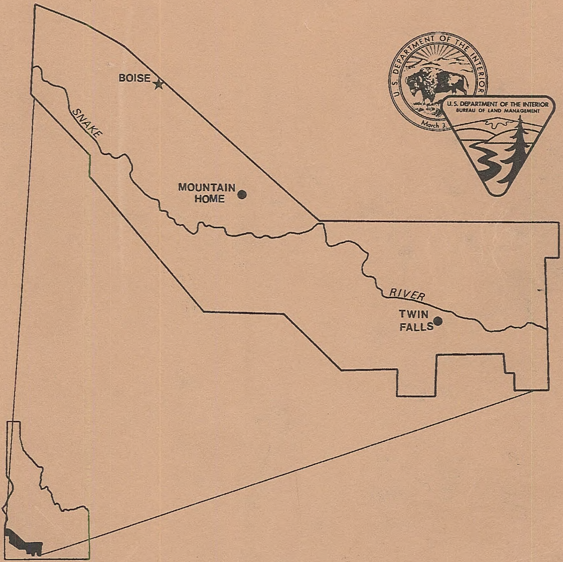
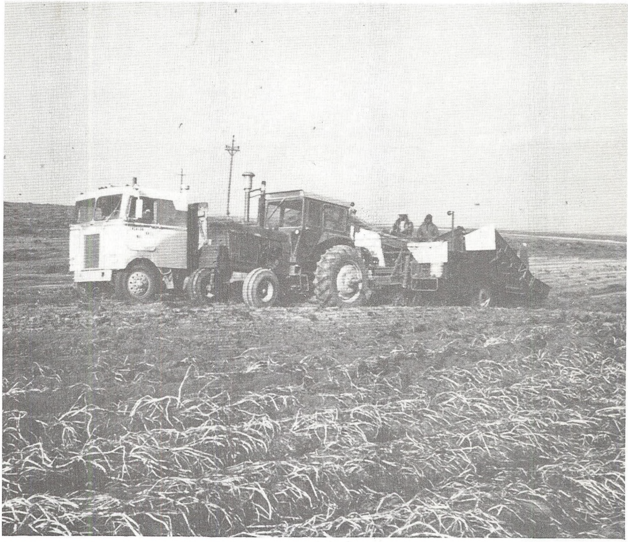
Environmental Analysis Record for the Agricultural Development Program



Lower Snake River Plains of Idaho

U.S. DEPARTMENT OF THE INTERIOR BUREAU OF LAND MANAGEMENT IDAHO STATE OFFICE

JANUARY 1976



The area adjacent to the Snake River is highly productive. Large yields of potatoes are grown the first several years. After this, the lands are used to raise sugar beets, grain, and alfalfa.

SUMMARY

Environmental Analysis Record

Department of the Interior, Bureau of Land Management, Idaho State Office

1. Type of action: (x) Administrative ( ) Legislative

2. Brief description of the action:

   The proposed action would allow for the agricultural development of about 300,000 acres of National Resource Lands administered by the Bureau of Land Management. This record analyzes the anticipated environmental impacts of such a proposal on the living and non-living components of the environment. It also analyzes the anticipated impacts upon the social and economic segments of the people and communities involved at this time. It is intended that under the proposed action approximately 20,000 acres of suitable land can be converted to agricultural development each year with the present limitation on manpower and funds.

3. Summary of environmental impacts and adverse environmental effects:

   Substantial environmental impacts associated with the better irrigable soils have already taken place during the past ten years in the selected areas shown in red on Figure 30. Large water pumping stations located on the Snake River have influenced the environment as water is lifted 300-400 feet above the river and transported over ten miles by pipelines and canals to new agricultural lands. New road construction, transmission, distribution and telephone lines, commercial facilities, buildings and other associated uses have affected the selected area. Also, some archeological, historical, recreational, wildlife and fishery habitat areas have already been impacted in the selected area. Additional agricultural development in the selected area will have minimal impacts on the environment because of the intrusions in existence there now. If agricultural development is proposed in areas outside of the selected areas shown in red on Figure 30 significant adverse impacts will result on National Resource Lands. Additional impacts and effects are summarized as follows:

   a. State, county, and local governments will realize an increased tax revenue from a conversion of land out of public and into private ownership. Local communities should experience an economic boost from the influx of new people and businesses.

   b. New agricultural development will increase the farm products available to consumers and will influence the agricultural market of the area and region.

c. This proposal will require the allocation of large quantities of capital, labor, energy, and water. These will all have secondary effects upon the environment and the people involved.

d. Increased farming activity will modify and in some instances degrade the quality of the air and water in the area.

e. Conversion of native rangeland to agricultural development will eliminate numerous wildlife and vegetation species.

f. This proposed development will decrease the land base available for public use. This will have numerous secondary effects upon future uses and management decisions for the area involved.

4. Alternatives considered:

   a. Conversion of more lands

   b. Conversion of fewer lands

   c. Conversion under other land laws

      (1) Public Sale Law

      (2) Land Exchanges

      (3) State Lieu Selections

      (4) Reclamation Act

   d. No Action

5. List of entities from whom comments have been requested:

See Section VI of EAR

6. Summary of Findings

Agricultural development causes both beneficial and adverse impacts. Beneficial impacts are increased food production and an expanded economy. Major adverse impacts are decreased native wildlife populations, possible lowered air and water quality levels, increased demand for energy and water, loss of land base available for public uses, and loss of natural, archeological and historical areas.

Residual impact levels depend upon the resources present in a given area and applicability of available mitigating measures. This analysis indicates that within the study area two principal impact levels can be identified. These are categorized as areas of high potential or residual adverse impacts (high conflict) and low residual adverse impacts (low conflict).

7. Date made available to the public:

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ABBREVIATIONS

EAR	Environmental Analysis Record
BLM	Bureau of Land Management
NRL	Natural Resource Lands
DLE	Desert Land Entry
DLA	Desert Land Application
CA	Carey Act
BR	Bureau of Reclamation
TGA	Taylor Grazing Act
NEPA	National Environmental Policy Act
EIS	Environmental Impact Statement
SLUP	Special Land Use Permits
IDWR	Idaho Department of Water Resources
IWRB	Idaho Water Resource Board
IF&GD	Idaho Fish and Game Department
EPA	Environmental Protection Agency
USF&WS	United States Fish & Wildlife Service
FS	Forest Service
USGS	United States Geological Survey
SCS	Soil Conservation Service
BSF&W	Bureau of Sport Fisheries & Wildlife
FPC	Federal Power Commission
COE	Corps of Engineers
kwh	kilowatt hours
kw	kilowatt
whp	water horsepower
cfs	cubic feet per second
AF	acre feet
AUM	animal unit month

I. INTRODUCTION

A. Purpose of Environmental Analysis Record (EAR). The Bureau of Land Management (BLM) is responsible for managing National Resource Land (NRL) to attain widest range of beneficial uses of the environment without undue environmental degradation, risk to health or safety, or impairment of the long-term productivity of lands and resources. To meet this responsibility, an analysis is needed to assure that environmental values are adequately considered in day-to-day decisions regarding the conversion of NRL to intensive agricultural use. The specific purpose of this analysis is to:

1. Identify individual and cumulative impacts arising from agricultural development of NRL.

2. Assess public controversy over such agricultural development.

3. Provide a basis for determining whether or not an environmental impact statement is required.

4. Provide guidance for the management of the agricultural development program in Idaho.

B. General Description

1. Location. The study area is located in southwestern Idaho and extends westerly from Burley along the Snake River to the Oregon border. The width of the study area is generally from the Classification and Multiple Use line south of the Snake River to the foothills on the north side of the river. Figures 2 through 17 are keyed to Figure 1 with the name of each quadrangle map shown in the upper right or lower left corners.

2. General Characteristics. The study area includes all parts of Ada, Cassia, Canyon, Elmore, Gem, Gooding, Jerome, Lincoln, Minidoka, Owyhee, Payette and Twin Falls Counties. The topography is generally flat to rolling and hilly with some lava rock outcroppings scattered through the area. Elevation varies from approximately 2,200' near the western edge of the study area to about 4,500' at the eastern edge of the area. (See Figure 1.)

The total land area comprises about 4.5 million acres of which 2.9 million acres are NRL with the remaining 1.6 million acres in either state or private ownership.

Of the 770,000 residents of Idaho, nearly 40% or 300,000 people live within the study area. The rivers which are vital for the intensive agricultural development found in this area include the Snake, Salmon Falls, Malad, Bruneau and Boise.

Although agricultural development occurs throughout southern and eastern Idaho, the EAR will be limited to this area because:

1. This area contains about 80% of the Desert Land Entry (DLE) application activity in the state;

2. Unique resource values are found here (Birds of Prey Natural Area, archeological sites, pioneer and historical sites, scenic and recreational resource values);

3. Water is currently available (surface and ground);

4. This area is better suited to agricultural development than the rest of the state because of soils, climate, elevation and topography.

C. Background

1. Brief Discussion of Desert Land Act (DLA). The DLA was preceded by more than a century in which disposal and management of the public land was a major public issue. Earlier land policies such as sales for cash or credit, grants to railroads and other corporations, guarantee of preemption rights in 1841, and grants to states had disposed of nearly one-half of the public land by 1862. Westward movement of land settlement had reached into Missouri, Iowa, Nebraska and scattered places beyond by this time. Other land disposal laws were used to stimulate development of the remaining land. These laws, which were suitable to the humid and semi-humid areas of the Midwest, proved to be inadequate for the arid regions of the West.

The DLA was passed in 1877. This new Act provides for the sale of a section (640 acres) of land to a settler who would irrigate part of it within 3 years after filing. He would pay 25¢ an acre at the time of filing and $1 an acre at the time of making final proof of compliance with the law. Provisions of the Act applied only to the 11 Western states.

The DLA was immediately subjected to criticism by the Land Commissioner, the Secretary of the Interior and many others.[1] The Act was so indefinite that it invited speculators to secure large holdings. Cattle companies were able to get large acreages by having each of their cowhands file entries. Often only a pretense was made at developing irrigation. Many irrigation systems consisted merely of a ditch running from a usually dry water hole, up a hill and out onto the land. Much of the land acquired in this manner was used as range, not as cropland. Under the original Act, land could be used for 3 years for the 25¢ down payment and then sold or assigned.

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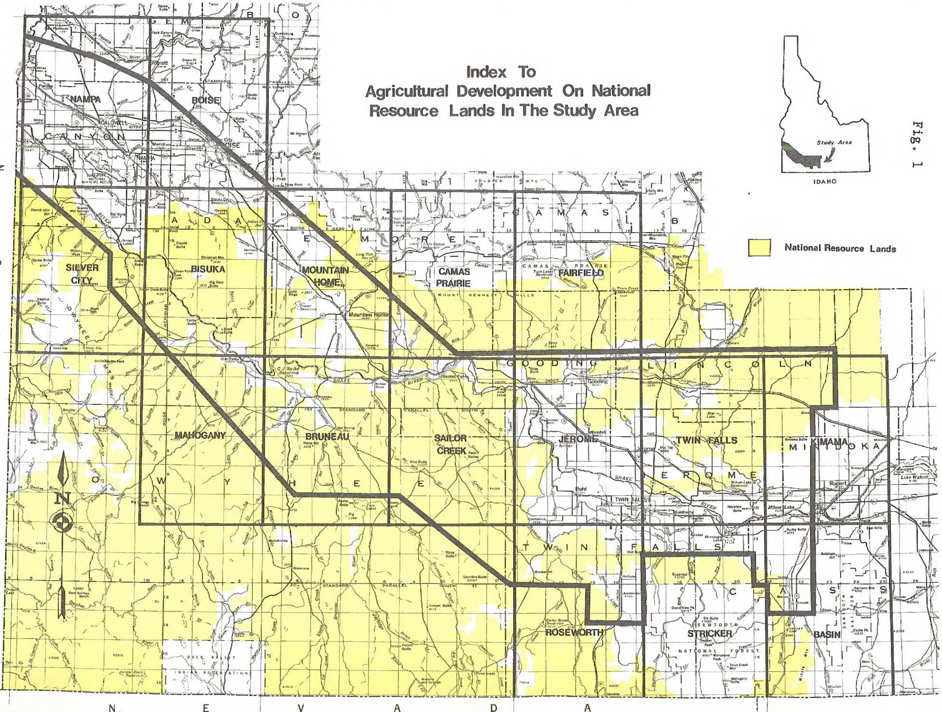
[1]Roy M. Robins, Our Landed Heritage, Princeton University Press, 1942, Princeton, New Jersey.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Study Area
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BOISE
CANYON
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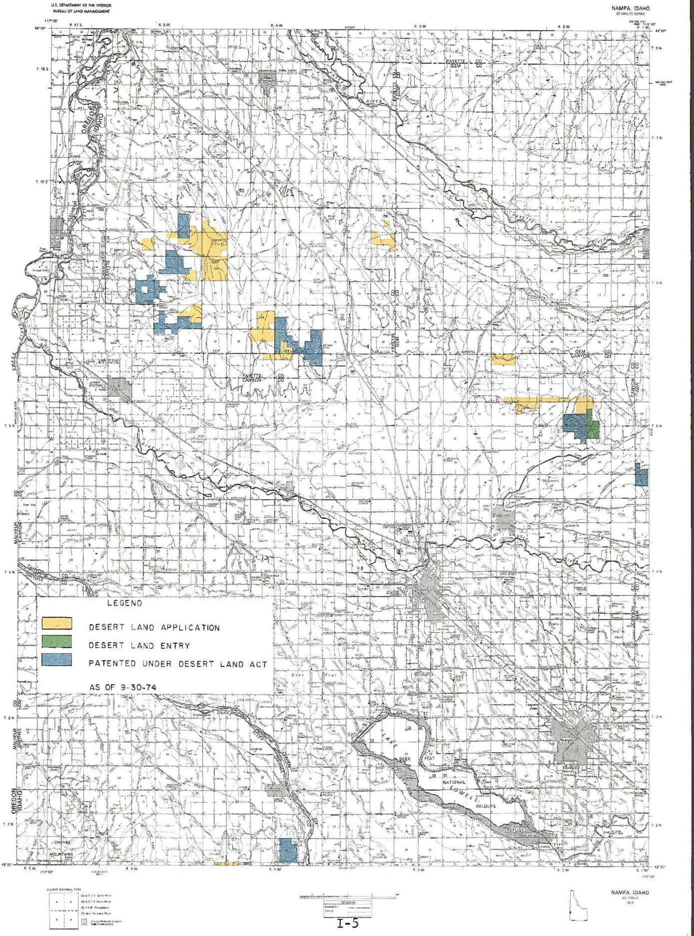
BISUKA
MOUNTAIN HOME
CAMAS PRAIRIE
FAIRFIELD
MAHOGANY
BRUNEAU
SAILOR CREEK
JEROME
TWIN FALLS
KIMAMA
MINIDOKA
ROSEWORTH
STRICKER
BASIN
ADA
ELMORE
CAMAS
GOODING
LINCOLN
OWYHEE
CASSIA
OREGON
NEVADA

Fig. 1

Fig. 2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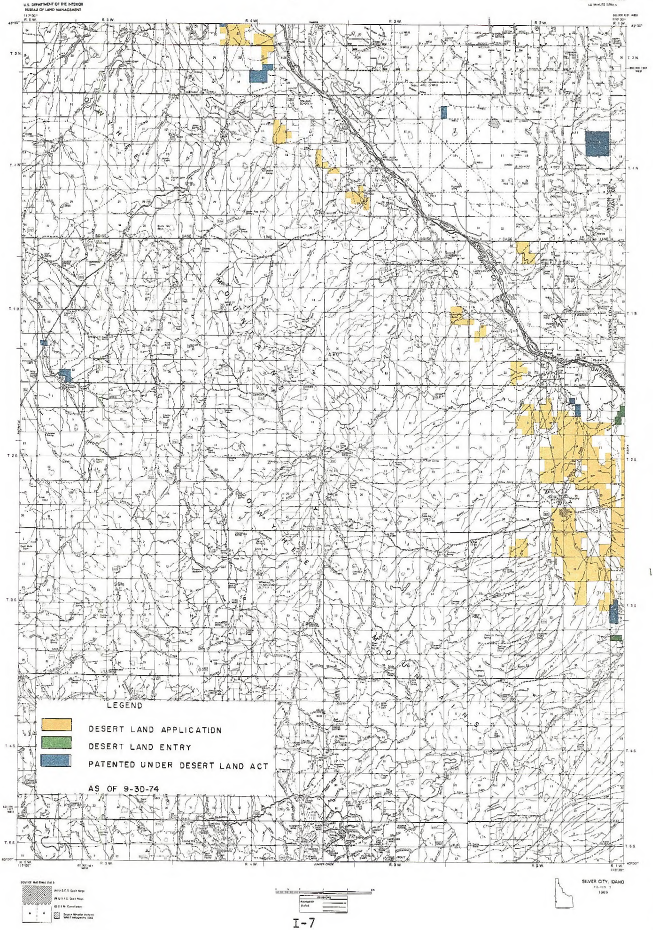
BUREAU OF LAND MANAGEMENT
NAMPA, IDAHO
LEGEND
DESERT LAND APPLICATION
DESERT LAND ENTRY
PATENTED UNDER DESERT LAND ACT
AS OF 9-30-74
OREGON
IDAHO
PAYETTE CO
GEM CO
CANYON CO
ADA CO
MALHEUR
OWYHEE
DEER FLAT NATIONAL WILDLIFE REFUGE
LAKE LOWELL
NAMPA, IDAHO

Fig. 3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SILVER CITY, IDAHO
LEGEND
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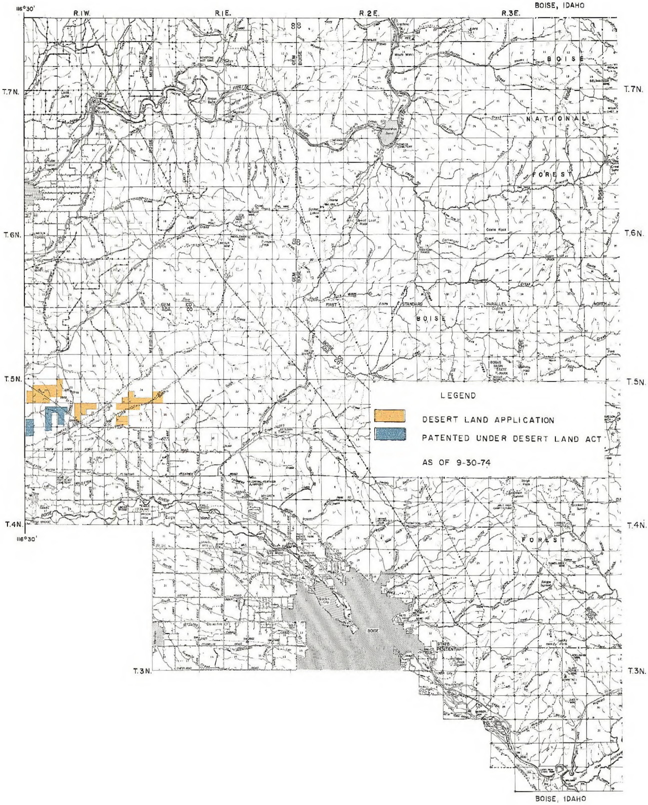
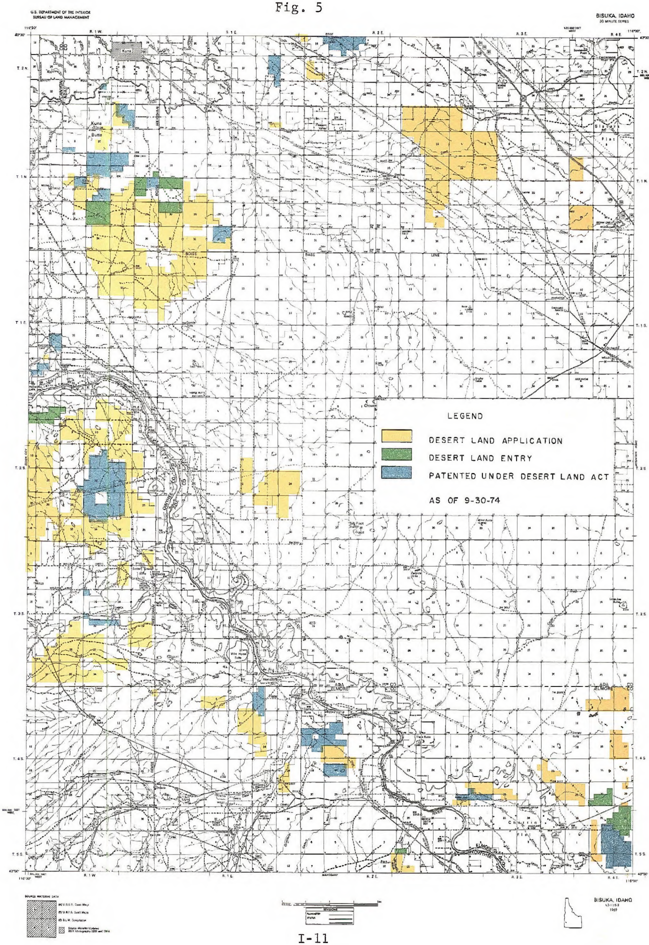
DESERT LAND ENTRY
PATENTED UNDER DESERT LAND ACT
AS OF 9-30-74
OWYHEE MOUNTAINS
BOISE BASE LINE
CANYON CO.
OWYHEE CO.
ADA CO.
SILVER CITY, IDAHO

Fig. 4



BOISE, IDAHO
R.1W.
R.1E.
R.2E.
R.3E.
T.7N.
T.6N.
T.5N.
T.4N.
T.3N.
116°30'
LEGEND
DESERT LAND APPLICATION
PATENTED UNDER DESERT LAND ACT
AS OF 9-30-74
BOISE NATIONAL FOREST

Fig. 5



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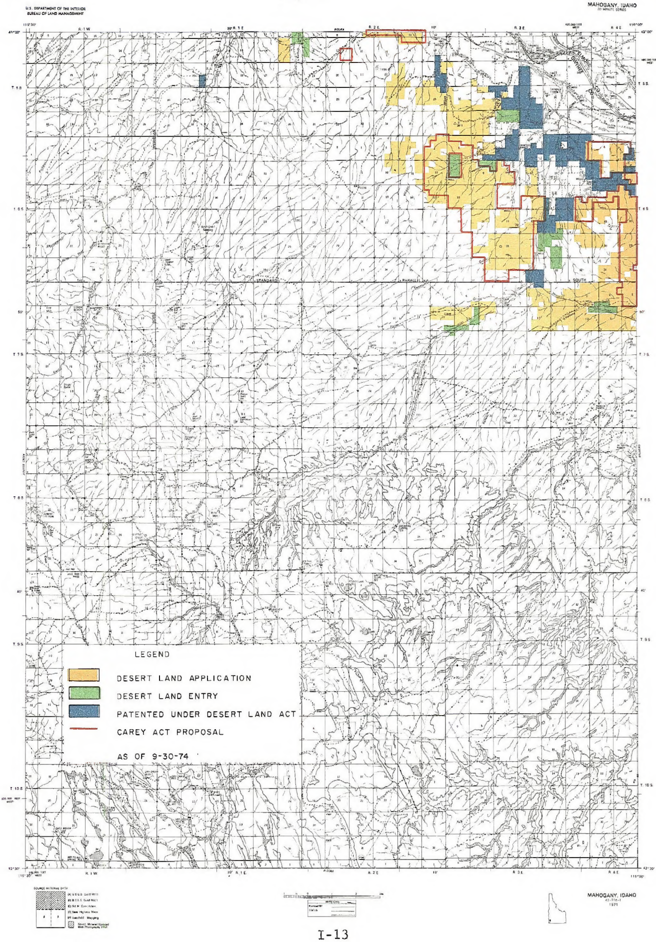
BUREAU OF LAND MANAGEMENT
BISUKA, IDAHO
30 MINUTE SERIES
LEGEND
DESERT LAND APPLICATION
DESERT LAND ENTRY
PATENTED UNDER DESERT LAND ACT
AS OF 9-30-74
Kuna
Kuna Butte
BOISE
BASE
LINE
ONYHEE CO
ADA
ELMORE
Hendersons Flats
SNAKE RIVER
Orchard
Slaters Flat
MERIDIAN
R. 1 W.
R. 1 E.
R. 2 E.
R. 3 E.
R. 4 E.
T. 2 N.
T. 1 N.
T. 1 S.
T. 2 S.
T. 3 S.
T. 4 S.
T. 5 S.
BISUKA, IDAHO

Fig. 6



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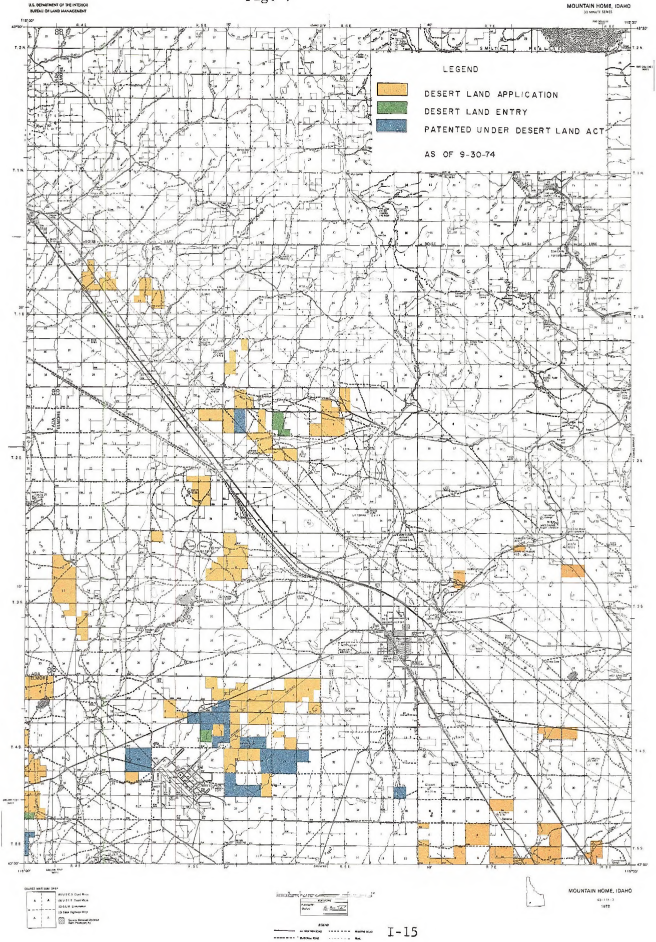
BUREAU OF LAND MANAGEMENT
MAHOGANY, IDAHO
LEGEND
DESERT LAND APPLICATION
DESERT LAND ENTRY
PATENTED UNDER DESERT LAND ACT
CAREY ACT PROPOSAL
AS OF 9-30-74
MAHOGANY, IDAHO

Fig. 7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BUREAU OF LAND MANAGEMENT
MOUNTAIN HOME, IDAHO
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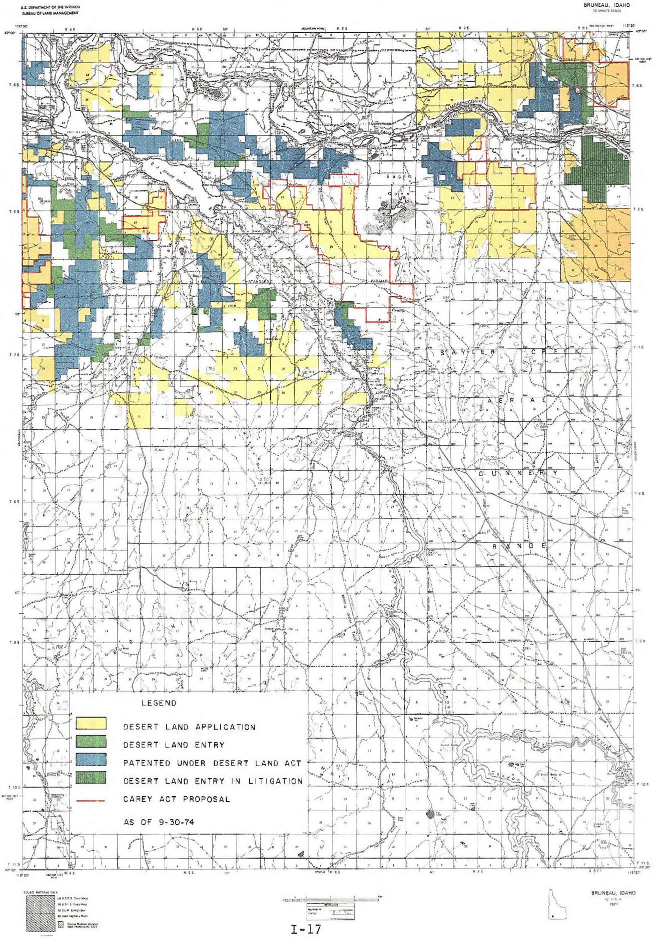
AS OF 9-30-74
MOUNTAIN HOME, IDAHO
1972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BRUNEAU, IDAHO
30 MINUTE SERIES
LEGEND
DESERT LAND APPLICATION
DESERT LAND ENTRY
PATENTED UNDER DESERT LAND ACT
DESERT LAND ENTRY IN LITIGATION
CAREY ACT PROPOSAL
AS OF 9-30-74
C. J. STRIKE RESERVOIR
SNAKE RIVER
ELMORE CO.
OWYHEE CO.
SAYLER CREEK
AERIAL
GUNNERY
RANGE
BRUNEAU, IDAHO

Fig. 9

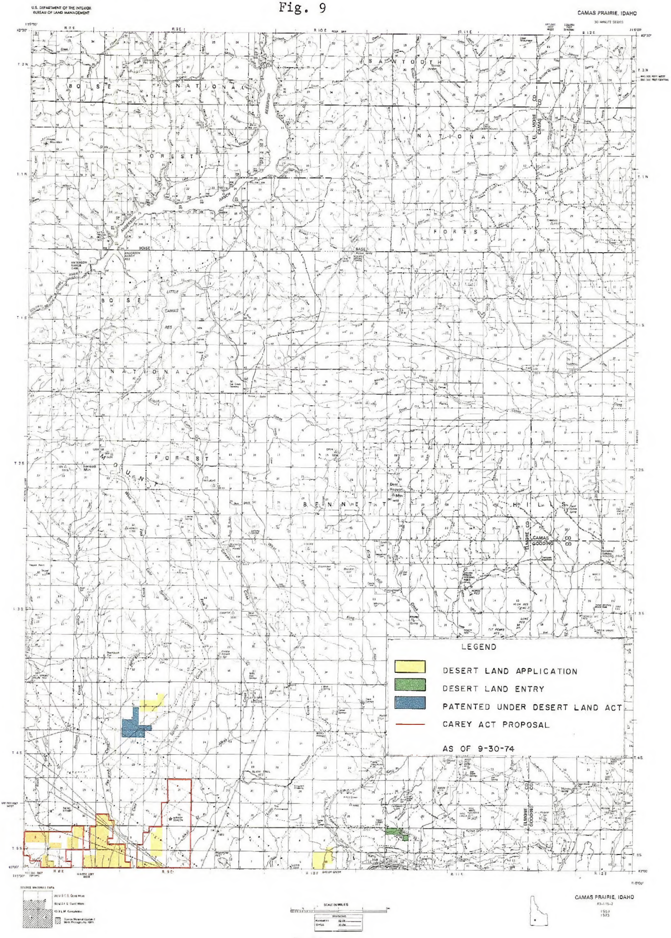
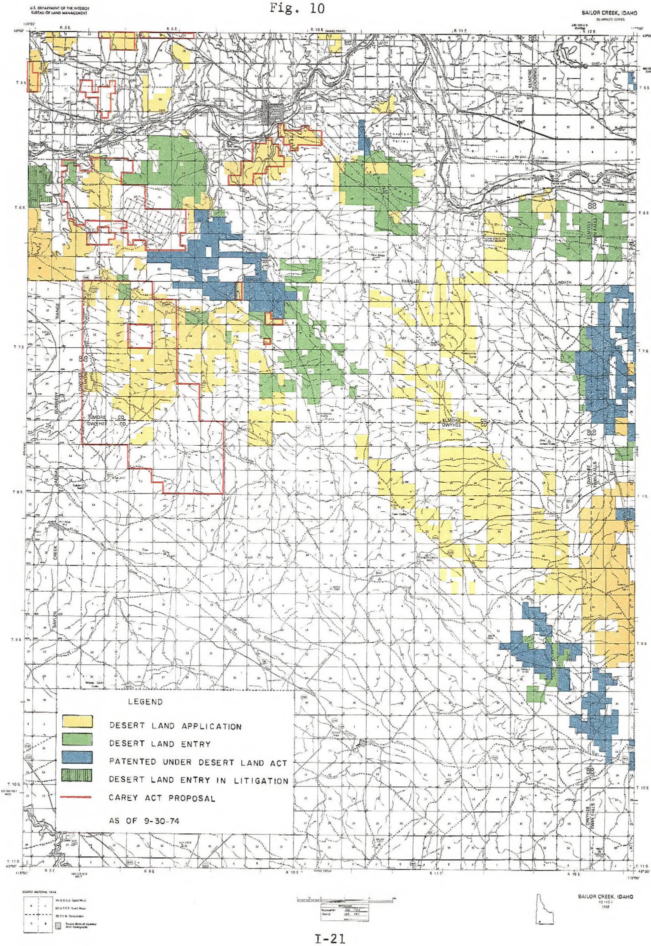

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
CAMAS PRAIRIE, IDAHO
30 MINUTE SERIES
BOISE NATIONAL FOREST
SAWTOOTH NATIONAL FOREST
ANDERSON RANCH RES
LITTLE CAMAS RES
MOUNT BENNETT HILLS
ELMORE CO
CAMAS CO
GOODING CO
LEGEND
DESERT LAND APPLICATION
DESERT LAND ENTRY
PATENTED UNDER DESERT LAND ACT
CAREY ACT PROPOSAL
AS OF 9-30-74
CAMAS PRAIRIE, IDAHO

Fig. 10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SAILOR CREEK, IDAHO
30 MINUTE SERIES
LEGEND
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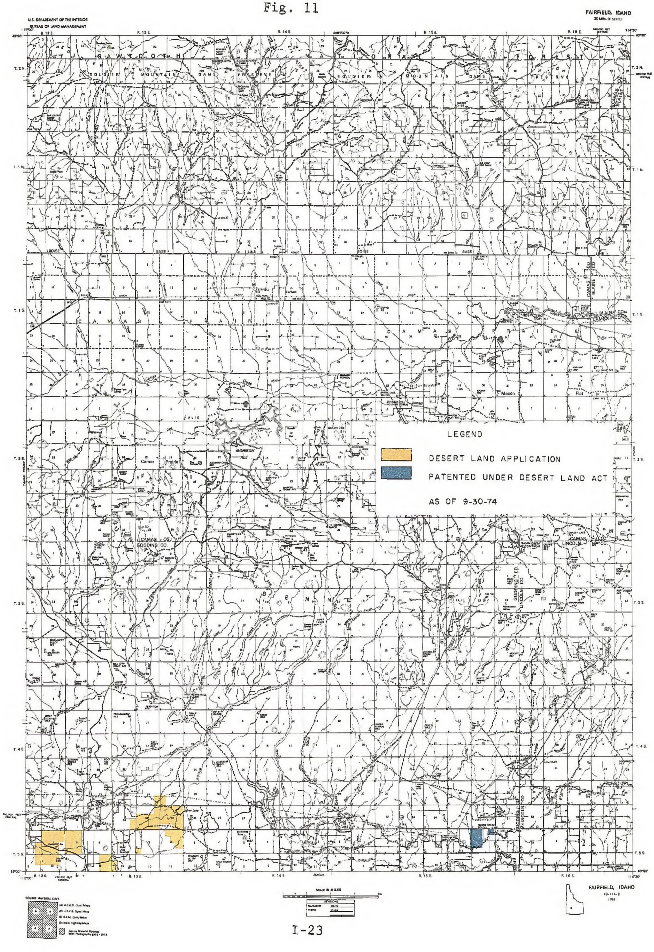
PATENTED UNDER DESERT LAND ACT
DESERT LAND ENTRY IN LITIGATION
CAREY ACT PROPOSAL
AS OF 9-30-74
ELMORE CO
OWYHEE CO
GOODING CO
TWIN FALLS CO
SAILOR CREEK, IDAHO

Fig. 11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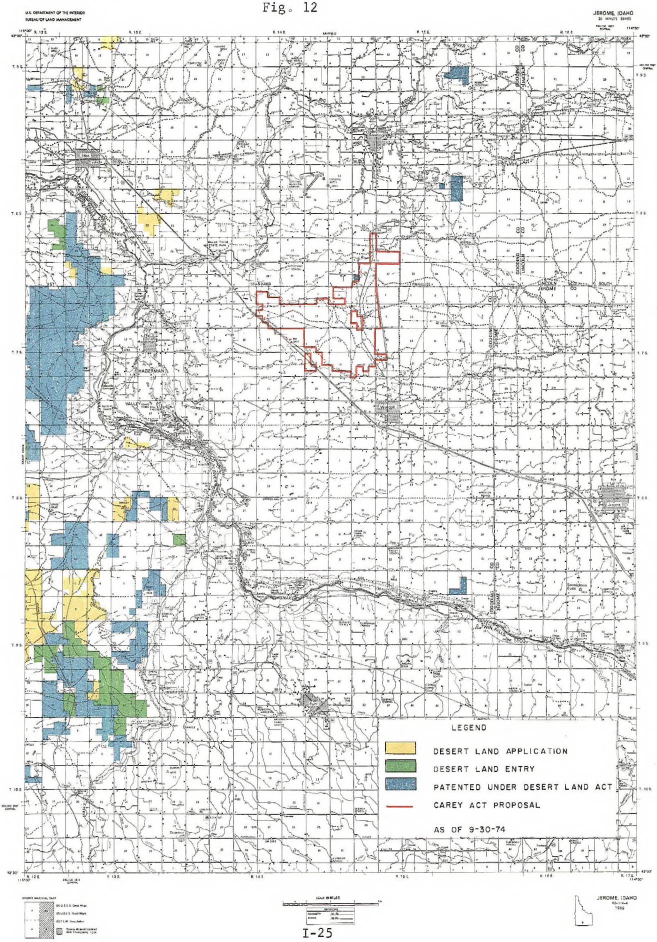
FAIRFIELD, IDAHO
30 MINUTE SERIES
SAWTOOTH NATIONAL FOREST
SOLDIER MTNS MOUNTAIN GAME PRESERVE
SOLDIER MOUNTAIN GAME PRESERVE
CAMAS PRAIRIE
BENNETT
MORMON RES
Camas
Prairie
Fairfield
Macon
Flat
CAMAS CO.
GOODING CO.
BLAINE CO.
LINCOLN CO.
LEGEND
DESERT LAND APPLICATION
PATENTED UNDER DESERT LAND ACT
AS OF 9-30-74
T. 2 N.
T. 1 N.
T. 1 S.
T. 2 S.
T. 3 S.
T. 4 S.
T. 5 S.
R. 12 E.
R. 13 E.
R. 14 E.
R. 15 E.
R. 16 E.
SCALE IN MILES
FAIRFIELD, IDAHO

Fig. 12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LEGEND
DESERT LAND APPLICATION
DESERT LAND ENTRY
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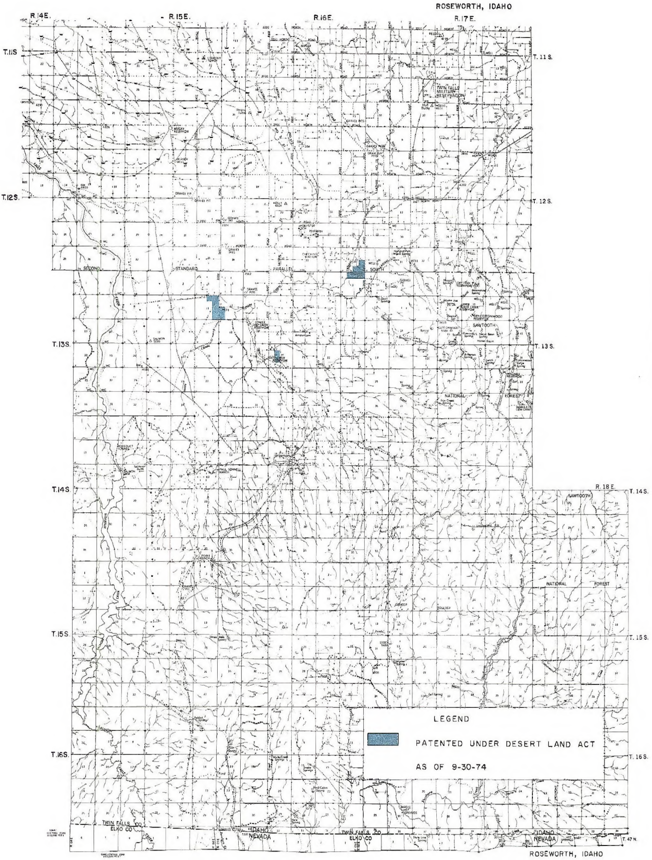
CAREY ACT PROPOSAL
AS OF 9-30-74
HAGERMAN
JEROME, IDAHO

Fig. 13


ROSEWORTH, IDAHO
R.14E.
R.15E.
R.16E.
R.17E.
R.18E.
T.11S.
T.12S.
T.13S.
T.14S.
T.15S.
T.16S.
T.47N.
TWIN FALLS MILITARY RESERVATION
SECOND STANDARD PARALLEL SOUTH
SAWTOOTH NATIONAL FOREST
TWIN FALLS CO
ELKO CO
IDAHO
NEVADA
LEGEND
PATENTED UNDER DESERT LAND ACT
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ROSEWORTH, IDAHO

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BUREAU OF LAND MANAGEMENT

Fig. 14

TWIN FALLS IDAHO

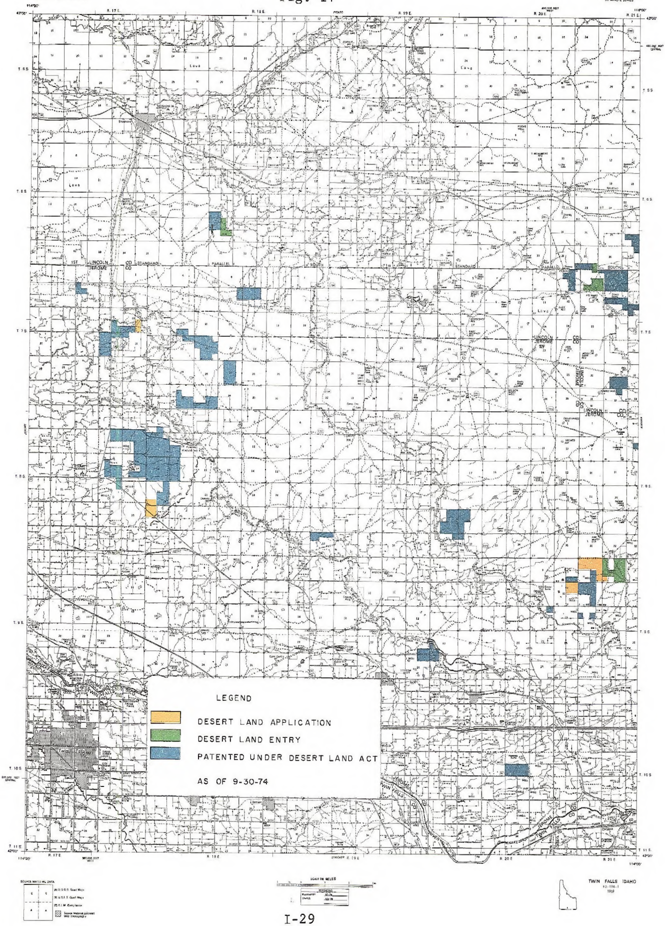
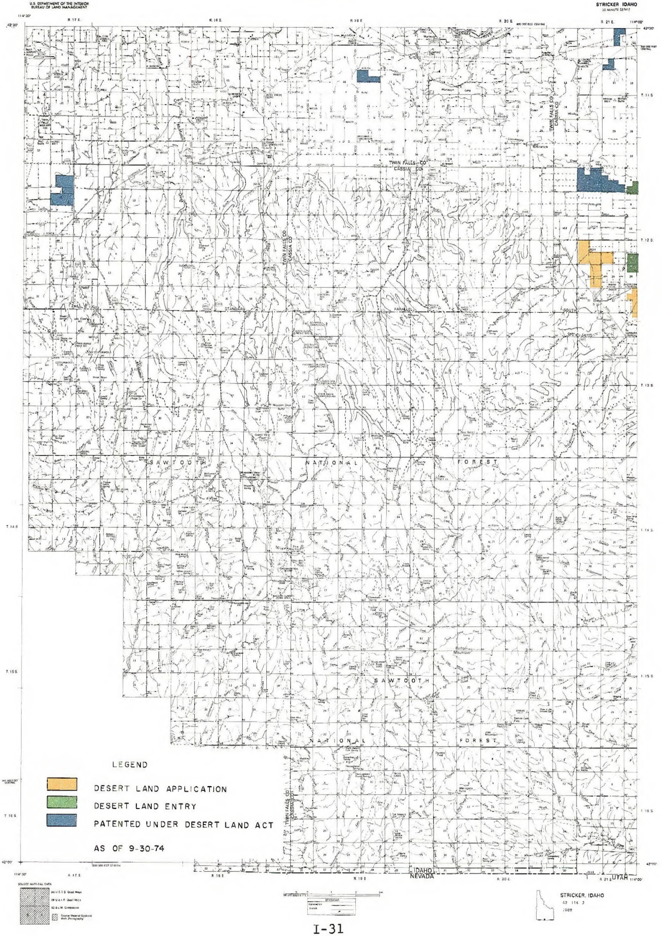


Fig. 15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BUREAU OF LAND MANAGEMENT
STRICKER IDAHO
30 MINUTE SERIES
TWIN FALLS CO
CASSIA CO
SAWTOOTH NATIONAL FOREST
IDAHO
NEVADA
UTAH
LEGEND
DESERT LAND APPLICATION
DESERT LAND ENTRY
PATENTED UNDER DESERT LAND ACT
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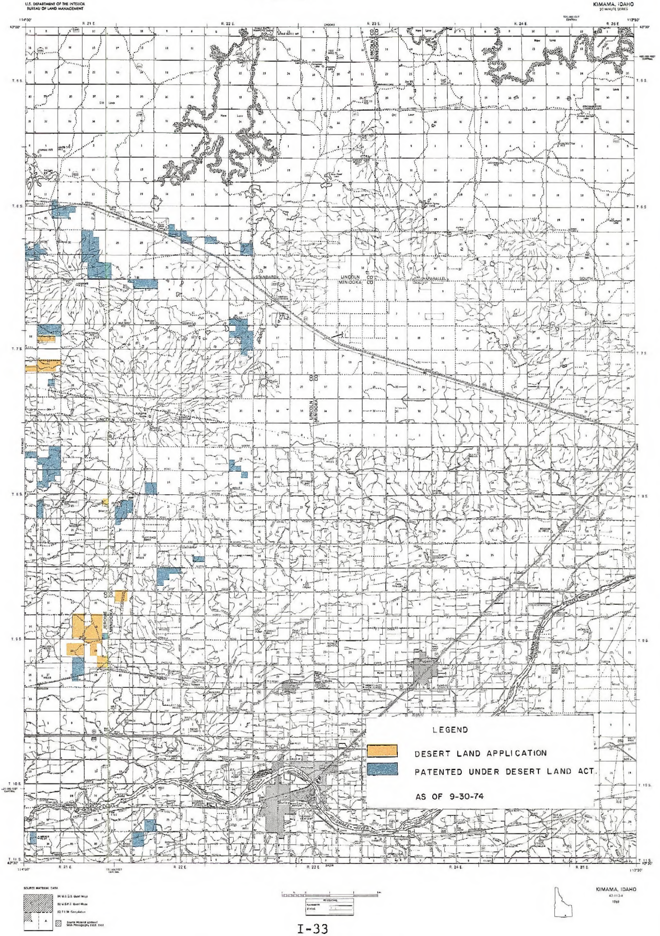
STRICKER, IDAHO

Fig. 16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KIMAMA, IDAHO
LEGEND
DESERT LAND APPLICATION
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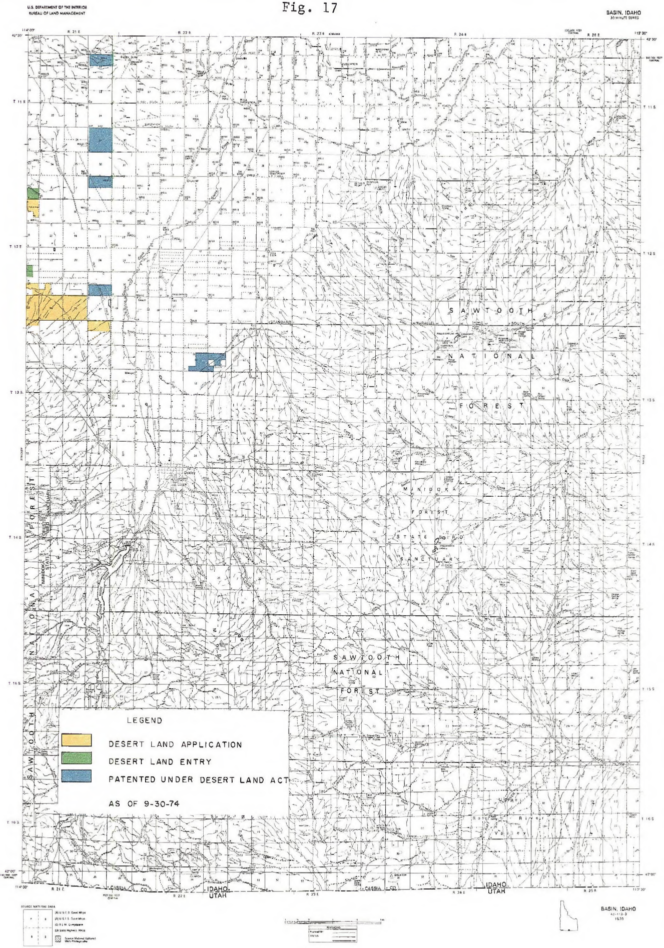
AS OF 9-30-74
SNAKE RIVER
LINCOLN CO
MINIDOKA CO
KIMAMA, IDAHO
1969

Fig. 17


U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
BASIN, IDAHO
30 MINUTE SERIES
SAWTOOTH NATIONAL FOREST
MINIDOKA FOREST STATE BIRD SANCTUARY
Oakley
IDAHO
UTAH
CASSIA CO
LEGEND
DESERT LAND APPLICATION
DESERT LAND ENTRY
PATENTED UNDER DESERT LAND ACT
AS OF 9-30-74
BASIN, IDAHO

The State Surveyor General for Idaho was one of the first to see the desert entry method was inadequate. In a report in 1889 he stated that it was folly to allow private parties to file on land and appropriate water almost indiscriminately.

He also indicated that it would be better to allow development by the government or the land should be granted to the states in order to assure comprehensive development of all of the lands suited for irrigation.[2] Other state land commissioners reported that the Act was not primarily working in the interest of the homesteader.[3]

Congress acted in 1891 to correct many of the faults that had come to light from the operation of the leading acts by which public land could be obtained by citizens. The preemption laws were repealed, the President was allowed to set aside National Parks, and the Homestead Act and DLA were amended in several respects. The DLA was amended as follows:

a. One person could now enter on 320 acres instead of 640 acres.

b. Improvements costing at least $1 per acre had to be made each year for 3 years.

c. Water had to be available for the total amount of irrigable land and 1/8 of it had to be put under cultivation for final proof.

d. Several persons could join together in a project for the watering of several entries.

e. Only residents of the state in which the land was situated were allowed the privilege of entry except in Nevada.

Other major provisions of the DLA which are still in effect today are:

a. Land that may be entered is limited to surveyed, vacant, unreserved, unappropriated desert land except that lands segregated by classification or contained in grazing districts can be opened for entry only at the discretion of the Secretary of the Interior. If the land is more valuable for the production of agricultural crops than for the production of native grasses and forage plants, it may be opened for entry.[4]

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[2] B. J. Hibbard, History of Public Land Policies, Peter Smith, 1939, New York, p. 430.

[3] Ibid, p. 429.

[4] Section 7, Taylor Grazing Act of 1934 (48 U.S. Stat. 1269: 43 U.S.C. 315, 315a-315r).

b. Only one tract is allowed per person and it must be in compact form, or if non-contiguous, it is shown to be economically feasible to develop.

c. The applicant shall have acquired or shall have taken all reasonable steps to acquire a bona fide water right based on the statutes of the state.

d. An irrigation plan must be filed with the application showing the proposed layout of the irrigation system, and evidence of an adequate supply of water must be presented.

e. Final proof, subject to extension for certain causes, is to be filed within 4 years after the entry is allowed.

2. Brief Discussion of Carey Act (CA). The CA was passed to encourage reclamation and settlement of lands located some distance from streams and other sources of water. The Act was passed August 18, 1894, and at the time of its passage the homestead and desert land laws had been in force for several years and a large portion of the desirable lands which could be reclaimed at moderate expense had been entered and patented under those laws. The average settler could not secure necessary funds to construct the expensive works necessary to reclaim the remaining desert lands which were less accessible to water. It was thought with the passage of the CA that the states themselves, through large companies, could get the necessary irrigation facilities constructed so that the lands could be reclaimed and settled.

Under the Act the 11 Western states were granted 1 million acres each to be developed under the Act. The land is to be disposed of by the state only to actual settlers in tracts of not more than 160 acres in each entry. The lands so designated are required to be desert lands as defined by the DLA of March 3, 1877. A Joint Resolution of the House and Senate approved in 1908 granted the State of Idaho an additional 1 million acres. The Act of May 27, 1908 (35 Stat. 347) approved the grant of the additional 1 million acres to the State of Idaho. The May 27, 1908 Act of Congress superseded the Joint Resolution approved May 25 of that year because the Resolution included only Idaho. The legislative history indicates that the May 25 Resolution was superseded in order to allocate an additional million acres to the State of Wyoming. Because of this Resolution, there has been confusion as to whether or not the State of Idaho has a potential allocation of 2 million acres or 3 million acres. The legislative history indicates that the 2 million-acre figure is correct. However, the question is moot since water is the limiting factor.

In 1910 the CA was amended to authorize the Secretary, upon application by a state, to temporarily withdraw for 1 year land which a state may want to select. This temporary withdrawal is to enable the state to examine the lands and plan a method of irrigating. The lands are to be restored at the end of 1 year if not applied for before that time. No extensions can be granted.

In 1911 the CA was amended to permit the sale of surplus water by the Bureau of Reclamation (BR) for use on CA lands.

A 1920 amendment to the CA relates to preference rights of state CA entrymen upon lands restored to NRL status from CA segregations.

Where there are CA entries on lands being restored from the CA, the entrymen have a preference right of entry for 90 days under other applicable land laws.

In 1921 the CA was amended by limiting the time within which the work of reclamation must be commenced. Actual construction of reclamation works must be commenced within 3 years after segregation or within an extended time not exceeding more than 3 years. If construction is not started within that period of time, BLM may restore the lands to NRL status. States are allowed 10 years from date of segregation in which to irrigate and reclaim the lands.

A 1901 amendment authorized extensions of the segregation period for, but not to exceed, an additional 5 years. At the close of the 10-year period, or extended period, BLM may restore to NRL any lands not irrigated or reclaimed. The lands, when patented, are disposed of by the states to actual settlers.

In 1896 the CA was amended to authorize the states to create liens on NRL for the costs of construction of irrigation works and to permit the government to issue patent without actual cultivation of the land.

A 1954 amendment provided for issuance of quitclaim deeds to the states involving lands segregated as of the day of the Act. Under this Act, the Secretary was to issue quitclaim deeds for all lands patented and also issue patents to all unpatented, segregated public lands for which the state had issued final certificates prior to June 1, 1953. Prior to the Act of August 13, 1954, there was no relief to a state which had received patent to CA lands and upon which the required irrigation and reclamation had not taken place. Because of the "trust status" of the lands, a state could not transfer or give clear title where this situation existed. Under such circumstances reconveyances of the land to the United States have been made. (The special relief afforded the states under the 1954 Act required applications to be filed before August 13, 1957.) Wyoming was the only state to take advantage of this Act. As to Wyoming, no further activity in connection with the patented CA lands is involved because under the terms of the Act the state quitclaimed all its right, title and interest to any and all other lands under the CA. As for Idaho and the other states, there may be from time to time reconveyances of patented lands to the United States. In order for the transfer to be complete, there must be an acceptance by the United States.

Mineral lands are not subject to selection under the CA.

The Act, as amended, requests that the state shall file with the BLM a map in duplicate on linen tracing, of a scale not greater than 1,000' per inch, showing the following:

a. the selected land,

b. the mode of contemplated irrigation,

c. the source of water, and

d. that the project has engineering feasibility.

(NOTE: This showing is somewhat comparable to the plan of development now required of group developments under the DLA.)

BLM is required to:

a. judge the practicability of the irrigation proposal;

b. withhold other dispositions on the lands involved until the CA application has been processed;

c. pass judgment on and render approval of the map and proposed plan; and

d. classify the land as being suitable for disposal under the CA.

If it is not rejected by BLM, the selected lands will be subject to application under the other public land laws, after the segregative effect of the application has been lifted.

If the map and proposed plan is approved by BLM, a contract will be executed between the state and the federal government agreeing as to the conditions under which the lands will be developed and patented. Upon approval of the map and plan, the lands are reserved for process of the Act. The segregation date reverts to the time of filing the map and plan in the BLM State Office.

When patents are desired, the state should file a list of the lands in the BLM State Office.

A statement is required of the State Engineer that an ample water supply has actually been furnished each tract in the list sufficient to thoroughly irrigate and reclaim it.

Lists for patent are filed in the BLM State Office. A notice is then published once a week for 5 consecutive weeks in a local newspaper. Proof of publication is also required.

Lands embraced in pending applications filed by states under the Act of August 18, 1894 (28 Stat. 422; 43 U.S.C. 641), and described in accompanying maps and plans of irrigation; lands withdrawn under the Act of March 15, 1910 (36 Stat. 237; 43 U.S.C. 643); and lands covered by approved segregations under the Act of August 18, 1894 are not subject to settlement, application, entry, or other filings while reserved, withdrawn or segregated; and applications to file, select, or enter shall be rejected by the BLM.

Under state law there is an annual proof requirement that 1/16 of the land be cultivated and irrigation facilities constructed. At the end of the second year, 1/8 of the land is to be cultivated and the irrigation facilities constructed. Final proof is required within 3 years with proof that 1/8 has been cultivated and irrigated.

As mentioned previously, the state was authorized 2 million acres under the Act--1 million in the original grant and an additional million authorized by the Act of May 27, 1908. BLM records reflect that 617,334 acres have been patented to the State of Idaho. This leaves approximately 1,382,666 acres on which the state could apply for segregation and development under the CA. However, as pointed out previously, water is the limiting factor.

More detailed information on the history and development of the CA in Idaho can be obtained from a report prepared during the summer of 1968 by Mikel H. Williams, a senior law student at the University of Idaho, and is available at the BLM State Office, Boise, Idaho. (See Appendix I.)

3. Brief Discussion of the Taylor Grazing Act (TGA) (Section 7). The TGA of June 28, 1934, with amendments to May 1, 1967, is the basic legislative authority governing the management and protection of the NRL of the United States. Section 7 of the Act authorized the Secretary of the Interior, at his discretion, to examine and classify any lands, withdrawn or reserved by Executive Order 6910 of November 26, 1934, and amendments thereto, and Executive Order 6964 of February 5, 1935, or within a grazing district, which are more valuable or suitable for the production of agricultural crops than for the production of native grasses and forage plants, or more valuable or suitable for any other use than for the use provided for under this Act, or proper for acquisition in satisfaction of any outstanding lieu, exchange or script rights or land grant, and to open such lands to entry, selection or location for disposal in accordance with such classification under applicable public land laws, except that homestead entries shall not be allowed for tracts exceeding 320 acres in area.

Such lands shall not be subject to disposition, settlement or occupation until after the same have been classified and opened to entry; provided that locations and entries under the mining laws, including the Act of February 25, 1920, as amended, may be made upon such withdrawn and reserved areas without regard to classification and without restrictions or limitations by any provision of this Act. Where such lands are located within grazing districts, reasonable notice shall be given by the Secretary of the Interior to any grazing permittee of such lands.

The applicant, after his entry, selection or location is allowed, shall be entitled to the possession and use of such lands; provided that upon application of any applicant qualified to make entry, selection or location under the public land laws filed in the Land Office of the proper district, the Secretary of the Interior shall entitle the applicant to a preference right to enter, select or locate such lands if opened to entry or herein provided. (43 U.S.C., Sec. 315f.)

4. Brief Discussion of the National Environmental Policy Act (NEPA). The NEPA became law on January 1, 1970. It has been stated that NEPA has become, "the major statutory lever for environmental quality in Federal Government actions."[5] This is because it imposes a broad responsibility on federal agencies to take environmental values into account in their planning and decision making.

The purposes of this Act are to declare a national policy which will encourage productive and enjoyable harmony between man and his environment, to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man, to enrich the understanding of the ecological systems and natural resources important to the nation, and to establish a Council on Environmental Quality. It is the continuing policy of the federal government, in cooperation with state and local governments and concerned public and private organizations, to use all practicable means and measures to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic and other requirements of present and future generations of Americans.

The national goals listed in the Act are:

a. To fulfill the responsibilities of each generation of Americans as trustee of the environment for future generations.

b. To assure safe, healthful, productive and esthetically and culturally pleasing surroundings for all Americans.

c. To attain the widest range of beneficial uses of the environment without degredation, risk to health or safety or other undesirable or unintended consequences.

d. To preserve important historic, cultural and natural aspects of our national heritage, and to maintain wherever possible an environment which supports diversity and variety of individual choice.

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[5]Council on Environmental Qualtiy, 2nd Annual Report, p. 158 (1971).

e. To achieve a balance between population and resource use which will permit a high standard of living and a wide sharing of amenities.

f. To enhance the quality of renewable resources and to approach the maximum attainable recycling of depletable resources.

NEPA specifically directs that all federal agencies must:

a. After consultation with and comment from other state and federal agencies, prepare a detailed Environmental Impact Statement (EIS) on any major federal action having a significant effect on the quality of the human environment.

b. Study, develop and describe appropriate alternatives to the recommended course of action whenever there are known unresolved conflicts over competing and incompatible uses of land, air or water resources.

c. Make available to states, counties, municipalities, institutions and individuals advice and information useful in restoring, maintaining and enhancing the quality of the environment.

d. Consider the policies and goals of this Act to be supplementary to those set forth in existing authorizations.

5. Brief Discussion of Cultural Resources Laws. "The Advisory Council on Historic Preservation Procedures for the Protection of Historic and Cultural Properties, 36 CFR 800," (published in the Federal Register, Vol. 39, No. 18, January 25, 1975) issued in accordance with the National Historic Preservation Act of 1966 and Executive Order 11593, require that at the earliest state of planning or consideration of any federal or federally assisted project, and in all cases prior to agency decision concerning an undertaking, all properties within the area to be affected that are included on or eligible for the National Register are to be identified and the effect of the project upon them to be evaluated. Criteria of eligibility of sites for the National Register are stated in these procedures, and steps for dealing with projects which will have an effect on properties so eligible are provided.

II. DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

A. Proposed Action. The proposed action is the conversion of approximately 300,000 acres of NRL by the allowance of the pending DLA and CA applications and the development of the natural semidesert land to farm land via the DLA and the CA at the current rate of about 20,000 acres per year over the next 17½ years.

B. Alternatives to the Proposed Action. The following alternatives were identified during the analysis process:

1. Allow entries (conversion of NRL to agricultural use) at an accelerated rate--approximately 40,000 acres per year. Total area developed would amount to about 650,000 acres.

2. Allow conversion of NRL to agricultural production at a slower rate and allow fewer total acres to be developed. This alternative would allow about 5,000 to 10,000 acres per year for a total of 200,000 acres.

3. Conversion of NRL to agricultural land by means other than the DLA and CA; i.e., public sale, land exchange, state lieu selections and BR projects (withdrawal).

4. Allow no future agricultural development of NRL.

5. Temporarily suspend filing of new applications under the DLA and CA until BLM land use planning and state water use planning is complete. When such planning is complete, allow applications according to such plans. Applications currently on hand would be processed.

C. Procedures Under DLA and CA. The procedures and on-the-ground actions involved in this program to convert NRL to agricultural use are identified as follows:

1. Desert Land Act

a. Federal Action. From the time of initial filing to final proof, the BLM has certain procedures and requirements that must be met before an entryman can receive patent to the land under application.

(1) Classification. Section 7, TGA, provides discretionary classification authority to the Secretary of the Interior; his authority has been redelegated to field officials. The classification officer views the various resource values and environmental impacts and recommends the "highest and best use" of the land. A proposed decision is issued to interested parties recommending classification. If no protests are received within 30 days, an "Initial Decision" is issued classifying the land. Again, a 30-day protest period is permitted. Once

the land is classified and there is a suitable plan of development, the entry is allowed.

(2) Permits and Rights-of-Way. A Special Land Use Permit (SLUP) is issued if irrigation water is to be obtained from a well and the adequacy of the source is questionable. The permit is issued for 1 year and covers 5 acres embracing the well site. Rights-of-way applications are reviewed and may be granted for access across NRL by utility and construction companies for power lines, telephone lines, pipelines and canals.

(3) Annual Proof Statements. The BLM requires verification of expenditures of $1 an acre per year toward the development of the land. These statements, signed by witnesses, must include the nature and the value of the work done.

(4) Final Proof and Patent. "Intention to Make Proof" is submitted to the State Office when the entry is ready for patent, or by the end of 4 years. This intention is advertised in the local newspaper. BLM personnel field-examine the entry to determine if the requirements of the law have been met. If everything appears to be satisfactory to the District Manager, it is recommended to the State Director that proof be accepted and patent issued. The final step is a legal review by the Field Solicitor. The Field Solicitor also may be present at the district office when final proof testimony is given.

b. Entryman Action. In order to obtain NRL for agricultural purposes, an entryman must follow the rules and regulations and meet the requirements of the law for patent of the land.

(1) Locating Suitable Land. The interested party locates a tract of irrigable, surveyed land which will not, without irrigation, produce an agricultural crop. The land should be examined for soil and topography to ascertain what portion is of tillable quality and how the tract can best be served with irrigation water.

(2) Filing an Application. An application, filed in the State Office, must be accompanied with a map of the proposed plan of irrigation and supporting information as to a source of irrigation water. If a favorable decision for classification is issued by the BLM, and no protest is received by an interested group, a water permit is obtained from the Idaho Department of Water Resources (IDWR) and submitted to BLM. The application is then allowed.

(3) Proving up the Entry. From the start of the allowance date the entryman has 4 years in which to prove that he can successfully irrigate land. In this time utility companies must be contacted to furnish power and communication; construction companies must build water transportation systems; the land must be cleared of any native vegetation, fields leveled, plowed and ripped; and the selected

crops must be planted, irrigated and cultivated throughout the summer, and harvested in the fall. At the end of 4 years, an adequate water supply is developed and a distribution system must be constructed to serve all irrigable land within the entry, and at least 1/8 of the total entry must be put under actual cultivation.

(4) Annual Proofs. Each year for 3 years the entryman must submit evidence to BLM that an expenditure of not less than $1 per acre has been made toward improving the land. This is done by filing annual proof statements, signed by witnesses, as to the nature and the value of the work done.

(5) Obtaining Patent. When the entry is ready for patent or by the end of 4 years, the applicant files his "Intention to Make Proof." This lists the BLM Proof Taking Officer and the names of witnesses who will appear for the proof taking. The date is set and the advertising is paid for by the entryman. The entryman and witnesses appear before the Proof Taking Officer on the appointed date and complete the necessary forms. Final proof testimony is given to BLM district personnel. If everything appears satisfactory, it is recommended that proof be accepted and patent issued.

c. Other Associated Action. Other agencies and groups are essential in granting patent to an entryman. Each has a specific function depending upon the nature of the request by the entryman.

(1) Private Companies. The actions of these usually involve providing a special service to the entryman; i.e., public utility companies may furnish power and communication lines or construction companies may build water-transportation systems or roads. Whatever the nature of the work, any use of NRL must first be preceded by receiving a right-of-way from the BLM. This allows a company access onto NRL for the purpose described in the request.

(2) State of Idaho, Department of Water Resources (IDWR). After an application is received from the entryman for a water use permit, the Director of the IDWR reviews the application, making sure it includes (a) the intended beneficial use of the water, (b) source of the water, and (c) the amount of water needed (not to exceed 1 cfs per 50 acres of land unless shown to be necessary). At the time of application the entryman must submit proof that the land in the DLE application has been classified as suitable for entry, or file an application within 15 days after filing a water use permit. This 15-day limit tends to discourage persons from obtaining a water permit for mere speculative purposes.[1] The BLM and the IDWR have worked out an arrangement where DLE applications are accepted by BLM but allowance of the entry is suspended until proof of a valid water permit is obtained from the IDWR.

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[1]Bobby Fleenor, IDWR, Personal Conversation, March 26, 1975.

The IDWR issues permits upon receiving a "Letter of Classification" from BLM, noting that the subject land is suitable for agricultural development.[2] Before the permit is issued a legal notice of application is published in a local newspaper. This allows all interested parties to comment. Whatever the outcome, the applicant must be notified of the IDWR action.

If the application is approved the permit holder may proceed with the necessary construction and must submit proof of the application of the water to the beneficial use within the time specified by his permit. After an affidavit of proof of beneficial use is submitted, IDWR personnel inspect the development and a water right is issued if the conditions and limitations of the permit appear to have been satisfied.[3]

2. Carey Act

a. Federal Actions. The BLM, after receiving a request from the state for development of a CA project, must determine if such a request is proper. If so, NRL may be segregated to the state for purposes of the project.

At this point BLM is relieved of any supervisory authority over the project. It will, however, be involved in land use permits and access on NRL. If the irrigation water is to be obtained from ground water supplies, BLM will request a showing as to the availability of water. The applicant is offered a chance to obtain a SLUP. This permit is filed to cover 5 acres embracing the well site and is issued for a period of 1 year. However, since the CA was designed to assist projects involving those lands which do not have a readily available water supply, the water source may be from rivers in the area.

The transport of water from its source to the project will probably require a right-of-way permit across NRL issued by BLM. This will allow construction companies to build water transportation systems for use by the entrymen.

The BLM will also issue any rights-of-way requested by utility companies that will provide necessary services to the project.

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[2]Ibid.
[3]Water Users Handbook, IDWR, June 1973.

III. DESCRIPTION OF EXISTING ENVIRONMENT

A. Non-Living Components

1. Climate and Air

a. The Hydrologic Cycle. The annual average precipitation over the study area is approximately 10" per year.[1]

The major moisture source is from snowstorms in December, January and February. These storms originate off the northwest Pacific Coast and move inland where cold arctic air movements push the moisture southward and create seasonal snowfalls. The occurrence of snow at the low elevations found in the study is entirely dependent upon the movement of these arctic cold air masses. As a result of erratic rain and snowfall patterns the average annual precipitation varies from a low of 7" at Grandview to 10" at Mountain Home and Shoshone.

The summer months are characterized by warm, dry winds blowing generally from the west and southwest. When rain showers do occur they add very little to the crop needs. The months of June, July and August are usually dry and hot. Mean temperatures during these months are in the 70^{o} F. range with highs of over 100^{o} F. and lows in the 20^{o} F. range recorded. In the study area consumptive water uses for various crops, in addition to precipitation, range from 15" for small grains to 33" for alfalfa. There would, therefore, be no agriculture without irrigation.

b. Conditions and Trends. Mean maximum annual temperatures[2] throughout the area range from approximately 34^{o} F. to 40^{o} F. in January and 86^{o} F. to 96^{o} F. in July. Respectively, mean annual minimums range from 12^{o} F. to 20^{o} F. and 46^{o} F. to 56^{o} F. The number of frost-free days varies from 120 to 180 days.

There is no wind data for most of the area. Records at the Boise Municipal Airport, Mountain Home Air Force Base and the Ontario, Oregon Airport indicate southeasterly winds predominate in the winter and northwesterly winds in the summer.

Due to the pronounced influence of local topography on wind direction, however, even this general pattern may not hold true for any other given spot within the region.

On an annual basis the wind at the Boise Municipal Airport is from the east-southeast to south-southeast 38% of the time with an average

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[1] Ed Chaney, The Sagebrush-Grass Ecosystem, October 1974. A report to the BLM Boise District, Boise, Idaho.

[2] Idaho Water Resources Board, Interim State Water Plan Preliminary Report, July 1972.

speed of 10.4 mph. During another 34% of the time the wind is from the west-northwest with an average speed of 9.0 mph. Speeds of 25 mph or more occur less than 1% of the time.

At the Mountain Home Air Force Base winds are from the east-southeast 28% of time with an average speed of 9.5 mph. Winds are from the west-northwest 33% of the time with an average speed of 10.8 mph. Speeds of 25 mph or more occur less than 1% of the time.

Evapotranspiration from non-irrigated land is limited by the amount of precipitation, but averages 6" to 10" per year from soils with available water-holding capacity of 2", and 10" to 15" per year from soils with available water-holding capacity of 6".[3]

Precipitation over large areas of the region contributes to little or no runoff after the demands of evapotranspiration have been satisfied.

c. Air Quality. Due to the undeveloped and open remote nature of the region, air quality is generally quite good. At present there are no large point sources of significant air pollution--even in the adjoining urban and suburban areas.

Idaho recently adopted federal air quality standards. However, with the exception noted below, it has no measured air quality data. State officials suspect that with the exception of intermittent, local concentrations of suspended particulate matter from unpaved roads, agricultural activities, depleted range land, range fires, etc., most pollutants are at very low levels throughout most of the region.

One particulate monitoring station west of Boise on Overland Road has been in operation since 1971. During the summer this station measures the particulate loads of winds that blow toward Boise across agricultural lands to the west and northwest. In 1972 the annual average concentration measured was 40 micrograms per cubic meter; the monthly average ranged from 24-103, while the maximum concentration for any one day was 242 micrograms per cubic meter. In 1973 the yearly and monthly averages, respectively, were 52 micrograms per cubic meter and 24-122 micrograms per cubic meter.

The state and federal primary particulate standard (the point at which people of normal respiratory health start becoming ill) is presently set at 75 micrograms per cubic meter and the secondary standard is 60 micrograms per cubic meter. (See Table 1.) The secondary particulate standard is that point at which the pollutant becomes noxious to crops, landscaping plants, esthetic values, etc.

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[3]Water Resources, Comprehensive Framework Study Water and Related Lands, Appendix V, Vol. 1, Columbia-North Pacific Region, Pacific Northwest River Basins Commission, April 1970.

Table 1. Ambient Air Quality In The Region

National Air Quality Standards		
Primary Standards	Secondary Standards	Overland Road Particulate Monitor
75 micrograms per cubic meter (annual mean)	60 micrograms per cubic meter (annual mean)	1972 40 micrograms
lower safety margin for public health	lower safety margin environment needs	1973 52 micrograms

The Idaho State Department of Health and Welfare reports that intermittent instances of high intensity air pollution by particulates occur in the general area east of King Hill. A monitoring station in that area has recorded a particulate concentration of approximately 1,000 micrograms per cubic meter for a 6-day period. The average concentration, however, will fluctuate between 30 and 40 micrograms per cubic meter. It is suspected that a 1,000 microgram storm period may have deleterious health effects; however, federal and state controls are based primarily on long-interval averages.

According to Idaho Department of Health and Welfare findings the average annual increase in particulate pollution due to new agricultural development in the study area will not exceed more than 10 micrograms per cubic meter.

The greater Boise metropolitan area has a photo-chemical oxident problem, but there is no data to show extent; nor are there projections of possible impact on adjacent ecosystems. To date there have been no citizen reports of damage to nearby croplands.

Idaho Power Company has proposed to construct two 500 megawatt (million watt) coal-fired electric power units, with a possible near future addition of 2 more, in southwestern Idaho. Company spokesmen have not announced predictable emission levels but have pledged to meet state air quality standards.

The ultimate atmospheric emissions from the proposed plant will hinge largely on analysis of the coal used and the design of the plant. It is suspected that even with the highest and now achievable emissions controls, there will be a profound impact on air quality and on the total environment of the study area.

2. Soils. Table 2 contains a systematic and detailed analysis of the variety of soils that occur in the region in which the study area is located.

Approximately one-half of the study area soils are in Soil Association 13 (as noted on the map in Figure 18). The soils in this group are

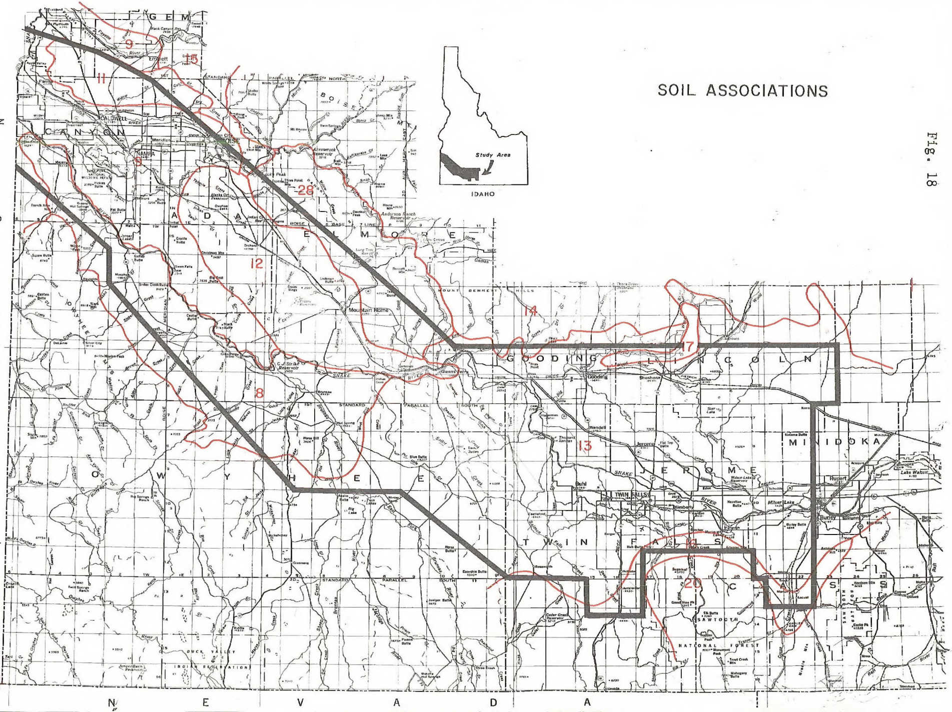
SOIL ASSOCIATIONS
Study Area
IDAHO
G E M
C A N Y O N
A D A
E L M O R E
O W Y H E E
G O O D I N G
L I N C O L N
J E R O M E
M I N I D O K A
T W I N F A L L S
C A S S I A
N E V A D A
O R E G O N
MOUNT BENNETT HILLS
Mountain Home
Boise
Nampa
Caldwell
Emmett
Twin Falls
Burley
Rupert
Jerome
Gooding
Shoshone
Wendell
Buhl
SNAKE RIVER
C J Strike Reservoir
DUCK VALLEY INDIAN RESERVATION
SAWTOOTH NATIONAL FOREST
8
9
11
12
13
14
15
16
17
20
28

Fig. 18

III-5

Table 2

SOILS

Soil Groups, Map Symbols	Elevation (ft.) Precipitation (in.)	Freeze free Season & Major land use	Family & % of Assn.	Parent Material, Landscape	Surface Soil on Subsoil	Profile Depth, Permeability	Waterholding Capacity on Drainage Class	Range of Major Capability	Major Soil Problems	Treatment
Moderately deep to very deep soils with loamy subsoils on gentle to moderate slopes - 8	2,000 - 3,000 7 - 12	120 - 165 Rangeland Cropland (cereals, potatoes, mint, hops, vegetables, and hay)-irrigated	Fine-loamy, mixed, mesic 25	Terraces, Alluvium	Gravelly loam on clay loam	60"+, Moderately slow	Medium on Good	VIc, IIIe	Erosion; alkaline; gravelly profile: droughtiness	Cross-slope opers; residue mgmt; cropping seq; soil amendments; irrig. mgmt; rangeland mgmt.
			Coarse-loamy, mixed, calcareous, mesic 20	Terraces, Lake-laid sediments	Silt loam on Silt loam	20-40" over siltstone, Moderate	Low & Medium on Good and somewhat excessive	VIe, IIIe, VIc, IVe, IIIs	Erosion; alkaline; mod. deep over siltstone; droughtiness	Cross-slope opers; residue mgmt; cropping seq; soil amendments; irrig. mgmt; rangeland mgmt.
			Coarse-loamy, mixed, calcareous, mesic 15	Fans and Terraces, Alluvium and lake sediments	Sandy loam on Fine sandy loam	60"+, Moderately rapid	Medium on Good	VIe, IIe, VIc, IIs, IIIe	Erosion; alkaline; sandy profile; droughtiness	Cross-slope opers; residue mgmt; cropping seq; soil amendments; irrig. mgmt; rangeland mgmt.
			Fine-loamy, mixed, mesic 10	Terraces and fans, Alluvium	Loam on Loam	60"+, Moderate	High on Good	VIc, IIe, VIe, IIIe, IVe	Erosion; alkaline; droughtiness	Cross-slope opers; residue mgmt; cropping seq; soil amendments; irrig. mgmt; rangeland mgmt.
			Coarse-silty, mixed, calcareous, mesic 10	Terraces and fans, Lake-laid sediments over outwash	Silt loam on Silt loam	40-60" over sand and gravel, Moderate	Medium & High on Good	VIc, I, VIe, IIe, IIIe, IVe	Erosion; alkaline; droughtiness	Cross-slope opers; residue mgmt; cropping seq; soil amendments; irrig. mgmt; rangeland mgmt.
			Fine-loamy mixed, mesic 10	Fans, Alluvium	Gravelly loam on Cobbly clay loam	60"+, Moderately slow	Medium on Good	VIe, IIIe, IIe, IVe	Erosion; gravelly and cobbly profile; droughtiness	Cross-slope opers; residue mgmt; cropping seq; irrig. mgmt; rangeland management

Table 2 Cont'd.

Soil Groups, Map Symbols	Elevation (ft.) Precipitation (in.)	Freeze free Season & Major land use	Family & % of Assn.	Parent Material, Landscape	Surface Soil on Subsoil	Profile Depth, Permeability	Waterholding Capacity on Drainage Class	Range of Major Capability	Major Soil Problems	Treatment
Moderately deep to very deep soils with silty subsoils on gentle to strong slopes - 9	2,000 - 3,000 7 - 11	120 - 160 Cropland (cereals, potatoes, Sugar beets, beans, and hay)-irrigated	Fine-silty, mixed, mesic 20	Terraces, Alluvium	Silt loam on silt loam	60"+, Moderate	High on Good	VIc, I, VIe, IIe, IIIe, IVe	Erosion; alkaline subsoil; droughtiness	Cross-slope opers; residue mgmt; cropping seq; soil amendments; irrig. mgmt; rangeland mgmt.
		Rangeland	Coarse-silty, mixed, mesic 15	Uplands (lava plains nearly level to rolling), Loess	Silt loam on silt loam	20-40" over lime pan, Moderate	Low & Medium on Good	VIc, IIIs, VIe, IIIc, IVe	Erosion; alkaline; mod. deep over duripan; droughtiness	Cross-slope opers; residue mgmt; cropping seq; soil amendments; irrig. mgmt; rangeland mgmt.
			Fine-silty, mixed, mesic 15	Terraces, Alluvium	Silt loam on silt loam	20-40" over lime silica pan, Moderate	Low & Medium on Good	VIc, IIIs, VIe, IIIe	Erosion; alkaline subsoil; mod. deep over lime-silica pan; droughtiness	Cross-slope opers; residue mgmt; cropping seq; soil amendments; irrig. mgmt; rangeland mgmt.
			Fine-silty, mixed, mesic 10	Terraces, Alluvium	Silt loam on silt loam	20-40" over lime silica pan, Moderate	Low & Medium on Good	VIc, IIIs, VIe, IIIe, IVe	Erosion; mod. deep over lime-silica pan; droughtiness	Cross-slope opers; residue mgmt; cropping seq; soil amendments; irrig. mgmt; rangeland mgmt.
			Coarse-silty, mixed, mesic 10	Terraces and fans, Alluvium	Loam on loam	40-60" over sandy loam, Moderate	High on Good	VIc, I, VIe, IIe, IIIe	Erosion; alkaline; droughtiness	Cross-slope opers; residue mgmt; cropping seq; soil amendments; irrig. mgmt; rangeland mgmt.

Table 2 Cont'd.

Soil Groups, Map Symbols	Elevation (ft.) Precipitation (in.)	Freeze free Season & Major land use	Family & % of Assn.	Parent Material, Landscape	Surface Soil on Subsoil	Profile Depth, Permeability	Waterholding Capacity on Drainage Class	Range of Major Capability	Major Soil Problems	Treatment
Moderately deep to very deep soils with clayey and loamy subsoils on gentle to moderate slopes 11	2,200 - 3,000 7 - 12	120 - 140 Rangeland Cropland (cereals, potatoes, and hay)- 85% irrigated	Fine, montmorillonitic, mesic 40	Terraces, Alluvium	Silt loam on Clay	20-40" over lime-silica pan, Slow	Low & Medium on Good	VIc, IIIc, VIe, IIIs, IVe	Erosion; clay subsoil restricts water & roots; mod. deep over lime-silica pan; droughtiness	Cross-slope opers; residue mgmt; cropping seq; subsurface tillage; irrig. mgmt; rangeland mgmt.
			Fine, montmorillonitic. mesic 25	Uplands (hills & terraces), Alluvium	Loam on Clay loam to clay	40-60" over sand and/or gravel, Moderately slow & slow	Medium & High on Good	VIc, IIe VIe, IIIe	Erosion; alkaline subsoil; clayey subsoil restricts water and roots; droughtiness	Cross-slope opers; residue mgmt; cropping seq; subsurface tillage; irrig. mgmt; rangeland mgmt.
			Fine-silty, mixed, mesic 20	Terraces, Alluvium	Silt loam on silt loam	20-40" over lime-silica pan, Moderate	Low & Medium on Good	VIc, IIIs, VIe, IIIe, IVc	Erosion; mod. deep over lime-silica pan; droughtiness	Cross-slopes opers; residue mgmt; cropping seq; irrig, mgmt; rangeland mgmt.
			Coarse-loamy, mixed, non-acid, mesic 5	Uplands (hills & terraces), Alluvium	Coarse sandy loam on coarse sandy loam	40-60" over sand, Very rapid	Low & Medium on Good & somewhat excessive	VIe, IIIe VIIe	Droughtiness; sandy profile	Rangeland mgmt.
			Fine-silty, mixed, mesic 2	Terraces, Alluvium	Silty clay loam on silty clay loam	20-40" over lime-silica pan, Moderately slow	Low & Medium on Good	VIs	Alkaline soil; mod. deep over lime-silica pan	Rangeland mgmt.

Table 2 Cont'd.

Soil Groups, Map Symbols	Elevation (ft.) Precipitation (in.)	Freeze free Season & Major land use	Family & % of Assn.	Parent Material, Landscape	Surface Soil on Subsoil	Profile Depth, Permeability	Waterholding Capacity on Drainage Class	Range of Major Capability	Major Soil Problems	Treatment
12	2,300 - 4,000 7 - 11	120 - 140 Rangeland Cropland (cereals, alfalfa, & potatoes)-70% irrigated	Loamy, mixed mesic 20	Uplands (lava plains) Loess & basic igneous rock	Silt loam on silt loam	10-20" over bedrock, Moderate	Low on Good	VIs, IVe, VIIs, IVs	Erosion; shallow over bedrock; alkaline subsoil; droughtiness	Rangeland mgmt.
			Fine-loamy, mixed, mesic 15	Uplands (lava plains-gently rolling), Loess over basic igneous rock	Silt loam on silty clay loam	20-40" over bedrock, Moderately slow	Low & Medium on Good	VIe, IIIe, IIIs, IVe, IVs	Erosion; alkaline; mod. deep over bedrock; droughtiness	Cross-slope opers; residue mgmt; cropping seq; soil amendments; irrig. mgmt; rangeland mgmt.
			Fine-montmorillonitic, mesic 15	Terraces, Alluvium	Silt loam on Clay	20-40" over lime silica pan. Slow	Low & Medium on Good	VIe, IIe, IIIe, IVe	Erosion; clay subsoil restricts water & roots; mod. deep over lime-silica pan droughtiness	Cross-slope opers; residue mgmt; cropping seq; subsurface tillage; irrig. mgmt; rangeland mgmt.
			Fine-loamy, mixed, mesic 10	Uplands (hills-undulating to hilly), Alluvium	Gravelly loam on Very gravelly clay loam	40-60" over gravel and sand, Moderately slow	Low on Good	VIe	Erosion; gravelly profile	Rangeland mgmt.
			Fine-silty, mixed, mesic 10	Terraces, Alluvium	Silt loam on silt loam	20-40" over lime-silica pan, Moderate	Low & Medium on Good	VIe, IIIe, IIIs, IVe	Erosion; mod. deep over lime-silica pan; droughtiness	Cross-slope opers; residue mgmt; cropping seq; irrigation mgmt. rangeland mgmt.
			Fine-silty, mixed, mesic 10	Terraces, Alluvium	Silt loam on silt loam	10-20" over duripan, Moderate	Low on Good	VIe, IVe, VIs	Erosion; shallow over duripan	Rangeland mgmt.

Table 2 Cont'd.

Soil Groups, Map Symbols	Elevation (ft.) Precipitation (in.)	Freeze free Season & Major land use	Family & % of Assn.	Parent Material, Landscape	Surface Soil on Subsoil	Profile Depth, Permeability	Waterholding Capacity on Drainage Class	Range of Major Capability	Major Soil Problems	Treatment
Shallow to very deep soils with silty profiles on gentle to moderate slopes 13	2,500 - 6,000 8 - 12	100 - 140 Cropland (cereals, potatoes, beans and hay)- 80% irrigated	Coarse-silty, mixed, mesic 30	Loess, Lava plains	Silt loam on silt loam	60"+, Moderate	High on Good	VIc, IIe IIc IIIe IVe	Erosion; droughtiness	Cross-slope opers; residue mgmt; cropping sequence; irrigation mgmt; rangeland mgmt.
		Rangeland	Loamy-mixed, mesic 25	Loess & igneous rock, Lava plains	Silt loam on silt loam	10-20" over bedrock, Moderate	Low on Good	VIs, IVc IVs VIe	Erosion; shallow over bedrock; droughtiness	Rangeland mgmt; residue mgmt; irrigation mgmt.
			Coarse-silty, mixed, mesic 10	Loess, Lava plains	Silt loam on silt loam	20-40 over lime pan, Moderate	Low and Medium on Good	VIs, IIIe IIIs IVe	Erosion; moderately deep over lime pan; droughtiness	Cross-slope opers; residue mgmt; cropping sequence; irrigation mgmt; rangeland mgmt.
			Coarse-silty, mixed, mesic 10	Loess over basic igneous rock, Lava plains	Silt loam on silt loam	20-40" over bedrock, Moderate	Low and Medium on Good	VIs, IIIe IIIs IVe	Erosion; moderately deep over bedrock; droughtiness	Cross-slope opers; residue mgmt; cropping sequence; irrigation mgmt; rangeland mgmt.
			Coarse-loamy, mixed, calcareous, mesic 5	Alluvium and Lake sediments, Terraces	Sandy loam on Fine sandy loam	60"+, Moderately rapid	Medium on Good	VIs, IIIe IIIs IVe	Erosion: droughtiness	Cross-slope opers; residue mgmt; cropping sequence; irrigation mgmt; rangeland mgmt.

Table 2 Cont'd.

Soil Groups, Map Symbols	Elevation (ft.) Precipitation (in.)	Freeze free Season & Major land use	Family & % of Assn.	Parent Material, Landscape	Surface Soil on Subsoil	Profile Depth, Permeability	Waterholding Capacity on Drainage Class	Range of Major Capability	Major Soil Problems	Treatment
14	4,500 - 6,500 10 - 14	60 - 120 Rangeland	Fine, montmorillonitic, frigid 20	Loess over basic igneoua rock, Nearly level to rolling lava plains	Silt loam on clay	20-40" over bedrock, Slow	Low and Medium on Good	IIIe, IIIe IIIs, IIIs IVc, IVe VIIs	Erosion; moderately deep over bedrock; clay subsoil	Cross-slope opers; residue mgmt; cropping sequence; subsurface tillage; rangeland mgmt.
			Loamy, mixed, frigid 20	Loess and basic igneoua rock, Nearly level to rolling lava plains	Rocky loam on Very rocky sandy clay loam	10-20" over bedrock, Moderately slow	Low on Good	VIs	Shallow over bedrock rocky profile	Rangeland mgmt.
			Fine-loamy, mixed, frigid 15	Loess over basic igneous rock, Undulating to rolling lava plains	Silt loam on Silty clay loam	40-60" over bedrock, Moderately slow	Medium and High on Good	IIIc, IIIc IIIe, IIIe IIIs	Erosion	Cross-slope opers; residue mgmt; cropping sequence; rangeland mgmt.
			15	Basic igneous rock, Nearly level to rolling lava plains		Less than 10" over bedrock	Low on Good	VIIIs	Shallow over bedrock	Watershed use
			Fine-loamy, mixed, mesic 10	Loess over basic igneous rock, Rolling lava plains	Clay on clay	40-60" over bedrock, Slow	Medium on Good	IVs, IIIc VIIs, IIIe	Erosion; clay	Cross-slope opers; residue mgmt. cropping sequence; subsurface tillage; rangeland mgmt.
			Loamy, mixed, frigid 5	Loess and basic igneoua rock, Undulating to rolling lava plains	Sandy loam on Sandy loam	10-20" over bedrock, Rapid	Low on Good	VIIe VIIs	Erosion; shallow over bedrock	Rangeland mgmt.

Table 2 Cont'd.

Soil Groups, Map Symbols	Elevation (ft.) Precipitation (in.)	Freeze free Season & Major land use	Family & % of Assn.	Parent Material, Landscape	Surface Soil on Subsoil	Profile Depth, Permeability	Waterholding Capacity on Drainage Class	Range of Major Capability	Major Soil Problems	Treatment
15	3,000 - 5,000 12 - 18	80 - 140 Rangeland Cropland (cereals, hay, pasture, and potatoes)-25% irrigated	Fine, montmorillonitic, mesic 20	Loess over basic igneous rock, Uplands (hills)	Loam on Clay loam	20-40" over bedrock, Moderately slow	Low & Medium on Good	IIIe, IIIe, IVe, IVe VIe	Erosion; droughtiness	Cross-slope opers; residue mgmt; irrig. mgmt; rangeland mgmt.
			Loamy-skeletal, mixed, mesic 20	Loess & basic igneous rock, Uplands (hills)	Very stony silt loam on Very silty silt loam	10-20" over bedrock, Moderately slow	Low on Good	VIs, VIe, VIIs	Erosion; shallow over bedrock; droughtiness; alkaline subsoil	Rangeland mgmt; residue mgmt; irrig. mgmt.
			Fine-loamy, mixed, mesic 15	Loess over over basic igneous rock, Uplands (hills)	Loam on Cobbly clay loam	20-40" over bedrock, Moderately slow	Low on Good	IVe, IVe VIe, VIs, VIIs	Erosion; alkaline; mod. deep over duripan; droughtiness	Cross-slope opers; residue mgmt; cropping seq; soil amendments; irrig. mgmt; rangeland mgmt.
			Fine, montmorillonitic, mesic 15	Loess over basic igneous rock, Fans	Loam on Cobbly clay or clay loam	40-60" over bedrock, Moderately slow and slow	Low to High on Good	IIIe, IIIe, IIe, IIe, IIe, IIe, IVe, IVe	Erosion; mod. deep over bedrock; droughtiness	Cross-slope opers; residue mgmt; irrig. mgmt; rangeland mgmt.
			Fine-loamy, mixed, mesic 10	Acid igneous rock, Uplands (hills)	Loam on Clay loam	20-40" over bedrock, Moderately slow	Low & Medium on Good	IVe, IIIe, VIe, IVe, VIIe	Erosion; droughtiness; alkaline	Cross-slope opers; residue mgmt; cropping seq; soil amendments; irrig. mgmt; rangeland mgmt.

Table 2 Cont'd.

Soil Groups, Map Symbols	Elevation (ft.) Precipitation (in.)	Freeze free Season & Major land use	Family & % of Assn.	Parent Material, Landscape	Surface Soil on Subsoil	Profile Depth, Permeability	Waterholding Capacity on Drainage Class	Range of Major Capability	Major Soil Problems	Treatment
16	4,500 - 6,500 11 - 16	60 - 110 Rangeland Cropland (cereals and hay)-dryland & irrigated	Fine-loamy, mixed, frigid 40	Loess over basic igneous rock, Lava plains	Silt loam on Silty clay loam	20-40" over bedrock, Moderately slow	Low & Medium on Good	IVe, VIIs	Erosion; mod. deep over bedrock	Rangeland mgmt; residue mgmt.
			Fine, montmorillonitic, frigid 20	Acid igneous rock, Plateau	Silt loam on Stony clay	20-35" over bedrock, Slow	Low on Good	IVe, IVe, VIIs, IVs	Erosion; stony clay subsoil	Rangeland mgmt.
			Fine-loamy, mixed, frigid 5	Loess over basic igneous rock, Lava plains	Silt loam on Silt loam	16-40" over bedrock or hardpan, Moderate	Low & Medium on Good	VIe	Erosion; mod. deep over bedrock or hardpan	Rangeland mgmt; residue mgmt.
			Fine, montmorillonitic, frigid 5	Loess over basic igneous rock, Lava plains	Silt loam on Silty clay	30-40" over bedrock, Slow	Low & Medium on Good	IVe	Erosion; mod. deep over bedrock	Rangeland mgmt.
Shallow to deep, frigid soils with stony, loamy subsoils on gentle to steep slopes 17	4,500 - 6,000 7 - 14	80 - 120 Rangeland	60	Basic igneous rock, Lava plain		Less that 10" over bedrock	Low on Good	VIIIs	Very shallow over bedrock	
			Loamy, mixed, frigid 20	Loess and basic igneous rock, Lava plain	Stony loam on Stony loam	10-20" over bedrock, Moderate	Low & Medium on Good	VIs, VIIs	Shallow over bedrock; stony profile	Rangeland mgmt.
			Coarse-silty, mixed, frigid 10	Loess over basic igneous rock, Lava plain	Silt loam on Silt loam	20-40" over bedrock, Moderate	Low & Medium on Good	VIs, IIIs VIc, IIIe IVe	Erosion; mod. deep over bedrock; alkaline subsoil	Rangeland mgmt.

Table 2 Cont'd.

Soil Groups, Map Symbols	Elevation (ft.) Precipitation (in.)	Freeze free Season & Major land use	Family & % of Assn.	Parent Material, Landscape	Surface Soil on Subsoil	Profile Depth, Permeability	Waterholding Capacity on Drainage Class	Range of Major Capability	Major Soil Problems	Treatment
28	3,500 - 7,500 12 - 15	100 - 140 Rangeland Cropland (cereals and hay)- some irrigated	Fine-loamy, mixed, mesic 30	Acid, igneous rock, Uplands (hills)	Coarse sandy loam on Coarse sandy clay loam	40-60" over bedrock, Moderately slow	Medium on Good	IIIe, IIIe, IVe, IVe VIe, VIIe	Erosion; sandy profile	Cross-slope opers; residue mgmt; cropping seq; rangeland mgmt.
			Coarse-loamy, mixed, mesic 20	Acid igneous rock, Uplands (hills-steep south slopes)	Coarse sandy loam on Coarse sandy loam	20-40" over bedrock, Very rapid	Low on Good & somewhat excessive	IVe, IVe VIe, VIs	Erosion; sandy profile; mod. deep over bedrock	Cross-slope opers; residue mgmt; cropping seq; rangeland mgmt.
			Fine-loamy, mixed, frigid 15	Acid, igneous rock, Uplands (hills-moderately sloping to steep)	Loam on Clay loam	40-60" over bedrock, Moderately slow	Medium & High on Good	IIIe, IIIe, IVe, VIe, VIIe	Erosion	Cross-slope opers; residue mgmt; cropping seq; rangeland mgmt.
			Fine-loamy, mixed, mesic 15	Acid igneous rock, Uplands (hills-undulating to steep)	Coarse sandy loam on Coarse sandy clay loam	20-40" over bedrock, Moderately slow	Low on Good	IVe, IVe VIe, VIIe	Erosion; sandy profile; alkaline subsoil; mod. deep over bedrock	Cross-slope opers; residue mgmt; cropping seq; rangeland mgmt.
			Fine-loamy, mixed, mesic 10	Alluvium, Uplands (hills-nearly level to steep)	Silt loam on Loam	40-60" over impervious sediments	Medium & High on Good	IIIe, IIIe, IVc, IVe VIe	Erosion	Cross-slope opers; residue mgmt; cropping seq; rangeland mgmt.

generally deep, silt loams with medium to high water-holding capacity and good drainage. They are erodible soils with a tendency for droughtiness and are generally suitable for irrigated row crops. For the most part the soil is associated with wind and water and the amounts are estimated to vary from 1 to 150 tons per acre. No studies are currently available to substantiate this estimate. Roughly 33% of these soils have been developed for irrigation, most of which is in the Twin Falls-Burley area known as Magic Valley.

Soils in Soil Association 8 lie generally west and northwest of the Bruneau River and south of the Snake River. The soils are more complex than those in Group 13. There are more sands and gravels intermixed in the deep profile along with some tighter soils. On the average these soils have a medium water-holding capacity and good drainage. They are characteristically erodible and droughty. Moderate alkalinity and the sands and gravels may create extra problems for agricultural development. There are no suitability limitations to crop selection.

The next most important group of soils are in what is called the "Mountain Home Desert", Soil Association 12 on the map (Figure 18). These soils are mostly relatively shallow silt loams with a low water-holding capacity on medium to good drainage. Soil problems would include erodibility, alkalinity, lime and clay pans, some gravels and droughtiness. About 70% of these soils are irrigable for potato, grain and alfalfa crops.

The soils in Soil Association 9 include most of the lands in Boise Valley that have been developed for irrigated agriculture. These are mostly silt loams that vary in depth from 20" to 60". Water-holding capacity varies in these soils from low to high but with good draining. Problems with these soils are much the same as those associated with the adjoining Group 12: erodibility, droughtiness, lime and hard pans, and alkalinity. The full list of southwest Idaho crops can be grown on these soils.[4]

The soils in Soil Association 11 are silt loams in the surface horizon with clayey subsoils and lime-silica pans that have low water-holding capacity and poor permeability. These soils are highly erosive when water is placed on them. Other problems would include some alkalinity and the restriction of water and roots by the lime-silica pan.

The soils in Soil Association 28 are mostly coarse sandy loams of granitic origin. They have low water-holding capacity and are highly erosive. They are generally on fairly steep slopes and are usually too rough and steep for irrigation.

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[4]Figure 18 and Table 2 were adapted from Land and Mineral Resources, Appendix IV, Vol. 1, Comprehensive Framework Study of Water and Related Lands, Columbia-North Pacific Region, Pacific Northwest River Basins Commission, June 1970.

Generally the soils throughout the study area are silt loams with relatively good water-holding capacity and good drainage. There are a few problems (erodibility, droughtiness, alkalinity, some soil pans, some intermixed gravels and sands) but none in such a degree that would significantly limit development for irrigation.

Soils information for this analysis was taken from the Land and Mineral Resources, Appendix IV, Vol. 1, Comprehensive Framework Study of Water and Related Lands, Columbia-North Pacific Region. This, in turn, was taken from soil surveys made by the Soil Conservation Service and the best estimates that could be made on lands that did not have a soil survey.

Much of the potential irrigated land does not have soil surveys. Therefore detailed soil surveys should be made in order to properly evaluate impacts on the land and the relationship to the existing environment.

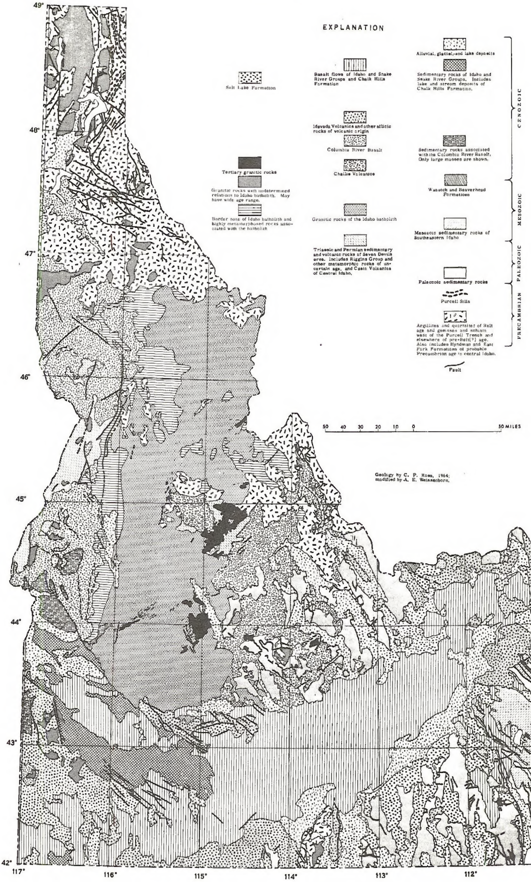
3. Geology-Geomorphology. The Middle-Upper Snake River Ecosystem is geologically unique and this uniqueness has created the environment for the high yield agriculture for which the region is noted. (See Figure 19.)

In general much of the region (Burley, King Hill, Boise, Malheur) is characterized by nearly horizontal sheets of basalt. Primarily these are of two age groups: the older Miocene-Phiocene and the younger Pliocene-Recent. Individual flows are seldom more than 100' thick, but the combination of numerous flows commonly reaches several thousand feet in depth. Volcanic ash and lake and stream sediments, including sands, gravels and silts, are interbedded with the basalts. Volcanism, stream erosion and wind deposits have been the most important processes in the landscape modification. Most recently much of the region has been faulted, warped or dissected by great river canyons.

The distinctive character of each section reflects difference in stratigraphy, structure and chemical and physical composition of the underlying rocks. All of these influences have a bearing on the complexity and the mosaic nature of the elements that comprise the geologic environment of the region.

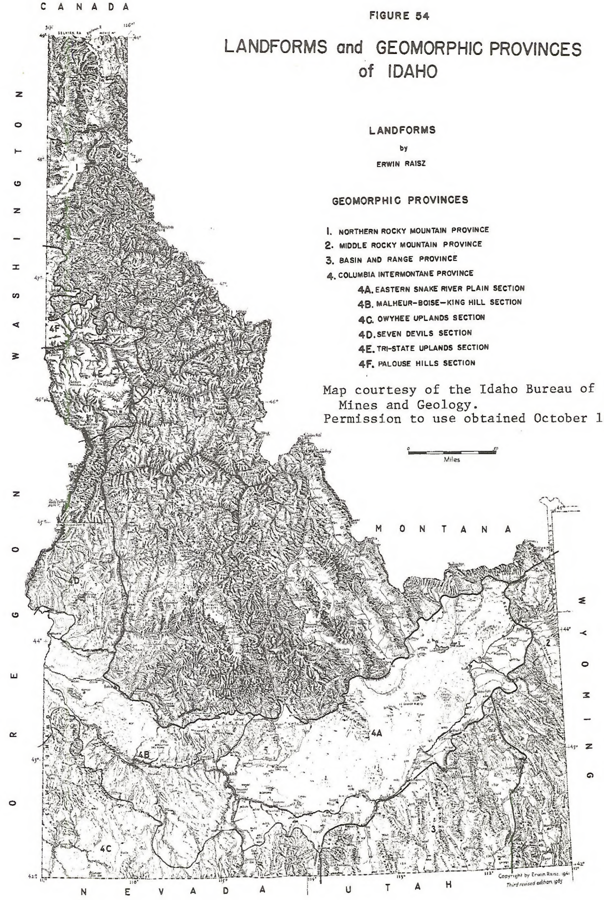
The Eastern Snake River Plain section is essentially flat with elevations ranging from 3,000' in the west to about 6,000' in the east. The surface is a youthful lava plateau, partially covered with a thin, windblown soil layer and is almost featureless except for low shield volcanoes, cinder cones and squeezed-up lava ridges. Only a few permanent streams exist on the plain, but the waters of several streams, including the Big Lost and Little Lost Rivers, disappear into the porous lavas and become a part of the subsurface drainage. This is an important source of recharge water for the Snake River. For example, a relatively large volume of water enters the Snake at Thousand Springs west of Twin Falls. Where soils, terrain and available water supplies permit, irrigated agriculture is common.

FIGURE 19



Map courtesy of the Idaho Bureau of Mines and Geology.

FIGURE 20



Map courtesy of the Idaho Bureau of Mines and Geology.
Permission to use obtained October 1975.

The Malheur-Boise-King Hill section is lower in elevation than the Snake River Plain to the east. Major characteristics include generally flat topography and thick lake and stream sediments extensively interbedded with basalt flows. The section includes lowlands on both sides of the Snake River, and much of the Bruneau River basin and the lower Boise and Payette River basins.

Miocene basalts are the most common, although basalts of the Snake River group of the Pleistocene to Recent age cover portions of the section (Figure 20). Highly polished boulders on the eastern edge of the section near Hagerman and throughout the Snake River Canyon are presumed to have been deposited by the catastrophic spillover of Pleistocene Lake Bonneville. The spillover occurred between 18,000 and 38,000 years ago.

This section's relatively level surface of poorly consolidated, silty sediments have proven highly productive under agriculture.

4. Water. Water conservation practices should be improved since the study area appears to have a limited amount of both surface water and ground water. The pattern and magnitude of seasonal surface water flows are closely regulated by storage facilities, diversions and return flows from irrigation. The Snake River Plain aquifer is the main source of ground water for the eastern part of the study area. The quantity and quality of surface and ground water is of increasing concern to both agricultural and recreational groups. The reduction of the quantity and quality of the water resource is a serious problem not only for the region's agricultural industry but also for all other water users, including the power and related industries and the many recreation related uses. The Federal Water Pollution Control Act Amendment of 1972 states as one of its objectives, "It is the national goal that wherever attainable, an interim goal of water quality which provides for the protection and propogation of fish, shellfish, and wildlife and provides for recreation in and on the water be achieved by July 1, 1983."

The major surface drainage through the study area is the Snake River. Numerous dams have been built in the study area portion of the river for power purposes; but only one, Milner Dam, for water storage and irrigation diversion. The Milner Dam is at the eastern end of the study area.

Average annual flows in the river, measured at Idaho Falls, ranged from 6,000 cubic feet per second (cfs) down to 900 cfs during the period 1928 to 1968. Flows at the Milner Dam during the same period have averaged from 1,600 cfs down to 5 cfs. At the Oregon border on the western edge of the study area, with inflows from the Boise River and Thousand Springs, average annual flows have varied from 15,700 cfs to a low of 7,100 cfs (Pacific Northwest Water Resources Board, 1974).

Flow fluctuations are attributable in great part to higher elevation snowpacks and the operational requirements for irrigation, flood control, power and other purposes imposed on downstream diversions and impoundments.

Principal tributaries of the Snake River in the study area also have a history of fluctuating water patterns. The Bruneau River, near its mouth, has a record (during a 20-year period) of from 6,500 cfs to 25 cfs. Flows varying from 1,360 cfs to 21 cfs have been recorded on Salmon Falls Creek below Salmon Falls Creek Dam (IWRB, 1972).

Most of the water needed for irrigating new lands in the study area would have to be pumped from the Snake River. In past years the pumping lifts and costs were too high for using the available water. In recent years, however, the success of high lift pumping operations has generated considerable interest in pumping more water to undeveloped lands all along the river from Thousand Springs to the Oregon state line.

In years of low flow all water in the Snake River east of the study area is stopped at Milner Dam during the irrigation season and no flow is allowed from the dam downstream. There are proposals to use early spring flood flows through off-site storage, but the development of lands by DLE adjacent to the Snake River in the immediate future will probably be limited to the pumping of water during the irrigation season.

Since all water is stopped at the Milner Dam during low flow times, waters available for pumping are the return and inflows that occur downstream from Milner Dam. The largest source of water for inflow below the Milner Dam is Thousand Springs which flows at about 6,500 cfs. About one-fourth of this flow has been atrributed to subsurface return flows from upstream irrigation (IWRB, 1972). Maximum water available for irrigation, then, by drafting from the river, is between 5,000 and 6,000 cfs. If all this is diverted it would irrigate approximately 400,000 acres.[5]

Table 3 is a partial list of creeks, lakes, rivers, reservoirs and canals that influence the total aquatic resources of the area. The problem of instream flow is critical to all users of this resource and to this end the State of Idaho is currently preparing a State Water Plan which should result in establishing this flow amount. The State Water Plan is to be completed by 1977. Also, as water is taken from the study area this may have an impact on the Snake and Columbia Rivers downstream. These downstream impacts could involve water quality, fisheries and outdoor recreation uses, etc.

The Idaho Fish and Game Department (IF&GD) has determined instream flows needed for aquatic life in the Snake River and important tributaries within the study area (IWRB, 1969). These recommended flows are being

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[5]At the present time agricultural developments between King Hill and Murphy draft 4,000 cfs from the river during July (IWRB, April 1974).

modified as new studies are completed. While instream flows have not yet been established by the IWRB the recommended minimum flows have been set at 1,000 cfs at Milner Dam and 3,740 cfs above the mouth of the Bruneau River (IWRB, April 1974). The IWRB is continuing studies relating to upstream as well as downstream use and control for future conditions.

Table 3

A partial list of creeks, rivers, lakes, reservoirs and canals that influence the aquatic resources in the study area. The State Water Plan is scheduled for completion in 1977 and should provide quantification estimates of flow rates for the following:

Creeks

Junko	Brown	Hot	Cedar
Squaw	Castle	Browns	Deep
Hardtrigger	Birch	West Fork Browns	Rock
Wilson	Poison	Pot Hole	Dry
Reynolds	Shoofly	Sailor	Goose
Rabbit	Jacks	Deadman	Clover
Sinker	Little Jacks	Salmon Falls	King Hill
Picket	Sugar	Devils	Little Canyon
Cold Springs	Bennett	Squaw	Rattlesnake
Corder	Indian	Land	Willow

Rivers

Snake	Little Wood	Thousand Springs	Malad
Bruneau	Wood	Boise	

Lakes, Reservoirs, Canals

C. J. Strike	Lowell	Low Line Canal
Murtaugh	Gooding Canal	High Line Canal
Milner	New York Canal	Mora Canal
Wilson	Phyllis Canal	North Side Main Canal

Minimum flows have not been developed for the many tributaries entering the Snake River in the study area. There are approximately 45 small tributaries, both perennial and intermittent, that have some influence on quantity and quality of water in the study area of the Snake River.

a. Surface Water

(1) Water Quality (Contaminants, Pollutants). The Snake River in the study area is presently receiving pollution loads from

agricultural activity, industrial processing plants and untreated domestic waste water return to the river.

The major waste sources upriver and through the study area are the food processing industries, particularly potato processing and sugar refining; municipalities; agricultural animals; and irrigation return flows (Environmental Protection Agency, 1973).

The water quality of the Snake River declines moderately but progressively as the water flows westerly through the study area. Nutrient concentrations rise at a rapid rate, periodically causing dense algal and weed growths, and are accompanied by increases in dissolved solids, biochemical exygen demand, bacteria and temperature. Low dissolved oxygen and high bacterial densities result from a combination of municipal and industrial waste discharges and insufficient stream flows depleted by irrigation diversions. Most of the water in the Snake River has dissolved oxygen concentrations usually above levels necessary to support salmonoid fish, although localized dissolved oxygen depressions have occurred. This is particularly true as evidenced by reported periodic fish kills in the Milner Reservoir below Burley, Idaho, but cannot be substantiated at this time.

The guidelines, issued by the Evironmental Protection Agency (EPA) in January 1971, state that interim plans are to focus on point sources of pollution (primarily municipal and industrial waste).

A 1971 EPA report lists three communities within the study area where improved waste treatment is needed and where federal enforcement action will be taken if required. They are listed in order of priority as (1) Paul, (2) Heyburn, and (3) Twin Falls. Efforts are now underway to correct these problems.

The water quality of the Snake River is excellent in its upper reaches northeast of the study area. Water quality gradually deteriorates as it moves through the study area under the impact of man's activities combined with natural degradation. The heavy inflow from the Thousand Springs area greatly improves the water quality until the inflows of the Boise, Payette and Owyhee Rivers cause a marked decline (EPA, 1971-74). Water quality in the study area has an impact on the water quality downstream outside of the study area.

One of the unusual water quality problems existing in the area is in the waters of the Bruneau River and some of its tributaries which contain natural flouride concentrations in excess of the limits set for drinking water by the public health service (IWRB, 1972).

Nitrates and phosphates from both natural and man-made sources are the major cause of excessive aquatic growth in parts of the Snake River Basin. In addition to taste and odor problems, these growths have caused increased maintenance costs for irrigators because of clogged diversions and distribution systems.

Limited improvements have been made in the Snake River water quality since quality standards were established or revised by Idaho on September 4, 1968 (EPA, 1973). The federal Environmental Protection Agency (EPA) states that a substantial upgrading of municipal and industrial waste treatment has been accomplished in recent years and additional treatment facilities are under construction or planned. It is estimated that over 50% of the towns in the study area have upgraded their waste treatment plants but it cannot be substantiated at this time. Higher levels of treatment may be needed for waste sources if applicable effluent guidelines and water quality standards are to be met. Many problems exist because few advances have been made toward the maintenance of essential minimum stream flows (EPA, 1974).

Meeting the state water quality standards will require the establishment of minimum flows for dilution of wastes in conjunction with adequate waste water treatment practices. The Idaho Board of Health adopted (effective July 5, 1967) rules, regulations, and standards for interstate water of Idaho and disposal of sewage and industrial wastes. These standards have been accepted by the Secretary of the Interior as meeting the requirements of the Water Quality Act (IWRB, 1972). (See Appendix III.)

b. Ground Water

(1) Supply. The largest ground water supply is found in that part of the Snake River aquifer which is in the northeast corner of the study area. Water within this aquifer flows from a source outside the study area southwesterly past Shoshone and Jerome to the discharge point of Thousand Springs. Ground water depths in the Shoshone area are about 150'. Irrigation wells are commonly used in various parts of the aquifer.

The Sailor Creek-Salmon Falls area south of the river and near the center of the study area has ground water at greater depths which limits its development to domestic and stockwater use. The depth to water is a minimum of 200' and is as great as 800' northwest of Hollister. Quantities sufficient for irrigation have yet to be discovered. Very little drilling has been done by the U. S. Bureau of Reclamation and the U. S. Geological Survey. The few functioning irrigation wells that now exist are just outside of the study area near the Salmon Falls Reservoir. It is felt that this reservoir provides the water supply to them.

The Mountain Home plateau located north of the river has ground water at various locations. Most drilling has been near the mountains at depths from 300' to 400'. Flows from other aquifers in this area are typical sand/gravel formations and are limited to what can be recharged from the surface and mountains to the east. Wells drilled in the area produce moderate quantities sufficient for small farm use but no extensive source for large irrigation projects has been located.

The Initial Butte area, located to the northwest of the Mountain Home area, has the best potential ground water source for irrigation outside of the Snake River aquifer. Joint irrigation developments in this area appear to be worth consideration. Most all of the area south of the river and west of Sailor Creek from Bruneau to Murphy is underlain with aquifers that produce water that can be used, but the quality and temperature are problems in development.

Except for the Initial Butte area and that part of the Snake River Plain aquifer near Shoshone, there are few areas remaining in the study area where adequate water for irrigation can be obtained. Numerous private wells drilled throughout the study area are now abandoned. The deeper lifts required in most areas are proving uneconomical. The trend is away from individual wells to joint pumping projects from surface water sources.

In addition to direct pumping of water from aquifers, ground water contributes to the flow of springs, lakes, reservoirs, and stream flow. In effect then, ground water is an important contribution to the habitat of aquatic animals and organisms. Projects which influence the hydrologic cycle of ground water, such as pumping or recharge projects, in turn affect the quantity and quality of the surface system (IWRB, 1972). The ground water return flows that affect the water quantity and quality in the study area of the Snake River are extremely important to the existing fisheries and aquatic life. Creel census and fish population studies by IF&GD in the Snake River have shown that much of the trout fishery is associated with the influx of ground water flows augmenting the surface Snake River flows (IF&GD, 1970-74).

Legislation passed by the Idaho 1971 Legislative Session (Idaho Code, Section 67-4307 through 67-4312 R12) authorizes and directs the State Parks Board to appropriate in trust for the people of the state the unappropriated natural spring flows in the Hagerman Valley, including the springs in Malad Canyon, Niagara Springs, Big Springs, Box Canyon and Thousand Springs area (IWRB, 1972).

Even though costs would be increased, there is a possibility that aquaculture can be increased in other parts of the Snake River Valley by pumping from other aquifers. Some aquaculture programs have been investigated and planned with DLE projects (Chronic & Associates 1973).

The Thousand Springs area now provides one of the world's most extensive operational aquaculture programs (IWRB, 1972). Idaho is one of the primary areas in the world where fish are produced in large quantities using spring waters. The industry ranges from large, integrated businesses that are self-sufficient in producing fish food, growing, processing and marketing the fish down to operations producing fish for small farm ponds.

Most of the water for these springs originates from the Snake River aquifer. At the present time, these springs seem to be recharged at the rate of approximately 2,000 cfs each year over the historic low records in the past. This recharge rate is being studied at the present time. Most of the recharge is contributed by return irrigation water held in the aquifer.

The IF&GD issued licenses for 43 commercial trout producers in 1971. The commercial trout harvest in Idaho for 1972 is estimated to be between 4 and 5 million pounds with an estimated value of $3½ to 4 million. In addition to trout produced for commercial distributions, state and federal agencies both produce for public stocking programs. In the Hagerman and Thousand Springs area there is both a large state and a federal fish hatchery. These fish produced are distributed by the state hatchery in Idaho and from federal hatcheries in many states.

Adequate water quality is a major factor in the successful production of fish. These springs in the Hagerman area have average temperatures of approximately 58° F. throughout the year, which is ideal for salmonoid fish production. Lower temperatures produce slower growth, but fewer disease problems. Conversely, higher temperatures, within certain limits, produce faster growth, but more disease. Fish farms and hatcheries, private, state and federal are now being required to obtain discharge permits from the EPA and to limit waste discharges from hatchery operations.

(2) Water Quality (Contaminants, Pollutants). Maintenance of high water quality in the Snake River Plain aquifer is of major concern since increased usage is the key to obtaining optimum use of ground and surface water resources. The quality of water in the Hagerman Valley below Thousand Springs is dependent upon the maintenance of the present high quality water in the aquifer. Also, the quality of water downstream outside of the study area is dependent on the quality of water in the study area.

Basaltic formations similar to those that are in the Snake River Plain aquifer occur in the Initial Butte area. Good water for irrigation is also available from wells developed in this area.

Except in these two areas, the existing data on ground water shows a wide variation in quality available. Each development will need analysis from test wells or other wells in the area before a definite determination of quality can be made.

In many instances, it is impossible to completely distinguish between the combinations of domestic, industrial, and agricultural pollutants in the Snake River. However, the food processing industries contribute heavily to the pollution load in the Snake River in the study area. Phosphate-processing wastes from the Pocatello area have caused enrichment problems to the Snake River upstream from the study area. Of the total phosphorous point source pollution of the Snake River, irrigation and tributaries of the Snake River contributed 44% of the load (EPA, 1974).

Of the seven major industrial waste sources listed in an EPA report (1971) the Idaho Potato Starch Company, Rogers Brothers Company and Western Farmers Association have elected to join with Idaho Falls in a combined municipal, industrial treatment system. The others are: Idaho Potato Foods at Idaho Falls; Colonial Concrete at Twin Falls; Amalgamated Sugar Company at Twin Falls; and Remington Brothers at St. Anthony (IWRB, 1972).

The magnitude of wastes from agricultural animals and irrigation return flows is not readily identifiable. The direct impact of agricultural activities on water quality is difficult to assess due to a lack of water quality data on return flows (IWRB, 1972). Agricultural animal waste discharges in the upper Snake River region are a major source of coliform bacteria and biochemical oxygen demand (BOD). The organic waste potential of the animal population is estimated to be equivalent to that from a population of 5½ million people. Even though an estimated 95% of the waste generated is reduced by deposit on the land and natural decomposition, the residue equals the organic waste of about 275,000 population equivalent and eventually reaches waterways (IWRB, 1972).

Irrigation returns to the Snake River create major water quality problems. During late spring and summer, the Snake River receives water from 1,340,000 acres of irrigated land (Anonymous, 1969). Most tributary streams in the area carry turbid irrigation return water and at many points drain ditches pour directly into the Snake River. From upper Salmon Falls Dam to Shoshone Falls during July and August 1971 turbidity readings averaged 16 Jackson turbidity units (JTU) with a high reading of 30 JTU's. Turbidities in this range discourage sport fishing and other recreational use (Reid, 1971).

c. Water Uses

(1) Municipal, Industrial, Agricultural. Significant current consumptive water requirements in the DLE study area generally include municipal, industrial, rural-domestic and irrigation uses. Water withdrawals or diversions for these uses in 1973 totaled nearly 3 million AF, 96% of which was for irrigation of about 629,000 acres of farmland. Surface water sources provided 1,799,000 AF or 90% of the total, and ground water sources provided 190,500 AF.

Water Withdrawals
(Acre-Feet)

Use	Total	Surface Water	Ground Water
Municipal and Industrial	74,100	15,600	58,500
Irrigation	1,915,400	1,783,400	132,000
TOTAL	1,989,500	1,799,000	190,500

Around 68% of the water withdrawn or diverted for these uses was consumed or depleted and 32% was returned to surface flows or ground water supplies. The 1973 consumptive use for municipal and industrial purposes amounted to about 17,800 AF while irrigation depletions totaled 1,327,600 AF. (See Tables 4 and 5.)

Use	Withdrawals or Diversions (Acre-Feet)	Consumption or Depletion (Acre-Feet)	Return Flow (Acre-Feet)
Municipal and Industrial	74,100	17,800	56,300
Irrigation	1,915,400	1,327,600	587,800
TOTAL	1,989,500	1,345,400	644,100

Municipal and industrial use includes domestic use in both municipalities and rural areas. Area usage can be categorized as:

Fire protection, household or commercial uses, lawn watering and livestock consumption. Industrial water supplies may be provided through industrial water systems or through municipal systems. The net consumptive use for municipal purposes in 1973 was approximately 7,700 AF and industrial use amounted to 5,500 AF. Rural-domestic uses consumed an estimated 4,600 AF, of which 2,500 AF was for domestic purposes and 2,100 AF was for livestock use. Some outdoor recreation uses and fish hatchery production uses are included in the municipal and rural-domestic categories.

(2) BLM Consumptive Water Requirements in the DLE Study Area, 1973. BLM consumptive water use in 1973 was estimated at about 12,600 AF, most of which was supplied by surface water. These estimates include both amounts of water actually consumed as well as losses through evaporation and other transmission and impoundment processes. (See Table 6.)

Waterfowl habitat and impoundments account for a large percentage of the total BLM use. An estimated 2,600 acres were identified as significant waterfowl habitat areas requiring some 6,200 AF for developing and maintaining marsh and wetland areas. Requirements were essentially for evaporation loss plus transpiration by marsh and riparian plants.

More than 6,000 AF was used in 150 impoundments, including natural or artificial water bodies. All types of impoundments except those transpiration losses were estimated.

Large wild animals, primarily deer and antelope, totaled 46,000 animal months and consumed about 4 AF for drinking water. (See Table 7.) In the other wildlife category, some 1.2 million acres were identified with significant populations of smaller animals and other wildlife. About 12 AF were used annually for this wildlife segment.

Table 4

Estimated 1973 Irrigation Water Use in the DLE Study Area*

	Unit	Total	Water Source: Ground Water	Water Source: Surface Water
Irrigated Area	Acres	629,300	59,880	569,420
Depletions	Acre-feet	1,327,600	114,705	1,212,895
Return Flows	Acre-feet	587,800	17,266	570,534
Diversions	Acre-feet	1,915,400	131,971	1,783,429

*Estimates from Federal - State study team planning materials for the Boise and Bruneau subareas which in total approximate the DLE study area.

Table 5

Estimated 1973 M&I Water Use in the DLE Study Area*

	Unit	Total	Water Source: Ground Water	Water Source: Surface Water
Depletions	Acre-feet	17,793	14,946	2,847
Return Flows	Acre-feet	43,561	56,266	12,705
Diversions	Acre-feet	58,507	74,059	15,552

		Categories of M&I Consumptive Use				
		Municipal	Industrial	Rural-Domestic		Total
				Domestic	Livestock	
Depletions	Acre-feet	7,651	5,516	2,491	2,135	17,793

*Estimates derived from diversion or withdrawal information in the Idaho Interim State Water Plan, July 1972; and consumption or depletion data from Federal - State study team personnel for the Boise and Bruneau subareas which approximates the DLE study area.

Table 6

Annual Consumptive Water Requirements on BLM Lands in the DLE Study Area*

Type of Water Use	Unit	Annual Requirement: 1973 Surface Flow	1973 Surface Storage	1973 Sub-Surface	1973 Total		1980		2000		2020	
Wildlife												
Large Mammals**	AM's				46,130		65,530		79,430		78,430	
	AF	4.1	.2			4.3		6.0		7.4		7.2
Other Wildlife	Acres				1,239,500		1,214,500		1,199,500		1,199,500	
	AF	10.8	1.6			12.4		12.2		12.0		12.0
Fish Production	Number											
Facilities	AF											
Waterfowl Habitat	Acres				2,606		2,606		2,846		2,846	
	AF	6,212.0				6,212.0		6,212.0		6,692.0		6,692.0
Habitat Irrigation	Acres											
	AF											
Sub-Total	AF	6,226.9	1.8			6,228.7		6,230.2		6,711.4		6,711.2
Livestock												
Animal Use**	AUM's				209,903		311,330		338,030		304,730	
	AF	155.0	41.3	55.0		251.3		273.8		299.9		271.1
Recreation												
Visitor Use	RecDays				262,500		325,000		391,000		431,500	
	AF	11.8				11.8		14.5		17.6		19.3
Fire Protection												
Area Burned	Acres				12,000		12,500		14,500		18,000	
	AF											
Construction & Main.												
Roads	Miles				400		435		455		360	
	AF	.9				.9		1.0		1.0		.9
Impoundments												
All Lakes (ponds)	Number				153		259		332		349	
	AF	6,075.9				6,075.9		6,159.8		6,205.9		6,209.4
Total Water Need	AF	12,470.5	43.1	55.0		12,568.6		12,679.3		13,235.8		13,211.9

*Data source is planning unit information developed in the 1973 BLM water requirements survey. These are totals of the following planning units which approximate the DLE study area: Black Canyon, Meridian, Kuna, 35% of Bruneau, Sailor Creek, 35% of Jarbidge, Twin Falls, Canyon and Wendell.

**Types of large mammal and livestock use shown on Table 7.

Table 7

Consumptive Water Requirements for Large Mammals and Livestock on BLM Lands in the DLE Study Area

Type of Water Use	Unit	Annual Requirement 1973 Surface Flow	1973 Surface Storage	1973 Sub-Surface	1973 Total		1980		2000		2020	
Large Mammals												
Deer	AM's				32,100		41,000		44,600		37,400	
	AF	3.0	.1			3.1		3.7		4.1		3.4
Antelope	AM's				13,040		23,300		33,200		38,600	
	AF	1.0	.1			1.1		2.2		3.1		3.6
Bighorn Sheep	AM's				960		1,200		1,600		2,400	
	AF	.1				.1		.1		.2		.2
Elk	AM's				30		30		30		30	
	AF											
Total		4.1	.2		46,130	4.3	65,530	6.0	79,430	7.4	78,430	7.2
Livestock												
Cattle & Horses	AUM's				217,853		256,930		291,580		267,080	
	AF	116.6	38.0	46.0		200.6		236.0		267.8		245.2
Sheep	AUM's				73,050		54,400		46,450		37,650	
	AF	38.4	3.3	9.0		50.7		37.8		32.1		25.9
Total		155.0	41.3	55.0	290,903	251.3	311,330	273.8	338,030	299.9	304,730	271.1

Livestock used approximately 251 AF, and this accounts for about 12% of the total livestock consumptive water use included in the municipal and industrial water estimates for the DLE study area. Livestock use on BLM lands totaled about 291,000 AUM's, including 218,000 cattle and horse AUM's and 73,000 sheep AUM's.

5. Land Use

a. Land Status and Ownership. Patterns of ownership can be noted in Figures 1-17 which show large blocks of private land in the irrigable and low-lying, deep-soiled plains adjacent to the Snake River.

Intermittent private ownerships are generally associated with the livestock industry and occur where limited water, pasture and winter feed-lot facilities have been traditionally available.

Other private ownerships in the study area have developed in conjunction with mining, transportation, recreation, energy and a variety of other activities.

The following agencies have withdrawn lands from BLM jurisdiction:

(1) Bureau of Reclamation. The Reclamation Act of June 17, 1902, as amended and supplemented many times, was passed to provide for the reclamation of arid lands through the development of irrigation works by the United States. The actual occupancy and development of the lands was to be done by individual settlers under Reclamation Homesteads of not more than 160 acres. The BR is the administering agency.

In the study area there are five main projects initiated by the BR. Three projects have been constructed and are existing. These are:

(a) Minidoka Project extending from Burley down-river to Bliss. Several active divisions within the project have been constructed and developed. The developed lands have been patented under Reclamation Homesteads. There are approximately 35,355 acres of withdrawn lands remaining in the project.

(b) Boise Project located north of the Snake River from Boise to the state line. Most of the withdrawn lands were patented under Reclamation Homesteads. Approximately 2,658 acres of withdrawn lands remain.

(c) Owyhee Project in Idaho is located south of the Snake River from Marsing to the state line. Approximately 302 acres of withdrawn lands remain.

The Salmon Falls Project is an authorized but not constructed project located south of the Snake River from Milner Dam to Filer. Construction of the project was recently authorized and preconstruction planning studies are now underway. The BR and BLM are now studying suitable areas for wildlife habitat development and mitigation measures. Discussions are also being held on proposed pumping plant and penstock sites to insure that construction, placement and use of facilities are in locations having the least detrimental effect on the environment, cultural and historical values of the land. Approximately 7,595 acres are in proposed withdrawal I-841.

The Southwest Idaho Water Project is a planning project as it has not been authorized and no construction has taken place. It encompasses a large area from Bliss to the Weiser River Basin including approximately 190,354 acres of withdrawn land. Three main divisions within the project are located in the study area: Mountain Home Division, Bruneau Division and the Garden Valley Division. The Long Tom and Guffey Units are within the Mountain Home Division. The Initial Butte Unit is within the Garden Valley Division.

The possibility of the BR obtaining authorization for the Southwest Idaho Water Project, at least for the land within the study area, appears to be quite remote. Consideration is now being given by the BR to revoking the withdrawals within the study area. Most of these lands would then be subject to application under the public land laws, particularly the DLA.

The proposed Crane Falls Project lies south and in the vicinity of the Mountain Home Air Force Base and runs to the Snake River Canyon. The primary project purpose is to divert water from the C. J. Strike Reservoir to irrigate 10,200 acres of land. This land, of which 96% is NRL, is currently used for winter grazing of livestock. The primary significance of the area is its production of small mammals which are important as food for a large variety of raptors. This significance is exemplified by the Snake River Birds of Prey Natural Area, located approximately 15 miles downstream.

Opposition exists to the Crane Falls Project or similar agricultural developments that may be proposed adjacent to the Snake River in the vicinity of the Snake River Birds of Prey Natural Area. Development would cause substantial uncompensated damages to wildlife resources, seriously impair a natural functioning ecosystem and reduce the potential for expansion of the Snake River Birds of Prey Natural Area.[6]

(2) Geological Survey (USGS). Islands within and lands adjoining the Snake River are included within powersite classifications issued by the USGS. The exact acreage has not been computed. These lands probably lack suitability for agricultural development. Since they adjoin and parallel the Snake River, pumping stations or plants for irrigation may be constructed on the lands.

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[6]USDI, Fish and Wildlife Service Report to Idaho Department of Water Resources, Boise, Idaho, January 28, 1975.

(3) Federal Power Commission (FPC). Powersite withdrawals, powersite reserves, power projects and lands included in applications for licenses are all administered by the FPC as well as affected lands parallel and contiguous to the entire stretch of the Snake River from Burley to the state line. The acreage of land affected has not been computed. The lands as a whole probably lack suitability for agricultural development. The construction of irrigation pumping stations or plants adjoining the Snake River will probably affect such lands. The C. J. Strike Dam and reservoir was constructed under Power Project 2055. An application for license has been filed with the Commission affecting all the NRL along the Snake River from Grandview down river to Guffey Butte.

(4) Bureau of Sport Fisheries and Wildlife (BSF&W). Islands and other lands adjoining the Snake River from Burley to the state line are included in withdrawals or proposed withdrawals of the BSF&W. The C. J. Strike Wildlife Area north and northwest of Bruneau, Idaho involves approximately 3,042 acres of withdrawn land. The IF&GD is involved in the management of some of these lands. Most of the islands down river from Guffey Butte have been withdrawn as part of the Deer Flat Wildlife Refuge. Withdrawn lands probably lack suitability for agricultural development, their main value being for wildlife protection purposes. Some of the lands may be utilized for the construction of irrigation pumping stations or plants.

(5) Corps of Engineers (COE). Withdrawals made by the COE have been made on behalf of the Air Force. The Mountain Home Air Force Base and the Sailor Creek Gunnery Range are the main large tracts included in withdrawals. There should be no change made in the withdrawal status of these lands within the foreseeable future.

The COE has also been involved in the inclusion of large tracts of lands south of Boise in SLUP's for the Idaho National Guard. The lands are used for maneuver and field exercise areas by various National Guard units in Idaho and adjoining states during the summer.

b. Other Land Use. The land and other resources in the study area fill a large variety of uses. The following table and list will give the reader a view of the major uses in perspective. It should be noted that these uses overlap and interrelate with each other:

Table 8: Land Use by Major Categories in Study Area

USE	ACRES	%	COUNTY BY % USE
Grazing	2,438,000	54.0	Owyhee
Agriculture	1,863,000	41.0	Payette
Urban	80,500	2.0	Ada
Transportation	42,550	1.0	Canyon
Recreation	23,000	.6	Canyon
Military	59,800	1.4	Elmore

(1) Grazing. The principal grazing use is by cattle on a uniform basis throughout the study area. Sheep also rank high in importance, although the larger amount of sheep use occurs in the northern portion of the area.

Of lesser importance is rangeland use by domestic horses on a limited basis and by bees. The latter present a management problem in some situations, particularly during insect control projects. At one time turkeys were herded on rangeland in the Gooding-Jerome area.

(2) Agriculture. The unique combination of soil, water and climate has made the study area high in agricultural resources. There are few crops that are not adaptable to the area and many find higher yields and profits here than in any other place in the world.

(3) Urban Development. This is a relatively active use in the study area. To date most of the urban development has been confined to metropolitan Boise and Twin Falls.

(4) Transportation. The use is for highways, railroads and airfields. New rights-of-way needs are not being anticipated by transportation agencies.

(5) Communications. This use includes radio and television transmitter sites, microwave repeater stations and land telephone and cable lines. New development projections are unknown.

(6) Recreation. This includes hunting and fishing, off-road vehicle activity, rock-hounding, backpacking, picnicking, winter and water sports activities and visual esthetic enjoyment.

(7) Commercial and Industrial. Apart from that amount of commercial and industrial development that is related directly to the agricultural industry, there is a minimum of other commercial activity of any significance.

(8) Mining. The principal mineral value in the study area lies in sand and gravel deposits located on each side of the Snake River from Thousand Springs to the Oregon border. Some areas are classified as prospectively valuable for geothermal resources.

Metallic mineral resources in the region are generally associated with areas of igneous intrusion, particularly the Idaho batholith and Columbia River basalt. Virtually none of the study area is underlain by the batholith and none by the Columbia River basalt.

Gold placer mining has occurred at the mouths of several streams that drain through the region into the Snake River, e.g., King Hill, Canyon, Sailor, Browns, Shoofly, Castle and Reynolds Creeks.

Other minerals found in or near the region include unevaluated deposits of titanium, zirconium and hafnium, silica, sandstone, and a variety of gemstones such as petrified wood, opal and agate.

The Payette Formation and Idaho Group have shown traces of oil and gas. In the Payette-Weiser area one exploratory well reportedly yielded 75 million cubic feet of gas per day for a short period. Exploratory wells have been drilled in Payette, Canyon, Gem, Elmore and Owyhee Counties but with no commercial success.[7]

(9) Military. There are approximately 130,000 acres of military withdrawals in the study area for the Idaho Air Guard, Mountain Home Air Force Base and the Sailor Creek Gunnery Range.

(10) Energy. Present use includes power plant siting, power distribution stations and power transmission line rights-of-way.

(11) Cultural Value. Present use includes educational and research activities relating to archeology, biologic and physical sciences and esthetic and environmental studies.

(c). Rapid Land Use Change. In June 1972 the Soil Conservation Service (SCS) released results of a study conducted on the rapid land use changes each year in Idaho.[8]

It was shown that an average of 8,650 acres of cropland are converted each year into residential, commercial or recreational property. The counties where the highest acreages are converted each year are Canyon, Ada, Benewah and Bonneville.

It was also found that there are 18,930 acres of rangeland and woodland converted to cropland each year. The counties where these conversions occur are Bingham, Elmore, Clark, Ada, Gooding, Lincoln and Butte. All are located in the study area except Bingham, Clark and Butte Counties.

From this it can be shown that there is a 10,280-acre net increase in the amount of cropland in Idaho each year.

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[7]Adapted from Land and Mineral Resources, Appendix IV, Vol. 1, Comprehensive Framework Study of Water and Related Land, Columbia-North Pacific Region, Pacific Northwest River Basins Commission, June 1970. Also see "Geology and Mineral Resources of Ada and Canyon Counties," and "Geology and Minearl Resources of Gem and Payette Counties," County Report No. 3 and 4, Idaho Bureau of Mines and Geology. According to Monte Wilson, Boise State University Geologist, nothing similar has been done for Washington, Elmore or Owyhee Counties.

[8]USDA, Soil Conservation Service, Rapid Land Use Change, Idaho. June 1972.

d. New Land Irrigation Needs. The IDWR staff has a hydrology computer model of the Snake River Basin.[9] This model is being used to analyze alternative effects of projected major water uses on total water resources. Initially one alternative plan stresses economic development including irrigation of agricultural land. A second alternative plan emphasizes instream water uses including minimum stream maintenance flow for fish and wildlife, recreation and water quality.[10]

Ultimately a single plan will be developed consolidating most significant developments and instream needs that will best meet requirements of the general public as constrained by the availability of water resources.

For the purposes of this analysis we have reviewed the relationship of the NRL and desert land filings to preliminary projects of new land irrigation needs prepared for the Pacific Northwest River Basins Commission Comprehensive Joint Plan by the Federal-State Study Team. See Figure 21 for generalized locations of new land irrigation areas.[11]

Potentially irrigable NRL and desert land filings in the study area, as of September 30, 1974, related to areas identified by the Federal-State Study Team for new irrigation by 2020 are summarized in Table 9.

In the study area an estimated 573,000 acres of non-irrigated arable land could be irrigated by 2020 to meet projected food and fiber demands. In these generalized new irrigation areas BLM administers some 812,000 acres, of which about 433,000 acres are potentially irrigable Class 1 and Class 2 lands (based solely on soil characteristics). In the study area BLM has approximately 337,000 acres of desert land filings, with 135,000 acres falling in the generalized new land irrigation areas.

Sometime in 1975 the Federal-State Study Team will reach conclusions on minimum stream maintenance flows that will be included in the final Commission Comprehensive Joint Plan and the State Water Plan. This in turn may have considerable effect on the new irrigation projections and water supplies for new development in the study area. Flow requirements of the reaches located at the lower end of the highly developed Snake River plains may prove to be controlling factors in the Snake River Basin water planning.[12]

The growth rate for the study area should reflect a balance between development and environmental protection, and will probably involve somewhat less agricultural water use than the 2020 conditions described in the study prepared by COE for the IWRB.[13]

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[9]IWRB, Water Availability for Instream Flows, Snake River, Swan Falls-Hells Canyon Dam, April 1974.

[10]Federal-State Study Team, Pacific Northwest River Basins Commmission Comprehensive Joint Plan, Sub-Regions 4 and 5, November 1974 and January 1975.

[11]Ibid.

[12]IWRB, Water Availability for Instream Flows, Snake River, Swan Falls-Hells Canyon Dam, April 1974.

[13]Ibid.

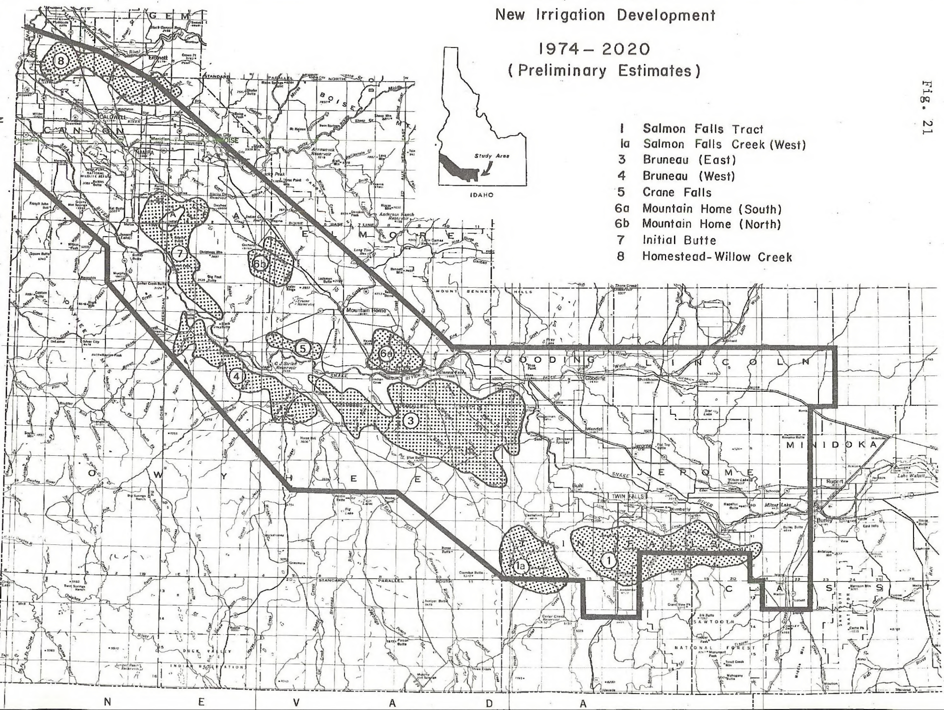
Proposed Areas of
New Irrigation Development
1974 – 2020
(Preliminary Estimates)
1 Salmon Falls Tract
1a Salmon Falls Creek (West)
3 Bruneau (East)
4 Bruneau (West)
5 Crane Falls
6a Mountain Home (South)
6b Mountain Home (North)
7 Initial Butte
8 Homestead-Willow Creek
Study Area
IDAHO
GEM
CANYON
BOISE
ELMORE
OWYHEE
GOODING
LINCOLN
JEROME
MINIDOKA
TWIN FALLS
CASSIA
OREGON
NEVADA
Mountain Home
Caldwell
Nampa
Boise
Emmett
Twin Falls
Rupert
Burley
Gooding
Jerome
Shoshone
Snake River

Fig. 21

Table 9

Potentially Irrigable National Resource Lands

	In area designated for new land irrigation by 2020 (Acres)	Outside areas designated for irrigation by 2020 (Acres)	Total (Acres)
BLM Land Area:			
Potentially Irrigable Class:			
Class 1	96,700	246,900	343,600
Class 2	336,500	402,800	739,300
Class 3	187,700	283,000	470,700
Other	54,800	110,200	165,000
Total Potentially Irrigable	675,700	1,042,900	1,718,600
Non-Irrigable Land	136,000	677,900	813,900
GRAND TOTAL	811,700	1,720,800	2,532,500
Desert Land Applications	91,540	157,980	249,520
Desert Land Entrys	19,100 1/	24,500 2/	43,600 3/
Carey Act Proposals	44,560 4/	39,080 5/	83,640 6/
Conflicting Areas	-20,260	-19,460	-39,720
TOTAL	134,940	202,100	337,040

1/ 360 acres in litigation
2/ 3,320 acres in litigation
3/ 3,680 acres in litigation
4/ 19,900 acres in conflict with DL App.
360 acres in conflict with DLE's
20,260

5/ 19,220 acres in conflict with DL App.
240 acres in conflict with DLE's
19,460

6/ 39,120 acres in conflict with DL App.
600 acres in conflict with DLE's
37,720

e. Summary of Patented DLE's in the Study Area. In 1971 a 10% random sample was taken of the total 326 DLE's patented in the last 10 years. They ranged in size from 40 acres to 720 acres and were found from Kimama to Parma. The average size was found to be approximately 327 acres. After arriving at each site, an inventory was made of water developments, fences, homes and other buildings. Present land use, beneficial and adverse effects, and special problems were noted as well as development of the surrounding area. All information can be found in Table 10.

It was found that 94% of the entries are under cultivation, 3% have been abandoned and 3% are beginning farming operations. Nearly all tracts were surrounded by agricultural or range land, with only 9% lying within 2 miles of commercial property. (With any expansion in these areas, it could be expected that these patented entries would be used for commercial, residential or recreational property.)

Over half of all the entries have fences, wells and some type of permanent irrigation system. Nearly one-fourth have homes, other buildings or reservoirs.

Approximately 36% have a moderate soil erosion problem due to wind and 3% have a severe problem. There is an obvious lack of windbreaks in the more recently developed areas. This erosion caused large areas to have very poor air quality when windy. These areas have very little cover for wildlife. There were also some local problems with odors and noise, especially surrounding the Mountain Home Air Force Base and near Burley.

There is a serious soil erosion problem on 3% of the tracts and 3% have a serious overgrazing problem. These problems are related to poor farming practices. Other problems, also possibly caused by poor practices, were found on 9% of the tracts. However, 15% had good farming practices with the remaining being average.

Eighty-eight percent (88%) of the tracts have had beneficial effects through increased revenues and production and/or an increase and improvement in wildlife habitat. Nine percent (9%) of the tracts were considered to have a more adverse than beneficial effect, either through erosion, overgrazing or general lack of attention.

f. Additional Information on Patented DLE's in the Study Area. The 1974 survey was conducted on randomly selected patented DLE's in the study area. Fifty-two percent (52%) of these occurred in areas having little or no pending DLA's In order to get a better understanding of the total picture, 21 other entries were arbitrarily selected in 1975 in areas having large amounts of pending DLA's. These were inventoried in the same manner as before and results are presented in Table 11.

It was found that 81% of the entries are presently under cultivation, with the remaining 19% in commercial, residential or recreational property. Our previous study showed 94% of the entries are presently under cultivation.

Table 10

Inventory of Desert Land Entries

	% of Total DLE's Sampled	Acres
ACCESS - Within ¼ Mile of a Gravel Road	63.3	
EROSION - None or Slight	60.6	
Moderate	36.4	
Severe	3.0	
PRESENT USE - 3/4 of Farm is Presently Being Cultivated	93.9	
Agricultural Land	94.9	10,220
Non-Agricultural Land	5.1	560
TYPE OF CROPS - Alfalfa		2,935
Grain		2,760
Row Crops		4,135
Pasture		380
Grapes		10
SURROUNDING AREA - Within 2 Miles of Commercial Property	9.1	
MAJOR WATER SOURCE - Well	75.8	
Canal	9.1	
River	15.1	
DETRIMENTS - Odors	3.0	
Noise	9.1	
Air Pollution	45.5	
IMPROVEMENTS - Fences	63.6	
Wells	51.5	
Houses	24.2	
Other Buildings	21.2	
Permanent Irrigation System	54.5	
Pumphouse	15.2	
Reservoir	21.2	
OVER-ALL EFFECTS - More Beneficial	87.9	
More Adverse	9.1	
FARMING PRACTICES - Good	45.5	
Poor	54.5	
SPECIAL PROBLEMS - Serious Erosion	3.0	
Serious Over-Grazing	3.0	

Table 11

Inventory of Additional Desert Land Entries

	% of Total DLE's Sampled	Acres
ACCESS - Within ¼ mile of a Gravel Road	61.9	
EROSION - None or Slight	85.7	
Moderate	10.5	
Severe	3.8	
PRESENT USE - 3/4 of Farm is Presently Being Cultivated	81.0	
Agricultural Land	83.0	6,940
Non-Agricultural	17.0	1,420
TYPE OF CROPS - Row Crops		1,580
Grain		3,680
Alfalfa		1,600
Pasture		80
SURROUNDING AREA - Within 2 Miles of Commercial Property	61.9	
MAJOR WATER SOURCE - Well	85.7	
Canal		
River		
DETRIMENTS - Noise	52.4	
SPECIAL PROBLEMS - Serious Erosion	10.5	
Excessive Noise	33.3	
FARMING PRACTICES - Good	70.0	
Poor	11.0	
IMPROVEMENTS - Fences	47.6	
Wells	66.7	
Houses	42.9	
Other Buildings	38.3	
Permament Irrigation System	42.9	
Reservoir	10.5	
OVER-ALL EFFECTS - More Beneficial	80.0	
More Adverse	20.0	

Unlike the first study in which only 9% of the tracts were within 2 miles of commercial property, this study revealed 62% were within 2 miles of commercial property. If the present rate of urban development continues, as we would expect, the areas would be taken out of agricultural production as they are converted to commercial, residential and recreational property.

Approximately 4% of the tracts have a serious soil erosion problem and nearly one-third have a noise problem. This usually stems from traffic along main highways or near the Mountain Home Air Force Base.

Either through increased revenue and productivity or an increase in wildlife habitat, or both, 80% of the DLE's have added to or enhanced the area and 20% have had an adverse impact on the environment and the surrounding community.

g. Geothermal Resource Leasing. Open NRL and most withdrawn lands administered by the Forest Service (FS) and the BLM and certain other agencies were opened to leasing under the terms of the Geothermal Steam Act of December 24, 1970 (84 Stat. 1566) on January 2, 1974. The leasing functions on behalf of the government are handled jointly by the BLM and the U. S. Geological Survey (USGS), with the assistance of such federal agencies as may have management responsibilities on lands applied for. Geothermal resources are broadly defined as heat which can be extracted from the earth and utilized for the production of power and byproducts which might be recovered in connection with the processes employed. Commonly the process involves drilling a deep well from which hot water or steam can be withdrawn and converted to electric power. Various exploration techniques will probably be employed to locate favorable areas, following which exploration wells may be drilled with the prospect of achieving a producible well.

Where production is found possible, several wells in the concentration of 1 on each 40-acre tract would be necessary to justify the construction of a generating plant. Because the hot fluids or steam cannot be piped very far without losing excessive heat, a steam plant would have to be constructed to collect the output from all the wells on approximately 640 acres.

As of June 30, 1975 there have been 25 leases issued for a total of 44,210.76 acres of NRL.

Lease applications involve the study as follows:

(1) Approximately 5 sections of land north of Hammett and west of King Hill.

(2) The approximate equivalent of 5 townships of land in the vicinity of Bruneau, south of the Snake River, including land around the Bruneau arm of C. J. Strike Reservoir, and continuing up the Bruneau River for approximately 20 miles.

(3) The equivalent of approximately 4 townships of land south of the Snake River and southwest and northwest of Grandview.

(4) Ten sections near Murphy and 12 sections on and adjacent to Sinker Creek southeast of Murphy.

(5) The approximate equivalent of 1 township of land situated northeast of Parma.

Geothermal leases will not segregate lands from subsequent approval of DLE's on the same ground. However, if a geothermal field were to be discovered, the USGS, which has jurisdiction over the conservation of the geothermal resource, could recommend cancellation of DLA's on the basis that desert land development would unduly interfere with the recovery of geothermal resources. Where DLA's are made on lands which possess proven geothermal values, there may be compatible and simultaneous agricultural use with the exception, however, of the obvious conflict on land tracts occupied by geothermal facilities such as plants, pipelines and wells.

6. Energy

a. Types of Energy Used for Agricultural Production. Until 1949 nearly all irrigated lands in Idaho and the study area were irrigated by gravity flow. At that time there were only 132,000 acres dependent on electrical power in the state. Since that time the development of efficient high lift pumps and high pressure sprinkling systems has encouraged the development of new farm lands and the conversion to sprinkler irrigation of many irrigated and dry farms. According to an Idaho Power Company publication "Load and Resource Planning 1975," an average of 50,000 or more acres per year (until 1974) has been added to the Idaho Power electric pumping load. At that time 1,390,565 acres were dependent on electric pumping. Most predictions indicate that this trend will continue into the foreseeable future.

In addition to the use of electric energy, the production of agricultural crops also entails the use of significant amounts of petroleum products (gasoline and diesel). Estimates of typical energy use for typical farm operations are contained in this section.

b. Electrical Energy Demand and Consumption for Irrigation. Although other private, governmental and quasi-governmental power entities provide (directly and indirectly) electrical power for agricultural production within the study area, the amounts are very minor and are not significant to the point that they warrant inclusion in this discussion. The electrical resources and capability for agricultural production are, therefore, limited in this section to those of the Idaho Power Company.

Idaho Power Company is a member of the Northwest Power Pool and the Western Systems Coordinating Council. Through agreements, transmission systems and interconnections with other Northwest utilities, Idaho Power is able to buy surplus power, as well as to exchange capacity and bulk power with other members of the pool. Idaho Power Company peak demands and loads occur in the summer time due to irrigation and air conditioning (1974 total peak load was approximately 1,700,000 kw). Idaho Power irrigation load has grown continuously since World War II. In 1949 only 132,259 acres were irrigated with 1,903 pumps. As of 1974, 11,854 irrigation pumps were operating which irrigated 1,390,565 acres and consumed 1,382,498,110 kwh.[14]

Table 12. Annual kwh Consumed by Customer Class

Customer	1974	1973	1972	1971
Residential	1,927,319,640	1,765,308,890	1,602,617,490	1,096,762,020
Commercial-Small	1,146,369,700	1,103,677,250	1,019,444,960	976,035,950
Commercial-Large		2,856,140,140	3,242,540,240	2,862,528,520
Irrigation	1,382,498,110	1,132,365,820	995,347,040	892,561,790
Street Lighting	19,105,880	18,615,940	17,691,730	17,381,560
Gen Bus Total		6,876,108,040	6,877,641,460	6,211,393,540
Resale to P U		1,925,465,128	3,003,210,093	2,799,019,209
TOTAL-ALL		8,801,573,168	9,880,851,553	9,010,412,749

During 1971-1974 Idaho Power had 300,000 acres of new electrical-powered sprinkler systems added to its system load. Total electrical demand for irrigation increased during that period by about 500,000,000 kwh. Additionally, Idaho Power had requests for irrigation pumping for 1975 totaling more than the average of those 4 years.

c. Existing System Capability. The index of principal hydropower plants[15] indicates Idaho Power maximum system capacity to 1,494,700 kw. It is important, however, to recognize that this capacity is installed capacity which can vary greatly from actual capacity which is subject to water flows and water flow regulation. An additional 500,000 kw coal-fired steam unit near Rock Springs, Wyoming has been in commercial operation since August of 1974. Idaho Power also has two emergency standby units; a 50,000 kw combustion turbine at Hailey, Idaho, and a 6,000 kw diesel capacity near Salmon, Idaho. Theoretically, then, the system is capable of generating in excess of 2,000,000 kw. Again it must be kept in mind that the system's peak occurs in the summer when regulation and diversions of the Snake River for irrigation purposes can have significant effect on generating capability.

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[14]Idaho Power Publication, Load and Resource Planning 1975 through 1985, 1975; Idaho Power Publication, 1973 Annual Report, 1973.

[15]Idaho Power Company, 1973 Annual Report.

d. Planned Future Capability. Idaho Power predictions for future load growth indicate the following proposed construction schedule for required capacity to serve peak load with prudent reserve.

1978	American Falls	63,000 kw
1979	Jim Bridger #4	167,000 kw
1981	Pioneer #1	500,000 kw
1983	Pioneer #2	500,000 kw

e. Future Needs for Electricity for Irrigation Purposes. Areas in the Snake River Basin of southern Idaho where future irrigation development will more logically occur contain large acreages of BLM NRL. BLM presently has about 1,100 unallowed DLA's pending in southern Idaho embracing about 352,000 acres. Additionally, the state has applied for temporary withdrawal of some 224,000 acres under the CA for irrigation development. Some of this acreage overlaps, and in total there are about 452,000 acres of NRL pending under the CA and DLA. More specifically, about 80% of the lands under application lie within the study area generally adjacent to the Snake River in the reach from Twin Falls downstream to Payette.

If all of the proposed irrigation projects were to reach fruition, about 80% would be dependent upon high lift pumping from the Snake and the remaining 20% dependent on ground water pumping.

The typical high lift pumping irrigation project requires a cooperative water development system because of extraordinarily high initial installation costs. Typical of the more recent high lift irrigation development plans is one that includes a river pumping station with twenty-three 1500 hp electrical pump motors and 31 booster pumps with 100 to 1,200 hp motors.

Detailed engineering studies by consulting firms, other studies, and some estimates derived from average farm operations and typical crop rotation indicate typical high lift annual pumping power and fuel requirements for a 320 acre farm to be:

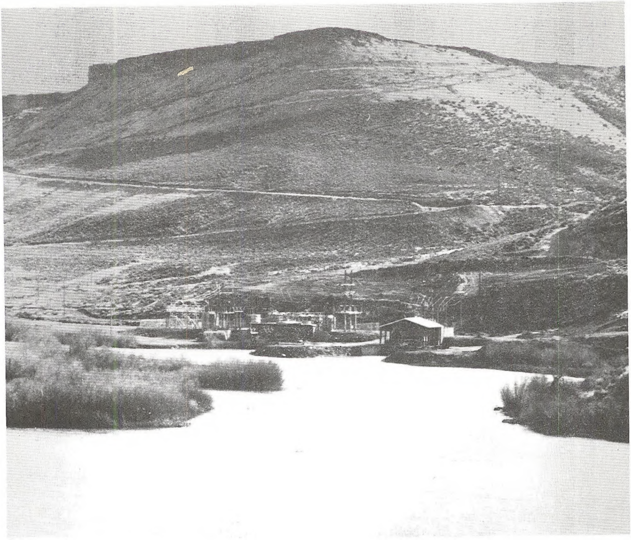
6,600 gallons diesel
600,000 kwh
1,500 gallons gasoline

Studies and estimates indicate ground water pumping power and fuel requirements:

120,000 kwh
1,500 gallons gasoline

Total annual energy requirements for development of the entire area proposed on NRL would approximate:

80% x 452,000 = 362,000 320 = 1,131 x 600,000 kwh = 679,000,000 kwh
20% x 452,000 = 90,000 320 = 281 x 120,000 kwh = 33,720,000 kwh



A pumping station on the Snake River which supplies water necessary to irrigate the Sailor Creek and Grindstone Butte projects. The twenty 1500-horsepower pumps lift water through large penstocks to the plateau some 400' above the river. The water is then transported to agricultural lands via canals and pipelines. These tracts may be as far as 10 miles from the river.

Total electrical power high lift & ground water pumping = 712,720,000 kwh

6,600 x 1412 = 9,319,200 gallons diesel
1,500 x 1412 = 2,118,000 gallons gasoline

In addition to energy required for development of new farms on NRL, additional electrical demand will be forthcoming for the conversion of existing gravity irrigation farms and dry farms to high pressure sprinkling systems. Of the 50,000 acres added annually to Idaho's pumping/sprinkling power load, about 20,000 acres have entailed conversion of NRL to intensive agricultural production. The remaining 30,000 acres have involved primarily the conversion from gravity to sprinkler and the development of wells and sprinkling systems on dry farms.

There are no readily available sources which indicate the percentage of increased electrical demand attributable to these types of conversion to sprinkler irrigation. The U. S. Soil Conservation Service (SCS) in its Land Measure Function for the Pacific Northwest River Basin Commission Coordinated Comprehensive Joint Plan has estimated that conversion to sprinkling from present surface methods requires about 275 kwh per AF of water per acre. The SCS has also estimated that an average water requirement necessary to successfully produce a crop is 3½ AF of water per acre. (See also "Hydrologic Cycle" page III-1.)

Additional annual energy requirement attributable to these conversions:

275 x 3.5 = 396 kwh per acre x 30,000 acres = 28,890,000 kwh.

(1) High Lift Pumping. Cost of high lift pumping operations vary and we have no actual costs at this time. A feasibility study of the Mountain View Irrigation Project by Chronic and Associates dated January 1973 showed the following:

Table 13. Total Power Demand

	Phase I	Phase II
April	76,267	77,332
May	2,122,160	2,158,440
June	5,904,650	6,007,540
July	10,315,850	10,496,330
August	7,215,630	7,341,650
Sept. 1-15	1,550,420	1,576,860
Sept. 15-Oct. 1	1,536,020	1,562,460
Oct. 1-15	3,003	3,054
	28,724,000 kwh	29,223,666 kwh

Total Annual Use 57,947,666 kwh.

Of the 29,900 acres included in the study, 24,600 acres were irrigable and represented about 93 DLE's which would average over 620,000 kwh use annually per entry.

A similar feasibility study of the Bell Rapids Irrigation Project done in 1967 estimated annual power use at 42,972,000 kwh. For 21,000 acres and about 65 DLE's, use per entry would average over 660,000 kwh annually.

(2) Well Irrigation. Power requirements of well irrigation system vary with the depth of well, power source, irrigation method, etc. Studies indicate an efficiency of 10.94 water horsepower (whp) hours per gallon of diesel, 8.66 whp hours per gallon of gasoline, and a .885 whp hours per kwh. In southwestern Idaho electricity is the most common power source. For a 400-acre farm two 200 hp pumps run an average of 2,340 hours annually. The most common cash crops grown on DLE's require 2.5 to 3 AF of water per acre. About 130 kwh are required to pump one AF or 400 kwh for 3 AF. A 320-acre DLE would, therefore, require about 120,000 kwh annually on the average.

(3) Farm Operations. For land typically included in DLE's a crop rotation is required to assure continued production over time. A crop rotation that includes a soil building crop at least 2 years out of a 7-year sequence is required. (Some rotations include soil building two years out of five.) Commonly, barley is planted as a nurse crop for the soil building alfalfa crop in conjunction with cash crops of potatoes, beets or beans. A typical 320-acre DLE would include about 300 acres of irrigable land. A representative rotation acreage would include on the average: barley, 13%; alfalfa, 29%; beans, 29%; and potatoes, 29%. Fuel consumption for farm operations in each rotation is estimated as follows:

Crop	Fuel Used (Gallons)
Barley	
Clearing (Brushland plow, rake)	3.0
Plow	3.0
Leveling 2 times	3.0
Disk	0.6
Harrow 2 times	1.25
Drill	1.5
Weed Spray (custom)	0.31
Harvest (custom)	1.2
	13.86 per acre
Alfalfa (following Barley)	
Stand Establishment	1.25
Fertilizer (custom)	0.63
Swathing (custom) 3 times	3.6
Baling 3 times	10.5
	28.58 per acre

Potatoes

Spray Hay	0.43
Plow/Disk	3.0
Harrow 2 times	1.0
Plant	3.5
Fertilize (custom)	0.63
Cultivate 2 times	3.0
Spray (custom) 3 times	0.95
Roll	0.51
Roto Beat	2.1
Harvest (custom)	4.9
	20.02 per acre

Beans

Plow	3.0
Disk	0.9
Harrow 4 times	2.0
Float	3.0
Seedbed preparation	1.5
Plant	2.4
Cultivate 3 times	3.75
Cut	1.2
Rake	1.05
Harvest (custom)	3.5
	22.30 per acre

Incidental fuel use would include:

Automobile 9,000 miles @ 13 mpg = 692 gallons gasoline
Pickup 5,000 miles @ 10 mpg = 500 gallons gasoline
Truck 2,000 miles @ 6 mpg = 333 gallons gasoline

Total fuel consumption for this farm enterprise can be estimated as follows:

Barley 13% x 300 acres = 39 acres x 14 gal = 546 gallons diesel
Alfalfa 29% x 300 acres = 87 acres x 28 gal = 2,436 gallons diesel
Potatoes 29% x 300 acres = 87 acres x 20 gal = 1,740 gallons diesel
Beans 29% x 300 acres = 87 acres x 22 gal = 1,914 gallons diesel
Vehicle use per entry = 1,525 gallons gasoline

Total per 320-acre farm: 6,636 gallons diesel fuel
1,525 gallons gasoline

B. Living Components

1. Vegetation (aquatic). Aquatic plants are a basic and vital component of aquatic ecosystems because they are the very beginning of the food chain. Together with sunlight they can fix biochemical energy and synthesize basic organic substances. Aquatic plants of various kinds

provide the food and cover for many aquatic organisms and higher animals. Insects, other invertebrates, fish waterfowl, fur bearers, big game and non-game birds and animals all can utilize aquatic plants. In addition, the growth of aquatic vegetation along stream banks, stable reservoirs and natural lakes additionally help prevent soil erosion and contribute to the natural beauty of the area (BLM Oregon, 1973).

Throughout the Snake River study area aquatic plants of all common types grow in nearly all the waters under consideration. Growth depends on suitable temperature, water depth and movement, the available nutrients, salinity, light for photosynthesis, and sufficient time with all these factors for growth and reproduction. Types of aquatic vegetation may vary from that occurring in a running (lotic) or a standing (centic) water habitat. The small streams entering the study area that have steep gradients, clear water and a lower concentration of nutrients have less aquatic vegetation than other types of waters in the study area. The lower ends of stream systems usually are slower moving, have warmer water and a heavy concentration of nutrients and may produce an abundance of various types of aquatic vegetation.

The portion of the Snake River behind dams and reservoirs and some of the adjacent ponds, lakes, marshes and bogs make up the standing water habitat in the Snake River study area. These standing bodies of water usually produce a greater variety and more abundant growth of vegetation. Most of the reservoirs and lakes found in the study area contain fairly high amounts of nutrients even though the reservoirs are flushed each year during their use for irrigation. Because of the extensive agricultural, industrial and domestic wastes that enter the upper portion of the Snake River system, many portions of the Snake River and tributaries have enormous biological productivity from the nutrients in the water.

The aquatic plants found in the main Snake River, mainstem reservoirs, tributary streams and offsite lakes and reservoirs are usually grouped into 3 general categories--floating, submersed and immersed. Representative plant species in the study area that are widespread are listed in Table 14.

Aquatic plants tend to grow in communities according to water depth and turbidity which are probably the major habitat requirements for most species. In aquatic ecosystems, some plants occur in open water, others occupy the shoreline zone and different species grow along the shores of lakes and banks of rivers (riparian vegetation). This tendency is highly visible in the study area.

Plant communities in standing water environments that are not subject to violent fluctuation of water are constantly changing due to natural processes. Shoal areas, for example, are developed by sedimentation from shore erosion and influx from tributary streams and agricultural operations. Rooted vegetation then grows on the shoals and contributes to filling the shorelines of the reservoirs and lakes by retaining debris and sediment. As more nutrients are added to the waters, dense growths

Table 14

Aquatic Plants Found in Main Snake River

FLOATING	SUBMERSED	IMMERSED
green & blue algae	stone wart (Chara)	cattail (Typha)
duckweed (Lemna) (Spirodela)	bladder wart (Utricularia)	bull rush (Scirpus)
watershield (Brasenia)	pond weed (Potamogeton)	yellow cress (Rorippa)
pond lily (Nuphar)	horn wart (Ceratophyllum)	buttercup (Ranunculus)
floating pond weed (Potamogeton)	water milfoil (Myriophyllum)	bur-reed (Sparganium)
	water buttercup (Ranunculus)	water persicaria (Polygonum)
	mares tail (Hippuris)	water plantain (Alisma)
	elodea (Elodea)	arrowhead (Saggitaria)
		sedge (Carex)
		spike rush (Eleocharis)
		horsetail (Equisetum)
		cyperus (Cyperus)
		rush (Juncus)
		mannagrass (Glyceria)
		common reed (Phargmites)
		slough grass (Beckmannia)
		reed canary grass (Phalaris)

of emergent plants can extend outward from shore. This is particularly noticeable in overflow and standing water areas and backwaters of reservoirs in the Snake River study area. As the dead plant material accumulates, the shoreline is further filled. In some of the standing water areas along the Snake River, succession is an important factor in gradual conversion of water bodies to land. Normally this is a long-term process but can be accelerated by excessive amounts of silt, nutrients, and good growing conditions (BLM Oregon, 1973 Timber EIS).

The Snake River and some of the tributaries in the study area have annual extensive blooms of algae that thrive on the nutrients in the water. The blooms are normally associated with extensive fish kills. Heavy algae blooms causing depleted oxygen supplies have been declared responsible for fish kills in several areas of the Snake and especially in Milner Reservoir (EPA, 1973). Excessive algae also causes high water turbidity and decreases the esthetic value of recreation water areas. Free floating and unrooted aquatic vegetation can cause serious problems to irrigationists in pumping operations and in water diversions. Rooted aquatics and filamentous algae are a constant source of problems in irrigation canals and ditches (USBR, 1965). IF&GD studies of the Snake River area found that large mouth bass were found predominately in mud and rock areas with brush or tree overhang and a vegetative water cover. Fewest game fish were captured on shallow, sloping beaches with mud or sand bottom and no cover. Habitat of this type was usually populated by non-game fish (Gibson, 1974).

It can be seen that even in the mainstem of the Snake River, in both the fast and slow moving sections, riparian aquatic vegetation has value for bank stability and as food and cover for wildlife both terrestrial and aquatic. This is particularly true of the smaller tributary streams entering the river.

Even though algae has wide distribution in the water system, it can be beneficial or disastrous to the fish populations. As a primary source of energy, it is absolutely necessary for life of aquatic organisms; yet, in abundance with an oversupply of nutrients, it can remove essential, dissolved oxygen from the water and destroy aquatic organisms.

2. Vegetation (terrestrial).

a. Identification. Many terrestrial plants such as willow, alder, cottonwood and a variety of shrubs are indigenous to the study area. Quaking aspen, Populus tremuloides, is also an important tall growing species found in riparian vegetation that protects streams from the direct rays of the sun in the summer months to reduce critical water temperatures.

Riparian or streamside vegetation forms a network throughout the study area along small tributary streams and the wetted zone and islands on the mainstem of the Snake River. Riparian vegetation varies considerably depending whether annual flooding occurs or whether streams are normally confined to their banks. Where flooding occurs, important species can be red alder (Alnus rubra), black cottonwood (Populus trichocarpa), aspen (Populus tremuloides) and willow (Salix spp). IF&GD studies on the mainstem of the Snake River have documented the importance of riparian vegetation (Gibson, 1974).

The present quality of riparian vegetation in the study area (the tributaries and mainstem Snake River) have not been studied in detail. Condition of the riparian vegetation varies with use of adjacent lands. There is a tendency in heavy agricultural areas to eliminate the vegetation along ditches and some stream banks as part of clean farming practices. Most streams and canyons are usually not affected by this practice and riparian vegetation is usually in better condition.

The small streams and canyons, however, are usually used heavily for livestock grazing or winter use by big game animals. Riparian vegetation can be completely eliminated or seriously harmed through overgrazing. Riparian vegetation provides cover and stream protection for aquatic organisms and fish (Lorz, 1974). In addition to aquatic animal protection, riparian vegetation is important for song birds, upland birds and raptors, small mammals and other wildlife in the study area.

The study area falls within the sagebrush-grass ecosystem with a precipitation range of 8 to 10" which occurs mostly in the spring, fall and winter, with the area along the Snake River receiving the least precipitation.

Early records indicate that much of the area was once covered with lush bunchgrasses such as bluebunch wheatgrass (Agropyron spicatum) and Thurber needlegrass (Stipa thurbereana) along with some sagebrush (Artemisia spp) and winter fat (Eurotia lanata) with winter fat being confined to the heavier soils.

Heavy use by livestock, especially during the spring period, and indiscriminate use of fire to remove old growth, led to the establishment of the present vegetative cover. This cover consists, principally, of big sagebrush (Artemisia tridentata) and cheatgrass (Bromus tectorum). Cheatgrass is an annual grass which began invading many of the overgrazed ranges before 1910.

On the heavier soils and on soils with a high salt content, shadscale (Atriplex confertifolia) has replaced winter fat which is now limited to a small area south of Boise.

Plants occur in many different associations within the sagebrush-grass ecosystem. These associations are referred to as vegetative types depending upon which plants or groups of plants appear to be most abundant in the stand. The vegetative types within the area are shown in Figure 22.

As can be seen from Figure 22 vegetation within the area is mostly solid stands of cheatgrass and/or sagebrush.

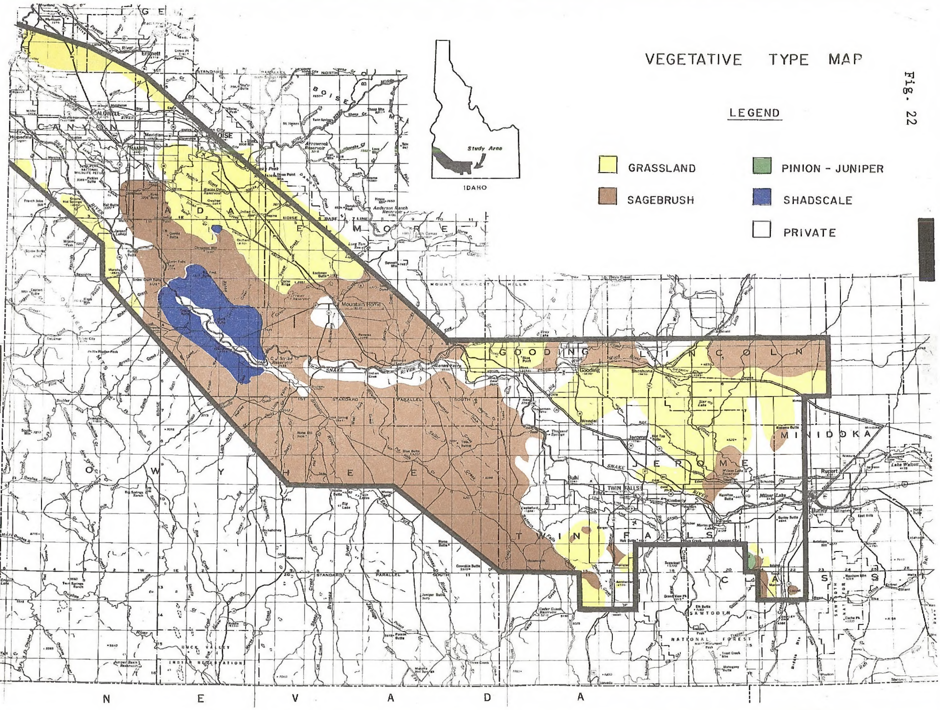

VEGETATIVE TYPE MAP
LEGEND
GRASSLAND
SAGEBRUSH
PINION - JUNIPER
SHADSCALE
PRIVATE
Study Area
IDAHO
CANYON
ADA
ELMORE
OWYHEE
GOODING
LINCOLN
JEROME
MINIDOKA
TWIN FALLS
CASSIA
NEVADA
BOISE
CALDWELL
NAMPA
Mountain Home
SNAKE RIVER
C.J. Strike Reservoir
Gooding
Shoshone
Jerome
TWIN FALLS
Burley
Rupert

Fig. 22

Three varieties of big sagebrush can be found within the study area--mountain big sagebrush (A. tridentata subsp. vaseyana), Wyoming big sagebrush (A. tridentata subsp. wyomingensis), and basin big sagebrush (A. tridentata subsp. tridentata).[16]

Basin big sagebrush grows on deep, well drained soils of the lower foothills and valley bottoms and has, therefore, suffered the greatest inroads by agriculture.[17] This is also the area which has been used heaviest by livestock and frequently covered by fire.

Areas where the perennial vegetative cover has been depleted by fire or overgrazing are often reseeded with crested wheatgrass (Agropyron cristatum) in an effort to quickly establish a perennial vegetative cover. These areas are also prime agricultural development areas and are often taken up by DLE's at the first opportunity. Attempts to improve wildlife habitat by seeding browse species with the grass species have often failed and the area is left with a cover of only one species. Although this provides adequate protection for the watershed and an abundance of livestock forage, it provides little in the way of wildlife habitat.

A list of the plant species found within the study area, grouped by family is shown in Appendix IV. Three species on the endangered or threatened plant list--Henderson's desert parsley (Lomatium hendersonii), loco weed (Astragalus comptopus), and pepper grass (Lepidium montanum var. vopilliferum)--have been identified within the study area. Another species, winter fat (Eurotia lanata), once abundant in the study area, has been depleted and now occurs in pure stands on only 8,200 acres and as a minor species on another 48,800 acres. Both areas are in the vicinity of Swan Falls north of the Snake River.

3. Animals (aquatic). The Snake River from the Oregon-Idaho border near Homedale upstream to Burley, Idaho represents a very diverse habitat for aquatic animals and organisms. The area has been significantly changed by man through the construction of major dams forming reservoirs in the river and by diversion of water for irrigation purposes. Major sources of agricultural, municipal and industrial pollution have also modified the aquatic habitat.

a. Fish. Originally this section of the river contained anadromous fish that migrated up the Columbia River system as far as Shoshone Falls in our region. Primarily these were Chinook Salmon (Oncorhynchus tshawytscha) and steelhead (Salmo gairdneri). Other Pacific salmon may have been present. With the construction of Swan Falls Dam in 1906, the first man-made blockage to anadromous fish into the Snake River occurred.

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[16] E. W. Tisdale; M.A. Fosbert; and M. Hironaka, The Sagebrush Region in Idaho, Bulletin 512 Agricultural Experiment Station, University of Idaho, 1969.

[17] Ed Chaney, The Sagebrush-Grass Ecosystems, Description of the Existing Environment, Boise District, BLM, October 15, 1974.

With the construction of Brownlee Dam starting in 1955 and completed in 1958, all anadromous species were eventually eliminated from the study area (C-NP, Appendix XIV, 1971). Some of the Pacific salmon such as kokanee (Oncorhynchus nerka), which is the land-locked form of the sockeye salmon, and coho (Oncorhynchus kisutch) have been stocked in the Snake River System. Kokanee have been stocked in Salmon Falls Reservoir on Salmon Falls Creek and coho in Lake Walcott, the reservoir behind Minidoka Dam (IF&GD, 1974).

With the construction of the dams and the forming of reservoirs in the main Snake River, much of the free flowing habitat of the river has been replaced with lake-like situations. Initially these reservoirs supported substantial populations of game fish, but after a few years the productivity declined and the biomass converted into species that are not presently popular for angling. Studies have been conducted in this section of the river by the IF&GD. The free flowing sections of the Snake River from the Guffey damsite downstream to the Oregon-Idaho border show that game fish densities and species diversities are much higher than the mainstem reservoirs. The free flowing sections of the Snake River appear to be excellent spawning and rearing areas for smallmouth bass. Rainbow trout are stocked annually in this section of the river, but the fish seem to prefer the tailwater areas below the dams and natural springs (IF&GD, 1971-74).

The fish populations remaining in the study area are a combination of native and introduced species (see Appendix V). The present native species remaining from the original populations are small numbers of rainbow and cutthroat trout. Most stocks have been diluted by introductions of hatchery fish. Other native species are mountain whitefish, white sturgeon, bridgelip and large scale suckers (the original suckers above Shoshone Falls), northern squawfish, Utah chub, peamouth, tench, chiselmouth, redside shiner, dace and various sculpins. Introduced species in the study area are various strains of rainbow trout, brown trout, coho salmon, kokanee, yellow perch, smallmouth bass, largemouth bass, black crappie, white crappie, bluegill sunfish, pumpkinseed sunfish, warmouth, channel catfish, flathead catfish, bullhead catfish, carp and Tui chub.

Certain species of fish have been declared game fish by Idaho law. Some of these include all the trout, introduced species of salmon, warm water fish such as yellow perch, smallmouth bass, largemouth bass, black crappie, white crappie, bluegill sunfish, pumpkinseed sunfish, warmouth, channel catfish, flathead catfish and the bullhead catfish, white sturgeon and mountain whitefish.

Fish population studies show that many of the non-game species have thrived in the reservoirs of the mainstem Snake. Many of these are native species such as the suckers and squawfish. The habitat has been extremely beneficial to introduced species such as carp.

The trouts and whitefish and other salmonoids require cold water temperatures below 70° F. They also require better water quality than some of the non-game species. Some resident trout, whitefish and suckers require seasonal intrastream migrations. The migrations can be a critical requirement of some species. Young trout and whitefish are primarily insect feeders; however, as they grow and become larger they feed on a greater variety of organisms. An abundant population of salmonoid fish is therefore dependent upon a healthy food chain consisting of many small animals that feed on aquatic plants. Good quality water and habitat conditions are essential to maintain their food chain and habitat (BLM, 1973) (Appendix VI).

Spiney-ray fish, sometimes called warm water game fish, were introduced into the West in the late 19th century. These introduced species now contribute to the major catch in the Snake River system in the study area. Species such as crappie, smallmouth bass, largemouth bass and bullhead catfish are especially important in the catch. These species can exist and even require warmer water temperatures for reproduction. The water temperatures favored for reproduction are in the range of 75^{o} to 85^{o} F. They are also more tolerant to adverse habitat conditions than the trouts and salmon; e.g., lower dissolved oxygen concentrations and increased turbidity. Most of the warm water species do not require gravel and flowing water to build nests for eggs and are, therefore, more prolific in the section of the Snake River under study. Because they thrive in a wide range of habitat conditions, these fish provide high recreation in the various aquatic habitats of the Snake River study area.

A diverse population of resident species such as the suckers, dace, sculpins, squawfish, chiselmouth and chubs provide the great biomass in the river. Introduced species like the carp add substantially to the biomass. The population studies at Swan Falls Reservoir show that 94.5% of the population collected were non-game fish (Goodnight 1972).

Many native species such as shiners, suckers, squawfish and the introduced carp do cause serious problems for fishery managers that must produce populations popular to sport anglers. Many are particularly adapted to reservoir habitat or slow moving rivers and tend to "explode" and form the major biomass produced by any body of water. Some of these problems are now present in the mainstem Snake River in the study area. Table 15 is a listing of the various habitat types sampled for fish populations in the study area by IF&GD. The relationship of game to non-game fish in the mainstem Snake River in the study area is presented in Table 16.

The white sturgeon (<u>Acipenser transmontanus</u>) is considered an endangered species in this section of Idaho (Miller, 1972). Successful reproduction of sturgeon in the area is documented by the occurrence of yearling sturgeon in the Swan Falls to Guffey reach of the Snake River. The existence of a viable, reproducing population is of great importance in protection of native species within Idaho. This reach of the river is then one of the two known remaining areas of the Snake River where significant reproduction of sturgeon is apparent. The other area is the

Table 15

Fish population study locations in the Snake River from the Oregon-Idaho border to Burley, Idaho

Section I.	Oregon border upstream to Guffey damsite	
Section II.	Guffey damsite to Grand View	
	subsection a.	Guffey Butte - Swan Falls Dam
	subsection b.	Swan Falls Reservoir
	subsection c.	Swan Falls backwater to Grand View
Section III.	Grand View to backwater of C. J. Strike Reservoir	
	subsection a.	Grand View to C. J. Strike Dam
	subsection b.	C. J. Strike Reservoir
Section IV.	Backwater C. J. Strike Reservoir to upper Salmon Falls Dam	
Section V.	Upper Salmon Falls Dam to Burley	
	subsection a.	Upper Salmon Falls Dam to Shoshone Falls
	subsection b.	Shoshone Falls to Burley

(IF&GD, 1971-74)

Hells Canyon area of the Snake (Reid, 1973). The red-banded trout (Salmo sp.) is an undescribed species probably originally found in the Owyhee River drainage, Wood River drainage and other streams tributary to the upper Snake River. It is now rare or extinct in Idaho (Wallace, 1975). Table 17 is a checklist of fish distribution in the Snake River study area as determined by IF&GD sampling and creel census (IF&GD, 1971-74).

Table 16

Relationship of game to non-game fish in the mainstem Snake River as determined by fish population studies of IF&GD, 1971-1974.

Section I.	Oregon border to Guffey Damsite		
	Non-game Fish		71.1%
	Game Fish		28.9%
Section II.	Guffey Damsite to Grand View		
	subsection a. Below Swan Falls		
	Non-game Fish		82.2%
	Game Fish		17.8%
	subsection b. Swan Falls Reservoir		
	Non-Game Fish		94.5%
	Game Fish		5.5%
	subsection c. From Swan Falls backwater to Grand View		
	Non-Game Fish		88.7%
	Game Fish		11.3%
Section III.	Grand View to backwater of C. J. Strike Reservoir		
	subsection a. Grand View to C. J. Strike Dam		
	No data		
	subsection b. C. J. Strike Reservoir		
	Bruneau arm	Non-game Fish	39.9%
		Game Fish	60.1%
	Snake arm	Non-game Fish	56.1%
		Game Fish	43.9%
	Main Reservoir	Non-game Fish	22.0%
		Game Fish	78.0%

b. Aquatic Organisms

(1) Molluscs. No known significant studies or inventories have been made of the molluscs in the study area of the Snake River. Freshwater clams and snails are considered to be an important part of the food chain of many aquatic organisms and higher animals such as fish. Molluscs also are important hosts of a variety of parasites. Various species of molluscs are usually specific to running or impounded water habitat. The diverse Snake River provides a variety of habitat and it is expected that the more common forms of snails and clams would be present. The moving portions of the Snake River contain what appear to

Table 17

Fish Distribution in the Snake River Study Area as Determined by Idaho Fish and Game Sampling and Creel Census (IF&GD 1971-74)

Species distribution by section

No.	Common name	Scientific name	SEC I	SECTION II			SEC III		SEC IV	SEC V	
				A	B	C	A	B	A	A	B
1.	Rainbow Trout	Salmo gairdneri		x		x	x	x	x	x	x
2.	Brown Trout	Salmo trutta								x	x
3.	Cutthroat Trout	Salmo clarki species									x
4.	Coho Salmon	Oncorhynchus kisutch									x
5.	Red Salmon (Kokanee)	Oncorhynchus nerka									
6.	Yellow Perch	Perca flavescens				x	x	x	x	x	
7.	Smallmouth Bass	Micropterus coosae	x	x			x				
8.	Largemouth Bass	Micropterus salmoides	x	x		x	x	x	x	x	
9.	Black Crappie	Pomoxis nigromaculatus	x	x	x	x	x	x	x	x	x
10.	White Crappie	Pomoxis annularis									
11.	Bluegill Sunfish	Lepomis macrochirus	x	x		x	x	x	x	x	
12.	Pumpkinseed Sunfish	Lepomis gibbosus	x			x		x	x	x	
13.	Warmouth	Lepomis gulosus	x								
14.	Mountain Whitefish	Prosopium williamsoni	x	x	x	x	x		x	x	x
15.	Channel Catfish	Ictalurus puctatus	x	x			x	x	x	x	
16.	Flathead Catfish	Pylodictis olivaris	x								
17.	Bullhead Catfish	Ictalurus species		x		x	x	x	x	x	
18.	White Sturgeon	Acipenser transmontanus		x			x				
19.	Carp	Cyprinus carpio	x	x	x	x	x	x	x	x	x
20.	Bridgelip Sucker	Catostomus columbianus	x	x	x	x	x	x	x	x	
21.	Largescale Sucker	Catostomus macrocheilus	x	x	x	x	x	x	x	x	
22.	Northern Squawfish	Ptychocheilus oregonensis	x	x	x	x	x	x	x	x	
23.	Utah Chub	Gila atraria									x
24.	Peamouth	Mylocheilus caurinus	x			x	x		x	x	
25.	Suckers	Catastumus sp.									x
26.	Chiselmouth	Acrocheilus alutaceus	x	x	x	x	x	x	x	x	
27.	Redside Shiner	Richardsonius balteatus	x	x	x						
28.	Sculpin	Cottus species		x	x	x					
29.	Dace	Rhinichthys species									
30.	Tui Chub	Gila bicolor	x								

be heavy populations of the large freshwater mussels (Margaritifera) that contribute to the food of fish such as sturgeon and quite a variety of wildlife associated with water (e.g., otter, raccoons, herons, etc.).

(2) Benthic (bottom living) Insects. Undoubtedly some systematic collections of benthic insects have been made in various sections of the Snake River; however, some of the most recent were associated with the stomach samples studied from collections of channel catfish by scientists of the IF&GD (Gibson, 1974). This analysis showed a variety of benthic insects consumed by channel catfish. Probably the most exhausting study on the Snake River was by Bruzven in 1973 during the evaluation of water requirements for the Hells Canyon reach of the middle Snake River. Even though this portion of the river is out of the study area, it indicates representative benthic insects that are found in the Snake River system. It was determined that aquatic insects represent a large and important heterotrophic group of organisms in the Snake River. It was found that the values of the biomass for aquatic insects far exceeded the smaller streams in northern Idaho containing less nutrients. Because insect life is intimately associated with algal development in the Snake River, the factors that determine algal growth will also have a direct effect on the population of aquatic insects. Algal growth is dependent on the numerous physical and chemical characteristics of the river. Increased nutrients stimulate algal growth and turbid water tends to decrease the growth because of the weakening of the photosynthetic process. Common forms of aquatic insects found in the Snake River are: mayflies (Ephemeroptera), flies and midges (Diptera), caddis flies (Trichoptera), aquatic moths (Lepidoptera) and beetles (Coleoptera). (See Table 18.)

(3) Zooplankton. Zooplankton are microscopic and macroscopic animals ranging from minute bacteria and protozoa to crustaceans and certain fish. Numbers of these animals in the biomass of any water is also dependent on basic nutrients, algae and water quality. These animals are essential to the food chain of the higher aquatic organisms and other wildlife. The abundance of zooplankton in the Snake River will vary between standing and moving water and the amount of nutrients entering from other sources.

(4) Crustaceans. Crustaceans in both the Snake River and its tributaries are important food sources for fish. Some species such as crayfish and scuds (freshwater shrimp) are especially important in the food chain. The rapid growth rate of fish in many reservoirs, mainstem Snake and tributary streams is due to the abundant populations of freshwater shrimp (Gammarus sp.). Crayfish are common foods of furbearers such as otter and raccoon and water oriented birds such as blue heron.

The study area of the Snake River and tributaries, with the variety of waters and rich biotic potential, provides a great variety and abundance of all types of aquatic organisms. With further research and inventory into the studies that have been conducted, it may be found that unusual or rare species are present that have both scientific and economic values.

Table 18

Typical miscellaneous aquatic organisms in waters of the Snake River. 1/

Protozoa	-	single celled organisms
Porifera	-	freshwater sponges
Coelenterata	-	freshwater hydra
Platyhelminthes	-	flatworms Planaria
Nemathelminthes	-	roundworms
Rotifers	-	multicelluar microscopic predators
Bryozoa	-	small colonial freshwater forms
Mollusca	-	freshwater clams, mussels and snails
Annelids	-	segmented worms - aquatic earthworms
Arthropoda		
Crustacea		
Cladocera	-	Daphnia
Phyllopods	-	fairy shrimp
Copepodes	-	microcrustacea
Isopodes	-	aquatic sowbugs
Amphipodes	-	Scuds - freshwater shrimp
Decapoda	-	crayfish
Insecta		
Diptera	-	Two winged flies, midges, blackflies
Coleoptera	-	aquatic beetles
Ephemeroptera	-	mayflies
Trichoptera	-	Caddis flies
Plecoptera	-	stoneflies
Odonata	-	dragon flies and damsel flies
Neuroptera	-	alder flies, salmon flies
Hemiptera	-	true bugs, water striders, water boatman
Lepidoptera	-	aquatic moths
Arachinida	-	freshwater mites

1/ EPA - Freshwater Biology and Pollution Ecology (1968).

Table 18 is a general listing of the miscellaneous aquatic organisms that would be common to the study area of the Snake River.

4. Animals (terrestrial). The animals found within the study area occupy 2 general habitat types. These are the sagebrush-grass and the riparian. The following is a brief review of habitats and a discussion of the various animals found in the two habitat types. Individual species such as game animals, that are endangered or threatened, or species having high public interest are discussed separately.

a. By Habitat Types

(1) Sagebrush-Grass Habitat Type. The majority of the habitat within the study area is a sagebrush overstory with annual and perennial grasses and forb understory. There are large grassland areas within this type where few or no sagebrush plants or other shrub species occur. Also in this type are the steep talus slopes and cliffs of the canyons within the Snake River complex, many of which have scattered juniper trees. Usually these are the south and east exposures, but there are many exceptions. There are also areas dominated by greasewood and rabbitbrush adjacent to streams, rivers, lakes and ponds or in any area where soils are highly alkaline in nature. In general, the more diverse the vegetation is in plant communities, the greater the variation in the wildlife species. For more detailed information see the Living Components, Plants (Terrestrial) section.

The sagebrush-grass habitat type is the most important in the BLM's livestock grazing program within the study area. This is primarily due to the size of the area involved. Cattle, sheep and horses are grazed in allotments and the number of animals per allotment is determined by the grazing capacity of the allotment. For more information see Human Values section, Economic Characteristics. The season of use and numbers of animals permitted per allotment have a significant impact on the density and distribution of the wildlife species within the study area.

A wildlife species list of the animals and their season of use within the sagebrush-grass habitat is given in Appendix VI, Table 1. Depending on location, many of the species have a limited distribution and do not occur randomly throughout the subject area. Forty-four species of mammals, 62 birds, 8 amphibians and 17 reptiles have been identified. Examples of animals almost totally adapted to the sagebrush-grass habitat are the Richardson ground squirrel, Great Basin kangaroo rat, sagebrush vole, sage grouse, sage thrasher, vesper sparrow, western spadefoot toad, sagebrush lizard and the striped whipsnake.[18]

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[18] Sources for the wildlife species lists are given in the reference section. Thirteen references were used.

In a recent report prepared by the USF&WS on the Crane Falls Project, dated February 3, 1975, non-game species in the sagebrush-grass habitats were of major concern. This project is within the study area and is quoted as follows:

"Of all the vertebrates known or suspected to frequent the project area and adjacent Snake River and Bruneau River Canyons, snakes are thought to be the most threatened. They include the Western rattlesnake, longnose Western ground night, Western ring-necked and Eastern ring-necked snakes. Other reptiles of concern are the collared, short-horned, desert horned and long-nosed leopard lizards and Western whiptail."

"The Ord kangaroo rat and possibly the Great Basin kangaroo rat are both declining rapidly as a result of converting native habitat to cropland. The pygmy rabbit also is declining as a result of agricultural development. The kit fox and spotted bat have been observed in the Crane Falls area, but no recent records of their presence exist."

(2) Riparian Habitat Type. The riparian habitat type occurs along the major streams, rivers, lakes, reservoirs and ponds within the study area. Riparian habitats consist of sandy, pebbly shores, saltgrass flats, cattail and rush marshes and willows to the cottonwood overstory (with an occasional brushy understory). Also included in this habitat type are the steep north and west facing slopes in some canyons in the Snake River complex consisting of a tangle of shrubs such as rose, willow and currants. Similar situations occur on many of the islands in the Snake River.

Livestock grazing occurs within some of the tracts in the riparian habitat type. Livestock grazing in the riparian habitat areas does not contribute a great deal to the local economy as many of the tracts are inaccessible to livestock and many of the tracts are scattered and less than 100 acres in size.

As seen in Appendix VI, Table 2, wildlife species diversity is extremely high due to the great variation of subtype plant communities within the riparian habitat type. Thirty-three mammal, 169 bird, 9 amphibian and 8 reptile species are known to be dependent on the water or associated riparian vegetation during all or some seasons of each year.

The riparian habitat type has distinct wildlife species totally adapted to various sub-vegetative types. Examples are mink, raccoon, muskrat, 75 species of waterfowl and shorebirds, red-winged blackbird, belted kingfisher, yellowthroat, downy woodpecker, long-billed marsh wren, tiger salamander, leopard frog, common garter snake and many others.

The riparian habitats and associated water are extremely important as migration corridors and wintering areas for birds. Again the waterfowl and shorebirds are notable as well as cedar waxwings, myrtle warblers, yellow-shafted flickers, brown creepers, dippers, ruby-crowned kinglets, etc.

b. Wild Horses. Six bands of wild horses occur in the subject area. Seventy-two horses were counted in 5 areas in December 1974. The known use areas of the horses are shown in Figure 23 (Douglas Winton, Boise BLM District, personal communication). Productivity of the horses is high and an increase in numbers and range occupied is expected in the future.

c. Mammalian Predators. The 1972 and 1973 coyote densities surveys as conducted by Animal Damage Control, USF&WS, indicate that moderate to high densities of coyotes occur in the following areas: 20 miles northeast of Shoshone, 15 miles southeast of Boise and in the Roseworth area.

No survey data for bobcats is available within the subject area. However, fair to moderate populations can be expected in the canyons and rimrock areas in the more remote tracts of the subject lands.

Although there is no data on sport hunting of coyotes and bobcats, the hunting pressure for these species has and is continuing to increase at an accelerated rate on NRL, particularly since pelt prices have shown substantial increases in the past few years.

d. Game Animals

(1) Deer. Mule deer occur in limited numbers in the riparian habitats and to a lesser degree in the sagebrush-grass habitats. Four areas are shown in Figure 23 which are important deer use areas. A small population of deer occurs year long in Salmon Falls Creek Canyon just above its junction with the Snake River. Similar situations probably occur at the mouths of other canyons which drain into the Snake River within the subject area.

The Star Lake area as shown in Figure 23 is a known mule deer wintering area, although scattered bunches of deer winter throughout the Big Desert. There were 22 deer counted 4 miles northeast of Shoshone, Idaho in 1972. Deer tend to concentrate in the Star Lake area during winters of extreme cold and heavy snow. For example, 305 deer were counted by the IF&GD in 1972 (Dale Turnipseed, personal communication). The majority of these counts were ground counts and not from helicopters so that the numbers given are probably far below actual wintering populations. Migration routes to and from the area are unknown. A second critical deer winter range is shown in Figure 23 just southeast of Boise. Approximately 5,000 deer utilize this area annually during the winter months. The fourth area in the Little and Big Jacks Creek areas has a wintering concentration of about 400 deer each winter (Thiesen, IF&GD).

(2) Antelope. Antelope historically inhabited the majority of the rolling hills and plains in the sagebrush-grass vegetative type. For the most part an occasional antelope is sighted in the subject area with the exception of the lands in the five important antelope ranges shown in Figure 23.

Approximately 60 antelope inhabit antelope Area I, 30 in Area II and 150 in Area III. All three populations are believed to be increasing in numbers. There are approximately 250 in Area IV and 75 in Area V.

(3) Cottontail and Pygmy Rabbit. Cottontail and pygmy rabbits are the only 2 of the 5 rabbit species in Idaho classified as game animals. The mountain cottontail occurs in all habitats within the study area in dense brushy areas or rocky areas. The pygmy rabbit is found only in the sagebrush-grass habitat type. There is no known data available on cottontail and pygmy rabbit densities for the various habitat types discussed.

Jackrabbits are not classified as game animals, but are heavily hunted as a recreational pursuit particularly during the period of January to May each year. Jackrabbit densities of over 500 rabbits per linear mile driven within the study area have been recorded during peak rabbit periods (about every 10 years) where sagebrush lands border agricultural lands (Paul Hegdau, USF&WS, personal communication).

e. Upland Game Birds

(1) California Quail. California quail occur in brushy areas adjacent to agricultural areas in scattered populations along the Snake River Valley from just west of Hammett, Idaho to the Idaho-Oregon state line. They seem to prefer the greasewood-rabbitbrush and sagebrush tracts adjacent to irrigated farms in the study area. Good populations occur in the vicinity of C. J. Strike Reservoir.

(2) Mountain Quail. Mountain quail occur in limited numbers in brushy, rocky slopes adjacent to water in the western portion of the study area. Their numbers have decreased from past populations and they occur only in scattered populations in the extreme western portion of the subject area. Good populations still persist along Sinker Creek.

(3) Bobwhite Quail. Bobwhite quail occur in limited populations along the Snake River in irrigated agricultural areas from about Marsing, Idaho, to the Idaho-Oregon state line. There are no known sightings of bobwhites occurring in the scattered NRL or islands in the Snake River in this area.

(4) Sage Grouse. Sage grouse historically occurred in great numbers throughout the study area in the sagebrush-grass habitat. Still an occasional bird will be sighted within the subject area where sagebrush occurs. There are only 5 remaining sage grouse populations in the subject area. See Figure 24 for distribution.

Sage grouse migrate to these locations in the fall or early winter where they remain during courtship and nesting in the spring. Male sage grouse gather on traditional "strutting grounds" which are critical to the welfare of a sage grouse population. Several strutting grounds have been identified throughout the areas shown in Figure 24. There are approximately 500 sage grouse in the extreme northeastern area (Michael Green, Shoshone BLM District, personal communication). There have been no counts for the remaining 2 areas except that several hundred birds occupy the areas shown on the extreme southern border of the subject lands (see Figure 24). The remaining population just south and east of Lucky Peak has greatly declined in the past. Within the area shown, the population has stabilized and a substantial recovery of this population can be expected through intensive sage grouse habitat management.

(5) Chukars. Good chukar populations occur throughout the subject area primarily in canyons in most localities having steep, rocky, semi-arid slopes with vegetation of cheatgrass and brush near a source of water. Examples of areas having good chukar populations are the Snake River Canyon just west of C. J. Strike Reservoir, Salmon Falls Creek Canyon and Sinker Creek.

(6) Hungarian Partridge. Hungarian partridge (Huns) occur throughout the study area generally in fertile farmlands where there is wheat adjacent to sagebrush tracts. Some excellent populations occur on NRL where crested wheatgrass has been planted adjacent to sagebrush areas. Examples of known good Hun populations are in the area immediately south of Oakley, Kimama Butte, Black Mesa and Sailor Creek.

(7) Pheasants. Pheasants occur throughout the study area where irrigation and dryland farming occurs. Excellent pheasant populations, particularly wintering concentrations, occur on NRL in isolated tracts in the farmed areas or adjacent to farmed areas that have sagebrush or other dense vegetative cover.

Pheasant populations have been rapidly declining in much of the subject area primarily due to the lack of winter cover due to clean farming practices. As an example, rooster pheasant crow counts on one transect conducted by the IF&GD dropped from a high of 21 in 1954 to a low of 4 by 1962 in the Burley area. Rooster pheasant crow counts are conducted as an indicator of pheasant populations.

In approximately 1969, the BLM began identifying key tracts of land within the subject area to be retained in public ownership primarily for pheasant nesting, escape cover and winter habitat maintenance and/or development. Pheasant densities of 1 bird per acre are considered high. In some of the sagebrush tracts, identified and retained by the BLM in Golden Valley, densities of 1 to 4 birds per acre were found. Golden Valley is approximately 8 miles southwest of Burley.

(8) Mourning Doves. Mourning doves occur throughout the study area in both habitat types during the spring, summer and early fall. They nest in trees and shrubs or on the ground wherever there is suitable undisturbed cover to hide their nests. Water is an important component of their habitat as they will go to water twice daily. They will nest up to 3 miles from a water source.

Seeds of grass, wheat, weeds, etc., comprise 98% of their diet. Good mounring dove populations occur throughout the study area.

f. Waterfowl. Including the coot, there are 26 species of waterfowl found in Snake River in southern Idaho. These species are listed in Appendix VI, Table 2.

The Snake River within the study area is one of the most critical wintering areas for waterfowl in North America. On the one extreme of the subject area, peak counts of wintering waterfowl by the IF&GD show over 100,000 ducks and 200 geese from Burley downstream 7 miles to Milner Reservoir (Milner Wildlife Habitat Management Plan). On the western end of the study area over 165,000 ducks and 550 geese have been counted from the backwaters of C. J. Strike Reservoir downstream to the Idaho-Oregon state line (Charles Jensen, IF&GD, personal communications).

Besides being an important wintering area, the Snake River is also an important Canada goose and duck production and hunting area. There are 5 wildlife refuges administered by the IF&GD and 1 National Wildlife Refuge within the subject area. The IF&GD also provides numerous boat launching and parking facilities throughout the study area along the Snake River for hunting and fishing access. Many of the islands in the Snake River are NRL administered by the BLM or islands withdrawn by the USF&WS.

g. Other Game Birds. Wilson's Snipe are found throughout the study area in wet areas, fresh marshes, irrigation ditches, streamsides, wet meadows, ponds and reservoirs in the lower elevations. Although it is classified as a game bird and hunted under established seasons, hunting pressure is extremely light.

h. Fur Bearers. In the study area the major fur bearing species, as classified by state statutes, are mink, river otter, beaver and muskrats. Other species of value for their pelts, but not classified as fur bearers and found in the study area, are fox, bobcat, weasel, coyote, skunk, raccoon, spotted skunk or civet, badger and nutria. Table 19 lists the reported number of each species taken per county for the 1973-74 fur trapping season for those counties within the subject area. There is no way to determine the percentage contribution made by NRL. No river otter or nutria were taken in 1973-74 trapping season within the study area.

The following categories (endangered, threatened and status undetermined) are those as defined by the USF&WS.

i. Endangered Species. An endangered species is defined as a species which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range. Currently, these species have not been reclassified under the Endangered Species Act of 1973 but will probably be in the future. The spotted bat and the prairie falcon are the only 2 threatened species believed to inhabit the study area.

Table 19

Number of Fur Bearers Taken Per County for the 1973-74 Trapping Season

County	Beaver	Muskrat	Mink	Raccoon	Fox	Bobcat	Weasel	Coyote	Skunk	Civet	Badger
Canyon	37	12,674	69	50	75	0	3	6	45	5	3
Ada	21	1,684	45	17	96	8	3	99	5	0	32
Owyhee	210	2,064	24	66	0	338	2	993	2	9	12
Gooding	37	6,691	18	12	0	39	0	170	2	3	6
Lincoln	0	78	3	0	0	21	0	0	0	0	2
Jerome	0	4,228	14	29	0	0	2	6	5	0	0
Twin Falls	39	4,414	14	51	0	38	0	108	0	0	8
Minidoka	1	2,298	18	5	0	0	0	11	0	0	0
Cassia	57	545	21	8	0	48	0	132	5	0	5
TOTAL	402	34,676	226	238	171	492	10	1,525	64	17	68

(1) Spotted Bat. That there is only 1 record of spotted bats in Idaho is probably due to their rarity. This specimen was collected in Moscow. All reputable wildlife species distribution maps depict southern Idaho as having spotted bats during spring and fall migrations and summer. Little is known about spotted bats except they prefer arid areas such as the sagebrush-grass habitat, roost in buildings and caves, and feed on insects usually caught over wet areas such as springs and ponds.

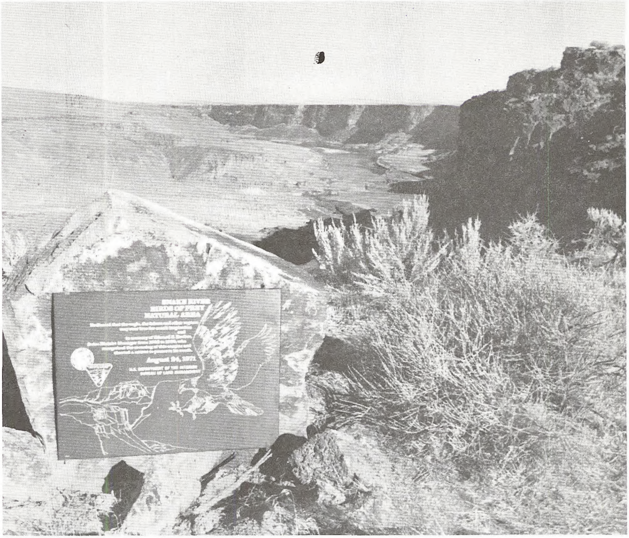
(2) Prairie Falcon. The prairie falcon is found throughout the study area. It nests in the Snake River Canyon complex and bluffy areas where cliff sites occur and suitable nesting niches prevail on the cliffs. Unlike the peregrine falcon, the prairie falcon is not dependent on the riparian habitat for its principal food source. The prairie falcon is almost totally dependent on the sagebrush-grass habitat type as its principal prey species are ground squirrels, rodents and small birds common in sagebrush-grass communities.

Recent studies have shown that approximately 10% or more of all the nesting pairs of prairie falcons in North America occur within and adjacent to the Birds of Prey Natural Area shown in Figure 24 (Mike Kochert, Boise BLM District, personal communication). The Birds of Prey Natural Area is discussed in the Birds of Prey section.

j. Status Undetermined Species. A status undetermined species is defined as a species which has been suggested as being endanagered or threatened, but about which not enough is known to determine its status.

(1) Ferruginous Hawk. The ferruginous hawk is almost totally tied to the sagebrush-grass habitat type. It nests on the ground and sometimes trees in areas of little or no human disturbance. Its principal food is rabbit with mice and small rodents making up the remainder. The ferruginous hawk occurs throughout this study area with a noticeable increase in numbers during the winter. No intensive inventories on the distribution of this species has been undertaken in the study area, but 18 pairs have been identified from Con Shea Basin to Glenns Ferry on the Snake River in 1974. Fifty-five pairs were estimated to inhabit the area within 20 miles on the same stretch of Snake River (Douglas Smithey, Boise BLM District, personal communication).

(2) Osprey. Osprey occur in the study area in limited numbers along the major rivers, creeks, reservoirs and lakes during migrations and winter. They are almost totally tied to the riparian habitat type. Their principal food is fish. No intensive winter inventories have been conducted on ospreys in the subject area. They have been sighted at Guffey Butte, Swan Falls Dam upriver to C. J. Strike Reservoir and in the C. J. Strike Reservoir area (Douglas Smithey, Boise BLM district, personal communication).



The Snake River Birds of Prey Natural Area was dedicated in August 1971 by Secretary of the Interior, Rogers C. B. Morton. In this 26,000 acre withdrawal 240 raptor pairs representing 13 separate species breed and raise their young between February and August each year. The abundant food supply adjacent to the Natural Area is one of the fundamental reasons so many birds can nest successfully.

(3) Pigeon Hawk. The pigeon hawk occurs in the study area during migrations and winter. Again it is almost totally dependent on the riparian habitat, but occasionally is observed in the sagebrush-grass habitat. Its principal food is small birds, but it will take insects and mice. In January 1974 one was observed south of Oakley. Here again no winter inventories for this species have been undertaken.

(4) Western Burrowing Owl. The burrowing owl occurs throughout the subject area with the exception of the extreme eastern portion. It occurs during spring and fall migrations and summer. It is totally dependent on the sagebrush-grass habitat type usually nesting in badger, ground squirrel or any suitable hole in the earth. Its primary food source is insects, small rodents, lizards and a few birds. Again, little information is available on nesting locations of this species. They are known to nest on NRL in the sagebrush-grass habitats in the area on the south side of Milner Dam just east of Burley. Significant populations occur in the Gooding-Shoshone and Star Lake areas in the Shoshone BLM District. In the Boise BLM District there is a known population in the Grandview area. These known areas are shown in Figure 24.

(5) Long-Billed Curlews. Long-billed curlews occur throughout the subject area during spring and fall migrations. Three known high density nesting areas have been identified although there could be others. In one curlew nesting survey for the area shown in the extreme northwestern portion of the subject area (see Figure 24) 456 curlews were counted within 65 square miles, and the total population is estimated to be 600 to 700 birds (Mike Rath, Boise BLM District, personal communication).

Although the long-billed curlew is an upland nester, it is a typical shorebird found near large lakes, reservoirs, rivers and wet meadow area situations most of the year. It nests on the ground in large, low growing, grassy areas with little or no brush and usually far removed from water. It generally nests in large colonies at historic nesting localities to which the individual curlew populations return each year.

(6) Semipalmated Plover. This species only occurs in the study area during spring and fall migrations. It is found during these periods in the riparian habitat type along sandy shores and mud flats of lakes, reservoirs, rivers and ponds. It is primarily insectivorous but does take small crustaceans and molluscs. This species nests in northern arctic America and winters in South America. Maintenance of nesting and feeding habitats during migrations is vital to this species' existence.

(7) Snowy Plover. The snowy plover is known to occur only during spring migrations in the study area. It is primarily found in the riparian habitat type along beaches, alkali flats and sand flats of lakes, reservoirs, rivers and ponds. It is primarily insectivorous but possibly some vegetative matter is taken.

k. Birds of Prey. Southern Idaho, particularly the Snake River Plains and all of the study area, is known as one of the most significant wintering areas of birds of prey in North America. The known critical nesting and birds of prey wintering areas are shown in Figure 24. In aerial census flown in southern Idaho, highest numbers were observed in natural areas and lowest in farmed areas. There are 11 species of hawks, 1 eagle and 3 owls which are primarily dependent on the sagebrush-grass habitat type for their prey species. Rabbits and ground squirrels are known to be 2 of the more important prey species (Kochert, Boise BLM District, Raptor Biologist). There are 11 species of hawks, 1 eagle and 6 species of owls associated with the riparian habitat. These species are listed in Appendix VI, Tables 1 and 2.

(1) Bald Eagles. Bald eagles migrate into the study area particularly along the Snake River during the winter months but also occur in fewer numbers in the sagebrush-grass plains area. Their principal food is fish and carrion. In 1974 in the Birds of Prey Natural Area, 1 bald eable was sighted, 2 were observed upstream from C. J. Strike Reservoir during the same period and 11 were sighted at the mouth of Cottonwood Canyon west of Oakley in 1970. No intensive bald eagle inventories have been conducted.

(2) Golden Eagles. These eagles occur throughout the study area year long and are primarily associated with the sagebrush-grass habitat type. Highest nesting density occurs in cliffs within the canyon complex of the Snake River, but they also nest in fewer numbers in trees and powerlines within the sagebrush-grass habitat. They are primarily carnivorous but take carrion when available. There are 55 eagle eyries identified between lower Salmon Falls Dam and Marsing along the Snake River. Forty-one eagles were sighted during an eagle survey flight in January 1974. The survey boundaries were almost identical to the subject area boundaries (Douglas Smithey, Boise BLM District, personal communication).

The study area is also an important wintering area for the rough-legged hawk which was the most common winter raptor sighted during road transects. These birds summer in northern Canada and Alaska and winter in the U. S. Its principal habitat is the sagebrush-grass. It feeds on mice and other small rodents. Loss of winter habitat in the subject area for rough-legged hawks could result in adverse environmental conditions in Canada and Alaska. In January 1974, 32 rough-legged hawks were sighted during the aerial flight discussed for golden eagles. The following areas are known to have high wintering densities--Salmon Falls Creek, Blue Butte, Horse Hill, Bliss-King Hill (Douglas Smithey, Boise BLM District, personal communications).

Due to the importance of the nesting and wintering habitat for birds of prey in the Snake River Plains, the 26,300 acre Birds of Prey Natural Area was dedicated by Secretary of Interior, Rogers C. B. Morton. The natural area was withdrawn by Public Land Order 5133, October 18, 1971.

The natural area, as shown in Figure 24, primarily includes the Snake River Canyon. It includes very little of the adjacent table lands of sagebrush-grass habitat from which many of the birds of prey obtain their food. Currently, the BLM is not disposing of any land within a 5 mile area back from the canyon rim until key hunting areas have been identified and prey population studies and additional birds of prey studies are completed. All of these studies should be completed by 1980.

m. Reptiles and Amphibians. Of the 17 species of reptiles in the study area only 1 is limited in distribution and numbers. Only 3 collection localities for the Western ground snake have been reported in Idaho, all of which are within the subject area. The approximate distribution of the Western ground snake in Idaho is shown in Figure 23, but no inventories have been undertaken.

Little is known of the habitat of this snake except it prefers arid and semi-arid areas (sagebrush-grass habitat) and burrows under the ground. It feeds on spiders, centipedes, crickets and insect larva.

Amphibians are also limited in the study area, particularly in the sagebrush-grass habitat. Permanent and intermittent streams, reservoirs and ponds are particularly important as amphibians must have water areas in which to reproduce. As such areas are limited in distribution in the sagebrush-grass habitat, they are of critical importance to the welfare of these species.

C. Ecological Interrelationships

1. General. Ecological interrelationships are the interworkings between all living and non-living components of an ecosystem. Plants and animals, singly or as a whole population, are examined in relation to one another and to their environment. Understanding an ecosystem requires study of its energy flows, food chains, nutrient cycles, and hydrologic cycle. These relationships are often intricate and subtle but in some cases are direct and obvious, even to the untrained observer. A common example of the latter is a food chain such as grass-cow-man. This example is perhaps oversimplified because there is actually more to this food chain than these three components. There also must be energy and nutrients to grow the grass, decomposers to remove the plant and animal waste and restore soil fertility, etc. This example serves the purpose, then, of showing that some interrelationships may appear absolute and obvious, but there are always secondary and tertiary relationships involved. These are the relationships that are likely to be overlooked and/or misunderstood.

The semidesert ecosystems of southern Idaho are more vulnerable to improper use and may reflect this more quickly than ecosystems found in areas of higher precipitation, less extreme temperatures, or greater species diversity. Precipitation is low and can vary considerably from year to year. Evapotranspiration is high, making available soil moisture a limiting factor for production of living components of the ecosystem. Solar radiation is high but the amount of energy captured by photosynthesis is greatly reduced due to limited moisture and sparse vegetation. The nutrient cycle operates slowly because of the slow rate of decomposition. Large quantities of nutrients are tied up in the shrubby vegetative biomass. Such factors reduce the natural productivity of the area and shorten the food chain.

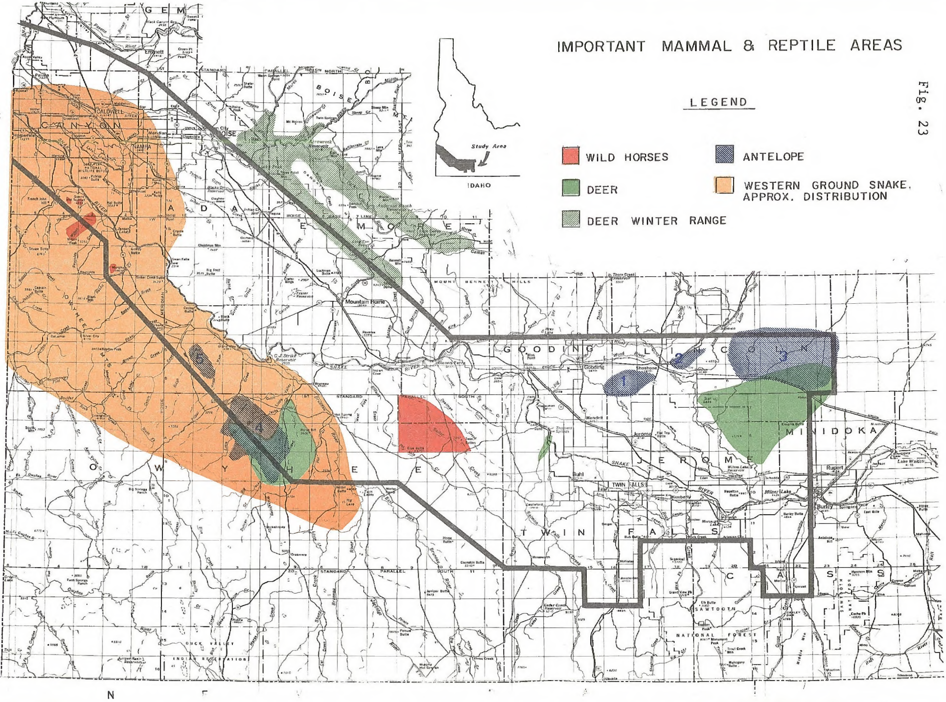

IMPORTANT MAMMAL & REPTILE AREAS
LEGEND
WILD HORSES
DEER
DEER WINTER RANGE
ANTELOPE
WESTERN GROUND SNAKE, APPROX. DISTRIBUTION
Study Area
IDAHO
CANYON
ADA
ELMORE
OWYHEE
GOODING
LINCOLN
MINIDOKA
JEROME
TWIN FALLS
CASSIA
GEM
BOISE
Mountain Home
TWIN FALLS
Rupert
Burley
Caldwell
Nampa
Shoshone
Gooding
Jerome
Wendell
Buhl
Kimberly

Fig. 23

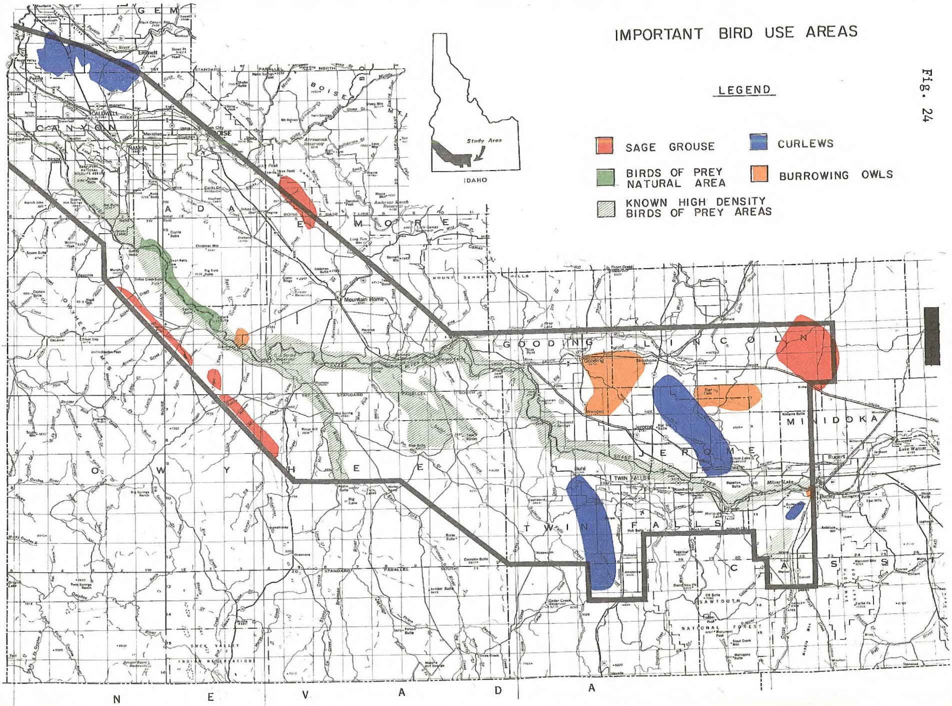

IMPORTANT BIRD USE AREAS
LEGEND
SAGE GROUSE
CURLEWS
BIRDS OF PREY NATURAL AREA
BURROWING OWLS
KNOWN HIGH DENSITY BIRDS OF PREY AREAS
Study Area
IDAHO
G E M
C A N Y O N
A D A
E L M O R E
O W Y H E E
G O O D I N G
L I N C O L N
M I N I D O K A
J E R O M E
T W I N F A L L S
C A S S I A
O R E G O N
N E V A D A
BOISE
CALDWELL
NAMPA
Mountain Home
TWIN FALLS
Gooding
Shoshone
Wendell
Jerome
Buhl
Rupert
Burley

Fig. 24

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[redacted]

Man's use of this area has altered the natural ecosystem to varying degrees. These activities have long-lasting effects because of the slow, natural successional recovery of semidesert communities. Man-caused fires and livestock grazing have had the greatest influence on the ecosystem. These 2 factors have reduced the variety of vegetation and helped the invasion of this area by undesirable, noxious and poisonour plant species such as cheatgrass, halogeton, Russian thistle and tumble mustard. Cultivation and abandonment of marginal croplands have also been detrimental to the ecosystem's production in some areas.

2. Nutrient Cycles. Nitrogen, oxygen, phosphorous and potassium, along with many other elements, are essential to life on earth. These nutrients continuously circulate through our environment in fixed patterns, or cycles, and in the process are made available in various forms to man and other animals (consumers) and to plants (producers). Nitrogen, for example, is recycled from plants (producers) to animals (consumers) to the atmosphere and back to the soil as excreta or upon decomposition after the death of the animal. A nutrient cycle (nitrogen) is depicted in Figure 25.

Nutrient cycles are more or less in balance under natural conditions (in the absence of man). Through natural processes (nitrification, ammonification, oxidation, reduction, etc.) nutrients are made available by and to living components of the ecosystem. Through hundreds of years of time, thousands of different plant and animal species have adjusted and readjusted roles until a state of near-balance is reached. In this state of near-balance, soil microbes (fungi, bacteria and protozoans), nematodes, mites, soil insects, earthworms and other micro-organisms play a primary role in making chemical elements (nutrients) available to higher life forms. Without these unobserved but essential organisms the ecosystem we see would not exist.

A number of things affect the activity of soil organisms. Some can be controlled. Others depend on the weather. Some are determined by early geological processes and the kind of plant cover. Temperature, moisture, aeration, acidity, supply of nutrients, tillage and the kind and amount of crop residues and manures returned to the soil all affect soil organism activity. Cropping systems and soil management exert strong influences on most of these factors.

In a "natural" situation, nutrients cycle through the living components of the sagebrush-grass ecosystem. Some nutrients are lost by leaching, erosion, chemical processes and combustion, but the cycles remain intact. Plant and animal wastes and residues are returned to the cycle; hence, "recycled." In an artificial or man-controlled system such as cropland, certain plants or animals are usually harvested and removed from the system. These products are utilized primarily for human consumption and the wastes and residues therefrom are generally "wasted" since they are not returned to the system from which they came. In many cases the "wastes" are introduced into a different ecosystem, such as a river, and create nutrient excesses.

3. Energy Flows. Energy flows through an ecosystem--it does not cycle. A schematic energy flow system is depicted in Figure 26. Energy from the sun is used by plants and through the process of photosynthesis converted into plant material. Herbivores, carnivores and omnivores (consumers) feed on plants and other animals to acquire energy. Bacteria, fungi, plants and some animals derive energy as they decompose dead organisms. Energy is continuously being consumed by these organisms, and new energy is continuously being acquired from the sun.

In the sagebrush-grass ecosystem, most of the energy is tied up in vegetation, primarily sagebrush. Because the bulk of this vegetation is unused by other life forms, most of this energy remains in the vegetative tissues. Only rarely is this energy totally released, such as when a wildfire occurs, and this energy is then released into the atmosphere in the form of heat. Even though only a small percentage of the total energy in this natural ecosystem actually flows from producers to consumers, this energy is nonetheless critical to all life within the ecosystem. Removal of this energy source (producers) by fire, land clearing, overgrazing, disease, or parasites will disrupt energy flow and have an adverse impact on those organisms (consumers) dependent upon such energy sources. The severity of the adverse impact depends upon the extent of vegetation lost, length of time it is lost and availability of alternative energy sources.

Energy flows are quite different under agricultural production than under natural conditions. It can be stated as a general principle that gross productivity of cultured ecosystems does not exceed that which can be found in nature.[19] Production can be increased by supplying water and nutrients in areas where these are limiting. Most of all, however, production is increased through addition of huge energy subsidies. In a real way the energy for potatoes, sugar beets, beef, and plant produce of intensive agriculture is coming in large part from fossil fuels rather than directly from the sun.

American agriculture employs an annual mechanical energy input of one horsepower per hectare (2.5 acres) of arable land as compared to an average of about 0.1 hp per hectare for Asia and Africa. The United States produces about 3 times as much food per hectare as Asia and Africa but at a cost of 10 times as much which is very expensive auxiliary energy.[20] With energy resources becoming more expensive, if not more limited, increased agricultural development at the expense of increasing energy input does not seem desirable.

4. Hydrologic Cycle. This has been previously discussed under Part III A.4., Water.

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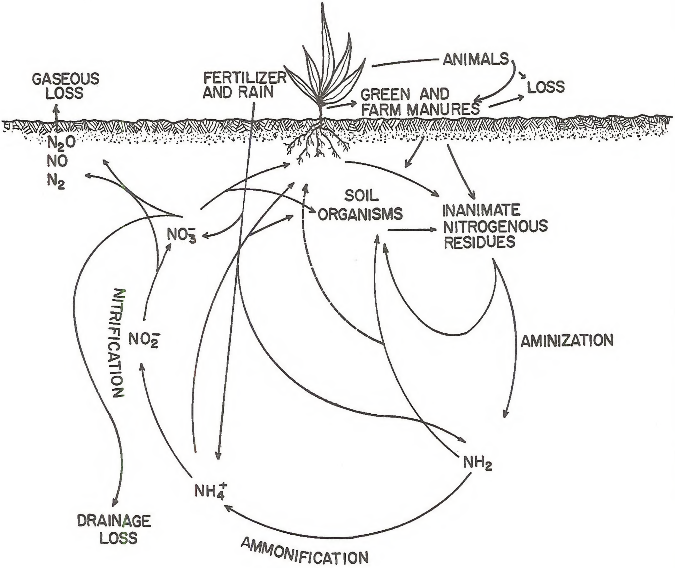
[19] E. P. Odum, Fundamentals of Ecology, Third Edition, 1971.
[20] Ibid.



THE MAIN PORTION OF THE NITROGEN CYCLE

Fig. 26

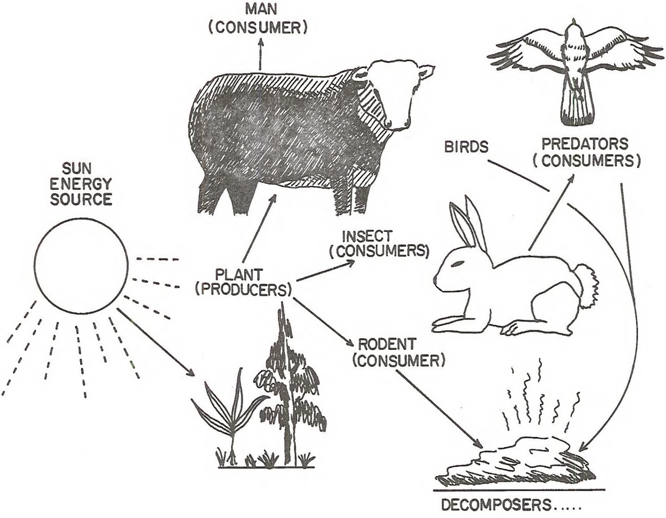


ILLUSTRATION OF ENERGY FLOWS THROUGH THE SAGEBRUSH-GRASS ECOSYSTEM

5. The Sagebrush-Grassland Ecosystem. The non-living (soils, water, etc.) and living (plant and animal) components of the sagebrush-grass ecosystem have been identified in Sections III A. and B. of this document. These components are more easily identified than are their interrelationships, however. A complete description of how this ecosystem functions is not possible but some examples of the interrelationships of some species with their environment may illustrate how a portion of this ecosystem functions.

In appearance, the sagebrush-grass ecosystem gives the impression of a vast "wasteland." This is a popular attitude expressed by those wishing to "improve" the area by eliminating sagebrush and replacing the existing plants and animals with more "desirable" species. In reality, however, the ecosystem is a complex, living community of substantial, and in many cases, unique and irreplaceable value. Because these interrelationships are poorly understood, most effort has been made to control rather than understand this ecosystem.[21]

Insects, for example, are of great ecological importance and are directly or indirectly involved with nearly every other living thing. Many are predators on other insects and parasites on other insects, plants or animals. They normally play a very beneficial role in an ecosystem, but under the right conditions, can cause severe problems. The beet leafhopper is a notable example of an insect that became a threat to irrigated crop production because of man's disruption of the natural balance of the sagebrush-grass ecosystem. Overgrazing by domestic livestock depleted the native range and allowed invasion by Russian thistle and tumble mustard. These two plants harbor the beet leafhopper which carries curly-leaf mosaic, which in turn infects field beans. In order to control this disease thousands of acres of native range were converted to a crested wheatgrass ecosystem to remove the host plants.

By closely observing this situation one can see several cause-effect relationships. By failing to understand the natural ecosystem a series of events took place which finally led to complete replacement of the natural ecosystem.

Insects are a major food source for a variety of animals: birds, amphibians, mammals, fish and other insects. Many species of game birds, for example, are very dependent on insects for food.

Rabbits and other rodents are major consumers of seeds and other plant material, and in turn are consumed by many other members of the ecosystem, including birds of prey and larger mammals. The unpopular coyote is particularly influential because he is active throughout the year and feeds on a variety of rabbits, rodents, birds, reptiles, insects and plants.

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[21] E. Chaney, The Sagebrush-Grass Ecosystem, 1974.

The ability of an organism to adapt to changes in its environment depends primarily upon its physiological requirements. Animals, because of their mobility, are obviously more adaptive than plants. This does not mean, however, that animals can simply move out of one area and re-establish themselves in another area at will. In most instances loss of a particular habitat also means a loss of those particular animals that depend on that habitat. An animal with a wider variety of food sources (such as a coyote) is much more adaptive than one with a very selective diet (peregrine falcon). Some animals (such as sage grouse in the winter) are completely dependent on one particular food source. Adaptability, then, varies with the species involved and depends upon whether or not that species can obtain food, space and shelter when removed from its present habitat.

6. Summary. Finally, the study area--containing all of those elements that have been described thus far in this EAR--functions as an organism in its own right. We know that the integrity of any organism or system depends upon its ability to meet stress. We also know that semiarid environments, such as our region, are relatively fragile and that, historically, many cultures in semiarid climates have collapsed because they failed to consider ecological principles.

We know that agricultural production can be increased, either by growing more crops per unit of land or by converting more land to agriculture. Both alternatives are viable but both are ecologically expensive. Maximizing for yield without regard to other consequences can produce very serious backlashes, both environmentally and socially. To double crop yield, for example, requires a tenfold increase in fertilizers, pesticides and horsepower. Industrialized (fuel-powered) agriculture can produce 4 times the yield per acre as does simple man and domestic animal powered agriculture but is 100 times as demanding of resources and energy. It is not hard to understand, then, why agroindustry is one of the chief causes of air and water pollution.[22]

The planner and agricultural engineer of the future must obviously be more concerned with the quality of the rural landscape in terms of its ability to supply clean water and air, as well as food, to the cities (not to mention recreation and other "quality of life" needs).

D. Human Values

1. Landscape Character. The landscape of the study region is extremely varied. Two distinct landscape categories exist--natural or modified.

A natural landscape contains the primary characteristics of natural land forms, vegetative patterns and water forms. A modified landscape

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[22]E. P. Odum, Fundamentals of Ecology, Third Edition, 1971.

includes the same primary characteristics, i.e., land form, vegetative patterns and water form, but there has been some action by man to change one or more of these characteristics or to place structures in the landscape.

Within the study area, the natural and modified landscapes are intermingled. There are large blocks of natural landscape and these exist generally in the northern and southern portions of the unit away from the Snake River. The intermingling of landscapes and variations in view depend on location of the viewer and the speed he is traveling through the area.

Generally the regional landscape is dominated by broad plains raising to foothills and mountains north of the Snake River which bisects the unit. South of the Snake the country is more rugged, with high sagebrush-covered plateaus raising to even higher foothills and eventually to mountain ranges outside the unit boundaries, but still in view. The plateaus are broken and cut by numerous drainages, large and small, live and intermittent. The west end of the unit is primarily farmed valley land, as is the east end of the unit except for large expansive lava flows of rather recent origin north of the Snake River.

The closer one gets to the Snake River the more extreme the landscape modifications. Interstate 80 follows the general course of the Snake River through the unit as do other intrusions such as canals, railroad and transmission lines.

Other dominant landscape features are the major water bodies: Milner, C. J. Strike and Swan Falls Reservoirs on the Snake River proper; and the off site reservoirs: Lake Murtaugh, Wilson Lake, Lake Lowell, and Lucky Peak. All these reservoirs have been created through modifications of the natural landscape. To some these reservoirs add a human interest dimension to the landscape in terms of scenic quality, added recreation opportunities, and a modified fishery resource.

By the same token, natural streams in the study area contribute to the enhancement of human interest through scenic, recreation, and fisheries values.

Modifying activities have altered land forms, vegetative patterns, water forms, or have placed structures in the landscape. From the standpoint of esthetics, some modifications are more acceptable than others. Modifications range from slight alterations of a single landscape characteristic to major disturbances of one or more characteristics.

In order to quantify the scenic quality it is necessary to assign a value for the purpose of comparing landscapes within the region. In this discussion the term "scenic quality" is based upon the key factors of land form, color, presence of water, vegetation (variety), uniqueness and the extent of intrusions. In applying these key factors to landscapes in the study area most rate low in quality. The exceptions to the low rating are the deeply incised portions of the Snake, Bruneau and Salmon Falls Creek Canyons; the massive lava flows with associated geologic features; and the Bruneau Sand Dunes which are located almost entirely in a state park. There are also portions of the remaining landscape which rate higher than average and these small subunits represent a locally important visual resource.

2. Sociocultural Interests

a. Education/Scientific. The study area is rich in opportunities of many kinds for the educational and scientific community. For the purposes of this analysis some of these opportunities will be explored under the following headings: (1) Research Natural Areas, (2) Environmental Study Areas, (3) Aquatic Studies, and (4) Antiquities.

(1) Research Natural Areas. The BLM is participating in a program to identify natural areas which provide outdoor laboratories for the educational/scientific communities. This program is under the leadership of the Interdepartmental Committee on Research Natural Areas.

The objectives of the research natural areas are:

(a) To assist in the preservation of examples of all significant natural ecosystems for comparison with those influenced by man.

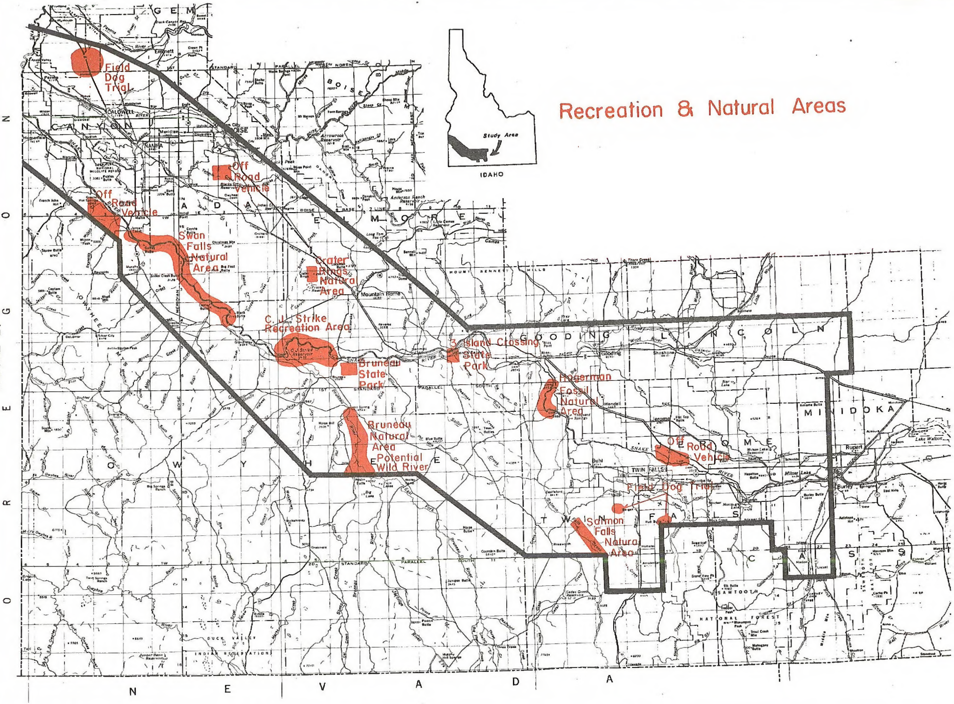
(b) To provide educational and research areas for scientists to study the ecology of the natural environment.

(c) To serve as gene pools and preserves for rare and endangered species of plants and animals.

Within the region there are areas that have been designated research natural areas. These areas are: Bruneau River Canyon, Crater Rings, Salmon Falls Canyon, and Swan Falls Canyon of the Snake River. (See Figure 27).

Scientists and educators are encouraged to use research natural areas. Restrictions are applied only to preserve the natural values of the area. Since the designations were made through administrative procedures, there are no Congressional mandates requiring protection of the area.

The National Park Service has studied and prepared recommendations to establish a national monument to protect the Hagerman Horse Quarry,



Recreation & Natural Areas
IDAHO
Study Area
Field Dog Trial
Off Road Vehicle
Off Road Vehicle
Swan Falls Natural Area
Crater Rings Natural Area
C. J. Strike Recreation Area
Bruneau State Park
3 Island Crossing State Park
Hagerman Fossil Natural Area
Bruneau Natural Area
Potential Wild River
Off Road Vehicle
Field Dog Trial
Salmon Falls Natural Area
NEVADA
OREGON

FIGURE 27

a site of international importance. This area may encompass over 5,000 acres of NRL.

In addition to the above there are many known historical, archeological, and paleontological sites of interest to the educational/scientific community. A discussion of these sites follows in this section.

At present there are limited intrusions in the research natural areas and the proposed national monument. There are pump stations and penstocks passing through Swan Falls Canyon and the Hagerman Horse Quarry. These pipelines irrigate agricultural lands on the plateau lands adjacent to the canyons.

Generally those sites that have been designated as research natural areas are in essentially the same condition as of the date designations were made.

(2) Environmental Study Areas. Several sites in the study area have been used as environmental study areas. At least one of these, used by Caldwell, Homedale, and other schools, is on NRL south of Marsing. NRL adjoining Bruneau Dunes State Park have been used, on occassion, by school groups for environmental studies. A site adjoining the Veterans Hospital lands near Boise has been used and is still under study for continued use as an environmental study area.

As more emphasis is put on outdoor environmental studies, more sites in the DLE study area will be sought for use as environmental study areas by schools and other community organizations.

(3) Aquatic Studies. Apart from the natural area study program, the area's variety of water resources also offer an excellent opportunity for study and scientific use.

(a) Aquatic Laboratories. The Snake River and its tributaries are outstanding aquatic laboratories available for training of students and providing habitats for research on a variety of aquatic subjects ranging from water use and water quality to fish and other aquatic flora and fauna.

(b) School Participation. Relationship magnitude of present school participation in studying aquatic resources of the study area of the Snake River has not been documented. Many of these studies are carried on as normal management and research needs of the IF&GD.

(c) Scientific Interest. Many species of fish and other aquatic organisms in the study area are of scientific interest to taxonomists and ichthyologists. Fish populations above the historic upstream migration barrier of Shoshone Falls are of significant national interest. Taxonomists continue to study these populations that were separated from normal Columbia River species. The remaining population of white sturgeon in this section of the Snake River is at the present time of significant regional interest and could be of national interest (Miller, 1972). Studies to determine how these fish have survived in the one remaining upper portion of the Snake River could be the subject of future investigations. In the area above Milner Dam to Minidoka Dam, there appears to be remnant populations of the rare fall-spawning rainbow trout that migrate to the spring areas to spawn in the early part of December. Viable stocks of natural fall-spawning rainbow are rare in most parts of the west (Casey, 1975).

(d) Unusual Species. Most studies investigated in this area of the Snake River and tributaries have been of a general nature depicting the overall problems and general status of the aquatic fish populations. Detailed studies by the Boise District near Mountain Home in the Bennett Creek drainage have indicated there may be uncommon populations of native dace (*Rhinichthys* sp.). With such a diverse habitat, it is possible that other tributary streams may contain species of educational or scientific interest.

(4) Antiquities. This assessment of the antiquities resources of the Western Snake River Plain is intended to provide an estimate of the potential quality and quantity of prehistorical, historical, and paleonthological values within the DLE study area. The methods used to accomplish this assessment are as follows:

-- An examination of the literature on the cultural resources of the study area,
-- Consultation with historians, archeologists, and paleonthologists knowledgeable about the cultural resources of the study area.

In general, while not well known, the values of the past that are found within the study area are of considerable importance not only to professional researchers from the fields of the natural and social sciences but also to local teachers, students, and the general public as well. These values can be identified and grouped into the following three major categories: paleontology, archeology, and history.

(a) Paleontology. For many years southern Idaho--especially the Western Snake River Plain--has attracted a number of scientists from some of the most outstanding universities and museums in the United States. The first paleontological research was conducted by the Smithsonian Institute during the summers of 1930, 1931, and 1934. Since the pioneering research of the 1930's, other institutions which have sent specialists into the area include the California Institute of Technology, the University of California at Berkeley, the University of California at Davis, the Natural History Museum of Los Angeles County, Harvard University, University of Michigan Museum of Paleontology, and the Idaho State University Museum.

The DLE study area is considered to be one of the most significant regions for paleontological research in North America. The fossil resources found throughout the study area are not only numerous and varied, but often spectacular. Seeds, leaves, and diatoms from within this area have been dated to late Miocene (15 million years ago). Fossil fish and molluscan remains have been dated to the Pliocene (3-13 million years ago). Mammalian fossils have been dated to early Pleistocene times (3 million years ago) and include such beasts as rhinoceros, mammoth, mastodon, camel, bear, sloth and giant beaver among others (Malde and Powers, 1962). Present evidence indicates these Pleistocene mammals inhabited the Western Snake River Plain under periglacial conditions when the climate was cooler and somewhat more moist than today (White, 1972).

Mammalian fossils from the study area have thus far attracted the most interest. The largest quantity of mammalian fossil material has been discovered in a stratigraphic unit known as the Glenns Ferry Formation. The unit is found on both sides of the Snake River from just east of the town of Hagerman with outcrops found continuously as far west as the town of Homedale. In addition portions of the Glenns Ferry formation are found in the badlands south of the Snake River (Malde and Powers, 1962). Thus this important stratigraphic unit embraces an area of several thousand square miles within the study area.

At the present time the most important paleontological discoveries have been made where the Glenns Ferry formation outcrops along the Snake River near the town of Hagerman. Scientists working in this area have recovered more than 150 fossil horse skulls along with the remains of other Pleistocene beasts. This fossil deposit is known as the Hagerman Horse Quarry and is one of only four major paleontological deposits in North America. The three others are the Rancho La Brea Tar Pits in Los Angeles, Dinosaur National Monument in Utah and the Agate Fossil Beds National Monument in Nebraska. Recently, the National Park Service, with the assistance of U. S. Senator James A. McClure, has recommended that the Hagerman Horse Quarry be designated a national monument.

While many of the fossil discoveries made throughout the 4.5 million acre study area are of major scientific importance, there are believed to be many other paleontological remains which have yet to be found. It is unfortunate, but this rich region has never been adequately inventoried for paleontological resources and thus it remains largely unknown. Based on present evidence it is quite possible that another deposit such as the Hagerman Hose Quarry may exist in some remote, unexplored part of the study area.

(b) Archeology (Prehistoric). Since professional archeology in Idaho is barely 18 years old, there are areas within the state that have not received an adequate amount of study. However, while Idaho archeology lacks sufficient data from many areas, research has indicated that there are several regions in the state that have the potential to yield data of major scientific significance. One of these exceptional regions is the Snake River Plain, particularly the Western Snake River Plain. The study area is therefore largely within one of the key archeological regions in all of Idaho.

Archeologists have devised several stages of prehistoric cultural history development on the North American continent. In Idaho only two stages are recognized, the Big Game Hunting stage and the Archaic stage. The Big Game Hunting stage is the earliest fully recognized stage in North America and is associated with a number of different regions and a number of different archeological cultures. Generally, this earliest stage spans a time range from 15,000 BP (Before Present) to 7,000 BP, and is largely associated with the hunting of large, now extinct, Pleistocene (Ice-Age) beasts such as elephants, camels and giant bison. In the West, this earliest stage is broken down into three subsequent groups, from earliest to latest: Llano, Folsom, and Plano. In Idaho, Llano and Folsom cultural remains have yet to be recovered from excavated sites although a number of surface finds are known. Plano artifacts, however, have been taken from several archeological excavations (e.g. Wilson Butte Cave, the Wasden Site and Bison and Veratic Rockshelters in the Birch Creek Valley). Thus the Plano remains are the oldest cultural material yet recovered from controlled archeological contexts in the state.

Several archeological sites which have been studied in southern Idaho indicate the temporal range of aboriginal man's habitation of this region is about 15,000 years. One of the earliest known sites in North America was located in the study area and others are believed to exist. Wilson Butte Cave, located near the town of Shoshone, was excavated by a joint team of specialists from Harvard University and the Idaho State University Museum. The earliest date from this cave indicates that hunters and gatherers inhabited this part of what is now southern Idaho during the late Pleistocene (Ice-Age), some 14,500 years ago. Jaguar Cave and the Wasden Site, two archeological sites east of the study area, have also been dated to the late Pleistocene. In southern Idaho the potential for further Big Game Hunter studies is considered to be exceptional.

The Archaic stage 7,000 BP to AD 1800 immediately follows the Big Game Hunting stage and in terms of numbers of sites is the dominant stage in Idaho. The Archaic is associated with climatic conditions similar to the present, a wider range of resource use, and a more diverse technology than the preceding stage.

If the historic and ethnographic literature from the Western Snake River Plain can serve as a guide to the past, then this area of Idaho contained great cultural diversity during the late prehistoric and early historic periods. Ethnohistoric research has shown that several distinct Indian groups, with different languages and cultures, were on the Western Snake River Plain in the recent past. These groups included Northern Paiute, Nez Perce, Cayuse, Shoshoni, and Bannock, among others.

The valleys and adjacent lands in the region of the Boise, Payette and Weiser Rivers appear to have been an important area for these Indian groups. Unfortunately it is unlikely that much more knowledge of these recent aboriginal peoples can be gleaned from the written historic record and archeology must ultimately provide anthropologists and historians with answers to their questions.

The known prehistoric resources on NRL in the 4.5 million acre study area number approximately 600 sites. Archeologists familiar with this part of Idaho estimate that 600 is 10-25% of the total number of sites. However, until the land surface can be inventoried, the number of existing sites within any one area will remain unknown. In the study area most of the archeological research has taken place along the Snake River. Excavations have included burials and rockshelters. However, the most substantial contributions to prehistory in the study area have been by survey work. The one outstanding exception to this was the excavation of Wilson Butte Cave. The earliest surveys were very broad and were not designed to inventory all the archeological sites in the area. More recently intensive surveys have been designed to produce a significant amount of concrete archeological data for the BLM and the IDWR.

The results of the more recent surveys not only reaffirm the importance of the lands along the Snake River in the study area as "the richest yet surveyed in southern Idaho," but also indicate that the vast, largely unexplored hinterlands north and south of the Snake are of significance as well. But without a full knowledge of the prehistoric settlement patterns along the Snake as well as in the hinterlands, it is not possible to adequately understand the prehistory of the study area. Until the vast acreage of the unexplored lands in the DLE study area is at least inventoried for archeological resources, the prehistory of the Western Snake River Plain will remain imperfect and speculative.

(c) History (Archeological & Architectural). The history of Euroamerica and Indian people in the study area is part of the broader history of the growth and development of the American West. In Idaho this history can be said to have begun with the entrance of the Lewis and Clark Expediation into what is now northcentral Idaho in 1805. In general the largest portion of the history of the study area is composed of two interrelated themes--the demise and final removal of the local Indians, and the rise and final dominance of Euroamerican culture. Thus the history of the DLE study area is a history of tremendous cultural change.

The historic record indicates that the recent Indian populations in the study area were from several ethnic groups. In part the study area attracted these different Indians because it was an area rich in natural food sources. Big game animals were plentiful and included deer, mountain sheep, elk, antelope, buffalo, and bear. In addition abundant quantities of fish were taken from the Snake River and other streams, and numerous plant foods were utilized as well.

The first white people to enter southern Idaho were also attracted by the region's natural resources, particularly the beaver. So numerous and efficient did these trappers become that within less than 30 years the trade ceased to be a profitable venture. The fur trade era lasted from 1810-1840 and was followed by another major phase of Western American history.

The second phase of history in the study area is associated with the growth of travel on the Oregon Trail between the 1840's and 1860's. By the 1840's thousands of families from the East and Midwest were making the journey across the Snake River Plain to the valleys of western Oregon and California. These immigrants viewed the arid lands along the Snake as unsuitable for agriculture, and farming in the study area did not begin until late in the 19th century.

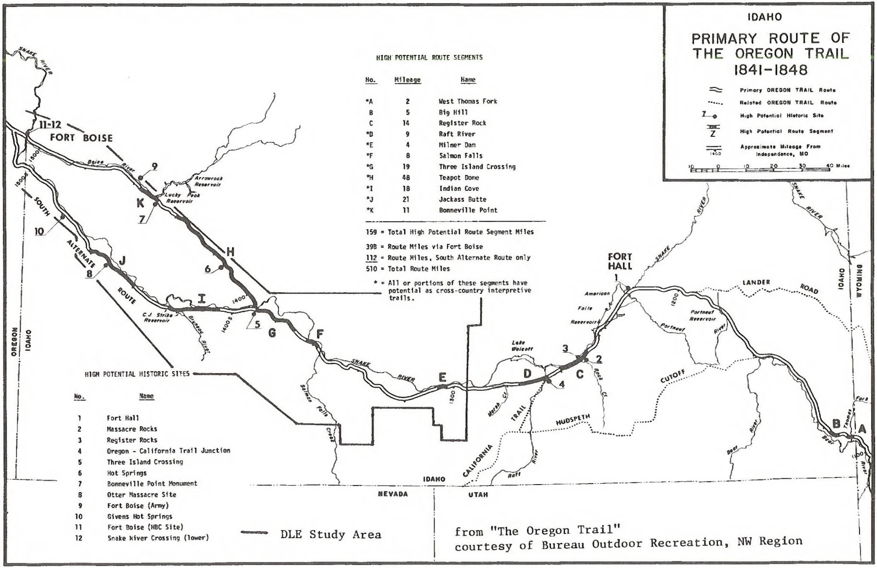
Two major routes of the Oregon Trail are within the study area. The main segment on which the immigrants traveled was south of the Snake to Three Island Crossing where they crossed the river and then moved northwest to the Boise River Valley. An alternate route was traveled by those immigrants who did not cross the Snake at Three Island Crossing (Figure 28). Today the ruts of the Oregon Trail along both routes are prominent in many places in the study area, although some portions have been destroyed by farming and other activities.

Silver mining brought about the next phase in the history of southern Idaho. In the 1860's discoveries of the precious metal in the Boise Basin and Owyhee County created almost instantaneous growth. Small mining camps, as well as larger towns such as Boise, Silver City, and Idaho City, became established at this time. Mining activity brought the first large scale permanent settlement in the state; and farming, commerce, and banking all grew in response to this population growth.

The study area thus has a rich and colorful history. Small homesteads, mining camps, stage depots and routes, and even entire towns dot the area. Very few of the important historical resources have been adequately studied or inventoried. Possibly there are historic sites or features which merit inclusion on the National Register of Historic Places that have not yet been discovered.

At present historic sites in the study area on the National Register and sites in the process of being nominated are as follows:

-- The Oregon Trail
-- The Kelton Road
-- Swan Falls
-- Initial Point
-- Wilson Butte Cave


IDAHO
PRIMARY ROUTE OF THE OREGON TRAIL 1841-1848
Primary OREGON TRAIL Route
Related OREGON TRAIL Route
High Potential Historic Site
High Potential Route Segment
Approximate Mileage From Independence, MO
10 0 10 20 30 40 Miles
HIGH POTENTIAL ROUTE SEGMENTS
No. Mileage Name
*A 2 West Thomas Fork
B 5 Big Hill
C 14 Register Rock
*D 9 Raft River
*E 4 Milner Dam
*F 8 Salmon Falls
*G 19 Three Island Crossing
*H 48 Teapot Dome
*I 18 Indian Cove
*J 21 Jackass Butte
*K 11 Bonneville Point
159 = Total High Potential Route Segment Miles
398 = Route Miles via Fort Boise
112 = Route Miles, South Alternate Route only
510 = Total Route Miles
* = All or portions of these segments have potential as cross-country interpretive trails.
HIGH POTENTIAL HISTORIC SITES
No. Name
1 Fort Hall
2 Massacre Rocks
3 Register Rocks
4 Oregon - California Trail Junction
5 Three Island Crossing
6 Hot Springs
7 Bonneville Point Monument
8 Otter Massacre Site
9 Fort Boise (Army)
10 Givens Hot Springs
11 Fort Boise (HBC Site)
12 Snake River Crossing (lower)
DLE Study Area
FORT BOISE
FORT HALL
SOUTH ALTERNATE ROUTE
LANDER ROAD
HUDSPETH CUTOFF
CALIFORNIA TRAIL
SNAKE RIVER
Boise River
Arrowrock Reservoir
Lucky Peak Reservoir
C.J. Strike Reservoir
Bruneau River
Salmon Falls Creek
Lake Walcott
American Falls Reservoir
Portneuf Reservoir
Portneuf River
Rock Cr.
Marsh Cr.
Raft River
Bear River
Thomas Fork
OREGON
IDAHO
NEVADA
UTAH
WYOMING
from "The Oregon Trail"
courtesy of Bureau Outdoor Recreation, NW Region

b. Recreation. The study region includes portions of State Parks planning units III and IV.

Collectively, these two units represent nearly one-half the state resident population. The major north-south and east-west highways across southern Idaho pass through the study area providing the majority of the nonresidents entering the state with the opportunity to recreate in the region. There are a number of destination sites of regional importance--five state parks, the Snake River, the Bruneau River (under study as a potential wild river), Deer Flat National Wildlife Refuge, C. J. Strike Reservoir, and Lucky Peak Reservoir.

The region includes opportunities for hunting (big game, small game, upland game birds, waterfowl), fishing (cold and warm water), rockhounding, sightseeing, water sports, off-road vehicles and the associated activites of hiking, camping, and picnicking.

Much of the NRL in the region is available for dispersed type recreation activites. The BLM does administer some land with potential for accommodating more intensive use, primarily near the major water bodies.

According to the State Comprehensive Outdoor Recreation Plan (SCORP), Idaho Outdoor Recreation 1973, the greatest activity demand in the region is for sightseeing, followed closely by the desire to hike, fish, and boat. Camping and picnicking opportunities are high in demand, but these activities are normally associated with the recreation uses mentioned and usually occur in conjunction with the more active outdoor recreation opportunities.

The dispersed uses (off-road vehicle operation, hunting, collecting, etc.) collectively represent the greatest demand. The quality of the available opportunities for dispersed use is high.

Presently there are few restrictions and the supply of opportunities is adequate to meet the present demand.

Water-based activities such as fishing (warm and cold water species), boating, water skiing, and swimming are in adequate supply to meet existing needs. However, for those activities involving direct body/water contact, conditions affecting water quality are changing rapidly. Numerous water bodies in the region have reached, or are approaching, minimum water quality levels acceptable for water contact sports.

The situations involving impoundments which were developed primarily for water storage for irrigation, flood control or power production are quite complex. The recreationist enjoying water based activities on these reservoirs would prefer pollution free waters bordered by naturalistic landscapes. A good example is C. J. Strike Reservoir on the Snake River. This project was developed to generate power and store water for irrigation. The power is sold to drive pumps which lift water from the reservoir to irrigate adjacent farmlands. Secondary uses of the reservoir are for recreation and it appears the recreationist will have to coexist with the shoreline clutter of pumps and penstocks, transmission lines, artificial vegetative patterns, and return irrigation flows which lower water quality. These same policies apply to other storage reservoirs on the Snake River and elsewhere in the region.

Water based recreation also occurs in the natural waters. On these waters recreation is a dominant use and water quality is a major concern.

Off-road vehicle opportunities are prevalent with respect to open NRL. There are some areas which have been closed or use has been restricted to protect certain natural features, but the majority of the NRL are open to off-road vehicles.

Because of the proximity of the NRL in the region to the major population centers in Idaho, and the good access from major travel routes, these lands represent a very important recreation resource for the active and passive recreation user. For the most part these lands are available to the public year round because of their low elevation and accessibility.

There are three areas in the region that are presently used for field dog trials (Figure 27). A number of events, regional and national, have been held in these areas.

With regard to upland game bird hunting and the hunting of small game (such as rabbits) the isolated parts of the NRL in southern Idaho are especially important.

The demand for pheasants in this area is extremely high. Hunters from throughout the U. S. and Canada hunt pheasants in the study area. Each year public hunting areas for pheasants are more in demand as additional private lands are posted. Although the popularity for rabbits is not as widespread as for pheasants, the hunting pressure is very high from January to May as other hunting seasons close. NRL in close proximity to major population centers receive most of the rabbit hunting pressure.

The public attitudes and opinions of Idaho's water resources were researched by the IWRB. From this survey it was learned that some 85% of the families have one or more members who fish, and fishing is the most popular outdoor water activity of over 50% of the population. Idahoans also strongly endorse the setting of minimum water flows for fish and wildlife, recreation and water quality. The survey also showed more than half of the fishermen prefer streams and rivers for fishing. Of the various kinds of outdoor water activities, fishing is by far the most popular with 51.4% stating angling as their number one choice (Opinion Research West, 1973).

Spot creel census and studies in the mainstem Snake show that many areas have significant angling pressure at the present time (see Table 20). Table 21 is a listing of angler use recorded by IF&GD in the studies from 1971 to 1974.

Most of the small tributary streams are not stocked by IF&GD and present stocks are provided through natural reproduction of rainbow trout. Most of the reservoirs and heavily fished sections of the Snake River that support a trout fishery are stocked by releasing legal sized rainbow trout. Some of the more important tributaries like Salmon Falls Creek and the Bruneau River are stocked annually by the IF&GD with legal sized rainbow trout. The abundant warm water fisheries in this section of the Snake River are produced by natural reproduction and require no extra hatchery cost. This is an important factor in considering future fisheries and the value of a natural renewable resource that can be harvested in almost all seasons of the year in this heavily populated section of the State of Idaho. Trout fisheries, however, are preferred by the majority of Idaho anglers.

Many fish losses have been documented in parts of the Snake River and related to pollution (EPA, 1973). Water quality and quantity has a bearing on the game fish populations in the river and tributaries and, in turn, the magnitude of the sport fish resource. Fishermen do not prefer to fish in heavily turbid water and will avoid heavily polluted areas even though fish are present. The entire aquatic ecosystem is lost in areas where river flows are reduced completely or to a fraction of the water flow. Most of these low flows occur below irrigation diversions. Studies have shown that a viable fishery cannot be produced in these areas (Lorz, 1974).

c. Planning and Zoning. There is a wide variety of planning activities underway in the study area. Planning is being conducted by federal, state, regional, county, and local governments, and by private groups. Although many of the ongoing planning efforts attempt to coordinate with other planning groups, the variety and scope of the work precludes any central organization or overall direction. Planning activities vary from the multi-state approach of the Pacific Northwest River Basins Commission to corporate planning for specific sites. For the purpose of the environmental analysis, the planning groups directly concerned with agricultural land use and irrigation will be stressed.

(1) Federal. "The Columbia-North Pacific Region Comprehensive Framework Study" conducted by the Pacific Northwest River Basins Commission was completed in 1970 and includes a main report with 16 appendices. The study includes detailed analyses of Idaho, Washington, and Oregon by river basin. Federal and state resource agencies in Idaho are currently participating in preparation of a draft water plan for the State of Idaho. When this work is finalized, an Idaho State Water Plan will result which will also be a part of the Pacific Northwest

TABLE 20

Sport angling importance of the Snake River and tributaries in the study area. (C-NP Appendix XIV, 1971)

NAME	NATIONWIDE	STATEWIDE	COUNTYWIDE	LOCAL
Boise River			X	X
Snake River	X	X	X	X
Rattlesnake Creek				X
Bruneau River			X	X
Bennett Creek			X	X
King Hill Creek			X	X
Clover Creek				X
Malad River			X	X
Big Wood			X	X
Little Wood				X
Salmon Falls Creek			X	X
Deep Creek		X	X	X
Rock Creek	X	X	X	X
Dry Creek			X	X
Goose Creek				X

TABLE 21

Angler use and success determined by the Idaho Department of Fish and Game, Snake River, March 22, 1971 to January 9, 1972. 1/

AREA	FISHERMEN DAYS	CATCH OF FISH
C.J. Strike Reservoir	7,343	52,795
C.J. Strike downstream to Grandview	6,649	34,962
Grandview downstream to Swan Falls Pool	No significant angling	
Swan Falls Pool	No significant angling	
Swan Falls Dam downstream to Guffey damsite	3,321	16,398
Guffey damsite downstream to Bernards Ferry	5,802	6,176

1/ Goodnight, 1972.

River Basins Commission "Comprehensive Coordinated Joint Plan" for the region. The Idaho State Water Plan is scheduled for completion by the end of 1976. Preliminary data developed by this planning group for all projected consumptive and non-consumptive instream requirements indicate an inadequate water supply to meet all additional future needs.

Federal agencies in Idaho have completed some land use and development plans and are in the process of developing others. The completed plans are in various stages of implementation. The major planning efforts concerning the study area by agency are as follows:

(a) Bureau of Land Management. The BLM has completed a number of multiple use plans for defined geographic areas. These Management Framework Plans provide the basic framework for actions to manage NRL for multiple uses:

Boise Front	Management	Framework	Plan	(Complete)
Sailor Creek	"	"	"	"
Kuna	"	"	"	"
Bennett Hills	"	"	"	"
Canyon-Jerome	"	"	"	"
Twin Falls	"	"	"	"
West Cassia	"	"	"	"
Black Canyon	"	"	"	(In progress)
West Owyhee	"	"	"	(In progress)

(b) Bureau of Reclamation. The BR conducts studies and investigations to develop project proposals which would contribute toward regulations, conservation, and utilization of water and related land resources. The studies and reports lead toward the development of specific water project proposals. Bureau-built projects for irrigation, municipal and industrial water, settlement, and other purposes are funded through Congressional appropriations with repayment to the government through contractual arrangements.

Reports on several water development projects have been completed which involve lands in the study area.

(c) Forest Service. The FS develops land use plans to allocate resources for specific uses, to protect the forest environment, and to give direction in the coordination of uses. Land use plans typically involve several management areas in the geographic area included in the planning unit. Land use plans have been completed for the Mountain Home Planning Unit, April 1974.

(d) Geological Survey. The USGS identifies sites suitable for power generation. Although land use planning is not a primary function, land withdrawals for power purposes in portions of the Snake River and tributaries have been made.

(e) Federal Power Commission. The Commission is primarily a regulatory agency but participates with other agencies in coordinating development and utilization of water and related land resources. The Commission has identified potentials for power generation through land withdrawals on the Snake River and tributaries.

(2) State of Idaho. State agencies have prepared a number of plans for operation of the agency. These are operational plans or are oriented toward fulfilling the particular agency function. (Some of these plans are summarized in "Inventory of State Agency Planning," State Planning and Community Affairs Agency, Feb. 1973). It seems evident that coordination has been lacking. For example, the IWRB had no input into the "Idaho Tomorrow Plan" recently publicized although they are dealing with many pertinent issues in preparation of a State Water Plan. Many state agency plans stem from federal requirements for grants-in-aid programs and cost sharing. The recent reorganization of the state resulted in formulation of the Division of Budget, Policy Planning and Coordination. Indications are that this Division will improve the coordination between state, federal and local planning groups.

The most important state planning effort directly concerning the desert land program is the development of a State Water Plan. A draft plan will be submitted by June 1976 and will include recommendations concerning the conservation, development, and optimum use of the state's water resources. Among other things, the recommended plan will address allocation of water for irrigation and stream flow maintenance. Completion of a State Water Plan will clarify the effects of new agricultural developments on both water and land resources.

(3) Sub-State Regions. The State of Idaho has recognized five comprehensive planning agencies as representing the state's six planning regions:

Region I : Panhandle Regional Planning & Development Commission
Region II : Clearwater Economic Development Association
Region III: IDA-ORE Economic Development Association
Region IV : South Idaho Resource Planning & Development Assoc.
Region V : Southeastern Idaho Council of Governments
Region VI : No planning agency currently represents Region VI

The planning regions were established by the Governor in July 1972. In Region III and IV, which include the study area, the following planning groups are also active:

Ada Council of Governments, Boise
Canyon Development Council, Caldwell
Magic Valley Association of Governments

Composition of the regions is:

Region III		Region IV	
Adams Co.	Canyon Co.	Camas Co.	Jerome Co.
Valley Co.	Ada Co.	Blaine Co.	Minidoka Co.
Washington Co.	Elmore Co.	Gooding Co.	Twin Falls Co.
Payette Co.	Boise Co.	Lincoln Co.	Cassia Co.
Gem Co.	Owyhee Co.		

(4) Counties and Local Government. Of the 10 counties in Region III, all have a planning and/or zoning commission and are represented by a regional council. Only 1 county (Ada) has completed a comprehensive plan, 5 counties have zoning ordinances and 6 counties have subdivision ordinances. Of the 34 cities in Region III, 28 have planning or zoning commissions and all are served by a regional council. Six cities have completed a comprehensive plan, 12 have zoning and subdivision ordinances and 9 have building codes.

Of the 8 counties in Region IV, all have a planning and/or zoning commission and 7 are served by a regional council. Only 1 county (Twin Falls) has a completed comprehensive plan, 4 have zoning ordinances and building codes and 3 have subdivision ordinances. Of the 33 cities and towns in Region IV, 32 have a planning and/or zoning commission and 14 are served by a regional council. Only 3 cities have completed comprehensive plans, 16 have a zoning ordinance, 14 a subdivision ordinance, and 18 have established building codes.

A variety of planning, such as comprehensive, sewer and road plans, has been done by counties; and a number of such planning efforts are now in progress ("Local Planning Inventory," Bureau of State Planning and Community Affairs, October 1974).

(5) Private Planning. Private planning takes many forms. Individuals or single business enterprises are concerned with future plans for their particular operation. The private sector is interested and concerned about planning efforts by federal, state and local entities and attempt to utilize data gathered by planning groups. However, individual planning efforts in progress are generally not evident and information used by companies or individuals is usually not available for public planning. For example, an individual's plans or purposes may not be evident until applications are filed. Company plans for expansion or new development are generally kept confidential until definite plans and schedules are announced. Data used by private firms usually remain confidential.

3. Economic and Social Characteristics. The area delineated for this environmental analysis involves portions of 10 counties in southwestern Idaho. With exception of the Boise-Nampa-Caldwell area in

Ada and Canyon Counties, the area is characterized by low population density, relatively slow population growth, an economy based on farms and ranches, few widely scattered cities and towns, high percentages of land in federal ownership and personal incomes lower than the state and nation. Boise, the capital city, is the largest urban area in the state and Ada County has been designated a Standard Metropolitan Statistical Area. Ada and Canyon Counties both have high population densities, rapid population growth, a diversified economy and relatively high personal income levels compared to the other counties.

Agriculture is an important component of the regional economy and is examined in detail in this analysis. It appears that 1 person is employed for every 112.5 acres of new agricultural land on the average. This employment fosters about 40 persons in the food processing industry for each 100 people in crop production. For each 100 persons engaged in food production and processing, an additional 160 people are employed in dependent industries such as retail trade and services. The economy and social factors are closely related; some social factors are economic factors and vice versa. The factors included in this analysis as "economic" or "social" are indicators arranged for convenience.

A brief perspective of Idaho's economic and social development facilitates an understanding of the current situation. Economic development in the Pacific Northwest has traditionally been based on the growth of resource-oriented industries. The Idaho economy, in particular, has been structured around goods which are derived from the soils, forests, and mines of this sparsely populated state. Its manufacturing industries primarily process agricultural commodities, forest products and mineral materials extracted within the state.

Idaho's heavy dependence on resource-based industries has accentuated the consequences of fluctuations on its economy. Employment opportunities and prices were highly favorable during periods of economic growth, but during economic slumps the area was at a competitive disadvantage with regions nearer the heart of the country.

In 1940 the percentage of Idaho's labor force employed in agriculture was 34.4--almost twice as large as the 17.5% of the labor force then employed in agriculture nationally. Consequently, heavy rural-to-urban migration beginning with World War II severely constrained economic growth in Idaho for the next three decades, resulting in a net outmigration approximating 40,000 people per decade. Migration usually is selective (not random), and a disproportionately large number of ambitious, well-educated youth and young adults left the state in search of better economic opportunities. Sustained net outmigration dampens investment incentives to upgrade and modernize business districts and community facilities, diminishing further their ability to compete with larger urban centers. Housing similarly tends to deteriorate in quality under depressed economic conditions. With net outmigration, communities and local governments are deprived of talented leadership lost to more dynamic economic opportunities in communities developing along the Pacific Coast.

Economic progress is highly dependent upon man's discovery of more efficient means for producing food, releasing an ever larger proportion of the labor force to enhance the quantity and variety of other goods and services available. Rising productivity in agriculture is a prerequisite for economic growth, but it produces enlarged supplies of agricultural commodities depressing farm prices and income. Severe economic and social adjustments are necessary for the people whose occupations and life style have been linked to agriculture for generations. Similarly, the wood products industries and mining activities have become more capital intensive. Accordingly, Idaho's economic posture was weak for a quarter of a century following the conclusion of World War II because of its heavy dependence upon three basic, non-growing industries: farming, mining, and forestry.

By the late 1960's internal and external trends of long duration had begun to exert a diversifying and stabilizing influence upon Idaho's economic base. Although resource-oriented industries continued to be dominant, their contributions to new employment opportunities were declining. The major areas of growth occurred in other manufacturing, trade, education, services and public administration. The transportation equipment industry came into southwestern Idaho, multiplying the size and number of its plants, and by 1972 factories located in 8 different communities in the Treasure Valley provided average annual employment of 3,164 people compared to 651 annual employment a decade earlier in 1962.

The addition of 2,500 basic jobs in southwestern Idaho made a significant contribution toward slowing the rate of outmigration. The Twin Falls-Jerome area experienced substantial economic stimulus when 3 factories making hosiery, plastics, and business forms located in this area between 1970 and 1973.

The economic base in the Upper Snake River region has been enlarged since 1970 by the following 3 major developments: (1) Bucyrus-Erie, a major manufacturer of mining machinery, acquired Pocatello Industrial Park and began rapid expansion of employment; (2) American Microsystems employed more than 300 people producing microcircuits; and (3) the phosphate industry, including related chemical industries, are under heavy pressure to expand capacity to meet strong demand for more fertilizer in agriculture. Another large growth component has been statewide expansion of ski resorts, accelerated construction of condominiums in mountain and lakeside resorts, the creation of Idaho's first National Recreation Area in the Sawtooth Mountains, and the establishment of a large state university at Boise. The aggregate impact of these developments is diversification of the economic base and decreased dependence upon resource-oriented industries.

Farmers, too, found themselves involved in an entirely new game where historical calculations were no longer relevant. On the whole they benefited very substantially from the multiplication of farm prices two, three, four and even five-fold. Producers of dairy products and livestock were soon caught in a vise where higher feed costs cancelled out the benefits of higher prices of livestock sold. Shortly the prices for land, fertilizer, and farm machinery responded to new pressures for larger supplies. In early 1975 prices of agricultural commodities were changing with such rapidity both upward and downward that farmers found it increasingly difficult to decide what to plant and how much.

a. Economic Characteristics

(1) Population. A dynamic, growing economy is highly dependent upon mobility of its labor force, and the willingness of a worker to move often spells the difference between success and failure. The American people generally have been very mobile and this attribute has been a positive advantage for the national economy. Further, the freedom to move is one of our cherished values because it constitutes one of the cornerstones of economic opportunity.

The study area has apparently just concluded one full cycle of settlement and outmigration and this region appears to be reemerging as a "New Land of Promise" in the 1970's attracting young, adventurous people just as it did in the 1870's. The first settlers were lured by the discovery of gold and silver in nearby mountain locations. According to the 1880 census the percentage of Idaho's labor force engaged in mining was 20 times as large as the national average. Mining had accelerated the development of this region, but it was the prime mover only during territorial status. When Idaho became a state in 1890 agriculture moved into the driver's seat, and its expansion between 1890 and 1920 was the dominant force in economic growth. Observe the growth of population during this period of rapid growth.

Census	Population	Increase Over Preceding Census		Net Migration
		No.	%	
1970	713,008	45,817	6.9	-42,029
1960	667,191	78,554	13.3	-37,081
1950	588,637	63,764	12.1	-22,847
1940	524,873	79,841	17.9	+26,673
1930	445,032	13,166	3.0	-47,834
1920	431,866	106,272	32.6	
1910	325,594	163,822	101.3	
1900	161,772	73,224	82.7	
1890	88,548	55,938	171.5	

The first 2 decades of the twentieth century constituted the era when Idaho's population registered its largest growth. Between 1900 and 1910, the population more than doubled, adding 163,822 residents to the

Gem State, and the next decade its population grew by an additional 106,272 people. No other decade, earlier or later, witnessed a growth of this magnitude. By 1900 the two basic preconditions for agricultural development in this region had been met. The completion of transcontinental railroads across Idaho in the 1880's enabled farmers to ship bulky farm commodities from this landlocked state to compete for the first time in eastern markets. The volcanic soils in the arid Snake River Plateau were fertile, but irrigation was essential for crops and summer pasture. Congress, at last, recognized that individual farmers by themselves could not bring water to the land and that major reclamation projects would have to be undertaken. It, therefore, voted appropriations to accelerate development of arid land in the West. Fortunately a substantial segment of new farmland came into production just in time to reap extraordinarily high prices for farm commodities during World War I.

Within the 10 counties comprising the study area, the number of farms multiplied five-fold between 1900 and 1920, rising from 2,300 to 12,400 farm units. Similarly, acreage in farms increased more than 3 times from 403,650 acres to 1,402,712 acres during this same period. The next half-century between 1920 and 1970 were lean years for Idaho. Agriculture in the United States had overexpanded during the war to help our European allies. As a result agriculture was a semidepressed industry during the prosperous 1920's and many farms were bankrupt by exceedingly low prices during the Great Depression.

Following World War II productivity in agriculture scored dramatic improvement on account of increased mechanization. These developments led to consolidation of farms into larger, more efficient units which required fewer farm workers. Thus there followed one of the greatest migrations in history from American farms into burgeoning cities. Since Idaho was the most agricultural of any of the mountain states, the exodus from the farms was particularly severe upon the economy of this state. In 1940, 17.5% of the U. S. labor force was engaged in agriculture, but 34.4% of Idaho's labor force worked in agriculture.

By 1960 Idaho's posture as an agriculture state had been further solidified. Nationally only 6.6% of our labor force was still employed in agriculture, but nearly three times as many Idahoans proportionally (18.4%) earned their living in agriculture. The impact of these significant economic and social changes upon the study area is apparent by examining the rural farm population in these 10 counties for the last 3 decades (see Table 22).

It is especially instructive to note that Idaho's rural farm population declined by 105,828 people between 1940 and 1970. This is surprisingly close to the aggregate net outmigration of 101,957 people during this same period. The intercensal population estimates since 1970 signify that a sudden and unexpectedly large reversal has occurred in the migration patterns between the Pacific Coast states and the Northern Rocky

Table 22

POPULATION IN D.L.E. STUDY AREA

Census of Population

	1950	1960	1970	percent change 1960-70	est.[1] pop. 7/1/73	est.[1] pop. 7/1/74	% change 4/1/70- 7/1/74	special[2] census
Ada County	70,699	93,460	112,230	20.1	127,200	131,700	17.35	
Boise (1972)	34,393	34,481	74,990	117.5				79,818
Eagle (1974)	-	-	-					776
Garden City	764	1,681	2,368	40.9				
Kuna (1974)	534	516	593	14.9				941
Meridian (1973)	1,810	2,081	2,616	25.7				3,179
Canyon County	53,579	57,662	61,288	6.3	69,200	72,900	18.95	
Caldwell	10,487	12,230	14,219	16.3				
Greenleaf (1971)	-	-	-					323
Melba	203	197	197	0				
Middleton	496	541	739	36.6				
Nampa	16,185	18,897	20,768	9.9				
Notus	313	324	309	-6.2				
Parma (1973)	1,369	1,295	1,228	-5.2				1,817
Wilder (1971)	555	603	564	-6.5				748
Elmore County	6,687	16,719	17,479	4.5	19,300	20,300	16.14	
Glenns Ferry	1,515	1,374	1,386	0.9				
Mountain Home (1974)	1,887	5,984	6,451	7.8				6,755
Gem County	8,730	9,127	9,387	2.8	10,200	10,900	16.12	
Emmett	3,067	3,769	3,945	4.7				
Pearl	38	24	8	-66.7				
Gooding County	11,101	9,544	8,645	-9.4	9,500	10,600	22.61	
Bliss	126	91	114	25.3				
Gooding	3,099	2,750	2,599	-5.5				
Hagerman	520	430	436	1.4				
Wendell	1,483	1,232	1,122	-8.9				
Jerome County	12,080	11,712	10,253	-12.5	12,000	13,500	31.67	
Eden	456	426	343	-19.5				
Hazleton	429	433	396	-8.5				
Jerome (1974)	4,523	4,761	4,183	-12.1				5,625
Lincoln County	4,256	3,686	3,057	-17.1	3,200	3,300	7.95	
Richfield	429	329	290	-11.9				
Dietrich	160	118	84	-28.8				
Shoshone	1,420	1,416	1,233	-12.9				
Owyhee County	6,307	6,375	6,422	0.7	7,100	7,500	16.79	
Grandview (1971)								260
Homedale	1,411	1,381	1,411	2.2				
Marsing	643	555	610	9.9				
Payette County	11,921	12,363	12,401	0.3	13,700	13,900	12.09	
Fruitland	573	804	1,576	96.0				
New Plymouth	942	940	986	4.9				
Payette	4,032	4,451	4,521	1.6				
Twin Falls County	40,979	41,842	41,807	-0.1	45,300	45,900	9.8	
Buhl	2,870	3,059	2,975	-2.7				
Castleford		274	174	-36.5				
Filer	1,425	1,249	1,173	-6.1				
Hollister	80	60	57	-5.0				
Hansen	463	427	415	-2.8				
Kimberly	1,347	1,298	1,557	20.0				
Murtaugh	239	214	124	-42.1				
Twin Falls	17,600	20,126	21,914	8.9				
D.L.E. Study Area	226,307	282,490	282,969	7.9	316,700	330,500	16.8	
Idaho	588,637	667,191	713,008	6.9	776,000	799,000	12.0	
U.S.A. (in 1,000)	151,326	179,323	203,236	13.3	209,844	211,390	4.0	

Mountain states (Table 23). Whether these changes are due to sudden shifts in economic opportunities or inspired by major modifications in values with regard to urban society and the natural environment is not clear. Within the last 5 years the American people have been forced to recognize that our resources are finite. In such a time it is highly probable that those few states whose resources are least developed have taken on a new importance in our economic system.

County	1940	1950	1960	1970
Ada	11,356	9,236	7,064	4,252
Canyon	17,143	17,270	13,682	8,275
Elmore	1,885	1,773	1,229	697
Gem	4,608	3,697	3,202	2,053
Gooding	4,968	4,279	3,764	2,965
Jerome	5,209	5,536	5,074	3,638
Lincoln	2,271	2,057	1,586	1,395
Owyhee	3,393	3,625	3,360	2,065
Payette	4,227	4,830	3,378	2,324
Twin Falls	14,441	11,658	10,078	7,678
Study Area	69,501	63,961	52,417	35,342
State Total	200,016	164,605	130,586	94,188

Whatever the reason, a demographic analysis of these new developments yields two conclusions. First, the magnitude of the change is very comprehensive. Whereas 9 out of 10 counties experienced net outmigration in the decade 1960-1970, all of the counties (with the possible exception of Lincoln County) have received net immigration since 1970. Seldom do trends reverse themselves in such a dramatic manner. Second, the greatest population pressure currently is being exerted upon suburban communities in the Boise area.

(2) Employment. Because Idaho has been one of the five most agriculturally-oriented states in our country, its economic growth has been severely restrained since 1920 by the massive farm-to-city migration. In addition to diminished employment available on the farms, the indirect effect of this migration was quite often adverse upon employment opportunities in the small rural towns which served the farm population. If the region was to recover from the devastating economic and social costs of large scale outmigration, a new economic base had to be established.

During the 1960's the distribution of industries and occupations in Idaho was becoming more diversified. These developments lessened its dependence upon extractive industries, which have been low growth industries in our modern society. A comparison of employment by industries for

Table 23

POPULATION CHARACTERISTICS AND TRENDS

County	Square Miles [1]	Population 1970 [1]	Dens/ Square Mile [1]	Urban Population [1]	Rural Non-Farm [2]	Rural Farm [2]	Percentage Urban-Rural 1970	1960	Net Migration 1960-70 No.[3]	Percent	Net Migration 1950-60 No. [4]	Percent
Ada	1,043	112,230	107.6	87,803	20,175	4,252	78-22	70-30	7,298	7.8	8,722	12.3
Canyon	578	61,288	106.0	34,987	18,026	8,275	57-43	52-48	-2,312	-4.0	-4,520	-8.4
Elmore	3.048	17,479	5.7	12,489	4,293	697	71-29	36-64	-3,630	-21.7	6,019	90.0
Gem	555	9,387	16.9	3,945	3,389	2,053	42-58	41-59	-562	-6.2	-835	-9.6
Gooding	720	8,645	12.0	2,599	3,081	2,965	30-70	29-71	-1,263	-13.2	-2,976	-26.8
Jerome	595	10,253	17.2	4,183	2,432	3,638	41-59	41-59	-2,571	-22.0	-2,619	-21.7
Lincoln	1,203	3,057	2.5	-	1,662	1,395	0-100	0-100	-798	-21.6	-1,327	-31.2
Owyhee	7,641	6,422	0.8	-	4,357	2,065	0-100	0-100	-697	-10.9	-1.082	-17.2
Payette	402	12,401	30.8	4,521	5,556	2,324	36-64	36-64	-770	-6.2	-1,146	-9.6
Twin Falls	1,947	41,807	21.5	24,889	9,240	7,678	60-40	55-45	-4,180	-10.0	-6,241	-15.2
D.L.E. Study	17,732	282,969	15.95	175,416	72,211	35,342	62-38	54-46	-9,485	-3.6	-6,005	-2.7
Idaho	82,677	713,008	8.6	385,434	232,946	94,188	54-46	48-52	-42,029	-6.3	-40,026	-6.8
USA (in 1,000)	3,537	203,235		149,325	45,587	8,292			3,048		2,724	

1. 1970 Census, Number of Inhabitants, Table 9.

2. 1970 Supplementary Report, Rural Population by Farm-Nonfarm residence for counties in the United States:1970 (A corrected copy for major errors originally published in census).

3. Current Population Report, Series P-25, No. 461, Components of Population change by county: 1960 to 1970.

4. Current Population Reports, Series P-23, No. 7, Components of Population change, 1950 to 1960, for counties.

the census years 1960 and 1970 shows that employment in public administration and public education rose from 9.3% to 11.7% of the total labor force of the state (Table 24). Employment in professional and related services (S.I.C. 80-89) increased from 6.7% to 9.9%, and aggregate employment in wholesale and retail trade rose from 20.3% to 22.7% of the total labor force. In general these expanding sectors of the econony offer a wider range of opportunities for professionally trained people. Also good job security is assured because these industries are not highly vulnerable to business fluctuations.

An examination of labor force participation rates for men and women during the last two decades reveals that the employment rate for women in Idaho (age 14 and older) has been consistently lower than the national rate. However this gap has narrowed in recent years.

	Labor Participation Rate		
	1970	1960	1950
Females 14 yrs. & older			
Idaho --	37.3	32.2	23.9
United States --	39.6	34.5	29.0
Males 14 yrs. & older			
Idaho --	73.2	79.6	80.1
United States --	72.9	77.4	79.0

By referring to Table 25, it can be ascertained that job availability determines the extent to which women work outside the home. In the urban areas of Ada, Canyon and Twin Falls Counties more than 40% of the women above 16 years of age have entered the labor force. However in the rural areas of Gem, Owyhee and Lincoln Counties these rates (28-32%) are substantially lower. One major factor in female employment in southern Idaho is the location of food processing plants. Traditionally about 66% of their employees are women; and as their industry grew employment opportunities for women broadened significantly in farm service centers.

The changing composition of employment by industry in the study area is evident in Table 24. The two sources of information (Census of Population and Department of Employment) afford an opportunity to analyze employment: first, on the basis of residence, and second, by the place of work on the whole. Intercounty commuting in this region (between places of residence and employment) is much less extensive and complicated than in major metropolitan areas. However the proportion of workers commuting to places of employment outside their county of residence in 1970 was quite significant in 3 geographical areas, as follows:

423 Owyhee County residents work in Canyon County,
434 Jerome County residents work in Twin Falls County,
990 Payette County residents work in Malheur County, Oregon.

Employment information from the Idaho Department of Employment provides much more accurate employment data than the 1970 census because

Table 24

CIVILIAN LABOR FORCE

	Census of Population (Residence Based)			Department of Employment (By Place of Work)		
	1960	1970	% Change	1968	1973	% Change
Ada County						
Civilian Labor Force	36,919	46,554	26	46,200	62,600	35.5
Unemployment	1,953	1,733	-11.3	1,250	2,250	80
%Unemployed	5.2	3.7		2.7	3.7	
Total Employment	34,966	44,821	28.2	44,950	60,350	34.3
Agricultural Employment	2,409	1,766	-26.7	2,050	1,950	-4.9
Total Manufacturing	3,464	4,634	33.8	4,100	5,800	41.5
Food Processing	993	828	-16.6	950	1,200	26.3
Lumber	452	691	52.9	800	1,500	87.5
Other	2,019	3,115	54.3	2,350	3,100	31.9
Total Non-manufacturing	28,229	32,200	36.1	32,200	48,000	41.9
Construction	3,616	3,841	6.2	2,000	3,850	92.5
Transportation, Communication & Utilities	2,811	3,353	19.3	3,150	3,550	12.7
Trade	8,104	11,864	46.4	10,150	14,050	38.4
Finance, Insurance, and Real Estate	2,039	2,913	42.9	2,450	3,600	46.9
Service & Misc.	7,445	9,968	33.9	5,650	9,100	61.1
Government	4,214	6,482	53.8	8,800	13,850	57.4
Industry Not Reported	864					
Non-Agriculture Self Employed and Domestic				6,600	4,600	-30.3
Total Employment	34,966	44,821	28.2	44,950	60,350	34.3
Canyon County						
Civilian Labor Force	22,687	24,311	7.2	24,740	29,900	20.9
Unemployment	1,204	836	-30.6	800	1,360	70
% Unemployed	5.3	3.4		3.2	4.5	
Total Employment	21,483	23,475	9.3	23,940	28,540	19.2
Agricultural	5,518	3,354	-39.2	5,500	5,240	-4.7
Total Manufacturing	3,320	4,400	32,5	4,640	6,440	38.8
Food Processing	2,237	2,285	2.2	2,640	3,360	27.3
Lumber	161	356	121.1	400	540	35
Other	922	1,759	90.8	1,600	2,540	58.8
Total Non-manufacturing	12,198	15,721	28.8	10,840	14,440	33.2
Construction	996	1,241	24.6	560	980	75
Transportation, Communication & Utilities	1,716	1,502	-12.5	1,080	1,160	7.4
Trade	4,167	5,340	28.2	3,760	5,000	33
Finance, Insurance, and Real Estate	612	768	25.4	440	560	27.3
Sèrvice and Misc.	3,294	5,034	52.8	2,660	3,880	45.9
Government	1,413	1,836	29.9	2,340	2,860	22.2
Industry Not Reported	447					
Non-Agriculture Self Employed and Domestic				2,960	2,420	-18.2
Total Employment	21,483	23,475	9.3	23,940	29,900	24.9

Table 24 Cont'd.

Civilian Labor Force--2

	Census of Population (Residence Based)			Department of Employment (By Place of Work)		
	1960	1970	% Change	1968	1973	% Change
Elmore County						
Civilian Labor Force	3,542	3,989	12.6	4,404	4,665	5.9
Unemployment	210	248	18.0	230	239	3.9
% Unemployed	5.9	6.2		5.2	5.1	
Total Employment	3,332	3,741	12.3	4,174	4,426	6.0
Agricultural	502	557	10.9	872	749	-14.1
Total Manufacturing	99	144	45.5	108	130	20.4
Food	11	20	81.8	16	31	93.8
Lumber	48	58	20.8	83	81	-2.4
Other	40	66	65	9	18	100
Total Non-manufacturing	2,618	3,040	16.1	2,674	3,128	17
Construction	445	237	-46.7	76	160	110.5
Transportation, Communication and Utilities	445	320	-28.1	268	230	-14.2
Trade	631	915	45	508	729	43.5
Finance, Insurance, and Real Estate	49	122	148.9	109	159	45.9
Service and Misc.	521	645	23.8	329	334	1.5
Government	527	801	51.9	1,384	1,516	9.5
Not Reported	113					
Non-Agriculture Self Employed and Domestic				520	419	-19.4
Total Employment	3,332	3,741	12.3	4,174	4,426	6
Gem County						
Civilian Labor Force	3,446	3,353	-2.7	3,538	4,388	24
Unemployment	254	177	-30.3	191	308	61.3
%Unemployed	7.4	5.3		5.4	7.0	
Total Employment	3,192	3,176	-.5	3,347	4,080	21.9
Agricultural	935	844	9.7	1,142	1,304	14.2
Total Manufacturing	865	736	14.9	777	1,027	32.2
Food Processing	123	85	-30.9	111	137	23.4
Lumber	721	605	-16.1	652	793	21.6
Other	21	46	119	14	97	592.9
Total Non-manufacturing	1,341	1,596	19	1,087	1,474	35.6
Construction	140	200	42.85	31	38	22.6
Transportation, Communication and Utilities	102	129	26.5	49	62	26.5
Trade	447	529	18.3	397	446	12.3
Finance, Insurance, and Real Estate	59	94	59.3	40	57	42.5
Service and Misc	419	355	-15.3	200	240	20
Government	186	289	55.4	370	513	38.6
Not Reported	39					
Non-Agriculture Self Employed and Domestic				341	275	-19.4
Total Employment	3,192	3,176	-.5	3,764	4,080	21.9

Table 24 Cont'd.

Civilian Labor Force--3

	Census of Population (Residence Based)			Department of Employment (By Place of Work)		
	1960	1970	% Change	1968	1973	% Change
Gooding County						
Civilian Labor Force	3,673	3,416	-6.9	3,706	3,453	-6.8
Unemployment	81	128	58	111	163	46.8
% Unemployed	2.2	3.8		2.9	4.7	
Total Employment	3,592	3,288	-8.5	3,595	3,290	-8.5
Agricultural	1,446	1,181	-18.3	1,478	1,078	-27.1
Total Manufacturing	95	171	80	79	126	59.5
Food Processing	51	86	68.63	51	96	88.2
Lumber	4	21	425			
Other	40	64	60	28	30	7.1
Total Non-Manufacturing	1,966	1,936	-1.5	1,638	1,790	9.7
Construction	155	186	20	50	102	104
Transportation, Communication and Utilities	370	204	-44.9	145	180	24.1
Trade	603	641	6.3	450	569	26.4
Finance, Insurance, and Real Estate	73	95	30.1	57	59	3.5
Service and Misc.	489	494	1	356	256	-28.1
Government	276	316	14.5	574	624	8.7
Not Reported	70					
Non-Agriculture Self Employed and Domestic				313	395	26.2
Total Employment	3,888	3,875	-.3	3,598	4,317	20
Jerome County						
Civilian Labor Force	4,064	4,086	.5	3,821	4,539	18.8
Unemployment	176	211	19.9	223	222	-0.4
% Unemployed	4.3	5.2		5.8	4.9	
Total Employment	3,888	3,875	-.3	3,598	4,317	20
Agricultural	1,612	1,179	26.9	1,676	1,472	-12.2
Total Manufacturing	248	432	74.2	179	709	296.1
Food Processing	168	352	109.5	155	165	6.5
Lumber	11	4	-63.6			
Other	69	76	10.1	24	544	2,166.7
Total Non-Manufacturing	1,958	2,264	15.6	1,430	1,741	21.7
Construction	244	222	-9	72	108	50
Transportation, Communication and Utilities	262	258	-1.5	67	116	73.1
Trade	642	770	19.9	527	693	31.5
Finance, Insurance, and Real Estate	52	65	25	47	70	48.9
Service and Misc.	470	635	35.1	285	321	12.6
Government	288	314	9	432	433	.2
Not Reported	70					
Non-Agriculture Self Employed and Domestic				313	395	26.2
Total Employment	3,888	3,875	-.3	3,598	4,317	20

Table 24 Cont'd.

Civilian Labor Force--4

	Census of Population (Residence Based)			Department of Employment (By Place of Work)		
	1960	1970	% Change	1968	1973	% Change
Lincoln County						
Civilian Labor Force	1,351	1,059	-21.6	1,536	1,311	-14.6
Unemployment	40	18	-55	55	43	-21.8
% Unemployed	3.0	1.7		3.6	3.3	
Total Employment	1,311	1,041	-20.6	1,481	1,268	-14.4
Agriculture	485	408	-15.9	647	529	-18.2
Total Manufacturing	31	45	45.2	29	24	-17.2
Food Processing	16	12	-25	27	24	-11.1
Lumber		8				
Other	15	25	66.7	2	-	-100.0
Total Non-manufacturing	778	588	-24.4	673	677	0.6
Construction	157	128	-18.5	2	-	-100.0
Transportation, Communica-ation and Utilities	99	85	-14.1	99	88	-11.1
Trade	158	113	-28.5	99	77	-22.2
Finance, Insurance, and Real Estate	26	19	-26.9	14	16	14.3
Service and Misc.	181	119	-34.3	66	95	43.9
Government	157	124	-21.0	393	401	2.0
Not Reported	17					
Non-Agriculture Self Employed and Domestic				132	38	-71.2
Total Employment	1,311	1,041	-20.6	1,481	1,268	-14.4
Owyhee County						
Civilian Labor Force	2,415	2,395	-.8	2,839	2,814	-.9
Unemployment	64	75	17.2	142	188	32.4
% Unemployed	2.7	3.1		5.0	6.7	
Total Employment	2,351	2,320	-1.3	2,697	2,626	-2.6
Agricultural	1,189	953	-19.8	1,804	1,406	-22.1
Total Manufacturing	174	291	67.2	31	110	254.8
Food Processing	116	173	49.1		97	
Lumber	7	40	471.43		11	
Other	51	78	52.94	31	2	-92.5
Total Non-manufacturing	956	1,076	12.5	731	939	28.5
Construction	148	72	-51.4	24	70	191.7
Transportation, Communication and Utilities	90	81	-10	33	64	93.9
Trade	311	281	-9.6	191	244	27.7
Finance, Real Estate, and Insurance	20	40	1	25	28	12
Service and Misc.	170	181	6.5	88	86	-2.3
Government	217	421	94	370	432	16.8
Not Reported	32				15	
Non Agriculture, Self Employed and Domestic				131	171	30.5
	2,351	2,320	-1.3	2,697	2,626	-2.6

Table 24 Cont'd.

Civilian Labor Force--5

	Census of Population (Residence Based)			Department of Employment (by Place of Work)		
	1960	1970	% Change	1968	1973	% Change
Payette County						
Civilian Labor Force	4,612	4,934	7.0	4,139	4,355	5.2
Unemployment	198	208	5.0	188	249	32.4
% Unemployed	4.2	4.2		4.5	5.7	
Total Employment	4,414	4,726	7.1	3,951	4,106	3.9
Agricultural	1,209	822	-32.0	1,502	1,097	-27.0
Total Manufacturing	886	1,068	20.5	591	633	7.1
Food Processing	733	826	12.7	405	247	-39
Lumber	74	64	-13.5			
Other	79	178	125.3	186	386	107.5
Total Non-Manufacturing	2,247	2,836	26.2	1,482	1,751	18.2
Construction	317	276	-12.9	63	158	150.8
Transportation, Communication, and Utilities	268	287	7.1	208	233	12
Trade	810	1,012	25	498	529	6.2
Finance, Insurance, and Real Estate	95	132	38.9	57	64	12.3
Service and Misc.	497	740	48.9	238	249	4.6
Government	260	389	49.6	418	518	23.9
Not Reported	72					
Non Agriculture Self Employed and Domestic				376	625	66.2
Total Employment	4.414	4,726	7.1	3,951	4,106	3.9
Twin Falls County						
Civilian Labor Force	16,046	16,774	4.5	18,570	19,762	6.4
Unemployment	604	593	- 1.8	770	768	-0.3
% Unemployed	3.7	3.5		4.2	3.9	
Total Employment	15,442	16,181	4.8	17,800	18,994	6.7
Agricultural	3,685	2,710	-26.46	2,900	2,751	-5.1
Total Manufacturing	1,382	1,911	38.3	1,830	2,571	40.5
Food Processing	757	978	29.19	1,390	1,466	5.5
Lumber	40	42	5			
Other	585	891	52.3	440	975	121.6
Total Non-Manufacturing	10,072	11,560	14.8	9,800	11,972	22.2
Construction	983	842	-14.3	700	961	37.3
Transportation, Communication and Utilities	1,267	1,203	-5.1	990	1,239	25.2
Trade	3,688	4,422	19.9	3,870	4,654	20.3
Finance, Insurance, and Real Estate	550	734	33.45	530	620	17
Service and Misc.	2,619	2,931	11.9	1,890	1,885	-0.3
Government	965	1,428	47.9	1,820	2,613	43.6
Not Reported	303					
Non-Agriculture, Self Employed and Domestic				3,270	1,700	-48
Total Employment	15,442	16,181	4,8	17,800	18.994	6.7

Sources: Census of Population, 1960, Table 83, Labor Force
1960 Table 85, Industry of Employed Persons
1970 LTable 121 Labor Force
1970 Table 123 Industry of Employed Persons
Basic Economic Data for Idaho, Department of Employment, State of Idaho, March 1970
1973 Data from unpublished Department of Employment Information.

Table 25

SUMMARY OF SOCIAL CHARACTERISTICS (1970)

	ADA	CANYON	ELMORE	GEM	GOODING	JEROME	LINCOLN	OWYHEE	PAYETTE	TWIN FALLS	STATE
Total Population	112,230	61,288	17,479	9,387	8,645	10,253	3,057	6,422	12,401	41,807	713,008
Number Households	35,816	19,259	4,760	2,997	2,817	3,293	935	1,873	4,151	13,710	
Persons per Household	3.08	3.05	3.36	3.00	3.09	3.22	3.29	2.95	2.95	3.00	3.17
% Under 18 years	35.6	34.9	38.7	36.8	34.9	35.9	37.7	39.3	33.8	35.2	37
% 65 years and older	9.1	11.7	3.9	12.6	13.6	11.3	11.3	9.7	15.3	12.2	10
median age	27.5	28.3	22.3	29.6	33.8	31.0	31.1	26.2	32.4	30.3	26.4
% Families with own children under 6 years	26.2	22.9	34.5	24.6	19.5	23.9	17.3	28.3	19.5	23.5	
Persons 25 years and over, median school years completed											
Male	12.6	12.0	12.4	10.8	11.7	11.0	11.8	10.7	12.0	12.1	12.2
Female	12.5	12.2	12.4	12.0	12.2	12.1	12.1	12.0	12.1	12.2	12.3
% Population born in Idaho	48.4	42.8	25.4	52.8	52.9	50.9	55.2	48.3	40.0	50.6	
% Males 16 years and over in labor force	78.7	74.5	91.0	76.4	79.4	79.9	72.8	78.0	76.0	77.4	76.9
% Females 16 years and over in labor force	44.4	41.2	32.6	29.1	35.3	36.5	28.4	31.3	38.9	40.4	39.0
% Workers who work outside County of Residence	4.4	8.6	2.0	11.4	9.8	20.6	7.9	23.8	29.0	4.7	16.6
% Population 5 years and older whose residence in 1965 was same	45.9	48.1	20.5	48.5	53.4	52.1	60.4	43.6	52.0	50.8	57.3
non white population	1,151	1,005	976	79	70	57	57	418	254	352	13,765
Spanish language or origin	2,741	7,180	1,572	267	498	572	445	881	1,018	2,237	34,552

Source: 1970 Census of Population, General Social and Economic Sharacteristics, Idaho, Tables 119, 120, 121 one can perceive those industries and geographical regions where the economic base has been strengthened or weakened. The employment figures given for 1968 and 1973 by the Department of Employment are for average annual employment and require no adjustment for seasonal fluctuations.

The employment in Idaho improved materially after 1970. Due to the reversal of migration the civilian labor force has grown more rapidly, but employment has not declined. For example, the seasonally adjusted civilian labor force for Idaho in January 1975 was 369,200, an increase of 19,500 (or 5.6%) from January 1974. Despite the fact that employment in Idaho on a seasonally adjusted basis grew 14,000 (or 4.3%) from January 1974 to January 1975, unemployment rose by 5,500 (or 24.4%) from 22,500 a year ago to 28,000 in January of this year. In January 1975 unemployment on a statewide basis was 7.6% of the civilian labor force.

(3) Income

(a) Personal Income. Personal income is widely regarded as a barometer of economic welfare and provides a comprehensive measure both of the relative position of different households and of geographic areas in our society.

To date Idaho's personal income position can be classified into two distinct periods. Prior to 1920 per capita income was consistently higher than the national average. Although personal fortunes varied widely, the adventurous people who prospected for gold and silver in this region earned incomes better than 1.5 times the national average. Likewise, the early settlers who established farms on these fertile soils found attractive rewards; otherwise, it is not likely that settlement would have proceeded at such a rapid pace. National income statistics confirm that per capita income in Idaho during the first half-century following permanent settlement ranged between 100% and 160% of the national average.

Disaster struck the Idaho economy in 1920 and 1921 when farm prices, which had escalated during the war, were suddenly deflated by one-half or more. Widespread bank failures in Idaho during the so-called "Roaring Twenties" attest to the precarious position of the entire economy in this agriculturally-oriented state. In 1920 and 1921 Idaho's per capita income relative to the U. S. average fell from 120 in 1919 to 75.6 in 1921. The Great Depression further aggravated the poverty in Idaho, and the per capita income of its residents fell to a record low of 61% of the national norm in 1933.

One of the few beneficiaries of war is agriculture. Higher prices for agricultural products lifted per capita incomes almost to the U. S. average in 1942-1944, but thereafter personal income in Idaho relative to the rest of the nation sank again and remained persistently between 80 and 87% of the national average through the 1960's. Sharply higher prices for agricultural commodities which followed the Russian wheat deal in 1972 restored Idaho's per capita income once again to 87% of the

U. S. average. Basically this geographically-isolated state has had the lowest per capital income of any of the 8 Mountain States about three-fourths of the time.

Table 26 clarifies income distribution within the region. Of particular interest to this analysis, Owyhee County has the lowest per capita income among the 10 counties within the study area. This county has the largest acreage of potentially irrigable land and presently has a population density of 0.8 per square mile. Unquestionably its status is due partly to the fact that its population is below the threshold necessary to support professional services. The county is nearly as large as the State of Massachusetts, but has no doctor and only one dentist. Consequently its income is low because it lacks the contribution of professional and technical people who customarily earn higher incomes.

Generally speaking those counties with low female labor force participation rates are also the areas where per capita incomes are lowest. In our present society a second wage earner in a family is a common prerequisite for achieving desired income levels and living standards. Again Ada County is conspicuous by its singular position as the only county which receives incomes comparable with the rest of the nation.

(b) Agricultural Income. The current mix of agricultural commodities produced within the study area is shown on Table 27. These computations were made within the guidelines of the very extensive revision of the farm income series published by the U. S. Department of Agriculture for the time in State Farm Income Estimates, September 1974.

The relative quantities of different commodities are not shown, but the impact of higher prices in 1972 and 1973 are fully reflected. The magnitude and timing of changes in farm commodity prices varied widely and their impact was unevenly distributed. This differential impact can be appreciated by examining the following list of the top 15 commodities in Idaho and comparing the cash receipts realized from them in 1971 and 1973.

Table 26

COUNTY INCOME INFORMATION

	Ada	Canyon	Elmore	Gem	Gooding	Jerome	Lincoln	Owyhee	Payette	Twin Falls	Region	State
Per Capita Personal Income: 1960	1,894	1,474	1,495	1,424	1,467	1,281	1,356	1,412	1,375	1,649	1,634	1,611
1970	3,144	2,480	2,307	2,237	2,545	2,146	2,108	1,713	2,343	2,631	2,707	2,721
% Change 60-70	66	68	54	57	73	67	55	21	70	59	65	68
Relation. to state	1.16	.91	.85	.82	.94	.79	.77	.63	.86	.97	.99	1.0
Median Family Income	9,708	7,786	7,218	7,478	6,939	6,600	7,102	5,615	7,085	7,760		8,381
% Families under $5,000	17.3	26.4	26.9	28.7	35.9	34.5	31.0	42.8	34.0	26.1	24.2	23.0
% Families over $12,000	33.5	20.7	16.3	16.2	20.3	16.7	16.7	11.3	16.7	21.4	24.9	24.7
# Families under poverty level	2,483	1,928	505	305	417	336	113	351	540	1,327	8,305	19,504
% all families	8.6	12.2	12.3	12.4	18.2	12.4	14.1	22.7	15.8	12.0	11.4	10.8
Mean Family Income	1,831	1,969	1,743	1,827	1,660	1,404	1,351	1,407	1,907	1,891	1,822	1,870
Mean Income Deficit	1,327	1,274	1,503	1,212	1,321	1,357	1,789	1,730	1,072	1,360	1,334	1,346
% Receiving Public Asst.	14.3	17.8	5.9	21.3	5.0	8.6	7.0	13.4	17.2	15.4		13.9
# People below poverty level	11,404	8,636	2,225	1,458	1,779	1,524	507	1,645	2,192	6,190	37,562	91,578
% All persons	10.3	14.7	13.9	15.7	20.9	14.9	16.9	25.9	17.8	15.0		13.2
1972 Per Capita Personal Income	4,555	3,789	3,928	3,108	3,382	3,673	3,418	2,794	3,511	4,127		3,711
% National Average	101	84	87	69	75	82	76	62	78	92		82

Source: All data except 1972 per capita income taken from Table 124, Income and Poverty Statistics in 1969 for counties, 1970 Census of Population, General and Social Characteristics
1972 per capita income by counties, Survey of Current Business, May 1974.

Table 27

(in thousands of dollars)	ADA COUNTY			CANYON COUNTY		
	1969	1971	1973	1969	1971	1973
Cattle and Calves	5,584	7,223	10,902	18,354	23,740	35,831
Sheep and Lambs	444	376	372	254	216	213
Hogs	489	463	696	722	685	1,029
Dairy Products	8,167	10,018	13,051	7,936	9,734	12,680
Poultry and Eggs	1,700	1,506	1,445	1,441	1,276	1,225
Wool	59	26	92	50	34	115
Other Livestock	224	212	365	543	513	887
Total Livestock Products	16,667	19,824	26,923	29,300	36,198	51,980
Wheat	390	377	1,317	1,751	1,742	5,492
Barley	170	354	652	865	1,737	5,369
Other Grains	396	418	607	743	789	1,111
Hay	1,033	1,033	2,149	1,128	1,291	2,347
Potatoes	1,042	825	1,112	7,254	6,025	7,674
Dry Beans	82	136	231	764	1,262	2,146
Other Vegetables	334	314	450	4,650	5,575	9,122
Sugar Beets	594	799	548	13,529	13,665	17,186
Seed Crops	409	461	832	4,547	5,295	10,341
Other Crops	1,208	1,144	2,469	5,002	5,936	9,064
Total Crops	5,658	6,011	10,367	40,233	43,317	69,852
Fruits and Nuts	37	31	25	3,691	3,150	4,791
Cash receipts from all commodities	22,362	25,866	37,315	73,224	82,665	126,623

	ELMORE COUNTY			GEM COUNTY		
	1969	1971	1973	1969	1971	1973
Cattle and Calves	9,932	12,846	19,388	2,264	2,928	4,419
Sheep and Lambs	678	575	568	214	182	179
Hogs	50	47	71	84	79	119
Dairy Products	354	434	566	1,864	2,286	2,978
Poultry and Eggs	2	2	2	196	173	166
Wool	220	114	246	41	17	64
Other Livestock	13	12	22	14	13	23
Total Livestock	11,249	14,030	20,863	4,677	5,678	7,948
Wheat	149	123	519	123	114	487
Barley	323	592	1,193	51	108	203
Other Grain	187	193	271	105	107	160
Hay	374	428	778	389	446	810
Potatoes	6,403	5,369	10,887	22	18	24
Dry Beans	45	75	128	-	-	-
Other Vegetables	61	69	97	170	155	228
Sugar Beets	2,388	2,423	1,372	45	50	72
Seed Crops	278	322	760	151	177	398
Other Crops	162	183	331	89	110	181
Total Crops	10,370	9,777	16,336	1,145	1,285	2,563
Fruits and Nuts	2	3	3	4,194	3,591	5,547
Cash Receipts from all commodities	21,621	23,810	37,202	10,016	10,554	16,058

Table 27 Cont'd.

(in thousands of dollars)	GOODING COUNTY			JEROME COUNTY		
	1969	1971	1973	1969	1971	1973
Cattle and Calves	5,852	7,569	11,424	8,497	10,990	16,587
Sheep and lambs	666	565	558	648	550	544
Hogs	345	327	491	200	189	285
Dairy Products	3,019	3,703	4,824	2,168	2,660	3,465
Poultry and Eggs	1,093	968	930	167	148	142
Wool	210	113	321	105	41	162
Other Livestock	99	93	161	42	40	69
Total Livestock Products	11,284	13,338	18,709	11,827	14,618	21,254
Wheat	450	618	1,216	1,121	1,121	5,417
Barley	78	171	314	268	539	1,121
Other Grains	442	472	671	287	291	465
Hay	836	957	1,739	1,147	1,313	2,385
Potatoes	1,077	1,135	2,015	5,724	4,837	7,875
Dry Beans	374	617	1,049	2,147	3,545	6,030
Other Vegetables	249	233	334	293	244	475
Sugar Beets	628	646	832	2,415	1,979	1,915
Seed Crops	243	230	441	965	884	1,701
Other Crops	31	99	64	1	41	-
Total Crops	4,408	5,178	8,675	14,368	14,794	27,384
Fruits and Nuts	29	24	32	39	32	26
Cash Receipts from All Commodities	15,721	18,540	27,416	26,234	29,444	48,664

	LINCOLN COUNTY			OWYHEE COUNTY		
	1969	1971	1973	1969	1971	1973
Cattle and Calves	1,809	2,340	3,532	4,005	5,181	7,819
Sheep and Lambs	313	265	262	841	713	705
Hogs	106	101	151	162	154	231
Dairy Products	1,748	2,144	2,793	1,380	1,692	2,205
Poultry and Eggs	337	299	287	25	22	21
Wool	73	39	81	64	41	102
Other Livestock	23	22	38	36	34	59
Total Livestock	4,409	5,210	7,144	6,513	7,837	11,142
Wheat	381	430	743	394	598	679
Barley	106	216	564	314	760	1,232
Other Grain	76	76	127	251	270	377
Hay	455	521	947	982	1,124	2,043
Potatoes	1,263	1,065	1,638	3,032	2,298	4,790
Dry Beans	154	253	432	79	130	222
Other Vegetables	6	6	8	225	285	478
Sugar Beets	262	529	546	1,899	1,841	2,544
Seed Crops	74	68	126	1,757	2,126	5,198
Other Crops	-	11	-	33	56	68
Total Crops	2,777	3,175	5,131	8,966	9,488	17,631
Fruits and Nuts	2	3	1	252	217	345
Cash Receipts from All Commodities	7,188	8,388	12,276	15,731	17,542	29,118

Table 27 Cont'd.

(in thousands of dollars)	PAYETTE COUNTY			TWIN FALLS COUNTY		
	1969	1971	1973	1969	1971	1973
Cattle and Calves	8,596	11,118	16,781	10,213	13,210	19,938
Sheep and Lambs	92	79	78	2,385	2,023	1,999
Hogs	188	178	268	325	307	462
Dairy Products	2,104	2,581	3,362	4,213	5,167	6,731
Poultry and Eggs	465	412	395	214	189	182
Wool	12	6	35	163	80	347
Other Livestock	76	72	124	146	138	238
Total Livestock Products	11,533	14,446	21,043	17,659	21,114	29,897
Wheat	311	302	677	2,506	2,368	8,801
Barley	84	191	314	444	872	1,643
Other Grains	110	116	170	663	682	1,059
Hay	412	472	857	1,878	2,150	3,906
Potatoes	454	359	484	4,051	4,908	8,986
Dry Beans	31	52	88	5,892	9,730	16,553
Other Vegetables	958	1,187	2,015	2,110	1,925	3,090
Sugar Beets	1,189	1,261	1,854	6,603	6,171	6,094
Seed Crops	297	358	875	2,824	2,605	5,006
Other Crops	748	680	1,531	76	199	154
Total Crops	4,594	4,978	8,865	27,047	31,610	55,292
Fruits and Nuts	2,681	2,136	4,767	198	170	201
Cash Receipts from All Commodities	18,808	21,560	34,675	44,904	52,894	85,390

Source: Bollinger, W. LaMar, Personal Income in Idaho Counties, 1965-1972, (To be published at Caldwell, Idaho in the summer of 1975)

Farm Commodities	Cash Receipts (in thousands of dollars)	
	1971	1973
Cattle and calves	200,811	303,082
Potatoes	116,967	178,902
Dairy Products	76,093	96,873
Wheat	56,197	162,786
Sugar beets	51,152	54,802
Barley	34,513	56,485
Hay	28,841	52,392
Sheep and Lambs	21,491	21,239
Dry beans	20,092	34,181
Hogs	8,133	12,222
Onions	7,221	12,494
Alfalfa seed	6,306	15,903
Apples	4,923	13,334
Garden bean seed	4,536	8,610
Dry peas	4,394	9,950

The revenue statewide from 4 of these crops more than doubled; specifically, wheat, apples, alfalfa seed, and dry peas. Eight other commodities (cattle and calves, potatoes, barley, hay, dry beans, garden bean seed, onions, and hogs) yielded increases upward from 50%. Cash receipts from dairy products rose less than 30%, the returns from sugar beets less than 10%, and the receipts from sheep and lambs actually fell.

(4) Public Finance and Tax Base. Unaccustomed to wealth or to extravagance in government, the citizens of Idaho have long been fiscally conservative. The consitution imposes an absolute debt limit of $2 million upon the State of Idaho, and the people have managed to live within this constraint for 85 years. The legislature, in turn, has imposed conservative fiscal and debt policies upon all units of local government. Ornate city halls and county courthouses have never been accepted as symbols of public pride. Rarely are these facilities of public administration replaced before the old buildings are either condemned or consumed by fire. Six of the the ten counties have no indebtedness at all.

Whatever generosity the people of Idaho display toward government is primarily reserved for the education of their children. By comparison with more affluent states along the Pacific Coast or in the Middle Atlantic area, education facilities, equipment, and salaries in Idaho are modest. Nevertheless Idaho ranks sixth in the upper third of the states in its ability to hold grade school students in school through the completion of high school. These results are somewhat astonishing for a state characterized by low per capita income and cultural isolation. An inspection of bonded indebtedness of local governments in the study area (Table 28) indicates that taxpayers have been willing to incur indebtedness to construct needed educational facilities, and their school buildings are more likely to be newer and more modern than other public buildings. In other words, school buildings compare favorably with other public buildings in this region; but there are still a substantial minority of school facilities that are outdated and constrain unduly the educational opportunities available.

Prior to the adoption of standards requiring secondary and tertiary treatment for municipal wastes in the interest of better health, the towns and cities in this region incurred relatively little indebtedness. Public insistence that residential developments and commercial enterprises must meet progressively higher standards before sewage is discharged into rivers and streams has been the primary reason that municipalities have increased their indebtedness within the last decade. Since these debts are normally paid out of usage fees, they are not regarded as a burden upon real property.

It is relevant to the objective of this analysis to discuss the degree to which efficiency in public administration is related to population density. If the 1973 expenditures made by Lincoln County are divided by the mid-1973 population estimate of 3,200, county expenditures per resident averaged $95.01. Lincoln County has the lowest population of any county within the study area, and the expenditures for county government per capita are the highest in this region. In contrast county expenditures per capita in Ada County with a mid-year 1973 population estimate of 127,000 were $25.31, which is the lowest for any county in this area. In general county expenditures per capita are inverse to the size of the population base. The larger counties benefit in two important ways: (1) Their county government ordinarily delivers a wider range of services than those received in thinly populated areas, and (2) the costs per household are lower. For instance, Owyhee County, with the second lowest population base of 7,100 people in 1973 and the second highest expenditures for county government per capita $63.70, made available for the first time in March 1975 a toll-free telephone line into the county sheriff's office from the western half of the county where two-thirds of the population live.

b. Social Characteristics

(1) Housing. The quality and quantity of housing is one indicator of social well being. In the 1960-1970 period available housing units varied considerably from a 20.6% increase in Ada County to a 17% decrease in Lincoln County (Table 29). In Ada County the percentage increase in housing units barely exceeded the percentage increase in

Table 28

PUBLIC FINANCE
DLE Study Area

	1973 Property Taxes [1]	1973 Disbursements [2]	Bonded Indebtness
Ada County	2,947,318	3,219,274	0
Boise	5,375,689	5,554,496	2,172,396
Eagle	8,252	9,217	0
Garden City	79,467	237,937	192,000
Kuna	21,894	66,777	0
Meridian	136,521	410,007	93,000
Schools			
#1 Boise	9,879,222	18,976,604	9,531,000
#2 Meridian	1,532,518	3,632,435	2,316,000
#3 Kuna	296,923	654,396	200,400
Library Districts (2)	10,033	10,108	
Flood Control District (1)	5,340	5,392	
Highway District (1)	1,470,426	3,784,620	
Fire Protection District (6)	219,169	231,505	
Cemetary District (6)	45,989	44,918	
Drainage District (3)	21,764	28,946	
Sewer Districts (5)	219,315	223,672	2,268,075
Recreation District (1)	39,266	9,662	
Canyon County	1,747,419	2,855,876	
Caldwell	755,685	2,756,877	985,066
Melba	5,365	15,581	4,000
Middleton	25,559	32,526	156,000
Nampa	909,134	2,608,359	1,179,540
Notus	9,100	21,888	80,000
Parma	42,699	173,645	79,000
Wilder	15,980	24,660	149,000
Schools			
#131 Nampa	1,238,614	4,421,785	2,745,000
#132 Caldwell	856,347	2,531,148	2,592,000
#133 Wilder	119,310	471,989	
#134 Middleton	179,855	692,303	243,000
#135 Notus	76,297	269,246	5,000
#136 Melba	147,048	352,643	154,000
#137 Parma	240,722	735,346	90,000
#138 Scism	56,414	9,145	12,000
#139 Canyon	548,065	1,673,911	2,206,000
Highway Districts	419,916	945,618	
Fire Protection District	81,906	91,745	
Cemetary District	21,536	21,958	
Drainage District	23,601	23,891	
Flood Control District	6,337	3,722	
Gopher District	0	1,586	1,621
Elmore County	660,191	936,479	295,000
Mountain Home	257,815	672,076	536,513
Glenns Ferry	49,217	114,705	215,000
Schools			
#191 Prarie	6,878	12,203	0
#192 Glenns Ferry	289,517	528,572	510,000
#193 Mountain Home	538,925	3,324,496	98,187
Highway Districts (2)	146,785	648,108	
Fire Districts (2)	8,735	9,074	
Gem County	335,136	832,200	183,000
Emmett	102,236	353,538	80,232
Schools			
#221 Emmett	388,546	1,556,594	1,115,000
Drainage Districts (2)	3,170		
Fire District (1)	8,297	11,697	
Mosquito Abatement District	45,849	53,590	
Cemetary District (2)	956	2,095	
Forest Protection District	156		

Table 28 Cont'd.

Public Finance--DLE Study Area - 2

	1973 Property Taxes[1]	1973 Disbursements[2]	Bonded Indebtness
Gooding County	580,654	599,904	455,000*
Gooding	118,357	345,737	618,723
Wendell	35,569	149,263	155,000
Hagerman	6,491	34,500	
Bliss	5,367	5,900	
Schools			
#231 Gooding	328,238	765,638	985,000
#232 Wendell	180,908	580,964	212,000
#233 Hagerman	74,097	273,168	380,000
#234 Bliss	100,747	141,465	
Highway Districts (5)	134,520	321,100	
Cemetary Districts (3)	14,849		
Fire Districts (3)	19,561		
			*County hospital
Jerome County	442,722	422,611	
Jerome	171,521	419,881	591,000
Eden	8,167	19,816	130,000
Hazelton	17,336	29,700	
Schools			
#261 Jerome	471,698	1,396,971	27,000
#262 Valley	198,315	498,163	
Highway Districts (3)	208,740	452,345	
Irrigation Districts & Weeds.	127,586		
Fire Districts(3)	33,608		
Airport	6,948		
Cemetary District	2,796		
Lincoln County	258,042	304,044	
Shoshone	37,614	97,073	
Dietrich	1,675	3,157	
Richfield	6,882	35,027	
Schools			
#312 Shoshone	164,454	363,805	14.000
#314 Dietrich	63,388	97,643	5,000
#316 Richfield	49,415	178,234	16,500
Highway Districts (4)	84,262	254,242	
Cemetary Districts (2)	5,990	9,193	
Fire Districts (2)	7,620	9,875	
Library District	1,779	1,705	
Owyhee County	294,297	452,269	
Homedale	42,126	155,418	172,720
Marsing	20,075	57,068	166,500
Schools			
#363 Marsing	160,057	385,288	188,000
#364 Plesant Valley	17,485	30,863	
#370 Homedale	199,854	599,016	588,000
#364 Bruneau Grand View	225,737	649,052	74,000
Highway Districts (3)	45,666	190,780	
Cemetary Districts (4)	7,419		
Fire Districts (4)	16,500		
Irrigation Districts (5)			242,669
Payette County	564,451	833,180	445,000
Payette	209,696	521,192	427,000
New Plymouth	26,182	75,257	93,000
Fruitland	66,298	164,672	
Schools			
#371 Payette	290,345	1,218,144	316,390
#372 New Plymouth	139,759	509,984	117,000
#373 Fruitland	235,626	626,577	402,828
Highway Districts	32,284	98,552	
Cemetary Districts (2)	32,118		
Fire Districts (1)	6,982		

Table 28 Cont'd.

Public Finance--DLE Study Area - 3

	1973 Property Taxes [1]	1973 Disbursements [2]	Bonded Indebtedness
Twin Falls County			
Twin Falls	1,298,142	3,330,458	1,665,000
Buhl	126,055	157,723	125,000
Filer	51,813	55,575	37,000
Kimberly	21,045	33,556	0
Hansen	7,252	9,116	0
Hollister	808	1,163	0
Castleford	1,977	2,639	
Murtaugh	3,730	4,506	
Schools			
#411 Twin Falls	1,103,600	3,960,799	4,160,000
#412 Buhl	382,708	996,394	456,000
#413 Filer	281,641	706,025	470,000
#414 Kimberly	151,169	528,629	299,000
#415 Hansen	90,880	248,815	380,000
#416 Three Creek Elementary	15,450	12,308	
#417 Castleford	122,439	256,492	33,900
#418 Murtaugh	92,510	261,792	160,000
Highway Districts (4)	636,763	1,358,303	

Source: 1 County Financial Reports, 1973
2 Disbursements for School Districts were taken from Financial Summaries for Idaho School Districts, July 1, 1973--June 30, 1974, Department of Education, State of Idaho. Other disbursements and bonded indebtedness from county financial reports.

<u>Table 29</u>

HOUSING INVENTORY

	Ada	Canyon	Elmore	Gem	Gooding	Jerome	Lincoln	Owyhee	Payette	Twin Falls
1970 Population	112,230	61,288	17,479	9,387	8,645	10,253	3,057	6,422	12,401	41,807
1960 Housing Units	30,782	18,717	4,756	3,006	3,190	3,803	1,231	2,191	4,271	14,445
1970 Housing Units[1]	37,131	20,271	5,286	3,332	3,127	3,637	1,152	2,135	4,453	14,923
1960 to 1970 change in total housing units[3]	20.6	8.3	11.1	10.8	-2.0	-4.4	-6.4	-2.6	4.3	3.3
1960 to 1970 change in population - percent	20.1	6.3	4.5	2.8	-9.4	-12.5	-17.1	0.7	0.3	-0.1
all year-round units 1970	37,124	20,166	5,246	3,172	3,122	3,579	1,124	2,087	4,434	14,825
owner occupied [1]	25,518	12,930	2,176	2,296	2,087	2,248	713	1,253	2,957	9,067
Renter Occupied[1]	10,316	6,336	2,582	697	731	1,041	223	619	1,188	4,662
Vacant year round[1]	1,290	900	488	179	304	290	188	215	289	1,096
Lacking some or all plumbing [1]	684	712	251	208	89	139	86	240	144	471
Lacking piped water[1]	75	92	71	68	11	44	28	68	17	96
Lack Flush Toilet[1]	196	314	169	158	50	89	62	177	73	247
Built 1965 to Mar 1970[2]	5,240	2,190	525	334	188	268	34	206	352	1,102
Built Prior to 1940[2]	11,074	8,472	1,078	1,657	1,702	1,891	662	664	1,964	7,447
Persons per occupied unit[1]	2.6	2.5	3.1	2.5	2.4	2.6	2.7	2.7	2.4	2.5
persons per owner occupied unit[1]	2.9	2.5	3.0	2.5	2.3	2.5	2.6	2.5	2.4	2.5
persons per renter occupied unit[1]	2.2	2.6	3.1	3.0	3.1	2.8	3.1	3.5	2.6	2.5

Source: 1970 Census of Housing, Volume I, Housing characteristics for states, cities, and counties, Part 14, Idaho
1. Table 60, Occupancy, Utilization, and Plumbing Characteristics for counties, 1970
2. Table 62, Structural, Plumbing, Equipment and Financial Characteristics for counties, 1970
3. Computed

population. Since the 1970 census housing units have barely kept pace with population increases in Ada County. Escalation of interest rates and uncertainties in the national economy have had some effects on new housing starts. However, new building permits recently were at a new high for a 6-month period in Idaho.

Housing in the more rural counties is predominantly owner occupied. In Gem County more than 3 of 4 families own their home. In Ada and Canyon Counties, almost half the housing is renter occupied. Generally persons per unit in the 10-county area were higher in rental housing and in the predominantly rural areas. A higher percentage of the homes in rural areas lack plumbing facilities than urban areas with increasing populations. Older homes are more frequent in rural areas where population decreased during the 1960-1970 period.

In 1970 median gross rents per housing rent were highest in Ada, Elmore, and Canyon Counties and lowest in Gooding and Lincoln Counties (Table 30). The median value of owner occupied housing was highest in Ada County and lowest in Owyhee County (Table 31).

(2) Transportation and Utilities. The major transportation and utility systems have developed on the relatively level Snake River Plain. Interstate Highway 80N is nearly complete from Burley to the Idaho-Oregon state line. Work is in progress on about 15 miles near Bliss and about 20 miles near King Hill and Glenns Ferry. U. S. Highways 26, 30, and 20 are east-west highways. U. S. Highways 93 and 95 are north-south routes. Secondary state highways in the study area include routes 27, 25, 50, 78, 69, 19, and 55.

The Union Pacific Railroad serves the study area with routes dividing north of Lake Walcott Reservoir east of Rupert. The northern route serves Dietrich, Shoshone, Gooding, and Bliss. The southern route splits at Rupert and serves Hazelton, Eden, Jerome, and Wendell north of the river and Burley, Hansen, Kimberly, Twin Falls, Filer, and Buhl south of the river. The railroad continues through Boise, Meridian, Nampa, Caldwell, and through Parma and Notus to the state line. The railroad divides again at Orchard to Kuna and Nampa.

Natural gas, oil and gasoline pipelines extend through the study area across the Snake River Plain. Natural gas is marketed locally by Intermountain Gas Company. Electric power is supplied by Idaho Power Company (described in detail elsewhere in this analysis) and telephone service provided by Mountain Bell. The study area has a high percentage of septic tanks; and public sewer facilities are limited in many communities. Water service varies considerably, but it should be noted that many of the smaller communities have outdated water systems with limited capacities. A complete description of transportation and utility systems in each community within the study area is attached as Appendix VII.

Table 30

GROSS RENTS OF RENTER-OCCUPIED UNITS, 1970

	Total renter occupied units	Less than $40	$40 to $59	$60 to $79	$80 to $99	$100 to $149	$150 or more	no cash rent	median gross rent
Ada	10,316	203	680	1,387	1,934	3,296	1,757	569	105
Canyon	6,336	143	604	1,135	1,229	1,296	331	541	89
Elmore	2,682	26	81	236	395	592	93	1,049	99
Gem	697	17	73	156	126	103	10	51	80
Gooding	731	16	117	101	57	49	7	73	68
Jerome	1,041	25	108	148	168	108	26	86	81
Lincoln	223	6	19	36	34	14	0	23	76
Owyhee	619	14	20	111	99	63	5	131	82
Payette	1,188	23	140	248	253	157	55	140	82
Twin Falls	4,662	115	578	741	762	837	174	304	84
Ten County Region	28,395	588	2,420	4,299	5,057	6,515	2,458	2,967	
Idaho	57,041	1,717	5,743	10,869	12,007	15,484	5,249	5.972	92

Source: 1970 Census of Housing, Volume I
Housing characteristics for States, Cities and Counties
Part 14, Idaho, Table 61 Financial Characteristics for Counties

Table 31

VALUE OF OWNER OCCUPIED UNITS, 1970

Counties	Total Owner Occupied	Less than $5,000	$5,000 to $9,999	$10,000 to $14,999	$15,000 to $19,999	$20,000 to $24,999	$25,000 to $34,999	$35,000 or more	Median Value
Ada	25,518	454	2,861	5,611	5,247	2,987	2,482	1,247	16,400
Canyon	12,930	625	2,139	2,520	1,953	903	619	262	13,400
Elmore	2,176	84	269	510	411	92	30	20	13,800
Gem	2,296	109	458	463	282	76	67	30	11,700
Gooding	2,087	160	436	312	139	38	29	16	9,600
Jerome	2,248	233	469	297	221	55	19	5	9,400
Lincoln	713	49	110	85	28	57	9	0	10,300
Owyhee	1,253	106	234	123	90	31	0	0	9,000
Payette	2,957	132	607	551	336	128	45	16	11,400
Twin Falls	9,067	518	1,669	1,891	1,409	611	493	176	13,100
Ten County Region	61,245	2,470	9,252	12,363	10,116	4,978	3,793	1,772	
Idaho	108,319	7,414	22,827	28,631	23,990	12,343	9,117	3,997	14,100

Source: 1970 Census of Housing, Volume I
Housing characteristics for States, Cities, and Counties,
Part 14, Idaho, Table 61, Financial Characteristics for counties, 1970

(3) Social Services. There are a wide range of facilities and services which can be used as indicators of general well-being. Educational facilities, health services, law enforcement, and fire protection are considered basic indicators. Generally the educational facilities of this 10-county area compare favorably to counties in other states with similar populations. School districts and enrollments of grade schools through junior high are shown on Table 32. It is noteworthy that enrollment nationwide decreased almost 4% during the period 1969-70 to 1974-75, but increased 4.8% in Idaho and 6.9% in the 10-county area. Only 2 counties, Lincoln and Twin Falls, have shown decreased enrollments in the past 5 years.

The population increases described earlier in this analysis are clearly evident in school enrollments. The Meridian schools increased 71% and Kuna schools 51%. Middleton schools in Canyon County increased 46%. The schools with rapidly increasing enrollments are overcrowded and student-to-teacher ratios tend to be high. Many of the newer schools had enrollments above their capacity shortly after they were opened. Maintenance and operation expenditures per average daily attendance in the rapidly growing schools tend to be lower than schools with stable or decreasing enrollments.

High school enrollments generally reflect similar influences of population growth (Table 33). Borah High School enrollment of 2,151 exceeds its 1,735 student capacity. The Boise, Meridian, Kuna, Nampa, and Jerome High Schools are operating beyond their capacity.

Health facilities in the 10-county area are summarized in Table 34. General hospitals are not located in Lincoln, Owyhee, or Payette Counties. Nursing homes or long-term care units are located in all counties. Three hospitals are located in Ada and Canyon Counties. Relatively high occupation rates are evident in Elmore Memorial, Veterans Administration, St. Alphonsus and Mercy Medical Center. Ratios between medical professionals and population are large, and at least 1 county has no doctor.

Law enforcement personnel and jail facilities are summarized in Table 35. The number of personnel per 1,000 persons gives some indication of the quality of law enforcement, but does not consider the land area which varies greatly in the 10-county region. Gooding and Lincoln Counties both have low ratios of law enforcement personnel to population. Although Owyhee County has 8 sworn personnel, the county area is almost 5 million acres and some of the county is practically devoid of law enforcement personnel. Other rural counties share the problem of a few officers responsible for relatively large land areas.

Fire protection service is generally adequate in urban areas and major communities. Fire protection in rural areas of the 10 counties is generally poor due to distance between housing, lack of water in rural areas, and in some cases either limited or old equipment. Many

Table 32

SCHOOL ENROLLMENT

	Enrollment 69-70	Enrollment 74-75	percent change 5 year period	Full Term ADA 73-74	Assessed Valuation per ADA 73-74	M&O Expend. per ADA 73-74
Ada County						
1 Boise	22,092	22,957	3.9	20,799	6,988	1,013
2 Meridian	3,760	6,440	71.3	5,516	4,924	737
3 Kuna	802	1,212	51.1	1,024	6,301	716
8 private schools	1,757	1,497	-14.8			
Ada County Totals	28,417	32,106	13	27,339	6,545	
Canyon County						
131 Nampa	5,633	5,784	2.7	5,493	4,655	892
132 Caldwell	3,596	3,728	3.7	3,611	5,076	783
133 Wilder	655	581	-11.3	522	5,131	997
134 Middleton	766	1,123	46.6	940	4,336	814
135 Notus	303	293	-3.3	308	7,001	967
136 Melba	410	420	2.4	383	11,501	1,011
137 Parma	955	894	-6.4	834	6,874	974
138 Scism	87	93	6.9	79	22,653	1,213
139 Canyon	1,697	2,027	19.4	1,902	8,126	965
7 private schools	984	1,052	6.9			
Canyon County Totals	15,086	15,995	6.0	14,072	5,699	
Elmore County						
191 Prarie	17	9	-47.1	9	27,535	1,445
192 Glenns Ferry	672	580	-13.7	562	14,389	1,038
193 Mountain Home	3,671	3,793	3.3	3,787	3,868	966
Elmore County Totals	4,360	4,382	.5	4,358	5,277	
Gem County						
221 Emmett	2,428	2,504	3.1	2,346	5,998	741
Gem County Total	2,428	2,504	3.1	2,346	5,998	
Gooding County						
231 Gooding	1,029	1,095	6.4	1,063	7,248	800
232 Wendell	682	802	17.6	700	7,299	918
233 Hagerman	325	342	5.2	320	8,310	941
234 Bliss	143	127	-11.2	115	20,549	1,348
Gooding County Totals	2,179	2,366	8.6	2,198	8,118	
Jerome County						
261 Jerome	1,868	2,136	14.3	1,983	8,195	781
262 Valley	684	614	-10.23	565	12,237	970
Jerome County Total	2,552	2,750	7.8	2,548	9,090	
Lincoln County						
312 Shoshone	503	399	-20.7	352	13,141	1,136
314 Dietrich	97	101	4.1	106	13,426	1,019
316 Richfield	201	190	-5.5	177	11,982	1,113
Lincoln County Totals	801	690	-13.9	635	12,857	
Owyhee County						
363 Marsing	512	533	4.1	455	7,761	941
364 Pleasant Valley	13	26	100.0	22	27,267	1,532
365 Bruneau Grandview	467	578	23.8	546	12,217	1,270
370 Homedale	817	829	1.5	806	5,258	822
Owyhee County Total	1,809	1,966	8.7	1,829	8,216	

Table 32 Cont'd.

	Enrollment 69-70	Enrollment 74-75	percent change 5 year period	Full Term ADA 73-74	Assessed Valuation per ADA 73-74	M&O Expend. per ADA 73-74
Payette County						
371 Payette	1,517	1,602	5.6	1,539	5,228	874
372 New Plymouth	658	617	-6.2	585	7,377	962
373 Fruitland	853	988	15.8	897	6,115	777
Payette County Total	3,028	3,207	5.9	3,021	5,908	
Twin Falls County						
411 Twin Falls	6,049	6,110	1.0	5,925	5,369	746
412 Buhl	1,417	1,403	-1.0	1,326	7,954	832
413 Filer	910	899	-1.2	890	8,829	878
414 Kimberly	737	689	-6.5	693	5,992	848
415 Hansen	272	285	4.8	271	9,934	1,012
416 Three Creek	11	10	- 9.1	8	142,775	1,781
417 Castleford	294	290	-1.4	285	12,196	991
418 Murtaugh	288	254	-11.8	243	13,148	1,174
5/3 Private Schools	641	310	-51.6			
Twin Falls County Total	10,619	10,250	-3.5	9,641	6,722	
Ten County Total	71,273	76,216	6.9	67,987	6,517	
State Total excluding Kindergartens	178,919	187,552	4.8	173,795	7,025	897
USA Total (in 1,000) excluding Kindergartens	48,341	46,573	-3.7			

Sources:

Enrollment: Idaho Educational Directory 1969-70, State of Idaho Department of Education, Statehouse, Boise, D.F. Engelking, State Superintendent of Public Instruction

Idaho Educational Directory 1974-75, State of Idaho Department of Education, Statehouse, Boise, Roy E. Truby, State Superintendent of Public Instruction

ADA and Valuation per ADA and M & O per ADA: Financial Summaries, Idaho School Districts, July 1, 1973 - June 30, 1974, State of Idaho Department of Education, Statehouse, Boise, Roy E. Truby, State Superintendent of Public Instruction

Table 33

HIGH SCHOOLS IN D.L.E. STUDY AREA

	Enrollment 74-75	Capacity	Pupil/Teacher Ratio
Ada County			
Boise			
Boise High School	1530	1500	22.12
Borah High School	2151	1735	23.7
Capital High School	1727	1800	22.43
Meridian	1389	1400	23.5
Kuna	364	250	14.1
Canyon County			
Nampa	1356	1250	24.41
Caldwell	821	900	22.84
Middleton	360	400	21.9
Valivue	636	800	24.1
Wilder	255	325	13.64
Parma	283	300	17.17
Melba	246	250	18.3
Notus	158	150	12.89
Elmore County			
Glenns Ferry	217	300	19.5
Mountain Home	804	920	22.36
Gem County			
Emmett	855	900	24.6
Gooding County			
Gooding	578	400	18.2
Wendell	227	300	15.5
Hagerman	194	NA	15.37
Bliss	57	350	7.28
Jerome County			
Jerome	491	350	22.4
Valley	209	350	17.2
Lincoln County			
Shoshone	157	250	17.55
Richfield	72	150	11
Dietrich	40	150	9.35
Owyhee County			
Homedale	267	325	19.8
Marsing	185	250	15.6
Grandview	171	125	
Payette County			
Fruitland	302	300	21.9
Payette	510	550	21.9
New Plymouth	221	250	18.6
Twin Falls County			
Buhl	492	600	16
Twin Falls	1474	1600	23.13
Filer	336	400	17.3
Hansen	149	200	14
Kimberly	383	450	18.5
Castleford	92	150	15.4
Murtaugh	144	120	15.6

Source: High School Accreditation Reports (Unpublished)

Table 34

USAGE OF MEDICAL FACILITIES IN DLE STUDY AREA

	Beds	Occupancy Rate (Percent)
Ada County		
Hospitals		
St. Alphonsus	227	81
St. Lukes	216	76
Elks Rehabilitation	38	69
Nursing Homes		
Boise Convalescent Center	168	
Boise Valley Sunset Home	210	
Grand Oaks Health Care	88	
Treasure Valley Manor	168	
Canyon County		
Hospitals		
Caldwell Memorial	154	65.4
Mercy Medical Center	144	76.1
Idaho State School & Hospital	38	51
Nursing Homes		
Boulevard Nursing Home	41	
Caldwell Convalescent Center	76	
Midland Manor, Inc.	110	
Mountain View Caldwell Conv. Ctr.	110	
Nampa Convalescent Center	120	
Elmore County		
Hospitals		
Elmore Memorial	19	87
Nursing Homes		
Elmore Memorial Nuraing Home	39	
Gem County		
Hospitals		
Walter Knox Memorial	49	41.7
Nursing Homes		
Emmett Convalescent Center	54	
Shady Lane Guest Home	29	
Gooding County		
Hospitals		
Gooding County Memorial	30	60.7
Nuesing Homes		
Green Acres Terrace, Inc	89	
Magic Valley Manor, Inc	63	
Jerome County		
Hospitals		
St. Benedict's	80	72.5
Nursing Homes		
St. Benedict's Geriatric Unit	40	
Lincoln County		
Nursing Homes		
Wood River Convalescent Center	34	
Owyhee County		
Nursing Homes		
Homedale Nursing Home	42	
Payette County		
Nursing Homes		
Casa Loma Convalescent Center	83	
Twin Falls County		
Hospitals		
Magic Valley Memorial	124	73.4
Twin Falls Clinic	37	62.2
Nursing Homes		
Harrals Nursing Home	64	
Hazeldale Manor	84	
Skyview Manor	89	
Mountain View Convalescent Center	50	
Federal Hospitals		
V.A. Hospital	172	84.1

Source: Health Profile, Idaho, Mountain States Regional Medical Program, Updated Supplement 1. Comprehensive Health Planing, Department of Health and Welfare.

Table 35

LAW ENFORCEMENT PERSONNEL AND JAIL FACILITIES

County	Sworn * Personnel	Sworn * Personnel per 1,000 population	No. ** of Jails	Total ** Capacity
Ada	176	1.42	2	105
Canyon[1]			3	104
Elmore	29	1.53	1	6
Gem	12	1.17	1	26
Gooding	10	1.02	1	21
Jerome	16	1.32	1	7
Lincoln	3	.89	1	10
Owyhee	8	1.10	1	8
Payette	24	1.79	1	28
Twin Falls	66	1.43	1	79

* October 31, 1974
**September 1, 1973
1 Via telephone the number of sworn personnel in Canyon County as of January 1, 1975 was determined to be 121.

CRIMES BY COUNTY

July to December 1973

County	Total Index	Murder	Rape	Robbery	Agrav. Assault	Burglary	Larceny	M.V. Theft
Ada	2,943		8	25	177	662	1,853	218
Canyon	717		2	7	19	134	517	38
Elmore	248		6	4	6	58	149	25
Gem	178	1	1	1	7	44	110	14
Gooding	24				1	10	11	2
Jerome	106			1	7	26	66	7
Lincoln	25					1	24	
Owyhee	10					1	8	1
Payette	211				10	58	136	7
Twin Falls	897		6	11	15	250	559	56

Source: Law Enforcement Planning Commission

Table 36

FIRE PROTECTION SERVICE

IN D.L.E. STUDY AREA

	Number Firemen		Amount Equipment			
	Full Time	Volunteer	No. Trucks	Gallons/ Minute	No. Tankers	No. Hydrants
Ada County						
Boise	123		12	11,900	4	1239
Cole-Collister (Rural)	10	23	4	3,250	1	
Eagle (Rural)		10	1	750	1	
Kuna		12	1	320		20
Kuna (Rural)			1	500	1	
Meridian		23	1	500		41
Meridian (Rural)			2	1,250	1	
Star (Rural)		9	2	1,250	1	
Whitney (Rural)	8	14	4	2,500	4	
Canyon County						
Caldwell	15	8	4	4,000		212
Caldwell (Rural)			1	500	1	
Melba		4	1	750		15
Melba (Rural)			1	750	1	
Middleton		17	1	500		22
Middleton (Rural)			1	750	1	
Nampa	29		4	3,750		579
Nampa (Rural)			1	1,000	1	
Notus		18	1	500		10
Parma		15	2	1,250		48
Parma (Rural)			1	600	1	
Upper Deer Flat (Rural)		20	1	500	2	
Wilder		12	2	1,000		18
Elmore County						
Glenns Ferry		12	1	750		58
Mountain Home		22	5	3,750		127
Mountain Home (Rural)			2	1,250	1	
Gem County						
Emmett		10	2	1,250		83
Gem Co. (Rural)		8	2	1,250	1	
Gooding County						
Bliss		9	1	500		
Gooding	1	12	1	750		77
Gooding (Rural)			1	750	1	
Hagerman		11	1	500		19
Hagerman (Rural)			1	500	1	
Wendell		20	2	1,250		34
Wendell (Rural)			1	750	1	
Jerome County						
Eden		10	2	750	1	13
First Segregation (Rural)		4	1	750	1	
Hazleton		12	1	500		19
Jerome	3	15	3	2,750		112
Jerome Co. (Rural)		6	1	1,000	1	
Lincoln County						
Richfield		14	1	273		11
Richfield (Rural)		5	1	600	1	
Shoshone		12	2	1,250		38
Wood River Protection		6	1	500	1	
Owyhee County						
Grandview		16	2	1,250		21
Grandview (Rural)					1	
Homedale		15	1	500		27
Homedale (Rural)			1	500	1	
Marsing		20	2	1,250		20
Marsing (Rural)					1	
Payette County						
Fruitland		12	1	750		72
New Plymouth		15	2	1,750		32
New Plymouth (Rural)			1	500	1	
Payette	2	19	5	3,600		107
Twin Falls County						
Buhl	3	18	2	1,500	2	66
Castleford		6	1	400		10
Filer		10	1	500		51
Hansen		12	1	500		11
Kimberly			1	500		51
Murtaugh		10	1	500	1	
Twin Falls	27		10	11,000		530

Source: Idaho Survey and Rating Bureau (Unpublished) of the firemen in the 10-county area are on a volunteer basis. Elmore, Gem, Lincoln, and Owyhee County firemen are all volunteer. Fire protection services are summarized in Table 36.

(4) Attitudes. In this unsettled period when people have become increasingly aware that resources are finite, there has been a more serious reexamination of values and of public policies than has been witnessed for many years. Although Idaho is somewhat insulated by geographical location from major social confrontations, its residents are increasingly aware that we all live on the same planet and that our destiny is often dictated by economic and political power based elsewhere.

A very comprehensive study of attitudes in Idaho toward water resource use was undertaken by the IWRB. The sample was statewide and 873 people were interviewed in depth. In response to the question "Do you think that more sagebrush land or dry farmland should be placed under irrigation in Idaho?", less than 20% of the people said "No." L. E. Johnson and Associates, who conducted the survey, summarized their attitudes as follows:

"There is general endorsement of increasing Idaho's irrigable land by all Idahoans--farm and nonfarm population alike. And there is significant enthusiasm for providing government assistance in doing the job right so as to make efficient use of the state's water resources . . . to include making interest-free loans to water users to help stimulate improvement of below-standard water transfer and storage systems."

IV. ANALYSIS OF THE PROPOSED ACTION

A. Environmental Impacts of the Proposed Action

1. Non-Living Components

a. Air. Air quality in the study area is generally good except during the early spring and late fall months. At these times high winds pick up sand and silt particles from cultivating and harvesting operations. Interstate 80 between Mountain Home and Bliss has been closed for several hours at a time because of the blowing dust. Severe automobile accidents have occurred in the same vicinity because of the lack of or reduced visibility. Residents of Hagerman have complained about the intensity of the dust storms originating from group desert entries to the west. Air pollution from blowing soil will continue to be a problem. The high particulate concentration of approximately 1,000 micrograms per cubic meter for a 6-day period is not felt to be injurious to health since it is for only a short duration and the federal and state controls are currently based on longer interval averages.

Other air pollutants will be in the form of smoke from burning crop residue (mostly in the fall), water soluble sprays, and farm equipment exhaust. Secondary air pollutant sources are industrial plants that produce agricultural equipment or process agricultural products. Increased demand for electric power for pumping water could require coal-fired power plants which will add to existing air pollutants.

b. Soils. The existing soil types have a wide range of erosion susceptibilities; some are unstable while others are moderately stable. The removal of natural vegetation and intensive agricultural development will generally increase the susceptibility of these soils to water and wind erosion. Allowance of DLE and CA entries involves clearing and land modification for irrigation and cultivation purposes. Exposure of the soil to wind erosion, particularly during the spring and early summer months, causes soil movement on adjoining lands and reduces visibility. This is evident during windy days and along fence lines, roads, and other forms of windbreaks where blowing sand is deposited. It is estimated that from 1 to 150 tons of top soil per acre are transported by the wind, but no studies are currently available to substantiate this.

Water erosion will occur in those areas where irrigation water is applied at a rate which exceeds the ability of the soil to absorb it. Higher erosion rates will also occur on agricultural developments during spring runoff periods. Sediment losses from water erosion usually find their way into the Snake River. At present we lack information and current research relative to specific sediment losses.

Wind erosion will occur when lands are clean-cropped, the soil is dry and wind velocities are high enough to pick up soil particles. Windblown soils have covered county roads in some places and have almost buried fences in others. The primary area of concern lies south of Hammett and west of Hagerman where the soils are primarily eolian (wind-blown) in nature.

c. Geology. There are no apparent impacts on the geological aspects of the area. Because of the thick basaltic rock there is no concern about possible subsidence as a result of pumping from the deep aquifers. Isolated geologic structures may be damaged or destroyed by agricultural development; however, these are incidental to the larger geologic overview.

d. Water (Supply and Use Quality). Conversion of native rangeland requires a necessary physical change in the surface contour and vegetation. Changes are often made to the physical character of the smaller stream systems. Present farming practices encourage cultivation of land to the shores of small drainages and stream systems. State of Idaho and other studies show that stream alteration degrades aquatic life in the stream. The habitat may take many years to recover to produce predisturbance fish populations. In Idaho undisturbed stream channels produce from 1.5 to 112 times more pounds of game fish than altered stream channels. In some instances, altered streams contain no fish. On the average, the undisturbed streams contained 8 times greater poundage of game fish than altered streams (IF&GD, 1970).

The larger streams such as Salmon Falls Creek and the Bruneau River would probably not be affected by channel changes from agricultural development. There is the possibility, however, of development of new road systems that may follow stream courses. Road construction in Idaho has been the cause of 60% of the channel alterations and destruction of streams (IF&GD, 1970).

Present operating DLE projects have shown the effect of wind and water erosion. Each of these causes of land erosion has the ability to deposit sediments in streams, lakes, and reservoirs and eventually the Snake River itself. Unnatural amounts of sediment and bedload movement in streams cause environmental degradation of the aquatic habitat by covering gravel and rubble habitats. Aquatic insects, such as mayflies, stoneflies, and caddisflies, are important trout food that live in gravel and rubble areas relatively free of sediments and turbid water. This problem has been observed throughout the Snake River Valley in the smaller tributaries such as Raft River, Salmon Falls Creek, and Malad River. Organisms that live in clear, sediment free streams are replaced by forms that live in sediments and turbid water. Various flies and aquatic worms are examples of organisms that live in muddy or turbid water. Entire fish populations may change from clear water forms, such as trout, to fish more adapted to turbid and silty water conditions, such as suckers and squawfish. This type of change has been documented by fish population studies in the Lower Raft River, a tributary of the Snake River (Borovicka, 1973).

The runoff pattern of water through the water courses will be altered when the lands are prepared for agricultural development. Soil disturbance at certain times of the year may cause variable water flows that are different than the normal fluctuation of streams. The changes could have an adverse impact on fish spawning, migration, and general biological productivity.

Examples that change flow patterns are development of new roads, ditches and drainage facilities. Farm facilities such as feeding areas, agricultural products storage and handling may cause physical changes if located near streams.

Snake River flows, influenced by various reservoirs and water diversions, are at present critical for aquatic life during some periods of the year. As an example, flows at Milner Dam below the diversions have averaged from 1,600 cfs to less than 5 cfs. With lower flows, water temperatures increase. In general, the higher the water temperature, the greater degradation of water quality.

If new projects are established from DLE's and water is taken directly from the Snake River, the reduced flows would further degrade water quality. Low flows have the following impacts:

(1) Reduced aquatic biomass production because of habitat loss.

(2) Increase in water temperature that may benefit certain undesirable fish.

(3) Undetermined environmental effect on flows in the lower Snake and Columbia Rivers outside of the study area.

If water is taken directly from underground sources the reduction of the ground water could have some of the following impacts:

(1) Lowering the water table beyond the depths of existing wells in the area.

(2) Additional cost to drill deeper for water, plus having to lift the water from lower depths.

(3) Quality and quantity of water may vary substantially as the water table is lowered.

(4) Mining of underground water could have effects on meeting stream flow objectives and fish hatcheries in the study area as well as outside of the study area.

The ongoing Idaho State Water Plan (April, 1974) makes the following conclusions in regard to water availability for instream needs for the Swan Falls-Hells Canyon reach of the Snake River:

(1) Present condition flows are not adequate to meet any of the flow objectives 100% of the time.

(2) Under future conditions deficits from the flow objectives are extremely large and occur frequently.

(3) The greatest potential water sources for meeting flow objectives under future conditions would be ground water and increaed irrigation efficiency.

With increased water demands by new irrigation developments, withdrawals from existing reservoirs could reduce the minimum pools that are presently sustaining fish population. Unsatisfactory minimum pools cause water kills to fish and lower the aquatic productivity of the impoundment due to oxygen depletion.

There are at least 46 identified streams and rivers in the study area and over a dozen lakes, reservoirs, and canals. These tributaries and water bodies contain various populations of fish and aquatic life. Even though pumping may not occur directly from these tributaries, the water quantity could be changed by adjacent agricultural development. Flows of some tributaries will be increased by waste water returns in the irrigation season. Increased water flows will have a beneficial effect on the ability of the stream to produce aquatic organisms during normal low or intermittent summer flows, but could be equally adverse due to increased sedimentation and leached nutrients from the soil as the result of agricultural development. In potential agricultural development areas where irrigation water will be developed from gound water sources, it is highly probable the water tables will be lowered, thus reducing spring and water seepage into the Snake River tributaries. With reduced stream flows, the subsequent adverse impacts previously discussed will result.

Ground water stored in the Snake River aquifer is known to contribute to the flow of the Thousand Springs area and possibly other springs in the Snake River system. New irrigation projects that will use ground water from the Snake River aquifer could significantly reduce minimum flows in the Thousand Springs area, thus the Snake River. The contribution to the region's flora and fauna of this high quality water into the Snake Riber system has not been fully studied or understood, thus quantitative impacts cannot be identified.

Even though limited recent improvements have been made in the Snake River water quality, the addition of new agricultural water demands and pollution loads could adversely affect the delicate habitat in the Snake River ecosystem. Increased temperatures as a result of lower flows can cause increased algae blooms as well as contamination by bacteria. Lower water flows will also result in concentration of pesticides--thus increasing the toxicity of present and potential chemicals. Since salmanoid and other desirable fish do not tolerate warm and nutrient-high waters, a drop in water quality will generally promote the growth of the rough species such as carp, squawfish and suckers which cannot ordinarily compete with trout, bass, whitefish, etc. A further reduction in water quality will also cut down and perhaps completely destroy the populations of even the rough fish because of the reduction of available oxygen and the increased content of toxic substances. Reduction of dissolved oxygen from heavy algae blooms caused by added nutrients would create a biological desert in portions of the Snake River system.

Possibly the greatest impact to water quality in the main Snake River and affected tributaries would be the increase of sedimentation and turbidity in waters. Turbid water has the effect of reducing the productivity of the aquatic habitat. Increased bedload movement and sediment in streams will reduce desirable benthic organisms, and in turn, impact the numbers and types of all aquatic organisms.

Uncontrolled dumping of solid waste and haphazard disposal of pesticide containers could have a serious impact on the aquatic fauna if these materials reach streams. Many common agricultural pesticides are lethal in small concentrations to many types of aquatic life (McKee, 1971).

Changes in quality of ground water surfacing in the Thousand Springs and other natural spring areas along the Snake River would have adverse impacts on domestic uses and the aquaculture industry as discussed above. Because of the lack of data on movement of chemicals in an aquifer, environmental impacts from this source of pollution cannot be predicted.

(1) Quantity. The U. S. Fish and Wildlife Service completed an instream flow study for the stretch of the Snake River from Milner Dam to C. J. Strike Reservoir in 1973. Instream flow is defined as the flows required by all the uses of water in a stream collectively (boating, water quality, recreation, hydro-electric production, fish and wildlife, other biological forms, esthetics, etc.). Table 37 below summarizes the recommended instream flows on the Snake River within the study area.[1]

Table 37

Stretch of River	Time of Year	Recommended Instream Flow (cfs)
Milner Dam to Blue Lakes	October through March	620
Spring	April through September	1,240
Blue Lakes Spring to	October through March	8,020
above Big Wood River	April through September	8,640
Big Wood River to C. J.	October through March	8,335
Strike Reservoir	April through March	8,955

[1]Data taken from a memorandum of June 18, 1973 from Regional Director, U. S. Fish and Wildlife Service, Portland, Oregon to State Director, BLM, Boise, Idaho.

The action under consideration--the conversion of 300,000 acres of desert lands to agriculture--would generally result in direct pumping from the Snake River for irrigation of the proposed annual increments. Flows in the river would be depleted by about 600 to 800 cfs per year which could result in depleting the recommended instream flows in the Snake River in low-water years.

The following minimum daily flows actually occurred during a recent 5-year period as documented by a preliminary study by the IWRB. Measurements were made at King Hill, Idaho about midpoint in the study area.

July, King Hill, Idaho - USGS Data

1965	7,390 cfs
1966	6,750 cfs
1967	6,630 cfs
1968	6,940 cfs
1969	7,020 cfs

The instream flow as recommended by the U. S. Fish and Wildlife Service (USF&WS) is over 800 cfs for the same location. A withdrawal of 600 cfs, therefore, would have theoretically reduced river flow in 1969 to 6,420 cfs at one time in July.

The impact of the annual withdrawal of an additional 600 cfs of Snake River water cannot be accurately predicted at this time. By the same token, the impact on ground water by the same withdrawal cannot be predicted. It appears that with the relatively large remaining flow, the impacts resulting from conversion at the present rate would not be significant for at least the next several years. Because of the relative size and value of the Snake River corridor and ecosystem, any significant adverse impacts which might occur should be closely evaluated.

Approximately 80% of the water utilized in the study area is from surface flow, while about 20% is estimated to come from ground water. The impacts on ground water would be significantly less than on surface water. The impacts on municipal, industrial, rural, domestic and irrigation uses for the total area is difficult to estimate since we do not know how much of the total acreage under application can actually be irrigated. If we assume that the latter is about 70% of the total acreage under application, then the required cfs or AF would also be reduced by that amount.

(2) Quality. As stated in Section 101 of the Federal Water Pollution Control Act Amendments of 1972, "The objective of this Act is to restore and maintain the chemical, physical, and biological integrity of the nation's waters." Surface water quality in the study area could be adversely affected by runoff from the agricultural area sediment or chemicals. The severity or frequency of such effects cannot be predicted at this time, but limiting agricultural development

to the best soils could minimize the adverse effects as long as good farming practices were used. The impacts on water quality from municipal, industrial, rural, domestic and irrigation uses for the total area is difficult to assess. As more lands are converted from this natural state to farmland, the impacts will be much more significant but can be reduced with good farming techniques and better conservation of water practices.

e. Land Use. Under the existing proposal, extensive rangeland presently used for livestock grazing will be converted to agricultural use. This will elminiate grazing privileges on valuable spring-fall rangeland. If developed areas are a substantial part of a rancher's allotment, he will be forced to move his livestock to other rangeland. If he is unable to find another suitable area, he may be forced out of the livestock industry altogether. This will affect that part of the local economy which may be dependent upon the livestock industry.

National Resource Lands in the region are used for extensive recreation activities such as hunting, rockhounding, off-road vehicle operation and photography. By 1980 about 330,000 people will live in the region, and 720,000 nonresidents will visit in the region annually. Some 3 million acres of NRL are available for recreation, all of which lie within a 50-mile radius of major population centers.

An annual reduction of 20,000 acres of land by conversion to agriculture represents a considerable reduction in the available public land recreation base. Generally the farmable lands are close to the Snake River and are fairly accessible. As the closer lands are converted to private ownership, people will be forced to seek recreation land further from their homes. In light of projected energy shortages, some people will be unable to enjoy wildland recreation experiences; and others will suffer a loss of quality due to overcrowding on the remaining accessible lands.

Many wildlife species are partially dependent upon NRL in the study area for their existence. By conversion to agricultural use an extensive area is lost for this wildlife use. An extreme result might be the demise of one or more species of wildlife.

Under the proposed conversion of NRL to agricultural development, large quantities of irrigation water and energy, both fossil fuels and electrical, will be consumed. These amounts are discussed in previous sections. This increased consumption will have secondary effects from the development of new energy sources and increased demands for water. This will restrict use of sites for future generating plants and may restrict some use of surface water.

f. Energy. The proposed action anticipates the annual conversion of about 20,000 acres of NRL to intensive agricultural use.

Based on the energy consumption requirements developed in Section III.A., total annual energy consumption would approximate:

80% x 20,000 = 16,000 ac. ÷ 320 = 50	x 600,000 kwh =	30,000,000 kwh
20% x 20,000 = 4,000 ac. ÷ 320 = 12½	x 120,000 kwh =	1,500,000 kwh
Total electrical energy/year		31,500,000 kwh

6,600 x 62½ = 412,500 gallon diesel
1,500 x 62½ = 93,750 gallon gasoline

Existing installed capacity of the Idaho Power Company system hypothetically has the capability of producing about 17½ billion kwh annually. This calculation assumes complete system operation 24 hours a day, 365 days a year which normally is precluded by water flows, hourly and seasonal demands, and the needs of other utilities in the Northwest Power Pool. Actual 1973 consumption was 8,801,573,168 kwh. Information is not available which would indicate the actual flexibility of capacity the Idaho Power system has to generate energy between the amounts actually consumed and the hypothetical maximum.

Idaho Power predictions for total future load growth and proposed construction schedule indicate an additional maximum installed capacity of 1,230,000 kw (or nearly ten and three-fourths billion kwh) by 1983. Hypothetical 1983 maximum system generating capacity would then be around 18½ billion kwh.

Assuming that 50,000 acres (including 20,000 acres NRL--80% high lift pumping) of new farmland and conversion to sprinkling continues annually through 1983, total electrical consumption for that use will have increased from 1,382,498,110 kwh in 1973 to about 1,926,000,000 kwh in 1983.[2] Specific projections for uses such as residential, commercial, industrial, street lighting and resale to other utilities are not available.

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[2]See energy section in description of existing environment for rationale.

180,000 ac. NRL x 80% (high lift pumping) =
144,000 ac. ÷ 320 = 450 x 600,000 kwh =
270,000,000 kwh.

180,000 ac. NRL x 20% (ground water pumping) =
36,000 ac. ÷ 320 = 112 x 120,000 kwh =
13,440,000 kwh.

270,000 ac. (conversion from dry farm and gravity irrigation to high pressure sprinkling)
x 963 kwh per acre = 260,010,000 kwh.

The latest year for which full year total electrical consumption statistics from the Idaho Power Company systems are available is 1973. That year about 8.8 billion kwh were consumed. Of that amount 1.925 billion kwh were resold to other public utilities in the Northwest Power Pool.

The west group area of the Northwest Power Pool reported that 3% of the total energy production is sold to irrigation customers.[3]

Consumption for irrigation in the Idaho Power Company system for 1973 was about 13%. Idaho Power Company power load pattern is unique; however, in that peak demands occur in the summer, whereas the west group area's high peak load and demand occur during the winter months. This has been advantageous in the past since it has permitted the use of excess power from the Northwest Power Pool by Idaho Power Company when it is needed most for irrigation. The system's operation then in turn permits the use of power excess to Idaho Power Company needs by the other members of the pool during the winter months.

On balance, Idaho Power Company had an actual interchange with other members of the Northwest Power Pool of 239 megawatts (or roughly 2 billion kwh) during the heavy winter 1973-74 base case.[4]

The conversion of 20,000 acres of new farmland per year under the assumed situation, i.e., 80% high lift pumping, 20% groundwater, would require the annual additional diversion, primarily from the Snake River below Milner, of 504,000 AF of water by the year 1983.[5] Such depletion of Snake River flows would probably adversely affect hydropower generation capability downstream on the Snake River.

2. Living Components

a. Aquatic Plants. Agricultural development will cause several environmental impacts to aquatic vegetation in established streams, rivers, lakes, and reservoirs.

Probably the greatest impact will be destruction of rooted plants adjacent to streams and water bodies through farming practices. Channel changes, road construction, and dewatering of live streams can either physically remove or kill vegetation that is so valuable for stream

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[3]Western Systems Coordinating Council, Reliability and Adequacy of Electrical Service, Denver, Colorado, April 1, 1974.

[4]Ibid.

[5]Power Planning Committee, Pacific Northwest River Basins Commission, Twenty Questions on Electric Power Loads and Resources in the Pacific Northwest, Portland, Oregon, November 1972.

water quality and habitat for wildlife. Terrestrial trees and shrubs that provide shade during critical periods of high air temperatures could also be lost.

Physical changes of streams alter water flow and aquatic growth. Change from fast to slower moving streams provides an opportunity to increase growth of algae, floating vegetation and some rooted aquatics.

Nutrients added to water will increase aquatic plant growth. Algae and other plants may increase to levels above which fish populations are severely limited.

Loss of riparian vegetation would have the following impacts:

(1) Water temperature increases during critical summer months will impact salmanoid fish and some aquatic organisms. The greatest impact from increased water temperatures would be to trout and whitefish. Sustained temperatures over 70o F. could be detrimental to present populations of salmanoid fish. Over 70° F. habitat would be more desirable for nongame species such as suckers, squawfish, and chiselmouth. Aquatic insects and other invertebrates associated with a temperature water environment would be replaced by those organisms able to withstand high water temperatures.

(2) Streambank degradation after loss of riparian vegetation will cause increased turbidity during high water, resulting in increases in bedload movement and aquatic habitat degradation.

Loss of riparian vegetation on NRL is not expected to be a significant factor since very little of the land involved is riparian in nature.

b. Terrestrial Plants. Development of water and the construction of other facilities will have only minimal impact on the terrestrial vegetation in the area. There will, of course, be some trampling of vegetation by drilling and other construction equipment and some disturbance when roads and main irrigation lines are installed.

The most significant impacts will occur when the lands are cleared, leveled and plowed, as all native perennial vegetation in these areas will be destroyed and it will take many years for these species to become re-established.

Long-term availability of irrigation water is imperative for all lands diverted to agricultural purposes. In addition, the conversion to crops must be diligently pursued. Even 1 year without a protective vegetative cover could cause serious erosion, especially from wind. Removal of the topsoil by erosive action from an area denuded of vegetation could reduce the productivity of the area and its deposition in other areas could reduce their productivity. There might also be considerable damage to roads, fences and other facilities. Denuded land is also susceptible to rapid invasion of annual weeds--some of which might be noxious and/or host to noxious insects.

There are several plant species in the study area which are threatened, and without protection, could be expected to disappear altogether from the Snake River Plains. Allowing DLE's in the 8,200 acres occupied by winter fat (Eurotia lanata) will essentially eliminate the last remaining pure stand of this important forage species in Idaho. Two other plant species are threatened: a loco weed (Astragalus camptopus) found in sand deposits between Bruneau and Murphy and a peppergrass (Lepidium montanum var. vopilliferum) found in deep soil with a sagebrush cover along the Snake River. These may also be eliminated should the areas they occupy be converted to agricultural use. It is expected that the area containing the peppergrass would be the first to be converted.

c. Aquatic Animals. The Snake River and some tributaries in the study area are already heavily impacted by development. Aquatic habitat has been significantly changed by the construction of major dams that form reservoirs in the river channel. Reservoir waters now contain primarily those animals able to live in a standing water habitat. Most species that live in running water have been eliminated. Some reservoirs provide good warm water and non-game fish habitat and have favored aquatic insects (Diptera) and other organisms adapted to this environment. Species such as trout and whitefish have not prospered in the mainstem reservoirs, but restricted populations are found in free-running portions of the river. The heavy demand for water along the Snake River has caused water fluctuation in some areas, including complete dewatering of streams. These are some of the major impacts already existing in the study area. The remaining aquatic fauna has adapted to the present habitat and aquatic animals are still abundant throughout the study area waters.

Additional dewatering of the mainstem Snake River could have an impact on some of the landlocked forms of salmon, such as coho (Oncorhynchus kisutch).

Pumping water from the Snake River would reduce aquatic habitat of fish. The action will have a tendency to reduce water flows and cause additional adverse impacts on the present tenuous position of many fish populations in the system.

Pumps for lifting will physically impact local populations of fish. Most of the screening facilities on pumps inspected in the Snake River are inadequate to prevent the intake of small fish. No studies were available, however, to determine the magnitude of loss or impact to the fishery resource from inadequate screening.

Pumps located in sections of the river that have larger populations of game fish could have an adverse impact on desirable species such as rainbow trout, endangered sturgeon, channel catfish, smallmouth bass, and other popular species.

Many areas of the Snake River contain various size populations of bass, crappie and sunfish (IF&GD, 1971-74). Fry stages of these fish are vulnerable and would be easily pulled into the suction pumps through any known method of screening. This can also occur with the fry and small life stages of other species of resident fish. Nearly the entire fauna of freeswimming aquatic organisms, including insects and other plankton forms, would be vulnerable to the pumps.

Operation of pumping plants along the river could have additional adverse off-site impacts to anadromous fish on the lower Snake and Columbia River dams (U. S. Army Engineers, 1974). An example of this occurred during the extreme low flows of the Snake River in the water year 1972-73, when pumping from the river may have influenced the water shortage for instream power production. At that time short-term decreases in the level of operation of anadromous fish passage facilities at the Snake and Columbia River dams were implemented in order to conserve available water supplies for power plant use.

Water temperatures could increase in low flows during heavy pumping in summer months and result in impacts previously discussed.

Major flow reduction in the Thousand Springs area would impact trout and other game fish stocks. If pumping is established on the remaining flows of 5,000 to 6,000 cfs below Thousand Springs, there would be a major adverse impact on the trout and other desirable fish populations in this area. At the present time the area at and below Thousand Springs is producing an important population of desirable game fish (IF&GD, 1970-74).

Remaining stocks of white sturgeon could be impacted. Little is known of the biology of the white "endangered" sturgeon in the Snake River from Salmon Falls to Guffey. The tenuous existence of this small population of fish could become threatened by even small changes in the water quality and quantity in this reach of the Snake River.

Increased demand for water in low water years would impact fish populations should minimum flows and water quality not be maintained at present levels. The most significant adverse impact to the fish populations in the mainstem Snake River would occur during a series of low-water years. There is a history of this phenomenon. In years of low flows (considering the present use plus projected uses for agricultural development) some areas would be completely dewatered or the flow reduced to either kill some populations of fish or severely reduce the numbers of all species of fish as well as populations of fresh water clams, mussels and the standing crop of benthic insects. The importance of the large freshwater mussels in the food chain of a variety of wildlife and fish has not been determined. It is known that these mussels are utilized by the white sturgeon for food in the Columbia River system.

Tributary streams that may be altered because of agricultural development or road construction will produce fewer numbers and species of all aquatic organisms. This could result in complete alteration of aquatic habitats.

New development of agricultural lands is expected to add more nutrients to the Snake River and some tributaries. The increased nutrients will trigger algae growth, the basic food source for benthic insects. Populations of insects could increase to undesirable levels. Nutrients may cause an overabundance of algae which in turn could trigger demands on supplies of dissolved oxygen in the water. In many areas benthic insects would be destroyed except the most tolerant species.

Severe eutrophication may destroy aquatic insects valuable as food for desirable game fish. Examples are: the mayflies (Ephemeroptera), caddisflies (Tricopter), and stonefly nymphs (Plecoptera).

Zooplankton, the microscopic and macroscopic animals attached to the bottom or moving in water, will be affected by the changes in water quality and size of the water mass. Zooplankton is an essential item in the food chain of higher aquatic organisms, and has a direct relationship to the fish populations. The addition of more nutrients to the Snake River from agricultural development would probably increase zooplankton population. Increased turbidity and sedimentation of the bottom of the main Snake River and tributaries would reduce the population of attached zooplankton.

Increased nutrients in the Snake River coupled with an increase in growth of aquatic vegetation could be beneficial to crustaceans such as scuds (freshwater shrimp). Water quality must reamin high, especially the dissolved oxygen supplies. The increased supplies of freshwater shrimp could stimulate growth rate and general population numbers of all major fish populations.

Loss of significant populations of crustaceans, such as crayfish, could be an adverse impact on furbearers such as otter, raccoon and water-oriented birds. Presently little is known of the abundance and distribution of crustaceans in the Snake River and tributaries; therefore, the degree of impact on these aquatic organisms from changes in the Snake River aquatic ecosystem is not known. Rare species, if any, have not been documented.

d. Terrestrial Animals (by habitat types). The impacts for each wildlife species known or which could possibly occur in the subject area can be found in Appendix VI, Tables 1 through 5.

Six categories were used to determine the degree of impact for each wildlife species per habitat type. These are: slightly, moderately or highly adverse; and slightly, moderately, or highly beneficial. The degree of impact was determined by reviewing the relative abundance, life history and habitat requirements for each species. For example, the horned lark is one of the most common species found in the sagebrush grass habitat type. It nests on the ground under shrubs or bunch grasses and feeds on seeds, grain and insects. Its primary habitat is plains, deserts, and sparse sagebrush flats. In winter it prefers to congregate in open areas of little or sparse vegetation, particularly when feeding. This species was considered to be highly adversely affected, as its nesting habitat will be completely altered and rendered unsuitable for nesting through agricultural development. A serious decline in nesting densities and total numbers will result. Simultaneously, because migratory populations and populations from undisturbed adjacent areas will utilize the open areas where seeds and grains will be available in the winter resulting from sprinkler system agricultural practices, a slightly beneficial rating was assigned for horned larks in this habitat type.

The complexity of discussing total numbers and total species is extremely difficult when comparing total number of animals of a species and total number of species impacted when some habitats will be destroyed and new habitats will be developed. For example, currently there are thousands of horned larks in the subject area year long in the sagebrush-grass habitat type. Significant numbers of horned larks will occupy the same tracts of land in the winter should the remaining sagebrush-grass habitat be converted to sprinkler irrigation farming. The overall net result will be a significant reduction in the total horned lark population in southern Idaho. Also, some species such as the English sparrow and house mouse do not occur in the sagebrush-grass habitat currently, but will occur should the lands be developed for agriculture.

Conversion of NRL, particularly in the sagebrush-grass habitat type, to agricultural lands will result in the development of three additional wildlife habitat types. These are: (1) windbreaks and trees developed around farms; (2) small ponds, detention dams, and waste water drainages resulting from irrigation waste water; and (3) sprinkler system agricultural tracts. Each type will be discussed separately.

Not all the existing sagebrush-grass and riparian habitats within the subject area have the potential to be developed for irrigation farming. It must be understood that a small percentage of the sagebrush-grass and riparian habitats will remain in their present condition. Therefore, the five habitats (the animal communities) involved are discussed in general terms; and individual species of an important economic or regional concern are discussed in specific terms.

(1) Sagebrush-Grass Habitat Type. As seen in Appendix VI, Table 1, alteration of the sagebrush-grass habitat to agricultural development will adversely affect 129 wildlife species and probably have no effect on 2 species, the meadow vole and cliff swallow. The overall impact will be reduced populations of each species and a complete change in the distribution, composition, and densities of the animals within the study area. The greatest impact will be to those species which are adapted or almost totally adapted to sagebrush-grass habitats, and amphibians and reptiles. The wildlife species that totally depend on the sagebrush-grass habitat or have limited distributions within the area are listed in Table 38.

Table 38

Significantly Adversely Impacted Wildlife Species in Sagebrush-Grass Habitats of Subject Area in Idaho

Common Name	Scientific Name
Merriam shrew	Sorex merriami
Idaho ground squirrel	Citellus brunneus
Great basin kangaroo rat	Dipodomys microps
Sagebrush vole	Lagurus curtatus
Pronghorn antelope	Antilocapra americana
Prairie falcon	Falco mexicanus
Long-billed curlew	Numenius americanus
Townsend ground squirrel	Citellus townsendi
Ord kangaroo rat	Dipodomys ordi
Northern grasshopper mouse	Onychomys leucogaster
Pygmy cottontail	Sylvilagus idahoensis
Ferruginous hawk	Buteo regalis
Sage grouse	Centrocercus urophasianus
Western burrowing owl	Speotyto cunicularia
Vesper sparrow	Pooecetes gramineus
Black-throated sparrow	Amphispiza bilineata
Leopard lizard	Crotaphytus wishizenii
Short-horned lizard	Phrynosoma douglassi
Ring-necked snake	*Diadophis punctatus
Western ground snake	Sonora semiannulata
Sage sparrow	Amphispiza belli
Sage thrasher	Oreoscoptes montanus
Sagebrush lizard	Sceloporus graciosus
Desert horned lizard	Phrynosoma platyrhinos
Long-nosed snake	Rhinochelius lecontei
Night snake	Hypsiglena torguata

*There are two subspecies of ring-necked snakes in southern Idaho, the Western and Eastern. Both have very limited distributions.

An overall reduction of livestock animal unit months (AUM's) with existing ranching interests in the study area will result if those lands suitable for agriculture are developed. There will be crop residues such as sugar beet tops, grain in stubble fields and alfalfa utilized by livestock should the lands be farmed. Livestock forage for crop residues will be available only in the fall after harvesting. These may or may not be by the same owner's livestock using the lands currently.

The sagebrush-grass habitat is utilized the heaviest during the spring and early summer in the area. The average forage production in this type is 7 acres per AUM. Removal of approximately 300,000 acres from livestock grazing will reduce the grazing capacity about 43,000 AUM's. This reduction will leave some of the current livestock operators in a very vulnerable position as areas suitable for spring and early summer grazing are becoming extremely scarce. Some of the existing livestock operations may be forced out of business for this reason.

Another problem will arise in that livestock will be fenced or blocked from existing watering facilities, particularly where livestock trail to and from grazing lands and live streams. With the development of irrigation for farming, water will be available for livestock but may not be available to the current owner's livestock in the study area.

(2) Riparian Habitat Type. Anticipated impacts to wildlife species in riparian habitats are based on the following assumptions:

(a) Minimum flows of water will be available to maintain the riparian habitats in their present condition;

(b) Water quality will be maintained to standards that will not adversely affect wildlife species adapted to living in the existing aquatic environments.

As seen in Appendix VI, Table 2, no wildlife species was rated as highly adversely affected (that is, all of their habitat components destroyed) because of the 2 above assumptions and because the acreage of the riparian habitats administered by BLM within the subject area is relatively small.

The riparian habitat type has the greatest number of wildlife species adversely affected (211), should the habitat be altered for agriculture. The major difference in total species affected between the riparian habitat and those which will be created in and adjacent to small ponds, detention dams and waste water drainages (Appendix VI, Table 4) is the size and depth of the water area. Many species such as river otters, western grebes, diving ducks, flickers, etc., are adapted to either large water areas or large areas of deciduous trees. Therefore, only 137 species will be affected adjacent to small ponds, detention dams, and waste water drainages compared to 211 in the riparian.

Again it must be emphasized that should the remaining riparian habitats administered by the BLM in the area be developed for agricultural development, an overall significant reduction in total numbers of wildlife would occur. The 84 wildlife species receiving the greatest adverse impact are those which reside in the riparian habitat year long. The 62 species which migrate to southern Idaho riparian habitats to raise their young during the summer will also be significantly reduced in numbers. There are 16 species which migrate to the riparian habitat in southern Idaho during the winter.

The majority of the remaining riparian habitats adjacent to streams, rivers, and reservoirs administred by the BLM will probably be retained in public ownership and not developed for agricultural purposes.

Impacts to the riparian habitat and livestock grazing on these tracts should be minimal if the Bureau policy to protect and maintain recreational and scenic resource qualities is enforced.

(3) Windbreaks and Trees Developed Around Farms Converted from the Sagebrush-Grass Habitat. The number of wildlife species and the degree to which these species that could benefit from creating small islands of trees and shrubs around new farms are listed in Appendix VI, Table 3. The development of windbreaks and trees throughout the study area in comparison to the total area will be extremely small and the number of animals per species benefited will be small. Only 17 mammals, 51 birds and 1 reptile will benefit. Those species normally associated with man will receive the greatest benefits. These are the Norway rat, housemouse, domestic pigeon, starling, brown headed cowbird, house sparrow, and house finch. These species are very tolerant of man and are also aggressive competitors for nesting niches created in domestic areas.

The second major group of species that will benefit from these created habitats are those species of migratory and wintering song and insectiverous birds that seek trees and brushy areas while migrating. It is estimated 33 species will benefit with the development of these islands of habitat.

(4) Habitats In and Adjacent to Small Ponds, Detention Dams and Irrigation Waste Water Drainages Converted from the Sagebrush-Grass Habitat. Based on past DLE's, some ponds and detention dams will be developed with irrigation waste water. Occasionally drawbottoms and gullies collect irrigation waste water which cannot be disturbed, resulting in small microhabitat areas. Often trees such as Russian olive, cottonwood, willow and shrubs are planted around ponds and detention dams. Occasionally cattails, bulrushes and pond weeds become established in the ponds, detention dams, and along some irrigation waste water drainages. The development of these microhabitats, depending on the size and associated plant species, can be highly diversified and therefore create habitat niches for a wide variety of wildlife

species. As shown in Appendix VI, Table 4, 18 mammals, 105 birds, 9 amphibians and 5 reptilian species could benefit.

The major species benefited are those associated with riparian habitats and those species more tolerant of humans and human activity. Besides those man-tolerant species previously mentioned that could occur with the development of windbreaks and trees around farms, spotted bats, striped skunks, sparrow hawks, California quail, mourning doves, black-chinned hummingbirds, rufous hummingbirds, and red-eyed vireos will be the major benefiting species. Again migratory and wintering songbirds will be the second major wildlife species benefiting from the development of these new habitats.

(5) Sprinkler System Agricultural Tracts Converted from the Sagebrush-Grass Habitat Type. As can be seen by reviewing Appendix VI, Table 5, there are 7 mammals, 29 birds, and 3 reptiles that will persist and, depending on the crops planted, benefit slightly from agricultural development. With agricultural development, new feeding areas will be created for 6 waterfowl species and new habitat will be developed for 3 wildlife species that in most instances presently do not occur. The 3 species are pheasants, Hungarian partridge and California quail.

e. Wild Horses. The proposed action will have an adverse impact on wild horses in 5 locations within the study area. (See Figure 23.) Should these areas be developed for agricultural purposes, the horses will be forced onto adjacent ranges not now occupied. This will result in one or all four of the following circumstances:

(1) A reduction in livestock use will have to be made to provide forage for the wild horses once they have reestablished new home ranges or are forced to occupy a reduced portion of their present range.

(2) The existing number of horses will be reduced naturally by overgrazing their remaining range if there is not suitable adjacent ranges to which they can move.

(3) Crop depredation problems will probably result.

(4) The horses could be removed from their present range and relocated to other ranges occupied by wild horses.

The probability that the horses will be removed and reestablished in other wild horse areas is extremely remote in that there are no known wild horse ranges that are not at carrying capacities now.

A conflict does arise should the wild horses be forced to occupy new ranges in that the Wild Horse and Burro Act (Public Law 92-195) Section 9 states: "Nothing in this Act shall be construed to authorize the

Secretary to relocate wild free-roaming horses or burros to areas of the public lands where they do not presently exist . . ."

f. Mammalian Predators. Although Appendix VI, Table 5, depicts that coyotes will slightly benefit from agricultural development, the overall impact on coyotes will be a significant reduction in habitat and numbers as shown in Appendix VI, Table 1, where a highly adverse impact is shown. Some segment of the existing coyote population and habitat will persist should all the suitable tracts be developed for farming within the area. Based on existing data, few or no bobcats will remain. Therefore, the opportunity of hunting, sightseeing, photographing and studying coyotes and bobcats will be significantly reduced.

As previously stated, some livestock operations will be developed in conjunction with the proposed farming. Some livestock depredations by coyotes particularly on sheep in the winter will occur. The problem will probably be greatest during the first 5 years of development, reducing in magnitude as the bobcat and coyote populations decline. Nevertheless, livestock (particularly sheep) depredation by coyotes will continue to be a problem and could pose substantial losses on the sheep industry.

g. Game Animals

(1) Deer. Those small numbers of mule deer that currently occupy the riparian habitats and canyons year long will benefit from agricultural development in that plantings of alfalfa, cereal grains, etc. will increase their food base. Thus a slight increase in numbers can be expected. Depredation problems by deer in fields, particularly in the spring and summer, could also result.

Conversion of rangelands which are known to be deer winter ranges would result in a reduction of habitat. This may mean the loss of approximately 300-400 deer harvested annually. Also, conversion of rangelands in or adjacent to deer winter ranges could result in depredation of crops by deer. The IF&GD may be held liable for these crop damages or it may be required to provide personnel to keep deer out of the crops.

In the event the winter ranges are not developed for agriculural purpose, migration routes to and from these winter ranges must be preserved or the resulting impact could be a significant reduction in deer numbers.

(2) Antelope. The impact of converting existing antelope ranges to farms will result in a reduction in habitat, thus antelope numbers will be reduced accordingly. With conversion, there is also the possibility of the elimination of a herd. The development of such crops as cereal grains and alfalfa would be beneficial to antelope--but the antelope would probably be fenced out. Antelope-proof

fences would significantly reduce the use by antelope of large areas. Depredation problems on converted ranges formerly used by antelope could cause additional hardship on the IF&GD.

h. Upland Game Birds

(1) California Quail. The overall impact to California quail will be a reduction in distribution and numbers. However, where natural areas of greasewood, sagebrush and other brushy species are left adjacent to water (such as ponds, detention dams, and streams adjacent to farmed areas) isolated populations could increase in numbers.

(2) Mountain Quail and Bobwhite Quail. Agricultural development will have little or no impact on these two quail species. Mountain quail could benefit or be significantly reduced in the Sinker Creek area depending upon the factors discussed for California quail.

(3) Sage Grouse. An overall reduction in sage grouse numbers will result in the 5 locations discussed in the description of the environment section. Agricultural development will result in loss of the grouse's principal winter food source, sagebrush, upon which they are almost totally dependent. Sagebrush is the major nesting cover. Also, historic strutting grounds will be destroyed.

There could be a few isolated areas where planting of alfalfa, weeds in stubble fields, etc. and increased water availability would be beneficial to sage grouse. These developments would not compensate for the overall reduction in numbers that will result if the wintering, courtship, and nesting areas are destroyed.

(4) Chukars. The general terrain utilized by chukars is not suitable for irrigation and agricultural development. A few fringe areas utilized for feeding by chukars will be lost. Therefore, a slight adverse impact to chukars in some areas can be expected.

The chukar distribution and population could be increased through agricultural development in that water could become available in the summer where there is no water presently. Often irrigation waste water is permitted to flow from the fields on the plateaus into canyons and draws which drain into the Snake River and its tributaries. The increase in water availability in the canyons and draws would be most beneficial to chukars.

(5) Hungarian Partridges and Pheasants. The anticipated overall impact to "Huns" and pheasants is little or none. Some areas of high existing populations of these 2 species will be significantly reduced while others will be significantly increased. Both of these species thrive in irrigated farming areas as long as there are ample cover areas for the birds during the spring, winter and fall. Areas of irrigation farming with undisturbed areas of sagebrush, weeds,

cover around irrigation water, ponds, etc., will have high populations of these species, while large tracts of little or no spring, winter and fall cover will have few or no populations.

(6) Mourning Doves. The overall impact to mourning doves will be moderately adverse. Mourning doves nest on the ground in sagebrush-grass habitats where the majority of the agricultural development will occur. This total loss of nesting habitat will not be totally compensated by an increase of water, food and some nesting habitat being developed around farms. A major decrease in populations can be expected in the interior of large blocks of land being converted to agricultural development while slight increases in populations along fringe areas can be expected.

During migrations, particularly in the fall, agricultural development will be significantly beneficial. Agricultural development in new areas will tend to concentrate the birds in the late summer and fall where they have not congregated previously and lead many persons to believe an increase in birds has resulted.

i. Waterfowl. As previously discussed, the major adverse impact to waterfowl would be the unlikely loss of riparian habitats. Therefore, the overall impact of developing new irrigation farming areas will be beneficial in that some new nesting areas will be developed where ponds and detention dams are created with ample nesting and escape cover. These water areas will also be used by migrating waterfowl.

Development of cereal grain crops associated with agricultural development will be significantly beneficial as winter feed areas to Canada geese, snow geese, Ross' geese, mallards, pintails and American widgeons.

j. Wilson's Snipe. Should there be no loss of existing Wilson's snipe habitat (riparian) and large ponds developed with emergent vegetation such as cattails and bulrushes, the overall impact to this species will be beneficial.

k. Cottontail and Pygmy Rabbit. The overall impact of agricultural development will be moderately adverse. There will be some small areas where rabbits will increase, particularly where there are rocky outcrops of brushy cover adjacent to farmed areas, in areas where machinery is stored and around farm buildings.

The loss of suitable rabbit habitat (thus reducing populations) and change of land status will have the accumulative effect of adversely affecting those persons who enjoy rabbit hunting during the winter months. Much of the NRL available to rabbit hunters presently will be posted to hunting once the land is developed for agriculture. This impact will be most significant in areas of 20 to 25 miles around existing cities and towns.

l. Fur Bearers. The overall impact on the furbearing animals and the fur industry will be adverse. Such species as beaver, muskrat, mink, raccoon, fox, skunk, and weasel will have little or no adverse impact as little or no agricultural development is anticipated in the remaining riparian habitats as previously discussed. Except for beaver, all of these species could result with slight increases in distribution and numbers, particularly where waste water drainages, farm ponds, and detention dams are not manipulated and the associated riparian habitats are allowed to materialize.

The greatest impact will come to bobcats, coyotes, and badgers which make up the greatest number of animals harvested in the subject area as discussed in the "Description of the Existing Environment" section of this analysis. There is no means of quantifying the degree of impact at this time as there are no records which show the number of animals harvested on NRL within the subject area.

m. Endangered Species Act of 1973. The remainder of the wildlife species discussed, and many of those previously discussed, are or could become classified "endangered" or "threatened" within the subject area as defined by the Endangered Species Act of 1973, Public Law 93-205.

The Endangered Species Act of 1973 greatly broadened the potential class and number of species that could be classified endangered or threatened by the following definitions in Section 3 of the Act:

> Definition Number 4: "The term 'endangered species' means any species which is in danger of extinction throughout all or a significant portion of its range other than a species of Class Insecta determined by the Secretary to constitute a pest whose protection under the provisions of this Act would present an overwhelming and overriding risk to man."
>
> Definition Number 5: "The term 'fish and wildlife' means any member of the animal kingdom, including without limitation any mammal, fish, bird (including any migratory, nonmigratory or endangered bird for which protection is also afforded by treaty or other international agreement), amphibian, reptile, mollusk, crustacean, arthropod or other invertebrate, and includes any part, produce, egg, or offspring thereof, or the dead body or parts thereof."
>
> Definition Number 11: "The term 'species' includes any subspecies of fish or wildlife or plants and any other group of fish or wildlife

> of the same species or smaller taxa in common spatial arrangement that interbreed when mature."

The above definitions can be explained in general terms that any living population within a geographical area of plants or animals can become classified endangered.

Section 7 of the Act states:

> "The Secretary shall review other programs administered by him and utilize such programs in furtherance of the purposes of this Act. All other Federal departments and agencies shall, in consultation with and with the assistance of the Secretary, utilize their authorities in furtherance of the purpose of this Act by carrying out programs for the conservation of endangered species and threatened species listed pursuant to Section 4 of this Act and by taking such action necessary to insure that actions authorized, funded, or carried out by them do not jeopardize the continued existence of such endangered species and threatened species or result in the destruction or modification of habitat of such species which is determined by the Secretary, after consultation as appropriate with the affected states, to be critical."

The Federal Register of May 16, 1975 further defines critical habitat as it relates to the Endangered Species Act of 1973. It states, "Under this concept, the destruction, disturbance, modification, curtailment, or subjection to human activity of habitat considered 'critical' for a given species would not conform with Section 7 of the Endangered Species Act of 1973, etc." The following vital needs are relevant in determining "critical habitat" for a given species:

(1) space for normal growth, movements, or territorial behavior;

(2) nutritional requirements, such as food, water or minerals;

(3) sites for breeding, reproduction, or rearing of offspring;

(4) cover or shelter; or

(5) other biological, physical, or behavioral requirements.

Therefore any action that would alter the habitat for the endangered, threatened and possibly status undermined species would be contrary to the above.

There have been few or no intensive wildlife surveys conducted except for game animals within the subject area. To date there are no known mollusks, crustaceans, arthropods or other invertebrates which could be classified endangered or threatened, but there have been no known inventories to determine if any of these species exist in the study area which could be endangered or threatened.

The following discussions pertaining to those species which are classified as endangered or threatened or could become endangered or threatened should all suitable tracts of NRL be developed for irrigation farming in the subject area.

(1) Peregrine Falcon. This species will be adversely affected because of the reduction of prey species (primarily passerine birds) and from human disturbance. It will be indirectly adversely impacted by contracting trichomoniasis (frounce) carried by pigeons which will definitely increase. With agricultural development impacts can be expected from chemical pesticides, particularly the organochlorine compounds acquired from preying on songbirds containing pesticide residues in their systems. Frounce may or may not be significant, but pesticide poisoning could be significant. The falcons can become sterile by accumulating to sublethal levels any of several chemical pesticides. These chemicals, which have been found in lethal amounts in peregrines are: dieldrin, BHC, endrin, heptachlor, DDT, TDE (DDD), and DDE (Snow, 1972).

(2) Prairie Falcon. A significant adverse impact on prairie falcons may be the result of unlimited agricultural development in the subject area. This conclusion was determined primarily because of the possible loss of prey species and secondarily because of other human disturbance to the prairie falcon niche. Studies conducted in the Birds of Prey Natural Area have revealed that 65 to 70% of the food biomass utilized by nesting prairie falcons are ground squirrels (Kochert, personal communication). Kochert states that any area in North America having high densities of nesting prairie falcons is also associated with adjacent areas of high ground squirrel populations. It is estimated that over 10% of all the nesting pairs of prairie falcons in North America occur within the subject area. Prairie falcons are susceptible to pesticide poisoning, as are peregrine falcons, but not to the same extreme degree.

n. Birds of Prey. Those birds of prey species associated with riparian habitats, particularly wintering populations, will benefit from agricultural development for the same reasons as given in the discussion on pigeon hawks. The one exception would be bald eagles. There are feeding areas within the sagebrush-grass habitat type utilized by wintering populations of bald eagles. Loss of these areas could adversely affect isolated populations of wintering bald eagles.

Golden eagles and rough-legged hawks would be highly adversely impacted with the reduction of prey populations, particularly rabbits and diurnal feeding rodents.

All the large birds of prey--golden eagles, rough-legged hawks, ferruginous hawks, Swainson's hawks, etc. are vulnerable to injuries incurred from flying into powerlines. With an increase in farms and farming activity, powerlines for additional electricity demands will have to be installed in areas where few or no powerlines occur presently.

(1) Ferruginous Hawks. Ferruginous hawks will be highly adversely affected by agricultural development as they are predominately associated with the sagebrush-grass habitat. In many areas it is a ground-nesting species and is also very intolerant to human disturbance. Loss of prey species, particularly rabbits, would also limit this species capability to carry on the life processes and would result in the loss of important wintering areas.

(2) Osprey. Little or no impact would result to ospreys as little or none of the remainig riparian habitat should be disposed of for agricultural purposes. See riparian habitat discussion in this section.

(3) Pigeon Hawk. Pigeon hawks could be slightly beneficially impacted from agricultural development in the subject area. There is little chance that any of the existing habitat (riparian) will be lost as discussed for ospreys. Pigeon hawks inhabit the subject area during migrations and winter. Therefore the development of trees along irrigation waste water drainages and around detention dams and ponds would create additional roosting and feeding areas.

o. Long-Billed Curlews. Long-billed curlews would be highly adversely impacted with agricultural development. Again, loss of suitable undisturbed nesting habitat would result.

p. Semipalmated Plover and Snowy Plover. Little or no adverse impact would result to these species as they are primarily associated with riparian habitats of which few or none will be affected as previously discussed. These two species will benefit from agricultural development where ponds and detention dams are created.

q. Birds of Prey. Those birds of prey species associated with riparian habitats, particularly wintering populations, will benefit from agricultural development as previously discussed for the same reasons given in the discussion for pigeon hawks.

r. Reptiles and Amphibians. Reptiles and amphibians and the associated impacts have been previously discussed in other portions of this section (see reparian and sagebrush-grass habitat types). Of the reptiles and amphibians within the subject area, the western ground snake population could already be an endangered species in Idaho but has not been identified as such at this time. It has been collected in Idaho in 3 localities only, all of which have been developed for farming in recent years. The 3 areas are:

(1) north rim of the Snake River near Guffey, Ada County;

(2) Hot Springs on the Bruneau River, Owyhee County; and

(3) near the Snake River south of Caldwell, Canyon County (Tanner, 1941).

Because reptiles and amphibians have small home ranges and are very specific in their habitat requirements, other species and subspecies populations could become endangered within the subject area as they have limited distributions in Idaho. These include the Northern desert horned lizard (Phrynosuma platyrhinos platyrhinos), Northwestern ringneck snake (Diadophis punctatus occidentalis), Western long-nosed snake (Rhinocheilus lecontei lecontei), Western ground snake (Sonora semiannulata), desert night snake (Hypsiglene torquata deserticola) and the Northern Pacific rattlesnake (Crotalus viridis oreganus), a subspecies of the Western rattlesnake.

3. Ecological Interrelationships

a. General. Many of the early stages of desert land development have severe adverse impacts on ecosystems. Removing existing vegetation, disturbing the soil, building roads and installing sprinkler systems and other farm facilities all combine to completely disrupt existing ecosystems. Nearly all plant and animal populations are either destroyed or displaced. Natural ecological processes, such as succession, nutrient cycles and energy flows are essentially stopped. Erosion processes--wind and water--pick up soil and nutrients and deposit them offsite. This creates siltation and nutrient problems for aquatic ecosystems. The lost topsoil is irreplaceable and results in reduced soil fertility.

In 1 to 3 years after initial development agricultural-type vegetation replaces native vegetation and new ecosystems begin to develop. New and remnant animal species of many forms will begin to fill ecological niches afforded by this new environment. Nutrient cycles, supplemented by man-made fertilizers, are partially reestablished. Limited food webs and energy flows also come into play. None of the basic ecological processes--succession, nutrient cycles, energy flows, etc.--are ever fully developed, however, because tillage and crop harvest cause these processes to collapse or nearly cease annually.

b. Nutrient Cycles. Land clearing and tillage have an adverse impact on nutrient processes. Removing perennial and annual vegetation removes an important phase of nutrient cycling. Return of vegetative and animal residue to the soil is one important source of nitrogen, phosphorus, sulfur and other nutrients. Loss of this nutrient source does not completely stop these nutrient cycles, since they are available from other sources, such as the air and soil parent material. Agricultural fertilizers replace those quantities of nutrients that would be available in the unaltered ecosystem. In many cases fertilizer is applied in much heavier amounts than would normally be found. When more of these materials are applied to the soil than can be used by the organisms at a given time, the excess is either tied up in the soil or lost by leaching and sedimentation.

Continued application of fertilizers also has offsite impacts which are often very significant. Introducing excess nutrients into ecosystems not adapted to high nutrient levels may cause unanticipated changes. Fertilizers are often carried from farmland and deposited in streams, ponds and reservoirs. This is not only a waste of fertilizer but also a direct impact on these aquatic ecosystems. Since specific organisms in an aquatic system are adapted to a certain nutrient level, increased availability of that nutrient can cause serious changes in the types and numbers of organisms found in the ecosystem. Although it is not known what specific changes will occur in the Snake River, for example, it is known that higher-than-normal nutrient levels cause algae blooms and eutrophication in water bodies. This situation is not desirable for quality fishery production, or other uses such as recreation.

Not enough is known about nutrient tolerance levels of the aquatic organisms in the Snake River system to quantitatively evaluate the impacts from fertilizer "losses" from farmland. It is a fact, however, that if more and more fertilizer is allowed to enter the system, and less and less water remains in the system, impacts will become more severe.

It is possible that use of chemical toxicants (herbicides and pesticides) has an adverse impact on soil micro and macro-organisms. These chemicals are used to control plant and animal species that interfere with maximum crop production. In using these chemicals, however, desirable plants and animals in the soil are also killed. When this happens natural fertility is reduced and may have to be supplemented with man-made fertilizers.

c. Energy Flow. Under intensive agriculture, energy flows at a higher volume than under natural conditions. With the use of specialized crops, irrigation, fertilizers and auxiliary energy, far more solar energy is converted to food to meet human demands. This solar energy is converted and stored in plant and animal tissue. These agricultural products, for the most part, are transported away to be utilized in more populated or urban areas.

Since the bulk of the energy in plant material is removed from a given unit of farmland, there is obviously less available to other life forms. Therefore animal populations are lower in number and of less species variety. Smaller life forms--rodents, birds, insects, etc.--are most successful at adapting to the agricultural ecosystem.

d. Summary. Impacts to the sagebrush-grassland ecosystem of the study area will be significant. The ecosystem that now exists will be lost. Native plants will be replaced by domestic varieties which are designed to meet man's food production needs.

Without appropriate conservation measures, soil productivity will gradually decline. This is due to the loss of the soil itself through wind and water erosion. Soil nutrients will also decline through sedimentation and continued cropping. Supplemental nutrients will have to be continually supplied by fertilizer application. Nutrients lost from the soil will create nutrient imbalances in water bodies which receive this runoff. Water runoff will accelerate because large land areas will be bare for lengthy periods and irrigation will sometimes place more water on the land than can be absorbed by the soil.

Specific impacts on the living and non-living components of the sagebrush-grassland ecosystem are found in Parts IV.A.1. and 2.

4. Human Values

a. Landscape Character. In treating the visual landscape as a basic resource it is necessary to develop quality objective classes for use in evaluating the naturalistic character of the landscape. Quality objective classes are based upon 3 factors related to the visual resource:

(1) the quality of the scenery being viewed,

(2) the volume of visual use it receives, and

(3) the visual zone it is in, i.e., foreground, middle ground or background.

In evaluating modifications to the landscape from agricultural development, the impacts to the land actually being farmed must be considered as well as the landscape that might be altered to provide necessary services. Water, power, roads, storage areas, dwellings, etc., must be provided and this results in alterations to offsite visual landscapes. The areas for particular concern are those that rate high in scenic quality and are within the foreground/middle ground view from major travel routes.

In the existing environment the high quality scenery is limited to the canyons of the Snake, Bruneau, and Salmon Falls Creek, the Bruneau Sand Dunes, the lava flow areas, and those lands surrounding the heavy recreational use reservoirs. The threat of the canyons being farmed does not exist, but the fact that these canyons enclose the waters needed to irrigate potential farmlands is of major concern.

Agricultural development has the potential of modifying form, line, color, and texture in all the components of the landscape. Any such modification is especially critical in the region because the potential farmlands are situated close to surface waters, and the highest class scenery is associated with these water bodies. In other words, portions of the most valuable scenic resource are viewed by the maximum number of people. (Interstate 80N parallels the Snake River near the largest concentration of desert land entries.) Not all the Snake River Canyon rates high in scenery class, but most of it is above average in quality. All canyon lands in view from the Interstate will fall into an objective class which requires that changes or modifications in any of the basic elements of form, line, texture, and color should not be evident. This requirement will not preclude agricultural development within the I-80N corridor or any other visual management unit in the region.

There are other visual units in the region that have natural features which place them in the highest quality objective class. These units are the Bruneau Canyon, Salmon Falls Creek Canyon, Snake River Birds of Prey Natural Area and other portions of the Snake River Canyon. These units fall into the most restrictive quality class which requires there be no man-made modifications except for very low visual impact recreational management facilities. DLE activities on these sites would not be compatible with these quality standards.

The severity of alterations to the landscape from agricultural conversion and associated activities will depend on whether the landscape is natural or modified. A previously modified landscape which has been modified utilizing sound visual management techniques would be seriously impaired if future modifications were not made to these standards. However the impact from a new road through a natural landscape will be much greater than a new road through a modified landscape regardless of the attention given to past modifications. It can then be reasoned that any alteration which results in a change of the existing line, color, or texture in the natural landscape will represent an irreversible commitment of the resource. This impact will be much greater in those areas with high scenic quality. With the same reasoning, it is evident that man's action which alters a modified landscape will also have various degrees of impact. A slightly modified landscape which is more intruded upon by altering form, line, color, or texture will be more impacted than a totally modified landscape that is further modified.

The effects of the scattered abandoned farms in the study area are minimal because the small acreage that was once cultivated is reverting to native grass and sagebrush. As the land continues to remain out of cultivation, it tends to blend in more with the natural scenery in the area and provides habitat for wildlife. Generally houses and associated outbuildings are not located on the abondoned farm in the area. However, roads, electrical distribution lines, fences, etc., are still evident in the vicinity of the abandoned farm units but they are now only associated with the nonabandoned farm units.

As stated above, all activities associated with farming threaten the landscape. Vegetative conversion will modify form, line, color and texture of the existing landscape. New roads, transmission lines, buildings, pump stations, pipelines, etc., will alter land form, add intrusive lines, add unnatural colors and change landscape texture.

Such changes will be accepted or not accepted depending on the sensitivity level of the individual viewer. The public's concern for scenic quality and the point of view as to what scenic quality will contribute to this sensitivity will vary among individuals.

Therefore the only positive statement that can be made about the impact of agricultural conversion on the landscape in the study area is that the natural landscapes will be irreversibly modified and modified landscapes will be modified further.

b. Sociocultural Interests

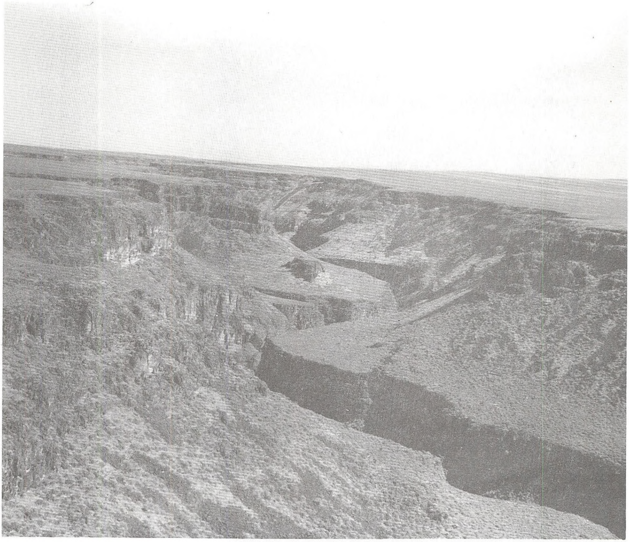
(1) Educational/Scientific

(a) Research Natural Areas, Environmental Education Areas and the Proposed Hagerman National Monument. These are managed to maintain their natural qualities. Since the designations are administrative, the areas are being managed only in cooperation with the efforts of the Interdepartmental Committee on Research Natural Areas and there is no mandate to keep them undisturbed.

However, if the Hagerman Monument is established, the mandate to protect this area will be clearly established by Congress. If the monument is not established, the international significance of the site compels the BLM to protect the value of the site. Those activities associated with agricultural development on or adjacent to national resource research natural areas will conflict with the objectives for making the designations.

There is presently no indication from the educational/scientific community about the need or value of the BLM research natural areas in promoting their programs. There is no record that either group has utilized these areas for educational/scientific study except for the activities of the College of Idaho and the University of Idaho in the Snake River Birds of Prey Area. Some of their activities have been through contracts with the BLM.

The fact that these areas are underutilized in no way lessens the need to provide natural, undisturbed segments of the environment as controls in measuring man's impact on similar lands. The BLM believes in



Salmon Falls Creek is one of the few established research natural areas found in southwest Idaho. To maintain this area as a natural area, no man-made modification should be constructed in the canyon. The threat to this research natural area lies in the fact that this water may be necessary to irrigate land in the future.

and supports the concept of research natural areas; therefore, protection of these irreplaceable resources should be a dominant consideration in allowing future agricultural development.

In evaluating the impacts from agricultural conversion and associated activities on research natural areas and national monuments, it is necessary to consider the purpose for such designations and the management objectives. Both types of areas serve as control units where scientists can gather data to measure the action man has had on natural ecosystems. Therefore the objectives of management are to protect and preserve the characteristics of these representative ecosystems in an unaltered condition.

Any encroachment by man will impact these areas by disrupting the natural condition. Once altered the natural qualities of the area might never be restored, thus eliminating a part or all of the area as a natural area. Encroachment in terms of agricultural conversion refers to the actual farming of native grasslands and to the activities which support the farms. Any of these actions would have a detrimental effect on a research natural area or national monument.

(b) Antiquities

(i) Paleontology. As indicated in Section III of this report, the desert land study area is considered to be one of the most significant regions for paleontological research in North America. The anticipated impact of the conversion of desert land to agricultural production on these nonrenewable resources will be adverse. The major problem is that these resources have not been inventoried and are largely unknown. Until adequate inventories can be undertaken, it will be impossible to protect unknown paleontological values from damage or destruction. The anticipated loss of paleontological resources will be irreversible and final.

(ii) Prehistoric Resources. The known prehistoric resources in the study area number approximately 600 sites. It has been estimated that this figure represents only 10-25% of the total number of potential sites that exist in the region. By any standard of measure, the study area is rich in prehistoric values.

The anticipated impact of the conversion of desert land to agricultural production on these nonrenewable resources will be adverse. The major problem is that the prehistoric resources in the study area are largely unknown. Until intensive inventories can be undertaken it will be impossible to protect unknown prehistoric resources from damage or destruction.

(iii) Historic Resources. The study area has a rich and colorful history. Throughout the region are small homesteads, mining camps, stage depots and routes, and even entire towns.

These historical resources, like the prehistoric values, have not been adequately inventoried. The anticipated impact of the conversion of desert land to agricultural production on these nonrenewable resources will be adverse. Until intensive inventories can be undertaken it will be impossible to protect unknown historic resources from damage or destruction.

(c) Recreation. The anticipated impacts from increased agricultural development are basically three-fold. First, the conversion of additional NRL to farms reduces the land base available for recreational use. Second, the provision of service facilities affects the visual landscape of offsite lands. Third, and more indirectly, the additional farming acreage will bring more people to the area and increase recreation use pressure on remaining lands and facilities. This combination of a reduced area and more concentrated use on remaining lands lessens the capability of meeting the demands of the recreating public. As a result some people will not realize their desire to recreate and others will have the opportunity to recreate but the quality of their experience will be lowered.

Increased farming activities may result in uncontrolled waste water flows into water courses, causing lower water quality and a reduction in the opportunities for water contact sports.

Uncontrolled pump station locations will lower the landscape values adjacent to water bodies. Open ditches, fences and the location of additional farm lands closed to public use provide barriers to overland travel and off-road vehicle operation. The reduced land base will force off-road vehicle users to concentrate in smaller areas, resulting in heavier localized impacts on the remaining lands.

Hunting opportunities of all types will be affected by additional farming. Natural habitat is destroyed by clean farming practices. The hunter is also closed out of areas formerly available to him. Some game and furbearing species will move out of areas adjacent to farming areas and be less accessible to hunters and trappers.

Fishing waters can be disturbed by siltation and waste waters containing fertilizers or other impurities. Unless pumps are properly installed with adequate intakes, a hazard is created to small fish.

In addition to the more active recreation pursuits discussed here, there are cultural resources of recreation interest that might be affected by farming. These activities are discussed under cultural, archeological and historical values in this report.

The nonconsumptive use of wildlife for observation or photography will be affected by agricultural conversion. Animals normally associated with natural lands will be displaced. However, as pointed out in the wildlife section, certain wildlife species will be drawn to and inhabit the farmlands. This could be considered a beneficial impact.

The dog trial areas (Figure 27) represent a unique specialized recreation activity in the region. The existing trial areas have a combination of topography and vegetation which make them suitable for this purpose. Conversion of these lands to agriculture will eliminate the use for dog trials.

c. Social and Economic Characteristics. The proposed action to continue conversion of native rangeland to new irrigated agriculture at historical rates of about 20,000 acres per year for the next 17 years represents a perpetuation of past trends in the regional economy. Although the national and regional economy is currently undergoing major stress and change, estimates of probable impacts can be made.

For example, the addition of 701,600 acres of new agricultural land in the period 1974 to 2020 represents a rate of about 15,250 acres per year (refer to Table 39). This additional acreage would be expected to require 6,236 man-years of labor, 2,495 new employees in food processing, and support 14,000 new employees in dependent industries such as services and retail trade. The addition then, of this acreage would be expected to foster about 22,700 new employees and about 54,900 persons in 18,300 households by the year 2020.

Conversion of 701,600 acres to irrigated agriculture would reduce the available spring range for livestock by about 100,000 AUM's. The cost of supplemental feed or establishing spring range through seeding would be required.

Wildlife contributes to the regional economy through expenditures in conjunction with hunting, trapping, and other uses. Loss of some kinds of wildlife in the region would tend to be offset by development of habitat for different species on the same land area. The economic impacts of continuing to divert water from the Snake River are difficult to estimate and require further study. However both beneficial and adverse economic impacts appear to be great.

Positive social impacts would be expected to occur through development of services and facilities which tend to provide amenities. Local communities near relatively large scale new agricultural developments would be expected to experience a variety of benefits. Conversely, continued agricultural development would be accompanied by some adverse social impacts. Increased traffic, population, increased demands for roads, schools, medical facilities, and others are adverse impacts. The social costs of losing native rangeland and the opportunity costs of uses foregone are difficult to quantify. The social costs of continued diversion of water from the Snake River appear to be very significant. Increased supplies of some agricultural products tend to foster lower consumer prices spreading broad social benefits. However increased supply tends to also reduce the price the producer receives--an adverse impact. There are numerous positive and negative social impacts and the net impact is not clear.

Table 39

Employment Effects of Agricultural Development

Private Development and Federal/State Assistance (OBERS Series C)

Time Period	Acres	Man Years Per Acre	Food Processing	Total Basic Employment	Dependent Employment	Total Employment	Number of Households	Number of People
1974-80 Region 4	33,600	298.7	119.5	418.2	669.1	1,087.3	876.9	2,718.4
1974-80 Region 5	81,900	728	291.2	1,109.2	1,774.7	2,883.9	2,327.7	7,215.9
1974-80 Total Area	115,500	1,026.7	410.7	1,437.4	2,299.8	3,737.2	3,013.9	9,340.1
1981-2000 Region 4	30,700	272.9	109.2	382.1	611.4	993.5	801.2	2,403.6
1981-2000 Region 5	304,000	2,702.2	1,080.9	3,783.1	6,053.0	9,836.1	7,932.3	23,796.9
1981-2000 Total Area	334,700	2,975.1	11,900.4	14,875.5	23,800.8	38,676.3	31,190.6	13,571.8
2001-2020 Region 4	5,000	44.4	17.8	62.2	99.5	161.7	130.4	391.2
2001-2020 Region 5	246,400	2,190.2	876.1	3,066.3	4,906.1	7,972.4	6,429.4	19,288.2
2001-2020 Total Area	251,400	2,234.6	893.8	3,128.4	5,005.4	8,133.8	6,559.5	19,678.5
GRAND TOTAL								
1974-2020 Region 4	69,300	616	246.4	862.4	1,379.8	2,242.2	1,808.2	5,424.6
1974-2020 Region 5	632,300	5,620.4	2,248.2	7,868.6	12,589.7	20,458.3	16,498.6	49,495.8
1974-2020 Total Area	701,600	6,236.4	2,494.6	8,731.0	13,969.6	22,700.6	18,306.9	54,920.7
(15,252 acres per year average)								

Impacts summarized above have been estimated from study of the regional economy described in the foregoing sections of this analysis (III. Description of the Existing Environment). The methodology of estimating impacts is based on the following factors.

Americans have historically taken cheap food for granted and assumed that the trend of food spending could be taken for granted by anyone making economic forecasts. Political history has been shaped by cries of despair from farmers seeking relief from low prices due to oversupply. Since New Deal economic programs were inaugurated, the government has frequently been embarrassed by the size and cost of commodities held in reserve to support farm prices. A sustained national effort to restrain production by limiting the amount of land allocated to specific crops has usually been defeated by the combined ingenuity of technology and farmers who productivity gains exceeded forecasts.

People have not recovered from the shock that these days may be over, and food prices have suddenly emerged as a dynamic element in our economy with widespread implications for diets in the average household and for the kind of raw materials which business firms may be required to utilize. Within 2 years, reserves of agricultural commodities which frequently exceeded the annual domestic consumption of that product have disappeared with unexpected speed. Sixty million acres of agricultural cropland had been set aside in the nation for long-term land retirement for the purpose of avoiding the downward pressure on prices as a result of oversupply. In 1973 the acreage in retirement was reduced by 80% of 12,000,000 acres. In 1974 virtually the entire acreage in retirement was released for production. Suddenly increased agricultural production became a strategic weapon, (1) to restore domestic stability by arresting two-digit inflation, and (2) to overcome unprecedented deficits in the U. S. balance of payments through expansion of exports in sufficient volume to offset magnified cost of imports triggered by monopolistic pricing policies of the cartel of oil exporting countries. In current dollars the value of agricultural exports from the United States rose as follows:

Agricultural Exports from the United States
in Billions of Dollars

1974 - 22.0	1971 - 7.8
1973 - 17.7	1970 - 7.2
1972 - 9.4	1969 - 5.9

The impacts of continued developments bringing new land into production of agricultural products can be measured only if a valid theory exists that clarifies cause and effect relationships together with the magnitudes involved. The widest used theory for this purpose is the economic base model. An essential step in forecasting is the identification of key factors important to future levels of economic activity. In localized areas, such as communities or regions, the key factor is the basic or export market. As the basic market changes, dependent, nonbasic industries will change.

Economic base theory divides the local economy into two segments: (1) firms and individuals serving markets outside the community, and (2) firms and individuals serving markets within the community. The goods and services sold outside the community are considered exports. In this analysis exports include all sales outside the region. The remaining goods and services go to the local market--"local" in reference to the 10 county study area.

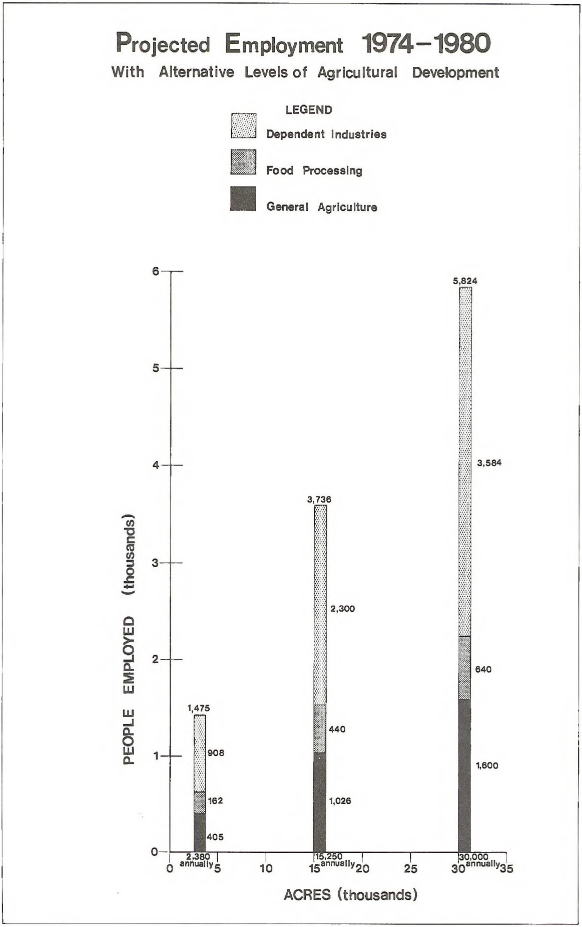
Export markets are the prime mover of the local economy, and if employment serving this market rises or falls, employment serving the local market is presumed to move in the same direction. When factories or farms (export) close or scale down their operations, retail merchants and professional firms (local) feel the impact of reduced expenditures. Employment which services the local market is adaptive and is designated "nonbasic" or dependent. Basic employment (exports) have been described as the "town building" activities, while nonbasic employment serving local needs constitutes "town filling" activities.

Continued expansion of farming activities and the associated food processing industries constitute an addition to basic employment. The location quotient for agriculture in all 10 counties exceeds 1. The region, therefore, is a net exporter of agricultural commodities even though it does not produce all of the specified food requirements. The location quotient for all counties except Ada is higher than 3, and in Gooding, Jerome, Lincoln and Owyhee Counties exceeds 8. This means that 7/8 of the agricultural commodities produced in those counties are sold to markets outside the areas, and 1/8 or less is consumed by the local market. Additional increments of agricultural commodities are surpluses for the region which can be shipped to distant export markets. Similarly, the location quotient for food processing approximates 2. This means that the study area may import processed foods, but its production of processed food is twice as large as its consumption of processed food. This means that the study area may import specified processed foods, but on balance, its production of processed foods is twice as large as its consumption of processed foods, and half of the output is net export.

It is recognized that the employment-location quotient model has been criticized as overstating multiplier effects because it fails to account for domestic trade and imports in an adequate manner. A recent article in Land Economics (Mathur and Rosen, Feb. 1974) applied 2 models to the same data and concluded that the location quotient model overstated employment multiplier effects over 2 times.

Additional employment in agriculture or in food processing industries would be classified as basic employment. A comparison between aggregate annual employment in agriculture and in the food processing industries established a well-defined relationship between these 2 basic industries. In the interest of deriving a valid relationship, aggregate employment in these 2 industries were computed for all 18 counties in the State of Idaho Planning Regions 3 and 4. Since these planning

Fig. 29



Projected Employment 1974–1980
With Alternative Levels of Agricultural Development
LEGEND
Dependent Industries
Food Processing
General Agriculture
PEOPLE EMPLOYED (thousands)
6
5
4
3
2
1
0
1,475
908
162
405
3,736
2,300
440
1,026
5,824
3,584
640
1,600
2,380 annually
15,250 annually
30,000 annually
0
5
10
15
20
25
30
35
ACRES (thousands)

regions were designed to identify areas that follow natural geographic boundaries and posses similar economic and social characteristics, the ratio between total employment in agriculture and its allied food processing industries have more reliability. Specifically, the annual employment for these 18 counties in agriculture during 1972 was 23,918 and the aggregate annual employment in food processing was 9,637. There were 40.29 people employed in food processing for every 100 workers in agriculture.

The relationship of irrigated land acreage to man-years of labor directly involved in agriculture varies considerably. Average relationships are useful, particularly on larger agricultural projects. The basic unit is considered an acre of irrigated cropland. Labor requirements for irrigated pasture, dry cropland and dry pasture were converted into equivalents of irrigated cropland for consistency. Canyon and Jerome Counties were useful analytical models because the predominant agricultural use in both counties is irrigated cropland. After making the adjustment just described, it was determined that in 1972 year-around employment in agriculture for the entire study area averaged 1 worker for every 74.3 acres. In Gem and Canyon Counties 1 worker was required for every 42 and 44 acres respectively. The lowest manpower ratio was found in Lincoln County where farm labor averaged 1 man to 139 acres.

After reviewing current technology and the trend toward more capital intensive farming units, it appears that newly established farms converted from native rangeland through highrise pumping units are approximately 50% more efficient in the use of labor than the typical established farming enterprise. The ratio determined was one man-year of labor for every 112.5 acres of new irrigated cropland. This ratio between nonbasic (or dependent) employment to the amount of basic employment is low in sparsely populated areas, for the economic threshold is insufficient to maintain important service and professional establishments. Areas with small populations must import virtually all manufactured goods, and residents frequently shop out of town because of limited choice in local business districts. As a region advances economically this ratio rises, for it produces locally a larger proportion of the goods and services that its inhabitants require. This trend has been verified many times, and Dr. Gary Wells confirmed its applicability to the Idaho economy in the economic base study which he prepared for the IWRB.

The basic/nonbasic ratio (commonly referred to as the "multiplier") is a key component for deriving the ultimate impact of any development project. Unfortunately marginal projects have sometimes been "dressed up" by injecting exotic multipliers. For these reasons this ratio should be selected with great care. After a careful analysis of 1960 census data Dr. Gary Wells determined that in southwest Idaho (which contains the Boise metropolitan area) the basic/nonbasic ratio was 1.7. In other words, one additional basic job creates employment for 1.7 workers in utilities, retail trade, finance, health professions, education, government and all other fields which serve basic industries. In Magic Valley Dr. Wells determined that this ratio in 1960 was 1:1.26. The study area overlaps both of these regions. Dr. Harry Caldwell prepared a study on Population Dynamics for the State Board of Education. After analyzing 1970 census data he determined that the statewide basic/nonbasic ratio was 1:1.84.

On the basis of this evidence, a ratio of 1:1.6 is considered appropriate. This multiplier is a regional multiplier, not a local one. The majority of potentially irrigable land is adjacent to small communities where the local multiplier would be lower than 1.6. As a result of new agricultural developments, a portion of the indirect employment will be created in a regional trade center such as Boise and Twin Falls even though they may be 50 or 100 miles from the development.

These economic base projections appear to ignore possible improvements in agricultural productivity where a constant man-to-land ratio is used to estimate future years. This should be adequately compensated by use of a constant multiplier for the same time period. Since the multiplier tends to rise as a region develops, improvements in agricultural productivity should be offset adequately by use of a constant basic/nonbasic ratio.

These conclusions can be illustrated and tested by comparison with a Draft Environmental Statement prepared by BR for the Columbia Basin Project in Washington. In that statement the economic impact of irrigation development of 11,600 acres was summarized as follows:

Block 253 - 11,600 Acres

Direct employment - on the farm and supportive industries	150 man-years
Indirect employment -	248 man-years
Employment	398 man-years

If Block 253 were analyzed according to the precedures used in the study area the results would be as follows:

11,600 acres ÷ 112.5 =	103.111 man-years in agriculture
103.111 x 0.4 =	41.244 man-years in food processing
	144.355 Total direct employment
Basic/nonbasic ratio	
(144.355 x 1.6)	230.968 Total indirect employment
	375.323 Total Employment

The explicit assumptions used in deriving direct and indirect employment for the Columbia Basin Project were not available. The comparison appears justified because these studies are basically contemporary and probably assume similar technology in agriculture. The Columbia Basin Draft Environmental Statement was issued January 17, 1975.

To arrive at the aggregate effect of continued conversion of native rangeland to agricultural production 2 additional factors must be considered. In our present society it is erroneous to assume the number of households will rise in proportion to the number of jobs. Many families have more than one "breadwinner" and this trend has grown steadily. When aggregate employment in the 10 counties was divided by the total number of households, 1.24 members of the average household were employed. Therefore the sum of direct and indirect employment should be divided by 1.24 to estimate the appropriate number of households.

In 1970 there were 3.17 persons per household in Idaho and 3.16 in the study area. In recent years persons per household have decreased steadily at the national level. Population effect for 1974-80 assumes a 3.1 person per household average and 3.0 after 1980 to reflect realistic population effects.

B. Possible Mitigating or Enhancing Measures.[6] The following statutes, regulations, and policies govern all BLM actions. They relate to a wide variety of resources to be managed, preserved, protected or administered on NRL. This list does not include all the directives under which BLM operates. Rather it contains those that specify environmental protection measures with which the Bureau must comply.

PL 92-500 - Federal Water Pollution Control Act Amendment of 1972

Antiquities Act

Taylor Grazing Act

Clean Air Act

Air and Water Quality Act

National Historic Preservation Act

Endangered Species Act

National Environmental Policy Act

43 CFR 1725.3-3

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[6]These are measures that will lessen environmental disturbance or actually improve present conditions.

43 CFR 2740

43 CFR 6220

43 CFR 6250

36 CFR 800

Executive Order 11593

Departmental Manual Part 602.3.3

Executive Order 11296 (Flood Hazard)

National Wild and Scenic Rivers Act

National Trail System Act

Fish and Wildlife Conservation Act

Wild Horse and Burro Act

Executive Order 11514 (Environmental Quality)

43 CFR 2400

43 CFR 4700

43 CFR 6225

43 CFR 2800

Measures that could reduce the severity of adverse impacts or enhance the quality of our environment have been put into 2 groups. Before a tract of land is classified as being suitable for DLE, the Bureau has certain mitigating or enhancement measures available. However, once the land is classified and the entry is allowed, some mitigating or enhancing measures are lost. Therefore possible mitigating and enhancing measures are grouped here by (1) those measures applicable before allowance, and (2) measures applicable after allowance. Within each of these first 2 categories are 2 subcategories: (1) those measures which are enforceable by law, regulation, or policy, and (2) those measures not enforceable by law, regulation or policy, but nevertheless sound resource management practices that would lessen adverse impacts.

Mitigating or Enhancing Measures Applicable Before Allowance

Component	Enforceable	Not Enforceable
Air Quality	1. provide windbreaks between areas to be farmed by preserving strips of native vegetation or planting shelterbelts	
Water Quality	1. prohibit entry on soils susceptible to excessive soil erosion and soil movement into water bodies 2. prohibit dumping of litter, wastes and foreign substances into water courses and water bodies	
Soils	1. prohibit entry on lands that are steep or susceptible to excessive erosion	
Land Use	1. schedule allowances to coincide with available utilities & services	
Energy		1. Lay out farm units in practical blocks so that: a. road mileage is held to minimum, b. powerlines, pipelines, and other facilities serve as large an area as is feasible,

Mitigating or Enhancing Measures Applicable Before Allowance (Cont.)

Component	Enforceable	Not Enforceable
Vegetation (aquatic)	1. Reserve lands with riparian or aquatic habitats	
Vegetation (terrestrial)	1. Same as aquatic	
Animals (aquatic)		

Mitigating or Enhancing Measures Applicable Before Allowance (Cont.)

Component	Enforceable	Not Enforceable
Animals (terrestrial)	1. prohibit agricultural development within five miles of the Snake River Birds of Prey Natural Area or similar canyon habitats until research on prey species is complete and/or indicates disposal of specific tracts would not have an adverse impact.	1. establish shelterbelts to provide food and cover for wildlife
	2. retain suitable areas within developments for wildlife habitat management purposes	
	3. retain lands identified as having high game populations and/or areas known to be inhabited by "endangered, threatened, or status undetermined" or unique fauna.	
	4. maintain intact the existing wild horse range to accomodate the present number of horses	
Landscape Character	1. develop standards for landscape management using the principles of the BLM Visual Resource Mgmt. System.	
	2. prohibit landscape alterations in the Bruneau, Salmon Falls, and Birds of Prey Natural Areas.	

Mitigating or Enhancing Measures Applicable Before Allowance (Cont.)

Component	Enforceable	Not Enforceable
Educational/ Scientific and Cultural	1. retain lands in existing Research Natural Areas and proposed Hagerman National Monument, and disallow any land uses which would alter or disturb the existing landscape and ecosystem.	
	2. survey lands for cultural resource values prior to allowing any surface disturbance	
	3. identify and retain representative examples of flora, fauna, or geologic features as Research Natural Areas	
	4. retain the Saylor Creek research pastures for continued scientific study and research	
Recreation	1. reserve public access to recreational lands and water	
	2. retain lands with quality development potential	
	3. retain lands with special qualities for use as off-road vehicle sites, dog trials, and other recreation and public purposes value.	
	4. reserve areas which provide consumptive and non-consumptive wildlife associated recreation values	

Mitigating or Enhancing Measures Applicable Before Allowance (Cont.)

Component	Enforceable	Not Enforceable
Social	1. work closely with state and local planning agencies prior to allowing entries to facilitate planning new roads, schools, utilities, medical facilities, landfills, etc. 2. encourage progressive local planning by city and county planning groups	
Economic		1. plan and lay out agricultural development areas in logical and economic units to insure conservation of all resources and adequate return for monetary investments

Mitigating or Enhancing Measures Applicable After Allowance

Component	Enforceable	Not Enforceable
Air Quality	1. permits and other use authorizations for pipelines, transmission lines, and other structures should require windrowing of vegetation removed to provide windbreaks 2. keep surface disturbance to a minimum when installing facilities 3. re-establish natural or near-natural vegetative cover on disturbed areas 4. strict enforcement of air quality standards by appropriate local, state, and federal agencies	1. utilize conservation practices in farming operations, such as: a. leave part of land in cover at all times b. leave soil cloddy when bare to reduce soil erosion c. establish permanent windrows and windbreaks d. contour plowing e. leave watercourses in permanent vegetation 2. stubble burning should be discouraged

Mitigating or Enhancing Measures Applicable After Allowance (Cont.)

Component	Enforceable	Not Enforceable
Water Quality	1. all permits and use authorizations should contain water quality protection stipulations 2. make National Resource Lands available for settling ponds and other water control structures needed for good watershed management 3. compliance with state water quality standards for on-site and adjacent waters 4. develop a monitoring plan for water quality in major drainages in areas involving agricultural development 5. develop off-site water storage reservoirs to collect flood waters to supplement Snake River flows depleted by pumping. Water from these reservoirs would enhance water quality in the Snake River	1. utilize conservation practices in farming operations to: a. reduce soil movement and siltation of waters b. develop catchment ponds for irrigation waste water

Mitigating or Enhancing Measures Applicable After Allowance (Cont.)

Component	Enforceable	Not Enforceable
Soil		1. utilize farming practices to: a. avoid cultivation of steep slopes b. rotate crops to maintain soil productivity c. decrease soil erosion, such as sprinkler irrigation, contour plowing, strip farming, vegetated watercourses, etc.
Land Use	1. provide sanitary landfills to avoid indiscriminate dumping and littering	
Energy		1. consider developing railroad systems moving farm commodities and supplies
Vegetation (aquatic)		1. control waste water flows to protect aquatic vegetation

Mitigating or Enhancing Measures Applicable After Allowance (Cont.)

Component	Enforceable	Not Enforceable
Vegetation (terrestrial)		1. develop livestock forage to replace that lost when DLE's are developed, utilizing seedings and other practices 2. make farmland available for supplemental grazing to offset loss of native range
Animals (aquatic)	1. join Fish and Game Dept. in cooperative study to identify and designate minimum pools on all lakes and reservoirs to protect aquatic ecosystems 2. enforcement of water quality standards	1. develop fish propogation facilities for raising fish to replace losses in Snake River 2. restrict use of chemicals that are detrimental to aquatic ecosystems 3. utilize good farming practices to control return flow of waste water, and minimize siltation and entrance of pollutants into water bodies

Mitigating or Enhancing Measures Applicable After Allowance (Cont.)

Component	Enforceable	Not Enforceable
Animals (terrestrial)	1. provide for safe disposal of pesticide containers	1. restrict use of chemicals that are detrimental to wildlife 2. leave crops and crop residues to benefit wildlife 3. plant shelterbelts for wildlife cover
Landscape Character	1. all landscape modifications under permit should adhere to "Standards for Visual Resource Management"	1. encourage farming practices that compliment the visual landscape

Mitigating or Enhancing Measures Applicable After Allowance (Cont.)

Component	Enforceable	Not Enforceable
Educational/ Scientific and Cultural	1. land uses under permit or other use authorizations must be compatible with Research Natural Areas	
	2. include stipulations in all permits for survey and salvage or protection of cultural resources	
	3. prohibit surface disturbance within one-fourth mile on each side of visible segments of the Oregon Trail	
Recreation	1. make reservations in allowances for public access to recreation lands and water	1. encourage development of recreation facilities by local agencies
	2. develop facilities to accomodate use on National Resource Lands remaining after DLE allowances	

Mitigating or Enhancing Measures Applicable After Allowance (Cont.)

Component	Enforceable	Not Enforceable
Social		
Economic		1. develop alternative livestock forage sources to replace that lost to agricultural development

C. Residual Impacts. The objective of this section is to describe impacts that can be expected to remain after the recommended mitigation measures have been applied. The listing includes unavoidable impacts and the net residual effects likely to remain despite mitigation efforts.

It must be assumed that recommended mitigation measures will be used and enforced, adequate money and manpower will be available and the private farm operators will be willing to cooperate.

1. Air. During certain times of the year air quality and visibility levels will be reduced by wind-borne dust particles. The burning of stubble and ditch bank vegetation will put smoke into the lower atmosphere.

Sprinkler irrigation will raise the relative humidity in the microclimate.

2. Water. The water quality in the Snake River and tributaries and downstream water outside of the study area will be reduced below present levels by the addition of sediment and chemicals from surface runoff and return irrigation flows.

Water flows in the Snake River and tributaries and water flows downstream and outside of the study area will be lowered by the removal of irrigation water.

Ground water levels will be lowered by the pumping from wells for irrigation water. Reduced water flows will increase water temperature affecting changes in fish populations.

3. Soils. Soil movement and removal of topsoil will occur through the process of wind and water erosion. This will result in the loss of soil productivity on sites with excessive topsoil loss.

4. Land Use. The development of farms will result in the use of other offsite lands for facilities to support the primary activity. Activities such as road construction, storage facilities, land fills, etc. will preempt the use of certain lands for other productive purposes.

5. Energy. Farming activities will require the use and increased demand for all forms of energy.

6. Vegetation (aquatic). Riparian habitats will be removed as new pump stations are developed on water courses to remove irrigation.

Increased sedimentation will disrupt plant succession affecting the food chain.

7. Vegetation (terrestrial). As new farms are developed forage for domestic livestock and wildlife will be removed.

8. Animals (aquatic). The aquatic ecosystem will be affected by reduced water quality and quantity levels. The cumulative effects to aquatic ecosystems are unknown, but many populations will be adversely affected.

9. Animals (terrestrial). Individual wildlife species will be eradicated by farming activities. The populations dependent on the existing native habitat will be significantly reduced. Other species will be destroyed by the presence of man and the activities associated with farming. Some impactions could be on small isolated populations (or habitats) of endangered, threatened or status undetermined species for which there is no data.

Domestic livestock grazing on native ranges will be lost by the conversion to farm lands.

Increased populations of wildlife which thrive in a farm environment can be expected.

10. Landscape Character. The existing natural landscape will be modified by farming and associated activities. Primarily the change will be from a sagebrush-grass environment to a farm environment. Atmospheric smoke from ditch bank burning and dust will be visible at times. All the basic landscape elements of form, line, color and texture will be modified to some degree.

11. Educational, Scientific and Cultural. Unique natural features may be disturbed by farming activities. Scientific values may be inadvertently disturbed or destroyed by efforts to salvage resources associated with archeological, paleontological and historic sites.

12. Recreation. Farming will remove land from public recreation use. The opportunity to view natural landscape will be lessened. Water-based recreation activities involving water contact may be threatened by reduced water quality. Water sports will be affected by lowered water levels in the Snake River.

Opportunities for nonconsumptive wildlife activities such as sightseeing and photography will be reduced as wildlife populations are displaced. Hunting and fishing activities will also be affected by the loss of habitat and lowered water quality.

Those people recreating on the remaining land base will probably have a lower quality experience due to the presence of more people in a smaller area.

13. Social. As farming activities increase more people will be drawn to the area to work the farms and provide necessary services. Human settlement will result in a need for additional utilities, improvement to the transportation network and increased need for social services such as schools, health facilities, police and fire protection.

14. Economic. New farms will affect the price of agricultural commodities.

The cash flow for provisions of goods and services to new farms would increase. There would be a change in the cost flow to local communities as a result of opportunities foregone such as loss of livestock forage or certain recreation opportunities.

Successful farm operations can be expected to provide operators a monetary gain.

D. Short-Term Use vs. Long-Term Impacts. Short-term uses under the proposed agricultural development consist of those actions taken to convert native rangeland to irrigated cropland. Included are the first few (2-5) years of farming until a cropping pattern is established and pertinent facilities (roads, fences, buildings, etc.) are constructed. Long-term use consists of the continued farming practices that will take place far into the future. It also includes future use of this farmland for other purposes such as commercial or residential development. Long-term uses would occur beyond that time up to 50 years into the future.

1. Air Resources. There will be both short-term and long-term impacts on air quality. Primary pollutants will be in the form of smoke from burning crop residue (mostly in the fall), windborne dust particles, water-soluble sprays and farm equipment exhaust. Secondary air pollutant sources are commercial and industrial plants that produce agricultural equipment or process agricultural crops. Increased demand for electrical power plants for pumping water could very likely require coal-fired power plants which will add to air pollutants.

2. Land Resources. Agricultural development constitutes a long-term commitment of the land resource. Because of high capital investment and increasing demand for foodstuffs we can anticipate most developed land will remain in agricultural production indefinitely. There are 2 main reasons for land to be taken out of agricultural production: loss of water supply, or conversion to a use yielding higher capital returns (residential, commercial or industrial use). Once developed, we project less than 10% of such land will be taken out of agricultural production in the foreseeable future.

Once a tract of land is put to agricultural use, many short- and long-term uses of this land are lost. The most immediate loss is the loss of public values that can only be assured by retention of land in public ownership. Once transferred into private ownership and devoted to agricultural production, several alternative uses are foregone. Some of these uses are discussed in the following sections.

3. Water Resources. Irrigation of cropland creates a long-term demand for water. If ground water is the source, it is possible to pump water out of the ground faster than it can naturally be replaced.

This can become a serious problem and lead to a shortage of irrigation water. Diversion and use of surface water has long-term impacts on water quality of streams and impoundments, water-based recreation, aquatic and terrestrial wildlife and all other water users. Specific long-term impacts cannot be determined because the available supply of ground and surface water is not known.

4. Energy. Irrigated farming requires large amounts of fossil fuels and electrical energy. Long-term agricultural production depends upon reliable sources of both types of energy. As more acreage is converted to agriculture the demand for energy will contine to increase.

To meet this added demand, power companies are planning new power plants--primarily coal-fired and nuclear. These plants, of course, will have short- and long-term impacts of their own.

5. Vegetation Resources. All plants in the area of the proposed development will be affected, either directly or indirectly. Most native terrestrial plant species will be eliminated from the area except for some along fence rows and areas unsuitable for cultivation. The plant community will change from a native sagebrush-grassland to one of introduced species (crops) that are adapted to the area and are presently under high demand. Since reestablishment of the original conditions would be very impractical and uneconomical, it may be assumed that this loss of native plant species would be permanent. There will also be long-term degradation of the aquatic and riparian vegetative communities.

6. Ecological Interrelationships. Agricultural production is oriented toward creating monocultures, or a series of different monocultures. That is, any vegetation other than the desired crop is looked upon as a nuisance and is eliminated. Only where a vegetative community does not conflict with "good" farming practices is that community allowed to remain. For this reason agricultural ecosystems are relatively simple compared to natural ecosystems.

Total biomass production will be increased over the long-term period since the volume of vegetation produced under irrigation and fertilization is much higher than that produced under natural conditions. Perhaps as much as 90% of this biomass is removed, however, and is not available to restore soil fertility. Natural nutrient and energy cycles are disrupted and must be supplemented by artificial means such as fertilizers.

7. Human Values. The natural landscape will be permanently altered by land development practices, service facilities, and road construction. Once disturbed, unsurveyed archeological and historical values can never be realized. There would be a benefit to the local communities through increased employment, greater capital flow, and broadened tax base. There will be an expansion of agriculture-related industries and an increase in food production.

Certain recreation opportunities will be lost and, on the whole, wildlife populations lost. Grazing of livestock on open range will eventually be reduced. Whether or not these long-term impacts are indicative of enhancing man's environment is, of course, a matter of individual and collective value judgments. Future generations may gain or lose, depending upon one's point of view.

E. Irreversible and Irretrievable Commitment of Resources. The purpose of this section is to examine those resources which would be consumed and those that would be altered irreversibly and irretrievably by the proposed DLE project.

Conversion of NRL will represent a permanent loss of public lands and involve a commitment to agricultural production for a minimum period of 25 to 75 years. This is relatively long in terms of human lifetimes and related alternative uses of these lands and their other resources. The conversion of the study area from native rangeland, in combination with legal transfer out of public domain, would, for all practical purposes, be an irreversible process. Although the land may not always be used for agriculture and may, in time, be converted to another purpose, it would practically be impossible to reestablish conditions similar to the original ones.

1. Human Resources. Large amounts of manpower would be used in the initial development of the project and more would be needed in the day-to-day operations. There will also be a commitment of other resources related directly to development and maintenance, including large amounts of equipment and construction materials. However, assuming that capital and other resources represent a commitment to increase food production for national needs, their consumption would be necessary regardless of which region they were used in.

The proposed development will greatly affect the communities in the area. There will be increased employment, greater capital flow, and a broadening of the tax base that usually benefits the total social environment.

The conversion of more NRL to farms reduces the total land base available for public recreation use. The public now recreating on these lands will be joined by those brought to the area to work the farms. As a result some people will not realize their desire to recreate because of the reduced available lands, and other will have the opportunity to recreate but the quality of the experience will be lessened.

Unknown archeological and historical sites may be destroyed during the farming operations. Significant cultural resource sites shall be set aside and remain under federal ownership.

2. Land Resources. The conversion from existing native rangeland will greatly complicate land use patterns in the area. This project will set a precedence for future use and development in the area. There

will also be fewer options for the type of land uses available to future generations.

The livestock operators will suffer a loss of their grazing privileges, but it is unknown if there will be a decrease in available AUM's of livestock forage since operators could benefit from farm production, possible reseedings, and other mitigating projects (see Section III.A.3.).

3. Water Resources. This project will require large quantities of water for irrigation purposes. The water will be pumped from the Snake River and deep wells. This water will be used for irrigation as long as the project is alive. This will prevent the water being used for any other purpose.

There will also be a commitment of a substantial amount of water in the Snake River. Since the reduced water volume will not be able to dilute pollutants, these waters will have reduced value as a fishery and for certain types of water-contact sports. This represents a larger commitment of water than just what is used for irrigation.

4. Energy Resources. There will be a substantial amount of energy consumed during the development and operation of the proposed project. Even if the land is used for another purpose, there may be an increase in energy consumed, the total amount being directly related to that use. No matter what the purpose, development may increase the consumption of energy, both electrical and fossil fuels, in the region. Reduced flow of water in the Snake River will reduce the production capacity of existing hydroelectric installations.

With increased energy consumption there will be secondary effects on the environment associated with the production of this new energy. The hydroelectric dams and coal-fired generating plants required to supply the power will have great impacts on the surrounding environment. These impacts cannot be listed in this document but it must be realized that some will occur.

5. Vegetation Resources. The impact of the development will result in irreversible changes in vegetation. Whether this effect would be beneficial or detrimental depends upon a person's point of view. Some of the plant species that may be adversely affected are considered to be threatened and are proposed in an Endangered Plant Species List developed by the Smithsonian Institute (see Adverse Impacts on Terrestrial Vegetation). A loss of vast numbers of the plants will decrease their ability to survive as a species and could ultimately lead to the complete elimination of the species from the Snake River Plains.

6. Fish and Wildlife Resources. The commitment of this land to agricultural development involves the permanent changes exerted upon the fauna and flora by alteration or loss of habitat in the area. The following effects are examples of the potential scope of this type of

commitment on fish and wildlife habitat resulting from removal of protective vegetation and from pollution: destruction of physical habitat for resident species, reduced populations of species that are intolerant of human activities, and the destruction of wintering ranges for migratory species.

Although several are readily adaptable and can survive, we must expect the complete elimination of numerous species in the study area. Included in this category are several small mammals that are the primary food source for many raptors. By eliminating this food supply it can also be expected that the numbers and varieties of raptors in the Birds of Prey Natural Area and similar areas will drastically decline.

Additional wildlife species could become endangered or threatened. The habitat of the wild horses in the area will be permanently altered. These horses are protected by the Wild Horse and Burro Act and their range is essential to their continued existence under the law.

7. Esthetics. Much of the area is native rangeland. To many this area represents an esthetic experience by virtue of the vast expanse of undisturbed open space. Conversion to farmland would eliminate the characteristics of undisturbed open space. In addition there are natural landscape features that represent a unique, esthetic resource in the study region. For example, the Bruneau, Salmon Falls and Snake River Canyons might be irretrievably disturbed by agricultural development from assorted service facilities such as roads, pipelines, pump stations and transmission lines. The onsite service facilities together with the actual farming practices are modifications that might also affect the quality of the resulting landscape after conversion. Since esthetic values can only be measured from each individual's viewpoint, there will be those people who feel the sight of highly developed farms is pleasing. However the natural landscape has been permanently altered.

V. ANALYSIS OF ALTERNATIVES

A. General. When considering alternatives and impacts on the environment, the size of the development generally has less relationship to impacts than the location of the project. For example, a 100-acre project may have a much more severe impact on big game animals if it is situated directly in their winter range than a 1,000-acre project that is outside the winter range. Similarly, a 10-acre project may drastically affect a natural area if it is on the same land much more so than a 100-acre project outside the natural area boundaries. These two examples may be oversimplified but they illustrate the problem of identifying impacts. Until the locations of the proposed developments can be determined, it is difficult to discuss the impacts these alternatives will have and the problems they will create for the surrounding region. Only after the site is chosen can a detailed assessment of the impacts upon the environment be made.

B. Anticipated Impacts of Alternatives

1. Alternative #1. This alternative is to allow conversion of NRL to agricultural production at an accelerated rate of 40,000 acres per year for about 15 years until the best land in the study area is developed. This would amount to a total of about 650,000 acres. Applications would be allowed under both the DLA and the CA.

The impacts resulting from this alternative would be similar to those of the proposed action listed in Section IV.A., but would be of a greater magnitude. Major impacts would involve water quality, air quality, energy, livestock forage, wildlife and fishery habitat, soil erosion, archeological and historcial values, and the social and economic situation.

Accelerated agricultural development would degrade surface and ground water quality in several ways. Increased sediments, chemicals, and other pollutants would enter the Snake River and, to a lesser extent, underground aquifers. More water would be required to irrigate additional farm acreage. Drawing this water from the Snake River and underground aquifers would hasten depletion of the water supply. Other water uses would be curtailed. Instream needs, industrial, recreation, municipal and other agricultural demands may very possibly be unfilled. Overall, water quality would continue to decline as more water is removed from a particular source and more pollutants are allowed to enter that source.

Air quality would decline as agriculture related activities intensify. Ground disturbance, burning, and various types of vehicle travel would all contribute to added particulate matter in the air. Carbon monoxide and related hydrocarbon pollutants from internal combustion engines would increase as additional farm equipment and agro-industrial machinery is put into operation.

Energy supply has come into play in the last few years as a limiting factor in increasing acres of land under irrigation. Whether or not energy is available for accelerated agricultural development is currently a debated question, but one thing seems certain--delivery of this amount of energy to the point of use is beyond the present capability of the utility companies involved in energy supply. Even so it must be recognized that irrigated farming is an energy intensive method of food production and it is very likely that accelerated conversion of land to irrigated agriculture could create an energy demand in excess of supply.

Impacts on aquatic and terrestrial wildlife habitat and archeological and historical values will be much the same as discussed in Section IV.A. Residual adverse impacts would be higher because accelerated development would most likely leave less time for mitigating measures and protection or salvage of unique values.

An acceleration of the rate at which NRL are converted to production of agricultural commodities would have significant economic impacts. The creation of new jobs on the land, in the food processing industry, in related trade and service industries and in regional industrial areas would dramatically increase. Creation of new jobs at a greatly accelerated rate would, of course, foster immigration from adjoining states and areas and accelerate the region's already rapidly increasing population. Income in food processing and dependent industries would probably increase. However the accelerated production of agricultural commodities might drive prices received down to establish a trend of lower prices received for farm products. Combined with higher operating costs (water, machinery, energy, etc.), this trend, if continued, would force some farm operations to go out of production where costs continued to exceed sales. Conversion of relatively large blocks of native rangeland to irrigated agriculture would seriously affect the range livestock industry. Reduced acreage of already scarce spring forage would necessitate supplemented feed or development of other forage supplies. Itensifying the cost-price squeeze would force some livestock operators out of business. Personal incomes in many livestock operations and in existing and new farm operations would tend to decline over time.

An acceleration of the conversion of NRL to agricultural production would bring significant social impacts. The demand for additional housing, utilities and improvements in the transportation network would likely increase faster than the ability to meet these needs. Particularly the increased demands would be most evident in the regional centers and urban areas already faced with the pressures of increased growth. The demand for social services such as schools, health facilities, police and fire protection would probably tend to increase faster than the demand could be met. The trend of diversification of the economy away from agriculture would probably be accompanied by a change in life styles--even though the amount of agricultural land would actually increase. Changes in life styles would probably be most evident in the communities which are presently small and rural.

Expansion of irrigated agriculture along the Snake River would have rather dramatic impacts on present uses of the land and water. An increase in water pumped from the Snake River would adversely affect fish populations, waterfowl and recreation opportunities. Decreased area for some wildlife species would result in limited hunting opportunities. Loss of unique flora or fauna would probably occur, the costs of which are difficult to estimate. Utilization of large acreages of land for food production under private ownership would preclude other uses by the public at large. Agricultural development near urban centers would increase recreation costs by forcing recreationists to travel greater distances. The present situation of urban areas and communities in a rural setting would be expected to undergo change to a farm setting more common to the midwestern states.

The net effects of an accelerated rate of agricultural development are beyond the scope of this analysis. Clearly, economic growth embodies many benefits to individuals and the region. Just as clearly, economic growth is accompanied by some degradation of the environment and loss of amenities. The critical point beyond which continued growth and development yields net losses--not benefits--is both highly controversial and elusive. The attitudes of persons moving into the southwestern portion of Idaho indicate quality of the environment is one of the major attributes which drew them to the area. The residents of southwestern Idaho appear to be voicing increasing concern for environmental quality and the quality of life in general. This area clearly merits further study and consideration to achieve optimal allocations of resources for net economic and social benefits.

2. Alternative #2. This alternative is to allow agricultural development under the DLA and CA at a slower rate of about 5,000 to 10,000 acres per year for a total development of 200,000 acres. With this alternative impacts would be similar to those discussed in Section IV.A., but adverse impacts would be on a smaller scale. It is possible more mitigating measures could be employed with a net result of fewer negative residual impacts. Compared to the proposed action this alternative has a number of beneficial impacts:

a. There would be less commitment of land and water resources, allowing time for more thorough planning and development of land and water use plans. Alternative future options for use of land and water would be preserved. Potential use conflicts could be avoided.

b. Actual adverse impacts on other land uses and resources would be less.

c. Energy consumption would be reduced and adverse secondary impacts of energy production would also be reduced.

d. Economic growth would be at a slower rate and in a more orderly manner. Changes in employment, income and population would be comparatively gradual.

Social impacts of this alternative would include addition of utilities, improvement of portions of the transportation network and an increased need for some of the social service. Opportunity costs of converting relatively smaller acreages of land to agriculture would be less than under historical rates of change. Some increase in agricultural production would tend to depress prices received by producers and would have a minor effect on lowering consumer prices. These impacts would be less than those resulting from historical rates of new agricultural land.

3. Alternative #3. Other known alternative avenues for disposal and conversion of NRL to agricultural use which are available at the present time are as follows:

a. Public Sale. The impacts resulting from this alternative would be minimal since NRL applied for and/or ordered into the market under the law must meet one or two of the following criteria: (1) the land must be disconnected or isolated from other federally owned land, or (2) the land must be too rough or mountainous for irrigation. Since most of the lands in the study area do not qualify under either category, the application of the public sale law does not appear feasible.

Some of the advantages of this alternative, where applicable, would include the opportunity for immediate development; it would provide the fastest and most efficient method of disposal for the BLM; it would give the United States market value for the land; it would remove the threat of a give-away program; and according to national interest, the Secretary of the Interior would have the discretion to determine whether lands should be sold or retained.

Disadvantages would include the possibility that large landowners or people with financial support would purchase the land and establish corporate style farms--some with absentee ownership.

b. Land Exchanges. The impacts resulting from this alternative could be minimal, or significant, or similar to those discussed in Section IV.A., depending on how the land is used after the exchange is completed. The lands would be exchanged on equal value either with the State of Idaho or with private owners.

Some of the advantages for state exchanges would enable the state to fully control its own irrigation development and at the same time dispose of lands not suited for state management. Land exchanges would also help the BLM in blocking up its management units, allowing for better management of NRL.

Disadvantages of land exchanges involve appraisal of selected and offered land which frequently have been costly, time consuming and controversial.

c. The Reclamation Act (Bureau of Reclamation). The impacts resulting from this alternative would be similar to those discussed in Alternatives 1 and 2 of this section, depending on the size of the area to be converted from desert land to farmland. The actual occupancy and development of the land would be done by individual settlers under the Reclamation Homesteads of not more than 160 acres. The BR would be the administering agency.

This act would avoid jeopardizing full-scale development and permit multiple purpose rather than single purpose developments. Provision for long-term repayment under this option would also better promote true family farms. Extremely high initial development costs under group DLE projects precludes the participation of individuals with only average financial means.

Development under the Reclamation Act would result in more comprehensive area-wide layout and a more coordinated use of existing land and water resources.

One of the disadvantages might be that total withdrawal would delay development for possibly 10-12 years and invite intense pressure from private owners.

d. State Lieu (Indemnity) Selections. The impacts resulting from this alternative could be minimal or significant--like those discussed in Section IV.A., or Alternatives 1 and 2 once title passed from the United States to the State of Idaho. Idaho has base lands of about 38,000 acres entitling it to select an equal acreage of unreserved NRL, subject to BLM approval of the tracts selected.

Some advantages would include immediate disposal of NRL with little or no money and manpower expenditures by the BLM. The state could sell land for irrigation development or other purposes or develop its own irrigation projects. Some disadvantages would include the question of acceptability to local residents, and the fact that it would solve only part of the problem (1½ years development at the current rate of 20,000 acres per year).

4. Alternative #4. Under this alternative no agricultural development of NRL would be permitted. This could be on a permanent or temporary basis. No adverse impacts to the nonhuman components of the existing environment would occur. Actually some beneficial impacts would accrue since those actions associated with agricultural development that cause adverse impacts would not take place. Another result that might be considered beneficial is that idle farmland now in private ownership might go into production.

If no further NRL were made available for conversion to irrigated agriculture, a number of economic and social impacts would develop. New agricultural ventures would be confined to lands currently in private ownership. Studies by the IWRB indicate only about 20% of the potentially irrigable lands in Idaho are now in private ownership. New agricultural development would be limited to significantly smaller acreages, and therefore foster less new employment and income in the region. Table 39 (Chapter IV) illustrates employment effects of minimal new agricultural developments. A no-action alternative would be expected to produce considerably less new employment in the agricultural sector.

No action would tend to slow local growth and development. This has both positive and negative benefits. Limited supplies of new agricultural products might contribute to higher consumer prices, but would lend stability to prices received by producers. There would be little or no reduction of spring grazing in the livestock industry. Slower growth of smaller communities would also influence slower growth in regional centers. The impact of relatively slow growth is subjective and can be viewed as either beneficial or adverse. Relatively fewer new jobs would tend to slow Idaho's immmigration. Social well-being would probably be indirectly increased in the larger communities but would be stable or only slowly improving in the small, rural communities. Possible adverse impacts of continued diversion of water from the Snake River would be greatly reduced.

5. Alternative #5. This alternative would temporarily suspend filing of new desert land or CA applications until the State Water Plan and BLM land use plans are completed. Applications on hand would be processed as expediently as possible. About 450,000 acres of land are now applied for.

The environmental impacts of this alternative are essentially the same as the proposed action. Since there is evidence to indicate there may not be enough water available to irrigate the acres of land now under application, this alternative would be useful in preventing additional conflicting applications. It would also prevent the backlog of desert land and CA applications from increasing.

VI. PERSONS, GROUPS AND GOVERNMENT AGENCIES CONSULTED

A. Persons, Groups, and Government Agencies That Submitted Comments. Public meeting workshops to discuss the proposed regional EAR for the agricultural development program on the lower Snake River were held in Boise, Mountain Home, Glenns Ferry, and Twin Falls prior to writing the report. All persons who submitted any comments, either through these workshops or individual responses to our inquiry sheet, (see Appendix IX) are listed as follows:

1. Individuals

Name	Representing
Robert Henggeler	Self
Raymond Russell	Self
Alan Claiborne	Self
Bruce Bowler	Self
Verde Anderson	Self
Glen Depew	Self
Richard Stimpson	Entryman
Mac Martin	Anderson-Martin Farms
James Nefziger	Anderson-Nefziger
Lyle Munns	Entryman
James Hamilton	Entryman
George Ascuena	Self
M. A. Robinson	Entryman
M. J. Seamons	Entryman
Roy French	Entryman
Jack Streeter	Economic
Wesley Hooley	Entryman
Tony Jolley	Entryman
Mr. & Mrs. Seth Neibaur	Entryman
Eugene Ascuena	Rancher
Randy Jackson	Rancher
Dean Durfee	Rancher
Amos Shenk	Rancher
Lee Trail	Rancher
Robert F. Adolf	Rancher
Roger L. Williams	Self
John D. Courtney	Farming
Don Adolf	Rancher
Dale Shelby	Rancher
Don Carnahan	Rancher (Southside Grazing Assoc.)
Doran Butler	Rancher
Ray Blair	Rancher
Harold C. Anderson	Land Entry
Lloyd J. Montgomery	Land Entry
D. Boyd Chugg	Land Entry

Name	Representing
Bill Pruett	Rancher
Charles C. Kast	Rancher
Forrest P. Hymas	Land Entry
Orral Hymas	Land Entry
Gordon L. Enders	Self
A. D. Walker	Self
Joe Lamb	Self
Maria Thompson	Self
Charles R. Hisaw	Self
Thomas E. Griswald	Self
Jerome J. Devers	Self
Erwin Kassert	Self
Geraldine Kassert	Self
Con O'Keeffe	Self
E. W. Wilson	Self
William L. Harding	Self
Ron Pierce	Self
A. G. Leming	Self
Albert Sword	Self
Joan Bean	Self
Donald F. Bean	Self
Don Wavra	Self
Dallis Brown	Self
Vivian Carte	Self
Wayne B. Carte	Self
Marshall Everheart	Recreation
Ingrid Strope	Self
Joe Leguineche	Farming
Margaret E. Sliger	Entryperson
Ardith Wheeler	Entryperson
G. R. Munsee	Farmer
John K. Courtney	Entryman
Ted Quigley	Farming
Dean Kohntopp	Farming
Don A. Neibaur	Entryman
Phyllis Harris	Farming
Merlin Harris	Farming
John P. Carter	Farming
Don C. Wright	Farming
Judith A. Smith	Farming
George W. Anthony	Farming
Henri LeMoyne	Economic
Lawrence May	Farming
Jerry Boyd	Farming
Milkeal K. Miller	Farming
Vernon Ravenscroft	Economic
Courtney Hohnhorst	Farming
Kenneth W. Marshall	Farming
Jimmy D. Blair	Rancher
Gary L. Enders	Self

Name	Representing
J. P. Wilson	Economic
Leonard Peters	Ranching
Lester Schnitker	Ranching
Norman Schnitker	Ranching
Tom Callen	Ranching
Fred A. Gilbert	Ranching

2. Groups

Name	Representing
Mike Sweatt	Golden Eagle Audubon Society
William R. Meiners	Ada County Fish & Game League
Franklin Jones	Idaho Wildlife Federation
Paul Jaurequi	Idaho Power Company
Ira Neibaur	Oregon Trail
Cleo Neibaur	Oregon Trail
Mark Hamilton	West Indian Cove Irrigation Company
Norman Myers	DLE Entries
Oscar Field	Idaho Farm Bureau
Bill Brown	Idaho Farm Bureau
Ted Diehl	Northside Canal Company
Dale Depew	Northside Canal Company
Warren Hart	Northside Canal Company
David Pierce	Basin Mutual Canal Company
Dale Hooley	West Indian Cove Water Company
W. F. Ringert	Grindstone
Carl Eshelman	National Farm Organization
E. Eshelman	National Farm Organization
Board of Supervisors	Bruneau River Soil Conservation Service
Janet Ward	American Assoc. of University Women
Dick Marker	Gem State 4-Wheel Drive Association
Jim Johnson	Gem State 4-Wheel Drive Association
Damon Rust	Idaho Motorcycle Association
Steven Hamilton	Idaho Motorcycle Association
Sigert Johnson	West Indian Cove Irrigation District
R. J. O'Connor	Idaho Power Company
Mark Hamilton	West Indian Cove Water Company
(no name)	Mesa Del Rio Project
Mike Shenk	West Indian Cove Water Company
Sam Hamilton	West Indian Cove Water Company
Gene Davis	BLM District Advisory Board
Lloyd J. Walker	Mountain View Irrigation District
Louis A. Logosz	Gooding Sheep Association
Al Bauscher	Advisory Board
Raymond F. Ruffing	Mountain View Irrigation Company
John Ahrendson	Mountain View Irrigation Company

Name	Representing
Richard S. Gregory	Handy Realty Company
D. Brent Marten	Mountain View Irrigation Company
Lester Sliman	Gooding Sheep Association
Fred A. Christensen	Nampa Rod & Gun Club
Edward E. Parsons	Southwestern Idaho Development Assoc.

3. Agencies

a. County

Name	Representing
Milford D. Jones	Jerome County Commissioner
Dean Weatherwax	North Side Soil Conservation
John C. Van Orman	Jerome County Commissioner
Glenn Nelson	Twin Falls County Zoning Commission
John W. Shrum	Elmore County Commissioner
Bill Walker	Glenns Ferry Highway District
Daniel E. Irons	Glenns Ferry Highway District
Robert Fox	Central District Health Department
John R. LeMoyne	Gooding County Commissioner
Josephine Hillis	Minidoka County Commissioner
John Peavy	State Senator
Ralph Olmstead	State Representative

b. State

Name	Representing
Allan D. Linder	Idaho State University
R. Keith Higginson	Department of Water Resources
Earl H. Swanson	Idaho State University - Museum
B. Robert Butler	Idaho State University - Archaeology
Herbert Edwards	University of Idaho Extension
Norman Young	Department of Water Resources
Paul Hanne	Idaho Fish and Game
Jim Keating	Idaho Fish and Game
Steve Allred	Department of Water Resources
Max Pavesic	Boise State University - Archaeology
George Wagner	Department of Health and Welfare
Dale Turnipseed	Idaho Fish and Game
Dave Taliaferro	Parks and Recreation Department
Dave Jenkins	O.P.M.
Jerome E. Jankowski	Department of Health and Welfare

c. Federal

Name	Representing
Eugene Crisman	Soil Conservation Service
Eldon Edmundson	Environmental Protection Agency
R. J. Fisher	Fish and Wildlife Service

B. Groups and Government Agencies That Did Not Respond to Inquiry Sheet. The following groups were mailed the inquiry sheet, agenda, and map concerning public input into the regional EAR for the DLE development program on the lower Snake River and asked for comments or suggestions (see Appendix IX). These groups failed to submit any information into this study in either letters or comments at the various meetings.

1. Groups

Isaak Walton League
Idaho Historical Society
High Country News
Idaho Archaeological Society
Jerome Rod & Gun Club
Southern Idaho Fish and Game Association
Twin Falls Fish and Wildlife Club
Big Wood Canal Company
League of Woman Voters
Idaho Federation of Women's Clubs
Hagerman Grazing Association
Idaho Conservation League
Idaho Cattlemen's Association
Idaho Chamber of Commerce
Idaho Mining Association
Idaho Water User's Association
Snake River Land Use Congress
Twin Falls Canal Company
Starlake West Grazing Association
Milner Cattle Association
Notch Butte Cattle Association
Wendell Cattlemen's Association
Clover Creek Livestock Association
Dietrich Butte Grazing Association
Crater Butte Grazing Association

2. Local Government and Agencies

a. City. Mayors of all surrounding communities.

b. County

Ada Council of Government
Twin Falls County Highway District
Mountain Home Highway District
Elmore County Planning Commission
Owyhee County Commissioners
Owyhee County Planning Commission
Elmore County Agent
Owyhee County Agent
Twin Falls County Agent
Lincoln County Commissioners
Gooding County Planning and Zoning Commission
Jerome County Planning and Zoning Commission
Lincoln County Planning and Zoning Commission
Minidoka County Planning and Zoning Commission
Magic Valley Association of Government
Gooding County Agent
Jerome County Agent
Lincoln County Agent
Dietrich Highway District
Wendell Highway District
Kimama Highway District
Jerome Highway District
Hillsdale Highway District
Good Roads Highway District
Wood River Soil Conservation District

c. State

State Highway Department
Idaho Department of Commerce
Idaho Department of Water Administration
Idaho Environmental Council
Idaho State Department of Lands
Idaho Planning and Community Affairs
Idaho Department of Environmental and Community Services
Range Department, University of Idaho
Department of Biology, University of Idaho

d. Federal

Bureau of Reclamation
Mountain Home Air Force Base

VII. INTENSITY OF PUBLIC INTEREST

A. General. Public input was gathered from individual correspondence; and 4 public meeting workshops were held in Boise, Mountain Home, Glenns Ferry and Twin Falls prior to writing the EAR. Thirty-seven people attended the Boise workshop, 18 attended the Mountain Home, 29 in Glenns Ferry, and 63 attended the Twin Falls workshop. There were also 35 individual inputs representing 104 people. The purpose of the public input was to obtain public comments on planning direction and mitigating measures they felt were of concern.

Public interest consisted primarily of persons and groups involved in agriculture; local, county, state, and federal agencies; economic interests, such as commercial land developers and industry; and noneconomic interest groups, such as wilderness, historical, wildlife or ORV organizations.

Together in both individual inputs and group sessions, agricultural interests represented 163 people. There were 32 agency people, 14 people with economic interests, and noneconomic interests were represented by 42 people.

A majority of the people favor an increase in or unlimited development of converting rangeland to agricultural land. A large part of this group has agricultural interests. It was their feeling that the market and the availability of capital, water, and power should determine the amount of land converted to farmland. The people and organizations favoring only limited development are mainly noneconomic interest groups. Most of this group indicated that public lands should be retained for public use.

Although most people contacted favor an acceleration of DLE processing, they indicated it should be done in an orderly fashion. They suggested that this could be accomplished by coordination with the state planning agency or by making large blocks of land open to application.

Family farm development was favored by a majority of the people. Many of the people contacted felt that every family should get only so much land, no matter how large or small the family.

The problem of erosion was a major concern to a high percentage of the people. A majority favored amending the DLA to require practices to reduce soil erosion. Most mentioned sound agricultural practices as the solution to erosion, while some said cooperation with the SCS and Extension Service would help. Others mentioned concerns for land use planning and pollution, including chemical pollution of land and streams.

The public was evenly divided on the question of replacement of livestock forage and wildlife habitat eliminated by the establishment of DLE's. A majority of agricultural interest people opposing mitigation stated that islands of cover are enhanced for wildlife as more surrounding land comes under cultivation and areas unsuited for agriculture may be used for wildlife habitat. Those that favored mitigation, and who also had agricultural interests, also favored the ranchers, entrymen and Congress financing the mitigation of habitat and forage for livestock and wildlife.

B. Additional Public Concern. The study area is in the Snake River Plains adjacent to the Snake River. The area is highly productive due to the deep rich soil, favorable climate and abundance of water. For these and other reasons this portion of southern Idaho was settled early and has the majority of Idaho's people today. Since many people live in the area and it is vital to Idaho's economy, any proposal or planning is subjected to a great deal of scrutiny.

Today there are many controversial proposals and projects and many questions that the people of Idaho feel need to be answered. Several publicly debated topics today are:

1. Idaho Power Company Pioneer Coal-Fired Generating Plant. Company officials and other supporters emphasize the need for future power sources in Idaho, while opponents question the possible air pollutants and site location. Three alternate sites have been selected and they are located in the study area.

2. Additional Agricultural Development in Southern Idaho. Developers contend the resources are available and it will boost the economy of the area while opponents question the degree of adverse impacts on the environment.

3. New Land Use Planning Bills. A land use bill (Senate Bill 1094, Second Half of 43rd Session of Legislature) passed the Idaho Legislature but met with strong opposition from various segments of the public.

4. Other Controversial Proposals. Other controversial proposals in the study area that concern the public are:

a. Status of Bruneau and Jarbridge River System for selection as a wild and scenic river;

b. Possible encroachment upon the Snake River Birds of Prey Natural Area and adjacent lands used for feeding grounds by raptors, including the endangered Peregrine falcon;

c. The State of Idaho lawsuit against the Department of the Interior for interpreting the statute to limit a husband and wife to 160 acres of land under the CA;

d. IDWR study into water availability for southern Idaho and minimum streamflows for the Snake River;

e. Increased use of public land for recreation, including sightseers and ORV organizations;

f. Status of the wild horses in southwestern Idaho, and the protection of these animals;

g. Potential geothermal sites in the area and their impact on the environment;

h. The Regional Airport Proposal for the vicinity of Twin Falls. This proposal is situated in the study area and is located north of Twin Falls, Idaho at the junction of I-80 and U.S. Highway 93. It is our understanding that it is still a viable proposal, but the time frame and public concern for this project is not known at this time; and

i. Increased possibility of some plant and animal species becoming endangered.

These are some of the more prominent controversies in the area that may be considered of major importance. Generally the people of southern Idaho are concerned about this area and will want to review and provide their input for any proposal in the Snake River Plains.

VIII. PARTICIPATING STAFF

The following staff personnel composed the team and participated in the draft of this EAR.

Name	Position Title	Area of Expertise
Frank Pallo	Lands Specialist	Team Leader
Howard Hedrick	Range Technician	Coordinator
Richard Lingenfelter	Environmental Specialist	Writer/Editor
Lanny Wilson	Wildlife Management Biologist	Wildlife
Vernon Webb	Soil Scientist	Geology, Soils, Air
Richard Geier	Outdoor Recreation Planner	Human Interest
Jens Jensen	Range Conservationist	Range
Don Watson	Regional Planner	Socio-Economist
Robert Borovicka	Fishery Biologist	Fisheries/Water
Lowell Dahl	Chief, Engineering Staff	Hydrologic Cycle/ Energy
Deane Zeller	Environmentalist	Ecological Inter-relationships
Rich Harrison	Archeologist	Archeology
Fred Cook	Chief, Public Affairs	Public Participation Plan
Max Macfarlane	Range Conservationist	Range
Richard Huff	Chief, Planning Staff	Planning/Energy
Robert J. Coffman	BLM Study Team Representative, CCJP	Water Uses

IX. SUMMARY OF FINDINGS

The purposes of this EAR are to identify individual and cumulative impacts, assess public controversy, assist in evaluating the need for EIS, and provide guidance for developing a management program for agricultural development on NRL in the study area.

Based on current information, this analysis indicates that agricultural development has both beneficial and adverse impacts. The degree and extent of these impacts generally vary with location, although some impacts are nearly constant. For example, in the latter case, production of agricultural commodities is usually seen as a favorable addition to an area's economic status. New job opportunities, additional sales in farm-related goods, services and machinery, and broadened tax bases usually accompany expanded agricultural development. The rural (or agriculture-oriented) life style is realized for some individuals. There are also adverse impacts that are common to agricultural development--increased energy consumption, disruption of natural ecosystems in general, periodic water and air quality deterioration, increased soil erosion, and decreased availability of water for other uses. In addition, agricultural development can have localized adverse impacts on livestock grazing, wildlife, recreation, natural areas, historical and archeological values, and other land uses.

Upon analyzing impacts anticipated from future agricultural development, two principal impact levels can be identified. These have been categorized as low-conflict areas and high-conflict areas. The two areas, displayed in relation to suitable Class I and II soils, are shown in Figure 30.

A. Low-Conflict Areas. These are areas within which future agricultural development apparently will not have significant adverse impacts. The rationale for this finding is:

1. Soils are suitable (Class I and II) and capable of continued agricultural production. These are the best soils in the study area, having good drainage features, water holding capacity, fertility and minimal slopes.

2. For the most part, these areas are already partially developed. New development would be intermittently contiguous to or intermingled with existing development and would be a compatible land use.

3. Many of the actions associated with agricultural development have already occurred in the area. These actions are:

a. Pumping stations and penstocks

b. Pipelines

c. Main canals

POTENTIALLY IRRIGABLE LAND AND EXTENT OF APPARENT CONFLICTS

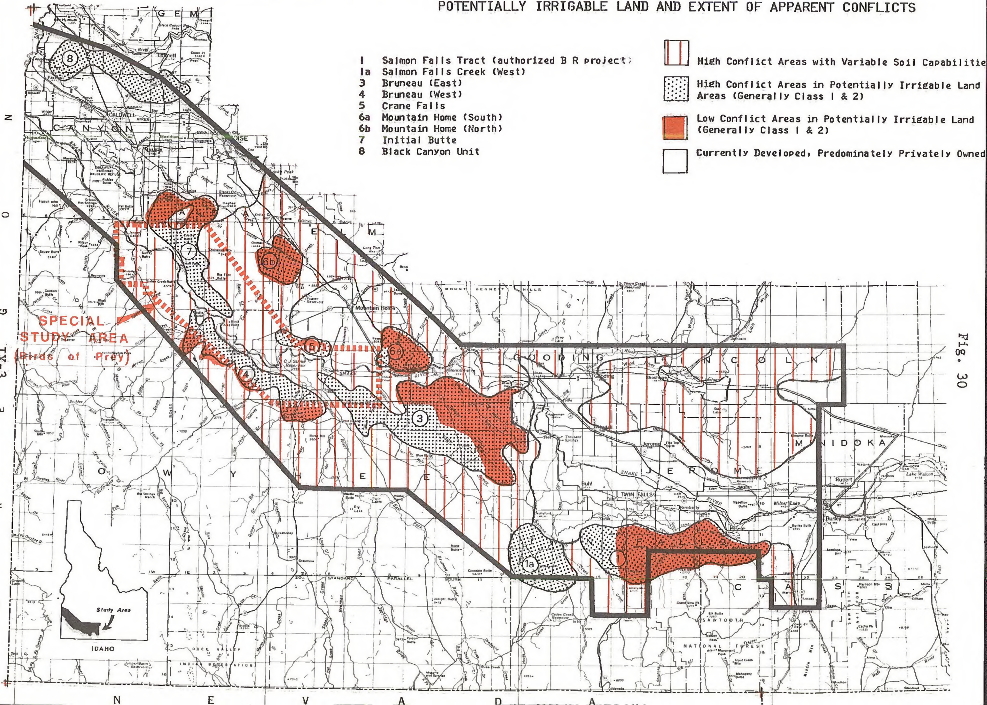

Fig. 30

d. Powerlines and substations

e. Buildings, roads, and other such facilities.

4. Since many of these actions have already taken place, associated adverse impacts have also occurred. The most common environmental impacts associated with these past actions are:

a. Loss of aquatic habitat from stream-side disturbance.

b. Disruption of natural and scenic vistas and/or loss of seclusion or isolation.

c. Interference with nesting, rearing, breeding, etc., of some wildlife species and loss of critical habitats and food sources.

d. Loss of certain wildlife populations or portions of populations, such as sage grouse, ground nesting birds and small mammals.

e. Loss of range forage utilized by domestic livestock.

f. Loss of unidentified rare and endangered plants.

5. The natural ecosystem is substantially altered.

6. Energy and water can be used more efficiently in these areas because many necessary facilities (roads, powerlines, pipelines, canals, etc.) already exist and can be used for future expansion. Soils and topography are also best suited to efficient use of these two resources which may soon become critically limiting factors.

7. As this analysis indicates, low-conflict areas do not contain any known natural, historical, cultural, or archeological resources that cannot be protected by applying mitigating measures.

8. Special uses, i.e. as a feeding area for birds of prey, are not considered to be significant.

B. <u>High-Conflict Areas</u>. Based on this analysis, agricultural development within these areas may result in significant adverse impacts. The rationale for this finding is:

1. The impact of agricultural development near the birds of prey nesting area (Snake River Birds of Prey Natural Area) is presently unknown. Ongoing research is designed to better identify the food needs of the birds of prey and will provide a basis for modifying the present birds of prey study area.

2. The major portion of these areas contain less suitable soils although some Class I and II soils are found within these areas.

3. The natural ecosystem is relatively undisturbed.

4. Development of less suitable soils within these areas would require greater amounts of energy and water per unit of crop produced in comparison to better soils.

5. These areas contain natural, historical, cultural, and archeological resources. Several wildlife species, such as sage grouse, antelope, deer, Western ground snake, and wild horses, depend upon habitats subject to future development. Such development could have highly adverse impacts on these resources.

Based on the rationale shown above, it is apparent that cumulative impacts could be much higher in the high-conflict areas than the low-conflict areas. Information and data are not available to quantify this difference. The amount of water that will be available for agricultural development together with impacts from developing additional energy sources are major unknowns at this time. Additional inventories and studies are needed to fully identify impacts on wildlife, water and air quality, and other values.

X. CONCURRENCE STATEMENT

Preliminary Draft

Agricultural Development Program - Environmental Analysis Record

The Environmental Analysis Record for the agricultural development program has been reviewed by the undersigned. It is technically adequate and all resource values have been considered to the best of our knowledge.

Environmental Coordinator	Aug. 6, 1975 Date
Team Leader	August 5, 1975 Date
State Director	AUG - 6 1975 Date

CAREY ACT PROJECTS IN IDAHO

APPENDIX I

Project		Acres Segregated	Acres Patented	Est. Cost $	Final Cost $	Remarks
American Falls	(1895)	57,241.90	50,498.16	251,986.75	886,301.00	Initial estimate low. Successful project.
Big Lost River	(1906)	83,648.75	15,526.11	2,100,000.00	3,500,000.00	Financial problems.
Birch Creek (TW) #32	(1909)	18,605.28		550,000.00	30,000.00	Project never sanctioned. Lack of water.
Birch Creek (TW) #27	(1916)	19,107.36		450,000.00	?	Ditto. Should have been listed as one project.
Black Canyon		23,836.61		7,134,638.05		Never completed. Unfeasible water source.
Blackfoot Northside T. R. Jones (same as above)	(1910)	22,360.34		950,000.00	40,000.00	Unable to secure sufficient water supply
Blaine County	(1907)	14,714.16	6,366.36		300,000.00	Water, financing, land relinquishment problems.
Boise Project	(1909)	229,901.87		20,000,000.00		Never started. Water source problems.
Bowler's Project	(1914)					Never started.
Little Bruneau	(1908)	80,000.00		26,500,000.00	30,000.00	Never finished. Withdrawn land Bruneau River prevented.
Big Bruneau 1st	(1908)	527,040.87		22,000,000.00	40,000.00	Never finished. Lack sufficient water to reclaim land.
Big Bruneau 2nd	(1919)	554,258.19		65,000,000.00		Segregations never approved. Bur. Rec. land withdrawal.
Camas						Never got beyond preliminary planning (pump. grnd. wtr.)
Canyon Canal	(1898)	5,829.02	5,829.02	300,000.00	1,100,000.00	Underestimated cost of tunnels.
Central Idaho		14,491.67			940,000.00	Unsuccessful due to lack water and financing.
Crane Falls				788,275.00		Never approved. (Little Bruneau) in favor Grandview Proj.
Deep Creek	(1906)					Never officially Carey Act proj. 3,200 ac. pat. & recl. Water rights & not enuf water. Taken over by TF/SR proj.
Dubois	(1909)	267,601.77		7,500,000.00		Never started. Lack financing, no water rights.
Elmore Irrig.		6,249.83				Same as Mt. Home.
Grand Canyon						Never started.

Project		Acres Segregated	Acres Patented	Est. Cost $	Final Cost $	Remarks
Grandview L & IC	(1920)	840.00	40.00	150,000.00	45,000.00	Part of Little Bruneau. Lack of funds.
Grasmere (TW)	(1909)	53,206.06		1,250,000.00	·10,000.00	Never segregated. Govt. withdrew central lands for PS purposes.
C. V. Hansen		3,456.96		75,000.00	26,000.00	Never started. Inadequate water.
Hegsted & Mason	(1909)	3,490.00		100,900.00		Const. never started. Non-economic plan.
Highline Pumping		4,078.08	3,029.67	120,000.00	120,000.00	Ext. TF S.Side.
Huston Ditch Co.	(1908)	1,884.46		50,000.00	?	Outstanding stock, financial problems.
Idagon Irrig. Co. Ltd.		8,664.53		590,000.00	75,000.00	No water diverted or acreage sold. Inadequate finances.
Idaho Irrig.	(1906)	167,757.41	107,393.95	4,000,000.00	4,000,000.00	Lack of water. Presently 98M ac. + 800 farm units in project.
Keating Carey Land Co.	(1910)	15,226.71	3,683.50	250,000.00	49,500.00	Insufficient water. Exceeded est. cost.
King Hill King Hill Ext.	(1903)	17,666.22 9,454.51	13,702.71	600,000.00 465,000.00	2,982,332.00	Taken over by Fed. Govt. Financing problems. Project still alive.
Lemhi	(1910)	10,480.32		150,000.00		Never started. Inadequate water supply.
Little Lost River	(1909)	8,000.00		320,000.00	10,000.00	Abandoned - water supply.
Lost River. Rec.						Proposal stage only. Planned artisian water supply.
Marysville Canal	(1898)	6,572.50	5,852.50	127,000.00	250,000.00	Bankruptcy - inadequate water supply.
Milner South Side		3,686.14		22,500.00	2,000.00	Inactive.
Mountain Home	(1910)	6,249.83				Segregation never allowed - inadequate water supply.
Owsley 1st	(1909)	14,834.63	12,825.72	150,000.00	50,000.00	Relatively successful.
Owsley 2nd	(1914)	14,491.67	14,091.67			Lack of water. Continuous supply could not be guaranteed. Financial problems.
Owyhee	(1908)	3,295.92	160.00	65,000.00	58,000.00	Inadequate water supply.

Project		Acres Segregated	Acres Patented	Est. Cost $	Final Cost $	Remarks
Owyhee Land & Irrig. Co.		29,323.05		1,000,000.00	10,000.00	Project never started.
Pahsimeroi						No records available - water supply.
Lower Pahsimeroi		7,143.02		200,000.00		Project unfeasible - water supply.
Upper Pahsimeroi		40,305.90		400,000.00		Project never started.
I. B. Perrine (TW)	(1932)	601,000.00			50,000.00	Extension Bruneau projects (last Carey Act in Idaho).
Portneuf-Marsh Valley	(1908)	11,913.96	11,354.13	275,000.00	500,000.00	Successful project - financial problems.
Pratt	(1907)	4,674.02	3,948.68	60,000.00	135,000.00	Successful project - some problmes water priority.
Sailor Creek	(1911)	2,987.83				Never started.
Snake River Irrig.	(1908)	8,066.52	1,283.40	467,500.00	325,000.00	Lack of water - contracts with prior DLE settlers - financial problems.
Edwin Snow		2,503.07				Never started.
S. W. Idaho						Never started.
T. A. Starrh		46,321.48				Never started - water supply.
C. A. Sunderlin (TW)	(1912)	14,767.68				Never started - water supply inadequate (Boise Rv.) - economically unfeasible.
Sunnyside						Never started.
Tabor		21,760.00				Never started - ground water pumping.
Thousand Springs	(1909)	6,371.77		90,000.00	100,000.00	Water unavailable - previous settlers would not relinquish water rights.
Twin Falls L & W Co.	(1907)	17,888.36		600,000.00		Unsuccessful - ? financial problems

CAREY ACT PROJECTS IN IDAHO (CONTINUED)

Project		Acres Segregated	Acres Patented	Est. Cost $	Final Cost $	Remarks
Twin Falls North Side		261,945.87	178,062.17	3,000,000.00	6,300,000.00	Project finished.
Twin Falls Oakley		43,893.56	10,990.10	1,500,000.00	1,577,126.12	Overestimation of water necessitated reduction in acreage.
Twin Falls Salmon River		127,707.29	32,968.43	3,000,000.00	3,600,000.00	Reduction in segregation to match available water.
Twin Falls South Side	(1900)	244,025.98	192,750.66	1,500,000.00	3,600,000.00	Most successful (4 projects)
(Mullins	(1899)	6,543.26		100,000.00		
Kuhn	(1907)	30,000.00 125,979.29 43,573.56				Preliminary to Twin Falls North Side Project. TF on Salmon Falls Creek. Twin Falls Oakley
Twin Falls-Raft River	(1911)	20,268.05				Never started - tied in w/RR never built.
Twin Falls-Shoshone						Preliminary stage only.
Van Meter & Neison (TW)		18,196.83				No action.
Warm Springs						Abandoned.
West End Twin Falls	(1907)	46,016.27	7,934.43	760,000.00	760,000.00	Unsuccessful - lack funds and water.
Wichahoney L & W Co.	(1915)	30,000.00		750,000.00		Attempted revival of Little Bruneau Project - underestimate of cost of project.

Water Quality Standards

The present water quality standards for Idaho, as given below, are listed in the rules and regulations for standards of water quality for the interstate waters of Idaho and disposal areas for sewage and industrial waste. Regulations were adopted by the Board of Health of the State of Idaho on June 26, 1967. The water quality standards are subject to revision (following public hearings and concurrence of the U. S. Secretary of Interior in the case of interstate streams) as technical data, surveillance programs, and technological advances make such revisions desirable.

The following general water quality standards shall apply to all interstate waters of the state in addition to the water quality standards set forth herein for the various specified and unspecified interstate waters of the state. Interstate waters shall not contain:

1. Toxic or other deleterious substances (pesticides, phenolics and related organic and inorganic materials) - Toxic chemicals of other than natural origin in concentrations found to be of public health significance or adversely affect the use indicated; deleterious substances of other than natural origin in concentrations that cause tainting of edible species or tests and odors to be imparted to drinking water supplies.

2. Radioactive materials of other than natural origin shall not be present in any amount which reflects failure in any case to apply all controls which are physically and economically feasible. In no case shall such materials exceed the limits established in the 1962 U. S. Public Health Service Drinking Water Standards.

3. Esthetic considerations (water offensive to the senses of sight, taste, smell or touch) - Floating or submerged matter not attributable to natural causes; excess nutrients of other than natural origin that cause visible slime growths; visible concentrations of oil, sludge deposits, scum, foam or other wastes that may adversely affect the use indicated; objectionable turbidity which can be traced to a point.

In and relating to our area these standards are for the main stem of the Snake River from the Wyoming border (river mile 918) to the Oregon border (river mile 407); the North Fork of the Teton River; Henry's Fork from its junction with Falls River to the Snake River; Raft River; Goose Creek; Salmon Falls Creek; Jarbridge River; and the Bruneau River. No waste shall be discharged and no activities shall be conducted which either alone or in combination with other wastes or activities will cause in these waters:

a. Organisms of the coliform group where associated with fecal sources (MPN, equivalent MF or appropriate test using a representative number of samples). Average concentration of coliform bacteria to exceed 1,000 per 100 milliliters, with 20% of samples not to exceed 2,400 per 100 milliliters.

b. Dissolved oxygen (DO) - DO to be less than 75% of saturation in spawning areas during spawning, hatching and fry stages of salmonoid fishes.

Exception: 5 parts per million at Milner Dam based on a minimum stream flow of 600 cfs at this point.

c. Hydrogen ion concentration (pH) - pH values to be outside the range of 7.0 to 9.0. Induced variation not be more than 0.5 pH unit.

d. Temperature - Any measurable increase when temperatures are 68° F. or above, or more than 2° F. increase when stream temperatures are 66° F. or less.

PLANT LIST IN DLE AREA

ACERACEAE (Maple Family)

Acer glabrum var. *douglasii*	mountain maple

AMARANTHACEAE (Amaranth Family)

Amaranthus californicus	amaranth - red root, pig weed
A. graezicans	" " " "
A. powellii	Powell's amaranth

ANACARDIACEAE (Sumac Family)

Rhus radicans	poison ivy
R. trilobata	squawbush

APIACEAE (Carrot Family)

Cicuta douglasii	water hemlock
Conium maculatum	poison hemlock
Cymopterus acaulis	cymopterus
C. terebinthus	"
Heracleum lanatum	cow parsnip
Lomatium grayi	Gray's desert parsley
L. hendersonii	Henderson's desert parsley
L. triternatum ssp. *platycarpum*	whisk-broom parsley
Orogenia linearifolia	salt-and-pepper
Osmorhiza chilensis	sweet cicely
O. occidentalis	"

Perideridia bolanderi	yampah
P. gairdneri	"
P. parishii	"

APOCYNACEAE (Dogbane Family)

Apocynum androsaemifolium	dogbane

ADCLEPIADACEAE (Milkweed Family)

Asclepias cryptoceras	Davis' milkweed
A. fascicularis	thin-leaved milkweed
A. speciosa	common milkweed

ASTERACEAE (Composite Family)

Anthemideae Tribe

Achillea millefolium ssp. *lanulosa*	yarrow
Anthemis arvensis	dogfennel
Artemisia arbuscula var. *arbuscula* & *nova*	low sagebrush
A. biennis	biennial sagebrush
A. ludoviciana var. *ludoviciana*	silver sagebrush
A. spinescens	budsage
A. tridentata var. *tridentata*	basin big sagebrush
A. tridentata var. *vaseyana*	mountain big sagebrush
A. tridentata var. *wyomingensis*	Wyoming big sagebrush
A. tripartita	three tip sagebrush

Astereae Tribe

Aster canescens	aster

A. chilensis ssp. adscendens	aster
A. eatonii	Eaton's aster
A. leiodes	low aster
A. occidentalis	western aster
A. scopulorum	aster
Chrysothamus nauseosus var. artus	rabbitbrush
C. viscidiflorus var. humilus	"
C. viscidiflorus var. lanceolata	lanceleaf rabbitbrush
Conyza canadensis	horseweed
Erigeron bloomeri	rayless daisy
E. chrysopdidis ssp. austiniae	" "
E. linearis	yellow fleabane
E. pumilis	fleabane
E. speciosus var. macranthus	tall fleabane
Grindelia squarrosa var. quasiperrinis	gumweed
Haplopappus acaulis	haplopappus
H. carthamoides var. cusickii	"
H. nanus	dwarf haplopappus
Solidago gigantea var. serotina	goldenrod
Townsendia florifer	desert daisy

Cichorieae Tribe

Agoseris grandiflora	mountain dandelion
Cichorium intybus	chicory
Crepis acuminata	hawksbeard
C. modocensis ssp. _modocensis_	Modoc's hawksbeard
C. occidentalis ssp. _pumila_	western hawksbeard
Hieracium albertinum	hawkweed
Lactuca pulchella	chicory lettuce
L. serriola	Chinese lettuce
Lygodesmia spinosa	skeletonweed
Microseris nutans	desert dandelion
M. troximoides	" "
Sonchus asper	prickly sowthistle
Stephanomeria tenuifolia	wirelettuce
Taraxacum officinale	dandelion
Tragopogon dubius	goatsbeard

Cynareae Tribe

Arctium minus	burdock
Cirsium arvense var. _horridum_	Canada thistle
C. canovirens	white-flowered thistle
C. foloisum	dwarf thistle
C. undulatum	wavyleaf thistle
C. vulgare	bull thistle

Eupatorieae Tribe

Brickellia microphylla	brickellia

Helenieae Tribe

Chaenactis douglasii	dusty maiden, false yarrow
C. macrantha	large-flowered chaenactis
Eatonella nivea	eatonella
Eriophyllum lanatum var. integrifolium	woolly yellowdaisy
Rigiopappus leptocladus	rigiopappus

Heliantheae Tribe

Balsamorhiza hirsuta	hairy balsamroot
B. hookeri	splitleaf balsamroot
B. sagittata	arrowleaf balsamroot
Bidens frondosa	beggarsticks
Blepharipappus scaber	tidytips
Helianthus annuus	sunflower
H. cusickii	Cusick's sunflower
H. nuttallii	Nuttall's sunflower
Iva axillaris	poverty weed
Layia glandulosa	white layia
Madia glomerata	tarweed
M. gracilis	"
Wyethia amplexicaulis	yellow mules ears
W. helianthoides	white mules ears
Xanthium strumarium	cocklebur

Inuleae Tribe

Antennaria dimorpha	dwarf antennaria
A. luzuloides	silver pussytoes
A. rosea	rose-everlasting
Gnaphalium palastre	cudweed

Senecioneae Tribe

Arnica cordifolia	heartleaf arnica
A. sororia	arnica
Dimersia howellii	dimersia
Senecio cymbalaroides	groundsel
S. foetidus	"
S. integerriumus var. exaltus	"
S. serra	"
S. sphaerocephalus	"
S. werneriaefolius	short senecio
Tetradymia canescens	horsebrush
T. glabrata	"
T. spinosa	cottonthorn

BERBERIDACEAE (Barberry Family)

Berberis aquifolium (repens)	Oregon grape

BETULACEAE (Birch Family)

Alnus tenuifolia (A. incana)	thinleaf alder

BORAGINACEAE (Forget-me-not Family)

Amsinckia tessellata	fiddleneck
Cryptantha circumscissa	cryptantha, popcorn flower
C. interrupta	" " "
C. propria	" " "
C. torreyana	" " "
C. watsonii	Watson's cryptantha
Hackelia floribunda	stickseed
Lappula redowskii	"
Lithospermum ruderale	gromwell
Mertensia ciliata var. *ciliata*	bluebells
M. longiflora	"
M. oblongifolia	"
M. viridis	"
Myosotis micrantha	forget-me-not
Plagiobothrys harknessii	plagiobothrys, popcorn flower
P. scouleri var. *penicillatus*	" " "

BRASSICACEAE (Mustard Family)

Arabis cusickii	Cusick's rock cress
A. holboellii	Holboell's arabis, rock cress
A. lyallii	arabis
A. microphylla	"
A. nuttallii	Nuttall's arabis
A. sparsiflora var. *subvillosa*	arabis

Barbarea orthoceras	wintercress
Brassica campestris	field mustard
B. nigra	black mustard
Camelina microcarpa	falseflax
Capsella bursa-pastoris	shepard's purse
Cardamine pennsylvanica	bittercress
Cardaria draba	whitetop
C. pubescens var. *elongata*	"
Caulanthus pilosus	wild cabbage
Chorispora tenella	chorispora
Conringia orientalis	hares-ear mustard
Descurainia pinnata	descurainia
D. richardsonii	"
D. sophia	tansy-mustard
Draba nemorosa	yellow whitlowgrass
D. verna	spring whitlowgrass
Erysimum inconspicuum	prairie-rocket
E. repandum	wallflower
Hutchinsia procumbens	hutchinsia
Lepidium perfoliatum	peppergrass
Phoenicaulis cheiranthoides	phoenicaulis
Rorippa curvisiliqua	rorippa
R. obtusa	"
Sisymbrium altissimum	tumblemustard

Stanleya confertifolia	prince's plume
Thlaspi arvensis	field pennycress

CAPPARIDACEAE (Caper Family)

Cleome platycarpa	yellow beeplant

CAPRIFOLIACEAE (Honeysuckle Family)

Sambucus cerulea	blue elderberry
S. racemosa var. *melanocarpa*	black elderberry
Symphoricarpos oreophilus var. *utahensis*	snowberry

CARYOPHYLLACEAE (Pink Family)

Arenaria aculeata	spiny sandwort
A. burkei	Burke's sandwort
A. congesta var. *congesta*	sandwort
A. franklinii	Franklin's sandwort
A. nuttallii	Nuttall's sandwort
A. pusilla	sandwort
Saponaria officinalis	bouncing Bet
Silene douglasii var. *douglasii*	Douglas' silene
S. oregana	Oregon silene
Spergularia marina	sandspurry
S. rubra	red sandspurry
Stellaria jamesiana	sticky starwort
S. longipes	starwort
Vaccaria segetalis	cowcockle

CELASTRACEAE (Staff-tree Family)

Glossopetalon nevadense var. stipuliferum	spiny greenbush

CHENOPODIACEAE (Goosefoot Family)

Atriplex confertifolia	shadscale
Bassia hyssopifolia	bassia
Chenopodium album	lambs quarters
C. fremontii var. atrovirens	Fremont's goosefoot
C. glaucum	little pigweed
C. hybridum	goosefoot
C. leptophyllum	narrow-leaf goosefoot
C. murale	pigweed
Eurotia lanata	winterfat
Grayia spinosa	hop-sage
Halogeton glomeratus	halogeton
Monolepis nuttalliana	monolepis
Salsola kali var. tenuifolia	Russian-thistle
Sarcobatus vermiculatus	greasewood
Suaeda fruticosa (=intermedia)	seablite

CONVOLVULACEAE (Morning Glory Family)

Convolvulus arvensis	bindweed

CORNACEAE (Dogwood Family)

Cornus stolonifera var. occidentalis	red-osier dogwood

CRASSULACEAE (Stonecrop Family)

Sedum stenopetalum var. stenopetalum	stonecrop

CUPRESSACEAE (Cypress Family)

Juniperus occidentalis	western juniper

CUSCUTACEAE (Dodder Family)

Cuscuta occidentalis	dodder

CYPERACEAE (Sedge Family)

Carex douglasii	Douglas' sedge
C. hoodii	Hood's sedge
Eleocharis acicularis	little spike-sedge
E. palustris	common spike-rush

ELANTINACEAE (Water Wort Family)

Bergia texana	bergia

EQUISETACEAE (Horsetail Family)

Equisetum aruense	horsetail
E. laevigatum	"

EUPHORIBIACEAE (Spurge Family)

Euphorbia glyptosperma	ground spurge

FABACEAE (Legume Family)

Astragalus adanus	milkvetch
A. filipes	"
A. lentiginosus var. *platyphyllidius* var. *salinus*	bladderpod
A. malacus	hairy milkvetch
A. purshii var. *ophiogenes*	woollypod
var. *purshii*	woollypod
A. obscurus	milkvetch
A. reventus var. *conjunctus*	locoweed

Lathyrus pauciflorus ssp. *pauciflorus* var. *utahensis*	wild sweetpea
Lotus purshianus	lotus
Lupinus argenteus var. *parviflorus*	silvery lupine
L. caudatus	lupine
L. laxiflorus var. *calcaratus*	"
var. *laxiflorus*	"
L. polyphyllus var. *burkei*	many-leaf lupine
Medicago lupulina	black medic
M. sativa	alfalfa
M. alba	white sweetclover
M. officinalis	yellow sweetclover
Robinia pseudo-acacia	black locust
Trifolium cyathiferum	cup clover
T. longipes var. *longipes*	longstalk clover
T. microcephalum	littlehead clover
T. pratense	red clover
T. repens	white clover
Vicia americana var. *truncata*	American vetch

GENTIANACEAE (Gentian Family)

Centaurium exaltum	centaury
C. muhlenbergii	"

GERANIACEAE (Geranium Family)

Erodium cicutarium	storksbill
Geranium bicknellii	Bicknell's geranium
G. viscosissimum var. nervosum	sticky-leaf geranium

GROSSULARIACEAE (Gooseberry Family)

Ribes aureum	golden currant
R. cereum var. cereum	squaw currant
R. viscosissimum var. viscosissimum	sticky currant

HALORAGIDACEAE (Water Milfoil Family)

Myriophyllum sp.	water milfoil

HYDROPHYLLACEAE (Waterleaf Family)

Hesperochiron pumilis	hesperochiron
Hydrophyllum capitatum var. alpinum	waterleaf
Nemophila parviflora var. austiniae	nemophila
Phacelia hastata var. alpina	scorpionweed
P. hastata var. leucophylla	"
P. heterophylla var. heterophylla	"
P. linearis	linear-leaf phacelia
P. lutea var. lutea	yellow phacelia
var. scopulina	yellow phacelia
P. minutissima	phacelia
P. ramosissima	phacelia

HYPERICACEAE (St. Johnswort Family)

Hypericum formosum var. *scouleri*	St. Johnswort goat weed

IRIDACEAE (Iris Family)

Iris missouriensis	wild iris
Sisyrinchium inflatum	grass-widows, blue-eyed grass

JUGLANDACEAE (Walnut Family)

Juglans nigra	black walnut

JUNCACEAE (Rush Family)

Juncus balticus	rush
J. longistylus	"
J. orthophyllus	"
J. tenuis var. *dudleyi*	"

LABIATAE (Sage Family)

Agastache urticifolia	giant hyssop
Marrubium vulgare	horehound
Mentha arvensis var. *glabrata*	mint
Monardella odoratissima var. *odoratissima*	false horsemint
Salvia dorrii var. *carnosa*	purple sage
Scutellaria antirrhinoides	skullcap
S. nana var. *nana*	dwarf skullcap

LEMNACEAE (Duckweed Family)

Lemna minor	duckweed

LILIACEAE (Lily Family)

Allium acuminatum	wild onion

Allium lemmonii	Lemmon's onion
A. nevadense	Nevada onion
A. parvum	wild onion
A. simillimum	"
Asparagus officinalis	asparagus
Brodiaea douglasii	wild hyacinth
Calochortus macrocarpus	sego lily
C. nuttallii	"
Fritillaria lanceolata	riceroot
F. pudica	yellowbells
Smilacina racemosa	false Solomon's seal
S. stellata	wild lily-of-the-valley
Veratrum californicum	false hellebore
Zigadenus paniculatus	death-camas
Z. venenosus var. venenosus	"

LIMNANTHACEAE (Meadowfoam Family)

Floerkea proserpinacoides	false mermaid

LINACEAE (Flax Family)

Linum perenne var. lewisii	blue flax

LOASACEAE (Loasa Family)

Mentzelia albicaulis	white-stem stickleaf
M. dispersa	stickleaf
M. laevicaulis	blazingstar

LORANTHACEAE (Mistletoe Family)

Arceuthobium douglasii	dwarf mistletoe

LYTHRACEAE (Loosestrife Family)

Lythrum hyssopifolia	purple loosestrife

MALVACEAE (Hollyhock Family)

Malva neglecta	common mallow
Sidalcea oregana ssp. *oregana*	Oregon sidalcea
Sphaeralcea grossulariaefolia	desert-mallow
S. munroana	"

MORACEAE (Mulberry Family)

Morus alba	white mulberry

OLEACEAE (Olive Family)

Syringa vulgaris	lilac

ONAGRACEAE (Evening Primrose Family)

Boisduvalia densiflora	boisduvalia
B. glabella	"
B. stricta	"
Circaea alpina var. *pacifica*	enchanter's nightshade
Clarkia pulchella	ragged-robin
C. rhomboidea	clarkia
Epilobium angustifolium	fireweed
E. glaberrimum var. *glaberrimum*	willowherb
E. glandulosum var. *glandulosum*	"
var. *tenue*	"
E. paniculatum	small fireweed
Gayophytum nuttallii	Nuttall's gayophytum

G. ramosissimum	gayophytum
Oenothera allysoides	annual evening primrose
O. andina var. *andina*	evening primrose
O. caespitosa	stemless evening primrose
O. heterantha	yellow evening primrose
O. hookeri var. *angustifolia*	yellow evening primrose
O. scapoidea	evening primrose

ORCHIDACEAE (Orchid Family)

Corallorhiza maculata	spotted coralroot
Habenaria sparsiflora	bog orchid

OROBANCHACEAE (Broomrape Family)

Orobanche californica var. *corymbosa*	California broomrape
O. fasciculata	broomrape
O. uniflora	"

PAEONIACEAE (Peony Family)

Paeonia brownii	wild peony

PLANTAGINACEAE (Plantain Family)

Plantago lanceolata	lance-leaf plantain

POACEAE (Grass Family)

Agrostideae Tribe

Agrostis alba	redtop
A. thurberiana	Thurber's bentgrass
Oryzopsis hymenoides	Indian ricegrass

Aristideae Tribe

Calamagrostis canadensis var. *canadensis*	bluejoint

Phleum pratense	timothy
Polypogon monspeliensis	beardgrass
Stipa comata var. comata	needle-and-thread grass
S. lemmonii var. lemmonii	Lemmon's needlegrass
S. occidentalis var. minor	western needlegrass

Aveneae Tribe

Deschampsia cespitosa var. cespitosa	tufted hairgrass
D. elongata	slender hairgrass

Festuceae Tribe

Bromus brizaeformis	rattlesnake brome
B. carinatus var. linearis	bromegrass
B. commutatus	meadow brome
B. inermis	smooth brome
B. japonicus	Japanese brome
B. tectorum	cheatgrass
B. willdenowii (=catharticus)	rescuegrass
Dactylis glomerata	orchardgrass
Festuca microstachys	pull-up grass
F. octoflora	annual fescue
Distichlis stricta	saltgrass
Melica spectabilis	purple oniongrass
Poa bulbosa	bulbuous bluegrass
P. cusickii var. cusickii	Cusick's bluegrass
P. nevadensis	Nevada bluegrass

P. sandbergii	Sandberg's bluegrass
P. pratensis	Kentucky bluegrass

Hordeae Tribe

Agropyron repens	quackgrass
A. spicatum var. *spicatum*	bluebunch wheatgrass
A. subsecundum var. *subsecundum*	bearded wheatgrass
Elymus caput-medusae	medusa-head rye
E. cinereus	giant wild-rye
E. glaucus var. *glaucus*	wild-rye
Hordeum brachyantherum	meadow barley
H. glaucum	foxtail
Sitanion hystrix var. *hystrix*	squirreltail

Paniceae Tribe

Panicum occidentale	western panicgrass

POLEMONIACEAE (Phlox Family)

Collomia grandiflora	large-flowered collomia
C. linearis	narrowleaf collomia
Eriastrum sparsiflorum	eriastrum
Gilia aggregata	tinpaiute
G. capillaris	gilia
G. leptomeria	"
G. sinuata	"
G. tenerrima	"
Langloisia setosissima	bristly langloisia
Leptodactylon pungens	bristly-phlox

Linanthus harknessii	linanthus
Microsteris gracilis var. *humilior*	microsteris
Navarretia breweri	yellow navarretia
N. intertexta var. *propinqua*	white navarretia
Phlox aculeata	needle-leaf phlox
P. hoodii	Hood's phlox
P. longifolia	longleaf phlox
Polemonium micranthum	polemonium

POLYGONACEAE (Buckwheat Family)

Eriogonum caespitosum	matted wild buckwheat
E. cernuum	nodding wild buckwheat
E. deflexum	wild buckwheat
E. heracleoides var. *heracleoides*	"
E. microthecum var. *laxiflorum*	bush wild buckwheat
E. ovalifolium var. *orthocaulon*	silverplant
E. ovalifolium var. *ovalifolium*	butterballs
E. strictum ssp. *proliferum* var. *proliferum*	wild buckwheat
E. umbellatum var. *croceum* var. *umbellatum*	sulfur flower umbellate wild buckwheat
E. vimineum	annual wild buckwheat
Polygonum aviculare	common knotgrass
P. bistortoides	snakeweed
P. douglasii var. *latifolium*	Douglas' knotgrass

P. hydropiper	smartweed
P. kelloggii	Kellogg's knotgrass
P. lapathifolium	willow-weed
P. majus	knotgrass
P. phytolaccaefolium	fleece-flower
P. polygaloides	knotgrass
P. sawatchense	"
P. spergulariaeforme	"
Rumex acetosella	sheep-sorrel
R. crispus	curlydock
R. salicifolius	willow-leaf dock

POLYPODIACEAE (Wood Fern Family)

Cysopteris fragilis	brittle fern

PORTULACACEAE (Portulaca Family)

Claytonia lanceolata	spring beauty
C. linearis	narrowleaf claytonia
Lewisia nevadensis	Nevada lewisia
L. rediviva	bitterroot
Montia chamissoi	water montia
M. perfoliata	miner's lettuce
Spraguea umbellata var. *caudicifera*	pussypaws
var. *umbellata*	"

POTAMOGETONACEAE (Pond Weed Family)

Potamogeton foliosus	leafy pondweed

PRIMULACEAE (Primula Family)

Dodecatheon *pauciflorum* var. *pauciflorium*	shooting-star

RANUNCULACEAE (Buttercup Family)

Aconitum *columbianum*	wolfbane
Aquilegia *formosa*	columbine
Clematis *ligusticifolia*	virgin's bower
Delphinium *andersonii*	Anderson's larkspur
D. *burkei*	Burke's larkspur
D. *diversifolium*	larkspur
D. *nelsonii*	Nelson's larkspur
Ranunculus *alismaefolius* var. *hartwegii*	buttercup
R. *aquatilis* var. *hispidulus*	water buttercup
R. *cymbalaria* var. *cymbalaria*	Rocky Mtn. buttercup
R. *cymbalaria* var. *saximontanus*	" " "
R. *glaberrimus*	sagebrush buttercup
R. *orthorhychus* var. *platyphyllus*	buttercup
R. *sceleratus* var. *multifidus*	bog buttercup
R. *testiculatus*	burr buttercup
Thalictrum *venulosum*	meadowrue

RHAMNACEAE (Buckthorn Family)

Ceanothus *velutinus*	snowbrush

ROSACEAE (Rose Family)

Amelanchier utahensis	serviceberry
Cercocarpus ledifolius var. *intercedens* var. *ledifolius*	mountain mahogany
Crataegus douglasii var. *douglasii*	Douglas' hawthorn
Geum triflorum var. *ciliatum*	old man's whiskers
Holodiscus dumosus var. *dumosus*	mountainspray
Potentilla arguta var *convallaria*	potentilla
P. biennis	biennial potentilla
P. glandulosa var. *intermedia*	potentilla
P. gracilis var. *flabelliformis*	cinquifoil
P. emarginata	bittercherry
P. virginiana var. *melanocarpa*	chokecherry
Purshia tridentata	bitterbrush
Rosa foetida var. *persiana*	Persian yellow rose
Rosa woodsii	wild rose
Sibbaldia procumbens	sibbaldia
Sorbus scopulina var. *scopulina*	mountain-ash

RUBIACEAE (Madder Family)

Galium aparine	cleavers
G. asperulum	bedstraw

Galium bifolium	twinleaf bedstraw
G. mexicanum	mexican bedstraw
G. multiflorum	shrubby bedstraw

SALICACEAE (Willow Family)

Populus alba	silver poplar
P. deltoides	eastern cottonwood
P. tremuloides	quaking aspen
Salix argophylla	whiteleaf sandbar willow

SANTALACEAE (Sandlewood Family)

Comandra pallida	false toad-flax

SAXIFRAGACEAE (Saxifrage Family)

Heuchera cylindrica	heuchera
Lithophragma bulbifera	starflower
L. parviflora	"
Saxifraga integrifolia var. *columbiana*	saxifrage

SCROPHULARIACEAE (Snapdragon Family)

Castilleja angustifolia	paintbrush
C. chromosa	"
C. exilis	annual paintbrush
C. linearifolia	narrowleaf paintbrush
Collinsia parviflora	blue-eyed Mary
Cordylanthus ramosus	bird's-beak
Limosella aquatica	mudwort
Mimulus breviflorus	monkeyflower
M. cusickii	Cusick's monkeyflower

Mimulus floribundus	monkeyflower
M. guttatus var. depauperatus var. guttatus	" common monkeyflower
M. lewisii	Lewis' monkeyflower
M. nanus	dwarf monkeyflower
Orthocarpus hispidus	white owlclover
O. luteus	yellow owlclover
Penstemon albertinus	Alberta penstemon.
P. cusickii	Cusick's penstemon
P. deustus var. deustus	white penstemon
P. deustus var. heterander	" "
P. fruticosus var. fruticosus	bush beards-tongue
P. rydbergii var. varians	Rydberg's penstemon
P. speciosus	beards-tongue
Verbascum thapsus	mullein
V. blattaria	"
Veronica americana	American speedwell
V. anagallis-aquatica	European speedwell
V. arvensis	speedwell
V. peregrina var. xalapensis	veronica
V. serpyllifolia var. humifusa	"

SOLANACEAE (Potato Family)

Lycium halamilifolium	matrimony vine
Nicotiana attenuata	wild tobacco
Solanum sarrachoides	hairy nightshade
S. triflorum	nightshade

SPARGANIACEAE (Burreed Family)

Sparganium minimum	burreed
S. simplex	"

TAMARICACEAE (Tamarisk Family)

Tamarix pentandra	tamarisk, salt cedar

TYPHACEAE (Cattail Family)

Typha latifolia	cattail

URTICACEAE (Nettle Family)

Urtica dioica ssp. *gracilis* var. *gracilis*	stinging nettle
U. lyalli	" "
U. serra	" "

VALERIANACEAE (Valerian Family)

Plectritis macrocera	white plectritis

VERBENACEAE (Verbena Family)

Verbena bracteata	verbena

VIOLACEAE (Violet Family)

Viola nephrophylla	purple violet
V. nuttallii var. *vallicola*	yellow violet
V. pupurea var. *venosa*	purple-veined yellow violet

phyllum BRYOPHTUM

class Musci	moss

CHECK LIST OF FISHES IN DLE AREA

FAMILY ACIPENSERIDAE - sturgeons

Acipenser transmontanus (Richardson). White sturgeon. (N) 1/
Snake River below Shoshone Falls. A threatened species in the Snake River. Kootenai River.

FAMILY SALMONIDAE - trout, char, whitefish, grayling

Oncorhynchus

kisutch (Walbaum). Coho salmon, silver salmon. (N) Rare. Stocked recently in many lakes and reservoirs around the state.

nerka (Walbaum). Sockey salmon, blueback salmom, kokanee. (N) Kokanee have been planted in a number of lakes outside their native range.

Prosopium

williamsoni (Girard). Mountain whitefish. (N) Widely distributed. Abundant.

Salmo

clarki (Richardson). Cutthroat trout, blackspotted trout, native trout. (N) Remnant stocks.

gairdneri (Richardson). Rainbow trout. (N) Widely distributed.

1/ (N) Native, (I) Introduced

trutta (Linnaeus). Brown trout, Loch Leven trout. (I) 1/

Snake River from American Falls to Weiser; Portneuf River. Rare.

sp. Red-banded trout. (N)

An undescribed species probably originally found in the Owyhee River drainage, Wood River drainage and other streams tributary to the upper Snake River. Rare, possibly now extinct in Idaho.

Salvelinus

malma (Walbaum). Dolly Varden, bull trout, char.

(N) Snake River drainage below Shoshone Falls: Lost Rivers; Pend Oreille River drainage; Kootenai River drainage; Spokane River drainage. Common.

fontinalis (Mitchell). Brook trout. (I) May be present in spring areas and tributaries.

FAMILY CYPRINIDAE - minnows and carps

Acrocheilus alutaceus (Agassiz and Pickering). Chiselmouth. (N) Snake River system below Shoshone Falls. Common.

Carassius auratus (Linnaeus). Goldfish (I)

Isolated ponds throughout the State. Rare.

Cyprinus carpio (Linnaeus). Carp. (I)

Widely distributed. Abundant.

Gila

atraria (Girard). Utah chub. (N) Abundant. Snake River system upstream from Shoshone Falls; Wood River.

bicolor (Girard). Tui chub. (I) Common. Indian Creek, Boise Valley.

copei (Jordan and Gilbert). Leatherside chub. (N) Wood River. Common.

Mylocheilus caurinus (Richardson). Peamouth. (N) Snake River system below Shoshone Falls. Abundant.

Pimephales promelas (Rafinesque). Fathead minnow, blackhead minnow. (I) Planted in ponds on Perrine Trout Farm, Twin Falls.

Ptychocheilus oregonensis (Richardson). Northern squawfish. (N) Snake River system below Shoshone Falls. Abundant.

Rhinichthys

cataractae (Valenciennes). Longnose dace. (N) Widely distributed. Common.

falcatus (Eigenmann and Eigenmann). Leopard dace. (N) Bruneau River. Rare.

osculus (Girard). Speckled dace. (N) Widely distributed.

Richardsonius

balteatus (Richardson). Redside shiner. (N)

Snake River system. Abundant.

FAMILY CATOSTOMIDAE - suckers

Catostomous

ardens (Jordan and Gilbert). Utah sucker. (N)

Snake River above Shoshone Falls. Abundant.

catostomous (Forster). Longnose sucker. (N)

Common. Snake River above Shoshone Falls. Abundant.

columbianus (Eigenmann and Eigenmann). Bridgelip suckers. (N) Snake River system below Shoshone Falls. Abundant.

discobolus (Cope). Bluehead sucker. (N)

Snake River above Shoshone Falls. Rare.

macrocheilus (Girard). Largescale sucker. (N)

Snake River system below Shoshone Falls. Abundant.

platyrhynchus (Cope). Mountain sucker. (N)

Snake River system. Common.

FAMILY ICTALURIDAE - catfishes

Ictalurus

nebulosus (Le Sueur). Brown bullhead. (I)

Widely distributed. Abundant.

punctatus (Rafinesque). Channel catfish. (I)

Snake River. Abundant.

Noturus gyrinus (Mitchell). Tadpole madtom. (I)

Lower Boise River; Snake River at Weiser. Common.

Pylodictis olivaris (Rafinesque). Flathead catfish.

(I) Snake River. Rare.

FAMILY CENTRARCHIDAE - sunfishes

Lepomis

gibbosus (Linnaeus). Pumpkinseed. (I) Widely distributed. Abundant.

gulosus (Cuvier). Warmouth. (I)

Snake River near Boise. Lower Payette River. Rare.

macrochirus (Rafinesque). Bluegill (I)

Widely distributed in southwestern Idaho. Common.

Micropterus

dolomieu (Lacepede). Smallmouth bass. (I)

Snake River below Swan Falls; Boise River, lower; Wood River. Recently stocked in certain reservoirs as Anderson Ranch (Boise River). Common.

salmoides (Lacepede). Largemouth bass. (I)

Widely distributed. Common.

Pomoxis

annularis (Rafinesque). White crappie. (I)

Included provisionally.

nigromaculatus (Le Seur). Black crappie. (I)

Widely distributed. Common.

FAMILY PERCIDAE - perches

Perca flavescens (Mitchell). Yellow perch. (I)

Widely distributed. Abundant.

FAMILY COTTIDAE - sculpins

Cottus

bairdi (Girard). Mottled sculpin. (N)

Snake River system. Common

beldingi (Eigenmann and Eigenmann). Piute sculpin.

(N) Common. Snake River system.

confusus (Bailey and Bond). Shorthead sculpin. (N)

Snake River drainage. Abundant.

greenei (Gilber and Culver). Shoshone sculpin. (N)

Riley Creek near Hagerman. Common

leiopomus (Gilber and Evermann). Wood River sculpin.

(N) Little Wood River; Big Wood River. Rare.

Appendix V

BIOLOGICAL REQUIREMENTS

Biological requirements used by the IF&GD to determine needed sustained minimum flows for cold water game fish populations. (IWRB 1969)

Biological requirements necessary to maintain cold water game fish populations were the basis for determining needed sustained minimum flows in all waters of Idaho. In arriving at flows to provide these requirements five major criteria were used: water quality, food, escape cover, reproduction, fish passage.

Water Quality

Dissolved oxygen and water temperature are the two water quality factors most influenced by minimum flows. Generally speaking suitable water for cold water game fish spawning, and survival of eggs and fry in the gravel, should range from 8 to 10 parts per million dissolved oxygen and from 42° to 55° F. Temperatures for rearing of juveniles and to maintain adult fish should not exceed 65° F. over extended periods of time, and dissolved oxygen content should not be below 5 parts per million. Even minor decreases, or increases, of dissolved oxygen levels, and temperatures outside the limits of these parameters contribute to excessive losses of eggs and fry, and an increased disease level. High water temperatures decrease dissolved oxygen content and increase fish metabolic rates. Lethal tolerance levels will be reached if the parameters are exceeded to a major degree.

Food

The primary food of stream dwelling, cold water game fish, is aquatic insects. These insects in turn feed on smaller life forms. Fish also utilize organisms such as crustaceans and other fish. These food items are produced almost exclusively in riffle areas. Minimum flows should be adequate to cover a sufficient portion of available large gravel, or rubble, and to supply water of a quality suitable to produce these food forms. Water quality which is adequate for fish life is generally suitable for production of secondary food organisms.

Escape Cover

Fish must have escape cover to evade predators and to provide resting areas where they are not subjected to stress. Pool areas of a stream usually supply most escape cover. Cut banks, overhanging brush and grass, submerged logs, and the deeper riffles also supply cover. An adequate minimum flow should provide enough water so that the above features of a stream can be utilized. As an example, escape cover which is provided primarily by cut banks and overhanging vegetation is useless if minimum flows confine water to a reduced midstream channel area which does not reach the normal banks of the stream.

Reproduction

All cold water game fish considered in the study deposit eggs in, or upon, gravel of varying size, depending on the species and sizes of fish spawning. Minimum flows should assure adequate water depth and velocity for successful spawning. Minimum water depth for spawning steelhead and large trout and char is 0.6 ft. Proper water velocities for spawning range between 1.0 and 2.5 ft. per second as measured 0.4 ft. from the bottom.

Fish Passage

Salmon and steelhead are anadromous fish that migrate from the ocean to fresh water streams in order to spawn. Resident cold water game fish also make spawning runs of varying lengths into headwater and spring migrations from headwaters to lower river reaches and back again. Local movements from resting cover to feeding areas and back also take place.

Stream water depths should be sufficient to allow fish migrations and movements to take place without blockage or imposing undue stress on the fish. These depth requirements will vary widely depending on the size of fish, the length of the stream section involved and other factors.

In streams where fish populations are maintained primarily by "put and take" hatchery releases, angling success is an additional consideration in establishing minimum flows. Sound fishery management dictates that as many as possible of these hatchery-reared fish be harvested the year they are stocked as there is little survival beyond this time. Under these conditions minimum flows should provide enough water to hold localized concentrations of fish and support intensive angling effort.

TERRESTRIAL ANIMALS SPECIES LIST

Table 1

Season of Use and Animals Found in the

Sagebrush-Grass Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Mammals	Merriam Shrew	Sorex merriami	Yl		Highly Adverse
	Dusky Shrew	Sorex obsurus	Yl		Moderately Adverse
	Fringed Myotis (Bat)	Myotis thysanodes	M-S		Slightly Adverse
	California Myotis (Bat)	Myotis californicus	M-S		Slightly Adverse
	Yuma Myotis (Bat)	Myotis yumanensis	M-S		Slightly Adverse
	Long-Legged Myotis (Bat)	Myotis volans	M-S		Slightly Adverse
	Western Pipistrel (Bat)	Pipistrellus hesperus	M-S		Slightly Adverse
	Spotted Bat	Euderma maculata	M-S	Threatened	Slightly Adverse
	Western Big-Eared Bat	Plecotus townsendii	M-S		Slightly Adverse
	Pallid Bat	Antrozous pallidus	M-S		Slightly Adverse
	Longtail Weasel	Mustela frenata	Yl		Slightly Adverse
	Badger	Taxidea taxus	Yl		Highly Adverse
	Spotted Skunk	Spilogale putorius	Yl		Slightly Adverse
	Striped Skunk	Mephitis mephitis	Yl		Highly Adverse
	Coyote	Canis latrans	Yl		Highly Adverse
	Bobcat	Lynx rufus	Yl		Moderately Adverse
	Yellowbelly Marmot	Marmota flaviventris	Yl		Highly Adverse
	Townsend Ground Squirrel	Citellus townsendi	Yl		Highly Adverse

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Season of Use and Animals Found in the
Sagebrush-Grass Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Mammals	Idaho Ground Squirrel	Citellus brunneus	Yl		Highly Adverse
	Richardson Ground Squirrel	Citellus richardsoni	Yl		Highly Adverse
	Belding Ground Squirrel	Citellus beldingi	Yl		Moderately Adverse
	Columbian Ground Squirrel	Citellus columbianus	Yl		Moderately Adverse
	Whitetail Antelope Squirrel	Ammospermophilus leucurus	Yl		Highly Adverse
	Least Chipmunk	Eutamias minimus	Yl		Highly Adverse
	Northern Pocket Gopher	Thomomys talpoides	Yl		Moderately Adverse
	Great Basin Pocket Mouse	Perognathus parvus	Yl		Highly Adverse
	Ord Kangaroo Rat	Dipodomys ordi	Yl		Highly Adverse
	Great Basin Kangaroo Rat	Dipodomys microps	Yl		Highly Adverse
	Western Harvest Mouse	Reithrodontomys megolotis	Yl		Highly Adverse
	Canyon Mouse	Peromyscus crinitus	Yl		Slightly Adverse
	Deer Mouse	Peromyscus maniculatus	Yl		Highly Adverse
	Northern Grass-hopper Mouse	Onychomus leucogaster	Yl		Highly Adverse
	Meadow Vole	Microtus pennsylvanicus	Yl		Slightly Adverse
	Longtail Vole	Microtus longicaudis	Yl		none
	Sagebrush Vole	Lagurus curtatus	Yl		Highly Adverse
	Bushy-Tailed Woodrat	Neotoma cinera	Yl		Slightly Adverse

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

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Season of Use and Animals Found in the Sagebrush-Grass Habitat Type

Class of Animal	Common Name	Scientific Name	Season of Use *	Classification	Impact
Mammals	Desert Woodrat	Neotoma lepida	Yl		Highly Adverse
	Western Jumping Mouse	Zapus princeps	Yl		Slightly Adverse
	Whitetail Jack-rabbit	Lepus townsendii	Yl		Moderately Adverse
	Blacktail Jack-rabbit	Lepus californicus	Yl		Highly Adverse
	Mountain Cotton-tail	Sylvilagus nuttalli	Yl	Game Animal	Highly Adverse
	Pygmy Cotton-tail	Sylvilagus idahoensis	Yl	Game Animal	Highly Adverse
	Mule Deer	Odocoileus hemionus	Yl	Game Animal	Slightly Adverse
	Pronghorn Antelope	Antilocapra americana	Yl	Game Animal	Highly Adverse
Birds	Turkey Vulture	Cathartes aura	M-S		Moderately Adverse
	Red-Tailed Hawk	Buteo jamaicensis	Yl		Moderately Adverse
	Swainson's Hawk	Buteo swainsoni	M-S		Highly Adverse
	Harlan's Hawk	Buteo harlani	M		Moderately Adverse
	Rough-Legged Hawk	Buteo lagopys	M-W		Moderately Adverse
	Ferruginous Hawk	Buteo regalis	Yl	Status Undetermd.	Highly Adverse
	Broad-Winged Hawk	Buteo platypterus	S		Slightly Adverse
	Golden Eagle	Aquila chrysaetos	Yl		Highly Adverse
	Bald Eagle	Haliaeetus leucocephalus	M-W		Moderately Adverse

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

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Season of Use and Animals Found in the

Sagebrush-Grass Habitat Type

Class of Animal	Common Name	Scientific Name	Season of Use *	Classification	Impact
Birds	Marsh Hawk	Circus cyaneus	Yl		Highly Adverse
	Prairie Falcon	Falco mexicanus	Yl	Threatened	Highly Adverse
	Peregrine Falcon	Falco peregrinus	Yl	Endangered	Highly Adverse
	Sparrow Hawk	Falco sparverius	Yl		Slightly Adverse
	Sage Grouse	Centrocercus urophasianus	Yl	Game Bird	Highly Adverse
	California Quail	Lophortyx californicus	Yl	Game Bird	Highly Adverse
	Mountain Quail	Oreortyx pictus	Yl	Game Bird	Slightly Adverse
	Chukar	Alectaris graeca	Yl	Game Bird	Slightly Adverse
	Hungarian Partridge	Perdix perdix	Yl	Game Bird	Moderately Adverse
	Pheasant	Phasianus colchicus	Yl	Game Bird	Slightly Adverse
	Long-Billed Curlew	Numenius americanus	M-S	Status Undetermd.	Highly Adverse
	Upland Plover	Bartramia longicauda	M		Slightly Adverse
	Mourning Dove	Zenaidura macroura	M-S	Game Bird	Highly Adverse
	Snowy Owl	Nyctea scandiaca	W		Moderately Adverse
	Western Burrowing Owl	Speotyto cunicularia	M-S	Status Undetermd.	Highly Adverse
	Short-Eared Owl	Asio flammeus	Yl		Highly Adverse
	Poor-Will	Phalaenoptilus nuttallii	M-S		Slightly Adverse
	Common Nighthawk	Chordeiles minor	M-S		Moderately Adverse

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Season of Use and Animals Found in the

Sagebrush-Grass Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Birds	White-Throated Swift	Aeronautes saxatalis	M-S		Slightly Adverse
	Black-Chinned Hummingbird	Archilochus alexandri	M-S		Slightly Adverse
	Northern Shrike	Lanius excubitor	W		Highly Adverse
	Loggerhead Shrike	Lanius ludovicianus	M-S		Highly Adverse
	Yellow-Breasted Chat	Icteria virens	M-S		Slightly Adverse
	Western Meadowlark	Sturnella negeota	M-S		Highly Adverse
	Lazuli Bunting	Passerina amoena	M-S		Slightly Adverse
	Snow Bunting	Plectrophenax nivalis	W		Moderately Adverse
	House Finch	Carpodacus mexicanus	Yl		Slightly Adverse
	Gray-Crowned Rosy Finch	Leucosticte tephrocotis	W		Slightly Adverse
	Savannah Sparrow	Passerculus sandwichensis	Sp-S		Slightly Adverse
	Grasshopper Sparrow	Ammodramus savannarum	M		Moderately Adverse
	Vesper Sparrow	Pooecetes gramineus	M-S		Highly Adverse
	Lark Sparrow	Chondestes grammacus	M-S		Moderately Adverse
	Sage Sparrow	Amphispiza belli	M-S		Highly Adverse
	Black-Throated Sparrow	Amphispiza bilineata	M-S		Highly Adverse
	Brewer's Sparrow	Spizella breweri	M-S		Moderately Adverse
	McCown's Longspur	Rhynchophanes mcCowni	F		Slightly Adverse

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

A-VI-5

Season of Use and Animals Found in the

Sagebrush-Grass Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Birds	Lapland Longspur	Calcarius lapponicus	W		Slightly Adverse
	Western Kingbird	Tyrannus verticalis	M-S		Slightly Adverse
	Ash-Throated Flycatcher	Myiarchus cinerascens	S		Slightly Adverse
	Says Phoebe	Sayornis saya	S		Moderately Adverse
	Traill's Flycatcher	Empidonax traillii	M-S		Slightly Adverse
	Dusky Flycatcher	Empidonax oberholseri	M-S		Moderately Adverse
	Horned Lark	Eremophila alpestris	Yl		Highly Adverse
	Bank Swallow	Riparia riparia	M-S		Slightly Adverse
	Barn Swallow	Hirundo rustica	M-S		None
	Cliff Swallow	Petrochelidon pyrrhonota	M-S		Slightly Adverse
	Common Raven	Corvus corax	Yl		Slightly Adverse
	Canyon Wren	Catherpes mexicanus	Yl		Slightly Adverse
	Rock Wren	Salpinctes obsoletus	M-S		Slightly Adverse
	Sage Thrasher	Oreoscoptes montanus	M-S		Highly Adverse
	Western Bluebird	Sialia mexicana	M		Slightly Adverse
	Townsend's Solitaire	Myadestes townsendi	W		Slightly Adverse
	Water Pipit	Anthus spinoletta	M		Slightly Adverse

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

A-VI-7

Season of Use and Animals Found in the Sagebrush-Grass Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Amphibians	Long-Toed Salamander	Ambystoma macrodactylum	Y1		Moderately Adverse
	Tiger Salamander	Ambystoma tigrinum	Y1		Moderately Adverse
	Great Basin Spadefoot Toad	Scaphiopus intermontanus	Y1		Highly Adverse
	Western Toad	Bufo boreas	Y1		Moderately Adverse
	Woodhouse's Toad	Bufo woodhousei	Y1		Moderately Adverse
	Chorus Frog	Pseudocris triseriata	Y1		Moderately Adverse
	Pacific Tree Frog	Hyla regilla	Y1		Slightly Adverse
	Leopard Frog	Rana pipens	Y1		Slightly Adverse
Reptiles	Leopard Lizard	Crotaphytus wislizenii	Y1		Highly Adverse
	Collard Lizard	Crotaphytus collaris	Y1		Slightly Adverse
	Western Fence Lizard	Sceloporus occidentalis	Y1		Moderately Adverse
	Sagebrush Lizard	Sceloporus graciosus	Y1		Highly Adverse
	Side-Blotched Lizard	Uta stansburiana	Y1		Highly Adverse
	Short-Horned Lizard	Phrynosoma douglassi	Y1		Highly Adverse
	Desert Horned Lizard	Phrynosoma platyrbinos	Y1		Highly Adverse
	Western Skink	Eumeces skiltonianus	Y1		Slightly Adverse
	Western Whiptail	Cnemidophorus tigris	Y1		Highly Adverse

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Y1 = Occurs year long.

Season of Use and Animals Found in the

Sagebrush-Grass Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Reptiles	Striped Whipsnake	Masticophis taeniatus	Yl		Slightly Adverse
	Racer	Coluber constrictor	Yl		Moderately Adverse
	Gopher Snake	Pituophis melanoleucus	Yl		Moderately Adverse
	Long-Nosed Snake	Rhinocheilus lecontel	Yl		Highly Adverse
	Western Terrestrial Garter Snake	Thamnophis elegans	Yl		Slightly Adverse
	Western Ground Snake	Sonora semiannulata	Yl		Highly Adverse
	Night Snake	Hypsiglena torquata	Yl		Highly Adverse
	Western Rattlesnake	Cortalus viridis	Yl		Moderately Adverse

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Table 2

Season of Use and Animals Found in the

Riparian Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Mammals	Dusky Shrew	Sorex obscurus	Yl		Slightly Adverse
	Little Brown Myotis (Bat)	Myotis lucifugus	M-S		Slightly Adverse
	Fringed Myotis (Bat)	Myotis thysanodes	M-S		None
	California Myotis (Bat)	Myotis californicus	M-S		Slightly Adverse
	Long-Legged Myotis (Bat)	Myotis volans	M-S		Slightly Adverse
	Western Pipistrel (Bat)	Pipistrellus hesperus	M-S		None
	Big Brown Bat	Eptesicus fuscus	M-S		Slightly Adverse
	Hoary Bat	Lasiurus cinereus	M-S		Slightly Adverse
	Western Big-Eared Bat	Plecotus townsendii	M-S		Slightly Adverse
	Pallid Bat	Antrozous pallidus	M-S		Moderately Adverse
	Raccoon	Procyan lotor	Yl		Slightly Adverse
	Short-tail Weasel	Mustela erminea	Yl		None
	Long-tail Weasel	Mustela frenata	Yl		Slightly Adverse
	Mink	Mustela vison	Yl	Furbearer	Slightly Adverse
	River Otter	Lutra canadensis	Yl	Furbearer	None
	Spotted Skunk	Spilogale putorius	Yl		Moderately Adverse
	Striped Skunk	Mephitis mephitis	Yl		Slightly Adverse
	Coyote	Canis latrans	Yl		Slightly Adverse

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Season of Use and Animals Found in the

Riparian Habitat Type

Class of Animal	Common Name	Scientific Name	Season of Use *	Classification	Impact
Mammals	Red Fox	Vulpes fulva	Yl		Moderately Adverse
	Red Squirrel	Tamiasciurus hudsonicus	Yl		Slightly Adverse
	Townsend Pocket Gopher	Thomomys townsendi	Yl		Moderately Adverse
	Beaver	Castor canadensis	Yl	Furbearer	Slightly Adverse
	Meadow Vole	Microtus pennsylvanicus	Yl		Slightly Beneficial
	Longtail Vole	Microtus longicaudus	Yl		Slightly Adverse
	Richardson Vole	Microtus richardsoni	Yl		Slightly Adverse
	Muskrat	Ondatra zibethica	Yl		Slightly Adverse
	Busy-Tailed Rat	Neotoma cinera	Yl		Slightly Adverse
	Norway Rat	Rattus norvegicus	Yl		Slightly Beneficial
	House Mouse	Mus musculus	Yl		Slightly Beneficial
	Western Jumping Mouse	Zapus princeps	Yl		Slightly Adverse
	Nutria	Myocastor coypus	Yl		None
	Mountain Cottontail	Sylvilagus nuttalli	Yl	Game Animal	Slightly Adverse
	Mule Deer	Odocoileus hemionus	Yl	Game Animal	Slightly Adverse
Birds	Common Loon	Gavia immer	M		None
	Ring-Necked Grebe	Podiceps grisegena	M		None

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Season of Use and Animals Found in the Riparian Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Birds	Horned Grebe	Podiceps auritus	M		None
	Eared Grebe	Podiceps caspicus	Yl		None
	Western Grebe	Aechmophorus occidentalis	M-S		None
	Pied-Billed Grebe	Podilymbus podiceps	Yl		None
	White Pelican	Pelecanus erythrorhynchos	S		None
	Double-Crested Cormorant	Phalacrocorax auritus	M-S		None
	Great Blue Heron	Ardea herodias	M-S		Slightly Beneficial
	Common Egret	Casmerodius albus	M-S		None
	Snowy Egret	Leuocophoyx thula	M-S		None
	Black-Crowned Night Heron	Nycticorax nycticorax	M-S		Slightly Adverse
	Least Bittern	Ixobrychus exilus	M-S		Slightly Adverse
	American Bittern	Botarus lentiginosus	M-S		Slightly Beneficial
	Whistling Swan	Olor columbianus	M-W	Game Bird	None
	Trumpeter Swan	Olor buccinator	M	Game Bird	None
	Canada Goose	Branta canadensis	Yl	Game Bird	Slightly Beneficial
	Snow Goose	Chen hyperborea	M	Game Bird	Slightly Beneficial
	Ross' Goose	Chen roosii	M	Game Bird	Slightly Beneficial
	Mallard	Anas platyrhynchos	Yl	Game Bird	Slightly Beneficial

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

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Season of Use and Animals Found in the

Riparian Habitat Type

Class of Animal	Common Name	Scientific Name	Season of Use *	Classification	Impact
Birds	Gadwall	Anas strepera	Yl	Game Bird	None
	Pintail	Anas acuta	Yl	Game Bird	Slightly Beneficial
	Green-Winged Teal	Anas carolinensis	Yl	Game Bird	Slightly Adverse
	Blue-Winged Teal	Anas discors	M-S	Game Bird	Slightly Adverse
	Cinnamon Teal	Anas cyanoptera	M-S	Game Bird	Slightly Adverse
	American Widgeon	Mareca americana	Yl	Game Bird	Slightly Beneficial
	Shoveler	Spatula clypeata	Yl	Game Bird	Slightly Adverse
	Wood Duck	Aix spinosa	Yl	Game Bird	Slightly Adverse
	Redhead	Aythya americana	Yl	Game Bird	None
	Ring-Necked Duck	Aythya collaris	M-W	Game Bird	None
	Canvasback	Aythya valisineria	M-W	Game Bird	None
	Lesser Scaup	Aythya affinis	Yl	Game Bird	None
	Common Goldeneye	Bucephala clangula	M-W	Game Bird	None
	Barrows Goldeneye	Bucephala islandica	M-W	Game Bird	None
	Buffelhead	Bucephala albeola	M-W	Game Bird	None
	Ruddy Duck	Oxyura jamaicensis	M-S	Game Bird	Slightly Adverse
	Hooded Merganser	Lophodytes cucullatus	M-W	Game Bird	None
	Common Merganser	Mergus merganser	M-W	Game Bird	None

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Season of Use and Animals Found in the

Riparian Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Birds	Red-Breasted Merganser	Mergus serrator	M-W	Game Bird	None
	Turkey Vulture	Cathartes aura	M-S		Slightly Adverse
	Goshawk	Accipiter gentilis	Yl		Slightly Adverse
	Cooper's Hawk	Accipiter cooperii	Yl		Slightly Adverse
	Sharp-Shinned Hawk	Accipiter striatus	Yl		Slightly Beneficial
	Red-Tailed Hawk	Buteo jamaicensis	Yl		Moderately Adverse
	Swanson's Hawk	Buteo swansoni	M-S		Moderately Adverse
	Bald Eagle	Haliaeetus leucocephalus	M-W		Slightly Adverse
	Marsh Hawk	Circus cyaneus	Yl		Moderately Adverse
	Osprey	Pandion haliaetus	Yl	Status Undetermd.	Moderately Adverse
	Peregrine Falcon	Falco peregrinus	Yl	Endangered	Moderately Adverse
	Pigeon Hawk	Falco columbarius	M-W	Status Undetermnd.	Moderately Adverse
	Sparrow Hawk	Falco sparverius	Yl		Slightly Adverse
	Bobwhite	Colinus virginianus	Yl	Game Bird	None
	California Quail	Lophortyx californicus	Yl	Game Bird	None
	Hungarian Partirdge	Perdix perdix	Yl	Game Bird	None
	Pheasant	Phasianus colchicus	Yl	Game Bird	None
	Virginia Rail	Rallus limicola	M-S		None

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Season of Use and Animals Found in the

Riparian Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Birds	Sora	Porzana carolina	M		None
	Yellow Rail	Coturnicops noveboracensis	M		None
	American Coot	Fulica americana	Yl	Game Bird	None
	Semipalmated Plover	Charadrius semipalmatus	M	Status Undetermd.	None
	Snowy Plover	Charadrius alexandrinus	Sp	Status Undetermd.	None
	Killdeer	Charadrius vociferus	Yl	Status Undetermd.	None
	Black-Bellied Plover	Squatarola squaturola	M		None
	Wilson's Snipe	Capella gallinago	M-S	Game Bird	Slightly Adverse
	Long-Billed Curlew	Numenius americanus	M-S	Status Undetermd.	None
	Solitary Sandpiper	Tringa solitaria	M		Slightly Adverse
	Willet	Catoptrophorus semipalmatus	M-S		Slightly Adverse
	Greater Yellowlegs	Totanus melanolcucus	M		Slightly Adverse
	Lesser Yellowlegs	Totanus flavipes	M		None
	Pectoral Sandpiper	Erolia melanotes	F		None
	Baird's Sandpiper	Erolia bairdii	M		Slightly Beneficial
	Least Sandpiper	Erolia minutilla	M		None
	Short-Billed Dowitcher	Limnodromus griseus	M		None
	Long-Billed Dowitcher	Limnodromus scolopaceus	M		None

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Season of Use and Animals Found in the

Riparian Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Birds	Semipalmated Sandpiper	Erewnetes pusillus	M		None
	Western Sandpiper	Erewnetes mauri	M		None
	Marbled Godwit	Limosa fedoa	M		None
	Sanderling	Crocethia alba	M		None
	American Avocet	Recurvirostra americana	M-S		None
	Black-Necked Stilt	Himantopus mexicanus	M-S		None
	Wilson's Phalarope	Steganopus tricolor	M-S		None
	Northern Phalarope	Lobipes lobatus	M		None
	Herring Gull	Larus argentatus	M		None
	California Gull	Larus californicus	M-S		Slightly Beneficial
	Ring-Billed Gull	Larus delawarensis	Yl		Slightly Beneficial
	Franklin's Gull	Larus pipixcan	M-S		Slightly Adverse
	Bonaparte's Gull	Larus philadelphia	M		None
	Forster's Tern	Sterna forsteri	M-S		Slightly Adverse
	Common Tern	Sterna hirundo	M		None
	Caspian Tern	Hydroprogne caspia	M-S		Slightly Adverse
	Black Tern	Chlidonias niger	M-S		Slightly Adverse
	Domestic Pigeon	Columba livia	Yl		Moderately Beneficial

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Season of Use and Animals Found in the

Riparian Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Birds	Mourning Dove	Zenaidura macroura	M-S	Game Bird	Slightly Adverse
	Yellow-Billed Cuckoo	Coccyzus americanus	M-S		Slightly Adverse
	Barn Owl	Tyto alba	M-S		Slightly Adverse
	Screech Owl	Otus asio	Yl		Slightly Adverse
	Great Horned Owl	Bubo virginianus	Yl		Slightly Adverse
	Long-Eared Owl	Asio otus	Yl		Slightly Adverse
	Short-Eared Owl	Asio flammeus	Yl		None
	Saw-Whet Owl	Aegolius acadicus	Yl		Slightly Adverse
	Black-Chinned Hummingbird	Archilochus alexandri	M-S		Slightly Adverse
	Rufous Hummingbird	Selasphorus rufus	M		None
	Belted Kingfisher	Megaceryle alcyon	M-S		Slightly Adverse
	Bohemian Waxwing	Bombycilla garrula	W		Slightly Adverse
	Cedar Waxwing	Bombycilla cedrorum	M-W		Slightly Adverse
	Loggerhead Shrike	Lanius ludovicianus	M-S		Slightly Adverse
	Starling	Sturnus vulgaris	Yl		Highly Beneficial
	Solitary Vireo	Vireo solitarius	M-S		Slightly Adverse
	Red-Eyed Vireo	Vireo olivaceus	M-S		Slightly Adverse
	Myrtle Warbler	Dendroica coronata	M		Slightly Beneficial

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Season of Use and Animals Found in the

Riparian Habitat Type

Class of Animal	Common Name	Scientific Name	Season of Use *	Classification	Impact
Birds	Townsend's Warbler	Dendroica townsendi	M-S		Slightly Adverse
	MacGillivray's Warbler	Oporornis tolmiei	M-S		Slightly Adverse
	Yellow Throat	Geothlypis trichas	M-S		Slightly Adverse
	Yellow-Breasted Chat	Icteria virens	M-S		Slightly Adverse
	Wilson's Warbler	Wilsonia pusilla	M-S		Slightly Adverse
	House Sparrow	Passer domesticus	Yl		Moderately Beneficial
	Bobolink	Dolichonyx oryzivorus	M-S		None
	Yellow-Headed Blackbird	Xanthocephalus xanthocephalus	M-S		Slightly Adverse
	Red-Winged Blackbird	Agelaius phoeniceus	M-S		Slightly Adverse
	Tricolored Blackbird	Agelaius tricolor	M-S		Slightly Adverse
	Bullock's Oriole	Icterus bullockii	M-S		Slightly Adverse
	Brewer's Blackbird	Euphagus cyanocephalus	M-S		None
	Brown-Headed Cowbird	Molothrus ater	Sp-S		Slightly Adverse
	Western Tanager	Piranga ludoviciana	M		None
	Black-Headed Grosbeak	Pheucticus melanocephalus	M		Slightly Adverse
	Evening Grosbeak	Hesperiphonia vespertina	M-S		Slightly Adverse
	Lazuli Bunting	Passerina amoena	M-S		Slightly Adverse
	House Finch	Carpodacus mexicanas	Yl		None

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Season of Use and Animals Found in the Riparian Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Birds	Common Redpoll	Acanthis flammea	M-W		None
	American Goldfinch	Spinus psaltria	Yl		Slightly Adverse
	Green-Tailed Towhee	Chlorura chlorura	M		Slightly Adverse
	Rufous-Sided Towhee	Pipilo erythrophthalmus	M		Slightly Adverse
	Savannah Sparrow	Passerculus sandwichensis	Sp-S		Moderately Adverse
	Chipping Sparrow	Spizella passerina	M-S		Slightly Adverse
	Harris' Sparrow	Zonotrichia querula	Sp-W		Slightly Adverse
	White-Crowned Sparrow	Zonotrichia leucophrys	M		Slightly Adverse
	White-Throated Sparrow	Zonotrichia albicollis	M		Slightly Adverse
	Song Sparrow	Melospiza melodia	Yl		Moderately Adverse
	Blue Grosbeak	Guiraca caerulea	M-S		Slightly Adverse
	Yellow-Shafted Flicker	Colaptes aurutus	M		Slightly Adverse
	Red-Shafted Flicker	Colaptes cafer	Yl		Slightly Adverse
	Downy Woodpecker	Dendrocopos pubescens	Yl		Slightly Adverse
	Eastern Kingbird	Tyrannus tyrannus	M-S		Moderately Adverse
	Western Kingbird	Tyrannus verticalis	M-S		Moderately Adverse
	Traill's Flycatcher	Empidonax traillii	M-S		Moderately Adverse
	Western Flycatcher	Empidonax difficilis	M-S		Moderately Adverse

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Season of Use and Animals Found in the

Riparian Habitat Type

Class of Animal	Common Name	Scientific Name	Season of Use *	Classification	Impact
Birds	Western Wood Pewee	Contopus sordilulus	M-S		Moderately Adverse
	Violet-Green Swallow	Tachycineta thalassina	M-S		Slightly Adverse
	Tree Swallow	Iredoprocne bicolor	M-S		Slightly Adverse
	Bank Swallow	Riparia riparia	M-S		Slightly Adverse
	Barn Swallow	Hirundo rustica	M-S		Slightly Adverse
	Cliff Swallow	Petrochelidon pyrrhonota	M-S		Slightly Adverse
	Purple Martin	Progne subis	M		None
	Rough-Winged Swallow	Stelaidopteryx ruficollis	M-S		Slightly Adverse
	Black-Billed Magpie	Pica pica	Yl		Slightly Adverse
	Common Crow	Corvus brachyrhynchos	Yl		Slightly Adverse
	Black-Capped Chickadee	Parus atricapillus	Yl		Moderately Adverse
	White-Breasted Nuthatch	Sitta carolinensis	Yl		Slightly Adverse
	Brown Creeper	Certhia familiaris	W		Slightly Adverse
	Dipper	Cinclus mexicanus	W		Slightly Adverse
	House Wren	Troglodytes aedon	M-S		Slightly Adverse
	Long-Billed Marsh Wren	Telmatodytes palustris	Yl		Moderately Adverse
	Catbird	Dumetella carolinensis	M-S		Slightly Adverse
	Robin	Turdus migratorius	Yl		None

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Season of Use and Animals Found in the

Riparian Habitat Type

Class of Animal	Common Name	Scientific Name	Season of Use *	Classification	Impact
Birds	Hermit Thrush	Hylocichla guttata	M		None
	Swainson's Thrush	Hylocichla ustulata	M-S		Slightly Adverse
	Verry	Hylocichla fuscescens	M-S		Slightly Adverse
	Golden-Crowned Kinglet	Regulus satrapa	W		Slightly Adverse
	Ruby-Crowned Kinglet	Regulus calendula	M		None
Amphibians	Long-Toed Salamander	Ambystoma macrodactylum	Yl		Moderately Adverse
	Tiger Salamander	Ambystoma tigrinum	Yl		Moderately Adverse
	Western Toad	Bufo boreas	Yl		Slightly Adverse
	Woodhouse's Toad	Bufo woodhousei	Yl		Slightly Adverse
	Chorus Frog	Pseudocris triseriata	Yl		Slightly Adverse
	Pacific Tree Frog	Hyla regilla	Yl		Slightly Adverse
	Spotted Frog	Rana pretiosa	Yl		Slightly Adverse
	Leopard Frog	Rana pipens	Yl		Slightly Adverse
	Bull Frog	Rana catesheiana	Yl		Slightly Adverse
Reptiles					
	Western Skink	Eumeces skiltonianus	Yl		Slightly Adverse

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Season of Use and Animals Found in the

Riparian Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Reptiles	Western Whiptail	Cnemidophorus tigris	Yl		Slightly Adverse
	Ringneck Snake	Diadophis punctatus	Yl		Moderately Adverse
	Racer	Colber constrictor	Yl		Slightly Adverse
	Gopher Snake	Pituophis melanaleucus	Yl		Slightly Adverse
	Common Garter Snake	Thamnophis sirtalis	Yl		Slightly Adverse
	Western Terrestrial Garter Snake	Thamnophis elegans	Yl		Slightly Adverse
	Western Ground Snake	Sonora semiannulata	Yl		Slightly Adverse

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Table 3

Season of Use and Animals Found in the Windbreaks and Trees Developed Around Farms Converted from the Sagebrush-Grass Vegetative Habitat Type

Class of Animal	Common Name	Scientific Name	Season of Use *	Classification	Impact
Mammals	Fringed Myotis (Bat)	Myotis thysanodes	M-S		Slightly Beneficial
	California Myotis (Bat)	Myotis californicus	M-S		Slightly Beneficial
	Yuma Myotis (Bat)	Myotis yumanensis	M-S		Slightly Beneficial
	Long-Legged Myotis (Bat)	Myotis volans	M-S		Slightly Beneficial
	Western Pipistrel (Bat)	Pipistrellus hesperus	M-S		Slightly Beneficial
	Spotted Bat	Euderma maculata	M-S	Threatened	Slightly Beneficial
	Western Big-Eared Bat	Plecotus townsendii	M-S		Slightly Beneficial
	Pallid Bat	Antrozous pallidus	M-S		Slightly Beneficial
	Longtail Weasel	Mustela frenata	Yl		Slightly Beneficial
	Spotted Skunk	Spilogale putorius	Yl		Slightly Beneficial
	Striped Skunk	Mephitis mephitis	Yl		Slightly Beneficial
	Ord Kangaroo Rat	Dipodomys ordi	Yl		Slightly Beneficial
	Western Harvest Mouse	Reithrodontomys megolotis	Yl		Slightly Beneficial
	Deer Mouse	Peromyscus maniculatus	Yl		Slightly Beneficial
	Norway Rat	Rattus norvegicus	Yl		Highly Beneficial
	House Mouse	Mus musculus	Yl		Highly Beneficial
	Mountain Cottontail	Sylvilagus nuttalli	Yl	Game Animal	Slightly Beneficial

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Season of Use and Animals Found in the Windbreaks and Trees Developed Around Farms Converted from the Sagebrush-Grass Vegetative Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Birds	Pigeon Hawk	Falcon columbarius	M-W	Status Undetermd.	Slightly Beneficial
	Sparrow Hawk	Falco sparverius	Yl		Moderately Beneficial
	Pheasant	Phasianus colchicus	Yl	Game Bird	Slightly Beneficial
	Domestic Pigeon	Columba livia	Yl		Highly Beneficial
	Mourning Dove	Zenaidura macroura	M-S	Game Bird	Slightly Beneficial
	Barn Owl	Tyto alba	M-S		Slightly Beneficial
	Screech Owl	Otus asio	Yl		Slightly Beneficial
	Great-Horned Owl	Bubo virginianus	Yl		Slightly Adverse
	Black-Chinned Hummingbird	Archilochus alexandri	M-S		Slightly Beneficial
	Rufous Hummingbird	Selasphorus rufus	M-S		Slightly Beneficial
	Bohemian Waxwing	Bombycilla garrula	W		Slightly Beneficial
	Cedar Waxwing	Bombycilla cedrorum	M-W		Slightly Beneficial
	Loggerhead Shrike	Lanius ludovicianus	M-S		Slightly Beneficial
	Starling	Sturnus vulgaris	Yl		Highly Beneficial
	Red-Eyed Vireo	Vireo olivaceus	M-S		Moderately Beneficial
	Black and White Warbler	Mniotilia varia	M		Slightly Beneficial
	Yellow Warbler	Dendroica petechia	M-S		Slightly Beneficial
	Myrtle Warbler	Dendroica coronata	M		Slightly Beneficial

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

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Season of Use and Animals Found in the Windbreaks and Trees Developed Around Farms Converted from the Sagebrush-Grass Vegetative Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Birds	House Sparrow	Passer domesticus	Yl		Highly Beneficial
	Bullock's Oriole	Icterus bullockii	M-S		Slightly Beneficial
	Brewer's Blackbird	Euphagus cyanocephalys	M-S		Slightly Beneficial
	Brown-Headed Cowbird	Molothrus ater	Sp-S		Highly Beneficial
	Western Tanager	Piranga ludoviciana	M-S		Slightly Beneficial
	Evening Grosbeak	Hesperiphonia vespertina	M-W		Slightly Beneficial
	Pine Grosbeak	Pinicola enucleator	M-W		Slightly Beneficial
	House Finch	Carpodacus mexicanus	Yl		Highly Beneficial
	Common Redpoll	Acanthis flammea	M-W		Slightly Beneficial
	Pine Siskin	Spinus pinus	W		Slightly Beneficial
	American Goldfinch	Spinus tristis	Yl		Moderately Beneficial
	Red Crossbill	Loxia curvirostra	W		Slightly Beneficial
	Rufous-Sided Towhee	Pipilo erythrophthalmus	M		Slightly Beneficial
	Oregon Junco	Junco oreganus	W		Slightly Beneficial
	Lark Sparrow	Chondestes grammacus	M-S		Slightly Beneficial
	Tree Sparrow	Spizella arborea	W		Slightly Beneficial
	Chipping Sparrow	Spizella passerina	M-S		Slightly Beneficial
	Song Sparrow	Melospiza melodia	Yl		Slightly Beneficial

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Season of Use and Animals Found in the Windbreaks and Trees Developed Around Farms Converted from the Sagebrush-Grass Vegetative Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Birds	Yellow-Shafted Flicker	Colaptes auratus	M		Slightly Beneficial
	Red-Shafted Flicker	Colaptes cafer	Yl		Slightly Beneficial
	Downy Woodpecker	Dendrocopos pubescens	Yl		Slightly Beneficial
	Eastern Kingbird	Tyrannus tyrannus	M-S		Slightly Beneficial
	Western Kingbird	Tyrannus verticalis	M-S		Slightly Beneficial
	Say's Phoebe	Sayornis saya	S		Slightly Beneficial
	Barn Swallow	Hirundo rustica	M-S		Slightly Beneficial
	Cliff Swallow	Petrochelidon	M-S		Slightly Beneficial
	Purple Martin	Progne subis	M		Slightly Beneficial
	Black-Billed Magpie	Pica pica	Yl		Slightly Beneficial
	Red-Breasted Nuthatch	Sitta canadensis	W		Slightly Beneficial
	House Wren	Troglodytes aedon	M-S		Slightly Beneficial
	Robin	Turdus migratorius	Yl		Slightly Beneficial
	Golden-Crowned Kinglet	Regulus satrapa	W		Slightly Beneficial
	Ruby-Crowned Kinglet	Regulus calendula	M		Slightly Beneficial
Amphibians	NONE				

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Season of Use and Animals Found in the Windbreaks
and Trees Developed Around Farms Converted from
the Sagebrush-Grass Vegetative Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Reptiles	Gopher Snake	Pituophis melanoleucus	Yl		Slightly Beneficial

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Table 4

Season of Use and Animals Found in the and Adjacent to
Small Ponds, Detention Dams and Waste Water Drainages
Cpnverted from the Sagebrush-Grass Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Mammals	Dusky Shrew	Sorex obsurus	Yl		Slightly Beneficial
	California Myotis (Bat)	Myotis californicus	M-S		Slightly Beneficial
	Spotted Bat	Euderma maculata	M-S	Threatened	Moderately Beneficial
	Pallid Bat	Antrozous pallidus	M-S		Slightly Beneficial
	Raccoon	Procyon lotor	Yl		Slightly Beneficial
	Long-Tail Weasel	Mustela frenata	Yl		Slightly Beneficial
	Spotted Skunk	Spilogale putorius	Yl		Slightly Beneficial
	Striped Skunk	Mephitis mephitis	Yl		Moderately Beneficial
	Red Fox	Vulpes fulva	Yl		Slightly Beneficial
	Western Harvest Mouse	Reithrodontomys megolotis	Yl		Slightly Beneficial
	Meadow Vole	Microtus pennsylvanicus	Yl		Slightly Beneficial
	Longtail Vole	Microtus longicaudis	Yl		Slightly Beneficial
	Muskrat	Ondatra zibetica	Yl		Slightly Beneficial
	Richardson Vole	Microtus richardsoni	Yl		Slightly Beneficial
	Norway Rat	Rattus norvegicus	Yl		Moderately Beneficial
	Western Jumping Mouse	Zapus princeps	Yl		Slightly Beneficial
	Mountain Cottontail	Sylvilagus nuttalli	Yl	Game Animal	Slightly Beneficial
	Mule Deer	Odocoileus hemionus	Yl	Game Animal	Slightly Beneficial

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Season of Use and Animals Found in ~~the~~ and Adjacent to
Small Ponds, Detention Dams and Waste Water Drainages
Converted from the Sagebrush-Grass Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Birds	Least Bittern	Ixobrychus exilis	M-S		Slightly Beneficial
	Mallard	Anas platyrhynchos	Yl	Game Bird	Slightly Beneficial
	Pintail	Anas acuta	Yl	Game Bird	Slightly Beneficial
	Green-Winged Teal	Anas carolinensis	Yl	Game Bird	Slightly Beneficial
	Blue-Winged Teal	Anas discors	M-S	Game Bird	Slightly Beneficial
	Cinnamon Teal	Anas cyanoptera	M-S	Game Bird	Slightly Beneficial
	American Widgeon	Mareca americana	Yl	Game Bird	Slightly Beneficial
	Shoveler	Spatula clypeata	Yl	Game Bird	Slightly Beneficial
	Ruddy Duck	Oxyura jamaicensis	Yl	Game Bird	Slightly Beneficial
	Red-Tailed Hawk	Buteo jamaicensis	Yl		Slightly Beneficial
	Swainson's Hawk	Buteo swainsoni	M-S		Slightly Beneficial
	Harlan's Hawk	Buteo harlani	M		Slightly Beneficial
	Broad-Winged Hawk	Buteo platypterus	S		Slightly Beneficial
	Bald Eagle	Haliaeetus leucocephalus	M-W		Slightly Beneficial
	Marsh Hawk	Circus cyaneus	Yl		Slightly Beneficial
	Pigeon Hawk	Falco columbarius	M-W	Status Undetermd.	Slightly Beneficial
	Sparrow Hawk	Falco sparverius	Yl		Moderately Beneficial
	California Quail	Lophortyx californicus	Yl	Game Bird	Moderately Beneficial

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Season of Use and Animals Found in the and Adjacent to Small Ponds, Detention Dams and Waste Water Drainages Converted from the Sagebrush-Grass Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Birds	Hungarian Partridge	Perdix perdix	Yl	Game Bird	Slightly Beneficial
	Pheasant	Phasianus colchicus	Yl	Game Bird	Slightly Beneficial
	American Coot	Fulica americana	Yl	Game Bird	Slightly Beneficial
	Killdeer	Charadrius vociferus	Yl		Slightly Beneficial
	Black-Bellied Plover	Squatarola squatarola	M		Slightly Beneficial
	Wilson's Snipe	Capella gallinago	M-S		Slightly Beneficial
	Whimbrel	Numenius phaeopus	M		Slightly Beneficial
	Solitary Sandpiper	Tringa solitaria	M		Slightly Beneficial
	Willet	Catoptrophorus semipalmatus	M-S		Slightly Beneficial
	Greater Yellowlegs	Totanus melanoleucus	M		Slightly Beneficial
	Lesser Yellowlegs	Totanus flavipes	M		Slightly Beneficial
	Pectoral Sandpiper	Erolia melanotos	F		Slightly Beneficial
	Baird's Sandpiper	Erolia bairdi	M		Slightly Beneficial
	Least Sandpiper	Erolia minutilla	M		Slightly Beneficial
	Dunlin	Erolia alpina	M		Slightly Beneficial
	Short-Billed Dowitcher	Limnodromus griseus	M		Slightly Beneficial
	Long-Billed Dowitcher	Limnodromus scolopaceus	M		Slightly Beneficial
	Stilt Sandpiper	Micropalama himantopus	M		Slightly Beneficial

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Season of Use and Animals Found in the and Adjacent to
Small Ponds, Detention Dams, and Waste Water Drainages
Converted from the Sagebrush-Grass Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Birds	Semipalmated Sandpiper	Ereunetes pusillus	M		Slightly Beneficial
	Western Sandpiper	Ereunetes mauri	M		Slightly Beneficial
	Marbled Godwit	Limosa fedoa	M		Slightly Beneficial
	Sanderling	Crocethia alba	M		Slightly Beneficial
	American Avocet	Recurvirostra americana	M-S		Moderately Beneficial
	Black-Necked Stilt	Himantopus mexicanus	M-S		Slightly Beneficial
	Wilson's Phalarope	Steganopus tricolor	M-S		Slightly Beneficial
	Northern Phalarope	Lobipes lobatus	M		Slightly Beneficial
	California Gull	Larus californicus	M-S		Slightly Beneficial
	Ring-Billed Gull	Larus delawarensis	Yl		Slightly Beneficial
	Mourning Dove	Zenaidura macroura	M-S	Game Bird	Highly Beneficial
	Barn Owl	Tyto alba	M-S		Slightly Beneficial
	Screech Owl	Otus asio	Yl		Slightly Beneficial
	Great Horned Owl	Bubo virginianus	Yl		Slightly Beneficial
	Pygmy Owl	Glaucidium gnoma	W		Slightly Beneficial
	Black-Chinned Hummingbird	Archilochus alexandri	M-S		Moderately Beneficial
	Rufous Hummingbird	Selasphorus rufus	M-S		Moderately Beneficial
	Bohemian Waxwing	Bombycilla garrula	W		Slightly Beneficial

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Season of Use and Animals Found in the and Adjacent to
Small Ponds, Detention Dams and Waste Water Drainages
Converted from the Sagebrush-Grass Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Birds	Cedar Waxwing	Bombycilla cedrorum	M-W		Slightly Beneficial
	Loggerhead Shrike	Lanius ludovicianus	M-S		Slightly Beneficial
	Starling	Sturnus vulgaris	Yl		Highly Beneficial
	Red-Eyed Vireo	Vireo olivaceus	M-S		Moderately Beneficial
	Black and White Warbler	Mniotilta varia	M		Slightly Beneficial
	Yellow Warbler	Dendroica petechia	M-S		Slightly Beneficial
	Myrtle Warbler	Dendroica coronata	M		Slightly Beneficial
	MacGillivray's Warbler	Oporornis tolmiei	M-S		Slightly Beneficial
	Yellowthroat	Geothylpis trichas	M-S		Slightly Beneficial
	Yellow-Breasted Chat	Icteria virens	M-S		Slightly Beneficial
	House Sparrow	Passer domesticus	Yl		Slightly Beneficial
	Bobolink	Dolichonyx oryzivorus	M-S		Slightly Beneficial
	Yellow-headed Blackbird	Xanthocephalus xanthocephalus	M-S		Slightly Beneficial
	Red-Winged Blackbird	Agelaius pheoniceus	M-S		Slightly Beneficial
	Tricolored Blackbird	Agelaius tricolor	M-S		Slightly Beneficial
	Brown-Headed Cowbird	Molothrus ater	Sp-S		Moderately Beneficial
	Western Tanager	Piranga ludoviciana	M-S		Slightly Beneficial
	Evening Grosbeak	Hesperiphonia vespertina	M-W		Slightly Beneficial

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Season of Use and Animals Found in the and Adjacent to
Small Ponds, Detention Dams and Waste Water Drainages
Converted from the Sagebrush-Grass Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Birds	Lazuli Bunting	Passerina amoena	M-S		Slightly Beneficial
	House Finch	Carpodacus mexicanus	Yl		Slightly Beneficial
	Common Redpoll	Acanthis flammea	M-W		Slightly Beneficial
	American Goldfinch	Spinus tristis	Yl		Slightly Beneficial
	Green-Tailed Towhee	Chlorura chlorura	M-S		Slightly Beneficial
	Rufous-Sided Towhee	Pipilo erythrophthalmus	M		Slightly Beneficial
	Oregon Junco	Junco oreganus	W		Slightly Beneficial
	Savannah Sparrow	Passerculus sandwichensis	Sp-S		Slightly Beneficial
	Tree Sparrow	Spizella arborea	W		Slightly Beneficial
	Chipping Sparrow	Spizella passerina	M-S		Slightly Beneficial
	Harris' Sparrow	Zonotrichia querula	Sp-W		Slightly Beneficial
	White-Crowned Sparrow	Zonotrichia leucophrys	M		Slightly Beneficial
	White-Throated Sparrow	Zonotrichia albicollis	M		Slightly Beneficial
	Song Sparrow	Melospiza melodia	Yl		Slightly Beneficial
	Downy Woodpecker	Dendrocopos pubescens	Yl		Slightly Beneficial
	Eastern Kingbird	Tyrannus tyrannus	M-S		Slightly Beneficial
	Western Kingbird	Tyrannus verticalis	M-S		Slightly Beneficial
	Says Phoebe	Sayornis saya	S		Slightly Beneficial

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Season of Use and Animals Found in ~~the~~ and Adjacent to
Small Ponds, Detention Dams and Waste Water Drainages
Converted from the Sagebrush-Grass Habitat Type

Class of Animal	Common Name	Scientific Name	Season of Use *	Classification	Impact
Birds	Traill's Flycatcher	Empidonax trailli	M-S		Slightly Beneficial
	Dusky Flycatcher	Empidonax oberholseri	M-S		Slightly Beneficial
	Tree Swallow	Iredoprocne bicolor	M-S		Slightly Beneficial
	Bank Swallow	Riparia riparia	M-S		Slightly Beneficial
	Barn Swallow	Hirundo rustica	M-S		Slightly Beneficial
	Cliff Swallow	Petrochelidon pyrrhonota	M-S		Slightly Beneficial
	Rough-Winged Swallow	Stelgidopteryx ruficollis	M-S		Slightly Beneficial
	Black-Billed Magpie	Pica pica	Yl		Slightly Beneficial
	Common Crow	Corvus brachyrhnchos	Yl		Slightly Beneficial
	Black-Capped Chickadee	Parus atricapillus	Yl		Slightly Beneficial
	House Wren	Troglodytes aedon	M-S		Slightly Beneficial
	Long-Billed Marsh Wren	Telmatodytes palustris	Yl		Slightly Beneficial
	Robin	Turdus migratorius	Yl		Slightly Beneficial
	Golden-Crowned Kinglet	Regulus satrapa	W		Slightly Beneficial
	Ruby-Crowned Kinglet	Regulus calendula	M		Slightly Beneficial
Amphibians	Long-Toed Salamander	Ambystoma macrodactylum	Yl		Slightly Beneficial
	Tiger Salamander	Ambystoma tigrinum	Yl		Slightly Beneficial

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Season of Use and Animals Found in the and Adjacent to
Small Ponds, Detention Dams and Waste Water Drainages
Converted from the Sagebrush-Grass Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Amphibians	Great Basin Spade-foot Toad	Scaphiopus intermontanus	Yl		Slightly Beneficial
	Western Toad	Bufo boreas	Yl		Slightly Beneficial
	Woodhouse's Toad	Bufo woodhousei	Yl		Slightly Beneficial
	Chorus Frog	Pseudacris triseriata	Yl		Slightly Beneficial
	Pacific Tree Frog	Hyla regilla	Yl		Slightly Beneficial
	Leopard Frog	Rana pipens	Yl		Slightly Beneficial
	Bull Frog	Rana catesbeiana	Yl		Slightly Beneficial
Reptiles	Racer	Colber constrictor	Yl		Slightly Beneficial
	Gopher Snake	Pituophis melanoleucus	Yl		Slightly Beneficial
	Common Garter Snake	Thamnophis sirtalis	Yl		Slightly Beneficial
	Western Terrestrial Garter Snake	Thamnophis elegans	Yl		Slightly Beneficial
	Western Ground Snake	Sonora semiannulàta	Yl		Slightly Beneficial

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Table 5

Season of Use and Animals Found in the Sprinkler System Agricultural Tracts Converted from the Sagebrush-Grass Habitat Type

Class of Animal	Common Name	Scientific Name	Season of Use *	Classification	Impact
Mammals	Coyote	Canis latrans	Yl		Slightly Beneficial
	Blending Ground Squirrel	Citellus blendingi	Yl		Slightly Beneficial
	Columbian Ground Squirrel	Citellus columbianus	Yl		Slightly Beneficial
	Meadow Vole	Microtus pennsylvanicus	Yl		Slightly Beneficial
	Whitetail Jackrabbit	Lepus townsendi	Yl		Slightly Beneficial
	Blacktail Jackrabbit	Lepus californicus	Yl		Slightly Beneficial
	Mule Deer	Odocoileus hemionous	Yl		Slightly Beneficial
Birds	Canada Goose	Branta canadensis	W	Game Bird	Moderately Beneficial
	Snow Goose	Chen hyperborea	W	Game Bird	Moderately Beneficial
	Ross' Goose	Chen rossii	W	Game Bird	Moderately Beneficial
	Mallard	Anas platyrhynchos	W	Game Bird	Moderately Beneficial
	Pintail	Anas acuta	W	Game Bird	Moderately Beneficial
	American Widgeon	Mareca americana	W	Game Bird	Moderately Beneficial
	Turkey Vulture	Cathertes aura	M-S		Slightly Beneficial
	Swainson's Hawk	Buteo swainsoni	M-S		Slightly Beneficial
	Rough-Legged Hawk	Buteo lagopus	M-W		Slightly Beneficial
	Golden Eagle	Aquila chrysaetos	Yl		Slightly Beneficial

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Season of Use and Animals Found in the
Sprinkler System Agricultural Tracts
Converted from the Sagebrush-Grass Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Birds	Bald Eagle	Haliaeetus leucocephalus	M-W		Slightly Beneficial
	Marsh Hawk	Circus cyaneus	Yl		Slightly Beneficial
	Sparrow Hawk	Falco sparverius	Yl		Slightly Beneficial
	California Quail	Lophortyx californicus	Yl	Game Bird	Slightly Beneficial
	Hungarian Partridge	Perdix perdix	Yl	Game Bird	Slightly Beneficial
	Pheasant	Phasianus colchicus	Yl	Game Bird	Slightly Beneficial
	Killdeer	Charadrius vociferus	Yl		Slightly Beneficial
	Herring Gull	Larus argentatus	M		Slightly Beneficial
	California Gull	Larus californicus	M-S		Slightly Beneficial
	Domestic Pigeon	Columba livia	Yl		Moderately Beneficial
	Mourning Dove	Zenaidura macroura	M-S	Game Bird	Slightly Beneficial
	Barn Owl	Tyto alba	M-S		Slightly Beneficial
	Short-Eared Owl	Asio flammeus	Yl		Slightly Beneficial
	Common Nighthawk	Chordeiles minor	M-S		Slightly Beneficial
	Northern Shrike	Lanius excubitor	W		Slightly Beneficial
	Loggerhead Shrike	Lanius ludovicianus	M-S		Slightly Beneficial
	Starling	Sturnus vulgaris	Yl		Moderately Beneficial
	House Sparrow	Passer domesticus	Yl		Slightly Beneficial

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Season of Use and Animals Found in the
Sprinkler System Agricultural Tracts Converted from the Sagebrush-Grass Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Birds	Western Meadowlark	Sturnella negeota	M-S		Slightly Beneficial
	Red-Winged Blackbird	Agelaius phoeniceus	M-S		Slightly Beneficial
	Tricolored Blackbird	Agelaius tricolor	M-S		Slightly Beneficial
	Brown-Headed Cowbird	Molothrus ater	Sp-S		Highly Beneficial
	Snow Bunting	Plectrophenax nivalis	W		Slightly Beneficial
	Common Redpoll	Acanthis flammea	M-W		Moderately Beneficial
	American Goldfinch	Spinus tristis	Yl		Slightly Beneficial
	Lark Sparrow	Chondestes grammacus	M-S		Slightly Beneficial
	Brewer's Sparrow	Spizella breweri	M-S		Slightly Beneficial
	Lapland Longspur	Calcarius lapponicus	W		Slightly Beneficial
	Horned Lark	Eremophila alpestris	W		Slightly Beneficial
	Barn Swallow	Hirundo rustica	M-S		Slightly Beneficial
	Water Pipit	Anthus spinoletta	M		Slightly Beneficial
Amphibians	None				
Reptiles	Western Fence Lizard	Sceloporus occidentalis	Yl		Slightly Beneficial
	Gopher Snake	Pituophis melanoleucus	Yl		Slightly Beneficial

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

Season of Use and Animals Found in the Sprinkler System Agricultural Tracts Converted from the Sagebrush-Grass Habitat Type

Class of Animal	Common Name	Scientific Name	Season * of Use	Classification	Impact
Reptiles	Western Rattlesnake	Cortalus viridis	Yl		Slightly Beneficial

* Season of Use: Sp = Occurs during spring migrations; F = Occurs during fall migrations; M = Occurs during spring and fall migrations; S = Occurs during summer; W = Occurs during winter; Yl = Occurs year long.

TRANSPORTATION AND UTILITIES
PAYETTE COUNTY

Transportation

The principal highways in Payette County are Interstate Highway 80N extending northwest-southeast through the southern part of the county; U.S. Highway 95 connecting Fruitland and Payette with Weiser (Washington County) to the north and Caldwell (Canyon County) to the south; U.S. Highway 30 joining Fruitland and New Plymouth; and State Highway 52 connecting Payette with New Plymouth before entering Gem County. Traffic along I-80N averages 4200 cars per day; U.S. 95 carries an average daily load of 1300 vehicles.

There are no regularly scheduled airline flights but charter flights and other general aviation services are available at the Payette Airport. The Union Pacific Railroad serves New Plymouth and Payette. Local bus service is available. "The Stage" busline operates on a round-trip daily basis through Payette between New Meadows and Boise. Daily motor freight schedules are maintained by a number of interstate and local carriers.

Utilities

The Idaho Power Company supplies electric power to Payette County; Intermountain Gas Company delivers natural gas to Payette, Fruitland, and New Plymouth. The Salt Lake Pipeline Company has a fuel transport line that crosses the county, with a distribution station near Gayway Junction in Fruitland. The Farmers Mutual Telephone Company supplies telephone service to the Fruitland and New Plymouth areas and Mountain Bell serves the rest of the county.

Fruitland

Water System--The original water system was installed in 1951 and consisted of several wells and a distribution network. The city's expansion in 1968 necessitated system expansion and an elevated storage reservoir, additional well, and major distribution lines were constructed at that time. Wells range in depth from 68 to 115 feet and all are equipped with chlorination equipment and water is treated during summer months.

Sewerage System--A small collection system was constructed in the early 1940's to carry sewage to the Snake River. Additional collection lines were constructed until the 1960's and an initial lagoon was constructed in the mid-1960's. In 1969 a new collection system and a second lagoon were constructed. Flow is predominantly from domestic users.

New Plymouth

Water System--The community-owned system was constructed in the 1930's and subsequent improvements have included development of two wells and minor expansion of the distribution network. The four supply wells range from 80 to 200 feet in depth and are chlorinated. Storage is maintained in a 20,000-gallon elevated steel reservoir. The original distribution system is of 4-inch steel pipe with newer lines of plastic. Physical condition is good.

Sewerage System--The original community septic tank was replaced with a stabilization lagoon in 1966, and treated effluent from the lagoon system is discharged into the Payette River. Flow is from domestic and industrial sources.

Payette

Water System--The original system was constructed in 1912 with a major expansion occurring in the mid-1930's. The distribution system has since been extended and several wells developed. Domestic water is supplied by seven wells with total maximum yields of 2,000 gallons per minute and one with 900 gpm. Total daily flow is 4.18 million gallons. The water is not treated but is closely monitored. Storage is in a 400,000-gallon covered concrete reservoir. The distribution system is in good condition.

Sewerage System--The collection system built in the 1930's was built to its present size in 1960 and a primary water treatment plant was built. The system is in good physical condition.

GEM COUNTY

Transportation

The principal highways in Gem County are State Highway 52 joining Letha, Emmett, and Montour with Horseshoe Bend to the east and Payette to the west; and State Highway 16 which runs south to State Highway 44 near Star from Emmett. A paved county road runs north from Montour to Ola, then continues as an unimproved road for ten miles until it leaves the county. A gravel road runs west from Sage Hen Reservoir and intersects an unimproved road near the county line.

State Highway 52 carries an average daily traffic load of 850 cars, while State Highway 16 carries 2100 cars each day. Although there is no scheduled air service into Gem County, charter flights to two unpaved airports near Emmett are arranged. Limited general aviation services are also available.

The Union Pacific Railroad serves Letha, Emmett, and Montour, and bus service is provided on a round-trip daily basis to Boise by "The Stage" bus company. Local and long-distance motor freight service are provided by a number of companies to the area.

Utilities

The Idaho Power Company provides electric power to the county and Intermountain Gas Company provides natural gas to Emmett.

Emmett

Water System--The original system was constructed early in the 1900's of wood pipe and replaced in the mid-1930's with cast iron. Subsequent improvements have occurred. Four wells are the source of supply and they range from 200 to 300 feet in depth and produce 7.05 million gallons per day. Wells are chlorinated and calgon-treated to stabilize high iron content. Storage consists of a 72,000-gallon elevated steel tank and a 100,000-gallon concrete reservoir. The distribution system is cast iron pipe in very good condition.

Sewerage System--The original 1915 system drained directly into the Payette River. In 1965, a three-cell stabilization lagoon treatment facility was constructed and direct river discharge was discontinued. Flows are mostly from domestic sources. Two lift stations are incorporated in the existing system.

Letha

Water System--Domestic water is obtained from private wells having depths of from 30 to 150 feet. Most are over 80 feet and the supply is from an artesian source.

Sewerage System--Private systems are used for sewage waste disposal. A community water and sewer district has been formed to serve as an agency for requesting community sewerage system funds for a central system.

CANYON COUNTY

Transportation

The major highways in Canyon County include I-80N extending across the county via Caldwell and Nampa, and U.S. Highway 95 going north-south through Wilder. State Highway 44 joins Boise directly to Caldwell and State Highway 45 runs south from I-80N at Nampa to State Highway 78 at Walters Ferry on the Snake River. State Highway 19 extends from Caldwell westward through the county and State Highway 55 from the south connects to I-80N at Nampa.

Interstate 80N carries average daily traffic of 10,000 trips between Boise and Caldwell, and 5400 trips between Caldwell and the Oregon State Line. U.S. 95 averages 1700 cars per day and U.S. 30 between Caldwell and Nampa averages 10,400 trips per day. State Highway 19 has a daily load of 4,000 vehicles and State 55 averages 2700 cars a day.

There is no regularly scheduled air carrier service to the county. The growing demand is handled by the Boise Municipal Airport; general aviation services and facilities are available at the Caldwell and Nampa airports. In addition, the FAA has approved construction of Phase One of the new Caldwell Airport.

The Union Pacific Railroad provides freight service to Wilder, Caldwell, and Nampa. Northwest Greyhound and Trailways bus companies serve the county and local charter bus service is available. Boise-Winnemucca serves the county from points south and Boise. At least a dozen companies provide general commodity and specialized motor freight service in the Nampa-Caldwell area.

Utilities

The Idaho Power Company supplies electric power from the Bonneville Power Administration network. Intermountain Gas Company provides natural gas to Parma, Nampa, and Caldwell. Telephone service is provided by Mountain Bell, with the Idaho Telephone Company serving the Parma area and the Owyhee Telephone Company supplying Wilder.

Caldwell

Water-System--Seven deep wells provide the source for the city's domestic water, Production capacity is 4.5 million gallons per day and average-day production is 2.4 million gallons. The gravity flow distribution storage capacity is 500,000 gallons. Retail population served is 15,500 and there are 5121 metered connections.

Sewerage System--The existing facility is mechanical with trickling-filter secondary treatment. The capacity is 7.6 million gallons daily. The system needs expansion to accomodate new growth areas, and the need to reduce infiltration is indicated.

Greenleaf

Water System--The original system was constructed in the late 1940's and early 1950's and has since been upgraded. Presently it consists of four wells from 165 to 300 feet in depth and a distribution system of mostly two-inch pipeline. The community has formed the Greenleaf Water and Sewer Association.

Sewerage System--The system consists of a 1950 installation consisting of a single pipeline from the community to a drain ditch.

Melba

Water System--The source is two wells with total yield of 360 gallons per minute. Storage is provided by a 22,000 gallon ground-level steel tank. The distribution system is a network of 4-inch and larger pipelines to all developed areas.

Sewerage System--The city has no sewage collection system or centralized treatment facility.

Middleton

Water System--The primary source is a 600-foot artesian well; the standby is a 130-foot semi-artesian well. A 15,000 gallon elevated tank provides storage. The distribution system is generally in fair condition. There are no major industrial users.

Sewerage System--The collection system provides sanitary service to nearly all the developed areas of the community. Pipeline sizes vary from 8-inch to 24-inch. Treatment facilities include a four-stage lagoon from whose last stage effluent is discharged into the Boise River.

Nampa

Water System--The city's source of domestic water is from eight deep wells with an average daily flow of approximately six million gallons with distribution storage in excess of one million gallons. The water is treated for disinfection by chlorination. A retail population of 25,000 is served.

Sewerage System--The existing facility consists of a mechanical plant with trickling filter secondary treatment of an 18-million-gallon capacity daily. The plant is overloaded and needs expansion and modifications to meet discharge permit requirements. The need to reduce infiltration is also present.

Notus

Water System--The source of supply is a 185-foot well which produces 500 gpm and an 80-foot standby well. Storage is in a 100,000-gallon elevated tank. Water quality is monitored in the absence of chlorination. Distribution is via an 8- to 14-inch system in good condition.

Sewerage System--The system includes a conventional treatment lagoon, collector and interceptor and lateral line, and it was extensively improved in 1969.

Parma

Water System--The primary source is a 495-foot well capable of supplying 1600 gpm. Two 300-foot wells provide standby sources. Storage requirements are provided by a 150,000-gallon elevated storage tank; the distribution system is comprised of ten-inch and smaller pipelines.

Sewerage System--The system was built in 1963 and consists of a conventional sewage treatment lagoon; outfall and interceptor lines to intersect the older collection lines. Three lift stations are on the distribution system which ranges up to 18 inches in size.

Roswell

Water System--The system consists of a single well rated at 200 gpm, a 750-gallon hydropneumatic tank, and 4-inch or smaller distribution pipeline.

Sewerage System--The system collects effluent from individual septic tanks and transports it via gravity flow to a granular drainage area west of Roswell. No treatment is provided.

Wilder

Water System--A 250-gallon-per-minute well is the source of supply. Storage is in a 40,000-gallon elevated steel storage tank. The majority of the distribution pipeline is of cast iron. About 265 users are served.

Sewerage System--The system dates back to 1934. Complete replacement of the collection system and construction of a treatment lagoon took place in the early 1970's. The lateral, interceptor, and outfall sewer lines and lift station are adequate of the community's needs.

Residential Area Northeast of Homedale

Water System--Domestic water is supplied from individual wells or natural springs.

Sewerage System--The residential area is not served by a central system. Treatment and/or disposal is through septic tank or cesspool.

Subdivisions in the Nampa-Caldwell Area

Water System--At present, the majority of residents utilize well sources for domestic water needs. The balance of the residents obtain domestic water from community-type systems which serve anywhere from two users to an entire subdivision.

Sewerage System--Sewage treatment and/or disposal is generally accomplished with individual septic tank and field-drain systems, or on occasion, community septic tanks.

OWYHEE COUNTY

Transportation

Owyhee County's principal highways include: U.S. 95 between the Oregon State Line and the Snake River via the Marsing area and Homedale; State 51 connecting Bruneau, Grasmere, and Riddle from I-80N at Mountain Home to Nevada on the south; State 78 (Owyhee Highway) traversing the county along the Snake River; and State 45 connecting to State 78 at Walters Ferry on the Snake River. U.S. 95 carries average daily traffic of 600 cars; State 51 averages 150 trips per day, and State 78 carries 200 per day.

No scheduled air carriers serve the county. General aviation facilities in varying degree are available at the Homedale Airport, Symms Airport at Marsing, and smaller facilities across the county. The Union Pacific Railroad serves Homedale and Marsing with freight facilities. Boise-Winnemucca bus company provides thrice daily service to points north and south. A variety of interstate and specialized motor freight transport services and schedules are available.

Utilities

Electric power is supplied to the county by the Idaho Power Company. There is no natural gas service to the county. Telephone service is furnished by four companies: Owyhee Telephone in the western border area; Mountain Bell in the Marsing to Bruneau area; Filer Mutual in the southeastern portion; and Gem State Utilities in the remainder.

Bruneau

Water System--Two artesian wells supply 10 gpm each and many private wells - 30 feet to 300 feet - augment them. Some water is hauled from Mountain Home. Storage is in a 7500-gallon concrete reservoir. The limited distribution system consists of 3-inch and smaller lines.

Sewerage System--The community has no centralized sewage treatment facility. Disposal is accomplished through septic tanks and drainfields.

Grand View

Water System--Domestic needs are supplied by numerous individual wells of between 20 and 30 feet. There is no public water system.

Sewerage System--The community has no central sewage system. Existing facilities consist of septic tanks and drain fields.

Homedale

Water System--Four wells varying in depth from 550 to 777 feet provide the source. Total availability is 675 gpm. Storage is in a 20,000-gallon steel tank. The distribution system is of cast iron and asbestos cement pipe and is in good condition.

Sewerage System--The original system was built in 1938 and extended in 1947. By 1964 raw sewage was being discharged into the Snake River. In 1967 sewage stabilization ponds were constructed and service extended to the entire community.

Marsing

Water System--The source is an 825-foot well on the east side of the Snake River in Canyon County. A 976-foot well near the city center provides standby. Storage is provided by a 40,000-gallon elevated steel tank. The distribution system serves the entire city.

Sewerage System--The original system built in 1958 was improved in 1967 by addition of a sewage life station, extended trunk lines, and construction of an aerated sewage treatment lagoon. The collection system basically consists of 18-inch and smaller lines in good condition.

Murphy

Water System--Source is a single artesian well and one drilled well, supplying a total of 100 gpm. A 30,000-gallon ground-level reservoir provides storage. The entire community is served by the 4-inch steel-pipe distribution system.

Sewerage System--The community has no central sewage system i disposal is accomplished entirely by individual septic tanks drainfields.

Silver City

Water System--Source is a natural spring feeding a wood-stave storage reservoir of 25,000 gallon capacity from which water is distributed via a galvanized pipeline system to about half the local population.

Sewerage System--The facilities within Silver City consist of open-pit outhouses.

ADA COUNTY

Transportation

The highway network of the county consists of Interstate 80N and parallel U.S. 20-26 and U.S. 30, all of which generally extend east-west via Boise. State Highways 44, 55, and 21 all terminate near the central business district of the city. Five bus companies provide interstate and intrastate service. In Boise, there is a municipal bus line, four taxicab companies, and an airport limousine service.

Scheduled air carriers include United, Air West, Sun Valley, Cascade, and Exec-U-Air. Ten general aviation operators provide a full spectrum of services with fixed-wing and rotary-wing craft. Union Pacific furnished rail freight service and there are outlet brokerages for most major other companies. The industrial park at the Municipal Air Terminal is a model for such facilities. About 30 firms provide a full range of motor freight trucking.

Utilities

Idaho Power Company furnishes the area's electric energy. Natural Gas is provided by Intermountain Gas Company. Mountain Bell serves the entire county with telephone service. Natural gas and fuel pipelines have major terminals in Boise.

Boise

Water System--There are 43 deep wells ranging in depth from 100 to 1,000 feet, with output of 60 million gallons per day. Concrete and steel reservoirs at ground level provide storage for 13.5 million gallons. There are 400 miles of mains and 26,000 connections. The system is chlorinated for disinfecting and treated with phosphate for iron sequestering. The Boise Water Corporation is the major supplier and serves 90 percent of the city. Other smaller systems take care of the remainder.

Sewerage System--Two existing treatment plants are being modernized and a third will come on line in 1976. Total capacity will be over 20 million gallons per day. A combination of trickling filter and activated sludge treatments are used. There are two major service sewer districts and 20,500 connections.

Eagle

Water System--No community-wide water system exists in Eagle. Approximately 125 connections are served by private wells. Combined average daily production of wells now in use is estimated at 8,000 gallons per day.

Sewerage System--The existing sewage collection system of the city was expanded to include lagoon treatment of its largely domestic sewage in 1965. The gravity flow is augmented by lift pump to stabilization ponds. The pipelines are largely 8-inch concrete laterals and interceptors. Flow is about 100 gallons per capita per day.

Meridian

Water System--Four wells produce a capacity of 1040 gpm. An elevated tank near the city center provides 60,000 gallons of storage. The distribution system is comprised primarily of 6-inch pipe with some four and eight inch. There are 1200 connections. Peak hour consumption in July, 1973 approached 1.50 mgd.

Sewerage System--The major portion of Meridian is served by 8-inch vitrified clay pipe sewage collection dating from 1925. Two main trunk lines with 8-inch lateral systems have been added since that time. Flow capacity in the system is 2.56 million gallons per day. There are 18-inch lines serving the treatment plant.

Kuna

Water System--The system is comprised of two wells, a 40,000-gallon storage tank, and nearly eight miles of distribution piping. There are 310 users, of which about 30 are commercial. Present service in the downtown area is adequate, but outlying residences experience low pressures.

Sewerage System--Kuna does not have central sewer service at this time. All treatment is accomplished with individual septic tanks and drainfields.

Star

Water System--Star does not have a community water supply.

Sewerage System--There is a nearly complete network of collection lines for the downtown section and a stabilization pond treatment system fed by gravity flow. The system is adequate for the present population.

ELMORE COUNTY

Transportation

The principal highways in Elmore County are I-80N traversing the county via Mountain Home; State 68 extending from I-80N at Mountain Home to the northeast; State 67 linking I-80N and Mountain Home Air Force Base; and State 51 which extends from I-80N at Mountain Home southward to the Nevada State Line.

Interstate 80N carries average daily traffic of 5500 trips; State 68 averages 350 cars per day; State 67 carries 3500 daily, and the route average for the entire length of State Highway 51 is about 200 vehicles per day.

There is no scheduled air service to the county. Charter flights and various general aviation services are available at the municipal airport in Mountain Home. Limited facilities are provided at local airports throughout the county. The Union Pacific Railroad serves Mountain Home, Glenns Ferry, Hammett, and King Hill. Greyhound lines and Trailway Bus Company furnish through bus service and local bus charters are available. A number of motor freight carriers provide full-range services.

Utilities

The Idaho Power Company provides the county's electric energy, except for an area in the vicinity of Anderson Ranch Reservoir which is served by a rural electrification association. Telephone service is provided by Mountain Bell and Intermountain Gas serves the area.

Atlanta

Water System--Residents provide for their own supply, which source is mainly surface water from adjacent streams of the Boise River (Middle Fork).

Sewerage System--Sewage disposal is accomplished with individual facilities such as septic tanks and drainfields.

Featherville

Water System--Source is a natural spring and a standby well; a 6000-gallon concrete reservoir provides storage; distribution is via a 2-inch transmission system. Physical and chemical quality of the water is good.

Sewerage System--There is no central system. Sewage treatment is accomplished with individual disposal systems.

Glenns Ferry

Water System--The source is a series of springs on the north side of the Snake River. Storage is in one 50,000-gallon elevated tank and one 250,000-gallon reservoir. The system has a chlorinator and distribution is community-wide through 6-inch and 4-inch mains.

Sewerage System--The present system was constructed in 1969 and consists of a conventional treatment lagoon, two main outfall sewer lines, and a storm-sewer serving essentially all developed portions of the city.

Hammett

Water System--The community does not have a central system and domestic water is supplied from individual wells.

Sewerage System--There is no centralized treatment facility. Most sewage treatment is accomplished through individual septic tanks and drainfields.

King Hill

Water System--Service is provided by a privately owned central domestic system from a 400-foot well with a 50 gpm yield. Storage is in a 3,000-gallon concrete reservoir which feeds 2-inch and smaller distribution lines to the majority of community residences.

Sewerage System--A small system was installed in 1918 consisting of two pipelines serving 16 users and which discharges directly into the Snake River. Treatment and disposal for the rest of the community is by individual septic tanks, etc.

TWIN FALLS COUNTY

Transportation

The principal highways in Twin Falls County are U.S. 93 extending north-south through the county via the city of Twin Falls; east-west U.S. 30; bypass route 74 south of Twin Falls; and State 50 extending eastward of Twin Falls to the Snake River. Interstate 80N lies just across the river in Jerome County. There is a good network of paved farm-to-market roads and other local feeder routes.

Traffic on U.S. 93 averages 1400 cars per day and U.S. 30 carries 3500 vehicles daily. Volumes on less important routes are correspondingly lighter.

Air West and Sun Valley Airlines provide scheduled carrier service to the county at Twin Falls. Charter and other general aviation services are available at other county airports as well as at Twin Falls Municipal Airport. A master plan for a five-county regional airport north of Twin Falls is being prepared.

The Union Pacific furnishes rail freight service to the area and Greyhound Lines provides bus service. Local bus service is available to Sun Valley and other county points.

Utilities

Idaho Power Company supplies electrical power from the Bonneville Power Administration. Intermountain Gas Company provides natural gas service to major county communities. Mountain Bell furnishes telephone service which is supplemented by Filer Mutual.

Buhl

Water System--The source is three wells from 904 to 1116 feet deep with a total capability of 2550 gpm. Two 504,000-gallon tanks have chlorinators. Steel pipe constitutes the distribution system. All of the city is served, ten percent being commercial.

Sewerage System--The original 1930's system was enlarged and extended in the 1950's. In 1964, the city installed a treatment facility which consisted of an aerated sewage lagoon with three aerobic lagoons following. The sewage plant provides both primary and secondary treatment before discharge into Mud Creek. Effluent is not chlorinated.

Castleford

Water System--The source is a single well 500 feet deep capable of 350 gpm. The storage is a ground-level tank and distribution is through a network of 2- to 6-inch pipelines. A chlorinator provides disinfection.

Sewerage System--Castleford has no collection system or treatment facility. Disposal is chiefly provided by septic tanks with drainfields.

Filer

Water System--Source includes three wells 570 to 942 feet deep, with a total pumped capacity of 915 gpm. Storage is in a 150,000-gallon steel tank. The distribution system is comprised of 8-inch and smaller pipelines. All residences are served by the central system.

Sewerage System--The collection system dates to the 1930's and is composed mostly of 6- and 8-inch laterals with ten to 15-inch trunk lines. A flow-through lagoon system was installed in the early 1960's and in 1967, a total of four ponds were provided with diking and aeration. Filer's plant provides both primary and secondary sewage treatment and discharges unchlorinated effluent into a drain ditch.

Hansen

Water System--The sources are one 520-foot well with a design output of 450 gpm and a 405-foot well with a design output of 200 gpm. Storage is provided by a 32,000-gallon tank. Water is chlorinated.

Sewerage System--The central sewage system was completed in 1969 and utilizes 8-inch lines throughout. The treatment system consists of a flow-through aerated lagoon setup. Effluent is discharged into a small irrigation ditch.

Hollister

Water System--The source is two artesian wells whose natural flow is augmented by pumping. Transmission lines are six inch asbestos cement with some original wooden pipe. Storage needs are met by a 40,000-gallon concrete cistern.

Sewerage System--There is no central system. Disposal is by private septic tanks and drainfields.

Kimberly

Water System--The sources are four wells in the 450-foot range capable of producing an estimated 1740 gpm. Total storage capacity is 70,000 gallons. The wells pump into the distribution system with the 70,000 gallon storage floating on the system. All pipes four inch and larger are asbestos cement pipe and the smaller pipes are galvanized steel.

Sewerage System--The collection system consists of 8-inch laterals with some 12- and 15-inch trunk sewer lines. A recent addition is a sewage lift station. The treatment plant consists of both primary and secondary stages with sludge digestion before discharge into a ditch.

Murtaugh

Water System--The community does not have a central supply system, water being obtained through individual wells for all domestic needs.

Sewerage System--The central sewer facilities were constructed between 1970 and 1972. The collection system serves all of the developed and various outlying areas. Treatment facilities are a standard full-containment lagoon utilizing two aerobic ponds.

Rogerson

Water System--The spring-fed source is a privately-owned central domestic system. Collection and distribution lines are tarred steel. The system is adequate for present demands.

Sewerage System--Sewage treatment and disposal are generally accomplished by septic tanks and drainfields.

Twin Falls

Water System--Source of supply is two drilled wells and Alpheys Springs all of which are chlorinated for disinfection. Production capability is 35 million gallons per day with average-day production being in the 6.5 million gallon range. Storage capacity is 5 million gallons per day. A retail population of 23,000 is served by 8067 connections.

Sewerage System--The existing facility is primary. Under construction is a new plant to consist of activated sludge treatment, filteration, etc. with a capacity of four million gallons.

LINCOLN COUNTY

Transportation

U.S. Highways 93, 93A, 20, and 26 traverse the county. There are 102 miles of Federal and State Highways and one-third of all local roads are hard-surfaced. Most city streets are paved. The Union Pacific Railroad serves the county, the mainline passing through Shoshone and branch lines to other points. Sun Valley Stages serves the county with 2 busses daily. The municipal airport is located one mile east of Shoshone. Another smaller airport is located at Richfield.

Utilities

Electric service is supplied by Idaho Power Company. Intermountain Gas Company serves the city of Shoshone. Mountain Bell and Gem State Utilities provide telephone service.

Dietrich

Water System--The city doesn't have a central domestic water system. Approximately 16 private wells in the 250- to

300-foot depth range are in use.

Sewerage System--Dietrich has no central sewage system, disposal being through private septic tanks and drain fields.

Richfield

Water System--The domestic water system consists of two wells which have combined capability of 220 gallons per minute; a 60,000-gallon elevated storage tank; and a distribution system which serves the entire community.

Sewerage System--The city does not have a sewage collection system. Most disposal is through septic tanks, etc.

Shoshone

Water System--The source is two wells 355 and 290 feet deep with a combined capability of 2000 gpm. Storage is in a 90,000-gallon elevated tank. The entire population is served by the system.

Sewerage System--A central sewerage system was completed in 1972. Prior to that time, the residents utilized individual private systems. The collector system serves the entire community. There are four lift stations. Treatment facilities include a three-stage lagoon. Effluent is chlorinated and discharged into Little Wood River.

JEROME COUNTY

Transportation

The county's major highways are I-80N connecting Hazelton, Eden, and Jerome with Burley to the east and with Mountain Home to the west; U.S. 93 which intersects I-80N approximately 8 miles north of Twin Falls; and State 25 which parallels I-80N east from Jerome to Hazelton.

Traffic on I-80N averages 1300 trips per day and U.S. 93 carries an average daily flow of 1300 trips.

There are no scheduled air carriers serving the county. Some limited general aviation services and facilities are available at Jerome and Hazelton Airports. The Union Pacific Railroad operates regular freight service into county communities. Both Greyhound and Trailways Bus Companies serve the county. Local charter bus service is available. Several firms furnish motor freight schedules.

Utilities

Idaho Power Company supplies Jerome County with electric energy and Intermountain Gas Company provides Jerome with natural gas.

Telephone service is supplied by Mountain Bell.

Eden

Water System--Two wells, each 380 feet deep, have a combined output of 330gpm. Distribution is through a network of cast-iron pipes. A wooden elevated tank of 25,000-gallon capacity provides storage. The entire community is served by the present system.

Sewerage System--The central sewage system was completed in 1971. The collection system serves practically all of the developed community and consists of trunk, interceptor, and lateral lines. Treatment facilities consists of a full-containment lagoon. Prior to 1970, the city utilized individual sewage disposal systems.

Hazelton

Water System--Sources of domestic water are two wells, 316 and 344 feet deep, with a combined capability of 300 gpm. An elevated wooden tank provides storage for 25,000 gallons. The distribution system is cast-iron pipe and serves most of the community.

Sewerage System--The collection system was built in 1951 and all elements are adequate for present demands. The treatment plant is a conventional trickling-filter plant consisting of a pump lift station, primary and secondary clarifiers, and sludge digestor.

Jerome

Water System--Five wells between 360 and 397 feet deep provide the water source. The combined capability is 4025 gpm. Storage is provided by a 50,000-gallon elevated tank. The water is chlorinated before entering the system. The distribution system is in good condition with only a nominal amount of upkeep required.

Sewerage System--The collection system furnishes service to most of the developed sections of the city. The system consists primarily of eight-inch laterals and 12-inch mainlines. There are two lift stations. The treatment plant provides both primary and secondary sewage treatment before discharging into the "N" Canal.

GOODING COUNTY

Transportation

Major highways include I-80N (replacing State 25) extending southeast-northwest across the lower part of the county; east-west U.S. 20-26 bisecting the county via Bliss and Gooding; north-south Highway 46 between I-80N at Wendell and the Camas County Line; and U.S. 30 from Bliss to Hagerman. A good system of paved farm-to-market county and other local routes is tributary to the major network.

Traffic on I-80N west of Bliss is on the order of 5000 trips per day, and between Bliss and Wendell about 4000 trips per day. U.S. 20-26 carries an average daily traffic of 1100 vehicles and State 46 about 2400 trips between Wendell and Gooding; the volume diminishing rapidly from Gooding northward. U.S. 30 carries about 1250 trips daily between Bliss and Hagerman.

The Union Pacific Railroad provides freight service to Bliss, Wendell, and Gooding. Greyhound Lines serves Bliss and Hagerman and Trailway Bus Lines serves Gooding and Wendell. No scheduled air service is available in the county. General aviation facilities and services are provided by the operators of the Gooding Airport. Local and long-distance specialized and general-commodity motor freight schedules are maintained by several firms at Gooding and Wendell.

Utilities

Mountain Bell furnishes telephone service to the entire county. Intermountain Gas provides natural gas to Gooding and Wendell. There is a Western Union Telegraph office in Gooding.

Bliss

Water System--Both private and city-owned wells and lines constitute the system. There are five small private wells and two city wells. The water system is in good condition and the capacity is adequate for present needs.

Sewerage System--The system consists of private septic tanks and drain fields or cesspools.

Hagerman

Water System--The system is composed of a grid of various sizes of pipe supplied through a ten-inch main from Potter Spring, which flows 2250 gpm, and Big Spring, which flows 720 gpm. The present system is adequate.

Sewerage System--Each residence presently has a septic tank and drain field or cesspool.

Wendell

Water System--The source is three deep wells with a combined capacity of 780 gpm. An elevated steel storage tank provides 50,000 gallons of storage. The distribution system is cast iron and asbestos cement pipeline. The condition of most of the pipe is good.

Sewerage System--The city provides sewers for most improved areas of the city. All lines are in good condition. The system has one lift station. The treatment facility is a three-cell lagoon system with a 100 gpm design flow.

Gooding

Water System--The source of domestic water is three deep wells producing about 1000 gpm from a depth of 360 to 420 feet. Chlorination is provided. Distribution system is steel pipeline, two to twelve inches in diameter. Over 1200 customers are served and usage is 720,000 gallons per day.

Sewerage System--Most of the city is sewered and the system consists of approximately 12 miles of concrete pipe and seven lift stations. The secondary mechanical sewage treatment plant includes clarifiers, digester, trickling filter, and chlorinator. The per capita flow is 100 gallons per day.

IN REPLY REFER TO
1792 (912)

United States Department of the Interior

BUREAU OF LAND MANAGEMENT

Idaho State Office
Room 398, Federal Building
550 W. Fort Street
P.O. Box 042
Boise, Idaho 83724

Oct. 31, 1974

Dear

We feel it is desirable that we keep you advised as to progress being made concerning the formulation of the proposed statewide environmental impact statement on desert land entry development.

After conferring with our Washington Office, we are not sure whether an environmental impact statement will be required under the terms of the National Environmental Policy Act. However, to be certain that cumulative environmental impacts are fully disclosed, we are preparing a regional environmental analysis report. The environmental analysis report will address the cumulative effects of converting rangeland to agriculture and will provide a tool for better management of the program. The analysis will fully assess the impacts. It should also surface the magnitude of controversy and provide a basis (on environmental grounds) for determining whether an environmental impact statement should be prepared.

We have established an inter-disciplinary team that is diligently proceeding with the analysis. Upon completion of the analysis, a draft of the report will be circulated to the interested public for further comments and suggestions. It appears, at this time, the analysis will be completed by April 1. If an environmental impact statement is then determined to be necessary, several additional months will be required.

As an important part of the formulation of the analysis report we are asking for information and opinions from as many interested people as possible. Therefore, we will conduct four public meetings to help us obtain this information. The meetings will be held on:

November 6, 1974 - Boise -	BLM Conference Rm. Boise District Office 230 Collins Road	7:30 p.m.
November 7, 1974 - Mt. Home -	County Court House	7:30 p.m.
November 13, 1974 - Glenns Ferry -	City Hall	7:30 p.m.
November 14, 1974 - Twin Falls -	Rogerson Motor Inn	7:30 p.m.

We would appreciate your attendance at one of these work sessions to give us the benefit of your knowledge and experience. In any case, if you cannot attend one of the meetings, please give us your written comments and suggestions.

Sincerely yours,

Clair M Whitlock

Clair M Whitlock
Acting State Director

Enclosures (3)
Encl. 1 - Inquiry Sheet
Encl. 2 - Agenda
Encl. 3 - Map

Inquiry Sheet

Environmental Analysis Report
for
Desert Land Entry Program in Idaho

Background Information:

During the past 24 years approximately 330,000 acres of rangeland has been converted to farmland under the Desert Land Act. During the last 5 years an average of about 17,000 acres per year have gone to patent under the Act.

Also during the last 4 years the National Environmental Policy Act has required an analysis of the environmental impacts associated with every decision which involves the National Resource Lands managed by the BLM. We are complying with the Act by making individual environmental analysis reports on individual desert land entry applications. Three years ago we developed an area-wide analysis involving the Saylor Creek area (the area west of Hagerman Valley and south of King Hill, Glenns Ferry, and Hamett) where a substantial number of group entries are involved.

We now feel it is desirable to up-date and consolidate the Desert Land Entry Environmental Report on a regional basis and to further assess the cumulative impacts of converting rangeland to farmland in the lower Snake River Area. On the basis of our studies, plus your advice, we plan to recommend a land conversion program that will satisfy both the environmental needs of the area and meet the agricultural objectives for the region.

BLM objectives in converting Desertland to Farmland

As long as we have the combination of farmable land, available water for irrigation, and relatively high prices for farm commodities the Bureau expects continued pressure for making land available for this use.

The conversion of National Resource Lands to agricultural development is considered to be in the public interest provided:

1. The physical and economic capabilities of the site are such that the continued use of the land for farming is reasonable assured.

2. Major adverse environmental impacts can be avoided or minimized so that they will not seriously affect the proposed development.

3. Development occurs in a planned and orderly manner.

4. Development considers the national and regional needs for agricultural products.

5. The development takes place in balance with other land uses within the planning unit.

6. Development will consider the adverse effects on other resource uses and these will be minimized or mitigated to the extent possible.

The following issues are basic to any decisions that we make on the future of the Desert Land Entry program in Idaho. We are asking your opinion on these issues so that we can better plan and carry out a program that is responsive to the needs of the people. Please give us your suggestions.

- Give us your recommendations on those issues you do not feel have been adequately covered in the listing of objectives.

- Based on your knowledge and experience what are some of the major environmental impacts which you feel must be avoided or adequately minimized?

- Do you have any thoughts or suggestions as to how we can dovetail development under the Desert Land Act, Carey Act, and Reclamation Act, so that all programs can work in concert so as to maximize the yield of public benefits.

- What are your recommendations as to how we should proceed to develop Desert Land entries in a planned and orderly manner?

- What are your recommendations on the amount of desert land that should be converted to farmland each year over the next 5 years?

- Based on your knowledge and experience what should be done to replace livestock forage and wildlife habitat that is eliminated when desert land is converted to farmland?

● What type of farming practices would you recommend to reduce wind erosion and other adverse impacts? Should the Desert Land Act be amended to require such practices?

● What are your recommendations as to how we should encourage the development of family farms or should the emphasis be placed on increased production of farm commodities without specific concern over social impacts?

Name ____________________

Address ____________ Zip Code ______

Representing ____________________

Send to:

Frank B. Pallo, Team Leader
Bureau of Land Management
Idaho State Office
P. O. Box 042, Federal Bldg.
550 W. Fort Street
Boise, ID 83724

Agenda

1. Introduction

    (a) Purpose of meeting

    (b) Area involved

    (c) Team membership

2. What is an Environmental Analysis Report (EAR)

    EAR outline

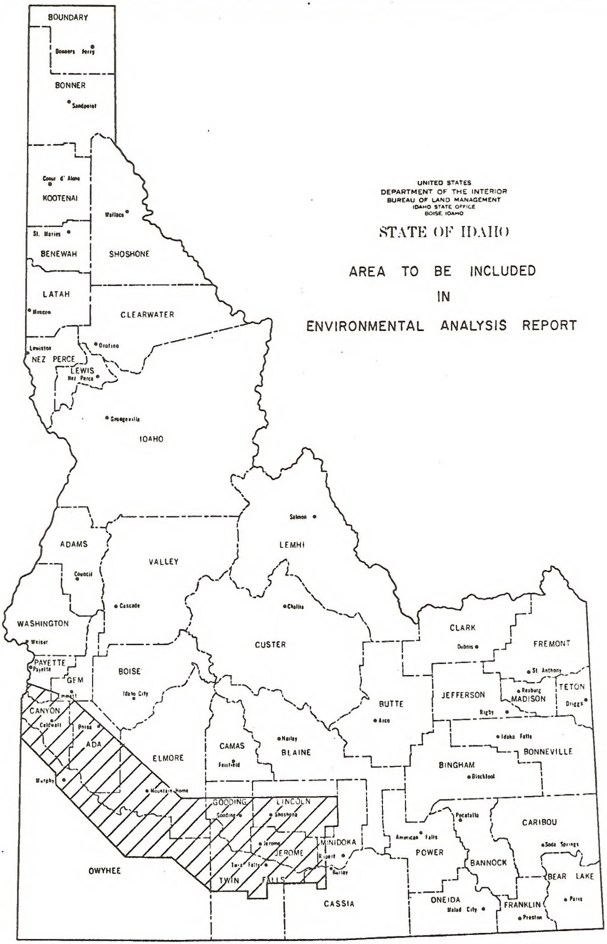
3. Public input for desert land program in Idaho

4. Closing Remarks

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
IDAHO STATE OFFICE
BOISE, IDAHO

STATE OF IDAHO

AREA TO BE INCLUDED IN ENVIRONMENTAL ANALYSIS REPORT



UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

ENVIRONMENTAL ANALYSIS WORKSHEET

1. Action

Agricultural Development of NRL

2. Stages of implementation

Land Preparation

3. DISCRETE OPERATIONS	Surveying	Clearing	Leveling	Plowing	Fencing	
4. COMPONENTS, SUBCOMPONENTS, AND ELEMENTS IMPACTED	**5. ANTICIPATED IMPACTS**					**6. REMARKS**
I. NONLIVING COMPONENTS						
A. AIR						
Temperature	0	-L	-L	-L	0	
Particulate matter	0	-H	-H	-H	0	
Carbon monoxide	-L	-L	-L	-L	0	
Hydrocarbons	-L	-L	-L	-L	0	
Nitrogen oxides	0	0	0	0	0	
Sulfur oxides	0	0	0	0	0	
B. LAND						
Soil depth	0	-L	-M	-M	0	
Soil structure	0	-L	-M	-M	0	
Soil nutrient properties	0	-L	-M	-L	0	
Soil pollutant properties	0	-L	-L	-L	0	
Soil erosion	0	-H	-H	-H	0	
Geologic structure	0	0	0	0	0	
Land use compatibility	0	-L	-M	-L	0	
Land use suitability	0	+H	+H	+H	+H	
C. WATER						
Hydrologic cycle	0	-H	L	+L	0	
Sediment load	0	-H	-L	-M	0	
Dissolved solids	0	-L	-L	0	0	
Chemicals & toxic sub.	0	-L	0	0	0	
Nutrients	0	-M	0	0	0	
Solid debris	-L	-L	0	0	-L	
Acid balance	0	-L	0	0	0	
Dissolved oxygen	0	-L	-L	-L	0	
Temperature	0	-L	-L	-L	0	
II. LIVING COMPONENTS						
A. PLANTS *(Aquatic)*						
Vascular plants	0	-H	-M	-M	0	
Phytoplankton	0	-M	-L	-L	0	
Floating	0	-L	-L	-L	0	

(Continued on reverse)

Form 1790–3 (June 1974)

DISCRETE OPERATIONS	Surveying	Clearing	Leveling	Plowing	Fencing	
COMPONENTS, SUBCOMPONENTS, AND ELEMENTS IMPACTED	**ANTICIPATED IMPACTS**					**REMARKS**
II. LIVING COMPONENTS (Con.)						
B. PLANTS *(Terrestrial)*						
Riparian (stream-side)	-L	-H	-M	-H	-L	
Semi-desert grasses/forbs	-L	-H	-M	-H	-L	
Semi-desert shrubs	-L	-H	-M	-H	-L	
Semi-desert trees	-L	-H	-M	-H	-L	
Lichens and mosses	-L	-H	-M	-H	-L	
C. ANIMALS *(Aquatic)*						
Mammals	0	-M	-L	-L	0	
Birds	0	-M	-L	-L	0	
Amphibians & reptiles	0	-M	-L	-L	0	
Fish	0	-M	-L	-L	0	
Invertebrates	0	-M	-L	-L	0	
Zooplankton	0	-M	-L	-L	0	
D. ANIMALS *(Terrestrial)*						
Mammals	-L	-M	-L	-H	-M	
Birds	-L	-M	-L	-H	X	
Amphibians & reptiles	-L	-M	-M	-H	-L	
Invertebrates	-L	-M	-M	-H	-L	
III. INTERRELATIONSHIPS						
A. ECOLOGICAL PROCESSES						
Succession	0	-H	-L	-M	0	
Food relationships	0	-M	-M	-M	-L	
Community relationships	0	-H	-M	-M	-L	
IV. HUMAN VALUES						
A. LANDSCAPE CHARACTER						
Natural landscape	0	-H	-H	-H	-M	
B. SOCIOCULTURAL INTERESTS						
Educational - Scientific						
Archeological	-L	-H	-H	-H	-L	
Historical	-L	-H	-H	-H	-L	
Paleontological	-L	-H	-H	-H	-L	
Natural Ecology	-L	-H	-H	-H	-L	
Recreation	0	-H	-H	-H	-H	

1. *Action* – Enter action being taken, analytic step for which worksheet is being used, environmental viewpoint of impact, and any assumptions relating to impact.
   a. Worksheet is normally used to analyze *"Anticipated Impacts"* of action; *however*, it may be used to analyze *"Residual Impacts."* Worksheets may also be used to compare impacts before and after mitigating measures are applied.
   b. State viewpoint that best describes environmental impact. For example, a fence viewed down the fence line has greater impact than the same fence viewed over an entire allotment. Generally, narrow viewpoints better illustrate specific impacts than will broad viewpoints.
   c. Assumptions may be made to establish a base for analysis *(e.g. estimated time periods, season of year, etc.)*.

2. *Stages of Implementation* – Identify different phases of proposed project *(e.g. a road project consists of survey, construction, use, and maintenance stages)*.

3. *Discrete Operations* – Identify separate actions comprising a particular stage of implementation *(e.g. the construction stage of the road project has the discrete operations of clearing, grading, and surfacing)*.

4. *Elements Impacted* – Enter under appropriate heading all environmental elements susceptible to impact from action and alternatives. Relevant elements not contained in the digest should also be entered. See BLM Manual 1791, Appendix 2, Environmental Digest.

5. *Anticipated Impact* – Evaluate anticipated impact on each element and place an entry in the appropriate square indicating degree of impact as low (L), medium (M), high (H), no impact (O), or unknown or negligable (X). Preceed each entry by a plus (+) or minus (–) sign indicating a beneficial or adverse type of impact. If type of impact reflects a matter of opinion or is not known, *do not* preceed with a sign. For example, construction of a wind mill on open range has a definite visual impact; *however*, to some people the effect is detrimental while to others it is an improvement. By not entering a plus (+) or minus (–) sign the worksheet is kept fectual and unbiased. If both degree and type of impact are unknown, place an (x) in the appropriate square.
   a. The measures of impact *(e.g. low, medium, and high)* are relative and their meaning may vary slightly from action to action. The term *"low"* should not be applied to impacts of a negligible nature. For example, we know that a pickup truck driving down a proposed fence line laying wire has some impact on air quality. However, the significance of this impact is not normally great enough to warrant even a *"low"* rating. In cases like this, the impact will usually be marked "O" or the element left off the worksheet.
   b. It is recognized that some environmental elements may defy accurate measurement or in-depth analysis within current Bureau capabilities or expertise. The nature of the action as well as type and degree of impact should guide in the decision to seek outside expertise or assistance.

6. *Remarks* – Enter clarifying information.

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

ENVIRONMENTAL ANALYSIS WORKSHEET

1. Action

Agricultural Development of NRL

2. Stages of implementation

Development and Use of Irrigation Systems

3. DISCRETE OPERATIONS / 4. COMPONENTS, SUBCOMPONENTS, AND ELEMENTS IMPACTED	Well drilling and equipment	Surface water - pump installation	Installation of main irrig. lines	Operation of irrigation system	Maintenance of irrigation system	Irrigation return flows	6. REMARKS
	5. ANTICIPATED IMPACTS						
I. NONLIVING COMPONENTS							
A. AIR							
Temperature	0	0	0	L	0	0	
Particulate matter	-L	-L	-L	+L	0	0	
Carbon monoxide	-L	-L	-L	0	0	0	
Hydrocarbons	-L	-L	-L	0	0	0	
Nitrogen oxides	0	0	0	0	0	0	
Sulfur oxides	0	0	0	0	0	0	
B. LAND							
Soil depth	0	0	0	-L	0	-L	
Soil structure	0	0	-L	-L	0	0	
Soil nutrient properties	0	0	0	-L	0	-L	
Soil pollutant properties	-L	0	0	-M	0	-M	
Soil erosion	-L	0	-L	-M	0	-H	
Geologic structure	-L	0	0	X	0	X	
Land use compatibility	0	-L	-L	+L	0	L	
Land use suitability	0	-L	-L	+M	0	L	
C. WATER							
Hydrologic cycle	0	0	0	M	0	L	
Sediment load	0	-L	-L	-L	-L	-H	
Dissolved solids	0	-L	0	-L	0	-M	
Chemicals & toxic sub.	X	-L	-L	0	-L	-H	
Nutrients	0	0	0	0	0	-H	
Solid debris	0	-L	-L	0	-L	-L	
Acid balance	0	0	0	0	0	M	
Dissolved oxygen	0	0	0	0	0	-M	
Temperature	0	0	0	-L	0	-M	
II. LIVING COMPONENTS							
A. PLANTS *(Aquatic)*							
Vascular plants	0	-L	0	-H	0	+M	
Phytoplankton	0	-L	0	-H	0	+M	
Floating	0	-L	0	-H	0	+M	

(Continued on reverse)

Form 1790-3 (June 1974)

COMPONENTS, SUBCOMPONENTS, AND ELEMENTS IMPACTED	DISCRETE OPERATIONS: Well drilling and equipment	Surface water - pump installation	Installation of main irrig.	Operation of irrigation system	Maintenance of irrigation system	Irrigation return flows	REMARKS
	ANTICIPATED IMPACTS						
II. LIVING COMPONENTS (Con.)							
B. PLANTS *(Terrestrial)*							
Riparian (stream-side)	0	-L	-L	-M	0	M	
Semi-desert grasses/forbs	-L	0	-L	0	0	+L	
Semi-desert shrubs	-L	0	-L	0	0	+L	
Semi-desert trees	0	0	-L	0	0	+L	
Lichens and mosses	-L	0	-L	0	0	+L	
C. ANIMALS *(Aquatic)*							
Mammals	0	-L	0	-M	-L	-M	
Birds	0	-L	0	-M	-L	-M	
Amphibians & reptiles	0	-L	0	-M	-L	-M	
Fish	0	-M	0	-M	-L	-M	
Invertebrates	0	-L	0	-M	-L	-M	
Zooplankton	0	-L	0	-M	-L	-M	
D. ANIMALS *(Terrestrial)*							
Mammals	-L	-L	-L	M	-L	+L	
Birds	-L	-L	-L	M	-L	+L	
Amphibians & reptiles	-L	-L	-L	L	-L	+L	
Invertebrates	-L	-L	-L	L	-L	+L	
III. INTERRELATIONSHIPS							
A. ECOLOGICAL PROCESSES							
Succession	0	0	-L	-H	0	L	
Food relationships	0	0	-L	H	0	L	
Community relationships	0	0	-L	H	0	L	
IV. HUMAN VALUES							
A. LANDSCAPE CHARACTER							
Natural landscape	-L	-H	-H	-L	0	+M	
B. SOCIOCULTURAL INTERESTS							
Educational - Scientific							
Archeological	-H	-H	-H	-L	0	-M	
Historical	-H	-H	-H	-L	0	-M	
Paleontological	-H	-H	-H	-L	0	-M	
Natural Ecology	-H	-H	-H	-H	-H	-H	
Recreation	0	-M	-L	-M	-L	-H	

INSTRUCTIONS

1. *Action* – Enter action being taken, analytic step for which worksheet is being used, environmental viewpoint of impact, and any assumptions relating to impact.
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   c. Assumptions may be made to establish a base for analysis *(e.g. estimated time periods, season of year, etc.)*.

2. *Stages of Implementation* – Identify different phases of proposed project *(e.g. a road project consists of survey, construction, use, and maintenance stages)*.

3. *Discrete Operations* – Identify separate actions comprising a particular stage of implementation *(e.g. the construction stage of the road project has the discrete operations of clearing, grading, and surfacing)*.

4. *Elements Impacted* – Enter under appropriate heading all environmental elements susceptible to impact from action and alternatives. Relevant elements not contained in the digest should also be entered. See BLM Manual 1791, Appendix 2, Environmental Digest.

5. *Anticipated Impact* – Evaluate anticipated impact on each element and place an entry in the appropriate square indicating degree of impact as low (L), medium (M), high (H), no impact (O), or unknown or negligible (X). Precede each entry by a plus (+) or minus (-) sign indicating a beneficial or adverse type of impact. If type of impact reflects a matter of opinion or is not known, *do not* precede with a sign. For example, construction of a wind mill on open range has a definite visual impact; *however*, to some people the effect is detrimental while to others it is an improvement. By not entering a plus (+) or minus (-) sign the worksheet is kept factual and unbiased. If both degree and type of impact are unknown, place an (x) in the appropriate square.
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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

ENVIRONMENTAL ANALYSIS WORKSHEET

1. Action

Agricultural Development of NRL

2. Stages of implementation

Actions Related to DLE Activities (Ancillary Facilities, etc.)

3. DISCRETE OPERATIONS		Road construction and maintenance	Powerline installation	Const. of housing and farm bldgs.	Livestock grazing (crop residue)		
4. COMPONENTS, SUBCOMPONENTS, AND ELEMENTS IMPACTED		5. ANTICIPATED IMPACTS					6. REMARKS
I. NONLIVING COMPONENTS	A. AIR						
	Temperature	0	X	X·	0		
	Particulate matter	-L	-L	-L	0		
	Carbon monoxide	-L	-L	-L	0		
	Hydrocarbons	-L	-L	-L	0		
	Nitrogen oxides	0	0	-L	0		
	Sulfur oxides	0	0	-L	0		
	B. LAND						
	Soil depth	-M	-L	0	0		
	Soil structure	-M	-M	-L	0		
	Soil nutrient properties	-L	-L	0	+L		
	Soil pollutant properties	-L	-L	0	0		
	Soil erosion	-M	-L	-L	0		
	Geologic structure	0	0	0	0		
	Land use compatibility	H	H	M	L		
	Land use suitability	L	L	L	L		
	C. WATER						
	Hydrologic cycle	-L	0	-L	-L		
	Sediment load	-L	0	-L	-L		
	Dissolved solids	0	0	-L	0		
	Chemicals & toxic sub.	-L	0	-M	0		
	Nutrients	0	0	-L	+L		
	Solid debris	-L	-L	-L	0		
	Acid balance	X	0	0	-L		
	Dissolved oxygen	0	0	0	0		
	Temperature	0	0	0	0		
II. LIVING COMPONENTS	A. PLANTS *(Aquatic)*						
	Vascular plants	-L	0	0	L		
	Phytoplankton	-L	0	0	L		
	Floating	-L	0	0	L		

(Continued on reverse)

Form 1790-3 (June 1974)

DISCRETE OPERATIONS		Road construction and maintenance	Powerline installation	Const. of housing and farm bldgs.	Livestock grazing (crop residue)		
	COMPONENTS, SUBCOMPONENTS, AND ELEMENTS IMPACTED	ANTICIPATED IMPACTS					REMARKS
II. LIVING COMPONENTS (Con.)	B. PLANTS *(Terrestrial)*						
	Riparian (stream-side)	-L	-L	-M	-M		
	Semi-desert grasses/forbs	-M	-L	-M	-M		
	Semi-desert shrubs	-M	-L	-M	-M		
	Semi-desert trees	-M	-L	-M	-M		
	Lichens and mosses	-M	-L	-M	-L		
	C. ANIMALS *(Aquatic)*						
	Mammals	-L	0	0	-L		
	Birds	-L	0	0	L		
	Amphibians & reptiles	-L	0	0	-L		
	Fish	-L	0	0	-L		
	Invertebrates	-L	0	0	-L		
	Zooplankton	-L	0	0	-L		
	D. ANIMALS *(Terrestrial)*						
	Mammals	-M	0	+L	-L		
	Birds	-M	-M	-L	-M		
	Amphibians & reptiles	-L	-L	-L	-L		
	Invertebrates	-L	-L	L	-L		
III. INTERRELATIONSHIPS	A. ECOLOGICAL PROCESSES						
	Succession	-L	0	-L	0		
	Food relationships	-L	0	-L	-L		
	Community relationships	-L	0	-L	-L		
IV. HUMAN VALUES	A. LANDSCAPE CHARACTER						
	Natural landscape	-H	-H	H	+M		
	B. SOCIOCULTURAL INTERESTS						
	Educational - Scientific						
	Archeological	-H	-L	-H	-L		
	Historical	-H	-L	-H	-L		
	Paleotological	-H	-L	-H	-L		
	Natural Ecology	-H	-L	-H	-H		
	Recreation	M	M	-M	L		

INSTRUCTIONS

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3. *Discrete Operations* – Identify separate actions comprising a particular stage of implementation *(e.g. the construction stage of the road project has the discrete operations of clearing, grading, and surfacing)*.

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5. *Anticipated Impact* – Evaluate anticipated impact on each element and place an entry in the appropriate square indicating degree of impact as low (L), medium (M), high (H), no impact (O), or unknown or negligable (X). Preceed each entry by a plus (+) or minus (–) sign indicating a beneficial or adverse type of impact. If type of impact reflects a matter of opinion or is not known, *do not* preceed with a sign. For example, construction of a wind mill on open range has a definite visual impact; *however*, to some people the affect is detrimental while to others it is an improvement. By not entering a plus (+) or minus (–) sign the worksheet is kept factual and unbiased. If both degree and type of impact are unknown, place an (x) in the appropriate square.
   a. The measures of impact *(e.g. low, medium, and high)* are relative and their meaning may vary slightly from action to action. The term *"low"* should not be applied to impacts of a negligible nature. For example, we know that a pickup truck driving down a proposed fence line laying wire has some impact on air quality. However, the significance of this impact is not normally great enough to warrant even a *"low"* rating. In cases like this, the impact will usually be marked *"O"* or the element left off the worksheet.
   b. It is recognized that some environmental elements may defy accurate measurement or in-depth analysis within current Bureau capabilities or expertise. The nature of the action as well as type and degree of impact should guide in the decision to seek outside expertise or assistance.

6. *Remarks* – Enter clarifying information.

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UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

ENVIRONMENTAL ANALYSIS WORKSHEET

1. Action

Agricultural Development of NRL

2. Stages of implementation

Farm Operations

4. COMPONENTS, SUBCOMPONENTS, AND ELEMENTS IMPACTED	3. DISCRETE OPERATIONS / 5. ANTICIPATED IMPACTS: Plowing	Planting	Cultivation	Fertilization	Use of herbicides and pesticides	Harvesting	6. REMARKS
I. NONLIVING COMPONENTS							
A. AIR							
Temperature	0	0	0	0	0	0	
Particulate matter	-H	-M	-M	-L	-L	-M	
Carbon monoxide	-L	-L	-L	0	-L	-L	
Hydrocarbons	-L	-L	-L	0	-L	-L	
Nitrogen oxides	0	0	0	0	0	0	
Sulfur oxides	0	0	0	0	0	0	
B. LAND							
Soil depth	-M	-L	-M	0	0	0	
Soil structure	-M	-M	-M	-L	0	-L	
Soil nutrient properties	+L	0	0	+H	-L	0	
Soil pollutant properties	0	-M	0	-L	-H	0	
Soil erosion	-H	-L	-L	-L	-L	-L	
Geologic structure	0	0	0	0	0	0	
Land use compatibility	-L	-L	-L	0	M	0	
Land use suitability	+H	+H	+H	+H	M	+H	
C. WATER							
Hydrologic cycle	+L	0	L	X	0	-L	
Sediment load	-L	0	-L	0	0	-L	
Dissolved solids	0	0	0	-L	-L	0	
Chemicals & toxic sub.	-L	-L	-L	-H	-H	-M	
Nutrients	0	0	0	+M	-L	0	
Solid debris	0	0	0	0	0	0	
Acid balance	-L	X	X	L	L	0	
Dissolved oxygen	-L	0	0	M	-L	0	
Temperature	0	0	0	0	0	0	
II. LIVING COMPONENTS							
A. PLANTS *(Aquatic)*							
Vascular plants	-L	0	0	+M	-M	0	
Phytoplankton	-L	0	0	+M	-M	0	
Floating	-L	0	0	+M	-M	0	

(Continued on reverse)

Form 1790–3 (June 1974)

DISCRETE OPERATIONS / COMPONENTS, SUBCOMPONENTS, AND ELEMENTS IMPACTED	Plowing	Planting	Cultivation	Fertilization	Use of herbicides and pesticides	Harvesting	REMARKS
	ANTICIPATED IMPACTS						
II. LIVING COMPONENTS (Con.)							
B. PLANTS *(Terrestrial)*							
Riparian (stream-side)	-L	X	-L	L	-H	0	
Semi-desert grasses/forbs	0	0	0	0	0	0	
Semi-desert shrubs	0	0	0	0	0	0	
Semi-desert trees	0	0	0	0	0	0	
Lichens and mosses	0	0	0	0	0	0	
C. ANIMALS *(Aquatic)*							
Mammals	-M	-L	-L	L	-L	-L	
Birds	-M	-L	-L	L	-M	+M	
Amphibians & reptiles	-M	-L	-L	L	-L	-L	
Fish	-M	-L	-L	M	-M	-L	
Invertebrates	-M	-L	-L	M	-M	-L	
Zooplankton	-M	-L	-L	M	-M	-L	
D. ANIMALS *(Terrestrial)*							
Mammals	-H	-L	-L	-L	-L	L	
Birds	-H	+L	-M	-L	-M	M	
Amphibians & reptiles	-H	-L	-L	-L	-M	L	
Invertebrates	-H	-L	-L	X	-H	L	
III. INTERRELATIONSHIPS							
A. ECOLOGICAL PROCESSES							
Succession	-L	-L	-L	+L	-M	-M	
Food relationships	L	+L	L	+M	-M	M	
Community relationships	-L	L	-L	+L	-M	M	
IV. HUMAN VALUES							
A. LANDSCAPE CHARACTER							
Natural landscape	-L	M	0	0	0	0	
B. SOCIOCULTURAL INTERESTS							
Educational - Scientific							
Archeological	-H	-L	-H	-L	-L	-L	
Historical	-H	-L	-H	-L	-L	-L	
Paleotological	-H	-L	-H	-L	-L	-L	
Natural Ecology	0	0	0	0	0	0	
Recreation	-L	0	0	0	X	-L	

INSTRUCTIONS

1. *Action* – Enter action being taken, analytic step for which worksheet is being used, environmental viewpoint of impact, and any assumptions relating to impact.
   a. Worksheet is normally used to analyze *"Anticipated Impacts"* of action; *however,* it may be used to analyze *"Residual Impacts."* Worksheets may also be used to compare impacts before and after mitigating measures are applied.
   b. State viewpoint that best describes environmental impact. For example, a fence viewed down the fence line has greater impact than the same fence viewed over an entire allotment. Generally, narrow viewpoints better illustrate specific impacts than will broad viewpoints.
   c. Assumptions may be made to establish a base for analysis *(e.g. estimated time periods, season of year, etc.).*
2. *Stages of Implementation* – Identify different phases of proposed project *(e.g. a road project consists of survey, construction, use, and maintenance stages).*
3. *Discrete Operations* – Identify separate actions comprising a particular stage of implementation *(e.g. the construction stage of the road project has the discrete operations of clearing, grading, and surfacing).*
4. *Elements Impacted* – Enter under appropriate heading all environmental elements susceptible to impact from action and alternatives. Relevant elements not contained in the digest should also be entered. See BLM Manual 1791, Appendix 2, Environmental Digest.
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Addendum to
Appendix X

CULTURAL RESOURCES BIBLIOGRAPHY FOR DLE-EAR

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