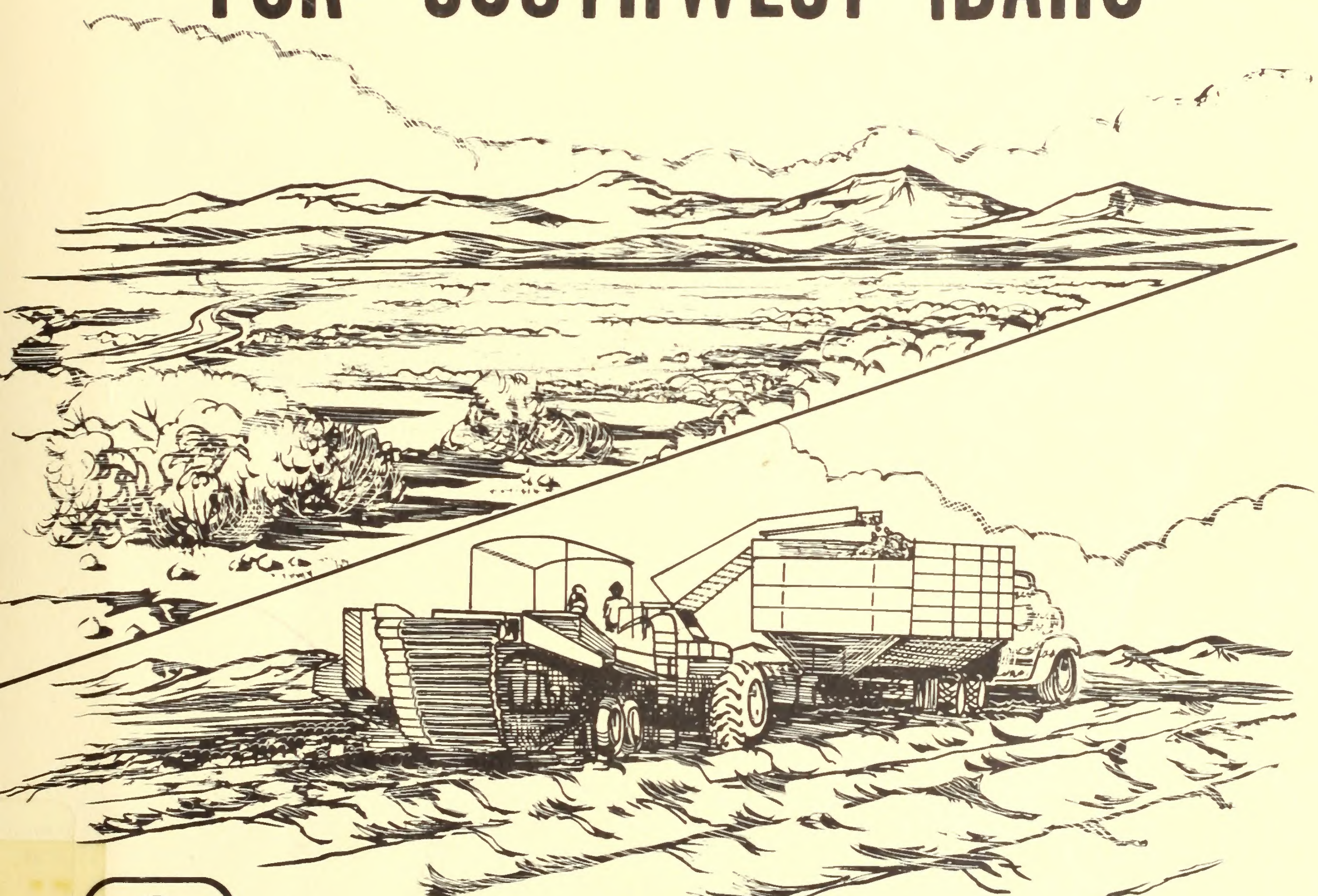
# BOISE DISTRICT AGRICULTURAL DEVELOPMENT DRAFT ENVIRONMENTAL STATEMENT FOR SOUTHWEST IDAHO



UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

BOISE DISTRICT OFFICE

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# UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT
Idaho State Office
Federal Building, Box 042
550 West Fort Street
Boise, Idaho 83724



Dear Reader:

Enclosed for your review and comment is the draft environmental statement concerning agriculture development on public land in portions of Elmore, Twin Falls and Owyhee Counties in Southwestern Idaho.

The Bureau of Land Management is considering the allowance of Desert Land Act (DLA) and Carey Act (CA) development on 111,015 acres within the Boise District.

Alternatives considered are: (1) a total of 176,310 acres of farm development under DLA and CA; (2) a total of 28,590 acres of farm development under the Desert Land Act and Carey Act; (3) allow no development, reject all existing DLA and CA applications and impose a moratorium on further filings; (4) Federal Land Policy and Management Act of 1976 (FLPMA) Lease farm development; (5) FLPMA Sale farm development; (6) FLPMA Exchange farm development.

Written comments from public agencies, interested citizens groups and individuals concerning the draft environmental statement will be accepted until July 3, 1979. Comments should be sent to:

District Manager
Bureau of Land Management
230 Collins Road
Boise, Idaho 83702
Telephone: (208) 384-1582

There will be public hearings concerning the draft environmental statement on June 11, 1979 at 7:00 p.m. at the Rodeway Inn-Alturas Room, Boise, Idaho, on June 12, 1979 at 7:00 p.m. at the Owyhee County Courthouse Murphy, Idaho, and on June 13, 1979 at 2:00 p.m. at the Little Tree Inn, Twin Falls, Idaho. Written requests to testify should be submitted to the Boise District Manager prior to close of Business on June 6, 1979. The form on the back of this sheet is enclosed for this purpose.

Testimony presented in the public hearings and written comments submitted to the District Manager will be considered in preparing the final environmental statement. A decision on the agriculture development program will not be made until after the final environmental statement is completed.

Sincerely yours,

Wm. L. Mathews

William L. Mathews
State Director

# PUBLIC HEARINGS REGISTRATION FORM

For Public Hearings on the Boise District Agricultural Development Draft Environmental Statement

(Please Print)

TO: District Manager, Bureau of Land Management
230 Collins Road, Boise, Idaho 83702

FROM: NAME ______________________________

STREET ADDRESS ______________________________

CITY-STATE ____________________ ZIP CODE __________

I wish to appear at the following public hearing and express my views:

Check One:

__________ 7:00 p.m., June 11, 1979, Rodeway Inn, Alturas Room, Boise, ID

__________ 7:00 p.m., June 12, 1979, Owyhee County Courthouse, Murphy, ID

__________ 2:00 p.m., June 13, 1979, Little Tree Inn, Twin Falls, ID

I intend to submit written documentation: Yes_____ No_____ Signature____________________

Verbal testimony limited to 10 minutes; written testimony acceptable until July 3, 1979.

# DRAFT



# ENVIRONMENTAL STATEMENT

# BOISE DISTRICT AGRICULTURAL DEVELOPMENT

PREPARED BY

DEPARTMENT OF THE INTERIOR

BUREAU OF LAND MANAGEMENT

BOISE DISTRICT OFFICE

Wm L Mathews

STATE DIRECTOR, IDAHO STATE OFFICE

# SUMMARY

(X) Draft ( ) Final Environmental Statement

Department of the Interior
Bureau of Land Management

1. Type of Action: (X) Administrative ( ) Legislative

2. Brief Description of Action: The Bureau of Land Management would allow 111,015 acres of public land in Elmore, Owyhee and Twin Falls Counties to be developed for farming under the Desert Land Act (DLA) and Carey Act (CA). In addition, about 37,000 acres of public land adjacent to farm locations would be reserved for public purposes such as wildlife habitat tracts, gravel sites, air strips, sanitary landfills, etc. This development would occur from 1980 through 1984 at about 22,000 acres per year.

3. Summary of Environmental Impacts: Farm development under the proposed action will require 250,004 acre-feet of water from the Snake River, reducing flow by about 1000 CFS in July and about 27,823 acre-feet of groundwater between Bruneau and Murphy.

Idaho Power Company (IPC) would have to provide from 200 to 240 average megawatts (MW) of electricity during the peak irrigation month of July. This block of electricity would require additional IPC generating facilities and raise electricity rates for all customer classes.

Wind soil erosion losses would range from 0-75 tons per acre.

Up to 130,000 acres of native wildlife habitat would be eliminated including habitat of sensitive wildlife species (long-billed curlew, ferruginous hawk and burrowing owl). Upland game bird species numbers would increase dramatically. Game fish stocks in the Snake River would be reduced 5-25 percent.

Hunting for upland game birds would be enhanced while 60,400 acres of Off Road Vehicle areas would be lost.

There would be a loss of 14,975 AUMs-41,397 AUMs among 127 livestock operators on public land that would be converted to farms.

4. Alternatives Considered: (1) a total of 176,310 acres of farm development under DLA and CA; (2) a total of 28,590 acres of farm development under DLA and CA; (3) allow no development, reject all existing DLA and CA applications and impose a moritorium on further filings; (4) Federal Land Policy and Management Act of 1976 (FLPMA) Lease farm development; (5) FLPMA Sale farm development; (6) FLPMA Exchange farm development.

5. Comments Have Been Requested From The Following: See list in Chapter 9, p. 3-5.

6. Date Statement Made Available to EPA and the Public:

Draft:

Final:

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# CHAPTER 1

## DESCRIPTION OF THE PROPOSED ACTION

Chapter 1 provides a brief background leading to formulation of the proposed action and preparation of this ES. The proposed action is discussed in terms of purpose, location, time frame, stages of implementation, required authorizing actions, its relationship to other land use projects and planning.

# CHAPTER 1
# DESCRIPTION OF THE PROPOSED ACTION

## HISTORY AND BACKGROUND

Agriculture has long been the most important component of Idaho's economy. Much of Idaho's farmland was once public land and was developed under the Desert Land Act (DLA) and Carey Act (CA). Over 1.5 million acres have been patented under the DLA and about 600,000 acres via the CA since their enactments in the late 1800s. Today, the Snake River Plains area in southwest Idaho has one of the largest blocks of public land left in the nation with potential for new farm expansion. Statewide, there are over 1,400 DLA and 90 CA applications pending on about 700,000 acres of public land administered by the Bureau of Land Management (BLM). The highest concentration of these applications is on Boise District BLM administered land in southwestern Idaho.

Most prime agricultural land near sources of irrigation water in Idaho were developed by the turn of the century. In the late 1940s, the first deep well for irrigation on the Snake River Plain was drilled near Rupert, Idaho. This opened a new possibility for land conversion under the DLA, and a flurry of development followed. In the early 1960s, another breakthrough occurred when the first high-lift pumps were used to elevate water hundreds of feet from the Snake River onto benchlands south of Nampa in the Dry Lake farm area. As a result of these irrigation methods, 1,440 desert land entries totaling 317,645 acres were converted from public to private ownership from 1947 to 1973.

High farm commodity prices between 1970 and 1974 created a favorable climate for new farm development. Intense public interest was evidenced by the increased number of DLA and CA applications filed during the early 1970s.

The Bureau developed two land use plans for portions of the area, one in 1972 and the other in 1975. However, these planning documents did not provide adequate guidance for allocating public land to new farm development. As a result, an environmental analysis report (EAR) was written covering overall agricultural expansion on BLM administered land in southern Idaho. This document, published in January of 1976, depicted possible environmental impacts agricultural development could have on the region. It also identified high and low resource conflict areas.

In 1977, the BLM Director authorized the State BLM Director of Idaho to prepare this environmental statement (ES) in accordance with the National Environmental Policy Act (NEPA). As authorized, it focuses on about 440,000 acres of public land in the Boise District and is keyed to Part Two of the Idaho State Water Plan, published in March 1976. The State Water Plan was geared in part to implement the objective of increasing Idaho's agricultural production to "maintain the state's current share of the national and international market." It projected irrigating an additional 790,000 acres of potential agricultural land in southern Idaho by 2020. The proposed level of farm expansion in this ES, 111,015 acres from 1980 through 1984, was derived from this projection.

## PROPOSED ACTION

The proposed action to be analyzed in this environmental statement is to allow conversion of 111,015 acres of public land within the BLM Boise District to irrigated farmland during the period 1980 through 1984. Such conversion would occur by the DLA and CA. This development would take place principally on Class 1 and 2 soils, which are the best soils having high crop production potential. Irrigation water would be provided primarily by high-lift pumping from the Snake River and, to a lesser extent, by groundwater pumping. In addition to raising crops on this land, a small portion of the 111,015 acres, about 3 percent, would be devoted to on-farm access roads, shop buildings, equipment storage areas, residences, etc. The proposed action is not to be construed necessarily as the BLM's position, but rather a logical course of action to be taken if agriculture expansion in the ES area took place.

The proposed action would take place in Elmore, Owyhee, and Twin Falls counties. Table 1-1 illustrates current cropland acreages and new farmland acreage to be developed under the proposed action.

TABLE 1-1
ACRES OF CROPLAND IN AFFECTED COUNTIES - CURRENT AND UNDER PROPOSED ACTION

| County | Total County * | Cropland Dry ** | Cropland Irrigated Surface ** | Cropland Irrigated Sprinkler ** | Total Cropland |
|---|---|---|---|---|---|
| Owyhee | 4,888,960 | - | 150,455 | 22,400 (46,800) 1/ | 172,855 |
| Elmore | 1,953,280 | 28,210 | 35,276 | 62,900 (51,115) 1/ | 126,386 |
| Twin Falls | 1,242,886 | 6,000 | 263,160 | 19,600 (13,100) 1/ | 288,760 |
| Totals | 8,085,120 | 34,210 | 448,891 | 104,900 (111,015) 1/ | 588,801 |

* BLM Facts In Idaho

** Idaho Almanac 1977, Idaho Division of Tourism and Industrial Development, Boise, Idaho

1/ Acreages to be farmed under the proposed action

Besides developing 111,015 acres of new farm project areas, 25 percent of the developed area, or an additional 37,000 acres of intermingled tracts of federal land, would be reserved for public purpose needs associated with agricultural land uses. Public access to these tracts would be reserved.

About 18,000 acres of these tracts would be devoted to wildlife habitat enhancement. As such, each wildlife tract would be fenced for identification and protection. Water catchments would be developed at strategic locations for wildlife. Where the existing vegetation is not optimum, dryland shrubs, forbs, and grasses would be established. Selection criteria for these wildlife tracts are discussed in Appendix 1-1. Other tracts would be reserved for sanitary landfills, airstrips, sand and gravel deposits, archaeological sites, endangered plant species and future building spots for public facilities such as county maintenance yards. Thus, 148,000 acres of public land would be directly affected under the proposed action.

A large block of electricity would be required to provide energy for irrigation pumping on new farms under the proposed action. It is estimated that approximately 200 average megawatts (MW) would be required in the peak irrigation month of July during a normal climate year and 240 average MW during a drought year such as occurred in 1977. (These estimates include both the direct demand for pumping water to the new farms, plus hydroelectric losses at dams downstream from irrigation diversions for the proposed action, see Chapter 3 Energy). Current company-owned generating facilities could not meet this new load demand. Because of the uncertainty at this time of where the electricity would come from and how it would be generated, no attempt can be made to analyze environmental impacts associated with a particular power plant generating facility brought on by this new load demand. This ES will, however, attempt to analyze the economic impact on the affected users of electricity under some possible scenarios of future electricity supply sources.

## Land Transfer Methods

The public land involved in this ES could be transferred to private ownership under either of the following two statutes:

### Desert Land Act (DLA)

This act was passed in 1877 and has been amended a number of times. It allows a state resident to file on up to 320 acres. DLA applications are filed singly or in group project proposals similar to the CA. There is an initial filing fee of 25¢ per acre plus $1 per acre prior to obtaining patent. There must be an investment of at least $1 per acre each year for three years covering costs of land preparation and construction of irrigation works. Patent applications, subject to time extension for certain cases, are to be filed within four years after entry is allowed, and water must be available to all irrigable portions of the entry. At least one-eighth of the entry is to be cultivated at the time of patent application. The DLA does not require an entryman to build a home on the farm unit. The BLM has administrative control of the land under a DLA filing until patent is issued.

An individual can independently develop a farm with one irrigation system that serves only his single entry or he can join a group of individuals that cost share a larger irrigation system with a river pump station. As of January 1, 1979, there were 230 single and 16 group DLA projects incorporating 301 member applications in the ES area. Maps 1-1 and 1-2 are location maps depicting the ES area and Map 1-3 illustrates public land in the ES area that was under DLA and CA application on January 1, 1979.

After DLA applications are filed in the BLM Land Office in Boise, they are adjudicated and forwarded to the respective BLM District Office where the land is located. The District Office has the responsibility of collecting and compiling information used to classify the land as suitable or nonsuitable for farm development. Economic, engineering, and environmental feasibility is evaluated in an Environmental Analysis Report (EAR) and Land Report document. In addition to the farm proposal itself, any associated "off-farm" projects (canals, ditches, pump stations, power lines) are analyzed. The EAR and Land Report also identifies measures that can be taken to reduce negative environmental impacts.

Once the BLM reaches a decision, initial and final classification notices are issued. These are public notices of the BLMs decision to approve or reject the application. Any interested party may submit protest to the decision, and BLM must address the protest with a written analysis. If and when the land is classified as suitable, a notice of allowance is issued to the applicant. The applicant is then free to commence development of the land.

Carey Act (CA)

This act was passed August 18, 1894, and was intended to encourage reclamation and settlement of desert land located away from the source of irrigation water. Under this law, each of the eleven Western States was granted one million acres to select and develop; amendments later increased this to three million acres for Idaho. About 600,000 acres have since been converted under the CA in Idaho. Most of these projects were developed between 1895 and 1914 with the last acreage patented under CA in the 1930s. Currently, there are 16 CA projects filed on public land within the ES area (see Map 1-3).

Farm project proposals under CA normally incorporate a number of entrymen into the development to share costs associated with water transportation facilities (similar to a group DLA project). Each entryman is allowed up to 160 acres and must build a residence on the farm unit in order to meet CA regulations. The CA settlers are allowed up to ten years to develop the farm units, with a five year time extension under certain circumstances. CA project filing fees vary from $250 to $2,500 depending on the acreage involved. The settler must pay $10 per acre for patent and up to $5 per acre to reimburse losses to wildlife and livestock grazing. At least one-eighth of the entry must be in irrigated crops to qualify for land patent.

The CA requires that the State of Idaho, through the Idaho Department of Water Resources (IDWR), initially approves feasibility of the project before formal application is filed with the BLM Land Office. Upon IDWR concurrance, the application is forwarded to BLM for land classification as under the DLA procedure. Economic and engineering feasibility, and environmental impacts are assessed. If the land is classified suitable and the project plan approved, a contract is signed between the Secretary of Interior and the State. Once signed, the land is segregated for CA and farm construction can commence. Administration of the land is under State control until patent is issued to the entrymen. When farm development is completed and contract conditions met, a land grant (patent) is issued to the State or directly to the settlers involved. This grant must be approved by the President of the United States.

There are two pending appeals awaiting a decision in the Ninth Circuit Court of Appeals which could have a major affect on future farm development under CA. In August of 1976, U.S. District Judge J. Blaine Anderson ruled that a husband and wife could meet CA dwelling requirements by sharing a residence located on the common boundary line between two filings. Anderson also ruled that the Secretary of Interior, through the BLM, "may not arbitrarily deny" application for public land once the state has given its approval on a CA project proposal. The second ruling is the most significant since it eliminates the discretionary role of BLM to classify public land suitable or unsuitable for CA projects based on environmental and economic feasibility. The BLM has appealed both judgements, and a decision is pending in the Ninth Circuit Court of Appeals.

## Project Purpose and Objectives

The purpose of the proposed action is to allow conversion of undeveloped public land into farmland under the DLA and CA. New farms would produce agricultural products for human consumption and feed for livestock, and help maintain Idaho's agricultural base.

As of January 1, 1979, there were 531 DLA and 16 CA project applications covering an estimated public land area of about 270,000 acres within the ES area (see Map 1-3). Some of these applications have been on file since the mid 1960s, and in many localities much of the acreage has been applied for by more than one applicant. Map 1-3 depicts those areas where there are overlapping DLA and CA applications. There are about 56,000 acres where CA projects have been filed over DLA filings, and approximately 8,000 acres of DLA filings over other DLA applications. This has resulted in a conflicting and complicated arrangement of applications in the ES area.

The primary objective of this ES is to identify and analyze environmental and social impacts arising from agricultural development of certain public land within the BLM Boise District. It will identify what impacts would result if a certain level of development took place at certain likely locations. This is not a "site specific" analysis, but rather a broader illustration of impacts expected from new farm expansion. It is expected that the information contained in this ES can be applied to other BLM administered land in southern Idaho where agricultural expansion is a possibility.

Ultimately, this ES will provide decision-makers with information needed to respond to a large backlog of CA and DLA filings. Specifically, this ES will help decision-makers answer the following questions: 1) is agricultural development of public land in Idaho in the national interest as required by Title I, Sec. 102(1) of the Federal Land Policy and Management Act (Public Law 94-579); 2) if such development is in the national interest, where and at what rate should it occur; and 3) what authority would provide the best method(s) for authorizing agricultural development of public land?

## Location

Map 1-2 illustrates the ES area. It is totally within BLM's Boise District in southwestern Idaho. The ES encompasses portions of Owyhee, Elmore, and Twin Falls Counties and four BLM planning units - Owyhee, Bruneau, Bennett Mountain, and Saylor Creek (see Map 1-2). The ES area is about 125 miles long and 45 miles at the widest point. It includes 440,000 acres of public land managed by the BLM. Table 1-2 depicts land status (ownership) in the counties affected by this ES.

TABLE I-2
COUNTY LAND STATUS STATISTICS

| County | Total Land In County (Acs) * | Total Public Land In County (Acs) * | % Public Land In County * | Total County Land In ES Area (Acs) | Private Land In ES Area (Acs) | State Land In ES Area (Acs) | Public Land In ES Area (Acs) | Farm Development Land In Proposed Action (Acs) |
|---|---|---|---|---|---|---|---|---|
| Owyhee | 4,888,960 | 3,657,601 | 75 | 323,159 | 108,254 | 9,961 | 204,944 | 46,800 |
| Elmore | 1,953,280 | 543,788 | 28 | 246,680 | 60,037 | 7,043 | 179,600 | 51,115 |
| Twin Falls | 1,242,886 | 552,074 | 44 | 108,899 | 52,860 | 1,280 | 54,759 | 13,100 |
| TOTALS | 8,085,120 | 4,753,463 | | 678,738 | 221,151 | 18,284 | 439,303 | 111,015 |

* Taken from the publication-BLM Facts in Idaho, 1977

Communities within the ES region are small, varying from Murphy, population 75, to Glenns Ferry, population 1,386. Boise (state capitol) and Mountain Home to the north and Twin Falls to the east comprise the larger towns adjacent to the ES location.

Overlay 1A and 1B (found inside the back cover of this document) identify public land tracts where new irrigated cropland could be developed under the proposed action. Although the better soil locations are depicted on Overlay 1A and 1B, it should be pointed out that there are also lesser amounts of intermingled poorer quality soils (Class III and VI) within the proposed action areas. All public land in the ES area that is available for DLA and CA development was divided into 40 acre parcels. Where a parcel had more than 50 percent (20 acres) Class I and II soils, the entire 40 acres was considered suitable for agricultural development under the proposed action. Forty acre parcels were likewise considered non-suitable where there was less than 50 percent Class I and II soils. The proposed action is therefore a theoretical configuration of farmland development. Overlay 1A and 1B indicates a total of 148,020 acres suitable for farming under the previously described selection criteria.

In reality, when a farm is designed and the irrigation systems laid out, there may be some inclusion of poorer grade soils within the farm unit. It is typically more profitable to include isolated locations of poorer soils than to farm around them. Nonetheless, if agricultural development is eventually allowed in the ES area, farm unit layout will have to be concentrated on the better soils to assure a profitable return to the farmer. Economic feasibility of a particular farm unit is directly dependent upon soil productivity.

## Time Frame

Development of 111,015 acres of new farms under the proposed action would take place over a five-year period, from 1980 through 1984, at an average of about 22,000 acres per year. Development at this pace could be done on an orderly basis throughout the five-year period. It would provide time for various federal, state, and local planning on a site specific basis. It would also permit development impacts to be dispersed over a long period, reducing the impacts which could result from immediately "flooding the market" with 111,015 acres of new farmland.

Construction of farm facilities and irrigation systems would lag behind BLM approval to enter upon the land by as much as four years or more. With 22,000 acres allowed in 1984, for example, it could be 1988 before some DLA farms were fully operational and harvesting crops. The time span used to establish a farm unit could be a function of the law by which the public land was transferred to the entryman. For instance, under the DLA, the entryman is given a four-year development period plus grants of time extensions for unavoidable delay in the construction of irrigation works. Under the CA, the entryman has ten years to establish a farm and residence before a patent can be issued. Therefore, under CA it could be 1994 before farms were in private ownership.

## STAGES OF IMPLEMENTATION AND DISCRETE OPERATIONS

After BLM and other agencies have approved a specific project, the entryman can commence with land preparation and irrigation system construction.

The following section describes the development stages that would take place in constructing new farms in the ES area. It is of a general nature because construction methods and types of irrigation facilities used in new farm expansion vary. It is patterned after existing agricultural land in the ES area. Water would be applied by sprinkler irrigation systems, and all pumping power would be supplied by electricity. Potatoes, winter wheat, barley, sugar beets, dry beans, and alfalfa would be the crops grown.

The project description of the proposed Indian Hills CA project, located on the south side of the Snake River near Hammett, is an example of a typical project. The description, found in the Appendix 1-2, typifies the engineering layout for a group farm project.

## Construction of Farm Facilities

Land preparation for growing crops involves removing native vegetation and leveling the terrain. Most public land in the ES area is covered by brush and grass. (See Figure 1-1). Brush is normally eliminated with a disk plow pulled behind a caterpillar-type tractor. (See Figure 1-2). This breaks up the brush, destroys the root system, and prepares the soil surface for a crop seedbed. The chopped brush may be left on the ground to add mulch to the soil or it may be raked and windrowed for burning.

After the vegetation is removed some land leveling may be necessary. This is done with bulldozers or other earth moving equipment. Gully or ravine areas may be filled while hills and knolls may be graded down. However, land leveling may not be necessary on gently rolling topography since modern sprinkler systems are adaptable on terrain up to an 8 percent slope.

### Irrigation Works

Under the 111,015 acres proposed action, it is assumed that about 11,136 acres (10 percent) would use groundwater and 99,879 acres (90 percent) would use water from the Snake River. Based on current groundwater use. It is projected that 11,136 acres in the Bruneau to Murphy area would be irrigated with groundwater (see Map 1-2). All other proposed action development would be watered from high-lift pump stations situated along the Snake River. Table 1-3 is a summary of the acreage under the proposed action and the two alternative levels of development (discussed in Chapter 8) that would be irrigated from the four different reaches of the Snake River in the ES area.

River Pumping Irrigation Systems: Facilities for a typical river pumping system are discussed in the Indian Hills CA project description in Appendix 1-2. Basically, the components are a pump plant, (see Figure 1-4), a penstock that transports water to the farm areas, and a distribution system that delivers water to the sprinkler heads in the fields (see Figures 1-7, 1-8 and 1-9). Once water has been pumped from the river, some projects may use a system of open canals and holding ponds. Others may use a completely enclosed pipe system. In all cases, mainlines to the fields would be pressurized to facilitate sprinkler application.

TABLE 1-3

SUMMARY: ACREAGE TO BE IRRIGATED

| | Salmon Falls/ King Hill Reach | King Hill/C.J. Strike Reach | C.J. Strike/ Murphy Reach | Murphy/Ore. Line Reach | Total |
|---|---|---|---|---|---|
| I. MAX. DEV. ALT. | | | | | |
| Snake River | 58,635 | 68,649 | 4,032 | 7,050 | 138,366 |
| Groundwater | -0- | 21,816 | 16,128 | -0- | 37,944 |
| TOTAL | 58,635 | 90,465 | 20,160 | 7,050 | 176,310 |
| II. MIN. DEV. ALT. | | | | | |
| Snake River | 1,350 | 15,210 | 462 | 4,680 | 21,702 |
| Groundwater | -0- | 5,040 | 1,848 | -0- | 6,838 |
| TOTAL | 1,350 | 20,250 | 2,310 | 4,680 | 28,590 |
| III. PROPOSED ACTION | | | | | |
| Snake River | 48,180 | 46,053 | 1,026 | 4,620 | 99,879 |
| Groundwater | -0- | 7,032 | 4,104 | -0- | 11,136 |
| TOTAL | 48,180 | 53,085 | 5,130 | 4,620 | 111,015 |

SOURCE: IDWR and BLM Idaho State Office, 1978

FIGURE 1-1. View of a native sagebrush landscape in the ES area that has good soils and potential for farm development.

FIGURE 1-2. A brush rake being used to windrow brush for burning in preparing the land for plowing.

FIGURE 1-3. The land on the left side of the fence has been cleared of sagebrush and the bare soil is ready for planting crops.

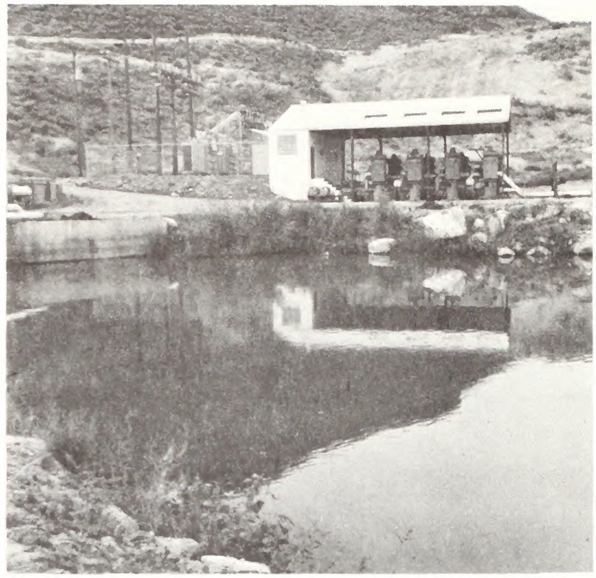


FIGURE 1-4. A river pumping station with covered pump deck and transformers in rear.

FIGURE 1-5. Aerial panorama of pump station located on a side channel of the Snake River. A buried penstock ascends the hill behind the station to deliver irrigation water to the bench high above the river.

Construction of a river pumping system would involve bank excavating and river dredging for placement of the pump station, ditching and burying of the penstock pipe, and ditch digging where open canals are used. Extensive structural concrete work would be required in the construction of pump stations and booster pump decks.

Electric power from the Idaho Power Company System would be used to provide irrigation pumping pressure. Some existing pump stations in the ES area total more than 12,000 horsepower each. Pumping facilities of such size require installation of an electrical substation next to the pump station. Power distribution lines would also have to be built into the substation and throughout the farm project area to provide electricity to booster pumps that pressurize sprinkler irrigation systems. All powerlines would be of a design to prevent electrocution of perched raptors.

Deep Well Pumping: Based on the existing situation, deep well pumping would provide 80 percent of the irrigation water in the ES area between Bruneau and Murphy. Adequate water supplies have been found from depths of 100 - 700 feet. Providing irrigation water by pumping groundwater would normally require less elaborate facilities than river pumping. The well would likely be located on the farm unit itself. Water pumped to the surface would immediately be distributed into mainlines to the field, or into a holding reservoir with booster pumps, or into a canal with booster pumps for mainline pressurization.

Field sprinkler systems would be the same for groundwater or river water pumping. Based on current farming practices in the ES area, the sideroll sprinkler is the most common system used. (See Figure 1-7). Normally, two side roll units 1320 feet long are used in a 40-acre field. Sprinkler head pressure is normally 70 pounds per square inch (psi) with sprinklers spaced along the length of the pipe. The unit is connected to risers located along the buried mainline. After each irrigation "set", the system is moved by a gas or electric motor located at the middle of the unit. Duration of the sets depend on weather conditions and the type of crop being irrigated.

Other Farm Facilities

There are a number of other items that would be typically associated with the new farm developments. The perimeter of the farm project would be fenced to keep range livestock out. Fences would have to be constructed to allow passage of wildlife and yet meet livestock needs.

New access and farm roads would be required. It is assumed that these roads would be built on section lines (1 mile apart) within the interior of the farm project in a grid type pattern. Roads would be built to road district standards with a gravelled surface about 34 feet wide and 8 inches deep. Based on current conditions in the ES area, it is assumed that there would be 1.7 miles of new roads constructed for each square mile (640 acres) of farmland. There would also be lower grade dirt roads maintained along irrigation canals and powerlines, edges of fields, fence lines, etc.

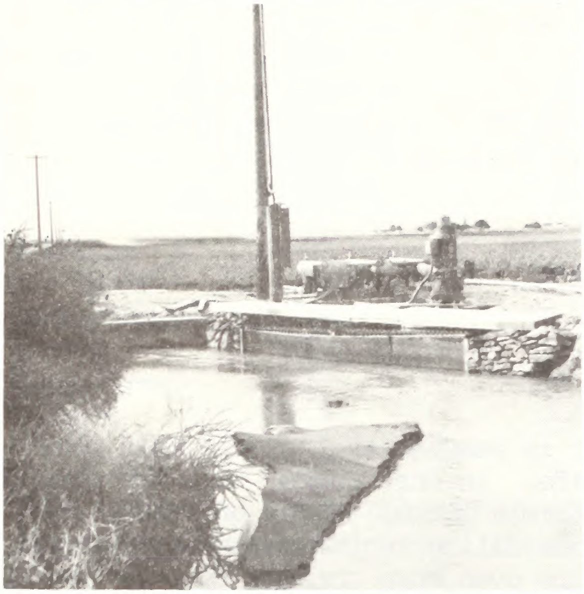


FIGURE 1-6. This booster pump takes water from the canal and pumps it into aluminum mainline pipe which delivers it to sprinkler heads in the field.

FIGURE 1-7. Side roll sprinkler equipment in a sugar beet field.

FIGURE 1-8. A solid set sprinkler system irrigating winter wheat that has recently been planted. This system is commonly used in the ES area.

FIGURE 1-9. This pivot sprinkler rolls in a complete circle around its pivot point. Most pivots can cover about 140 acres. Sprinklers are located along the complete length of the pivot arm.

Farm shop buildings, equipment storage yards, and potato sheds would have to be constructed. Some residences would be established; under the CA, a residence is required for each farm unit. Residences could be mobile homes or new permanent-type homes. Based on past DLA projects in the ES area, most farm units would not have residences established on them if it was not required. It is assumed that these non-crop land uses would take up about 3 percent of each farm unit acreage.

## Farm Operations

### Farm Unit Size

For the purposes of analysis, it is assumed that a farm unit would be a joint filing of a husband and wife. In most cases, this has occurred in the past and allowed a family to farm a larger amount of land. In many cases, sons and daughters who meet filing requirements would also file along with their parents to secure even more acreage for the family operation.

A husband and wife would qualify for 320 acres under the CA and 640 acres under DLA. Where groundwater would be used as the irrigation source, the two entrymen (husband and wife) would probably plan development of the land independent of other entrymen. Where river water was to be used, they would likely be members of a larger group of entrymen.

### Crops

Based on agricultural practices in the ES area, it is anticipated that six crops would be grown on the new land opened up under the proposed action. It is assumed that these crops would be grown on a long-term sustained basis under the rotation, shown in Table 1-4.

TABLE 1-4
CROP COMPOSITION OF TYPICAL
DLA AND CA FARM UNIT

| Crop | % Crop Composition On Farm | Average Yield per Acre | | Crop Acres Under DLA Farm Unit | Crop Acres Under CA Farm Unit |
|---|---|---|---|---|---|
| Potatoes | 22 | 315 | cwt | 136.4 | 68.2 |
| Dry Beans | 21 | 18.75 | cwt | 130.2 | 65.1 |
| Winter Wheat | 17 | 75 | bu | 105.4 | 52.7 |
| Barley | 17 | 75 | bu | 105.4 | 52.7 |
| Sugar Beets | 17 | 20 | tons | 105.4 | 52.7 |
| Alfalfa | 6 | 3.55 | tons | 37.2 | 18.1 |
| | | | | * 620.0 | * 310.0 |

* 20 acres (3%) under DLA and 10 acres (3%) under CA are considered non-crop acres (roads buildings, powerlines, etc.).

SOURCE: Idaho State Office BLM and Idaho Department of Water Resources 1978

Table 1-5 depicts planting and harvesting dates, fertilizer utilized, and consumptive water used by the various crops during the growing season. Potatoes are the highest value cash crop of the six listed. Potatoes normally comprise at least 50 percent of the crops grown on new irrigated land during the first few years since yields are higher and disease less likely. The percent crop compositions in Table 1-4 represents a likely crop mix after the first three or four years of farming.

## Farming Practices

Farming operations are typical of highly mechanized practices used elsewhere in the United States. Efficient water application is possible through the use of sprinkler systems. It is possible to control the amount of water applied to crops more effectively with sprinklers than surface gravity irrigation. Very little water is left over to run off the land after the irrigation cycle or "set". All irrigable ground surfaces are farmed under clean farming practices and there is little opportunity for weedy vegetation to be established around the perimeters of fields since crops are planted right up to roadways. (See Figure 1-11). Agricultural consultant services are available to advise farmers on chemical application and the latest technology to maximize crop yields. Pesticides and herbicides are applied in amounts prescribed by the Environmental Protection Agency. Custom farming is a common practice which allows the farmer or land owner to purchase certain types of the farm work (planting, harvesting, spraying, etc.,) from firms or individuals that specialize in the work.

Many farmers in the ES area lease rather than own the land they farm. These tenant farmers have various pay-back arrangements with the land owner. In many cases sharing crop yields replaces cash rental.

TABLE 1-5

CROP INFORMATION

| Crop | Planting Date | Harvesting Date | Chemical Fertilizers | AVERAGE CONSUMPTION WATER USE -inches/month- APRIL | MAY | JUNE | JULY | AUG. | SEPT. | OCT. | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Potatoes | April 25- May 25 | Sept. 10- Oct. 23 | nitrogen phosphate zinc sulphur | .07 | 1.21 | 4.77 | 9.92 | 8.69 | 1.21 | | 25.87 |
| Dry Beans | May 15- June 1 | Late Aug.- Early Oct. | nitrogen phosphate zinc | | .98 | 4.50 | 8.45 | 4.64 | | | 18.57 |
| Winter Wheat | Sept. 28- Oct. 20 | July 25- Aug. 15 | nitrogen phosphate | .94 | 3.79 | 7.85 | 8.96 | .64 | | | 22.18 |
| Barley | March 15- April 20 | July 25- Aug. 15 | nitrogen phosphate | .83 | 3.59 | 7.33 | 6.85 | .55 | | | 19.15 |
| Sugar Beets | March 20- April 15 | Oct. 15- Nov. 10 | nitrogen phosphate zinc | .27 | 1.86 | 4.08 | 8.05 | 8.01 | 4.73 | 1.51 | 28.51 |
| Alfalfa | Sept. 1-10 and April 10-15 | June 1-18 and July 8-14 and Aug. 15-24 | nitrogen (seedlings) phosphate | | 2.79 | 6.25 | 8.53 | 6.91 | 3.91 | 1.33 | 29.78 |

SOURCE: Extension Agriculture Agent, Elmore County, 1978

FIGURE 1-10. View of a DLA project developed in the early 1970's. Potato sheds and other buildings are about one mile in the distance.

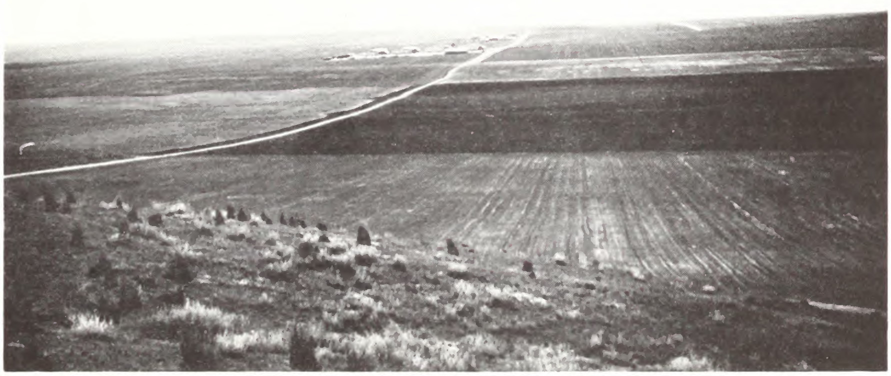


FIGURE 1-11. This photo depicts clean farming practices where weedy vegetation is prevented from establishing along roadway and perimeters of fields. Photo was taken in spring before planting.

Alfalfa windrowed and ready to bale.

Harvesting grain.

Digging potatoes.

FIGURE 1-12. Farm Scenes.

## STATUTES RESTRICTING FARM DEVELOPMENT

There are a number of laws that could prohibit farm development in certain locales in the ES area. These statutes would have to be complied with before farm expansion was approved on public land.

### Wild Horse and Burro Act (Public Law 92-195)

This law requires BLM to protect, manage, and control wild horses on public land. To do this, BLM must prepare a Wild Horse Management Plan (WHMP) for each herd, in conjunction with the Bureau's Multiple Use Planning System. The WHMP will designate specific herd range, determine optimum herd size, and provide management practices to adequately protect, maintain, and manage the herd.

There are two wild horse herds within the ES area. The Owyhee herd is presently being managed under a WHMP. A WHMP has not yet been prepared for the Saylor Creek herd, though one is scheduled for completion by 1983. Until the WHMP for the Saylor Creek herd is completed, decisions on whether or not to allow farm development in areas used by the herd would have to be postponed. Once the WHMP is completed, agricultural development could be precluded in certain areas that would be devoted to management of the herd.

### Endangered Species Act of 1973 (Public Law 93-205)

This law protects plants and animals on federal threatened or endangered species list. The BLM may not allow actions, such as farm development, that could jeopardize the continued existence of any listed species. At this time the Northern Bald Eagle is the only endangered species on the federal threatened or endangered species list which occurs in the ES area. As is required under Section 7 of this Act, consultation was initiated with the U.S. Fish and Wildlife Service (FWS) regarding impact of the proposed action on the Northern Bald Eagle. On September 1, 1978, BLM received a memorandum from FWS stating that the bald eagle would not be jeopardized by the proposed action.

There are, however, five plant species in the ES area which are proposed candidates to Idaho's threatened and endangered species list (these plants are listed in Chapter 2, Table 2-7). BLM is required to consider proposed state threatened and endangered species as if they were listed on the federal threatened or endangered list, affording full protection of the Endangered Species Act. As a result, farm development would not be allowed on locations that were inhabited by these plant species.

### Wilderness Review Provision of FLPMA (Public Law 94-579)

Under Section 603 of FLPMA, the BLM is responsible for ensuring that all public land, including that within the ES area, is inventoried for wilderness characteristics as described in the Wilderness Act of 1964. A preliminary inventory of the ES area has identified four qualifying areas totaling 70,547 acres. This includes 4,705 acres within the ES area and 65,842 acres of contiguous undeveloped land. Land uses that would impair the suitability of qualifying areas for wilderness preservation will not be allowed, pending completion of formal public review and Congressional action as required by Section 603 of FLPMA. Farm development would not be allowed on Congressionally designated wilderness areas.

### Cultural Resources

There are a number of laws that protect paleontological, archaeological, and historical resources on public land. Some of the more important ones are the Antiquities Act of 1906, the National Historic Preservation Act of October 15, 1966, and Executive Order 11593. Basically, these statutes require the BLM to inventory, locate, and evaluate such resources before land disturbance or disposal can take place. Farm development could be prevented in locations where cultural resources were found to be eligible for inclusion in the National Register of Historic Places. The National Register of Historic Places is a register of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, and culture maintained by the Secretary of Interior. The criteria for National Register Criteria and Federal agency responsibility under Section 106 of the National Historic Preservation Act is found in Appendix 1-3.

Cultural resource surveys have not been completed for the entire ES area. Therefore, before public land could be farmed under the proposed action, the BLM would complete cultural surveys under standard procedures as described in Appendix 1-4.

## AUTHORIZING ACTIONS

### BLM Authorization

The basic procedure for approving DLA and CA applications has been described earlier in this chapter. There would be other land use applications associated with farm development that would need BLM approval. Where public lands were crossed by powerlines, canals or roads, right-of-way (R/W) grants would be required from BLM. Right-of-way grants are also required where pump stations are located on public land shoreline of the Snake River. BLM would require road plans to be submitted as part of the overall project design. Roads would have to be constructed to county road standards and be compatible with public transportation needs in the area. Once constructed, these roads would be dedicated into the county road systems for upkeep and maintenance. Top soil replacement and revegetation stipulations would be required where public lands were excavated for penstocks, canals, roads, pump stations, etc. Stipulations would be designed to minimize soil erosion where soil disturbances occurred.

In order to limit soil erosion from excess irrigation water and local flash flooding, BLM would require settling ponds in certain instances. These check dams would normally be located in the farm projects on the farm unit itself. Public land may be made available for catchment ponds in those cases where such ponds could not be located on the farm unit. Settling ponds would help prevent gully erosion and eliminate surface irrigation return flows from entering and polluting water bodies such as the Snake River. In many circumstances, however, check dams would not be needed due to flat topography.

Where groundwater is proposed as the source of irrigation water, the BLM would require a temporary use permit (TUP) to enter upon the land for purposes of well drilling. TUPs are required primarily where adequacy of the water source is questionable. DLA and CA applications would be rejected if groundwater was found to be insufficient.

BLM would also authorize land uses on some of the 37,000 acre public purpose tracts interspersed throughout the farm areas. Once agricultural development occurred, there could be land needed for sanitary landfills, sand and gravel pits, airstrips, and public service facilities such as road maintenance yards. Commercial business locations might also be needed. BLM could sell or lease public land under the Recreation and Public Purposes Act (R&PP) to government agencies for airstrips, sanitary landfills, or maintenance work. The Materials Act of 1947 would authorize local government entities to extract sand and gravel by a Free Use Permit (FUP) or private firms could purchase the material for fair market value. Commercial enterprises could buy or lease public land under Sections 203 and 302 of FLPMA for purposes of establishing a business location.

<u>Other Agency Authorization</u>

The Corps of Engineers must authorize and issue permits for any diversion structures, such as pump stations, located downstream from Walters Ferry on the Snake River. This is to assure that river navigation is in compliance with Section 10 of the Rivers and Harbors Act. The Corps also requires permits under Section 404 of the Clean Water Act of 1977 for placement of dredge or fill material when facilities are constructed in the Snake River.

The Idaho Department of Water Resources (IDWR) licenses irrigation water uses. The prospective farmer files a permit application for irrigation water, be it Snake River water or groundwater. The permit application appears as a public legal notice in the local newspaper. If no protests are received, the permit can be approved by the IDWR. The permit holder can then proceed with the necessary construction and eventually submit proof of application of the water to beneficial use within the time specified by the permit (normally five years). After an affidavit of proof of beneficial use is submitted, IDWR personnel inspect the development, and a water right (license) is issued if conditions of the permit have been satisfied.

# INTERRELATIONSHIPS

This section briefly discusses other proposed projects, studies and land use planning that are closely related to the proposed action. They are found both in and adjacent to the ES area and several are depicted on Map 1-4.

## With Other BLM Programs

### Birds of Prey Study Area

The Snake River Birds of Prey Natural Area (see Map 1-4), less than 30 miles south of Boise, was established in 1971 to protect wintering and nesting habitat for birds of prey. The Natural Area stretches along 33 miles of the Snake River and encompasses both the river bottom and steep volcanic cliffs that provide nesting habitat for the highest concentration of raptors in North America. Golden eagles, prairie falcons, red-tailed hawks, and ten other species of raptors are found.

In September 1977, over 500,000 acres of public land surrounding the Natural Area were put under administrative moratorium by the Secretary of Interior. This is referred to as the Birds of Prey Study Area (see Map 1-4) and was established to determine the precise food and habitat needs of the birds. In addition, the study will determine the basis for proposing a boundary that will provide permanent protection for the raptors.

To maintain the study area in its natural state while research is in progress, the public land in this study area is closed to land disposal, oil and gas leasing and geothermal leasing until permanent protection is established. Much of this study area is under DLA and CA application.

After data is analyzed, a final boundary recommendation will be submitted by the Secretary of Interior to Congress for possible legislation. This recommendation will be examined in an environmental statement scheduled for release during the last half of 1979.

### Livestock Grazing Environmental Statements

The BLM Boise District is scheduled to complete livestock grazing ESs for the Owyhee Planning Unit (PU) in 1980, the Bruneau and Kuna PU's in 1982 and Saylor Creek and Bennett Mountain Pu's in 1984. Forage inventories will be conducted to determine current and potential livestock carrying capacities before these ESs are started. With data obtained from these inventories, a revised grazing management program will be written to form the basis of the grazing ESs.

## With Other Federal Programs

### Oregon Trail

In 1977, the Bureau of Outdoor Recreation published a study report which recommended that the route of the Oregon Trail be designated as the Oregon National Historic Trail. During 1978, legislation was enacted in the Omnibus Parks Bill, which included the Oregon Trail within the National Trails System as a National Historic Trail. The National Park Service will coordinate preparation of the plan scheduled to be completed in 1981. This management plan will be directed toward the protection of existing trail remnants, the trail environment and public enjoyment of the trail. Map 1-4 illustrates the Oregon Trail route through the ES area.

### Hagerman Fauna Sites National Natural Landmark

Map 1-4 shows the location of the Hagerman Fauna Sites National Natural Landmark. It is recognized as one of the most important Pliocene fauna fossil areas in the world. BLM has management responsibility for the 3,875 acres of the public land involved. The National Park Service completed a study in 1974, recommending the fauna beds be included in the National Monument System. Management of the area is oriented towards preserving the scientific values of the fossil beds.

## With Other State Proposals

Map 1-4 shows locations of four low-head hydroelectric dams that are currently under study in the reach of the Snake River which flows through the ES area. These facilities would be jointly constructed by Idaho Power Company (IPC) and the Idaho Water Resource Board. These dams would have low storage capacity and would be used principally for run-of-the river hydrogeneration. If these low-head dams were eventually constructed, they would help meet increased electricity demand created by new irrigation pumping in the ES area. ES documents are to be written by IPC on these proposed facilities in 1978 and 1979.

### Wiley Dam

Wiley Dam would be located about 2 miles southwest of Bliss. It would be 79 feet high and generate up to 75 megawatts (MWs) of power.

### Dike Dam

Dike Dam is proposed to be located 12 river miles below Wiley Dam. It would be 55 feet high and produce up to 50 MWs.

Swan Falls and Guffey Dams

Swan Falls Dam would be constructed at the present site of the old Swan Falls Dam built in 1901. The new facility would be 65 feet high and eventually generate 157 MWs. Twelve miles downstream near Melba, Guffey Dam would be constructed. Guffey is intended to function primarily as a river flow regulation dam for water fluctuations created by Swan Falls power generation. It would be 40 feet high and would produce up to 29 MWs.

The Bruneau Plateau Feeder Canal

The Bruneau Plateau Feeder Canal project would involve building a new canal beside the present High Line Canal in Twin Falls County. It would be constructed west asross Twin Falls and Owyhee Counties. Under the proposal, Snake River winter flow water would be diverted at Milner Dam through the new canal. The water would flow across Salmon Falls Creek via a large inverted siphon and would flow westerly through an open canal, located approximately on the 4,000 foot contour level. It would finally empty into two reservoirs used for irrigation water storage (see Map 1-4). The reservoir dams would be located on Saylor Creek and Deadman Creek drainages. Core drilling to help determine feasibility has taken place at the proposed Saylor Creek dam site. Deadmans storage capacity would be 116,000 acre feet while Saylor Creek Reservoir could hold 330,000 acre feet. There is a possibility of some low-head hydro-electric power generation from irrigation water releases from the reservoirs. The Bruneau Plateau Feeder Canal is conceptual at this point, but feasibility studies may be funded by the Idaho State Legislature in 1979. If ever constructed, this canal could help eliminate rising costs to farmers of high-lift pumping directly from the Snake River. Much of the public lands within the ES area could be irrigated by this proposal, primarily in the Saylor Creek Planning Unit.

Idaho State Outdoor Recreation Plan (SCORP)

Both the Oregon Trail and the Hagerman Fauna Sites are mentioned in the 1977 Idaho State Outdoor Recreation Plan (SCORP) as being significant recreation attractions. It is the goal of the SCORP to "maintain, identify, and protect outstanding examples of Idaho's natural, cultural, recreational and historical resources for the future enjoyment of Idahoan's and visitors." The SCORP estimates that the regional demand for those types of recreation activities found within the ES area will more than double between the year 1975 and 2000.

## With Land Use Planning

BLM Planning

The ES area is covered by portions of four BLM planning units; Saylor Creek, Owyhee, Bruneau, and Bennett Mountain (see Map 1-2).

Planning has been completed for three of these units and partially completed for the fourth.

The Saylor Creek plan was completed in 1972 and is scheduled for revision in 1983. Decisions allowed agricultural development of approximately 40,000 acres of public land in the Blue Gulch and Deadman Flat areas. Most of these 40,000 acres have been developed to date. The plan stated that additional farm expansion could be considered after more is known about environmental impacts, agricultural demands, and economic policies. This ES will address the question of more farm expansion.

The Owyhee and Bruneau Planning Units are covered by one plan, the West Owyhee. This was completed in 1975. It recommended that all public land in the ES area from the Bruneau River to the Oregon border having Class I and II soils be available for farm expansion. Revision for the Owyhee Unit is scheduled for 1979 and the Bruneau Unit in 1981.

The Bennett Mountain Plan is not complete. Work on this planning unit has been stopped until a vegetation inventory is completed for the Bennett Mountain Grazing ES. Information from this ES will be used in the final plan. Preliminary recommendations are to allow farm development on Class I and II soils in an orderly sequence, considering economic benefits and environmental safeguards.

County Planning

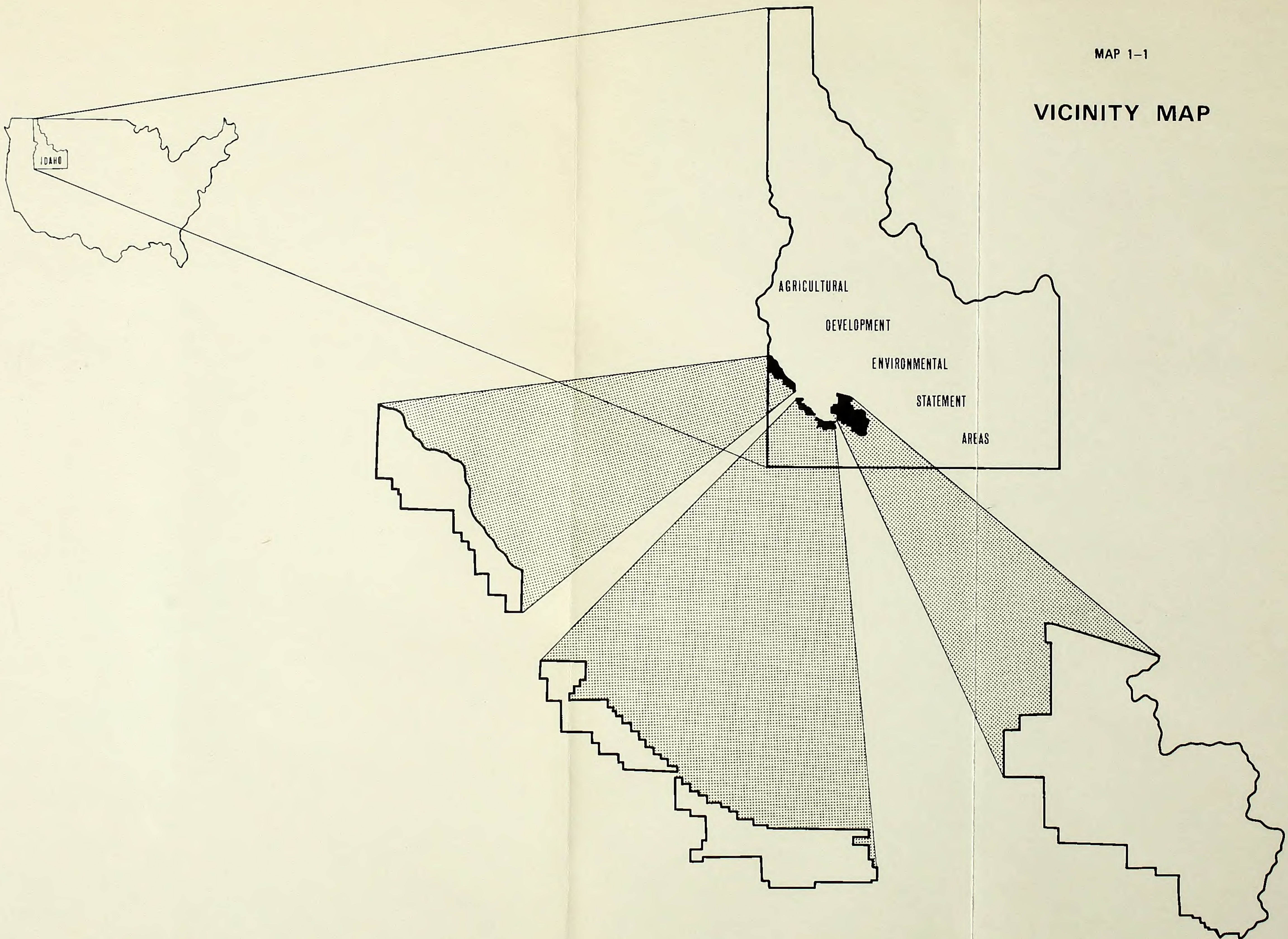
The ES area is located primarily in Owyhee and Elmore Counties with the eastern portion in western Twin Falls County (see Map 1-2). All three counties have comprehensive land use plans which were completed in the mid 1970s; however, no zoning or land use restrictions have been implemented to enforce the planning recommendations.

All three land use plans allow for agricultural development on "the best soils," and have designated all reasonable land within the ES study area suitable for agricultural development. Both Twin Falls and Elmore Counties have indicated that minimum development be 40 acres per farm unit. Owyhee placed no size limitation.

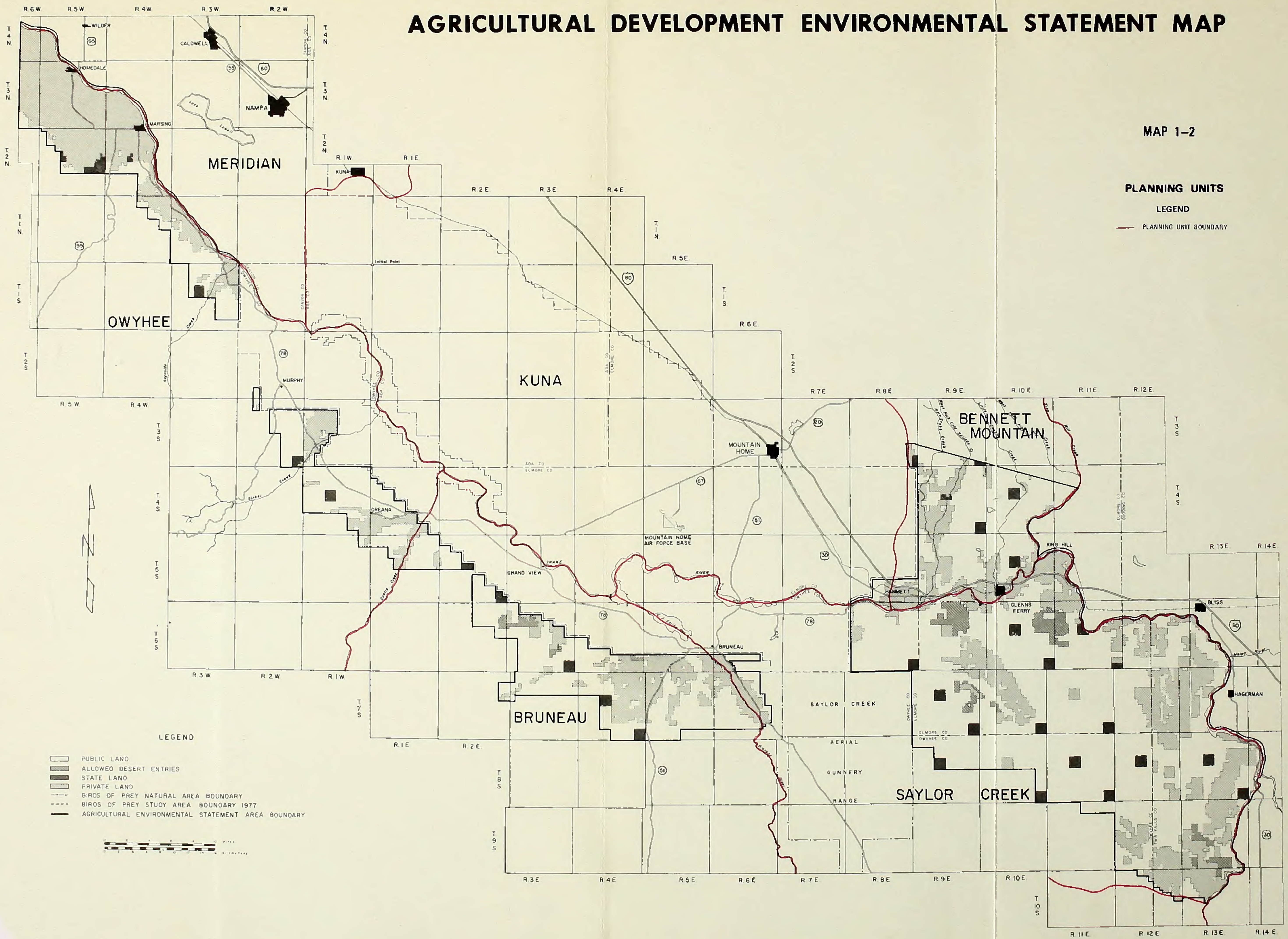
If farming is eventually authorized as defined under the proposed action, BLM would update land use plans when specific farm projects were about to be approved. This updated BLM planning would be made available as input into county and local community land use changes. BLM would closely coordinate with county entities so that efficient use would be made of available planning resources.

MAP 1-1

# VICINITY MAP

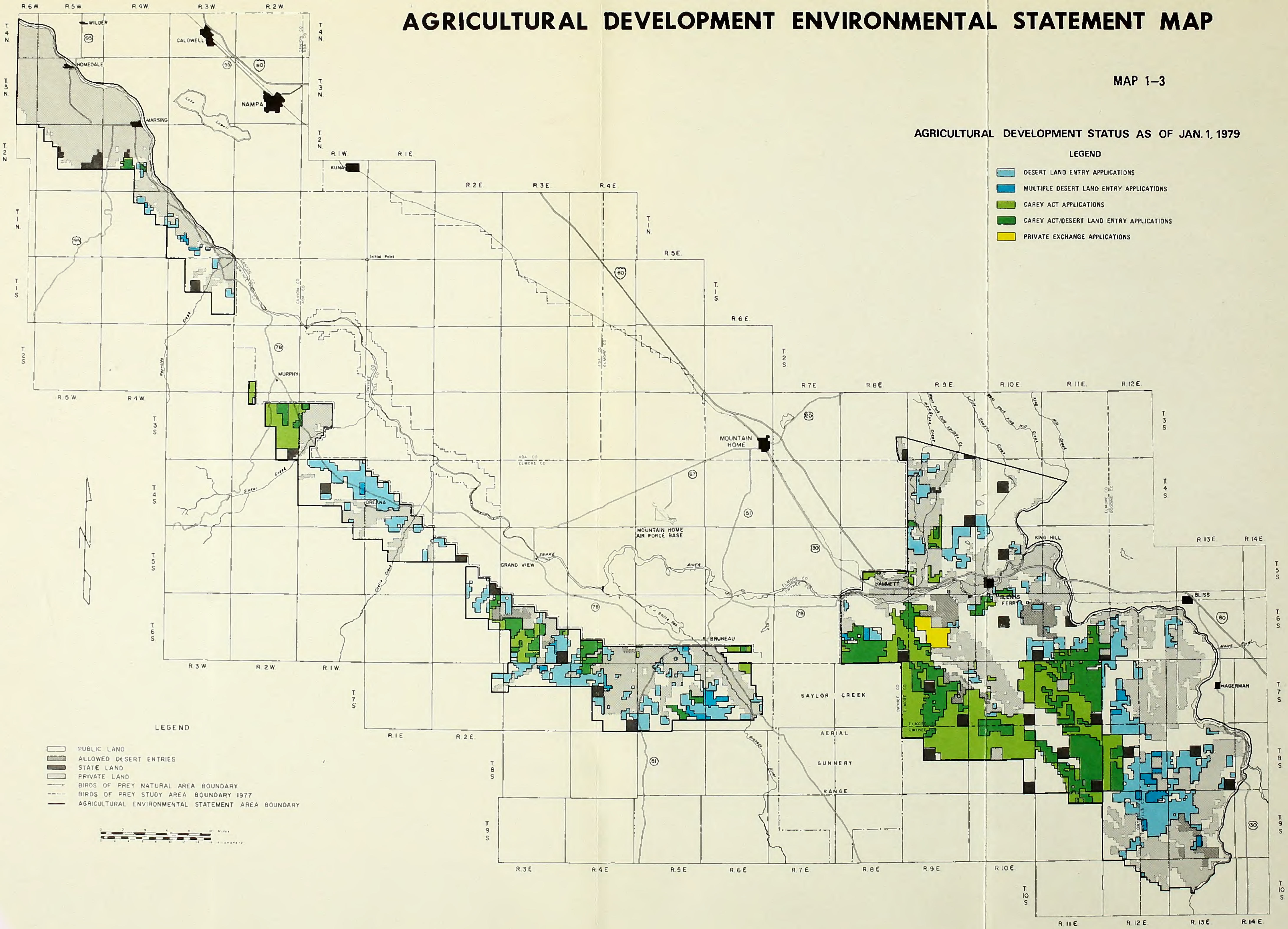


# AGRICULTURAL DEVELOPMENT ENVIRONMENTAL STATEMENT MAP



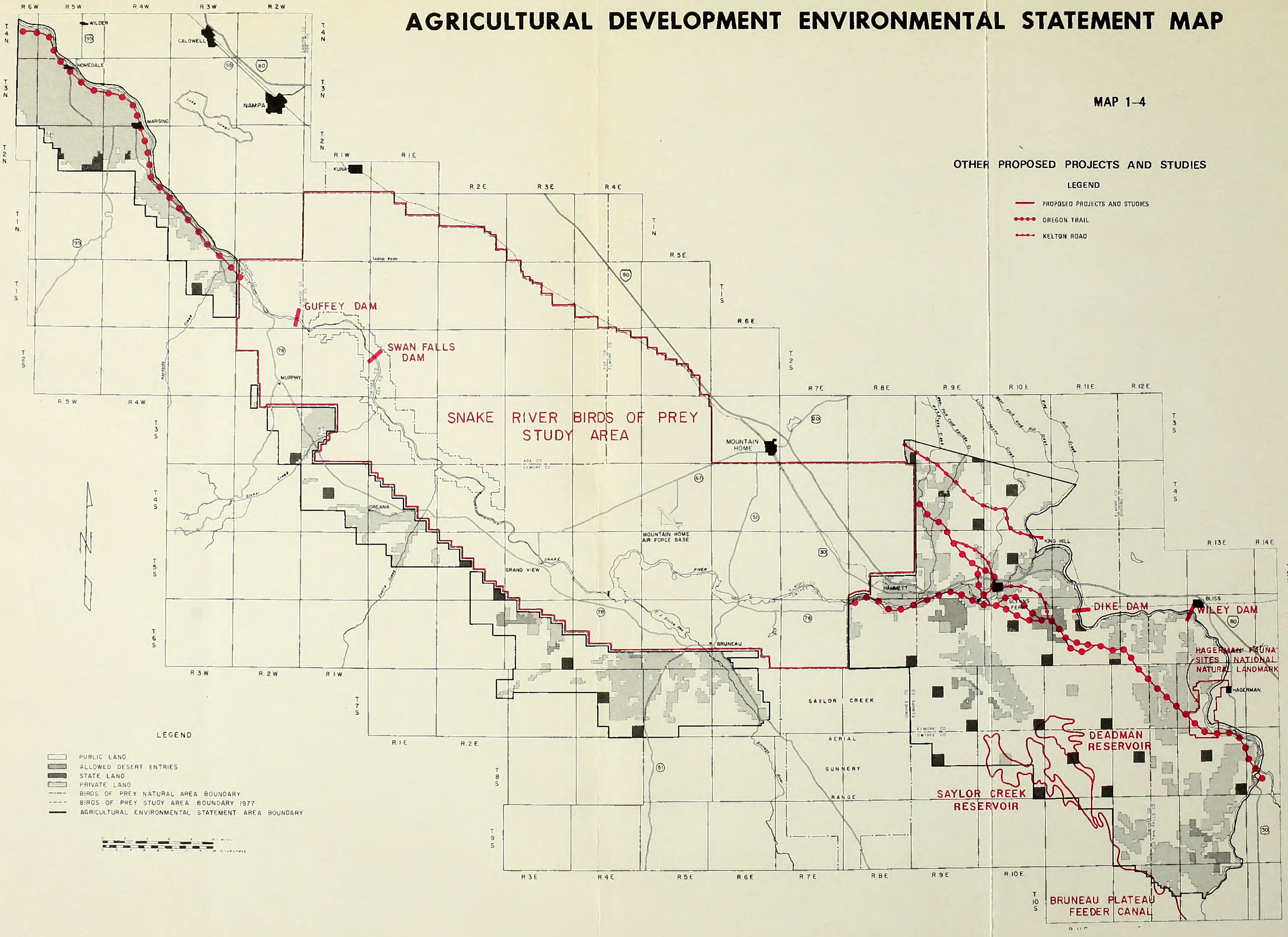
# AGRICULTURAL DEVELOPMENT ENVIRONMENTAL STATEMENT MAP

MAP 1–3



# AGRICULTURAL DEVELOPMENT ENVIRONMENTAL STATEMENT MAP

MAP 1–4



# CHAPTER 2

# DESCRIPTION OF THE ENVIRONMENT

Chapter 2 describes the environmental and social setting in which the proposed farm development takes place. Emphasis is placed on those subjects most likely to be affected by the proposed action. The chapter is divided into two sections — a description of the present environment and a description of the future environment without the proposed action.

# CHAPTER 2
# DESCRIPTION OF THE ENVIRONMENT

## EXISTING ENVIRONMENT

This section describes the area today. It pays particular attention to those resources, land uses, and socio-economic features that would be affected by the proposed action.

### CLIMATE

Climate conditions are consistent throughout the ES area. The climate may be generally characterized as moderate to cool mean temperatures with warm to hot, dry summers and cool to cold winters. Precipitation is typical of semiarid regions, averaging approximately 8.7 inches per year. Also characteristic of the area are moderate to low relative humidities, wind conditions which range from slight to rather severe, an abundance of sunshine, and a moderate frequency of rain or snow storms. The growing season varies from 100 to 200 days with an average of 165 days.

The climate of the area originates principally from Pacific maritime air masses brought into the region by prevailing westerly winds. These air masses exert a modifying influence on temperatures and contain moisture which is the source of nearly all precipitation. Occasionally, cool polar air masses or warm continental air masses invade the region, displacing or modifying the effects of the maritime air masses. These latter types are partly responsible for the clear weather, low humidities, and temperature extremes. Wind conditions vary with the season of year. Windy conditions are characteristic in the spring while summers are usually calm. At the Gooding Airport (10 miles east of the ES area) wind velocities exceed 18 mph about 9 percent of the time in March, April, and May. During the months of July, August, and September wind velocities exceed 18 mph only 2 percent of the time (see Figure 2-1).

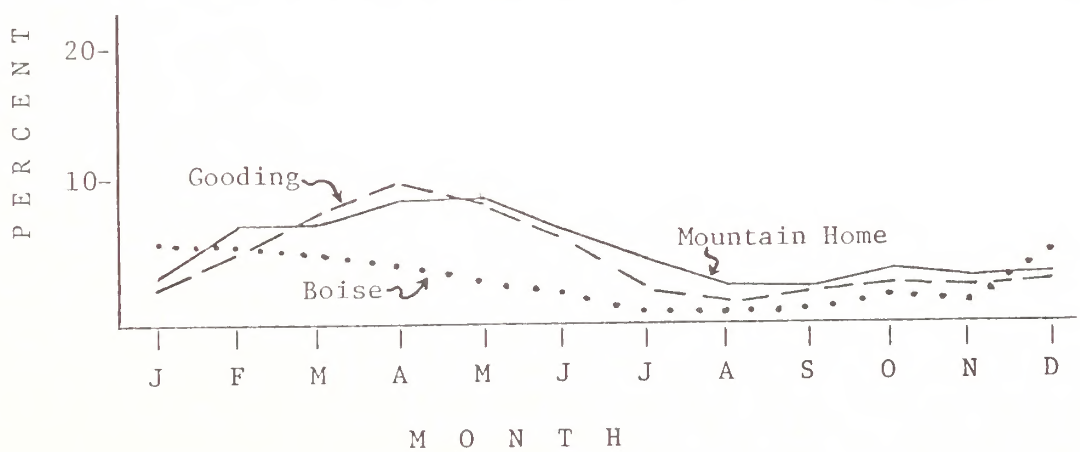



FIGURE 2-1. Percent of time wind exceeds 18 MPH (by month) for three stations in southern Idaho.
SOURCE: Climatological Handbook, Pac. NW River Bas. Com.

TABLE 2-1

CLIMATIC SUMMARY

| County | Station | Average Temperature, °F | | Average Killing Frosts | | | Average Precipitation, Inches | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | January | July | Last in Spring | First in Fall | Growing Season, Days | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sept | Oct | Nov | Dec | Annual |
| Ada | Boise | 29.1 | 75.2 | Apr 21 | Oct 23 | 177 | 1.32 | 1.33 | 1.32 | 1.16 | 1.29 | 0.89 | 0.21 | 0.16 | 0.39 | 0.84 | 1.20 | 1.32 | 11.43 |
| | Kuna | 29.0 | 72.0 | Apr 24 | Oct 14 | 173 | 1.12 | 1.03 | 1.20 | 1.03 | 1.37 | 0.88 | 0.19 | 0.14 | 0.40 | 0.79 | 1.18 | 1.03 | 10.36 |
| Elmore | Glenns Ferry | 30.5 | 76.4 | May 6 | Oct 3 | 150 | 1.25 | 0.94 | 1.02 | 0.75 | 0.90 | 0.59 | 0.25 | 0.14 | 0.25 | 0.55 | 1.05 | 0.99 | 8.68 |
| | Mountain Home | 28.3 | 73.7 | May 3 | Oct 6 | 156 | 1.04 | 0.87 | 1.10 | 0.84 | 1.02 | 0.73 | 0.24 | 0.15 | 0.30 | 0.65 | 0.93 | 0.91 | 8.78 |
| Gooding | Bliss | 28.1 | 74.2 | Jun 3 | Sept 24 | 113 | 1.24 | 0.92 | 0.92 | 0.66 | 0.88 | 0.61 | 0.22 | 0.11 | 0.27 | 0.55 | 1.05 | 1.11 | 8.54 |
| Owyhee | Grandview | 29.4 | 76.5 | Apr 28 | Sept 23 | 144 | 0.71 | 0.58 | 0.91 | 0.70 | 1.09 | 0.83 | 0.16 | 0.11 | 0.33 | 0.47 | 0.68 | 0.69 | 7.26 |
| TwinFalls | TwinFalls | 26.9 | 72.3 | Apr 26 | Oct 8 | 165 | 1.02 | 0.72 | 0.87 | 0.86 | 1.01 | 0.79 | 0.21 | 0.21 | 0.46 | 0.75 | 0.93 | 0.91 | 8.74 |

Source: Climates of the States, U.S. Department of Commerce, 1971.

At Mountain Home (about 15 miles north of the ES area), wind velocities are 8 percent and 3 percent, respectively. Wind direction in the ES area is westerly.

Figure 2-1 depicts wind conditions taken from three stations in southern Idaho. All three stations show the same seasonal wind characteristic - windy springs. This feature becomes increasingly important in light of the fact that spring is also the season of high farming activity.

Thunderstorms occasionally produce high intensity precipitation for brief periods but are confined to small areas. Other than localized situations, storms are not an important cause of floods in the region except as they occur in conjunction with heavy snow cover and frozen watershed conditions.

Table 2-1 shows weather information from recording locations which characterize the climatic conditions in the ES area.

## AIR QUALITY

The existing air quality in the ES area is very good. However, it varies depending on the proximity to existing agricultural land, unpaved roads, etc.

Idaho has adopted the federal air quality standards. A number of air quality monitoring stations throughout the state measure total suspended particulates. Sulfur dioxide and hydrocarbons are not being monitored at this time. Particulate pollution is a primary concern in the ES area. Other measured pollutants are not present in significant amounts in the rural or agricultural areas in southern Idaho.

The state and federal air quality standards for particulates are divided into primary and secondary standards. The primary particulate standard (the point at which people of normal respiratory health start becoming ill) is presently set at 75 micrograms per cubic meter ($ug/m^3$). The secondary particulate standard, set at 60 $ug/m^3$, is that point at which the pollutant affects crops, landscaping plants, aesthetic values, etc.

There has been no monitoring of air quality for the undeveloped desert land in southern Idaho. There are, however, several monitoring stations throughout the state located in physical environments similar to the ES area. Data from these stations show that the annual primary and secondary standards for total suspended particulates have been exceeded during past years on developed agricultural land. However, the standards are normally exceeded only during the months of crop planting and harvesting. These data are fairly consistant between the differing agricultural areas, indicating that this is a general air quality characteristic for this type of land use.

In addition to the annual standards, there are 24-hour standards which must be met. Available data indicates that during the months involved in spring cultivating, planting, and harvesting one to three days per month will have particulate concentrations on agricultural land that exceed the 24-hour primary standard. The increased particulate concentrations are due primarily to windy conditions.

In summary, areas with agricultural development will exceed the secondary standards during specific months of the year but seldom exceed the primary standards either for the 24-hour or annual time lengths.

In contrast to agriculturally developed areas, one monitoring station, located at the Craters of the Moon National Monument, illustrates the background total suspended particulates where no agricultural development is present. Data from this station show that air quality for this type of land never exceeds the annual primary standards, but does occasionally exceed the annual secondary standards during the spring and summer months when there are high winds and/or droughty conditions. This station does not reflect the same vegetation, soils, or climatic conditions found on the ES area, but does indicate that there are some background particulates in an area with no agricultural development.

## GEOLOGY AND TOPOGRAPHY

The ES area is located within the Snake River Plain, a downwarped basin filled with interbedded lake, stream, and volcanic deposits. The area is underlain by sedimentary silt, sand, clay, ash, gravel, and basalt predominantly of Pliocene-Pleistocene age. Younger alluvial deposits are widespread throughout the region (see generalized geologic Map 2-1).

Much of the region, and most of the ES area, is flat-lying or of low relief, reflecting the nature of the underlying horizontal sediments and basalt flows. Elevation ranges from about 2,250 feet adjacent to the Snake River in the western portion of the ES area, to in excess of 4,000 feet in the extreme southeastern part of the area in the Salmon Falls Creek region.

With the exception of that portion of the ES area situated adjacent to Salmon Falls Creek, much of which is underlain by igneous rocks (Banbury Basalt), most land is underlain by Idaho Group sediments which, in some areas, include surface exposures of basalt interbeds. Those lands underlain directly by basalts are gently rolling or flat-lying.

Land in the Bruneau, Oreana, and Marsing regions is directly underlain by lake sediments with gravelly layers commonly forming a resistant "cap", resulting in a somewhat muted badlands-like topography.

## SOILS

Soils within the ES area were grouped according to the Bureau of Reclamation Economic Land Classification System. The soils were grouped into three productive and one nonproductive classifications; i.e., Class

I, II, III, and VI. Class I soils are most productive. There are 439,303 acres of public land within the ES area. Of this amount, 347,812 acres are open to DLA and CA filing. Public land in the ES area available to filing have 65,294 acres (17%) of Class I soils, 74,616 acres (20%) of Class II soils, 82,916 acres (22%) of Class III soils, and 151,986 acres (41%) of Class VI (non-irrigable land).

Appendix 2-1 contains a complete legend of criteria used in classifying the soils. Soils were mapped according to the physical qualities of the individual soil profiles. Factors considered were depth, texture, permeability, slope, erosion, parent material, and inhibitory factors. Each individual mapping unit is classified and identified with a descriptive symbol that is representative of the predominant soil properties.

Production figures given in Appendix 2-2 are taken from soil survey interpretation sheets of established soil series recognized within the ES area. Certain other soil series were identified during surveys, but were not officially classified and established because the nature of mapping was oriented toward crop production and irrigability, not soil series identification. Several of the soil series were found on more than one irrigability class due to the normal range of characteristics such as slope, depth, and texture found within a series. Production figures were derived from the appropriate soil phase peculiar to that class. Land was classified without consideration of its elevation or distance from water.

## Class I

Class I land is well suited for irrigation development. The dominant soil textures are silt loams and loams, but range from sandy loams to clay loams. They are predominantly deep, dark brown to light brown, and friable. Soil depths exceed 36 inches over sand, gravel, rock, or hardpan. There are few areas of surface rock or gravels. Soil permeabilities range from 1.30 to over 2.00 inches per hour, and the water holding capacity exceeds 5 inches in the top 4 feet. The pH of the saturated soil surface ranges between 7.2 and 8.5. The topography consists of smooth, gentle slopes ranging from 0 to 4 percent. The soils do not have drainage problems or toxic amounts of salt or sodium within the profile.

## Class II

Class II land is suited for irrigation and the production of row crops. Soil textures range from loamy fine sands to silty clay loams with a predominance of silt loams and loams. These soils are moderately deep to deep or at least 20 inches to sands, gravels, or restrictive layers. The principal soil deficiencies of this land class are the moderately shallow depths and the slightly toxic amounts of salt and/or sodium. Topographic deficiencies include land with short irrigation runs and slightly undulating or moderately sloping surface relief. Small areas of rock outcrop exist in spots, but the depth to bedrock is generally greater than 6 feet. Soil permeabilities are slower in the finer textured soils, and the pH ranges from 6.2 to 9.0. Water holding capacity exceeds 3 inches in the top 4 feet of soil. Slopes range from 0 to 15 percent with few drainage problems.

Class III

Class III land is adapted more for the use of small grains and pasture and is considered marginal for row crops. Management should include 80 percent permanent cover within any crop rotation.

Soil textures can range from loam fine sands to clays with a predominance of loams and silt loams. Depth to gravels, rock, or hardpans is at least 10 inches, and some gravel and rock is found on the surface. Slopes range from 0 to 20 percent and can have rills and undulations varying from 16 to 24 inches that may require extensive cut and fill operations. Soil permeabilities can be low because of poor drainage and high concentrations of sodium. Water holding capacities exceed 2 inches in the top 4 feet.

The more predominant deficiencies for irrigation is the presence of slick spots (high sodium) and fine textured subsurface horizons. Areas of shallow soils or severely eroded slopes are also a prevalent problem. Some restricted drainage may occur in the lower portions of alluvial fans, low terraces, and shallow lava plains; but this is not a serious problem.

Class VI

Class VI land is considered non-irrigable. It is comprised mostly of basalt flows and outcrops, canyons, gorges, steep sloping lands, and mountain areas (USDI, Bureau of Reclamation, 1969).

The estimated average production from each of the three irrigable classes is given in Table 2-2. This information was derived from the Soil Conservation Service (SCS) Form 5s for established soil series identified within the ES area.

Present soil sheet (water) erosion was calculated using the Musgrave equation (see Appendix 2-3) for the highest and lowest limits of each irrigability class (Table 2-3). Actual erosion rates for soils within the ES area are more accurately represented by the lower figure, particularly within Class III and VI soils.

General soil erosion maps have been developed using the Universal Soil Loss equation based on the Idaho Water Resources Board Soil Survey. These maps show that most of the soil within the ES area is classified as having a slight erosion rate. General soil erosion maps can be seen at the Soil Conservation Service, Idaho State Office.

Wind erosion potential varies with the soil type. Windy conditions are most prevalent during spring months in the ES area. Wind erodibility group ratings which show the relative rates that soils will erode are in Appendix 2-4 with a detailed description of soil and wind erodibility criteria. Studies to determine the actual amount of wind erosion have not been conducted. Therefore, wind erosion rates are not known at this time.

TABLE 2-2

ECONOMIC LAND CLASSIFICATION
(Yield figures based on irrigated land)

| Item | Class I | Class II | Class III |
|---|---|---|---|
| Sugar Beets (Tons) | 26 | 19.5 | 13 |
| Alfalfa Hay (Tons) | 5.7 | 4.6 | 3.1 |
| Potatoes, Irish (CWT) | 357 | 290 | 210 |
| Wheat (BU) | 84 | 68 | 52 |
| Corn, Silage (Tons) | 23 | 21 | 16 |
| Corn, Sweet (Tons) | 7 | 5.7 | - |
| Pasture (AUM) | 16 | 13 | 11 |
| Barley (BU) | 105 | 88 | 65 |
| Apples (BU) | 540 | 500 | - |
| Field Corn (BU) | - | 46 | - |
| Alfalfa Seed (lbs) | - | 540 | - |

SOURCE: Soil Conservation Service Form 5's

TABLE 2-3

PRESENT SOIL EROSION CONSIDERING THE END MEMBER CONDITIONS OF EACH CLASS-TONS PER ACRE

| Class | Soil Erosion Condition | Erosion Rate | Mean |
|---|---|---|---|
| I | Low | .03 | .16 |
| | High | .30 | |
| II | Low | .03 | .59 |
| | High | 1.15 | |
| III | Low | .26 | 4.24 |
| | High | 8.19 | |
| VI | Low | .82 | 14.08 |
| | High | 27.31 | |

## WATER RESOURCES

### Uses and Flows

#### Surface Water

The major surface drainage through the ES area is the Snake River. The Snake is one of the nations largest rivers and serves may uses. Forty dams have been built on the Snake and its tributaries. Between 20 and 25 more have been proposed. Five dams have been built within the ES area for power purposes, water storage, and irrigation water diversion (see Map 2-2). The Snake is also valuable for a wide variety of recreational, wildlife, commercial, and industrial uses.

Average flows in the river vary widely, depending upon location and season (see Table 2-4). Most areas of the basin produce relatively little runoff. The Snake River plain receives only an average of about ten inches of precipitation per year. The mountains on the northern and southern edges of the plain are also quite dry. Flow fluctuations are mostly due to higher elevation snowpacks and the operational requirements for irrigation, flood control, power, and other uses imposed on downstream diversions and impoundments.

Most of the flow is derived from the Henry's Fork basin and the Snake River basin above Idaho Falls. Average annual flows in the river, measured at Idaho Falls, ranged from 6,000 cubic feet per second (CFS) to 900 CFS during the period 1928 to 1968. Much of this water is diverted for irrigation on the Snake River Plain above Milner Dam. Flows through Milner Dam, about 50 miles east of the ES area, during the same period have averaged from 1,600 CFS down to 5 CFS. In about one-fifth of all years, the annual flow passing Milner averages less than 275 CFS (Pac. NW River Basins Comm. 1974). Map 2-3 illustrates flows at different gaging locations on the Snake River system. It also depicts the major tributaries of the Snake River in Idaho.

TABLE 2-4

SNAKE RIVER FLOWS (AVERAGE CFS) BASE CONDITIONS

| Gauging Station | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lower Salmon Falls | 7487 | 8460 | 9875 | 9111 | 8210 | 9376 | 11142 | 8493 | 7338 | 6276 | 6458 | 7105 |
| King Hill | 9714 | 10250 | 11571 | 10963 | 9881 | 11152 | 13090 | 10153 | 8833 | 7538 | 7754 | 8547 |
| C.J. Strike | 9157 | 10545 | 11858 | 11299 | 10285 | 11684 | 13869 | 11079 | 9418 | 7032 | 7022 | 8038 |
| Murphy | 9214 | 10705 | 12001 | 11461 | 10482 | 11892 | 13973 | 11016 | 9331 | 6884 | 6854 | 7949 |
| Brownlee | 13573 | 15721 | 18283 | 18992 | 25998 | 23983 | 25498 | 20171 | 16989 | 10890 | 10000 | 12091 |

SOURCE: IDWR 48 year flow record.

Federal reservoirs on the Snake River and its tributaries are operated as a system to control the flows for irrigation of about 1.2 million acres above Milner (see Map 2-2). In years of low-flow all water in the Snake River is stopped at Milner during the irrigation season. No flow is allowed from the dam downstream. Downstream flows in the river 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 (near Hagerman) which flows year round at about 6,500 CFS. About one-fourth of this spring flow has been attributed to subsurface return flows from upstream irrigation (Idaho Water Resources Board, 1972).

The average flow of the Snake River at King Hill, about 65 miles below Milner, is about 9900 CFS. The characteristics of flow at King Hill, under present conditions of upstream use and control, are shown in Figure 2-2. Data for Figure 2-2 include water years 1928-1975. The lower line (minimum) represents largely the groundwater discharge from the Snake River Plain acquifer but also includes minor amounts of flow passing Milner, irrigation return flow, and flow from the Malad River and Salmon Falls Creek. The average line on Figure 2-2 is considerably higher, being influenced greatly by large flows passing Milner in the high runoff years.

About 2.8 million acres of land are irrigated on the Snake River Plain above King Hill. Nearly one million acres of this land is supplied from groundwater sources. Reservoirs, totaling 5.7 million acre-feet (MAF) capacity, and natural streamflows supply the remainder.

The river gains only small amounts of flow between King Hill and the Oregon border. There are numerous intermittent creeks that drain across the ES area into the Snake River (see Aquatic Environment Map 2-4). Most of these drainages only run water during early spring or during flash, high intensity rain storms. The Bruneau River contributes about 260,000 acre-feet per year, and there are minor amounts from other small tributaries. Existing diversions for about 140,000 acres in the ES area reduce the annual flow about 360,000 acre-feet in this reach. The diversions, which are all withdrawn during the summer months, substantially reduce the summertime flows downstream. 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 (Idaho Water Resources Board, 1972).

Seasonal characteristics of the flow of the Snake River near Murphy are shown on Figure 2-3.

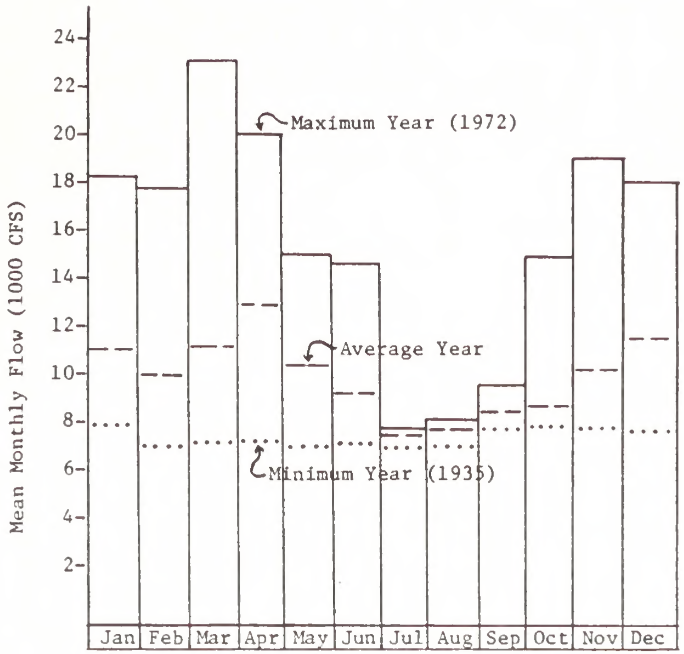



FIGURE 2-2. Characteristics of Snake River flows at King Hill under base conditions. (Source: IDWR 48 year flow records)

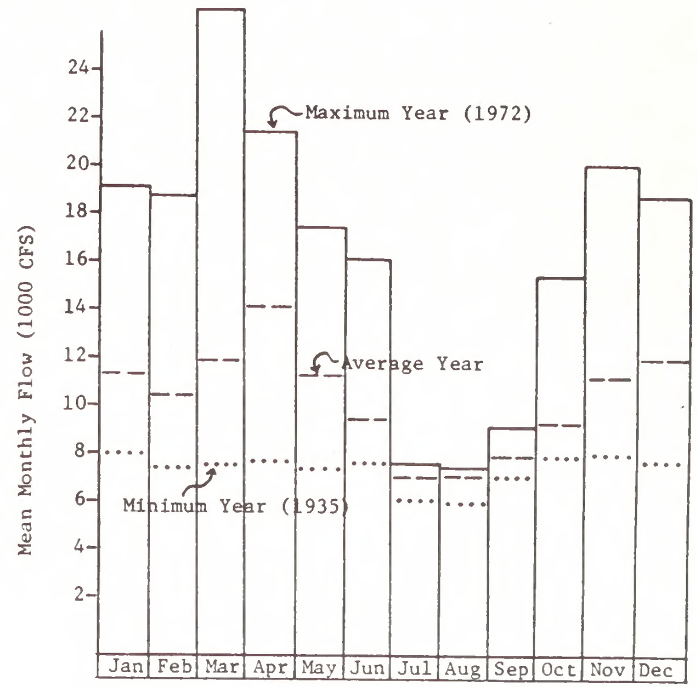



FIGURE 2-3. Characteristics of Snake River flows at Murphy under base conditions. (Source: IDWR 48 year flow records)

Groundwater

Groundwater is generally scarce; great depth and/or low volumes represent the general picture for groundwater. Some wells have been drilled to great depths (1000 ft.) and have yielded less than 50 gallons per minute. Areas can be found, however, where groundwater supplies may be adequate. Following is a brief description of the groundwater system in Northern Owyhee County summarized from reports of the Idaho Department of Reclamation and the U.S. Geological Survey. This area has the greatest potential for farming with a groundwater source within the ES area.

The Northern Owyhee County area lies south of the Snake River between the Bruneau River and Murphy. This lowland area between the Owyhee Mountains and the Snake River is one of varied relief. It is believed the groundwater flows northward toward the Snake River.

The geologic formations which are important acquifers in the area are Tertiary Silicic Volcanics, Poison Creek Formation, Glenns Ferry Formation, and the Banbury Basalt. The Tertiary Silicic Volcanics, exposed in the Owyhee Mountains, are believed to be the major source of the aquifer systems in the area. The highly jointed and fractured character of the rock allows vertical and horizontal movement of groundwater.

The Poison Creek Formation unconformably overlies the Tertiary Silicic Volcanics and is recharged by upward leakage. The formation is composed primarily of bentonite silt and poorly consolidated shale. The fine-grained nature and high bentonite content of most of the formation restricts the yield to wells in the area. The water present in the formation is generally warm and under artesian pressure. It is often highly mineralized.

The Banbury Basalt overlies and interfingers with the Poison Creek Formation. Well yields vary from poor in the western part of the area to good in the east. The water is hot under artesian pressure.

The Glenns Ferry Formation is an important aquifer in the study area. It overlies both the Banbury Basalt and the Poison Creek Formation. The formation has low yields of warm artesian water.

There are no records of diversions or other direct measurements of water use in the ES area. Nearly all of the water is used for irrigation, most of which is pumped from the Snake River. Acreages irrigated from the Snake River in 1975 were approximately:

| | |
|---|---|
| Milner to King Hill | 42,000 acres |
| King Hill to C.J. Strike | 78,600 |
| C.J. Strike to Murphy gage | 18,100 |
| Murphy gage to Nyssa | 43,500 |
| Nyssa to Payette | 8,000 |
| Payette to Weiser | 4,500 |
| | 195,100 acres |

Based upon computed diversions from power use data, the average diversion for this land is about one-half million acre-feet per year.

About 42,000 acres are irrigated from groundwater sources in Twin Falls, Elmore, and Owyhee counties in the ES area.

Communities near the Snake River use groundwater for domestic water supplies. Following are water use data from 1960 for communities in the ES area as reported in the Idaho Water Inventory:

| Community | Source | Annual Diversion (acre-feet |
|---|---|---|
| Glenns Ferry | Springs | 841 |
| Homedale | Wells | 168 |
| King Hill | Well | 39 |
| Marsing | Well | 67 |
| Mountain Home | Wells | 841 |
| Murphy | Wells | 22 |

## Water Quality

### Snake River

The most serious pollution loading in the ES area of the Snake River arises from upstream municipal and industrial wastes, irrigation return flows from gravity systems, and low-flows (IDWRB 1972 and IDHW 1978, USDI 1968, FWPCA 1960).

Critical low-flows and maximum industrial waste production occur mainly from late summer through winter. Low-flows are "man-made" because storage regulation and irrigation diversion outweigh natural influence in determining flow patterns. For example, the entire flow of the Snake River may cease below Milner, as was the case for several months in 1977.

Table 2-5 presents a breakdown of pollution loadings by river reach. Map 2-4 depicts the Snake River reach that flows through the ES area from river mile (RM) 586.5 at the mouth of Salmon Falls Creek to RM 410 at the Oregon border. Most point-source discharges in the middle Snake River occur downstream of the ES area. Non-point source pollution loading is mostly from flood irrigation return water upstream of the ES area.

Approximately 3 million acre-feet of irrigation return flows enter the river annually (PNRBC 1970). Subsurface flows contain high levels of nutrients, especially nitrogen. Surface flows carry high levels of bacteria, organic debris, suspended sediments, phosphorous, and pesticides if little or no underground flow has been involved (Steward et al 1976 and PNRBC 1970).

Livestock grazing and feeding are major sources of nutrient, BOD (biochemical oxygen demand) and bacterial loading to the area of the

TABLE 2-5

POINT-SOURCE POLLUTION LOADINGS WHICH MOST AFFECT
THE ES AND DOWNRIVER REACH OF THE SNAKE RIVER (IDHS 1978)

| | | | Pollutant Loading and Sources | | |
|---|---|---|---|---|---|
| Site | River Mile | | Major | Minor | Pollutants |
| Below Milner (into ES reach) | 638.7 | Point Sources | Rupert<br>Burley<br>J.R. Simplot (Burley)<br>Ore-Ida Foods | Heyburn | Suspended solids<br>BOD<br>Nutrients<br>Bacteria |
| | | Non-Point Sources | Irrigation return flows | Urban runoff<br>Livestock grazing & feeding | Sediment<br>Turbidity<br>Nutrients<br>Bacteria |
| King Hill (ES reach) | 546.6 | Point Sources | Jerome<br>Twin Falls | Fish hatcheries/Farms<br>Tupperware<br>Green Giant<br>Buhl<br>Filer | Suspended solids<br>BOD<br>Nutrients<br>Bacteria |
| | | Non-Point Sources | Irrigation return flows | Hydrologic modification<br>Livestock grazing & feeding | Sediment<br>Turbidity<br>Nutrients<br>Bacteria |
| Marsing (ES reach) | 424.0 | Point Sources | None | Marsing Job Corps Center<br>Glenns Ferry<br>Grandview | Suspended solids<br>BOD<br>Nutrients<br>Bacteria |
| | | Non-Point Sources | Irrigation return flows | Livestock grazing & feeding<br>Dryland farming | Sediment<br>Turbidity<br>Dissolved salts<br>Temperature<br>Nutrients<br>Bacteria |
| Nyssa (below ES reach) | 389.0 | Point Sources | None | Marsing<br>Homedale<br>Parma | BOD<br>Suspended solids<br>Nutrients<br>Bacteria |
| | | Non-Point Sources | Irrigation return flows | Possible Oregon sources<br>Livestock grazing & feeding | Sediment<br>Turbidity<br>BOD<br>Temperature<br>Nutrients<br>Bacteria |

Snake River especially along tributaries below the ES area, where over 750,000 cattle are grazed annually (PNRBC 1970). These animals cause pollution loadings equivalant to wastes from 250,000 humans. Animal-caused streambank erosion along feeder streams is an important source of soil losses. The very high coliform bacteria levels in the Snake River below the ES area are attributed to a large extent to livestock use.

Temperature: The Snake River flowing into the ES area is considerably warmed in winter and cooled in summer by the discharge of one Snake River aquifer at Thousand Springs (RM572). Mean water temperatures for the Snake River in winter and summer conditions reflect this effect of the aquifer discharges to the river (Figure 2-4). Only a modest amount of icing occurs in the ES reach because of the high inflow rates from groundwater sources.

In June and July the average monthly water temperature at King Hill (RM546) is 18.5$^{o}$C. In 1977 the maximum reached 24.5$^{o}$C at Swan Falls (RM457.7); Swan Falls discharge exceeded 21$^{o}$C for 14 consecutive weeks. In 1976, temperature at Swan Falls exceeded 21$^{o}$C for 11 weeks, and for 9 weeks in 1978. The 21$^{o}$C level is important in determining initiation of blue-green algal blooms and also delineates the upper temperature limit of active trout and white fish communities. Fish diseases can be stimulated when temperatures reach the maximum tolerated by a given species.

Idaho State Water Quality Standards for water temperature (18.8$^{o}$C for Class A primary contact recreational waters) are consistently exceeded in the ES area of the Snake River during the summer months. (The Water Quality Standard is the point beyond which unnatural heat inputs cannot be permitted to increase stream temperature).

Downstream from Buhl (RM581), the combination of reservoirs, surface heating, and tributaries in the downstream 160 miles raise the average summer temperature about 1$^{o}$C (EPA 1978a). Tributaries have a minor role in warming the Snake River because of their small flows and summer temperatures averaging only 20 to 21$^{o}$C (EPA 1978b). Surface heating is by far the major source of summer heat gain to the Snake River in the ES area overriding even the large, cool discharges from the Snake River aquifer at Thousands Springs. Therefore, summer temperatures in excess of 18.8$^{o}$C are a natural phenomenom between Salmon Falls Creek (RM 586.5) and Marsing (RM 424.0).

Turbidity: Stream turbidity (suspended sediments, algae, and organic debris) of the Snake River increase markedly from Burley (RM 653.7) to Weiser (RM 351.3) (see Figure 2-5). Upstream of the ES area (RM 654) mean annual turbidity values are around 7.5 Jackson Turbidity Units (JTU). (At 30 JTU the river would be greenish-brown). (IDWH 1978.) In the 70 miles below Burley, the river receives large volumes of turbid water from surface gravity irrigation returns.

At Buhl the river turbidity has a mean of 28.5 JTU (EPA 1978) as a result of irrigation returns from gravity irrigation. For example, the

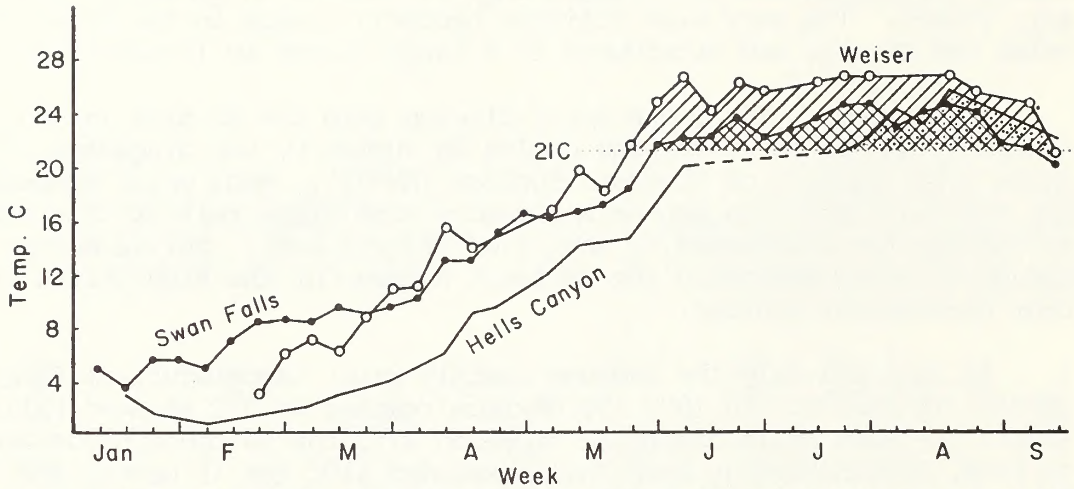



FIGURE 2-4. Snake River water temperatures from winter through early fall at selected points in and below the ES area. Shaded areas indicate periods in which water temperatures exceed 21° C, the threshold which often triggers blooms of blue-green algae and is an upper level for viable trout and whitefish populations.

SOURCE: EPA 1978a.

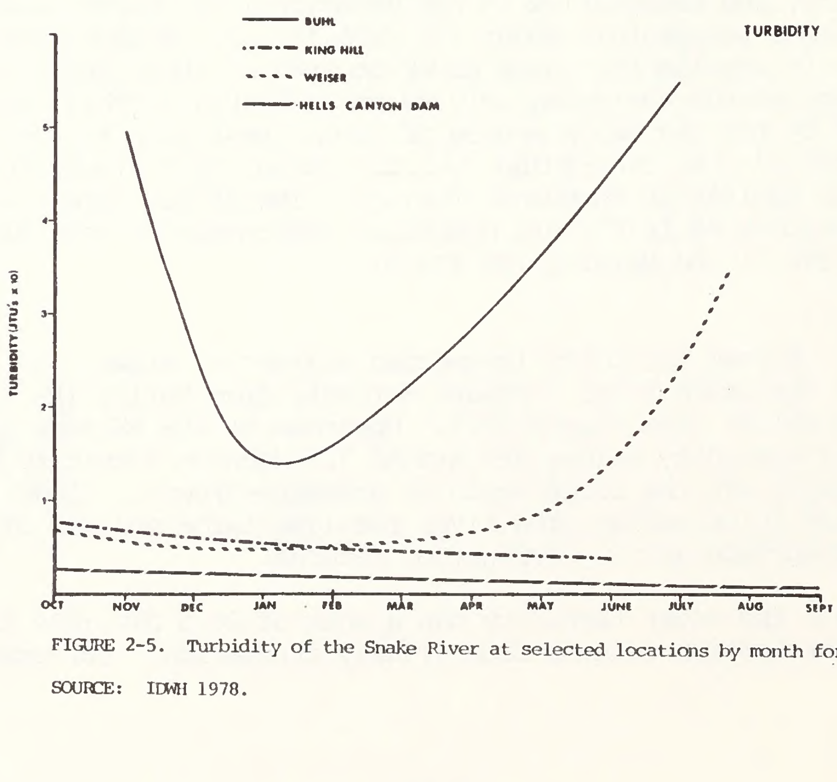



FIGURE 2-5. Turbidity of the Snake River at selected locations by month for 1977.

SOURCE: IDWH 1978.

Twin Falls tract delivers about 414 pounds of sediment per acre per year (Brown et al 1974) in extremely turbid return flows (14 percent of water applied in this tract returns as surface flow).

After the large inflow from Thousand Springs (RM 572) enters the small volume of turbid water in the main Snake, turbidity is reduced to a mean annual level of 6 JTU. By Marsing (RM 424), turbidity reaches a mean of 8 JTU (IDHW) as surface irrigation returns add more suspended solids than settle out in the reach. By Nyssa (RM 389), irrigation returns increase turbidity to 10 JTU. Algae contribute heavily in the reach also (EPA 1974).

In the Idaho Power dam complex below Weiser (RM 351), settling reduces turbidity to a mean of 3 JTU below Hells Canyon Dam (RM 247).

Idaho Water Quality Standards cite 5 JTU as the limit beyond which man caused inputs should not cause additional turbidity (IDECS 1973). Present upstream irrigation return flows clearly cause the ES reach of the Snake River to exceed this standard for most of the year. The high summer turbidity in the Buhl reach and below Marsing is probably the major factor limiting aquatic plant growth through the summer and fall. In the middle reach (King Hill to Marsing) turbidity also limits plant abundance but not to the marked or continuous extent of the more turbid areas.

Sedimentation: Fine sediments now predominate stream bottom coverage in several areas through the ES area (Falter 1978...personal observation and Sigler et al 1972). Free-flowing stretches are partially scoured in each high-flow period, but the reservoir areas (C.J. Strike, Swan Falls) continue to accrue sediments even at high flow.

pH: Throughout the ES area pH (hydrogen ion concentration--a measure of acidity; neutrality is at pH 7.0 ranges from 7.2 to 8.9 (IDHW 1978). The lower values are in the upstream reaches while the range increases downstream. From Marsing down to Weiser summer pH often attains 8.9, indicating both increased algal production and increased bicarbonate in the Snake River. Since Idaho Water Quality Standards specify an allowable range of 6.5 to 9.0, pH levels are within the allowable limits.

Conductivity: Electrical conductivity (a measure of the ability of water to pass electrical currents), the best single measure of dissolved substances, averages about 450 umhos through the upstream end of the ES area (see Figure 2-6). There is very little change until Marsing, where conductivity rises about 10 percent. Below Marsing, large tributaries of low conductivity, as well as nutrient entrapment by Idaho Power Company (IPC) reservoirs, combine to return conductivity to 450 umhos below Hells Canyon Dam.

Nutrients: Nutrient content of the upper Snake River rises rapidly as the river flows over the upper Snake River plain. The key nutrients- $NO_3$ and total phosphorus $PO_4$- indicate the algal growth potential of water since one or both of these nutrients is/are most often limiting to algal growth at any one time if adequate light is available (EPA 1974a).

At Buhl and King Hill both $NO_3$ and total $PO_4$ are very high, usually ove the 0.30 and 0.05 mg/liter concentrations considered as respective algae bloom threshold concentrations for the two ions for the entire year (see Figures 2-7 and 2-8).

Nutrient levels consistently exceed bloom-threshold concentrations in the Bruneau River as well as in the small tributaries and irrigation return flows (IDHW 1978 and EPA 1978b). As a result, the Snake River below Salmon Falls Creek (RM 586.5) to Brownlee Reservoir has sustained high nutrient levels.

Most of the phosphorus leaving irrigated land is associated with sediment (Carter et al 1971 and 1974). Surface flows of irrigation return water deliver high phosphorus loading in the stream while groundwater returns are quite low in phosphorus. Nitrogen is the other major aquatic plant growth-limiting nutrient, but the abundance of nitrogen-fixing blue-green algae in Snake River blooms ensures a high late summer nitrogen supply, and phosphorus limits algal growth for most of the summer.

Nitrates behave in a manner opposite to phosporus when irrigation water is applied to fields. Carter et al (1971) demonstrated a 1540 percent increase in nitrate to a mean of 3.1 mg/liter in subsurface runoff water (compared to applied water) while there was insignificant concentration change in nitrate in surface runoff. The maximum $NO_3$ concentration established in Idaho drinking water standards is 10.0 mg/liter (nitrate nitrogen), in order to prevent methemoglobinemia (a blood anemia) in infants (IDHW 1977).

Bottom organisms: Total live weight (per unit area) of bottom invertebrates such as water insects, clams and crayfish in the ES area of the Snake River is high in polluted reaches and low in clean-water areas. The composition shifts from a high proportion of forms preferred by game fish in the cleaner upper end of the ES area to a low percentage of preferred forms in the more polluted reach below the ES area (Falter et al 1976 and EPA 1973b). Appendix 2-5 lists invertebrate groups found in the Snake River.

Bacteria: All surface waters contain many types of bacteria not dangerous to man. No studies of these forms are available in the ES reach. The only non-pathogenic (disease-associated) form worth special mention is Sphaerotilus, a colorless filamintous bacterium. It is abundant on the stream bottom and on debris below heavy inflows of organic pollution, such as below the Malheur and Boise rivers (EPA 1973a), both below the ES area.

Average fecal coliform bacteria (bacteria associated with diseases potentially dangerous to man) are generally below the Idaho State Water Quality Standard of 50 per 100 milliliters of water except downstream from Marsing where they may reach a mean of 183 per 100 ml of water (see Figure 2-9). Individual samples on a given day in the period 1974-77 have reached 10,000 per 100 ml below the ES area at Nyssa and 20,000 per 100 ml in the lower Boise River (IDHW 1978).

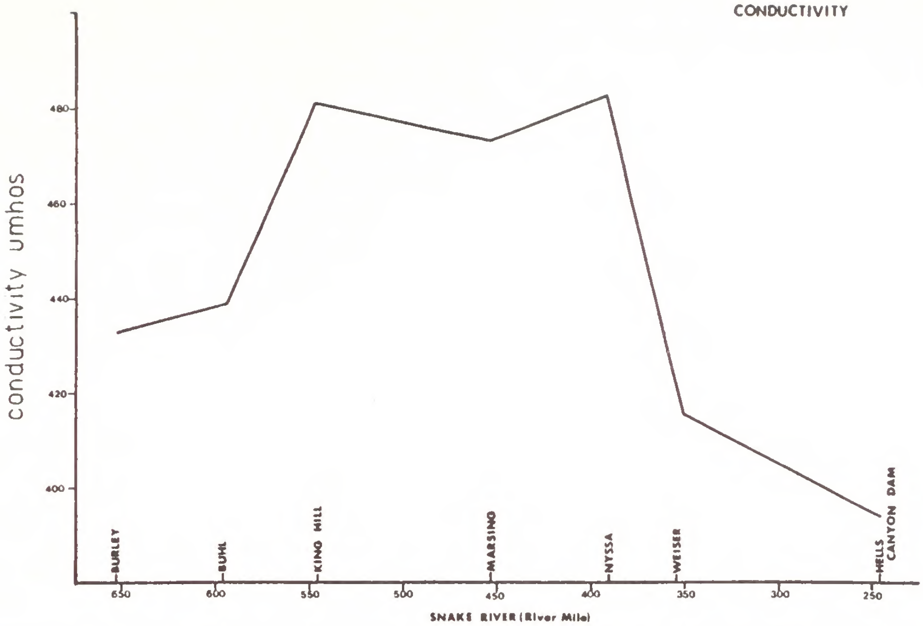



FIGURE 2-6. Water conductivities at selected points in and below the ES area by month in 1977.

SOURCE: IDHW 1978.

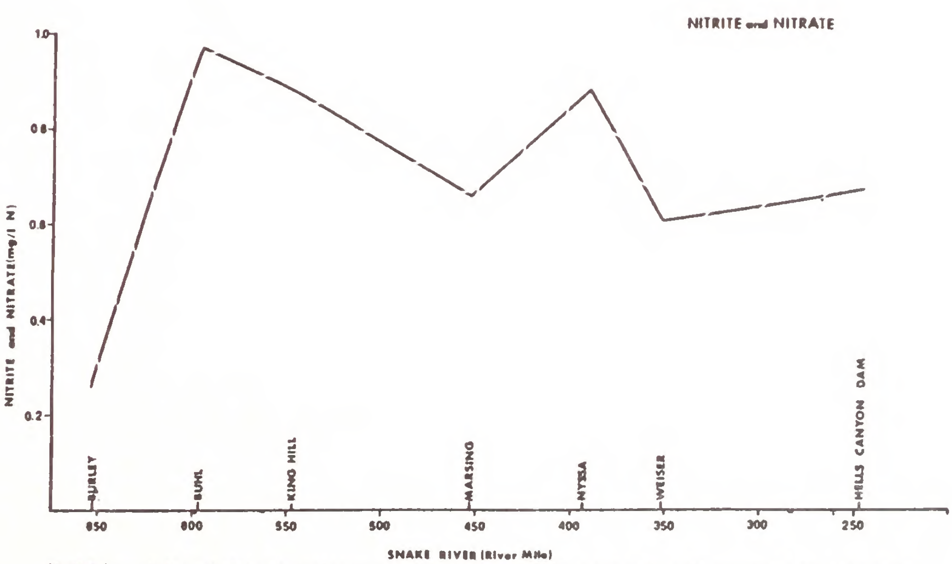



FIGURE 2-7. Total nitrate and nitrite nitrogen at selected points on the Snake River in the ES area, means for 4 years.
SOURCE: IDHW 1978.

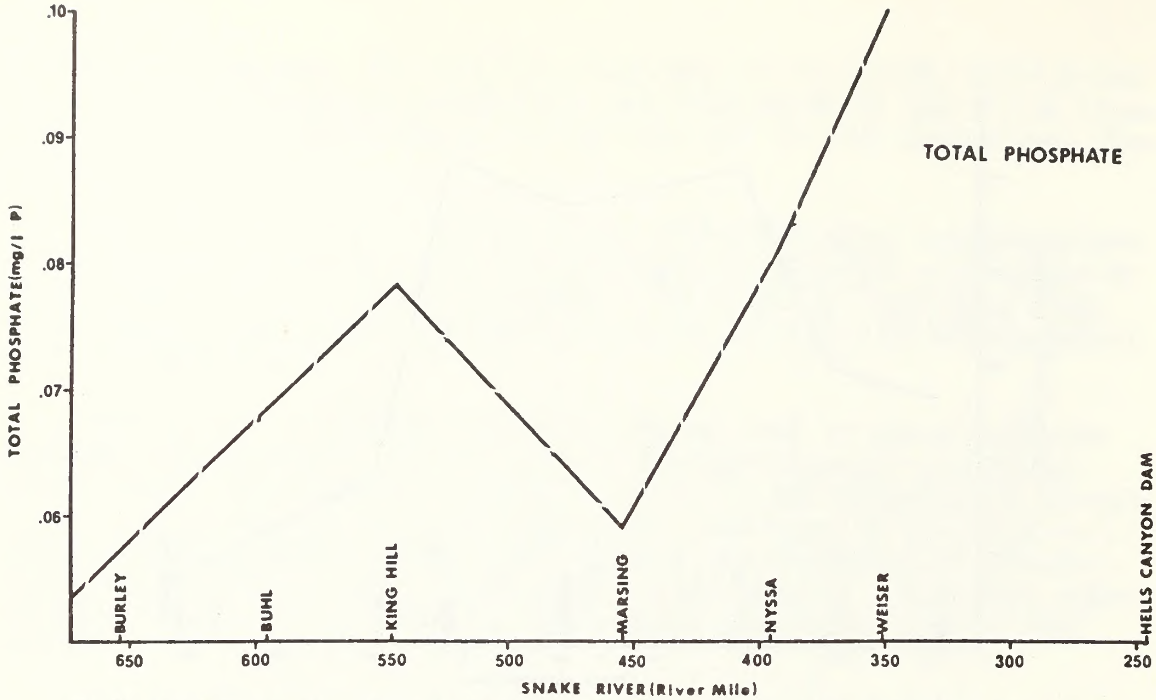



FIGURE 2-8. Total phosphate at selected points on the Snake River in the ES area, means for 4 years. SOURCE: IDHW 1978.

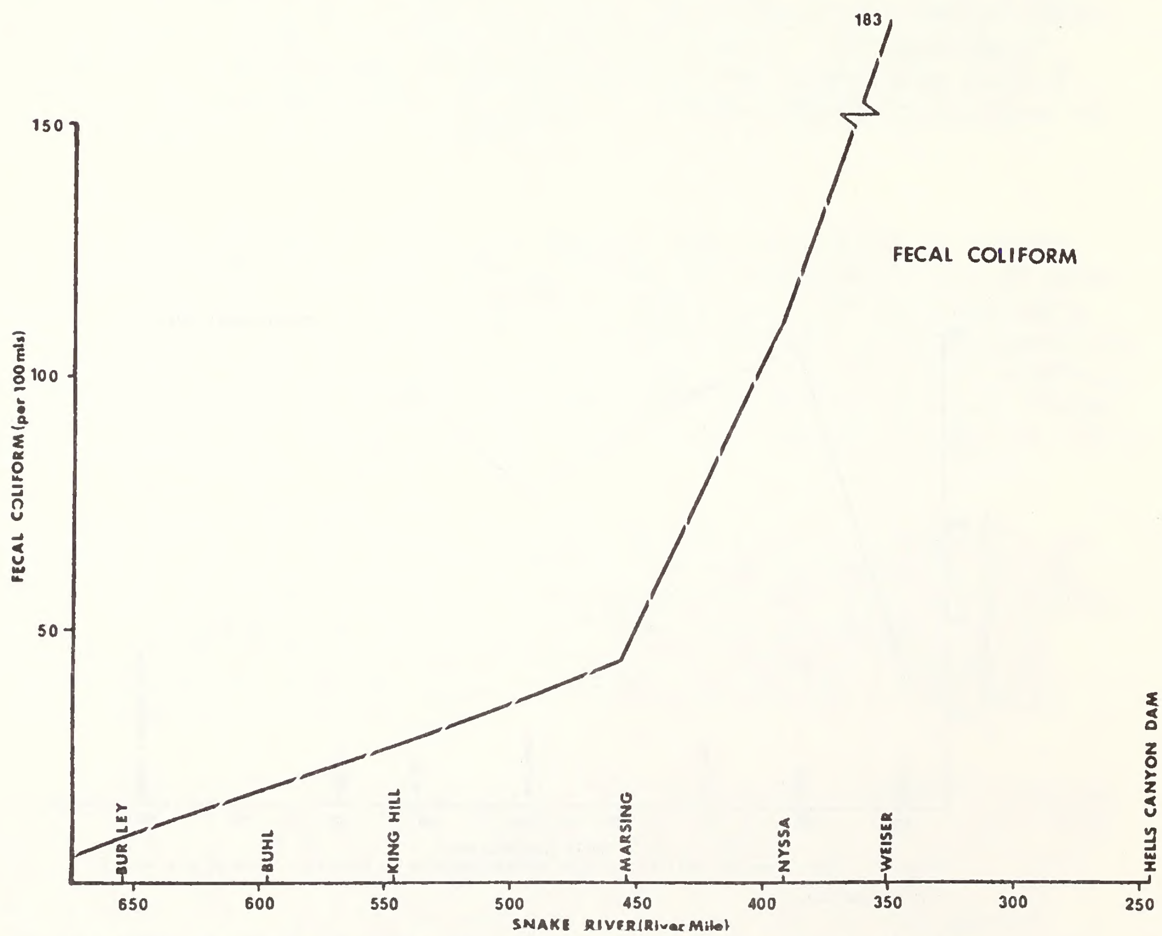



FIGURE 2-9. Average Annual Fecal Coliform Densities in the ES Reach of the Snake River.

Fecal streptococci, a good indication of livestock pollution, have reached 110,000 per 100 ml in the Boise, Payette, and Weiser rivers; and 7700 per 100 ml in the Snake (EPA 1972) below the ES area.

Total counts of coliform bacteria (not necessarily all pathogenic but an indication of conditions which support dangerous bacteria) are high in the upper ES area and gradually decrease to just under Idaho water quality standards at Marsing (USGS 1965-76). Very high bacterial concentrations have been found in the Twin Falls-Burley area, with sewage, livestock, and soil bacteria from heavily irrigated farm areas all contributing (PNRBC 1970). Total coliforms often exceed 10,000 per 100 ml of water, and no declines occurred 1970 to 1976, even as point sources were treated. This suggests the heavy contribution of non-point surface irrigation returns.

Oxygen: Even after biochemical oxygen demand (a measure of oxygen needed to oxidize organic materials in water) is diluted in the Thousand Springs area, it remains high. This is residual effect of point and non-point pollution loadings above the ES area. Algal activity is largely responsible for the high biochemical oxygen demand (BOD) from King Hill downstream to the major tributaries.

Oxygen is not a factor which limits aquatic life from the upper ES area of the Snake River down to Marsing. Below Marsing, daytime oxygen concentrations are still well above 100 percent saturation in early summer but drop to 90 percent saturation in late summer and fall as the organic-waste loading and plant utilization of oxygen overshadow photosynthetic production of oxygen. Night-time levels decline even further below 90 percent.

Ammonia: Ammonia (which may be toxic to aquatic life) concentrations in Snake River waters of the ES area have steadily decreased through the 1970s as point sources of pollution come under some form of waste treatment. At nearly all times of the year at all points of concern ammonia concentrations are lower than the 0.30 per liter guideline set by the State of Idaho (IDHW 1978). Ammonia concentrations decrease downstream through the ES area to average 1977 level of about 0.05 mg per liter. Levels exceeding 0.20 mg are generally considered indicative of organic pollution.

Other Chemicals which are potentially toxic to aquatic life: The IDHW has determined arsenic, cadmium, chromium, cobalt, lead, manganese, and zinc to be below the maximum permissible 20 mg per liter limit in 1976 and 1977 (IDHW 1978).

There is mounting evidence of increasing pesticide concentrations in waters draining major agricultural areas (PNRBC 1970). Water samples may show very low pesticide levels but aquatic organisms can concentrate these toxicants in their tissues. Pesticides data are scanty in the ES area of the Snake River. Appendix 2-6 lists concentrations in water and sediment in Milner Pool above the ES area from 1970 to 1973 (US BOR 1978). Concentrations are low in the water sample, but certain pesticide components show high concentrations in the sediments (chlordane, toxaphene, and the PCB AroChlor). Organic pesticides tend to be bound onto sediments, or in the water column. The highest pesticide concentrations in the ES area are in the upstream ends of reservoirs and in stream reaches which receive large irrigation surface-return flows. Subsurface return flows have effectively been cleansed of sediments, heavy metals, and pesticides.

Herbicides as a group are comparatively short-lived in soils and can be expected to behave as pesticides, binding with soil particles. No data on herbicide levels are available in the ES area.

Tributaries

Of the 20 more important tributaries which drain into the Snake River from the ES area, six have a high percentage of their watersheds within ES land with high farm development potential (Pilgrim Gulch - RM 556; Roosevear Gulch - RM 539; Deadman Creek - RM 537; Saylor Creek - RM 528; Alkali Creek - RM 535; and Cold Springs Creek - RM 531). Based on data from a similar stream (Big Jacks Creek, a Bruneau River tributary), it can be stated that peak flows in tributaries usually occur in March and minimum flows in late fall and winter. Most streams probably cease flowing at some time in the year.

All six of these tributaries are typical desert streams with moderate temperatures similar to the main Snake. They are often warmer than preferred trout temperatures in summer and have high conductivity, flashy runoff, and highly-variable nitrates and phosphates.

Mean summer water quality in Little Valley Creek (a Bruneau River tributary), another stream similar to the six named above, was 20.9$^{o}$C, 2125 umhos conductivity, 29 JTU turbidity (range 2.7 to 90, or from clear to muddy brown), 1.2 mg/liter nitrate, 1.12 mg/liter total phosphate, and less than 0.01 mg/liter ammonia.

Samples of bottom invertebrates in tributary streams in the ES area indicate a species diversity similar to that in the main Snake (Falter et al 1976) but without the extreme low diversity of organically-polluted sites. Cleanwater forms tend to be more abundant in tributaries.

Groundwater

Discussion of groundwater will be limited to the Bruneau - Murphy area since this is the area of groundwater availability and would provide irrigation water under the proposed action.

Groundwater is generally of a sodium bicarbonate type. Water from sedimentary-rock aquifers is generally high in dissolved solids (greater than 600 mg/liter), nearly neutral in pH, and low in flouride. Water from volcanic aquifers generally is lower in dissolved solids (less than 500 mg/liter), higher in pH (over 8.0), and higher in flouride (over 8 mg/liter). Chloride concentrations are usually lower than 75 mg/liter in water from volcanic aquifers and are usually less than 20 mg/liter in water from sedimentary aquifers. Sulfate concentrations are higher in volcanic aquifers than in the overlying sedimentary aquifers.

Groundwater temperatures at the surface range from 9.5° to 83.0°C. Temperatures are higher in water from the deeper volcanic aquifers (40°-83° C) than in the sedimentary aquifers (less than 35°C).

Temperature and dissolved solids can cause problems for irrigators. Hot water has to be cooled, usually in ponds, before it can be applied to crops. High sodium and flouride levels cause buildup of these minerals in the soil, reducing crop production.

Downriver from the ES Area

The reach from Marsing to Brownlee Reservoir below the ES area has settling and floating solids with high bacterial contamination and noxious algal growths (IDWRB 1972). The Boise River contributes 64 percent of the total load of point source biological oxygen demand, and the mainstem Snake contributes 27 percent (EPA 1975). Of the total input of suspended solids from point sources to the main Snake, tributaries (largely lower tributaries) contribute 91 percent and the mainstem accounts for 9 percent of the point-source loading.

Non-point source loading is mostly from irrigation return flows above and below the ES area. The Boise River carries the highest nutrient and suspended sediment loads from irrigation. The Malheur and Owyhee Rivers deliver lower irrigation loadings to the Snake, but are of low water quality. The Twin Falls tract also delivers heavy irrigation loading.

Summer mean temperatures average 21.3° C at Weiser, which is about 3°C higher than the upstream ES area water temperatures. This is significant because 21°C is the uppermost temperature limit of active trout and also is the temperature at which noxious blue-green algae occurs. Summer water temperature below Brownlee Reservoir is 6° C lower than above.

Turbidity increases to 12 JTU (greenish color) at Weiser from 8 JTU at the lower ES area (IDHW 1978). Irrigation surface return flows are the major source of turbidity. Very high algae concentrations also contribute to turbidity of this reach. As the Snake River flows through Brownlee, Oxbow, and Hells Canyon Reservoirs, most of the inorganic sediments settle out, lowering the average turbidity to 3 JTU (nearly clear) at Hells Canyon.

As in the ES area, fine sediments predominate in bottom coverage to Brownlee Pool (Falter 1978 and Sigler et al 1972). Brownlee reservoir, a giant settling pool, accrues sediments even at high river flows.

Below the ES area to Weiser, summer pH often attains 8.9, indicating both increased algal production and increased bicarbonate in this area of the Snake River as compared to the ES reach.

Conductivity holds at 500 umhos into Brownlee Reservoir from the ES area; irrigation return flow contributions are offset by the large tributaries of low conductivity. Passage through the Hells Canyon reservoirs reduces the dissolved solid load about 10 percent so that conductivity at Hells Canyon annually averages about 450 umhos.

Nutrient levels consistently exceed threshold concentrations for algal blooms in the Boise, Malheur, Payette, Owyhee, and Weiser Rivers downstream from the ES area. The decline of total phosphate at Weiser indicates rapid removal from the river by algae uptake during the summer months.

After the Snake River has passed through the 3 Hells Canyon reservoirs, mean total phosphate concentrations are at or below the 0.05 mg/liter threshold level for algae blooms, a major reduction from Weiser. Levels of nitrate below the reservoirs remain similar to those above the reservoir.

Below the ES area to Brownlee, daytime oxygen concentrations are well above 100 percent saturation in early summer. This drops to below 90 percent saturation in late summer and fall due to increased organic waste loading and algae respiration. Night-time levels decline even further below 90 percent.

Ammonia concentrations in the downriver reach below the ES are lower than the 0.30 mg/liter State Standard. Heavy or trace metals in the river reach have been below safe limits in recent years. Below Hells Canyon Dam, copper concentrations are similar to those at Weiser (USGS 1965-76).

Samples at Nyssa (1975-77), below the ES area, indicate an accumulation of DDT and DDT derivatives, aldrin, chlordane, dieldrin, ethion, and malathion in the water. It is likely that pesticides adsorbing to the sediments accumulate at Brownlee reservoir.

Levels of some bacteria of public health significance consistently exceed Class A2 water (recreational primary contact use) State Standards of 50 organisms per ml in the river reach below the ES area. Levels have reached as high as 74,000 organisms per ml for fecal streptococci in 1971. The Boise River has delivered a large percentage of this bacterial loading to the mainstem of the Snake River. Pathogenic (disease associated) species of the bacterium Salmonella were also isolated from this river reach in 1971.

There is a high abundance of aquatic invertebrates at Weiser but a low percent of preferred forms for game fish. Below Hells Canyon dam, total live weight is reduced but desirability for game fish increases again.

## VEGETATION

### Terrestrial

The ES area falls within the sagebrush/grass and salt-desert shrub/grass ecosystems, with a precipitation range of 8 to 10 inches. Early records indicate that much of the area was once covered with lush bunchgrasses (including Thurber's needlegrass, Idaho Fescue, and bluebunch wheatgrass) and some sagebrush and winterfat. Heavy grazing by livestock, especially during the spring period, and indiscriminate use of fire to remove old growth led to the establishment of the present vegetation cover. This present cover consists mainly of big sagebrush and cheatgrass, the latter invading many of the overgrazed ranges before 1910. A salt-desert shrub vegetation type occurs on heavier soils and on soils having a high salt content, with shadshale, greasewood, and cheatgrass being the most predominant species. Overall, current vegetation is in relatively poor condition.

Areas where the natural vegetation cover has been destroyed by fire or overgrazing have often been reseeded with crested wheatgrass in an effort to quickly establish a perennial vegetative cover. Attempts to improve wildlife habitat by seeding browse species have been limited. However, recent browse species seedings in the Saylor Creek planning unit have been encouraging.

The 439,303 acres of public land within the ES area include approximately 275,583 acres of sagebrush/grassland, 87,085 acres of seeded grassland, 42,810 acres of salt-desert shrub/grassland, and 33,825 acres of natural grassland. Map 2-5 shows these general vegetation types. Grasses and shrubs most commonly found throughout the ES area are listed in Table 2-6. A complete list of plant species found within the ES area is on file at the Boise District BLM office.

TABLE 2-6
GRASSES AND SHRUBS MOST COMMONLY FOUND
THROUGHOUT THE ES AREA

| GRASSES | SHRUBS |
|---|---|
| bluebunch wheatgrass (Agropyron spicatum) | big sagebrush (Artemisia tridentata, subspp.) |
| cheatgrass (Bromus tectorum) | bud sage (Artemisia spinescens) |
| crested wheatgrass (Agropyron cristatum) | greasewood (Sarcobatus vermiculatus) |
| Idaho fescue (Festuca idahoensis) | rabbitbrush (Chrysothamnus, spp.) |
| Indian ricegrass (Oryzopsis hymenoides) | shadscale (Atriplex confertifolia) |
| needle-and-thread grass (Stipa comata) | spiney hopsage (Grayia spinosa) |
| Sandberg's bluegrass (Poa sandbergii) | |
| squirreltail (Sitanion hystrix) | |

SOURCE: BLM Planning Documents and Range Surveys, 1960-1978.

Riparian

Riparian or streamside vegetation varies considerably depending on whether annual flooding occurs or whether streams are normally confined to their banks. Where flooding occurs, important species may be red alder, black cottonwood, aspen, and willow.

Condition of the riparian vegetation will vary with the use of adjacent land. There is a tendency in heavy agricultural areas to eliminate vegetation along ditches and some stream banks as part of clean farming practices. Riparian vegetation provides cover for wildlife and stream protection for fish and aquatic organisms. There are approximately 55 miles of riparian vegetation on public land within the ES area. (Refer to Map 2-5).

Aquatic

Phytoplankton (Free-Drifting Single-Celled or Colonial Algae)

The ES reach of the Snake River supports heavy concentrations of this aquatic growth, which can be considered an effect of water pollution in part. This growth also partly controls other pollution parameters such as biochemical oxygen demand (BOD is the amount of oxygen required to oxidize the organic matter in a given amount of water). Phytoplankton is the main source of BOD in the lower ES area and below, far outranking all other BOD contribution. Diversity of algae tends to be high in the high-nutrient reaches, but decreases where nutrients are below bloom thresholds. Phytoplankton composition is dominated by diatoms year-round in the ES area (USGS 1965-1976). Blue-green algae are present as short-lived blooms in late summer. The more polluted reaches below Marsing have a higher incidence of blue-green algae (USGS 1965-76).

Attached Benthic Algae (Single-Celled or Colonial Algae Attached to the Stream Bottom)

As with the floating planktonic algae, benthic algae reach highest stock levels in the ES area in the more polluted areas below Marsing. Distribution of benthic algae depends on presence of a suitable substrate, and sediments are not suitable except in still water. Because the stream bottom in the ES area is covered by sediments in many areas, the habitat for benthic algae is limited. Riffles, submerged debris, rooted aquatic plant surfaces, and bare rocks in the more-rapidly flowing sections are the best habitat areas for benthic algae.

Rooted Aquatic Plants (Multi-celled Plants with Stems and Leaves)

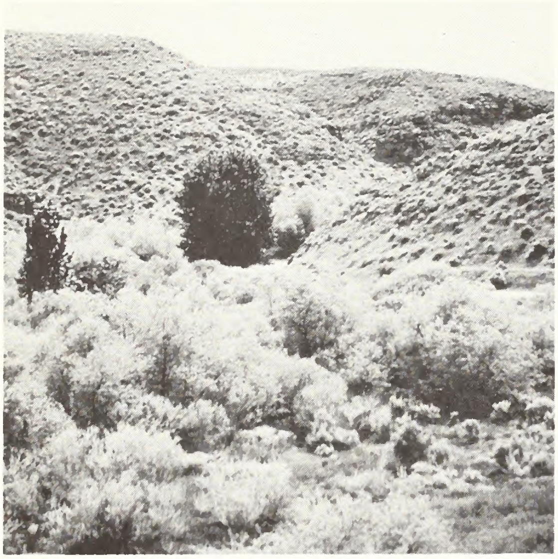
The ES reach of the Snake River is not choice habitat for rooted aquatic plants. Light availability seems to be the limiting factor. Water-level fluctuations may also limit rooted aquatic plants in reaches

TABLE 2-7
CURRENT STATUS, AREA SIZE, AND DENSITY OF
THREATENED AND ENDANGERED PLANTS WITHIN THE ES AREA

| Scientific Name | Common Name | Approximate total area of sites | Approximate density 1/ | Current Status |
|---|---|---|---|---|
| *Astragalus camptapus* | Murphy milkvetch | 8300 acres | moderately dense | candidate for Idaho's Endangered list. May be proposed to the Federal Register of Endangered Plants. |
| *Eriogonum shockleyi* | cow pie eriogonum | 1.2 acres | sparce | same as above |
| *Astragalus atratus* | mourning milkvetch | 170 acres | sparce | candidate for Idaho's Threatened list |
| *Astragalus calycosus* | matted milkvetch | 600 acres | sparce | same as above |
| *Gymnosteris nudicalis* | large flowered gymnosteris | 40 acres | sparce | same as above |

1/ density values are:
sparce=less than 10 plants per acre
moderately dense=between 10-100 plants per acre
dense=more than 100 plants per acre

**SOURCE:** Threatened and Endangered Plant Inventory and Study, 1978, BLM



Riparian

Grassland

Sagebrush/Grass

FIGURE 2-10. Vegetation types in the ES area.

below Milner Dam, in Strike Pool, in Swan Falls Pool, and below the latter two dams.

A few isolated areas of rooted aquatic plant development are found in the ES area of the Snake River. They include the Thousand Springs area where the large inputs of clear water reduce turbidity enough for thick rooted aquatic plant beds to develop across the width of the Snake River on riffle areas; the head of C.J. Strike Pool where plants grow as patchy clumps across the river in the upper 2 to 3 miles of the pool (further into the C.J. Strike Pool, rooted aquatic plants grow only in a shore zone up to 30 feet in width (Falter et al 1974); and slow-moving reaches such as the Swan Falls Pool where emergent aquatic plants dominate.

## Threatened and Endangered Plants

During the spring and summer of 1978, an extensive vegetation inventory for plants classified as threatened or endangered was conducted in the ES area. From this inventory and consultation with local plant specialists on the Rare and Endangered Plants Technical Committee of Idaho, two plants within the ES area have been tentatively classified as endangered and three have been tentatively classified as threatened. All five are proposed as candidates to Idaho's Endangered and Threatened list. None are currently on any federal status lists.

Map 2-5 shows the approximate locations of these plants. Table 2-7 lists the five plants and shows their current status. The table also shows the approximate total area size for all known sites within the ES area and approximate density.

Complete reports as well as dried specimens of these plants are on file at the BLM Boise District office.

# WILDLIFE

## Terrestrial

Reproduction and feeding are the functions most critical to the existence of a wildlife species. For this reason, wildlife species in the ES area have been categorized into specific groups based on a combination of their requirements for reproduction sites and feeding habitat. This unique combination for an animal is referred to as its "life form." All terrestrial animals which breed in the ES area have been assigned to the life form which most closely depicts their reproductive and feeding habitat requirement in this area (see Appendix 2-7). Not only are these life forms useful in that they show the basic needs of each animal, they will also be used to aid in the assessment of impacts as a result of the proposed action. Species lists include season of use, relative abundance, and habitat preference (see Appendix 2-7).

Within each particular life form there may be a number of vegetation types resulting from differing site conditions and successional stages. This diversity of habitat is directly related to the abundance and variety of species found in a given life form.

There are five basic habitat types within the ES area. These habitat types include the shrub/grassland type, grassland type, rocky cliffs and canyons, wetlands (riparian and marshes), and agricultural land. Each of these habitat types is important to particular groups of animals and will be discussed in greater detail in the following section.

Mammals

Big Game:

Mule Deer: Mule Deer are native to southwestern Idaho. The most significant population of Mule Deer occurring in the ES area occupies a winter range which falls partially within the ES boundaries. This important winter range is located in the Bennett Mountain foothills and along the King Hill Creek drainage (see Map 2-6). The approximate acreage of this range which lies within the ES area is 14,100 acres. An estimated 500 mule deer use this area from November through March (Idaho Fish and Game).

Shrubs are the dominant vegetative structure and provide critical cover on this winter range. In the spring, grasses provide an important portion of the mule deer diet.

In addition to the migratory deer herd on the winter range, small scattered year long populations of mule deer occur throughout the ES area. It is estimated that these populations total between 100 to 150 deer. These deer are most often associated with riparian vegetation and are found along rivers, creeks, and drainages (such as the Snake River, Bruneau River, Reynolds Creek, and Salmon Falls Creek) and on islands in the Snake River. Deer are also seen in the shrub/grassland habitat type and are occasionally observed near agricultural land where cover exists. Shrubs are the dominant vegetative structure and are used for food and cover by these animals. Other vegetation species provide food during certain seasons.

Pronghorn: Pronghorn are native to southwestern Idaho, but their occurrence in the ES area is relatively limited. Three antelope ranges border the area and, to a limited extent, overlap the area. A major range lies in the foothills of the Owyhee Mountains to the south and southwest. These pronghorn areas are shown on Map 2-6.

Approximately 35 to 40 antelope inhabit area "A" (as shown on Map 2-6) year long. Only about 800 acres of this range fall within the ES area. Approximately 40 animals are year long residents in area "B", which borders the ES area. Area "C" is an antelope winter range which supports approximately 200 to 250 pronghorns (Idaho Fish and Game, U.S. Fish and Wildlife Service). A small percentage, approximately 10,250 acres, of this range falls within the ES area. The Dove Springs area, area "D", has been reported as being inhabited by approximately 30 to 35 pronghorns (Idaho Fish and Game). In 1976 this area was exposed to an extensive range fire, and a large crested wheatgrass seeding was established. This may have displaced some of the antelope that originally occupied the area.

Perhaps because of the small acreages of antelope range located in the ES area, no critical breeding or foraging areas have been identified.

Small Game:

Mountain Cottontail and Pygmy Rabbit: The mountain cottontail (*Sylvilagus nuttalli*) and pygmy rabbit (*Sylvilagus idahoensis*) are both native to southwestern Idaho and are classified as game animals in Idaho. The mountain cottontail is found throughout the ES area where suitable habitat exists. The pygmy rabbit is primarily restricted to dense stands of big sagebrush and occurs in relatively low numbers.

Snake River Birds of Prey study personnel found that riparian, tallus, and greasewood areas supported the highest numbers of mountain cottontails. Specifically, riparian habitat accounts for approximately 50 percent, talus 40 percent, greasewood 5 percent, and other areas 5 percent of cottontails caught in their studies. Mountain cottontails are seen in agricultural areas where suitable adjacent cover exists.

Predators and Furbearers: Furbearers found in suitable habitat in the ES area include the longtail weasel, shorttail weasel, mink, red fox, beaver, and muskrat. Populations of these species are limited within the ES area. They are primarily associated with riparian habitat and no population data has been collected. The river otter and bobcat are furbearers but are also classified as sensitive species and will be discussed in the section dealing with sensitive species.

Predatory mammals include striped and spotted skunk and the coyote. The coyote is quite common throughout the ES area. Although it chiefly occurs in the shrub/grassland habitat type, it is quite adaptable and can be seen in many habitats including the agricultural lands.

Non-game: Non-game mammals provide a significant prey base for raptorial birds and other predatory animals. Their composition and numbers have a direct relationship to the numbers and types of predatory species which occur in a given area. All non-game mammals found in the ES area are listed in Appendix 2-7. It was not possible to rate relative abundance for all species. However, life forms are developed for all 37 non-game mammals which occur in the ES area. A number of these, including the Great Basin kangaroo rat, sagebrush vole, and whitetail antelope squirrel, are primarily dependent upon the shrub/grassland habitat type, which is so dominant in the ES area.

Upland Game Birds:

California Quail: California quail are native to southwestern Idaho and occur in scattered populations throughout the ES area. Numbers vary according to habitat type. California quail are most abundant in riparian habitats, particularly those adjacent to irrigated agriculture. Free water is important to these birds during the warm months when succulent plant species are not available. For this reason, river valleys and creeks throughout the ES area, as well as the Snake River islands, are concentration areas for California quail. Agricultural areas in the vicinity of Marsing and Oreana have large populations of quail. This is also true of the Castle Creek drainage and Bruneau River Valley where creeks and surface irrigation have allowed establishment of riparian vegetation.

In contrast, the large agricultural developments in the Saylor Creek, Grindstone Butte, Bell Rapids and Blue Gulch areas have low numbers of quail. Little adequate habitat exists in conjunction with these large sprinkler irrigated farms.

Bobwhite Quail: Bobwhite quail were first introduced to southwestern Idaho during the early 1900s. They occur in limited numbers along the Snake River around irrigated agricultural areas from Marsing to the Idaho-Oregon border. The Idaho Department of Fish and Game (IDF&G) reports that numbers of these birds are quite low.

Hungarian Partridge: Hungarian Partridge were first introduced to Idaho during the early 1900s. Their occurrence and population numbers are limited in the ES area. Most "Huns" are found in those areas where the shrub/grassland or grassland habitat type is adjacent to irrigated agriculture. Occasionally, Huns are found on the sagebrush/grass and grassland habitat type quite some distance from cropland. Populations of these birds in southwest Idaho have declined due to changes toward "cleaner" farming practices. Urbanization has also caused a loss of winter food and cover.

Chukar Partridge: Chukars were initially released in Idaho in the early 1950s. They occur throughout the ES area where appropriate habitat conditions exist. Steep rugged canyons, tallus slopes, rocky outcrops, and scattered brush and clumps of grass over irregular terrain comprise characteristic chukar habitat (Christensen, 1970). During dry periods, chukars concentrate around sources of water. Within the ES area, examples of areas having relatively high chukar populations are Salmon Falls Creek, King Hill Creek, and Reynolds Creek.

Mourning Doves: Mourning doves are native to, and are widely distributed throughout, the ES area. Their habitat requirements are quite broad and they can be found in the shrub/grassland, riparian, and agricultural land types. Water is an important component of their habitat and partially limits mourning dove distribution. Most migrate out of the ES area at the first sign of heavy frost and return again the following spring.

Pheasants: Introduction of Chinese ring-necked pheasants (*Phasianus colchicus*) into southeastern Idaho occurred along the Snake River Plain in the early 1900s. Pheasant populations in the ES area are limited to agricultural land or riparian habitat. Certain habitat requirements must be met in order for these birds to occupy the modern day farmland in the area. Winter cover and food are critical components of pheasant habitat. Therefore, year-round vegetation must exist in close proximity to any agricultural developments. Pheasant populations in southwestern Idaho are on the decline due primarily to a conversion of agricultural land into subdivisions. Clean farming practices also adversely affected numbers. Sprinkler systems and concrete ditches have eliminated considerable habitat needed for food and cover.

A few areas within the ES boundary still have fair to good populations of pheasants. These areas are primarily the small farms along the Snake River and adjacent drainages that still have suitable nesting and winter cover left for pheasants. Islands in the Snake River also provide good habitat. Principle areas of pheasant concentrations are Hammett, Glenns Ferry, King Hill Creek, Salmon Falls Creek, Reynolds Creek, Castle Creek, and Marsing.

Sage Grouse: Sage grouse are native to southwest Idaho. They have been observed in the ES area, primarily at strutting grounds. Strutting grounds are critical to sage grouse reproduction, and there is some evidence that the strutting ground is the hub of year-round activity (Eng and Schladweiler, 1972).

Strutting grounds within and bordering on the ES area have been surveyed. A total of nine grounds were checked, four within the ES boundary and five just outside (1½ miles or less) the boundary. All are considered as active grounds and currently being used by sage grouse. Locations of these strutting grounds are shown on Map 2-6.

Sage grouse are dependent upon sagebrush for their survival. Martin (n.d.) found that from December through February sagebrush was the only food item found in all sage grouse crops. Only during the period of June through September did sagebrush make up less than 60 percent of the diet. Big sagebrush (*Artemesia tridentata*) is critically important as sage grouse nesting cover. Ninety-two percent of approximately 300 nests found by Patterson (1952) were under sagebrush.

Nest sites are usually located within two miles of a strutting ground (Martin, n.d.). Klebenow (1969) found that the greatest number of brood observations were in open stands of sagebrush; and as the summer progressed, broods moved up in elevation following a gradient of green food plants. During late summer sage grouse move back down to the sagebrush vegetation type for winter cover and food. Low growth forms of sagebrush usually provide the winter food and cover.

Waterfowl:

The season of use and relative abundance of waterfowl which use the ES area can be found in Appendix 2-7. In addition to the Canada goose, nine other species of waterfowl are known to breed in the ES area. Sixteen other members of this family are known to use the ES area at some time during the year.

Canada goose nest surveys were run by Idaho Department of Fish and Game (IDF&G) and Fish and Wildlife Service (FWS) personnel on the Snake River in 1978. On the river from King Hill Bridge to Indian Cove Bridge a total of 17 goose nests were found to be active. The section of river between Walters Ferry and Marsing was found to support 19 active goose nests.

While the waterfowl that nest in the ES area tend to migrate in the fall, many northern geese arrive in the fall and winter along the Snake River.

Canada geese feed heavily on agricultural crops (barley, oats, wheat, rye, and corn) during spring and summer. The remainder of the summer diet consists of aquatic vegetation and insects. During winter, the geese depend almost solely upon aquatic vegetation and waste grains with little or no animal matter taken into the diet.

Areas within the ES boundaries, other than the Snake River, which are commonly used by breeding, wintering, and migrating ducks include Blair Trail Reservoir, Emigrant Crossing Reservoir, Morrow Reservoir, Salmon Falls Creek, Foreman Reservoir, and the Bruneau River. At times ducks can be observed anywhere in the ES area where canals, streams, or ponds are present.

Most ducks in the ES area are surface feeders. The mallard, pintail, gadwall, and wigeon consume approximately 90 percent plant matter and 10 percent animal matter (Martin, Zim, and Nelson, 1961). The blue-winged teal, cinnamon teal, and shoveler have a diet consisting of 75 percent plant foods and 25 percent animal foods. Agricultural areas containing cereal grains, corn, and alfalfa provide a considerable amount of food for ducks during the fall and winter period.

Raptors:

A total of 21 raptor species use the ES area at some time during the year. In addition, four other raptor species have been reported in the area, but their occurrence is accidental. Of the 21 regularly occurring species, sixteen breed in the ES area and five occur in the area during the winter. Six are owls and fifteen are diurnal raptors (daytime feeders). A listing of these birds, their season of use, relative abundance, and life form can be found in Appendix 2-7.

Of the breeding raptors in the ES area seven are cliff nesters, five are tree nesters, and four are ground nesters. Raptors such as the golden eagle, prairie falcon, and ferruginous hawk are traditional nesters and often return to the same nest or same immediate area that was used the previous season. Birds which are traditional to the ES area depend on it for fulfillment of their breeding cycle. Breeding chronology for some of the common raptors in the ES area can be seen in Table 2-8.

Most of these birds hunt in the grassland and shrub/grassland habitat types. Their major prey species (food sources) are black-tailed jack rabbits, mountain cottontails, Townsend ground squirrels, various passerine birds, chukar, quail, and reptiles. These prey species are most often found in the grassland, shrub/grassland or rocky cliffs and canyon habitat types.

Rabbit populations fluctuate in numbers on a seven to ten year cyclic basis (Gross et al., 1974). Since rabbits are an important prey

TABLE 2-8

BREEDING CHRONOLOGY OF RAVENS AND RAPTORS IN THE SNAKE RIVER BIRDS OF PREY STUDY AREA, 1976

| Species | First Arrival | First Courtship | Laying X Range | Hatch X range N | Fledge X range N | First** Young Dispersed | Last Young Seen** | Last Adult Season | Length of Breeding (Days) |
|---|---|---|---|---|---|---|---|---|---|
| Golden Eagle | * | 22 Jan | 2 Mar<br>8 Feb-22 Mar | 17 Apr<br>24 Mar-6 May | 6 Jun<br>23 May-27 Jun | 2 Jun | 11 Aug | * | 202 |
| Red-tailed hawk | 4 Feb | 13 Feb | 6 Apr<br>23 Mar-21 May | 6 May<br>22 Apr-20 Jun | 11 Jun<br>29 May-21 Jun | 8 Jun | 8 Aug | 24 Aug | 177 |
| Prairie falcon | 18 Jan | 22 Jan | 13 Apr<br>1 Apr- 6 May | 13 May<br>1 May-5 Jun<br>13 | 9 Jun<br>21 May-26 Jun<br>15 | 12 Jun | 21 Jul | 5 Aug | 181 |
| Ferruginous hawk | 4 Mar | 26 Mar | 23 Apr<br>14 Apr-7 May | 23 May<br>14 May-6 Jun<br>6 | 22 Jun<br>14 Jun-12 Jul<br>5 | 29 Jun | 27 Jul | 30 Jul | 123 |
| Raven | * | 22 Jan | 4 Apr<br>17 Mar-29 Apr | 4 May<br>16 Apr-28 May<br>8 | 1 Jun<br>15 May-10 Jun<br>14 | 5 Jun | 6 Aug | * | 197 |

* Year round residents

** First date that a fledgling cannot be located near its natal site if it is not observed on subsequent visits.

***Date that last young of species was seen in vicinity of natal site.

species, this cycle has a direct effect on certain raptor populations in the area (such as golden eagles and ferruginous hawks). Colonies of Townsend ground squirrels, although quite numerous north of the Snake River, occur only in one small localized area south of the river - the vicinity of Fossil Butte. Therefore, raptors which depend upon Townsend ground squirrels hunt primarily north of the river.

The ES area is located south and east of the Birds of Prey Natural Area (BPNA). Raptors foraging in the ES area are not highly dependent upon Townsend ground squirrels for prey. Common prey species found south of the BPNA include Belding ground squirrels, rabbits, passerine birds, upland birds, and various reptiles.

Dunstan (BPNA Annual Report, 1977) found individual ranges of eagles during the breeding season to be from 4.7 to 62.6 square kilometers, with a mean of 18.1 square kilometers (1.8 to 24.5 square miles, with a mean of 7.1 square miles). Individual ranges of red-tailed hawks during the breeding season were found to be from 2.1 to 59.5 sq. km., with a mean of 19.3 sq. km. (0.82 to 23.2 square miles, with a mean of 7.5 square miles). Individual ranges of prairie falcons during the breeding season were found to be from 49.7 to 134.9 sq. km., with a mean of 83.4 sq. km. (19.4 to 52.7 square miles, with a mean of 32.6 square miles).

Raptor foraging ranges for golden eagles, prairie falcons, ferruginous hawks, Swainson's hawks, red-tailed hawks, and burrowing owls are depicted on Map 2-6. These distances are calculated from maximum average foraging range determined to exist in the BPNA. However, since the configuration of the foraging area may differ from nest to nest, the actual maximum distance may vary somewhat from the boundary shown.

Birds of Prey are sensitive creatures and require a high degree of solitude during their reproductive cycle. Without this seclusion, breeding attempts often fail or are only partially successful. In addition to a lack of disturbance, raptors also need large foraging areas in order to obtain food for themselves and their young.

Discussion of the ferruginous hawk, osprey, merlin (pigeon hawk), and western burrowing owl can be found in the sensitive species section. Discussion of the bald eagle can be found in the endangered species section.

Other Non-game Birds:

There are 84 species of non-game birds (not including birds of prey) which breed within the ES area. In addition there are 58 migrant bird species (excluding raptors) that use the ES area sometime during the year. The breeding birds are listed in Appendix 2-7. Season of use, relative abundance and life form (for the breeding birds) is also shown in the Appendix. Because the shrub/grassland habitat type is the most dominant in the ES area, birds which are dependent upon this type are most abundant. These birds include the sage sparrow, sage thrasher, vesper sparrow, black-throated sparrow, and the lark sparrow. Other habitat types such as riparian habitats offer high species diversity, but the amount of land covered by the riparian habitat type within the ES area is low compared to the shrub/grassland type. Overall, the total number of birds found in the riparian habitat type is relatively low.

A discussion of the long-billed curlew can be found in the sensitive species section.

Reptiles and Amphibians

There are six lizard, nine snake, and eight amphibian species which occur in the ES area. Appendix 2-7 lists these reptiles and amphibians, their relative abundance, and their life form. The western spadefoot toad and the striped whipsnake are an amphibian and a reptile which are dependent upon the shrub/grassland habitat type which is dominant in the ES area.

The western ground snake is discussed in the sensitive species section.

Sensitive Species

In 1977, a Memorandum of Understanding was drawn up between IDF&G and BLM concerning sensitive wildlife species in Idaho. Sensitive species are defined as "wildlife in Idaho whose populations are consistently small and widely dispersed or whose ranges are restricted to few localities such that any appreciable reduction in numbers, habitat availability, or habitat conditions might severely affect their status." The Department and BLM have designated a list of sensitive species, and they have agreed to "insure, to the best of their abilities, that critical habitats and populations of sensitive species occurring on lands administered by the Bureau will be managed and/or conserved to maintain population numbers of these sensitive species." Sensitive species do not fall within the purvue of the Endangered Species Act. However, it is Bureau policy "to ensure that the critical habitats of sensitive animals will be managed and/or conserved to minimize the need for listing those animals by either Federal or State governments in the future." Discussed below are those sensitive species which occur within the ES area.

Spotted Bat: The spotted bat is a bat of arid country such as that which lies within the ES area. These mammals occasionally enter buildings and caves, and feed on insects. Their favorite feeding sites are wet areas such as springs and ponds. Although none of these bats has been observed or reported in the ES area, there have been no inventories to determine their abundance. Reputable sources state that spotted bats occur in southern Idaho during spring, summer, and fall periods (Burt and Grossenheider, 1964; Larrison, 1967).

River Otter: A native to southwestern Idaho, the river otter is an aquatic mammal which eats fish, frogs, turtles, crayfish, insects, and on occasion, young birds. It enlarges and dens in burrows built by other animals. The burrows can be in brush piles or in tules, as much as one half mile from water. Most often dens are located in banks with an entrance below the water.

River otter inhabit scattered locations along the Snake River throughout the ES area (IDF&G). Another known otter location is Emigrant Crossing Reservoir (R. 10 E., T. 4 S., Section 28). Other suitable otter habitats exist in the ES area but have not been inventoried. The Bruneau River and Salmon Falls Creek, for example, may have otter present.

Bobcat: The bobcat, which is native to southwest Idaho, is scattered throughout the ES area where suitable habitat exists. This animal prefers rocky, brushy country for hunting prey and raising its young. The den is usually a protected cavity or cave among rocks. Only one bobcat has been observed in the ES area (near King Hill Creek), but IDF&G, FWS, and BLM biologists believe that these animals occur throughout the area in association with brushy canyons and talus slopes.

Bobcats are known to feed on ground squirrels, pocket gophers, meadow mice, cottontails, and jackrabbits. Small or weak deer are occasionally preyed upon in the winter.

Bobcats are classified as furbearers, and in recent years the value of their pelts has increased. For this reason trapping pressure has also increased.

Trumpeter Swan: This bird breeds in Alaska, Canada, southwest Montana, Wyoming and eastern Idaho. It does not breed within the ES area boundary but does pass through in small numbers during spring and fall migrations along the Snake River (IDF&G).

Mountain Quail: Mountain quail are native to southwestern Idaho and are inhabitants of dry, brushy mountain slopes. Their food consists of buds, seeds, grain, and insects. They nest on the ground among brush. The only known mountain quail population in the ES area is in the lower section of King Hill Creek (IDF&G). This location is shown on Map 2-6.

Osprey: The Osprey breeds throughout the United States where suitable habitat exists. These birds are tied to bodies of water as their source of food is fish. They nest in trees, most often in dead snags near rivers and lakes in forested areas.

The Osprey is a nonbreeding migrant in the ES area during the spring and fall. They are found along the Snake River throughout the ES area for indefinite time periods.

Merlin: Merlins, or pigeon hawks, breed in Alaska, Canada, Washington, Montana, North Dakota, and northern Idaho. During spring and fall migrations they are rarely observed in the ES area. While they inhabit the ES area Merlins are most often found in trees which act as windbreaks, where they prey on smaller birds.

Ferruginous Hawk: Native to southwestern Idaho, the ferruginous hawk is a raptor that prefers open country. Nest sites can occur in trees, shrubs, on low cliffs, or on the ground. In the ES area, all nests found were ground nests. Breeding chronology for these birds can be seen in Table 2-8.

Nests in the ES area are usually stick nests found near the top of steep, sparsely vegetated hillsides. These hillsides are within the shrub/grassland habitat type, where the ferruginous hawk most often hunts. A total of eight nests were found, none of which were occupied (active) this year. Although these nests were not active this year, it is believed that they are traditional nest sites, and during years of high prey density (jackrabbits in particular) these nests will be re-occupied (FWS).

BLM Birds of Prey personnel (Birds of Prey annual report, 1976) found that Townsend pocket gophers and Townsend ground squirrels comprised 90 percent of the total prey biomass for ferruginous hawks. In southern Idaho and northern Utah, Howard (1974) found that jackrabbits made up 91.7 percent and 86.2 percent of the total prey biomass in 1972 and 1973 respectively.

Most ferruginous hawks which nest in the Birds of Prey Study Area hunt north of the river for Townsend ground squirrels. Due to low Townsend ground squirrel populations south of the river, birds which would forage in the ES area depend more heavily upon the rabbit population which occurs in the shrub/-grassland habitat type. Townsend pocket gophers are also an important prey source to these birds.

Western Burrowing Owl: The burrowing owl is native to southwestern Idaho and nests in the ES area. A partial survey has been conducted and average maximum foraging ranges are included on Map 2-6.

Burrowing owls arrive here from mid-March to mid-April, and eggs are laid in April and early May. Family groups and colonies begin to disperse by late August.

The nest consists of an underground burrow which can be found in a number of different locations such as cut banks, arroyos, grasslands, agricultural areas, urban areas, and open situations. Burrowing owls usually depend on burrow starts made by other animals such as ground squirrels, badgers, and marmots. They are capable of digging their own burrow along banks or other suitable locations. The burrow is important for the owls nesting, shelter, protection from predators, thermoregulation, and social interactions. The burrow is often reused each year, but not necessarily by the same pair.

The Burrowing owls' main source of food are insects; however, small rodents, reptiles, and birds are also preyed upon. They hunt in a variety of habitats in the ES area including shrub/grassland and agricultural areas. Three factors essential to good burrowing owl habitat are openness, short vegetation, and burrow availability (BLM tech. note 250).

Long-billed Curlew: The long-billed curlew was once distributed throughout the United States. Numbers have diminished, and now they chiefly reside in the western United States. This large shore bird migrates inland during the early spring to breed and rear young. Arrival

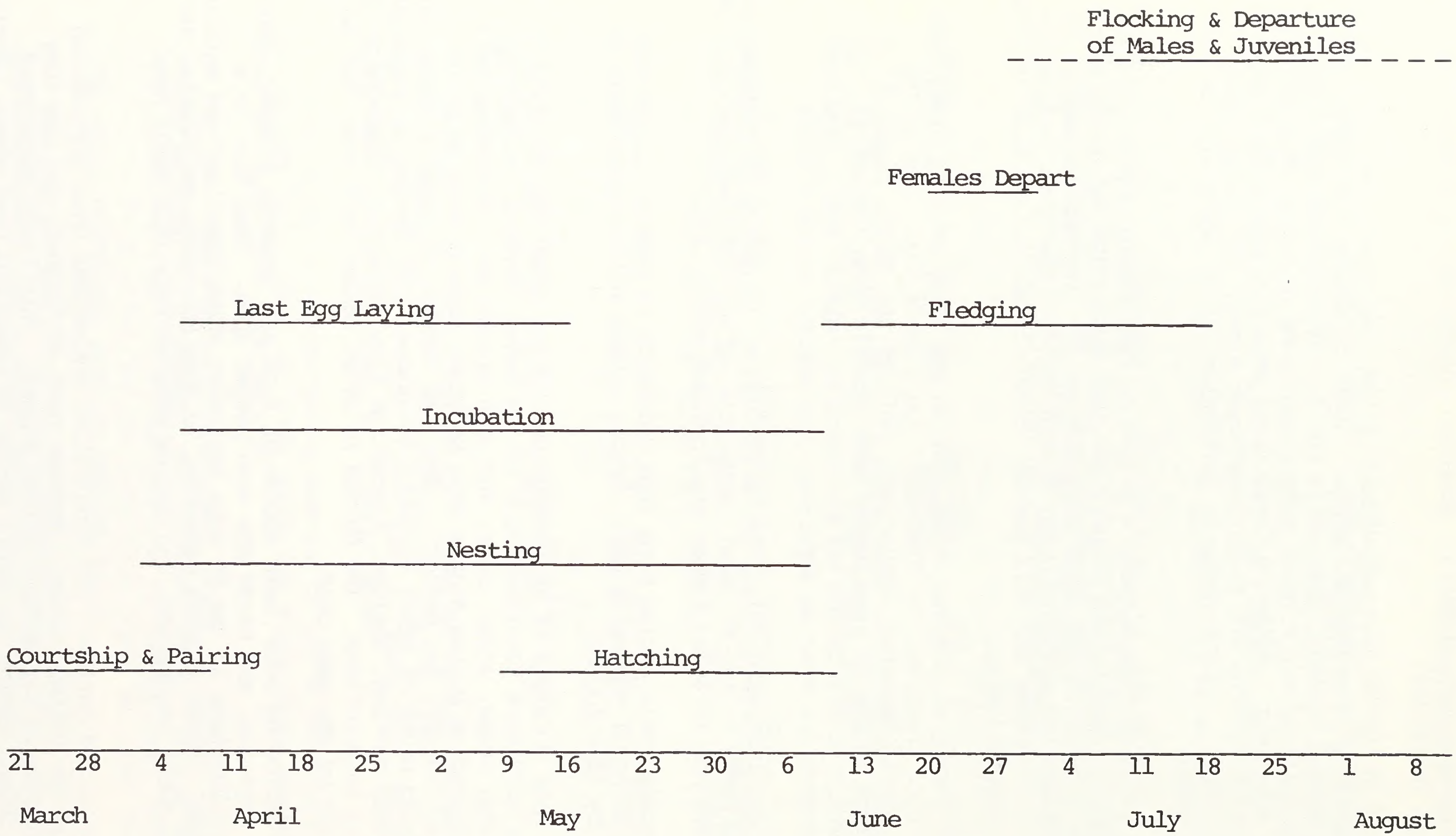



FIGURE 2-11

Breeding Chronology of the Long-billed Curlew in Southwestern Idaho.

of these birds to southwestern Idaho takes place during late March. Figure 2-11 illustrates the breeding chronology of long-billed curlews in southwestern Idaho.

Nesting habitat consists of the grassland habitat type. Curlews are colonial nesters, and nests can often be found quite close together. The nest consists of a grass-lined depression on the ground. During incubation and while the parents are raising young, they are very defensive. Adults cooperatively "swarm" or "mob" intruders in the breeding territory. The young are feathered and are able to walk and feed themselves several hours after hatching.

Curlews rely on invertebrates, both in and on top of the soil, as a food source. Early in the season, prey items include burrowed grubs, larvae, worms, and beetles. Grasshoppers become an important food source later in the season.

Three main areas of curlew concentration occur in the ES area. These areas are plotted on Map 2-6.

Western Ground Snake: The western ground snake is a secretive, nocturnal snake of arid and semi-arid regions. It is found within the shrub/grassland habitat type. Lowell Diller (personal communication) has made most of his observations of this species on fine, wind blown volcanic soil. This snake spends much of its time underground. It is known to frequent river bottoms, desert flats, sand hummocks, and rocky hillsides where there are pockets of loose soil. BLM personnel observed eight of these snakes in 1978 in habitat similar to that described above within the Snake River Birds of Prey Natural Area. Food consists of invertebrates such as spiders, centipedes, crickets, and insect larvae.

Little is known about this species in the ES area. One sighting was made in 1977 near the ES border. Using soil maps and available distribution maps (Stebbin, 1966) western ground snake habitat covers all of the ES area south of the Snake River from the Idaho-Oregon border east to the Bruneau River.

Endangered Species

Bald Eagle: The bald eagle is an endangered species listed on the Federal list of endangered and threatened species. Bald eagles occupy the ES area during the winter within the 90-mile reach of the Snake River from Walter's Ferry to Bliss, Idaho. Numbers range from three to fifteen birds, depending upon food availability. No permanent bald eagle roosting sites or concentrations have been identified.

## Fisheries

Fifteen game fish species and ten non-game species have been collected in the past decade from the Snake River between the mouth of Salmon Falls Creek (RM 586.5) and Clark's Island (RM 419.0) near Marsing (see Map 2-4). A checklist showing common and scientific names is given in Table 2-9. In addition, the cutthroat trout (*Salmo clarki*) and the

TABLE 2-9

## GAME FISH SPECIES FOR SNAKE RIVER from MOUTH OF SALMON FALLS CREEK to CLARKS ISLAND NEAR MARSING

| COMMON NAME | SCIENTIFIC NAME | RIVER SECTION I[1] | II | III | IV | V |
|---|---|---|---|---|---|---|
| Rainbow Trout | Salmo Gairdneri | X | X | X | | X |
| Coho Salmon | Oncorhynchus kisutch | 2 | | | | 4 |
| Mountain Whitefish | Prosopium williamsoni | X | X | X | X | X |
| Smallmouth Bass | Micropterus dolomieui | X | X | | X | X |
| Largemouth Bass | Micropterus salmoides | 2 | X | X | X | X |
| Black Crappie | Pomoxis nigromaculatus | X | X | X | X | X |
| Warmouth | Lepomis gulosus | | X | | | |
| Pumpkinseed | Lepomis gibbosus | 2 | X | X | | X |
| Bluegill | Lepomis macrochirus | X | X | X | | X |
| Yellow Perch | Perca flavescens | 2 | X | X | X | |
| Redear Sunfish | Lepomis microlophus | | | | | 3? |
| Channel Catfish | Ictalurus punctatus | X | X | | X | X |
| Flathead Catfish | Pylodictis olivaris | 2 | | | | |
| Brown Bullhead | Ictalurus nebulosus | X | X | | | |
| Black Bullhead | Ictalurus melas | | | X | | X |

X - Reported in literature since 1970.

1 - No survey of fish populations has been made; data from Angler Harvest Survey (Gibson & Mate, 1976).

2 - Present according to B. Bell (ID Fish & Game Dept., Jerome), Personal Communication.

3 - Listed by both Irving and Cuplin (1956) and Sigler et al. (1972), but may actually be misidentified Pumpkinseed (H. Pollard, ID Fish & Game Dept., Boise), Personal Communication.

4 - Present according to W. Reid (ID Fish & Game Dept., Garden City), Personal Communication.

Common and scientific names used are from the American Fisheries Society Special Publication Number 6, A List of Common and Scientific Names of Fishes from the United States and Canada, Third Edition, 1970.

## NON-GAME FISH SPECIES CHECKLIST

| COMMON NAME | SCIENTIFIC NAME | RIVER SECTION I | II | III | IV | V |
|---|---|---|---|---|---|---|
| Carp | Cyprinus carpio | X | X | X | X | X |
| Largescale Sucker | Catostomus macrocheilus | X | X | X | X | X |
| Bridgelip Sucker | Catostomus columbianus | | X | | X | X |
| Northern Squawfish | Ptychocheilus oregonensis | X | X | X | X | X |
| Chiselmouth | Acrocheilus alutaceus | X | X | X | X | X |
| Peamouth | Mylocheilus caurinus | X | X | X | X | X |
| Redside Shiner | Richardsonius balteatus | X | X | | X | X |
| Dace | Rhinichthys spp. | | X | | | |
| Sculpin | Cottus spp. | | X | X | X* | X* |
| Tadpole madtom | Noturus gyrinus | | | | | X |

*Identified (probably incorrectly) as the Shorthead Sculpin, C. confusus, by Sigler, et al., (1972).

Source: Data from Angler Harvest Survey (Gibson & Mate, 1976).

kokanee (Oncorhynchus nerka) are believed to occasionally and briefly inhabit the upstream portion of the ES area; the former in springs entering the river and the latter while moving down from impoundments some distance upstream. Coho Salmon (Oncorhynchus kisutch) are also found below Swan Falls dam. The Shoshone sculpin (Cottus greenei) is probably present in the Snake River in the Salmon Falls Creek-Hagerman area (B. Bell, personal communication).

Abundance of Fish

In the following material, the most recent surveys are used for reference.

Section I - Mouth of Salmon Falls Creek (RM 586.5) to C.J. Strike (RM 494): Harvest records (Gibson and Mate 1976) suggest sizable populations of rainbow trout, channel catfish, and brown bullhead. Large inflows of spring water above Bliss Dam support a high-quality rainbow trout population (B. Bell, personal communications), and a few smallmouth bass and mountain whitefish are also caught. Below Bliss, channel catfish and smallmouth bass predominate, and brown bullhead, mountain whitefish, bluegill and black crappie are also common.

Of the non-game fish in Section I, northern squawfish are most abundant above Bliss Dam, and along with peamouth, are the most common non-game species below Bliss. Suckers, carp, chiselmouth, and redside shiners are occasionally taken by anglers.

Irving and Cuplin (1956) sampled the impounded portions of Section I in 1953-54 (see Appendix 2-8 Table A). Mountain whitefish were the most abundant game species, with few other game fish taken. More than 90 percent of the fish collected were non-game species, especially suckers and Utah chubs.

Section II - C.J. Strike Reservoir (RM 494): Reid (1974) sampled Section II in 1973. Appendix 2-8 Table B summarizes data for the entire reservoir. Eleven or more species of game fish and nine or more non-game species were found with each comprising about half of the total numbers in the sample. Largemouth bass were the dominant game fish, followed by bluegill and black crappie. A few rainbow trout and mountain whitefish were collected, almost all during the fall of the year. Most of the game fish sampled were small (less than 15 cm), and the majority were young-of-the-year.

Carp, suckers, northern squawfish, and chiselmouth were the most abundant non-game species, and most of these, with the exception of chiselmouth, were large (longer than 30 cm). Thus, the bulk of the live weight of fish in the reservoir is tied up in large individuals of species which would not be vulnerable to predation.

The Bruneau arm and the main portion of C.J. Strike Pool had greater relative fish densities (both about 75 game fish per hour of electrofishing) than the Snake arm (about 47 per hour). This difference seems correlated with habitat type.

Since the completion of Reid's survey in 1973, there are indications that some species abundance is shifting. Largemouth bass and black crappie appear to be declining in abundance, while channel catfish and smallmouth bass are significantly increasing, (W. Reid and H. Pollard, personal communication).

Section III - C.J. Strike dam (RM 494) downstream to Swan Falls reservoir (RM 457) flow line: Section III was sampled by Goodnight and Bowler (1973) in 1972 (see Appendix 2-8 Table C). Game species constituted only 11 percent of the number of fish caught; large (to 40 cm long) mountain whitefish, bluegill (6 to 9 cm long,) and black crappie (12 to 15 cm long) predominated.

Some large rainbow trout are also taken in the Strike tailwaters during the cooler months of the year (H. Pollard, personal communication).

Large (30 cm) carp and suckers were the most abundant non-game species. Young of the year carp and suckers were also common, and northern squawfish (most larger than 30 cm) were the only other species normally taken.

This portion of river has a very reduced game fish population. Catch rates averaged about one-third to one-fourth the catch rate in C.J. Strike Reservoir.

Section IV - Swan Falls Reservoir (RM 457): Two surveys have been made of Section IV. Sigler et al (1972) sampled in 1971, and Goodnight and Bowler (1973) sampled in 1972. Less than 5 percent of the fish collected in both studies were game fish (see Appendix 2-8 Table D). Most game fish were black crappie (10 to 13 cm long) and mountain whitefish. Non-game fish species composition was similar to that of upstream sections, with suckers, carp, and northern squawfish predominating. Squawfish and suckers were mostly young-of-the-year or yearlings. Most carp were larger (greater than 30 cm) and constituted the majority of the live weight of fish in the reservoir. The sample catch rate of game fish (13 fish per hour) was the lowest of any section of the river.

Section V - Swan Falls Dam (RM 457.7) to Clark's Island (R.M. 419): Three surveys were conducted on Section V. Sigler (1972) sampled in 1971, Goodnight and Bowler (1973) in 1972, and Gibson (1974) in 1973 and 1974. Gibson's data is used as being representative of Section V, all free-flowing water.

About 25 percent of all fish taken were game fish (Appendix 2-8 Table E). Channel catfish and smallmouth bass together made up 62 percent of the game fish collected in the three surveys. Most channel catfish were large (22 to 40 cm), and sizes of smallmouth bass ranged from 5 cm (young-of-the-year) to 30 cm. Most crappie were 18 to 22 cm in length, and bluegill were normally 6 to 16 cm.

Large rainbow trout (1 to 2 kg) and coho salmon were commonly taken by fishermen in the tailwaters of Swan Falls Dam in 1977 (H. Pollard, and W. Reid, personal communication).

As in other sections, large carp and suckers dominated the non-game species collections. Most squawfish were large, but the species was somewhat less abundant than in upstream sections. Chiselmouth ranged in size from 6 to 30 cm, and redside shiners averaged 4 to 12 cm.

## Age and Growth

Smallmouth bass from the freeflowing river below Swan Falls Dam were aged by Gibson (1974). They averaged about 8 to 9 cm at the end of their first year, 14 to 16 cm at the end of their second year, about 21 cm at the conclusion of their third year, and about 25 cm at the end of their fourth year.

Gibson aged a few channel catfish and found fish older than 6 years, and 32 to 40 cm fish were not uncommon. The youngest fish he examined were 25 to 30 cm long and were in their fifth growing season. Of the bluegill he examined, a few were 6 to 8 years old (20 to 30 cm long) but most were 12 to 17 cm long and 3.5 years old. Black crappie displayed a similar age structure but were a few centimeters longer at each age.

A very limited amount of information on age and growth of largemouth bass is available from a study of C.J. Strike Reservoir by Reid (1974). His data, however, suggest that growth in that portion of the free-flowing river was considerably slower than in Strike Reservoir.

## Competition and Prey Availability

It is clear that there is an abundance of non-game forage fish for important game fishes such as largemouth and smallmouth bass, black crappie, and channel catfish that are predatory as adults. On the other hand, most sections support substantial populations of northern squaw-fish that may compete with game species for food or prey upon them.

It is also significant that most river sections contain large densities of very large suckers and carp that are virtually immune to predation. These fish tie up large quantities of nutrients and energy in unusable form for a number of years. They, especially carp, rely on the same food resources (bottom invertebrates) as most juvenile game fish. Thus, the potential for competition for food appears significant between juvenile game and non-game species.

## Food Abundance

Daily and seasonal fluctuations in water level in reservoirs and free-flowing sections such as between Strike and Swan Falls reduce the habitat carrying capacity for bottom organisms. Irving and Cuplin (1955) found that production of food organisms was excellent or good in non-fluctuating tailwaters and non-fluctuating impoundments, but poor in shallow impoundments with severe fluctuations (i.e., Swan Falls Reservoir), and virtually absent within the zone of fluctuation in tailwaters such as those of C.J. Strike Dam and Swan Falls Dam.

The fluctuations in water level and amount of sedimentation tend to shift the production of organisms from groups that are valuable food for fish game species to less preferred forms.

### Cover and Habitat Type

Some general conclusions may be drawn from a study of fish distribution in C.J. Strike Reservoir, where Reid (1974) felt shoreline habitat was one of the primary factors limiting game fish. The greatest density of game fish was found along steep-gradient rock shorelines that were little affected by water level drawdown. Shallow mud, sand, and gravel areas only held game fish if riparian cover was present, and coves held more fish than areas of straighter shoreline. Such relationships probably result from differences in food availability among habitat types as well as differences in cover.

In the free-flowing river, the distribution of largemouth bass is restricted to the few quiet coves that are present. Black crappie are also normally associated with coves (H. Pollard, personal communication). Smallmouth bass are typically found in areas of rock and rubble, apparently more because of the food available there than because of the cover provided.

### Temperature Requirements

Temperature-related fish kills occur nearly annually below Swan Falls Dam. Large numbers of adult mountain whitefish die as temperatures reach the summer maximum of approximately 25$^{\circ}$ C. (Reid, personal communication).

### Entrainment and Impingement

A large number of pumping stations presently withdraw water for irrigation of adjacent land. These pumps may entrain fishes in the flow of water being pumped; or, if the pump intakes are screened, fishes may be held on those screens (impinged) by the intake flow until killed. Although the U.S. Fish and Wildlife Service recommends screening intakes with mesh size not greater than 3.5 mm and restricting approach velocity to 17 cm per sec, few (if any) existing intakes meet these recommendations (W. Reid, personal communication).

The magnitude of current fish mortality in the Snake River due to entrainment and impingement is completely unknown. Even if pump intakes were screened when installed, plant debris would clog them rapidly, requiring constant maintenance or removal.

### Fisheries Downriver of the ES area

The Snake River supports large populations of resident and anadromous fish below Hells Canyon, which contribute to both sport and commercial fisheries in the Pacific Northwest. Chinook salmon and steelhead trout, which were native to the upper Snake, were denied access to ancestral spawning and rearing reaches by construction of Brownlee, Oxbow, and Hells Canyon Dams. Chinook salmon, steelhead, and a remnant run of sockeye salmon to Redfish Lake in the upper Salmon River still return to the Snake River (USDO 1968, and personal communication with biologists of Idaho Fish and Game Department, 1978). The Snake River system produces fall, spring, and summer races of chinook, each with slightly different behavior and biology.

Resident fishes in the river reach below the ES area include smallmouth bass, white sturgeon, channel catfish, rainbow trout, brown bullhead, channel catfish, mountain whitefish, flathead catfish, black crappie, carp, squawfish, suckers, chiselmouth, and shiners.

Hydroelectric peaking causing daily water fluctuations limits fish and bottom insect production below IPC dams in Hells Canyon. Further downriver, beginning at lower Granite pool, habitat for resident and anadromous game fishes is reduced by hydro operations at Corps of Engineers dams, and flows are inadequate for unimpeded and safe migration of anadromous fish in low and average-flow years.

White Sturgeon

This species is considered "sensitive" by the BLM and Idaho Fish and Game Department. Sturgeon are present in all free-flowing reaches of the ES area and reproduce in these reaches as well. Sturgeon do not tolerate impounded waters, although they are seen occasionally in the gently-flowing Snake River arm of C.J. Strike Pool. There are about 205 miles of river in which sturgeon live and prosper in Idaho. The best portion of this is the 100 miles above Weiser, and the ES reach near Bliss is considered to be the finest sturgeon habitat in the entire Snake River. Growth of sturgeon throughout the ES area is excellent.

This species reaches lengths of at least 10 feet in the ES area and has been recorded to weigh in excess of 600 pounds.

Very small sturgeon feed on aquatic invertebrates, largely insects. Large sturgeon consume molluscs, crayfish, and carrion. Sturgeon may live for as long as 100 years. The male reaches sexual maturity at 11 to 22 years, the female at 26 to 34 years.

The ES reach is currently closed to all but catch-and-release fishing for sturgeon. Catch rates have been as high as one fish each six angler-hours for larger sturgeon and up to eight fish of 9 to 18 inches in one angler-day.

## WILD HORSES

Two wild horse herds are within the ES area (see Map 2-7 for general locations). The two herds will be discussed separately.

Owyhee Herd

There are approximately 50 wild horses in the Owyhee herd. These horses are offspring of unclaimed horses allowed to range free in the past. This herd is protected and managed in accordance with the Wild Horse Management Plan (WHMP), prepared in 1978. Under the WHMP, herd size will be maintained at 47 to 74 head in the area shown on Map 2-7. The WHMP is on file at the Boise District office.

Approximately 7,400 acres, or 5 percent, of the Owyhee herd's 156,600 acre range fall within the ES area. Here the land is drier and lower in elevation than the remainder of the range. Vegetation is primarily a salt-desert shrub and sagebrush/grass type, with general range condition best described as poor. Water is available here only during the winter and early spring months.

From field observations and aerial surveys by BLM personnel, it is apparent that the portion of the Owyhee herd range within the ES area receives only minimal horse use due to poor range condition, insufficient water, and close proximity to roads and human activity. The remaining areas of their range are more desirable and offer better habitat for the horses in terms of forage, water, cover, climate, and isolation from humans. It is in these areas where the horses prefer to remain, and do remain.

Saylor Creek Herd

Based upon aerial surveys and field observations by BLM personnel, there are approximately 75 wild horses in the Saylor Creek herd. These horses are offspring of unclaimed horses allowed to roam free in the past. Unlike the Owyhee herd, the Saylor Creek herd is not currently being managed under a Wild Horse Management Plan. Although the horses are still fully protected under law, specific herd range and optimum herd size has not yet been established for management purposes. The WHMP is scheduled for completion in 1983.

Map 2-7 shows the approximate range presently used by the Saylor Creek herd. This encompasses roughly 103,200 acres of which approximately 84,400 acres, or 82 percent, fall within the ES area. This range is defined primarily by available forage and water, existing fences, and human use areas. Water is the most limiting factor for the herd.

Of the fourteen water sources used by the horses, three are under BLM ownership, two are undeveloped springs, and nine are provided by adjacent farm projects in an agreement with the local livestock operators and are primarily intended for livestock use. In the past, only two sources have provided water year-round and did not freeze over. These two are owned by the adjacent farm projects and are the herd's primary source of water during the winter months. Refer to Map 2-7 for locations of these water sources.

Over the years as the area's human population and human activity has increased (from farms being established, more traffic on roads, increased numbers of access roads, greater ORV use, etc.,) the range of the wild horses has gradually become more restricted, as wild horses prefer to range away from people.

## Historic Resources

A historic site is the location of some human activity which took place after recorded history began for a given area. It need not be a standing structure but may take the form of buried artifacts or even a geographic location lacking physical remains where an important event is known to have occurred. Historic sites may best be described in reference to their associated time period.

### 1840s to 1860

This period is marked by the American acquisition of the Oregon Territory in 1846 lending further impetus to westward movement of emigrants along the Oregon Trail. There are two major routes of the Oregon Trail within the ES area and several associated roads such as the Kelton Road which served as a freight and stage road from Utah. Map 2-8 illustrates the route of the Oregon Trail and locations where wagon ruts are still visible.

There are several known historic sites on private land associated with the Oregon Trail, including the Cold Springs Station, the Pilgrim Station, the Poison Creek Station, and the old townsite of Glenns Ferry. Givens Hot Spring and a trading post near Hagerman are also associated with the Oregon Trail, as is Three Island Crossing on the Snake River near the present town of Glenns Ferry.

### 1860s

The discovery of gold and silver in the Owyhee Mountains and the Boise Basin stimulated settlement in the ES area. A network of roads, railroads, stagelines, and river ferrys developed to meet the needs of the miners. Evidences of these support activities are still present in the ES area.

### Post 1860s

Agriculture and livestock rose to a prominent position in the economy of the region after the 1860s and have remained dominant. Numerous old homesteads such as the Cold Springs Ranch occur in the ES area as do less permanent evidences of early livestock activities such as sheepherder and buckaroo camps.

Nearly all of the known sites mentioned previously are located on private land and would seemingly not be affected by agricultural development on adjacent lands. However, Federal agencies are also required to evaluate impacts federal undertakings may have on National Register eligible sites located on private land. Since these important historic sites are by nature more obvious than prehistoric or paleontological sites, they are more vulnerable to vandalism as described in Chapter 3; thus they are considered in this discussion.

National Register of Historic Places

The Oregon Trail has been designated as part of the National Historic Trails System, and all existing ruts in the ES area have been officially determined eligible for the National Register. In addition, Cold Springs Ranch and Station have also received an official eligibility determination. It is anticipated that several more historic sites and districts believed to be of National Register quality (Map 2-8) will receive official determinations of eligibility in the future, (personal communication, SHPO, Larry Jones, Feb. 1979).

There are currently a number of factors impacting historical resources in the ES area. These include livestock use, vandalism, weathering, and major repair or removal of historic structures. In addition, portions of the Oregon Trail on both public and private land have been plowed over in the course of farming.

## Prehistoric Resources

The 65 known prehistoric sites in the ES area consist of the physical evidence left by early inhabitants beginning as long as 15,000 years ago. These areas of human activity were created by the probable ancestors of distinct Indian groups historically known as Northern Paiute, Shoshoni, and Bannock. Their way of life is often referred to as the Desert Culture subsistence pattern and is characterized by seasonal exploitation of various resources which included small and large game, camas and other edible plants, and fish.

Several overlapping types of sites are recognized in the ES area with varied activities suggested by the kinds of artifacts found in the sites. Most of the sites are open and consist of lithic (stone) tools and waste flakes created in their manufacture.

The following types of sites have been described in the ES area as the result of a number of archaeological surveys and a few excavations (see Map 2-9 for surveyed areas.)

### Temporary Camp Sites

Temporary campsites are usually small and located near major drainages or prominent topographic features. They are often related to specific resources such as hunting or fishing and yield artifacts indicative of these activities.

### Quarry or Workshop Sites

Quarry or workshop sites are associated with tool making or the acquisition of raw material for tools and are often found near rock outcroppings and drainages. They are characterized by the presence of flakes, hammerstones, and nodules of the source material.

Semi-Permanent Habitation Sites

Semi-permanent habitation sites may take the form of rock shelters, caves, boulder shelters, or open villages. They are generally found on major drainages. They usually exhibit a wider variety of artifacts such as projectile points, scrapers, and milling stones; sometimes pottery and such perishables as basketry and cordage are present. Features such as housepit depressions and fire hearths also characterize habitation sites.

Rock Alignments and Rock Art Sites

Rock alignments and rock art sites include stone rings, cairns, and walls as types of rock alignments. Rock art may take the form of petroglyphs (carvings) or pictographs (paintings). They may be found wherever suitable rock faces occur.

Miscellaneous Sites

Miscellaneous sites include isolated artifact finds, burials, hunting blinds, and possible kill sites. The latter two types may occur in strategic hunting locations; the former two may be present in a wide variety of situations.

Attempts to predict site densities over a large area in the absence of a systematic sample inventory tend to grossly underestimate the number of actual sites present and are usually biased toward larger sites associated with prominent landforms or features (Schiffer, 1977). No attempt will be made to predict how many sites actually occur in the ES area, but limited generalizations may be made on the basis of past surveys.

The eastern portion of the ES area, including the Bennett Mountain Planning Unit area north of the Snake River and portions of the Saylor Creek Planning Unit area, has consistently yielded low site densities, generally less than one site per section of land surveyed (Cinadr, 1976; Pavesic and Moore, 1973; Bucy 1971, Geer, 1977; Murphey, 1977). Certain portions of Saylor Creek do appear to have slightly higher site densities of less than one site per section (Plew, 1976; Walters, in progress). The areas which include Marsing and Oreana have thus far produced the highest site densities in the ES area, ranging from slightly less than one to more than three sites per section (Young, in progress; Metzler, 1976, 1977).

It must be emphasized that these generalizations of site density may be extremely unreliable due to the varying quality and nature of the data obtained from surveys in the ES area.

None of the known 65 prehistoric sites in the ES area are listed on the National Register of Historic Places. A number of archaeological site districts have been identified as meeting National Register eligibility criteria (Appendix 1-3 and Map 2-8); however, no official determination of their eligibility has been sought to date. It is likely many of these site districts will receive formal eligibility determinations in the near future (Tom Green, SHPO, Jan. 1979, personal communication).

There are currently a number of factors impacting cultural resources in the ES area. These include cattle trampling and erosion and dune building (particularly in the Saylor Creek Bicentennial Fire area). Some other sites in the Saylor Creek area were inadvertently seeded over in BLM operations in 1976 (1977). Some of the sites identified by Pavesic in 1973 and Bucy in 1971 were impacted by Desert Land Entry farming several years ago (Murphey, 1977). Sites throughout the ES area are being and have been vandalized by artifact hunters. Rock shelters, rock art, and large habitation sites are particularly vulnerable to this type of activity.

## Paleontological Resources

The ES area is considered to be one of the most significant regions for paleontological research in North America, having yielded numerous and varied fossil specimens. At least eight localities rich in fossil remains have been reported in the ES area (see Map 2-8). Types of fossils recovered from the ES area include seeds, leaves, fish, molluscs, and large mammals. Scientists working in southwestern Idaho believe vertebrate remains, of which fossil mammals are a type, to have the most scientific value.

The largest quantity of mammalian fossil material has been discovered in a layer of deposits known as the Glenns Ferry Formation. The layer 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, 1972). Thus, this important layer of deposits embraces a large area within the ES 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 Ice-Age beasts. This area has been designated the Hagerman Fauna Sites National Natural Landmark and may be designated as a national monument in the future (Federal Register, Vol. 43, #82-Thursday, April 27, 1978, 4310-03-National Registry of Natural Landmarks).

The ES area has not been adequately inventoried for paleontological resources, but present evidence suggests additional sites are present in the Glenns Ferry Formation within the ES area. The current incidence of vandalism to these fossil sites is also not known, but some indiscriminant collecting has been known to occur. Significant paleontological resources are protected under the Antiquities Act of 1906.

Visual resources are an integral part of the recreational experience in the ES area and include features such as land form, vegetation, water, color, and influence of adjacent scenery. They are perceived by local residents, recreationists, and highway travelers.

A systematic approach for identifying scenic quality and setting minimum quality standards for management of the visual resource values has been prepared for all BLM administered land (BLM Manual 8410). This process classifies land into one of five Visual Resource Management (VRM) classes. Each class contains specific management objectives for maintaining or enhancing visual resource values. VRM Classes within the ES area are shown on Map 2-10.

## VRM Class I

VRM Class I applies only to designated special areas where management activities are to be restricted, such as National Trails. Usually only natural ecological changes are permitted, however, very limited management activity can occur. Any contrast created within the characteristic environment must not attract attention.

This class includes land within the Oregon Trail and Kelton Road corridors. Although the Idaho State Historic Preservation Office has determined that both historic routes are eligible for inclusion into the National Register of Historic Places, the routes within the ES area have not yet been included in the National Register. Remnants of the Oregon Trail have been included in the National Trails System as a National Historic Trail. A one-half mile corridor along either side of visible Oregon Trail and Kelton Road wagon ruts are rated VRM Class I to protect the visual quality of the trails. In sections where topography prevents viewing the full half mile, the corridors were reduced in width.

Also included in this class is the proposed National Monument at the pliocine fauna fossil beds of Hagerman Valley. This area is presently a designated National Natural Landmark.

## VRM Class II

Changes in any of the basic landscape elements (form, line, color, texture) caused by management activity should not be evident in the characteristic landscape of VRM Class II land. Management units in this class include the Snake River corridor, Morrow Reservoir, Salmon Falls Creek, and King Hill Creek. Activities in the past have already resulted in dominant changes in the basic elements in most of these units. One example is road cuts in the canyon walls which result in unnatural landform lines and color contrasts from soil and vegetation removal.

## VRM Class III

Contrasts to the basic elements caused by management activity may be evident in VRM Class III land. However, this land should remain subordinate to the existing characteristic landscape. Management units include Deadman Canyon, Emigrant Crossing, and Foremans Reservoirs.

VRM Class IV

Contrast may be a dominant feature in VRM Class IV land, however, changes must reflect the basic elements in the landscape. This class involves most of the land within the ES area. Most of the natural landscape in the ES area has little variety.

VRM Class V

VRM Class V applies to areas where the quality class has been reduced because of unacceptable cultural modifications. There were no Class V areas identified on public land within the ES area.

## RECREATION

Most recreation use in the ES area occurs along the Snake River for water related or enhanced activities such as fishing, waterfowl hunting, boating, swimming, waterskiing, camping, and picnicking. The rangeland above the river is used for some hunting, off-road vehicle activities, and rockhounding. Sightseeing is common throughout the area.

In 1977, excluding sightseeing, recreation use in the ES area was estimated at 83,000 visitor days. Ninety-one percent of this use occurred along the Snake River. Although total sightseeing use has not been estimated, it is known that, during 1977, daylight motor vehicle use on primary and secondary roads amounted to 335,000 visitor days. The above figures were based on information provided by the Idaho Department of Fish and Game, Idaho State Parks and Recreation Department, Idaho Department of Transportation, and the Idaho Power Company.

Fishing

Other than sightseeing use and visitation to the Three Island State Park, the greatest recreation use is fishing along the Snake River, which supports both warm and cold water species. A few tributary streams and reservoirs also support moderately good fisheries.

Fishing on the Snake River, major streams, and reservoirs is rated as follows:

| | Warm Water Species | Cold Water Species |
|---|---|---|
| Bruneau River | Poor | Fair |
| Salmon Falls Creek | Fair | Fair |
| Sinker Creek | Poor | Good |
| Blair Trail and Morrow Reservoir | Fair | Poor |
| Emigrant Crossing Reservoir | Poor | Fair |
| Snake River | | |
| Thousand Springs | Fair | Good |
| Indian Cove Bridge-Boise River | Good | Poor |

Despite the fact that sturgeon fishing in the Snake River is declared "catch and release" only, sturgeon fishing continues to increase in popularity. A section of river approximately 12.6 miles long from Bliss Dam to King Hill contains the best sturgeon habitat and the best sturgeon population in the Magic Valley Region (Idaho Department of Fish and Game). Three other free-flowing reaches of the Snake River in and adjacent to the ES area that are white sturgeon habitat include Weiser to Swan Falls Dam, Swan Falls Reservoir to C.J. Strike Dam, and C.J. Strike Reservoir to Bliss Dam.

In 1977, fishing use was estimated at 26,200 visitor days. The 1975 National Survey of Hunting, Fishing, and Wildlife Associated Recreation by the U.S. Fish and Wildlife Service estimated that, on a national average, fishermen spent $11.50 per fishing day. Based on this estimate, $301,300 ($11.50 x 26,200 fisherman days) were spent for fishing on water within the ES area in 1977.

## Sightseeing

The presence of several major roads through the ES area accounts for sightseeing as the major recreational use. The total of 335,000 visitor days of daylight motor vehicle use on primary and secondary roads is not a true measurement of sightseeing use since travelers are traveling for a variety of purposes. Sightseeing opportunities are best along and adjacent to the Snake River where scenic values are higher and where more concentrated wildlife populations can be viewed.

Near Hagerman, the Snake River has eroded away sedimentary deposits revealing fossils of an ancient ecosystem. This area, which is viewed and studied by casual visitors and educational institutions, is a designated National Natural Landmark and has been studied and proposed for inclusion into the National Park System as the Hagerman Fauna Sites National Monument.

There is a high potential for "historic" sightseeing. Documented portions of the Oregon Trail and Kelton Road still remain visible (see Map 2-10). Remnants of the Oregon Trail have been included in the National Trails System as a National Historic Trail. Stage stations and remains of old homesteads and ferry sites may also be viewed throughout the area. Three Island State Park, where the Oregon Trail crosses the Snake River, offers interpretive hiking trails, a visitor center, and historical displays (see Map 2-11). Refer to the preceding discussion on history and archeology for a summary of these resources.

Wild horses can be viewed in the Saylor Creek portion of the ES area.

## Hunting

All public land in the area is open for hunting. Huntable populations of waterfowl and upland game exist in the area. Waterfowl hunting, the most popular hunting use, occurs along the Snake River, Bruneau River, Morrow and Foreman Reservoirs, along creeks, and on ponds. Populations of pheasants exists primarily on private property in irrigated farming areas where there is ample cover during the spring, fall, and winter months. Hunting, however, may be restricted on private property. Valley quail hunting opportunities occur throughout the ES area in irrigated agricultural areas which are adjacent to the shrub/ grassland habitat and along river valleys and creeks. Excellent opportunities occur along Mudflat Road and in the Castle Creek area. Chukar partridge hunting exists in areas of steep terrain and rough topography, particularly where canyons intersect the Snake River. Hungarian partridge and cottontail rabbit hunting also exists throughout the ES area, although hunter harvest is minimal and usually incidental to pheasant or chukar hunting. Hunting demand peaks in the fall, most noticeably during opening weekend of waterfowl season.

Hunting pressure for big game is quite low, corresponding to low game populations. Big game species are normally at higher elevations outside the ES area. Although deer are occasionally spotted on Snake River islands and major creek bottoms there are very few in the ES area south of the Snake River.

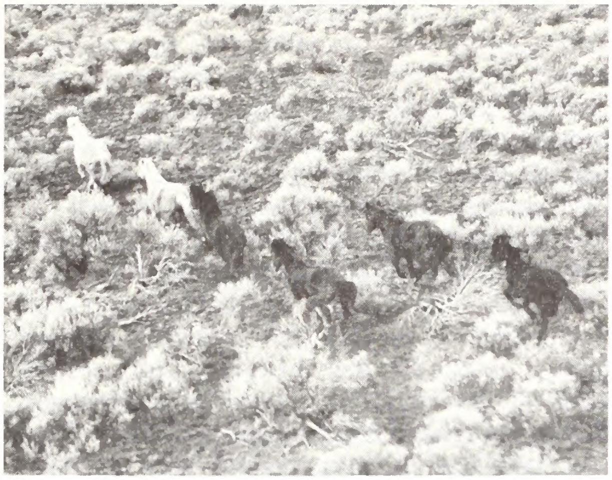
It is estimated that 7,500 hunter days were expended within the ES area during 1977. The 1975 National Survey of Hunting, Fishing, and Wildlife-Associated Recreation by the U.S. Fish and Wildlife Service estimated that on a national average hunters spent $12.20 per hunting day. Based on this estimate, $91,500 ($12.20 x 7,500 hunter days) were expended on hunting within the ES area during 1977.

## Off-Road Vehicle Use

Recreational use of off-road vehicles (ORV) is very popular in southwestern Idaho. The majority of use is by motorcyclists. It is estimated that 35 percent of trailbike use in Idaho occurs in ten counties within southwestern Idaho (Idaho's State Off-Road Motor Vehicle Plan, August 1977). The majority of the ORV use in the ES area occurs on public land near the towns of Marsing, Murphy, Bruneau, Hammett, Glenns Ferry, and Hagerman (see Map 2-11). An area south of Grand View receives low use, but offers good potential. Many competititve events, such as motorcycle races sponsored by off-road vehicle clubs, are held throughout the area.

Approximately 171,385 acres of public land within the ES area are used bv motorcyclists. In 1977, an estimated 4,148 visitor days (motorcyclists) were expended in the ES area. Highest use occurred in the Murphy and Hagerman areas. During the peak season, an estimated 100 to 150 motorcyclists may use these areas per weekend (Idaho Department of Parks and Recreation). The challenging terrain, good soil characteristics, and network of trails and primitive roads in these two areas account for the intensive use.

It is estimated that 60 percent of the ORV use is for trailbiking with the remaining 40 percent four-wheel drive use. Applying this percentage to the 4,148 visitor days of motorcycle use, the total ORV use in the ES area is estimated to be 6,900 visitor days.



Wildhorses

ORV

Wildlife

Livestock Grazing

FIGURE 2-12. Public land uses.

## Collecting

A portion of the ES area west and south of the Snake River is well known by rockhounds for its resource of various rock specimens. (See Map 2-11 for location of collecting areas.) Materials collected within the ES area include petrified conifer cones and pitcher sandstone. Fossils, mostly along the prehistoric lakeshore west and south of the Snake River, are also found. However, indiscriminate collecting of objects of scientific value is prohibited by the Antiquities Act of 1906.

## Water Sports

In addition to fishing, the Snake River offers opportunities for rafting, canoeing, powerboating, waterskiing at reservoirs along the Snake River. Rafting and canoeing are gaining in popularity along unimpounded stretches of the river. There are 69 public land islands on the Snake River within the ES area. These are accessible by boat and are an important recreation resource for activities such as hunting, fishing, camping, picnicking, and nature study.

## Facilities

Most of the visitor use in the ES area is of the extensive type. Normally, these activities are carried out in the natural environment. Man-made facilities are limited to developed access areas (see Map 2-11).

Developed recreation sites within and near the ES area include Three Island State Park, boat launching sites, recreation sites on larger reservoirs such as the BLM administered Cove Site on C.J. Strike Reservoir, Bruneau Sand Dunes State Park, and a city park at Homedale, Marsing, Hammett, and Glenns Ferry. Peak use for these areas occur during May, June, and July. A privately operated indoor swimming pool is located at Givens Hot Spring.

Three Island State Park located at Glenns Ferry is opened year-round and offers campground and picnic facilities, interpretive hiking trails, a swimming area, fishing, restroom facilities, historical displays, and a visitor center. During 1977, 66,200 people visited this park.

During the same year, 71,981 individuals visited the Bruneau Sand Dunes State Park, adjacent to the ES area east of Bruneau.

# WILDERNESS

Under Section 603 of the Federal Land Policy and Management Act (FLPMA), the BLM is responsible for ensuring that all public land, including that within the ES area, is inventoried for wilderness characteristics as described in the Wilderness Act of 1964. Land found to possess wilderness characteristics is to be managed during the study and reporting process required by Section 603 of FLPMA so as not to impair its suitability for preservation as wilderness.

Special authorization to conduct an accelerated inventory of wilderness characteristics within the ES area was issued on August 23, 1978, by the Director of the BLM. As a result of this inventory a total of 4 areas totaling 70,547 acres, including 4,705 acres within the ES area and 56,842 acres of contiguous wildlands, have been identified as proposed Wilderness Study Areas (see Map 2-8). These areas are presently undergoing formal public review. Following completion of the public review period, the BLM will issue a final decision identifying Wilderness Study Areas within the ES area. Such areas will be retained in public ownership and will be considered unavailable for agricultural development until Congress acts on the President's recommendation on the suitability of the areas for designation as wilderness.

The proposed Wilderness Study Areas identified on Map 2-8 are generally dominated by plant and animal communities representative of northern desert shrub and douglas-fir forest ecosystems. Topography varies from gently-rolling tableland to steep mountain terrain. These areas are not generally representative of the types of areas already designated as units of the National Wilderness Preservation system.

Wilderness-oriented recreational use within the proposed Wilderness Study Areas shown on Map 2-8 is rated low at present.

## LIVESTOCK GRAZING

Livestock grazing is a major use of public land within the ES area. Private livestock operators are issued licenses by the BLM to graze animals on public rangeland. This public land is divided into management units called "allotments". All or part of 24 grazing allotments fall within the ES area (see Map 2-12). There are 127 individual operators licensed to graze livestock within the ES area. Seventeen of the 127 operators have licenses in 2 allotments, and 4 have licenses in 3 allotments. Seven allotments have only one operator in each. The remaining 17 allotments are designated as common allotments and have from 2 to 48 operators licensed in each (see Table 2-10). Currently 418,580 acres within the ES area are used for livestock grazing.

Operators are generally licensed to graze their livestock in specific allotments based upon historic use, location of their private property, type of livestock operation, and type of range vegetation. The period they use the public land is often critical to the success of their operation.

Vegetation surveys determined stocking rates of the range in "animal unit months" (AUMs) per year for livestock based upon available forage. Grazing use was then adjudicated to eligible livestock operators as "grazing qualifications" (AUMs) for specific allotments, specific type and number of livestock, and specific seasons of the year. The annual fee charged by the BLM currently is $1.89 per AUM.

TABLE 2-10

CURRENT GRAZING USE, BY ALLOTMENT

| Allotment | Operator | Class 1/ | Season 2/ | Active Grazing Qualifications (AUMs) 3/ |
|---|---|---|---|---|
| Graveyard Point | (1) H. Markley | C | Sp | 113 |
| Poison Creek | (1) R. Bruce | C | Sp | 172 |
| | (2) G. Johnstone | C | Sp | 250 |
| French John Area | (1) M. Quintana | S | Sp | 38 |
| Elephant Butte | (1) T. Blackstock | C | Sp | 177 |
| | (2) R. Pershall | C | Sp | 92 |
| River Group | (1) H. Brandau | C | Sp Su F | 440 |
| | (2) R. Brandau | C | Sp Su F | 241 |
| | (3) Chipmunk Grazing Association | C | Sp Su | 72 |
| | (4) A. Curtis | C | Sp Su F | 93 |
| | (5) C. Johnston | C | Sp Su F | 293 |
| | (6) B. Malmberg | C | Sp Su F | 90 |
| | (7) C. McMahon | C | Sp Su F | 489 |
| Reynolds Creek Group | (1) H. Bass | C | Sp Su | 565 |
| | (2) J. Bass | C | Sp Su | 493 |
| | (3) W. Boston | C | Sp Su | 104 |
| | (4) C.T. Ranch Co. | C | Sp | 1594 |
| | (5) E. Jaca | C | Sp Su | 244 |
| | (6) R. McKee | C | Sp Su | 81 |
| | (7) W. Thomkins | C | Sp Su | 1239 |
| Field | (1) H. Brandau | C | Sp | 42 |
| | (2) R. Brandau | C | Sp | 30 |
| | (3) Chipmunk Grazing Association | C | Sp | 877 |
| | (4) C.T. Ranch | C | Sp | 376 |
| | (5) E. Jaca | C | Sp Su F | 2198 |
| | (6) C. Johnston | C | Sp | 77 |
| | (7) C. McMahan | C | Sp | 126 |
| | (8) J. Nettleton | C | Sp Su F | 1133 |
| Oreana #1 | (1) Joyce Livestock | C | F W | 966 |
| | (2) J. Nettleton | C | F | 525 |
| Nahas Ind. | (1) R. T. Nahas | C | Sp Su F | 1463 |
| Oreana #2 | (1) Joyce Livestock | C | Sp Su F | 4952 |
| | (2) J. Nettleton | C | Sp Su F | 1133 |
| Fossil Butte | (1) O. Cox | C | F W | 93 |
| | (2) Joyce Livestock | H | F W | 108 |
| | | C | F W | 961 |
| | (3) Miller Land Co | C | W | 213 |
| | (4) R.T. Nahas | C | F W | 861 |
| | (5) C. Steiner | C | F W | 26 |
| Oreana #3 | (1) O. Cox | C | Sp Su | 2725 |
| | (2) Hayland Ranches | C | Sp Su | 465 |
| | (3) R. T. Nahas | C | Sp Su F W | 1677 |
| Castle Creek Winter | (1) P. Black | C | F W | 68 |
| | (2) Burghardt Co. | C | F W | 275 |
| | (3) B. Collett | C | F W | 910 |
| | (4) Glenns Ferry Grazing Assoc. | C | F W | 90 |
| | (5) G. King | C | F W | 2155 |
| | (6) L. Maupin | C | F W | 250 |
| | (7) 9-K Ranch | C | F W | 481 |
| | (8) C. Steiner | C | F W | 168 |

1/ Class - Type of livestock: C=Cattle, S=Sheep, H=Horses

2/ Season - General season of licensed use. Exact dates may vary somewhat from year to year.
Sp=Spring=April, May, June
Su=Summer=July, August, September
F=Fall=October, November, December
W=Winter=January, February, March

3/ Active Grazing Qualifications (AUMs) - Active grazing use licensed for the individual operator, as adjudicated from the range surveys. Sometimes an operator will choose not to use the full number of AUMs for which he is licensed. As a result, actual use may vary up to 8 percent on an average from year to year.

TABLE 2-10 (Continued)

| Allotment | Operator | Class | Season | Active Grazing Qualifications (AUMs) |
|---|---|---|---|---|
| Battle Creek Spring, Summer, Fall | (1) J. Black | C | Sp Su | 1372 |
| | (2) P. Black | C | Sp Su | 782 |
| | (3) Bruneau Cattle Co. | C | Sp Su | 5649 |
| | (4) Colyer Cattle Co. | C | Sp Su | 3370 |
| | | H | Sp Su F | 25 |
| | (5) D. Lahtiner | C | Sp Su | 1224 |
| | (6) C. Sellman | C | Sp Su | 325 |
| | (7) Uriquidi & Ocamica | C | Sp Su F | 366 |
| Battle Creek Winter | (1) Burghardt Co. | C | F W | 276 |
| Tindall Northwest | (1) Guthries Rancho Idaho | C | Sp Su F W | 11,501 |
| | (2) A. Harley, Jr. | C | Sp Su F | 960 |
| | (3) L. Rudge | C | Sp Su F | 390 |
| | (4) C. Sellman | C | Sp Su | 354 |
| Chalk Flat | (1) D. McGhehey | C | Sp F | 2068 |
| | (2) G. Withers | C | Sp F | 333 |
| Sunnyside Spring, Fall 1/ | | S | Sp F | 1365 |
| | | C | Sp F | 23,910 |
| Hammett #1 | (1) S.D. Blackwell | C | Sp Su | 95 |
| | (2) F. Phelps & Sons | C | Sp Su F | 1632 |
| | (3) G. Presley | C | Sp Su F | 1207 |
| | (4) 2-Plus Ranches | C | Sp Su F | 1398 |
| Hammett #2 | (1) D. Wicher | C | Sp | 400 |
| Hammett #3 | (1) B. Stephens | H | F W | 240 |
| Hammett #4 | (1) P. Batruel | C | Sp | 62 |
| | (2) S.S. Blackwell | C | Sp F | 470 |
| | (3) W. Brimson | C | Sp | 195 |
| | (4) Double Anchor Ranches | C | Sp | 404 |
| | (5) Half Moon Ranch | C | Sp F | 1035 |
| | (6) C. Kast | C | Sp F | 242 |
| Hammett #4 (Cont) | (7) D. McGhehey | C | Sp F | 1036 |
| | (8) J. Mills | C | Sp | 27 |
| | (9) R. Ross, est. | C | Sp F | 390 |
| | (10) Russell Inc. | C | Sp F | 240 |
| | (11) 2-Plus Ranches | C | Sp F | 1235 |
| | (12) R. Viner | C | Sp | 473 |
| | (13) W. Walker | C | Sp F | 588 |
| | (14) D. Wicher | C | F | 150 |
| Hammett #5 | (1) Double Anchor Ranches | C | Sp F | 1924 |
| Saylor Creek | (1) R. Adolf | C | Sp Su F | 750 |
| | (2) Arkoosh & Zidan | S | Sp | 1190 |
| | | C | Sp Su | 880 |
| | (3) E. Ascuena | C | Sp Su F | 609 |
| | (4) E. Astorquia | S | Sp F | 2508 |
| | | C | Sp Su F | 600 |
| | (5) J. Barinaga & Sons | S | Sp | 200 |
| | (6) C. Berry | C | Sp Su F W | 2100 |
| | (7) A. Black | C | F W | 630 |
| | (8) J. Black | C | F W | 1059 |
| | (9) R. Brailsford | C | Sp Su F | 283 |
| | (10) D. Carnahan | C | Sp Su F | 983 |
| | (11) I. Carnahan | C | Sp Su F | 198 |
| | (12) Faulkner Land & Livestock | S | Sp F | 4005 |
| | | C | Sp Su | 1010 |

1/ This allotment has 20 operators with a total of 25,275 AUMs active licensed use. Since only a small portion of this would possibly be lost to agricultural development (refer to Map 2-12, and Chapters 3 and 8) it is not necessary to show further breakdown by operators.

TABLE 2-10 (Continued)

| Allotment | Operator | Class | Season | Active Grazing Qualifications (AUMs) |
|---|---|---|---|---|
| Saylor Creek (cont.) | (13) Flying Triangle Inc. | S | Sp F W | 1203 |
| | | C | Sp Su F | 1960 |
| | (14) Guerry Inc. | S | Sp | 250 |
| | (15) W.B. Hall | C | Sp Su F | 998 |
| | (16) Hammett Lvstk Company | S | Sp F W | 2480 |
| | | C | Sp Su F | 4000 |
| | (17) J. Jewett | C | Sp Su F | 510 |
| | (18) C. Johnson | C | Sp Su F | 175 |
| | (19) S. Johnson | C | Sp Su F | 72 |
| | (20) L. Jolley | C | Sp Su F | 435 |
| | (21) Jones & Sandy Livestock Co. | S | Sp | 810 |
| | | C | Sp Su F | 1860 |
| | (22) S. Jones | C | Sp Su F | 150 |
| | (23) D. Keck | C | Sp Su F | 800 |
| | (24) R. Kerbs | C | Sp Su F W | 2338 |
| | (25) C. Kevan | C | Sp Su F | 135 |
| | (26) David Kinyon | C | Sp Su F | 724 |
| | (27) Denver Kinyon | C | Sp Su F | 949 |
| | (28) K. Kubik | C | Sp Su | 480 |
| | (29) S. Leguineche | C | Sp | 258 |
| | (30) S. Lehmann | C | Sp Su F | 682 |
| | (31) E. Miller | C | Sp Su F | 904 |
| | (32) Noh Sheep Co. | S | F | 315 |
| | (33) Patterson L&L Co. | S | Sp | 625 |
| | (34) E. Perkins | C | Sp Su F W | 2100 |
| | (35) J. Potucek | C | Sp Su F | 411 |
| | (36) B. Pruett | C | Sp Su F | 413 |
| | (37) R. Ring | C | Sp Su | 127 |
| | (38) Salmon Falls Sheep Co. | S | Sp | 600 |
| | | C | Sp | 960 |
| | (39) K. Seesee | C | Sp Su F | 383 |
| | (40) Mrs. T. Shenk | C | Sp Su | 8 |
| | (41) Simplot Lvstk Company | S | Sp W | 840 |
| | | C | Sp W | 2208 |
| | (42) Sliman Sheep Co. | S | Sp | 650 |
| | (43) J.L. Solosabal | C | Sp Su F | 1080 |
| | (44) R. Steele | C | Sp Su F | 413 |
| | (45) Tews Angus Farms | C | Sp Su | 101 |
| | (46) M. Thompson | C | Sp Su F | 1794 |
| | (47) L. Trail | C | Sp Su F | 1005 |
| | (48) Wells Livestock Company | S | Sp | 200 |

SOURCE: BLM Grazing Case Files

Grazing use within the ES area is based primarily upon the following range vegetation surveys: Wilson Unit, 1962; Pole Creek Unit, 1965; Tindall Unit, 1959; Hammett Unit, 1940; and Saylor Creek Unit, 1965 (all on file at the BLM Boise District Office).

Table 2-10 illustrates licensed active grazing qualifications (AUMs) for each operator in each allotment. This table presents a general idea of the current types of livestock operations in the ES area. More detailed information can be obtained from the individual case files at the BLM Boise District Office.

Table 2-11 shows total acres of public land and total AUMs licensed in each of the 24 allotments as well as the number of acres and AUMs of each allotment which fall within the ES area.

In the past, sheep had been the most common type of domestic livestock grazing on the federal range. Since the 1950s, however, there has been a gradual shift from sheep to cattle use. As can be seen from Table 2-10, approximately 88 percent of the total licensed AUMs are used by cattle, 11 percent are used by sheep, and less than 1 percent are used by horses.

In general, the sheep operators use the public land for grazing during spring, or spring and fall season, and drive their flocks to higher elevation National Forest land for summer. They generally spend the winter and early spring lambing season on private land.

Typically, cattle operators run a cow-calf operation. Cattle are generally turned out onto public land in early spring and gathered during late spring, summer, or fall. Some lower elevation range areas are better suited for winter grazing, however, and receive late fall and winter use. To round out a year-long livestock operation, the operators move their cattle to state, National Forest, or private land during the seasons they do not use the BLM administered range.

To move the livestock from allotment to allotment or from public land to and from private, National Forest, or state land, the operators generally trail (drive) their herds or flocks. Most livestock are moved through the area along common "driveways". Saylor Creek allotment has designated stock driveways for livestock movement. Operators who do not use these routes move their animals cross country through their allotment or obtain permits from BLM to travel through other allotments. Most trail along dirt or gravel roads. Stock driveways and customary trailing routes are shown on (Map 2-12).

A number of range improvements for livestock are located within the ES area. BLM improvements found on the public land within the ES area consist of 87,085 acres of range grass seedings 140 miles of fenceline, 18 miles of water pipeline, 9 cattleguards, 9 check dams, 8 water troughs, and 4 developed springs or wells. Records of locations of privately owned or maintained improvements within the ES area are incomplete.

TABLE 2-11

ACRES AND AUMs WITHIN THE ES AREA, BY ALLOTMENT

| Allotment | Total Allotment Acres 1/ | Total Allotment AUMs 2/ | Acres of Public Land Within the ES Area 3/ | AUMs Within the ES Area 4/ |
|---|---|---|---|---|
| Graveyard Point | 3,292 | 113 | 1,165 | 40 |
| Poison Creek | 7,760 | 422 | 450 | 25 |
| French John Creek | 830 | 38 | 315 | 15 |
| Elephant Butte | 10,163 | 269 | 3,870 | 99 |
| River Group | 16,507 | 1,718 | 1,785 | 131 |
| Reynolds Creek Group | 38,061 | 4,320 | 4,255 | 239 |
| Black Mountain Field | 70,124 | 4,859 | 3,800 | 223 |
| Oreana #1 | 27,436 | 1,491 | 425 | 123 |
| Nahas Individual | 11,421 | 1,463 | 1,460 | 44 |
| Oreana #2 | 46,395 | 6,085 | 5,155 | 256 |
| Fossil Butte | 53,063 | 2,262 | 18,420 | 469 |
| Oreana #3 | 45,512 | 4,867 | 4,650 | 52 |
| Castle Creek Winter | 70,745 | 4,397 | 23,330 | 1,138 |
| Battle Creek Winter | 26,010 | 276 | 11,280 | 120 |
| Battle Creek Sp/Su/F | 117,485 | 13,113 | 6,245 | 312 |
| Tindall Northwest | 191,870 | 13,205 | 24,220 | 1,426 |
| Chalk Flat | 11,530 | 2,401 | 445 | 29 |
| Sunnyside Sp/F | 223,610 | 25,275 | 755 | 53 |
| Hammett #1 | 28,951 | 4,332 | 9,645 | 2,176 |
| Hammett #2 | 2,800 | 400 | 2,800 | 400 |
| Hammett #3 | 2,640 | 240 | 640 | 67 |
| Hammett #4 | 52,737 | 6,547 | 42,670 | 5,782 |
| Hammett #5 | 13,983 | 1,924 | 900 | 101 |
| Saylor Creek | 541,401 | 53,411 | 249,900 | 28,027 |
| TOTALS | 1,614,326 | 153,428 | 418,580 5/ | 41,397 |

1/ Total Allotment Acres: Public lands presently used for livestock grazing within the allotment. (see Map 2-12).

2/ Total Allotment AUMs: Licensed active grazing use within the allotment. These figures are based upon range survey adjudications and reflect current licenses.

3/ Acres of Public Land Within the ES Area: Public land presently used for livestock grazing within the ES area portion of the allotment. (see Map 2-12)

4/ AUMs Within the ES Area: Licensed active grazing use within the ES Area portion of the allotment. These figures are based upon range survey adjudications and field estimates by BLM personnel, derived from current licensed stocking rates.

5/ This figure does not include present wildlife leave areas, restricted right-of-way, or other areas not presently alloted for livestock grazing.

SOURCE: BLM grazing case files and 1940, 1959, 1962, 1965 range surveys.

## AGRICULTURE

Ownership of land within the ES area are in three basic groups: private, state, and federal. Table 1-2 in Chapter 1 gives land ownership statistics for each county in the ES area. The private land is used almost exclusively for agriculture and there are about 165,000 acres of private farmland in the ES area. In some areas, such as the private land along the Snake River southeast of Marsing, rural home sites are being developed on small acreages which encroach on existing agricultural development. Many of the small towns, both within and outside of the ES area, are expanding in the same fashion into the more desirable living areas thus reducing the existing agricultural land.

Map 2-14 depicts the general ownership of land within the ES area as well as the existing generalized land uses.

Much of the public land in the ES area is encumbered by applications under the Desert Land Act or the Carey Act for development into farm units. Much of this land is included in multiple applications which consist of over filings of Desert Land Act applications or Carey Act over Desert Land Act. The following table shows number, type, and approximate acreage of applications within the ES area as of January 1, 1979.

| Number of Applications | Type of Application | Approximate Acreage |
|---|---|---|
| 531 | Desert Land Act | 150,000 |
| 16 | Carey Act | 120,000 |

The table above does not indicate the number of acres involved in multiple applications. There are about 56,000 acres where CA projects have filed over DLA filings, and about 8,000 acres of DLA filings over other DLA applications. Map 1-3 in Chapter 1 shows the DLA and CA applications on public land in the ES area as of January 1, 1979.

## MINERAL RESOURCES

### Locatables

Only two locatable minerals are known to be present: diatomite and oolitic limestone (see Map 2-13). Four diatomite occurrences are known to exist within the study area: 1) T. 1 S., R. 3 W., Sec. 14, 15, 22 and 23, 2) T. 5 S., R. 9 E., Sec. 15, 3) T. 5 S., and 6 S., R. 10 E. and 11 E. (Pasadena Valley), 4) T. 6 S., R. 10 E., Sec. 15 and 22 (Rosevear Gulch).

Pursuant to a BLM mineral investigation in 1958, the Reynolds #1-4 mining claims located in T. 1 S., R. 3 W., Sec. 14, 22 and 23 were excepted from Public Law 167 inclusion, allowing surface management right by the claimants. Of the other known diatomite deposits, only the Rosevear Gulch material has experienced commercial exploitation, there having been about eight "carloads" of diatomite produced during the 1930s. The remaining deposits appear to be commercially infeasible at the present time.

A fairly extensive (estimated 80 million tons) deposit of oolitic limestone occurs in T. 7 S., R. 3 E., Sec. 4 and 9, where a local resident has seven placer claims and a processing plant. According to the owner, he mines about 200 tons a month. He produces a chicken food (calcium) supplement for regional markets. Patent to the claims has been applied for and, if granted, the land would pass into private ownership.

The presence of commercial-grade locatable commodities suggests the probable occurrence of as yet undiscovered valuable materials. Many of these can be expected to increase in value as presently exploited deposits are exhausted or new uses are found for the minerals.

## Leasables

The United States Geological Survey (USGS) has classified large portions of the Snake River Plain as prospectively valuable for oil, gas, and geothermal resources. Within the ES area, there currently are 21 oil and gas leases covering approximately 21,550 acres. About one-fourth of the ES area is underlain by the enormous Bruneau-Grandview hot water aquifer, and there are 71 geothermal leases accounting for approximately 84,500 acres within the ES area. Both the Castle Creek and Bruneau KGRAs (Known Geothermal Resource Area) are located within the ES area boundaries. There have been some temperature gradient wells drilled in the Castle Creek area.

## Salables

In calendar year 1977, there were seventeen active free use permits and one major material sale contract within the ES area, accounting for a reported 350,000 cubic yards of sand and gravel removed. Although production can vary drastically from year to year, the annual average is estimated to be on the order of 150,000 cubic yards, including free use permits, material sale contracts, and unauthorized removal.

Of notable importance is a cement aggregate-quality sand and gravel deposit in T. 5 S., R. 10 E., Sec. 25, for which a firm in Mountain Home has a long-term material sale contract. A high quality sand deposit occurs in T. 6 S., R. 3 E., Sec. 21 and 28. In addition, relatively low grade bentonite and volcanic ash deposits are known to occur within the ES area, although none is believed to be of much economic significance.

# LAND USE PLANS, CONTROLS, AND CONSTRAINTS

The ES area is affected by county-wide comprehensive land use plans for Owyhee, Elmore, and Twin Falls Counties. Owyhee and Twin Falls Counties land use plans were developed in the mid-1970s through a coordinated effort of a private consultant and appropriate county planning authorities. Elmore County developed its land use plan through its Planning and Zoning Commission. The vast majority of the land in the ES area is classified for some type of agricultural development or use as (native) range grazing land. Owyhee County has classified its agricultural land into Class 1 and Class 2 based on the Idaho Water Resources Board classification of irrigated and potentially irrigable land. Recommendations for this classification include giving highest priority for agricultural development. Land with a Class 1 or 2 designation will continue to be used as rangeland until it is feasible for irrigation.

Elmore County has made a broad, generalized classification of its land within the ES area as being in "Agricultural A". The "Agriculture A" area includes all farm and rangeland, except the City Impact and Rural Residential classification areas. The "Agricultural A" areas are irrigated farmland of high priority or land well outside the city zones that if allowed to intensively develop would present a leap-frog effect of development and in the long run would cost the taxpayer more money to service than if development were kept close in the existing service areas. Density allowable within the "Agricultural A" area shall be one single-family residential unit per 40 acres and other agricultural related developments. Agriculture, therefore, is the main use.

That portion of Twin Falls County located in the ES area is divided into categories of "agricultural" and "farm/range." The "agricultural" designations are areas containing the productive farmland which are generally composed of the best agricultural soils. In most instances these areas are also irrigated. The plan states, "One of the most critical factors in protecting productive agricultural land is to maintain large land parcels which can be farmed on an economical basis. It is recommended that 40 acres be the minimum size parcel in these areas. It is recognized that some agricultural operations, such as feed lots, are economical on smaller parcels. However, agricultural trends change, and to maintain viable options requires maintaining usable areas of land. The recommendation of 40 acres is not by any means a magical figure which will in itself solve all problems. Rather, it is a minimum acreage which has been successfully implemented in many rural areas and as such has proved to be a workable size."

The "farm/range" designation area contains both agricultural and grazing uses. It is looked upon as being an opportunity area as portions may eventually come under irrigation and could then become highly productive cropland. If this occurs, then certain areas could be reclassified as "agricultural". Because a large number of acres are needed to support grazing operations, it is recommended that the minimum parcel size be 80 acres.

In summary, it appears that the proposed or recommended land uses in the respective county land use plans are focused on the use of land for agriculture or grazing throughout the ES area with allowance for some rural residential use which is incident to agricultural uses.

## TRANSPORTATION NETWORKS

Transportation networks within or directly affecting the ES area consist mostly of secondary (two lane) paved roads and many miles of gravel or dirt roads which provide transportation routes to outlying farm areas. State Route 45 from Kuna enters the ES area at Walters Ferry about 17 miles upstream on the Snake River from Marsing and connects the towns of Murphy, Oreana, Grandview, and Bruneau with an all-weather paved road. State Route 51, the only all-weather paved road which goes north to south, passes through the ES area just south of Bruneau and is the main route between Mountain Home and the Nevada border. Interstate 80N is the primary means of travelling from east to west in the region and is located 10 to 20 miles north of the ES area in most locations and passes through the ES area in the vicinity of Glenns Ferry, Hammett, and King Hill. The Union Pacific Railroad operates a spur line which serves Homedale and Marsing at the northwest end of the ES area and a main line which parallels I-80 where it passes through the ES area.

Utility transportation systems, such as powerlines and pipelines, are located along main surface transportation systems such as the existing railroads, highways, and the interstate highway. Secondary service lines are numerous and serve all residences, irrigation pumps, etc. The main utility transportation systems within the ES area are the high voltage electrical transmission lines located south of King Hill which run northwest to southeast. Two of these lines originate at the Upper and Lower Salmon Falls Power Plants on the Snake River just east of the ES area. Petroleum product pipelines run diagonally through the ES area parallel to the above mentioned power transmission line. All of these utility transportation system components are shown on Map 2-14.

## SOCIO-ECONOMIC CONDITIONS

The ES area is predominantly rural and agricultural. Agriculture and food processing are the two inducstires that export products outside the ES area and provide the area's economic base. The government sector is also important in providing jobs and earnings.

The market area, which includes Canyon County, is highly dependent on agriculture and food processing. In addition, Canyon County exports many services to the Boise area which further strengthens the market area economy. The potential market area for this analysis has been identified as Canyon, Elmore, Twin Falls, and Owyhee Counties. Canyon County is not a part of the ES area, but has been included in the following analysis for comparison. The impact of Canyon County in the market area will be addressed in Chapter 3.

### Population

The population of Elmore, Owyhee and Twin Falls counties were estimated to be 72,962 persons in 1975. This represents 9 percent of the State's total population. Approximately 64 percent of the Tri-County population is in Twin Falls County, with 26 percent in Elmore County and 10 percent in Owyhee County.

As noted in Table 2-12, males comprise approximately 50.4 percent of the area population. This is slightly higher than the state average of 49.1 percent. Elmore County, with its influx of personnel at Mountain Home Air Force Base, is significantly higher at 53.7 percent males followed closely by Owyhee County with 52.1 percent.

TABLE 2-12

POPULATION, 1975

| County | Population | Females | Males | PCT Females | PCT Males |
|---|---|---|---|---|---|
| Elmore | 19,244 | 8,897 | 10,347 | 46.2 | 53.7 |
| Owyhee | 7.182 | 3,439 | 3,743 | 47.8 | 52.1 |
| Twin Falls | 46,536 | 23,839 | 22,696 | 51.2 | 48.7 |
| TOTAL | 72,962 | 36,175 | 36,786 | 49.5 | 50.4 |
| State | 787,080 | 395,828 | 391,424 | 50.2 | 49.7 |
| Canyon | 67,790 | 34,653 | 33,138 | 51.1 | 48.8 |

SOURCE: Meale, Robin and Jack Weeks. 1978. Population and Employment Forecast-State of Idaho Series 2 - Projections 1975-2000. Department of Water Resources and Boise State University Center for Research, Grants and Contracts, Boise, Idaho.

Average annual growth rates were determined for the 1960-1970 period and the 1970-1975 period (see Table 2-13).

TABLE 2-13

ANNUAL GROWTH RATES

| | 1960-1970 | 1970-1975 |
|---|---|---|
| Elmore | .45 | 1.92 |
| Owyhee | .07 | 2.23 |
| Twin Falls | - .01 | 2.14 |
| TOTAL | .12 | 2.09 |
| Canyon | .6 | 2.02 |

SOURCE: Idaho Department of Water Resources.

Earnings by Major Economic Sector

Table 2-14 displays earnings in the area by major economic structure. The area has total earnings of $325,621,000. In the area, 84 percent of total earnings are from non-farm industries. The largest earning sector in private industries of the area is wholesale and retail trade.

The most active sector in Elmore County is government with Federal military comprising almost 73 percent of the government economic structure. Farming is the most influential sector in Owyhee County, representing approximately 26 percent of total labor and proprietor's earnings. Twin

TABLE 2-14

EARNINGS BY MAJOR ECONOMIC SECTOR

(Thousands of Dollars)

1976

| | Elmore | Owyhee | Twin Falls | Study Area | Canyon |
|---|---|---|---|---|---|
| Total Labor & Proprietor's Earnings by Place of Work | 88,125 | 16,706 | 220,790 | 325,621 | 287,514 |
| By Industry: | | | | | |
| Farm | 8,952 | 4,422 | 39,000 | 52,374 | 32,449 |
| Non-Farm | 79,173 | 12,824 | 181,790 | 273,787 | 255,065 |
| (Private) | 23,043 | 8,535 | 155,320 | 186,898 | 226,298 |
| Manufacturing | 2,957 | 1,090 | 28,031 | 32,078 | 74,083 |
| Mining | (L) | (D) | 329 | 329 | 485 |
| Contract Construction | 3,071 | 1,689 | 18,667 | 23,427 | 17,939 |
| Wholesale & Retail Trade | 6,787* | 2,974 | 51,627 | 61,388 | 55,838 |
| Finance, Insurance, & Real Estate | 1,893 | 345 | 9,146 | 11,384 | 8,432 |
| Transportation & Public Utilities | 4,009 | 650 | 17,858 | 22,517 | 20,440 |
| Services | 2,892 | 994 | 27,856 | 31,742 | 46,526 |
| Other Industries | (D) | (D) | 1,806 | 1,806 | 2,555 |
| Government | 56,130 | 3,749 | 26,470 | 86,349 | 28,767 |
| Federal Civilian | 9,081 | 1,164 | 5,821 | 16,066 | 3,226 |
| Federal Military | 41,188 | 116 | 864 | 42,168 | 1,339 |
| State and Local | 5,861 | 2,469 | 19,785 | 28,115 | 24,202 |

* - Wholesale Data not shown in order to avoid disclosure, but included in totals.

(D) - Not shown in order to avoid disclosure; data included in totals.

(L) - Less than $50,000; data included in totals.

SOURCES: Bureau of Economic Analysis, Regional Economics Information System, "Personal Income by Major Sources," July 1978.

Falls County statistics show high activity in wholesale and retail trade; farm industries; and federal, state, and local governments.

## Labor Force

The 1977 average unemployment rate for the area was 5.9 percent which is slightly lower than the state unemployment rate of 6.3 percent (see Table 2-15). (The following analysis is based on average unadjusted employment figures and unemployment rates (see Appendix 2-9 for definitions).

Elmore County has the highest 1977 unemployment rate with 6.7 percent. Elmore County's average labor force is 5,859 persons; its average total unemployment is 389 persons; and its average total employment is 5,470 persons.

Owyhee County has the lowest unemployment rate with 4.7 percent. Its average 1977 labor force is 4,515 persons; its total unemployment is 208 persons; and its total employment is 4,307 persons.

Twin Falls County has an unemployment rate of 6.3 percent. The 1977 labor force is 23,234 persons; the total unemployment is 1,445 persons; and the total employment is 21,788 persons.

Canyon County, for comparison, has an unemployment rate of 5.5 percent. Its average 1977 labor force is 37,420 persons; its total unemployment is 3,228 persons; and its total employment is 35,399 persons.

TABLE 2-15

RESIDENT LABOR FORCE

1977

| | Elmore | Owyhee | Twin Falls | 3 County Total | State | Canyon |
|---|---|---|---|---|---|---|
| Employment, Unadj. | 5,470 | 4,307 | 21,758 | 31,565 | 384,067 | 35,399 |
| Unemp, Unadj. | 389 | 208 | 1,445 | 1,942 | 25,700 | 3,228 |
| Labor Force, Unadj. | 5,859 | 4,515 | 23,234 | 33,608 | 409,767 | 37,420 |
| Unemp. Rate Unadj. | 6.6 | 4.6 | 6.2 | 5.8 | 6.3 | 8.6 |

SOURCE: Idaho Department of Employment, unpublished 1977 labor force information.

## Employment by Major Economic Sector

According to Table 2-16, 19 percent of persons employed in the area in 1976 were in the agricultural sector, while approximately 12 percent of persons employed statewide were in agriculture. Over 50 percent of those employed in Owyhee County are classified in the agricultural sector.

The most active economic sector in the area is wholesale and retail trade; the least active is mining.

TABLE 2-16

EMPLOYMENT SUMMARY

1976

| | Elmore | Owyhee | Twin Falls | ES Area Total | State | Canyon |
|---|---|---|---|---|---|---|
| Agriculture | 717 | 1,414 | 2,768 | 4,899 | 38,600 | 4,973 |
| Food Processing | -- | -- | 1,574 | 1,574 | 16,675 | 4,020 |
| Wood Products | -- | -- | 65 | 65 | 18,133 | 853 |
| Other Manufacturing | -- | -- | 274 | 274 | 10,726 | -- |
| Construction | 146 | 93 | 1,152 | 1,391 | 17,142 | 1,017 |
| Mining | -- | 32 | -- | 32 | 3,325 | 35 |
| Trans., Comm., And Utilities | 131 | 100 | 1,332 | 1,563 | 17,133 | 1,570 |
| Wholesale and Retail Trade | 748 | 376 | 5,304 | 6,428 | 72,800 | 5,856 |
| Finance, Ins., and Real Estate | 224 | 57 | 691 | 972 | 15,392 | 887 |
| Services and Misc. | 275 | 126 | 2,327 | 2,728 | 48,767 | 4,433 |
| Government | 1,505 | 464 | 3,068 | 5,037 | 64,467 | 3,653 |
| TOTALS | 3,986 | 2,777 | 19,268 | 26,031 | 329,650 | 29,178 |

(--) - Indicate no employment, employment data withheld to avoid disclosure, or data not tabulated for this year; data included in totals.

SOURCES: Agricultural Employment Data from an Idaho Department of Employment, 1976 Unpublished Report. All other data from Bureau of Research and Analysis, Basic Economic Data For Idaho, Idaho Department of Employment, March 1978.

TABLE 2-17

PER CAPITA REVENUES AND EXPENDITURES

1975

(Rounded to the Nearest Dollar)

| | ELMORE | | OWYHEE | | TWIN FALLS | | CANYON | |
|---|---|---|---|---|---|---|---|---|
| | Rev. | Exp. | Rev. | Exp. | Rev. | Exp. | Rev. | Exp. |
| Property Tax | 136 | | 199 | | 172 | | 170 | |
| Education Transfers* | 154 | | 190 | | 129 | | 147 | |
| Revenue Sharing 1/ | 10 | | 18 | | 11 | | 22 | |
| Highway Transfers** | 28 | | 47 | | 37 | | 21 | |
| School Costs | | 67 | | 112 | | 66 | | 85 |
| Street and Highway Costs | | 12 | | 21 | | 16 | | 13 |
| Solid Waste Costs 1/ | | 1.40 | | 7 | | 1 | | 2.50 |
| Cemetery, Fire, Irrigation Drainage, etc. | | .75 | | 5 | | 2 | | 3.56 |
| Water Distribution Costs | | -0- | | .35 | | .15 | | -0- |
| Local Government Functions | | | | | | | | |
| Cities | | 24 | | 11 | | 40 | | 35 |
| County | | 32 | | 50 | | 35 | | 35 |

* Education Transfers consist of State Education Foundation Apportionment, State Apportionment to County General Schools, Teachers Retirement and Social Security, and School Lunch and Drivers Education Fund.

** Highway Transfers consist of Highway Users Revenue and State Highway Matching Funds.

1/ 1975 Annual Financial Reports of the Respective Counties.

SOURCES: Associated Taxpayers of Idaho, Mac Yost, Boise, Idaho.

While approximately 14 percent of Twin Falls County employees are in the agricultural sector, 27 percent participate in the services and miscellaneous sector and 16 percent are employed by federal, state, and local governments.

## Per Capita Revenues and Expenditures

Table 2-17 shows county revenue and expenditures on a per capita basis for local services. The largest revenue category in Elmore County is education, representing 33 percent of local services. Property tax in Owyhee County is the largest with 30 percent. In Twin Falls, property tax is 34 percent of local services.

School costs represent the highest expenditure in each county. For the combined area of Elmore, Owyhee, and Twin Falls Counties, school costs are 15 percent of total local services.

Generally, Owyhee County has high per capita costs of government functions and property taxes. This is moderated to some extent by state aid transfers which are high on a per capita basis. These figures are not surprising in light of the large size of Owyhee County and the small number of residents living there. Property taxes are larger due to the average size of private holdings in the county compared to smaller sites for the more urbanized counties. Also, because of the ratio of area to people, Owyhee County receives high per capita transfers for highways, education, and federal revenue sharing. The result, as it effects Owyhee County residents, is that they generally get a larger amount of state and federal dollars per person than other counties.

## Social Values

For the past 90 years agriculture has been a major component in the economic as well as the socio-cultural composition of Idaho. Its influences have encouraged the development, within the long-term residents of the State, of a generally conservative political posture, a strong sense of independence, a pride in ingenuity (being able to fashion ideas as well as objects to fit personal needs), a reluctance toward government regulations and intervention, and a deep interest in land use matters.

Many of these characteristics are reflected in material produced by a private research firm that conducted attitudinal surveys in the State in 1973 and 1975. (Both surveys were conducted by Opinions Research West, a Boise firm. The surveys were commissioned by the Idaho Water Resource Board. Since the firm is no longer in business, original data could not be obtained. All references herein are from the two available publications produced by the firm). These surveys were administered to a sample of the population in each of the six regions of the State, established by the State Water Resource Board. Several items in the surveys pertain to the attitudes of the general public toward agricultural development in the ES area.

For example, in its conclusion on the subject of whether Idaho residents (the general public) favor an increase in the amount of irrigated land, the firm stated that over half of the respondents approve the placement of more sagebrush or dry farmland under irrigation. The results (of the survey) in 1973 (64.04%) provide an even greater endorsement than those of 1972 (50.2%) ("A Survey of Public Attitudes and Opinions," December, 1973, Opinions Research West, Boise, 1973, p. 26.)

Data relating to agricultural development in the 1975 survey also indicate support from the general public for the development of irrigated farmland. In answer to a question asking how many thousands of acres they (respondents) would designate for irrigation development if they were the decisionmakers, about 36 percent indicated they would favor maintaining no more than the present average (about 30,000 acres per year). In comparison, 47 percent said they felt more irrigated acreage would be desirable. These data are summarized in Table 2-18.

TABLE 2-18
QUESTIONNAIRE ITEM RESPONSES

Question: ". . . how much irrigated land should be added each year?"

| Alternatives | Percent Response |
|---|---|
| None, or take land out of production | 2.88 |
| 10,000 acres or less | 4.81 |
| 10,001 to 20,000 | 3.85 |
| 20,001 to 30,000 | 24.04 |
| 30,001 and more | 47.11 |
| Don't know/no response | 17.31 |

SOURCE: "A Survey of Public Attitudes and Opinions", June, 1975, "Opinions Research West," 1975. p. 25.

While these statistics point out that, apparently, the general public, in 1975 and 1973, favored an increase in the amount of sage/dry land to be placed under irrigation, the feeling was not unanimous. Some contend that the number of supporters in the general public would have been diminished if the respondents had been aware of the costs involved in electrical pumping, costs which would have been shared by the urban residents.

However, in 1978, 56 percent of the farmers and residents (based on nine interviews with community leaders and citizens conducted in September 1978) of the area did not view growth as being entirely beneficial. Primarily, farmers did not want increased competition in the marketplace from new production. Most farm receipts are not providing a living wage for farmers. Additional competition without increased demand would lower returns even further. The rest of the results from those nine interviews, though not statistically significant, are presented for information purposes.

Outside of the farm, the schools and the churches serve as the main forum of social interaction. Almost 90 percent of the ES area residents questioned felt that the school system represents the major formally organized system in the area. Because of the location of schools in the ES area, children must spend one or more hours each day riding the school buses.

Most people questioned (56 percent) felt that the school systems offered them the opportunity to have some input into their community by attending parent-teacher organization meetings. They also felt that these gatherings were necessary as an opportunity to exchange ideas and meet new area residents. Due to the rural nature of the counties in the ES area, there are few other opportunities for social interaction. Quite often the discussions at school functions center around farm planning and operations.

The numerous churches in the ES area are also gathering places for many residents one or more times each week. No single denomination stands out as dominant at the present time. Women's groups related to church activities are strong and numerous. These groups meet on regularly scheduled dates providing an opportunity for exchanges of ideas and general social interactions. These activities further tie the county residents together into tight knit brotherhoods sharing common lifestyles and goals. The church meetings provide opportunities for the men to meet new farmers in the area and establish neighbor relationships with other people. The result is that people have a sense of security though neighbors may live a considerable distance away. Help is generally available from friends when needed to perform jobs or provide a ride to a shopping area. The lack of a fully developed community social structure emphasizes the importance of grazing and farm organizations. Examples of these are the Owyhee Cattlemen's Association, the Farm Bureau, and the Bruneau Ditch Company. These organizations provide input to the political process as special interest groups, and they serve as a communications link between their members.

## Attitudes and Values Regarding Quality of Life

Quality of life indicators show that in more categories the counties in the ES area are below the national average. However, 67 percent of those people interviewed in September 1978 said they wanted to raise their children in a rural atmosphere. Twenty-two percent had lived in larger cities (Boise, Twin Falls, Pocatello) before moving to the ES area. Many residents drive to Boise, Nampa, Caldwell, and Twin Falls for services and goods not readily available in the ES area.

The extremely rural nature of the ES area coupled with a strong sense of independence produces a fragmented power structure characterized by many diverse groups, but no dominant group.

The description of the energy environment will be divided into electrical energy, which is used in the ES area primarily for irrigation pumping, and chemical energy, which is used mainly in the form of fuel, fertilizers, and pesticides.

## Electrical Energy Environment

There are an estimated 165,000 acres currently irrigated with water from the ES reach of the Snake River. In almost all cases, electric motors are used to pump the irrigation water. Electricity is assumed to be the most likely power source for future irrigation in the area.

The ES area falls within the service area of Idaho Power Company (IPC). (See Map 2-15). Unless privately-owned small-scale generation facilities were built by consumers, IPC would be the sole supplier for future electricity consumption in the area.

Idaho Power Company is an investor-owned electric utility, regulated by the State of Idaho through the Idaho Public Utilities Commission (IPUC). In addition to supplying customers in its service area, IPC has "firm" long-term contracts to sell electricity to the Weiser municipal utility and to two other private utilities in Nevada and Oregon.

### Idaho Power Electricity Supply

The IPC system is based primarily on hydroelectric power. In a normal water year, about 70 percent of IPC's generation is from dams, compared with 30 percent from thermal (fossil fuel) facilities.

The IPC dams are shown in Map 2-15. IPC's largest hydroelectric facility is the T.E. Roach Complex, consisting of Brownlee, Oxbow, and Hell's Canyon Dams. Normally, these three dams which have a capacity of 942 megawatts (MW), account for about 70 percent of IPC's total hydroelectric output.

Idaho Power Company's major thermal facility is a one-third, 500 MW, interest in the Jim Bridger coal-fired plant near Rock Springs, Wyoming. An addition to the Bridger plant will be completed in 1979, increasing IPC's share of the Bridger complex by about 33 percent, from 500 to 667 MW. In addition, IPC owns two smaller facilities near Salmon and near Hailey, Idaho. A list of all IPC owned generating facilities is contained in Appendix 2-10.

Besides company-owned resources, IPC has several firm contracts to purchase from or exchange power with other utilities. IPC imports power primarily in the summer to meet summer peak demand and generally exports power to other utilities during winter and spring.

In addition to firm contracts, IPC has been able to make special short-term purchases in times of extreme deficits, such as were caused by the 1977 drought.

Because IPC depends on dams for a large part of its generation, IPC's capability to produce electricity varies seasonally and yearly with streamflows. From its dams, IPC can produce about 8 million megawatt hours (MWH) in a median water year, compared with 5.5 million MWH in a low-flow year. Within a given year, streamflows are highest in the winter and spring and lowest in July and August, giving IPC greater generating potential (sometimes more water than the dams can handle) in spring than in summer.

Another factor with seasonal effects on IPCs generating capability is irrigation diversion of water upstream from the IPC dams. In spring months when flows are high, this water may not have been usable for generation at all the downstream dams; but in the summer, for every acre-foot of water diverted, there is a corresponding loss of generation at every dam downstream. Eight IPC dams are currently or potentially affected by diversions by agriculture in the ES area. Table 2-19 shows those dams and a value in kilowatt-hours (KWH) of electricity that can be generated at each of them by an acre-foot of water passing through the turbines.

Hydroelectric losses resulting from existing depletions have reached significant levels. Idaho Power Company estimated 1976 losses at 213,000 MWH total, with a monthly high of 85,700 MWH or 117 average MW in July. These losses are the subject of some controversy and have resulted in complaints filed with the IPUC by a consumer group (Idaho Water Rights Defense Fund, IPUC Case #U-1006-124), alleging in part that IPC has failed to protect its power producing water rights in not collecting compensation from irrigators who have removed water from the Snake River. The resolution of this issue could have implications for the proposed action.

## Idaho Power Company Electricity Demand

IPC customers are generally divided into five main customer classes: residential, small commercial, large commercial and industrial, irrigation, and sales for resale (sales to other utilities). Appendix 2-11 provides a more detailed breakdown of IPC customers.

Demand for electricity on the IPC system varies seasonally. The system peak occurs in the summer, usually late in June or early July, and is caused principally by irrigation sales. Figure 2-13 illustrates 1977 sales by month for each customer class; Figure 2-14 shows the same for 1978. The top line on each figure represents total sales each month. The areas between the lines represent sales to each customer class. The graphs illustrate the contribution of the irrigation load to the summer peak demand. They are different because in 1977, a drought year, electricity supplies were short and sales to other utilities were limited almost entirely to firm contracts.

TABLE 2-19

IPC DAMS AFFECTED BY

DIVERSIONS IN THE ES AREA

| Dam | Generation Potential at Dam KWH/Acre Foot |
|---|---|
| Hells Canyon | 179.1 |
| Oxbow | 94.4 |
| Brownlee* | 137.9 - 242.0 |
| Swan Falls | 16.9 |
| C.J. Strike | 77.4 |
| Bliss | 61.7 |
| Lower Salmon | 50.8 |
| Upper Salmon | 71.4 |

*Electricity generated by an acre foot of water at Brownlee Dam varies with the reservoir elevation and the resulting head. Generally during summer months the reservoir is full and the electricity generated by an acre foot is at or near the upper limits.

SOURCE: IPC Answer to Complaints Interrogations Third Set Response 4d, IPUC case # U-1006-124

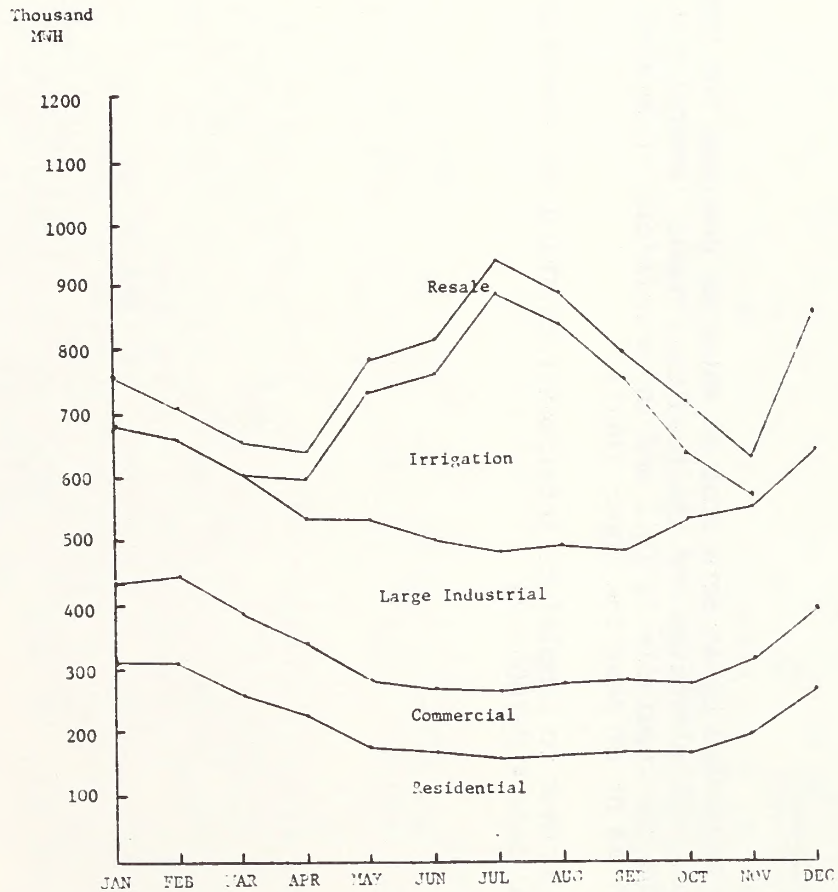



FIGURE 2-13

IDAHO POWER COMPANY 1977 MONTHLY
SALES BY CUSTOMER CLASS

Source: IPC monthly reports to the IPUC for 1977.

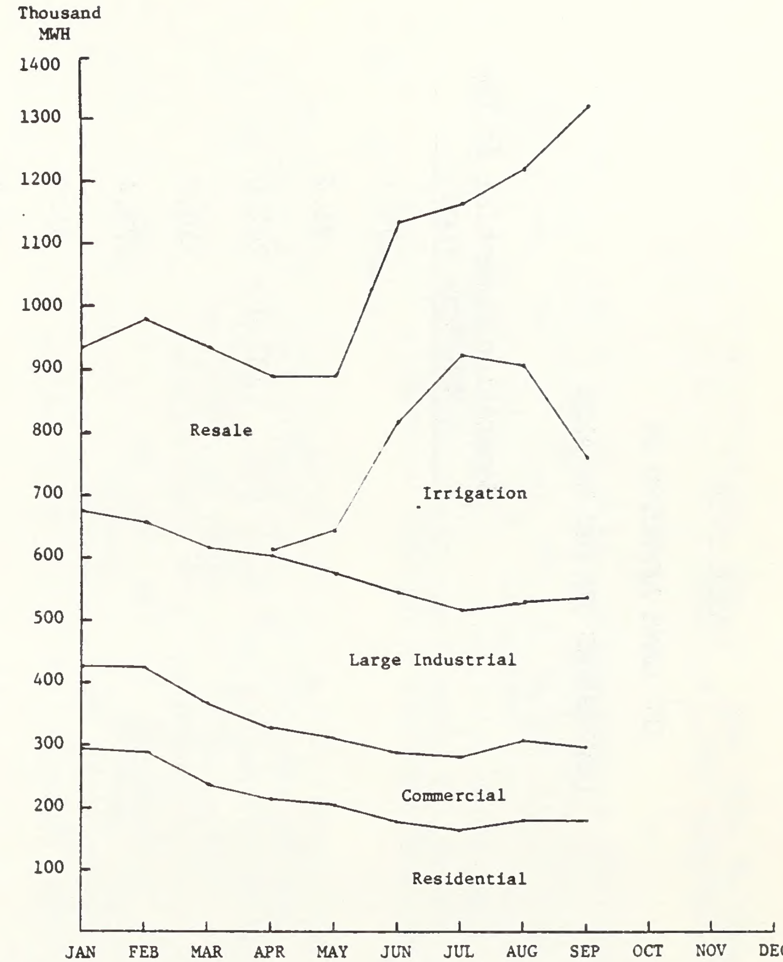



Figure 2-14

IDAHO POWER COMPANY 1978 MONTHLY
SALES BY CUSTOMER CLASS

Source: IPC monthly reports to the IPUC for 1978.

Figure 2-15 illustrates the growth in demand the IPC has experienced over the past ten years. The top of the bar represents the summer peak load, while the shaded part represents the difference between the peak and the average load throughout the year. As shown in Figure 2-15, peak demand has been growing at a faster rate than average demand, thus the ratio of summer peak to average demand is increasing.

## Matching of Supply and Demand

Idaho Power Company's major problem in terms of matching electricity supply resources with demand occurs in the summer when the peak demand coincides with low streamflows through the hydroelectric system. This problem is illustrated in Figure 2-16. The solid line represents the total of IPC-owned generating resources, both thermal and hydro, by month, assuming median water conditions. The dotted line is IPC's 1978 forecast load, by month. The shaded area between these two lines indicates the summer gap between resources and demand, a gap which the company currently makes up with traded or purchased power. The months in which the demand line falls below the resource line are those months in which IPC exports power to other utilities. With the exception of 1977, IPC has been a net exporter of electricity in each of the last 10 years.

## IPC Rate System

A basic feature of the IPC rate system is "average cost pricing." IPC's various power resources (hydro, thermal, and imported) all differ in cost. Under an "average cost" system, the costs of all the resources used are averaged together and then spread out among all IPC customers. One result of this pricing method is that if, for example, as a result of increased industrial growth in the service area a new power plant is built, the cost of the electricity produced at the new plant will be averaged in with the cost of electricity produced at all the old plants. From this is arrived a new average price for the entire system. This means that if electricity from the new plant is more expensive than the old system average, all customers will face increased rates to pay for the new generating facility.

The IPC rate system is basically made up of three determinations, each of which must be approved by the Idaho Public Utilities Commission (IPUC). These determinations are 1) the total amount of revenue which the company must collect in order to make a fair profit; 2) the amount of revenue to be collected from each customer class; and 3) the system of rate schedules used to bill customers in each class.

The revenue requirement of the company is based on many factors, such as operating expenses, the company's total investment in generating plants, and the interest charges the company must pay on its investment. A change in any one of those (e.g., an increase in the price of coal, construction of a new plant, etc.,) creates a change in the company's revenue requirement, and thus in customer prices.

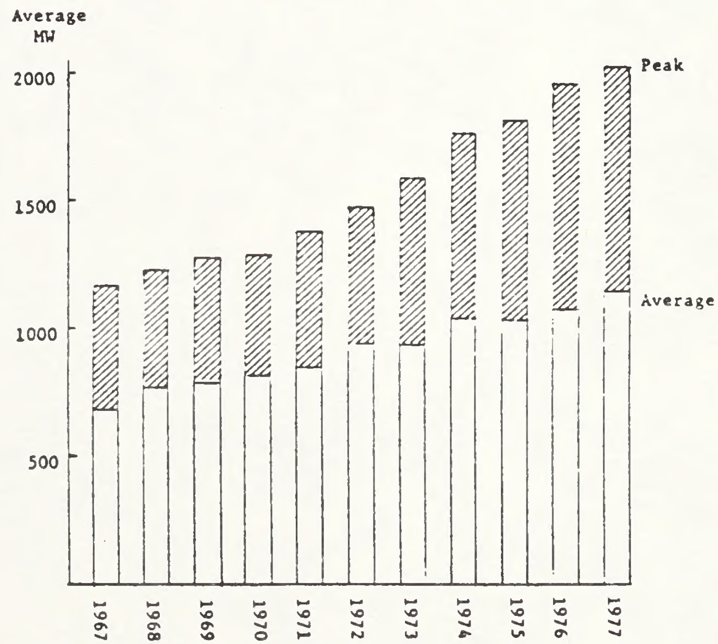



Figure 2-15

IPC PEAK AND AVERAGE LOADS
1967-1977

Source: IPC Annual Reports to the Federal Energy Regulatory Commission (FPC Form 1) for the years 1967-1977.

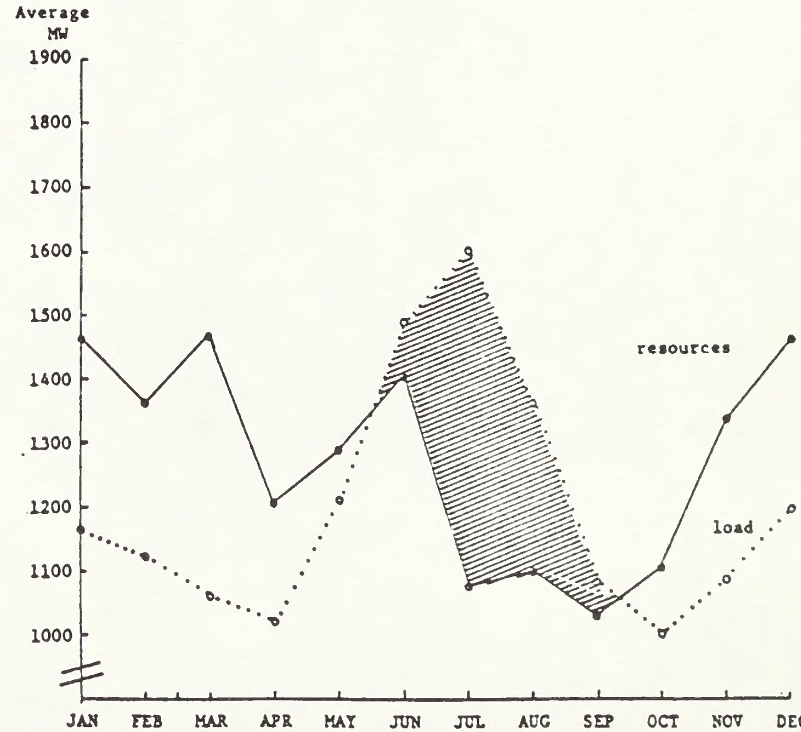



FIGURE 2-16

IPC LOAD AND COMPANY OWNED RESOURCES
1978

Source: Exhibit 48 IPC Witness Barclay, IPUC Case # U-1006-140

Since 1974, the revenue requirements of IPC and the rates charged to customers have been increasing. The main factor has been the addition of IPC's portion of the Jim Bridger coal-fired power plant. For one thing, new plants, both hydro and thermal, have high capital costs; IPC's 500 MW of Jim Bridger had an installed cost of $338 per kilowatt (KW) compared to an average installed cost of $192 per KW for the three dams in the T.E. Roach Complex completed in the early 1960's. Total generating costs of thermal plants are also high (12 mils per KWH at Bridger in 1976 compared to 4 mils per KWH at IPC dams).

For any given year, a "system average price" per KWH may be calculated by taking the total revenues collected and dividing by the total number of KWH sold. In 1977 this figure was 16.3 mils per KWH.

All customers, however, do not pay the "system average price." As mentioned before, customers are divided in various classes. In order to determine prices IPC, with the approval of IPUC, distributes its revenue requirement among the various classes of customers, taking a number of factors into account. (For example, IPC may determine that it is less expensive to deliver a KWH to large industrial customers than to residential customers because the large industrial electrical delivery system is more concentrated than the delivery system for residences). Table 2-20 shows the average price for several main categories of customers and the average system price for 1977.

The customer classes are further broken down into one or more "rate schedules", each with a different set of tariffs. Residences, for example, currently pay a fixed monthly customer charge of $3.50, with an energy charge of 18.4 mils per KWH. Irrigation customers, on the other hand, pay a "demand" charge, depending on the maximum electricity requirement at any given time, plus a KWH hour charge which decreases as more KWH are used for each KW of demand. Therefore, depending on usage patterns, some customers pay more than the average class price per KWH and some pay less (see Appendix 2-11 for greater detail).

## Agricultural Electricity Environment

According to IPC (Testimony of IPC witness James Bruce, IPUC Case # U-1006-140), in 1977 there were about 1.7 million acres of land in their service area irrigated with electrically driven pumps. Pump installations ranged from 1 to over 20,000 horsepower (HP). These pumps consumed about 1.67 million MWH of electricity in 1977.

According to IPC estimates, out of the total amount of irrigated land in 1977 about 162,000 acres were irrigated with water from the same reach of the Snake River (Salmon Falls to Weiser) as the proposed action. Though less than 10 percent of the irrigated land in the IPC area, this land used about 25 percent of the irrigation electricity sold by IPC. Land in this area used an average of 2549 KWH of electricity per acre over the irrigation season as compared with 992 KWH per acre for all IPC pump irrigation. This difference is accounted for by the relatively high lifts associated with pumping in or near the ES area. Lifts of 400 to 600 feet are typical of much of the currently irrigated land in the area.

TABLE 2-20

AVERAGE PRICE FOR
SELECTED CUSTOMER CLASSES, 1977

| | Mils/KWH |
|---|---|
| Residential | 20.7 |
| Irrigation | 16.0 |
| Large Commercial | 12.5 |
| Industrial Special Contracts* | 8.3 |
| Commercial - Small** | 23.3 |
| Public Street Lighting | 45.0 |
| Sales to Other Utilities | 11.6 |
| Average System Price | 16.3 |

* Special Contracts between IPC and six very large industrial customers.

**In TABLE 2-4 & 5, Small Commercial and Street Lighting are combined, and Large Commercial and Industrial Special Contracts are combined.

SOURCE: IPC, FPC Form 1, for the year 1977

TABLE 2-21

MONTHLY DISTRIBUTION OF ELECTRICITY FOR
PUMPING & WATER DIVERSIONS IN THE STUDY AREA

| | Percent per Month (Electricity and Water) | Acre-Feet per Month (Water Only) |
|---|---|---|
| April | 4 | .10 |
| May | 10 | .26 |
| June | 23 | .59 |
| July | 27 | .70 |
| August | 21 | .54 |
| September | 12 | .31 |
| October | 3 | .08 |
| TOTAL | 100% | 2.58 |

SOURCE: Idaho Department of Water Resources

A 1977 study, "Energy and Water Consumption of Pacific Northwest Irrigation Systems" by Larry King and others at Oregon State University estimated a total of about 3.5 million acres of irrigated land in the portions of south Idaho and eastern Oregon generally covered by the IPC service area. This includes both pump and gravity irrigated land. The average electricity consumption over all irrigated acres was 575 KWH per acre.

In a normal year, 99 percent of the electricity used for irrigation is consumed from April to October. Table 2-21 shows the monthly distribution of irrigation electricity in or near the ES area in an average year (Idaho Department of Water Resources). Since the amount of water diverted from the Snake River is assumed to be proportional to the amount of electricity used, the monthly distribution of diversions from the Snake River by agriculture in the ES area is exactly the same as the distribution of electricity use.

According to Idaho Department of Water Resources (IDWR), the total amount of water diverted per acre of farmland in or near the ES area in a year with average weather conditions is 2.58 acre-feet. This number represents an estimated seasonal diversion for each acre of farmland, including uncultivated areas; and thus the actual application of water to cropland would be somewhat higher. Column 2 of Table 2-21 shows the monthly distribution of the 2.58 acre-feet per acre in acre-feet diverted each month.

The 2.58 acre-feet per acre does not represent an absolute diversion from the river as 15 percent of this water is assumed to return to the river via underground percolation. IDWR assumes that this occurs over a ten-month period starting with the month of application.

## Pacific Northwest Electricity Environment

IPC is a member of the Northwest Power Pool, an organization of utilities in the region, including the Bonneville Power Administration (BPA). As a result of its membership in the pool, IPC is a party to a number of regional power supply agreements. IPC also has purchase, trade, and transmission agreements with other northwest utilities and the BPA. In this section, therefore, the ES area will be considered as a part of the larger energy environment of the whole Pacific Northwest.

About half the power produced in the northwest comes from the Federal Columbia River Power System (FCRPS). The FCRPS consists of 29 federally built dams on the Columbia and its tributaries operated by the Army Corps of Engineers or Bureau of Reclamation. BPA markets and transmits the power generated by these dams, as well as part of the output of four privately owned facilities--one hydro, two nuclear, and two coal. (For the dams which are operated by the Bureau of Reclamation, some of the output is reserved for use at Bureau of Reclamation irrigation projects.)

Of the 29 FCRPS dams, eight are fed wholly or partially by the Snake River, a major tributary of the Columbia River. On the average these dams are capable of generating about .87 KWH per foot of head for each acre-foot of water which passes through the turbines. Thus, a dam with a 100-foot head can produce 100 x .87 = 87 KWH per acre-foot of water. The eight dams are listed in Table 2-22 along with the KWH per acre-foot value for each dam. The total of 617.7 KWH per acre-foot represents the electricity generated by one acre-foot of water passing through the turbines of the eight FCRPS dams fed by the Snake River.

Existing diversions from the Snake River in Idaho have an effect on the generating capability of these FCRPS dams. In the past some of the water diverted might have been spilled, i.e., not run through the turbines because of lack of markets or too much water. However, in the future, it may be assumed that all diversions would have been usable at these dams since the market for Northwest power is expanding rapidly and since peaking units are being added to some of the dams to take advantage of high flows.

The Bonneville Power Administration markets electricity to 115 public agencies, several state and federal agencies, and 17 direct service industrial customers in the Pacific Northwest (PNW). In addition to these sales, BPA sells electricity to California through a variety of contractual arrangements. Generally these sales are the highest in the spring and summer months, used to displace more expensive electricity generated at oil and natural gas fired power plants.

Chemical Energy Environment

Energy is consumed by agriculture in the ES area not only in the form of electricity for pumping but also in a variety of chemical forms. Chemical energy consumption may be thought of as either direct or indirect. Direct consumption consist mostly of diesel or gasoline use by farm vehicles and machinery. Indirect consumption includes the energy used in the raw materials, manufacturing, and transportation of energy for fertilizers, insecticides and herbicides.

Table 2-23 gives rough estimates of quantities of chemical inputs for five crops commonly grown in or near the ES area.

Current yearly statewide consumption levels for all uses are approximately as follows: gasoline--521 million gallons per year (Idaho State Tax Commission Figure for 1977-1978 Fiscal year); diesel--316 million gallons per year (Bonner and Moore Associates 1978); all Fertilizers--565,793 tons per year (Idaho Department of Agriculture 1977); and all pesticides (agricultural use only) - 3,067 tons per year (Federal Energy Administration 1977).

TABLE 2-22

FCRPS DAMS FED BY THE SNAKE RIVER

| | KWH/Acre Foot |
|---|---|
| Lower Granite | 85.3 |
| Little Goose | 85.3 |
| Lower Monumental | 87.0 |
| Ice Harbor | 85.3 |
| McNarry | 64.4 |
| John Day | 87.0 |
| The Dalles | 72.2 |
| Bonneville | 51.3 |
| TOTAL | 617.7 |

SOURCE: "Energy and the Growth of Irrigated Agriculture in South Idaho," Agricultural Economics Research Paper #AER 210, by Joel Hamilton, Department of Agriculture, University of Idaho.

TABLE 2-23

ESTIMATED CHEMICAL ENERGY INPUTS FOR FIVE CROPS

| Chemical Inputs | Potatoes | Grain | Beets | Beans | Alfalfa |
|---|---|---|---|---|---|
| Gasoline (Gal/Acre) | 17.0 | 3.2 | 11.9 | 11.8 | 3.0 |
| Diesel (Gal/Acre) | 54.0 | 2.3 | 10.1 | 26.5 | 5.0 |
| Nitrogen (lb/Acre) | 240.0 | 80.0 | 200.0 | 40.0 | - |
| Phosphate (lb/Acre) | 120.0 | - | 100.0 | 100.0 | 80.0 |
| Potassium (lb/Acre) | 100.0 | - | 80.0 | - | - |
| Insecticide (lb/Acre) | 2.5 | - | 1.0 | - | - |
| Herbicide (lb/Acre) | 4.0 | 4.0 | 3.0 | 1.0 | 1.0 |

Sources: Gasoline use per acre: Federal Energy Administration.

Fertilizer, pesticide applications: Idaho Department of Water Resources.

This section describes the resources, land uses and socio-economic features that would probably be found in the ES area in about 20 years (2000) without implementation of the proposed action as described in Chapter 1.

No significant changes from the current conditions would be expected in climate, air quality, geology and topography, visual resources, transportation networks, and soils.

## WATER RESOURCES

### Uses and Flows

Available water supplies in the Snake River Basin are being subjected to increasing demands for several major water uses. The major uses would be consumptive uses for irrigation and nonconsumptive uses for stream resource maintenance flows for fish, wildlife, power generation, and recreation. Easily attainable and inexpensive water would not be available to satisfy a majority of the competitive or conflicting demands.

Potential changes in management practices for storage systems on the Snake River would be studied (Idaho State Water Plan-Part II). It is probable that low-head hydroelectric dams would be constructed at Dike and Wiley sites as mentioned in Chapter 1. It is possible that an extensive diversion scheme would be constructed which would take spring flows of the Snake River through the Bruneau Plateau Feeder Canal to storage impoundments near Grindstone Butte (Saylor Creek and Deadman Creek drainages) for delivery to land during the irrigation season. These impoundments would hold a total of 446,000 acre-feet of water. This proposal would drastically reduce energy costs since high-lift pumping would be eliminated. Most public land projected for development under the proposed action within the Saylor Creek unit (about 81,000 acres) could probably be irrigated by this project. About 51,500 acres of existing farmland relying on high-lift pumping could also be irrigated by this canal.

The flows of the Snake River in the year 2000 would be considerably less in the ES area than at present. Spring runoff would be captured in average flow years at Milner Dam and transported to off-stream storage reservoirs. Summer flows would be considerably less than at present as objectives of the State Water Plan are actively pursued by state agencies and private interests. The State Water Plan calls for 498,000 acres in the Upper Snake River Basin and 292,000 acres in southwestern Idaho to be irrigated by the year 2020 in addition to acreages irrigated in 1975. This would require about 1.7 million acre-feet annually (Water Resources Board 1976). The additional 292,000 acres would require a diversion in the ES area of about 2800 CFS of water at the highest month (probably July). Insufficient water is available in summer to satisfy this demand plus the recommended minimum flow in the Snake for in-stream uses. Idaho Fish and Game Department research has resulted in recommended stream resource maintenance flows of over 4200 CFS above C.J. Strike Pool, 5000 CFS between C.J. Strike Pool and Swan Falls Pool, 5500 CFS from Swan Falls to Bernard's Ferry, and 5100 CFS to the Boise River mouth. In 1977, although the mean flows at all points exceeded these recommendations, low flow at Swan Falls was less than the recommended 5500 CFS on 16 days in June and July.

The Idaho Water Resources Board has prepared "protected flow" recommendations for the Snake River. These are considerably below the flows recommended by the Idaho Fish and Game Department. Water Resources Board "protected" minimum average daily flows (Water Resources Board 1976) are Murphy, 3300 CFS; and Weiser, 4750 CFS.

If put to use, permits already on file would reduce flows to the Murphy minimum average daily flow of 3300 CFS. In exceptionally dry years, flows at Murphy and Weiser would be considerably below the Water Resources Board "protected flows." For example, 1977 low daily flows would have been about 2400 CFS at Murphy in June and July. The State Water Plan notes that federally-licensed projects in Hells Canyon are to operate with certain navigation and power restrictions. The Water Resources Board minimum average daily flows would apparently meet these requirements (Water Resources Board 1976).

The canal diversion of water to reservoirs near Grindstone Butte, designed to capture and store spring freshets, would augment the water supplies available for irrigation and relieve some pressure on the Snake River in average and high-flow years. In low-flow years there would be insufficient freshet waters available at Milner Dam (2500 CFS for 3 months) to fill the storage reservoirs.

More demand for non-consumptive water use would probably occur. Opposition to water diversion from the river would increase because of greater demands on fish, wildlife, energy, and recreation resources.

## Water Quality

### Snake River

The following future environment description of water quality is based on the future environment setting described in the previous Water Resources section. This includes the addition of the two hydropower dams, Dike and Wiley, to the Snake River in the ES area and the implementation of the State Water Plan (Part 2) further reducing Snake River flows.

The supply of one million additional acres of land with irrigation water would result in a pronounced change to the Snake River. This is assuming that surface return flows from new land would be negligible since all new water would be applied by sprinkler. Assuming the State Water Plan is implemented, suspended sediments and turbidity would decrease slightly (roughly 5 to 7 percent in the ES area). Turbid waters (approximately 25 percent of the existing average summer flow) would be removed from the river for irrigation of which a fraction (about 15 percent) would be delivered back to the Snake River as clear subsurface flows.

Pesticides, herbicides, phosphates, and heavy metals would likewise decrease slightly. Dissolved loading of salts and nitrates would moderately increase in the Snake River. With secondary treatment of point sources and absence of additional surface return flows, fecal, total coliform, fecal striptococci, and Sphaerotilus bacteria should all meet A-2 standards.

The percentage of fine sediments in the Snake River would decline slightly, thereby enhancing the benthic invertebrate production capability, both in terms of total live weight and in composition of forms desirable for game fish.

As electrical energy becomes more expensive due to need for high-cost fossil-fuel power or imported energy, farm profit margins would decline. As profits decrease conservation measures such as maintenance of settling ponds or other erosion control methods are likely to be the first farm practices to be discarded. The net effect is likely to be an increase in erosion and sedimentation, with accompanying increases in delivery of pesticides, heavy metals, and nutrients to the river.

### Groundwater

There would probably be continuous groundwater irrigation in the Bruneau-Murphy area as new farmland is periodically developed. Based on present observations, groundwater levels would continue to drop as much as 2 feet per year.

Groundwater quality would not appreciably change in the future. Because of depth from the surface, the Snake River aquifer would not noticeably change in water quality. Water applied to the land surface would not find its way back to the aquifer. Perched groundwater in sedimentary systems would increase in nitrates, total dissolved solids, and occasionally in toxicants. With ever-increasing irrigation costs, it can be assumed that irrigation systems would be operated at very high efficiencies. Little water would be applied in excess of crop consumption and evapotranspiration needs.

Water from occasional and unpredictable accidents would flow overland along with associated sediments, adsorbed phosphates, heavy metals, and pesticides to tributaries and the main Snake River. Intense summer storms would have the same effect. As more land is cultivated, more bare soil would be exposed to wind action, increasing wind-borne sediment delivery to water courses.

## VEGETATION

### Terrestrial and Riparian

Grazing environmental statements addressing livestock grazing on the public rangeland within the ES area are scheduled for completion by 1986. As a result, management plans would be implemented to better regulate livestock and reduce overgrazing. Terrestrial and riparian vegetation studies would be conducted, and range improvement practices would be employed. Management goals would be to alter species composition toward a decrease in sagebrush and annual grasses and an increase in perennial grasses, and desirable shrubs and forbs. With proper management the overall condition of terrestrial and riparian vegetation would improve by the year 2000. Vegetation would be managed under a multiple use concept, thereby benefitting livestock, wildlife, recreation, and other resources.

## Aquatic

Dissolved loading of plant nutrients would moderately increase in the Snake River. Without additional high inputs of sediments and associated turbidity to control light penetration, algal blooms would increase slightly, especially in low flows at which time blooms would be especially high in and below areas of settling, ie., the upper half of C.J. Strike Pool, Swan Falls Reservoir, and upper Brownlee Pool. With increased irrigation, the slightly increased productivity of Snake River water and reduced depths would slightly increase algal growth through C.J. Strike and slightly increase algal abundance as far as Brownlee Pool. Attached benthic algae would increase modestly throughout the flowing river reaches. Rooted aquatic plants would increase moderately from Salmon Falls Creek into C.J. Strike Reservoir and slightly increase below C.J. Strike to Brownlee Pool. In terms of plant growth, the Snake River would continue to become increasingly phosphorus-limited as all point sources of pollution come under some form of secondary waste treatment.

## Threatened and Endangered Plants

The BLM will continue to conduct inventories to determine the presence of threatened or endangered plants. In an effort to comply with the intent and spirit of the Endangered Species Act of 1973, every step necessary will be taken to protect and preserve these plants.

# WILDLIFE

## Terrestrial

Based on past non-agricultural environmental changes that have occurred in the ES area, little significant change to existing native wildlife species is anticipated by the year 2000.

Wildfires would continue to be a constant threat to the existing habitat. It is anticipated an average of approximately 15,000 acres would burn each year. This would alter some areas that presently have a shrub/grassland vegetation type to a reseeded grassland type. This change in habitat type would be followed by a change in wildlife species composition in these areas. Many of the fires would reburn areas that are already predominately grassland type but would not change the habitat type.

The improvement of roads would increase visitor use in the area. This would increase the amount of human disturbance to wildlife and would also put more pressure on wildlife as many visitors are consumptive users of wildlife.

Increased ORV use could be expected as human populations increase in the ES area. This would have some disruptive impacts upon wildlife, especially those species which use the area in the spring.

Because of the BLM's isolated tracts program, habitat condition of the isolated tracts can be expected to improve. Nesting and cover opportunities for those wildlife species that inhabit agricultural areas would probably improve.

It is anticipated that new water storage reservoirs might be constructed in selected drainages in the ES area. These reservoirs would provide water for cropland in the ES area. They would also create new wildlife habitat, thereby aiding species which are attracted to aquatic habitats.

## Fisheries

The following future environment description of fisheries is based on the future environment setting described in the previous Water Resources Future Environment section of this ES. This includes the addition of the two hydropower dams, Dike and Wiley, to the Snake River in the ES area and implementation of the State Water Plan (Part 2), further reducing Snake River flows.

### Sturgeon

Flow reductions of the magnitude anticipated would sharply reduce sturgeon habitat and abundance. This species is not found in rivers with small flow volumes, such as the Boise, Payette, or Weiser. Reducing the size of the Snake River by half or more in summer, to a mean of 3300 CFS in average years and less in low flow years, would reduce the quality of the Snake River for sturgeon habitat. Spring freshets would be eliminated in all but high-flow years by diversions at Milner, further changing the character of the river. The river would become clearer as slightly more of the flow is contributed by return-flow groundwater. These conditions would tend to slightly reduce the total quantity of carrion moving along the stream bottom as more of the available fish populations, other than sturgeon, would be consumed by predators such as squawfish and trout. This would leave a smaller proportion of annual production to die. Ultimately, there would be less food for scavenger fishes.

Dike and Wiley Dams would eliminate 20 percent of the sturgeon habitat remaining between C.J. Strike Pool and Shoshone Falls. This reach has been termed "the best sturgeon habitat and sturgeon populations in the Magic Valley" (Bob Bell, Idaho Fish and Game Biologist, Jerome, personal conversation and a letter from Idaho Fish and Game Department to the PUC dated 14 June 1978). This reach is also the best sturgeon habitat in the Snake River at this time since dams in Hells Canyon have eliminated or degraded large habitat areas.

Some food for sturgeon would be produced directly below the turbines at Dike and Wiley Dams as fish from the pools upstream are damaged or killed in passage through the turbines. This type of food increment can be seen below most hydropower facilities at various times during the year.

No chronic toxicity or water quality problems are anticipated in the future environment which would reduce sturgeon stocks. Serious pollution accidents have a greater probability of occurring as human activity increases. Accidental spills of heavy metals or pesticides are more likely with more development. No limiting problems to sturgeon due to growth of algae or other plants are anticipated.

Other Fishes

Flow reductions of the magnitude anticipated would reduce habitat for all fish species markedly. Flow changes in late spring and early summer would kill incubating embryos of smallmouth bass, channel catfish, and black crappie. The river channel would be dewatered to the point that available spawning areas would be seriously reduced and competition for them increased. Fish growth would be reduced as fish become more concentrated in residual flows. Food-producing areas would be lost and more pressure would be placed on remaining food supplies. Substantial decreases would occur in the total habitat available to benthic invertebrates such as snails and freshwater mussels. Benthic invertebrates are valuable food sources for game fish. Substantial numbers of young fish would probably be entrained in irrigation pump intakes and lost in water delivery systems. Interactions for available cover would be more severe as the wetted stream margin moves away from riparian vegetation.

There would be no barriers to fish migrations or local movement as long as summer flows remain above 2000 CFS. Reservoir populations would not be affected materially by the flow reductions if the present hydropower management regime continues.

Predatory fishes would benefit slightly from the concentration of flow and very slightly improved clarity.

Existing trends which would continue are an increase in presence of rainbow trout and coho salmon in tailwaters, a shift, especially in C.J. Strike Pool, toward smallmouth bass and channel catfish, and a shift away from largemouth bass and black crappie.

Fisheries Downriver of the ES Area

An environmental review by the Corps of Engineers (USACE 1976) indicates that by the year 2020 irrigation withdrawals from the Snake and Columbia Rivers would severely impact resident game fish, water quality, and recreation in the lower Snake and Columbia Rivers under the probable conditions of flow. The study did not address anadromous fish problems, but it is clear that salmon and steelhead runs would be significantly damaged by the projected reductions in flow, of which Idaho withdrawals would be a part.

## WILD HORSES

### Owyhee Herd

The Owyhee wild horse herd would continue to be protected and managed as intended in the present Wild Horse Management Plan under a multiple use system in conjunction with livestock grazing, wildlife management, recreation, and other uses of public land. It is expected that the range will remain the same as that shown on Map 2-7, and that herd size will continue to be between 47 to 74 horses.

### Saylor Creek Herd

Under the WHMP (scheduled for completion in 1984) the Saylor Creek herd would be protected and managed in accordance with the multiple use concept. An optimum herd size of approximately 25 head (based upon present management objectives) would be maintained, and range sufficient to support the herd and meet habitat requirements would be designated. Watering facilities and range improvements would be installed if necessary. Management practices and monitoring programs would be developed to insure proper herd protection and management.

## CULTURAL RESOURCES

### Prehistoric Resources

In the year 2000, vandalism, cattle trampling, off-road vehicle use, and weathering processes would continue to be the major factors contributing to the loss of prehistoric resources. Cultural resource inventories completed as part of the required range environmental statements for all of southwestern Idaho would provide more data on the nature of sites and their distribution in the ES area. Federal agencies would continue to evaluate all proposed projects and actions for impacts on cultural resources prior to their implementation, thus minimizing the loss of scientific data.

### Historic Resources

Historic resources would deteriorate to some degree by the year 2000 simply due to ongoing natural processes such as weathering and erosion. In addition, vandalism and livestock related impacts in grazing areas are expected to continue. Significant historic structures on private land may receive restoration benefits from other federal or state agencies. Enforcement of cultural resource protection laws would continue to be difficult. The BLM would continue to follow directives requiring inventory, evaluation, and consultation with the National Advisory Council on Historic Preservation.

### Paleontological Resources

Paleontological resources in the ES area would probably not be substantially better known in the year 2000 than they are at present. Unless protective legislation is clarified and enforced, indiscriminant collecting and destruction through the activities of man would eliminate a portion of this data base.

## RECREATION

Significant increases in outdoor recreation use are expected along with population growth and a trend towards more leisure time.

Specific increased recreational use for historic and paleontological sightseeing would be expected to increase at the proposed Hagerman Fauna Sites National Monument and the designated Oregon National Historic Trail.

Increased recreational use for power boating and waterskiing would occur at the Dike and Wiley Dam sites which are proposed for construction in the near future. Access and recreation facilities at the dam sites would accommodate the increase in visitor use. Sturgeon fishing in this area, however, would significantly decrease corresponding to habitat loss, and the impoundments would eliminate float boating use.

ORV use would increase through the area since motorcycling is among the fastest growing activities. According to the Off Road Vehicle Recreation Plan (Idaho Department of Parks and Recreation), motorcycle use is expected to increase 130 percent by the year 2000.

Uncontrolled recreational use could adversely affect the existing environment. The most severe impact would be from the off road vehicle activity. Increases in fishing, hunting, camping, and picnicking would also degrade undeveloped recreation sites, especially along the Snake River and adjacent to reservoirs.

## WILDERNESS

Following completion of the wilderness characteristics inventory and public review as required by Section 603 of FLPMA, the BLM will issue final recommendations for the designation of Wilderness Study Areas within the ES area. If by the year 2000 wilderness is established within the ES area, wilderness characteristics would be expected to deteriorate slightly due to increased recreational use.

## LIVESTOCK GRAZING

Grazing environmental statements are scheduled to be written for all public grazing land within the BLM Boise District. These statements would propose to initiate intensive livestock grazing management programs on an allotment-by-allotment basis. Scheduled completion dates of statements for those planning units within the ES area are Owyhee, 1980; Bruneau, 1982; and Saylor Creek and Bennett Mountain, 1984.

Prior to writing each of these environmental statements, extensive resource inventories would be conducted. Included would be a vegetation inventory to determine current and potential forage production from which existing livestock carrying capacities and stocking rates could be updated. With data obtained from these inventories, allotment management plans (AMPs) would be written, and would form the basis for future livestock management programs.

With intensive livestock grazing management under AMPs, by the year 2000 there would be an improvement in forage condition, forage availability, vegetation production, and vegetation condition. This would lead to overall range improvement of the grazing land within the ES area. With intensive management and range improvements, by the year 2000 there should be an increase in the amount of forage available, leading to an increase in stocking rates above what it was at the time the AMPs were first implemented.

Until the time the grazing ESs are approved and the AMPs are implemented, livestock grazing in the ES area is expected to be much the same as it is described in Chapter 2, Description of the Existing Environment.

## MINERALS

Production of common variety minerals can be expected to remain relatively stable, depending on annual market demand for those materials. Barring any major oil or gas discoveries or advancements in geothermal engineering technology, future activity with respect to those resources would be confined to leasing with no major production. In the past few years, several geothermal test wells have been drilled in the Castle Creek area. As leases reach maturity, it seems quite probable that further testing of the Bruneau-Grandview aquifer will be done.

## LAND USE PLANS, CONTROLS, AND CONSTRAINTS

Comprehensive land use planning by the counties in the ES area is beginning but no zoning or other constraints have been developed to enforce the recommendations in the existing plans. Based on this performance and the response of more highly populated counties to land use planning, few restrictions and little direction will be provided through county land use plans. BLM planning efforts would guide the use of public land in the counties and determine future public purpose projects, location of utility corridors, or other intensive land uses.

## Projected Total Population

It is estimated that by the year 2000, the three counties in the ES area would have a population of approximately 116,000. This is 8.5 percent of the state's projected year 2000 population figure of 1,363,970 (see Appendix 2-12).

Twin Falls County would experience the fastest growth rate, and Owyhee County would be the slowest growing county in the ES area. Table 2-24 illustrates projected population figures for the three counties and for the state, and shows the estimated annual growth rates.

TABLE 2-24

PROJECTED POPULATION - 2000

| County | Population | Annual Growth |
|---|---|---|
| Elmore | 27,564 | 1.4% |
| Owyhee | 8,737 | 0.8% |
| Twin Falls | 79,990 | 2.2% |
| TOTAL | 116,291 | |
| State | 1,363,970 | 2.2% |
| Canyon | 116,760 | 2.2% |

SOURCE: Meale, Robin and Jack Weeks. 1978. Population and Employment Forecast-State of Idaho, Series 2-Projections 1975-2000. Department of Water Resources and Boise State University Center for Research, Grants, and Contracts, Boise, Idaho.

## Projected Employment by Major Economic Sector

Agriculture employment would decrease in the ES area through the year 2000, but this activity would be picked up by manufacturing, services and miscellaneous, and wholesale and retail trade.

Agriculture would still be the most active sector in Owyhee County, while wholesale and retail trade in Elmore and Twin Falls Counties represent approximately 30 percent of those who would be employed by 2000.

Elmore County would still display a high participation rate in the Federal government sector. This increase is attributed to the location of the air base in the county.

Table 2-25 offers an employment forecast for the three county area and for the state.

TABLE 2-25

EMPLOYMENT FORECAST 2000

| | Three County Area | State | | Three County Area | State |
|---|---|---|---|---|---|
| Agriculture | 3,721 | 25,766 | Wholesale, Retail, & Trade | 15,059 | 152,258 |
| Mining | 105 | 4,880 | | | |
| Construction | 3,125 | 38,059 | Finance, Ins., & Real Estate | 2,227 | 30,056 |
| Food & Kindred | 4,013 | 29,402 | Services & Misc | 5,004 | 109,554 |
| Wood Products | 536 | 35,683 | State & Local Govt. | 4,893 | 86,009 |
| Other Mfg. | 4,857 | 45,445 | Federal Government | 1,932 | 15,726 |
| Trans., Comm., & Utilities | 2,996 | 33,069 | | | |

SOURCE: Meale, Robin and Jack Weeks. 1978. Population and Employment Forecast-State of Idaho Series 2-Projections 1975-2000. Department of Water Resources and Boise State University Center for Research, Grants, and Contracts, Boise, Idaho.

Projected Unemployment Rate

An attempt was made to project unemployment rates to the year 1982 (see Table 2-26). Linear regression was used based on 1970-1977 historical unemployment information. Because participation in the labor force is a function of inflation, money reserves, governmental actions, etc., the figures presented are estimates at best. Overall, it is assumed that unemployment rates would not significantly change over the next 20 years. The rates presented are not seasonally adjusted.

TABLE 2-26

Annual Unadjusted 1980 - 1982

| Year | Elmore | Owyhee | Twin Falls | Canyon |
|---|---|---|---|---|
| 1980 | 8.44 | 6.04 | 6.75 | 6.69 |
| 1981 | 8.83 | 6.16 | 6.97 | 6.90 |
| 1982 | 9.22 | 6.28 | 7.19 | 7.12 |

## Projected Earnings by Major Economic Sector

A growth rate (displayed in Appendix 2-12) from 1975 to 2000 was established for each major economic sector and applied to current estimates of earnings. Table 2-27 illustrates projected earnings in 1975 dollars by major economic sector estimates by the year 2000. One important aspect to note in this table is that agriculture is in a state of decline.

TABLE 2-27

PROJECTED EARNINGS BY MAJOR ECONOMIC SECTOR

2000

(Thousands of Dollars)

| | Elmore | Owyhee | Twin Falls | Three County Area | Canyon |
|---|---|---|---|---|---|
| Agriculture | 5,747 | 3,145 | 31,622 | 39,679 | 23,303 |
| Food Processing | --- | --- | --- | --- | --- |
| Wood Products | --- | --- | --- | --- | --- |
| Other Manufacturing | --- | --- | 419,136 | 484,418 | --- |
| Construction | 7,094 | 4,982 | 40,033 | 51,902 | 41,151 |
| Mining | --- | --- | --- | --- | --- |
| Trans., Comm., & Utilities | 9,544 | 552 | 34,486 | 1,039 | 39,380 |
| Wholesale & Retail Trade | 14,589 | 4,531 | 123,186 | 42,778 | 111,670 |
| Finance, Ins., & Real Estate | 4,424 | 459 | 21,127 | 141,803 | 13,918 |
| Services and Misc. | 4,233 | 2,813 | 53,525 | 61,107 | 108,234 |
| Government | 98,017 | 2,960 | 32,820 | 116,895 | 47,038 |
| ALL SECTORS | 147,523 | 18,167 | 439,502 | 601,497 | 520,034 |

Projected Per Capita Revenues and Expenditures:

Table 2-28 illustrates projected revenues and expenditures on a per capita basis for local services by the year 2000. Average population growth rates, derived from the ES area counties, were calculated and applied to current estimates of per capita revenues and expenditures. The growth rates are .014 percent for Elmore County; .008 percent for Owyhee County; and .022 percent for Twin Falls County. Canyon County has a growth rate of .022 percent. It is assummed that as population growth occurs during the 1975-2000 period, so would the need increase for local services, funding, and taxation.

TABLE 2-28

PROJECTED PER CAPITA REVENUES AND EXPENDITURES
2000
(In Rounded Figures)

| | ELMORE | | OWYHEE | | TWIN FALLS | | CANYON | |
|---|---|---|---|---|---|---|---|---|
| | Rev. | Exp. | Rev. | Exp. | Rev. | Exp. | Rev. | Exp. |
| Property Tax | 193 | | 243 | | 296 | | 293 | |
| Education Transfers | 218 | | 232 | | 222 | | 253 | |
| Revenue Sharing | 14 | | 22 | | 19 | | 38 | |
| Highway Transfers | 40 | | 57 | | 64 | | 36 | |
| School Costs | | 95 | | 137 | | 114 | | 146 |
| Street and Highway Costs | | 17 | | 26 | | 28 | | 22 |
| Solid Waste Costs | | 2 | | 9 | | 2 | | 4 |
| Cemetery, Fire, Irrigation Drainage, Etc. | | 1 | | 6 | | 3 | | 6 |
| Water Distribution Costs | | -0- | | .43 | | .26 | | -0- |
| Local Government Functions | | | | | | | | |
| Cities | | 34 | | 13 | | 69 | | 60 |
| County | | 45 | | 61 | | 60 | | 60 |

See Appendix 2-12 for explanation of applying growth rates.

## Social Values

It is anticipated that future sociological conditions would change little from the existing situation as described in Chapter 2, Existing Environment.

Agricultural sector employment would decrease in the future. As a result, the importance of farm related organizations would diminish in proportion to the decline in employment.

# ENERGY

A single definitive analysis of the future energy environment in south Idaho without the proposed action is not possible. A number of forecasts have been made, and they vary widely. There is no "right" forecast since the future energy environment depends heavily on a number of policy decisions which cannot be predicted with accuracy. In this section, a summary of various forecasts will be made to illustrate the range of current projections.

## Electrical Energy

Forecasts of the future electricity environment can be divided into demand forecasts, and supply and cost forecasts.

### Demand Forecasts

There have been a number of recent electricity demand forecasts for the IPC area made in connection with the IPC proposal to construct a major coal-fired power plant in south Idaho. These forecasts vary widely.

Figure 2-17 shows a range of forecasts for IPC total sales, including firm resale, through 1990. They include forecasts by IPC made in 1977 by the Arthur D. Little Company (marked ADL "High" and ADL "Low"); by Dr. Don Reading, Professor of Economics at Idaho State University; and by the IPUC staff. Professor Reading's study is basically a modification of the IPC study, using population predictions made by the Bonneville Power Administration. The IPUC staff made forecasts based on modifications of the IPC and ADL forecasts. The IPUC staff forecast presented in Figure 2-17 is a modification of the ADL forecast using population estimates of the Idaho Department of Water Resources (IDWR).

As can be seen from the graph, all forecasts predict an increasing demand for electricity over the next ten years.

Separate forecasts for future irrigation demand were made by IPC, Professor Reading, and ADL. These forecasts are illustrated in Figure 2-18. The IPC forecast contains an assumption of 20,000 acres of new irrigated land to be developed each year within the service area as well as 40,000 acres per year to be converted from gravity to sprinkler

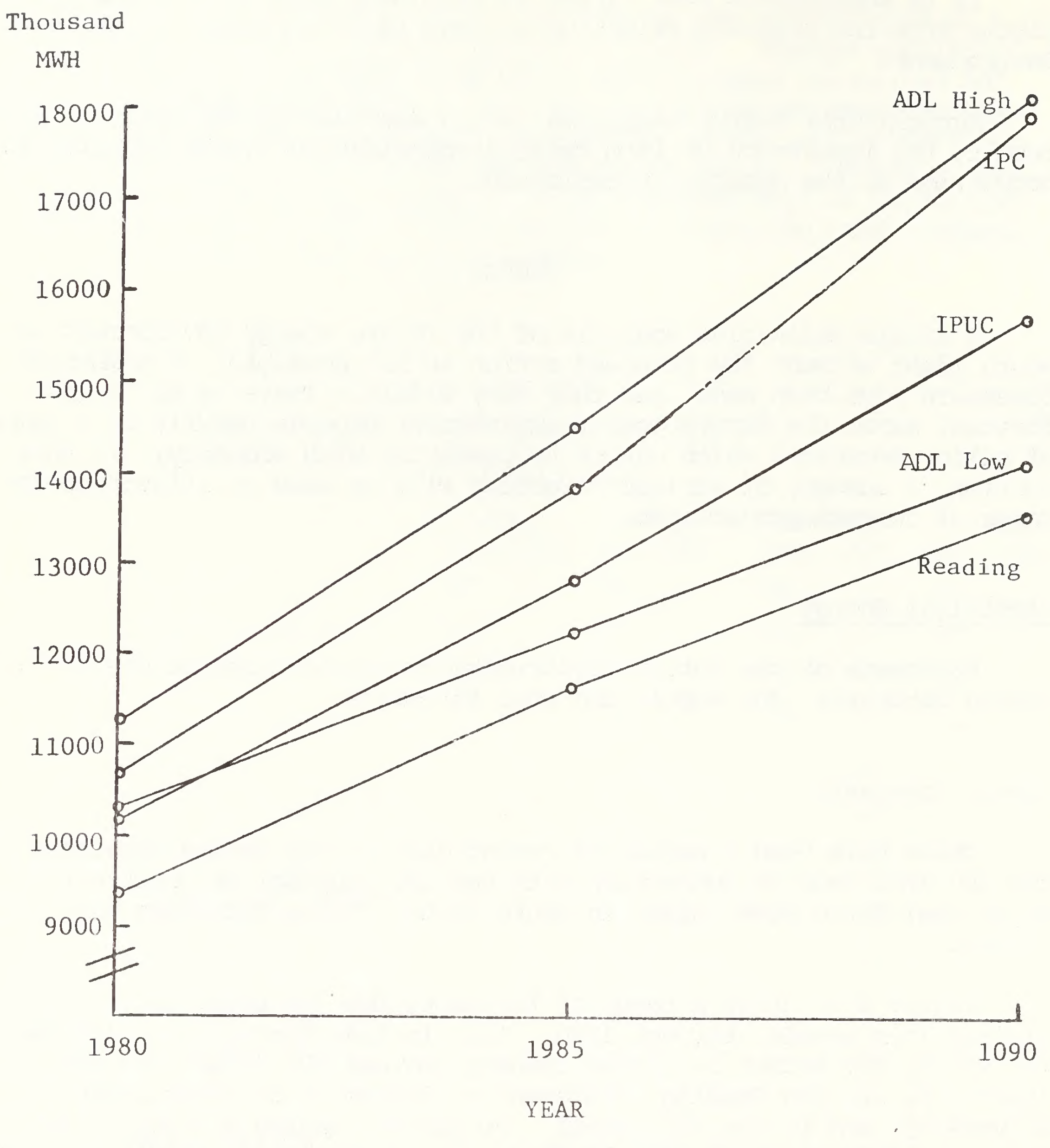



Figure 2-17

FORECASTS IPC GENERAL BUSINESS SALES*
1980-1990

Sources: IPC forecast: exhibits of IPC Witness Barclay, IPUC Case # U-1006-137; Reading forecast: exhibits of Citizens for Alternatives to Coal Power Witness Reading IPUC Case #U-1006-137; IPUC staff forecast: exhibits of IPUC Witnesses Winterfield and Wilmourth IPUC Case #U-1006-137. Arthur D. Little Co. forecast: "Idaho Power Company's Need for Additional Generating Capacity," Final Report to the IPUC by Arthur D. Little Co., February 1976.

* Includes Service Area Sales plus firm sales for resale to California Pacific Utilities, Weiser and Nevada Power.

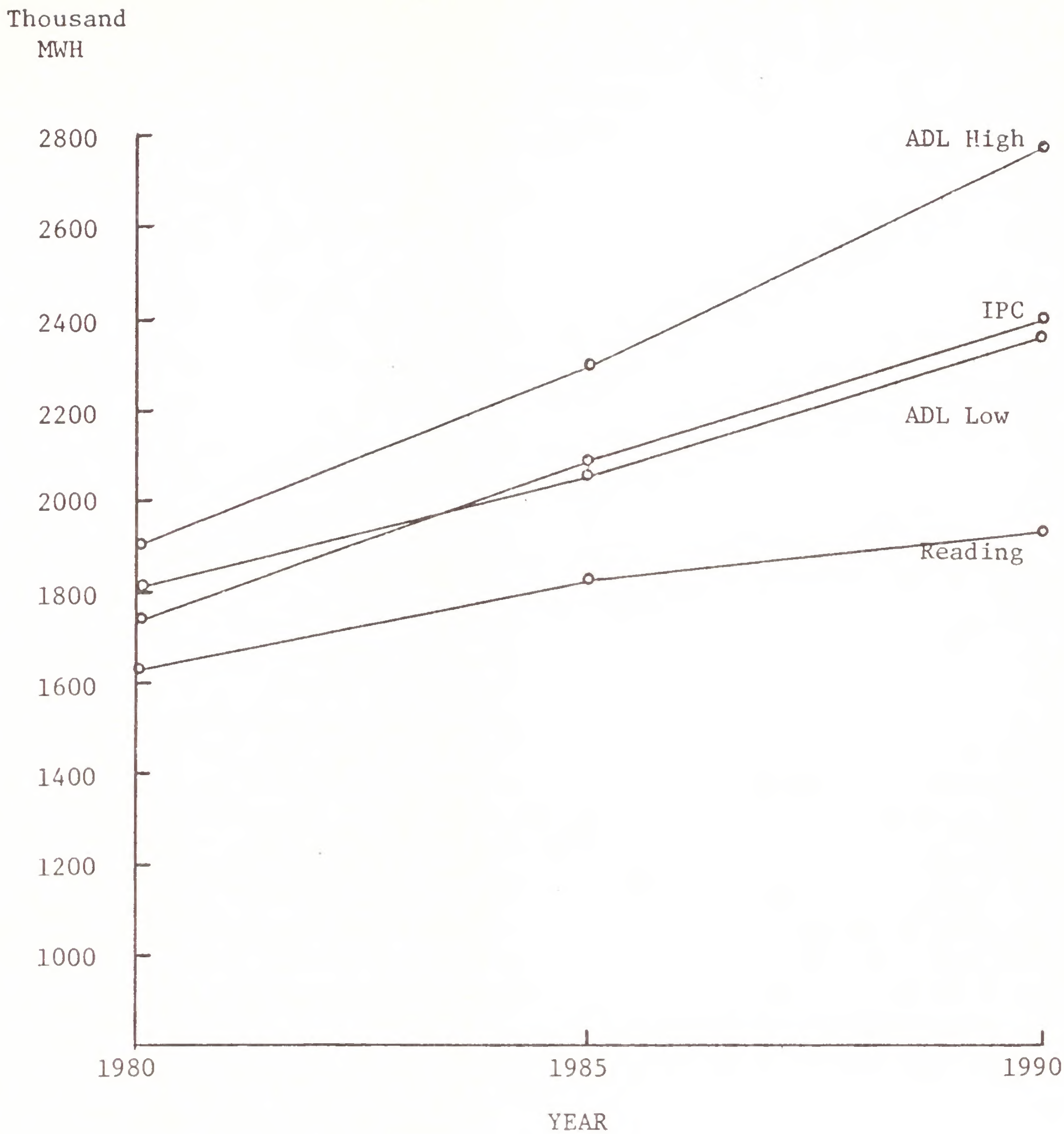



Figure 2-18

FORECASTS IPC IRRIGATION SALES
1980-1990

Sources: Same as Figure 2-17

irrigation. These assumptions give a total of 300,000 acres of new land and 585,000 acres of sprinkler converted land by 1990. Professor Reading's modification of the IPC study employed reduced acreage assumptions of 10,000 acres per year of new development and 25,000 acres per year of sprinkler conversions. Reading's new acreage assumption gives a total of 150,000 acres of new land by 1990. The ADL forecasts were also based on acreage assumptions, with the "high" forecast based on 600,000 acres of new land by 1990 and the "low" forecast based on a figure close to IPC's.

The IPC estimate of new acreage was based on the recommendations of the Idaho State Water Plan for the Snake River Basin prepared by the Idaho Water Resources Board. The acreage being considered for development in the proposed action is part of the acreage recommended in the State Water Plan and; therefore, is included in the IPC irrigation demand forecast.

IPC forecasts are the only ones that presented projected future monthly loads for the total system. According to these projections, the current pattern of consumption, i.e., peak loads in the summer due to irrigation pumping, is expected to continue through 1990.

If the proposed action is not implemented, the future seasonal peak electricity demand on the IPC system will be less by an amount equivalent to the direct and indirect electricity consumption of the proposed action plus hydroelectricity lost due to proposed action irrigation diversions. This assumes that other actions which would create an energy demand replacing the energy demand of the proposed action (such as irrigating other land) would not be the direct result of a decision not to irrigate the land in the ES area.

Supply and Costs

Over the past several years there has been extensive debate in south Idaho over the question of electricity supply. The debate centers around whether electricity should be increasingly relied upon as an energy delivery form, and, if so, how it should be generated. The future cost of electricity will depend on the answer to these questions and on the actual future levels of demand.

Future electricity supplies and cost will be described for two policy scenarios that have been put forward and seriously discussed. For convenience, we will label these the "electricity self-sufficiency" and the "reliance on outside sources" scenarios.

Electricity Self-Sufficiency Scenario The Idaho State Water Plan states that, "to meet the state's objective of reducing reliance on imported electric power...considerable instate sources of power will be needed in the future." (Idaho Water Resources Board, "The State Water Plan--Part II", page 144, December 1976). IPC itself has in effect proposed a policy of self-sufficiency for the company over the past few years. IPC has proposed the construction of a major coal-fired facility in Idaho, several hydro facilities, and participation in new thermal facilities with other utilities.

The effect on average system costs of adding new generating capability can be illustrated by using the example of the 500 MW IPC proposed coal-fired plant to be constructed at American Falls. The addition of this plant would add 3.3 million MWH annually to IPC supply at an annual cost of $123 million, or about 37 mils per KWH. If this plant had been added in 1977, the company's revenue requirements would have been increased from $150 to $273 million, and (assuming a market for the power) sales would have been raised from 9.2 million to 12.5 million KWH. The resulting new system average price would be 21.8 mils per KWH, compared to an old average price of 16.3 mils per KWH. This analysis does not include any assumptions for inflation.

A study performed for the IPUC in 1977 by the consulting firm of Dames and Moore attempted to predict actual future electricity prices in Idaho assuming a 5 percent annual inflation rate. The study assumes construction of new coal-fired plants over the period 1976-1992 built at a rate to meet an assumed increase in future demand. The results of the study are presented below:

FORECAST PRICES TO CONSUMERS
(Mils/KWH)

| | KWH Produced (Billions) | Industrial | Commercial | Residential |
|---|---|---|---|---|
| 1976 | 14.8 | 10.1 | 18.5 | 19.0 |
| 1982 | 19.5 | 23.6 | 32.1 | 32.4 |
| 1987 | 23.2 | 38.4 | 46.4 | 46.9 |
| 1992 | 26.1 | 64.7 | 70.5 | 71.1 |

By 1992, the amount of KWHs produced has not quite doubled, but prices to consumers have nearly quadrupled for commercial and residential customers and increased sixfold for large industrial customers.

Reliance on Outside Sources Scenario: As an alternative to constructing facilities in Idaho sufficient to meet Idaho's demand, a policy of power trading and seasonal purchases has been discussed in Idaho electricity supply debates. South Idaho has a summer peak demand while the rest of the Pacific Northwest has excess power in the summer and a winter peak demand. Given certain legislative and policy decisions, this diversity could be taken advantage of in a purchase/trading scenario.

The least costly potential outside source of electricity is the Bonneville Power Administration. According to existing BPA law, public customers such as municipal utilities have preference over industrial customers for BPA power. Currently, however, a large amount of BPA power is going to "direct service industrial customers", mostly aluminum plants. In 1978, legislation was proposed in the Idaho State Legislature to make the state of Idaho eligible to receive BPA power as a preferential customer. If this proposal were to go into effect immediately, this power, which would be distributed by IPC within its own service area, would actually lower the IPC system average price.

In the future, the price of BPA power, however, is almost certain to increase; in fact, BPA is currently (December 1978) considering a 90 percent rate increase. For purposes of a long-range future electricity cost estimate, it would be reasonable to assume a cost double the current rate, or 8 mils per KWH.

Another plausible source of power from outside Idaho is British Columbia (BC). During the 1977 drought, IPC made some purchases of electricity from a large thermal plant owned by BC Hydro at a rate of 25 mils per KWH. The Idaho Governor's Office has discussed the possibility of long-term purchases of power from BC Hydro. The potential supplies are large, especially in the summer, since BC Hydro is a winter peaking system.

At a current cost of 4 mils per KWH for BPA power and 25 mils per KWH for BC power, it seems certain that acquiring power from either of these two sources, through purchase or trade, would be less expensive than building new thermal facilities in Idaho. Current estimates of power costs from new plants, in 1977 dollars (without inflation), are in the range of 35-40 mils per KWH.

As stated before, the question of future supply and costs is intricately related with the question of future demand. Although definitive predictions of either future electricity demand or cost levels without the proposed action cannot be made, it can be said that if the proposed action is not implemented the future seasonal peak electricity consumption would be less by that amount of electricity the proposed action would have used. As a result, future electricity supply requirements and costs would be less.

## Chemical Energy Environment

Figure 2-19 shows several different demand forecasts for petroleum consumption in Idaho. These were prepared by the Northwest Energy Policy Project and by the consulting firm of Bonner and Moore. The graph shows the wide range of possible consumption levels in the future, with the (NEPP) "high" and "low" ranging from 295 to 119 trillion British Thermal Units (BTUs) per year by the year 2000. All forecasts predict increasing petroleum use in Idaho. As in electricity predictions, the differences between the forecasts reflect different assumptions.

According to the Idaho State Tax Commission, in fiscal year 1977-78, a total of 521 million gallons of gasoline were consumed in Idaho. Of that, about 23 million gallons, or about 4 percent, were used for agricultural purposes. Data on diesel consumption put Idaho use at 316 million gallons in 1975 (Bonner and Moore) and agricultural diesel use at 41 million gallons in 1974 ("Energy in Agriculture, 1974 Data Base," Federal Energy Administration, Washington, D.C., 1977). Though this data is from different sources and years, it does suggest that agricultural petroleum use is, and in the future would remain, relatively small portion of total Idaho petroleum consumption.

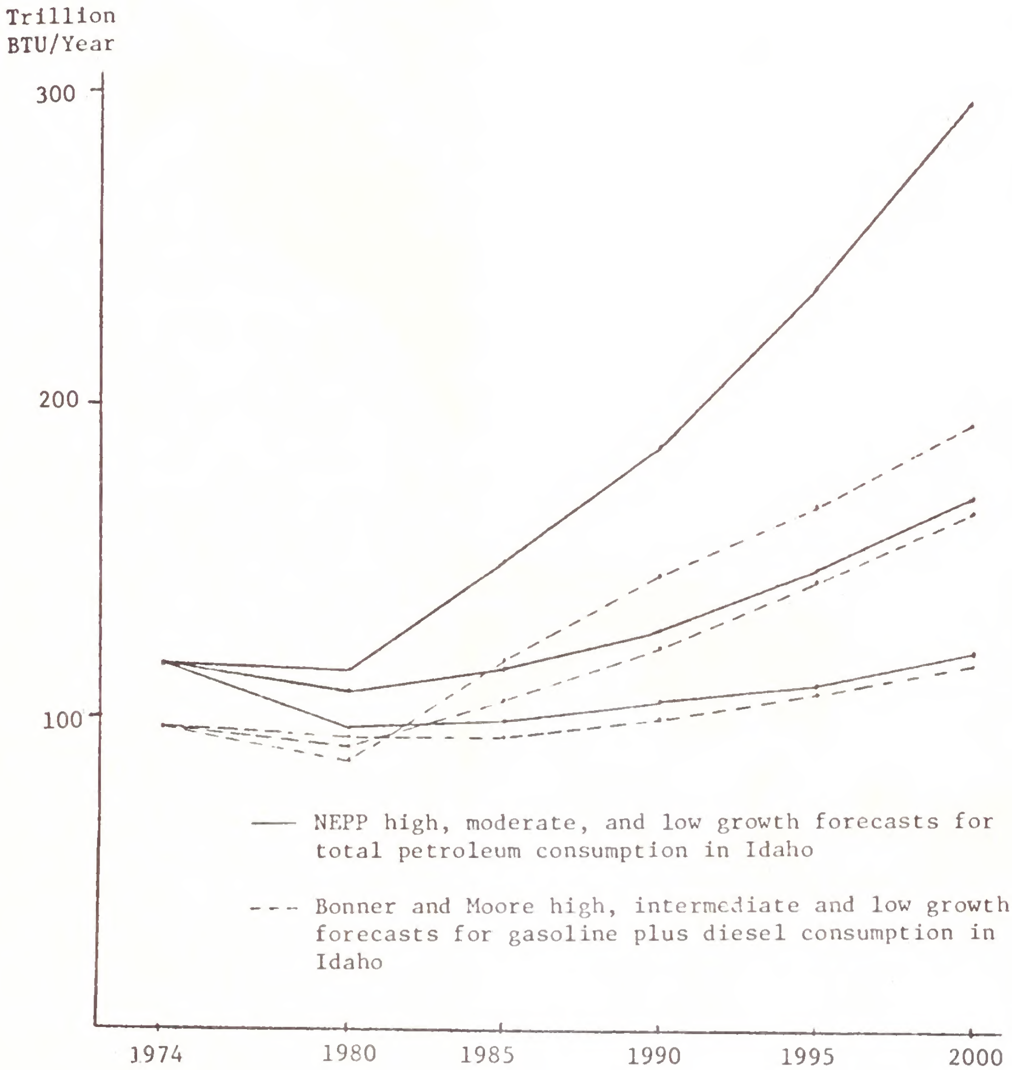


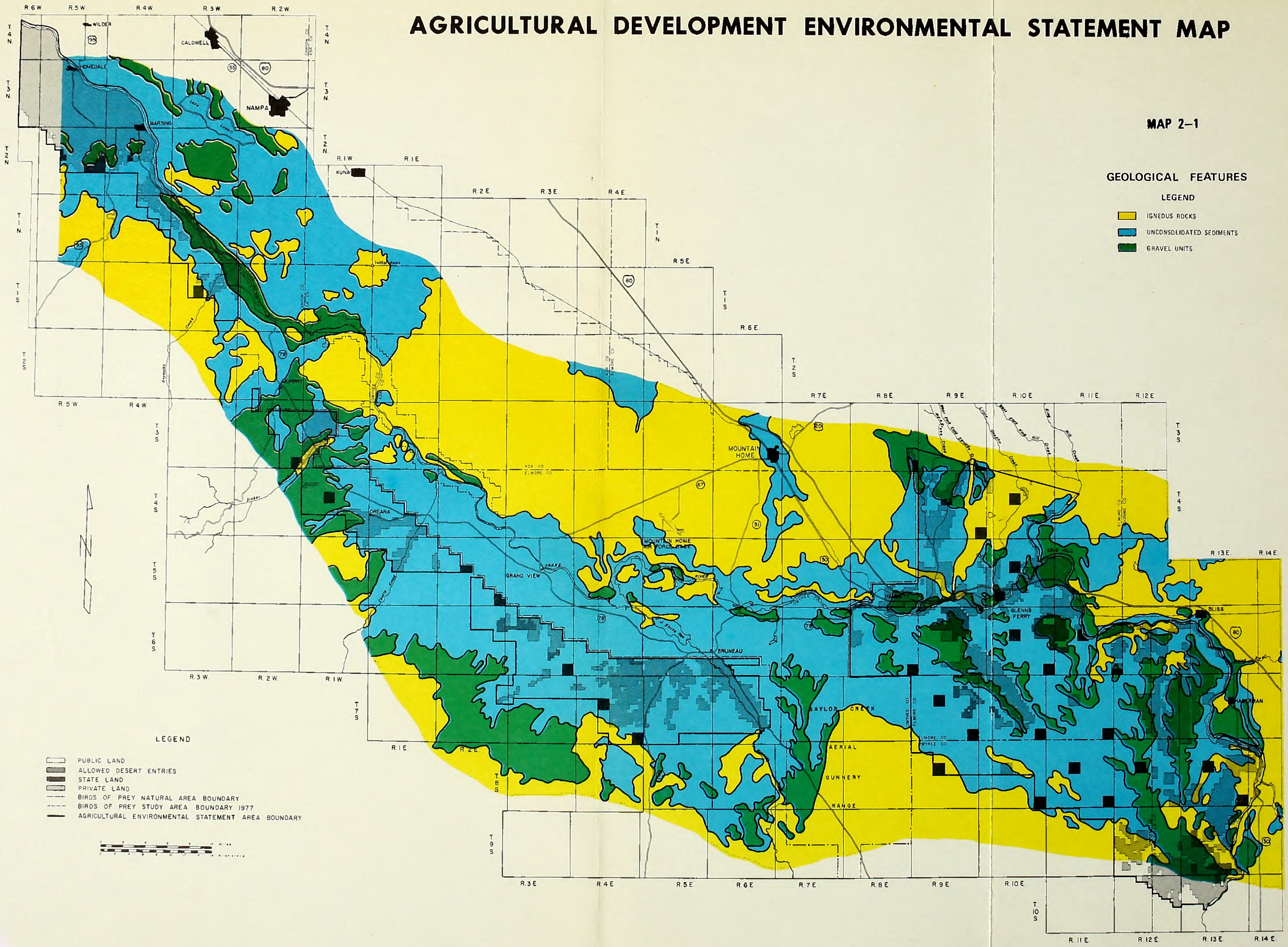

Figure 2-19

DEMAND FORECASTS FOR PETROLEUM CONSUMPTION IN IDAHO

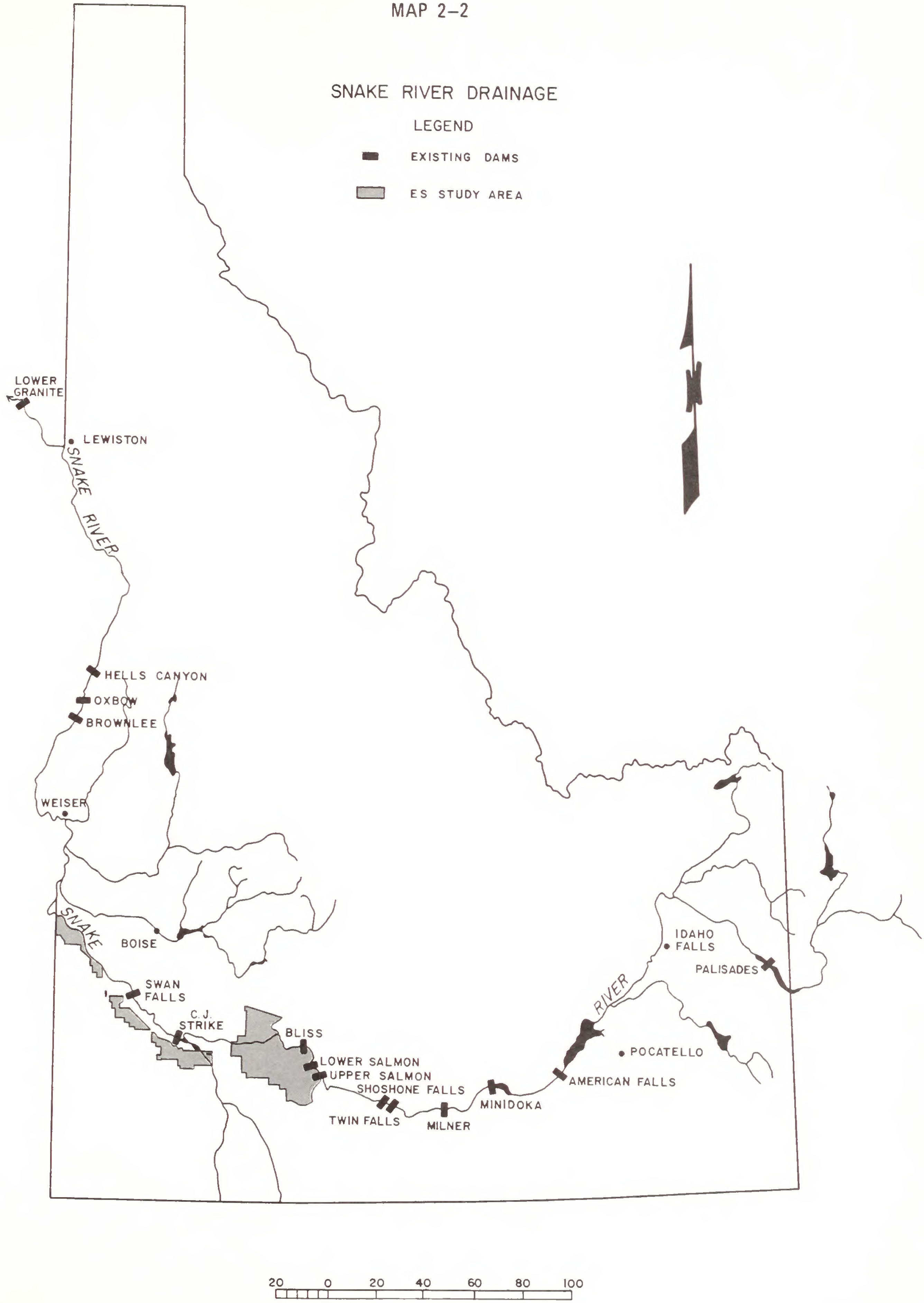
Sources: "Northwest Energy Policy Project, Energy Demand Modeling and Forecasting, Final Report," 1977, and "Energy Demand Forecasts for the Northern Tier and Inland States, Vol. I," prepared by Bonner and Moore Assoc., Inc. for the D.O.E., 18 August 1978.

# AGRICULTURAL DEVELOPMENT ENVIRONMENTAL STATEMENT MAP

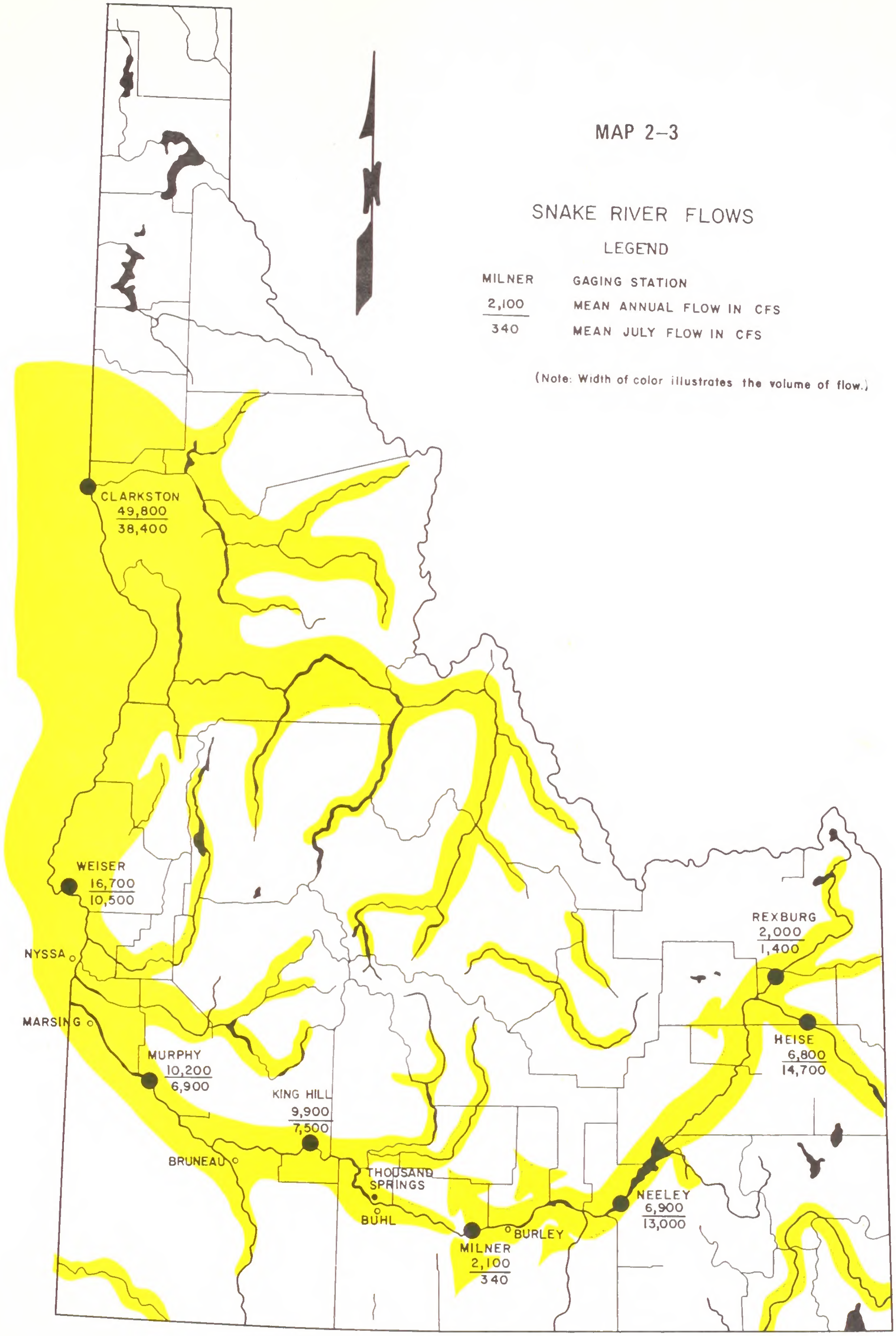
**MAP 2–1**



MAP 2-2



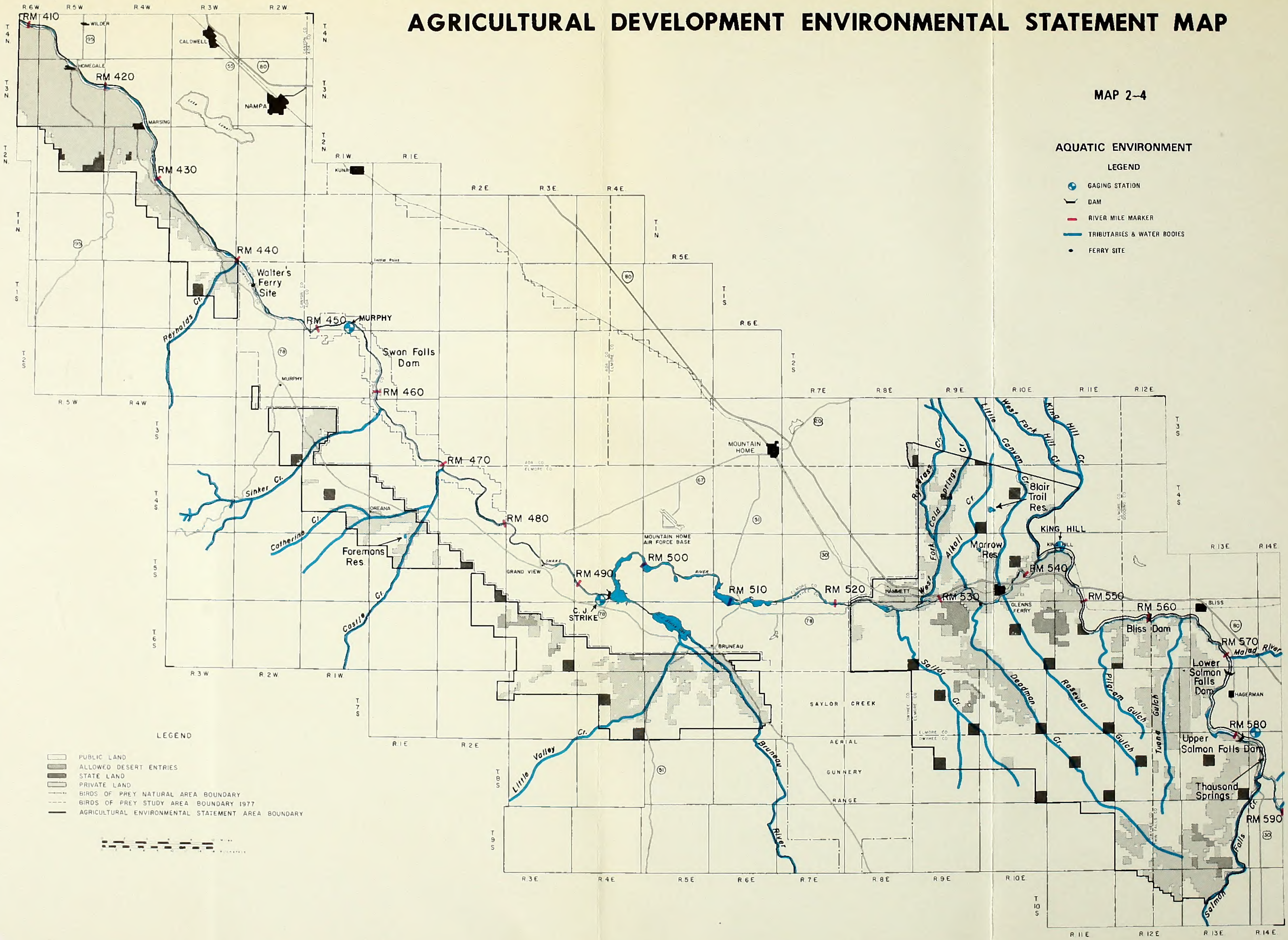

Source: Idaho Department of Water Resources



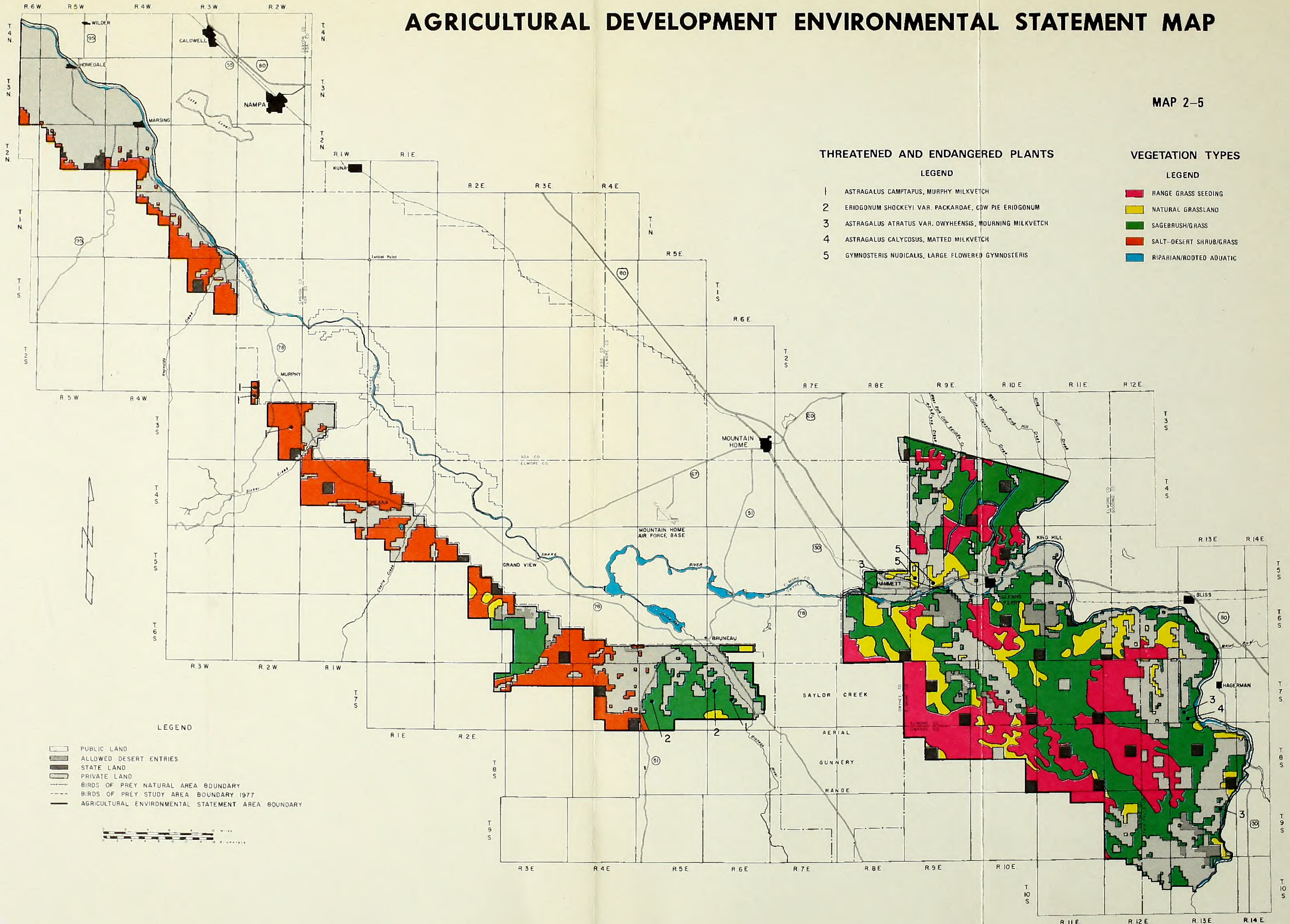

Source: Idaho Department of Water Resources

# AGRICULTURAL DEVELOPMENT ENVIRONMENTAL STATEMENT MAP

MAP 2–4

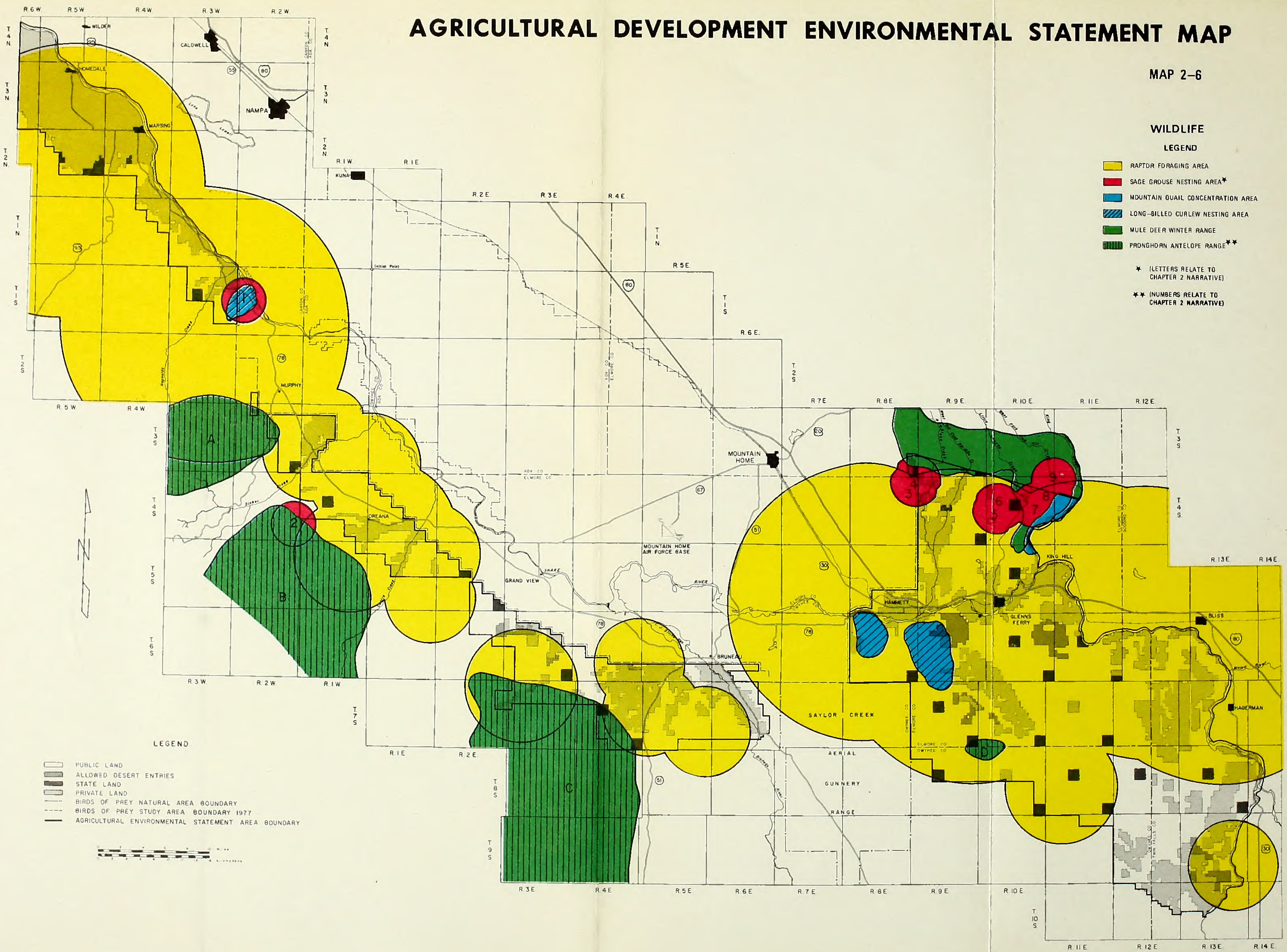


# AGRICULTURAL DEVELOPMENT ENVIRONMENTAL STATEMENT MAP



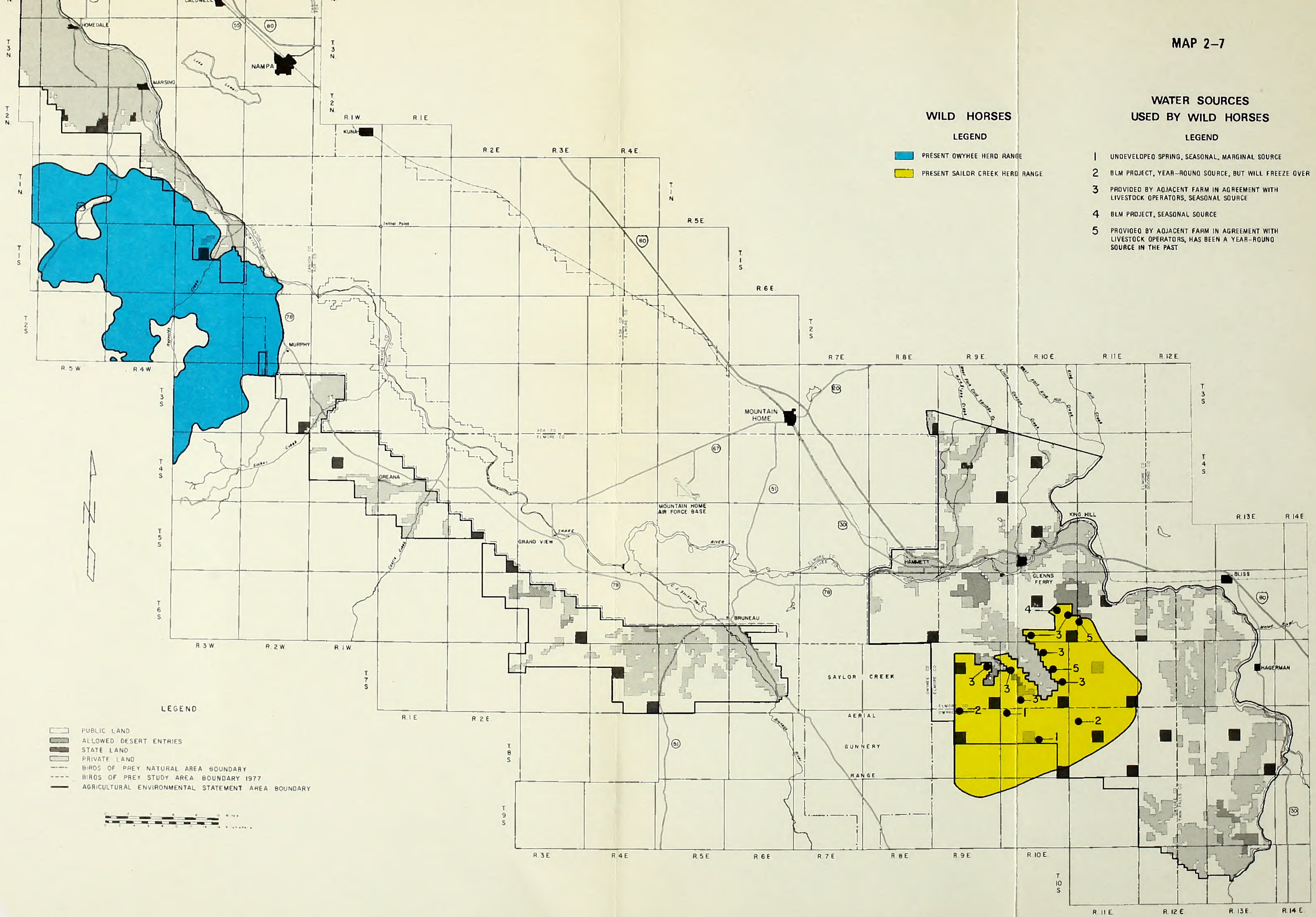
# AGRICULTURAL DEVELOPMENT ENVIRONMENTAL STATEMENT MAP

MAP 2–6



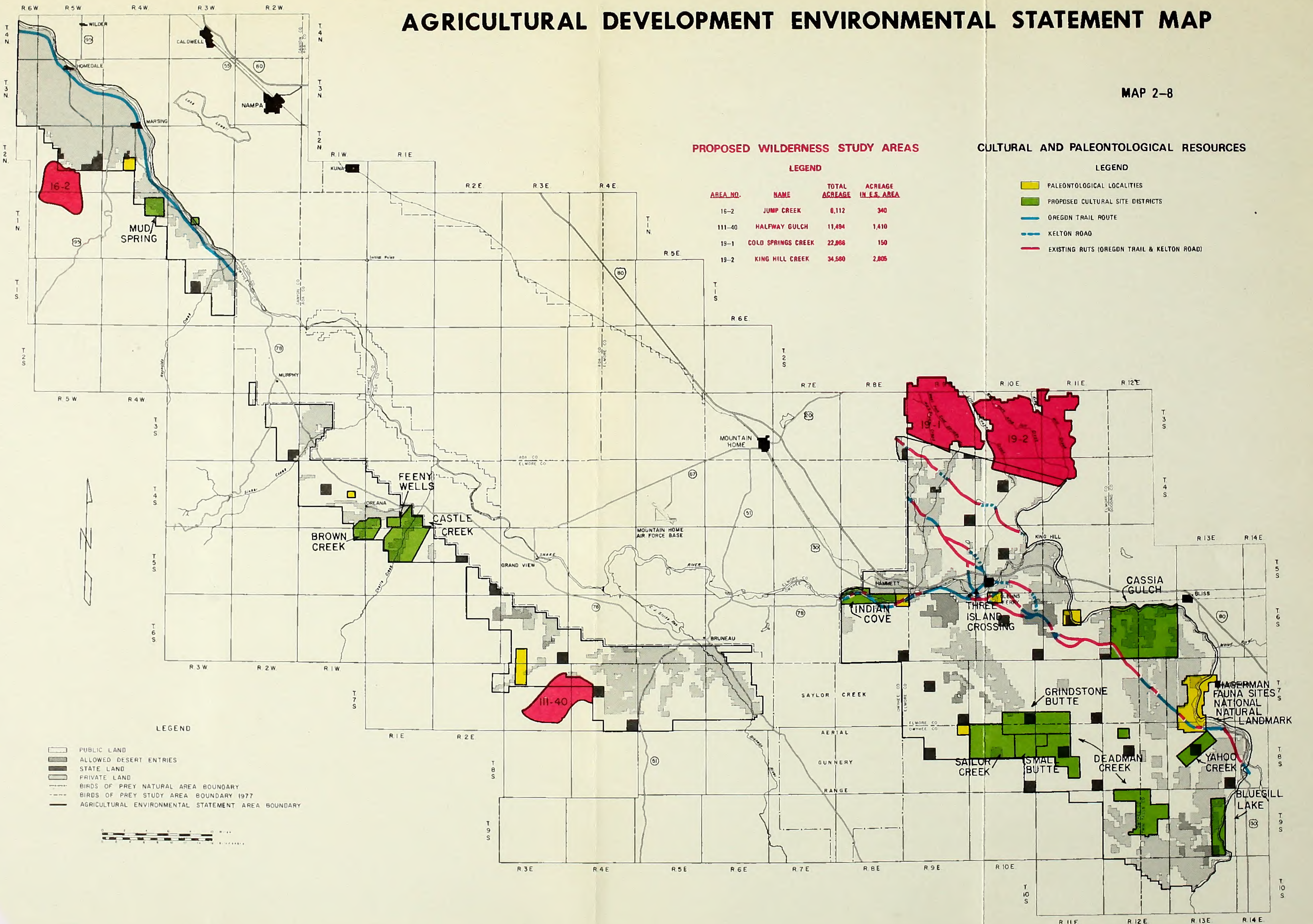
# AGRICULTURAL DEVELOPMENT ENVIRONMENTAL STATEMENT MAP

MAP 2–7



# AGRICULTURAL DEVELOPMENT ENVIRONMENTAL STATEMENT MAP

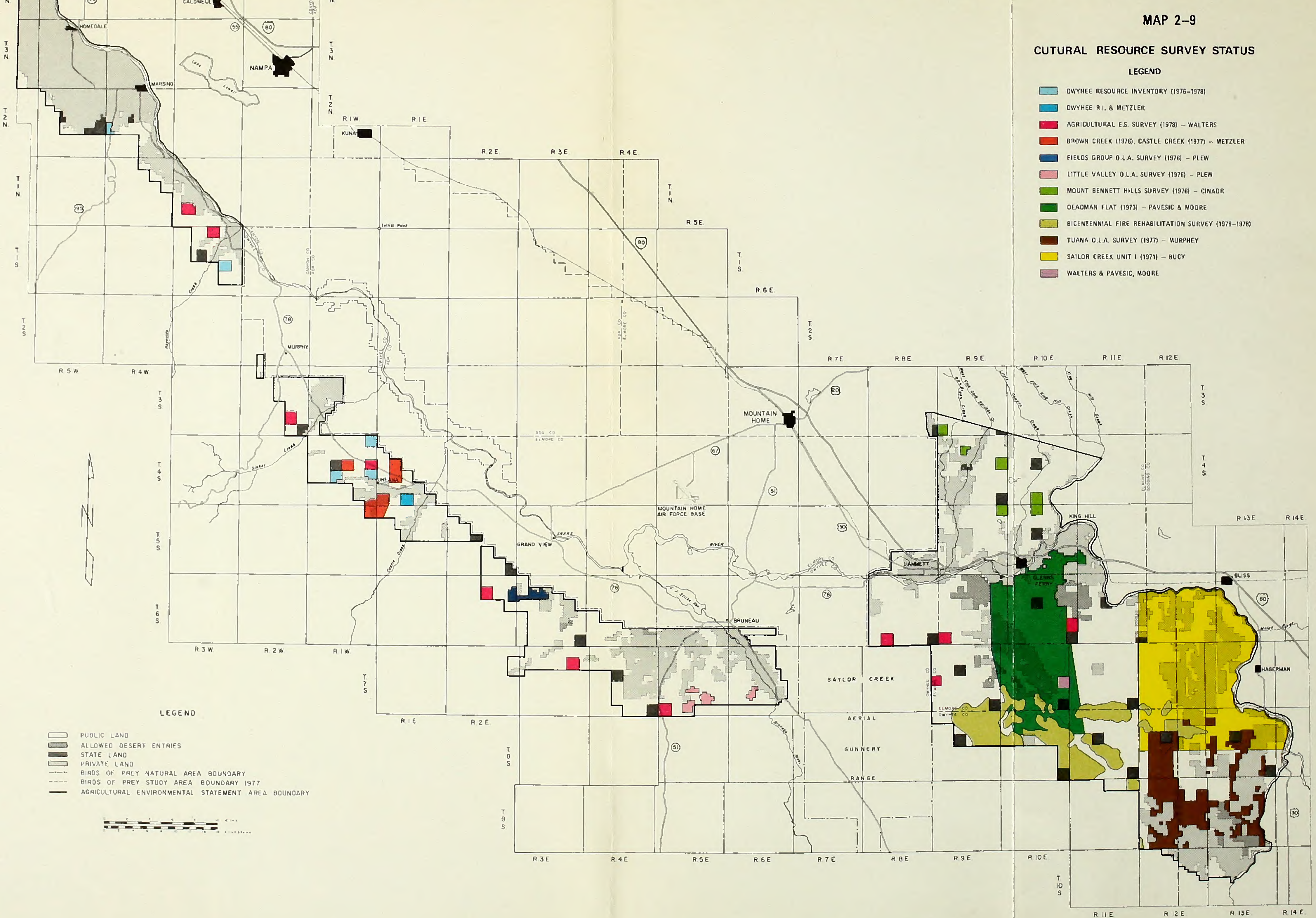
MAP 2–8



# AGRICULTURAL DEVELOPMENT ENVIRONMENTAL STATEMENT MAP

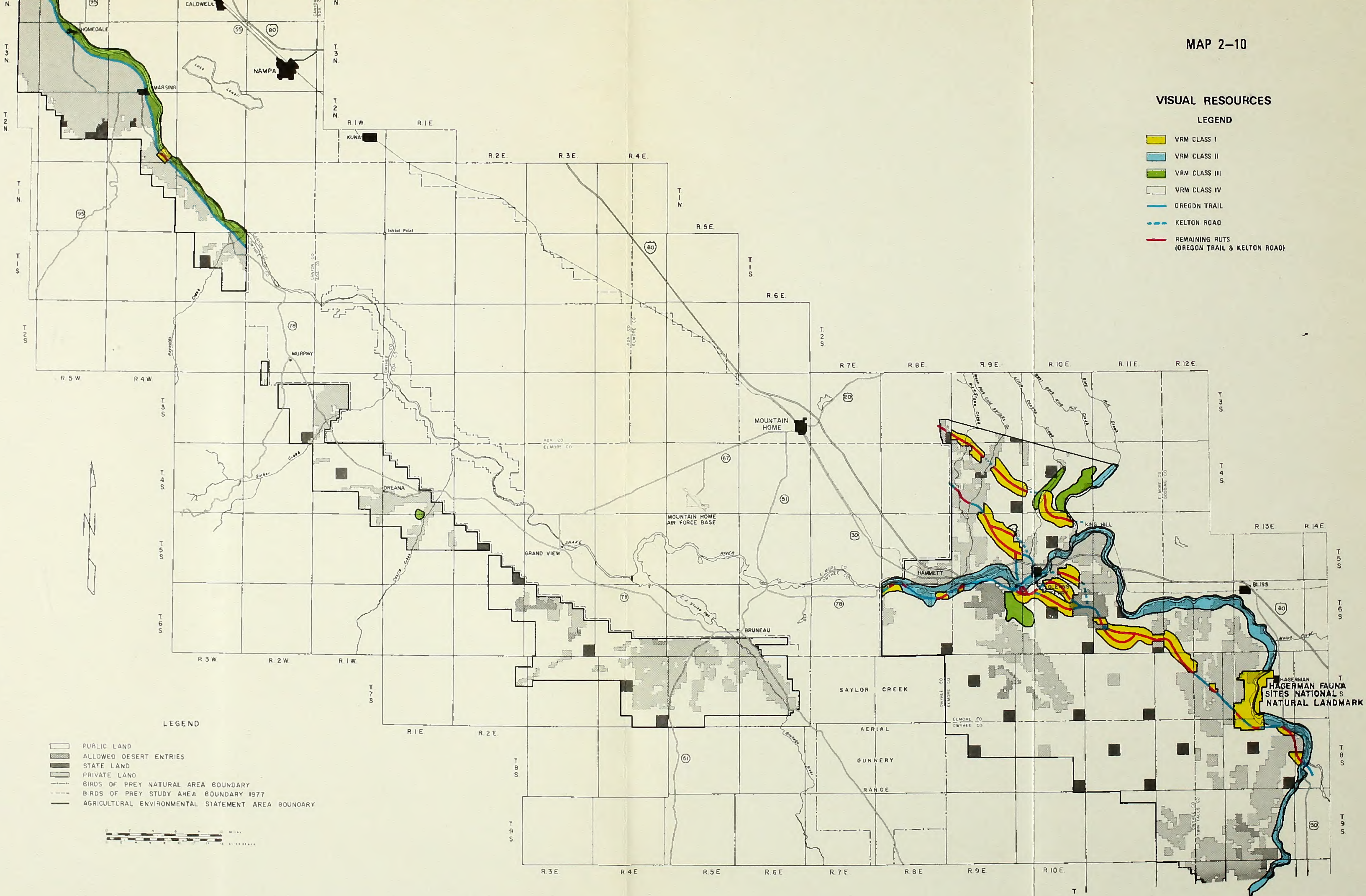
## MAP 2–9

### CUTURAL RESOURCE SURVEY STATUS

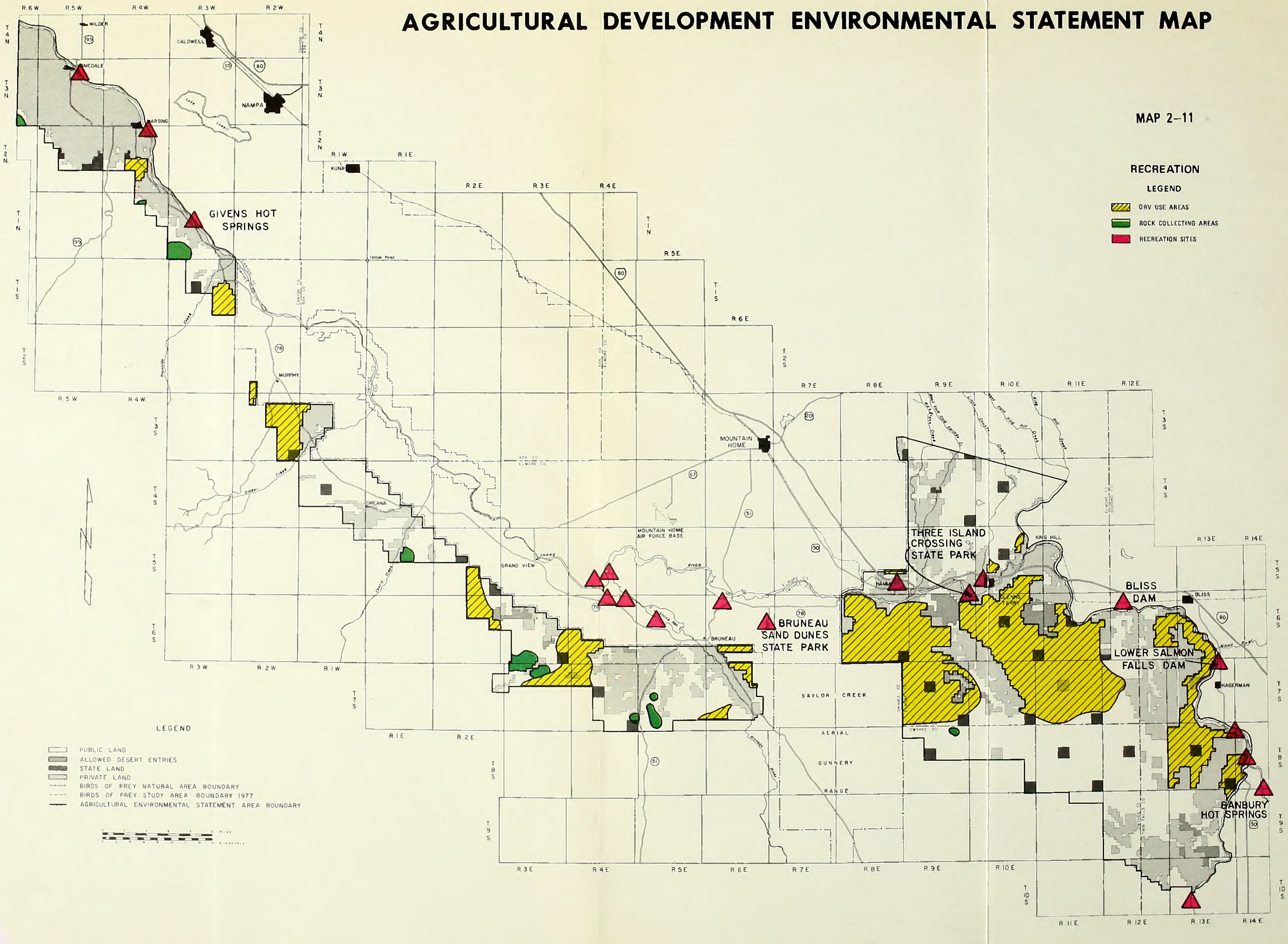


# AGRICULTURAL DEVELOPMENT ENVIRONMENTAL STATEMENT MAP

MAP 2–10

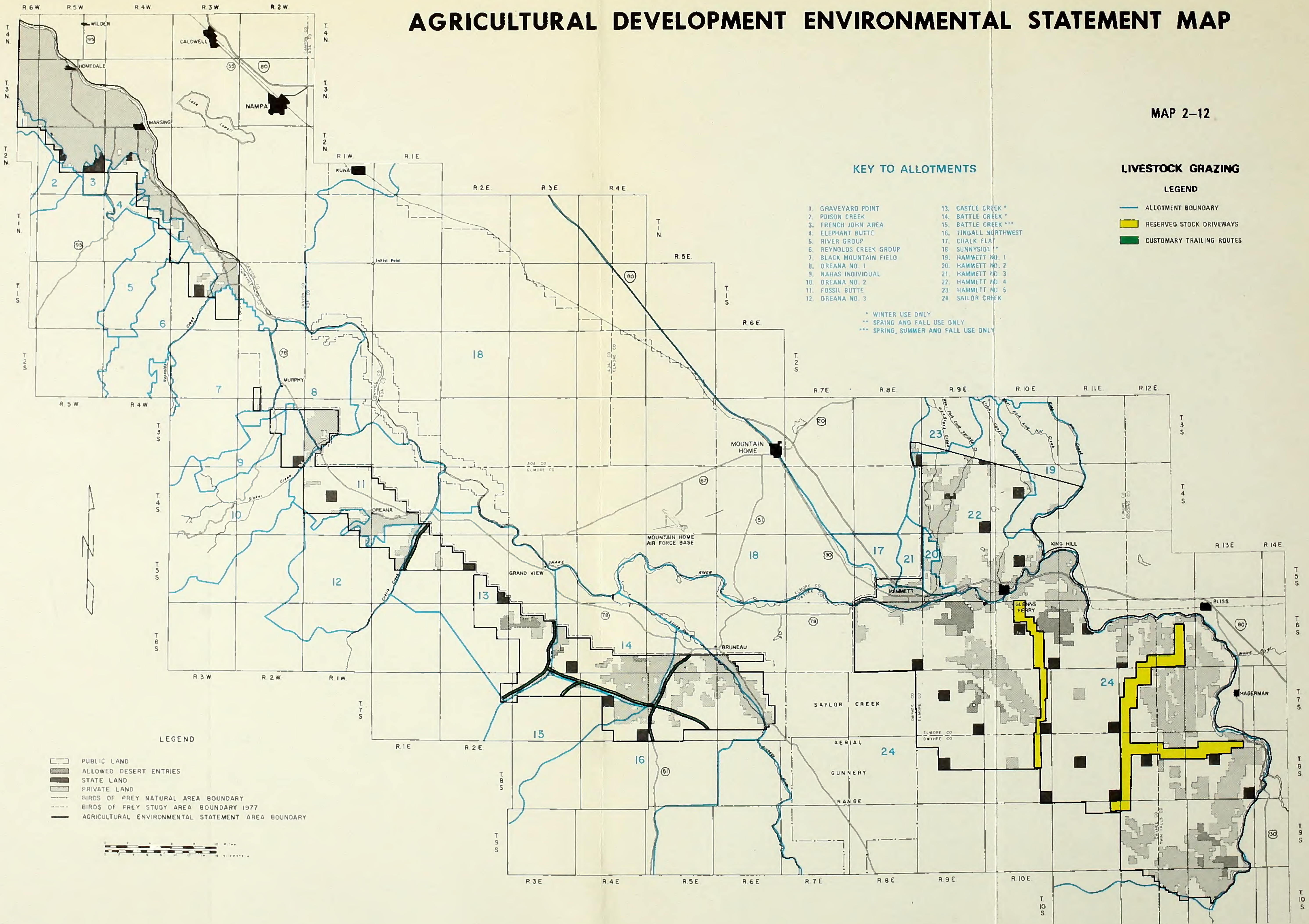


# AGRICULTURAL DEVELOPMENT ENVIRONMENTAL STATEMENT MAP



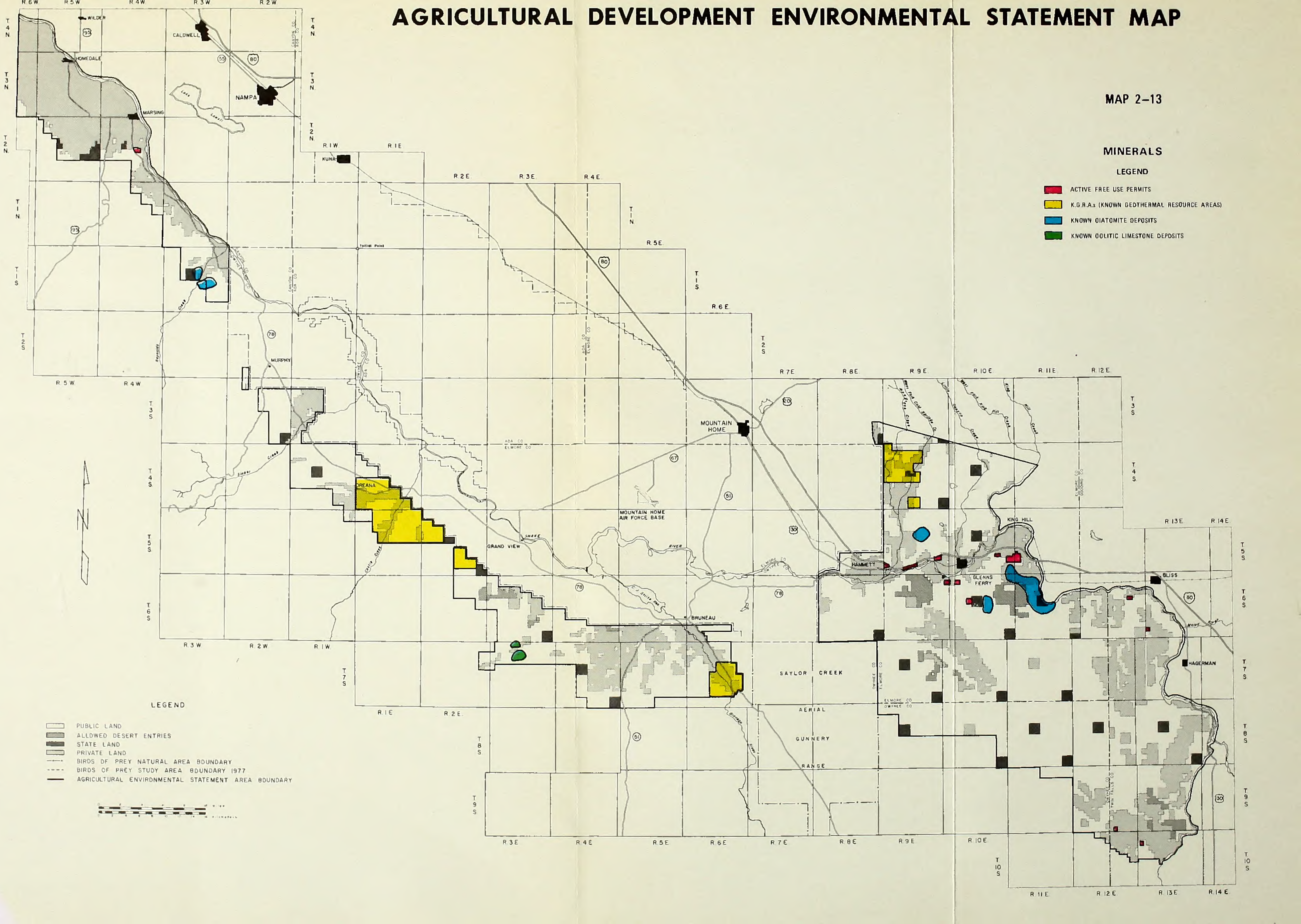
# AGRICULTURAL DEVELOPMENT ENVIRONMENTAL STATEMENT MAP

MAP 2-12



# AGRICULTURAL DEVELOPMENT ENVIRONMENTAL STATEMENT MAP

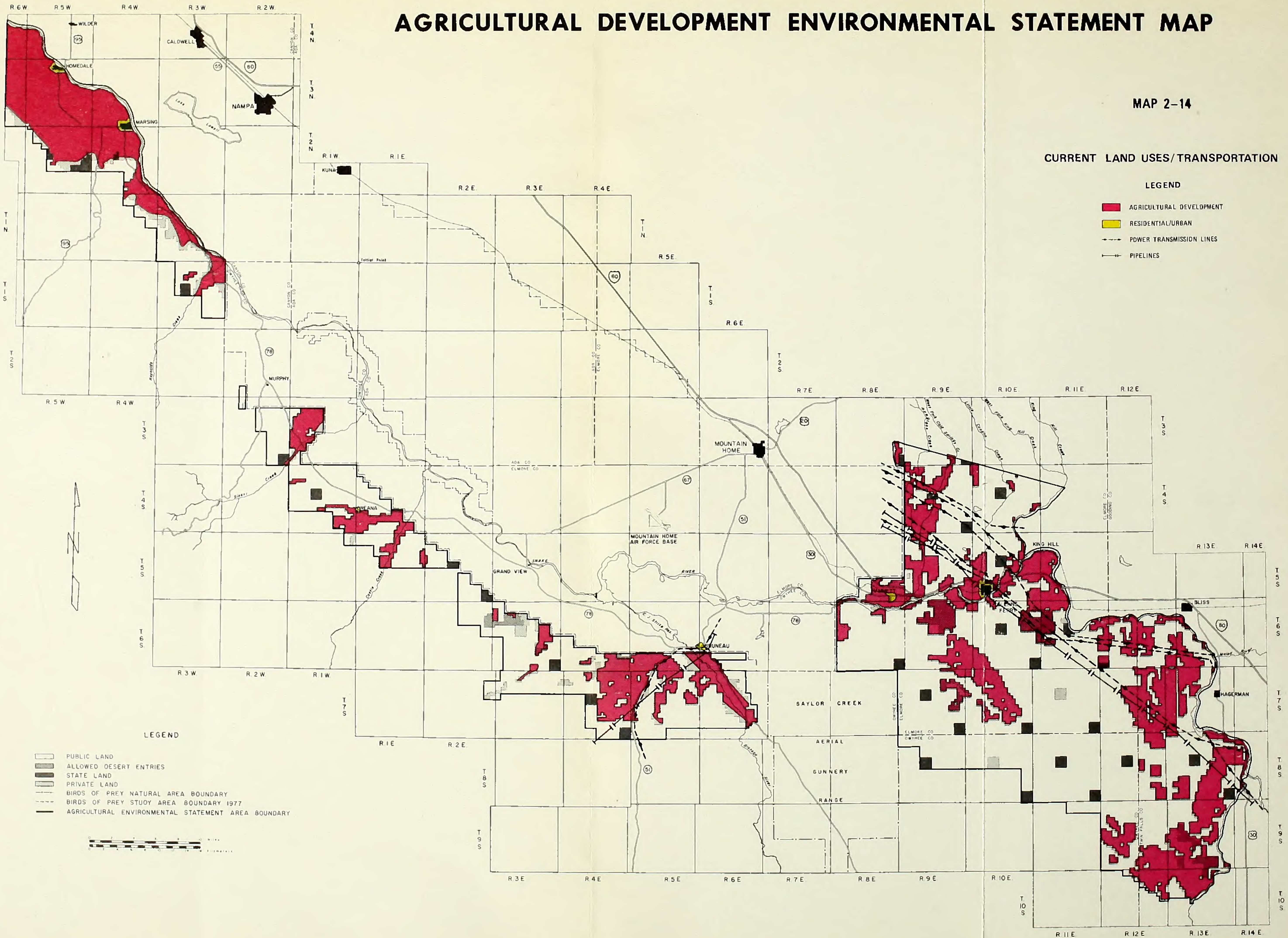
MAP 2–13

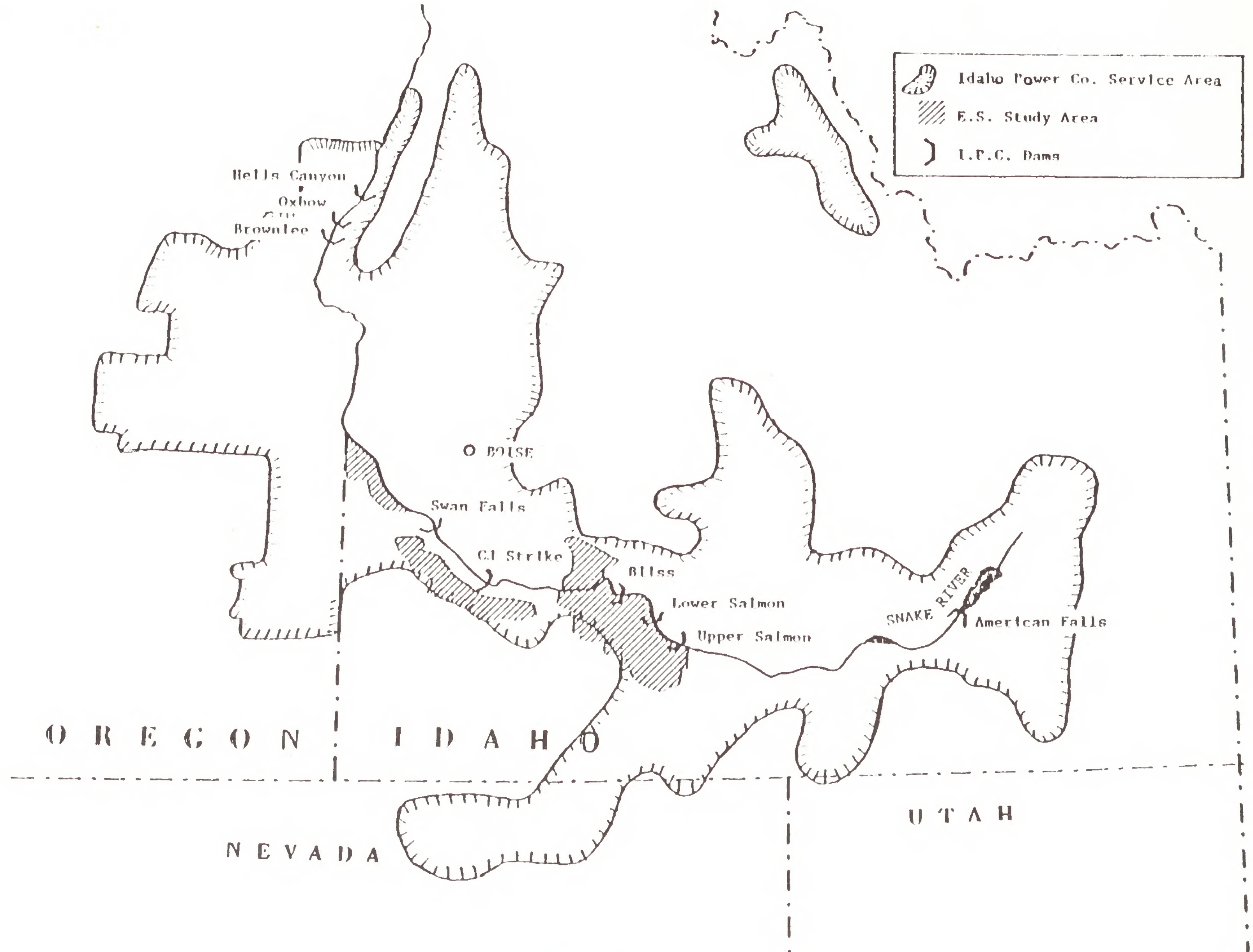


# AGRICULTURAL DEVELOPMENT ENVIRONMENTAL STATEMENT MAP

MAP 2-14

CURRENT LAND USES/TRANSPORTATION






MAP 2-15

IDAHO POWER COMPANY SERVICE AREA

# CHAPTER 3

# ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTIONS

Chapter 3 describes the impacts likely to result from the proposed farm development. Where possible, impacts are linked to specific aspects of the proposed action and are described by their magnitude, importance, duration and incidence.

# CHAPTER 3
# ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

## INTRODUCTION

The majority of environmental impacts discussed in this chapter are common to the Desert Land Act (DLA) and Carey Act (CA) methods of land disposal. The reader should assume that the impacts described in this section apply to both disposal methods, except where the text specifically identifies impacts unique to either disposal method.

## ASSUMPTIONS AND ANALYSIS GUIDELINES

The following assumptions were used to assess impacts depicted in this chapter. Some of these assumptions apply to more than one environmental category.

1. 2.58 acre feet of water per acre per year will be required to irrigate the expected crop rotation of 22% potatoes, 21% dry beans, 17% winter wheat, 17% barley, 17% sugar beets and 6% alfalfa in the ES area (Idaho Department of Water Resources).

2. There would be a 15 percent return flow of applied irrigation water to the Snake River via underground infiltration with some return emerging as surface flows in tributaries of the Snake. This water would return over a ten month period, amounting to about 70 CFS at the Murphy gage. (The 15 percent is the difference between amount diverted and consumption rate of crops under existing high-lift pumping. Timing of return is based on studies in upper Snake River and Boise Valley, IDWR.)

3. There will be no surface irrigation return flows leaving the fields as a result of normal efficient sprinkler irrigation operations and BLM requiring catchment ponds as part of DLA and CA project approval.

4. Infiltrated irrigation water that emerges as surface flows is the major source of increased salts and nutrients in the Snake River.

5. Of the 111,015 acres of farmland to be developed under the proposed action, 3 percent (3,330 acres) would be devoted to non-crop areas (roads, buildings, etc.).

6. Farm project perimeters will be fenced by farm developers to keep livestock using adjoining public land from trespassing on farm ground.

7. Livestock grazing reductions, in the amount equal to the AUMs eliminated on public lands from farm development, will be made by the BLM.

8. A Carey Act (CA) farm unit will be a joint husband and wife filing totaling 320 acres. A Desert Land Act (DLA) farm unit will be a joint husband and wife filing totaling 640 acres.

9. Irrigation will be done with closed pipe, rather than canals, all the way from the river to the point of delivery.

10. Friction losses in pumping the water through closed pipe were assumed to be 0.8 percent, which is equivalent to .008 feet of head per foot of pipe, or 42 feet of head per mile.

11. Each parcel of land will be irrigated as a part of a larger (6000 to 7000 acres) project, such as typically exists now in the ES area. This assumption determines the distance, 9080 feet, that the water must travel in closed pipe once it has reached the edge of the project.

12. Irrigation will be done with sideroll sprinkler systems operated at 70 pounds per square inch (psi).

13. Motors and pumps will operate at 90 percent efficiency, which yields an overall motor-pump efficiency of 80 percent. This assumption represents the upper limit of efficiency for irrigation pumps. If, in actual practice, pumps and motors are less efficient, then electricity consumption will be proportionally greater.

## IMPACT ANALYSIS

### CLIMATE

There would be no significant impacts on the existing climate from any of the transfer methods. Temperatures would be very slightly moderated and humidity would increase. It is doubtful either of these changes would be noticeable.

### AIR QUALITY

Air quality conditions in the ES area are presently good. Based on limited data, it appears the only standard that is ever exceeded is particulates, and this standard is exceeded infrequently.

The proposed action would lower air quality by causing dust particulate concentrations to increase. Particulate increases would occur mostly during the spring months when wind velocities are highest and farm fields are disturbed. These increases would also be the result of more acres being bare of vegetative cover (lying fallow) during the windy periods. It appears the annual secondary air quality standards would be exceeded during March, April, and May - the months of cultivation and planting. Based on observations in other existing agricultural areas, the primary and 24-hour standards would also be exceeded about one to three days per month during these same months.

According to Idaho Department of Health and Welfare findings, the average annual increase in particulate pollution due to new agricultural development in the ES area would not exceed more than 10 micrograms per cubic meter. (IDHW - 1977 State of Idaho Ambient Air Profile).

It has been reported and substantiated in the available data that dust storms of high intensity (to 2699 $ug/m^3$ at Jerome) do occur occasionally when high winds and other appropriate climatic conditions exist. These situations cause heavy loading of the air with dust particulates over a short time span (2 to 3 hours). This results in soil drifts across roads in agricultural areas, reduced visibility to near zero, hazardous driving conditions, and deposits of soil in residential areas in the vicinity of the affected agricultural land. The communities most affected in or near the ES area would be Hammett, Hagerman, Bruneau, Buhl, Gelnns Ferry, and Twin Falls. It is expected that these conditions would exist and probably grow more serious in the ES area.

Ground and air application of pesticides and other chemicals would cause air quality deterioration. It is doubtful that concentrations would become high enough to affect human health, but there is likely to be localized problems such as herbicide drift onto adjoining fields. Such drift could cause isolated crop losses.

## GEOLOGY AND TOPOGRAPHY

There would be no impacts to geology and topography.

## SOILS

Implementation of the proposed action would influence soils and their potential productivity. The most significant change that would occur is the increase in vegetative productivity. Presently, the area is producing about 160 lbs. of useable native livestock forage per acre. Forage production could increase through cultivation, fertilization, and irrigation to 7,100 lbs. per acre, if alfalfa alone would be grown. All acreages shown on Overlay 1A and 1B that will be cultivated could be subject to erosion, disturbance by ripping and plowing, compaction, and fertility losses depending on management. The degree of impact would depend on the kind of treatment, type of soil, and management practices. Generally, Class 1 soils would be impacted less than Class II, which is less than Class III. This is due to the fact that Class I soils have less slope, are more suited to development, and are less fragile than the other classes of soils for this type of development. Each individual soil within a class has its own capability and limitations and will respond differently under various types of management. The major types of treatment influencing soils will be discussed in the following sections.

### Construction

The entire soil profile would be severely affected on approximately 3 percent (3,330 acres) of the 111,015 acre farm area by construction of roads, settling ponds, ditches, and farm support facilities.

Under the proposed action, farms would be primarily located on Class I and II soils. There would be some instances where a particular farm unit would include a lesser amount of Class III soils and even isolated pockets of Class VI. Construction and farm support facilities are probably the greatest source of sediment yield from water erosion within the ES area. The amount of erosion would depend on soil class, however, since Class I has only 0 to 4 percent slope and runoff potential is lower compared to Class III at 0 to 20 percent slope. In areas where construction excavation was done for roads and farm support facilities, the natural soil profile could be irreversibly damaged and many soil properties changed. These changes could affect soil structure and reduce pore spaces, infiltration and permeability rates, and organic matter and nutrient levels. All these factors would increase soil compaction, lower the potential for revegetation, and thus increase the chances for soil loss through water and wind erosion.

Land Treatments

Approximately 97 percent of the acreage going into private ownership would be subjected to clearing, land leveling, ripping, tillage, planting, and harvesting. Each will impact the soil to varying degrees depending on the season and type of management.

Land treatment practices impact the soil in several ways. Removal of the natural vegetation combined with plowing, discing, or raking destroys the root zone. This root zone is very important in holding the surface soil in place and protecting it from water and wind erosion. If this manipulation is done when soil conditions are too wet, it would result in increased compaction and surface ponding or crusting. This may lower or slow down the germination of crop seed and thus reduce overall percent of crop vegetative cover. Wind and water erosion are directly related to percent vegetative cover. Wind erosion is most severe on sandy soils. When preparing sandy areas for planting, wind erosion will be a factor to consider. Cover crops, pre-wetting the soil by sprinkler irrigation, and/or over-wintering stubble are some ways to minimize wind erosion soil loss.

Leveling land involves the scalping of soils in some areas and the deposition in other spots. The extent of impacts caused by this process is dependent upon the depth of the soil over restrictive horizons and the degree of profile development. Deep soils (Class I) with weak profile development would be least impacted by this action. Shallow soils (Class III) that are scalped would have their productivity reduced by the amount of soil removed or increased somewhat by the addition of topsoil. Strongly developed soils (Class II) have distinct zones that serve specific functions for plant growth. Removal of the top soil and exposing subsurface horizons often results in decreased productivity in localized areas.

Discing and plowing fields over an extended period of time would eventually degrade soil structure, decreasing soil pores, and create a plow pan, or compacted zone, just below the depth of plowing. This creates the need to deep plow or rip. Performing these operations during periods of high soil moisture increases compaction thus decreasing the effect of the treatment and increasing the potential for erosion.

Deep tillage and ripping breaks up layers restricting root growth. It increases rooting depths, improves permeability, and provides more soil pore space. The impact on soils is generally favorable but can cause problems when calcareous substratums are mixed with noncalcareous surface horizons or expandable clays. Mixing saline and/or sodic zones with other horizons may decrease productivity in local areas. This would be important when dealing with Class II and III soils.

Field manipulations such as seeding, harvesting, and fertilizing require the use of heavy equipment and would cause soil compaction. This problem is increased with higher soil moisture, the weight of the vehicle in relation to tire size, and the number of trips across the field. Minimum tillage practices on dry soils using vehicles with flotation tires would cause the least amount of soil damage.

The use of chemicals to control weeds and insects would have some slight short term impacts on the soil microflora and micro-organisms. These impacts would be minimal. Insecticides may help keep soils in a closer equilibrium with its natural state by controlling crop related diseases.

## Crop Production

The production of crops will have either a beneficial or adverse impact on soils, depending on the type of management and crops used. Table 1-3, Chapter 1, outlines the percent composition of crops which will likely be used under actual farm conditions.

A rotation including row crops and small grains will modify the soil morphology to some degree. The production of row crops, where most of the plant is removed, would result in a general decline in soil organic matter. This reduction in organic matter would be reflected in the loss of natural fertility, a weakening of soil structure, a reduction of infiltration and permeability rates, and a reduction in aeration pore space. The net effect of these factors is a decrease of water entering the soil profile, thus, increasing the potential for soil erosion.

The production of small grain cover crops during winter months (double cropping) can have a beneficial effect on the soil if the stubble is plowed back into the soil. This will tend to increase organic matter content. Many of the soil properties will then be improved. However, if the stubble is burned, little or no improvement will occur.

Generally, a row crop/small grain rotation done annually will maintain the soil at a constant level of production provided the green manure is returned back to the soil. Any alfalfa put into the rotation will have a beneficial effect on the soil and improve fertility.

Alfalfa has a symbiotic relationship with certain soil microbes. This relationship fixes atmospheric nitrogen into nitrates that the plant uses for protein. Along with alfalfa improving soil nitrogen, it also provides a year round cover crop, reducing soil erosion.

Erosion

Water erosion rates, shown in Table 3-1, were calculated from the Musgrave equation (Appendix 2-3) for the highest and lowest possible erosion condition for each capability class under row and cover crop conditions. Actual erosion conditions anticipated from development within the ES area are represented by the lowest rate for each soil class, based on recent farm developments on similar soils.

TABLE 3-1

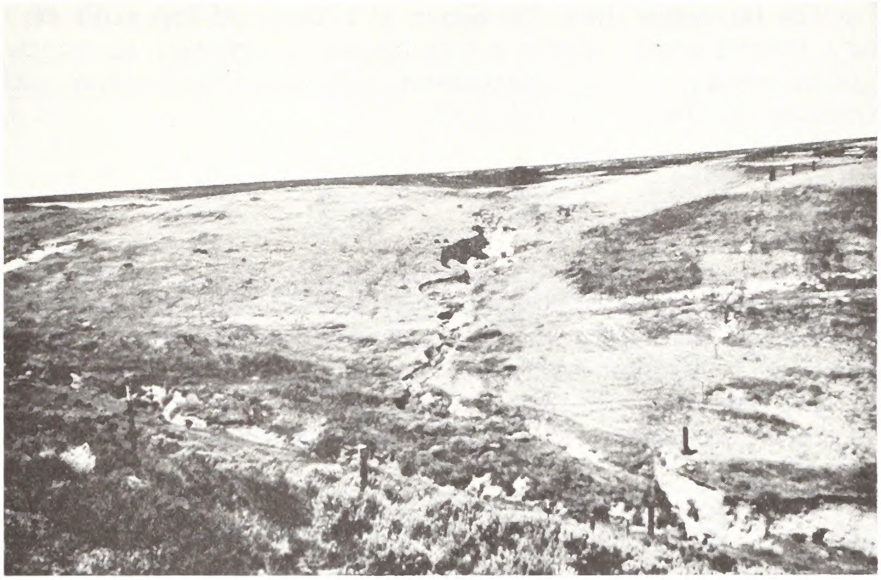
ESTIMATED FUTURE EROSION RATES
FOR ROW AND COVER CROPS - TONS PER ACRE

| Soil Class | Soil Erosion Condition | Row Crops | Mean Row Crops | Cover Crops | Mean Cover Crops |
|---|---|---|---|---|---|
| 1 | Low | 0.03 | 0.96 | 0.00 | 0.03 |
| | High | 1.88 | | 0.07 | |
| 2 | Low | 0.03 | 3.03 | 0.00 | 0.13 |
| | High | 6.02 | | 0.26 | |
| 3 | Low | 0.33 | 13.82 | 0.10 | 0.74 |
| | High | 27.31 | | 1.38 | |

SOURCE: Calculated from the Musgrave equation using 1.55 $gm/cm^3$ for soil density.

A study was made by the Idaho State Soil Conservation Commission to estimate the erosion rate of each area under Desert Land Application (DLA) and Carey Act (CA) application within the entire State of Idaho. This study was based on the use of sprinkler irrigation and covers all aspects of water erosion. Maps containing the location of applications and the anticipated erosion rate can be seen at the Idaho State Soil Conservation Commission (SCC) Office in Boise, Idaho. A summary map is being compiled by the SCC to summarize this data but is not presently available. However, present analysis shows that there are no severe erosion areas on Class I, II, and III soils within the ES area with a moderate potential for erosion. Most soils have a potential for a slight erosion rate.

Wind erosion will occur, particularily in the spring when the soil surface is bare. Wind velocities in the spring occasionally reach 20 to 35 mph and will cause wind erosion when soils are dry. Because little



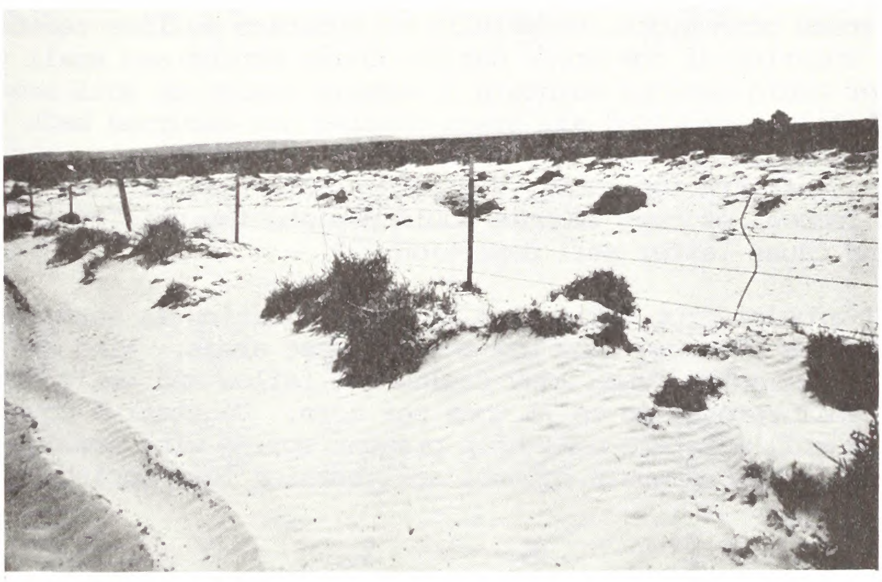


FIGURE 3-1. Consequences of poor farm practices in the ES area. The top photo shows where gully erosion has developed due to excess irrigation water run-off from field at the top of the hill. In bottom photo, sand has deposited around the edge of a field due to spring wind erosion. This situation could be helped by measures taken to maintain some vegetative crop cover during early spring months.

data is available, it can only be estimated that wind erosion rates will vary from 0 to 75 tons per acre (see Appendix 2-4). Seventy-five tons per acre would be equivilent to about 1/2 inch of top soil on an acre. The primary impact area, where soils become airborne, is south of Hammett and west of Hagerman. Good management practices utilizing rotations of cover crops can minimize this impact.

## Summary

Increases in soil production would occur on each acre put under cultivation with the use of irrigation, fertilization, weed control, and disease abatement procedures. The cash crop rotation of row crops and small grains will further increase the production return from these soils. Mixing the surface layers will occur as a result of cultivation, having only a minor affect on overall soil productivity.

An anticipated 3 percent of the area (3,330 acres) will undergo irreversible soil damage as a result of roads, settling ponds, and farm support facilities. Within these areas the entire soil profile will be altered.

Various land treatments would impact 100 percent of the area. Plowing, discing, or raking on 97 percent of the 111,015 acres will damage the surface root zone and would cause compaction within the profile. Damages will be greater if these practices are done during high soil moisture conditions, especially on moderate to fine textured soils. However, rotation of row crops during summer months and small grains in the winter would tend to maintain a certain degree of soil organic matter stability provided all green manures are returned back to the soil. This would maintain the soil fertility, percolation rates, soil structure, infiltration rates, and reduce potential erosion rates. Complete removal of crop stubble would deplete the soil of organic matter and cause faster soil depletion.

Soil erosion from irrigation and precipitation is estimated to be slight at less than two tons per acre in most areas. Wind erosion during spring months, when many fields are fallow and soils dry, will cause topsoil removal up to 75 tons per acre. Vegetative cover, organic matter and soil moisture will help prevent spring wind erosion. Good management practices would control soil erosion loss during windy periods.

# WATER RESOURCES

## Uses and Flows

The Snake River is the key to the economy of southern Idaho. Much of southern Idaho was settled by farmers who irrigated their farms with Snake River water. In the ES area the river is used for hydroelectric generation, recreation, habitat for many wildlife species, and incidentally for municipal/ industrial uses. The major demand on Snake River water, however, remains agricultural.

TABLE 3- 2 -SNAKE RIVER FLOWS (CFS) WITH THE PROPOSED ACTION-
BASED ON AVERAGE FLOW 1/

| GAUGING STATION | | OCT | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lower Salmon Falls | Base Flow | 7487 | 8460 | 9875 | 9111 | 8210 | 9376 | 11142 | 8493 | 7338 | 6276 | 6458 | 7105 |
| | w/Prop. Action | 7336 | 8460 | 9875 | 9111 | 8210 | 9376 | 11071 | 8353 | 7113 | 5767 | 5918 | 6693 |
| | Difference | 151 | 0 | 0 | 0 | 0 | 0 | 71 | 140 | 225 | 509 | 540 | 412 |
| | % | | | | | | | | 2 | 3 | 8 | 8 | 6 |
| King Hill | Base Flow | 9714 | 10250 | 11571 | 10963 | 9881 | 11152 | 13090 | 10153 | 8833 | 7538 | 7754 | 8547 |
| | w/Prop. Action | 9054 | 10282 | 11601 | 10993 | 9913 | 11179 | 13045 | 10033 | 8623 | 7046 | 7237 | 8163 |
| | Difference | 668 | +32 | +30 | +30 | +32 | +27 | 45 | 120 | 210 | 492 | 517 | 384 |
| | % | | | | | | | | 1 | 2 | 7 | 7 | 4 |
| C.J. Strike | Base Flow | 9157 | 10545 | 11858 | 11299 | 10285 | 11684 | 13869 | 11079 | 9418 | 7032 | 7022 | 8038 |
| | w/Prop. Action | 8901 | 10578 | 11890 | 11331 | 10317 | 11710 | 13755 | 10824 | 8992 | 6067 | 6010 | 7280 |
| | Difference | 256 | +33 | +32 | +32 | +32 | +27 | 114 | 255 | 426 | 965 | 1012 | 758 |
| | % | | | | | | | | 2 | 5 | 14 | 14 | 9 |
| Murphy | Base Flows | 9214 | 10705 | 12001 | 11461 | 10482 | 11892 | 13973 | 11016 | 9331 | 6884 | 6854 | 7949 |
| | w/Prop. Action | 8945 | 10726 | 11890 | 11482 | 10503 | 11907 | 13847 | 10747 | 8889 | 5897 | 5820 | 7172 |
| | Difference | 269 | +19 | 111 | +21 | +27 | +15 | 126 | 269 | 442 | 987 | 1034 | 777 |
| | % | | | | | | | | 2 | 5 | 14 | 15 | 10 |
| Brownlee (in flow) | Base Flow | 13573 | 15721 | 18283 | 18992 | 25998 | 23983 | 25498 | 20171 | 16989 | 10890 | 10000 | 12091 |
| | w/Prop. Action | 13297 | 15741 | 18307 | 19016 | 26126 | 24010 | 25366 | 19890 | 16439 | 9857 | 8916 | 11277 |
| | Difference | 276 | +20 | +24 | +24 | +128 | +27 | 132 | 281 | 550 | 1033 | 1084 | 814 |
| | % | | | | | | | | 1 | 3 | 9 | 10 | 7 |

Critical Withdrawal Period (MAY–SEP)

SOURCE: IDWR 48 year flow record

1/ All Snake River flow information is tentative. IDWR is now updating and revising these data. New information will be available for Final ES.

The proposed action would create a yearly demand of about 277,827 acre-feet of water to irrigate the 107,685 acres of new farmland. Approximately 90 percent (250,004 acre-feet) of the water needed would come from the Snake River. The remaining 10 percent (27,823 acre-feet) would come from groundwater sources in the Bruneau to Murphy region of the ES. (Refer to Chapter 1 for surface water/groundwater ratios, etc.).

The impact of diverting 250,004 acre-feet of water per year from the Snake River on existing water users in the area appears negligible. The new developments should not cause shortages for other irrigators for two reasons: 1) flows are sufficient to accomodate this diversion, and 2) mechanisms of the water right appropriation system would protect existing water users.

As Table 3-2 indicates, the actual reduction in flows would vary with the time of year. The irrigation season runs from April through October, with June, July, and August being the peak diversion months. Since August is usually the month of lowest flows in the river and is a period of high diversion, it can be considered a "worst case" example for examining flows remaining in the river after diversion. Since most of the diversion for the proposed action would be upstream from the gauging station at Murphy, (See Map 2-4) it is used as a common monitoring point. As Table 3-2 shows, the proposed action would reduce the average August flow at Murphy (based on 48 years' history) from 6854 CFS to 5820 CFS. This is a reduction in flow of 1034 CFS. August flows into Brownlee Dam, which is below the ES area, would be reduced from 10,000 CFS to 8916 CFS, a difference of 1084 CFS.

Mean-flow reduction of 1034 CFS at the worst case point (Murphy) would be about 15 percent of the average monthly flow. In a low-water year, such as 1977, the projected development would reduce mean flows as much as 17 percent. Table 3-3 depicts the effects of the proposed action on Snake River flows at Murphy during such a low-flow year.

TABLE 3-3. SNAKE RIVER FLOWS (CFS) AT MURPHY WITH THE PROPOSED ACTION - BASED ON LOW FLOW YEAR (1977), SHOWING MEAN LOW FLOWS AND ACTUAL LOW ONE-DAY FLOW 1/ FOR EACH MONTH.

| | MAY | | JUN | | JUL | | AUG | | SEP | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | Low | Mean | Low | Mean | Low | Mean | Low | Mean | Low |
| Base flow | 6848 | 6000 | 6495 | 5120 | 5657 | 5270 | 6107 | 5660 | 6835 | 5840 |
| w/Prop. Action | 6579 | 5731 | 6053 | 4678 | 4670 | 4383 | 5073 | 4626 | 6058 | 5063 |
| Difference | 269 | 269 | 442 | 442 | 987 | 987 | 1034 | 1034 | 777 | 777 |
| % | 4 | 4 | 7 | 9 | 17 | 19 | 17 | 18 | 11 | 13 |

SOURCE: IDWR 48 year flow records.

1/ These data are provisional - pending revision of base flow information by IDWR.

The Idaho Department of Fish and Game has recommended a minimum flow of 5500 CFS at Murphy. In average years, the development would not reduce mean flows below this recommendation. In low-flow years (such as 1977), however, the project would reduce mean flows as much as 17 percent below these recommendations. Also, in low-flow years the project would reduce flows to well below these recommendations for the entire period from June through September.

The assumed 15 percent return to the river of irrigation water via infiltration to tributaries or the Snake River will be spread over about 10 months. Return flows from an applied 277,827 acre-feet will amount to about 70 CFS. As a proportion of remaining flow at Murphy this would be 1.2 percent of the mean flow in an average-flow year; 1.5 percent of the mean flow in a low-flow year (1977); and 1.7 percent of the low daily flow in a low-flow year (1977).

The 1978 Idaho Legislature established an average minimum flow of 3,300 CFS at the Murphy gage. The proposed action does not appear to reduce flows below this figure. The proposed action would be an incremental part in the continuing diversion of water out of the Snake River. The same can be said, to a much smaller extent, of the relationship of the proposed action to the downstream Columbia River System.

Groundwater withdrawals (27,823 acre-feet per year) are more difficult to assess than surface water because no reliable groundwater supply data are available. U.S. Geological Survey investigations show the likelihood that conflict between groundwater users in the Bruneau area currently exist. That is, in some instances one well is causing a lowering of the water table feeding a neighboring well. With this situation in mind, it seems reasonable to predict that in such areas new wells will lower water tables further. This creates additional costs for the farmer. Pumps may need to be lowered and/or wells deepened. Water must then be lifted higher at more expense. Flows may be diminished.

There may, however, be areas where sufficient groundwater is available and no user conflict would occur. It is acknowledged that not enough is known about the groundwater supply situation to predict impacts with complete accuracy.

As a result of continued irrigation, perched water systems would develop in localized areas. They may eventually flow and appear as seep lines on canyon walls or small saturated areas in topographic lows.

## Impact Summary

In summary, impacts to municipal, industrial, domestic, agricultural, and other existing users would be slight. Snake River flows would remain above established minimum flows but not above recommended wildlife maintenance flows. Depletion of river flows would reduce downstream power generation. The degree of that reduction is discussed in the energy section of this chapter. Other instream effects are discussed in the wildlife and vegetation sections. Groundwater impacts are largely unknown, but it is believed that well development would create water-use conflicts in some areas.

Water Quality

Accurate and precise quantitative estimates of water quality changes caused by the proposed action are not possible. Based on experience and knowledge of the personnel writing the water quality sections of the ES, the following quantitative impacts are used: very slightly - 0 to 1 percent; slightly - 1 to 5 percent; moderate - 5 to 25 percent; heavy - 25 to 50 percent.

Snake River

Temperature: In years of average flow or above, there would be no significant water temperature change as project irrigation withdrawals occur. Irrigation return water as infiltration which enters tributaries as groundwater would neither cool nor warm the main stem river. Summer maximum temperatures in tributaries are not warmer than the mainstream river at present.

In an extreme low-flow year like 1977, water temperatures could be expected to increase slightly in the river between C.J. Strike and Swan Falls Dams and below Swan Falls in July and August as a result of shoaling-the reduction of water depth with moderate change in wetted perimeter (see Fisheries section for impacts). This 1 to 5 percent increase would place the temperature regime further above the 18.8°C State Water Quality Standard for Class A primary contact recreational waters.

Turbidity: Between Hammett (below major inflows of existing irrigation return water and upstream of the ES area) and C.J. Strike Pool (the first large reservoir in which suspended materials which cause turbidity would settle out) turbidity would decrease very slightly in an average or high-flow year because of return of cleaner groundwater in return flows from the projected development (see Aquatic Vegetation section for impacts). Changes would be imperceptible below Strike. In low-flow years, turbidity would not change since the slight inorganic silt decrease would be offset by phytoplankton caused turbidity increases. (see Aquatic Vegetation section).

In average and low-flow years occasional accidents or intense storms would cause brief increases in turbidity, largely in the summer, as a direct result of the proposed action. In all years, wind borne sediments would tend to increase turbidity in the Snake River. The extent of these temporary increases is unpredictable.

Sedimentation: Sediment deposition would not change significantly in average flow years since bedload would be little affected by the approximately 1000 CFS (10-15 percent of present flow) withdrawn for 99,879 acres of new farms using Snake River water. In an extreme low-flow year, sediment deposition would increase slightly in summer periods in the river below Hammett (this point is below major inflows of turbid irrigation return water from existing projects upstream from the ES area) because velocities would permit earlier settling of suspended solids which previously would have been carried down to settle in reservoirs (see Fisheries section for effects on sturgeon).

Occasionally, and with unpredictable timing, accidental failure of water supply systems or intense storms would bring sediment into the bedload of the river via tributaries as a result of the proposed action development.

pH: No change in pH would occur in any reach during summer conditions in average or high-flow years. In extreme low-flow years, pH would increase very slightly but remain within Idaho Department of Health and Welfare (IDHW) standards.

Conductivity: Conductivity (as a reflection of dissolved solids) would increase slightly in extreme low and average-flow years between Hammett and C.J. Strike Pool as return flows in tributaries reach the river. Elsewhere, there would be less change.

Nutrients: In years of both average and extreme low-flows, a slight increase in nitrate would occur from Hammett to Strike Pool. The change would not be detectable below Strike Dam. Phosphorus would decrease very slightly in the ES area because of return of cleaner groundwater and re-entry of infiltrated irrigation water from the proposed action (see Aquatic Plants section for effects).

Occasional and unpredictable accidents and intense storms would carry sediments with adsorbed phosphates to the river via tributaries and wind as a result of the proposed action.

Light Penetration: In years of average flow, the very slight decrease in turbidity above Strike Pool caused by inflow of cleaner irrigation return water from tributaries, together with a slight to moderate decrease in average water depth in reduced streamflows, would permit more light to reach the stream bottom. The increase in light incidence at the stream bottom would be partially offset by increases in plant caused turbidity (see Aquatic Plants section for impacts).

Benthic Organisms: Benthic invertebrates, a food source of fish, would increase slightly in abundance per unit area in the Hammett-Strike area in response to increases in attached benthic algae and rooted aquatic plants (see Vegetation section of the ES) as light penetration to the bottom increases.

Oxygen/Ammonia: Ammonia levels would not change in average or low-flow years, as the capacity of the river to meet oxygen demands would not be taxed under projected organic loadings. Oxygen would remain near or at present levels in all reaches.

Bacteria, Heavy Metals and Pesticides: Bacterial abundance, heavy metals, and pesticides would parallel the changes in turbidity, declining very slightly in both average and low-flow years. The declines should be slightly greater above Strike Pool than below.

Occasional and unpredictable accidents and summer storms would carry heavy metals and pesticides with soil particles to the river via tributaries and wind. These would be deposited in the river wherever currents permit settling of bedload.

### Tributary Streams

Water quality in the mostly intermittent tributary streams between Salmon Falls Creek and Bruneau arm of Strike Pool would deteriorate moderately. No base data are available for these waters. These streams appear similar to other better known tributaries in the ES area and on this basis temperatures in upper portions of these tributaries can be expected to decline slightly, then rise to near present levels in the lower reaches. Conductivity in these small streams would increase moderately as more salts enter with infiltrated return flows. Turbidity should decrease slightly to moderately; phosphorus would remain unchanged; and nitrate would increase heavily. Attached benthic algae would increase heavily as would benthic invertebrates. Plant production would be stimulated by inflow of nitrate and reduced turbidity, and because of the more stable flows resulting from groundwater return. Bacterial abundance would not change detectably. The above changes would all increase in magnitude in extremely low-flow years because groundwater return flow would then be a more significant portion of the available streamflow.

Occasional and unpredictable accidents and intense storms would carry eroded sediments with associated pesticides, heavy metals, and phosphates into tributaries via overland routes and wind. It is impossible to predict how much of these materials would remain in tributaries and how much would reach the main river (see Fisheries section).

### Downriver From The ES Area

Between the lower end of the ES area below Homedale and the upper end of Brownlee Pool (about 55 miles), the effects discussed previously for water quality would extend for only about 16 miles before inflows from major tributaries (Malheur, Boise, Owyhee Rivers) would make project-caused water quality changes indiscernible. All water quality effects would disappear below Brownlee Pool, since Brownlee Pool acts as a nutrient and sediment trap.

### Groundwater

Deep movement of water from irrigation to the regional water table is likely to be insignificant because of the great depth to the aquifer and anticipated low vertical hydraulic transfer in the predominantly horizontally-bedded layers.

The predominant impacts from the creation of local perched groundwater systems would be the formation of small seep and spring areas in topographic lows and at the base of gravel units along the canyon of the Snake River and its tributaries. Most of these discharges would be small and would form only wet areas. However, some surface flow would occur in tributary channels.

Available data indicate that there would be no return of surface water to the underground aquifers and, therefore, no change in existing quality. It is possible that there may be some "mixing" of aquifers where a well passes through two or more.

The small amount of surface water that percolates through the soil horizons and forms perched water tables would carry fertilizer residues with it. This water table would be high in nitrogen and would contain some phosphate. It may also contain pesticide residues. This water may emerge as seeps or springs on hillsides, and some may eventually be used as well water sources. In either case, it is not possible to quantitatively evaluate the quality of this water and its impact on potential uses.

Impacts Unique to the Proposed Transfer Methods

Disposal of land under the Carey Act would have slightly less effect on the aquatic environment than disposal under the Desert Land Act if the land under private ownership remains in small family holdings. Smaller acreages lead to greater crop diversification in a given area and increased numbers of fencelines and edge vegetation which impede wind and runoff from intense rainfall or pipeline accidents. This also reduces the need for very large settling ponds to minimize silt movement to neighboring properties. Accidental water discharge or rainfall or pipeline accidents leading to runoff would tend to involve less water concentration than would be the case in larger acreages. This is because erosive power of water rises exponentially with increased flow.

Since sedimentation from surface runoff (rainfall, wind, or accident-related) tends to carry adsorbed pesticides, heavy metals, and phosphorous, conversion of public land under the Carey Act should reduce the volume of these problem materials arriving in tributaries or in the Snake River. However, under the CA more farm lands would lead to potential increases in accidental or careless dumping of petroleum waste, pesticide containers, and compounds bearing heavy metals in channels for possible transport eventually to the Snake River. The merits of sediment decreases from small ownerships probably outweigh the disadvantages of accidental compound spills.

Impact Summary

Nitrates and conductivity (as a reflection of dissolved solids) would increase moderately in tributary streams. Turbidity and temperature would decrease moderately in these streams. Water temperature in the main Snake River would increase very slightly as a result of reduced water depths. Nitrates and conductivity in the ES area of the main Snake River would increase slightly above C.J. Strike. Turbidity would decrease in the same area very slightly. Occasional accidents caused by breakage in water delivery systems, intense storms, or wind would bring sediment to tributaries and the main Snake River, with adsorbed fertilizer residues and toxic materials. Magnitudes are not predictable. Benthic invertebrates would increase slightly in density in response to slight increases in attached plant density, but this will be offset by losses of wetted areas in reduced summer flows.

## VEGETATION

### Terrestrial

The 439,303 acres of public land within the ES area consists of approximately 275,583 acres of sagebrush/grassland, 87,085 acres of seeded grassland, 42,810 acres of salt-desert shrub/grassland, and 33,825 acres of natural grassland. Overall, the current vegetation is in relatively poor range condition.

Under the proposed action, approximately 47,285 acres of sagebrush/grassland, 33,090 acres of seeded grassland, 14,430 acres of salt-desert shrub/grassland, and 16,210 acres of natural grassland would be cleared over a 5-year period in preparation for agricultural development.

These 111,015 acres of range vegetation would be replaced by approximately 23,691 acres of potatoes, 22,615 acres of dry beans, 18,306 acres each of winter wheat, barley, and sugar beets, 6,461 acres of alfalfa, and 3,330 acres devoted to non-crop land uses (based upon assumed crop rotations).

An additional 37,000 acres of public land would be reserved as public purpose tracts to facilitate agricultural development. Approximately 18,000 acres of this would be designated as wildlife leave areas, and the present vegetation would not be removed. The other 19,000 acres would be subject to clearing, to provide public purpose facilities as needed.

This extensive vegetation change (see Map 2-5 and Overlays 1A and 1B) would in turn impact other resources such as recreation, wildlife, and livestock grazing. Refer to these sections for impact analysis.

### Riparian

There are approximately 55 miles of riparian vegetation on public land within the ES area. Under the proposed action, approximately 1.5 miles of this would be subject to removal (see Map 2-5 and Overlays 1A and 1B).

Possibly offsetting the destruction of riparian vegetation would be the stimulation of increased riparian growth as infiltrated irrigation water reaches stream courses and increases wetted stream margins. Higher nutrient levels in the return water would also stimulate riparian growth.

## Aquatic

Quantifying terms used in the following section are defined as: very slightly - between 0 and 1 percent; slightly - between 1 and 5 percent; moderately - between 5 and 25 percent; heavily - between 25 and 100 percent.

### Phytoplankton:

Phytoplankton blooms would be slightly longer lived, but total live weight would be unchanged above Strike Pool in an average-flow year. Below Strike there would be no change in phytoplankton. Phytoplankton concentrations in extreme low-flow years would increase moderately below Strike Pool as a result of a longer period of residence in the river. Increases in phytoplankton would tend to increase turbidity and BOD downstream (see Water Quality section).

### Attached Benthic Algae and Rooted Aquatic Plants:

Because of a very slight decrease in turbidity and increase in light incidence at the bottom due to decreased stream depth, attached benthic algae and rooted aquatic plants in all flow years would increase slightly above Strike Pool and would increase very slightly in deeper water in the Snake arm of Strike Pool. Between Strike and Swan Falls Pools and below Swan Falls, the increase would be slight to moderate since these shallower bottom areas receive more light. In low-flow years the increases would be moderate. The increases would be beneficial as noted in the Benthic - Invertebrate section.

## Effects of Different Land Disposal Methods

Accidental arrival of sediments, heavy metals, pesticides, and plant nutrients from ES land into tributaries and the main Snake would be less under CA disposal than DLA. Thus, there would be less likelihood that pesticides and heavy metals would be bound up in aquatic plant tissue for later concentration to invertebrates, fish, and bald eagles.

## Threatened and Endangered Plants

Table 3-4 shows information on known sites of the five species regarded as threatened or endangered within the proposed action area. As required in the Endangered Species Act of 1973, these plants will be protected and preserved. Any similarly classified species found in the ES area through future studies will also be protected. No development would be allowed where threatened or endangered plants are found. These plants, therefore, would not be impacted by the proposed action.

## Impact Summary

Overall, the proposed action would create a major change in terrestrial vegetation on approximately 130,015 acres in the ES area. About 107,685 acres of this would be replaced by agricultural crops, and up to 22,330 acres would be cleared for non-crop land uses.

Approximately 1.5 miles of riparian vegetation would be lost. This would be offset, however, by stimulation of riparian growth due to higher nutrient levels in the water and by infiltrated irrigation water reaching drainage areas which are presently dry.

Under the proposed action, there would be a slight increase in bloom life of phytoplankton especially above C.J. Strike Reservoir. Attached benthic algae and rooted aquatic plants in the Snake River would be expected to increase slightly in abundance.

No impacts to threatened or endangered plants would be allowed to occur as required in the Endangered Species Act of 1973.

# WILDLIFE

## Terrestrial

Implementation of the proposed action could result in the loss of existing natural vegetation on up to 130,015 acres (111,015 acres for farms and up to 19,000 acres for public purpose tracts not used for wildlife leave areas). Consequently, most wildlife species that inhabit the ES area would experience habitat loss. For animals such as pheasants, Hungarian partridge, and Valley quail, new habitat would be created as new agricultural land is developed near existing natural vegetation. This would create an edge, or ecotone, thereby increasing habitat diversity. Increased habitat diversity leads to increased wildlife diversity. However, acre-per-acre, large continuous agricultural projects provide less edge effect than smaller farms. As a result, wildlife species would be less abundant on large agricultural development ecotones than on the smaller farm units.

As part of the proposed action, BLM would set aside about 18,000 acres of isolated wildlife tracts among the 111,015 acres of new farmland. The selection criteria BLM would use is discussed in Appendix 1-1. These isolated tracts would provide year-round habitat for upland game birds. They would be primarily used by pheasants during winter and spring periods for shelter, feeding, and nesting when adjacent farmland is not useable for these needs.

In many areas, loss of habitat would result in displacement or destruction of the particular local population of concern. Because mobile animals can move to adjacent areas of suitable habitat does not necessarily indicate that the new habitat would be able to support the

TABLE 3-4

THREATENED AND ENDANGERED PLANT SITES WITHIN THE PROPOSED ACTION AREA

| Common Name | Current Status | Approximate total area of sites in Proposed Action | Approximate percent of known Idaho population occurring under Proposed Action | Approximate percent of known Idaho population occurring within ES area |
|---|---|---|---|---|
| Murphy milkvetch | candidate for Idaho's Endangered List. May be proposed to the Federal Register of Endangered Plants | 1110 acres | 2% | 15% |
| Cow Pie eriogonum | same as above | 0 acres | 0% | 75% |
| Mourning milkvetch | candidate for Idaho's threatened list | 35 acres | 1% | 5% |
| Matted milkvetch | same as above | 120 acres | 10% | 50% |
| Large flowered gymnosteris | same as above | 25 acres | 30% | 50% |

SOURCE: Threatened and Endangered plant inventory and study, 1978, BLM.

animal. In most cases certain habitats would already be occupied by as many animals as that habitat can support. The addition of more animals results in a decreased survival rate for that population. Therefore, habitat loss eventually leads to overall population decreases.

As discussed in Chapter 2, life forms have been assigned to all animals breeding within the ES area. These life forms are useful in illustrating impacts. If part or all of a species life form is lost due to implementation of the proposed action, population decreases and displacement of that species would occur. The most adversely impacted life forms are those in which the animal reproduces on the ground or in shrubs.

Mammals

Big Game:

Mule Deer: A total of 1,000 acres of existing vegetation has been proposed for conversion to agriculture within the mule deer winter range shown on Map 2-6. This accounts for approximately 7 percent of the total winter range acreage which lies within the ES area.

Mule deer using these areas during the winter depend upon the vegetation to provide food and cover. Loss of vegetation, primarily shrubs such as sagebrush, bitterbrush, and serviceberry, would result in a reduction in the cover and nutritional source which is important to these animals.

Because this wintering area could not support as many animals as it could prior to agricultural development, these deer (an estimated 40 to 60 animals, or 8 to 12 percent of the deer population using this winter range within the ES area) would be displaced, and the population would subsequently be reduced within the winter range.

Human activity associated with farm operations would increase, resulting in additional stress to these deer. This stress factor is especially critical to the survival of weak deer and fawns. Predators are able to catch weakened deer much easier, and disease becomes a more significant mortality factor. Fences would tend to restrict some deer but would not block major migration routes.

Other mule deer not using the above mentioned winter range are scattered throughout the ES area and are quite limited in numbers. They would not be adversely effected by the proposed action. These deer would benefit from plantings of alfalfa and cereal grains which would increase their food base.

Pronghorn: Pronghorn antelope populations are limited within the ES boundary, and since very few areas actually are occupied by antelope, impacts to these animals would be slight. Establishing cereal grains and alfalfa would be beneficial to antelope. However, fences around the perimeter of agricultural projects could become barriers to pronghorn movement if adequate passage specifications are not met. Also, any increased human disturbance would have detrimental impacts. This would probably force the few animals that inhabit the area to move away from the agricultural developments.

No migration routes are identified in the area and subsequently none are expected to be impacted by the proposed action.

Small Game:

Mountain Cottontail and Pygmy Rabbit: The mountain cottontail prefers talus slopes and riparian habitat. Because this type of habitat is not suitable for agricultural development, rabbits would not be adversely impacted by the proposed action. In areas where agricultural development borders on rocky canyons and riparian habitat cottontail populations could be expected to increase due to the additional vegetative diversity that would be created.

Pygmy rabbits are strongly tied to dense sagebrush stands which comprise approximately 275,583 acres within the ES area. Agricultural development resulting in clearing this vegetative type would displace and subsequently reduce pygmy rabbit populations and about 47,285 acres of their habitat (see Vegetation section).

Predators and Furbearers: Predators and furbearers (with the exception of the coyote) are most often associated with the riparian habitat type. Because this habitat type is not jeopardized by proposed agricultural development, impacts to these animals would be minimal. Many of these animals, such as short-tailed weasels and spotted and striped skunks, are often found in areas near agicultural land for this reason. Small population increases could be expected due to increases in agriculture.

The coyote which commonly occurs in the shrub/grassland habitat (comprising approximately 318,393 acres within the ES area) is also quite adaptable to agricultural areas. For this reason a slight increase in coyote numbers could be expected in some areas. However, an increased number of coyotes would probably be killed by farmers and other people due to an increase in roads and human encroachment in the area. Overall, numbers should remain close to the same.

Non-game: Removal of native vegetation in order to initiate agricultural development would adversely affect a number of non-game mammals. Species composition and population numbers of these types of animals would be altered by an increase in agricultural practices. Most of the mammals impacted are important prey for predatory mammals and birds. Clearing land of native vegetation, especially the shrub/grassland habitat type, would eliminate existing non-game mammals in that area. Some rodents would reinvade agricultural areas when sufficient cover exists. Wolfe (BPNA Annual Report, 1976) found that a "planted wheat field south of the (Snake) river did not contain any rodents until the wheat grew high enough to provide cover. The ubiquitous deer mice then moved into the interior of the field. Later in summer, meadow voles colonized the field under large diameter irrigation feeder pipes. By fall, deer mice had established a large breeding population." Ord's kangaroo rats are also known to utilize peripheral areas of cultivated fields where rangeland is adjacent and sufficient cover exists. Although irrigated wheat fields would attract certain rodents as pointed out above, their value as prey species is greatly reduced. The yearly schedule of this prey availability is an important consideration. Even though irrigated wheat fields would attract breeding deer mice and meadow voles, by the time this happens the wheat has grown to a height which effectively renders them invulnerable to predators. By then the critical raptor breeding season has passed before the interior of these fields can yield prey. It is also important to note that deer mice and Ord's kangaroo rats are nocturnal and are not normally available to diurnal raptors as prey items.

Non-game mammals which would be eliminated by conversion of rangeland to agricultural land include the black-tailed jackrabbit, Great Basin kangaroo rat, sagebrush vole, whitetail antelope ground squirrel, Townsend ground squirrel, and the Great Basin pocket mouse. All of these species are an important prey source for various mammals and birds and for this reason would present an adverse impact to these predatory animals.

Upland Game Birds:

California Quail: The overall impact to California quail may be slightly beneficial. These birds are most often found associated with irrigated agricultural areas. For this reason, increased agricultural development could help quail populations as long as adequate areas of the shrub/grassland habitat type are left undisturbed adjacent to the agriculture.

Riparian vegetation within the ES area is limited, but where it occurs it usually supports quail populations. Increased agricultural development in these areas would adversely impact these birds. One such area is Foreman Reservoir. Development here would probably reduce existing populations.

Where water developments such as ponds, detention dams, and streams exist or are built on new agricultural land adjacent to the shrub/grassland type, California quail populations could be expected to increase. It is expected that some new riparian habitat would be created in drainages down slope from farming areas due to seeps from percolated irrigation water.

Bobwhite Quail: Due to the limited distribution and numbers of this bird, agricultural development would have no impact to this species.

Hungarian Partridge: Where the shrub/grassland habitat is intermingled with irrigated agricultural development, Hungarian partridge would be beneficially impacted and populations would have the potential to increase.

Chukar Partridge: The habitat requirements of the Chukar are such that they do not conflict with proposed agricultural developments. For this reason Chukars would not be affected by the proposed action.

Mourning Doves: Mourning doves inhabit both grassland and the shrub/grassland habitat types. Agricultural development which converts this type of vegetation would adversely affect breeding birds. When the land is cleared of natural vegetation, doves would lose necessary nesting, hiding, and thermal cover. However, agricultural areas adjacent to natural vegetation would provide new water developments which would increase local dove populations. Overall, dove populations would be expected to increase.

Pheasants: Pheasants occuring in the ES area are tied to riparian vegetation and irrigated agricultural areas adjacent to natural vegetation. Large tracts of agricultural development not interspersed with the shrub/grassland type offer no year-long cover for pheasants. For this reason they support very low populations. New irrigated agricultural areas which offer natural year-long vegetation and a source of water would support new populations. Pheasant numbers could be expected to increase if these types of developments were initiated. No existing populations would be lost due to increased agricultural development.

With adequate protection, and in some cases water and vegetation enhancement, the wildlife tracts that are identified for retention in the proposed action would provide important habitat for pheasants. These wildlife tracts would be strategically located to allow good distribution of habitat throughout the agricultural area. Tracts would be selected on the basis of values. These selection parameters are listed in Appendix 1-1.

Once the tracts are selected, they would be managed for their habitat values under the "Sikes Act" cooperative management program with the Idaho Department of Fish & Game, the Intermountain Station of the Forest Service, and the BLM. Existing habitat felt to be adequate for wildlife food and cover would be protected. If selected tracts did not have adequate vegetation for food or cover, revegetation efforts would be made to improve conditions. Water would be developed on strategic tracts.

It is believed that viable populations of pheasants, Hungarian partridge, and other agriculturally orientated species would successfully occupy these isolated tracts and the surrounding agricultural land.

Sage Grouse: Sage grouse within the ES area are highly dependent upon sagebrush in order to survive. Land clearance would have a severe impact on these birds. Clearing the land of sagebrush would destroy one strutting ground, feeding areas, nesting sites, and thermal and hiding cover. Increased human activity due to increased agricultural development in the vicinity of three other strutting grounds would disturb sage grouse using these areas. They would be displaced and their reproductive performance could be reduced. This may lead to slight population reductions.

FIGURE 3-2. Example of established permanent vegetation cover that offers nesting habitat for pheasants on isolated wildlife tracts near agriculture.

FIGURE 3-3. This isolated tract has been fenced to keep livestock out, which allows native vegetation to mature without grazing pressure.


FIGURE 3-4. End results of the isolated tracts program as part of the proposed action farm development.

Sage grouse strutting ground number 7 is located in the middle of proposed agricultural development (see Map 2-6 with Overlay 1A and 1B) and would be destroyed should development occur. In 1967, forty male sage grouse were seen on this ground. Gill (1965) reports that 78 percent of 23 nests located in Colorado were found within one mile of a permanent strutting ground and 87 percent of the nests were within two miles of a strutting ground. This area also supports sage grouse during the winter; 40 to 50 birds were seen in this area in January of 1978.

Agricultural development in this area would destroy this strutting ground which is critical to the sage grouse breeding cycle. It would also destroy approximately 1,000 acres of important nesting and wintering habitat. Since strutting grounds, nesting habitat, and wintering habitat are crucial to a sage grouse population, sage grouse numbers in the area could decrease from 20 to 50 birds.

Waterfowl: In most cases breeding waterfowl in the ES area would not be adversely impacted. An exception to this would occur at Foreman Reservoir should agricultural development occur in this immediate area. Cinnamon teal, mallards, redheads, and ruddy ducks are observed here during the breeding season. Agricultural development adjacent to this reservoir would result in removal of approximately 20 acres of existing riparian vegetation which is so important for nesting cover used by these birds. Human disturbance would increase in the area which would also adversely affect nesting birds causing them to abandon nests or keeping them from initiating nesting in this area. The above impacts would cause the relatively small numbers of waterfowl using this reservoir for breeding to be significantly reduced or totally lost. Waterfowl using this area during the nonbreeding season would benefit by plantings of cereal grain crops in close vicinity to the reservoir, but this would not compensate for the loss of breeding birds due to agricultural development. Birds using Morrow Reservoir during the nonbreeding season would also benefit by agricultural development.

Cereal grain crops associated with agricultural development adjacent to the Snake River would be beneficial at winter feed areas to Canada geese, snow geese, Ross geese, mallards, pintails, and American wigeons. An estimated 36,614 acres of cereal grain crops would be established each year under the proposed action. As a result of this increased waterfowl habitat an increased number of these birds would frequent the ES area and would possible stay in this area for a longer period of time during their migration. New ponds and detention dams built due to agricultural development would be beneficial to waterfowl as loafing areas.

Raptors: Birds of prey within the ES area would be severely affected by agricultural development. Hunting habitat lost due to land conversion as well as increased human disturbance to nesting raptors in newly developed agricultural areas would adversely impact these birds.

Because most raptors in the area nest among rocky cliff areas which are not suitable for farming, actual nest sites for most raptors would not be jeopardized. However, there are four species of raptors in the

ES area which are primarily ground nesters: short-eared owl, burrowing owl, marsh hawk, and ferruginous hawk. Most nesting attempts of these birds would fail.

Increased disturbance to nesting raptors would result in added physical stress to these birds. This would also act to lower overall production and survival rates.

Factors leading to increased disturbance to nesting raptors in the ES area due to agricultural development include: 1) increased road development; 2) greater amount of human activity; and 3) increased number of pumping sites on the Snake River.

Any of the following problems could be encountered when increased disturbance to nesting raptors takes place: 1) the parent birds may become so disturbed that they desert their eggs or young completely; 2) the incidence of egg breakage or trampling of young by parent birds may be increased, as may the chances of cooling, overheating, loss of humidity, and avian predation of eggs; 3) newly hatched birds may be chilled or overheated and may die in the absence of brooding; 4) older nestlings may leave the nest prematurely, damaging feathers and breaking bones at the end of futile first flights. Unsuccessful flights may force them to the ground where they become highly vulnerable to predation. The Birds of Prey Natural Area Annual Report by Peterson and Stewart (1976) reports that "A nesting site readily observed and easily accessible to humans will usually fail. Generally, renesting attempts in the same vicinity will also fail."

The prey species used by birds of prey are chiefly dependent upon native rangeland. Beecham and Kochert (1975) believe that "while ring-necked pheasants formed an important part of the food brought to nests by eagles in agricultural areas, jackrabbits and cottontails still predominated, suggesting that eagles are dependent on lagomorph (rabbit) populations. The extensive monocultured irrigation projects, characteristic of DLE projects in Idaho, could result in a decrease in lagomorph densities with eagle density also decreasing." Previously discussed in the section "non-game mammals" was the fact that certain valuable prey species used by raptors would be lost or displaced due to agricultural development. It is also important to reemphasize the fact that prey species inhabiting irrigated fields would not be vulnerable to nesting raptors (during the critical time when young are developing) due to dense vegetation.

As a result of increased agricultural development the amount of land that is utilized for raptor hunting areas would be significantly reduced. Raptors would be forced to extend their foraging areas and spend an increased amount of time and energy in obtaining food for themselves and their young. At some point the energy return to these birds would be lower than the amount of energy expended to obtain their food. Their energetic demand would not be met thereby lowering reproductive success and survival rate. Production would decrease.

An increase in the use of pesticides and herbicides would probably accompany increased agricultural development. The occurrence of persistent toxic chemicals in many raptorial birds has been directly linked to decreased reproductive success (Hickey 1969). Because raptors are at the end of the food chain and are long-lived, they can accumulate large loads of these chemicals (Anderson et al. 1969, Keith 1970). Enderson and Berger (1970) showed that high pesticide residues in prairie falcon egg contents, eggshell thinning, and pronounced hatching failures are correlated events. Occasional accidents or intense summer storms may cause overland water flows which could carry pesticides or heavy metals into the Snake River. These pollutants could reach the bald eagle via concentration in plants, invertebrates, and fish.

Other Non-game Birds:

Non-game birds severely impacted by loss of habitat due to agricultural development include species which are closely tied to the shrub/grassland or grassland habitat types for nesting or feeding. Some of these birds were mentioned in Chapter 2 and are listed by life form in Appendix 2-7. On the other hand, increased agricultural development would lead to different bird species and increased numbers of these birds. Birds which would show an overall increase in numbers due to increased agricultural development are species such as house sparrows, blackbirds, starlings, and barn swallows. Life forms 6 and 17, shown in Appendix 2-7, list those non-game species expected to increase.

Birds dependent upon the native desert/range habitat would show population declines should agricultural development occur. Aesthetically, these birds are pleasing to many people, and their population reduction would be a severe impact to this portion of the public. In addition, non-game birds could be an important prey source to raptors when rodent populations are low. Therefore, these birds act as an important buffer prey base. A decrease in their numbers could lead to decreased raptor production in years when rodent populations are low.

Riparian areas (totalling 55 miles on public land within the ES area) are also important to passerine (non-game) birds as nesting, feeding, and cover areas. Agricultural development around Foreman Reservoir (riparian area) would act to reduce non-game bird populations in this area. This area offers a good variety of habitat and supports a great diversity of breeding birds. Species such as warblers, flycatchers, and woodpeckers would be affected due to habitat destruction and increased human disturbance in this area. As previously mentioned there could be some new riparian habitat created downslope from agriculture areas where seepage resulted from irrigation water percolation.

Reptiles and Amphibians:

Because reptiles and amphibians have small home ranges and are very specific in their habitat requirements, species dependent upon the shrub/grassland habitat type would be severely affected. Species such as the Great Basin spadefoot toad, Western whiptail lizard, desert horned lizard, striped whipsnake, western rattlesnake, and the western ground snake would show an overall reduction in numbers.

Increased human activity and numbers of roads would lead to an increased level of reptile mortality due to direct persecution and road kills.

Because reptiles and amphibians constitute a partial prey base for some birds of prey (such as red-tailed hawks) as well as other predators, a decline in their numbers would force these predators to change their hunting habits. For this reason, an increased level of physical stress and energetic demand on these predators would result and numbers and production would decrease.

Sensitive Species:

Spotted Bat: Specific locations of spotted bats in the ES area are not known, but their distribution falls within the boundaries of this area. Because water developments would increase with increased agricultural development, more feeding areas would be available for this species. An increase in buildings, which are occasionally entered by spotted bats, would also be of benefit to these animals. Therefore, increased agricultural development would not present an adverse impact to this species and in some respects beneficial impacts would result.

River Otter: River Otters are tied to an aquatic habitat. Therefore, land conversion due to agricultural development would not directly affect this species. River fluctuations would not be significant enough to impact the otter. Principle fish species utilized for food by otters are not expected to be reduced by the proposed action.

Bobcat: Bobcats are most often found in areas which are not suitable for agricultural development, but they may range widely and need brushy areas for cover and hunting. For this reason, proposed agricultural development locations in the vicinity of rocky or canyon areas would adversely affect the bobcats range. In those areas the bobcat would find it hard to obtain a sufficient amount of food to survive, overall production would be reduced.

Another adverse impact to bobcats arises from human disturbance, causing stress to this solitary species. An increase in bobcat trapping pressure would also result due to increased human activity and easier human access to areas where bobcats exist. The above impacts would act to reduce bobcat populations in the ES area.

Trumpeter Swan: Increased agricultural development would have little or no impact on the Trumpeter Swan due to the limited numbers of these birds in the ES area and the very short time period they occupy this area.

Mountain Quail: Very little proposed agricultural development occurs in the range where mountain quail exist in the ES area. There are two proposed agricultural development "units" which border on the mountain quail range (see Map 2-6 with Overlay 1A and 1B). Therefore, land conversion resulting in brush removal in these "units" would prevent these birds from expanding their range and would put a limit on the total population.

Increased human activity and improved access to the area would tend to increase hunting pressure and stress on these birds. This could reduce their numbers.

Osprey: The osprey is tied to an aquatic habitat and needs trees for perch sites. For this reason little or no impact would result to ospreys since little or none of the riparian habitat on the Snake River would be disposed of for agricultural development. However, as with the bald eagle, occasional accidents and intense summer storms would bring pesticides and heavy metals into the aquatic food chain for eventual concentration in osprey tissue.

Merlin: Only 1.5 miles of existing riparian habitat would be lost due to agricultural development. For this reason merlins would loose only a small amount of trees for perch sites and hunting areas. An exception exists at Foreman Reservoir where proposed agricultural development threatens a small amount of riparian vegetation. Therefore, a reduction in merlin habitat would occur, resulting in decreased use of this area. As previously mentioned birds of prey, such as the Merlin, are quite sensitive to human disturbance. Increased agricultural development adjacent to riparian areas, such as Foreman Reservoir, would increase human disturbance and incur stress to this species. This could result in displacement and decreased survival rates for merlin.

Merlins could be slightly beneficially impacted from agricultural development by the development of trees along irrigation waste water drainages and around detention dams and ponds which would create additional roosting and feeding areas.

Ferruginous Hawk: Ferruginous hawks using the ES area for hunting and nesting would be severely impacted. Howard and Wolfe (1976) state that, "Unless modified to meet the hawks' biological requirements, the conversion of extensive tracts of native vegetation into monotypic stands--either as the result of large-scale brushland conversion programs or intensive agriculture--may reduce their densities and reproductive success due to: (1) increased disturbance; (2) loss of nesting sites; and (3) reduction of major prey populations."

"During the incubation period ferruginous hawks appear sensitive to human activity, and even slight disturbances may cause nest abandonment (Olendorff, 1973)." He also points out that "Ferruginous hawks seem to be more prone to nest desertion than others (hawks) during the early stages of nesting." A result would be a decrease in overall production.

A total of eight known traditional nesting sites would be lost due to development, and another 24 known traditional nesting sites would be in very close vicinity to proposed agricultural development. Loss of these nests within the ES area would cause a decrease in overall ferruginous hawk production during years when prey populations were sufficient to support these hawks in the subject area.

Loss of the shrub/grassland habitat type (47,285 acres of sagebrush/grass and 14,430 acres of salt-desert/grass under the proposed action) decreases rabbit populations and in certain instances has an indirect negative effect on ferruginous hawks which prey on rabbits. Another important prey component for these hawks in the ES area is the Townsend pocket gopher. Although this prey species is attracted to agricultural areas, it is generally protected by dense vegetation (as discussed in the non-game mammal section). This makes them insignificant as a prey source.

The overall result is a loss of prey species and hunting habitat. Therefore, there would be a decline in ferruginous hawk numbers.

Western Burrowing Owl: Impacts to the burrowing owl would be both adverse and beneficial. Zarn (1974) attributes the declines in Western burrowing owl population to "loss of burrow sites as a result of widespread burrowing mammal control activities, and direct loss of habitat to urban, industrial, and agricultural development." Although burrowing mammal control activities are detremental, habitat loss is most critical. Burrow availability operates as the major factor in controlling burrowing owl numbers (Zarn, 1974), and for this reason land conversion in areas where burrowing owls are known to occur would have an adverse affect. Five of the nine known burrowing owl areas would be destroyed by the proposed action farm development. Rodent control through poisoning, in addition to decreasing preferred burrowing owl habitat, could also result in secondary poisoning of owls. Although burrowing owls accept a relatively high level of human disturbance, they present an ideal target, and the amount of deliberate shooting would probably increase.

The beneficial impact to these owls would be an augmented insect food supply from cropland. However, adverse impacts to the burrowing owl would far outweigh beneficial impacts.

Long-billed Curlew: Curlews inhabiting the ES area would be adversely affected. A complete loss of nesting habitat due to land conversion would result in loss of all three curlew use areas known to occur within the ES area (see Map 2-6 with Overlay 1A and 1B). An estimated 10 to ]5 breeding pairs would be lost should the proposed action be implemented.

Where the curlews are not totally eliminated by loss of nesting habitat, adverse impacts would result from increased human activity. During incubation and in the early stages of chick development, the curlews need seclusion. Without seclusion, the parent birds would spend a great deal of their time off their nests in defensive displays. As a result eggs would over-cool or over-heat causing reduced overall production. The adult would spend an inflated amount of energy on nest defense, and overall production would be reduced. Another impact arising from increased human activity in areas occupied by curlews could be an increase in deliberate shooting of these birds. In nest defense, curlews "mob" or "swarm" intruders and present easy and tempting targets to some people.

The overall result of these impacts to curlews would be much reduced populations or perhaps total nonuse of this area by curlews.

Western Ground Snake: Impacts to the western ground snake would be adverse where its range overlaps with proposed agricultural development areas. Discussion of these impacts is the same as that of other reptiles and can be found under the Reptiles and Amphibians section.

Endangered Species:

Bald Eagle: Formal consultation under Section 7 of the Endangered Species Act of 1973 with the U.S. Fish and Wildlife Service was initiated on March 17, 1978. Of concern was the effect the proposed action would have on wintering bald eagles (an endangered species). After available information was analyzed and field examination completed, the U.S. Fish and Wildlife Service reached the opinion that the proposed action would not jeopardize the bald eagle. This was stated in a memorandum to BLM dated September 1, 1978.

Impacts Unique to the Proposed Transfer Methods

The two transfer methods being considered in the proposed action all have similar adverse impacts as previously discussed in this chapter. However, beneficial impacts may differ between these transfer methods.

As was pointed out in the proposed action and also in this chapter, wildlife habitat areas (totaling approximately 18,000 acres) would be retained within any agricultural development area. These leave areas would provide food and cover for those wildlife species that are attracted to agricultural areas. This would lead to an increase of pheasant, Hungarian partridge, and certain nongame species (as seen in Appendix 2-7, life forms 6 and 17) which would be a beneficial impact resulting from the proposed action.

The quality of the habitat on the isolated tracts would regulate the number of the wildlife that are increased by the proposed action. The transfer method used could significantly affect the quality of the habitat on the isolated tracts for the reasons described below.

Carey Act

The Carey Act allows monetary payment for wildlife mitigation as a part of the granting of the application. This payment is designed to be shared with livestock grazing mitigation and may be as high as $5.00 per acre. This money could help in fencing, vegetation, and water development projects on the isolated tracts. This would reduce the Federal Government's expenses regarding habitat improvement and protection.

The Carey Act requires that a residence be constructed on the farmed area. This could enhance habitat values in that most farms that have residences also plant vegetation other than agricultural crops. These windbreaks and ornamental plantings provide habitat for wildlife.

Desert Land Act

No monetary compensation or land use covenants are authorized under the Desert Land Act. Any habitat improvement or protection would be the total responsibility of the federal government.

Impact Summary

Implementation of the proposed action would result in the removal of up to approximately 130,015 acres of existing vegetation for agricultural development and public purpose tracts. Specifically, 61,715 acres of the shrub/ grassland habitat type would be lost,and 49,210 acres of the grassland habitat type would be lost. An additional amount of native vegetation, up to 19,000 acres, could be removed on the public purpose tracts not utilized for wildlife leave areas. Hunting, nesting, and cover areas used by wildlife in the ES area would be substantially reduced. This loss represents significant habitat alteration resulting in decreased numbers of native wildlife now occupying this area. Conversely, those wildlife species adapted to agricultural land would show population increases due to new production of this type of habitat.

On the mule deer winter range depicted on Map 2-6, 40 to 60 deer, or 8 to 12 percent, of the deer population using this winter range within the ES area would be displaced, and the population would subsequently be reduced. Other wildlife species which would show significant population declines in the ES area due to increased agriculture include pygmy rabbits; many small non-game mammals (which serve as an important prey source); sage grouse; most raptor species including the ferruginous hawk and the Western burrowing owl; native non-game birds including the long-billed curlew; and most reptiles and amphibians.

Sage grouse would lose one strutting ground due to land clearance and approximately 1,000 acres of nesting and wintering habitat. This would result in a loss of 20 to 50 birds. Agricultural development in the vicinity of three additional strutting grounds would disturb sage grouse using these areas.

The ferruginous hawk, a sensitive species, would lose eight traditional nesting sites due to agricultural land clearance. In addition, 24 traditional nest sites would be in close vicinity to agricultural development and areas of increased human activity. This would have a negative affect on birds using this area and would act to reduce numbers of this hawk using the ES area. Another sensitive species, the western burrowing owl, would likewise lose five of nine known active nesting burrows (due to land clearance) resulting in reduced numbers of this bird in the ES area.

Agricultural development in areas occupied by nesting long-billed curlews, also a sensitive species, would cause a loss of 10 to 15 breeding pairs and would significantly reduce the population within the ES area. In addition, increased human disturbance due to agricultural development near curlew nesting areas would disturb breeding birds and cause a reduction in reproductive success.

Wildlife significantly benefitting from increased agricultural development as dictated by the proposed action would include Hungarian partridges, ring-necked pheasants, house sparrows, starlings, and blackbirds. BLM would reserve about 18,000 acres of public land tracts among farm projects to be managed for pheasant habitat. With proper vegetation cover, these tracts would be expected to increase pheasant numbers significantly. Waterfowl would benefit by planting of an estimated 36,614 acres of cereal crops should the proposed action be implemented. For this reason, numbers of migrating waterfowl using the ES area could increase.

## Fisheries

Based on minimum flow requirements for three key fish species in the ES area (white sturgeon, smallmouth bass, and channel catfish), rearing flows for fish food production, and waterfowl nesting needs, Cochnauer (Idaho Fish and Game, 1976 and 1977) recommended maintenance flows ranging from 4200 CFS to 5500 CFS within the ES area. In 1978, the Idaho Legislature established an average minimum stream maintenance flow of 3300 CFS at the Murphy gage. This is considerably less than the 5500 CFS desired by the Idaho Fish and Game (IFG).

In average-flow years, the projected development would not reduce flows below the IFG recommendations for stream resource maintenance. In low-flow years such as 1977, mean flows in July and August would be 16 percent and 4 percent, respectively, below recommended flows. Low one-day flows would be below the IFG recommended flows for the entire period from May through September (25 percent below in June, 23 percent below in July, and 12 percent below in August).

The proposed project would reduce wetted perimeter available to aquatic life from Swan Falls to Bernard's Ferry by 26 percent in June, the worst condition in low-flow years (see Figure 3-1). The reduction in other areas would be less due to the different stream profile there.

Qualification terms are used in this section of Chapter 3 to mean the following: very slightly - between 0 percent and 1 percent; slightly - 1 percent to 5 percent; moderately - between 5 percent and 25 percent; heavily-between 25 percent and 100 percent.

White Sturgeon (Average Flow Years)

There would be no effect on sturgeon reproduction (spawning and incubation) since spawning takes place in portions of the cross-sectional profile not affected by the May flow reduction caused by the proposed action. The flow would remain above IFG recommended flows for spawning.

Flow reductions caused by the proposed action would not affect sturgeon movements. The projected flow regime would not fall below levels suited for fish passage.

There would be a slight decline in growth rates of adult sturgeon. Losses of wetted river perimeter caused by flow reductions would reduce habitat slightly for molluscs and crayfish, the most important foods of sturgeon. Losses of wetted perimeter would be only partly offset by increases in benthic invertebrates resulting from project related water quality changes (see Water Quality section). There would be a slight decrease in growth rate of larval and juvenile sturgeon between Hammett and Strike Pool.

There would be a slight increase in the mortality rate of eggs and larval sturgeon hence reduced abundance of young sturgeon above Strike Pool due to increased predation and entrainment in pump intakes. There would be no change in the mortality rate of adult sturgeon and no detectable change in the mortality rate of all sturgeon below Strike Dam. Reduced abundance of young sturgeon above Strike would eventually cause slight declines in abundance of adult sturgeon.

Because of the different shape of the stream cross-section in the reach below Swan Falls, the effects of the project on sturgeon growth are more serious there than in other reaches of the river. The decline in sturgeon growth in that area should be moderate in large sturgeon. Growth of small sturgeon would be reduced slightly there.

White Sturgeon (Low Flow Years)

There would be no effect on sturgeon reproduction. There would be a slight decrease in sturgeon movements as flows drop below IFG recommended levels.

There would be a slight decline in the growth rate of larger sturgeon as shallow night-forage areas are denied them during the growing season and molluscs, a large percentage of the sturgeon food base, are exposed to drying. There would be a slight to moderate decline in growth of larval sturgeon as invertebrate-producing areas are dewatered. In the reach from Swan Falls to Bernard's Ferry, the growth of all age classes of sturgeon would be reduced moderately because stream cross-section profile differs there. From Hammett to C.J. Strike, slight accumulation of bed load deposits in low-flow years should very slightly improve habitat for mollusc used by sturgeon, partly offsetting losses in invertebrate availability as wetted area decreases.

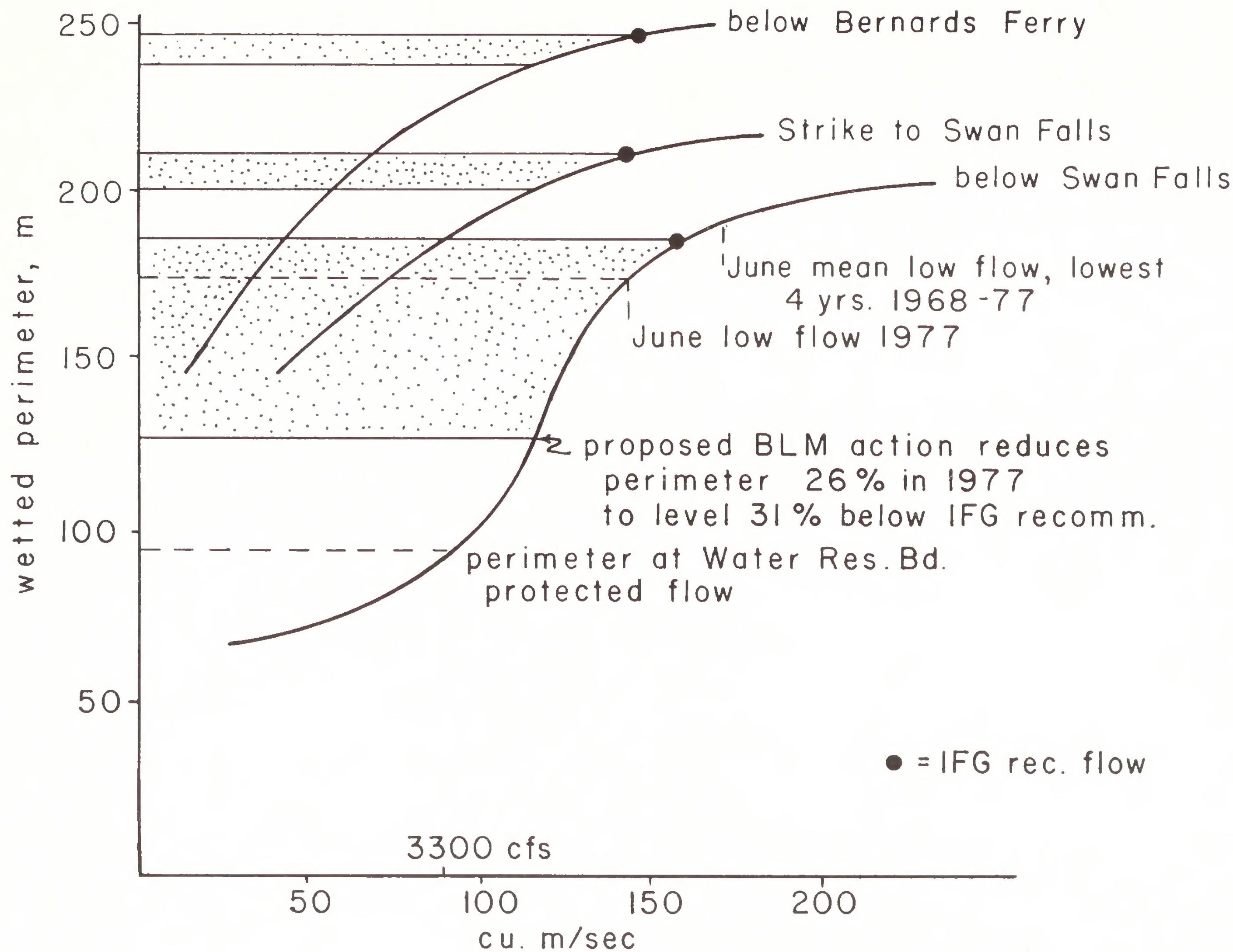



FIGURE 3-5. Wetted perimeter.

There would be a slight increase in mortality of embryos and small sturgeon as all fish species become concentrated by reduced flows (a condition more ideal for predators) and as pump intakes entrain more larvae above Strike Pool.

Other Fish Species (Average Flow Years)

A slight decrease in water depth, an improvement in water clarity, and an increase in plant and insect populations would slightly increase food available per unit area for most fish species above Strike Pool. It would also slightly improve hunting success of predaceous fish.

The flow regime would not affect fish migrations upstream or downstream. Reservoir populations of fish would not be affected by the projected development, except that in the upper portion of the Snake River arm of Strike Pool, channel catfish and smallmouth bass would enjoy slightly improved habitat quality.

Reduced wetted perimeter in reduced summer streamflows would slightly increase mortality in embryos and larvae of channel catfish, smallmouth bass, and black crappie. Channel-spawning species such as squawfish, whitefish, and suckers would not be affected.

Other Fish Species (Low Flow Years)

Reduced summer flows would slightly increase mortality in embryos and larvae of edge-spawners such as channel catfish, smallmouth bass, and black crappie as spawning and early-rearing areas are dewatered in June and July. Channel-spawning species would be slightly affected. Temperature triggered mortalities of whitefish would be slightly more likely in low-flow years.

Fish growth would be reduced slightly as the fish populations are concentrated by project-caused reduced flows in a reduced wetted perimeter. Food-producing areas would be lost and slightly more pressure placed on remaining food resources. Predator harvest of prey would increase slightly as prey populations are concentrated in the reduced stream area. Interactions for spawning sites would become slightly more severe as populations are concentrated by reduced flows. Interactions for available cover would become slightly more severe as fishes are confined to the reduced wetted stream area in the growing season. Slightly to moderately more fish would be entrained in pump intakes and lost in water-delivery systems. Lower flows caused by the proposed action would have no effect on migrations or movements up and downstream. Reservoir populations would not be affected except that channel catfish and smallmouth bass would have improved habitat quality.

Further Comments on Low-Flow Years

Smallmouth bass are the most prized warm water game fish in terms of total angler interest. Smallmouth bass would be most affected by projected water withdrawals. As noted in the discussion of minimum and recommended streamflows, a wetted-perimeter reduction for the area below Swan Falls would reach 26 percent in June in a low-flow year such as 1977 but only about 5 percent in usual low-water periods. Reductions in other reaches of the river would be less, as indicated earlier. But the reach below Swan Falls is heavily used by anglers and has been termed "the best warm water fishery in the ES area" (H. Pollard, personal communication). The lost wetted perimeter at low-water (26 percent) and less wetted cross-section would impact spawning in June and July. A reduction in water level at any time between mid-June and mid-July would strand smallmouth bass eggs, larvae, and fry. The net effect would be a moderate reduction in smallmouth numbers.

Black crappie also spawn in marginal areas in spring and would be expected to suffer reduced abundance in the quieter stream segments used by this species. Channel catfish, an important species in the reach below Swan Falls, would also decline slightly in abundance due to dewatering.

The best available estimate of food availability for young game fish is a function of the quantity of wetted perimeter of stream. The rapid decreases in wetted perimeter as flows decline below 5500 CFS in the Swan Falls-Bernard Ferry reach indicate that the populations of invertebrates would suffer from loss of living space, especially in low-flow years, and would be less abundant in total.

Since three of the major game fish species (smallmouth bass, channel catfish, and black crappie) spawn in shallow water at the time when substantial quantities of water are being withdrawn for irrigation, the area available for nest placement would be reduced as wetted perimeter drops. It is possible that bass and crappie would be able to find alternative sites, but channel catfish have specialized requirements for spawning sites (undercut banks, crevices, bank vegetation) and would be denied these areas as the water level drops.

As water flow declines, riparian vegetation becomes inaccessible to game fishes. The ecological balance would tend to shift toward non-game species as cover for game fish becomes less available over successive summers.

Feeding behavior of whitefish and suckers makes these species the most likely consumers (along with sturgeon themselves) of incubating sturgeon embryos which adhere to rocks in and below spawning areas. Flow reductions in June, during and just after sturgeon spawn, concentrate these fishes in parts of the channel profile in which sturgeon eggs lie. Sturgeon embryo survival would decline.

Reductions in smallmouth bass numbers as a result of several years of flow reductions at bass spawning time would reduce predator pressure on larval suckers, whitefish, and the larvae of the various members of the minnow family. The extent of this change is unknown and unpredictable.

Flow reductions in late spring and summer would have their greatest impact on those species which use stream edges for spawning and incubation. Suckers, squawfish, whitefish, trout, dace, and shiners spawn in channel areas less subject to edge loss. Of these species, squawfish, whitefish, and shiners all leave their eggs exposed and are subject to predation. Dewatering would impact embryos of trout, dace, and suckers (all of which bury their eggs) less than the other channel spawners.

Impingement and Entrainment

Mortality rates of fish eggs and larvae entrained in pump intake structures at conventional power plants are normally 40 to 100 percent with most plants resulting in the mortality of all eggs and larvae entrained (Marcy 1975). Most of the sources of mortality from entrainment could equally affect fishes entrained in the high-lift pumps that would be used in the proposed action in the Snake River. In addition, fishes that survive pumping but are stressed may subsequently become more vulnerable to predators.

Fish mortality at intake structures is typically most severe when water temperatures are below about 10°C when fish are sluggish. Since water withdrawals for the proposed project would commence in mid-April when temperatures would be about 15°C, temperature effect would not be significant.

Those fish species whose juveniles tend to school and/or inhabit shorelines near where pumping stations would presumably be located would be most vulnerable to pumping mortality. Channel catfish, black crappie, and bluegill (in that order) would be the species most vulnerable as reported elsewhere in the country (Mathur et al 1977, Freeman and Sharma 1977). Impacts are likely to be slight to moderate for those species. Other gamefish species, with the possible exception of white sturgeon, would not be impacted by entrainment or impingement. Too little is presently known of the distribution and behavior of juvenile sturgeon to predict how they may be affected.

Accidental Mortalities

Occasional and unpredictable overland flows of water from broken lines or from intense summer storms would carry pesticides, other toxicants, and fertilizer residues to the Snake River. Fish kills in localized areas would occur from time to time, but their magnitude cannot be estimated.

Fisheries Impacts Downriver from the ES area

Flow reductions below Hells Canyon on the Snake River would reduce the total water available for passage of downstream migrant smolt salmon and steelhead in the lower Snake and Columbia Rivers. Given present flow management regimes for flood control and power production, spill is virtually terminated at dams in the system. This means that juveniles pass almost entirely through turbines, suffering resultant mortality. The contribution of the ES proposed action to flow decline below Hells Canyon is very small as judged by flows at Anatone in the lower Snake.

A flow reduction in the lower Snake and Columbia Rivers would slightly increase water temperatures, subsequently impacting migrations of adult salmon and steelhead and slightly increasing disease potential. This flow reduction and temperature increase would contribute very slightly to the stresses suffered by migrating fish, both juvenile and adult. Any stress increment tends to make fish more susceptible to agents of mortality.

Flow reductions below Hells Canyon would have no discernible effect on resident species. Flows in the area already fluctuate drastically in a 24-hour period because Idaho Power Company operates turbines in response to peak demands. The wetted margin of the river often drops 5 feet vertically within a few hours, then increases again 12 to 24 hours later. These fluctuations are softened below the mouth of the Salmon River, yet persist to Lower Granite Pool near Lewiston.

Brownlee, Oxbow, and Hells Canyon Dams on the mid-Snake all have great storage capacities, and Idaho Power Company often manipulates these to hold spring storage water longer into the summer, minimizing flow changes from the present regime in downstream reaches.

The Corps of Engineers (USACE 1976) prepared an environmental review study which examined the effects of various levels of irrigation development on resident fish and water quality in the lower Snake River and Columbia River. Assuming a projected level of irrigation based on year 2020 estimates by federal and state sources, the Corps study indicates rather severe impacts on resident fish, water quality, and recreation under certain probable conditions of flow-impacts to which the proposed action would contribute slightly.

## Impacts Unique to the Proposed Transfer Methods

Due to the differences that the methods of land disposal (Carey Act versus Desert Land Act) impose on water quality impacts (as discussed in the Water Quality section of Chapter 3), the Carey Act method of disposal would have slightly less impact on fisheries than the Desert Land Act method of land disposal.

## Impact Summary

Significant adverse impacts upon fisheries would occur during low-flow years. During these low-water years mortality of larvae and embryos of edge spawners (channel catfish, smallmouth bass, and black crappie) would increase sharply. Reduced survival of edge spawners would eventually lead to a slight shift of the fish species mix toward channel spawners, and fish biomass in the ES area would move toward squawfish, suckers, shiners, and in a few locations toward trout. Overall losses in harvestable portions of game-fish stocks would amount to 5-25 percent as a result of the proposed action. Sturgeon would decrease slightly to moderately as growth and larval survival decrease due to loss of wetted stream area. Edge-spawning species (smallmouth bass, channel catfish, black crappie) would decrease slightly to moderately because of effects of reduced wetted stream area on reproduction, growth and survival.

Also of major significance would be the moderate decline in growth and moderate increases in mortality of the white sturgeon along with other game fish in a low-flow year due to predation. These would lead eventually to moderate declines in sturgeon abundance. These declines will take some time because sturgeon stocks consist of 50-70 year old age classes.

With the exception of sturgeon, most game fish stocks in the ES area have 5 to 6 year classes in the population (although a few older fish will always be present). Thus, if two low-flow years were to occur within 5 years, one-third of an edge-spawning population would be impacted by reductions in reproductive success and growth. Sturgeon stocks consist of many age classes, hence the impact of two low-flow years in a short period does not immediately alter the total biomass. Eventually, reduced growth and survival of sturgeon will lead to moderate declines in abundance.

Average-flow years would only slightly impact fisheries in the ES area. Slight increases in mortality of larval white sturgeon, channel catfish, smallmouth bass, and black crappie in the Snake River ES area would occur. Growth of these same species would decline slightly. Total abundance would decline slightly to moderately.

Even with settling ponds, occasional overland flows of water will occur from very intense summer storms or broken canals or pipes. These flows will occasionally carry toxic materials to the river, and localized fish kills of unpredictable severity will occur. Winds will also carry toxic materials (bound to soil particles) to the river with the same effects.

As part of the nibble effect of Columbia basin water withdrawals, reduced flows in the Snake River would slightly reduce environmental quality for anadromous and resident fishes below the ES area.

If the proposed action is taken, it will contribute to the demand for more electrical energy, helping to justify construction of additional hydropower or thermal generation stations, both of which could eliminate habitat for sturgeon and other game fishes in the Snake River ES area. Hydropower stations physically eliminate running-water habitat. Thermal plants usually use river water for cooling. More importantly, their use for stable levels of energy production leads to increased use of hydropower dams for peaking, leading to substantial water fluctuations with accompanying deterioration of fishery habitat.

Unknown quantities of Snake River fishes will be entrained in pump intakes and lost to the system. These may include preferred game fishes. Screening of pump intakes is not practical because of plant debris which will continually clog intakes.

## WILD HORSES

### Owyhee Herd

Public land within the Owyhee wild horse range that would be subject to agricultural development under the proposed action amounts to approximately 2,800 acres (two percent) of the total 156,600 acres used by the herd (see Map 2-7 and Overlays 1A and 1B). These 2,800 acres generally receive limited wild horse use in comparison with the remaining herd range due to poor forage condition, lack of water, and close proximity to roads and human activity. This 2,800 acre reduction in range is not expected to adversely affect herd size or restrict customary movements or habits of the horses.

New access roads associated with farm development may make the wild horses slightly more accessible to the public, thereby increasing the chances for harassment of the herd.

### Saylor Creek Herd

As mentioned in Chapters 1 and 2, the Saylor Creek wild horse herd will not be managed under a Wild Horse Management Plan (WHMP) until 1983. Until that time, decisions would have to be postponed as to whether or not to allow farm development on approximately 31,900 acres of the proposed action that is within the estimated present 103,200 acre herd range (see Map 2-7 and Overlays 1A and 1B). The WHMP will determine optimum herd size, designate specific herd range, and provide management practices to adequately protect, maintain, and manage the herd under the multiple use concept.

Until the Saylor Creek WHMP is completed, it is not possible to predict impacts of agricultural development on the herd. As BLM is obligated by law (Wild Horse and Burro Act) to insure protection and management of wild horses on public land, agricultural development could be precluded in areas devoted to herd management.

## CULTURAL RESOURCES

Implementation of the procedures required by law as outlined in the Statutes Restricting Farm Development section of Chapter 1 would substancially prevent adverse impacts to individual or cultural sites. BLM would conduct cultural and paleontological resource inventories prior to allowing farm development; it would consult with the State Historic Preservation Office and Heritage Conservation and Recreation Service and would seek comments from the National Advisory Council on Historic Preservation on National Register eligible properties.

Farm development under the proposed action of 111,015 acres would impact an undetermined number of the following known sites: 56 prehistoric sites, 3 historic sites, and 2 paleontological sites. Several of the prehistoric sites are in the proposed Saylor Creek Archaeological District which has been identified as meeting National Register Criteria of eligibility (see Appendix 1-3). No formal determination of eligibility has yet been made.

The basic beneficial aspect of the proposed action would be the accumulation of cultural data through survey and excavation necessitated by agricultural development, thus contributing to the knowledge of prehistory and history in the ES area.

In less than ideal situations, some cultural sites would be adversely impacted in spite of the mitigation contained in the proposed action. These less than ideal situations would include the following:

(1) Failure of the field archaeologist to detect the presence of a cultural site or some of its components, leading to gross under-estimation of the site's significance.

(2) Inadequate test excavation or salvage due to limited time and money, thus sacrificing some of the data contained in the site.

(3) Sanctioned site destruction following failure of the Advisory Council to confer National Register eligibility on a given site.

(4) Increased vandalism to cultural sites as a result of more people in the area and improved access, both established effects of the proposed action.

All types of sites found in the ES area would be vulnerable to adverse impacts in the situations described above. It cannot be determined how many of the known 61 sites and the yet undiscovered sites in the area of the proposed action would actually be adversely impacted.

The primary adverse impact on cultural resources must be described in terms of the resource as a whole. An undetermined portion of a nonrenewable finite resource base would be lost forever as a result of the proposed action, regardless of the situation fostering destruction. Salvage excavation itself is an adverse impact on those sites which must be salvaged.

## VISUAL RESOURCES

The visual setting of the ES area is characterized by extensive open spaces of sage covered rolling hills disected by the Snake River and smaller drainages. The visual resources are an integral part of the recreational opportunities enjoyed in the area.

All activities associated with farming modify the natural landscape. Vegetation conversion, new roads, transmission lines, buildings, pump stations, pipelines, canals, etc., all alter the visual resource. Impacts would occur both on-site from the conversion of rangeland to farming and off-site from various developments associated with farm development.

The Visual Resource Management (VRM) classes discussed in Chapter 2 and the Bureau of Land Management's Visual Resource Contrast Rating Manual 8423 were used to provide a basis for measuring impacts of the proposed action on the visual resources.

The most significant impacts of the proposed action occur on four areas: Oregon Trail and Kelton Road corridors, Hagerman Fossil Beds, Snake River corridor, and Morrow Reservoir (see Map 2-10). These are areas where the visual contrast of farming under the proposed action would exceed VRM objectives.

## Oregon Trail and Kelton Road Corridor

This area, including a corridor averaging 1 mile in width along the Oregon National Historic Trail and remnants of the Kelton Road has been designated as VRM Class I. The proposed action would eliminate 14,560 acres, or 38 percent, of this VRM Class I area. In addition, agricultural and associated developments would produce discordant visual impacts within and outside those portions of the corridors remaining after farm development. These visual impacts would be associated with farm structures, transmission lines, roads, and other developments which would be visible from or would cross remnants of the historic routes.

Secondary impacts would result from increased uncontrolled recreation use and vandalism due to additional road access and increased population associated with the farms. Such actions would adversely effect historic features and sightseeing opportunities.

## Hagerman Fossil Beds

The proposed action would result in the farm development of four forty-acre parcels of land within the boundary of the designated Hagerman Fauna Sites National Natural Landmark (proposed Hagerman Fauna Sites National Monument). Any farm development within this area which has been designated as VRM Class I would produce discordant visual impacts. As a result, the potential for future inclusion of 160 acres into the National Park System would be impaired.

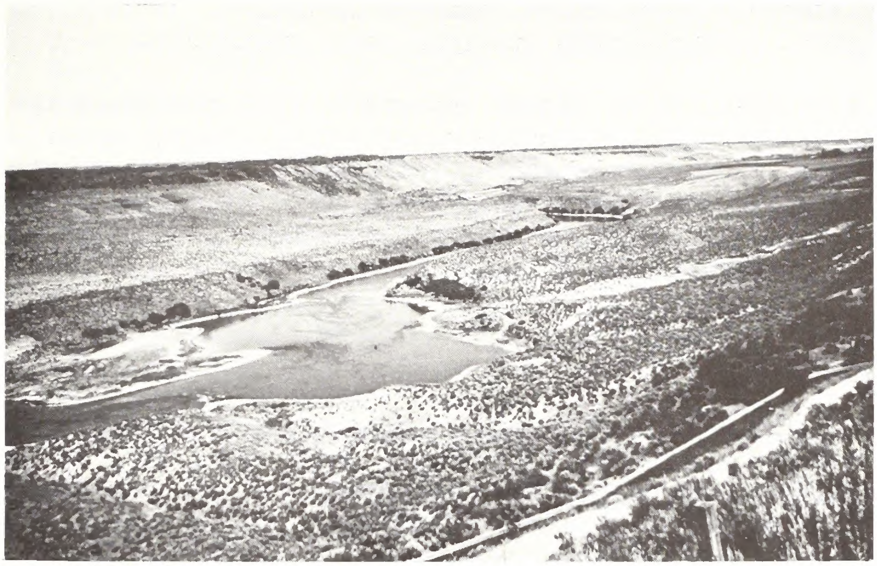
## Snake River Corridor

The proposed action would result in the construction of an undetermined number of irrigation pump stations along the Snake River. Modifications would include removal of natural vegetation, dredging of

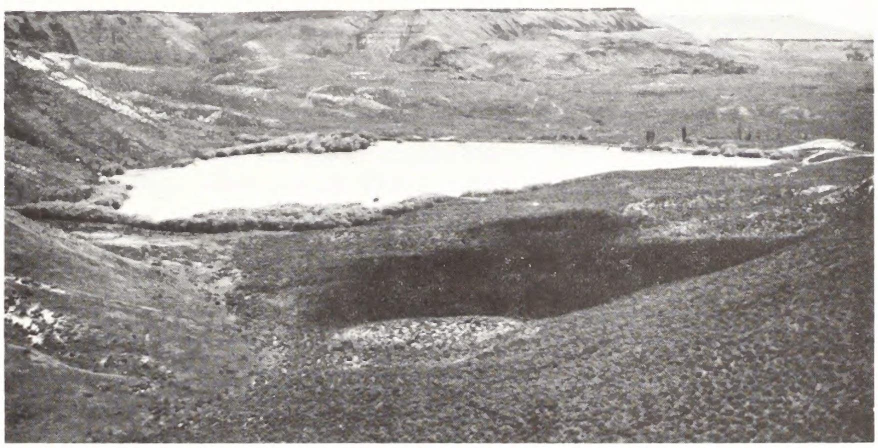
VRM Class I - Oregon Trail Route

VRM Class IV - Most common landscape found in ES area.

FIGURE 3-6. Visual Resource Management (VRM) Classes.



VRM Class II - Snake River Canyon near Bliss.



VRM Class II - Morrow Reservoir.

Figure 3-7. Visual Resource Management (VRM) Classes.

river shoreline, and construction of roads, pipelines, transmission lines, and pump stations. The visual resource contrast resulting from these developments would exceed the VRM objectives of this VRM Class II area at locations where pump stations were constructed.

The most descriptive visual impacts would occur where the canyon cliffs are viewed from recreation areas and by passing motorists from primary roads, i.e., Interstate 80 and Highway 30. Interstate 80, from Hammett to Bliss, was used by an average of 5,968 vehicles daily in 1977. Highway 30, from Bliss to Buhl, averaged 1,245 vehicles daily in 1977 (Idaho Transportation Department).

Morrow Reservoir

Proposed agricultural development would cover the majority of the Morrow Reservoir area which lies within a VRM Class II area (see Map 2-10 and Overlays 1A and 1B). Farm development would adversely affect scenic values and would exceed the VRM Class II objectives for the area.

Within the remainder of the ES area, farm development would occur on areas of low scenic value. Many individuals would consider it to be a pleasing scenic condition. Others would prefer to view the vast, open space sagebrush landscape in its unaltered condition.

In addition to the man-made developments discussed above, occasional dust storms caused by strong winds blowing across freshly plowed fields and smoke stubble burning would adversely effect scenic values during the spring and fall seasons.

## RECREATION

Within the ES area, 91 percent of the recreation use, exclusive of sightseeing, occurs along the Snake River for activities such as fishing, waterfowl hunting, boating, swimming, waterskiing, camping, and picnicking. The rangeland above the river is used for off-road vehicle activities, hunting, and rockhounding. In 1977, excluding sightseeing from roads, recreation use was estimated at 83,000 visitor days. During the same year, daylight motor vehicle use on primary and secondary roads amounted to 335,000 visitor days.

The proposed action could result in the loss of 111,015 acres of public land for recreation uses. Recreation opportunities on remaining adjacent public land could also be impaired due to some access being blocked by private land, farm fences, and obliterated roads although new farm related roads would likely create about the same access opportunity that was lost.

The effect of the proposed agricultural development upon recreation would vary by recreational activity. The most significant impacts would be on the sightseeing, ORV use, and hunting activities.

## Sightseeing

The proposed agricultural development would have substantial adverse impacts on the viewing and enjoyment of historic features. Farm development would destroy 12! miles of remnants of the Oregon Trail within the National Trails System and 4 miles of the historic Kelton Road, which is called the north alternate of the Oregon Trail by Dr. Merle Wells (Idaho State Historic Preservation Officer). In addition, public enjoyment of segments of the historic routes remaining after farm development would be impaired by views of modern intrusions associated with the proposed action (powerlines, roads, farm buildings, fields). Furthermore, increased road access and population growth (ranging from 581 to 986 people - see Socio/Economic section) associated with farm development would encourage inappropriate motorized recreation use of the historic routes and could result in historic site vandalism. Such use would decrease the quality of the historic sightseeing experience.

Developments associated with farm development, namely pump sites, would degrade sightseeing qualities along the Snake River, especially within those areas visible from highways. (See Visual Resource Section). Sightseeing use via boat would also be degraded by pump site developments contrasting with the natural river shoreline.

For the remainder of the ES area, farm development would have either adverse or beneficial effects on sightseeing, depending on the viewers point of view. Some find agricultural landscape pleasing, while others see greater value in desert scenery.

## Off-Road Vehicle Use

An estimated 60,400 acres of land within the proposed action areas are used by ORV enthusiasts. It is estimated that the affected acreage was used by 3,500 motorcyclists and 2,300 four-wheel drive enthusiasts during 1977.

Farm development would result in a displacement of this ORV use to other public land. This displacement along with farm associated road development and population increase could result in additional and more concentrated ORV use on nearby public land.

## Hunting

The wildlife section discusses impacts on wildlife species found in the ES area. Mule deer, sage grouse, and pygmy rabbit populations would be reduced by proposed action farm development. These species are pursued by hunters. Other game species that are hunted by sportsmen in the ES area would not be affected. These are principally mountain cottontail, coyote, bobwhite quail and chukar partridge.

A number of hunted wildlife species would likely increase due to enhanced habitat conditions. These would be California quail, Hungarian partridge, mourning doves, pheasants and certain waterfowl species. As part of the proposed action, about 18,000 acres of isolated tracts would be interspersed throughout the 111,015 acres of new farmland. These tracts would be managed to increase upland game bird numbers; principally pheasants. The tracts would have public access for recreational hunting. It is estimated that 18,000 acres of isolated wildlife tracts would generate 6,600 hunter days annually in the ES area (BLM Burley District 1979 survey estimates that each acre of isolated tracts equals .37 hunter days per season). This would generate $80,520 ($12.20 x 6,600 hunter days) expended by hunters using the isolated tracts if the value for a hunter day is used from the Chapter 2 Recreation section.

It is expected that some farmers would not allow public hunting on their land and some would. Farmland open to hunting would create an additional opportunity for sportsmen. Probably, isolated tracts would offer the better combination of habitat conditions to attract pheasants during the fall hunting period, however.

Certain species of waterfowl (see Chapter 2, Wildlife) feed on grain. Farmland open to hunting could give sportsmen a chance to field hunt for ducks and geese.

Overall, public hunting access on 111,015 acres of new farmland is impossible to estimate but there would be a net hunting gain in the ES area due to the isolated tracts program, and some farms undoubtedly would be left open for sportsmen.

## Rockhounding

Ten known rock collecting areas were identified within the ES area. Under the proposed action, an estimated 9 percent of these areas would be converted to privately owned farms which are often unavailable for public use.

If these disturbed rockhounding areas remained open to public use during those seasons when the land was not being actively farmed, a beneficial impact would occur since the vegetative removal and soil disturbance associated with farming would uncover collectable rocks.

## Water Based Activities

The proposed action impact on the Snake River fishery is expected to reduce harvestable game fish stocks (smallmouth bass, black crappie and channel catfish) from 5-25 percent depending on whether river flows are normal or low as in 1977 (see Fisheries section, impact summary). A reduction in the quality of fishery habitat would have a corresponding negative affect on fishing opportunities due to reduced fish numbers. It could be assumed that reduced sport fishing success caused by fewer fish would eventually diminish angling use of the Snake River.

Most camping and picnicking occurs along the Snake River and is associated with fishing, waterfowl hunting, and other water related activities. Therefore, any reduction of water related recreation opportunities during low-water years would have a corresponding effect on camping and picnicking opportunities.

Irrigation withdrawals would result in no impact on boating, water-skiing, and swimming during normal water years. However, during low-water years, adverse impacts may occur on the free-flowing sections of river due to reduced water flow. No impacts are expected on the reservoirs which accommodate the majority of these activities.

### Impact Summary

Proposed action farm development would destroy 12 1/2 miles of remnants of the Oregon Trail within the National Trails System and 4 miles of the historic Kelton Road. Farm development accompanied with an increase of road and better access would likely encourage inappropriate motorized recreation of these historic routes. Pump station development on the Snake River would degrade scenic quality. Farm development would displace about 60,400 acres of land currently used for ORV activities and force other public land to be used for this type of recreation.

There should be a net hunting gain in the ES area with new upland bird habitat created from agricultural land use and the BLM's wildlife isolated tracts program. During low water years, water based recreation (fishing, camping) on the free-flowing portions of the Snake River would diminish.

## WILDERNESS

The proposed action would result in no direct impact to wilderness resources.

Section 603 of FLPMA requires that all designated Wilderness Study Areas be considered unavailable to the development of farms, utility and access corridors, and other improvements which would impair their suitability for preservation as wilderness until Congress acts on the President's recommendation as to the suitability of the areas for designation of wilderness.

Implementation of the proposed action is expected to result in an increase in population of between 581 and 986 people within the ES market area (as described in Chapter 3, Socio-Economics). This increase in population could in turn result in some slight deterioration of wilderness characteristics within designated Wilderness Study Areas due to increased recreational use and increased particulate air pollution originating from farm projects and other developments. Control of such deterioration of wilderness characteristics is not considered feasible due to its random and dispersed nature.

A total of approximately 240 acres of land proposed for agricultural development is located within the proposed Wilderness Study Areas shown on Map 2-8. Development of these acres would be deferred until completion of the wilderness review process (see Chapter 1, Statutes Restricting Farm Development Under the Proposed Action).

## LIVESTOCK GRAZING

With implementation of the proposed action, 148,000 acres of farms and public purpose tracts would be interspersed throughout the 418,580 acres of public land within the ES area currently used for livestock grazing. Map 2-12 and Overlays 1A and 1B show the proposed development pattern in relation to present livestock grazing allotments.

The most apparent and significant impact associated with the proposed action would be the elimination of livestock grazing an approximately 146,380 acres of public land. Table 3-5 shows, by allotment, the 146,380 acres to be removed from grazing use and the associated 14,975 AUMs which would be lost per year as a result.

Table 3-6 further breaks down the 14,975 AUMs to indicate the approximate impact to the 127 individual livestock operators. Estimated AUMs to be lost within each allotment were proportionately distributed to all operators within the allotment (column 4). Reductions in licensed livestock grazing use similar to these preliminary estimates would be made by the BLM with implementation of the proposed action. To adjust to these reductions, each operator would have to either reduce operations accordingly, go out of business, or try to find another grazing location.

Customary trailing routes (other than reserved stock driveways shown on Map 2-12) would also be lost under the proposed action. Operators would have to truck their animals or take longer, less direct trailing routes. More operators may attempt to use the reserved stock driveways, however, these driveways are only 1/4 mile wide in some places and may not withstand much additional use.

Existing range improvements associated with livestock grazing within the ES area would no longer be effective. The proposed action would result in the loss of the use of as much as 87,085 acres of range grass seedings, 140 miles of fenceline, 18 miles of water pipeline, 9 cattleguards, 9 check dams, 8 water troughs, and 4 developed springs or wells owned by the BLM, plus other privately owned improvements. Compensation would have to be made by farm developers to the respective rancher or to the BLM for fair market value of authorized range improvements that would be removed (43 CFR 4120.66c).

The scattered land pattern of the proposed agricultural development would also pose problems. It would be difficult for operators to locate and keep track of their animals on the public land amongst the farms. Access would be limited in some areas, making it necessary for operators to take longer, less direct routes to reach public land within or on the other side of the ES area. Refer to Map 2-12 and Overlays 1A and 1B.

Some problems for the livestock operator may arise due to farm projects being located within and adjacent to grazing areas. Such problems that have occasionally occurred in the past around existing farms and could inadvertently occur with the proposed development include livestock trespassing onto farmland where fencing is inadequate or gates are left open; livestock becoming entangled in or injured by agricultural debris; and livestock ingesting toxic chemicals as the result of careless application and use of farm pesticides or fertilizers.

Overall, the total impacts resulting from the reduction in grazing use, scattered farm locations, and inadvertent interference of livestock operations from adjacent farm activity may be severe enough that for many operators it may no longer be physically nor economically feasible to graze livestock on the public land remaining amidst the farms. Because of this possibility effective grazing use may no longer be possible on all the public land left within the ES area after proposed action farm development. Therefore, up to a maximum of 41,397 AUMs on 418,580 acres could actually be lost to grazing among 127 operators rather than 14,975 AUMs on 146,380 acres.

TABLE 3-5

ACRES AND AUMs INCLUDED IN PROPOSED ACTION, BY ALLOTMENT

| Allotment | Public Land Included In Proposed Action (Acres) | (AUMs) | Public Land Within ES Area (Acres) | (AUMs) |
|---|---|---|---|---|
| Graveyard Point | 0 | 0 | 1,165 | 40 |
| Poison Creek | 0 | 0 | 450 | 25 |
| French John Area | 0 | 0 | 315 | 15 |
| Elephant Butte | 1,220 | 13 | 3,870 | 99 |
| River Group | 420 | 30 | 1,785 | 131 |
| Reynolds Creek Group | 2,430 | 109 | 4,255 | 239 |
| Black Mountain Field | 1,120 | 79 | 3,800 | 223 |
| Oreana #1 | 250 | 7 | 425 | 123 |
| Nahas Individual | 420 | 12 | 1,460 | 44 |
| Oreana #2 | 970 | 54 | 5,155 | 256 |
| Fossil Butte | 3,520 | 98 | 18,420 | 469 |
| Orenan #3 | 1,760 | 19 | 4,650 | 52 |
| Castle Creek, Winter | 4,800 | 240 | 23,330 | 1,188 |
| Battle Creek, Winter | 1,240 | 13 | 11,280 | 120 |
| Battle Creek. SpSuF | 600 | 30 | 6,245 | 312 |
| Tindall Northwest | 3,920 | 249 | 24,220 | 1,426 |
| Chalk Flat | 140 | 9 | 445 | 29 |
| Sunnyside, SpF | 460 | 32 | 755 | 53 |
| Hammett #1 | 600 | 150 | 9,645 | 2,176 |
| Hammett #2 | 2,200 | 302 | 2,800 | 400 |
| Hammett #3 | 320 | 27 | 640 | 67 |
| Hammett #4 | 11,910 | 1,454 | 42,670 | 5,782 |
| Hammett #5 | 80 | 9 | 900 | 101 |
| Saylor Creek | 108,240 | 12,039 | 249,900 | 28,027 |
| TOTALS | 146,380 1/ | 14,975 | 418,580 | 41,397 |

1/ Approximately 1620 acres of the total 148,000 acres of public land subject to development are not presently grazed.

SOURCE: BLM Boise District grazing case files and 1940, 1959, 1962, 1965 range vegetation surveys.

TABLE 3-6

AUMS INCLUDED IN THE PROPOSED ACTION AND WITHIN THE ES AREA, BY OPERATOR

| (1) Operator | (2) Allotment | (3) Active Grazing Quali-fications (AUMs) | (4) AUMs Included In Proposed Action | (5) AUMs Within ES Area | (6) Total AUMs in Boise District | (7) Percent of Local Operation Included in Proposed Action (AUMs) (Col.4÷Col.6) |
|---|---|---|---|---|---|---|
| R. Adolf | Saylor Cr. | 750 | 173 | 394 | 750 | 23 |
| Arkoosh & Zidan | Saylor Cr. | 2,070 | 467 | 1,087 | 2,070 | 23 |
| E. Ascuena | Saylor Cr. | 609 | 137 | 320 | 609 | 23 |
| E. Astorquia, Est. | Saylor Cr. | 3,108 | 700 | 1,630 | 3,108 | 23 |
| J. Barinaga & Sons | Saylor Cr. | 200 | 45 | 105 | 2,145 | 2 |
| H. Bass | Reynolds Cr. Group | 565 | 14 | 31 | 565 | 3 |
| J. Bass | Reynolds Cr. Group | 493 | 13 | 26 | 511 | 3 |
| P. Batruel | Hammett #4 | 62 | 14 | 55 | 62 | 22 |
| C. Berry | Saylor Cr. | 2,100 | 473 | 1,102 | 2,100 | 23 |
| A. Black | Saylor Cr. | 630 | 142 | 331 | 2,214 | 6 |
| J. Black | Battle Cr. SpSuF | 1,372 | 3 | 34 | 2,935 | 8 |
| | Saylor Cr. | 1,059 | 239 | 556 | | |
| P. Black | Castle Cr. W | 68 | 4 | 12 | 850 | 1 |
| | Battle Cr. SpSuF | 782 | 2 | 19 | | |
| T. Blackstock | Elephant Butte | 177 | 9 | 65 | 1,384 | 1 |
| S.D. Blackwell | Hammett #1 | 95 | 3 | 44 | 95 | 3 |
| S.S. Blackwell | Hammett #4 | 470 | 104 | 415 | 511 | 20 |
| W. Boston | Reynolds Cr. Group | 104 | 3 | 5 | 104 | 3 |
| R. Brailsford | Saylor Cr. | 283 | 64 | 149 | 283 | 23 |
| H. Brandau | River Group | 440 | 8 | 34 | 482 | 2 |
| | Black Mtn. Field | 42 | 1 | 2 | | |
| R. Brandau | River Group | 241 | 4 | 18 | 271 | 2 |
| | Black Mtn. Field | 30 | 1 | 1 | | |
| W. Brimson | Hammett #4 | 195 | 43 | 172 | 195 | 22 |
| R. Bruce | Poison Cr. | 172 | 0 | 10 | 719 | 0 |
| Bruneau Cattle Co. | Battle Cr. SpSuF | 5,649 | 13 | 134 | 6,819 | <1 |
| Burghardt Co. | Castle Cr. W | 275 | 15 | 71 | 3,446 | 1 |
| | Battle Cr. W | 276 | 13 | 120 | | |
| C. Carnahan | Saylor Cr. | 983 | 222 | 516 | 983 | 23 |
| I. Carnahan | Saylor Cr. | 198 | 45 | 103 | 198 | 23 |
| Chipmunk Grazing Association | River Group | 72 | 1 | 5 | 3,345 | <1 |
| | Black Mtn. Field | 877 | 14 | 40 | | |
| B. Collett | Castle Cr. W | 910 | 50 | 249 | 3,787 | 1 |
| Colyer Cattle Co. | Battle Cr. SpSuF | 3,395 | 7 | 81 | 4,135 | <1 |
| O. Cox | Fossil Butte | 93 | 4 | 19 | 5,170 | <1 |
| | Oreana #3 | 2,725 | 11 | 29 | | |
| C.T. Ranch Co. | Reynolds Cr. Group | 1,594 | 40 | 89 | 2,039 | 2 |
| | Black Mtn. Field | 376 | 6 | 18 | | |
| A. Curtis | River Group | 93 | 2 | 8 | 93 | 2 |
| Double Anchor Ranch | Hammett #4 | 404 | 90 | 357 | 3,616 | 3 |
| | Hammett #5 | 1,924 | 9 | 101 | | |
| Faulkner Land & Livestock | Saylor Cr. | 5,015 | 1,130 | 2,630 | 5,015 | 23 |
| Flying Triangle Inc | Saylor Cr. | 3,163 | 713 | 1,660 | 3,163 | 23 |
| Glenns Ferry Grazing Assn. | Castle Cr. W | 90 | 5 | 24 | 5,581 | <1 |
| Guery, Inc. | Saylor Cr. | 250 | 56 | 131 | 5,038 | 1 |
| Guthries Rancho Idaho | Tindall Northwest | 11,501 | 217 | 1,255 | 23,484 | 1 |
| Half Moon Ranch | Hammett #4 | 1,035 | 230 | 914 | 1,184 | 19 |
| W.B. Hall | Saylor Cr. | 998 | 225 | 524 | 998 | 23 |
| Hammett Lvstk Co. | Saylor Cr. | 6,480 | 1,461 | 3,400 | 10,852 | 14 |
| A. Harley, Jr. | Tindall Northwest | 960 | 18 | 100 | 960 | 2 |
| Hayland Ranches | Oreana #3 | 465 | 2 | 5 | 1,050 | <1 |
| E. Jaca | Reynolds Cr. Group | 244 | 6 | 14 | 2,691 | 2 |
| | Black Mtn. Field | 2,198 | 36 | 100 | | |
| J. Jewett | Saylor Cr. | 510 | 115 | 268 | 510 | 23 |
| C. Johnson | Saylor Cr. | 175 | 40 | 92 | 175 | 23 |
| S. Johnson | Saylor Cr. | 72 | 16 | 38 | 72 | 23 |
| C. Johnston | River Group | 293 | 5 | 22 | 370 | 2 |
| | Black Mtn. Field | 77 | 1 | 4 | | |
| G. Johnstone | Poison Cr. | 250 | 0 | 15 | 2,449 | 0 |
| L. Jolley | Saylor Cr. | 435 | 98 | 228 | 435 | 23 |
| Jones & Sandy Livestock | Saylor Cr. | 2,670 | 602 | 1,401 | 2,670 | 23 |
| S. Jones | Saylor Cr. | 150 | 34 | 79 | 150 | 23 |
| Joyce Livestock Co. | Oreana #1 | 966 | 5 | 80 | 7,212 | 1 |
| | Oreana #2 | 4,952 | 44 | 207 | | |
| | Fossil Butte | 1,069 | 47 | 220 | | |

TABLE 3-6 (Continued)

| (1) Operator | (2) Allotment | (3) Active Grazing Quali-fications (AUMs) | (4) AUMs Included In Proposed Action | (5) AUMs Within ES Area | (6) Total AUMs in Boise District | (7) Percent of Local Operation Included in Proposed Action (AUMs) (Col.4÷Col.6) |
|---|---|---|---|---|---|---|
| C. Kast | Hammett #4 | 242 | 54 | 214 | 242 | 22 |
| D. Keck | Saylor Cr. | 800 | 180 | 420 | 800 | 23 |
| R. Kerbs | Saylor Cr. | 2,338 | 525 | 1,228 | 3,103 | 17 |
| C. Keyan | Saylor Cr. | 135 | 31 | 70 | 135 | 23 |
| G. King | Castle Cr. W | 2,155 | 118 | 582 | 8,152 | 2 |
| Da. Kinyon | Saylor Cr. | 724 | 163 | 380 | 1,279 | 13 |
| De. Kinyon | Saylor Cr. | 949 | 214 | 498 | 949 | 23 |
| K. Kubik | Saylor Cr. | 480 | 108 | 250 | 480 | 23 |
| D. Lahtiner | Battle Cr. SpSuF | 1,224 | 3 | 28 | 1,224 | <1 |
| S. Leguineche | Saylor Cr. | 258 | 58 | 135 | 516 | 11 |
| S. Lehmann | Saylor Cr. | 682 | 154 | 358 | 682 | 23 |
| B. Malmberg | River Group | 90 | 2 | 7 | 90 | 2 |
| H. Markley | Graveyard Point | 113 | 0 | 40 | 785 | 0 |
| L. Maupin | Castle Cr. W | 250 | 13 | 71 | 2,454 | 1 |
| D. McGhehey | Chalk Flat | 2,068 | 8 | 25 | 3,246 | 7 |
| | Hammett #4 | 1,036 | 230 | 915 | | |
| R. McKee | Reynolds Cr. Group | 81 | 2 | 5 | 81 | 3 |
| C. McMahon | River Group | 489 | 8 | 37 | 615 | 2 |
| | Black Mtn. Field | 126 | 2 | 7 | | |
| E. Miller | Saylor Cr. | 904 | 204 | 474 | 1,784 | 11 |
| Miller Land Co. | Fossil Butte | 213 | 9 | 47 | 2,870 | <1 |
| J. Mills | Hammett #4 | 27 | 6 | 24 | 27 | 22 |
| R. T. Nahas | Nahas Individual | 1,463 | 12 | 44 | 9,520 | 1 |
| | Fossil Butte | 861 | 37 | 178 | | |
| | Oreana #3 | 1,677 | 6 | 18 | | |
| J. Nettleton | Black Mtn. Field | 1,133 | 18 | 51 | 3,304 | 1 |
| | Oreana #1 | 525 | 2 | 43 | | |
| | Oreana #2 | 1,133 | 10 | 49 | | |
| 9-K Ranch | Castle Cr. W | 481 | 26 | 131 | 2,933 | 1 |
| Noh Sheep Co. | Saylor Cr. | 315 | 71 | 165 | 1,586 | 5 |
| Patterson Land & Livestock Co. | Saylor Cr. | 625 | 141 | 328 | 625 | 23 |
| E. Perkins | Saylor Cr. | 2,100 | 473 | 1,102 | 2,100 | 23 |
| R. Pershall | Elephant Butte | 92 | 4 | 34 | 404 | 1 |
| F. Phelps & Sons | Hammett #1 | 1,632 | 57 | 827 | 1,769 | 3 |
| J. Potucek | Saylor Cr. | 411 | 92 | 216 | 411 | 23 |
| G. Presley | Hammett #1 | 1,207 | 42 | 609 | 1,310 | 3 |
| B. Pruett | Saylor Cr. | 413 | 93 | 217 | 413 | 23 |
| M. Quintana | French John Area | 38 | 0 | 15 | 2,383 | 0 |
| R. Ring | Saylor Cr. | 127 | 28 | 67 | 127 | 23 |
| R. Ross Estate | Hammett #4 | 390 | 87 | 344 | 420 | 21 |
| L. Rudge | Tindall Northwest | 390 | 7 | 43 | 390 | 2 |
| Russell Inc. | Hammett #4 | 240 | 53 | 212 | 392 | 14 |
| Salmon Falls Sheep Co. | Saylor Cr. | 1,560 | 352 | 819 | 1,560 | 23 |
| K. Seesee | Saylor Cr. | 383 | 86 | 201 | 383 | 23 |
| C. Sellman | Battle Cr. SpSuF | 325 | 1 | 6 | 679 | 1 |
| | Tindall Northwest | 354 | 7 | 28 | | |
| Mrs. T. Sphenk | Saylor Cr. | 8 | 2 | 4 | 8 | 23 |
| Simplot Livestock Company | Saylor Cr. | 3,048 | 687 | 1,599 | 17,728 | 4 |
| Sliman Sheep Co. | Saylor Cr. | 650 | 146 | 341 | 650 | 23 |
| J. L. Solosabal | Saylor Cr. | 1,080 | 243 | 567 | 1,080 | 23 |
| R. Steele | Saylor Cr. | 413 | 93 | 217 | 413 | 23 |
| C. Steiner | Fossil Butte | 26 | 1 | 5 | 2,160 | 1 |
| | Castle Cr. W | 168 | 9 | 48 | | |
| B. Stephens | Hammett #3 | 240 | 27 | 67 | 240 | 11 |
| Tews Angus Farms | Saylor Cr. | 101 | 23 | 53 | 10,546 | <1 |
| W. Thompkins | Reynolds Cr. Group | 1,239 | 31 | 69 | 1,254 | 3 |
| M. Thompson | Saylor Cr. | 1,794 | 404 | 940 | 1,794 | 23 |
| L. Trail | Saylor Cr. | 1,005 | 226 | 527 | 1,005 | 23 |
| 2-Plus Ranches | Hammett #1 | 1,398 | 48 | 696 | 2,678 | 12 |
| | Hammett #4 | 1,235 | 274 | 1,090 | | |
| Urquidi & Ocamica | Battle Cr. SpSuF | 366 | 1 | 10 | 2,398 | <1 |
| R. Viner | Hammett #4 | 473 | 105 | 418 | 539 | 20 |
| W. Walker | Hammett #4 | 588 | 131 | 519 | 588 | 22 |
| Wells Livestock Co. | Saylor Cr. | 200 | 45 | 105 | 4,931 | 1 |
| D. Wicher | Hammett #2 | 400 | 302 | 400 | 550 | 61 |
| | Hammett #4 | 150 | 33 | 133 | | |
| G. Withers | Chalk Flat | 333 | 1 | 4 | 333 | <1 |
| 20 Individual Operators | Sunnyside SpF | 25,275 | 32 | 53 | N/A | <1 |
| TOTALS | | 153,428 | 14,975 | 41,397 | | |

SOURCE: BLM grazing case files and 1940, 1959, 1962, 1965 range surveys.

Tables 3-5 and 3-6 show acres and/or AUMs of grazing use within the ES area for comparison with those strictly subject to development indicating the minimum and maximum losses possible under the proposed action. Column 6 shows the total number of AUMs for which each operator is licensed within the BLM Boise District. This gives an indication of sizes of total local operations. Column 7 of Table 3-6 shows approximate percentages of these local operations that would be lost strictly through loss of 146,380 acres of grazing land under the proposed action.

As a result of the proposed action, the figures in Column 7 of Table 3-6 show that at a minimum, out of 127 livestock operators, approximately 43 would lose more than 20 percent of their operation in the BLM Boise District; approximately 10 would lose 11-20 percent; and approximately 74 would lose 0-10 percent.

### Impact Summary

With implementation of the proposed action, livestock grazing would be eliminated on approximately 146,380 acres of public land within the ES area. An estimated 127 individual livestock operators in 24 allotments would lose a total of approximately 14,975 AUMs of associated grazing use per year. In addition, the use of a number of range improvements, including 87,085 acres of range grass seedings, 140 miles of fenceline, 18 miles of water pipeline, 9 cattleguards, 9 check dams, 8 water troughs, and 4 developed springs or wells owned by the BLM, plus other privately owned range improvements would also be lost.

Total cumulative impacts from reduced grazing use, scattered farm locations, and inadvertent interference of livestock operations from adjacent farm activity may be severe enough that for many operators it may no longer be feasible to graze livestock on the public land remaining amongst the farms. In some allotments, effective grazing use may no longer be made within the ES area. Therefore, up to a maximum of 41,397 AUMs per year could in effect be lost, rather than 14,975 AUMs.

## AGRICULTURE

The proposed action would add 111,015 acres of new farmland in three counties during the 1980s. Table 3-7 shows the amount of acres to be developed in each county and an estimate in acres of crops based on the assumed crop rotation discussed in Chapter 1, less three percent for non-crop areas on the farmland.

TABLE 3-7

ACRES OF CROPS BY COUNTY UNDER PROPOSED ACTION

| Crops | Elmore | Owyhee | Twin Falls | County Totals |
|---|---|---|---|---|
| Potatoes | 10,909 | 9,988 | 2,796 | 23,691 |
| Dry Beans | 10,412 | 9,533 | 2,669 | 22,615 |
| Winter Wheat | 8,429 | 7,717 | 2,160 | 18,306 |
| Barley | 8,429 | 7,717 | 2,160 | 18,306 |
| Sugar Beets | 8,429 | 7,717 | 2,160 | 18,306 |
| Alfalfa | 2,974 | 2,724 | 762 | 6,461 |
| Total Crops | 49,582 | 45,396 | 12,707 | 107,685 |

SOURCE: Table 1-2, Chapter 1

## MINERAL RESOURCES

### Locatables and Leasables

The mineral value of any tract of public land would be evaluated prior to making a disposal. Under the Desert Land and Carey Acts, land "mineral in character" cannot be disposed of unless valuable for leasables only (43 CFR 2520.08) in which case the leasable minerals would be reserved to the federal government. It can thus be presumed that valuable known locatable (diatomite and oolitic limestone deposits) and leasable minerals would be retained in federal ownership and therefore would be open to development. However, any undiscovered potentially valuable mineral deposits could be lost from development under a DLA or CA disposal.

### Salables

"Common variety" material (sand and gravel, common borrow) would be transferred to private ownership under the DLA and CA if located on land determined to also be suitable for agriculture. A major consideration of developing a large amount of desert land is the construction of a transportation network. Projecting from past history of desert land agricultural developments within the ES area, it can be assumed that there would be 1.7 miles of gravel road for each section of new farmland. Roads would be built to road district standards, with a 34-foot wide surface about 8 inches deep.

For 111,015 acres of additional farm development, approximately 300 miles of new road would be constructed, accounting for an estimated 1.3 million cubic yards of gravel. Assuming a hypothetical gravel deposit 2 yards deep, and accounting for waste rock and maintenance needs until paved or oiled roads are completed, it is estimated that between 200 and 300 acres of land would be required for gravel production. Gravel pits would be located on the 37,000 acres of public purpose tracts included in the proposed action. With proper reclamation, any land disturbed for gravel production would be only temporarily removed from other uses. The total area of land covered by 300 miles of road surface would be 1,236 acres, which in practical terms would be permanently removed from other uses.

## LAND USE PLANS, CONTROLS, AND CONSTRAINTS

As was mentioned in Chapter 2, all of the counties included in the ES area have developed land use plans; however, none of the counties have enacted any ordinances or restrictions which would implement the county plans. For the most part, county planning recommendations for land in the ES area are fairly broad, not site specific, and do not have restrictions on development of this land for intensive agricultural use. It should be pointed out that even though these plans were devised without the knowledge that large blocks of land within the ES area would be developed for agricultural use, future agricultural use was considered and in a broad sense planned.

Agricultural expansion under the proposed action should not impact the existing county plans. However, the support needs such as commercial, industrial, residential, and public service have not been planned for to meet the increase in demand (see Socio-Economic Impacts). Therefore, county land use plans would have to be updated and revised when farm development commences. It is the intent of BLM to coordinate closely with county agencies in updating their plans if the proposed action is implemented.

## TRANSPORTATION SYSTEMS

The amount of land used for roads and utility transportation systems would increase over what is now in existence. Based on the agricultural development of other land in the ES area, new roads would be the single largest change in land use except for the actual agricultural development. Based on existing farm developments in this area, 300 miles of new roads (encumbering 1,236 acres) would be required to serve the proposed farm areas. From 200-300 acres of public land would be needed as a source of material for road construction (see Mineral impacts).

Utility systems would also be increased, but, as in past development, these systems generally parallel existing or new roads and offer only a visual impact to the existing environment. It is not anticipated that any new large (greater than 245 kv) lines would be constructed in the ES area as a result of agricultural development.

## SOCIO-ECONOMIC CONDITIONS

The impacts depicted in this section are generated from a combination of the highest crop prices (1976 Normalized) and the lowest energy prices to irrigators (16.5 mills) as shown in Table 3-8. These high crop prices and low energy prices would be the most favorable circumstances for farmers under the proposed action. Most other combinations of crop and energy prices illustrated in Table 3-8 do not yield positive farm incomes.

The change in earnings and employment discussed in this section was analyzed with the aid of BLM's Dynamic Regional Analysis Model (DYRAM) as shown in Appendix 3-1.

Loss of ranch workers and ranch income was based on the total elimination of livestock grazing in the ES area, once farming was completely established under the proposed action. With such circumstances, 418,580 acres of public land would be closed to livestock grazing. This would represent the worst case situation for livestock operators in the ES area.

### Carey Act

The development of 111,015 acres would result in 347 farm units. At the same time, 418,580 acres would be closed to livestock grazing.

The primary employment impacts would be an addition of 347 farmers and a loss of 31 ranch workers. Assuming the highest crop returns and the most favorable energy costs, gains in the farm sector would create secondary impacts of an additional 53 employees in the farm sector and 66 in the remainder of the market area economy. The decrease in the livestock industry would result in an additional 14 jobs lost. Total employment changes by industry are shown in Table 3-9. The major impacted industries are wholesale and retail trade and services. However, all the sectors of the economy would be affected.

By the year 2000 the labor force would be 70 percent higher than in 1975. The proposed action would slow down the projected decrease in agricultural employment (Idaho Department of Water Resources, 1978).

As a result of the proposed action, the maximum increase in population in the market area would be 986. This was based on 1975 employment to population ratios.

TABLE 3-8

NET FARM INCOME AND
INCOME PER ACRE FOR A 320 ACRE FARM

| Crop Prices / Energy Prices | | B.C. Imports 16.5 Mills Per KWH | New Plant Participation 17.7 Mills Per KWH | Average 18.8 Mills Per KWH | Sale on IPC System 20.0 Mills Per KWH | Sale as Surplus 21.0 Mills Per KWH |
|---|---|---|---|---|---|---|
| 1976 Normalized | Net Farm Income | +$ 6,820.46 | +$ 5,422.86 | +$ 4,141.72 | +$ 2,744.12 | +$ 1,581.45 |
| | Income Per Acre | +$ 22.00 | +$ 17.49 | +$ 13.36 | +$ 8.85 | +$ 5.10 |
| 1977 Normalized | Net Farm Income | -$10,541.77 | -$11,939.37 | =$13,220.51 | -$14,618.11 | -$15,780.78 |
| | Income Per Acre | -$ 34.01 | -$ 38.51 | -$ 42.65 | -$ 47.16 | -$ 50.91 |
| 1977 Actual | Net Farm Income | -$28,049.39 | -$29,446.99 | -$30,728.13 | -$32,125.73 | -$33,288.40 |
| | Income Per Acre | -$ 90.48 | -$ 94.99 | -$ 99.12 | -$ 103.63 | -$ 107.38 |

1/ Average location of farm under the proposed action, i.e., 650 ft. above Snake River and 4-6 miles pumping distance.

SOURCE: Idaho State Office, BLM, 1979

TABLE 3-9

EMPLOYMENT CHANGES

NUMBER OF JOBS

CAREY ACT

| Industry | Due to Livestock Loss | Due to Agriculture Gains | Total |
|---|---|---|---|
| Agriculture | | | |
| Livestock (exc. Dairy-Poultry) | -33 | 6 | -27 |
| Other Agriculture | 0 | 100 | 400 |
| Mining | | | |
| Metal | - | - | - |
| Coal | - | - | - |
| Oil and Gas | - | - | - |
| Other Mining | - | - | - |
| Contract Construction | - | 5 | 5 |
| Manufacturing | | | |
| Food & Kindred Prod. | -2 | 6 | 4 |
| Lumber and Wood Prod. | - | 2 | 2 |
| Paper and Allied Prod. | - | - | - |
| Petroleum Refining | - | - | - |
| Primary Metals | - | - | - |
| Other Manufacturing | -3 | 3 | - |
| Transportation & Communication | -1 | 5 | 4 |
| Public Utilities | - | 1 | 1 |
| Wholesale & Retail Trade | -2 | 16 | 14 |
| Finance, Ins., & Real Estate | -1 | 3 | 2 |
| Services | -1 | 10 | 9 |
| Government | | | |
| Federal | - | 6 | 6 |
| State & Local | - | 4 | 4 |
| Acre Summary | -44[a] | 466[a] | 421[a] |

Source: Bureau of Land Management, Idaho State Office, Dynamic Regional Analysis Model (DYRAM), January 1979

a) Numbers may not add to totals due to rounding.

The following table describes the new population by age group:

TABLE 3-10

AGE BREAKDOWN OF NEW POPULATION

CAREY ACT

| Age Group | Number |
|---|---|
| 75 years | 102 |
| 5-17 years | 283 |
| 18-29 years | 276 |
| 30-44 years | 192 |
| 45-64 years | 100 |
| 65 + years | 33 |
| | 986 |

SOURCE: Idaho State Office, BLM, U.S. Department of Energy, 1978

Representative farm budgets were prepared by the Idaho Department of Water Resources (see Appendix 3-2).

The farm budget data is based on a 320-acre farm of which 310 acres are considered irrigable. The crops grown are potatoes, barley, winter wheat, alfalfa, dry beans, and sugar beets. The data is presented so that pre-tax net returns per acre may be calculated. The budget prepared by the Idaho Department of Water Resources relies on 1976 normalized prices (1977 custom harvesting production prices) and an electricity rate of 18.8 mills per KWH (Kilowatt hour). This rate was the average of the four scenarios developed in the energy section. The complete budget may be found in Appendix 3-2.

Table 3-8 presents fifteen possible combinations of pre-tax net returns based on three crop returns and five energy costs. With 1976 normalized crop prices, net farm income would range from $6,820 to $1,581. It should be noted that the poverty level for a farm family of four is $5,270 (U.S. Department of Labor 1978). The reader should be cautioned that the net returns are very sensitive to changes in energy prices and to changes in crop price returns.

Table 3-8 shows that only under the most favorable conditions would a 320-acre farm provide an income sufficient to be considered above the poverty level.

Assuming the worst case situation and the fact that ranchers in the ES area normally use an average of 92 percent of their grazing privileges they would lose 38,085 AUMs as a result of the proposed action. An AUM in the ES area is worth approximately $10.86 in income to the ranchers. (Livestock earnings in the ES market area in 1974 totaled approximately $34,510,000. Dividing total earnings by the total number of AUMs of forage consumed in the region yielded a per AUM average earning of $10.86). Thus, ranchers would annually lose approximately $414,000 in direct income.

Four scenarios were analyzed for secondary impacts: 1) Net farm income of $6,820.46 per farm, 2) Net farm income of $1,581.45 per farm, 3) Net farm income of - $28,049.39 per farm, and 4) Net farm income of - $33,288.40 per farm. These are the four extreme cases of the previous analysis involving energy costs and crop returns.

In the first case, earnings in the market area would increase by slightly more than $4 million. Both the livestock sector and the remaining agriculture sector would gain as do all the others. In the second case, the livestock and the food processing sectors would lose earnings. Under the third and fourth cases all sectors in the economy would lose earnings through secondary impacts, the difference between the two being a matter of degree. Case four presents more severe losses (see Table 3-11).

Implementation of the proposed action would lead to an increase of approximately 283 children in the 5-17 age group and an increase of 255 new school pupils - 184 elementary, 71 high school. These students would require 22,080 square feet of elementary classroom space and 10,650 square feet of high school classroom space (U.S. Department of Energy, 1978). If sufficient space were not available in the market area, it would cost roughly $1.1 million dollars to build the necessary space. Table 3-12 shows how the counties would be impacted (see Appendix 3-3 for methodology).

Total public capital costs that may be required could reach a maximum of $2.8 million. It is anticipated that public costs would be below this figure. Under 1977 average mill levys, the three counties in the ES area would receive $1.8 million in property taxes (see Appendix 3-4). The counties would not obtain these revenues until the land is deeded to the applicant (up to ten years after CA entrymen have commenced development).

## Desert Land Act

The number of acres developed into farms and the number of acres taken out of livestock production would be the same as under the Carey Act. Due to the lack of a residency requirement under the DLA, it is estimated that only 10 percent of the farms would have resident owner/operators. The remainder of the farms would have non-resident owner/operators who maintain their residence somewhere in the market area. The returns per acre for farming would be the same as under the Carey Act; the net farm income would double from that shown in Table 3-8.

The primary employment impacts would be an addition of 174 farmers and a loss of 31 ranch workers. Since secondary employment impacts are based on earnings, they would be the same as under the Carey Act. Total employment changes by industry are shown in Table 3-13. The major impacted industries are wholesale and retail trade and services. However, all the sectors of the economy would be affected.

By the year 2000 the labor force would be 69 percent higher than in 1975. The proposed action would slow down the projected decrease in agricultural employment (Idaho Department of Water Resources 1978).

As a result of the proposed action the maximum increase in population in the market area would be 581. This was based on 1975 employment to total population ratio.

TABLE 3-11

CHANGES IN EARNINGS FOR MAJOR

ECONOMIC SECTORS AND FOR THE

ES MARKET AREA

(000's)

| INDUSTRY | CASE 1 | CASE 2 | CASE 3 | CASE 4 |
|---|---|---|---|---|
| Livestock | $ 58 | $ -4 | $ -223 | $ -320 |
| Other AG. | 3,379 | 799 | -3,718 | -5,563 |
| Food & Kindred | 28 | -10 | -142 | -202 |
| Wh & Ret. Trade | 121 | 12 | -214 | -312 |
| Services | 107 | 16 | -209 | -304 |
| Other Industries | 315 | 35 | -1,688 | -2,518 |
| Total | $ 4,108 | $ 848 | $ -6,194 | $-9,219 |

Source: Idaho State Office, Bureau of Land Management, 1979

TABLE 3-12

IMPACTS RESULTING FROM
THE CAREY ACT

| | Owyhee | Elmore | Twin Falls | Canyon | Area Summary |
|---|---|---|---|---|---|
| Workers | 156 | 171 | 45 | 49 | 421 |
| Population | 366 | 400 | 106 | 114 | 986 |
| Children | 105 | -15 | 30 | 33 | 283 |
| **School Children** | 95 | 104 | 27 | 30 | 255 |
| Elementary | 68 | 75 | 20 | 21 | 184 |
| High School | 26 | 29 | 8 | 8 | 71 |
| Elem. Sq. Ft. | 8,192 sq ft | 8,964 sq ft | 2,363 sq ft | 2,561 sq ft | 22,080 sq ft |
| H.S. Sq. Ft. | 3,951 sq ft | 4,324 sq ft | 1,140 sq ft | 1,235 sq ft | 10,650 sq ft |
| Cost of School Construction | $412,923 | $451,878 | $119,091 | $129,108 | $1,113,000 |
| Cost of School Furnishings | $ 49,543 | $ 54,216 | $ 14,289 | $ 15,490 | $ 133,538 |
| Number of Teachers | 4 | 5 | 1 | 2 | 12 |
| Health Care Personnel | 4 | 5 | 1 | 2 | 12 |
| Fireman & Policeman | 2 | 3 | 1 | 1 | 7 |
| Cost of Public Facilities | $536,480 | $587,092 | $154,726 | $167,741 | $1,446,039 |
| Maximum Total Public Capital Costs | $1,039,323 | $1,137,373 | $299,751 | $324,964 | $2,801,411 |

Source: U.S. Department of Energy, 1978 and Idaho State Office, Bureau of Land Management.

Note: Numbers may not add up to totals due to rounding.

TABLE 3-13

EMPLOYMENT CHANGES
NUMBER OF JOBS
DESERT LAND ACT

| Industry | Due to Primary Livestock Loss | Due to Primary Agricult. Gain | Total |
|---|---|---|---|
| Agriculture | | | |
| Livestock | -33 | +6 | -27 |
| Other Agriculture | 0 | +227 | +227 |
| Food and Kindred | -3 | +6 | +3 |
| Wholesale & Retail Trade | -3 | +16 | +13 |
| Services | -1 | +10 | +9 |
| Other | -5 | +28 | +23 |
| Total | -45 | +293 | +248 |

SOURCE: Idaho State Office, Bureau of Land Management, Dynamic Regional Analysis Model, January 1979.

The following table describes the new population by age group:

TABLE 3-14

AGE BREAKDOWN OF NEW POPULATION
DLA

| Age Group | Number |
|---|---|
| 75 years | 60 |
| 5-17 years | 166 |
| 18-29 years | 163 |
| 30-44 years | 113 |
| 45-64 years | 59 |
| 65 + years | 20 |
| | 581 |

SOURCE: Idaho State Office, BLM, U.S. Department of Energy, 1978.

The change in earnings in the market area would be the same with the Desert Land Act as with the Carey Act.

Implementation of the proposed action via provision of the Desert Land Act would lead to an increase of approximately 166 children in the 5-17 age group. This would mean an increase of 150 new school pupils - 108 elementary and 42 high school. These students would require 12,960 square feet of elementary classroom space and 6,300 square feet of high school classroom space (U.S. Department of Energy 1978). If sufficient space were not available in the market area, it would cost roughly $763,000 to build the necessary space. Table 3-15 shows how the counties would be impacted.

Total public capital costs that may be required could reach a maximum of $1.4 million. It is anticipated that public costs would be below this figure. Revenues received by the counties would be the same as with the CA.

## Social Values

It is anticipated that approximately 40 percent of the DLA and CA applicants would be ranchers or farmers and that most of the applicants would be from Idaho or other rural areas. They would hold the same values as the existing residents. The result would be little change in lifestyle. The role of the schools and churches would be strengthened slightly. Some new organizations would develop as population increases. These would be farm related. There would be little attitude change by residents towards their social well-being as they feel that they have a lifestyle better than the more urbanized people. The increased number of "like-kind" residents would tend to solidify this type of lifestyle.

The increase in the number of groups would further fragment the power structure in the ES counties. There may be some resentment by current area residents toward new-comers. Increased farm competition may also cause some resentment between current residents and new-comers.

## Crop Prices

An example of what the proposed action development could do to the crop price of potatoes is discussed below. This is based on a demand elasticity study (George and King, 1971).

Over the first five years of the proposed action nationwide prices paid to farmers for potatoes could drop as much as 34 percent if all other factors remain equal (consumer demand, production costs, no other new land being developed, etc.). According to the representative farm budget, close to 7.5 million hundred weights of potatoes will be produced in the ES area (see Table 3-16).

TABLE 3-15

DESERT LAND ACT
LOCAL SERVICES

| | Owyhee | Elmore | Twin Falls | Canyon | Area Summary |
|---|---|---|---|---|---|
| Workers | 84 | 91 | 24 | 49 | 248 |
| Population | 196 | 214 | 56 | 115 | 581 |
| Children(5-17 yrs) | 56 | 61 | 16 | 33 | 166 |
| **School Children** | 51 | 55 | 14 | 30 | 150 |
| **Elementary** | 36 | 40 | 11 | 21 | 108 |
| **High School** | 14 | 16 | 4 | 8 | 42 |
| Elem Sq. Ft. | 4,368 | 4,769 | 1,257 | 2,566 | 12,960 |
| H.S. Sq. Ft. | 2,123 | 2,318 | 611 | 1,247 | 6,300 |
| Cost of School Construction | $220,681 | $240,981 | $ 63,520 | $129,658 | $654,840 1/ |
| Cost of School Furnishings | $ 26,481 | $ 28,918 | $ 7,622 | $ 15,559 | $ 78,581 |
| Cost of School Land | $ 9,887 | $ 10,796 | $ 2,846 | $ 5,809 | $ 29,337 |
| Number of Teachers | 2 | 3 | 1 | 1 | 7 |
| Health Care Personnel | 2 | 3 | 1 | 1 | 7 |
| Fireman and Policeman | 1 | 1 | 0 | 1 | 4 |
| Cost of Public Facilities | $ 7,696 | $ 8,404 | $ 2,215 | $ 4,522 | $ 22,838 |
| Total Public Capital Costs | $487,061 | $531,865 | $140,193 | $286,166 | |

Source: U.S. Department of Energy 1978 and Idaho State Office, Bureau of Land Management.

Note: Numbers may not add up to total due to rounding.

1/ All dollar figures are in constant 1975 dollars.

TABLE 3-16

POTATO PRODUCTION AND PRICES

| Year | Cumulative Acres | Cumulative CWT | National Price |
|---|---|---|---|
| 1 | 4,738 | 1,492,470 | $2.63 |
| 2 | 9,476 | 2,984,940 | $2.48 |
| 3 | 14,214 | 4,477,410 | $2.27 |
| 4 | 18,952 | 5,969,88 | $2.02 |
| 5 | 23,690 | 7,462,350 | $1.74 |

SOURCE: Idaho State Office, Bureau of Land Management, 1979.

If the base price was $2.70 per hundred weight i.e., the 1977 actual price, in five years the price could drop to $1.74 per hundred weight.

Impact Summary

Carey Act

Implementation of the proposed action via provisions of the Carey Act would lead to increased employment by 421 jobs and an increase in population of 986. Total earnings could increase as much as $4.1 million. There would be 283 more school children which would require 12 new teachers. The increased population would require 12 additional health care personnel and 7 additional firemen and policemen. The cost of required public facilities could be as much as $1.5 million, and the total public capital costs could reach $2.8 million.

Desert Land Act

Implementation of the proposed action via provisions of the Desert Land Act would lead to increased employment by 248 jobs and an increase in population of 581. Total earnings could increase as much as $4.1 million. There would be 150 more school children which would require 7 new teachers. The increased population would require 7 additional health care personnel and 4 additional firemen and policemen. The cost of required public facilities could be as much as $852,000 and the total public capital costs could reach $1.4 million.

## ENERGY

The energy impacts of the proposed action were assessed by estimating the amounts of various energy forms that would be consumed by the proposed action and then analyzing the impact that this consumption would have on future demand, supply, and cost. An evaluation of total per-acre and farm unit energy consumption as well as an analysis of the energy input and output for various crops was also performed.

## Electrical Energy

Estimation of Electricity Use

Direct Consumption: The calculation of electrical consumption for the proposed action was based primarily upon a determination of lift heights and distances from the river for the parcels of land that make up the proposed action.

Through a combination of contour lines and distance lines from the river, the ES area was divided into a lift height/distance grid such that for any particular parcel of land the closest distance to the river and the lift height from that point in the river could be determined. The number of acres for each combination of lift height and distance was then totaled. Distance intervals ranged from between 0-2 miles up to 16-18 miles from the river; lift heights ranged from 0-100 feet up to 1,300-1,400 feet (see Appendix 3-5, Table A). Out of approximately 99,000 acres assumed to be irrigated out of the Snake River (see Appendix 3-5 and Table 1-3, Chapter 1) the median distance was 6 to 8 miles from the river and 600 to 700 feet of lift.

For the approximately 11,000 acres assumed to be irrigated out of wells, existing well data was studied to determine a reasonable estimate of lift height to assign to wells. Well pumping depths in the central portion of the ES area range from 0 to over 350 feet; 100 feet was taken as an approximate average depth. All well-irrigated land was therefore evaluated on the basis of a 100-foot lift and zero distance from the water source.

Including well-irrigated land, the median lift height and distance for all acres in the proposed action would be 600-700 feet and 4-6 miles from the water source.

With the estimated lift heights and distances for all land in the proposed action, it was possible to calculate the per-acre energy consumption for each lift height/distance combination, given assumptions numbers 9, 10, 11, 12, and 13 at the beginning of this chapter.

Using the "average year" assumed diversion of 2.58 acre-feet/acre and corresponding monthly distribution (see Chapter 2, Energy), the per-acre energy requirement (in KWH/acre) was calculated by month and for the whole season for each lift height/distance combination. The seasonal energy requirements per acre range broadly, from 939 KWH/acre for land with the lowest lifts and closest to the river to over 6,600 KWH/acre for land with a lift of 1,300-1,400 feet and 10-12 miles from the river (See Appendix 3-5, Table B).

The electricity consumption for land with median lift height and distance (600-700 feet, 4-6 miles) is 3,478 KWH per acre. About 87 percent of the land to be irrigated out of the river has a higher per-acre electricity requirement than the 1977 average of 2549 KWH per acre

Table 3-17

WATER DISTRIBUTION - AVERAGE AND WORST CASE YEARS

| | Average Year Water Application | | Worst Case Year Water Application | |
|---|---|---|---|---|
| | % | Acre Feet | % | Acre Feet |
| April | 4 | .10 | 6 | .21 |
| May | 10 | .26 | 12.5 | .44 |
| June | 23 | .59 | 24.5 | .86 |
| July | 27 | .70 | 22.5 | .79 |
| August | 21 | .54 | 19.1 | .67 |
| September | 12 | .31 | 11.4 | .40 |
| October | 3 | .08 | 4 | .14 |
| TOTAL | 100% | 2.58 | 100% | 3.51 |

SOURCE: Idaho Department of Water Resources and Integrated Energy Systems, Inc. Boise, Idaho. (Contract No. YA-512-CT8-226).

Table 3-18

ELECTRICITY CONSUMPTION BY PROPOSED ACTION
(ave MW)

- Average Year -

| | Apr | May | June | July | Aug | Sept | Oct | Total (MWH) |
|---|---|---|---|---|---|---|---|---|
| Direct Consumption | 20.8 | 50.3 | 119.4 | 135.7 | 105.5 | 62.3 | 15.1 | 373,830 |
| Direct Load* | 22.7 | 54.9 | 130.5 | 148.3 | 115.3 | 68.1 | 16.5 | 408,557 |
| Indirect Consumption (Hydro losses on IPC system) | 4 | 10.3 | 24.6 | 52.6 | 55.4 | 40.7 | 13.7 | 148,104** |
| Total Load on IPC system (Direct load & Hydro losses) | 26.7 | 65.2 | 155.1 | 200.9 | 170.7 | 108.8 | 30.2 | 556,661 |

* Direct Consumption/.915 = Direct Load (includes line losses)

** Net losses over irrigation season.

Integrated Energy Systems, Inc., Boise, Idaho (Contract No. YA-512-CT8-226).

Table 3-19

ELECTRICITY CONSUMPTION BY PROPOSED ACTION
(ave MW)

- Worst Case -

| | Apr | May | June | July | Aug | Sept | Oct | Total |
|---|---|---|---|---|---|---|---|---|
| Direct Consumption | 43.8 | 88.2 | 178.7 | 158.8 | 134.8 | 83.1 | 28.2 | 525,154 |
| Direct Load* | 47.8 | 96.4 | 195.3 | 173.6 | 147.3 | 90.9 | 30.9 | 573,906 |
| Indirect Consumption (Hydro losses on IPC system | 16.7 | 37.3 | 74.6 | 66.7 | 55.0 | 32.7 | 9.3 | 214,506** |
| Total Load on IPC system (Direct load & Hydro losses) | 64.5 | 133.7 | 269.9 | 240.3 | 202.3 | 123.6 | 40.2 | 788,412 |

* Direct Consumption/.915 = Direct Load (includes line losses)

**Net losses over irrigation season

Integrated Energy Systems, Inc., Boise, Idaho (Contract No. YA-512-CT8-226).

for existing developed land in the ES area (see Appendix 3-5, Table B). The 3478 KWH per acre for the typical (median) acre in the proposed action is six times the estimated 575 KWH per acre average electricity consumption for all irrigated acres in south Idaho.

Calculations of proposed action electricity consumption were also made for a "worst case" or simulated drought year. This was done because the drier conditions and increased water use for irrigation in drought years generally coincide with low streamflows and reduced generating capability on the Idaho Power Company (IPC) hydro system. This "worst case" or drought year simulates a year like 1977.

The "worst case" differs from the "average case" year in that the diversion is estimated at 3.51 instead of 2.58 acre-feet/acre, and the monthly distribution shifts toward the spring, with peak water application occurring in June rather than July (see Appendix 3-5, Table C). This shift apparently occurs when natural rainfall is lacking and heavy water application must begin earlier in the season. The average and worst case monthly water distributions are compared in Table 3-17.

Electricity requirements for the "worst case" water year run from 1,277 KWH/acre to 9,019 KWH per acre, with a value of 4,736 KWH per acre for land with a median lift height and distance. In the "worst case" year, 96 percent of all the land to be irrigated out of the river has a per acre electricity requirement higher than the 1977 average for the area.

Tables 3-18 and 3-19 (line 1) show the direct electricity consumption, by month, for the "average year" and the "worst case" year in average megawatts. In each case, the total monthly consumption is the sum of the monthly consumption for all the acres in each lift height/distance combination.

The highest demand in the average case occurs in July with 136 average MW; the worst case demand peaks in June with 178.7 average MW.

The actual generation requirement necessary to serve the proposed action, or the "direct load", exceeds the proposed action consumption by about 8.5 percent due to transmission and distribution line losses. The direct load is shown in line 2 of Tables 3-18 and 3-19.

Indirect Consumption: In assessing the total electrical impact of the proposed action, the loss in generating capability at downstream dams due to proposed action diversions must be considered. Tables 3-18 and 3-19 (line 3) show the net losses on the Idaho Power Company dams that would result from proposed action water diversions during the irrigation season in the "average" and "worst case" years (see Appendix 3-5 for hydro loss calculations). The net hydro losses over the whole year would be slightly less since it is assumed that some of the water irrigated percolates back to the river throughout the year. The water percolated back to the river creates a minor increase in streamflow and therefore in generating capability in non-irrigation months (see Appendix 3-5.

Total Consumption: The total load the proposed action places on the IPC system can be calculated by adding the direct load, including line losses, to the hydroelectric losses. The resulting total load, by month, is shown in Tables 3-18 and 3-19 for "average" and "worst case" years.

Supply and Demand

The impact the "average year" additional load would have on the present IPC system is illustrated in Figure 3-8. The solid line is IPC-owned 1978 resources modified for median water conditions; the dotted line is the forecast 1978 load, and the dot-dashed line is the 1978 load plus the average proposed action load.

Figure 3-9 illustrates the proposed action impact in a "worst case", or drought year. The solid line is IPC-owned 1978 resources modified for 1977 (drought) water conditions. It reflects the decreased hydro capability in a low water year. The dotted line is the 1977 actual load, showing a drought-year type load. The dot-dashed line is the sum of the 1977 load and the proposed action "worst case" load.

It is clear that the electricity demand of the proposed action cannot be met by current company-owned generating resources in either the "average" or the "worst case" year. Existing firm purchase contracts under which IPC currently receives additional summer resources are scheduled to expire before farms under the proposed action would be in full production. If the proposed action is implemented, the resulting electricity demand would have to be met through acquisition of additional electricity supplies. As discussed in Chapter 2, Future, the future source and cost of additional electricity cannot be predicted with certainty. Electricity supply to meet proposed action load and resulting cost will therefore be discussed in the context of the supply cost scenarios outlined in Chapter 2, Future.

Self-Sufficiency Scenario: There are two ways in which IPC could expand its system to accommodate the proposed action load. The first, to be called Case 1, would be to build new generating capacity in which case the new output would be added to the IPC system year-round, not just when needed in the summer. The other possibility (Case 2) is that IPC might be able to purchase a part interest in a new plant being constructed by another utility and take its portion of the output only in the summer months to meet the new demand.

In Case 1, it will be assumed that 250 MW of coal fired generating capacity would be added by IPC to meet the peak demand of the proposed action in the average year. The July load of the proposed action is 201 MW. A 250 MW plant running at an average of 80 percent of maximum output would be required to meet this load. If IPC built to meet peak demand for the "worst case" year, a 350 MW plant would be required, and

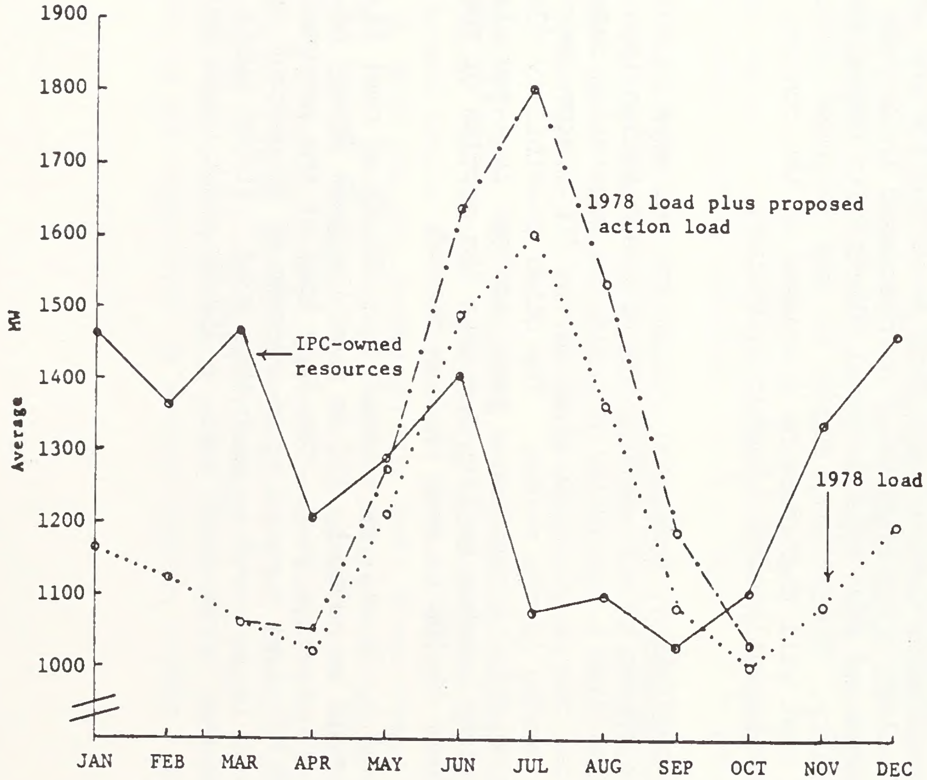



Figure 3-8

IMPACT OF PROPOSED ACTION ON IPC RESOURCES AND LOAD (AVERAGE YEAR)

SOURCE: Integrated Energy Systems, Inc., Boise, Idaho (Contract No. YA-512-CT8-226).

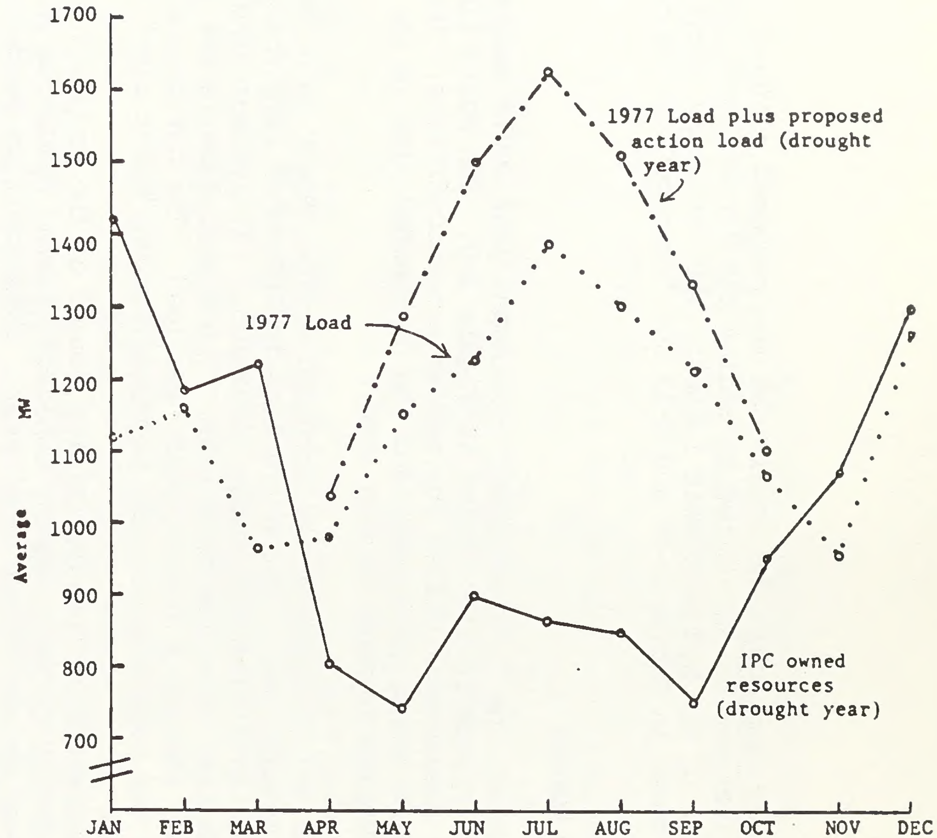



Figure 3-9

DROUGHT YEAR IMPACT OF PROPOSED ACTION ON IPC RESOURCES AND LOAD

SOURCE: Integrated Energy Systems, Inc., Boise, Idaho (Contract No. YA-512-CT8-226).

costs to the system would be higher. Based on a range of 1977 constant dollar cost estimates, 40 mils per KWH would be a reasonable figure for the electricity cost from this plant. The annual cost of this plant to the IPC system would depend on IPCs ability to sell the portion of the new output not required by the proposed action.

For purposes of analysis, two possible situations for disposing of the excess power will be discussed: Situation "A" - IPC would find enough new non-agriculture customers to buy up the rest of the power at system average price, or Situation "B" - IPC would be forced to export the power at an average of 10 mils per KWH (a reasonable price estimate for surplus export power).

In situation "A", if enough new customers were found to buy the excess power, the new plant could be assumed to run at an annual average of 75 percent of maximum output, thus producing 1.64 billion KWH per year at a cost of $65.7 million. The system average price would increase from 16.3 to 20.4 mils per KWH.

In situation "B", if IPC had to export the excess power at a low price, the new plant could reasonably be assumed to operate at 65 percent of maximum output and produce 1.42 billion KWH per year. The decreased output would result in an increased plant operating cost, from 40 mils per KWH to 44 mils per KWH. Total annual cost to the IPC system after subtracting revenue recovered from export sales would be $62.6 million, and the system average price would increase from 16.3 to 21.3 mils per KWH.

In case 2, the other possible way of achieving self-sufficiency would be through the purchase of shares of new power plants built by other utilities. It is unlikely that by doing so IPC would be able to exactly match their load, but to give a conservative estimate, it will be assumed that IPC could buy precisely the amount demanded by the proposed action over the irrigation season in an average year. (Again, IPC might purchase for the "worst case" year, in which case costs would be higher.) The new purchase, then, would be 556.7 million KWH at 40 mils per KWH, or $22.3 million per season. As a result of this purchase, system average price would increase to 18.0 mils per KWH.

Reliance on Outside Sources: In this scenario, which will be labeled case 3, the demand of the proposed action is assumed to be met with imported power (purchases of electricity rather than part ownership of other plants). In this case the new supply could potentially be matched closely to the demand. It will be assumed that purchases could be made to serve the proposed action only during the months of June, July, August, and September, but not in April, May, or October when IPC-owned resources would be sufficient. The amount required in an average year would be 466 million KWH. Given a British Columbia (assumed to be more probable than purchase of BPA power) price of 25 mils per KWH, the annual cost would be $11.7 million; the new system average price would be 17.0 mils per KWH.

"Most Likely" Scenario: The four scenarios discussed above represent an estimation of the middle range of possible future supply sources. Less costly scenarios such as Bonneville Power Administration (BPA) power made available by Domestic and Rural Power Authority (DRPA)-type legislation, discussed in Chapter 2 Future section, and more costly scenarios such as building plant to meet worst case rather than average year loads were not examined in detail.

If a "most likely" scenario were to be chosen, then, on the basis of policy trends in recent years, it would have to be one of the "self-sufficiency" alternatives. Case 1, the building of 250 MW of IPC owned generating capacity, is representative of policy recommendations of the Idaho State Water Plan as discussed in Chapter 2 Future, as well as IPC's proposal to build a "Pioneer" power plant. The Pioneer power plant proposal has been before the IPUC in various forms for the past several years. Of the two sub-cases of Case 1 dealing with IPC's ability to sell the output of this plant outside the irrigation season, situation "B", where IPC has to export the power as surplus at 10 mils/KWH, is a great deal more likely than situation "A". Given the predictions that IPCs peak demand will continue to occur in the summer (Chapter 2, Future), it is unlikely that IPC would be able to find a market for the off-season power at the system average price. Case 2, IPC participation in plants built by other utilities, is another form of "self sufficiency" and should be included as a "likely" scenario. Case 3, importing power from British Columbia ,is less likely given current policy trends. In sum, then, the most likely of the middle-range supply and cost estimates would be cases 1B and 2.

Impacts on IPC Ratepayers

The principal energy impact of the proposed action would be increased electricity prices to IPC consumers that would result from the addition of new supply to meet proposed action electricity demand.

In order to quantify and assess these impacts the new electricity supply and cost that would result from meeting the proposed action load were "rolled into" the 1977 IPC operating year. This provides a measure, in 1977 dollars, of the cost impact that the proposed action would have on existing IPC customers assuming that the present electricity rate system is in effect. The first step was to calculate a new IPC system average electricity price that includes the sales and cost of the new electricity supply. New average prices to each customer class were then calculated based on the new system average price. (For further explanation of these calculations, see Appendix 3-5.) These 1977 base prices plus new average prices for each of the supply scenarios are shown in the top half of Table 3-20. The new prices and the average electricity use for a customer in each class were used to calculate the increases in annual electric bills are shown in the bottom of Table 3-20.

TABLE 3-20

IMPACT OF PROPOSED ACTION ON CUSTOMER PRICES

| | | CASE 1 | | CASE 2 ** | CASE 3 |
|---|---|---|---|---|---|
| | | IPC ADDS 250 MW CAPACITY | | IPC PARTICIPATION IN NEW PLANTS | RELIANCE ON IMPORTS FROM B.C. |
| | BASE 1977 | SITUATION "A" SALE OF OFF PEAK POWER | SITUATION "B"** SALE OF OFF PEAK | | |
| COST OF NEW SUPPLY (mils/KWH) | | 40 | 44 | 40 | 25 |
| AVERAGE PRICES: (mils/KWH) | | | | | |
| System | 16.3 | 20.4 | 21.3 | 18.0 | 17.0 |
| *Irrigators | 16.0 | 20.0 | 21.0 | 17.7 | 16.5 |
| Residences | 20.7 | 25.9 | 27.2 | 22.9 | 21.5 |
| Small Commercial (Sched. 12) | 22.5 | 28.2 | 29.5 | 24.8 | 23.3 |
| Large Commercial (Sched. 19) | 12.5 | 15.6 | 16.4 | 13.8 | 13.0 |
| AVERAGE YEARLY INCREASE TO 1977 CUSTOMERS ($/year) | | | | | |
| *Irrigators | | 656 | 819 | 279 | 82 |
| Residences | | 72 | 90 | 30 | 11 |
| Small Commercial | | 545 | 670 | 220 | 76 |
| Large Commercial | | 33,865 | 42,605 | 14,202 | 5,462 |

* Corresponds roughly to the seasonal use of a 100 H.P. pump.
** Most likely cases.
SOURCES: Integrated Energy Systems, Inc., Boise, Idaho (Contract No. YA-512-CT8-226).

Table 3-21 shows the annual cost of each supply alternative to the IPC system as a whole and the distribution of these total costs between the proposed action irrigators and existing IPC customers. In the most likely cases the proposed action irrigators would pay $7.9 million in Case 1B or $6.5 million in Case 2, leaving 46.8 million or 15.8 million to be absorbed by other IPC customers. Table 3-22 shows these total annual costs and their distribution on a per-acre basis. In Case 1B the proposed action farmers would pay an average of $71 per acre per year and other IPC ratepayers would pay $422 per acre per year. In Case 2 these per-acre figures would be $59 to new irrigators and $142 to other IPC ratepayers.

The overall economic impact of the two most likely cases would be an increase of 29 percent in Case 1B or an increase of 10.5 percent in Case 2 over 1977 IPC revenues. The economic impact of these costs would vary both between different customer classes and between individual customers within each class.

Increased electricity bills to residential customers would be $90 per year in case 1B and $30 per year in Case 2. For affluent residences such an increase spread over 12 months may not be considered significant. For residences with electric heat and for low income households the impact of such increases could be severe.

Lower income households generally pay a much higher portion of their household income on electricity bills than average income households. Increases in the cost of basic necessities including electricity would cause severe hardships to low income households.

For the commercial- industrial customers the impact would depend on the portion of total costs of operation accounted for by electricity costs. For small commercial (Schedule 12 customers) the increase in annual costs would be $670 in Case 1B or $220 in Case 2. For the electricity intensive large industrial special contracts, the magnitude of the increase costs is great--$933,000, or $323,000 for the average use of the industrial special contracts.

The overall impact on irrigation customers of IPC is potentially significant. There are about 10,000 irrigation customers that rely at least to some extent on electricity to irrigate crops. The impact, however, would be expected to vary considerably between individual irrigators and depend on such factors as lift and distance from water source, type of crop, and amount of land irrigated.

The increased cost per year to "average" irrigator shown in Table 3-20 is either $279 or $819 per year for the two most likely cases. These increases are calculated from the average 1977 irrigation electricity use which corresponds roughly to the seasonal use of a 100 HP pump. For the irrigator who uses the 1977 average of 939 KWH per acre, irrigation cost increases would be $4.30, or $1.60 per acre. For currently irrigated land in the ES area using the average of 2549

Table 3-21

TOTAL COST OF PROPOSED ACTION TO IPC SYSTEM

(MILLION $)

| | CASE 1 | | CASE 2 ** | CASE 3 |
|---|---|---|---|---|
| | Situation A | Situation B ** | | |
| TOTAL INCREASE TO SYSTEM | 65.7 | 62.6 | 22.3 | 11.7 |
| REVENUE FROM PROPOSED ACTION | 7.5 | 7.9 | 6.5 | 6.2 |
| REVENUE FROM OFF-SEASON SALES | 20.3 | 46.8 | -- | -- |
| NET COST TO 1977 IPC SYSTEM | 37.9 | 46.8 | 15.8 | 5.5 |

Table 3-22

PER ACRE COST OF PROPOSED ACTION TO IPC SYSTEM
($)

| | | | CASE 2** | CASE 3 |
|---|---|---|---|---|
| | Situation A | Situation B ** | | |
| COST OF PROPOSED ACTION | 592 | 564 | 201 | 105 |
| REVENUE FROM PROPOSED ACTION | 68 | 71 | 59 | 56 |
| COST RECOVERED BY OFF PEAK SALES | 183 | 71 | -- | -- |
| COST BORNE BY 1977 IPC CUSTOMERS | 341 | 422 | 142 | 50 |

** Most likely cases

SOURCE: Integrated Energy Systems, Inc., Boise, Idaho (Contract No. YA-512-CT8-226).

KWH/acre, the increase in cost in Case 1B would be $11.70 per acre, or $4.30 per acre in Case 2. For a 5,000 KWH high-lift pump station, the increased cost would be about $45,000 per season in Case 1B.

Since implementation of the proposed action would cause a significant increase in electricity costs for pump irrigators, it is possible that some existing irrigated land would be forced out of production. Recent history suggests that electricity costs will continue to rise at a steady and rapid rate while commodity prices fluctuate. Over the long run, if the proposed action is implemented, the economic impact on existing agriculture is likely to increase with increased energy costs. In addition, the competition from proposed action agricultural production could increase the economic pressure on existing pump irrigators.

Implementation of the proposed action, as previously described, would require a sizeable commitment of electricity resources. This commitment may be viewed in terms of a trade-off for increased agricultural production in South Idaho. However, to the extent that the energy subsidy necessary to maintain the proposed action in operation increases the economic pressure on existing farms, it is questionable whether the proposed action would actually result in significant long term increases in agricultural production.

## Regional Impacts

The water diversions and downstream hydroelectric losses caused by the proposed action are not limited to the IPC service area. The hydroelectricity lost to the Pacific Northwest (PNW) as a result of streamflow depletions is electricity that is in demand in the Northwest or in California to replace oil and natural gas-fired generation. Assuming a total loss of 617.7 KWH per acre foot of water diverted above the eight FCRPS dams on the Snake and Columbia Rivers (see Chapter 2 and Appendix 3-5), proposed action hydroelectric losses on the BPA system were calculated for both the average and worst case year. These are displayed in Table 3-23. The assumption of percolation back to the river over a ten-month period would result in some slight increases in generation in the off-season months. Adding in these increases, the net losses on the FCRPS system would amount to 148,975 MWH in the "average" years and 207,633 MWH in the "worst case" years.

The cost associated with these losses can be estimated by using 35 mils per KWH, the value associated with replacing these lost KWH with the output of a mixture of new coal and nuclear plants. In the average year, this cost would be $5.2 million; in the worst case year, $7.3 million. On a per-acre basis (divided by 111,015), this amounts to $47 per acre in the "average" year and $65 per acre in the "worst case" year. These costs would be in addition to those absorbed by the IPC system.

However, in the case in which IPC builds a 250 MW plant and exports excess production at 10 mils per KWH, this cheap IPC-generated electricity

Table 3-23

HYDROELECTRIC LOSSES ON THE PACIFIC NORTHWEST
DUE TO THE PROPOSED ACTION

(Ave MW)

| | Apr | May | June | July | Aug | Sept | Oct | Total (MWH)* |
|---|---|---|---|---|---|---|---|---|
| Average Year | 7.9 | 21.5 | 50.4 | 57.4 | 43.6 | 24.9 | 4.9 | 154,799 |
| Worst Case Year | 17.3 | 36.3 | 73.2 | 70.2 | 53.9 | 32.1 | 9.3 | 214,879 |

* Total losses April - October

SOURCE: Integrated Energy Systems, Inc., Boise, Idaho (Contract No. YA-512-CT8-226).

would mitigate the PNW hydro losses and, in fact, provide a new benefit to the non-IPC portion of the PNW. (See Appendix 3-5).

## Chemical Energy

The total consumption of fuels, fertilizers, and pesticides by the proposed action can be calculated from the per-acre consumptions of these materials for various crops (see Table 2-23, Chapter 2). The long-term crop rotation assumed for the proposed action is 22 percent potatoes, 35 percent grain (combining, barley and winter wheat), 17 percent sugar beets, 21 percent beans, and 6 percent alfalfa. Of the total 111,015 acres in the proposed action, these materials are assumed to be applied to 97 percent, or 107,685 acres, leaving 3 percent for farmsteads, waste, etc. Proposed action consumption, total Idaho consumption, and proposed action consumption as a percent of Idaho consumption are shown in Table 3-24.

The amount of these chemical energy forms that would be used by the proposed action is small compared to total Idaho consumption. As a result the proposed action would not have a measurable impact on the supply and cost of gasoline, diesel, or energy forms (natural gas, petroleum, electricity, etc.,) that go into the manufacture of fertilizers and pesticides. This fact does not necessarily mean that the consumption of these chemical inputs is insignificant. For the most part, they represent non-renewable energy resources.

For example, it is estimated that 38,000 cubic feet of natural gas are required to produce one ton of nitrogen fertilizer (Lockeretz 1977). If the proposed action consumed an average of 121 pounds of nitrogen per acre (see Table 2-23, Chapter 2, and the assumed crop rotation), this would amount to 6,380 tons per year, or 242 million cubic feet of natural gas per year.

It has been assumed, so far, that electricity would be the energy form used in pumping water for the proposed action. It is possible, however, that at some point in the future diesel and/or natural gas would become competitive with electricity for irrigation. If diesel or natural gas were used instead of electricity for irrigating the proposed action, there would possibly be a significant effect on the supply and cost of these two commodities. As a rough estimate, the proposed action would require 9.2 million gallons of diesel per year, or 3 percent of the total Idaho consumption; alternatively, it would require 12.8 million therms of natural gas, or about 3.4 percent on Intermountain Gas Company's 1977 sales.

## On-Farm Energy Use

In order to calculate total on-farm energy use for a typical farm in the proposed action, chemical and electrical energy consumption must

Table 3-24

ANNUAL PROPOSED ACTION CONSUMPTION

OF CHEMICAL ENERGY FORMS

| | Proposed Action Consumption | Current Idaho Consumption* | Proposed Action Consumption As Percent Of Idaho Consumption |
|---|---|---|---|
| Gasoline (thou gal) | 1,012 | 521,000 | .2% |
| Diesel (thou gal) | 2,175 | 316,000 | .7% |
| Fertilizer (tons) | 12,061 | 565,793 | 2.1% |
| Pesticides (tons) | 201 | 3,067** | 6.5% |

* From Chapter 2, Existing Chemical Environment

** Agricultural Consumption only

SOURCE: Integrated Energy Systems, Inc., Boise, Idaho (Contract No. YA-512-CT8-226).

Table 3-25

CHEMICAL ENERGY CONSUMPTION FOR FIVE CROP ROTATION

| | Application (gal/acre) | Thou BTU/Acre |
|---|---|---|
| Gasoline | 9.4 | 1167 |
| Diesel | 20.2 | 2797 |
| Total Fuel | | 3964 |
| | (lbs/acre) | |
| Nitrogen | 121 | 3763 |
| Phosphate | 68 | 379 |
| Potassium | 35 | 150 |
| | 224 | |
| Total Fertilizer | | 4292 |
| | (lbs/acre) | |
| Insecticide | .71 | 83 |
| Herbicide | 3.03 | 203 |
| | 3.74 | |
| Total Pesticide | | 286 |
| Total Chemical Energy/Acre | | 8542 |

SOURCE: Integrated Energy Systems, Inc. - Boise, Idaho (Contract No. YA-512-CT8-226)

be combined. Based on the chemical inputs for each crop shown in Table 2-23, Chapter 2, the per-acre chemical inputs for the assumed five-crop rotation (combining barley and winter wheat as one crop) could be calculated. These values are then converted into BTUs and added up to give a total of 8,542 thousand BTU of chemical energy per acre as shown in Table 3-25.

Table 3-26 shows the total chemical and electrical energy input per acre for land located at various distances from and heights above the river. Table 3-27 shows the yearly energy consumption in million BTUs by a 320 acre farm at the various lift heights. For each lift height, the distance shown is the most typical (median) distance associated with that lift height. The 650 foot lift and 6-8 mile distance combination is the median for all acres irrigated out of the river. The 650 foot, 4-6 mile combination is included because it represents the median lift height and distance for proposed action areas, including well-irrigated acres.

The value used in Table 3-26 for converting KWH of electrical energy into BTUs (11,475 BTUs per KWH) is based on the "most probable" assumption that the electricity to supply the proposed action would come from coal fired power plants. This BTU value, therefore, is the energy value of the coal that must be burned to generate the required KWHs, including extra KWHs to cover line losses. Finally, to determine direct energy consumption the electrical input values were added to the average chemical input value of 8,542,000 BTUs per acre from Table 3-25.

In addition to direct energy consumption electricity for pumping and chemical applications the hydroelectric losses due to diversions should be considered in calculating the total energy consumption of a typical acre or typical farm in the proposed action.

The total net hydro loss due to the proposed action in an average year is the sum of the net losses in the IPC system and the net losses on the FCRPS system, or 294,864 MWH. This figure is then divided by 111,015 acres to get an average per-acre hydro loss of 2655 KWH per year. Assuming that this lost hydroelectricity must be replaced with electricity from a coal-burning plant, the conversion factor of 10,500 BTU per KWH is applied, giving a per-acre indirect consumption of 27.9 million BTUs. (Line losses are not included here since the hydroelectricity not generated is an at-the-plant, not a delivered, loss.) Adding this indirect comsumption to the direct consumption gives the total energy consumption of a typical acre and typical 320 acre farm as shown in the last columns of Table 3-26 and 3-27.

Input/Output Analysis

The relative amount of energy required to grow a certain crop can be compared with the energy value (in calories or BTUs) of that crop.

Table 3-26

TOTAL PER ACRE ENERGY CONSUMPTION

| LIFT | MILES | DIRECT CONSUMPTION Electricity KWH | DIRECT CONSUMPTION Electricity Million BTU's | DIRECT CONSUMPTION Total Energy Million BTU's | DIRECT + INDIRECT CONSUMPTION Total Energy Million BTU's |
|---|---|---|---|---|---|
| 150' | 0-2 | 1272 | 14.6 | 23.1 | 51.0 |
| 250' | 0-2 | 1605 | 18.4 | 26.9 | 54.8 |
| 350' | 2-4 | 2208 | 25.3 | 33.8 | 61.7 |
| 450' | 2-4 | 2538 | 29.1 | 37.6 | 65.5 |
| 550' | 2-4 | 2869 | 32.9 | 41.4 | 69.3 |
| 650' * | 4-6 | 3478 | 39.9 | 48.4 | 76.3 |
| 650' | 6-8 | 3757 | 43.1 | 51.6 | 79.5 |
| 750' | 8-10 | 4367 | 50.1 | 58.6 | 86.5 |

* Median lift height and distance

SOURCE: Integrated Energy Systems, Inc. - Boise, Idaho (Contract No. YA-512-CT8-226)

Table 3-27

ENERGY CONSUMPTION FOR A 320 ACRE FARM

(Billion BTU's)

| LIFT | MILES | DIRECT ENERGY | DIRECT PLUS INDIRECT ENERGY |
|---|---|---|---|
| 150' | 0-2 | 7.4 | 16.3 |
| 250' | 0-2 | 8.6 | 17.5 |
| 350' | 2-4 | 10.8 | 19.7 |
| 450' | 2-4 | 12.0 | 21.0 |
| 550' | 2-4 | 13.2 | 22.2 |
| 650' * | 4-6 | 15.5 | 24.4 |
| 650' | 6-8 | 16.5 | 25.4 |
| 750' | 8-10 | 17.9 | 27.7 |

* Median lift height and distance

SOURCE: Integrated Energy Systems, Inc. - Boise, Idaho (Contract No. YA-512-CT8-226)

TABLE 3-28

ENERGY OUTPUT OF CROPS

| CROP | KCAL/LB | YIELD/ACRE (LBS) | MILLION KCAL/ACRE | MILLION BTU/ACRE |
|---|---|---|---|---|
| Potatoes | 345 | 31,500 | 10.87 | 43.1 |
| Grain | 1750 | 4,500 | 7.88 | 31.2 |
| Sugar Beets | 262 | 40,000 | 10.48 | 41.6 |
| Beans | 1566 | 1,875 | 2.94 | 11.7 |
| Alfalfa | 221 | 7,100 | 1.57 | 6.2 |

Sources: KCAL/LB: Food Values of Portions Commonly Used, Bowes and Church, 1970. "Composition of Cereal Grains and and Forage", National Research Council, Washington National Academy of Sciences, 1958. Personal communication, Amalgamated Sugar Company.

Yields: IDWR

Conversion Factor: .252 KCAL/BTU

Table 3-29

INPUT/OUTPUT ANALYSIS FOR FIVE CROPS

PROPOSED ACTION "TYPICAL"[a] ACRE

MILLION BTU'S/ACRE

| | INPUT | | | OUTPUT | NET YIELD | INPUT/OUTPUT |
|---|---|---|---|---|---|---|
| | Chemical[b] | Electrical[c] | Total | | | |
| Potatoes | 18.7 | 76.5 | 95.2 | 43.1 | -52.1 | 2.2 |
| Grain | 3.8 | 59.9 | 63.7 | 31.2 | -32.5 | 2.0 |
| Sugar Beets | 10.3 | 80.3 | 90.6 | 41.6 | -49.0 | 2.2 |
| Beans | 7.0 | 62.0 | 69.0 | 11.7 | -57.3 | 5.9 |
| Alfalfa | 1.6 | 84.3 | 85.9 | 6.2 | -79.7 | 13.8 |

[a]The median lift and distance for the proposed action acreage including wells is used to define typical. This is 600-700 feet lift and 4-6 miles from water source.

[b]Calculated from Table 5, Chapter 2, using the following conversion factors: gasoline - 124,240 BTU/gal; diesel - 138,690 BTU/gal (Idaho Energy Office). Nitrogen - 31,097 BTU/bl.; Phosphorous - 5,561 BTU/lb.; Potassium - 4,279 BTU/lb.; Insecticide - 116,892 BTU/gal; Herbicide - 67,153 BTU/gal. (Federal Energy Administration)

[c]Direct consumption, based on the individual water requirements for each crop plus 27.9 million BTU for average per acre hydro losses, plys .9 million BTU for per acre embodied energy in aluminum pipe.

SOURCE: Integrated Energy Systems, Inc. - Boise, Idaho (Contract No. YA-512-CT8-226)

Table 3-28 shows the energy output of each crop in the assumed rotation given typical yields and nutritional values in kilo-calories (KCAL) per pound.

Though energy values of crops are based on nutritional values, these net energy values do not include any processing, transportation, or any other steps between the crop "in the ground" on the proposed action and actual human consumption. With the exception of potatoes and dry beans, which in theory require only cooking before human consumption, all the the other crops are not in a form that is normally consumed by humans without further processing. In addition, a substantial portion of the potatoes and beans may undergo further processing.

In addition to the electrical and chemical energy inputs described in the previous section, the input/output analysis will include input value for the energy embodied in the irrigation system itself. Assuming two quarter-mile wheel lines for each 40 acre parcel, there are approximately 78 pounds of aluminum per acre. About 16 KWH (Hagan, April 1978) of energy is required to produce one pound of finished aluminum pipe. Aluminum energy input is therefore 1250 KWH per acre. If this is divided by an assumed life expectancy of 15 years for the pipe, the annual energy requirement is 83 KWH per acre per year. Applying a thermal value to this of 10,500 BTU per KWH, this amounts to .87 million BTU per acre per year.

Table 3-29 shows the total electrical energy (direct and indirect), total chemical energy (calculated from Table 2-23, Chapter 2), and the sum of these inputs for each crop for a "typical" acre in the proposed action. The "typical" acre is in the median category for both lift height and distance (650 feet, 4-6 miles from the river) for all acres, including those irrigated from wells. Table 2-29 compares total inputs with the BTU value for the energy output of each crop, from Table 2-28 and shows the net energy yield for each crop along with the ratio of input to output.

The net energy yield, as shown in Table 2-29, is negative for all crops, with alfalfa as the least and grain as the most energy efficient. The same analysis performed for the lowest lift and distance (150 feet and 0 to 2 miles) also gives negative yields in all cases.

An input/output analysis of this sort has its limitations. For example, by converting all energy forms to one common unit (BTUs), a common value or usefulness is implied for all energy. In fact, some forms of energy may be more useful or more scarce than other forms, e.g., food is more important from the standpoint of feeding people than gasoline; natural gas may be more important from the standpoint of diminishing non-renewable resources than coal.

Impact Summary

The primary energy impacts would result from the cost to IPC customers of additional electricity resources to meet proposed action irrigation pumping demand. Electricity consumption of the proposed action was estimated for two cases. An "average" case designed to simulate average weather conditions and irrigation requirements and a "worst case" designed to simulate drought weather conditions and irrigation requirements.

In the "average" case the proposed action direct electricity consumption was estimated at 373,830 MWH per season. The typical (median lift height is 650' and 4-6 miles distance from the river) acre would require 3,478 KWH per season. In the "worst case" direct consumption was estimated at 525,154 MWH per season for the proposed action and 4,736 KWH per season for the "typical" acre.

Irrigation diversions from the Snake River result in losses of hydroelectric generation at downstream dams on the IPC system.

The total load on the IPC system that would be created by the proposed action, including downstream hydroelectric losses, was estimated at 556,661 MWH in the "average" year. The highest monthly load would be in July, with 201 average MW. "Worst case" total load was estimated at 788,412 MWH, with a monthly high in June of 269.9 average MW.

The load of the proposed action cannot be met from existing IPC owned generating resources. Existing IPC contracts for purchase and exchange of power expire before the proposed action would be implemented.

Calculations of cost impacts were based on "average year" consumption only. If electricity supplies were obtained to meet "worst case" loads, the cost impact would be greater. Three alternative sources of electricity supply to meet the proposed action load demand are analyzed. The most likely potential sources were determined to be either IPC construction of 250 MW of thermal generating capacity (with export of power during non-irrigation months) or seasonal IPC participation in a thermal plant constructed by another utility. In the first case the annual cost of the new supply in 1977 dollars would be $62.6 million, in the second case, $22.3 million. Assuming the current electricity rate system, of this total annual cost the proposed action irrigators would pay $7.9 million of this total annual cost in the first case or $6.5 million in the second case leaving $46.8 million or $15.8 million per year to be borne by other IPC ratepayers. On a per-acre basis this would be a subsidy paid by IPC ratepayers of $422 per acre per season in the first supply case, or $142 per acre per season in the second supply case.

The major energy impact of the proposed action would be the effect of increased electricity costs on existing IPC customers. The addition of the proposed action load on the current IPC system would result in the following estimated increases in annual electric bills (with no factor for future inflation) for typical (average use) IPC customers:

| $/Year | Residential | Small Commercial (Sch 12) | Large Commercial (Sch 19) | Irr(100HP) |
|---|---|---|---|---|
| Case I IPC adds 250 MW capacity | $90 | $670 | $42,605 | $819 |
| Case 2 IPC participation with another utility | $30 | $220 | $14,202 | $279 |

Impacts on residences depend on the portion of income spent on electric bills. For low income households, especially those with electric heat, the impacts could be severe.

Impacts on commercial, industrial, and irrigation pumpers depend on the portion of operating or production costs that go to electric bills.

The implications of high electricity prices to existing irrigation pumpers are especially important. The combination of higher electricity prices and increased competition from proposed action production has the potential for driving existing land out of production.

The result of implementing the proposed action would be a large increase in agricultural electricity consumption. However, the overall gain in agricultural production would depend on the extent of which existing farms (and even the proposed action itself) could weather the economic pressures caused by higher electricity costs which would result, in part, by proposed action electricity demand.

In addition to impacts on the IPC system, the irrigation diversions of the proposed action would result in losses of hydroelectric generation at federal dams on the Snake Columbia system. These losses would be either 154,799 MWH or 214,879 MWH over the irrigation season in the "average" or "worst case" years, respectively. Replacement of these losses would cost $5.2 (average) or $7.3 (worst case) million per year.

The direct energy consumption of gasoline and diesel plus indirect consumption represented by fertilizers, pesticides, herbicides, and the embodied energy of irrigation systems by the proposed action was estimated. The chemical energy consumption of the proposed action would not have a measurable impact on the supply or cost of these chemical energy forms. These energy forms are, however, generally non-renewable resources.

# CHAPTER 4

## MITIGATION MEASURES NOT INCLUDED IN THE PROPOSED ACTION

Chapter 4 discusses measures that would be used to reduce or eliminate certain adverse impacts from the proposed farm development.

# CHAPTER 4
# MITIGATION MEASURES

The Bureau of Land Management would carry out the following measures if the proposed action was to be implemented. These measures are designed to reduce certain environmental impacts identified in Chapter 3. However, only a small portion of adverse impacts identified can be reduced by application of measures mentioned in this section. All these measures would prevent farming in certain locations in the ES area. The mitigating measures are organized by environmental components and apply to both Desert Land Act (DLA) and Carey Act (CA) methods of land transfer. They were determined to be the only BLM mitigation that could be applied under the DLA and CA transfer methods. These measures can only be applied up to the time the public land is classified suitable for DLA or CA. After farm development begins, the BLM would have no further authority to apply these or any other mitigating measures discussed here.

## WILDLIFE

### 1. Measure

To protect valuable existing wildlife habitat, no farm development would be allowed across or immediately adjacent to a permanent stream body or established riparian habitat. A buffer strip of public land at least 100 feet each side of such habitat would be preserved in its native condition for wildlife benefits.

Effectiveness

This measure would protect all existing riparian habitats before farm projects were developed. It would provide a narrow buffer strip between the edge of agriculture fields and the riparian zone.

### 2. Measure

Buffer areas of existing native vegetation would be retained between large agriculture projects and adjacent to unique features, such as the Snake River canyon. These buffer areas would need to be interconnected and large enough to support viable populations of raptor prey species as determined by the BLM, Idaho Fish and Game Department, and U.S. Fish and Wildlife Service.

Effectiveness

The effectiveness of this mitigation is difficult to assess. Only limited populations would be retained as the buffer areas would be limited in size. An estimate would be that the percent of habitat retained equals the percent of wildlife species retained.

3. Measure

Surveys will be done prior to approval of proposed farm projects to determine effects on sensitive wildlife species in the area. This is in keeping with the 1977 Memorandum of Understanding between the BLM and Idaho Department of Fish and Game, previously discussed in Chapter 2. The principal sensitive wildlife species found in the ES area are the ferruginous hawk, western burrowing owl and long-billed curlew. Those proposed land alterations which would significantly impact sensitive species populations would not be allowed.

Effectiveness

The actual effectiveness of this mitigative effort will not result in 100 percent sensitive species retention. The size of the significant habitat areas needed to be retained will be difficult to determine. For example, raptor nesting sites will need adequate foraging areas nearby. The size of the foraging areas will be dependent upon many factors that cannot be precisely defined. Therefore, the effort to protect adequate habitat will not always be completely effective and would differ based on the species involved. For example, it might be possible to save 90 percent of curlew or burrowing owl habitat and only 50 percent of a ferruginous hawk habitat.

## CULTURAL RESOURCE

4. Measure

A buffer strip of public land would be established along the Oregon Trail, its alternate routes, and the Kelton Road, with no farm developments being allowed within the corridor. The width of the corridor would vary, but would be based on preserving aesthetic, visual and historic qualities along these trails. The Advisory Council would be consulted as outlined in Chapter 1 when National Register eligible segments of these routes are involved.

Effectiveness

This would preserve about 16 1/2 miles of natural landscape along the Oregon Trail and Kelton Road corridors. It would totally eliminate destruction of trail remnants from farm expansion and maintain these trails for cultural interpretation and public enjoyment.

5. Measure

No agricultural development or irrigation facility rights-of-way would be allowed in the 3,875 acre designated Hagerman Fauna Sites National Natural Landmark.

Effectiveness

This measure would fully eliminate the impact of farming on 160 acres (as designated under the proposed action) within the Hagerman Fauna sites, plus prevent future disturbance by construction of irrigation penstocks across the area. Paleontological values would be preserved.

RECREATION

6. Measure

Farm development would not be allowed within 1/4 mile of Foreman and Morrow Reservoirs to assure public recreation access to, and use adjacent to these waters.

Effectiveness

This measure would essentially maintain present public use and access to these waters.

VISUAL RESOURCES

7. Measure

The same as measures 4 and 5 above.

Effectiveness

These two measures would address the Oregon Trail, Kelton Road and the Hagerman Fauna Sites National Natural Landmark which are under Visual Resource Management (VRM) Class I designation. VRM Class I applies to special areas having unique features, where it is important to preserve the existing landscape integrity. Measures 4 and 5 would assure that the existing landscape character would not be changed under proposed action farm development.

# CHAPTER 5

## UNAVOIDABLE ADVERSE IMPACTS

Chapter 5 describes the adverse impacts likely to remain after application of the required mitigating measures discussed in the preceding chapter.

# CHAPTER 5
# UNAVOIDABLE ADVERSE IMPACTS

## AIR QUALITY

The proposed action would lower air quality by causing particulate concentrations to increase especially, during spring months when wind velocities are highest and fields are often bare of crop cover. Annual secondary, primary and 24-hour air quality standards would be exceeded during March, April and May. Dust storms would occasionally develop, affecting the communities of Hammett, Hagerman, Bruneau, Buhl, Glenns Ferry and Twin Falls. In some instances, hazardous driving conditions would result from near zero visibility. In accordance with Idaho Department of Health and Welfare findings, the average annual increase in particulate pollution due to new agricultural development would probably not exceed more than 10 micrograms per cubic meter.

## SOILS

Soil erosion from sprinkler irrigation is estimated to be slight, at less than two tons per acre in most areas, due to efficient irrigation water application. Wind erosion during spring months could be significant where fields lie fallow and soil moisture is low, varying from 0-75 tons per acre. Soil erosion from high winds would be slight where soil moisture was high, where an over wintering cover crop such as alfalfa was established, or grain stubble material was present. Crop rotations and farming practices would most influence wind soil losses.

## WATER RESOURCES

### Uses and Flows

The proposed action would pump 250,004 acre-feet of water from the Snake River and 27,823 acre-feet from ground water sources between Bruneau and Murphy. River flow would be reduced by 1034 CFS during peak pumping periods. This would not threaten existing municipal, industrial, domestic or agricultural water rights for Snake River water but would adversely impact farmers presently using ground water by lowering water tables between Bruneau and Murphy. The extent of this impact is unknown.

The Snake River flows would remain above the Idaho legislated 3,300 CFS maintenance flow at the Murphy gage during normal years, but would drop as much as 17 percent below the Idaho Fish and Game recommended wildlife maintenance flow of 5500 CFS during low water years (such as 1977) at the Murphy gage.

Irrigation withdrawals for the proposed action would result in losses of hydroelectric generation at downstream dams on the Snake River Idaho Power Company system. This is estimated at 148,104 MWH during an average flow year and 214,506 MWH during a 1977 low flow year (these losses are during the irrigation season only).

## Water Quality

There will be occasional accidents or storms which cause brief overland water flow, leading to movement of sediment and adsorbed fertilizer residues and toxicants to tributaries and the main river. Nitrate would increase slightly, expecially above Strike pool, from irrigation returns via infiltration and tributaries. Water quality in tributaries would decline moderately as silts and nitrate-rich water from infiltrated irrigation applications enters. Winds will carry soil particles with adsorbed fertilizer residues and toxicants to tributaries and the main river. The extent of this movement is not predictable.

In low flow years, water temperatures would increase slightly in the ES area, especially in the area above Swan Falls pool in July and August as a result of shoaling - the reduction of water depth with moderate change in wetted perimeter.

In low flow years, sedimentation would increase slightly above Strike pool, as reduced flows there permit earlier settling of suspended sediments.

# VEGETATION

## Terrestrial

Approximately 107,685 acres of shrub and grass range vegetation (including 33,090 acres of seeded grassland) would be cleared and replaced by agricultural crops. Up to 22,230 acres would be cleared in addition for non-crop land uses in support of farm development. This extensive vegetation change would in turn adversely impact other resources such as wildlife and livestock grazing.

## Aquatic

Only in extreme low flow years would there be moderate increases in phytoplankton within the ES area segment of the Snake River. In all years, phytoplankton blooms would last slightly longer. Increases in phytoplankton would tend to increase turbidities and BOD downstream.

# WILDLIFE

## Terrestrial

Habitat destruction is the most significant adverse wildlife impact which would result from the proposed action. Habitat loss would affect all native wildlife which use the 61,715 acres of shrub/grassland or 49,300 acres of grassland habitat types that would be converted by the proposed action. Seven percent of the mule deer winter range would be lost, and an estimated 40 to 60 deer (or 8 to 12 percent of the deer using this area within the ES boundaries) would be displaced or lost. Other mammals significantly impacted by habitat loss include pygmy rabbits, black-tailed jackrabbits, and various rodents. These mammals are an important food source to many predators.

Land conversion resulting in habitat loss for black-tailed jack-rabbits, various rodents, birds, and reptiles would be an important secondary adverse impact to birds of prey. This would result in a significant reduction of raptor food sources. This would cause population decreases for all raptor species in the ES area.

Birds which are dependent upon the shrub/grassland habitat type during their reproductive period would show population declines throughout the ES area due to habitat destruction. These birds include: the sage sparrow, sage thrasher, vesper sparrow, black-throated sparrow, lark sparrow, and the sage grouse. The sage grouse would suffer the loss of one strutting ground and 1,000 acres of wintering habitat, resulting in a loss of 20-50 birds. In addition, three other strutting grounds are located close to the proposed agricultural development. Sage grouse numbers on these grounds would be reduced.

The sensitive species survey mitigation discussed in Chapter 4 would only be partially effective. Sensitive species impacted by the proposed action are the ferruginous hawk, long-billed curlew, and the burrowing owl. Population declines of these animals would be expected. Since there is a great deal of difficulty in determining their spacial requirement or foraging area, nesting sites would be located and protected but some feeding ranges could not be saved.

Increased human disturbance to wildlife due to farming activity constitutes another significant, unavoidable adverse impact, particularly during reproduction periods. This impact would displace and cause additional stress to wildlife, resulting in decreased production and survival.

Fisheries

Significant adverse impacts upon fisheries would occur during low flow years. During these low water years mortality of larvae of embryos of edge spawners (channel catfish, smallmouth bass, and black crappie) would increase sharply. Reduced survival of edge spawners would eventually lead to a slight shift of the fish species mix toward channel spawners. Fish biomass in the ES area would move toward squawfish, suckers, shiners, and in a few locations, trout. Overall losses in game fish stocks would amount to 5-25 percent.

There would be the moderate decline in growth and moderate increases in mortality of white sturgeon along with other game fish in a low flow year due to predation. This would lead eventually to moderate declines in sturgeon abundance. These declines will take some time because sturgeon stocks consist of 50-70 year age classes.

With the exception of sturgeon, most game fish stocks in the ES area have 5 to 6 year classes in the population (although a few older fish will always be present). Thus, if two low flow years were to occur within 5 years, one-third of an edge-spawning population would be impacted by reductions in reproductive success and growth. Sturgeon stocks consist of many age classes, hence the impact of two low flow years in a short period does not immediately alter their total numbers. Eventually, reduced growth and survival of sturgeon will lead to moderate declines in abundance.

Average flow years would only slightly impact fisheries in the ES area. Slight increases in mortality of larval white sturgeon, channel catfish, smallmouth bass, and black crappie in the Snake River ES area would occur. Growth of these same species would decline slightly. Total abundance would decline slightly to moderately.

Even with settling ponds, occasional overland flows of water will occur from very intense summer storms or broken canals or pipes. These flows will occasionally carry toxic materials to the river, and localized fish kills of unpredictable severity will occur. Winds will also carry toxic materials (bound to soil particles) to the river with the same effects.

As part of the cumulative effect of Columbia Basin water withdrawals, reduced flows in the Snake River would slightly reduce habitat quality for anadromous and resident fishes below the ES area.

If the proposed action is taken, it will contribute to the demand for more electrical energy. In meeting that demand, construction of additional hydropower or thermal generation stations would eliminate habitat for sturgeon and other game fishes in the Snake River ES area. Hydropower stations physically eliminate running-water habitat. Thermal plants usually use river water for cooling. More importantly, the use of rivers for energy production leads to increased use of hydropower dams for peaking. This leads to substantial water fluctuations, with accompanying deterioration of fishery habitat.

Unknown quantities of Snake River fishes will be entrained in pump intakes and lost to the system. These may include preferred game fishes.

## CULTURAL RESOURCES

Even with compliance with the various laws and procedures that protect cultural resources discussed in Chapter 1, there would be loss of much scientific information in the ES area. A field archaeologist may fail to detect the presence of a cultural site. Losses of subsurface sites which give no surface evidence of their presence are likely to occur. Vandalism to cultural sites as a result of more people in the area and improved access would be a spin off of the proposed action. In addition, it should be pointed out that the process of salvage is itself destructive, and the site in question is gone forever.

Therefore, it cannot be determined how many of the 61 known sites in addition to the undiscovered sites in the ES area would actually be adversely impacted by farm development.

## VISUAL RESOURCES

Since most of the farm and associated development would occur on VRM Class IV areas (low scenic quality), modification of the natural landscape in these Class IV areas would be considered acceptable by some people. However, several road and transmission line crossings of the Oregon Trail and Kelton Road (VRM Class I) would be necessary to facilitate farming activity. These developments would result in adverse visual impacts on these historic routes. The impact would be especially severe on the Oregon National Historic Trail.

The Snake River Canyon from Hammett east to Salmon Falls Creek is designated as a BLM VRM Class II area. Even after proper location, facility design, and site rehabilitation and landscaping, the development of irrigation pump stations and associated roads, transmission lines, and penstocks would result in visual intrusions which may exceed the BLM's visual resource contrast rating for these areas. In VRM Class II areas, any changes in the basic elements of the natural landscape should not be evident and should not attract attention. Highest visual impacts would occur where the Snake River is visible to passing motorists on Highway 30 and Interstate 80.

There would also be an unavoidable adverse visual impact resulting from concentrated ORV activities. This is especially true on smaller parcels of public land with steeper topography that are retained within the farm areas and accessible from farm access roads. Since this use would occur mostly on Visual Resource Management Class IV areas, the impact would not be severe.

## RECREATION

During low-water years, such as 1977, the quality of water based recreational opportunities along the Snake River would be lowered. Snake River volumes would be reduced about 1,000 CFS in July at the Murphy river gage.

Sight-seeing use along the Snake River would also be impacted by the construction of pumping facilities along the river. These visual intrusions would have the most impact on sight-seeing opportunities if located in areas visible from Interstate 80 and Highway 30.

Road, canal and transmission line crossings of the Oregon Trail and Kelton Road routes would reduce the recreational value of these historic locations. The greatest impact would be on the Oregon Trail. It is included in the National Trails System and has the potential to attract significant recreational use once it is identified and interpreted for public enjoyment.

About 60,400 acres of public land currently used by ORV recreationists would be taken away by the proposed action. This would force increased ORV use on other ORV areas and put more pressure on remaining public land near the ES area.

## LIVESTOCK GRAZING

With implementation of the proposed action, livestock grazing would be eliminated on approximately 146,380 acres of public land within the

ES area. One hundred twenty seven operators in 24 allotments would lose a total of approximately 14,975 AUMs of grazing use per year. With this situation, approximately 43 operators would lose more than 20 percent of their operation in the BLM Boise District; approximately 10 would lose 11-20 percent; and approximately 74 would lose 0-10 percent. Furthermore, the scattered farm location would make it unfeasible for many operators to continue grazing livestock on the public land remaining amidst the farms, and in some allotments, effective grazing use could no longer be made within the ES area. Therefore, as much as 41,397 AUMs per year could actually be lost rather than 14,975 AUMs.

## MINERALS

Approximately 1.3 million cubic yards of gravel material would be needed for new access road construction when farmland is developed under the proposed action. This would disturb between 200 and 300 acres. (Assuming a gravel deposit two yards deep).

## TRANSPORTATION

About 300 miles of new gravel roads would be needed to provide access in new farm project areas. In most instances these roads would be constructed by farm developers in accordance with county road standards, and then dedicated to the counties for maintenance and upkeep.

## ECONOMIC

Of the 15 combinations of crop and energy prices depicted in Chapter 3, Table 3-8, only two showed a net farm income above the poverty level for a farm family. Therefore, it is assumed that in 13 cases, all economic sectors would be impacted adversely.

Socio-economic impacts were analyzed for the most favorable crop and energy conditions (1976 Normalized and 16.5 mills per KWH). Under this situation the following impacts would result:

### Carey Act

There would be an increase of 283 school children needing 12 new teachers; increased population would require 12 additional health care personnel and 7 additional firemen and policemen; the cost of required public facilities could be as much as \$1.5 million and the total public capital cost could reach \$2.8 million.

### Desert Land Act

There would be 150 more school children which would require 7 new teachers; increased population would require 7 additional health care personnel and 4 additional firemen and policemen; cost of required public facilities could be as much as \$852,000 and the total public capital costs could reach \$1.4 million.

Under both authorities local livestock ranchers would lose a total of up to 38,025 AUMs of active grazing use per year on public land, worth approximately \$414,000 in direct annual income.

# ENERGY

Electricity consumption of the proposed action was estimated for two cases. An "average" case designed to simulate average weather conditions and irrigation requirements and a "worst case" designed to simulate drought weather conditions and irrigation requirements.

In the "average" case the direct proposed action electricity consumption was estimated at 373,830 MWH per season. The typical (median lift height is 650 feet and 4-6 miles distance from the river) acre would require 3,478 KWH per season. In the "worst case" direct consumption was estimated at 525,154 MWH per season for the proposed action and 4,736 KWH per season for the "typical user."

Irrigation diversions from the Snake River result in losses of hydroelectric generation at downstream dams on the IPC system. The total load on the IPC system that would be created by the proposed action, including downstream hydroelectric losses, was estimated at 556,661 MWH in the "average" year. The highest monthly load would be in July, with 201 average MW. "Worst case" total load was estimated at 788,412 MWH, with a monthly high in June of 269.9 average MWH.

The load caused by the proposed action cannot be met from existing IPC owned generating resources. Existing IPC contracts for purchase and exchange of power expire before the proposed action would be implemented.

Calculations of cost impacts were based on "average year" consumption only. If electricity supplies were obtained to meet "worst case" loads, the cost impact would be greater. Three alternative sources of electricity supply to meet the proposed action load demand were analyzed. The most likely potential sources were determined to be either IPC construction of 250 MW of thermal generating capacity (with export of power during non-irrigation months) or seasonal IPC participation in a thermal plant constructed by another utility. In the first case the annual cost of the new supply in 1977 dollars would be $62.6 million; in the second case, $22.3 million. Assuming the current electricity rate system of this total annual cost the proposed action irrigators would pay $7.9 million of this total annual cost in the first case, or $6.5 million in the second case. This leaves $46.8 million or $15.8 million per year to be borne by other IPC ratepayers. On a per acre basis, this would be a subsidy paid by IPC ratepayers of $422 per acre per season in the first supply case, or $142 per acre per season in the second supply case.

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The result of implementing the proposed action would be a large increase in agricultural electricity consumption. However, the overall gain in agricultural production would depend on the extent of which existing farms (and even the proposed action itself) could weather the economic pressures caused by higher electricity costs which would result, in part, by proposed action electricity demand.

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The direct energy consumption of gasoline and diesel plus indirect consumption represented by fertilizers, pesticides, herbicides, and the embodied energy of irrigation systems by the proposed action was estimated. The chemical energy consumption of the proposed action would not have a measurable impact on the supply or cost of these chemical energy forms. These energy forms are, however, generally non-renewable resources.

# CHAPTER 6

# RELATIONSHIP BETWEEN LOCAL SHORT TERM USES OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG TERM PRODUCTIVITY

Chapter 6 provides a long-range perspective of the possible effects the proposed farm development would have on the overall environmental production of the area. It compares tradeoffs between the short-term uses of the environment to the long-term impairment or enhancement of the overall resource productivity.

# CHAPTER 6
# RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

For the purposes of this analysis, short-term is defined as the period from 1980 through 1994 during which time the land would be "opened" for farming, plus that amount of time that would be required to bring the land into full crop production. Generally speaking, land would be converted within the three to ten year time frames allowed under DLA and CA authorities. Thus, public land opened for farming in 1984 should be fully developed and patented by 1994. Therefore, the short-term will be considered between 1980 and 1994 and long-term will be any time after 1994.

## AIR QUALITY

There will be both a short-term and long-term lowering of air quality, principally during windy periods in the spring months. Pollutants would be mainly in the form of airborne dust particles. The average annual increase in particulate pollution due to new agriculture development would not exceed more than 10 micrograms per cubic meter. Additional pollutants from agriculture-related commercial and industrial facilities would eventually occur, adding somewhat to the long-term decline in air quality.

## SOILS

In the short-term, natural soils productivity would decline while farmers are attempting to reclaim their investments by continuously planting high-value cash crops. This would deplete organic matter content, deplete the surface horizon, and reduce fertility.

In the long-term, soil productivity would be regained but probably would not reach original levels. As investments are regained, farmers would generally develop crop rotation systems, use continuous pasture in eroding areas, implement soil conservation practices, and place more natural nutrients back into the soil. With such management, the soils would be improved by increasing organic matter content and fertility while improving the soil structure. Some farmers, however, would continue to seek high cash returns at the expense of soil fertility, and thus cause continual depletion. On some soils there may be a problem with salt build-up which would decrease long-term productivity.

## WATER RESOURCES

Irrigation of farmland creates a long-term demand for water. The 277,827 acre feet of water needed per year for the proposed development would be lost to any other present or future uses. The cumulative effect of this withdrawal plus future upstream withdrawals for other projects would lead to a gradual depletion of the areas water resources. Continued withdrawal of Snake River water would reduce long-term productivity of water based recreation opportunities and aquatic wildlife populations. Future options for water use would be gradually, and perhaps irrevocably, foreclosed. Water, a limited resource, would become more limited.

Surface water quality may increase slightly in the short-term and long-term. There could be a long-term improvement of water quality in the Snake River as state water quality goals are achieved. However, there is likely to be a trend toward thermal-generating power plants as energy demand continues to grow in the Snake River Basin. Thermal plants would require cooling water which would probably come from the Snake River, increasing summer water temperatures.

It is expected there would be both a short-term and long-term degradation of groundwater quality. Groundwater productivity would decrease in the sense that 1.) the quality of the water would interfere with its potential use, and 2.) water would be extracted from the aquifer faster than it would be replaced.

## VEGETATION

Under the proposed action, up to 130,015 acres of rangeland vegetation would be lost. This long-term loss will be accompanied by a long-term gain of about 107,685 acres of high producing farmland. In terms of vegetation production, native vegetation currently produces about 500 to 700 lbs./acre (loss); irrigated agriculture will produce an average of 8600 lbs./acre (gain). This gain is over 14 times (1,433 percent) greater than the loss. Most of the production from the agricultural land will be directly consumed by humans, whereas none of the native vegetation production is directly consumable by humans.

The short-term and long-term loss of 130,015 acres of rangeland vegetation represents about 4 percent of the 3.3 million acres of this vegetation type that currently exists in the State (Idaho Almanac, 1977). The gain of 107,685 acres of new irrigated farmland is 2.8 percent of the 3.9 million acres now under irrigation in the State.

Since the reason for the proposed action is to produce food for human consumption, additional vegetative production may also be viewed as an increase in human productivity. The crops grown would contribute to social well-being and stimulation of the local economy in the long-term. Further discussion of human productivity is found in the socio-economic section.

## WILDLIFE

From a total wildlife numbers standpoint, it is expected the proposed action will cause a short-term loss. In the long-term, however, total numbers should remain about the same as exist now, or may increase slightly. Short-term reductions will be caused by loss of habitat for nearly all species that now exist in the study area. As agricultural development proceeds, new habitat will be created and this habitat will serve different wildlife populations - some old and some new. If the proposed action is accomplished as planned, many of the "new" populations (pheasants) will have a higher public value than those populations that were lost (rabbits).

From a species survival standpoint, several species will be subject to long-term, adverse impacts. The long-billed curlew, burrowing owl, and ferruginous hawk will incur habitat and prey losses that will make their survival in the area questionable. Since their survival, as a species, is in jeopardy in Idaho, the proposed action must be considered, in the long-term, as a threat to the survival of these species.

Because of water withdrawals from the Snake River, there would be a 5 to 25 percent long-term decrease in game-fish production in the river. Cumulative impacts from other types of future withdrawals would further reduce game-fish production. Non-game fishes would increase.

## CULTURAL RESOURCES

In the course of carrying out the proposed action, a great deal of archeological information will be gained through inventory and/or salvage. From a long-term, cumulative standpoint, knowledge would be gained and be used with existing knowledge to form a better understanding of mans earlier activities. In the opposite vein, however, some sites would be missed, some would be destroyed, and knowledge from these sites lost forever.

## VISUAL RESOURCES

Agricultural development would constitute a long-term change in the appearance of the area. Viewers would see a change from remote, natural vistas to farmland scenes. Both have their scenic qualities and it is difficult to say one is preferred over the other. Perhaps the most prominent, long-term aesthetic loss would be the intrusion of pumping stations, power sub-stations, roads, and pipelines into the Snake River Canyon.

## RECREATION

Farm development would result in a permanent loss of at least 111,015 acres of land base for public recreation. In addition, the long-range productivity of the Snake River for water-based recreation uses and sightseeing would be reduced.

Long-range recreation productivity would be further impacted by the conversion of state-owned land within the ES areas to farm development since it is expected that this would occur along with the alteration of BLM land.

Successful farm development may adversely affect long-range recreational uses of other public land in southern Idaho since demands might be made to allow agricultural entry on public land outside of the ES area once feasible farming has been demonstrated.

Upland game bird hunting opportunity would be significantly increased. In terms of overall hunting opportunity, more would be available under the proposed action than is available at present.

## WILDERNESS

Implementation of the proposed action would result in no significant short-term use or loss of wilderness resources. Long-term productivity or quality of wilderness resources could diminish slightly due to secondary impacts associated with increased population in the area.

## LIVESTOCK GRAZING

In the short-term there would be a loss of at least 14,975 AUMs and possibly up to 41,397 AUMs among 127 livestock operators. Many operators would lose part or all of their customary grazing areas. Depending upon the extent the proposed action is implemented, over the long-term there could be a net loss as high as 41,397 AUMs of grazing use. The affected operators would reduce their operation, go out of business, leave the area, or find other means of getting along.

The AUM loss would be somewhat offset by agricultural crops, such as grain and alfalfa, grown in the ES area. Based upon the assumptions (taken from regional averages), that approximately 6 percent of the 111,015 acres farmed would be in alfalfa, that each acre would yield an average of 3 1/2 tons per acre of hay, and that there are 4 AUMs per ton of alfalfa hay, there would be a total of 93,240 AUMs produced in the ES area under the proposed action from alfalfa alone. However, this increased AUM production would not equalize the 14,975 to 41,397 AUM loss on public land. The operators within the ES area rely upon BLM range forage at the current cost of $1.89 per AUM and could not continue to run their operation feeding their livestock alfalfa hay at a cost of $11.25 per AUM (based upon an average of $45 per ton of hay). It is expected that most of the alfalfa hay grown in the ES area would be purchased by buyers other than the livestock operators affected by the proposed action.

## MINERAL RESOURCES

Short-term use of gravel resources would result in the disturbance of an estimated 300 acres of land. Since such actions can be adequately rehabilitated with proper resource management, the effects would be relatively short-term. Approximately 1.3 million cubic yards of gravel would be used for road construction in farm areas.

## TRANSPORTATION NETWORKS

Road systems and utility systems are absolutely necessary to begin and maintain intensive agricultural production. This would involve long-term dedication of about 1,236 acres for the estimated 300 miles of gravel roads needed for the proposed action. Maintenance and periodic upgrading would occur in the long-term.

## SOCIO-ECONOMIC

Since the economic feasibility of the proposed action is marginal, short- and long-term changes in socio-economic factors are conditional. If the assumption is made that farm energy costs remain low and crop prices are high (best case), then employment will rise, farm income would increase, and the total market area would gain in earnings. This would be viewed as an increase in the area's economic productivity. In reality, however, all indications are that energy costs will rise dramatically (as much as 100% in the next five years). If farm crop prices stay at about the same level they are now, new farm development would not be economical. In this case, new development would not occur, or newly developed and some older farms would be abandoned. In either of these situations, there would be no economic gains in the market area. There may even be a depression of the local economy and a slight downgrading of social well-being.

## ENERGY

From an energy standpoint the critical question relating to the use of the environment is the trade-off between energy impacts and the increase and maintenance of agricultural productivity.

The major energy-related impact resulting from the proposed action is the electricity cost that would be borne by users of electricity other than the proposed action irrigators. This would fall most heavily on the Idaho Power Company (IPC) rate-payers. The annual cost to IPC customers of supplying electricity to the proposed action ranges from $142 to $426 per acre (in 1977 constant dollars) for the average acre.

Electricity cost impacts will accumulate in two ways:

1) The cost of electricity forms a part of the cost of almost all products and services. The annual cost of the proposed action and the resulting increase in electricity price will accumulate and multiply as increased electricity costs are passed through the economy. The net effect will be increased inflation.

2) The cost impacts can be expected to accumulate and increase over time. The real price of electricity (as well as other energy forms) has been increasing relative to the rest of the economy, including commodity prices. The trend of rising real prices of conventional energy is expected to continue over the long-term as more demand pressure is placed on the finite supply of energy resources. These trends indicate that if the decision is made to maintian the proposed action in production, the magnitude of the electricity cost borne by IPC ratepayers will increase. This increasing cost will be in additon to all other increases in electricity cost which may occur.

The cumulative impact may be tempered somewhat if electricity use by other customers increases and the cost can be spread over a larger number of users and/or greater use. If electricity use stabilizes or declines relative to other changes in the economy, the cumulative impacts would be more severe as costs would be spread over fewer customers and/or less usage.

Other important cumulative impacts result from the commitment of energy resources to the proposed action. One of these is commitment of fossil fuel resources, which will be discussed in Chapter 7. Another is the commitment of Snake River stream-flow and hydroelectric resources. The proposed action would be an incremental increase in the reduction of Snake/Columbia streamflow. In comparison to total hydroelectric generation on the Snake/Columbia the loss may not be considered large. However, the proposed action is only one of a number of similar current or proposed developments on the Snake/Columbia. The cumulative impact on streamflow and hydroelectric generation of these projects taken together is significant relative to the total generation. In this context the proposed action is an incremental increase in a growing and significant problem--the loss of very low cost and hence, extremely valuable energy resource. As the costs of new electricity generating facilities increase, this hydroelectric resource increases in value.

Short-Term

Over the short-term, the relationship or trade-off between energy impacts and increased productivity can be assessed by comparing the incremental increase in agricultural production with the incremental increase in energy consumption. The 107,685 acres of new farmland represent an increase of about 3.5 percent of the estimated 3.1 million acres of cropland currently in production in 11 southwest and south central Idaho counties that correspond roughly to the IPC service area.

In terms of the IPC service area, it represents about a 6.5 percent increase in the 1.7 million acres under pump irrigation in their area. In terms of crop production, the assumed crop rotation would result in an 8.6 percent increase in Idaho potato production, 15 percent sugar beets, 11.9 percent beans, 4.7 percent spring wheat, 3.2 percent barley, and .6 percent alfalfa over 1976 levels of production.

The increase in electricity consumption is proportionally much greater. The consumption of the proposed action average case represents an increase of 26 percent over 1978 IPC irrigation sales. Proposed action worst case represents an increase of 33 percent over 1977 IPC irrigation sales.

The principal short-term relationship, then, is a relatively small increase in agricultural production at the expense of a much larger increase in electricity consumption. The benefit of this increased agricultural production to society would have to be weighed against the cumulative impacts of increased energy costs.

Long-Term

The short-term analysis has assumed that the proposed action would, in fact, result in an increase in agricultural productivity. This may happen over the short-term, however, a permanent long-term increase in productivity is questionable. From the standpoint of energy and the resulting economics, the proposed action is marginal. An analysis of farm budgets demonstrates that the proposed action would not be economically viable if faced with the full cost of its electricity requirements. The economic viability, if any, depends on the present IPC electric utility rate system which dilutes the real energy cost of new electricity supply by spreading it over all customers regardless of their responsibility for increased demand.

Because of the high energy requirement of the proposed action, it is particularly vulnerable if either a) electricity rates rise significantly faster than crop prices, or b) the electricity rate system is changed such that the proposed action would have to pay the full cost of its electrical requirements. In either case, the productivity of the proposed action would end.

Given the existing electricity rate structure, implementation of the proposed action would raise energy costs to existing pump irrigators, possibly to the point that some existing pump irrigated land may go out of production. As the price of energy increases over time, the total cost burden of the proposed action on existing irrigators would be expected to increase if it is decided to keep the proposed action in production. The competition from proposed action agricultural production, which may result in depressed prices for some commodities, could increase the economic impact on existing pump irrigators as well. The long-term result may well be no net gain in south Idaho agricultural production but, assuming the proposed action is maintained in operation, a net increase in agricultural energy consumption and electrical cost to all users.

## SUMMARY

If the proposed action is implemented, there would be permanent changes in land use, and many trade-offs would occur. Up to 148,000 acres of rangeland would be replaced by 107,685 acres of farmland and about 40,315 acres of public use areas, wildlife tracts, and other related uses. The dominant existing use - livestock grazing - would be replaced by intensive irrigated crop production. Contrary to the past, it is not likely that urban development will follow.

Although no threatened or endangered species (plant or animal) would be affected, some wildlife species like the burrowing owl, curlew, and ferruginous hawk would decline in numbers. These animals would be replaced by other species like pheasants and quail. The natural landscape would be replaced by a rural, agricultural landscape. A few archeological values would be lost but a greater knowledge of the area's archeological values would be gained. Some recreational pursuits - ORV's - would be replaced by new upland game hunting opportunities.

Short-term land productivity will be greatly increased, as will human productivity (see Vegetation discussion above). Use of the study area by predominately agricultural activities would displace few land uses that cannot be accomodated elsewhere.

In most cases, there would be a long-term gain to offset a short-term loss. In some cases there are losses that would not be offset: declining air quality, lowered soil productivity, a decrease in game fish and increase in non-game fish species, a detraction from the natural scenic qualities of the Snake River Canyon, and water diversion from the Snake River.

Energy, and its related costs, have a greater effect on the long-term productivity of the environment affected than any other factor. Although the proposed action is in line with growth trends and does not foreclose any important long-range options for enhancing the productivity of the area, it appears the cost of energy, and the increasing value of water, will make the proposed action obsolete in the near future. At least, it is not adequate for the long run.

# CHAPTER 7

## IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Chapter 7 quantifies, where possible, those impacts that would cause irreparable or permanent changes to the environment as a result of the proposed action.

# CHAPTER 7
# IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

This chapter identifies the irreversible and irretrievable commitment of resources resulting from the proposed action. For purposes of this chapter the term "irreversible" is defined as incapable of being reversed - once initiated, use, direction, or condition would continue. The term "irretrievable" is defined as irrecoverable - once used, not readily replaceable.

## AIR QUALITY

Farming operations would contribute to a slight irreversible degradation of air quality.

## WATER RESOURCES

Once water was diverted to farmland developed under the proposed action, it would be a "water right" and considered an irreversible and irretrievable resource commitment. An estimated 277,827 acre feet of water would be required of which 250,000 acre feet would be pumped from the Snake River. This would be a block of water removed from the Snake/Columbia system that could not be used for other purposes.

Groundwater supplies would gradually diminish between Bruneau and Murphy as 27,827 acre feet were pumped each year for irrigation in this part of the ES area.

## VEGETATION

An irreversible and irretrievable loss of 77,925 acres of natural range vegetation and 33,090 acres of rangeland grass seeding would occur.

## WILDLIFE

The proposed agricultural development would result in an irreversible and irretrievable change in native wildlife that inhabit land converted to farms. Although several are adaptable and can survive, complete elimination of numerous species in portions of the ES area would be expected. This would include several small mammals, some of which are primary food sources for many raptors (pygmy rabbit, black-tailed jackrabbits, and various rodents). It is expected that the numbers and varieties of raptors would decline due to the elimination of this food supply.

Birds which are dependent upon shrub/grassland habitat type during their reproductive period would show population declines (sage sparrow, sage thrasher, vesper sparrow, black-throated sparrow, lark sparrow). Sage grouse would suffer the loss of one strutting ground. About seven percent of a mule deer wintering range would be lost through agriculture land conversion.

There would be losses in fishery stocks as a result of the proposed action. Because the water diversion proposed for the project is not reversible, the fishery loss must be considered irretrievable. Losses in game-fish stocks will amount to 5 to 25 percent of the present abundance.

## CULTURAL RESOURCES

Any site destruction, by mistake or by salvage, represents an irretrievable and irreversible loss to that portion of the cultural resource base. At present, there is inadequate inventory data available to estimate the total amount of site destruction that would occur from the proposed action.

## VISUAL RESOURCES

The proposed action would irreversibly and irretrievably eliminate the natural landscape features on 111,015 acres of rangeland. Visual resources within the Snake River Canyon would be irreversibly and irretrievably modified from development of service facilities such as roads, pipelines, pump stations, and transmission lines. Views from Oregon National Historic Trail and the historic Kelton Road would be modified by farm developments.

## RECREATION

There would be an irreversible and irretrievable loss of at least 111,015 acres of land base to unrestricted recreational opportunities. Of this land area 60,400 acres are currently used for off-road vehicle activity.

## LIVESTOCK GRAZING

There would be an irreversible and irretrievable loss of up to 41,397 AUMs of grazing use each year in the ES area due to the proposed action.

## MINERAL RESOURCES

The use of an estimated 1.3 million cubic yards of gravel would constitute a commitment of resources that would be irreversible and irretrievable.

## SOCIO-ECONOMIC

An unquantifiable amount of farming equipment and machinery; wood, wire, and cement for fencing; gasoline and oil; fertilizer, herbicides, and insecticides, and associated implements; housing construction materials; and heating and cooling energy requirements are items which would be irreversibly and irretrievably committed.

The necessary capital investment would be irreversible and a certain amount would be irretrievable. The personpower requirements would be irreversible and irretrievable.

## ENERGY

### Electrical

Once generated and consumed, electricity is irretrievable. The commitment of electrical generating capacity to the proposed action is, however, reversible, assuming there would be some market that would use the electricity.

Fossil fuel consumed in generating the electricity would be the principal energy resource that would be irreversible and irretrievably lost.

In the "most likely" electricity supply scenarios detailed in Chapter 3 new electricity supplies obtained in response to the proposed action load would be coal-fired plants. To supply the direct electricity consumption of the proposed action in the average case year, account for line losses, and replace lost hydroelectricity would require the generation of 556.7 million KWH per year on the Idaho Power Company (IPC) system plus an additional 149.0 million KWH to replace hydro losses at the Snake River and Columbia River Dams downstream from IPC. Assuming the conversion of 10,500 BTU per KWH in a coal plant, this electricity generation would require 5.8 trillion BTU per year on the IPC system plus another 1.6 trillion BTU per year hydro losses, for a total of 7.4 trillion BTU per year.

The BTU value of coal can vary considerably. Southwestern Wyoming coal, contracted by IPC for the proposed "Pioneer" plant, has a heat value of about 9,500 BTU per pound. If the total electricity requirements of the proposed action were met with coal-fired generation using this Wyoming coal, about 308,000 tons of coal would be consumed annually for the IPC system plus an additional 82,000 tons to compensate for Pacific Northwest losses, for a total annual coal consumption of 390,000 tons.

In addition to the coal, there are a number of significant secondary energy uses associated with the operation of a power plant. These would include petroleum consumption by coal mining machinery, by transportation of the coal from mine to power plant, and for some power plant operations. Without having information on plant location, mine location, and type and plant design, this consumption cannot be quantified.

Chemical

The energy consumption represented by the use of gasoline, diesel, fertilizer, and pesticides on the proposed action is irreversible and irretrievable. The significance of the chemical energy consumption is not so much the relative magnitude of this use but rather the fact that these energy forms are non-renewable and limited in supply.

Chemical energy consumption would be less than the coal consumed in the generation of electricity for irrigation. However, most of the chemical energy consumption would be petroleum. This includes the direct use of gasoline and diesel plus feedstock and manufacturing energy for fertilizer and pesticides. The estimated annual nitrogen fertilizer consumption of the proposed action would result in the annual consumption of about 240 million cubic feet of natural gas from which the fertilizer is made (assuming 38,000 cubic feet per ton of nitrogen-see Chapter 2, Technical Report).

Supplies of petroleum and especially natural gas are much more limited than coal. Further, much of the U.S. petroleum and natural gas supply is imported. Proposed action petroleum consumption would therefore have a cumulative impact when considered along with other activities that are increasing U.S. petroleum consumption.

# CHAPTER 8

## ALTERNATIVES

Chapter 8 describes several alternatives to the proposed farm development. An assessment of the impacts expected to occur from each alternative is presented.

# CHAPTER 8
# ALTERNATIVES TO THE PROPOSED ACTION

## DESCRIPTION OF ALTERNATIVES

Six alternatives to the proposed action are discussed in this chapter. They are categorized as "Main Alternatives" and "Subalternatives." Alternative 1,2 and 3 (Main Alternatives) address different levels (acreages) of farm development under CA and DLA. Alternatives 4,5 and 6 (Subalternatives) address different authorities for land disposal under the Federal Land Policy and Management Act of 1976 (FLPMA) that could be used instead of CA and DLA. The FLPMA authorities could be used to permit farming under the proposed action level, Alternative 1 level, or Alternative 2 level, or any other acreage level.

The development features (stages of implementation and discrete operations) described in Chapter 1 and mitigating measures described in Chapter 4 apply to these alternatives as well as the proposed action.

Main Alternatives:

(1) Maximum (176,310 acres) Farm Development Under DLA and CA Authority.

(2) Minimum (28,590 acres) Farm Development Under DLA and CA authority.

(3) Allow no agricultural development, reject all existing DLA and CA applications, and impose a moratorium on further filings.

Subalternatives: Federal Land Policy and Management Act of 1976 (FLPMA)

(4) FLPMA Lease Farm Development

(5) FLPMA Sale Farm Development

(6) FLPMA Exchange Farm Development

## MAIN ALTERNATIVES

### Alternative 1: Maximum Farm Development

This level of farm development would involve land disposal under DLA and CA as with the proposed action. It would, however, allow a larger amount of public land to be developed. The proposed action is based on permitting agriculture conversion primarily on Class I and II soils (the best quality). This alternative would allow new farming on Class I, II, and III soils. Class III soils are considered marginal, of poorer quality and produce lower crop yields. In many cases, never the less, it is possible to farm Class III soils.

Overlay 2A and 2B (in back leaf of this document) illustrates 235,080 acres that were delineated in the ES area as suitable for development under this alternative. Of this amount, 25 percent would be reserved for public purpose tracts, similar to the proposed action, leaving 176,310 acres to actually be farmed. As with the proposed action, the public purpose tract locations are not identified, but location selection would be based on wildlife habitat needs, sand and gravel deposits, sanitary landfill sites, etc. Orderly development would take place in the ES area at about 35,000 acres per year from 1980 through 1984.

Alternative 2: Minimum Farm Development

This alternative calls for development by DLA and CA of Class I and II soils that are found under 500 feet elevation above the Snake River. This alternative is keyed to the rising electricity costs of high-lift pumping irrigation water from the Snake River. With this alternative, it is assumed that pumping water more than 500 feet above the Snake River would not be economically feasible for new farm projects between 1980 through 1984.

Overlay 3A and 3B depict a total of 38,120 acres for development under the minimum alternative. As with the proposed action and maximum alternative, 25 percent, or 9,530 acres, would be reserved for public purpose tracts. This leaves 28,590 acres that could actually go under plow. About 5,700 acres per year would be developed from 1980 through 1984.

Alternative 3: Allow No Farm Development

This alternative would allow no immediate farm development. Existing DLA and CA applications would be rejected and a moratorium imposed on future applications. This alternative would eliminate the possibility of any public land within the ES area of being immediately developed under CA, DLA, or FLPMA. It would hold land with agriculture potential in a status that would not preclude development at a later time. This alternative would not preclude farm expansion on private land within the ES area.

SUBALTERNATIVES

On October 21, 1976, Congress passed Public Law 94-579, the Federal Land Policy and Management Act (FLPMA). This act is commonly referred to as BLM's Organic Act and has some far reaching implications concerning the management of public land. This Act established the policy that public lands be retained in public ownership for multiple-use management and requires that any disposal of public land be in the national interest. It mandates land use planning and stresses environmental quality on public land administered by BLM. Under FLPMA, agricultural development can take place through lease or sale of public land or land exchanges with other landowners. At the time of this writing regulations concerning sale, lease, and exchange of public land have not been formalized. The FLPMA subalternatives to the proposed action and main alternatives (1) and (2) are as follows:

Alternative 4: FLPMA Lease

Section 302 of FLPMA authorizes the issuance of short or long-term leases (up to 30 years) to individuals to use public land for crop cultivation. Under lease provisions, there are no acreage limitations on the land to be farmed, and rental rates to the BLM would be based on fair market value. BLM would retain control over farming operations by requiring the lessees to comply with certain conditions in the lease grant. These conditions would be oriented toward soil conservation practices, wildlife preservation, and other environmental protection measures on the farmland under lease. A lease program would give BLM maximum flexibility and control of agricultural development on public land.

Under FLPMA lease, the BLM would lease public land in the ES area for farming. The BLM could lease any level of public land, from 1 acre up to 176,310 acres identified for farm development under the maximum alternatives. The land would be farmed by a private individual (much the same as a tenant) or some other private entity. Since ownership of the land would still be by the federal government, BLM would retain management controls. Under conditions of a lease, BLM could terminate or suspend the lease if the lessee did not comply with the lease conditions. Likewise, the lessee could relinquish the lease as long as the land was rehabilitated to the satisfaction of the BLM authorizing officer.

Since BLM is responsible for multiple use resource management, farm conservation practices and public benefits would be required under a farm lease arrangement. Emphasis would be put on sound soil conservation practices, wildlife habitat enhancement, environmental considerations and public recreation. These management concepts would be incorporated as conditions of the lease granted to the farmer. In keeping with this concept, BLM would establish the following management goals for FLPMA farm leases.

1. Recreation: Allow public access and recreation on leased land for hunting purposes as long as such access does not interfere with farm operations or jeopardize the lessees investment. This access may be designated by permission only.

2. Cultural Resources: Require lessee to cease operations and notify the BLM authorizing officers if a cultural site is found during construction activities.

3. Soils: Prior to the allowance of agricultural development, the grantee shall adopt and then abide by a Soil Conservation District Management Plan. These plans shall incorporate Best Management Practices (BMPs) to insure soil conservation and water quality protection. The BMPs should include, but not be limited to, the following control measures:

- A minimum of 25 percent of the lease acreage would be planted to "soil building crops" (alfalfa, grain, etc.) each year. This would mean that 25 percent of the acreage would have a crop cover year around.

- Minimum tillage practices to reduce soil compaction and use selective herbicides in lieu of tillage, for weed control, to reduce soil compaction.

- Chisel plowing practices which loosens soil without inverting surface soil. This practice shatters restrictive layers and pans which inhibit water and air movement through the soil.

- Establishment of on farm catchment basins or ponds to collect excess irrigation run off.

- Winter grain or other suitable crops would be planted immediately following harvest of potatoes, sugar beets, or beans to provide a cover crop to help retard soil erosion caused by spring winds. This grain can be plowed under and used as a manure crop prior to planting row crops the following spring.

4. Visual: Utilize the VRM system for the design and placement of buildings, fences, pumps, power lines, etc., on the farmland under lease.

5. Wildlife: Wildlife habitat enhancement would be a major feature of the FLPMA lease program. The lessee would:

- Be required to maintain in suitable condition certain important wildlife habitat on the leased farmland.

- Be required to irrigate selected habitat within the farm for wildlife benefits.

- Be required to establish vegetation (dryland shrubs, forbs, grasses and/or trees) at strategic locations on wildlife isolated tracts and/or leased farm land for wildlife habitat.

- Be required to establish boundary fences on those wildlife isolated tracts that fall within the leased farmland, or along the common boundary of an isolated tract that may be adjacent to leased farmland.

Each leased farm unit would require site specific stipulations to implement the intent of the above management goals. These stipulations could vary from one farm to the next depending on its location, farming techniques, etc. The prospective lessee would be required to submit his plan of development to the BLM for approval. The BLM would approve the plan based on farm economics, land use planning and environmental consideration. A Soil Conservation District Management Plan also would be required by BLM. The local Soil Conservation District would recommend the plan with final approval by BLM. The lessee would use the Best Management Practices deemed feasible in the Soil Conservation District Management Plan for his particular farm operation. BLM personnel or an authorized representative would conduct periodic compliance checks to assure the lessee was farming in accordance with the BMPs in his lease agreement.

Alternative 5: FLPMA Sale

Section 203 of FLPMA authorizes BLM to sell public land for agricultural purposes at a price no less than fair market value. A tract that is sold for farmland can be no larger than necessary to support a family size farm. An economically profitable family size farm unit would vary from region to region, depending on soil fertility, growing season, crop yields, crop rotation, operational cost, etc. This does not preclude the sale of parcels smaller than a family size farm in order to expand an existing farm operation. Under FLPMA sale provisions, the BLM could include convenants, terms, conditions, and reservations in the patent documents to insure proper land use and protection of the public interest. Land sales can be made by competitive bidding, modified competitive bidding, or negotiations as determined by BLM.

Covenants, terms, conditions, and reservations would not be inserted by BLM where existing state or local laws, regulations, or ordinances would adequately insure proper land use and protection of the public interest. Under FLPMA Sale, the BLM proposes to insert the following convenants, terms, conditions, and reservations in patents for tracts sold for farming purpose in the ES area:

1. To assure soil conservation and water quality protection, all agricultural operations on the land would be in accordance with and would abide by a Soil Conservation District Management Plan incorporating Best Management Practices (BMPs). The BMPs should include, but not be limited to, the following control measures:

- A minimum of 25 percent of the lease acreage would be planted to "soil building crops" (alfalfa, grain, etc.) each year.

- Minimum tillage practices to reduce soil compaction. Selective herbicides in lieu of tillage, for weed control, to reduce soil compaction.

- Chisel plowing practices which loosens soil without inverting surface soil. This practice shatters restrictive layers and pans which inhibit water and air movement through the soil.

- Establishment of on- farm catchment basins or ponds to collect excess irrigation run- off.

- Winter grain or other suitable crops would be planted immediately following harvest of potatoes, sugar beets, or beans to provide a cover crop to help retard soil erosion caused by spring winds. This grain can be plowed under and used as a manure crop prior to planting row crops the following spring.

2. The land to be patented shall be perpetually preserved for agricultural land uses. This is in keeping with the goals to 1) preserve the amount of productive agricultural land for food production,

2) preserve productive farms by preventing incompatible land uses, 3) maintain a viable agricultural base to support agricultural processing and service industries in the area, 4) and reduce costs of providing services to scattered non-farm uses.

3. Landowners receiving patent to farmland would maintain a fenced boundary around any wildlife isolated tract that falls within the farm unit or along the common boundary of any isolated tract adjacent to the farm unit.

4. Reservation of public access for recreational hunting under "hunting by permission only" procedure.

5. Reservation of right-of-way under Section 508 of FLPMA for public purpose types of right-of-way (power lines, canals, roads, etc.).

Alternative 6: FLPMA Exchange

The BLM can trade public land for private land where a public benefit is evident, under Section 206 of FLPMA. Land exchanges may be initiated by either party, and there are no acreage limitations in this type of transaction. In cases where the fair market value of properties in the exchange are not the same, a monetary payment by either party up to 25 percent of the value of the public land involved is allowed to equalize the two land values. Under this method, public land acquired by a private individual could be developed into farmland. In this case, the BLM would take over management of the new land acquired and relinquish control of public land traded in the exchange. As mutually agreed upon, either party could include covenants, terms, conditions, and reservations in the patent documents similar to FLPMA Sale.

In addition to the DLA and CA applications, there are currently two exchange proposals that involve public land in the ES area. The exchange proponents (the private land owners) are offering to trade approximately 800 acres of land they own for about 3500 acres (see Map 1-3) of public land in the ES area that they wish to farm. The private land offered has some high recreation, scenic, wildlife, and watershed values. At this time, the BLM has not made a decision to process these exchange proposals. Under FLPMA exchange, the BLM proposes to insert into the patent the same provisions as are discussed in the previous FLPMA Sale section.

The assumptions and analysis guidelines (page 3-1) used to analyze impacts for the proposed action in Chapter 3 were also used to guide impact assessments for the six alternatives discussed in this chapter. In addition, all mitigative measures identified in Chapter 4 were incorporated in the impact assessments. Therefore, the environmental impacts depicted for each alternative in this chapter are the residual impacts left after Chapter 4 mitigative measures were applied.

## ALTERNATIVE 1: MAXIMUM FARM DEVELOPMENT

### CLIMATE

Impacts would be the same as for the proposed action.

### AIR QUALITY

Air quality would be affected most by an increase in total suspended particulates. The total suspended particulates can be expected to be almost twice as much as the proposed action because of the greater acreage in farmland. The duration would be the same as the proposed action. Air quality standards will be exceeded during the months of March, April, and May. Dust storms would be severe but infrequent (less than 10 days per year). These storms would cause highway safety problems, maintenance problems on local roads caused by soil drifts, and a nuisance to the area in general when airborne soils are deposited. Communities most impacted in or near the ES area would be Hammett, Hagerman, Bruneau, Grandview, Buhl, Glenns Ferry and Twin Falls.

### GEOLOGY AND TOPOGRAPHY

There would be no impacts to geology and topography.

### SOILS

One hundred seventy six thousand three hundred and ten acres of new farmland would be developed under this alternative. This would include the Class I and II soils to be developed under the proposed action, plus about 65,300 acres of additional Class III soils. Impacts on Class I and II soils would be the same as discussed in Chapter 3. This section will focus on impacts associated with farming on Class III soils.

Depth of Class III soils are from 10 to 20 inches. They can have high amounts of coarse fragments (rocks) with textures that range from clay to loamy fine sand. There can be saline alkali problems with or without heavy subsurface structures. Slope can range from 0 to 20 percent.

The above described characteristics of Class III soils will drive farm costs up. Land leveling can expose unproductive subsurface layers or bedrock, or bring saline or alkali layers closer to the surface which will decrease potential production. Table 2-2, Chapter 2 illustrates that Class III land produces lower crop yields.

Because economic returns are lower, double cropping or growing cash crops will be less feasible on Class III soils. Where row crops are grown, lower economic returns to the farmer may prevent him from planting winter cover/soil building crops. This will result in more land being fallow exposing soil to wind and water erosion conditions. The lack of cover crops during winter months along with not incorporating green manures and the steeper slope conditions, all combine to make Class III soils subject to more erosion. In addition, Class III soils are shallower than Class I and II, and therefore productive soil zones can be removed sooner by erosive forces.

Erosion on a per acre basis and total overall erosion will be higher under the maximum development alternative than for the proposed action. Total erosion is predicted to be about 10 to 15 percent higher.

## WATER RESOURCES

### Uses and Flows

Surface Water

Approximately 357,000 acre-feet of water would be diverted from the Snake River. The following table indicates the impact of this withdrawal on mean flows at Murphy:

TABLE 8-1
SNAKE RIVER FLOWS (CFS) AT MURPHY WITH MAXIMUM FARM DEVELOPMENT - BASED ON AVERAGE FLOW 1/

| Month | Mean Flow Before Wdwl. | CFS Withdrawal | CFS Remaining | Percent Reduction |
|---|---|---|---|---|
| May | 11016 | 430 | 10856 | 4 |
| June | 9331 | 675 | 8656 | 7 |
| July | 6884 | 1444 | 5440 | 21 |
| Aug | 6854 | 1510 | 5344 | 22 |
| Sept | 7949 | 1149 | 6800 | 14 |
| Oct | 9214 | 432 | 8782 | 5 |

SOURCE: IDWR 48 year flow records. Includes 90 CFS return flow from project.

1/ All Snake River flow information is tentative. IDWR is now updating and revising these data. New information will be available for Final ES.

As this table indicates, maximum mean flow reduction would be 22 percent in August, and 21 percent in July. Although not shown on this table, mean flow reduction would be negligible in winter months.

Because low-flow years are often more important to fisheries than average-flow years, it is important to examine the effects of maximum development on low-flows.

In a low-flow year such as 1977, reductions in flow would be more severe. As the following table shows, maximum reduction would be 26 percent in July, followed by August with 25 percent.

TABLE 8-2
SNAKE RIVER FLOWS (CFS) AT MURPHY WITH MAXIMUM FARM DEVELOPMENT-BASED ON LOW-FLOW YEAR (1977) SHOWING MEAN LOW-FLOWS AND ACTUAL LOW-FLOW 1/

| Month | Mean Flow Before Wdwl. | CFS Withdrawal | CFS Remaining | Percent Reduction |
|---|---|---|---|---|
| May | 6848 | 430 | 6418 | 6 |
| June | 6495 | 675 | 5820 | 10 |
| July | 5657 | 1444 | 4213 | 26 |
| Aug | 6107 | 1510 | 4597 | 25 |
| Sept | 6835 | 1149 | 5686 | 17 |

SOURCE: IDWR 48 year flow records, including 90 CFS return flow.

1/ All Snake River flow information is tentative. IDWR is now updating and revising these data. New information will be available for Final ES.

Because of fish spawning in the period May to July, it is also instructive to examine the effects of the maximum-development alternative on the low one-day flows in these months in the low-flow year 1977:

TABLE 8-3
SNAKE RIVER LOW ONE-DAY FLOWS AT MURPHY WITH MAXIMUM FARM DEVELOPMENT BASED ON LOW-FLOW (1977), SHOWING ACTUAL LOW ONE-DAY FLOW 1/ FOR EACH MONTH

| Month | Low One-Day Flow Before Withdrawal | CFS Withdrawn | CFS Remaining | Percent Reduction |
|---|---|---|---|---|
| May | 6000 | 430 | 5570 | 7 |
| June | 5120 | 675 | 4445 | 13 |
| July | 5270 | 1444 | 3826 | 27 |

SOURCE: IDWR 48 year flows, including 90 CFS return flow.

1/ These data are provisioned-pending revision of base flow information by IDWR.

Although 1977 can be considered a year of unusually low-flows, it is also true that in the period 1968-1977, low one-day flows in June would have been below Idaho Fish and Game (IFG) recommended resource maintenance flows (5500 CFS at Murphy) in 4 of the 10 years under the maximum development alternative (1963-3.8 percent below; 1973-12 percent below; 1976-5 percent below; 1977-24 percent below).

Groundwater

Approximately 97,900 acre feet of groundwater would be required to irrigate 37,944 acres (see Table 1-3, Chapter 1). Based on current knowledge, this would adversely affect existing users as the aquifer would likely be depleted.

Impact Summary

In summary, in average years the maximum development alternative would not reduce mean flows at any river point below the resource maintenance flows recommended by IFG. In a low-flow year such as 1977, the project would reduce mean flows in summer months as much as 26 percent below IFG recommended flows. The daily low-flow for the months of May through July would be reduced as much as 27 percent below IFG recommended resource maintenance flows. The State's established flow of 3300 CFS at the Murphy gage would not be exceeded under this alternative.

Water Quality

Accurate and precise quantitative estimates of water quality changes caused by this alternative are not possible. Based on experience and knowledge of the personnel writing the water quality sections of the ES, the following quantitative impacts are used: very slightly - 0 to 1 percent; slightly - 1 to 5 percent; moderate - 5 to 25 percent; heavy - 25 to 50 percent.

Snake River

Turbidity would decrease slightly above C.J. Strike in both average and low-flow years. Below Strike, turbidity would decrease very slightly in average and low-flow years. Occasional accidents to water-delivery systems and intense summer storms would deliver sediments to the Snake River via tributary streams. Winds in spring and early summer will also carry sediments from project lands to the river. The magnitude of these sediment movements cannot be predicted. Water temperature would increase slightly below C.J. Strike because of shoaling--reduction in depth with moderate change in wetted perimeter. This slight increase would further raise existing temperatures which already often lie above state water quality standards.

Conductivity would increase slightly in average and low-flow years and in all reaches of the ES area pH would increase slightly. Nitrates would increase slightly in all reaches. Total phosphorus would decrease slightly above C.J. Strike and would not change in average or low-flow years below C.J. Strike. Occasional accidents to water delivery systems and intense summer storms would deliver phosphates adsorbed to sediments to the Snake River via tributaries. Winds would also carry phosphates to the river from project lands.

Bacteria, heavy metals and pesticides would decrease very slightly in all reaches of the Snake River in the ES area in average-flow years, and would decrease slightly in low-flow years. Occasional accidental overland flows from irrigation systems and intense summer storms or winds would carry heavy metals and pesticides adsorbed to sediments to the river in unpredictable quantities.

Light penetration to the river bottom will be greater as a result of this development alternative because water depth in the river will be reduced.

Benthic invertebrates density per unit area would increase slightly above C.J. Strike and very slightly below Strike in all years, but reductions in wetted areas caused by reduced stream flow would offset the beneficial effect.

### Tributary Streams

In tributary streams in all years, flows would increase moderately to heavily. Conductivity, nitrates, and benthic invertebrates would also increase moderately to heavily. There would be slight to moderate decreases in bacteria, total phosphorus, toxicants, turbidity and temperatures. Occasional accidents or high-intensity summer storms would deliver phosphorus, pesticides, heavy metals and sediments to tributary streams by overland flow and wind. The magnitude of movement of these materials from project lands to streams is not predictable.

In tributary streams, beneficial impacts would include moderate increases in flow and benthic invertebrates, and moderate decreases in bacteria, phosphorus, toxicants, turbidity, and temperatures.

### Downriver From The ES Area

Between the lower end of the ES area below Homedale and the upper end of Brownlee Pool (about 55 miles), the effects discussed previously for water quality would extend for only about 16 miles before inflows from major tributaries (Malheur, Boise, Owyhee Rivers) would make project-caused water quality changes indiscernible. All water quality effects would disappear below Brownlee Pool, since Brownlee Pool acts as a nutrient and sediment trap.

### Groundwater

The impacts under this level of development would be the same as the proposed action; but, they would be of a greater magnitude because a greater area would be irrigated. Perched water tables containing some pollutants (fertilizer, residues and pesticides) would be more common. Some of this water would appear as seeps in canyon walls and topographic lows. These could eventually drain back into the Snake River.

Impact Summary

In summary, adverse impacts upon Snake River water quality would include slight increases in nitrate in all flow years (see aquatic vegetation for impacts). Temperatures would increase slightly as water depth decreases. Of minor adverse impact would be slight increases in conductivity in all flow years. In comparison to the Snake River, tributary streams would be more severely affected by increases in conductivity and nitrates.

Beneficial impacts upon the Snake River water quality as the result of this alternative would include slight decreases in bacteria, toxicants, and turbidity; slight decreases in phosphorus; and slight to moderate increases in density of benthic macroinvertebrates above C.J. Strike in all flow years. The latter affect will be offset by loss of total area for plant and insect production, caused by reduced stream flow.

## VEGETATION

Terrestrial

The 439,303 acres of public land within the ES area consist of approximately 275,583 acres of sagebrush/grassland, 87,085 acres of seeded grassland, 42,810 acres of salt-desert shrub/grassland, and 33,825 acres of natural grassland. Overall the current vegetation is in relatively poor range condition.

The major impact to terrestrial vegetation would be the conversion of rangeland to cultivated farmland. Approximately 76,166 acres of sagebrush/grassland, 43,250 acres of seeded grassland, 36,834 acres of salt-desert shrub/grassland and 20,060 acres of natural grassland would be cleared (see Map 2-5 and Overlays 2A and 2B). These 176,310 acres would be replaced by approximately 37,624 acres of potatoes, 35,914 acres of dry beans, 29,074 acres each of winter wheat, barley, and sugar beets, 10,261 acres of alfalfa, and 5,289 acres devoted to non-crop land uses (based upon predicted crop rotations).

In addition, 58,770 acres of public land would be reserved as public purpose tracts. Of this, up to 30,770 acres would be subject to vegetation removal as needed for airstrips, sanitary land fills, and other facilities in support of farm development. The remaining 28,000 acres would be reserved for wildlife enhancement with native vegetation left intact.

This extensive change in vegetation would in turn impact other resources such as wildlife and livestock grazing. Refer to these sections for impact analysis.

## Riparian

Increased water flow volumes and additional plant nutrients in tributaries would tend to stimulate riparian growth, and overall riparian vegetation would probably increase as a result of infiltrated irrigation water reaching stream courses.

## Aquatic

Quantifying terms used in the following aquatic section are defined as: very slightly - between 0 and 1 percent; slightly - between 1 and 5 percent; moderately - between 5 and 25 percent; heavily - between 15 and 100 percent.

Because of slightly reduced turbidity and increased nitrates, phytoplankton would increase moderately in all flow years above C.J. Strike and slightly below Strike. Attached benthic algae and rooted aquatic plants would increase moderately because of greater light penetration due to slightly reduced turbidity and decreased water depths (which permit more light to reach the stream bottom).

In tributaries where there would be increases in flow, reduced turbidity and increased plant nutrients, attached benthic algae and rooted aquatic plants would increase moderately to heavily in all flow years.

Effects of Different Land Disposal Methods:

Accidental arrival of sediments, heavy metals, pesticides and plant nutrients from ES land into tributaries and the main Snake would be less under CA disposal than DLA. Thus there would be less likelihood that pesticides and heavy metals would be bound up in aquatic plant tissue for later concentration to invertebrates, fish, and bald eagles.

## Threatened and Endangered Plants

Table 8-4 shows information on known sites of five species regarded as threatened or endangered which occur within the maximum development area. Similar to the proposed action, these plants will be protected and preserved, as required in the Endangered Species Act of 1973. No development would be allowed where these plants are found; therefore they would not be impacted.

## Impact Summary

Approximately 171,021 acres of the present shrub and grass range-land would be replaced by agricultural cropland, and up to 36,059 acres would be subject to clearing for non-crop land uses associated with farm development.

TABLE 8-4
THREATENED AND ENDANGERED PLANT SITES UNDER
MAXIMUM AND MINIMUM DEVELOPMENT ALTERNATIVES

| | | Approximate total area of sites under: | | Approximate percent of known Idaho population occurring under: | | |
|---|---|---|---|---|---|---|
| Common Name | Current Status | Maximum Development | Minimum Development | Maximum Development | Minimum Development | Approximate percent of known Idaho population occurring within ES Area |
| Murphy milkvetch | candidate for Idaho's Endangered List. May be proposed to the Federal Register of Endangered Plants. | 3400 acres | 0 acres | 6% | 0% | 15% |
| Cow pie eriogonum | same as above | 0 acres | 0 acres | 0% | 0% | 75% |
| Mourning milkvetch | candidate for Idaho's Threatened List | 35 acres | 0 acres | 1% | 0% | 5% |
| Matted milkvetch | same as above | 120 acres | 0 acres | 10% | 0% | 50% |
| Large flowered gymnosteris | same as above | 25 acres | 0 acres | 30% | 0% | 50% |

SOURCE: Threatened and Endangered plant inventory and study, 1978, BLM.

Under this alternative there would be a slight to moderate increase in phytoplankton quantity and bloom life, and a moderate increase in abundance of attached benthic algae and rooted aquatic plants in the Snake River and tributaries.

No impacts to threatened or endangered plants would be allowed to occur, as required in the Endangered Species Act of 1973. As a result of this extensive loss of present vegetation, other resources such as wildlife and livestock grazing would be adversely impacted (refer to these sections in this chapter for analysis).

## WILDLIFE

### Terrestrial

The maximum development alternative would result in an increased level of native wildlife habitat loss resulting in a decline of most wildlife populations in the area. This alternative increases the amount of land proposed for agricutural development by 62 percent as compared to the proposed action. For this reason implementation of this alternative would increase the magnitude and intensity of adverse impacts to native wildlife dependent upon the shrub/grassland, and grassland habitat types. It could result in the loss of existing natural vegetation on up to 207,080 acres (176,310 acres for farms and approximately 30,770 acres for public purpose tracts not used for wildlife leave areas).

A total of up to 132,531 acres of the shrub/grassland type and 74,549 acres of grassland type, would be lost if the maximum development alternative is used.

For animals such as pheasants, Hungarian partridge, and Valley quail, new habitat would be created as new agricultural land is developed near existing natural vegetation. This would create an edge, or ecotone, thereby increasing habitat diversity. Increased habitat diversity leads to increased wildlife diversity. However, acre-per-acre, large continuous agricultural projects provide less edge effect than smaller farms. As a result, wildlife species would be less abundant on large agricultural development ecotones than on the smaller farm units.

Under this alternative, BLM would set aside about 28,000 acres of isolated wildlife tracts among the 176,310 acres of new farmland. The selection criteria BLM would use is discussed in Appendix 1-1. These isolated tracts would provide year-round habitat for upland game birds. They would be primarily used by pheasants during winter and spring periods for shelter, feeding, and nesting when adjacent farmland is not useable for these needs.

All impacts discussed in Chapter 3 are applicable to the maximum development alternative and will not be repeated in this section. The additional specific impacts that would result from this alternative are discussed below.

Mule Deer

Approximately 2260 acres of agricultural land are proposed for development by this alternative within the deer winter range shown on Map 2-6. This is equal to approximately 16 percent of the total winter range acreage which lies within the ES boundaries.

As explained in Chapter 3 conversion of this native range to agricultural land would result in a loss of vegetation which is important for the survival of deer using this winter range. The shrub/grassland type which would be lost is used for forage and cover. Loss of this type due to the maximum development alternative would act to displace and subsequently result in an estimated loss of 80 to 120 deer or 16 to 24 percent of the mule deer using the winter range within the ES area. Increased agricultural oriented human activity would also play a part in the above mentioned deer loss by causing additional physical stress to these animals.

Waterfowl

Waterfowl's feeding use of cropland, primarily the cereal grain crops which would comprise approximately 58,147 acres, would be expected to increase because more cropland would be available.

Western Burrowing Owl

Implementation of the maximum development alternative would adversely impact the western burrowing owl by converting seven of the nine known areas occupied by this bird to agricultural land. This is a higher loss of habitat to these owls than was presented in the proposed action. All other impacts described in Chapter 3 concerning this bird are applicable to this alternative but the intensity and magnitude of these impacts would increase.

Sensitive species mitigating measures under the maximum development alternative would be the same as those described in Chapter 4. It is expected that this measure would significantly reduce the impact on the burrowing owl.

Impact Summary

Implementation of the maximum development alternative would result in an increased conversion of existing vegetation to agriculture, an increase by 62 percent as compared to the proposed action. Specifically, up to 132,531 acres of the shrub/grassland habitat type and 74,549 acres of the grassland habitat type would be lost. Hunting, nesting and cover areas used by native wildlife in the ES area would be substantially reduced. This loss represents significant habitat alteration and would result in an overall increased magnitude and intensity of adverse impacts to native wildlife now occupying these areas. Conversely, those wildlife species adapted to agricultural land (pheasants, Hungarian partridge) would show marked population increases due to new production of this type of habitat, and the isolated wildlife leave tracts. Waterfowl feeding opportunities would benefit on the 58,147 acres of grain crops estimated with this alternative.

Those wildlife species which are particularly sensitive to human disturbance, such as raptors and long-billed curlews would suffer greater losses (as compared to the proposed action) should this alternative be implemented. In general, those wildlife species which would show significant population declines in the ES area due to a high level of habitat loss (as well as human disturbance) include; pygmy rabbits, many small non-game mammals (which serve as an important prey source), sage grouse, most raptor species including the ferruginous hawk and the western burrowing owl, native non-game birds including the long-billed curlew, and most reptiles and amphibians.

On the mule deer winter range depicted on Map 2-6, 80 to 120 deer, or 16 to 24 percent of the deer population using this winter range within the ES area, would be displaced and the population would subsequently be reduced.

Fisheries

In average years, the maximum development would not reduce Snake River mean flows at any river point below the resource-maintenance flows recommended by Idaho Fish and Game Department (IFG). Maximum development would reduce wetted stream perimeter (wetted cross-section) by 36 percent in a low-flow year, such as 1977, or 39 percent below the perimeter wetted by recommended flows. Maximum development would have reduced wetted perimeter by 33 percent in the average of the four lowest-flow years in the period 1968 - 1977 to a point 30 percent below the perimeter wetted by IFG recommended flows. All of these calculations are for the area below Swan Falls Dam, (see Map 2-4) the worst case in the ES area. Reductions of wetted area in other stream reaches would be less.

Quantifying terms used in the following section are defined as: very slightly - between 0 to 1 percent; slightly - between 1 and 5 percent; moderately - between 5 and 25 percent; heavily - between 25 and 100 percent.

Sturgeon

In average and low-flow years sturgeon reproduction would decline moderately; growth would decline slightly above Strike and moderately below. Survival would decrease moderately in all reaches of the ES area. Impingement and entrainment of larval white sturgeon at pump intake structures would increase the mortality of sturgeon in the ES area.

In low-water years, effects of reduced wetted perimeter in the area below Swan Falls would be especially heavy because the channel configuration changes sharply in that area as flows decline. This would sharply reduce embryo survival and growth of all sizes of sturgeon and would increase the mortality of larval fish. It is estimated the Snake River in the ES area would support less sturgeon--probably 25-50 percent less.

Other Fish Species

A slight increase in density of benthic invertebrates would tend to increase food available for most fish, but this beneficial impact would be offset by loss of wetted area for plant and insect production. The net effect would be a decline in growth rates of fish.

Flow conditions in all years would not affect fish movements upstream or downstream.

Reservoir populations will be little affected by the development, except that in the upper end of reservoir pools there will be some increase in abundance of rooted aquatic plants and benthic algae as light penetration increases slightly. The rooted plants should provide slightly more cover for fish. The impact would disappear a few miles into the reservoir pool.

In average flow years the wetted perimeter reduction with reduced streamflow would moderately increase mortality of embryos and larvae of edge-spawners above Strike and heavily below Strike. In low-water years the effect would be heavy in all areas. Entrainment of fish at pump intake structures would add to mortality of juvenile fish. In average-flow years fish growth would decline slightly as food-producing areas are reduced. In low-water years the decline would be moderate. Growth of fish would be slightly less affected above C.J. Strike than in other reaches. Survival of all age classes would decrease moderately in all flow years and areas.

Downriver Fish

Both anadromous and resident species downstream from the ES area will be impacted very slightly by reduced summer flows as part of the nibble effect of many water withdrawals in the Columbia system.

Impact Summary

The most serious adverse effects are caused by losses in wetted perimeter in the ES reach of the Snake River. Abundance of sturgeon will eventually decline as much as 50 percent as a result of the maximum development alternative, and the mix of other fish species will shift from game fishes toward less-preferred species. Smallmouth bass, channel catfish and black crappie populations will be reduced 25 to 50 percent. Entrainment in pump intakes will contribute to the declines in desired fish species to an unknown extent. Both anadromous and resident fish species downstream from the ES area will be reduced very slightly as a result of the water withdrawals for the maximum-development alternative.

Owyhee Herd

Under the maximum development alternative, public land within the Owyhee wild horse range that would be subject to agricultural development amounts to about 5840 acres (three percent) of the total 156,600 acres used by the herd. Due to poor forage condition, lack of water, and close proximity to roads and human activity, these 5840 acres generally receive limited wild horse use in relation to the remainder of the herd range. This 5840 acre loss of herd range is not expected to impact herd size or restrict movements of the horses although new access roads associated with farm development may make the wild horse areas slightly more accessible to the public, thereby increasing the chances for harassment of the herd.

Saylor Creek Herd

Until 1983, when a Wild Horse Management Plan (refer to Chapters 1 and 2) will be completed by BLM for the Saylor Creek herd, decisions would have to be postponed as to whether or not to allow farm development under this alternative on approximately 40,800 acres (40 percent) of the estimated 103,200 acre area presently used by the herd (see Map 2-7 and Overlays 2A and 2B). The WHMP will determine optimum herd size, designate specific herd range, and provide management practices to adequately protect, maintain, and manage the herd.

Until the Saylor Creek WHMP is completed, it is not possible to predict impacts of agricultural development on the herd. As BLM is obligated by law to insure protection and management of wild horses on public land, agricultural development could be precluded in areas devoted to herd management.

## CULTURAL RESOURCES

The impacts to cultural and paleontological resources resulting from the development of 176,310 acres differ from impacts of the proposed action only in a quantitative sense; the more acres developed, the more sites impacted. Development at the maximum level would impact an undetermined number of unrecorded sites and at least some of the following known sites: 65 prehistoric sites, 3 historic sites, and four additional paleontological sites. Several of the prehistoric sites are in the proposed Saylor Creek Archaeological District which has been identified as meeting National Register Criteria of eligibility. (See Appendix 1-3). No formal determination of eligibility has yet been made.

Agency procedures for mitigation are identical to those required under the proposed action: cultural and paleontological resource inventory prior to farm allowance, consultation with the State Historic Preservation Office and the Heritage Conservation and Recreation Service, comment from the National Advisory Council on Historic Preservation on National Register eligible properties, appropriate mitigation measure (salvage, avoidance, etc.) implemented. It is expected there would be more instances requiring mitigation than under the proposed action.

Since the resource base is still largely unknown in the ES area, it is impossible to assess the cumulative effect on cultural sites of developing 176,310 acres as opposed to the effect of developing 111,015 acres (the proposed action). In addition, since cultural and paleontological sites are not evenly dispersed over the ES area, the losses incurred under maximum development would not be likely to increase proportionally and may in reality be far greater or lesser than expected. It is conceivable that the resource base would be sufficiently depleted to preclude any future regional studies in the area.

## VISUAL RESOURCES

Visual impacts under the maximum development level would be similar to those discussed in Chapter 5 for the proposed action, although of a slightly greater magnitude.

Since most of the farm and associated development would occur on VRM Class IV areas (low scenic quality), modification of the natural landscape in these Class IV areas would be considered acceptable by some people. However, several road and transmission line crossings of the Oregon Trail and Kelton Road (VRM Class I) would be necessary to facilitate farming activity. These developments would result in adverse visual impacts on these historic routes. The impact would be especially severe on the Oregon National Historic Trail (see Map 2-10).

The Snake River Canyon from Hammett east to Salmon Falls Creek Canyon are designated as BLM VRM Class II areas. Even after proper location, facility design, and site rehabilitation and landscaping, the development of irrigation pump stations and associated roads, transmission lines, and penstocks would result in visual intrusions which may exceed the BLM's visual resource contrast rating for these areas. In VRM Class II areas, any changes in the basic elements of the natural landscape should not be evident and should not attract attention. Highest visual impacts would occur where the Snake River is visible to passing motorists on Highway 30 and Interstate 80.

There would also be an unavoidable adverse visual impact resulting from concentrated ORV activities. This is especially true on smaller parcels of public land with steeper topography that are retained within the farm areas and accessible from farm access roads. Since this use would occur mostly on Visual Resource Management Class IV areas, the impact would not be severe.

## RECREATION

This development level could result in the loss of 176,310 acres of public land for recreation uses. Recreation opportunities on remaining adjacent public land could also be impaired due to some access being blocked by private land, farm fences, and obliterated roads although new farm related roads would likely create about the same access opportunity that was lost.

The effect of this agricultural development level upon recreation would vary by recreational activity. The most significant impacts would be on the sightseeing, ORV use, and hunting activities.

Sightseeing

Agricultural development would have adverse impacts on the viewing and enjoyment of historic remnants of the Oregon Trail and Kelton Road. Public enjoyment of segments of the historic routes would be impaired by views of modern intrusions associated with agriculture development, primarily roads and powerline crossings. Furthermore increased road access and population growth (ranging from 981 to 1625 people - see Socio/Economic section of this alternative) associated with farm development would encourage inappropriate motorized recreation use of the historic routes and could result in historic site vandalism. Such use would decrease the quality of the historic sightseeing experience.

Irrigation works associated with farm development, namely pump sites, would degrade sightseeing qualities along the Snake River, especially within those areas visible from highways. (See Visual Resource section). Sightseeing use via boat would also be degraded by pump site developments contrasting with the natural river shoreline.

For the remainder of the ES area, farm development would have either adverse or beneficial effects on sightseeing, depending on the viewers point of view. Some find agricultural landscape pleasing, while others see greater value in desert scenery.

Off-Road Vehicle Use

An estimated 86,000 acres of land under this alternative are used by ORV enthusiasts. It is estimated that the affected acreage was used by 5,000 motorcylists and 3,300 four-wheel drive enthusiasts during 1977.

Farm development would result in a displacement of this ORV use to other public land. This displacement along with farm associated road development and population increase could result in additional and more concentrated ORV use on nearby public land.

Hunting

The wildlife section discusses impacts on wildlife species found in the ES area. Mule deer, sage grouse, and pygmy rabbit populations would be reduced by proposed action farm development. These species are pursued by hunters. Other game species that are hunted by sportsmen in the ES area would not be affected. These are principally mountain cottontail, coyote, bobwhite quail and chukar partridge.

A number of hunted wildlife species would likely increase due to enhanced habitat conditions. These would be California quail, Hungarian partridge, mourning doves, pheasants and certain waterfowl species. As part of this alternative about 28,000 acres of isolated tracts would be interspersed throughout the 176,310 acres of new farmland. These tracts would be managed to increase upland game bird numbers; principally pheasants. The tracts would have public access for recreational hunting. It is estimated that 28,000 acres of isolated wildlife tracts would generate 10,360 hunter days annually in the ES area (BLM Burley District 1979 survey estimates that each acre of isolated tracts equals .37 hunter days per season). This would generate $126,392 ($12.20 x 10,360 hunter days) expended by hunters using the isolated tracts if the value for a hunter day is used from the Chapter 2 Recreation section.

It is expected that some farmers would not allow public hunting on their land and some would. Farmland open to hunting would create an additional opportunity for sportsmen. Probably, isolated tracts would offer the better combination of habitat conditions to attract pheasants during the fall hunting period, however.

Certain species of waterfowl (see Chapter 2, Wildlife) feed on grain. Farmland open to hunting could give sportsmen a chance to field hunt for ducks and geese.

Overall, public hunting access on 176,310 acres of new farmland is impossible to estimate but there would be a net hunting gain in the ES area due to the isolated tracts program, and some farms undoubtedly would be left open for sportsmen.

Rockhounding

Ten known rock collecting areas were identified within the ES area. An estimated 45 percent of these areas would be converted to privately owned farms which are often unavailable for public use, under the maximum development alternative.

If these disturbed rockhounding areas remained open to public use during those seasons when the land was not being actively farmed, a beneficial impact would occur since the vegetative removal and soil disturbance associated with farming would uncover collectable rocks.

Water Based Activities

The maximum development level impact on the Snake River fishery is expected to reduce harvestable game fish stocks (smallmouth bass, black crappie and channel catfish) from 25 - 50 percent depending on whether river flows are normal or low as in 1977 (see Fisheries section, Impact Summary). A reduction in the quality of fishery habitat would have a corresponding negative affect on fishing opportunities due to reduced fish numbers. It could be assumed that reduced sport fishing success caused by fewer fish would eventually diminish angling use of the Snake River.

Most camping and picnicking occurs along the Snake River and is associated with fishing, waterfowl hunting, and other water related activities. Therefore, any reduction of water related recreation opportunities during low-water years would have a corresponding effect on camping and picnicking opportunities.

Irrigation withdrawals would result in little impact on boating, waterskiing, and swimming during normal water years. However, during low-water years, adverse impacts may occur on the free-flowing sections of river due to reduced water flow. No impacts are expected on the reservoirs which accommodate the majority of these activities.

Impact Summary

Farm expansion under this alternative accompanied with an increase in roads (about 470 miles, see Transportation section) and better access would likely encourage inappropriate motorized recreational use of the Oregon Trail and Kelton Road. Pump station developments on the Snake River and powerlines into farm areas would degrade scenic qualities. Farm expansion would displace about 86,000 acres of land currently used for ORV activities and force other public land to be used for this type of recreation.

There would be a substantial increase in hunting opportunity in the ES area for upland game bird species, created from agricultural land use and the BLM's wildlife isolated tracts program. Fishing would be significantly impacted on the Snake River, with an estimated loss of 25 to 50 percent of game fish populations, depending on water conditions.

## WILDERNESS

This alternative would result in little direct impact to wilderness resources.

Section 603 FLPMA requires that all designated Wilderness Study Areas be considered unavailable to the development of farms, utility and access corridors, and other improvements which would impair their suitability for preservation as wilderness until Congress acts on the President's recommendation as to the suitability of the areas for designation of wilderness.

Implementation of this alternative is expected to result in an increase in population of between 981 and 1,625 people within the ES market area (as described in Socio-Economics of this alternative). This increase in population could in turn result in some deterioration of wilderness characteristics within designated Wilderness Study Areas due to increased recreational use and increased particulate air pollution originating from farm projects and other developments. Control of such deterioration of wilderness characteristics is not considered feasible due to its random and dispersed nature.

A total of approximately 1,410 acres of land proposed for agricultural development under this alternative is located within the proposed Wilderness Study Areas shown on Map 2-8 and Overlays 2A and 2B. Development of these areas would be deferred until completion of the wilderness review process (see Chapter I, Statutes Restricitng Farm Development Under the Proposed Action).

## LIVESTOCK GRAZING

Under the maximum development alternative, 235,080 acres of farms and public purpose tracts would be scattered throughout the 418,580 acres of public land within the ES area currently used for livestock grazing. Map 2-12 and Overlays 2A and 2B show the development pattern of this alternative in relation to present livestock grazing allotments.

The most significant impact under this alternative would be the elimination of livestock grazing on approximately 233,220 acres of public land. Table 8-5 shows, by allotment, the 233,220 acres to be removed from grazing use and the associated 21,545 AUMs which would be lost per year as a result.

Table 8-6 further breaks down the 233,220 acres to indicate the estimated impact to the 127 individual livestock operators. Reductions in licensed livestock grazing use similar to these preliminary estimates, would be made by the BLM with implementation of this alternative. To adjust to these reductions, each operator would have to either reduce operations accordingly, go out of business, or try to find another grazing location.

Customary trailing routes (other than reserved stock driveways shown on Map 2-12) would be lost, causing operators to have to truck their animals or take longer, less direct trailing routes.

Existing range improvements associated with livestock grazing within the ES area would no longer be able to be used effectively. The maximum development alternative would result in the loss of the use of approximately 87,085 acres of range grass seedings, 140 miles of fence-line, 18 miles of water pipeline, 9 cattleguards, 9 check dams, 8 troughs, and 4 developed springs or wells under BLM ownership, plus other privately owned range improvements. Compensation would have to be made by farm developers to the respective rancher or the BLM for fair market value of the authorized range improvements that were removed (43 CFR 4120.66c).

The scattered land pattern of development would make it difficult for operators to locate and keep track of their animals on the public land amongst the farms. Access through the ES area would be limited. Refer to Map 2-12 and Overlays 2A and 2B.

Some problems for the livestock operator may occur due to farm projects being located within and adjacent to grazing areas. Such problems that could inadvertently occur include: livestock tresspassing onto farmland where fencing is inadequate or gates are left open; livestock becoming entangled in or injured by agricultural debris; and livestock ingesting toxic chemicals through careless application and use of farm pesticides or fertilizers.

TABLE 8-5

ACRES AND AUMs INCLUDED IN MAXIMUM DEVELOPMENT ALTERNATIVE, BY ALLOTMENT

| Allotment | Public Land Included In Maximum Development Alternative (Acres) | (AUMs) | Public Land Within ES Area (Acres) | (AUMs) |
|---|---|---|---|---|
| Graveyard Point | 280 | 10 | 1,165 | 40 |
| Poison Creek | 120 | 6 | 450 | 25 |
| French John Area | 240 | 11 | 315 | 15 |
| Elephant Butte | 2,310 | 60 | 3,870 | 99 |
| River Group | 440 | 32 | 1,785 | 131 |
| Reynolds Creek Group | 3,150 | 142 | 4,255 | 239 |
| Black Mountain Field | 1,960 | 121 | 3,800 | 223 |
| Oreana #1 | 550 | 15 | 425 | 123 |
| Nahas Individual | 770 | 25 | 1,460 | 44 |
| Oreana #2 | 3,250 | 164 | 5,155 | 256 |
| Fossil Butte | 10,800 | 268 | 18,420 | 469 |
| Oreana #3 | 3,440 | 43 | 4,650 | 52 |
| Castle Creek, Winter | 12,850 | 643 | 23,330 | 1,188 |
| Battle Creek, Winter | 9,020 | 96 | 11,280 | 120 |
| Battle Creek, SpSuF | 4,810 | 241 | 6,245 | 312 |
| Tindall Northwest | 16,320 | 1,003 | 24,220 | 1,426 |
| Chalk Flat | 240 | 16 | 445 | 29 |
| Sunnyside, SpF | 460 | 32 | 755 | 53 |
| Hammett #1 | 1,360 | 274 | 9,645 | 2,176 |
| Hammett #2 | 2,440 | 358 | 2,800 | 400 |
| Hammett #3 | 640 | 67 | 640 | 67 |
| Hammett #4 | 19,390 | 2,368 | 42,670 | 5,782 |
| Hammett #5 | 900 | 101 | 900 | 101 |
| Saylor Creek | 137,480 | 15,449 | 249,900 | 28,027 |
| TOTALS | 233,220 1/ | 21,545 | 418,580 | 41,397 |

1/ Approximately 1,860 acres of the total 235,080 acres of public land subject to development are not presently grazed.

SOURCE: BLM Boise District grazing case files and 1940, 1959, 1962, 1965 range vegetation surveys.

TABLE 8-6

AUMS INCLUDED IN THE MAXIMUM DEVELOPMENT ALTERNATIVE AND WITHIN THE ES AREA, BY OPERATOR

| (1) Operator | (2) Allotment | (3) Active Grazing Quali- fications (AUMs) | (4) AUMs Included In Maximum Development | (5) AUMs Within ES Area | (6) Total AUMs in Boise District | (7) Percent of Local Operation Included in Maximum Development (AUMs) (Col. 4 ÷ 6) |
|---|---|---|---|---|---|---|
| R. Adolf | Saylor Cr. | 750 | 6 | 394 | 750 | 29 |
| Arkoosh & Zidan | Saylor Cr. | 2,070 | 599 | 1,087 | 2,070 | 29 |
| E. Ascuena | Saylor Cr. | 609 | 176 | 320 | 609 | 29 |
| E. Astorquia, Est. | Saylor Cr. | 3,108 | 899 | 1,630 | 3,108 | 29 |
| J. Barinaga & Sons | Saylor Cr. | 200 | 58 | 105 | 2,145 | 3 |
| H. Bass | Reynolds Cr. Group | 565 | 19 | 31 | 565 | 3 |
| J. Bass | Reynolds Cr. Group | 493 | 16 | 26 | 511 | 3 |
| P. Batruel | Hammet #4 | 62 | 22 | 55 | 62 | 36 |
| C. Berry | Saylor Cr. | 2,100 | 607 | 1,102 | 2,100 | 29 |
| A. Black | Saylor Cr. | 630 | 182 | 331 | 2,214 | 8 |
| J. Black | Battle Cr. SpSuF | 1,372 | 25 | 34 | 2,935 | 11 |
| | Saylor Cr. | 1,059 | 306 | 556 | | |
| P. Black | Castle Cr. W | 68 | 10 | 12 | 850 | 3 |
| | Battle Cr. SpSuF | 182 | 14 | 19 | | |
| T. Blackstock | Elephant Butte | 177 | 39 | 65 | 1,384 | 3 |
| S. D. Blackwell | Hammett #1 | 95 | 6 | 44 | 95 | 6 |
| S. S. Blackwell | Hammett #4 | 470 | 170 | 415 | 511 | 3 |
| W. Boston | Reynolds Cr. Group | 104 | 3 | 5 | 104 | 3 |
| R. Brailsford | Saylor Cr. | 283 | 82 | 149 | 283 | 29 |
| H. Brandau | River Group | 440 | 8 | 34 | 482 | 2 |
| | Black Mtn. Field | 42 | 1 | 2 | | |
| R. Brandau | River Group | 241 | 4 | 18 | 271 | 2 |
| | Black Mtn. Field | 30 | 1 | 1 | | |
| W. Brimson | Hammett #4 | 195 | 70 | 172 | 195 | 36 |
| R. Bruce | Poison Cr. | 172 | 2 | 10 | 719 | <1 |
| Bruneau Cattle Co. | Battle Cr. SpSuF | 5,649 | 104 | 134 | 6,819 | 2 |
| Burghardt Co. | Cattle Cr. W | 275 | 40 | 71 | 3,446 | 4 |
| | Battle Cr. W | 276 | 96 | 120 | | |
| D. Carnahan | Saylor Cr. | 983 | 284 | 516 | 983 | 29 |
| I. Carnahan | Saylor Cr. | 198 | 57 | 103 | 198 | 29 |
| Chipmunk Grazing Association | River Group | 72 | 1 | 5 | 3,345 | 1 |
| | Black Mtn. Field | 877 | 22 | 40 | | |
| B. Collett | Castle Cr. W | 910 | 133 | 249 | 3,787 | 4 |
| Coyler Cattle Co. | Battle Cr. SpSuF | 3,395 | 62 | 81 | 4,135 | 1 |
| O. Cox | Fossil Butte | 93 | 11 | 19 | 5,170 | 1 |
| | Oreana #3 | 2,725 | 24 | 29 | | |
| C. T. Ranch Co. | Reynolds Cr. Group | 1,594 | 52 | 89 | 2,039 | 3 |
| | Black Mtn. Field | 376 | 9 | 18 | | |
| A. Curtis | River Group | 93 | 2 | 8 | 93 | 2 |
| Double Anchor Ranch | Hammett #4 | 404 | 146 | 357 | 3,616 | 7 |
| | Hammett #5 | 1,924 | 101 | 101 | | |
| Faulkner Land & Livestock | Saylor Cr. | 5,015 | 1,451 | 2,630 | 5,015 | 29 |
| Flying Triangle Incorporated | Saylor Cr. | 3,163 | 915 | 1,660 | 3,163 | 29 |
| Glenns Ferry Grazing Assn. | Castle Cr. W | 90 | 13 | 24 | 5,581 | <1 |
| Cuery, Inc. | Saylor Cr. | 250 | 72 | 131 | 5,038 | 1 |
| Guthries Rancho Idaho | Tindall Northwest | 11,501 | 873 | 1,255 | 23,484 | 4 |
| Half Moon Ranch | Hammett #4 | 1,035 | 374 | 914 | 1,184 | 32 |
| W. B. Hall | Saylor Cr. | 998 | 289 | 524 | 998 | 29 |
| Hammett Lvstk. Co. | Saylor Cr. | 6,480 | 1,874 | 3,400 | 10,852 | 17 |
| A. Harley, Jr. | Tindall Northwest | 960 | 73 | 100 | 960 | 8 |
| Hayland Ranches | Oreana #3 | 465 | 4 | 5 | 1,050 | <1 |
| E. Jaca | Reynolds Cr. Group | 244 | 8 | 14 | 2,691 | 2 |
| | Black Mtn. Field | 2,198 | 55 | 100 | | |
| J. Jewett | Saylor Cr. | 510 | 147 | 268 | 510 | 29 |
| C. Johnson | Saylor Cr. | 175 | 51 | 92 | 175 | 29 |
| S. Johnson | Saylor Cr. | 72 | 21 | 38 | 72 | 29 |
| C. Johnston | River Group | 293 | 6 | 22 | 370 | 2 |
| | Black Mtn. Field | 77 | 2 | 4 | | |
| G. Johnstone | Poison Cr. | 250 | 4 | 15 | 2,449 | <1 |
| L. Jolley | Saylor Cr. | 435 | 126 | 228 | 435 | 29 |
| Jones & Sandy Livestock Co. | Saylor Cr. | 2,670 | 772 | 1.401 | 2,670 | 29 |
| S. Jones | Saylor Cr. | 150 | 43 | 79 | 150 | 29 |
| Joyce Livestock Co. | Oreana #1 | 966 | 10 | 80 | 7,212 | 4 |
| | Oreana #2 | 4,952 | 133 | 207 | | |
| | Fossil Butte | 1,069 | 127 | 220 | | |

TABLE 8-6 (Continued)

| (1) Operator | (2) Allotment | (3) Active Grazing Quali-fications (AUMs) | (4) AUMs Included In Maximum Development | (5) AUMs Within ES Area | (6) Total AUMs in Boise District | (7) Percent of Local Operation Included in Maximum Development (AUMs) (Col. 4 ÷ 6) |
|---|---|---|---|---|---|---|
| C. Kast | Hammett #4 | 242 | 88 | 214 | 242 | 41 |
| D. Keck | Saylor Cr. | 800 | 231 | 420 | 800 | 29 |
| R. Kerbs | Saylor Cr. | 2,338 | 676 | 1,228 | 3,103 | 22 |
| C. Kevan | Saylor Cr. | 135 | 39 | 70 | 135 | 29 |
| G. King | Castle Cr. W | 2,155 | 315 | 582 | 8,152 | 4 |
| Da. Kinyon | Saylor Cr. | 724 | 209 | 380 | 1,279 | 16 |
| De. Kinyon | Saylor Cr. | 949 | 275 | 498 | 949 | 29 |
| K. Kubik | Saylor Cr. | 480 | 139 | 250 | 480 | 29 |
| D. Lahtiner | Battle Cr. SpSuF | | 23 | 28 | 1,224 | 2 |
| S. Leguineche | Saylor Cr. | 258 | 75 | 135 | 516 | 15 |
| S. Leham | Saylor Cr. | 682 | 197 | 358 | 682 | 29 |
| B. Malmberg | River Group | 90 | 2 | 7 | 90 | 2 |
| H. Markley | Graveyard Point | 113 | 10 | 40 | 785 | 1 |
| L. Maupin | Castle Cr. W | 250 | 37 | 71 | 2,454 | 2 |
| D. McGhehey | Chalk Flat | 2,068 | 14 | 25 | 3,246 | 12 |
| | Hammett #4 | 1,036 | 375 | 915 | | |
| R. McKee | Reynolds Cr. Group | 81 | 3 | 5 | 81 | 4 |
| C. McMahon | River Group | 489 | 9 | 37 | 615 | 2 |
| | Black Mtn. Field | 126 | 3 | 7 | | |
| E. Milller | Saylor Cr. | 904 | 262 | 474 | 1,784 | 15 |
| Miller Land Co. | Fossil Butte | 213 | 25 | 47 | 2,870 | 1 |
| J. Mills | Hammett #4 | 27 | 10 | 24 | 27 | 37 |
| R. T. Nahas | Nahas Individual | 1,463 | 25 | 44 | 9,520 | 2 |
| | Fossil Butte | 861 | 102 | 178 | | |
| | Oreana #3 | 1,677 | 15 | 18 | | |
| J. Nettleton | Black Mtn. Field | 1,133 | 28 | 51 | 3,304 | 2 |
| | Oreana #1 | 525 | 5 | 43 | | |
| | Oreana #2 | 1,133 | 31 | 49 | | |
| 9-K Ranch | Castle Cr. W | 481 | 70 | 131 | 2,933 | 2 |
| Noh Sheep Co. | Saylor Cr. | 315 | 91 | 165 | 1,586 | 6 |
| Patterson Land & Livestock Co. | Saylor Cr. | 625 | 181 | 328 | 625 | 29 |
| E. Perkins | Saylor Cr. | 2,100 | 607 | 1,102 | 2,100 | 29 |
| R. Pershall | Elephant Butte | 92 | 21 | 34 | 404 | 5 |
| F. Phelps & Sons | Hammett #1 | 1,632 | 103 | 827 | 1,769 | 6 |
| J. Potucek | Saylor Cr. | 411 | 119 | 216 | 411 | 29 |
| G. Presley | Hammett #1 | 1,207 | 76 | 609 | 1,310 | 6 |
| B. Pruett | Saylor Cr. | 413 | 120 | 217 | 413 | 29 |
| M. Quintana | French John Area | 38 | 11 | 15 | 2,383 | 1 |
| R. Ring | Saylor Cr. | 127 | 37 | 67 | 127 | 29 |
| Ross Estate | Hammett #4 | 390 | 141 | 344 | 420 | 34 |
| L. Rudge | Tindall Northwest | 390 | 30 | 43 | 390 | 8 |
| Russell Inc. | Hammett #4 | 240 | 87 | 212 | 392 | 22 |
| Salmon Falls Sheep Co. | Saylor Cr. | 1,560 | 451 | 819 | 1,560 | 29 |
| K. Seesee | Saylor Cr. | 383 | 111 | 201 | 383 | 29 |
| C. Sellman | Battle Cr. SpSuF | 325 | 6 | 6 | 679 | 5 |
| | Tindall Northwest | 354 | 27 | 28 | | |
| Mrs. T. Shenk | Saylor Cr. | 8 | 2 | 4 | 8 | 29 |
| Simplot Livestock Company | Saylor Cr. | 3,048 | 882 | 1,599 | 17,728 | 5 |
| Sliman Sheep Co. | Saylor Cr. | 650 | 188 | 341 | 650 | 29 |
| J. L. Solosabal | Saylor Cr. | 1,080 | 312 | 567 | 1,080 | 29 |
| R. Steele | Saylor Cr. | 413 | 120 | 217 | 413 | 29 |
| C. Steiner | Fossil Butte | 26 | 3 | 5 | 2,160 | 1 |
| | Castle Cr. W | 168 | 25 | 48 | | |
| B. Stephens | Hammett #3 | 240 | 67 | 67 | 240 | 28 |
| Tews Angus Farms | Saylor Cr. | 101 | 29 | 53 | 10,546 | <1 |
| W. Thompkins | Reynolds Cr. Group | 1,239 | 41 | 69 | 1,254 | 3 |
| M. Thompson | Saylor Cr. | 1,794 | 519 | 940 | 1,794 | 29 |
| L. Trail | Saylor Cr. | 1,005 | 291 | 527 | 1,005 | 29 |
| 2-Plus Ranches | Hammett #1 | 1,398 | 89 | 696 | 2,678 | 20 |
| | Hammett #4 | 1,235 | 447 | 1,090 | | |
| Urquidi & Ocamica | Battle Cr. SpSuF | 366 | 7 | 10 | 2,398 | <1 |
| R. Viner | Hammett #4 | 473 | 171 | 418 | 539 | 32 |
| W. Walker | Hammett #4 | 588 | 213 | 519 | 588 | 36 |
| Wells Livestock C. | Saylor Cr. | 200 | 58 | 105 | 4,931 | 1 |
| D. Wicher | Hammett #2 | 400 | 358 | 400 | 550 | 75 |
| | Hammett #4 | 150 | 54 | 133 | | |
| G. Withers | Chalk Flat | 333 | 2 | 4 | 333 | 1 |
| 20 Individual Operators | Sunnyside SpF | 25,275 | 32 | 53 | N/A | <1 |
| TOTALS | | 153,428 | 21,545 | 41,397 | | |

SOURCE: BLM grazing case files and 1940, 1959, 1962, 1965 range surveys.

The total combined impacts resulting from the reduction in grazing use, scattered farm locations, and inadvertent interference of livestock operations from adjacent farm activity, would likely be severe enough to make it no longer economically nor physically feasible to graze livestock on the public land remaining amidst the farms. Because of this, in most allotments, effective grazing use would no longer be possible on most of the public land within the ES area.

Therefore, under the maximum development alternative, grazing could in effect be eliminated on up to 418,580 acres of public land rather than on just the 233,220 acres actually developed. Up to 41,397 AUMs could actually be lost among 127 operators rather than 21,545 AUMs.

Tables 8-5 and 8-6 show acres and/or AUMs of grazing use within the ES area for comparison with those strictly included in the maximum development alternative. This gives a range of the maximum and minimum losses possible to the operators under this alternative. The figures in Column 7 of Table 8-6 show that at a minimum, out of 127 livestock operators, approximately 9 would lose more than 30 percent of their local operation in the BLM Boise District; approximately 38 would lose 21-30 percent; approximately 7 would lose 11-20 percent; and approximately 73 would lose 0-10 percent.

Impact Summary

Under the maximum development alternative livestock grazing would be eliminated on approximately 233,220 acres of public land within the ES area. One hundred twenty seven individual livestock operators in 24 allotments would lose a total of approximately 21,545 AUMs grazing use per year. The use of a number of range improvements including 87,085 acres of range grass seedings, 140 miles of fenceline, 18 miles of water pipeline, 9 cattleguards, 9 check dams, 8 troughs, and 4 developed springs or wells owned by the BLM, plus other privately owned range improvements would also be lost.

Total cumulative impacts from reduced grazing use, scattered farm locations and inadvertent interference of livestock operations from adjacent farm activity would likely be severe enough to make it no longer feasible to graze livestock on much of the public land remaining in the ES area amongst the farms. Therefore, as much as 41,397 AUMs per year could actually be lost.

## AGRICULTURE

The maximum development alternative would add 176,310 acres of new farms in the ES area during the 1980's. Based on the assumed crop rotation discussed in Chapter 1 and less three percent for non-crop areas, there would be 37,625 acres of potatoes, 35,914 acres of dry beans, 29,074 acres each of winter wheat, barley and sugar beets, and 10,260 acres of alfalfa grown each year as a result of the development level.

## MINERAL RESOURCES

Under the maximum development alternative, road construction needs would require about 2,060,000 cubic yards of sand and gravel materials for construction of an estimated 470 miles of gravel roads. This would involve about 400 acres of land, which would be temporarily disrupted. A total area of 1937 acres would be devoted to road use, and would, for all practical purposes, be permanently removed from other uses.

With proper reclamation, any land disturbed for gravel production would be only temporarily removed from other uses.

## LAND USE PLANS, CONTROLS, AND CONSTRAINTS

Impacts would be the same as for the proposed action.

## TRANSPORTATION NETWORKS

The amount of land used for roads and utility transportation systems would increase over what is now in existence. Based on the agricultural development of other land in the ES area, new roads would be the single largest change in land use except for the actual agricultural development. Based on existing farm developments in this area, 470 miles of new roads (encumbering 1,937 acres) would be required to serve the proposed farm areas. From 300-400 acres of public land would be needed as a source of material for road construction (see Mineral impacts).

Utility systems would also be increased, but, as in past development, these systems generally parallel existing or new roads and offer only a visual impact to the existing environment. It is not anticipated that any new large (greater than 245 kv) power lines would be constructed in the ES area as a result of agricultural development.

## SOCIO-ECONOMIC CONDITIONS

The impacts depicted in this section are generated from a combination of the highest crop prices (1976 Normalized) and the lowest energy prices to irrigators (16.5 mills) as shown in Table 3-8 (Chapter 3). These high crop prices and low energy prices would be the most favorable circumstances for farmers under the proposed action. Most other combinations of crop and energy prices illustrated in Table 3-8 do not yield positive farm incomes.

The change in earnings and employment discussed in this section was analyzed with the aid of BLM/s Dynamic Regional Analysis Model (DYRAM) as shown in Appendix 3-1.

Loss of ranch workers and ranch income was based on the total elimination of livestock grazing in the ES area, once farming was completely established under the proposed action. With such circumstances, 418,580 acres of public land would be closed to livestock grazing. This would represent the worst case situation for livestock operators in the ES area.

Carey Act

The development of 176,310 acres would result in 551 farm units. At the same time 418,580 acres would be closed to livestock grazing.

The primary employment impacts would be an additional 551 farmers and a loss of 31 ranch workers. Assuming the highest crop returns and the most favorable energy costs, gains in the farm sector would create secondary impacts of an additional 84 employees in the farm sector and 104 in the remainder of the market area economy. The decrease in the livestock industry would result in 14 jobs lost. Total employment changes by industry are shown in Table 8-7. The major impacted industries are wholesale and retail trade and services. However, all the sectors of the economy would be affected.

By the year 2000 the labor force would be 70 percent higher than in 1975. This alternative would slow down the projected decrease in agricultural employment (Idaho Dept. of Water Resources 1978).

As a result of the alternative, the maximum increase in population in the market area would be 1,625. This was based on 1975 employment to total population ratios. Table 8-8 gives age breakdown for the new population.

Assuming the worst case situation and the fact that ranchers in the ES area normally use an average of 92 percent of their grazing privileges they would lose 38,085 AUMs as a result of the maximum development alternative. An AUM in the ES area is worth approximately $10.86 in income to the ranchers. (Livestock earnings in the ES market area in 1974 totaled approximately $34,510,000). Dividing total earnings by the total number of AUMs of forage consumed in the region yielded a per AUM average earning of $10.86). Thus, ranchers would annually lose approximately $414,000 in direct income.

TABLE 8-7
EMPLOYMENT CHANGES, NUMBER OF JOBS
CAREY ACT - MAXIMUM AGRICULTURAL DEVELOPMENT

| Industry | Due to Primary Livestock Loss | Due to Primary Ag. Gain | Total |
|---|---|---|---|
| Agriculture | | | |
| Livestock | 33 | +9 | 24 |
| Other Agriculture | 0 | +635 | +635 |
| Food and Kindred | -3 | +9 | +6 |
| Wholesale & retail Trade | -3 | +25 | +22 |
| Services | -1 | +16 | +15 |
| Other | -5 | +45 | +40 |
| TOTAL | -45 | +739 | +694 |

SOURCE: Idaho State Office, Bureau of Land Management
Dynamic Regional Analysis Model January, 1979

TABLE 8-8
AGE BREAKDOWN OF NEW POPULATION

| Age Group | Number |
|---|---|
| 5 yrs. | 168 |
| 5-17 yrs. | 466 |
| 18-29 yrs. | 455 |
| 30-44 yrs. | 317 |
| 45-64 yrs. | 164 |
| 65 + yrs. | 55 |
| | 1,625 |

SOURCE: Idaho State Office, BLM
U.S. Dept. of Energy, 1978

TABLE 8-9
CAREY ACT
MAXIMUM AGRICULTURAL DEVELOPMENT
LOCAL SERVICES

| | Owyhee | Elmore | Twin Falls | Canyon | Area Summary |
|---|---|---|---|---|---|
| Workers | 257 | 281 | 73 | 83 | 694 |
| Population | 601 | 658 | 172 | 194 | 1,625 |
| Children (5-17 yrs) | 172 | 189 | 49 | 55 | 466 |
| School Kids | 155 | 170 | 44 | 50 | 419 |
| Elementary | 112 | 122 | 32 | 36 | 302 |
| High School | 43 | 48 | 12 | 14 | 117 |
| Elem. Sq. Footage | 13,440 | 14,640 | 3,840 | 4,320 | 36,240 |
| H.S. Sq. Footage | 6,450 | 7,200 | 1,800 | 2,100 | 17,550 |
| Cost of School Construction | $676,678 | $740,688 | $193,859 | $217,634 | $1,828,860 1/ |
| Cost of School Furnishings | $81,201 | $88,883 | $23,263 | $26,116 | $219,463 |
| Cost of School Land | $30,315 | $33,183 | $8,685 | $9,750 | $81,933 |
| Number of Teachers | 7 | 8 | 2 | 2 | 19 |
| Helath Care Personnel | 7 | 8 | 2 | 2 | 19 |
| Firemen and Policemen | 4 | 5 | 1 | 2 | 12 |
| Cost of Public Facilities | $882,807 | $966,315 | $252,912 | $283,930 | $2,385,964 |
| Total Public Capital Costs | $1,710,261 | $1,872,043 | $489,967 | $550,057 | $4,622,328 |

SOURCE: U.S. Department of Energy 1978 and Idaho State Office, Bureau of Land Mangement

NOTE: Numbers may not add up to totals due to rounding.

1/ All dollar figures are in constant 1975 dollars

Only the "best case" net farm income scenario (from Chapter 3, Table 3-8) was analyzed for secondary impacts. Under this case farm income would increase $3.7 million ($6,820 per farm x 551 farms). The secondary impacts would increase income through all sectors of the economy. The net effect would be that all sectors, excluding livestock, would gain income as a result of this alternative. The total income impact (direct and secondary) would be a gain of $6.2 million throughout the market area.

Implementation of this alternative would lead to an increase of approximately 466 children in the 5-17 age group. This would mean an increase of 419 new school pupils - 302 elementary and 117 high school. These students would require 36,240 square feet of elementary classroom space and 17,550 square feet of high school classroom space (U.S. Dept. of Energy 1978). If sufficient space were not available in the market area, it would cost roughly $2.1 million to build the necessary space (in 1975 dollars). Table 8-9 shows how the counties would be impacted.

Total public capital costs that may be required could reach a maximum of $4.6 million. It is anticipated that public costs would be below this figure. Under 1977 average mill levies the three counties in the ES area would receive $2.9 million in property taxes. The counties would not obtain these revenues until the land is deeded to the applicant (up to ten years after CA entrymen commence development).

Desert Land Act

The number of acres developed into farms and the number of acres taken out of the livestock production would be the same as under the Carey Act. Due to the lack of a residency requirement under the DLA it is estimated that only 10 percent of the farms would have resident owner/operators. The remainder of the farms would have non-resident owner/operators who maintain their residence somewhere in the market area.

The primary employment impacts would be an additional 276 farmers and a loss of 31 ranch workers. Since secondary impacts are based on earnings, they would be the same as under the Carey Act. Total employment changes by industry are shown in Table 8-10. The major impacted industries are wholesale and retail trade and services. However, all the sectors of the economy would be affected.

By the year 2000 the labor force would be 70 percent higher than in 1975. This alternative would slow down the projected decrease in agricultural employment (Idaho Department of Water Resources 1978).

As a result of this alternative, the maximum increase in population in the market area would be 981. This was based on 1975 employment to total population ratios. Table 8-11 give age breakdown for the new population.

The change in earnings in the market area would be the same with the DLA as with the CA.

TABLE 8-10
EMPLOYMENT CHANGES, NUMBER OF JOBS
DESERT LAND ACT - MAXIMUM AGRICULTURAL DEVELOPMENT

| Industry | Due To Primary Livestock Loss | Due To Primary Ag. Gain | Total |
|---|---|---|---|
| Agriclture | | | |
| Livestock | -33 | +9 | -24 |
| Other Agriculture | 0 | +360 | +360 |
| Food and Kindred | -3 | +9 | +6 |
| Wholesale & Retail Trade | -3 | +25 | +22 |
| Services | -1 | +16 | +15 |
| Other | -5 | +45 | +40 |
| Total | -45 | +464 | +419 |

Source: Idaho State Office, Bureau of Land Management, Dynamic Regional Analysis Model January 1979.

TABLE 8-11

AGE BREAKDOWN OF NEW POPULATION

| Age Group | Number |
|---|---|
| 5 yrs. | 102 |
| 5-17 yrs. | 281 |
| 18-29 yrs. | 275 |
| 30-44 yrs. | 191 |
| 45-64 yrs. | 99 |
| 65 + yrs. | 33 |
| | 981 |

SOURCE: Idaho State Office, BLM, U.S. Department of Energy, 1978

The change in earnings in the market area would be the same with the DLA as with the CA.

TABLE 8-12
DESERT LAND ACT
LOCAL SERVICES
MAXIMUM AGRICULTURAL DEVELOPMENT

| | Owyhee | Elmore | Twin Falls | Canyon | Area Summary |
|---|---|---|---|---|---|
| Workers | 141 | 155 | 40 | 83 | 419 |
| Population | 331 | 362 | 94 | 194 | 981 |
| Children (5-17 yrs) | 95 | 104 | 27 | 56 | 281 |
| School Children | 82 | 93 | 24 | 50 | 253 |
| Elementary | 61 | 67 | 18 | 36 | 182 |
| High School | 24 | 26 | 7 | 14 | 71 |
| Elem. Sq. Footage | 7,360 | 8,059 | 2,097 | 4,324 | 21,840 |
| H.S. Sq. Footage | 3,589 | 3,930 | 1,022 | 2,109 | 10,650 |
| Cost of School Construction | $372,270 | $407,620 | $106,047 | $218,723 | $1,104,660 1/ |
| Cost of School Furnishings | $ 44,672 | $ 48,914 | $ 12,726 | $ 26,247 | $ 132,559 |
| Cost of School Land | $ 16,678 | $ 18,261 | $ 4,751 | $ 9,799 | $ 49,489 |
| Number of Teachers | 4 | 4 | 1 | 2 | 11 |
| Health Care Personnel | 4 | 4 | 1 | 2 | 11 |
| Firemen and Policemen | 2 | 3 | 1 | 1 | 7 |
| Cost of Public Facilities | $482,442 | $528,252 | $137,432 | $283,452 | $1,431,578 |
| Total Public Capital Costs | $934,635 | $1,023,383 | $266,246 | $549,133 | $2,773,397 |

SOURCE: U.S. Dept. of Energy 1978 and Idaho State Office, Bureau of Land Management.

NOTE: Numbers may not add up to totals due to rounding.

1/ All dollar figures are in constant 1975 dollars.

Implementation of this alternative via provisions of the DLA would lead to an increase of approximately 281 children in the 5-17 age group. This would mean an increase of 253 new school pupils - 182 elementary and 71 high school. These students would require 21,840 square feet of elementary classroom space and 10,650 square feet of high school classroom space (U.S. Dept. of Energy 1978). If sufficient space were not available in the market area, it would cost roughly $1.3 million to build the necessary space (in 1975 dollars). Table 8-12 shows how the counties would be impacted. It is anticipated that public costs would be below this figure. Revenues received by the counties would be the same as with the CA.

## Social Values

Social values would be impacted the same as discussed for the proposed action in Chapter 3.

## Impact Summary

### Carey Act

Implementation of this alternative via provisions of the Carey Act would lead to increased employment by 694 jobs and an increase in population of 1,625. Total earnings could increase as much as $6.2 million. There would be 419 more school children which would require 19 new teachers. The increased population would require 19 additional health care personnel and 12 additional firemen and policemen. The cost of required public facilities could be as much as $2.4 million and the total public capital costs could reach $4.6 million.

### Desert Land Act

Implementation of this alternative via provisions of the Desert Land Act would lead to increased employment by 419 jobs and an increase in population of 981. Total earnings could increase as much as $6.2 million. There would be 253 more school children which would require 11 new teachers. The increased population would require 11 additional health care personnel and 7 additional firemen and policemen. The cost of required public facilities could be as much as $1.4 million and the total public capital costs could reach $2.8 million.

Ranchers would annually lose approximately $414,000 in direct income under both CA and DLA disposal.

## Electrical Energy

### Estimation of Electricity Use

The land in the maximum development alternative was measured according to estimated lift height and distance, and electricity consumption was estimated as described in Chapter 3. Out of approximately 138,000 acres assumed to be irrigated out of the river (see Table 1-3, Chapter 1), the median lift height and distance is 600-700 feet and 6-8 miles from the river. The approximately 38,000 acres to be irrigated out of wells were assumed to have an average of 100 feet of lift and to be located within the boundaries of the farm, i.e., "0" distance from the water source. The median of all acres, including the well-irrigated land, is 600-700 feet of lift and 4-6 miles from the water source. This median measurement is the same as for the proposed action.

Tables 8-13 and 8-14 show the maximum development electricity demand in the "average" case and "worst" case or drought years. As in Chapter 3, the "average" case is based on average weather conditions and monthly irrigation requirements. The worst case represents drought year weather conditions and irrigation requirements. Line 1 in each table shows the estimated direct consumption each month in average MW. Line 2 shows the losses of hydroelectric generation that result from diversions above Idaho Power Company (IPC) dams. Line 3 in each table shows the total load by month including the addition of a factor for line loss to the direct consumption.

In the average case year, the July load of this alternative is 298 average MW, in the worst case year the highest load occurs in June and is 389 average MW. Total load over the season would be 825,000 MWH in the average case, 1.1 million MWH in the worst case. (For further discussion of these calculations, see Appendix 8-1).

### Impacts of Load on IPC Electricity Supply and Demand

The impact the maximum development alternative would have on the current IPC system in an average year is illustrated in Figure 8-1. Figure 8-1 shows the maximum development average year demand superimposed on the 1978 company-owned resources (adjusted for median water conditions) and load. (Compare with Figure 3-8, Chapter 3).

The impacts of the maximum development alternative will be discussed in the context of the two "most likely" scenarios outlined in Chapter 3. These are: Case 1, situation "B", IPC construction of coal-fired generating capacity sufficient to cover the new peak load in an average (not drought) year, with the assumption that excess power from the new capacity will have to be sold off season to other utilities at a low price; and Case 2, IPC participation in new plants constructed by other utilities with the assumption that IPC would be able to purchase output from such plants to exactly cover its new average year load. These are considered to be "middle range" scenarios, and do not represent either maximum or

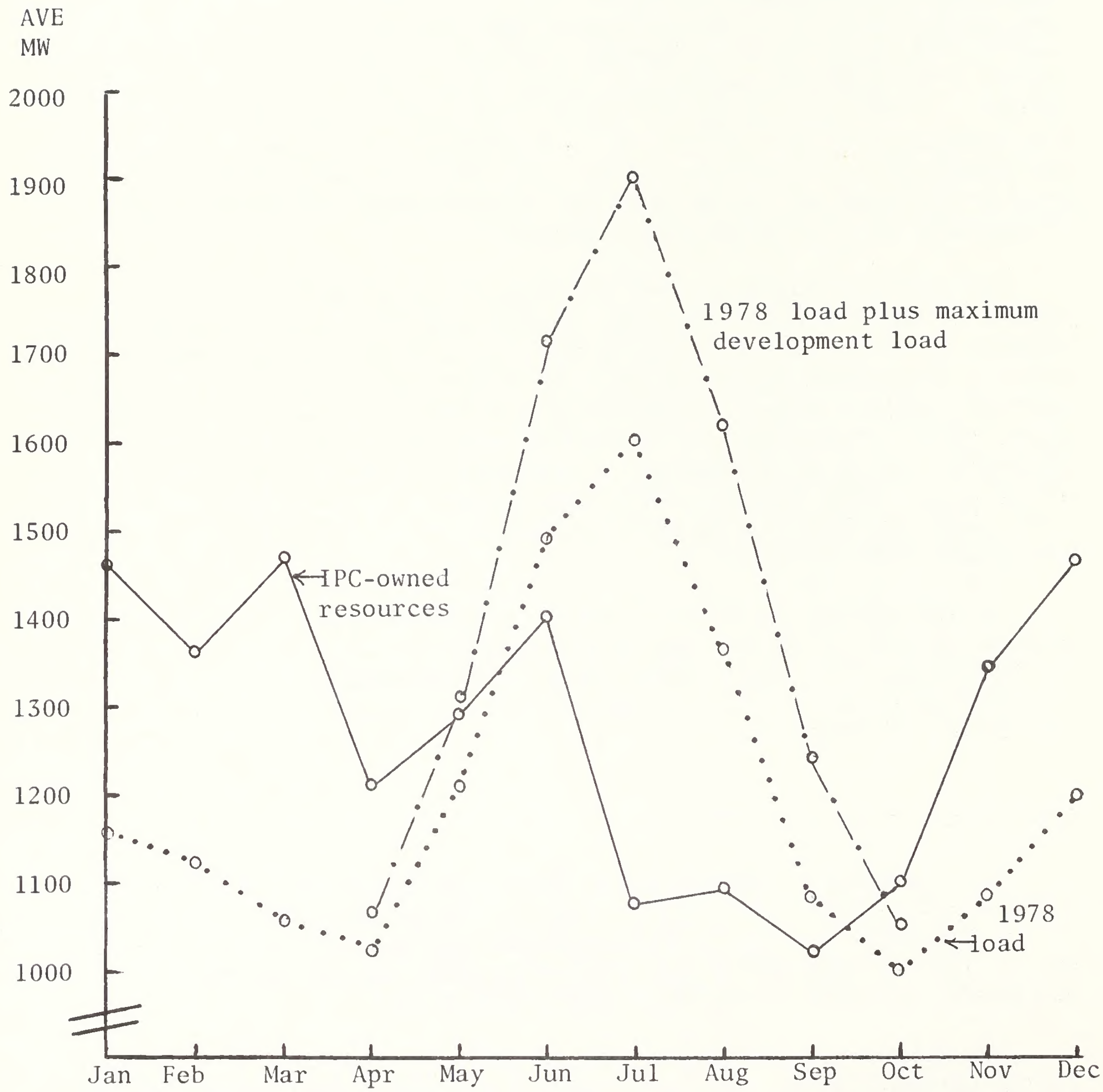



Figure 8-1
IMPACT OF MAXIMUM DEVELOPMENT
ON IPC RESOURCES AND LOAD
(AVERAGE YEAR)

SOURCE: Integrated Energy Systems, Inc., Boise, Idaho (Contract No. YA-512-CT8-226).

Table 8-13

ELECTRICITY CONSUMPTION BY MAXIMUM DEVELOPMENT ALTERNATIVE

(Average MW)

- Average Year -

| | Apr | May | June | July | Aug | Sept | Oct | TOTAL (MWH) |
|---|---|---|---|---|---|---|---|---|
| Direct Consumption | 29.9 | 75.3 | 176.6 | 202.7 | 156.4 | 92.8 | 23.2 | 555,897 |
| Indirect Consumption (Hydro losses on IPC system) | 7.0 | 16.1 | 35.2 | 76.3 | 80.0 | 59.7 | 21.5 | 217,630** |
| Total Load on IPC System * | 39.7 | 98.4 | 228.2 | 297.8 | 250.9 | 161.1 | 46.8 | 825,167 |

* Total Load = Direct Consumption/.915 + Hydro Losses

** Losses over irrigation season.

Table 8-14

ELECTRICITY CONSUMPTION BY MAXIMUM DEVELOPMENT ALTERNATIVE

(Average MW)

- Worst Case Year -

| | Apr | May | June | July | Aug | Sept | Oct | TOTAL (MWH) |
|---|---|---|---|---|---|---|---|---|
| Direct Consumption | 63.0 | 127.0 | 257.3 | 228.7 | 194.1 | 119.7 | 40.7 | 756,137 |
| Indirect Consumption (Hydro losses on IPC System) | 26.6 | 54.9 | 107.4 | 103.6 | 77.6 | 48.6 | 16.4 | 319,328** |
| Total Load on IPC System * | 95.5 | 193.7 | 388.6 | 353.5 | 289.7 | 179.4 | 60.8 | 1,075,465 |

* Total Load = Direct Consumption/.915 + Hydro Losses.
(.915 is a factor to account for line losses)

** Losses over irrigation season

minimum cost predictions. In years with loads greater than in the "average" case, additional resources would be required.

In Case 1B, 370 MW of IPC generating capacity operating at 80 percent load factor would be required to meet the July average load of maximum development. In Case 2, IPC would require 825,000 MWH of output from plants built by other utilities.

## Impacts on IPC Ratepayers

The impact of new supply costs on the price of electricity to IPC ratepayers was estimated by "rolling in" the cost of new supply and new irrigation sale to the 1977 IPC operating years as described in Chapter 3. The top of Table 8-15 shows the 1977 average price for different customer classes and new average prices for the two most likely scenarios. The bottom of Table 8-15 shows the increase in annual electric bills that would occur under these scenarios for the 1977 average electricity use customer in each class.

Table 8-16 shows the impact on the IPC system as a whole. In Case 1B the annual cost of new supply is $92.7 million per year; in Case 2, $33 million per year. In Case 1B, revenue from new irrigation and revenue from off season export of power would recover $25.3 million leaving $67.4 million per year to be absorbed by existing IPC ratepayers. In Case 2, new irrigators would pay $10.2 million, leaving $22.8 million to be absorbed by ratepayers. On a per acre basis, Table 8-17, new irrigators would pay an average of $77/year per acre in Case 1B, or $58 per year in Case 2, leaving $382 per acre or $129 per acre to be absorbed by existing IPC ratepayers.

The overall impact to 1977 customers would be an increase over 1977 revenues of 45 percent in Case 1B or 15 percent in Case 2.

As described in Chapter 3, the most important energy impacts result from the effect of the increased electricity prices described above on existing IPC ratepayers.

The average use residential customers' annual bill would rise by $151 per year in Case 1B or $42 per year in Case 2. As in the proposed action, impacts resulting from these increases would fall most heavily on low income househoulds especially those with electric heat. The impact under the maximum development alternative would have a severity beyond a simple proportional increase over the impacts felt under the proposed action. Larger increases subtract more from the ability to purchase other household essentials.

The 1977 annual electric bills of the average small commercial customers (Schedule 12) would rise by $1135 per year in Case 1B or $316 per year in Case 2. For the average use large commercial (Schedule 19) customers the annual increase would be $72,081 or $20,132.

For irrigation customers the increases for the average use would be $1385 per year in Case 1B or $387 per year in Case 2. The average use

Table 8-15

IMPACT OF MAXIMUM DEVELOPMENT ON CUSTOMER PRICES
AVERAGE YEAR

| | 1977 BASE | CASE 1 IPC ADDS 370 MW CAPACITY Situation B | CASE 2 IPC PARTICIPATION IN NEW PLANTS |
|---|---|---|---|
| AVERAGE PRICES (mils/KWH) | | | |
| System | 16.3 | 24.9 | 18.7 |
| Irrigators | 16.0 | 24.5 | 18.3 |
| Residences | 20.7 | 31.6 | 23.7 |
| Small Commercial * | 22.5 | 34.4 | 25.8 |
| Large Commercial ** | 12.5 | 19.1 | 14.3 |
| AVERAGE YEARLY INCREASE TO 1977 CUSTOMERS ($/year) | | | |
| Irrigators*** | 2622 | 1385 | 387 |
| Residences | 287 | 151 | 42 |
| Small Commercial * | 2153 | 1135 | 316 |
| Large Commercial ** | 136552 | 72081 | 20132 |

* Schedule 12

** Schedule 19

*** Corresponds roughly to the seasonal use of a 100 HP pump.

Table 8-16

TOTAL COST OF MAXIMUM DEVELOPMENT TO IPC SYSTEM

(MILLION $)

| | CASE 1 SITUATION B | CASE 2 |
|---|---|---|
| TOTAL INCREASE TO SYSTEM | 92.7 | 33.0 |
| REVENUE FROM MAXIMUM DEVELOPMENT | 13.6 | 10.2 |
| REVENUE FROM OFF-SEASON SALES | 11.7 | -- |
| NET COST TO 1977 IPC SYSTEM | 67.4 | 22.8 |

Table 8-17

PER ACRE COST OF MAXIMUM DEVELOPMENT TO IPC SYSTEM

($)

| | CASE 1 SITUATION B | CASE 2 |
|---|---|---|
| COST OF MAXIMUM DEVELOPMENT | 526 | 187 |
| REVENUE FROM MAXIMUM DEVELOPMENT | 77 | 58 |
| COST RECOVERED BY OFF PEAK SALES | 66 | -- |
| COST BORNE BY 1977 IPC CUSTOMERS | 382 | 129 |

corresponds roughly to the normal seasonal use of a 100 HP pump. For a typical 5,000 HP high lift pump station the increase in Case 1B would be $76,500 per year, or $22,500 per year in Case 2.

On a per acre basis the increases would be $8.40 or $2.30 for the average IPC area irrigated acre and $21.70 or $5.90 for an acre that required the 1977 average electricity use for high lift pumps in the area.

The impacts on existing farmers that would result from such increases in electric rates could have a severity that is more than proportionally greater than under the proposed action. Electricity costs for pumping would be increased more than 50 percent under supply scenario Case 1B. If such an increase occurred coupled with greater competition from even more commodity production, the economic pressure on existing irrigation customers could be expected to drive marginal operations, including existing high lift pumping projects, out of production. Based on the farm budgets presented in the economic section of Chapter 3, it is doubtful whether existing high lift pump irrigation could survive increases of $20.00 per acre per year and a continuation of depressed commodity prices.

Regional Impacts

The impacts of the maximum development alternative on the Pacific Northwest (PNW) region is determined by the downstream hydro losses on the eight downstream FCRPS dams, as described in Chapter 3. Assuming a value of 617.7 KWH lost per acre foot of water diverted, the hydro losses on the federal system total 245,851 MWH and 323,663 over 12 months in the average and worst case years. Evaluated at 35 mils/KWH, those losses represent $8.6 million in the average year and $11.3 million in the worst case year. This amounts to a cost of $47 and $64 per acre of the maximum development. These costs would be in addition to those absorbed by the IPC system.

As noted in Chapter 3, however, in Case 1B, where IPC exports large quantities of cheap power, these losses would be offset by the availability of that power.

Chemical Energy

The consumption of chemical energy impacts (gasoline, diesel, pesticides and herbicides) by the maximum development alternative, based on the per acre consumption estimates shown in Table 2-23, Chapter 2, are displayed in Table 8-18.

As in the case of the proposed action, consumption of these materials would be small in relation to total Idaho consumption.

Impact Summary

Electricity supply requirements of the maximum development alternative in an "average" case year would be 825,000 MWH. This accounts

Table 8-18

ANNUAL CHEMICAL ENERGY CONSUMPTION, MAXIMUM DEVELOPMENT

| | Maximum Development Consumption | Current Idaho Consumption * | Maximum Development as % of Total Idaho Consumption |
|---|---|---|---|
| Gasoline (Thou gal) | 1,608 | 521,000 | .3% |
| Diesel (Thou gal) | 3,455 | 316,000 | 1.1% |
| Fertilizer (Tons) | 19,154 | 565,793 | 3.4% |
| Pesticides (Tons) | 320 | 3,067 ** | 10.4% |

* From Chapter 2, Existing Chemical Environment

** Agricultural use only.

for transmission and distribution line losses and for losses of hydroelectric generation. The load in July would be 298 average MW for the average year and 392 MW in June for the worst case year.

The impact of meeting this load on the price of electricity to IPC consumers was analyzed for the two "most likely" supply alternatives described in Chapter III.

In the first supply case, labelled 1B, it is assumed that IPC would construct 370 MW of new thermal generating capacity to meet the maximum development July load and export power off the system during non-peak months. In the other most likely case, Case 2, it is assumed that IPC would obtain 825,000 MWH during the summer through participation in a new thermal power plant constructed by another utility.

In Case 1B the annual cost would be $92.7 million. Of this total, new irrigators would pay $13.6 million, leaving $67.4 million to be absorbed by other IPC ratepayers. In Case 2, total annual cost would be $33 million with $10.2 million paid by new irrigators with the remaining $22.8 million to be paid by IPC ratepayers.

The resulting increases over the 1977 annual electric bills for the typical (average use) IPC customers in each class are shown below.

| $/year | Residential | Small Commercial (Sched 12) | Large Commercial (Sched 19) | Irrigation (100 HP) |
|---|---|---|---|---|
| Case 1B IPC adds 370 MW capacity | 151 | 1135 | 72,081 | 1385 |
| Case 2 IPC participation with another utility | 42 | 316 | 20,132 | 387 |

In addition to the impacts of the maximum development alternative on the price paid by IPC consumers, the irrigation diversions would result in losses of hydroelectric generation at federal dams on the Snake/ Columbia river system. These losses would be 246,000 MWH in the average case year. It would cost $8.6 million to replace this electricity from new thermal power plants.

## CLIMATE

Impacts would be the same as the proposed action.

## AIR QUALITY

Due to the smaller amount of land to be developed under this alternative, it is expected there would be a decrease of about 75 percent from the proposed action in total suspended particulates in areas of agricultural development. It can be predicted that during periods of high winds (spring) and bare ground, dust particulate concentrations would be high and may exceed the national and state standards.

## GEOLOGY AND TOPOGRAPHY

There would be no impact to geology and topography.

## SOILS

Soils would be affected as described in Chapter 3, since this alternative would have farms located on Class I and II soils, as with the proposed action. Per acre impacts would be the same for this level of farm development. However, significantly less land would be involved, i.e., 28,590 acres as compared to 111,015 acres under the proposed action.

An anticipated three percent of the farm land (858 acres) will undergo irreversible soil damage as a result of roads, settling ponds and support facilities. Within these areas the entire soil profile will be altered.

Various land treatments would impact 100 percent of the area. Plowing, discing or raking on 97 percent of the 28,590 acres will damage the surface root zone and would cause compaction within the profile. Damages would be greater if these practices are done during high soil moisture conditions, especially on moderate to fine textured soils. However, rotation of row crops during summer months and small grains in the winter would tend to maintain a certain degree of soil organic matter stability provided all green manures are returned back to the soil. This would maintain the soil fertility, percolation rates, soil structure, infiltration rates and reduce potential erosion rates. Complete removal of crop stubble would deplete the soil of organic matter and cause faster soil depletion.

Soil erosion for irrigation and precipitation is estimated to be slight at less than two tons per acre in most areas. Wind erosion during spring months, when many fields are fallow and soils dry, will cause topsoil removal from 0-75 tons per acre. Vegetative cover, organic matter and soil moisture will help prevent spring wind erosion. Good management practices would control soil erosion loss during windy periods.

## WATER RESOURCES

### Uses and Flows

#### Surface Water

This alternative level of development would require 56,000 acre-feet of water diverted from the Snake River. Flows in the Snake River at Murphy, the critical low-flow point, would be reduced by an average of 200 CFS in July. This represents a 3 percent reduction in flow for that month. There would be no noticeable change on a year-long basis, compared to present flows. The adopted minimum flow at Murphy would not be exceeded at any time.

#### Groundwater

Approximately 17,800 acre-feet of groundwater would be required under this alternative. The impact on existing well users is unknown. Present studies by USGS indicate there may be some lowering of water tables in the Grandview-Bruneau area. Any additional groundwater pumping would logically compound this problem. Therefore, this alternative would have an adverse impact but not of the magnitude of the proposed action.

### Water Quality

Accurate and precise quantitative estimates of water quality changes caused by this alternative is not possible. Based on experience and knowledge of the personnel writing the water quality section of the ES, the following quantitative impacts are used: Very slightly - 0 to 1 percent; slightly - 1 to 5 percent; moderate - 5 to 25 percent; heavy - 25 to 50 percent.

#### Snake River

There would be no detectable change in or below the ES area. Conductivity and nitrate would increase very slightly above Strike Pool, as would density of benthic invertebrates.

#### Tributary Streams

In tributary streams draining project lands there would be slightly more flow, and slightly more conductivity, nitrates, salts, and benthic macroinvertebrates. Bacteria, total phosphorus, and toxicants would all decrease slightly, as would turbidity.

Groundwater

The impacts under this level of development would be the same as the proposed action, only they would be of much less magnitude because of the smaller acreage irrigated. It would take much longer for groundwater storage areas to fill. Perched water tables and seeps may not become apparent for many years, or they may not become evident except on a localized basis.

## VEGETATION

### Terrestrial

The 439,303 acres of public land within the ES area consists of approximately 275,583 acres of sagebrush/grassland, 87,085 acres of seeded grassland, 42,810 acres of salt-desert shrub/grassland, and 33,825 acres of natural grassland. Overall, the current vegetation is in relatively poor range condition.

The major impact to terrestrial vegetation would be the replacement of rangeland with cultivated farmland. Approximately 8,012 acres of sagebrush/grassland, 4,363 acres of seeded grassland, 10,017 acres of salt-desert shrub/grassland, and 6,198 acres of natural grassland would be cleared. These 28,590 acres would be replaced by approximately 6,102 acres of potatoes, 5,824 acres of dry beans, 4,714 acres each of winter wheat, barley, and sugar beets, 1,664 acres of alfalfa, and 858 acres devoted to non-crop land uses (based upon predicted crop rotations).

An additional 9,530 acres of public land would be reserved as public purpose tracts. Of this, up to 5,388 acres would be subject to clearing as needed for facilities in support of farm development.

### Riparian

Some increase in riparian growth can be expected in tributaries, stimulated by increased nutrients in the water and by increased flow volume from infiltrated irrigation water reaching low lying drainage channels.

### Aquatic

Phytoplankton, attached benthic algae, and rooted aquatic plants would increase very slightly above C.J. Strike Reservoir. In tributary streams, attached benthic algae would increase slightly to moderately.

Threatened and Endangered Plants

As shown on Table 8-4, none of the sites of the 5 plants considered as threatened or endangered within the ES area occur within the minimum development areas. If future studies locate new sites that would be within these areas however, they would be protected and preserved as required in the Endangered Species Act of 1973.

## WILDLIFE

### Terrestrial

This development alternative decreases the amount of land for farming by approximately 73 percent when compared to the proposed action. For this reason adverse impacts to wildlife resulting from loss of native range habitat would be substantially reduced under this alternative. Specifically 20,866 acres of the shrub/grassland and 12,254 acres of the grassland habitat types would be lost (28,590 acres for farms and up to 5,000 acres for public purpose tracts other than wildlife leave areas). The amount of human disturbance to wildlife and the effect of pesticide and herbicide use would also decrease under this alternative, both acting to lessen the adverse impacts to wildlife as compared to the proposed action.

As was the case in the proposed action, agricultural development would be beneficial to certain wildlife species. Some wildlife expected to benefit (as evidenced by increased numbers) include: ring-necked pheasant, California quail, Hungarian partridge, and various waterfowl. Under this alternative, BLM would set aside about 4,500 acres of isolated wildlife tracts among the 28,590 acres of new farmland. The selection criteria BLM would use is discussed in Appendix 1-1. These isolated tracts would provide year-round habitat for upland game birds. They would be primarily used by pheasants during winter and spring periods for shelter, feeding, and nesting when adjacent farmland is not useable for these needs.

Specific impacts resulting from this alternative that differ from the proposed action, Chapter 3, are discussed below.

#### Mule Deer

This alternative proposes no agricultural development within or adjacent to the mule deer winter range shown on Map 2-6. For this reason deer using this area would not be affected as discussed in Chapter 3. Beneficial impacts to mule deer existing throughout the ES area resulting from increased agriculture would be the same as those discussed in Chapter 3.

#### Non-game

As pointed out in Chapter 3 adverse impacts to non-game wildlife would result from loss of the shrub/grassland or grassland habitat types. About 33,000 acres of the native range habitat would be lost due to development. This would cause a slight reduction in non-game wildlife, but as pointed out earlier this impact would be much reduced as compared to the 111,015 acres of proposed development discussed in Chapter 3.

Birds

Sage Grouse: Under this alternative no sage grouse strutting grounds or wintering areas would be lost to agricultural development. For this reason impacts to these birds posed by this alternative would be insignificant.

Raptors: Loss of native hunting habitat and the effect of human disturbance would impact birds of prey as discussed in Chapter 3. Although, as pointed out earlier, these impacts would be significantly reduced by this minimum development alternative. The amount of farmland proposed by this alternative is quite small in relation to the total acreage of the ES area (approximately 7 percent of the total area). This small amount of "new habitat" could be of value to some raptors by creating an increased edge effect and by offering increased numbers of different prey species (such as upland game birds). Raptors benefiting by this "new habitat" include: shorteared owls, marsh hawks, rough-legged hawks, and red-tailed hawks.

Mountain Quail: Under this alternative no development is proposed in or adjacent to the mountain quail area shown on Map 2-6. For this reason impacts to these birds would be insignificant.

Other Species

Brought out in all previous chapters is the fact that habitat destruction (via agricultural development) would adversely impact native wildlife species. Loss of this habitat cannot be mitigated. Mammals significantly impacted by habitat loss include: pygmy rabbits, black-tailed jackrabbits, and various rodents, an important food source to many predators. Non-game birds likewise impacted by habitat loss include: sage sparrows, sage thrashers, vesper sparrows, black-throated sparrows, and lark sparrows.

Land conversion resulting in habitat loss for black-tailed jackrabbits, various rodents, birds, and reptiles would be an important secondary adverse impact to birds of prey. This would result in a significant reduction of raptor food sources. This could cause population decreases for all raptor species.

The adverse effect of human disturbance cannot be mitigated and would result in a adverse impact to those wildlife species which are sensitive to this type of interaction.

Ferruginous Hawk: As discussed in Chapter 3 a certain number of ferruginous hawk nests would be affected by increased agricultural development. The number of nests impacted under this alternative would decrease from 32 (under proposed action, Chapter 3) to 22. These nests would be adversely impacted primarily due to increased human disturbance (as a result of increased agricultural development) in immediate vicinity of the nest. The result would be decreased productivity.

Western Burrowing Owl: The number of nests lost by destruction due to agricultural development would be the same as the proposed action under this alternative. The amount of hunting habitat lost and the effect of human disturbance would be much reduced by this alternative (relative to the proposed action) and for this reason the magnitude of burrowing owl loss would be significantly reduced.

Long-billed Curlew: Under this alternative the same amount of land is proposed for farm development with each of the three curlew nesting areas as is considered by the proposed action. For this reason impacts to this bird would be the same under this alternative as disussed in Chapter 3.

The sensitive species survey mitigation discussed in Chapter 4 would only be partially effective. Sensitive species impacted by the proposed action are the ferruginous hawk, long-billed curlew, and the burrowing owl. Population declines of these animals would be expected. Since there is a great deal of difficulty in determining their special requirement or foraging area, nesting sites would be located and protected but some feeding ranges could not be saved.

Impacts Summary

This alternative would allow 20,866 acres of the shrub/grassland habitat type and up to 12,254 acres of the grassland habitat type to be lost. This would result in a small amount of habitat alteration and decreased adverse impacts to native wildlife when compared to the proposed action. Wildlife species adapted to agricultural land would show population increases due to new production of this type of habitat (pheasants, Hungarian partridge, quail).

Under this alternative there would be no impact to mule deer using the mule deer wintering area depicted on Map 2-6. Likewise, sage grouse would lose no strutting grounds and sage grouse wintering areas would not be affected.

When compared to the proposed action impacts to the western burrowing owl would be similar. The burrowing owl would lose five of the nine known active burrow sites in the ES area (this is the same number lost under the proposed action). In contrast loss of burrowing owl hunting habitat and the affect of human disturbance would be signficiantly reduced relative to the proposed action. Impacts to the long-billed curlew would be the same under this alternative as described under the proposed action (a loss of 10 to 15 breeding pairs leading to significantly reduced production in the ES area).

The number of ferruginous hawk nests impacted under this alternative would decrease from 32 (under the proposed action) to 22. In addition there would be a significant reduction in the amount of hunting habitat lost by this bird as well as all other raptor species occurring in the ES area.

As discussed in Chapter 5, sensitive species mitigation would not be 100 percent effective, and for this reason residual adverse impacts to ferruginous hawks, western burrowing owls, and long-billed curlew would exist.

No threatened or endangered species would be effected.

### Fisheries

Wetted perimeter would be reduced only about 6 percent in the worst case at Murphy in low-flow years. In areas above Swan Falls the impact of minimum development would be extremely difficult to detect in fish populations of all types. Below Swan Falls the effects would be very slight. Sturgeon abundance, growth, mortality, and reproduction would not change detectably from present levels. Abundance, growth and mortality of other fish species would not change detectably as a result of this project.

## WILD HORSES

### Owyhee Herd

Public land within the Owyhee wild horse range that would be subject to development would amount to approximately 2,760 acres (2 percent) of the total 156,600 acres used by the herd (see Map 2-7 and Overlays 3A and 3B). These 2,760 acres generally receive limited wild horse use in comparison with the remaining herd range due to poor forage condition, lack of water, and close proximity to roads and human activity. This 2,760 acre reduction in range is not expected to adversely affect herd size or restrict the horses in any way.

### Saylor Creek Herd

Until the Wild Horse Management Plan for the Saylor Creek herd is completed in 1983 (refer to Chapters 1 and 2), decisions would have to be postponed as to whether or not to allow farm development under this alternative on approximately 3,040 acres (3 percent) of the estimated 103,200 acre area presently used by the herd (see Map 2-7 and Overlays 3A and 3B). The WHMP will determine optimum herd size, designate specific herd range, and provide management practices to adequately protect, maintain, and manage the herd under the multiple use concept. It can be assumed that impacts on the Saylor Creek herd would be very slight, due to the small acreage in the herd range that would be farmed under this alternative.

## CULTURAL RESOURCES

Development of 28,590 acres would result in impacts similar to those of the proposed action, the primary difference being in numbers of sites impacted. Fewer sites, representing a smaller percentage of the resource base, would be destroyed under this alternative than under the proposed action or the maximum level of development. In addition to unrecorded sites, an undetermined number of the following known sites would be impacted by development: nine prehistoric sites, three historic sites, one paleontological site. Several of the prehistoric sites are in the proposed Saylor Creek Archaeological District which has been identified as meeting National Register criteria of eligibility. (See Appendix 1-3). No formal determination of eligibility has yet been made.

Agency procedures for mitigation are identical to those required under the proposed action: cultural and paleontological resource inventory prior to farm allowance, consultation with the State Historic Preservation Office and the Heritage Conservation and Recreation Service, comment from the National Advisory Council on Historic Preservation on National Register eligible properties, appropriate mitigation measures (salvage, avoidance, etc.) implemented. It is expected there would be fewer instances requiring mitigation than under the proposed action.

Since the resource base is still largely unknown in the ES area, it is difficult to predict how many sites would be impacted by this level of development. One must consider that these 28,590 acres were selected because they are 500 feet or less above the Snake River. In the absence of adequate inventory data, one cannot predict how the density and nature of sites change above and below this contour interval (or if in fact this occurs).

## VISUAL RESOURCES

Since most of the 28,590 acres of farm development would occur on VRM Class IV areas (low scenic quality), modification of the natural landscape in these Class IV areas would be considered acceptable by many people. However, some road and powerline crossings of 4 miles of Oregon Trail and one mile of Kelton Road (VRM Class I) would be necessary to facilitate farming activity. These developments would result in adverse visual impacts on these historic routes.

The Snake River Canyon from Hammett east to Salmon Falls Creek is designated as a BLM VRM Class II. Even after proper location, facility design, and site rehabilitation and landscaping, the development of irrigation pump stations and associated roads, powerlines, and penstocks would result in visual intrusions which may exceed the BLM's visual resource contrast rating for this area. In VRM Class II areas, any changes in the basic elements of the natural landscape should not be evident and should not attract attention. Highest visual impacts would occur where the Snake River is visible to passing motorists on Highway 30 and Interstate 80.

## RECREATION

Road, canal and powerline crossings of four miles of Oregon Trail and one mile of Kelton Road routes would reduce the recreation enjoyment of these historic locations. Sightseeing enjoyment of the Snake River Canyon near Interstate 80 and Highway 30 would be reduced by the construction of river pump stations associated with farm development.

About 20,000 acres of public land currently used by ORV enthusiasts, would be converted to farms under the minimum development alternative. This would force increased ORV use on other ORV areas and put more pressure on remaining public land near the ES area.

There would be an increased public hunting opportunity, primarily for pheasants. Under this alternative, BLM would establish about 4,500 acres of wildlife leave tracts that would be open for public hunting. The tracts would be managed to increase upland game bird numbers. It is estimated that 4,500 acres of wildlife tracts would generate 1,665 hunter days annually in the ES area (BLM Burley District 1979 survey estimates that each acre of isolated tract equals .36 hunter days per season). This would generate about $20,313 ($12.20 x 1,665 hunter days) expended by hunters if the value for a hunter day is used from Chapter 2 Recreation section. In addition it is expected that some farmers would allow public hunting on their farms. Overall, there would be a net hunting gain in the ES area.

## WILDERNESS

This alternative would result in no direct impact to wilderness resources.

Section 603 FLPMA requires that all designated Wilderness Study Areas be considered unavailable to the development of farms, utility and access corridors, and other improvements which would impair their suitability for preservation as wilderness until Congress acts on the President's recommendation as to the suitability of the areas for designation of wilderness.

Implementation of this alternative is expected to result in an increase in population of between 169 and 272 people within the ES market area (as described in Socio-Economics section of this alternative). This increase in population could in turn result in some slight deterioration of wilderness characteristics within designated Wilderness Study Areas due to increased recreational use and increased particulate air pollution originating from farm projects and other developments. Control of such deterioration of wilderness characteristics is not considered feasible due to its random and dispersed nature.

A total of approximately 170 acres of land proposed for agricultural development under this alternative is located within the proposed Wilderness Study Areas shown on Map 2-8 and Overlays 3A and 3B. Development of these acres would be deferred until completion of the wilderness review process (see Chapter I, Statutes Restricting Farm Development Under the Proposed Action).

## LIVESTOCK GRAZING

There would be 38,120 acres developed within the 418,580 acres of public land in the ES area currently used for livestock grazing. Map 2-12 and Overlays 3A and 3B show the development pattern of this alternative in relation to present livestock grazing allotments.

The most signficant impact under this alternative would be the elimination of livestock grazing on approximately 37,080 acres of public land. Table 8-19 shows, by allotment, the 37,080 acres to be removed from grazing use and the respective 3,515 AUMs which would be lost per year as a result.

Table 8-20 further breaks down the 3,515 AUMs to indicate the approximate impact to the 127 livestock operators within the ES area. Reductions in licensed grazing use similar to these preliminary estimates would be made by the BLM with implementation of this alternative.

There would be a loss of the use of range improvements associated with livestock grazing on the land subject to be developed. This would include approximately 4,365 acres of grass seedings, 22 miles of fenceline, 1 mile of water pipeline, 2 cattleguards, and 1 water trough owned by BLM, plus other privately owned improvements. Compensation would have to be made by farm developers to the respective rancher or the BLM for fair market value of the authorized range improvements that were removed (43 CFR 4120.66c).

A limited number of customary grazing areas and trailing routes would be lost. Access to remaining public land would be only slightly restricted.

Some problems for the livestock operator may occur due to farm projects being located adjacent to grazing areas. Some problems that could inadvertently occur include: livestock trespassing onto farmland where fencing is inadequate or gates are left open; livestock becoming entangled or injured by agricultural debris; and livestock ingesting toxic chemicals through careless application and use of farm pesticides or fertilizers.

Table 8-20 gives an indication of the impact of the minimum development alternative on individual operations. Column 7 of this table shows approximate percentages of local operations that would be lost. Out of 127 operators, approximately 3 would lose 6-15 percent of their local operation in the BLM Boise District, and 124 would lose only 0-5 percent.

Livestock grazing would be eliminated on approximately 37,080 acres of public land. One hundred twenty seven livestock operators would lose a total of approximately 3,515 AUMs grazing use per year as a result. This would amount to a reduction in local operations of only 5 percent or less for nearly all operators.

TABLE 8-19

ACRES AND AUMS INCLUDED IN MINIMUM DEVELOPMENT ALTERNATIVE, BY ALLOTMENT

| Allotment | Public Land Included In Minimum Development Alternative (Acres) | (AUMS) |
|---|---|---|
| Graveyard Point | 0 | 0 |
| Poison Creek | 0 | 0 |
| French John Area | 0 | 0 |
| Elephant Butte | 1,220 | 13 |
| River Group | 420 | 30 |
| Reynolds Creek Group | 2,390 | 106 |
| Black Mountain Field | 1,080 | 77 |
| Oreana #1 | 0 | 0 |
| Nahas Individual | 0 | 0 |
| Oreana #2 | 0 | 0 |
| Fossil Butte | 120 | 4 |
| Oreana #3 | 1,410 | 16 |
| Castle Creek, Winter | 4,120 | 206 |
| Battle Creek, Winter | 1,160 | 12 |
| Battle Creek, SpSuF | 520 | 26 |
| Tindall Northwest | 3,760 | 238 |
| Chalk Flat | 140 | 9 |
| Sunnyside, SpF | 460 | 32 |
| Hammett #1 | 0 | 0 |
| Hammett #2 | 340 | 38 |
| Hammett #3 | 320 | 27 |
| Hammett #4 | 860 | 137 |
| Hammett #5 | 0 | 0 |
| Saylor Creek | 18,760 | 2,544 |
| Totals | 37,080 1/ | 3,515 |

1/ Approximately 1,040 acres of the total 38,120 acres of public land subject to development are not primarily grazed.

SOURCE: BLM Boise District grazing case files and 1940, 1959, 1962, 1965 range vegetation surveys.

TABLE 8-20

AUMS INCLUDED IN THE MINIMUM DEVELOPMENT ALTERNATIVE, BY OPERATOR

| (1)<br>Operator | (2)<br>Allotment | (3)<br>Active Grazing Qualifications (AUMs) | (4)<br>AUMs Included In Minimum Development | (5)<br>Total AUMs in Boise District | (6)<br>Percent of Local Operation Included In Minimum Development (AUMs) (Col. 4 ÷ Col. 5) |
|---|---|---|---|---|---|
| R. Adolf | Saylor Cr. | 750 | 36 | 750 | 5 |
| Arkoosh & Zidan | Saylor Cr. | 2,070 | 99 | 2,070 | 5 |
| E. Ascuena | Saylor Cr. | 609 | 29 | 609 | 5 |
| E. Astorquia, Est. | Saylor Cr. | 3,108 | 148 | 3,108 | 5 |
| J. Barinaga & Sons | Saylor Cr. | 200 | 9 | 2,145 | <1 |
| H. Bass | Reynolds Cr. Group | 565 | 14 | 565 | 2 |
| J. Bass | Reynolds Cr. Group | 493 | 12 | 511 | 2 |
| P. Batruel | Hammett #4 | 62 | 1 | 62 | 2 |
| C. Berry | Saylor Cr. | 2,100 | 100 | 2,100 | 5 |
| A. Black | Saylor Cr. | 630 | 30 | 2,214 | 1 |
| J. Black | Battle Cr. SpSuF | 1,372 | 3 | 2,935 | 2 |
| | Saylor Cr. | 1,059 | 50 | | |
| P. Black | Castle Cr. W | 68 | 3 | 850 | 1 |
| | Battle Cr. SpSuF | 782 | 1 | | |
| T. Blackstock | Elephant Butte | 177 | 9 | 1,384 | 1 |
| S.D. Blackwell | Hammett #1 | 95 | 0 | 95 | 0 |
| S.S. Blackwell | Hammett #4 | 470 | 10 | 511 | 2 |
| W. Boston | Reynolds Cr. Group | 104 | 3 | 104 | 3 |
| R. Brailsford | Saylor Cr. | 283 | 13 | 283 | 5 |
| H. Brandau | River Group | 440 | 8 | 482 | 2 |
| | Black Mtn. Field | 42 | 1 | | |
| R. Brandau | River Group | 241 | 4 | 271 | 2 |
| | Black Mtn. Field | 30 | 0 | | |
| W. Brimson | Hammett #4 | 195 | 4 | 195 | 2 |
| R. Bruce | Poison Cr. | 172 | 0 | 719 | 0 |
| Bruneau Cattle Co. | Battle Cr. SpSuF | 5,649 | 11 | 6,819 | <1 |
| Burghardt Co. | Castle Cr. W | 275 | 13 | 3,446 | 1 |
| | Battle Cr. W | 276 | 12 | | |
| D. Carnahan | Saylor Cr. | 983 | 47 | 983 | 5 |
| I. Carnahan | Saylor Cr. | 198 | 9 | 198 | 5 |
| Chipmunk Grazing Association | River Group | 72 | 1 | 3,345 | <1 |
| | Black Mtn. Field | 877 | 14 | | |
| B. Collett | Castle Cr. W | 910 | 43 | 3,787 | 1 |
| Colyer Cattle Co. | Battle Cr. SpSuF | 3,395 | 7 | 4,135 | 1 |
| O. Cox | Fossil Butte | 93 | 0 | 5,170 | 1 |
| | Oreana #3 | 2,725 | 9 | | |
| C. T. Ranch Co. | Reynolds Cr. Group | 1,594 | 39 | 2,039 | 2 |
| | Black Mtn Field | 376 | 6 | | |
| A. Curtis | River Group | 93 | 2 | 93 | 2 |
| Double Anchor Ranch | Hammett #4 | 404 | 8 | 3,616 | <1 |
| | Hammett #5 | 1,924 | 0 | | |
| Faulkner Land & Livestock | Saylor Cr. | 5,015 | 239 | 5,015 | 5 |
| Flying Triangle Inc. | Saylor Cr. | 3,163 | 151 | 3,163 | 5 |
| Glenns Ferry Grazing Association | Castle Cr. W | 90 | 4 | 5,581 | <1 |
| Guery, Inc. | Saylor Cr. | 250 | 12 | 5,038 | <1 |
| Guthries Rancho Idaho | Tindall Northwest | 11,501 | 201 | 23,484 | 1 |
| Half Moon Ranch | Hammett #4 | 1,035 | 22 | 1,184 | 2 |
| W. B. Hall | Saylor Cr. | 998 | 48 | 998 | 5 |
| Hammett Lvstk. Co. | Saylor Cr. | 6,480 | 309 | 10,852 | 3 |
| A. Harley, Jr. | Tindall Northwest | 960 | 17 | 960 | 2 |
| Hayland Ranches | Oreana #3 | 465 | 1 | 1,050 | <1 |
| E. Jaca | Reynolds Cr. Group | 244 | 6 | 2,691 | 2 |
| | Black Mtn. Field | 2,198 | 35 | | |
| J. Jewett | Saylor Cr. | 510 | 24 | 510 | 5 |
| C. Johnson | Saylor Cr. | 175 | 8 | 175 | 5 |
| S. Johnson | Saylor Cr. | 72 | 3 | 72 | 5 |
| C. Johnston | River Group | 293 | 5 | 370 | 2 |
| | Black Mtn. Field | 77 | 1 | | |
| G. Johnstone | Poison Cr. | 250 | 0 | 2,449 | 0 |
| L. Jolley | Saylor Cr. | 435 | 21 | 435 | 5 |
| Jones & Sandy Lvstk. | Saylor Cr. | 2,670 | 127 | 2,670 | 5 |
| S. Jones | Saylor Cr. | 150 | 7 | 150 | 5 |
| Joyce Livestock Co. | Oreana #1 | 966 | 0 | 7,212 | <1 |
| | Oreana #2 | 4,952 | 0 | | |
| | Fossil Butte | 1,069 | 2 | | |

TABLE 8-20 (Continued)

| (1) Operator | (2) Allotment | (3) Active Grazing Qualifications (AUMs) | (4) AUMs Included In Minimum Development | (5) Total AUMs in Boise District | (6) Percent of Local Operation Included In Minimum Development (AUMs) (Col. 4 ÷ Col. 5) |
|---|---|---|---|---|---|
| C. Kast | Hammett #4 | 242 | 5 | 242 | 2 |
| D. Keck | Saylor Cr. | 800 | 38 | 800 | 5 |
| R. Kerbs | Saylor Cr. | 2,338 | 111 | 3,103 | 4 |
| C. Kevan | Saylor Cr. | 135 | 6 | 135 | 5 |
| G. King | Castle Cr. W | 2,155 | 101 | 8,152 | 1 |
| Da. Kinyon | Saylor Cr. | 724 | 35 | 1,279 | 3 |
| De. Kinyon | Saylor Cr. | 949 | 45 | 949 | 5 |
| H. Kubik | Saylor Cr. | 480 | 23 | 480 | 5 |
| D. Lahtiner | Battle Cr. SpSuF | 1,224 | 2 | 1,224 | <1 |
| S. Leguineche | Saylor Cr. | 258 | 12 | 516 | 2 |
| S. Lehmann | Saylor Cr. | 682 | 33 | 682 | 5 |
| B. Malmberg | River Group | 90 | 2 | 90 | 2 |
| H. Markley | Graveyard Point | 113 | 0 | 785 | 0 |
| L. Maupin | Castle Cr. W | 250 | 12 | 2,454 | 1 |
| D. McGhehey | Chalk Flat | 2,068 | 8 | 3,246 | 1 |
| | Hammett #4 | 1,036 | 22 | | |
| R. McKee | Reynolds Cr. group | 81 | 2 | 81 | 3 |
| C. McMahon | River Group | 489 | 8 | 615 | 2 |
| | Black Mtn. Field | 126 | 2 | | |
| E. Miller | Saylor Cr. | 904 | 43 | 1,784 | 2 |
| Miller Land Co. | Fossil Butte | 213 | 0 | 2,870 | 0 |
| J. Mills | Hammett #4 | 27 | 1 | 27 | 4 |
| R. T. Nahas | Nahas Individual | 1,463 | 0 | 9,520 | <1 |
| | Fossil Butte | 861 | 2 | | |
| | Oreana #3 | 1,677 | 6 | | |
| J. Nettleton | Black Mtn Field | 1,133 | 18 | 3,304 | 1 |
| | Oreana #1 | 525 | 0 | | |
| | Oreana #2 | 1,133 | 0 | | |
| 9-K Ranch | Castle Cr. W | 481 | 22 | 2,933 | 1 |
| Noh Sheep Co. | Saylor Cr. | 315 | 15 | 1,586 | 1 |
| Patterson Land & Livestock Co. | Saylor Cr. | 625 | 30 | 625 | 5 |
| E. Perkins | Saylor Cr. | 2,100 | 100 | 2,100 | 5 |
| R. Pershall | Elephant Butte | 92 | 4 | 404 | 1 |
| F. Phelps & Sons | Hammett #1 | 1,632 | 0 | 1,769 | 0 |
| J. Potucek | Saylor Cr. | 411 | 20 | 411 | 5 |
| G. Presley | Hammett #1 | 1,207 | 0 | 1,310 | 0 |
| B. Pruett | Saylor Cr. | 413 | 20 | 413 | 5 |
| M. Quintana | French John Area | 38 | 0 | 2,383 | 0 |
| R. Ring | Saylor Cr. | 127 | 6 | 127 | 5 |
| R. Ross Estate | Hammett #4 | 390 | 8 | 420 | 2 |
| L. Rudge | Tindall Northwest | 390 | 7 | 390 | 2 |
| Russell Inc. | Hammett #4 | 240 | 5 | 392 | 1 |
| Salmon Falls Sheep Co. | Saylor Cr. | 1,560 | 74 | 1,560 | 5 |
| K. Seesee | Saylor Cr. | 383 | 18 | 383 | 5 |
| C. Sellman | Battle Cr. SpSuF | 325 | 1 | 679 | 1 |
| | Tindall Northwest | 354 | 7 | | |
| Mr. T. Shenk | Saylor Cr. | 8 | 1 | 8 | 13 |
| Simplot Livestock Co. | Saylor Cr. | 3,048 | 145 | 17,728 | 1 |
| Sliman Sheep Co. | Saylor Cr. | 650 | 31 | 650 | 5 |
| J. L. Solosabal | Saylor Cr. | 1,080 | 51 | 1,080 | 5 |
| R. Steele | Saylor Cr. | 413 | 20 | 413 | 5 |
| C. Steiner | Fossil Butte | 26 | 0 | 2,160 | <1 |
| | Castle Creek W | 168 | 8 | | |
| B. Stephens | Hammett #3 | 240 | 27 | 240 | 11 |
| Tows Angus Farms | Saylor Cr. | 101 | 5 | 10,546 | <1 |
| W. Thompkins | Reynolds Cr. Group | 1,239 | 30 | 1,254 | 2 |
| M. Thompson | Saylor Cr. | 1,794 | 85 | 1,794 | 5 |
| L. Trail | Saylor Cr. | 1,005 | 48 | 1,005 | 5 |
| 2-Plus Ranches | Hammett #1 | 1,398 | 0 | 2,678 | 2 |
| | Hammett #4 | 1,235 | 26 | | |
| Urquidi & Ocamica | Battle Cr. SpSuF | 366 | 1 | 2,398 | <1 |
| R. Viner | Hammett #4 | 473 | 10 | 539 | 2 |
| W. Walker | Hammett #4 | 588 | 12 | 588 | 2 |
| Wells Livestock Co. | Saylor Cr. | 200 | 10 | 4,931 | <1 |
| D. Wicher | Hammett #2 | 400 | 38 | 550 | 7 |
| | Hammett #4 | 150 | 3 | | |
| G. Withers | Chalk Flat | 333 | 1 | 333 | <1 |
| 20 Individual Operators | Sunnyside SpF | 25,275 | 32 | N/A | <1 |
| TOTALS | | 153,428 | 3,515 | | |

SOURCE: BLM grazing case files and 1940, 1959, 1962, 1965 range surveys.

## AGRICULTURE

There would be 28,590 acres of new farms added to the ES area during the 1980's. Based on the assumed crop rotation discussed in Chapter 1 and less three percent for non-crop areas there would be 6,102 acres of potatoes, 5,824 acres of dry beans, 4,714 acres each of winter wheat, barley and sugar beets, and 1,664 acres of alfalfa grown each year as a result of this development level.

## MINERAL RESOURCES

Sand and gravel needs for road construction would involve 330,000 cubic yards, or approximately 50 to 70 acres of land disturbed.

## LAND USE PLANS, CONTROLS, AND CONSTRAINTS

Impacts would be the same as the proposed action.

## TRANSPORTATION NETWORKS

Based on existing farm developments in the ES area about 76 miles of new gravel roads throughout farm project areas would be needed. About 313 acres would be devoted to road right-of-ways and most power-lines would be built parallel to roads. It is not anticipated that any new large (greater than 245 kv) lines would be constructed in the ES area as a result of agriculture development.

## SOCIO-ECONOMICS

The impacts depicted in this section are generated from an average of the highest crop prices (1976 Normalized) and the average energy price to irrigators (16.65 mils) of the two most likely electric energy generation scenarios predicted in the Energy section of this alternative (see Table 8-21). In addition, the budget item for annual pumping system cost (see Appendix 3-2) was reduced in half to allow for the requirements of less powerful pumps, less penstock pipe, etc., due to lower lift and shorter pumping distances under this alternative.

The change in earnings and employment discussed in this section was analyzed with the aid of BLM's Dynamic Regional Analysis Model (DYRAM) as shown in Appendix 3-1.

### Carey Act

The development of 28,590 acres would result in 89 farms. At the same time 37,080 acres would be closed to livestock grazing.

The primary employment impacts would be an additional 89 farmers

TABLE 8-21

NET FARM INCOME & INCOME PER ACRE
FOR A 320 ACRE FARM 1/
MINIMUM DEVELOPMENT

| Crop Prices / Energy Prices | | IPC Participation New Plants (16.3 mills) | IPC Adds 43 MW Capacity (17.0 mills) | Average (16.65 mills) |
|---|---|---|---|---|
| 1976 Normalized | Net Farm Income | +$34,990.27 | +$34,569.72 | +$34,779.99 |
| | Income Per Acre | +$ 112.87 | +$ 111.52 | +$ 112.19 |
| 1977 Normalized | Net Farm Income | +$17,466.61 | +$17,046.06 | +$17,256.33 |
| | Income Per Acre | +$ 56.34 | +$ 54.99 | +$ 55.67 |
| 1977 Actual | Net Farm Income | -$ 1,532.76 | -$ 1,953.31 | -$ 1,743.04 |
| | Income Per Acre | -$ 4.94 | -$ 6.30 | -$ 5.62 |

1/ Average locations of Farm under Minimum Development Alternative, i.e., 350 feet above the Snake River and 0-2 miles pumping distance.

SOURCE: Idaho State Office, BLM, 1979.

and a loss of 3 ranch workers. Gains in the farm sector would create secondary impacts of an additional 69 employees in the farm sector and 86 in the remainder of the market area economy. The decrease in the livestock industry would result in 1 more job lost. Total employment changes by industry are shown in Table 8-22. The major impacted industries are wholesale and retail trade and services.

By the year 2000 the labor force would be 69 percent higher than in 1975. This alternative would slow down the projected decrease in agricultural employment (Idaho Department of Water Resources 1978).

As a result of this alternative the maximum increase in population in the market area would be 563. This was based on 1975 employment to total population ratios.

The age breakdown of the new population is described in Table 8-23.

TABLE 8-22
EMPLOYMENT CHANGES, NUMBER OF JOBS
CAREY ACT

| Industry | Due to Primary Livestock Loss | Due to Primary Primary Ag. Gain | Total |
|---|---|---|---|
| Agriculture | | | |
| Livestock | -3 | +8 | +5 |
| Other Agriculture | 0 | +158 | +158 |
| Contract Construction | 0 | +6 | +6 |
| Food and Kindred | 0 | +7 | +7 |
| Transportation & Communications | 0 | +7 | +7 |
| Wholesale and Retail Trade | 0 | +21 | +21 |
| Services | 0 | +13 | +13 |
| Other | -1 | +24 | +23 |
| Total | -4 | +244 | +240 |

SOURCE: Idaho State Office, Bureau of Land Management, Dynamic Regional Analysis Model, January 1979

TABLE 8-23
AGE BREAKDOWN OF NEW POPULATION

| Age Group | Number |
|---|---|
| 5 yrs. | 58 |
| 5-17 yrs. | 162 |
| 18-29 yrs. | 158 |
| 30-44 yrs. | 110 |
| 45-64 yrs. | 57 |
| 65 + yrs. | 18 |
| | 563 |

SOURCE: Idaho State Office, Bureau of Land Management, U.S. Department of Energy, 1978

Farm income would initially increase $3.1 million ($34,779 per farm x 89 farms). Ranchers in the ES area would lose 3,234 AUMs as a result of this alternative, considering 92 percent of the total AUMs licensed are actually used. An AUM in the ES area is worth $10.86 in income to the ranchers. Thus, ranchers would lose approximately $36,000 annually.

The secondary impact would increase income through all sectors of the economy. The total income impact (direct and secondary) would then be a gain of $5.5 million throughout the market area.

Implementation of this alternative would lead to an increase of approximately 162 children in the 5-17 age group. This would mean an increase of 146 new school pupils - 105 elementary and 41 high school. These students would require 12,600 square feet of elementary classroom space and 6,150 square feet of high school classroom space (U.S. Department of Energy, 1978). If sufficient space were not available in the market area, it would cost roughly $743,000 to build the necessary space (in 1975 dollars). Table 8-24 shows how the counties would be impacted.

Total public capital costs that may be required could reach a maximum of $1.6 million. It is anticipated that public costs would be below this figure. Under 1977 average mill levies the three counties in the ES area would receive $476,000 in property taxes. The counties would not obtain these revenues until the land is deeded to the applicant (up to ten years after CA entrymen commence development).

Desert Land Act

The number of acres developed into farms and the number of acres taken out of livestock production would be the same as under the Carey Act. Due to the lack of a residency requirement under the DLA, it is estimated that only 10 percent of the farms would have resident owner/operators. The remainder of the farms would have non-resident owner/operators who maintain their residence somewhere in the market area.

The primary employment impacts would be an additional 45 farmers and a loss of 3 ranch workers. Since secondary impacts are based on earnings, they would be the same as under the Carey Act. Total employment changes by industry are shown in Table 8-25. The major impacted industries are wholesale and retail trade and services.

By the year 2000 the labor force would be 69 percent higher than in 1975. This alternative would slow down the projected decrease in agricultural employment (Idaho Department of Water Resources 1978).

As a result of this alternative, the maximum increase in population in the market area would be 459. This was based on 1975 employment to total population ratios. Table 8-26 describes the age breakdwon of the new population.

TABLE 8-24

CAREY ACT
MINIMUM AGRICULTURAL DEVELOPMENT
LOCAL SERVICES

| | Owyhee | Elmore | Twin Falls | Canyon | Area Summary |
|---|---|---|---|---|---|
| Workers | 70 | 74 | 19 | 77 | 240 |
| Population | 161 | 176 | 46 | 180 | 563 |
| Children (5-17 yrs.) | 47 | 50 | 13 | 52 | 162 |
| School Children | 42 | 45 | 12 | 47 | 146 |
| Elementary | 30 | 33 | 8 | 34 | 105 |
| High School | 12 | 12 | 4 | 13 | 41 |
| Elementary Sq. Footage | 3,654 | 3,906 | 1,008 | 4,032 | 12,600 |
| High School Sq. Footage | 1,784 | 1,907 | 492 | 1,968 | 6,150 |
| Cost of School Construction | $184,875 | $197,625 | $51,000 | $204,000 | $637,500* |
| Cost of School Furnishings | $ 22,185 | $ 23,715 | $ 6,120 | $ 24,480 | $ 76,500 |
| Cost of School Land | $ 8,282 | $ 8,854 | $ 2,285 | $ 9,139 | $ 28,560 |
| Number of Teachers | 2 | 2 | 1 | 2 | 7 |
| Health Care Personnel | 2 | 2 | 1 | 2 | 7 |
| Firemen & Policemen | 1 | 1 | 1 | 1 | 4 |
| Cost of Public Facilities | $239,176 | $255,671 | $65,980 | $263,918 | $824,745 |
| Total Public Capital Costs | $463,356 | $495,3]2 | $127,822 | $511,289 | $1,597,779 |

All dollar figures are in 1975 dollars.

SOURCE: U.S. Department of Energy, 1978, and Idaho State Office, Bureau of Land Management.

Note: Numbers may not add up to totals due to rounding.

TABLE 8-25
EMPLOYMENT CHANGES, NUMBER OF JOBS
DESERT LAND ACT - MINIMUM AGRICULTURAL DEVELOPMENT

| Industry | Due to Primary Livestock Loss | Due to Primary Agriculture Gain | Total |
|---|---|---|---|
| Agriculture | | | |
| Livestock | -3 | +8 | +5 |
| Other Agriculture | 0 | +114 | +114 |
| Contract Construction | 0 | +6 | +6 |
| Food and Kindred | 0 | +7 | +7 |
| Transportation & Communications | 0 | +7 | +7 |
| Wholesale and Retail Trade | 0 | +21 | +21 |
| Services | 0 | +13 | +13 |
| Other | -1 | +24 | +23 |
| Total | -4 | +200 | +196 |

SOURCE: Idaho State Office, Bureau of Land Management, Dynamic Regional Analysis Model, January 1979

TABLE 8-26
AGE BREAKDOWN OF NEW POPULATION

| Age Group | Number |
|---|---|
| 5 yrs. | 47 |
| 5-17 yrs. | 132 |
| 18-29 yrs. | 129 |
| 30-44 yrs. | 89 |
| 45-64 yrs. | 46 |
| 65 + yrs. | 16 |
| | 459 |

SOURCE: Idaho State Office, Bureau of Land Management, U.S. Department of Energy, 1978

TABLE 8-27

DESERT LAND ACT
MINIMUM AGRICULTURAL DEVELOPMENT
LOCAL SERVICES

| | Owyhee | Elmore | Twin Falls | Canyon | Area Summary |
|---|---|---|---|---|---|
| Workers | 51 | 55 | 14 | 76 | 196 |
| Population | 117 | 128 | 34 | 180 | 459 |
| Children (5-17 yrs.) | 34 | 37 | 9 | 52 | 132 |
| School Children | 31 | 33 | 8 | 46 | 119 |
| Elementary | 22 | 24 | 6 | 34 | 86 |
| High School | 9 | 9 | 2 | 12 | 33 |
| Elementary Sq. Footage | 2,683 | 2,890 | 722 | 4,025 | 10,320 |
| High School Sq. Footage | 1,287 | 1,386 | 347 | 1,931 | 4,950 |
| Cost of School Construction | $134,987 | $145,370 | $ 36,343 | $202,480 | $519,180 |
| Cost of School Furnishings | $ 16,199 | $ 17,445 | $ 4,361 | $ 24,298 | $ 62,302 |
| Cost of School Land | $ 6,047 | $ 6,513 | $ 1,628 | $ 9,071 | $ 23,259 |
| Number of Teachers | 1 | 1 | 1 | 2 | 5 |
| Health Care Personnel | 1 | 1 | 1 | 2 | 5 |
| Firemen & Policemen | 1 | 1 | 0 | 1 | 3 |
| Cost of Public Facilities | $174,450 | $187,870 | $ 46,967 | $261,676 | $670,963 |
| Total Public Capital Costs | $337,962 | $363,959 | $ 90,990 | $506,944 | $1,299,855 |

*All dollar figures are in 1975 dollars.

SOURCE: U.S. Department of Energy, 1978, and Idaho State Office, Bureau of Land Management.

Note: Numbers may not add up to totals due to rounding.

The change in earnings in the market area would be the same with the DLA as with the CA.

Implementation of this alternative via provisions of the DLA would lead to an increase of approximately 132 children in the 5-17 age group. This would mean an increase of 119 new school pupils - 86 elementary and 33 high school. These students would require 10,320 square feet of elementary classroom space and 4,950 square feet of highschool classroom space (U.S. Department of Energy, 1978). If sufficient space were not available in the market area, it would cost roughly $605,000 to build the necessary space (in 1975 dollars). Table 8-27 shows how the counties would be impacted.

Total public capital costs that may be required could reach a maximum of $1.3 million. It is anticipated that public costs would be below this figure. Revenues received by the counties would be the same as with the CA.

## Impact Summary

### Carey Act

Implementation of this alternative via provisions of the Carey Act would lead to increased employment by 240 jobs and an increase in population of 563. Total earnings could increase as much as $5.5 million. There would be 146 more school children which would require 7 new teachers. The increased population would require 7 additional health care personnel and 4 additional firemen and policemen. The cost of required public facilities could be as much as $825,000 and the total public capital costs could reach $1.6 million.

### Desert Land Act

Implementation of this alternative via provisions of the Desert Land Act would lead to increased employment by 196 jobs and an increase in population of 459. Total earnings could increase as much as $5.5 million. There would be 119 more school children which would require 5 new teachers. The increased population would require 5 additional health care personnel and 3 additional firemen and policemen. The cost of required public facilities could be as much as $671,000 and the total public capital costs could reach $1.3 million.

Due to reductions of livestock grazing from farm development under this alternative, ranches would lose about $36,000 income annually.

## Electrical Energy

### Estimation of Electricity Use

The land in the minimum development alternative is all land in the proposed action alternative with a lift height less than 500 feet. The measurement of the minimum alternative, however, includes nearly 4,000 acres of river-irrigated land that was previously tabulated at higher lift heights in the proposed action measurement described in Chapter 2. The lift height for those 4,000 acres is greater than 500 feet if they are assumed to be irrigated by the shortest route from the river, i.e., the water would have to be pumped up over higher land in between; however, if they are assumed to be irrigated by a round-about route, the lift height is less than 500 feet.

Out of the 21,702 acres assumed to be irrigated from the river, (see Table 1-3, Chapter 1) the median lift height and distance is 450 feet and 2-4 miles. For the total 28,590 acres in the minimum development alternative, including 6,888 acres irrigated out of wells, the median lift height and distance is 350 feet and 0-2 miles from the river.

Table 8-28 shows the direct consumption (line 1), downstream hydro losses at IPC dams (line 2) and the total load including a line loss factor added to direct consumption on the IPC system created by the minimum development alternative in the average year (line 3). Table 8-29 shows the same for the worst case (drought) year.

In the average case year, July load is 34.4 average MW. In the worst case year, the June load is 45.6 average MW. Total load over the season would be 99,729 MWH in the average case, 127,922 MWH in the worst case. (see Appendix 8-1 for further discussion of these calculations).

### Load on IPC Electricity Supply

The impact of the minimum development alternative in the average case year is illustrated in Figure 8-2 which shows minimum development monthly load superimposed on IPC loads and resources. For the two most likely supply scenarios, IPC would require 43 MW of new generating capacity to meet minimum development July load in Case 1B. In Case 2, IPC would require 99,729 MWH of output from plants built by other utilities.

The minimum development alternative would irrigate about 26 percent as many acres as the proposed action, with an electricity consumption of about 16 percent as much as the proposed action. The average direct KWH use per acre in the minimum development alternative is 2087 KWH per acre compared with 3368 KWH per acre in the proposed action. This is a result of the lower lifts and shorter distances from the Snake River.

Table 8-28

ELECTRICITY CONSUMPTION BY MINIMUM DEVELOPMENT ALTERNATIVE

(Average MW)

| | - Average Year - | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Apr | May | June | July | Aug | Sept | Oct | TOTAL (MWH) |
| Direct Consumption | 3.3 | 8.0 | 19.1 | 21.7 | 16.8 | 9.9 | 2.4 | 59,664 |
| Indirect Consumption (Hydro losses on IPC system) | 1.5 | 2.7 | 8.5 | 10.7 | 11.3 | 8.6 | 3.7 | 34,522** |
| Total Load on IPC System * | 5.1 | 11.4 | 29.4 | 34.4 | 29.7 | 19.4 | 6.3 | 99,729 |

* Total Load = Direct Consumption/.915 + Hydro Losses.
(.915 is a factor to account for line losses.)

** Losses over irrigation season

SOURCES: Integrated Energy Systems, Inc,m Boise, Idaho (Contract No. YA-512-CT8-226).

Table 8-29

ELECTRICITY CONSUMPTION BY MINIMUM DEVELOPMENT ALTERNATIVE

(Average MW)

| | - Worst Case Year - | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Apr | May | June | July | Aug | Sept | Oct | TOTAL (MWH) |
| Direct Consumption | 6.7 | 13.7 | 27.5 | 24.4 | 20.7 | 12.8 | 4.3 | 80,762 |
| Indirect Consumption (Hydro losses on IPC System) | 4.0 | 8.1 | 15.6 | 15.1 | 11.5 | 7.2 | 2.6 | 47,160** |
| Total Load on IPC System * | 11.4 | 22.9 | 45.6 | 41.8 | 34.2 | 21.2 | 7.3 | 127,922 |

* Total Load = Direct Consumption/.915 + Hydro Losses.

** Losses over irrigation season.

SOURCE: Integrated Energy Systems, Inc., Boise, Idaho (Contract No. YA-512-CT8-226).

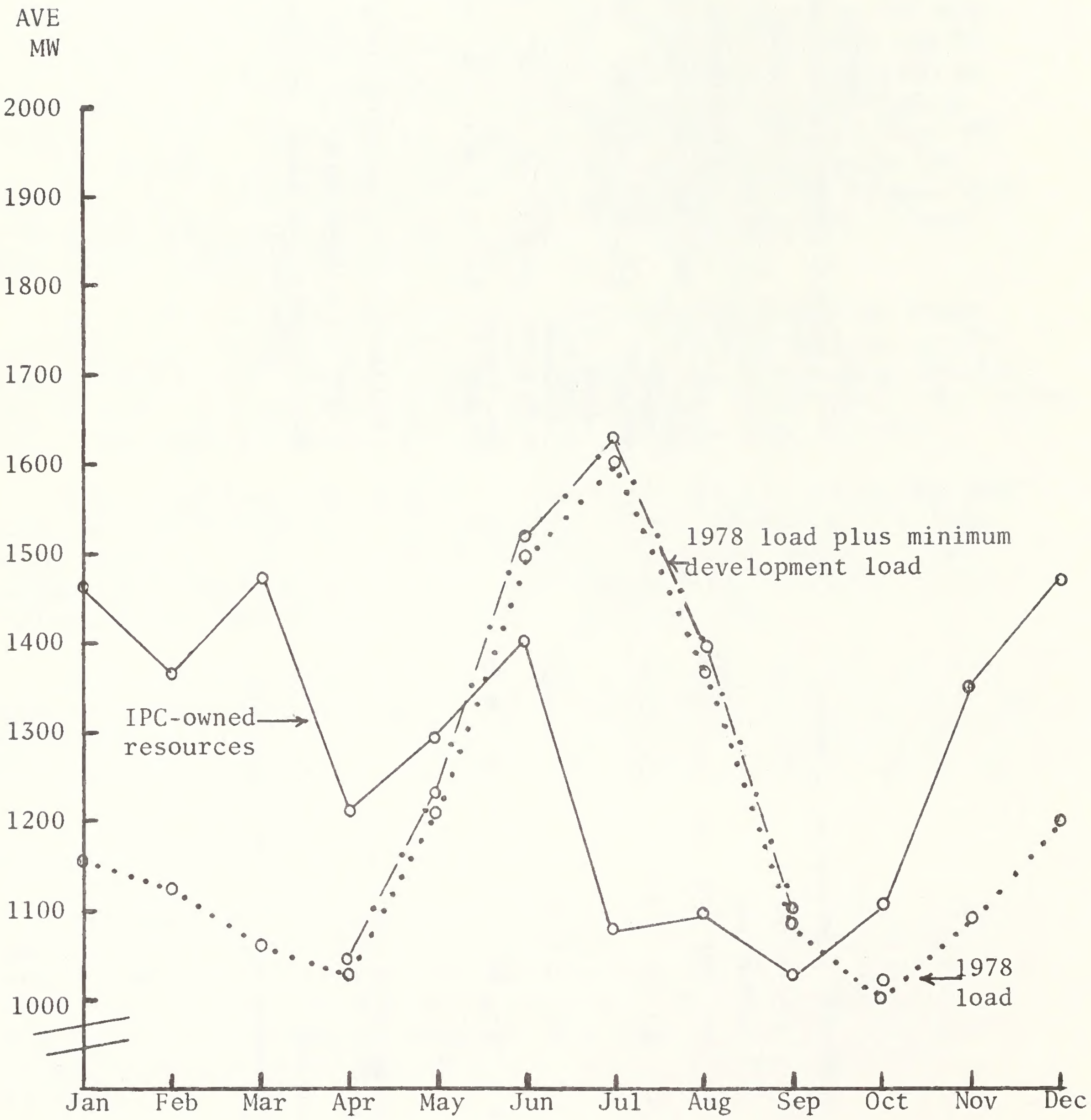



Figure 8-2

IMPACT OF MINIMUM DEVELOPMENT
ON IPC RESOURCES AND LOAD
(AVERAGE YEAR)

SOURCE: Integrated Energy Systems, Inc., Boise, Idaho (Contract No. YA-512-CT8-226).

### Impacts on IPC Ratepayers

The top half of Table 8-30 shows 1977 base average prices and new average prices for the two most likely scenarios for various IPC customer classes. The bottom of Table 8-30 shows the increase in 1977 annual electric bills that would occur under these scenarios for the 1977 average electricity use by customers in each class.

Table 8-31 shows the distribution of total annual cost between new irrigators, revenue from electricity sales during the non-irrigation months and revenue from existing IPC customers. In supply scenario Class 1B, total annual cost would be $10.8 million. Approximately $1 million from sale of export power leaving $8.5 million to be recovered from IPC ratepayers. In Case 2, total cost would be $4 million per year, with $1 million from new irrigators leaving $3 million to be absorbed by IPC ratepayers.

Table 8-32 shows these distributions of cost on a per acre basis. In Case 1B existing IPC customers would pay $297 per acre per year or in Case 2, $106 per acre per year. The overall impact to existing customers would be an increase over 1977 revenues of 7.2 percent in Case 1B or 2.7 percent in Case 2.

The most important energy impacts of the minimum development alternative would result from the effect of increased electricity prices described above on existing IPC ratepayers.

For residential customers the increases over 1977 electric bills would be $17 per year in Case 1B or $5 per year in Case 2.

For small commercial customers the increase in annual electric bill would be $131 per year in Case 1B or $39 per year in Case 2. For large commercial customers increases would be $8,402 per year or $2,537 per year.

Irrigators annual electric bills would rise $162 per year in Case 1B, $49 per year in Case 2 for the average seasonal use of a 100 HP pump.

Because the electricity consumption and electricity price increases to IPC customers are less than the proposed action by more than just the proportional reduction in acres, the minimum development impacts, though significant, would be much less severe.

### Regional Impacts

Assuming a value of 617.7 KWH cost per acre foot of water diverted, the total loss caused by the minimum development alternative on the eight downstream FCRPS dams is 37,893 MWH in an average year, and 52,483 MWH in a worst case year. Valued at 35 mils/KWH, this amounts to $1.3 and $1.8 million in the average and worst case year.

Table 8-30

IMPACT OF MINIMUM DEVELOPMENT ON CUSTOMER PRICES

| | | CASE 1 | CASE 2 |
|---|---|---|---|
| | 1977 BASE | IPC ADDS 43 MW CAPACITY Situation B | IPC PARTICIPATION IN NEW PLANTS |
| AVERAGE PRICES (mils/KWH) | | | |
| System | 16.3 | 17.3 | 16.6 |
| Irrigators | 16.0 | 17.0 | 16.3 |
| Residences | 20.7 | 22.0 | 21.1 |
| Small Commercial * | 22.5 | 23.9 | 22.9 |
| Large Commercial ** | 12.5 | 13.3 | 12.7 |
| AVERAGE YEARLY INCREASE TO 1977 CUSTOMERS ($/year) | | | |
| Irrigators*** | 2622 | 162 | 49 |
| Residences | 287 | 17 | 5 |
| Small Commercial * | 2153 | 131 | 39 |
| Large Commercial ** | 136552 | 8402 | 2537 |

* Schedule 12

** Schedule 19

*** Corresponds roughly to the seasonal use of a 100 HP pump

SOURCE: Integrated Energy Systems, Inc., Boise, Idaho (Contract No. YA-512-CT8-226).

Table 8-31

TOTAL COST OF MINIMUM DEVELOPMENT TO IPC SYSTEM

(MILLION $)

| | CASE 1 SITUATION B | CASE 2 |
|---|---|---|
| TOTAL INCREASE TO SYSTEM | 10.8 | 4.0 |
| REVENUE FROM MINIMUM DEVELOPMENT | 1.0 | 1.0 |
| REVENUE FROM OFF-SEASON SALES | 1.3 | -- |
| NET COST TO 1977 IPC SYSTEM | 8.5 | 3.0 |

SOURCE: Integrated Energy Systems, Inc., Boise, Idaho (Contract No. YA-512-CT8-226).

Table 8-32

PER ACRE COST OF MINIMUM DEVELOPMENT TO IPC SYSTEM

($)

| | CASE 1 SITUATION B | CASE 2 |
|---|---|---|
| COST OF MINIMUM DEVELOPMENT | 378 | 140 |
| REVENUE FROM MINIMUM DEVELOPMENT | 35 | 34 |
| COST RECOVERED BY OFF PEAK SALES | 46 | -- |
| COST BORNE BY 1977 IPC CUSTOMERS | 297 | 106 |

SOURCE: Integrated Energy Systems, Inc., Boise, Idaho (Contract No. YA-512-CT8-226).

In Case 1B, where IPC exports electricity at 10 mils/KWH those losses would be offset by the availability of this cheap power.

## Chemical Energy Impacts

As shown previously (Table 8-18), the chemical energy consumption of the maximum development alternative would have no measurable effect on Idaho supplies. Since the minimum development consumption would be far less (by comparison of 28,590 acres to 176,310 acres) the impact on Idaho consumption would be insignificant.

## Impact Summary

Electricity supply requirements of minimum development in an average case year would be 99,700 MWH. This includes line losses and hydroelectric losses resulting from irrigation diversions. The July load would be 34.4 average MW during average year and 43 average MW in June during the worst case conditions.

In the first of the "most likely" supply cases, 1B, it is assumed that IPC would construct 42 MW of new thermal generating capacity to meet minimum development July load. In Case 2 it is assumed that IPC would obtain 99,700 MWH during the summer through participation in a new thermal power plant constructed by another utility.

In Case 1B the total annual cost would be $10.8 million with $1 million paid by new irrigators and $8.5 million absorbed by other IPC ratepayers. In Case 2, the total would be $4.0 million per year with $1.0 million paid by new irrigators and $3.0 million paid by other IPC ratepayers.

The resulting increases over 1977 annual bills for the average use customer in each class is shown below.

| $/Year | Residential | Small Commercial (Sched 12) | Large Commercial (Sched 19) | Irrigation |
|---|---|---|---|---|
| Case 1B | 17 | 131 | 8402 | 162 |
| Case 2 | 5 | 39 | 2537 | 49 |

Losses of hydroelectric generation at federal dams on the Snake/Columbia system would total 37,900 MWH in an average case year and cost $1.3 million to replace with new thermal generating capacity.

ALTERNATIVE 3: NO FARM DEVELOPMENT

An impact analysis for this alternative would be similar to the narrative found in Chapter 2, Future Environment. The environmental conditions/impacts described in this section are set at about the year 2000.

## ALTERNATIVE 4: FLPMA LEASE

For the following listed resources, impacts of farming by FLPMA leasing would be identical to farming under the DLA and CA disposal methods. The reader is referred to impact analysis for these resources in Chapters 3 and 5 for the proposed action level and this chapter for impacts under the maximum (Alternative 1) and minimum (Alternative 2) development levels.

Climate
Geology and Topography
Water Resources (surface)
Vegetation
Wild Horses
Wilderness
Minerals
Livestock Grazing
Land Use Plans, Controls and Constraints
Transportation

Due to the management goals that the BLM would adopt for issuing FLPMA leases, the following resources would be impacted differently than if development was allowed under DLA and CA.

### AIR QUALITY

Blowing dust generated from farmland during windy spring months would likely be reduced by management goals under FLPMA lease. Requiring at least 25 percent of the land to be in soil building crops at all times plus requiring winter grain or other crops to be planted after potato, sugar beet, and bean harvests would guarantee that farmland would have a cropping cover through most of the year. Air quality would be judged to be slightly better under lease than if the farms were developed by DLA and CA.

### SOILS

Soil conservation would be emphasized by requiring Best Management Practices (BMPs). Cropping controls would assure a certain amount of soil building crops in the rotation. The use of winter grain would provide cover during the spring windy periods and/or it could be plowed under for an organic matter additive before row crops (potatoes, sugar beets, beans) were planted in the spring. Minimum tillage practices could reduce soil compaction which retards water percolation, and chisel plowing would break up hard pans in the soil structure. Under CA and DLA, farmers are not required to use BMPs. Thus, maintenance of soil fertility would be more likely under FLPMA lease.

All impacts would be the same as those listed under DLA and CA disposals except that the probability of accidental or storm-caused overland runoff and wind would be reduced by the conservation measures prescribed under FLPMA lease. Hence there is reduced likelihood of accidental introduction of phosphates, pesticides or heavy metals into the river.

## WILDLIFE

Wildlife management goals under FLPMA lease could enhance habitat for pheasants, quail, Hungarian partridge, and various waterfowl. Lease provisions would also serve to maintain native wildlife habitat within the farm units. As a result certain small mammals and birds which are adapted to the shrub/grassland habitat type would remain in these areas. A secondary beneficial impact would be an increase in agriculturally oriented species and a maintenance of native wildlife species leading to an increased prey base for raptors near farmland. Establishment of shrubs, forbs, grasses, and/or trees at certain locations would benefit wildlife species. Under FLPMA lease, on-farm wildlife habitat would be substantially better than CA and DLA on farm habitat.

All fishery impacts would be the same as those discussed under DLA and CA disposals except that the probability of accidental or storm-caused overland water runoff or wind erosion would be reduced by the conservation measures prescribed by FLPMA lease. Therefore, there is a slightly reduced likelihood of fish mortalities caused by heavy metals or other toxicants.

## CULTURAL RESOURCES

Impacts to cultural and paleontological resources under FLPMA lease would only be expected to vary slightly from DLA and CA farms. Leases would require the lessee to cease operations and notify the BLM should cultural or paleontological resources become apparent in the course of farm construction. This would improve the chance of unknown sites being preserved since CA and DLA farmers would not be required to stop operation if a site were found. This lease requirement would, however, be difficult to enforce.

## VISUAL RESOURCES

FLPMA leases would require that on-farm structures and powerlines be located and designed utilizing the BLM Visual Resource Management

System. Farm facilities could be made to be more visually and aesthetically acceptable, thus softening landscape impacts of new farm intrusions. Overall visual impacts would be judged to be slightly less under FLPMA lease than DLA and CA transfers.

## RECREATION

Recreation access, primarily hunting, would be allowed on lease farmland as long as the use would not conflict with farm operations or jeopardize the lessees investment. This would normally give the public a better chance at hunting opportunity in farm areas since private land is often posted and closed to public hunting.

## SOCIO-ECONOMIC

Under this alternative, lessees would lease the land from BLM at a rate comparable to costs of renting farmland in the private sector. Since those lease values would be based on fair market value for purchasing the land, it is assumed that FLPMA leasing would have the same impacts as purchasing land under Alternative 5 FLPMA Sale, i.e., lease rents would be the same as mortgage payments of purchasing land. Lease rates would be based on land values of about $250 per acre (native desert land). Rental rates would be approximately $600 per month on a 320 acre farm unit totaling $7,200 per year. This is based on comparable leases in the area at $22.50 per acre per year. These costs would be an addition to the farm budgets depicted in Appendix 3-2. Under the best circumstances of high crop returns and low energy costs, the hypothetical farm would be losing approximately $500 per year. (Refer to the net farm income Table 3-8, Chapter 3).

It is unlikely that farm development would occur, given the extra cost of leasing the land, unless farm prices rose dramatically.

Should farm prices rise enabling development to take place as depicted in Chapter 3, then the impacts on local government and sociological factors would be about the same as in Chapter 3, Desert Land Act.

In a recent survey sent out from the Idaho Department of Water Resources, to Carey Act and Desert Land Act applicants the respondents said they would not want to lease federal land. The main reason given for this was the opinion that the federal government does not belong in the landlord business.

## ENERGY

Under FLPMA lease, it would be possible to mitigate some chemical energy impacts. If Best Management Practices were followed, namely a requirement that 25 percent of the lease acreage were devoted each year to "soil building crops," then the consumption of fertilizer, particularly nitrogen, might be reduced.

## ALTERNATIVE 5: FLPMA SALE

For the following listed resources, impacts of farming by FLPMA Sale will be identical to farming under DLA and CA disposal methods. The reader is referred to the impact analysis for these resources in Chapters 3 and 5 for the proposed action level and this chapter for impacts under the maximum (Alternative 1) and minimum (Alternative 2) development levels.

- Climate
- Geology and Topography
- Water Resources (surface)
- Vegetation
- Wildlife
- Wild Horses
- Cultural Resources
- Visual
- Wilderness
- Minerals
- Livestock Grazing
- Transportation

Due to the FLPMA Sale provisions, the following resources may be impacted differently than if farm development was allowed under DLA and CA.

### AIR QUALITY

Blowing dust generated from farmland during windy spring months would likely be reduced by the soil conservation covenant (in the form of BMPs) as required in the FLPMA Sale patent. At least 25 percent of the land would be in soil building crops at all times, plus winter grain or other cover crops would be required to be planted after fall potato, sugar beet, and bean harvests. This would mean that most farm ground would have a cropping cover throughout the year and air quality, consequently, would be judged to be better under FLPMA sale than if the farms were developed under the DLA and CA authorities.

### SOIL

Soil conservation would be emphasized by requiring Best Management Practices (BMPs). Cropping controls would assure a certain amount of soil building crops in the rotation. The use of winter grain would provide cover during the spring windy periods, and/or it could be plowed under for an organic matter additive before row crops (potatoes, sugar beets, beans) were planted in the spring. Minimum tillage practices would reduce soil compaction which retards water percolation, and chisel plowing would break up and retard hard pans from forming in the soil structure. Under CA and DLA, farmers would not be required to use BMPs. Thus, maintenance of soil fertility would be more likely under FLPMA sale.

## WATER RESOURCES (Water Quality)

All impacts would be the same as those listed under DLA and CA disposals except that the probability of accidental or storm-caused overland runoff and wind erosion would be reduced by the BMP convenants in the FLPMA patents. Hence there is reduced likelihood of accidental introduction of phosphates, pesticides or heavy metals into the river.

## WILDLIFE (Fisheries)

All fishery impacts would be the same as those listed for DLA and CA disposals except that the probability of accidental or storm-caused overland flow of water runoff or wind erosion would be reduced by BMP convenants in the FLPMA patents. Therefore, there is reduced likelihood of fish mortality caused by heavy metals or other toxicants.

## RECREATION

A patent reservation would allow public recreational access, primarily for hunting. This would require land patented under FLPMA sale to be open for hunting as long as there would be no conflict with farm operators or jeopardize the owners investments. However, public hunting would be under "hunting by permission only" procedures. This would give sportsman a better chance at hunting opportunity in farm areas since private land is often posted and closed to hunting.

## LAND USE PLANS, CONTROLS AND CONSTRAINTS

Urban expansion has encroached onto prime farm land in many areas of the Nation and taken land out of agricultural production. Under FLPMA sale, a covenant would be in the patent that would perpetually preserve the land for agricultural land uses. Urban expansion onto farm land is not currently a problem in the ES area, but such a covenant would assure that it would not occur in the future.

## SOCIO-ECONOMIC

Under this alternative applicants would buy the land at fair market value. Land costs would be an additional financial burden that is not a factor under DLA and CA. Assuming a 320 acre farm, and assuming the market value of native desert land would be $250 per acre, the price of the land would be $80,000. If the farmer puts ten percent down and borrows $72,000 for a 30 year period at 9.25 percent interest, his monthly land payments would be $592.33 or $7,107.96 per year. These costs would be an addition to the farm budgets depicted in Appendix 3-2. Even under the best circumstances, high crop returns and low energy costs, the hypothetical farm would be losing approximately $500 per year. (Refer to the net farm income Table 3-8, Chapter 3.)

It is unlikely, given this set of circumstances that any farm development would occur in the ES area unless farm prices rise dramatically.

Should crop prices rise, enabling development shown in Chapter 3, then the impacts on local government and the sociological impacts would be about the same as in Chapter 3, Desert Land Act. There is the possibility that for some, FLPMA sale could be more advantageous. By gaining title to the land with its purchase, they might more easily qualify for mortgage money which could be used for farm development costs. In addition, some individuals who did not currently qualify under DLA or CA authority (for instance, people who had previously received public land by the DLA or CA) could get more land under FLPMA sale.

## ENERGY

Under FLPMA sale, it would be possible to mitigate some chemical energy impacts. If Best Management Practices were followed, namely a requirement that 25 percent of the lease acreage were devoted each year to "soil building crops," then the consumption of fertilizer, particularly nitrogen, might be reduced.

ALTERNATIVE 6: FLPMA Exchange

Environmental impacts under FLPMA Exchange are judged to be identical to those previously discussed under FLPMA Sale. Economic impacts would likely be more favorable to farmers under FLPMA Exchange due to essentially no land costs but otherwise similar to the DLA authority.

Conceivably, the 111,015 acres of public land which would be converted to cropland would be replaced by a similar acreage of private land during the exchange process. Some of the land acquired by the BLM could be of higher value for recreation, wildlife, watershed, or other public use than land transferred into private ownership. Some land acquired could be inholdings within significant BLM recreation areas such as wild rivers, proposed wilderness areas, and ORV areas. Other private land acquired by exchange could be inholdings within National Forests and could be of importance to the U.S. Forest Service for recreational purposes and wilderness management.

TABLE 8-33
ADVERSE IMPACTS-COMPARATIVE MATRIX OF PROPOSED ACTION AND ALTERNATIVES

| RESOURCE IMPACTED | PROPOSED ACTION 111,015acres-DLA/CA | #1 MAXIMUM DEVELOPMENT 176,310acres-DLA/CA | #2 MINIMUM DEVELOPMENT 28,590acres-DLA/CA | #3 NO DEVELOPMENT | #4 FLPMA LEASE | #5 FLPMA SALE | #6 FLPMA EXCHANGE |
|---|---|---|---|---|---|---|---|
| AIR QUALITY | Lowered air quality would exceed annual secondary, primary and 24 hr. dust particulate standards in spring months. Average annual increase in dust particulates of up to 10 micrograms/$m^3$ near region of agriculture development. | Total regional suspended particulates would be almost twice that of proposed action. Duration would be the same. | Total suspended dust particulates would be 1/4 that of proposed action. Duration would be the same. | None | ← Slight reduction from DLA/CA type farm development. → | | |
| SOILS | Slight soil erosion sprinkler irrigation less than 2 tons/acre. Wind erosion will vary with weather and farm practices ranging from 0-75 tons/acre. | Water and wind erosion induced erosion rates are predicted to be 10-15% higher than the proposed action. | Same soil erosion rates as proposed action. | None | ← Best management practices would slightly reduce irrigation erosion, but substancially reduce wind erosion by requiring winter cover crops and 25% of the farm land to be planted to soil building crops. → | | |
| WATER RESOURCES | | | | | | | |
| Uses and Flows | Snake River-reduced annual flow by 250,004 acre feet or 1,034 CFS during peak pumping period; during low water years, mean-flows could drop 17% below IF&G recommended maintenance flows. Ground water-reduce aquifer supplies by 27,823 acre feet. | Snake River-reduced annual flow by 357,000 acre feet or 1510 CFS during peak pumping period; during low water years, mean flows could drop as much as 26% below IF&G recommended maintenance flows. Ground water-reduce aquifer supplies by 97,900 acre feet, causing water use conflicts. | Snake River-reduced annual flow by 56,000 acre feet or 200 CFS during peak pumping. Ground water-reduce aquifer supplies by 17,800 acre feet. | None | ← Same as DLA/CA type farm development. → | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Water Quality<br>Snake River | Slight increase in nitrates, slight increase in temperature during low flow years, slight increase in sedimentation in low flow years above C.J. Strike. | Slight increase in nitrates, conductivity and water temperature during normal flow years. pH would increase slightly. | No detectable change. | None | ← Same as DLA/CA type farm development except for slight decrease in likelihood of overland flow accidents and wind erosion. → | | |
| Tributary Drainages | Moderate increase in silt, conductivity and nitrates. | Moderate to heavy increase in silts. Conductivity and nitrates. | Slight increase in conductivity and nitrates. | None | | | |
| VEGETATION | | | | | | | |
| Terrestrial | Up to 129,915 acres of natural vegetation would be eliminated. | Up to 207,080 acres of natural vegetation would be eliminated. | Up to 33,978 acres of natural vegetation would be eliminated. | None | | | |
| Aquatic | During low flow years there would be a moderate increase in phytoplankton in the Snake River. | Slight to moderate increase in phytoplankton in the Snake River. | A very slight increase in phytoplankton above C.J. Strike in the Snake River. | None | ← Same as DLA/CA type farm development. → | | |
| WILDLIFE | | | | | | | |
| Terrestrial | 40-60 mule deer will be displaced or lost; 47,285 acres (sagebrush/grass) of pygmy rabbit habitat lost; 61,715 acres (shrub/grass) of non-game species habitat lost-raptor prey based reduced; 20-50 sagegrouse displaced or lost; | 80-120 mule deer will be displaced or lost; 76,166 acres (sagebrush/grass) of pygmy rabbit habitat lost; 132,531 acres (shrub/grass) of non-game species habitat lost-raptor prey base reduced; 20-50 sage-grouse displaced or lost; | 8,012 acres (sagebrush/grass) of pygmy rabbit lost; 18,035 acres (shrub/grass) of non-game species habitat lost-raptor prey base reduced; | None | Some native wildlife habitat would be preserved within the farm unit-reducing impacts on small game species. All other impacts would be the same as DLA/CA farm development. | ← Same as DLA/CA type farm development. → | |
| | ← Reduction in sensitive species (western burrowing owl, ferruginous hawk, long-billed curlew) populations even with required mitigative measures. → | | | | | | |
| Fisheries | A reduction of game fish | A reduction of game fish | Fish populations essentially | None | | | |

TABLE 8-33 (continued)

| RESOURCE IMPACTED | PROPOSED ACTION | #1 MAXIMUM DEVELOPMENT | #2 MINIMUM DEVELOPMENT | #3 NO DEVELOPMENT | #4 FLPMA LEASE | #5 FLPMA SALE | #6 FLPMA EXCHANGE |
|---|---|---|---|---|---|---|---|
| Fisheries (con't.) | from 5-25% in the Snake River depending on annual flow conditions. An increase in rough fish populations. A moderate increase in mortality of sturgeon stocks in low flow years. Unknown quantity of fish entrained in pump intakes. | from 25-50% in the Snake River depending on annual flow conditions. An increase in rough fish populations. Decline in sturgeon stocks as much as 50%. Resident and anadromous fish downstream of ES area very slightly reduced in population. Unknown quantity of fish entrained in pump intakes. | uneffected. Unknown amount of fish entrained in pump intakes. | None | ←Same as DLA/CA type farm development.→ | | |
| CULTURAL RESOURCES | An undetermined number of the following known sites would be impacted: 56 Prehistoric, 3 Historice, 2 Palenotological | An undetermined number of the following known sites would be impacted: 65 Prehistoric, 3 Historic, 4 Palenotological | An undetermined number of the following known sites would be impacted: 9 Prehistoric, 3 Historic, 1 Palenotological | None | Slightly less damage to cultural resources due to lease requirements; otherwise impacts the same as DLA/CA type development. | ←Same as DLA/CA type farm development.→ | |
| | ←Even with required cultural clearence procedures, there would be a loss of much scientific information in the ES area.→ | | | | | | |
| VISUAL RESOURCES | An undetermined amount of roads and power lines into farm areas will cross the Oregon Trail and Kelton Road (VRM Class I); pump stations penstocks and roads in Snake River Canyon (VRM Class II) will cause visual intrusions. | Same as proposed action except to a greater extent because of larger amount of farm development. | Smaller impact than the proposed action because of less farm acreage. | None | Lease requirements will slightly reduce on farm visual impacts from proposed action and Alternative 2; otherwise impacts would be the same as DLA/CA type development. | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| RECREATION | 60,400 acres of public land currently used for ORV activity would be developed for farms; sightseeing impacted by slightly by visual intrusions in Snake River Canyon and along the Oregon Trail and Kelton Road; reduction of water based recreation on Snake River during low flow years. | 86,000 acres of public land currently used for ORV activity would be developed for farms; other impacts the same as proposed action. | 20,000 acres of public land currently used for ORV activity would be developed into farms; sightseeing impacts would be reduced from proposed action. | None | ←— Same as DLA/CA type farm development. —→ | | |
| LIVESTOCK GRAZING | 127 ranchers would lose from 14,975 AUMs to 41,397 AUMs of grazing privileges. | 127 ranchers would lose from 21,545 AUMs to 41,397 AUMs of grazing privileges. | 127 ranchers would lose 3,515 AUMs of grazing privileges. | None | ←— Same as DLA/CA type farm development. —→ | | |
| MINERAL RESOURCES | 1.3 million cubic yards of gravel material needed for new roads. | 2.1 million cubic yards of gravel material needed for new roads. | 333,000 cubic yards of gravel material needed for new roads. | None | ←— Same as DLA/CA type farm development. —→ | | |
| TRANSPORTATION | 300 miles of new farm access roads will be needed. | 470 miles of new farm access road will be needed. | 76 miles of new farm access roads will be needed. | None | ←— Same as DLA/CA type farm development. —→ | | |
| SOCIAL-ECONOMIC | Impacts based on 1976 Normalized crop prices and 16.5 mills per KWH<br><br>CAREY ACT<br>12 new school teachers needed; 12 additional health care persons and 7 new firemen and policemen needed; up to $1.5 million for new public facilities and up to $2.8 million for total public capital costs.<br><br>DESERT LAND ACT<br>7 new school teachers needed; 7 additional health care persons and | Impacts based on 1976 Normalized crop prices and 16.5 mills per KWH<br><br>CAREY ACT<br>19 new school teachers needed; 19 additional health care persons and 12 new firemen and policemen needed; up to $2.4 million for new public facilities and up to $4.6 million for total public capital costs.<br><br>DESERT LAND ACT<br>11 new school teachers needed; 11 additional health care persons and | Impacts Based on 1976 Normalized crop prices and 16.65 mills per KWH<br><br>CAREY ACT<br>7 new school teachers needed; 7 additional health care personnel and 4 new firemen and policemen needed; up to $825,000 for new public facilities and up to $1.6 million for total public capital costs.<br><br>DESERT LAND ACT<br>5 new school teachers needed; 5 additional health care persons and | None | Farming under FLPMA lease does not appear to be economically feasible. However, if crop prices were high enough to make farming | Same as FLPMA Lease | Impacts would be similar to those describ for DLA farm development. |

TABLE 8-33 (continued)

| RESOURCE IMPACTED | PROPOSED ACTION | #1 MAXIMUM DEVELOPMENT | #2 MINIMUM DEVELOPMENT | #3 NO DEVELOPMENT | #4 FLPMA LEASE | #5 FLPMA SALE | #6 FLPMA EXCHANGE |
|---|---|---|---|---|---|---|---|
| SOCIAL-ECONOMIC (con't.) | 4 new firemen and policemen needed; up to $852,000 and up to $1.4 million for total public capital costs. | 7 new firemen and policemen needed; up to $1.4 million for new public facilities and up to $2.8 million for total public capital costs. | 3 new firemen and policemen; up to $671,000 for new public facilities and up to $1.3 million for total public capital costs. | | profitable, then impacts would be the same as DLA farm development. | | |
| | Up to $414,000 of direct income lost to ranchers from either CA or DLA farm development. | Up to $414,000 of direct income lost to ranchers from either CA or DLA farm development. | $36,000 of direct income lost to ranchers from either CA or DLA farm development. | | | | |
| ENERGY | | | | | | | |
| Electrical | Average Case<br>556,661 MWH of total load on IPC system; 201 average MW during July. | Average Case<br>825,000 MWH of total load on IPC system; 298 average MW during July. | Average Case<br>99,700 MWH of total load on IPC system; 34.4 average MW during July. | None | ←Same as DLA/CA type farm development.→ | | |
| | Worst Case<br>788,412 MWH of total load on IPC system; 270 average MWH during June. | Worst Case<br>1.2 million MWH of total load on IPC system; 392 average MWH during June. | Worst Case<br>136,684 MWH of total load on IPC system; 42.4 average MWH during June. | | | | |
| | 154,799 MWH per year would be eliminated from downstream federal dams on the Snake/Columbia River system during the average case year. | 246,000 MWH per year would be eliminated from downstream federal dams on the Snake/Columbia River system during the average case year. | 37,000 MWH per year would be eliminated from downstream federal dams on the Snake/Columbia River systems during the average case year. | | | | |
| | COST TO NON-AGRICULTURAL IPC CUSTOMERS | | | | | | |
| Scenario 1 | $422/acre | $382/acre | $297/acre | | | | |
| Scenario 2 | $142/acre | $129/acre | $106/acre | | | | |

# CHAPTER 9

## CONSULTATION AND COORDINATION

Chapter 9 indicates who was involved in developing this environmental statement. It lists and discusses the consultation and coordination that took place with other agencies, organizations and individuals.

# CHAPTER 9
# CONSULTATION AND COORDINATION

In January of 1976, the Idaho BLM released an environmental analysis report (EAR) entitled Agricultural Development Program Lower Snake River Plains of Idaho. The purpose of this document was to analyze the impacts associated with converting public land to agricultural use across southern Idaho. The report identified areas where high and low environmental impacts could be expected from new development. It did not, however, provide adequate regional analysis of water or energy supplies to form a basis for the solid, reliable allocation of public land to new farm development. Most people who reviewed the document felt that it was a significant federal action and consequently requested the BLM to write a full environmental statement (ES). The subject proved to be complexed due to competing and conflicting demands for land and water, the large area of public land; and economic issues. The BLM worked closely with the Idaho Department of Water Resources (IDWR) since irrigation water allocation was an important consideration. Many meetings were held with IDWR during 1977 and 1978 to formulate a proposed action that was compatible with the goals of the State Water Plan (Part II). A committee of government agencies was formed in June 1977 to act as an information scoping and guidance group.

Membership was from the:

- Idaho Budget Policy, Planning and Coordination Dept.
- Idaho Dept. of Health and Welfare
- Idaho Fish and Game Dept.
- Idaho State Office of Energy
- Idaho Dept. of Water Resources
- Idaho Dept. of Agriculture
- Bureau of Reclamation
- U.S. Fish and Wildlife Service
- Bureau of Land Management

By late 1977, a proposed action was nearly finalized. The Soil Conservation Service was contracted in the spring of 1978 to survey about 160,000 acres where soils information was lacking in the ES area. After the soil survey was completed in April 1978, a specific proposed action was identified based on the location of the best soils in the ES area.

## ES TEAM ORGANIZATION

The ES Team was organized in February 1978 and consisted of BLM specialists in fisheries, minerals, soils, wilderness, cultural resources, wildlife, livestock administration, wild horses, vegetation, and recreation. In addition, there were socio-economic and hydrology specialists from IDWR, and two consulting firms were hired for the energy and water quality/fishery components.

## CONSULTATION IN REVIEW OF THE DRAFT ES

Formal consultation under Section 7 of the Endangered Species Act of 1973 with the U.S. Fish and Wildlife Service was initiated on March 17, 1978. Of concern was the effect the proposed action would have on wintering bald eagles (an endangered species). After available information was analyzed and field examination completed, the U.S. Fish and Wildlife Service reached the opinion that the proposed action would not jeopardize the bald eagle. This was stated in a memorandum to BLM dated September 1, 1978.

A "Notice of Preparation of a Draft Environmental Impact Statement" was sent to the Idaho State Clearinghouse on March 24, 1978. The State Clearinghouse is responsible for notifying state and area-wide agencies of the ES proposed action and associated significant environmental issues. A number of agencies requested copies of the draft ES (DES).

Dr. Patricia Packard of the College of Idaho in Caldwell and Robert Steele of the U.S. Forest Service in Boise were consulted a number of times in the spring of 1978 regarding threatened and endangered plants in the ES area. Packard is a member and Steele is chairman of the Rare and Endangered Plants Technical Committee of the Idaho Natural Areas Council.

On August 2, 1978, BLM sent a letter to Drs. Wright and White of Idaho State University requesting information pertaining to paleontological resources in the ES area. A response was received from a graduate student, Greg Conrad, indicating that there were several important fossil locations in the ES area, representing a wide variety of vertebrate specimens.

A news release was issued on October 13, 1978, to all Idaho newspapers and radio stations. The purpose of the release was to inform the public of the Boise District Agricultural Development ES and to obtain citizen input into formulation of the DES.

Dr. Howard R. Cramer of Emory University, Atlanta, Georgia was contacted by telephone and by letter on December 21, 1978, for information regarding the Oregon Trail and Kelton Road in southwestern Idaho. Dr. Cramer responded with loan of a number of Oregon Trail diaries for documentation of the route in the ES area.

A number of informal contacts were made with the State Historic Preservation Office (SHPO) for the following purposes:

1) To identify any cultural properties in the ES area currently in the process of nomination to the National Register of Historic Places.

2) To identify any cultural properties in the ES area for which formal determinations of eligibility for the National Register have been made or are pending.

3) To identify additional National Register eligible cultural properties in the ES area by applying the criteria set forth in 36 CFR 800 (see Appendix 1-3).

4) To evaluate the adequacy and potential effectiveness of mitigation contained in the proposed action.

In November of 1978, over 200 fact sheets and ES area maps were sent out to various federal, state, and local agencies; county governing and planning bodies; organizations; and interest groups for the purpose of soliciting participation.

## COORDINATION IN REVIEW OF THE DRAFT ES

Comments on the draft environmental statement will re requested from the following agencies, interest groups, and individuals:

### Federal Agencies

Department of the Interior
- Bonneville Power Administration
- Bureau of Reclamation
- Fish and Wildlife Service
- Geological Survey
- Heritage Conservation and Recreation Service
- National Park Service

Department of Agriculture
- Agricultural Research Service
- Agricultural Stabilization & Conservation Service
- Forest Service
- Soil Conservation Service

Farmers Home Administration
Army Corps of Engineers
Department of Health, Education and Welfare
National Weather Service
Pacific Northwest River Basins Commission

### State Agencies

Governor's Office
State Clearinghouse
Agricultural Experiment Station, Moscow
Department of Agriculture
Department of Finance
Department of Health and Welfare
Department of Lands
Department of Tourism and Development
Department of Water Resources

Department of Fish and Game
Highway Department
Idaho Energy Office
Idaho Public Utilities Commission
Soil Conservation Commission and Districts

State Planning Bureau
Oregon State Clearing House
Oregon Department of Natural Resources
Oregon State Water Resources Dept.

Washington State Clearing House
Washington State Fish Commission
Washington State Water Resources Dept.

## Local Government

- County Commissioners - Ada, Owyhee, Gooding, Elmore, Canyon and Twin Falls Counties
- Planning and Zoning Commissions - Ada, Owyhee, Gooding, Elmore, Canyon, and Twin Falls Counties.
- County Agents - Ada, Owyhee, Gooding, Elmore, Twin Falls
- Mayors - Boise, Mountain Home, Glenns Ferry, Bliss, Hagerman, Homedale, Twin Falls, Buhl
- Highway Districts - Ada, Owyhee, Gooding, Elmore, and Twin Falls Counties

## Other

- Idaho Congressional Delegation
- Idaho National Guard
- Mountain Home Air Force Base

## Economic Interests

- All DLA Groups within the ES area
- Carey Act Association
- Grazing Associations in ES area
  - Owyhee Cattlemens Association
  - Hagerman Grazing Association
  - Southside Grazing Association
  - 71 Grazing Association
  - Chipmunk Grazing Association
- Idaho Cattlemen's Association
- Idaho Farm Bureau Federation
- Idaho Mining Association
- Idaho Power Company

Idaho Water Users Association
Idaho Woolgrowers Association
Pacific Gas and Electric
Southwest Idaho Development Association

Non-Economic Interests

Ada County Fish and Game League
Audubon Society
Boise Valley Fly Fishermen
Capitol Conservation Club
Coalition to Save the Snake
Desert Raiders Motorcycle Club
Ducks Unlimited
Elmore Motorcycle Association
Friends of the Earth
Gem State 4 x 4 Club
Gooding County Motorcycle Association
Greater Snake River Land Use Congress
Greyson Andrist, MRVC
Idaho Archaeological Society
Idaho Association of Soil Conservation Districts
Idaho Conservation League
Idaho Environmental Council
Idaho Gem Club
Idaho Mining Association
Idaho Outdoor Association
Idaho Trails Council, Inc.
Idaho Trail Machine Association
Idaho Wildlife Federation
Kent Lamberson, Director, WETA
League of Women Voters
Mountain Home Air Force Base Sportsmen Club
Nampa Rod and Gun Club
National Wildlife Federation
Nature Conservancy
National Resource Defense Council, Inc.
Northwest Agricultural Policy Project
Off-Road Motorcyclists Council
Outdoors Unlimited
Owyhee Motorcycle Club
Regional Studies Center
Sierra Club
State Historical Preservation Office
Wildlife Society

Public hearings, tentatively scheduled for June, 1979, will be held following completion of the Draft Environmental Statement. At a minimum, hearings will be conducted in Boise, Twin Falls, and Murphy. Details of these hearings will be publicized in the local and regional media, and will be published in the Federal Register.

# APPENDICES

## APPENDIX 1-1

## WILDLIFE LEAVE SELECTION CRITERIA

Wildlife areas will be selected according to the following criteria:

1. Tracts will be distributed throughout any developed area and will comprise at least 15 percent of total developed area.

2. Minimum tract size will be 80 acres. Width must be at least ¼ mile.

3. Tracts will be within 1-1½ miles of each other.

4. Tracts will be located on or adjacent to any important wildlife habitat (existing or future).

5. Tracts will have public access.

6. Tracts will have highest percent canopy coverage available.

7. Tracts will have highest percent perennial vegetation available.

8. Tracts will be adjacent to existing or future ponds.

9. Tracts will be adjacent to existing or future mainlines.

10. Tracts will have best soils available.

It is estimated that only one-half of the 37,000 acres will actually become interior isolated tracts. The balance of the 37,000 acres of Class I and II soils not put into isolated tracts will provide mitigation opportunities for wildlife and are discussed in Chapter 4.

The isolated tracts will be managed for their wildlife habitat values. Each tract will be fenced for identification and protection. Water catchments will be developed at strategic locations for wildlife, and where the existing vegetation is not optimum, dryland shrubs, forbs, and grasses will be established.

An application for water-right will be made on all wildlife isolated tracts. This water-right is needed so BLM can take advantage of any opportunities to obtain water from adjacent farm operations. This water will be used to irrigate shelterbelts, nesting habitat, and cooperative farm areas. The actual development of irrigated areas on the isolated tracts will be dependent upon negotiation with adjacent landowners, since their water delivery system would be utilized to get the water to the isolated tract boundary.

It is estimated that not more than 30 percent (about 5,400 acres) of the isolated tracts (about 18,000 acres) would actually be irrigated under this cooperative program. This would require a water-right for approximately 14,000 ac/ft annually.

APPENDIX 1-2

INDIAN HILLS IRRIGATION PROJECT SUMMARY

The Indian Hills Project is located in Owyhee County approximately 18 miles southeast of Mountain Home, Idaho. A portion of the project lands were developed in 1964. Part of this early project was abandoned because of the lack of reliable pumping equipment. The Idaho Water Resource Board is proposing to redevelop this project using the Carey Act. The principal features of the project are:

1. A river pumping plant to have a maximum capacity of approximately 86 cfs for a total pumping head of 435 feet to be equipped with five 1,000 hp. and one 600 hp. vertical shaft turbine pump.

2. A 48 inch diameter steel penstock, 1,262 ft. in length, with wall thickness varying from 1/4 to 3/8 inch.

3. A regulating reservoir with a surface area of 6 acres and a capacity of 30 acre-ft., asphalt membrane lined.

4. A buried pipe distribution system consisting of approximately 1 mile of low-head, 48 inch diameter concrete pipe and 10.9 miles of buried pressure distribution system. Twenty-seven pressure farm turnouts will be provided.

5. Seven booster pumping plants will provide sprinkler pressures that range in size from 700 hp. to 60 hp., with a total of 2,040 hp. installed.

6. Construction of about 11 miles of access roads for maintenance, and facilities to control surface drainage.

7. Construction of a domestic water system to serve the project consisting of a well, storage tank and distribution pipe lines to furnish residential water.

The total project area comprises 6,980 acres. Of this total 4,554 acres will be developed as agricultural farmland and 2,426 acres will be retained in federal ownership to be managed for wildlife purposes.

The development of the proposed project will have both beneficial and adverse impacts on the natural and human environment. The project development will have a significant impact on raptors nesting in the Silver Creek Drainage. This impact will be from loss of hunting habitat and increased disturbance from man's activities. The project will also result in a small reduction of power production in the Snake River and consumption of energy.

Beneficial aspects of the project include increases in the property tax base and employment. Enhancement of wildlife lands will be accomplished by the establishment of windrows and by intermittent irrigation in selected locations. Return flow of waste irrigation water to the Snake River will be essentially eliminated.

## Proposed Plan

The physical location of proposed facilities are shown on the Project Map (located at the end of this appendix section). These facilities include a river pumping plant, steel pipe penstock from the river to a regulating reservoir, an asphalt line regulated reservoir with six acres of surface area, a low-head 48" concrete pipe, booster pumping stations discharging into a buried pipe distribution system, and pressurized farm turnouts for each 160 acre tract. A spillway is provided at the regulating reservoir. Maintenance roads are provided for access to farm turnouts and other project facilities. A new access road and farm roads, where required, will be provided in conjunction with Owyhee County. Windbreaks will be planted within the road right-of-ways at selected locations to control wind erosion. Obtaining domestic water supplies with acceptable quality at reasonable costs on an individual farm basis appears unlikely. Accordingly, a domestic water system is planned for residential needs and for stock watering. Operating and maintenance facilities will include a residence for the project manager and conversion of an existing structure to a combination shop and office building. The required initial operation and maintenance equipment and spare parts will also be provided. Surface runoff and drainage due to over irrigation will be controlled by a series of small impoundments generally situated in the wildlife lands. Small terminal ponds will also be provided for draining lateral lines and flushing main lines. These facilities are designed to prevent irrigation return flows from reaching the Snake River.

Construction of facilities solely for wildlife enhancement is not contemplated, however, wildlife lands are provided in the project. Where practicable, designs have been "slanted" to provide wildlife benefits without increasing costs. The drainage control facilities and windbreaks particularly will provide enhancement to wildlife in the project area.

## Project Design

The river pumping plant base will be constructed of reinforced concrete and will provide for installation of six vertical-shaft turbine pumps. The general arrangement is typical of a number of successful pumping plants in this reach of the Snake River. The pumps are mounted on an open concrete deck over a sump structure which is connected to the Snake River through a screened intake. Five of the pumps will be driven by 1,000 hp. vertical, hollow-shaft, six pole, 2,300 volt motors operating at 1,180 rpm. One of the pumps will be a 600 hp., 2,300 volt electric motor for operation at 1,180 rpm. The 1,000 hp. pumps have a rated capacity of 7,100 gallons per minute at a total operating head of 435 feet. The 600 hp. installation has a capacity of approximately 4,200 gpm at 435 feet TDH. The combined capacity of the pumping units is 39,700 gpm or about 88.5 cfs. An allowance for wear of 3 percent was made, which gives a net capacity of approximately 86 cfs. which is equal to the maximum probable demand for irrigation water. The reliability criteria used is that the river pumping station should be capable of furnishing 90 percent of the "50 percent probability" demand for irrigation water with one unit out of service. The overall efficiency of the pumping units is estimated at 81 percent for computation of power costs.

Each of the individual pumps at the river pumping plant will be manifolded to a steel penstock. Pump control valves, check valves and other fittings will be provided. A pilot operated surge relief valve will be installed to relieve water hammer surge from power outages.

Electrical controls for the pumping station will be installed in a control room at the rear of the pumping station. The power company's substation transformers will be located adjacent to the control room. The pumping plant will have a metal roof with removable access panels for pump and motor repairs. The inlet sump to the pumping plant is proportioned for inlet velocities less than 1 fps. at minimum expected water elevations. Remote monitoring equipment will be provided at the project headquarters. Based upon information presently available, the deck of the structure will be approximately 2 feet above water level at 50,000 cfs. Electrical controls and motors are located at such elevation that approximately 3 feet of water over the deck will be required before the pumping station is rendered inoperable.

The Snake River is wide and braided at the pumping plant site. Some additional excavation in the river bottom is required to provide the required submersion at minimum flows of the river. However, some problems with sedimentation may be encountered unless minor channel alterations are provided.

A 48" diameter steel penstock will convey water from the main pumping plant site to a regulating reservoir at the top of the Snake River Canyon rim. Preliminary designs call for this pipeline to be buried with minimum coverage of about 3 feet. About 400 feet of excavation through rock is expected between stations 6+00 and 10+00 of the pipeline. Wall thickness of the penstock will vary from a maximum of a 3/8 inch to ¼ inch diameter depending upon the total operating pressures. Velocity in the penstock at maximum flow rate is approximately seven feet per second. The penstock discharges into the reservoir through a reinforced concrete structure to provide for energy dissipation. Thrust blocks will be provided.

The existing reservoir will be raised about 2 feet and lined with a buried asphalt membrane to control seepage. The regulating reservoir will minimize frequent starting of pumps. Devices will be provided to sense water levels in the reservoir which will control operation of the river pumping plant. A second control is provided which will override the primary control system and stop all river pumps, sequentially, in case water level in the reservoir exceeds safe operating maximums. This condition could result from a power outage or other emergency shut-down of the booster pumping stations which did not affect the river stations. Additionally, an alarm will be provided to indicate an incipient spill from the regulating reservoir. A spillway structure is provided in the form of a rectangular launder. This structure also serves to drain the reservoir. Spills are expected to be very infrequent because of the control safeguards noted. In case of a spill, however, water would be conveyed by means of a 33 inch pipeline to an outlet structure located near the canyon rim. A rock-lined channel would be constructed to convey water down the canyon rim.

Two outlet structures are provided from the reservoir to convey water to the booster pumping plants. A 48" pipeline for regulating purposes. A 28" diameter steel pipeline conveys water southerly from the reservoir approximately 450 feet to booster pumping station B.

Preliminary designs were developed for a canal to convey water westerly from the reservoir in lieu of the 48" pipeline. The 48" pipeline was selected based on anticipated savings on O&M costs and difficulties associated with spills at the westerly end of the canal. Therefore, the entire distribution system will consist of buried pipelines. Pipeline location and sizes are shown on the Project Map.

A number of booster pumping stations are provided as shown in the facilities map. These will furnish the required pressure for operation of sprinkler systems. The larger stations are equipped with multiple pumps in order to more efficiently meet the varying demands. In general, these pump stations are planned as out-door type with open sides and roof structure to protect against direct sunlight. Pump control valves will be provided to regulate water hammer surges from power outages and pump starting and stopping. The two largest stations use centrifugal pumps because of desirable operating characteristics. Stations "A" and "G" are vertical shaft turbine pumps with a can or pot type housing. Control systems will be provided to shut down in case of low suction pressure to provide a time delay between pump starting and stopping and to maintain desired operating pressures. Table 1-A gives a summary of the booster pumping station size and capacities.

TABLE 1-A

BOOSTER PUMPING STATION SUMMARY

| Station | Q cfs | H-ft. | No. Pumps | H.P. |
|---|---|---|---|---|
| A. | 17.1 | 176 | 4 | 400 |
| B. | 25.6 | 192 | 3 | 700 |
| C. | 2.85 | 125 | 1 | 60 |
| D. | 29.6 | 138 | 4 | 700 |
| E. | 8.5 | 35 | 2 | 60 |
| F. | 2.85 | 125 | 1 | 60 |
| G. | 2.85 | 152 | 1 | 60 |
| TOTAL | 89.35 | | | 2,040 |

Pressurized farm turnouts will be provided at each 160 acre farm unit. A shut-off valve and in-line totalizing flow meter will be provided. One of the farm turnouts requires a pressure reducing valve.

A mainline pressure regulating station is required on pipeline D at about station 131+20. In order to minimize operating problems with restarting after a power outage, the pressure reducing valve station on pipeline D will be equipped with a pressure sustaining feature.

Maintenance roads will be provided for ready access to the project facilities. These are generally 14 feet in width with a gravel base and surface course.

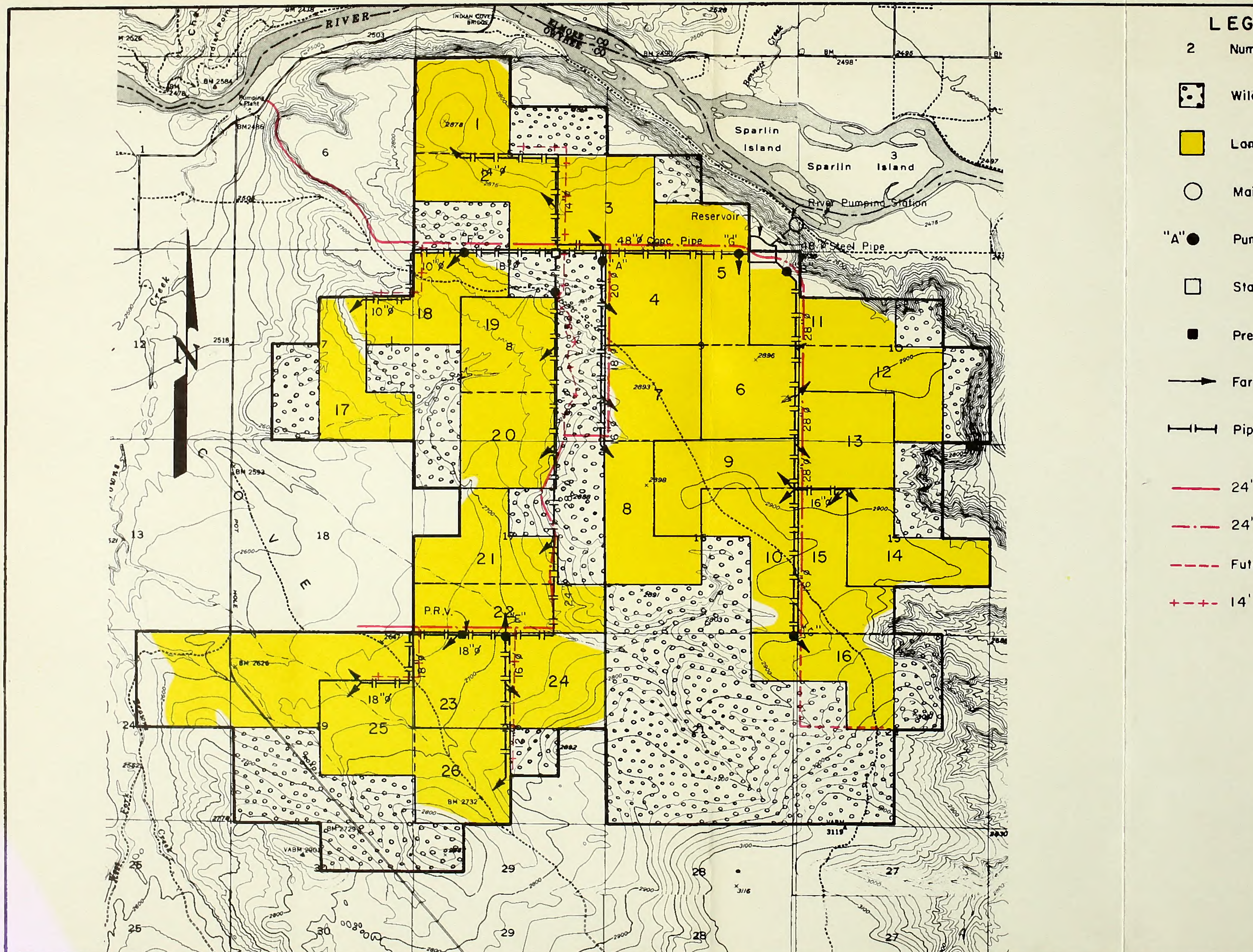
Drainage

Based on information developed during geologic investigations, and considering the method of water application, subsurface drainage is not expected to be a problem on the Indian Hills Project. However, some surface runoff, particularly from the steeper irrigated lands can be expected. This runoff will be controlled by construction of impoundments and intercepting ditches. In the larger drainages, water will be removed from the impoundment by 5 to 10 hp. pumping units and sprayed onto the adjacent wildlife lands. If this is not done, the impoundments become uneconomical due to increased size. Rock rip-rap spillways will be provided on the larger impoundments to pass flows from thunderstorm floods. A 1 percent occurrence flood has been used in proportioning the drainage control structure spillways. None of these impoundments will contain more than a few acre-feet of water and a failure would cause minimal downstream damage. Accordingly, larger and more costly spillway facilities are not indicated.

Pumping Power

Electrical power supplies for the project will be obtained from utilities in the area. In addition to furnishing electric power for the pumping plants, it is anticipated that the utility will provide the necessary electrical power to farm homes.

The total energy requirements for pumping is estimated to average 9,685,000 kilowatt hours annually. Of this, 6,810,000 kilowatt hours would be required at the main pumping plant and 2,875,000 will be used at the booster pumping plants.




INDIAN HILLS IRRIGATION PROJECT

PROJECT MAP

APPENDIX 1-3

NATIONAL REGISTER CRITERIA (FROM 36 CFR 800)

(a) "National Register Criteria" means the following criteria established by the Secretary of the Interior for use in evaluating and determining the eligibility of properties for listing in the National Register: The quality of significance in American history, architecture, archaeology, and culture is present in districts, sites, buildings, structures, and objects of State and local importance that possess integrity of location, design, setting, materials, workmanship, feeling and association and:

(1) That are associated with events that have made a significant contribution to the broad patterns of our history; or

(2) That are associated with the lives of persons significant in our past; or

(3) That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

(4) That have yielded, or may be likely to yield, information important in prehistory or history,

(b) Criteria considerations. Ordinarily cemeteries, birthplaces, or graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings, properties primarily commemorative in nature, and properties that have achieved significance within the past 50 years shall not be considered eligible for the National Register. However, such properties will qualify if they are integral parts of districts that do meet the criteria or if they fall within the following categories:

(1) A religious property deriving primary significance from architectural or artistic distinction or historical importance;

(2) A building or structure removed from its original location but which is the surviving structure most importantly associated with a historic person or event;

(3) A birthplace or grave of a historical figure of outstanding importance if there is no appropriate site or building directly associated with his productive life;

(4) A cemetery which derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events;

(5) A reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration

master plan, and when no other building or structure with the same association has survived;

(6) A property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own historical significance; or

(7) A property achieving significance within the past 50 years if it is of exceptional importance.

## SECTION 106 OF THE NATIONAL HISTORIC PRESERVATION ACT OF 1966 (PUBLIC LAW 89-655; 80 STAT. 915)

Sec. 106. The head of any Federal agency having direct or indirect jurisdiction over a proposed Federal or Federally assisted undertaking in any State and the head of any Federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register. The head of any such Federal agency shall afford the Advisory Council on Historic Preservation established under Title II of this Act a reasonable opportunity to comment with regard to such undertaking.

## APPENDIX 1-4

## CULTURAL RESOURCE SURVEY STANDARD PROCEDURES

Prior to allowance of farming or any related construction activities, all land under consideration for agricultural development would undergo intensive cultural resource inventory. ES areas requiring site-specific surveys and evaluations include, but are not limited to the following: farm units, pump station sites, roads, powerlines, irrigation canals and pipelines, fences and gravel source pits. The evaluation process may include test excavations if recommended by a qualified cultural resource specialist. Following evaluation of the cultural resources, the State Historic Preservation Office and a BLM cultural resource specialist will jointly identify properties which are potentially eligible for listing in the National Register of Historic Places. A determination of their eligibility will then be sought from the Heritage Conservation and Recreation Service (see Appendix 1-3 for National Register Criteria of eligibles). The Advisory Council on Historic Preservation will then be consulted regarding the properties determined to be eligible for inclusion in the National Register. It is the responsibility of the Advisory Council to specify what measures must be taken to mitigate impacts to the National Register eligible sites.

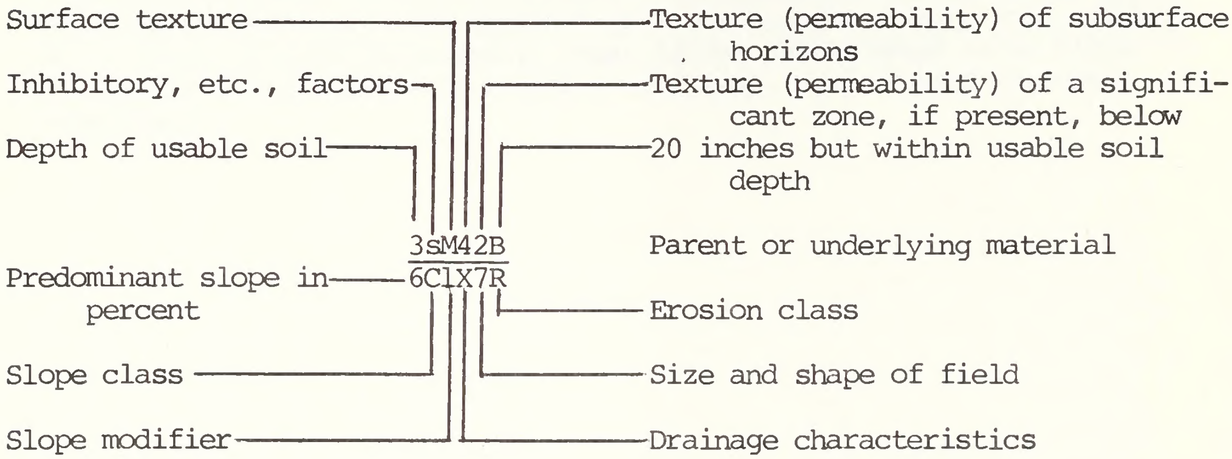
APPENDIX 2-1

Criteria Used In Classifying Soils

SOIL SURVEY LEGEND

The procedure-legend here outlined is designed to record the patterns and differences of physical soil characteristics as they occur across a given landscape. Such data is to provide a reference point from which interpretations may be made that are critical to the use and management of the soils resource.

Soils are recognized and are to be mapped in accordance with the approved legend. The physical characteristics of individual soil profiles will be examined and coded in a manner to reflect: depth, texture, permeability, slope class, and erosion where significant erosion has occurred. Modifying inhibitory or special feature factors to identify one unit from another and/or which affect use and management of the land will be utilized and made part of the coded symbol. Symbol-fractional-forms to be utilized in order of preference as they "fit" a given delineation are:




or: 3sM42B/6C1X7R

Soil Depth

The depth of the soil refers to the depth of the solum or the layers that are readily penetrated by plant roots or the depth to some layer that would restrict root penetration. Five depths are recognized:

| Symbol | Descriptive Team | Range |
|---|---|---|
| 1 | Very deep | Over 60 inches |
| 2 | deep | 30-60 inches |
| 3 | Moderately deep | 20-36 inches |
| 4 | Shallow | 10-20 inches |
| 5 | Very shallow | 0-10 inches |

## Soil Textures

The following textural classes will be recognized, grouped, and coded to reflect surface and subsurface charcteristics. Together, these factors will be utilized as a measure of soil permeability. Textured classes grouped in each separation are:

| Surface Texture Symbol | Subsurface Texture Symbol | Descriptive Term | Included Textural Classes |
|---|---|---|---|
| F | 1 | Fine | Clay, silty clay, stony clay, sandy clay |
| H | 2 | Moderately fine | Silty clay loam, sandy clay loam, clay loam |
| M | 3 | Medium | Silt, silt loam, stony loam, gravelly loam, loam, very fine sandy loam |
| L | 4 | Light | Fine sandy loam, sandy loam, loamy fine sand |
| C | 5 | Coarse | Loamy coarse sand, very fine sand, fine sand, sand, coarse sand, very coarse sand, gravel |

## Inhibitory Factors

Inhibitory factors are shown by lower case letters following the profile depth code. Combination of factors are made when necessary to express all inhibitory factors. The following are those inhibitory factors to be recognized.

Saline/Alkali - Such soils contain sufficient salts so distributed in the profile that they limit or restict growth of most crop plants. A saline-alkali soil has either so high a degree of alkalinity (pH 8.6 or higher), or so high a percentage of exchangeable sodium (15 per cent or higher), or both, that the growth of most plants is reduced. These conditions may exist at the soil surface, throughout the profile, at depth within the profile, and occur sporadically as "slick spots" across the landscape or as extensive tracts.

Five occurrences or intensities of saline/alkali conditions will be recognized:

| Code | Description |
|---|---|
| $a_1$ | Moderate saline/alkaline condition--growth of most crops is moderately affected and less tolerant plants are seriously affected. The pH ranges from 8.6 to 9.0. |
| $a_2$ | Severe saline/alkaline condition--growth of only salt and alkali tolerant plants is possible. The pH will exceed 9.0. |

| | |
|---|---|
| $a_3$ | Saline/alkaline subsoil--soils having the surface layers relatively free of salt or alkali but which have an accumulation of salt and alkali in the subsoil. Such material has been leached to a depth as to not affect crop production unless poorly managed. Accumulations at 20 inches or more. |
| $a_4$ | Saline/alkali slick spots--this situation appears on the land as "slick spots" having "pigmy" or thin B horizon development correctable with normal tillage operations. Land surface involved exceeds 15 per cent of total area. |
| $a_5$ | Saline/alkali complex--this complex appears on the land as strongly developed B horizons requiring extensive and/or special tillage or other practices to modify profile problems (deep plowing, etc.). Land surface involved exceeds 15 per cent of total area. |

Lime - Lime content sufficient to affect plant growth unfavorably.

| Code | Description |
|---|---|
| $z_1$ | Concentrations in excess of 15 percent represented by 6 inches or greater depth of nodular and/or cap accumulations within 8 to 20 inches of the soil surface. No apparent restriction of root and/or water penetration. |
| $z_2$ | Concentrations in excess of 15 percent represented by 6 inches or greater depth nodular and/or cap accumulations within 0 to 8 inches of the soil surface. Or, slight restriction of root and water penetration at 0 to 20 inches as evidenced by inextensive root-matting. |

Gravelly and Stony--Fragments of sufficient size and amounts significantly influence plant growth by creating poor soil-air moisture relationships and/or limits or restricts cultivation, planting, and harvest of crops.

| Code | Description |
|---|---|
| $g_1$ | Gravelly--20 to 40 percent of land surface is covered and/or upper soil profile (20 inches) is composed of gravels from 2 mm's to 4 inches in diameter. |
| $g_2$ | Very gravelly--40 to 75 percent of land surface is covered and/or upper soil profile (20 inches) is composed of gravels from 2 mm's to 4 inches in diameter. |
| $s_1$ | Stony--Sufficient stones to interfere with tillage but not to make intertilled crops impracticable. (If stones are 1 foot in diameter and about 10 to 30 feet apart, they occupy about 0.1 to 1.5 percent of the surface, and there are about 1.5 to 25 cubic yards per acre-foot.) |

$s_2$ Very stony--sufficient stones to make tillage of intertilled crops impacticable, but the soil can be worked for hay crops or improved pasture if other soil characteristics are favorable. (If stones are 1 foot in diameter and about 5 to 10 feet apart, they occupy about 0.1 to 3 percent of the surface, and there are about 1.5 to 50 cubic yards per acre-foot.)

r Extremely gravelly and/or stony condition in excess of foregoing conditions.

Overflow--Damaging overflow either as the result of stream action or as overland flow will be recorded as follows:

| Code | Description |
|---|---|
| $f_1$ | Damaging overflow, occassional and slight. Frequency: 1 to 2 times in 10 year period. |
| $f_2$ | Damaging overflow, frequent and severe. Frequency: 3 to 8 times in 10 year period. |

Wetness--Additional or excess water in the soil profile of sufficient degree to effect the normal function of the profile in production of crops. These degrees of wetness will be recognized:

| Code | Description |
|---|---|
| $w_1$ | Choice of crops limited due to delayed drainage and warming of soil in the spring. Evidence (mottling) or water table if found occurs in lower soil profile. |
| $w_2$ | Choice of crops is seriously affected due to high water table and delay in drainage and warming of the soil in the spring. Evidence of a water table is found near soil surface with characteristics mottling occurring within major root zone depth. |
| $w_3$ | Choice of crops limited to those which can withstand a shallow water table throughout the growing season. The water table is at or near the surface during wetter part of year. |

Parent and/or Underlying Materials

| | | | |
|---|---|---|---|
| A | Acid igneous rock | R | Indurated hardpan |
| B | Basic igneous rock | S | Semi-consolidated material |
| D | Unconsolidated materials | | |
| H | Aeolian sand | V | Lacustrine material |
| L | Loess | X | Recent alluvium |
| Q | Sand and gravel | Y | Clay |

Slope

Steepness or gradient of the land is measured by use of an appropriate hand level and recorded in the denominator of the composite symbol. The dominant slope for each delineated area is recorded in percent in addition to the appropriate slope class group. Grouping is as follows:

| Code | Limits |
|---|---|
| A | 0-2 |
| B | 2-4 |
| C | 4-7 |
| D | 7-12 |
| E | 12-20 |
| F | 20 percent plus |

Modifiers of Slope--Slope characteristics beyond that of gradient will be known by arabic numeral following slope class code. Three categories will be recognized:

| Code | Description |
|---|---|
| 1 | Gently undulating land surface requiring a "cut and fill" operation of minimal amount. Surface relief varies from a 4 to 8 inch elevation difference from a level plane (0 to 500 cubic yards excavation per acre required). |
| 2 | Moderately undulating land surface requiring greater "cut and fill" operations. Surface relief varies from a 8 to 16 inch elevation difference from a level plane (500 to 1,000 cubic yards excavation per acre required) |
| 3 | Strongly undulating land surface requiring extensive "cut and fill" operations. Surface relief varies from a 16 to 24 inch elevation from a level plane. (1,000 to 1,465 cubic years excavation per acre required). |

Drainage--Soil depth, structure, topographic features, and underlying strata effect and compound natural drainage patterns. Under "normal" or natural conditions drainage is satisfactory. However, under an irrigated, agricultural situation, drainage problems may arise. Accordingly, three categories are recognized and will be mapped as:

| Code | Description |
|---|---|
| X | Soil and topographic conditions such that limited drainage requirements are likely to occur. Relatively, simple and inextensive corrective measures will overcome the problem. |

| | |
|---|---|
| Y | Soil and topographic conditions such that significant drainage requirements are likely to occur. Coordinated and extensive corrective measures will be necessary to overcome the problem. |
| Z | Soil and topographic conditions such that excessive drainage requirements are likely to occur. Subsurface water is evidenced by mottling (mapped under wetness factor); and, although this may have beneficial effects upon pasture, etc., it will have detrimental effect upon irrigated crops and would require extensive measures to correct the problem. |

Size and Shape of Field--This factor can become an important criteria to irrigation layout. Although sprinkler systems are more or less independent of field size and shape, surface irrigation methods are predicated upon such limits. Accordingly, three criteria are established:

| Code | Description |
|---|---|
| 7 | 600 foot minimum runs--10 acre minimum size |
| 8 | 330 foot minimum runs-- 7 acre minimum size |
| 9 | 220 foot minimum runs-- 3 acre minimum size |

Erosion

Erosion class is shown in the mapping symbol by placing an arabic numeral or letter following the size and shape of field designation. The erosion will not be included in the symbol unless it is significant. Only two classes of erosion will be mapped. They are coded as follows:

| Code | Description |
|---|---|
| 2 | Active water erosion evident as indicated by evident sheet, rill, and gully erosion. |
| R | Active wind erosion evident as indicated by "blowout" or "dune" areas of removal and/or accumulation. |

Land Cover

These symbols are not a part of the composite symbol, but are placed as appropriate to record land cover to a 10-acre tract.

Land cover is confined to 5 classes. The following code will be used as required with a dashed(--) line utilized to separate various land cover occurring within a single delineation.

| Code | Description |
|---|---|
| 21 | Native perennial grasses |
| 22 | Reseeded perennial grasses |
| 23 | Annual grasses |
| 24 | Sagebrush |
| 25 | Other shrubs |

Miscellaneous

Other physical features (road, telephone, etc.) will be mapped and recorded in accordance with legend in Soil Survey Manual, Misc. Pub. No. 18.

Guide For Placing Bruneau Desert Soils
Into Land Capability Classes (Irrigable)

| Capability Class<br>Subclass | I<br>e,s | II<br>e,s | III<br>e,s | VI<br>All |
|---|---|---|---|---|
| Solum Depth | 36 inches | 20-36 inches | 10-20 inches | Less than 10 inches |
| Surface Texture | $v^{f}$sl-sicl | lfs-sicl | lfs-c | All |
| AWC-in/profile | 5.0+ | 5.0-3.0 in. | 3.0-2.0 in. | Less than 10 inches |
| Surface texture (Permeability-in/hour) | 2,3,4<br>(0.2-5.0in.) | 1,2,3,4,5<br>(0.05-10.0in.) | 1,2,3,4,5<br>(0.05-10.0in.) | All<br>All |
| Saline/Alkali | $a_3, a_4$ | $a_1, a_3$ | $a_2, a_5$ | All |
| Lime 1/ | None, $Z_1$ | $Z_2$ | All | All |
| Gravel | None, g | g | r | All |
| Stone | None | $s_1$ | $s_2$ | All |
| Overflow | None, $f_1$ | $f_2$ | All | All |
| Drainage 2/ | X | Y | Z | All |
| Wetness | None, $W_1$ | $W_2$ | $W_3$ | All |
| Slope class<br>Slope Modifier | AB<br>1 | ABC<br>2 | ABCDE<br>3 | More than E class<br>All |
| Erosion | None | 2, R | 2, R | All |
| F.F.D. (32°F) | 140-110 days & can mature all common crops except common field corn, or less than 110 days & can mature commercial potatoes. | 110-80 days or cannot mature commercial potatoes on less than 80 days and can mature 2 cuttings of alfalfa. | 80-60 days or have difficulty to mature cuttings of alfalfa or less than 60 days & can mature barley and seed potatoes. | Less than 60 days |

1/ Lime, drainage, slope modifier, and size and shape of field are not so much a criterion of land capability as they are hazards and/or problems associated with production. However, lime, drainage, and slope modifier are included as a guide to land capability consideration.

2/ E slope class (12-20%)-applicable to sprinkler irrigation development only.

APPENDIX 2-2

ECONOMIC LAND CLASSIFICATION

| Soil | Sugar Beets (tons) | Alfalfa (tons) | Potatoes Irish (CWT) | Wheat (BU) | Corn Silage (tons) | Corn Sweet (tons) | Pasture (AUM) | Barley (BU) | Apples (BU) | Field Corn (BU) | Alfalfa Seed (lbs.) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Class 1 | | | | | | | | | | | |
| Turbyfill | 28 | 6.5 | 410-415 | 85-88 | 25-27 | 7.0 | 17-19 | | | | |
| Power | 28-30 | 7.0 | 375-395 | 90-95 | 26-27 | 8.0-8.5 | 18 | | | | |
| Harpt | 28-30 | 6.5 | 370-380 | 110 | 25-26 | | | 120 | | | |
| Lankbush | | 5.0 | | 80 | 20 | | 15 | 90 | | | |
| Cencove | 19-22 | 4.0-4.5 | 240-260 | 47-60 | 18-21 | 5.6-5.8 | 11-12 | | | | |
| Clems | 18-26 | 4.5-5.5 | 345-380 | 75-90 | 18-23 | | 18 | | 540 | | |
| | 26 | 5.7 | 357 | 84 | 23 | 7.0 | 16 | 105 | 540 | | |
| Class 2 | | | | | | | | | | | |
| Minidoka | 16-18 | 4.5 | 225-275 | 90-95 | | | 16-18 | 85-90 | | | |
| Truesdale | 28 | 5.5 | 375 | 80 | 17-19 | 6.5 | 9-10 | | | | |
| Lanktree | | 6.0-6.5 | | 100-105 | 20-25 | | 15-16 | 110-115 | | | |
| Feltham | 17 | 3.0-3.5 | | 35-45 | 12 | | 6-7 | | | 42-50 | |
| Elijah | 15-20 | 4.5-5.0 | 245-290 | | 17-18 | 4.5-6 | | 60-75 | | | 480-600 |
| Clems | | 4.0 | 330 | 45 | 18 | | 15 | | 500 | | |
| Cencove | 18 | 4.0 | 225 | 45 | 14 | 5.2 | 11 | | | | |
| Lankbush | | 4.5 | | 70 | 18 | | 14 | 80 | | | |
| Class 3 | | | | | | | | | | | |
| Chilcott | | 3.5-4.0 | | 50-55 | 15-17 | | 13-14 | 55-60 | | | |
| Lankbush | | 2.5-2.0 | | 55-65 | 18 | | 9-14 | 65-75 | | | |
| Cencove | 13 | 3.5 | 210 | 42 | 12 | | 9 | | | | |
| Clems | | 2.0-2.5 | | | 16 | | 8 | | | | |

Note - Yield figures based on irrigated crops from SCS Form 5's.

APPENDIX 2-3

# CRITERIA USED IN CALCULATING SOIL EROSION

Erosion was calculated using the Musgrave Equation outlined in the BLM Manual 7317.22.

Sheet erosion by water may be estimated by using an equation developed by G. W. Musgrave. The equation is as follows:

$$E = FR(S/10)^{1.35} \times (L/72.6)^{0.35} \times (P/1.375)^{1.75}$$

where: E - basic erosion in tons/acre/year

F - basic erosion rate of bare soil in tons/year

R - cover factor

S - average slope of contributing area in percent

L - length of longest contributing meander waterway in feet (field measurement)

P - maximum 2-year frequency, 30-minute rainfall in inches (extrapolate from revised Weather Bureau TP-40 data)

APPENDIX 2-4

SOIL AND WIND ERODABILITY CRITERIA

Relationship of Dry Soil Aggregates to Soil Erodability Index and Wind Erodability Group

| Wind Erodability (WEG) | Dry Soil Aggregates 0.84 mm (percent) | Soil Erodability Index (1) Group (tons/acre/year) |
|---|---|---|
| 1 | 0.5-1.5 | 340-280 |
| 2 | 5.0-15.0 | 180-117 |
| 3 | 16.0-34.0 | 113-67 |
| 4 | 15.0-35.0 | 117-65 |
| 4L | 15.0.35.0 | 117-65 |
| 5 | 28.0-52.0 | 79-33 |
| 6 | 36.0-54.0 | 63-29 |
| 7 | 36.0-64.0 | 63-17 |
| 8 | — | -- |

Wind erodability group (WEG) estimates should be based on dry soil aggregate sieving of the soil or of similar soil. If data are not available, estimates can be made using other properties as a guide.

Texture of the surface inch of soil has the greatest single influence of soil erodability and is used as a guide for estimating wind erodability groups.

SOURCE: Soil Conservation Service. Handbook for Interpretation, Draft KKy, February 11, 1972.

Wind Erodability Soil Groups in the Northern Great Plains

For Use in Predicting Soil Losses by Wind and Determining Alternative Land Treatments for Soil Protection.

| Wind erodability soil group 1/ | Predominant soil classes |
|---|---|
| 1 | Very fine, fine, and medium sand and dune sand. |
| 2 | Loamy very fine, fine, and medium sands. |
| 3 | Very fine, fine, medium, and coarse sandy loams. |
| 4 | Clays, silty clays (subject to granulation). |
| 5 | Loams, sandy clay loams, sandy clays. |
| 6 | Silt loams, clay loams. |
| 7 | Silty clay loams, silt. |
| 8 | Soils subject to wetness, stoniness, etc., and not subject to wind erosion. |

1/ Group 1. Mostly dune sand; single grain structure, vegetation difficult to establish; not suitable for cropland.

Group 2. Mostly loamy sands; dry clod structure (as indicated by percentage of dry soil aggregates 0.84 mm. in diameter) is weak; requires a combination of intensive practices to control wind erosion.

Group 3. Mostly sandy loams; dry clod structure moderately stable; requires at least two measures to control wind erosion in regions with high and intermediate climatic factor.

Group 4. Mostly clays and silty clays; dry clod structure extremely variable due to concentration and swelling by freezing and thawing and wetting and drying; need a combination of at least two measures in regions with high and intermediate climatic factor.

Group 5. Mostly loams and sandy clay loams; dry clod structure quite stable; a combination of at least two measures is needed in a region with high climatic factor.

Group 6. Mostly silt loams and clay loams; dry clod structure stable; require a combination of at least two measures in a region with high climatic factor.

Group 7. Mostly silty clay loams; dry clod structure extremely stable; usually a single practice is sufficient to control wind erosion.

Group 8. Soils not suitable for crops because of wetness, stoniness, etc.

Source: Soil Conservation Service, Handbook for Interpretation, Draft Kky, February 11, 1972.

Guide for Estimating Wind Erodability Group (WEG) From Soil Textures

| Texture of Surface Inch* | WEG |
|---|---|
| Very fine sand, fine sand and medium sand | 1 |
| Loamy Sand, loamy fine sand | 2 |
| Very fine sandy loam, fine sandy loam, sand loam | 3 |
| Clay, silty clay, noncalcareous clay loam and silty clay loam with more than 35 percent clay content | 4 |
| Calcareous loam and silt loam; calcareous clay loam and silty clay loam with less than 35 percent clay content | 4L |
| Noncalcareous loam and silt loam with less than 20 percent clay content; noncalcareous clay loam with less than 35 percent clay content | 6 |
| Silt; noncalcareous silty clay loam with less than 35 percent clay content | 7 |
| Very wet or stony; not subject to wind erosion | 8 |

*Samples were taken of the surface horizon and it is assumed that the surface inch of soil is the same texture.

SOURCE: Soil Conservation Service, Handbook for Interpretations, Draft KKy, February 11, 1972

APPENDIX 2-5

LIST OF INVERTEBRATE GROUPS FOUND IN THE IMPACT AREA

- Insecta
  - Coleoptera
    - Elmidae
      - *Zaitzevia*
      - Unknown adults
  - Diptera
    - Chironomidae
      - larvae
      - pupae
    - Culicidae
    - Deuterophlebiidae
    - Empididae
    - Simuliidae
      - *Simulium*
    - Psychomyiidae
    - Rhagionidae
  - Ephemeroptera
    - *Baetis*
    - *Caenis*
    - *Cynigmula*
    - *Epeorus*
    - *Ephemerella*
    - *Hexagenia*
    - *Stenonema*
    - *Tricorythodes*
    - *Isonychia*
    - *Paracloedes*
    - *Pseudocleon*
    - *Rhithrogena*
  - Hemiptera
    - *Ambrysus*
    - *Graptocorixa*
  - Lepidoptera
    - *Paragyractis*
  - Odonata
    - *Argia*
    - *Coenagrion*
    - *Enallgma*
    - *Hyponcura*
    - *Ophrogomphus*
  - Plecoptera
    - *Acroneuria*
    - *Classenia*
    - *Isoplera*
    - *Nemoura*
    - *Pteronarcys*
    - *Brachyptera*
  - Trichoptera
    - *Athripsodes*
    - *Brachycentrus*
    - *Cheumatopsyche*
    - *Glossosoma*
    - *Hydropsyche*
    - *Hydroptila*
    - *Neothremma*
    - *Neotrichia*
    - *Polycentropus*
    - *Psychomia*
- Amphipoda
  - *Hyallela azteca*
- Gastropoda
  - *Ferrissia*
  - *Gyraulus*
  - *Lymnaea*
  - *Physa*
- Arachnoidea
  - *Hydrocarina*
- Oligochaeta
- Hirudinea
  - *Helobdella*
- Decapoda
  - *Pacifasticus*

APPENDIX 2-6

PESTICIDE CONCENTRATIONS
AT MILNER POOL

| PESTICIDE | | NO. OF SAMPLES | RANGE | | |
|---|---|---|---|---|---|
| | | | Low | High | |
| ALDRIN 1/ | mg/liter | 20 | .001 | .003 | |
| ALDRIN 2/ | mg/kg | 1 | | | .03 |
| BHC 1/ | mg/liter | 20 | .001 | .009 | |
| BHC 2/ | mg/kg | 1 | | | .03 |
| CHLORDANE 1/ | mg/liter | 9 | .005 | .005 | |
| CHLORDANE 2/ | mg/kg | 1 | | | .20 |
| DDD 1/ | mg/liter | 20 | .001 | .002 | |
| DDD 2/ | mg/kg | 1 | | | .03 |
| DDE 1/ | mg/liter | 20 | .001 | .002 | |
| DDE 2/ | mg/kg | 1 | | | .03 |
| DDT 1/ | mg/liter | 20 | .001 | .011 | |
| DDT 2/ | mg/kg | 1 | | | .10 |
| DIEIDRIN 1/ | mg/liter | 20 | .001 | .006 | |
| DIEIDRIN 2/ | mg/kg | 1 | | | .03 |
| ENDRID 1/ | mg/liter | 20 | .001 | .003 | |
| ENDRID 2/ | mg/kg | 1 | | | .06 |
| TOXEPHENE 1/ | mg/liter | 9 | .06 | .06 | |
| TOXEPHENE 2/ | mg/kg | 1 | | | 2.0 |
| HCHLR 1/ | mg/liter | 20 | .001 | .001 | |
| HCHLR 2/ | mg/kg | 1 | | | .03 |
| HCHLR-EP 1/ | mg/liter | 18 | .001 | .003 | |
| HCHLR-EP 2/ | mg/kg | 1 | | | .03 |
| ARO CIOR 1/ | mg/liter | 5 | .015 | .015 | |
| ARO CIOR 2/ | mg/kg | 1 | | | .50 |
| LINDANE 1/ | mg/liter | 9 | .001 | .001 | |
| LINDANE 2/ | mg/kg | 1 | | | .03 |

## APPENDIX 2-7

## WILDLIFE SPECIES IN THE ES AREA

### LIFE FORMS

| Life form number | Reproduces | Feeds |
|---|---|---|
| 1 | in water | in water |
| 2 | in water | on ground, in shrubs and/or trees |
| 3 | on ground around water, on floating or emergent vegetation | in water, on ground, in shrubs and trees |
| 4 | in cliffs, caves, rims, and/or talus | on ground or in air |
| 5 | on ground associated with shrubs or grassland | on ground |
| 6 | on ground associated with agricultural fields | on ground |
| 7 | on ground | in shrubs, trees or in air |
| 8 | in shrubs | on ground, in water or in air |
| 9 | in shrubs | in shrubs, trees, or in air |
| 10 | primarily in deciduous trees | in shrubs, trees, or in air |
| 11 | primarily in conifers | in shrubs, trees, or air |
| 12 | in trees | on ground, in shrubs, trees, air, or in water |
| 13 | excavates own hole in a tree | on ground, in water, or in air |
| 14 | in a hole made by another species or naturally occurring | on ground, in water, or in air |
| 15 | underground burrow | on or under ground |
| 16 | underground burrow | in water, on ground, or in air |
| 17 | in association with man made structures | on ground or in air |

## RELATIVE ABUNDANCE SYMBOLS

a - abundant: common species which is very numerous in suitable habitat.

c - common: certain to be seen in suitable habitat.

u - uncommon: present but not certain to be seen. May occur only locally.

o - occassional: seen only a few times during a season.

r - rare: not certain to be seen every year; may not be widely distributed.

x - accidental: seen only once or twice, out of normal range.

** - present but current abundance unknown.

## SEASONAL STATUS SYMBOLS

M - migrant

R - permanent resident

S - summer resident

W - winter resident

## CLASSIFICATION SYMBOLS

F - fur bearing animal

G - game animal

P - predatory animal

* - indicates a sensitive species

E - endangered species

BIRDS WHICH BREED IN THE AGRICULTURAL ES AREA;
THEIR RELATIVE ABUNDANCE,
SEASONAL STATUS, AND LIFE FORM(S)

| Common Name | Scientific Name | Relative Abundance and Seasonal Status | Life Form |
|---|---|---|---|
| Eared Grebe | Podiceps nigricolis | rS | 3 |
| Western Grebe | Aechmophorus occidentalis | cS | 3 |
| Pied - billed Grebe | Podilymbus podiceps | uS | 3 |
| Double-crested Cormorant | Phalacrocorax auritus | uS | 8 |
| Great Blue Heron | Ardea heroidias | cR | 12 |
| Black-crowned Night Heron | Nycticorax nycticorax | uS | 7 |
| American Bittern | Botaurus lentigiucsus | uS | 3 |
| Canada Goose | Branta canadensis | cR | 3 |
| Mallard | Anas platyrhynchos | cR | 3 |
| Gadwall | Anas strepera | uS | 3 |
| Pintail | Anas acuta | cR | 3 |
| Blue-winged Teal | Anas discors | uS | 3 |
| Cinnamon Teal | Anas cyanoptera | cS | 3 |
| American Wigeon | Anas americana | uR | 3 |
| Northern Shoveler | Anas clypeata | uS | 3 |
| Redhead | Aythya americana | uS | 3 |
| Ruddy Duck | Oxyura jamaicensis | uS | 3 |
| Turkey Vulture | Cathartes aura | uS | 4 |
| Cooper's Hawk | Accipiter cooperii | rR | 12 |
| Sharp-shinned Hawk | Accipiter striatus | oS | 12 |
| Red-tailed Hawk | Buteo jamaicensis | cR | 12,4 |
| Swainson's Hawk | Buteo swainsoni | uS | 12 |
| Ferruginous Hawk | Buteo regalis | *uR | 4,5 |
| Golden Eagle | Aquil chrysaetos | cR | 4 |
| Marsh Hawk | Circus cyaneus | cR | 5 |
| Prairie Falcon | Falco mexicanus | cR | 4 |
| American Kestrel | Falco sparverius | cR | 4,12 |
| Bobwhite Quail | Colinus virginianus | cR | 6 |
| Valley Quail | Lophortyx californicus | cR | 6 |
| Mountain Quail | Oreortyx pictus | *uR | 5 |

BIRDS WHICH BREED IN THE AGRICULTURAL ES AREA;
THEIR RELATIVE ABUNDANCE,
SEASONAL STATUS, AND LIFE FORM(S)(CONT.)

| Common Name | Scientific Name | Relative Abundance and Seasonal Status | Life Form |
|---|---|---|---|
| Chukar | Alectons chukar | cR | 5 |
| Hungarian Partridge | Perdix perdix | uR | 6 |
| Sage Grouse | Centrocercus urophasianus | uR | 5 |
| Pheasant | Phasianus colchicus | cR | 6 |
| Virginia Rail | Rallus limicola | oR | 3 |
| American Coot | Fulica americana | cR | 3 |
| Killdeer | Charadrius vociferus | cR | 3 |
| Wilson's Snipe | Capella gallinago | uS | 3 |
| Long-billed Curlew | Numenius americanus | *uS | 5 |
| Willet | Cataptrophorus semipalmatus | uS | 3 |
| Spotted Sandpiper | Actitis macularia | uS | 3 |
| American Avocet | Recurvirostra americana | cS | 3 |
| Black-necked Stilt | Himantopus mexicanus | uS | 3 |
| Wilson's Phalarope | Steganopus tricolor | uS | 3 |
| California Gull | Larus californicus | cS | 3 |
| Ring-billed Gull | Larus delawarensis | cR | 3 |
| Franklin's Gull | Laurus pipixcan | rS | 3 |
| Forester's Tern | Sterna forsteri | rS | 3 |
| Caspian Tern | Hydroprogne cuspia | oS | 3 |
| Rock Dove | Columbia livia | cR | 4 |
| Mourning Dove | Zenaida macroura | cR | 5,8 |
| Yellow-billed Cuckoo | Coccyzus americannus | xS | 9 |
| Barn Owl | Tyto alba | cR | 4,14,17 |
| Western Burrowing Owl | Speotyto cunicularia | *uR | 15 |
| Great Horned Owl | Bubo virginianus | cR | 4,12 |
| Long-eared Owl | Asio otus | uR | 8,12 |
| Screech Owl | Otus asio | oR | 14 |
| Short-eared Owl | Asio flammeus | uR | 5,6 |
| Common Nighthawk | Cordeiles minor | cS | 7 |
| Poor-will | Phalaeyoptilus nuttalli | uS | 7 |
| Calliope Hummingbird | Stellula calliope | uS | 8 |

BIRDS WHICH BREED IN THE AGRICULTURAL ES AREA:
THEIR RELATIVE ABUNDANCE,
SEASONAL STATUS, AND LIFE FORM(S)(CONT.)

| Common Name | Scientific Name | Relative Abundance and Seasonal Status | Life Form |
|---|---|---|---|
| Black-chinned Hummingbird | Archilochus alexandri | uS | 8 |
| White-throated Swift | Aeronautes saxatalis | uS | 4 |
| Belted Kingfisher | Megaceryl alcyon | uS | 16 |
| Common Flicker | Colaptes auratus | cR | 13 |
| Lewis Woodpecker | Asyndesmus lewis | uR | 13 |
| Eastern Kingbird | Tyrannus tyrannus | uS | 8 |
| Western Kingbird | Tyrannus verticalis | cS | 12 |
| Willow Flycatcher | Empiodonax traillii | US | 8 |
| Dusky Flycatcher | Empidonax oberholsen | oS | 8 |
| Olive-sided Flycatcher | Nuttallornis borealis | uS | 10 |
| Says Phoebe | Sayornis saya | uS | 4 |
| Gray Flycatcher | Empidonax wrightii | uS | 8 |
| Western Wood Pewee | Contopus sordidulus | cS | 12 |
| Horned Lark | Eremphila alpestris | aR | 5 |
| Violet-green Swallow | Tuohycineta thalassina | uS | 4 |
| Bank Swallow | Riparia riparia | cS | 16 |
| Barn Swallow | Hirundo rustica | cS | 4,17 |
| Cliff Swallow | Petrochelidon pyrrohonta | cS | 4,17 |
| Rough-winged Swallow | Stelgidopteryx rufficollis | cS | 16 |
| Black-billed Magpie | Pica pica | aR | 8,12 |
| Common Crow | Corvus brachyrhynchos | uR | 12 |
| Common Raven | Corvus corax | cR | 4 |
| Black-capped Chickadee | Parus atricapillus | uR | 14 |
| Winter Wren | Troglodytes troglodytes | uR | 3 |
| Long-billed Marsh Wren | Telmatodytes palustris | cR | 3 |
| Canyon Wren | Ctaherpes mexicanus | cR | 4 |
| Rock Wren | Salpinctes obsoletus | cR | 4 |
| Sage Thrasher | Oreoscoptes montanus | cS | 8 |
| American Robin | Turdus migratorius | uR | 8 |
| Loggerhead Shrike | Lanius ludovicianus | uR | 8 |

BIRDS WHICH BREED IN THE AGRICULTURAL ES AREA;
THEIR RELATIVE ABUNDANCE,
SEASONAL STATUS, AND LIFE FORM(S)(CONT.)

| Common Name | Scientific Name | Relative Abundance and Seasonal Status | Life Form |
|---|---|---|---|
| Starling | Strunus vulgaris | aR | 14,17 |
| Warbling Vireo | Vireo gilvus | uS | 12 |
| Solitary Vireo | Vireo solitarius | oS | 12 |
| Yellow-rumpted Warbler | Dendruica coronata | cS | 12 |
| Yellow Warbler | Dendroica petechia | cS | 9 |
| Orange-crowned Warbler | Vermivora celata | oS | 7 |
| Wilson's Warbler | Wilsonia pusilla | cS | 5 |
| MacGillirays Warbler | Opornis tolniei | uS | 8 |
| Common Yellowthroat | Geothlypis trichus | uS | 3 |
| Yellow-breated Chat | Icteria virens | uS | 9 |
| House Sparrow | Passer deomesticus | aR | 14,17 |
| Bobolink | Dolichonyx oryzivorous | rS | 5 |
| Yellow-headed Blackbird | Xanthocephalus xanthocephalus | cS | 8 |
| Red-winged Blackbird | Agelaius phoeniceus | aR | 8 |
| Northern Oriole | Icterus galbula | uS | 10 |
| Brewer's Blackbird | Euphagus cyanocephalus | aR | 8 |
| Brown-headed Cowbird | Molthrus ater | uS | 8 |
| Western Meadowlark | Sturnella neglecta | aR | 5 |
| Blue Grosbeak | Guiraca caerulea | rS | 8 |
| Laxuli Bunting | Passerina amoena | cS | 8 |
| House Finch | Carpodacus mexicanus | cR | 10 |
| American Goldfish | Spinus tristis | cR | 9 |
| Rufous-sided Towhee | Pipilio erythrophthalmus | uS | 8 |
| Brewer's Sparrow | Spizella brewerii | cS | 8 |
| Vesper Sparrow | Pooecetes gramineus | cS | 5 |
| Savannah Sparrow | Passerculus sandwichensis | uS | 5 |
| Lark Sparrow | Chondestes grammacus | cS | 5 |
| Sage Sparrow | Amphispiza belli | cS | 8 |
| Song Sparrow | Melospiza melodia | cR | 8 |
| Black-throated Sparrow | Amphispiza bilineata | cS | 8 |

BIRDS WHICH DO NOT BREED IN, BUT DO OCCUR WITHIN THE ES AREA

| Common Name | Scientific Name | Relative Abundance and Seasonal Status | Habitat Preference |
|---|---|---|---|
| Common Loon | *Gavia immer* | oM | Lakes, ponds, rivers |
| Horned Grebe | *Podiceps auritus* | oM | Lakes, ponds |
| White Pelican | *Pelecanus erythrorhynchos* | uM | Lakes, ponds, marshes |
| Great Egret | *Casmerodius albus* | oM | Marshes, irrigated lands, ponds |
| Snowy Egret | *Leucophoyx thula* | uM | Marshes, irrigated lands, ponds |
| White-faced Ibis | *Plegadis chihi* | rM* | Marshes |
| Whistling Swan | *Olor columbianus* | uM | Water, marshes, irrigated lands |
| Trumpeter Swan | *Olor buccinator* | xM* | River |
| White-fronted Goose | *Answer albifrons* | rM | Lakes, streams, marshes |
| Snow Goose | *Chen caerulescens* | oM | Lakes, rivers |
| Ross Goose | *Chen rossii* | rM | Lakes, rivers |
| Green-winged Teal | *Anus carolinensis* | cW | Marshes, lakes, ponds, rivers |
| Wood Duck | *Aix sponsa* | oM | |
| Ring-necked Duck | *Aythya collaris* | uM | Marshes, ponds, rivers |
| Canvasback | *Aythya valisineria* | uW | Marshes, lakes, rivers |
| Lesser Scump | *Aythya affinis* | uM | Marshes, ponds, lakes |

BIRDS WHICH DO NOT BREED IN, BUT DO OCCUR WITHIN THE ES AREA (CONT.)

| Common Name | Scientific Name | Relative Abundance and Seasonal Status | Habitat Preference |
|---|---|---|---|
| Common Goldeneye | *Bucephala clangula* | uW | Lakes, rivers |
| Barrows Goldeneye | *Bucephala islandica* | rM | Lakes, ponds, rivers |
| Bufflehead | *Bucephala albeola* | uW | Lakes, ponds, rivers |
| Hooded Merganser | *Lophodytes cucullatus* | oW | Lakes, ponds, rivers |
| Common Merganser | *Mergus merganser* | cW | Lakes, ponds, rivers |
| Red-breasted Merganser | *Mergus serrator* | rM | Lakes, ponds |
| Goshawk | *Accipter gentilis* | oW | Riparian |
| Rough-legged Hawk | *Buteo lagopus* | cW | Shrub/grassland, grassland |
| Bald Eagle | *Haliaeetus leucocephalus* | EuW | Lakes, rivers, shrub/grassland |
| Osprey | *Tandion haliaetus* | uM* | Rivers, lakes, riparian |
| Merlin | *Falco columbarius* | oW* | Riparian, shrub/grassland, grassland |
| Sandhill Crane | *Grus canadensis* | uW | Grassland, agricultural fields, marshes |
| Sora | *Porzana carolina* | uM | Marshes |
| Semipalmated Plover | *Charadrius semipalmatus* | rM | Marshes |
| Black-bellied Plover | *Squatorola squatarola* | rM | Marshes |
| Solitary Sandpiper | *Tringa solitaria* | oM | Marshes, ponds |

BIRDS WHICH DO NOT BREED IN, BUT DO OCCUR WITHIN THE ES AREA (CONT.)

| Common Name | Scientific Name | Relative Abundance and Seasonal Status | Habitat Preference |
|---|---|---|---|
| Greater Yellowlegs | Totanus melanoleucus | cM | Marshes, streams, ponds |
| Lesser Yellowlegs | Totanus flavipes | uM | Marshes, ponds |
| Pectoral Sandpiper | Erolia melanotos | rM | Marshes |
| Baird's Sandpiper | Erolia bairdii | oM | Marshes, ponds |
| Least Sandpiper | Erolia minutilla | oM | Marshes, ponds |
| Long-billed Dowitcher | Limnodromus scolopaceus | uM | Marshes, ponds |
| Semipalmated Sandpiper | Ereunetes pusillus | oM | Marshes, ponds |
| Western Sandpiper | Ereunetes mauri | cM | Marshes, ponds |
| Marbled Godwit | Limosa Fedoa | uM | Marshes, ponds |
| Northern Phalarope | Lobipes lobatus | rM | Lakes, ponds, marshes |
| Black Tern | Chlidonias niger | rM | Marshes, ponds, lakes |
| Snowy Owl | Nyctea scandiaca | rW | Grassland, shrub/grassland |
| Rufous Hummingbird | Selasphorus rufus | cM | Riparian, shrub/grass |
| Vaux's Swift | Chaetura vauxi | oM | Open sky, cliffs |
| Hairy Woodpecker | Dendrocopos villosus | uW | Riparian |
| Downy Woodpecker | Dendrocopos pubescens | uW | Riparian |

BIRDS WHICH DO NOT BREED IN, BUT DO OCCUR WITHIN THE ES AREA (CONT.)

| Common Name | Scientific Name | Relative Abundance and Seasonal Status | Habitat Preference |
|---|---|---|---|
| Black Phoebe | Sayornis nigricans | xM | Canyons, farmlands, riparian |
| Tree Swallow | Iridoprocne bicolor | uM | Riparian, marshes |
| Bushtit | Psaltriparus minimus | oW | Shrub/grassland, riparian |
| House Wren | Troglodytes aedon | oM | Riparian, shrub/grassland |
| Townsends Solitaire | Myadestes townsendi | oW | Canyons, shrub/grassland |
| Western Bluebird | Sialia mexicana | uM | Shrub/grassland, riparian |
| Mountain Bluebird | Sialia currucoides | uM | Shrub/grassland |
| Golden-crowned kinglet | Regulus calendula | uW | Riparian |
| Ruby-crowned kinglet | Regulus calendula | uM | Shrub/grass, riparian |
| Water Pipit | Anthus spinoletta | oM | Agricultural fields |
| Bohemian Waxwing | Bombycilla garrula | uW | Riparian, shrub/grassland |
| Cedar Waxwing | Bombycilla cedrorum | uW | Riparian, shrub/grassland |
| Northern Shrike | Lanius excubitor | oW | Shrub/grass, riparian |
| Black and White Warbler | Mniotilta varia | rM | Riparian |
| Townsend's Warbler | Dendroica townsendi | rM | Riparian |
| Nashville Warbler | Vermivora ruficapilla | uM | Riparian |

BIRDS WHICH DO NOT BREED IN, BUT DO OCCUR WITHIN THE ES AREA (CONT.)

| Common Name | Scientific Name | Relative Abundance and Seasonal Status | Habitat Performance |
|---|---|---|---|
| Tricolored Blackbird | Agelaius tricolor | rM | Marshes, agricultural land |
| Western Tanager | Piranga ludoviciana | uM | Riparian |
| Black-headed Grosbeak | Pheucticus melanocephalus | uM | Riparian, shrub/grassland |
| Evening Grosbeak | Hesperiphona melanocephalus | uW | Riparian |
| Snow Bunting | Plectrophenax nevalis | xW | Grassland |
| Pine Siskin | Spinus pinus | cW | Riparian, shrub/grassland |
| Gray-crowned Rosy Finch | Leucosticte tephrocotis | rW | Shrub/grassland |
| Common Redpoll | Acanthis flammea | oW | Shrub/grassland |
| Lapland Longspur | Calcarius lapponicus | rW | Grassland, agricultural fields |
| Dark Eyed Junco | Junco hyemalis | cW | Riparian |
| Harris Sparrow | Zonotrichia querula | rW | Shrub/grassland |
| White-crowned Sparrow | Zonotrichia leucophrys | cW | Shrub/grassland |
| White-throated Sparrow | Zonotrichia albicollis | rW | Shrub/grassland |
| Tree Sparrow | Spizella arborea | oW | Shrub/grassland |

MAMMALS WHICH OCCUR IN THE ES AREA;
THEIR CLASSIFICATION,
RELATIVE ABUNDANCE AND LIFE FORM(S)

| Common Name | Scientific Name | Classification | Relative Abundance | Life Form |
|---|---|---|---|---|
| Merriam Shrew | Sorex marriami | | ** | 16 |
| Vagrant Shrew | Sorex vagrans | | ** | 16 |
| Little Brown Bat | Myotis lucifugus | | ** | 4,17 |
| Fringed Bat | Myotis thysanodes | | ** | 4,17 |
| California Bat | Myotis californicus | | ** | 4,17 |
| Yuma Bat | Myotis yumanensis | | ** | 4,17 |
| Long-legged Bat | Myotis volans | | ** | 4,17 |
| Western Pipistrel | Pipistrellus hesperus | | ** | 4,17 |
| Spotted Bat | Euderma maculatum | * | ** | 4,17 |
| Western Big-eared Bat | Plecotus townsendi | | ** | 4,17 |
| Pallid Bat | Antrozous pallidus | | ** | 4,17 |
| Raccoon | Procyon lotor | F | c | 14 |
| Longtail Weasel | Mustela frenata | P | c | 15 |
| Shorttail Weasel | Mustela erminea | P | u | 15 |
| Mink | Mustela vison | F | u | 16 |
| Badger | Taxideu taxus | | c | 15 |
| Striped Skunk | Mephitis mephitis | P | c | 15 |
| Spotted Skunk | Spilogale putorius | P | u | 4 |
| River Otter | Lutra canadensis | *F | c | 16 |
| Red Fox | Vulpes vulpes | F | ** | 15 |
| Coyote | Canis latrans | P | a | 15 |
| Bobcat | Lynx rufus | *F | c | 4 |
| Yellowbelly Marmot | Marmota flaviventris | | c | 4 |
| Whitetail Antelope Squirrel | Ammospermophilus leucurus | | c | 15 |
| Townsend Ground Squirrel | Spermophilus townsendi | | u | 15 |
| Belding Ground Squirrel | Spermophilus beldingi | | u | 15 |
| Least Chipmunk | Eutamias minimus | | c | |

MAMMALS WHICH OCCUR IN THE ES AREA:
THEIR CLASSIFICATION,
RELATIVE ABUNDANCE AND LIFE FORM(S)(CONT.)

| Common Name | Scientific Name | Classification | Relative Abundance | Life Form |
|---|---|---|---|---|
| Townsend Pocket Gopher | Thomomys townsendi | | ** | 15 |
| Northern Pocket Gopher | Thomomys talpoides | | c | 15 |
| Great Basin Pocket Mouse | Perognathusparvus | | c | 15 |
| Ord Kangaroo Rat | Dipodomys ordi | | c | 15 |
| Great Basin Kangaroo Rat | Dipodomus microps | | ** | 15 |
| Beaver | Custor canadensis | F | u | 2,16 |
| Western Harvest Mouse | Reithrodontomys megalotis | | c | 15 |
| Deer Mouse | Peromyscus maniculatus | | c | 15 |
| Canyon Mouse | Peromyscus crinitus | | ** | 4 |
| Northern Grasshopper Mouse | Onychomys leucoyaster | | u | 15 |
| Bushytail Woodrat | Neotoma cinerea | | c | 4 |
| Desert Woodrat | Neotoma lepida | | ** | 4 |
| Sagebrush Vole | Lagurus curtatus | | u | 15 |
| Mountain Vole | Microtus montanus | | c | 15 |
| Longtail Vole | Microtus longicandus | | ** | 15 |
| Muskrat | Ondatra zibethicus | F | c | 16 |
| Norway Rat | Rattus norvegicus | | c | 17 |
| House Mouse | Mus musculus | | c | 17 |
| Western Jumping Mouse | Zapus rpinceps | | ** | 15 |
| Porcupine | Erethizon dorsatum | | c | 14 |
| Blacktail Jackrabbit | Lepus californicus | | a | 5 |
| Whitetail Jackrabbit | Lepus townsendi | | u | 5 |
| Mountain Cottontail | Sylvilagus nuttalli | G | c | 4,5 |
| Pygmy Rabbit | Sylvilagus idahoensis | G | r | 5 |
| Mule Deer | Odocoileus hemionus | G | u | 5 |
| Pronghorn Antelope | Antilocapra americana | G | u | 5 |

REPTILES WHICH OCCUR IN THE ES AREA;
THEIR RELATIVE ABUNDANCE AND LIFE FORM

| Common Name | Scientific Name | Relative Abundance | Life Form |
|---|---|---|---|
| Leopard Lizard | Crotaphytus wislizenii | c | 5 |
| Collard Lizard | Crotaphytus collaris | u | 4 |
| Side-blotched Lizard | Uta stanshuriana | a | 5 |
| Desert Horned Lizard | Phynosoma platyruines | c | 5 |
| Western Whiptail | Cnemidophorus tigris | a | 5 |
| Western Fence Lizard | Sceloporus occidentalis | c | 4 |
| Striped Whipsnake | Masticophis taeniatus | a | 5 |
| Racer | Coluber constrictor | u | 5 |
| Gopher Snake | Pituophis meoanoleucus | a | 5 |
| Long-nosed Snake | Rhinochellus lecontei | o | 5 |
| Common Garter Snake | Thamnophi sirtalis | o | 3 |
| Western Terrestrial Garter Snake | Thamnophis elegans | u | 3 |
| Western Ground Snake | Sonora semiannulata | o | 15 |
| Night Snake | Hypsiglena torquata | c | 5 |
| Western Rattlesnake | Crotalus viridis | a | 5 |

AMPHIBIANS WHICH OCCUR IN THE ES AREA;
THEIR RELATIVE ABUNDANCE AND LIFE FORM

| Common Name | Scientific Name | Relative Abundance | Life Form |
|---|---|---|---|
| Great Basin Spadefoot Toad | Scaphiopus intermontanus | a | 2 |
| Western Toad | Bufo boreas | x | 2 |
| Woodhouse's Toad | Bufo woodhousei | a | 2 |
| Chorus Frog | Pseudacris triseriata | u | 2 |
| Pacific Treefrog | Hyla regilla | a | 2 |
| Leopard Frog | Rana pipiens | u | 2 |
| Bull Frog | Rana catesbeiana | u | 1 |
| Long-toed Salamander | Ambystoma macrodactylum | u | 2 |

APPENDIX 2-8

ABUNDANCE OF FISHES IN THE SNAKE RIVER REACH OF THE ES AREA

TABLE A

ABUNDANCE OF FISHES IN UPPER SALMON FALLS, LOWER SALMON FALLS AND BLISS RESERVOIR IN 1953-54. FROM IRVING AND CUPLIN (1956).

| GAME SPECIES | Percent by number | Number Collected |
|---|---|---|
| Mountain whitefish | 6 | 284 |
| Yellow perch | 1 | 49 |
| Rainbow Trout | 1 | 41 |
| Bluegill | /1 | 18 |
| Brown bullhead | /1 | 4 |
| Largemouth bass | /1 | 2 |
| Green sunfish | /1 | 2 |
| Redear sunfish | /1 | 1 |
| Channel catfish | /1 | 1 |
| | 8 | 402 |
| NON-GAME | | |
| Sucker | 37 | 1770 |
| Utah chub | 24 | 1124 |
| Redside shiner | 11 | 544 |
| Northern squawfish | 7 | 336 |
| Chiselmouth | 3 | 154 |
| Carp | 1 | 29 |
| Sculpin | /1 | 3 |
| Dace | /1 | 2 |
| | 92 | 4364 |

TABLE B

ABUNDANCE OF FISHES IN SECTION II OF THE SNAKE RIVER, C.J. STRIKE RESERVOIR. FROM REID (1974), WITH DATA FROM ALL SAMPLING SITES, SAMPLE DATES AND TYPES OF GEAR COMBINED.

| GAME SPECIES | PERCENT BY NUMBER | NUMBER CAPTURED |
|---|---|---|
| Largemouth Bass | 25 | 1,207 |
| Bluegill | 10 | 481 |
| Black Crappie | 4 | 206 |
| Yellow Perch | 4 | 178 |
| Bullhead | 3 | 161 |
| Pumpkinseed | 3 | 139 |
| Channel Catfish | 2 | 87 |
| Warmouth | 1 | 39 |
| Mountain Whitefish | 1 | 30 |
| Rainbow Trout | <1 | 14 |
| Smallmouth Bass | <1 | 5 |
| | 52 | 2,547 |
| NON-GAME | | |
| Suckers (2 Species) | 20 | 963 |
| Carp | 15 | 748 |
| Northern Squawfish | 6 | 292 |
| Chiselmouth | 4 | 214 |
| Sculpin | 3 | 128 |
| Redside Shiner | <1 | 16 |
| Peamouth | <1 | 12 |
| Dace | <1 | 5 |
| | 48 | 2,378 |

*Data from all sampling sites, sample dates and types of gear combined.

## TABLE C

ABUNDANCE OF FISHES IN SECTION III OF THE SNAKE RIVER FROM C.J. STRIKE DAME DOWNSTREAM TO THE SWAN FALLS RESERVOIR FLOW LINE. FROM GOODNIGHT AND BOWLER (1973).

| GAME SPECIES | Percent by number | Number captured |
|---|---|---|
| Mountain whitefish | 25 | 54 |
| Bluegill | 3 | 45 |
| Black crappie | 3 | 44 |
| Largemouth bass | 1 | NG |
| Rainbow trout | 1 | NG |
| Yellow perch | 1 | NG |
| Pumpkinseed | 1 | NG |
| Black bullhead | 1 | NG |
| | 11.3% | 161 |
| NON-GAME | | |
| Carp | 41 | 585 |
| Suckers | 40 | 571 |
| Northern squawfish | 6 | 65 |
| Sculpin | 1 | NG |
| Chiselmouth | 1 | NG |
| Peamouth | 1 | NG |
| | 88.7% | 1264 |

NG - not given in report

## TABLE D

ABUNDANCE OF FISHES IN SECTION IV OF THE SNAKE RIVER, SWAN FALLS RESERVOIR. FROM SIGLER (1972) AND GOODNIGHT AND BOWLER (1973).

| GAME SPECIES | Sigler | | Goodnight & Bowler | |
|---|---|---|---|---|
| | Percent by Number | Number collected | Percent by number | Number collected |
| Black crappie | 1 | 6 | 5 | 84 |
| Mountain whitefish | 1 | 3 | 1 | 14 |
| Smallmouth bass | 1 | 1 | | 0 |
| Yellow perch | 1 | 2 | | 0 |
| Channel catfish | 1 | 1 | | 0 |
| Largemouth bass | 1 | 1 | | 0 |
| | 2 | 14 | 5.5 | 98 |
| NON-GAME | | | | |
| Suckers | 45 | 305 | 36 | 647 |
| Carp | 34 | 231 | 21 | 384 |
| Northern squawfish | 16 | 109 | 32 | 551 |
| Chiselmouth | | 0 | 3 | 61 |
| Peamouth | 3 | 19 | | 0 |
| Sculpin | 1 | 1 | 2 | 25 |
| Redseid shiner | | 0 | 1 | 18 |
| | 98 | 665 | 94.5 | 1686 |

## TABLE E

ABUNDANCE OF FISHES IN SECTION V OF THE SNAKE RIVER, FROM SWANS FALLS DAM DOWNSTREAM TO CLARK'S ISLAND. FROM SIGLER (1972), GOODNIGHT AND BOWLER (1973) AND GIBSON (1974).

| | Sigler | | Goodnight & Bowler | | Gibson | |
|---|---|---|---|---|---|---|
| GAME SPECIES | Percent by number | Number collected | Percent by number | Number collected | Percent by number | Number collected |
| Channel catfish | 12 | 141 | 6 | 83 | 5 | 199 |
| Black crappie | 3 | 37 | 4 | 58 | 4 | 152 |
| Smallmouth bass | 6 | 74 | 3 | 43 | 13 | 568 |
| Mountain whitefish | 3 | 35 | 3 | 46 | 2 | 79 |
| Pumpkinseed | | 0 | | 0 | /1 | 5 |
| Redear sunfish | | 7 | | 0 | | 0 |
| Bluegill | 1 | 17 | | | 4 | 152 |
| Black bullhead | /1 | 3 | 2 | 19 | | 0 |
| Largemouth bass | /1 | 3 | | | 2 | 80[1] |
| Rainbow trout | /1 | 1 | | | | 0 |
| | 26.5 | 318 | 18 | 249 | 29 | 1230 |
| NON-GAME SPECIES | | | | | | |
| Carp | 22 | 267 | 24 | 329 | 38 | 1636 |
| Largescale sucker | 28 | 341 | 38 | 535 | 25 | |
| Bridgelip sucker | 7 | 89 | | | | |
| Northern squawfish | 12 | 142 | 14 | 191 | 1 | 1048 |
| Peamouth | 1 | 6 | | 0 | /1 | 1 |
| Chiselmouth | 3 | 31 | 6 | 88 | 6 | 257 |
| Sculpin | /1 | 3 | /1 | 7 | | 0 |
| Redside shiner | | 0 | | | 1 | 38 |
| Tadpole madtom | /1 | 1 | | 0 | | 0 |
| | 73.5 | 880 | 82 | 1150 | 71 | 3018 |

1 - Probably most were collected downstream out of Section V.

APPENDIX 2-9

LABOR FORCE AND EMPLOYMENT DEFINITIONS[1]

Employment comprises wage and salary workers (including domestics and other private household workers), self-employed persons, and unpaid family workers who worked 15 hours or more during the survey week in family-operated enterprises. Employment in both agricultural and non-agricultural industries is included. Also included are persons temporarily absent from work because of illness, bad weather, vacation, labor management dispute, or because they were taking time off for various reasons, even if they were not paid by their employers for the time off. Employed persons holding more than one job are counted only once. Commuters are shown at their place of residence and not at their place of work.

Unemployment comprises all persons who did not work during the survey week, who made specific efforts to find a job, and who were available for work during the survey week. Also included as unemployed are those who were waiting to be called back to a job from which they had been laid off.

The Civilian Labor Force comprises the total of all civilians classified as employed or unemployed in accordance with the criteria described above.

Seasonal Adjustment refers to the correction of an economic time series for regularly recurring seasonal movement which can be estimated on the basis of past experience. By eliminating that part of the change which can be ascribed to usual seasonal variation, it is possible to observe the cyclical and other non-seasonal movements in the series. However, in evaluating deviations from the seasonal pattern--that is, changes in a seasonally adjusted series--it is important to note that seasonal adjustments is merely an approximation based on past experience. Seasonally adjusted estimates have a broader margin of possible error than the original data on which they are based, since they are subject not only to sampling and other errors but, in addition, are affected by the uncertainties of the seasonal adjustment process itself.

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[1] Idaho State Department of Employment, 1977. The Labor Force in Idaho. Boise, Idaho. p. 3.

# APPENDIX 2-10

## IDAHO POWER COMPANY HYDROELECTRIC FACILITIES

| PLANT | NAMEPLATE RATING KW | YEAR COMPLETED (LAST UNIT INSTALLED) | TOTAL COST $1,000,000 | COST $/KW |
|---|---|---|---|---|
| American Falls* | 92,340 | 1978 | 3.3 | 122 |
| Twin Falls | 13,000 | 1935 | .99 | 74 |
| Clear Lakes | 2,500 | 1937 | .318 | 127 |
| Shoshone Falls | 12,380 | 1921 | 1.68 | 134 |
| Thousand Springs | 8,800 | 1912 | 1.16 | 132 |
| Upper Salmon (A&B) | 34,500 | 1947 | 5.85 | 170 |
| Lower Salmon | 60,000 | | | |
| Malad (upper & lower) | 20,700 | 1948 | 4.84 | 234 |
| Bliss | 75,000 | 1950 | 11.5 | 153 |
| C.J. Strike | 82,800 | 1952 | 17.87 | 216 |
| Swan Falls | 10,265 | 1918 | 1.66 | 162 |
| Brownlee** | 360,400 | 1959 | 68.19 | 191 |
| Oxbow | 190,000 | 1961 | 46.7 | 246 |
| Hells Canyon | 301,500 | 1976 | 65.8 | 168 |
| Cascade | 300 | 1926 | .072 | 241 |
| SUB TOTAL | 1,354,485 | | | |

## IDAHO POWER COMPANY THERMAL GENERATING PLANTS

| PLANT | NAMEPLATE RATING KW | YEAR COMPLETED (LAST UNIT INSTALLED) | TOTAL COST $1,000,000 | COST $/KW |
|---|---|---|---|---|
| Jim Bridger (Steam) Coal Fired | 508,558 | 1971 | 171.1 | 338 |
| Salmon Internal Combustion (Diesel) | 6,825 | 1930 | .79 | 116 |
| Wood River Combustion Turbine (Natural Gas or Diesel) | 50,000 | 1974 | 5.41 | 113 |
| SUB TOTAL | 565,383 | | | |
| TOTAL | 1,919,868 | | | |

* American Falls Plant upgraded from 26,500 KW to 92,340 to be completed in 1978.
** 225,000 KW peaking facility under construction (not included)

SOURCE: IPC, FPC form 12 for 1977

# APPENDIX 2-11

IDAHO POWER COMPANY SALES OF ELECTRICITY BY RATE SCHEDULES

1977

| RATE SCHEDULE NUMBER AND DESCRIPTION | KWH SOLD | REVENUE ($) | AVERAGE NUMBER OF CUSTOMERS | KWH OF SALES PER CUSTOMER | REVENUE PER KWH SOLD |
|---|---|---|---|---|---|
| RESIDENTIAL SALES: | | | | | |
| Total - 3 schedules (1) | 2,570,192,180 | $ 53,162,181 | 185,091 | 13,886 | 20.7 |
| COMMERCIAL-INDUSTRIAL: | | | | | |
| 11 General Service (small commercial) | 74,899,500 | 3,301,784 | 13,583 | 5,514 | 44.1 |
| 12 General Service (small commercial) | 1,000,128,000 | 22,513,060 | 10,453 | 95,679 | 22.5 |
| 19 Uniform Electric Rate contracts (large commercial) | 928,555,760 | 11,617,094 | 85 | 10,924,185 | 12.5 |
| 24 Irrigation | 1,661,064,420 | 26,546,295 | 10,136 | 163,878 | 16.0 |
| 27 Commercial (all electric) | 209,599,050 | 4,304,783 | 1,531 | 136,903 | 20.5 |
| Special Contracts | 1,793,699,830 | 14,848,502 | 5 | 358,739,966 | 8.3 |
| All other Commercial (2) | 123,612,760 | 2,666,133 | 1,496 | 82,629 | 22.0 |
| Total Commercial-Industrial | 5,791,559,320 | 85,797,651 | 37,289 | 155,315 | 14.8 |
| PUBLIC STREET & HIGHWAY LIGHTING: | | | | | |
| Total - 5 schedules (3) | 22,723,320 | 1,021,485 | 187 | 121,515 | 45.0 |
| SALES FOR RESALE: | | | | | |
| Sales, other utilities | 832,286,836 | 9,694,011 | 6 | 138,731,139 | 11.6 |
| Total | 9,216,781,656 | 149,675,328 | 222,573 | 41,411 | 1.6 |

(1) Schedule 1, 15 and 45
(2) Schedules 13, 14, 15, 25, 33, 34, 46.
(3) Schedules 11, 12, 41, 42, 43.
SOURCE: IPC, FPC Form 1 for 1977

APPENDIX 2-12

# IDAHO POPULATION AND EMPLOYMENT FORECAST METHODOLOGY[1]

## The Demographic Submodel

The Idaho Population and Employment Forecast (IPEF) demographic submodel produces forecasts of household and group quarters population at five-year intervals for each age, race, and sex group. Estimates of labor force and school enrollment for five grade categories are also made. In addition, numerical and percent population changes by age-sex groups are calculated as well as population age-sex pyramids if desired. The model centers around the Cohort-Survival technique and includes the ability to generate employment-related migration internally as well as allowing for exogenous migration. In addition, certain populations having unique characteristics can be forecast exogenously and entered into subsequent calculations.

## Cohort-Survival Method

The demographic submodel is based on the Cohort-Survival method. This fore-casting technique recognizes three major components of population change: (1) decreases in population due to deaths, (2) increases in population resulting from births, and (3) increases and decreases resulting from in-and-out-migration.

## Migration

Employment-related migration is calculated by the model and is determined through a mechanism which balances available workers based on population with available jobs as forecast by the employment submodel. The process uses age-specific labor force participation rates (i.e., the proportion of population in an age-race-sex group that is working or seeking work), and the unemployment rate. The net migration necessary to balance labor force and employment is determined through successive iterations of the model.

## Inputs to the Demographic Submodel

An overview of the data requirements of the demographic submodel provides an indication of the magnitude of the task.

Base year resident population by age, sex and race (if desired) are required. For the calculation of employment-related migration, it is necessary to specify the percent distribution of employment-related migrants by age, race (if desired), and sex. A method of determining this distribution is the "forward survival" technique which involves surviving the resident population for each group over a ten-year period between two censuses and determining the differences between the survivors and the number of people enumerated in the later census. To account for migrants in the younger age groups, births during the ten-year period between censuses can be compared to the population aged 0 to 10 enumerated in a later census.

Certain forecast data must be prepared for each forecast interval. These include forecasts of retirement migration by age, sex, and race (if desired). In addition, a number of age-race-sex specific ratios must be forecast and supplied to the model as input. These include:

1) Survival rates; 2) Fertility rates; 3) Labor force participation rates; 4) School participation rates for nursery, kindergarten, elementary, high school, and college; 5) Group quarters rate (college dormitories and other group quarters); and 6) Household headship rates.

## The Employment Submodel

The IPEF employment submodel uses an econometric approach to produce forecasts for up to 100 industry categories at five-year intervals. The model centers around the concept of the economic base, considering certain activities as basic or growth producing and other activities as nonbasic or dependent. The basic sector includes those activities that export their output outside the boundaries of the local economy and hence create a dollar inflow for the local area. The nonbasis or dependent activities, on the other hand, are essentially those that are oriented toward serving the local area.

Employment forecasts for basic activities are generated using historical growth patterns as determined by regression analysis and the expected growth of external markets as reflected in national rates of growth for each of the basic activities. Basic employment supplies the input necessary to forecast non-basic employment. The forecasts for the sectors of the employment submodel are summed and total employment is compared to labor force available within the demographic submodel. If total employment from the employment submodel and total labor force (from the demographic submodel) are not in balance, migration occurs within the demographic submodel and employment in all sectors are recalculated. This process continues until total employment and population converge.

The Series 2 projections are based on an extended employment data base. Instead of the original six years (1967 t0 1972) of Bureau of Economic Analysis data, the model's data base consists of 16 years of data (1961 to 1976) provided by the Idaho Department of Employment.

## Model Flexibility

While the model is capable of producing forecasts on a county basis in response to varying assumptions and data bases, it is also capable of analysis on a regional or state basis. Data bases for regions within the state and for the state can be constructed and used to make projections based upon assumptions and data relevant to the particular region or demographic study. Individuals interested in utilizing this capability should contact the Department of Water Resources.

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[1]Meale, Robin and Jack Weeks. 1978. Population and Employment Forecast-State of Idaho Series 2-Projections 1975-2000. Department of Water Resources and Boise State University Center for Research, Grants and Contracts, Boise, Idaho.

## APPENDIX 3-1

## THE DYRAM MODEL

DYRAM, the model used in determining secondary impacts uses industry earnings in combination with a 20-sector industry expected transaction matrix, compiled from the national input-output table, in order to estimate net exports or imports by industry for the economy of a given area. Multipliers for each industry are computed; they refer to impacts on personal income, not business income. The reader is directed to The Annals of Regional Science, November 1975, pp. 44-50, for a detailed mathematical explanation of the model.

APPENDIX 3-2

FARM BUDGETS

The percentage of each crop in production was estimated as follows:

| | |
|---|---|
| Potatoes | 22% |
| Wheat | 17% |
| Barley | 17% |
| Alafalfa | 6% |
| Beans | 21% |
| Sugar Beets | 17% |
| Total | 100% |

It should be noted that the percentage of production in potatoes most probably represents a "short run" (10-15 years) situation. Under this situation, the farmer is trying to maximize his earnings by extensive potato production. The long run averages (27 years) show that potatoes represent 10 percent of plantings.

The three sets of prices represent 1976 and 1977 normalized prices and 1977 actual prices. Normalized prices are developed by the Water Resources Council and are used in all federal water projects. They are five year weighted averages. For instance, 1976 Normalized crop prices would be the average of the 5 years of weighted crop prices from 1972 through 1976. The 1977 actual data is from the Idaho Statistical Crop Reporting Service, USDA, and represents a weighted average of 12 months. The 28 year average is also from the Statistical Crop Reporting Service and is presented for comparison only (Table 1).

The energy section identifies four possible power rates for irrigation purposes. The first assumes reliance on impacts of power from British Columbia. This mill rate would be 16.5 mills/KWH. The second rate assumes Idaho Power Company (IPC) would participate in new power plants in other states (i.e., Boardman, Oregon Coal Fired thermal plant) in order to meet their demands. This rate would be 17.7 mills/KWH. The third rate assumes that Idaho Power would build their own power plants and sell off-peak power on the IPC system. This rate would be 20.0 mills/KWH. The fourth rate also assumes that IPC would build their own power plants but that off-peak power would be sold as surplus. This rate would be 21.0 mills per KWH. For a more detailed description of these four rate possibilities please refer to the energy section.

The annual pumping system cost reflects a water project designed to irrigate 5,000 acres and costing $5,000,000. It is assumed that farmers will form an irrrigation project and receive low interest money from the Bureau of Reclamation. Ninety two dollars and forty three cents per acre represents the amortization payments on the pumping system and pipeline, and includes interest.

Pumping costs were determined by using an average lift of 650 feet and an average distance from the river of 6 to 8 miles. Total dynamic head was calculated at 3,757 kilowatt hours per acre. The 3,757 KWH was miltiplied by the four different mill rates to obtain pumping costs under each energy scenario (Table 2).

Tables 3 through 8 show the production costs per acre for the various crops. These tables do not include energy or pumping system costs.

Table 9 shows the costs and revenues of 320 acre farm assuming 1976 Normalized crop prices, 18.8 mills/KWH, and $92.43/acre in pumping system costs. The other budgets can be obtained by substituting the various crop prices and energy costs as appropriate.

TABLE 1
CROP PRICES, REVENUE
320 ACRE FARM (310 ACRES ACTUALLY FARMED)

| Crop | 1976 Normalized Crop Prices | Total Revenue | 1977 Normalized Crop Prices | Total Revenue | 1977 Actual Crop Prices | Total Revenue | 28-Year Average Crop Prices |
|---|---|---|---|---|---|---|---|
| Potatoes | $ 3.76 | $74,617.20 | $ 3.52 | $69,854.40 | $ 2.70 | $53,581.50 | $ 3.55 |
| Wheat | 3.65 | 14,685.00 | 2.64 | 10,890.00 | 2.55 | 10,518.75 | 3.47 |
| Barley | 2.57 | 10,601.25 | 1.97 | 28,520.00 | 1.90 | 7,847.50 | 2.11 |
| Alfalfa | 45.87 | 3,093.93 | 50.10 | 3,379.25 | 50.46 | 3,403.53 | 44.07 |
| Beans | 18.55 | 23,651.25 | 17.26 | 22,006.50 | 20.50 | 26,137.50 | 15.37 |
| Sugar Beats | 31.84 | 31,840.00 | 28.52 | 28,520.00 | 22.14 | 22,140.00 | 26.82 |
| TOTAL | - | $158,488.63 | - | $141,126.40 | - | $123,618,78 | - |

TABLE 2

| Mill Rate | Average Lift | Distance | Energy Costs KWH/Acre | Energy Costs Cost/Acre | Cost/Farm |
|---|---|---|---|---|---|
| 16.5 | 650 feet | 6-8 miles | 3757 | $61.99 | $19,217.06 |
| 17.7 | 650 feet | 6-8 miles | 3757 | 66.50 | 20,614.66 |
| 18.8 | 650 feet | 6-8 miles | 3757 | 70.63 | 21,895.80 |
| 20.0 | 650 feet | 6-8 miles | 3757 | 75.14 | 23,293.40 |
| 21.0 | 650 feet | 6-8 miles | 3757 | 78.90 | 24,458.07 |

TABLE 3

PRODUCTION COSTS

IN OWYHEE COUNTY FOR WHEAT

| Operation | Times Over | Custom Cost per Acre | Total Cost per Acre |
|---|---|---|---|
| Plowing | 1 | $ 8.38 | $ 8.38 |
| Disking | 1 | 3.21 | 3.21 |
| Harrowing | 2 | 1.67 | 3.34 |
| Planting | 1 | 3.20 | 3.20 |
| Seed 3/6/ | 80 lbs. | 0.12 | 9.60 |
| Fertilizing, Dry, Broadcast | 2 | 2.60 | 5.20 |
| Fertilizer | | 0.00 | 0.00 |
| N | 80 lbs. | 0.30 | 24.00 |
| Spraying 14/ | 2 | 2.71 | 5.42 |
| Chemicals 11/7/ | | 0.00 | 0.00 |
| 2,4-D | 2 pts. | 1.02 | 2.04 |
| 2,4-D | 6 pts. | 1.02 | 6.10 |
| Harvesting | .23/bu | 17.94 | 17.94 |
| Hauling | .05/bu | 3.90 | 3.90 |
| Storage 15/ | .02/bu | 0.00 | 0.00 |
| | For 6 mos. | 9.36 | 9.36 |
| SUBTOTAL COSTS | | | $101.69 |
| Interest at 8 percent for six months | | | 4.07 |
| SUBTOTAL PRODUCTION COSTS | | | $105.76 |

SOURCE: Idaho Department of Water Resources

TABLE 4

PRODUCTION COSTS

IN OWYHEE COUNTY FOR BARLEY

| Operation | Times Over | Custom Cost per Acre | Total Cost per Acre |
|---|---|---|---|
| Plowing | 1 | $ 8.38 | $ 8.38 |
| Disking | 2 | 3.21 | 6.42 |
| Harrowing | 2 | 1.67 | 3.34 |
| Planting | 1 | 3.20 | 3.20 |
| Seed 3/6/1 | 1.5 bu | 5.95 | 8.90 |
| Fertilizing, Dry, Broadcast | 2 | 2.60 | 5.20 |
| Fertilizer 1/ | | 0.00 | 0.00 |
| N | 80 lbs. | 0.30 | 24.00 |
| Spraying 14/ | 2 | 2.71 | 5.42 |
| Chemicals 11/7 | | 0.00 | 0.00 |
| 2,4-D | 2 pts. | 1.02 | 2.04 |
| 2,4-D | 6 pts. | 1.02 | 6.10 |
| Combine 17/ | .2 bu | 18.00 | 18.00 |
| Hauling | .05 bu | 4.50 | 4.50 |
| Storage 15/ | .015 bu | 0.00 | 0.00 |
| | For 6 mos. | 8.10 | 8.10 |
| SUBTOTAL COST | | | $103.60 |
| Interest at 8percent for six months | | | 4.14 |
| SUBTOTAL PRODUCTION COSTS | | | $107.74 |

SOURCE: Idaho Department of Water Resources

TABLE 5

PRODUCTION COSTS

IN OWYHEE COUNTY FOR ALFALFA

| Operation | Times Over | Custom Cost per Acre | Total Cost per Acre |
|---|---|---|---|
| Establishment (4 years) | 1 | $ 8.47 | $ 8.47 |
| Fertilizing, Dry, Broadcast | 1 | 2.60 | 2.60 |
| Fertilizer 1/ | | 0.00 | 0.00 |
| 0205 | 80 lbs. | 0.25 | 20.00 |
| Spraying 14/ | 2 | 2.71 | 5.42 |
| Chemicals 8/7/ | | 0.00 | 0.00 |
| 2 4-D | 2 pts. | 1.02 | 2.04 |
| Swathing | 3 | 5.10 | 15.30 |
| Baling (3 times) | 5.57/ton | 30.64 | 30.64 |
| Hauling & Stacking (3 times) | 3.88/ton | 21.34 | 21.34 |
| SUBTOTAL COSTS | | | $105.81 |
| Interest at 8 percent for 6 months | | | 4.23 |
| SUBTOTAL PRODUCTION COSTS | | | $110.04 |

SOURCE: Idaho Department of Water Resources

TABLE 6

PRODUCTION COSTS

IN OWYHEE COUNTY FOR BEANS

| Operation | Times Over | Custom Cost per Acre | Total Cost per Acre |
|---|---|---|---|
| Plowing | 1 | $ 8.38 | $ 8.38 |
| Disking | 1 | 3.21 | 3.21 |
| Harrowing | 2 | 1.67 | 3.34 |
| Planting 18/ | 1 | 4.38 | 4.38 |
| Seed 4/ 6/ | 120 lbs. | 0.50 | 60.00 |
| Fertilizing, Dry, Broadcast | 2 | 2.60 | 5.20 |
| Fertilizer 1/ | | 0.00 | 0.00 |
| N | 40 lbs. | 0.30 | 12.00 |
| P295 | 100 lbs. | 0.25 | 25.00 |
| Spraying 14/ | 2 | 2.71 | 5.42 |
| Chemicals 8/7/ | | 0.00 | 0.00 |
| 2,4-D | 2 pts. | 1.02 | 2.04 |
| Cultivating 19/ | 3 | 3.00 | 9.00 |
| Cutting | .47 cwt. | 8.46 | 8.46 |
| Combine | 1.50 cwt. | 27.00 | 27.00 |
| SUBTOTAL COSTS | | | $173.43 |
| Interest at 8 percent for 6 months | | | 6.94 |
| SUBTOTAL PRODUCTION COSTS | | | $180.37 |

SOURCE: Idaho Department of Water Resources

TABLE 7

PRODUCTION COSTS

IN OWYHEE COUNTY FOR SUGAR BEETS

| Operation | Times Over | Custom Cost per Acre | Total Cost per Acre |
|---|---|---|---|
| Plowing | 1 | $ 8.38 | $ 8.38 |
| Disking | 1 | 3.21 | 3.21 |
| Harrowing | 2 | 1.67 | 3.34 |
| Planting | 1 | 6.00 | 6.00 |
| Seed 5/ 6/ | 2 lbs. | 2.00 | 4.00 |
| Fertilizing, Dry, Broadcast | 3 | 2.60 | 7.80 |
| Fertilizer 1/ | | 0.00 | 0.00 |
| N | 200 lbs. | 0.30 | 60.00 |
| P205 | 100 lbs. | 0.25 | 25.00 |
| K20 | 80 lbs. | 0.15 | 12.00 |
| Spraying | 3 | 2.71 | 8.13 |
| Chemicals 13/71 | | 0.00 | 0.00 |
| Treflan | 2 pts. | 3.18 | 6.36 |
| Ro-neet | 1/2 gal. | 27.00 | 13.50 |
| Cultivating | 4 | 3.75 | 15.00 |
| Weeding (hoeing) | 2 | 18.00 | 36.00 |
| Thinning | 1 | 15.00 | 15.00 |
| Topping & Digging | 2.57/ton | 77.10 | 77.10 |
| Hauling | 1.45/ton | 43.50 | 43.50 |
| SUBTOTAL COSTS | | | $344.32 |
| Interest at 8 percent for 6 months | | | 13.77 |
| SUBTOTAL PRODUCTION COSTS | | | $358.09 |

SOURCE: Idaho Department of Water Resources

TABLE 8

PRODUCTION COSTS

IN OWYHEE COUNTY FOR POTATOES

| Operation | Times Over | Custom Cost per Acre | Total Cost per Acre |
|---|---|---|---|
| Plowing | 1 | $ 8.38 | $ 8.38 |
| Disking | 1 | 3.21 | 3.21 |
| Harrowing | 2 | 1.67 | 3.34 |
| Planting 18/1 | 1 | 10.84 | 10.84 |
| Seed 3/ 6/ | 20 cwt. | 5.30 | 106.00 |
| Fertilizing, Dry, Broadcast | 3 | 2.60 | 7.80 |
| Fertilizer 1/ | | 0.00 | 0.00 |
| N | 240 lbs. | 0.30 | 72.00 |
| P205 | 120 lbs. | 0.25 | 30.00 |
| K20 | 100 lbs. | 0.15 | 15.00 |
| Spraying 14/ | 4 | 2.71 | 10.84 |
| Chemicals 7-10/ | | 0.00 | 0.00 |
| 2,4-D | 2 pts. | 1.02 | 2.04 |
| Eptam | 1/2 gal. | 16.90 | 8.45 |
| Treflan | 2 pts. | 3.18 | 6.36 |
| Thiodan | 4 pts. | 1.56 | 6.24 |
| Cultivating | 4 | 2.00 | 8.00 |
| Harvesting 16/ | .34 cwt. | 128.52 | 128.52 |
| Piling 17/ | .03 cwt. | 11.37 | 11.37 |
| Hauling 18/ | .13 cwt. | 49.14 | 49.14 |
| Storage 15/ | .16 cwt. | 60.48 | 60.48 |
| SUBTOTAL COSTS | | | $548.01 |
| Interest at 8 percent for 6 months | | | 21.92 |
| SUBTOTAL PRODUCTION COSTS | | | $569.93 |

SOURCE: Idaho Department of Water Resources

TABLE 9

PRODUCTION COSTS AND REVENUE
FOR A 320-ACRE FARM
(310 Acres Actually Irrigated)

Revenues: (1976 Normalized Prices)

| | | | | |
|---|---|---|---|---|
| Potatoes | - yield 315 cwt, | price $ 3.76, | 63 acres = | $74,617.20 |
| Wheat | - yield 75 bushels, | 3.56, | 55 acres = | 14,685.00 |
| Barley | - yield 75 bushels, | 2.57, | 55 acres = | 10,601.25 |
| Alfalfa | - yield 3.55 tons, | 45.87, | 19 acres = | 3,093.93 |
| Beans | - yield 18.75 cwt, | 18.55, | 68 acres = | 23,651.25 |
| Sugar Beets | - yiels 20 tons, | 31.84, | 50 acres = | 31,840.00 |
| | | Total Revenue | | =$158,488.63 |

Costs:

| Production | Total Cost/310 Acres |
|---|---|
| Plowing (291 acres) | $ 2,438.58 |
| Disking (291 acres) | 1,110.66 |
| Harrowing (291 acres) | 971.94 |
| Planting | 1,632.76 |
| Establishment (4 years alfalfa) | 160.93 |
| Seed | 11,975.50 |
| Fertilizing, Dry, Broadcast | 1,856.40 |
| Fertilizer | |
| N | 10,992.00 |
| P205 | 5,220.00 |
| K20 | 1,545.00 |
| Spraying | 2,157.16 |
| Chemicals | |
| 24-D | 1,201.40 |
| Treflan | 718.68 |
| Eptan | 532.35 |
| Thiodan | 393.12 |
| Ro-Neet | 675.00 |
| Cultivating | 1,866.00 |
| Harvesting | 9,083.46 |
| Swathing | 290.70 |
| Baling | 582.16 |
| Cutting | 575.28 |
| Weeding | 1,800.00 |
| Thinning | 780.00 |
| Topping and Digging | 3,855.00 |
| Piling | 716.31 |
| Hauling | 6,138.28 |
| Storage | $ 4,770.30 |
| Combining | 2,826.00 |
| Sprinkler System (40/ac) | 12,400.00 |
| Sprinkler Labor @ $3.50/hr. for 749 hrs. | 2,621.50 |
| Production Cost Subtotal | $ 91,856.47 |
| Net Return to Land @ 9 percent | 8,267.08 |
| Interest Expense for 6 mos. @ 8 percent | 3,674.26 |
| Total Production Cost | $ 103,797.81 |
| Annual Pumping System Cost (92.43/Acre) (Assumes 650 ft. lift and 6-8 miles transportation) | $ 28,653.30 |
| Annual Pumping Energy Cost (3757 KWH/Acre and 18.8 mill/KWH) | $ 21,895.80 |
| Total Costs | = $ 154,346.91 |
| NET FARM INCOME | |
| Total Revenue | $ 158,488.63 |
| Less Total Costs | $ 154,346.91 |
| | $ 4,141.72 |
| Income Per Acre (310 Acres) | $ 13.36 |

Rates charged for Custom Farm Operations in Idaho, Withers and Roetheli, April 1975, University of Idaho.

## APPENDIX 3-3

### COMMUNITY DEVELOPMENT MODEL

A community development model was developed for the U.S. Department of Energy and published in a report titled: Socioeconomic Impact Assessment: A Methodology Applied To Synthetic Fuels", which was published in April of 1978.

The factors used in the model are derived from socioeconomic profiles of mining dominant counties and the "Construction Worker Profile" of large-scale energy construction projects. The "cost of sprawl" was also used.

The model estimates impacts at the county level. It does not estimate impacts for multi-county regions or for municipalities or other sub-areas within counties. For this ES, the four county market area has been treated as a single county for incorporation with this model.

The model has some limitations. An important one is that it estimates gross, not net, impacts. Another limitation is that it describes conditions of selected points in time, not the evaluation of conditions leading up to or following from these points.

The major sources used in the model are: 1) ERDA, "Socioeconomic Profile," unpublished, 2) Old West Regional Commission, "Construction Worker Profile," 1975, 3) Council on Environmental Quality, "Costs of Sprawl," 1974.

Portions of the model can be "lifted" out and calculated without the requirement of the total model being run. Those portions of the model used and the corresponding calculations are shown below. All calculations are in 1975 dollars. The population data used is based on implementation of the proposed action via the provisions of the Carey Act.

POPULATION AGE DISTRIBUTION

| Age Group | 75 | 5-17 | 18-29 | 30-44 | 45-64 | 65+ | Total |
|---|---|---|---|---|---|---|---|
| Percent | 10.3 | 28.7 | 28.0 | 19.5 | 10.1 | 3.4 | 100.0 |
| Number | 102 | 283 | 276 | 192 | 100 | 33 | 986 |

School Enrollment:

Elementary and high school = population 5-17 years x .90 (283 x .90 = 255)

School Teachers:

Elementary and High School = school enrollment x .045 (255 x .045 = 11.475)

Living Situation:

Population in families = total population x .92 (986 x .92 = 907)

Population in other households = total population - population in families (986 - 907 = 80)

Households:

Families = population in families ÷ 3.8 persons per family = 907 ÷ 3.8 = 239

Other households = population in other households ÷ 1.25 persons per households = 80 ÷ 1.25 = 64

Total Households = families and other households (239 + 64 = 303)

Expected Social Service Personnel:

Physicians = 1.5 per 1,000 population (1.5 x .986 = 1,479)

Registered Nurses = 8.0 per 1,000 population (8.0 x .986=7.888)

Health Support Personnel = 2.5 per 1,000 population (2.5 x .986 = 2.465)

Police and Firemen = 3.5 per 1,000 population (3.5 x .986 = 3.451)

Total Housing Needs:

Total household x 1.05 (303 x 1.05 = 318)

Housing Needs by Type:

| Type | Single-Family | Mobile Home | Multi-Family | Total Needs |
|---|---|---|---|---|
| Percent | .60 | .25 | .15 | 1.00 |
| Number | 191 | 80 | 47 | 318 |

Public Facilty Land Requirements:

Land costs (police and fire) = facility development costs x .08 ($70,992 x .08 = $5,679)

Land costs (other public facilities) = facility development costs x .06 ($292,842 x .06 = $17,571)

Total land requirement = total land costs ÷ $8,500 per acre ($23,250 ÷ $8,500 per acre = 2.74 acres)

Residential-Related Street System:

Arterials (100 ft. R.O.W.) = (single family units x 6 ft. per unit) + (mobile homes x 5.5 ft. per unit) + (multi-family units x 5 ft. per unit) = (191 x 6) + (80 x 5.5) + (47 x 5) = 1,821 ft.

Collectors (60 ft. R.O.W.) = (single family units x 7 ft. per unit) + (mobile homes x 17.25 ft. per unit) + (multi-family units x 13.5 ft. per unit) = (191 x 7) + (80 x 17.25)+ (47 x 13.5) = 3,352 ft.

Minor Streets (50 ft. R.O.W.) = (single family units x 47 ft. per unit) + (mobile homes x 22 ft. per unit) + (multi-family units x 10 ft. per unit) = (191 x 47 ft) + (80 x 22) + (47 x 10) = 11,207 ft.

Community Street System:

Arterials = Arterials (residence - related) x 1.76 = 1,821 x 1.76 = 3,205

Collectors = Collectors (residence - related) x 1.1 = 3,352 x 1.1 = 3,687

Minor Streets = Minor Streets (residence - related) x 1.1 = 11,207 x 1.1 = 12,328

School Enrollment, by Grade Level:

Elementary = total school enrollment x .72 = 255 x .72 = 184

High School = total school enrollment x .28 = 255 x .28 = 71

School Bldg. Space:

Elementary = elementary enrollment x 120 sq. ft. per pupil = 184 x 120 $ft.^2$ = 22,080 sq. ft.

High School = high school enrollment x 150 sq. ft. per pupil = 71 x 150 $ft.^2$ = 10,650 sq. ft.

Total Bldg. Space = elementary + high school = 22,080 $ft.^2$ + 10,650 $ft.^2$ = 32,730 $ft.^2$

School Facility Development Costs:

Total school bldg. space x $34 per square foot = 32,730 x $34 = $1,112,820

Other School Development Costs:

Facility development costs x .12 = $1,112.820 x .12 = $133,538

Schools, Total Capital Costs:

Total development costs = Facility development costs + other development costs = $1,112,820 + $133,538 = $1,246,358

Land Costs = total development costs x .04 = $1,246,358 x .04 = $49,854

Total Capital Costs = total development costs + land costs = $1,246,358 + $49,854 = $1,296,212

Community Street System Development Costs:

Arterials = arterial street length x $117 per ft. = 3,205 x $117 = $374,985

Collectors = collector street length x $58 per ft. = 3,687 x $58 = $213,846

Minor Streets = minor street length x $37 per ft. = 12,328 x $37 = $456,136

Total development costs = arterials + collectors + minor streets = $374,985 + $213,846 + $456,136 = $1,044,967

Community Street System, Total Capital Costs:

Land costs = total development costs x .07 = $1,044,967 x .07 = $73,148

Total capital costs = total development costs + land costs = $1,044,967 + $73,148 = $1,118,115

Public Facility Development Costs:

Police Facilities = total population x $40 per person = 986 x $40 = $39,440

Fire Facilities = total population x $32 per person = 986 x $32 = $31,552

Government Administration = total population x $20 per person = 986 x $20 = $19,720

Health Care Facilities = total population x $236 per person = 986 x $236 = $232,696

Library Facilities = total population x $41 per person = 986 x $41 = $40,426

Total Development Costs = police + fire + government administration + health + library = $39,440 + $31,552 + $19,720 + $232,696 + $40,426 = $363,834

Public Facilities, Total Capital Costs:

Total Development Costs + Land Costs = $363,834 + $23,250 = $387,084

Total Capital Costs:

Grand Total = sum of Schools, total Capital Costs + Community Street System, total Capital Costs + Public Facilities, total Capital Costs = $1,296,212, + $1,118,115 + $387,084 = $2,801,411.

APPENDIX 3-4

PROPERTY TAX CALCULATION

PROPOSED ACTION

County Land In ES Area

| County | Acres In ES Area | Percent |
|---|---|---|
| Owyhee | 46,800 | 42% |
| Elmore | 51,115 | 46% |
| Twin Falls | 13,100 | 12% |
| | 111,015 | 100% |

Average 1977 assessed land valuation in three county areas was $131 per acre.

| County | Potential Assessed Valuation | Average Mill Levy |
|---|---|---|
| Owyhee | $ 6,130,800 | $ 8.17 |
| Elmore | 6,696,065 | 7.30 |
| Twin Falls | 1,716,100 | 11.75 |
| | $14,542,965 | $ 9.07 (average) |

Property Tax Per County

| County | Property Tax | Percent |
|---|---|---|
| Owyhee | $ 750,404 | 41% |
| Elmore | 917.269 | 51% |
| Twin Falls | 146,051 | 8% |
| | $1,813,724 | 100% |

## APPENDIX 3-5. ENERGY METHODOLOGY AND ANALYSIS

### NUMBER OF ACRES IRRIGATED FROM RIVER, WELLS

The total measured 109,279 acres was divided into 98,489 river-irrigated acres and 10,790 well-irrigated acres, based on the assumption that 80 percent of the land in the central portion of the ES area (in the C.J. Strike-Swan Falls reach) will be irrigated from groundwater. The measured total of 109,279 differs slightly from the 111,015 acre theoretical total. The difference is small, about 1.5 percent, and the results from instrument error and differences in estimating acreages from map overlays.

### COMPARISON WITH 1977 PER ACRE ELECTRICITY REQUIREMENT

A comparison of average year per acre electricity consumption of the proposed action with 1977 per acre consumption in the study area is slightly misleading, since 1977 was a drought year, with generally higher water use than would be typical.

### CALCULATION OF DROUGHT YEAR DIVERSION, DISTRIBUTION

The calculation of the "worst case" diversion of 3.51 acre feet/acre was based on the theoretical consumptive irrigation requirements in the Grandview-Saylor Creek area for each of the five crops in the assumed long-term rotation (Sutter, Bob, and G.L. Corey, "Consumptive Irrigation Requirements for Crops in Idaho," Bulletin 516, July 1970, University of Idaho, College of Agriculture Experiment Station).

The total per acre water requirement, weighted for the assumed rotation (22 percent potatoes, 16 percent sugar beets, 35 percent grain, 21 percent beans and 6 percent alfalfa), was calculated from the Sutter-Corey "maximum" and "mean" water requirements for each crop. The ratio of the maximum to the mean water requirement for the rotation was then applied for each month to the original "average year" monthly water application, transforming it into the "worst case" water application displayed in Table 1.

### CALCULATION OF DOWNSTREAM HYDRO LOSSES ON IPC SYSTEM

Line 3 of Table 3-18 represents the monthly differences from IDWR computer runs predicting IPC hydro generation with and without the proposed action. There are, however, a number of problems with the figures presented here: (1) The power losses are somewhat underestimated because they do not include losses at Lower Salmon Dam. As explained below, some 48,180 acres are assumed to be irrigated above Lower Salmon dam. (2) The power generation figure in each case is the predicted average generation over a 48-year period, and not the generation that would result from the average streamflow through IPC dams. (3) The computer runs were made assuming a monthly water application pattern different from the distribution pattern assumed for the purposes of this statement and shown in Table 1. Thus the hydro losses in line 3 peak in August instead of July and are much higher in September than in June. The reverse would be true if the correct distribution were used. IDWR is in the process of correcting the water distribution and a number of other errors in the computer model.

Line 3 of Table 3-19 was calculated on the basis of the "worst case" water application shown in Table 3-17. For the drought year, all water diverted was assumed to be useable at every downstream dam. Shown below are the points of diversion relative to IPC dams and the number of acres assumed to be irrigated from each point:

| | River | Wells |
|---|---|---|
| Above Lower Salmon | 48,180 | 0 |
| Lower Salmon - Bliss | 0 | 0 |
| Bliss - C.J. Strike | 46,053 | 7,032 |
| Strike - Swan Falls | 1,026 | 4,104 |
| Swan Falls - Brownlee | 4,620 | 0 |
| | 99,879 | 11,136 |

For land irrigated from the river, the return flow assumption is as described below. For land irrigated from wells, the river depletion was assumed to be 2 acre feet per acre, spread out evenly over 12 months. (IDWR assumes river depletions from wells at 2 acre feet per acre in the average year; this was multiplied by the ratio of 3.51/2.58 to get well-related depletions in the "worst case" year). The total diversion above each dam was multiplied by the KWH/acre-foot value for each dam (see Table 2-19, Chapter 2) to arrive at total KWHs lost as a result of the diversion.

## RETURN FLOW ASSUMPTION

The return flow assumption (provided by IDWR) is that 15 percent of the water diverted from the river each month percolates back to the river over a ten month period. The net yearly hydro losses, including return flows to the river in off-season months would be 145,889 MWH in the average year and 211,576 MWH in the worst case year.

## CALCULATION OF IPC REVENUES, SYSTEM AVERAGE AND CLASS AVERAGE PRICE UNDER EACH SCENARIO

In each case of the self-sufficiency scenario (cases 1A, 1B, 2) the proposed action irrigators would pay for 374 million KWH of the new supply (see Table 3-18, line 1, Direct Consumption) at the calculated new price of electricity for irrigators (from Table 3-20). In each case, also, the 148 million KWH of hydro losses due to the proposed action would be made up by the new supply and would be assumed to be sold at the new system average price. In Case 1A, the remainder of the power, or 994 million KWH is assumed to be sold at system average price. In Case 1B, the remainder, or 793 million KWH would be sold for export at 10 mils/KWH. In 1A and 1B line losses, estimated at 8.5 percent of all power generated, (not counting electricity to make up hydro losses), result in no revenue.

In Case 3, of the 466 million KWH imported by IPC June-September, 310 million KWH would be paid for by proposed action irrigators, with 127 million KWH for hydro losses and the remainder for line losses.

The new system average price for each of the four price estimates was calculated by adding the annual cost of each new supply to the 1977 revenues of $150 million and dividing this total required revenue by the sum of the new annual supply for each case and the 1977 supply of 9217 billion KWH. Theoretical new average prices for each customer class were calculated on the basis of a set of ratios of class price to system average price in 1977. This calculation assumes no change in the allocation of costs to customer classes or the rate structure. (Such changes in the future are impossible to predict).

HYDRO LOSSES AT FCRPS DAMS

Hydro loss calculations were made based on the monthly water diversions of the proposed action and the cumulative value of 617.7 KWH/acre foot for the 8 affected dams. This calculation assumes that all water would be usable at all of the 8 dams. In addition it was assumed that there would have been a market for all the lost hydrogeneration. These two assumptions are based on the recent Army Corps of Engineer Studies which predict that by 1980 there will be sufficient peaking capacity added to all dams so that no water need be spilled and that there will be markets year round for all electricity generated.

CASE 1B--IPC EXPORT POWER WOULD REPLACE PNW HYDRO LOSSES

For the case of IPC addition of 250 MW of capacity with off season sale of electricity at surplus prices, the cost of PNW hydro losses has been offset by the assumed export sales of IPC power. That is, off season sales to the PNW from the new IPC capacity are considered as replacement for the lost PNW hydroelectricity. Because it is sold at a surplus price of 10 mils/KWH the non-IPC portion of the PNW benefits. Rather than replacing the lost hydroelectricity at 35 mils/KWH an amount of electricity sufficient to cover the losses is made available at 10 mils/KWH. The net annual benefit to the non IPC portion of the PNW is $14.6 million.

## TABLE A

MEASURED ACRES IN THE PROPOSED ACTION BY LIFT HEIGHT AND DISTANCE
(REDUCED BY 25% FOR PUBLIC LEAVE AREAS)

- MILES -

| LIFT | 0-2 | 2-4 | 4-6 | 6-8 | 8-10 | 10-12 | 12-14 | 14-16 | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|
| 50 | 116 | 5 | -- | -- | -- | -- | -- | -- | 121 | |
| 150 | 1611 | 124 | 33 | -- | -- | -- | -- | -- | 1768 | |
| 250 | 2486 | 701 | 205 | 177 | 82 | 21 | -- | -- | 3672 | |
| 350 | 1158 | 1045 | 446 | 146 | 282 | 92 | 6 | -- | 3175 | |
| 450 | 4259 | 1814 | 1167 | 848 | 845 | 143 | -- | -- | 9076 | |
| 550 | 2730 | 4609 | 1373 | 1507 | 853 | 646 | -- | -- | 11718 | |
| 650 | 1413 | 6596 | 7431* | 5561** | 3919 | 5092 | 2091 | 24 | 32127 | |
| 750 | 15 | 580 | 3733 | 3384 | 2153 | 4316 | 2321 | 290 | 16792 | |
| 850 | -- | 225 | 381 | 3241 | 2869 | 1213 | 443 | -- | 8372 | |
| 950 | -- | -- | 161 | 2279 | 4839 | 999 | 271 | -- | 8549 | |
| 1050 | -- | -- | -- | 180 | 247 | 388 | 593 | 206 | 1614 | |
| 1150 | -- | -- | 386 | 52 | 200 | 296 | 35 | -- | 969 | |
| 1250 | -- | -- | -- | 46 | 355 | 50 | -- | -- | 451 | |
| 1350 | -- | -- | -- | -- | 71 | 18 | -- | -- | 89 | |
| TOTAL | 13788 | 15699 | 15316 | 17421 | 16715 | 13274 | 5760 | 520 | 98489 | |
| | | | | | | | | | 10790 | WELLS |
| | | | | | | | | | 109279 | |

* Median lift height and distance for all land

** Median lift height and distance for river-irrigated land

Source: Prepared for the Bureau of Land Management by Integrated Energy Systems, Inc. Boise, Idaho. (Contract No. YA-512 - CT8 - 226)

TABLE B

KWH/ACRE

PROPOSED ACTION "AVERAGE CASE"

Distance Miles

| Lift Ft | 0-2 | 2-4 | 4-6 | 6-8 | 8-10 | 10-12 | 12-14 | 14-16 |
|---|---|---|---|---|---|---|---|---|
| 50 | 939 | 1216 | | | | | | |
| 150 | 1272 | 1547 | 1826 | | | | | |
| 250 | 1605 | 1877 | 2156 | 2436 | 2715 | 2994 | | |
| 350 | 1938 | 2208 | 2487 | 2766 | 3045 | 3324 | 3603 | |
| 450 | 2271 | 2538 | 2817 | 3096 | 3376 | 3655 | | |
| 550 | 2604 | 2869 | 3148 | 3427 | 3706 | 3985 | | |
| 650 | 2937 | 2199 | 3478* | 3757 | 4037 | 4316 | 4595 | 4874 |
| 750 | 3270 | 3530 | 3809 | 4088 | 4367 | 4646 | 4925 | 5204 |
| 850 | | 3861 | 4139 | 4418 | 4697 | 4977 | 5256 | |
| 950 | | | 4470 | 4749 | 5028 | 5307 | 5586 | |
| 1050 | | | | 5079 | 5358 | 5638 | 5917 | 6196 |
| 1150 | | | 5131 | 5410 | 5689 | 5968 | 6427 | |
| 1250 | | | | 5740 | 6019 | 6299 | | |
| 1350 | | | | | 6350 | 6629 | | |

Wells: (100' lift, 0 distance) 1105 KWH/ACRE

* Median lift height and distance for all acres, including well-irrigated land

Source: Prepared for the Bureau of Land Management by Integrated Energy Systems, Inc. Boise, Idaho. (Contract No. YA-512 - CT8 - 226)

Table C

KWH/ACRE

PROPOSED ACTION "WORST CASE"

Distance - Miles

| Lift (Ft) | 0-2 | 2-4 | 4-6 | 6-8 | 8-10 | 10-12 | 12-14 | 14-16 |
|---|---|---|---|---|---|---|---|---|
| 50 | 1277 | 1655 | | | | | | |
| 150 | 1732 | 2104 | 2484 | | | | | |
| 250 | 2185 | 2554 | 2934 | 3314 | 3694 | 4073 | | |
| 350 | 2638 | 3006 | 3383 | 3763 | 4143 | 4523 | 4903 | |
| 450 | 3092 | 3456 | 3836 | 4213 | 4593 | 4972 | 5352 | |
| 550 | 3545 | 3907 | 4286 | 4666 | 5042 | 5422 | 5802 | |
| 650 | 3996 | 4357 | 4736* | 5116 | 5496 | 5876 | 6251 | 6631 |
| 750 | 4448 | 4803 | 5186 | 5566 | 5946 | 6326 | 6701 | 7081 |
| 850 | | 5253 | 5632 | 6012 | 6392 | 6771 | 7151 | |
| 950 | | | 6082 | 6461 | 6841 | 7221 | 7601 | |
| 1050 | | | | 6911 | 7291 | 7670 | 8050 | 7981 |
| 1150 | | | 6981 | 7360 | 7740 | 8112 | 8500 | |
| 1250 | | | | 7810 | 8190 | 8569 | | |
| 1350 | | | | | 8639 | 9019 | | |

WELLS: (100' lift, 0 distance): 1504 KWH/acre

* Median lift height and distance for all acres, including well-irrigated land

Source: Prepared for the Bureau of Land Management by Integrated Energy Systems, Inc. Boise, Idaho. (Contract No. YA-512 - CT8 - 226)

## MAXIMUM DEVELOPMENT - CALCULATION OF ELECTRICITY USE

The number of acres measured in the maximum development alternative, reduced by 25% for public leave areas was: 135,280 acres assumed to be irrigated out of the river, and 37,484 acres assumed to be irrigated out of wells, for a total of 172,764 acres. The array of river-irrigated acres by lift height and distance is shown in Table A.

The difference between the measured 172,764 acres and the actual 176,310 acres represents a 2% error in map work and measurement.

The total direct electricity demand calculated from the lift/distance array as described in Chapter 3, was adjusted upwords by the ratio of 176,310/172,764 to arrive at the direct demand for the actual 176,310 acres in the maximum proposal. The total direct demand of 555,897 MWH/ year and 756,137 MWH/year in the average and worst case (drought) years, respectively, was then distributed according to the average and worst case monthly distributions shown in Table 3-17, Chapter 3.

The method of calculating hydro losses was described in Chapter 3, Appendix 3-5. For the maximum development, the number of acres irrigated with respect to IPC dams are as follows:

| | River | Wells |
|---|---|---|
| Above Upper Salmon | 0 | 0 |
| Above Lower Salmon and Bliss | 58,635 | 0 |
| Bliss - C.J. Strike | 68,649 | 21,816 |
| C.J. Strike - Swan Falls | 4,032 | 16,128 |
| Swan Falls - Brownlee | 7,050 | 0 |
| | 138,366 | 37,944 |

In the calculation of hydro losses for the maximum development, there are net losses in all months of the year, as opposed to the proposed action calculation, which showed net gains in non-irrigation months. The gains in the proposed action calculation were due to the return flow assumption, as explained in Chapter 2. In the maximum development alternative, the river depeletions caused by pumping out of wells (2 acrefeet/acre, spread out evenly over 12 months) outweigh the return flows in all months, resulting in a net depletion, and therefore electricity loss, in all months. Total hydropower lost over 12 months would be 218,482 MWH in the average year, or 321,158 MWH in the worst case year.

## MINIMUM DEVELOPMENT - CALCULATION OF ELECTRICITY USE

The number of acres that were measured, as described in Chapter 3, with lift heights less than 500 feet, was 17,812 acres. The difference between this and the 21,702 river irrigated acres in the minimum development alternative is accounted for by the fact that the minimum development contains land that would have to be considered to have a higher lift height if irrigated by the shortest route from the river. In the minimum alternative, it is assumed that it would be feasible to irrigate this land by a more circuitous route, keeping the lift height below 500 feet. The distance from the river along the longer route was measured for this additional land, and it was added to the lift height, distance array at 450 feet of lift. The new array is shown in Table B.

The direct demand of the minimum alternative was calculated as described in Chapter 3.

The hydro losses on the IPC system were calculated on the basis of the following distribution of acres irrigated with respect to the IPC dams:

| | River | Wells |
|---|---|---|
| Above Upper Salmon | 0 | 0 |
| Above Lower Salmon - Bliss | 1,350 | 0 |
| Bliss - C.J. Strike | 15,210 | 5,040 |
| C.J. Strike - Swan Falls | 462 | 1,848 |
| Swan Falls - Brownlee | 4,680 | 0 |
| | 21,702 | 6,888 |

As in the maximum development alternative, there are net losses in all months, because well depletions outweigh return flows. The hydro losses on the IPC system over 12 months would be 36,530 MWH in the average year and 48,420 MWH in the worst case year.

TABLE A

MEASURED ACRES IN THE MAXIMUM DEVELOPMENT ALTERNATIVE BY LIFT HEIGHT AND DISTANCE
(REDUCED BY 25% FOR PUBLIC LEAVE AREAS)

- MILES -

| LIFT | 0-2 | 2-4 | 4-6 | 6-8 | 8-10 | 10-12 | 12-14 | 14-16 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| 50 | 136 | 5 | 14 | -- | -- | -- | -- | -- | 155 |
| 150 | 1985 | 204 | 199 | 26 | 15 | -- | -- | -- | 2429 |
| 250 | 2895 | 1770 | 583 | 455 | 164 | 24 | -- | -- | 5891 |
| 350 | 1517 | 2091 | 1568 | 607 | 661 | 209 | 20 | -- | 6673 |
| 450 | 4930 | 2792 | 1897 | 1375 | 1441 | 291 | 10 | -- | 12736 |
| 550 | 3520 | 5981 | 1930 | 2188 | 1792 | 959 | 4 | -- | 16374 |
| 650 | 1780 | 8386 | 9392 | 6604 | 5188 | 6680 | 2609 | 24 | 40663 |
| 750 | 15 | 855 | 4433 | 4783 | 2657 | 5389 | 2738 | 433 | 21303 |
| 850 | -- | 234 | 680 | 4420 | 3642 | 1343 | 558 | -- | 10877 |
| 950 | -- | 72 | 726 | 3002 | 5720 | 1517 | 333 | 8 | 11378 |
| 1050 | -- | 53 | 389 | 476 | 598 | 760 | 727 | 258 | 3261 |
| 1150 | -- | -- | 506 | 59 | 470 | 1043 | 518 | -- | 2596 |
| 1250 | -- | -- | -- | 46 | 357 | 383 | 51 | -- | 837 |
| 1350 | -- | -- | -- | -- | 71 | 36 | -- | -- | 107 |
| TOTAL | 16778 | 22443 | 22317 | 24041 | 22776 | 18634 | 7568 | 723 | 135280 |
| | | | | | | | | WELLS | 37484 * |
| | | | | | | | | | 172764 |

* Wells are evaluated at 100' and 0 miles from the water source.

Source: Prepared for the Bureau of Land Management
by Integrated Energy Systems, Inc. Boise, Idaho.
(Contract No. YA-512 - CT8 - 226)

TABLE B

MEASURED ACRES IN THE MINIMUM DEVELOPMENT ALTERNATIVE BY LIFT HEIGHT AND DISTANCE
(REDUCED BY 25% FOR PUBLIC LEAVE AREAS)

- MILES -

| LIFT (FEET) | 0-2 | 2-4 | 4-6 | 6-8 | 8-10 | 10-12 | 12-14 | TOTAL |
|---|---|---|---|---|---|---|---|---|
| 50 | 116 | 5 | -- | -- | -- | -- | -- | 121 |
| 150 | 1611 | 124 | 33 | -- | -- | -- | -- | 1768 |
| 250 | 2486 | 701 | 205 | 177 | 82 | 21 | -- | 3672 |
| 350 | 1158 | 1045 | 446 | 146 | 282 | 92 | 6 | 3175 |
| 450 | 4259 | 2488 | 1723 | 2364 | 1383 | 547 | 202 | 12966 |
| TOTAL | 9630 | 4363 | 2407 | 2687 | 1747 | 660 | 208 | 21702 |
| | | | | | | | WELLS | 6888 * |
| | | | | | | | | 28590 |

* Wells are evaluated at 100' and 0 miles from the water source.

Source: Prepared for the Bureau of Land Management by Integrated Energy Systems, Inc. Boise, Idaho. (Contract No. YA-512 - CT8 - 226)

# GLOSSARY

# GLOSSARY

Acre Foot: Volume of water that would cover an acre to a depth of one foot, equal to 43,560 cubic feet or approximately 326,000 gallons.

Aesthetics: Dealing with the nature of the beautiful and with judgements concerning beauty.

Air Quality Standard: An established concentration, exposure time, or frequency of occurrence of a contaminant or multiple contaminants in the ambient air which shall not be exceeded.

Algal Bloom: A proliferation of living algae on the surface of lakes, streams, or ponds. Algal blooms are stimulated by phosphate enrichment.

Allotment: An area of land where one or more individuals graze their livestock. It generally consists of public land but may include parcels of private or state owned lands. An allotment may consist of several pastures.

Allotment Management Plan (AMP): A documented program for a livestock operation on the public lands. It prescribes how the livestock operations will meet sustained yield, multiple-use, economic, and other needs and objectives for the public lands as determined through land-use planning; the type, location, ownership, and general specifications for range improvements that would be installed and maintained; and other provisions related to livestock grazing and other public land management objectives.

Alluvium: Clay, silt, sand, and gravel or other rock material transported by flowing water, and deposited as sorted or semi-sorted sediments.

Ambient Air: Any unconfined portion of the atmosphere; the outside air.

Animal Unit Month (AUM): The amount of forage one cow, five sheep, about fifteen pronghorn antelope, five deer, one horse, or one moose eat(s) in one month.

Aquifer: A geologic unit that contains water and that can deliver it to wells, springs, or seeps.

Archeological Resources: The physical evidence of past human occupation which can be used to reconstruct the culture of past peoples. The archeological record is usually expressed in the form of districts, sites, structures, and objects.

Artifact: Any object made, modified, or used by man.

Average Megawatts: Total megawatts consumed in a given month divided by the number of hours in that month.

Base Flow: The dry-weather flow of a stream, generally sustained by seepage of groundwater.

Benthic: Occurs at the bottom of a pond, lake, or stream.

Biochemical Oxygen Demand (BOD): The amount of dissolved oxygen consumed in five days by biological processes breaking down organic matter in an effluent.

British Thermal Unit (BTU): A measure of heat or energy equivalent to 252 calories.

Calcareous Soil: A soil containing calcium carbonate, or a soil alkaline in reaction because of the presence of calcium or magnesium carbonate.

Civilian Labor Force: Comprises the total of all civilians classified as employed or unemployed in accordance with the criteria described above.

Claypan: A compact, dispersed, slowly permeable soil horizon rich in clay and separated more or less abruptly from the overlying soil. Claypans are commonly hard when dry and plastic or stiff when wet.

Coliform: A group of bacteria used as an indicator of sanitary quality in water. The total coliform group is an indicator of sanitary significance because the organisms are normally present in large numbers in the intestinal tracts of humans and other warm-blooded animals.

Consumptive Use: As used here means the amount of water transpired in the process of plant growth plus the water evaporated from soil and foliage in the area occupied by the growing plant.

Crucial Wildlife Habitat: That portion of the living area of a wildlife species that is essential to the survivial and perpetuation of the species either as individuals or as a population.

Cubic Feet per Second: A measure of water flow. The number of cubic feet of water ( 1 CFS=7.5 gallons) that pass a fixed point in a second.

Cultural Resources: Those fragile and nonrenewable remains of human activity, occupation, or endeavor, reflected in districts, sites, structures, buildings, objects, artifacts, ruins, works of art, architecture, and natural features, that were of importance in human events. These resources consist of (1) physical remains, (2) areas where significant human events occurred--even though evidence of the event no longer remains, and (3) the environment immediately surrounding the actual resource. Cultural resources, including both prehistoric and historic remains, represent a part of the continuum of events from the earliest evidences of man to the present day.

Demand (Electricity): The amount of electricity required by the customers of an electric utility over a given period of time.

Desalinization: Removal of salts from saline soil, usually by leaching.

Diversion: The taking of water, generally for a specific use, from a stream, reservoir, or other body of water. The diversion rate may be given in cubic feet per second, acre-feet per year, million gallons per day, etc.

Effluent: A discharge of pollutants into the environment, partially or completely treated or in its natural state. Generally used in regard to discharges into waters.

Employment: Comprises wage and salary workers (including domestics and other private household workers), self-employed persons, and unpaid family workers who worked 15 hours or more during the survey week in family-operated enterprises. Employment in both agricultural and nonagricultural industries is included. Also included are persons temporarily absent from work because of illness, bad weather, vacation, labor management dispute, or because they were taking time off for various reasons, even if they were not paid by their employers for the time off. Employed persons holding more than one job are counted only once. Commuters are shown at their place of residence and not at their place of work.

Endangered Species: Those species officially designated by the Fish and Wildlife Service through publication in the Federal Register as being in danger of extinction throughout a significant portion of their range. The Endangered Species Act of 1973 requires that critical habitat for endangered species be delineated and enjoins federal agencies from taking actions within such designated critical habitat that would have a significant adverse impact on the endangered species.

Hardpan: A hardened or cemented soil horizon or layer. The soil material may be sandy or clayey, and may be cemented by iron oxide, silica, calcium carbonate, or other substances.

Head (Electricity): Behind a dam, the difference in elevation between the top of the reservoir and the level at which the water comes out through the turbines.

Heritage Conservation and Recreation Service: A Department of the Interior agency created by combining the National Park Service, Interagency Archaeolgical Service, and Bureau of Outdoor Recreation. HCRS is responsible for making National Register eligibility determinations and for maintaining standards in projects funded by the National Historic Preservation Fund.

Historical Resources: All evidences of human activity that date from historic (i.e., recorded history) periods. Historic resources are cultural resources and may be considered archeological resources when archeological work is involved in their identification and interpretation.

Hydro (Hydroelectric): Refers to electricity generated by water power, e.g. dams.

Kilowatt Hour (KWH): The amount of electrical energy from 1 KW of generating capacity operating for 1 hour. The amount of electricity consumed by 1 KW of demand for 1 hour. Ten average (100 watt) light bulbs operating for 1 hour would consume 1 KWH of electricity.

Leaching: The removal of materials in solution by the passage of water through soil.

Load (Electricity): The amount of electricity that a utility must generate at any given time, or over a period of time, to satisfy the demand of its customers (see demand).

Mean Monthly Flow: The average of all monthly flows, for a particular month, for the period of record at a flow-measuring station. The mean monthly flow for a given month is the average of all daily flows for that month.

Median Water Year/Median Water Conditions: Refers to streamflows in a hypothetical year such that over a long period of time actual streamflows will be higher in half the years and lower in half the years.

Megawatt (MW): 1.000 Kilowatts.

Megawatt Hour (MW): 1,000 Kilowatt hours.

Mil: One-tenth of a cent; 1,000 Mils = $1.

National Register of Historic Places: The official list, established by the Historic Preservation Act of 1966, of the Nation's cultural resources worthy of preservation. The Register lists archeological, historic, and architectural properties (i.e., districts, sites, buildings, structures, and objects) nominated for their local, State, or national significance by State and/or Federal agencies and approved by the National Register staff. The Register is maintained by the Heritage Conservation and Recreation Service.

Nitrification: The formation of nitrates and nitrites from ammonia (or ammonia compounds), as in soils by micro-organisms.

Nonconsumptive Use: Water that is used, as for plant cooling, and returned to the source or to another body of water. Instream uses, such as for quality control or hydropower, are nonconsumptive.

Paleocene: A geological time unit referring to the earliest epoch (53 to 65 million years ago) of the Tertiary period which spans the time interval of from 2 million years ago to 65 million years ago.

Paleontology: The study of life in past geologic periods, based on fossil plants and animals, and the chronology of the earth's history.

Particulates: Any solid matter emitted by a contaminant source. It is composed of settleable matter (which will settle as dust within a reasonable period of time) and suspended matter (which remains in the atmosphere until washed out by precipitation).

Peak Demand: The highest demand, measured over a relatively short period of time (an hour, a day or a month) that a utility experiences in the course of a year.

Perched Water: An isolated body of groundwater held above the zone of saturation (the place where openings in rock are filled with water) by a bed of low permeability through which the water does not pass readily.

Percolation: The downward movement of water through soil.

Point Source: Any stationary source causing emissions of any contaminant to the ambient air.

Prehistoric Resources: All evidences of human activity that pre-date recorded history and can be used to reconstruct lifeways and culture history of past peoples. These include sites, artifacts, environmental data, and all other relevant information and the contexts in which they occur.

Public Land: Historically, the public domain administered by the Bureau of Land Management for the purpose of providing forage, wood products, and minerals for public users. The uses and resources of these public lands have been expanded in recent years to provide open space, recreation resources, protection of cultural resources, and other commodities.

Raptor: Predator, specifically any of a group of birds of prey with a strong notched beak and sharp talons, as the eagle, hawk, owl, etc.

Reach: A portion of a given stream usually of a specified length.

Recharge: Water that, in entering an aquifer, replenishes the supply or raises the water level.

Riparian: As used here, riparian refers to the areas adjacent to streams and other bodies of water, wet meadows, springs, wells, and other sources.

Salvage: The recovery of material and data from an affected cultural resource, prior to its alteration or destruction, through recordation, documentation, partial or total excavation, and collection for analysis and interpretation.

Sensitive Animals: Animals classified by the BLM and Idaho Fish and Game Department are those:
-- not yet officially listed but which are undergoing a status review or are proposed for listing according to Federal Register notices published by the Secretary of the Interior or the Secretary of Commerce, or according to comparable State documents published by State officials;
-- whose populations are consistently small and widely dispersed,

or whose ranges are restricted to a few localities, such that any appreciable reduction in numbers, habitat availability, or habitat condition might lead toward extinction; and
-- whose numbers are declining so rapidly that official listing may become necessary as a conservation measure. Declines may be the cause of one or more of several factors including: destruction, modification, or curtailment of the species' habitat or range; overutilization for commercial, sporting, scientific, or educational purposes; disease or predation; the inadequacy of existing regulatory mechanisms; and/or other natural or manmade factors adversely affecting the species' continued existence.

Sheet Erosion: The removal of a fairly uniform layer of soil from the land surface by runoff water or wind.

Soil Horizon: A layer of soil, approximately parallel to the soil surface, with distinct characteristics produced by soil forming processes.

State Historic Preservation Officer (SHPO): The official within each State, authorized by the State at the request of the Secretary of the Interior, to act as a liaison for purposes of implementing the National Historic Preservation Act of 1966.

Threatened Species: Those species which are likely to become endangered in the foreseeable future throughout all or a significant portion of their range. Critical habitat can also be designated for threatened species (see endangered species).

Visual Resource Management Class: The degree of alteration that is acceptable within the characteristic landscape. It is based upon the physical and sociological characteristics of any given homogenous area.

Visual Resource: The land, water, vegetation, animals, and other features that are visible on all public lands.

Withdrawal: The removal of public (Federal) lands or resources from the operation of one or more forms of appropriation for private use or development.

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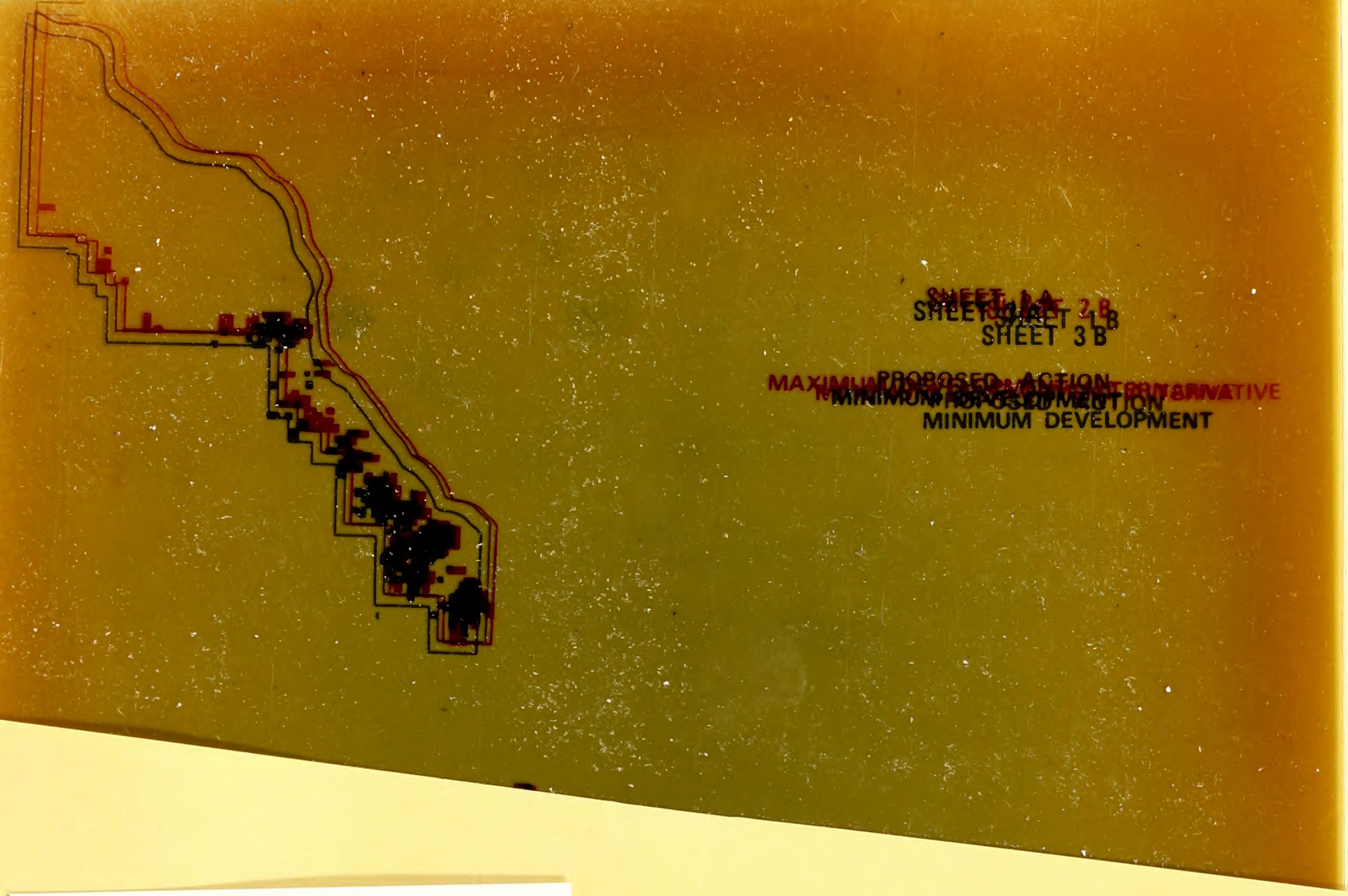
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MINIMUM DEVELOPMENT

SHEET 1 A

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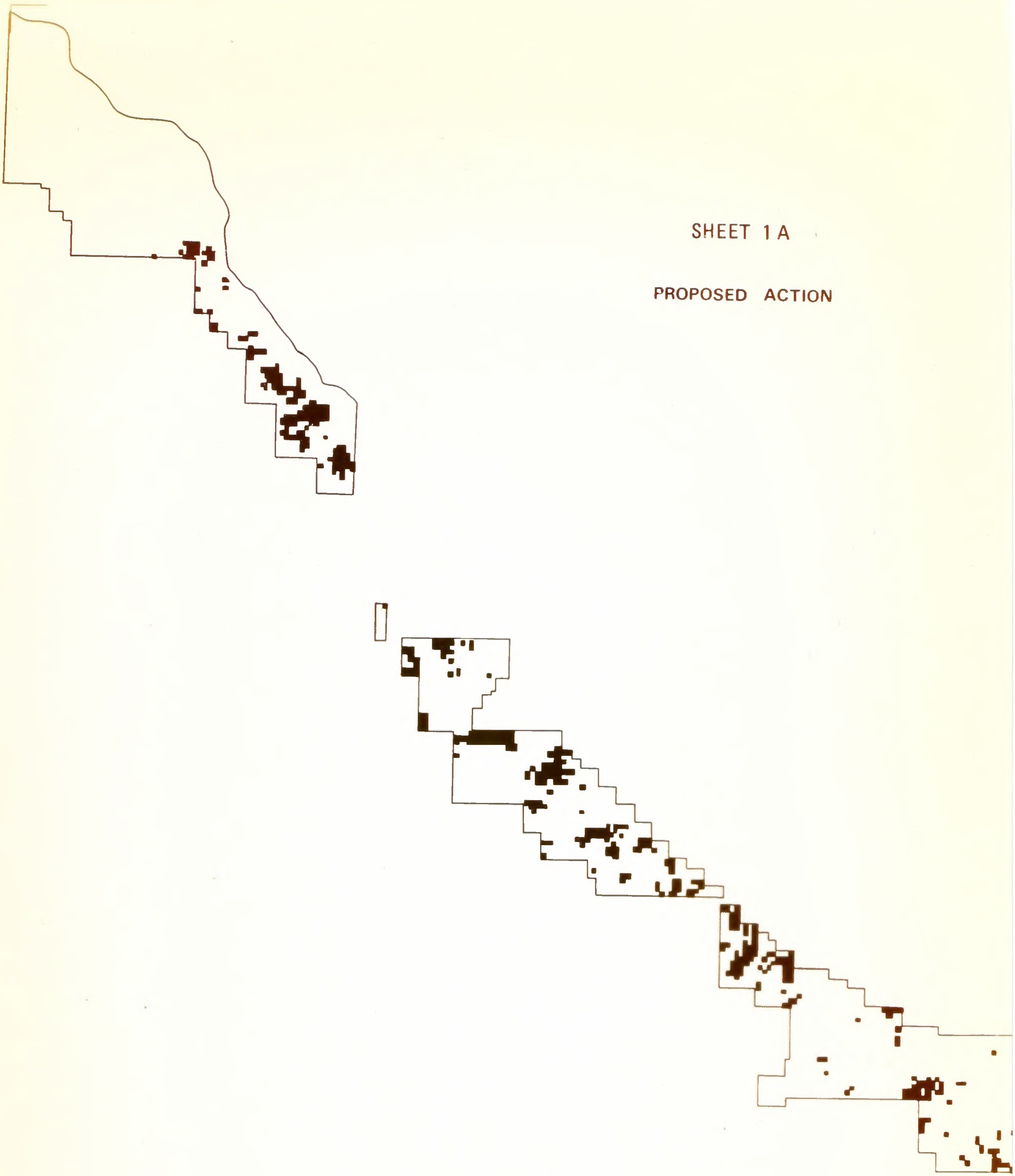

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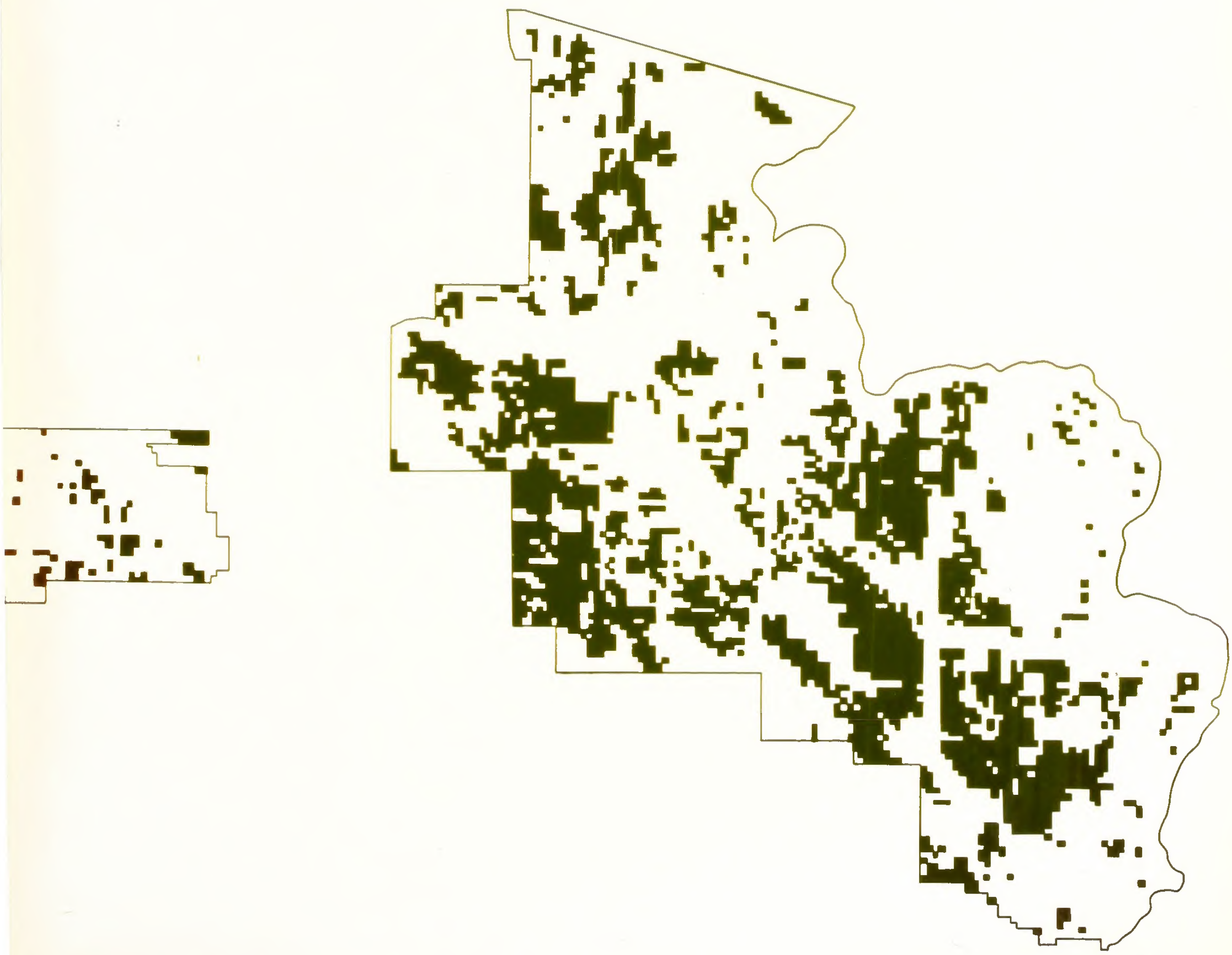

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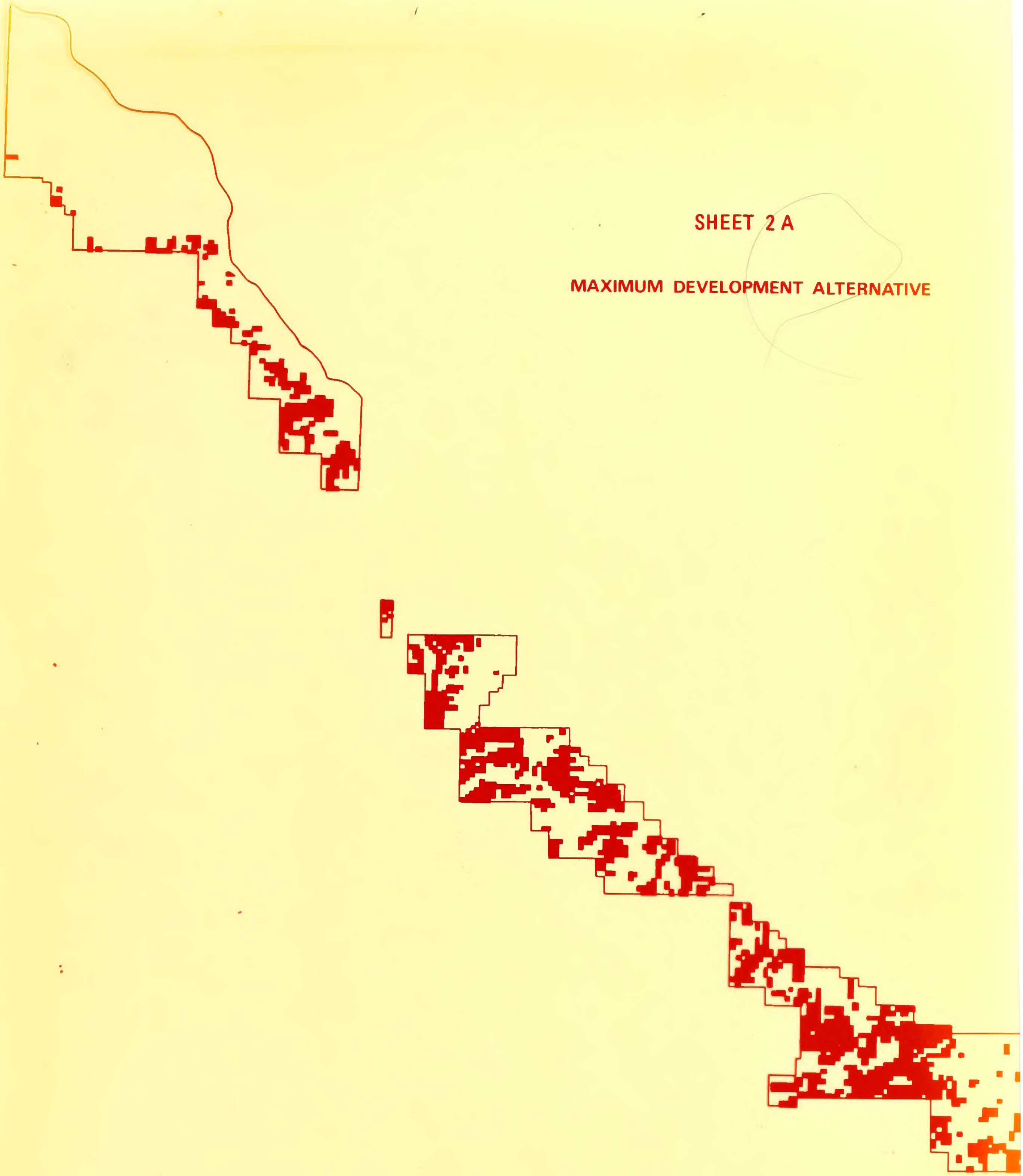

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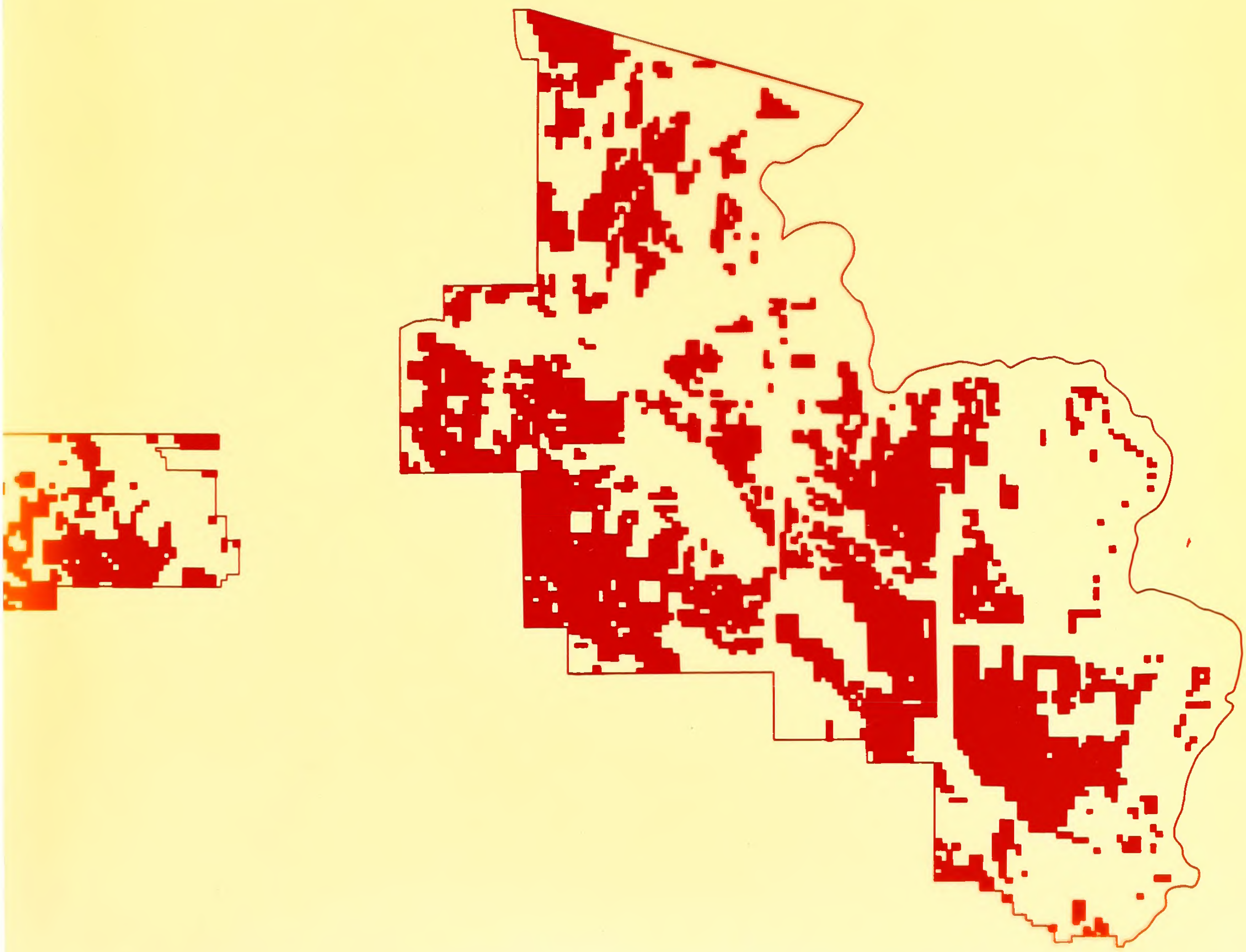

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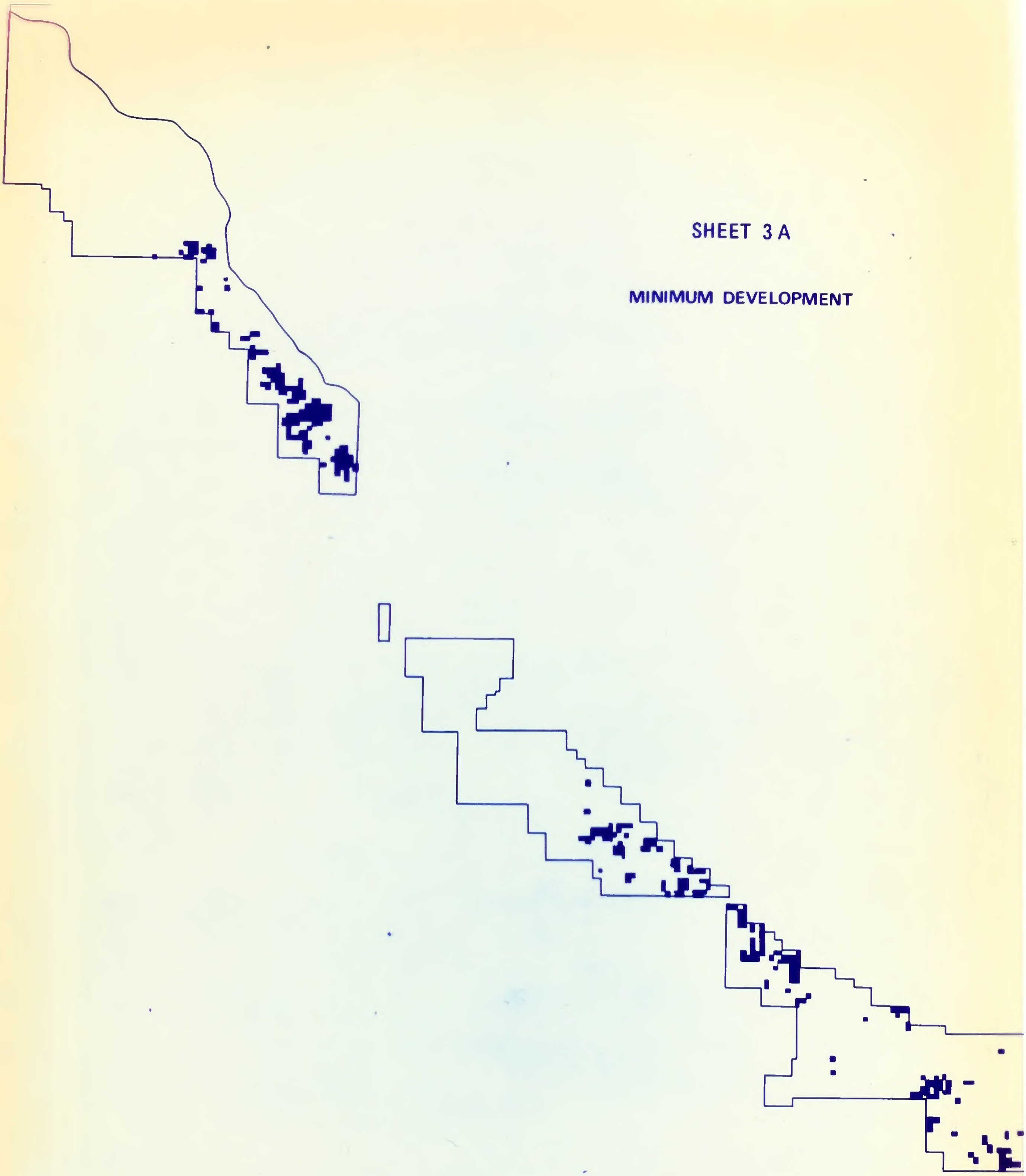

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