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ENVIRONMENTAL SURVEY OF THE TETON RIVER AND HENRY'S FORK OF THE SNAKE RIVER

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ABSTRACT

A survey of existing environmental conditions was conducted by seven investigators using the following methods: An investigative overflight, on-the-ground visitations, interviews with area professionals and laymen, and a search of literature and reference materials. Evaluation and discussion of the agricultural, archaeological, economic, population, water resources, wildlife, and plant life data comprise the major portion of the text. The evaluations are summarized in a list of recommendations which appear at the end of the text. Because near maximum utilization is now occurring, it is recommended that no further major development of water resources should occur without prior intensive investigations by competent teams who include all consequences of such development in their study. Included in the appendices are an economic evaluation of current and possible future activities of man and annotated lists of birds, mammals, fish, and plants of Fremont, Madison and Teton Counties, Idaho.

FOREWORD

The Water Resources Research Institute has provided the administrative coordination for this study by virtue of the Institute's broad experience in interdisciplinary research activities and its responsibility to coordinate, integrate, and facilitate the efforts of scientists from various disciplines. It is Institute policy to make available the results of significant water-related research conducted in Idaho's universities and colleges. The Institute and the sponsoring agency neither endorse nor reject the findings of the authors of this research. It does recommend careful consideration of the accumulated facts by those individuals concerned with the study of recognized problems.

SUPPORT FOR THE STUDY

Financial support for this study has been provided by the U. S. Department of the Army, Corps of Engineers, under Contract No. DACW68-72-C-02110. The contract for environmental studies is a part of the "General Investigations - Henry's Fork and Teton River Basin, Idaho and Wyoming," 96 x 3121 being conducted by the U.S. Army Engineer District, Walla Walla, Washington.

ACKNOWLEDGEMENTS

Many people provided valuable assistance to the study group in supplying materials used in preparing this report. Included were representatives of local, state and federal agencies who provided publications, open file reports and information from studies conducted by others which were considered to be of use in reviewing environmental resources of the Henry's Fork and Teton River Basins. Pertinent material obtained from a variety of published reports has been incorporated, and appropriate citation has been given in the list of references. Only on rare occasions did we encounter reluctance to make information available. At these times we interpreted that reluctance as reflecting differences in individual philosophies or concern about the differences in the approach to resource management held by different agencies.

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I. INTRODUCTION

Scope of Study

The purpose of this study was to inventory selected environmental factors related to the water resources in the watershed drained by Henry's Fork and Teton Rivers and their tributaries. Consideration was given to the effects of various forms of water development, utilization or management upon related environmental conditions. Among items considered in relating present resource use to environmental conditions were the problems involving aspects of ground water recharge, impoundments and irrigation, water quality, fisheries, wildlife and recreational uses, logging and grazing. In addition, historical and archaeological features of the basin were also considered.

At the request of the agency which sponsored this report, no attention was directed to those problems specifically related to construction of the Teton Dam. However, occasional remarks could be inferred to have reference to that project. The intent in all cases was to exemplify selected environmental problems.

The study area constitutes a significant portion of the Upper Snake River Basin including most of the area in Teton, Madison and Fremont Counties, Idaho. (See location map in Figure 1). Runoff from the winter accumulation of snowfall in the surrounding mountains is the major source of water, much of which is diverted during the growing season for the purposes of irrigation. However, increasing amounts of irrigation water are being drawn from the subsurface aquifer. The basin population of slightly more than 24,000 is centered in the southern portion in the vicinity of Rexburg, Idaho. The economy of the area is based primarily on agriculture, livestock production, forestry, wood products, manufacturing and recreation.

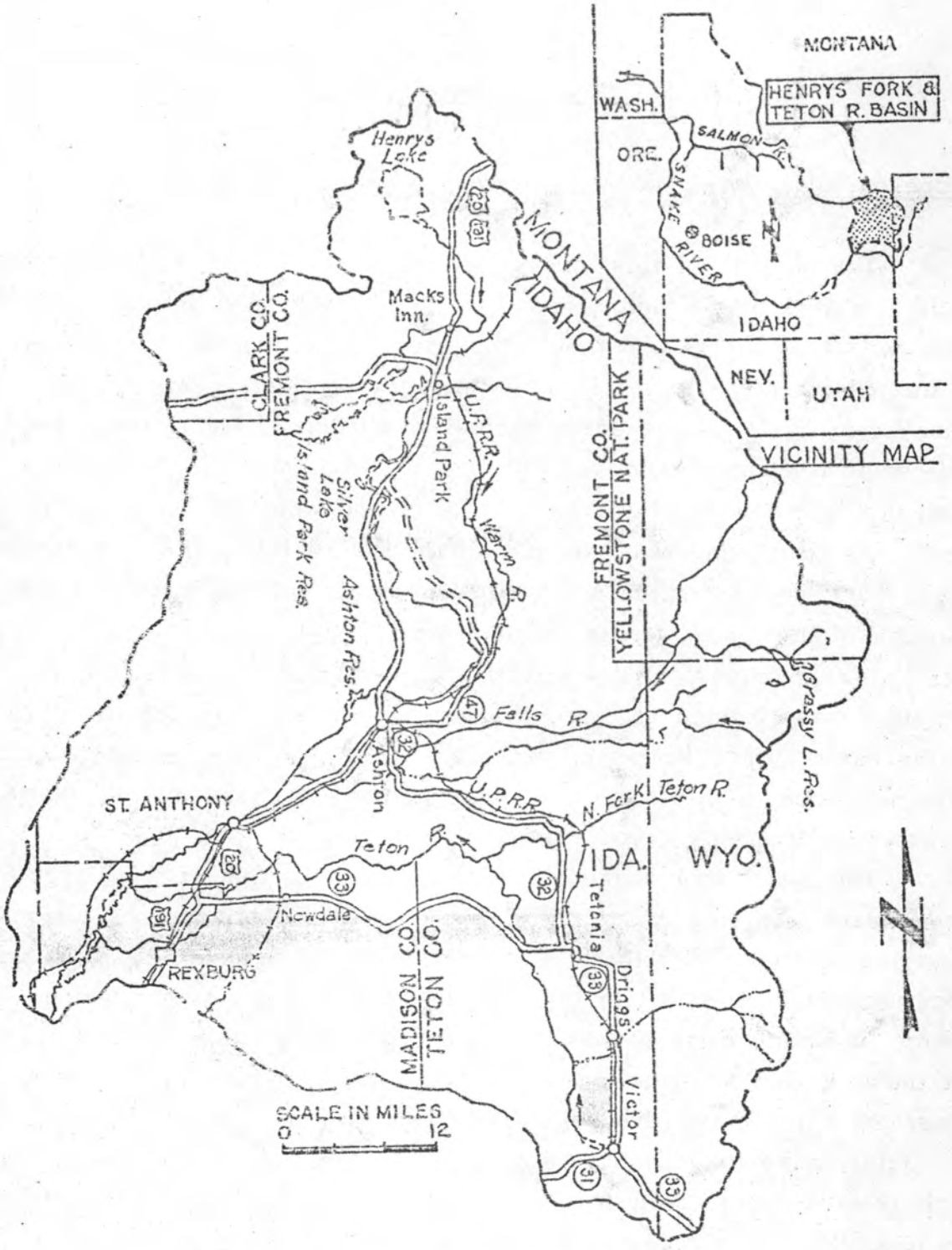


Figure 1. HENRYS FORK AND TETON RIVER BASIN

General Approach

The general inventory was based largely on material included in published reports and open files of several governmental agencies. Interviews with private individuals and representatives of local, state and federal agencies also contributed a great deal of information on environmental conditions. In addition, the personal observations and experience of members of the study group served to supplement available reports and other written material. A variety of activities were utilized in the formulation of opinions expressed in this report. First impressions were gained during a five-hour flight over the streams comprising the drainage. Subsequent to the aerial inspection, specific areas were visited on foot or by vehicle to examine more closely those portions of the watershed which appeared to have been subjected to intensive use and/or abuse. Personal interviews were held with a variety of people representing the U. S. Forest Service, U. S. Soil Conservation Service, U. S. Bureau of Reclamation, Fremont-Madison Irrigation District, U. S. Geological Survey and private individuals in the attempt to assess different philosophies regarding resource use and management. Because of time and financial restrictions, only a limited amount of new field evaluation could be conducted during the study period of June-August, 1972. Consequently, there is a critical need to obtain additional information regarding the ecological effects of any proposed changes on these streams. If future modification of water resources is considered, in-depth studies should be undertaken to examine possible effects of a specific project.

Participating Specialists

The technical group participating in this environmental study was selected to form a diverse background of professional knowledge and expertise. Because of the potential scope of environmental factors affected by water use and management, the study group could easily have been many times larger in order to obtain greater breadth and depth in the study. However, restrictions in funding, time and the availability

of individuals to participate in the study resulted in limiting the group to its present size.

Major responsibility for the preparation of this report was accepted by Karl E. Holte, Plant Specialist and Terrestrial Ecologist and Fred L. Rose, Aquatic Ecologist. Barry L. Keller, Population Ecologist, assembled the information relating to population demography. Charles H. Trost, Ornithologist, contributed material on the inventory of wildlife and aesthetic features. Water quality aspects were examined by G. Wayne Minshall, Limnologist. Review of historical and archeological features was made by Max Pavesic, Curator of Anthropology. Economic considerations were contributed by John Merriam, Economist and Karl E. Holte.

Each member of the study group assumed specific responsibility for developing information on particular environmental factors. Subsequent collaborative work and discussions augmented individual efforts wherever possible.

State on Philosophy

In the process of conducting a study such as this, it is impossible to avoid making value judgments regarding the analysis of environmental conditions. There are several perceptual bases from which one may approach such an analysis, and these have been described by Klingeman et. al., 1971. Among these perceptual bases are included the preservationist viewpoint in which there is a tendency to favor natural management and regard man as a part of nature rather than man apart from nature. Under this philosophy there is emphasis on allowing the environment to remain in its natural state; a condition which can best be achieved by natural rather than man's methods of management. A second kind of philosophy might be described as that of the conservationist. This philosophy embodies the idea that management of resources by man is preferred over natural management. This concept has been followed in the attempt to achieve sustained yields for populations of animals, timber and other resources which are regarded as important. The goal of sustained yield is always to maintain a sufficient quantity of the resource to meet human demands. Therefore, the sustained yield concept implies

"limited use" in order not to cause a decline in resource availability. In terms of population and economic growth, those following the conservationist philosophy tend to be opposed to any growth which would jeopardize preferred species of plants and animals. Both of the philosophies described above tend to be lumped together and referred to as the environmental philosophy, but the important distinctions already outlined should be kept in mind.

In contrast to the environmentalist philosophies are those of the exploiter who favor man's management of resources for the sole benefit of man and the developmental philosophy in which nature is seen as something which should be subdued. The exploiter tends to regard the environment as something created solely for short time personal gain - use it until it is exhausted and then move on to repeat the act in another location. From the environmentalist viewpoint the exploiter consistently violates nature and is, therefore, criticized as being short sighted and failing to see long-term detrimental effects.

It has been our impression gained during the field work portion of this study that resource utilization in the Henry's Fork and Teton River Basins has been based largely upon exploitive and developmental philosophies. We would, therefore, anticipate an adverse reaction and criticism to many of the items included in this report. We would also emphasize the critical need for inclusion of the other kinds of philosophies in planning for future projects. In view of recent changes in public attitudes toward environmental matters and subsequent passage of the National Environmental Policy Act, we are confident that these philosophies will indeed enter into the decision-making process. In this regard it is our opinion that more emphasis should be placed on environmental considerations when planning for specific projects involving modification of any watercourse or portion of the water resource in these basins. It appears evident that a balance needs to be struck between extreme points of view. Moreover, it seems obvious that each point of view might dictate which kind of decision might be made regarding a specific area. More clearly, it is our contention that some areas in these basins should be regarded solely from the preservationist viewpoint while other areas may indeed be justifiably regarded as suitable for development and/or exploita-

tion. More specific areas for consideration of preservation are pointed out in the conclusion. Historically, it would seem that conflicts are inevitable because of the commonly encountered situation of a particular special interest group wanting to use or abuse a given area.

II. EVALUATION OF PRESENT ENVIRONMENTAL CONDITIONS IN RELATION TO SPECIFIC WATER RELATED ACTIVITIES

Irrigation

From the environmental standpoint the greatest modification occurring in these basins involves the removal of water for the purpose of irrigating cropland. Operation of the impoundments located on these streams is directed primarily toward this objective. (See Table 1). The impoundments also, to a limited extent, serve the ancillary purpose of controlling runoff during peak periods, thus contributing to partial control of flooding in lowland areas along the streams. The extent of irrigation water removal can be appreciated when one examines Table 2 (Idaho Water Resource Board Summary Report No. 1, 1970) and notes that almost 240,000 acres are presently under irrigation in Teton, Fremont and Madison Counties. Surface water supply for 210,000 acres with the remaining 30,000 acres receiving their irrigation water from underground sources. Similar data compiled by the U. S. Soil Conservation Service in 1968 differ somewhat in total acreages irrigated from surface and ground water sources (Table 3). Regardless of these differences the full impact of water removal can be seen by examining data on diversions from the three major rivers in the basin (Table 4). In 1971 total diversion of water from Teton and Falls Rivers represented about one-half of the total annual flow! This figure becomes even more impressive when one considers that the diversion occurred largely within a growing season limited to about three months. During this period minimum flows in these rivers may reach critical levels. In Henry's Fork diversion during 1971 amounted to about one-fourth of the average annual runoff based on the thirty-year period 1928-1957.

Another indication of the complex problems related to water use in this area involves the high consumptive rates. Examination of water delivery to Idaho irrigation districts (Table 5) reveals that only two other districts in the State received more than 9.4 acre-feet per acre - the amount received by the Fremont-Madison Irrigation District in 1969 (Idaho Department of Water Administration, 1968-70).

Table 1. List of Reservoirs in the Henry's Fork and Teton River Basins.

	Name	Storage Capacity	Surface Area	Date Constructed
1.	Henry's Lake	79,500 acre ft.	6,200	1922
2.	Island Park	127,600 acre ft.	8,372	1938
3.	Grassy Lake	15,500 acre ft.	-	1939
4.	Ashton	-	360	1920

Table 2. Potentially Irrigable and Presently Irrigated Lands by County*

	Potentially Irrigable				Presently Irrigated Water Source		
County	Class 1	Class 2	Class 3	Total	Surface	Ground	Total
Fremont	25,500	77,700	18,300	121,500	83,100	6,100	89,200
Madison	33,700	44,200	9,400	87,300	79,600	19,400	99,000
Teton	25,100	48,000	8,600	81,700	46,300	3,400	49,700
	84,300	169,900	36,300	290,500	209,000	28,900	237,900

*Source: "Potentially Irrigable Lands in Idaho," Idaho Water Resource Board, 1970, Summary Report No. 1.

Table 3. Irrigated Land Status in Henry's Fork and Teton River Basins, 1968*

County	Acres Irrigated	Source of Water Supply			Method of Application	
		Streamflow	Ground-water	Reservoir Storage	Gravity	Sprinkler
Fremont	86,500	59,380	5,964	21,156	55,980	30,520
Madison	96,040	68,700	18,800	8,540	70,240	25,800
Teton	48,200	44,940	3,260	0	37,580	10,620
	230,740	173,020	28,024	29,696	163,800	66,940

*Source: Compiled by the River Basin Party, U.S.D.A., Soil Conservation Service, Boise, Idaho.; Letter to Idaho Water Resource Board, August 1, 1967. Reprinted in Water Planning Studies, Idaho Economic Base Study, Volume II, 1969.

Table 4. Water Diverted for Irrigation from Falls River, Henry's Fork and Teton Rivers*

River	Diversion (acre-ft)	Area Irrigated (acres)	Acre-feet per acre	Year	Average Annual Runoff**
Falls River	166,220	39,792	4.2	1961	549,000
Henry's Fork	461,900	44,610	10.3	1961	2,134,000
Lower Teton River	237,990	30,090	7.5	1961	539,000
Totals	866,200	114,480	7.5		
Falls River	210,315	42,935	4.9	1971	
Henry's Fork	490,010	45,085	10.9	1971	
Lower Teton River	285,380	29,893	9.6	1971	
Totals	985,705	117,913	8.4		

*Source: "Water Distribution and Hydrometric Work," District No. 01, Snake River, Idaho, Annual Reports, 1961, 1971.

**Acre-feet 1928-1957.

Table 5. Idaho Irrigation Districts and Water Delivery in 1969.

Irrigation District	Acreage Reported Irrigated - 1969	Water Delivered 1969
A & B Irrigation District	73,278.8 acres	3.32 acre-feet per ac
American Falls Reservoir District #1	46,747.33 acres	9.18 acre-feet per acre
American Falls Reservoir District #2	Not Reported	Not Reported
Avondale Irrigation District	979.4 acres	Not Reported
Big Lost River Irrigation Dist.	No Statement Submitted as	Required by Law
Black Canyon Irrigation Dist.	56,673 acres	5.22 acre-feet per ac
Boise-Kuna Irrigation Dist.	48,128.72 acres	4.01 acre-feet per ac
Burley Irrigation District	47,529 acres	4.13 acre-feet per acre
Caldwell Irrigation District	732 acres	7.51 acre-feet per ac
Capital View Irrigation Dist.	No Statement Submitted as	Required by Law
Center Irrigation District	3,000 acres	.03 acre-feet per acre
Dalton Gardens Irrigation Dist.	979 acres	Not Reported
East Green Acres Irrigation Dist.	1,539.77 acres	Not Reported
East Weiser Irrigation Dist.	27 acres	8 cubic feet per second
Emmett Irrigation District	Not Reported	Not Reported
Enterprise Irrigation District	5,892 acres	4.24 acre-feet per ac
Falls Irrigation District	11,226 acres	2.2 acre-feet per acre
Freemont-Madison Irriga. Dist.	107,160 acres	9.4 acre-feet per acre
Gem Irrigation District	33,578 acres	5.67 acre-feet per ac
Grandview Irrigation District	6,000 acres	Not Reported
Hayden Lake Irrigation District	1,544.50 acres	1.23 acre-feet per acre
Hillside Irrigation District	No Statement Submitted as	Required by Law
Idaho Irrigation District	35,683.45 acres	8.4 acre-feet per acre
Indian Cove Irrigation Dist.	1,006.34 acres	6.0 acre-feet per acre
King Hill Irrigation Dist.	9,054 acres	13.9 acre-feet per acre
Lake Irrigation District	6,758 acres	1.78 acre-feet per ac
Lemhi Irrigation District	47,825.33 acres	Not Reported
Lewiston Orchards Irr. Dist.	Not Reported	Not Reported
Little Weiser Irrigation Dist.	6,569.5 acres	Not Reported
Little Willow Irrigation Dist.	2,881.4 acres	2.5 acre-feet per acre
Little Wood River Irr. Dist.	Not Reported	Not Reported
Mann Creek Irrigation Dist.	4,228.4 acres	Not Reported
Milner Low Lift Irr. Dist.	13,524 acres	5.2 acre-feet per acre
Minidoka Irrigation District	71,930.5 acres	3.98 acre-feet per acre
Monroe Creek Irr. District	No Statement Submitted as	Required by Law
Mountain Home Irr. District	Not Reported	Not Reported
Nampa-Meridian Irr. District	Not Reported	Not Reported
New Sweden Irriga. District	22,465 acres	6.4 acre-feet per acre
New York Irrigation District	17,609.99 acres	3.08 acre-feet per acr
Opaline Irrigation District	2,500.0 acres	4.1 acre-feet per acre
Pioneer Irrigation District	34,896.23 acres	6.0 acre-feet per acre
Poplar Irrigation District	No Statement Submitted as	Required by Law
Post Falls Irrigation District	3,156 acres	2.5 acre-feet per acre

Source: Department of Reclamation, Twenty-sixth Biennial Report 1968-1970, R. K. Higginson, State Reclamation Engineer, Boise, Idaho.

Table 5 (Continued)

Irrigation District	Acreage Reported Irrigated - 1969	Water Delivered 1969
Progressive Irrigation Dist.	31,854 acres	4.1 acre-feet per acre
Reynolds Irrigation District	No Statement Submitted as Required by Law	
Riverside Irrigation District	8,143.08 acres	None- Engaged only in Drainage
Roseberry Irrigation District	2,810.45 acres	Not Reported
Settler's Irrigation District	12,000 acres	Not Reported
Snake River Valley Irr. Dist.	21,584.0 acres	4.34 acre-feet per acre
Snake River Irrigation Distr.	6,600 acres	Not Reported
Strongarm Reservoir Irr. Dist.	907.5 acres	2.02 acre-feet per acre
Sunnydell Irrigation District	Not Reported	Not Reported
Weiser Irrigation District	Not Reported	Not Reported
West Reynolds Irrigation D.	No Statement Submitted as Required by Law	
Wilder Irrigation District	56,631.35 acres	3.85 acre-feet per acre
Wood River Valley Irr. Dist.	8,500 acres	9.42 acre-feet per acre

Average annual consumptive irrigation requirements for crops grown in the Ashton and Driggs area range from approximately 9.5 inches for corn silage to 13.6 inches for winter grain. Although these values would appear to indicate a serious wasting of irrigation water, it must be noted that the two values are not comparable. Sutter and Corey (1970) describe a method of determining irrigation requirements for individual projects using consumptive irrigation requirements for each of the different crops grown on the project, acreages of each crop and an irrigation efficiency factor. This method should be followed to determine whether serious wasting of water is indeed occurring in the Madison-Fremont District.

While recognizing the positive contribution irrigation has on the economy of the region (see Appendix VI), one cannot overlook some direct and indirect effects on the local environment. Adverse effects include the following factors:

1. During a significant portion of the abbreviated growing season (Table 6), the removal of irrigation water results in extreme reduction in streamflow. The reduced flow may adversely affect many of the forms comprising the stream biota (Minshall and Winger, 1968). It may also contribute to elevated water temperatures and a reduction in the capacity of the stream ecosystem to receive and carry a variety of pollutants. Under the conditions of reduced flow and elevated temperatures, numerous problems may arise. One such problem is a reduction in dissolved oxygen, a factor which may also retard biochemical breakdown of pollutants. Attesting to the growing concern for minimum streamflows is the fact that the Pacific Northwest River Basins Commission held a workshop on instreamflow requirements in March, 1972. During this workshop the idea was voiced that if we are to plan for the development, conservation, use and management of our water resources, we must be cognizant of two factors: 1) the need for a well-conceived, acceptable land use plan; and 2) adequate flow regulations to protect that quality not only of the streams in this basin but throughout the entire northwest now and for the foresee-

Table 6. Length of Growing Season in Selected Areas of Henry's Fork and Teton River Basin*

County	Average Length of Growing Season (days)
Fremont	66
1. Island Park	46
2. Ashton	85
Madison	97
1. Sugar	97
Teton	59
1. Tetonia	64
2. Driggs	53

*Source: Idaho Agricultural Experiment Station, University of Idaho, Spring and Fall Freezing Temperatures in Idaho, (Moscow, Idaho: The University of Idaho), 1968.

able future. As early as 1955 the Oregon legislature established a Water Resource Board which had as one of its charges the establishment of minimum perennial streamflows sufficient to support aquatic life and to minimize pollution. Under that same legislation it was spelled out that the purpose of formulating water use programs was to allocate water for the highest and best use in the interests of the people of the State of Oregon. This bold step was obviously a change from the appropriative water law doctrine of being "first in time," "first in right," without regard to type of use except that it be beneficial. This concept adopted by the Oregon legislature some 17 years ago recognized the shortcoming of the philosophy that all water flowing in streams is surplus and is being wasted to the sea. It is also obvious that general acceptance of this change in philosophy has not occurred, and that in the minds of many people water remaining in the stream is still regarded as wasted water. This reluctance to change a basic philosophy would appear to be rooted in the "pioneer" philosophy in which resources were regarded as simply being available to those hardy enough to subdue and put them to use, a procedure sometimes referred to as "taming the West".

The Idaho Fish and Game Department has prepared a list of recommended minimum flows for the Idaho Water Resource Board. Streams of the Henry's Fork and Teton River Basins are included (Table 7). It is encouraging to note that an additional effort has recently been initiated to determine instreamflow requirements in some of these streams. Preliminary work is presently being conducted by the U. S. Bureau of Sport Fisheries and Wildlife under the direction of Mr. Keith Bayha of the Boise office. Unfortunately, these data do not come easily or quickly; and even once the data are available, it becomes the task of a group of individuals to make decisions regarding minimum flow requirements for individual streams. However, the need for

Table 7. Upper Snake River Basins Recommended Minimum Flows by Station*

Station No.	Stream	Location	Recommended Flow (cfs)	Fishery
1	Henrys Fk.	Henrys Lake Dam	10	Rainbow, Cutthroat
2	Henrys Fk.	Island Park	100	Rainbow, Cutthroat
3	Buffalo R.	At mouth	100	Rainbow, Brook trout
4	Warm R.	At mouth	150	Rainbow, Brook trout
5	Robinson Cr.	At mouth	80	Rainbow, Cutthroat, Brook trout
6	Henrys Fk.	Ashton	500	Rainbow
7	Conant Cr.	At mouth	10	Rainbow
8	Squirrel Cr.	At mouth	5	Brook trout
9	Falls R.	Squirrel	300	Rainbow
10	Falls R.	Chester	300	Rainbow
11	Falls R.	St. Anthony	300	Rainbow
12	Henrys Fk.	St. Anthony	500	Rainbow
13	Henrys Fk.	At mouth	500	Rainbow
14	Teton R.	Driggs	100	Rainbow, Cutthroat, Brook trout
15	N. Fk Teton	At mouth	50	Rainbow, Cutthroat, Brook trout
16	Teton R.	St. Anthony	300	Rainbow, Cutthroat, Brook trout
17	S. Fk. Teton	At mouth	50	Rainbow, Cutthroat, Brook trout
18	Teton R.	At mouth	350	Rainbow, Cutthroat Brook trout
19	Henrys Fk.	Near Rexburg	500	Rainbow

*Source: "Aquatic Life Water Needs," Planning Report No. 3, Idaho Water Resource Board, 1969.

such decisions is great, and we are confident that these kinds of decisions will be incorporated in future planning.

2. There are several other important effects related to the removal of irrigation water from streams; some of which might be categorized as direct effects, other as indirect effects. Where sizable quantities are removed from streams via irrigation ditches or canals followed by application to the land, an increased aquatic habitat is created which may support a variety of undesirable organisms. The mosquito is a good example of one such organism. Increased populations of these insects are regarded as pests and commonly occur in areas of irrigation development. Their presence frequently result in requests by the local populace for abatement or control programs. Frequently these control programs rely heavily on the use of chemicals which may themselves have some undesirable consequences. Mosquitos may pose additional problems besides being general pests. Their role as vectors in the transmission of equine encephalitis has been noted in the Upper Snake River Basin, Vol. III, Pt. 1 (Chapter 9).

Simply bringing new land into agricultural production to be farmed with or without irrigation is not without some ecological ramifications. In the attempt to maximize efficiency, we commonly see large acreages planted to a single crop. From an economic standpoint the reasons for following these procedures are well documented and include items such as ease of land preparation and greater efficiency in the utilization of mechanized equipment. However, this practice does produce ecological problems. The practice of monoculture has been criticized because of dramatic reduction in the diversity of organisms which are normally indigenous to a given area. A number of different plant and animal species are eliminated or their numbers greatly reduced in the process of clearing land and planting it to a single crop. At the same time some organisms which compete with man for a crop, and

thus are automatically regarded as pests, undergo dramatic increases in their numbers. Man reacts by undertaking abatement or control programs aimed at limiting their numbers so that crop yield is maximized. Once again chemical agents are too often used; some of which may have extremely undesirable side effects on non-target organisms.

As practiced today one common modification of farming involves the elimination of fence rows and patches of brush which directly influences the ability of the land to support a variety of wildlife forms. This is but another way of reducing species diversity, which if continued indefinitely places us in the precarious position of subjecting the environment to a condition of instability. Imbalances tend to occur with increasing frequency and are more difficult to bring back under control.

3. Irrigation return water is a third factor that must be considered when examining environmental effects of irrigation. The return of such waters might at first appear to be a positive factor; but because of materials contained in the water, it is generally regarded as a negative factor. Included in the materials found in return flows are inordinately high suspended sediment loads and a variety of chemical pesticides and fertilizers. If present in large enough concentrations in large volumes of return flows, these materials can contribute to degradation of the overall water quality. Increasing the sediment load has adverse effects on the stream biota by reducing dissolved oxygen and contributing to the siltation of stream beds, often making them unsuitable for invertebrate life and species of game fish. Chemical agents applied to the land to control a variety of insect or plant pests may, upon reaching a stream, undergo a series of concentrations referred to as "biological magnification" and have deleterious effects on fish and birdlife. Inorganic fertilizers high in nitrogen, ammonia and phosphorus elicit in the vegetation of streams precisely the

same response as in land plants. That response involves a stimulation of growth. Commonly this increased growth is manifested in a condition known as "algal blooms". This is particularly true when one is confronted with a standing body of water as in downstream reservoirs. However, irrigation return flows represent but one source of these materials as they are also common constituents of municipal and industrial sewage. The problems associated with irrigation return flows, though not eliminated, are on the decline in some areas as the transition from gravity to sprinkler irrigation is carried out.

Ground Water Recharge

Recharge involves the spreading of excess seasonal runoff and floodflows onto the Snake River Plain at locations where this water would disappear from the surface and find its way into the regional ground water table. Such a procedure has been proposed to provide additional sources of irrigation water on the Snake River Plain (Upper Snake River Basin, Vol. IV, Pt. I, p. 103) in the area between the sand dunes and Plano, Idaho. Maximum diversion of 1,500 cfs from the Henry's Fork at St. Anthony has been proposed. Calculated on this basis approximately 150,000 acre-feet could be diverted to the Snake River Plain for recharge. Up to 490,000 acre-feet might be diverted in a year of extremely high runoff. Although this means of storing water is attractive, it is not without potential problems. Prediction of the direction of movement taken by the recharge water is one of these, and one runs the risk of raising water tables in other areas.

The recharge of underground water supplies by design is not a common practice at the present time. The exception to this statement occurs in the type of irrigation practiced in some areas of the basin and in particular on the Egin Bench. This area is an unusually smooth and gently sloping body of land north and west of Henry's Fork between St. Anthony and the mouth of the south branch of Teton River. Soils in this area are highly permeable. Early in the spring water is diverted

via canals which are checked at intervals. At the same time diversions are made into shallow ponds and lakes bordering on the north edge of Egin Bench. As a result, ground water over the whole area is brought to a point near the surface. During the irrigation season limited amounts of water are introduced into the canals to maintain the desired water level beneath the cropland. Checked ditches are spaced from 60 to 80 feet apart and are used to intermittently raise and lower the ground water making it available to plants. Obviously this method of irrigation requires a high level of water input per acre.

Although ground water recharge contributes significantly to water availability, there is some question as to consequences this type of irrigation has on water levels in the Mud Lake region. There have been charges that high ground water levels in the Mud Lake area have been at least partly due to subirrigation practiced on the Egin Bench. A caution should be expressed that recharge of the regional ground water aquifer could cause drainage problems in agricultural areas down gradient from the diversions from the river. Areas immediately south of the Henry's Fork Basin near the communities of Rigby and Ririe are presently plagued with a high water table problem. A careful monitoring program should be initiated to be able to identify the hazards and to be able to avoid adverse environmental problems.

A further hazard is the effect of sediment carried by flood flows on the transmissibility characteristics of groundwater aquifer. The real impact of this water is not as well known as it should be.

Possibilities for utilizing the sand dunes area west of St. Anthony as a State Park or a special recreational area makes it imperative that future activity with recharge consider how the spreading areas will be maintained and what the aesthetic appearance might be. The opportunity for enhancing wildlife may be a benefit from diversions. Predictive biological response research is needed to help decide what environmental impact will be.

Gravity type irrigation, as practiced through the remainder of the basin, must certainly contribute to recharge of underground water supplies. Whether or not this recharge involves perched water tables at some point in the basin or whether there is a contribution to the overall aquifer

must be determined on an individual basis. It is conceivable that eventually much of the water applied in the Henry's Fork and Teton River Basins either by subirrigation or by simple gravity irrigation must enter the Snake River aquifer and ultimately appear at a point some distance downstream. It may even contribute to the flow in the Thousand Springs area.

Water Quality

One of the common criteria used in evaluating water quality involves the abundance of certain groups of bacterial organisms. Coliform bacteria are regarded as an indicator of the extent of fecal contamination in a stream. The U. S. Forest Service has been involved in studying bacterial contamination in portions of the Henry's Fork of the Snake River during the past several years. Most recently this work has been carried out by personnel at Ricks College under the direction of Dr. Lynn Speth. Although a final report has not been made available, certain trends are apparent. If one uses a water source such as the flow from Big Springs for a baseline, a comparison can be made as to the extent of pollution.

Their data indicate that during the summer of 1969 total coliform numbers in Big Springs exceeded the Idaho maximum permissable level of 240 MPN/100 ml on only one occasion. On all other sampling dates (1969) only very low numbers of total coliforms were present. A dramatic change in water quality based on these organisms can be seen in the vicinity of Mack's Inn. Immediately downstream from this area of intensive recreational use, total coliforms exceeded the Idaho maximum permissible level on all sampling dates except one. During the period of greatest use (late July to early September 1969), peak total coliforms exceeded 12,000 MPN/100 ml. Such levels preclude safe recreational use of the water by humans. Even downstream in the vicinity of Last Chance, coliform levels exceed 3000 MPN/100 ml on two sampling dates during the 1969 summer period. Again, enough organisms were present that the Idaho standards were exceeded throughout the summer months.

These data reveal both the degree and speed with which a stream may become overloaded as a result of sewage problems in areas of intensive recreational use. They also reflect the need for dramatic improvement in

sewage treatment capabilities wherever large numbers of people congregate during a relatively short season. Many of the summer homes in this area lack even minimal equipment such as septic tanks and are equipped only with outdoor "privies". As recreational use intensifies there is every likelihood that the problem will increase in severity.

Limited water quality data including stream temperatures and selected chemical parameters are available for 1970-71 in a publication entitled "Water Resources Data for Idaho, Part 2, Water Quality Records" as compiled by the U. S. Department of the Interior, U. S. Geological Survey. Data contained therein should be compared with those obtained in the future to assess changes in these water quality parameters.

III. ENVIRONMENTAL CONDITIONS AS NOTED IN IN ROBINSON CREEK, IDAHO

The benthic invertebrate community found in Robinson Creek, Fremont County, Idaho (Appendix II) is typical of most of the pristine trout streams of the basin such as Fall and Warm Rivers. This fauna is marked by a variety of mayflies (Ephemeroptera), stoneflies (Plecoptera) and caddisflies (Trichoptera) as well as by an assortment of worms, snails, clams and midges. Robinson Creek also supports an excellent trout fishery and sculpins (Cottus) are present. The diversity of the community as well as the moderate numerical abundance of the individual populations is a good indication of the excellent water quality and physical habitat presently found in Robinson Creek.

Should the stream become impounded, one would expect a shift in the benthic community to conditions of decreased diversity and increased abundance of the surviving populations. The kinds of mayflies, stoneflies and caddisflies would be severely reduced or eliminated. They would be replaced by ooze-dwelling organisms such as midges (Chiromomidae), tubifex worms (Oligochaeta:Tubificidae) and a few planktonic animals. Downstream populations probably would be noticeably affected by the altered temperature and flow regimens, but the exact shift in the structure of the community and whether or not the change would be totally detrimental is uncertain at this time. However, based on current reservoir design and management practices the effect would be expected to be generally unfavorable with one possible outcome being a sharp decrease in trout production (Corning, 1969).

A comparison of water samples from several streams which are tributaries to Henry's Fork (Table 8) indicates that the water in Robinson Creek is moderately-well buffered by calcium carbonate but less so than streams along the south edge of Teton Valley. This would suggest that streams in the Robinson Creek area would be less likely to support nuisance plant growths and less able to withstand the addition of acid materials (such as might arise from mining operations) than would their more heavily buffered counterparts. Maximum (summertime) temperatures

Table 8. Mid-Summer Temperature, pH, and Alkalinity Values for Selected Tributaries to Henry's Fork of the Snake River.

	Date	Temp (°C)	pH	Alkalinity	
				phphth	MP(total)
Robinson Creek	7-11-68	20.0	8.0	0	71
Warm River	7-11-68	14.5	8.3	0	64
Henry's Fork	7-11-68	15.0	7.9	0	86
Trail Creek	7-17-67	9.0	8.1	-	140
	7- 5-69	8.0	8.1	-	-
Warm Spring	7-17-67	19.0			
	7- 9-68	19.0	7.5	0	165
	7- 5-69	19.0	7.2	0	240
Warm Creek	7-17-67	9.5	8.1	0	127
	7- 9-68	9.0	8.2	0	128
	7- 5-69	14.0	7.9	0	200
Teton River	7-17-67	14.0	8.0	-	160
	7- 9-68	15.0	7.2	6.0	142
	7- 5-69	14.0	8.4	0	188

(Table 8) are within the optimum range for trout and are indicative of the snow-fed origin and well-shaded nature of the stream. Suspended solids generally are low as indicated by the quality of the bottom-dwelling invertebrates and the predominantly rubble-gravel substratum.

IV. PROBLEMS ASSOCIATED WITH PRESENT LAND USE PRACTICES

Logging

Timber in this drainage is composed mostly of Lodgepole Pine and Douglas Fir. As could be expected in any such uniform stand, diseases and related problems arise. Aerial observation of the area demonstrates that beetles are killing or have killed tens of thousands of trees. Some people feel that this is a waste and that the timber should be utilized. While from an immediate economic standpoint this view may be valid, it should also be noted that by allowing these trees to undergo a natural decay, process nutrients are released which can be utilized by replacement growth. Opening the canopy of typically uniform or even-aged stands of lodgepole makes possible the release of shade intolerant species such as Douglas Fir and hardwoods including aspen, cherry, and maple. While Douglas Fir ranks as the leading lumber producing species in the United States (Harlow, 1958), the hardwoods indigenous to this area have little or no direct economic value. However, they do play an important indirect role in providing cover and food for game.

Timber harvesting in the watershed has not been one of the major widespread disturbances; although in a few restricted areas, considerable clearcutting has occurred (Figures 2 and 3). Logging methods have been of two types: (1) select cutting involving removal of approximately 40% of the stand; and 2) clearcutting. The former does not appear to have significantly increased harvest cost. Clearcutting practices have been modified by reduction in size of the area logged and by cutting trees so that an irregular or "feathered" edge results. This practice increases "edge effect" which contributes both to diversified fauna and increased utilization by game animals.

Cutting has recently been largely restricted to salvaging timber damaged by beetle infestation and trees suffering damage from ice or wet snow. Some tracts which have been offered for sale have not been bid because loggers apparently believed that a profit could not be realized.

Figure 2. Clearcut and slash burn near Falls River.

Figure 3. Clearcut and slash burn near Falls River. Note the timber stands left in the middle. Islands such as these standing trees provide more edge effect.

Harvest yields are low in the area averaging about 8,000 to 9,000 board feet per acre in lodgepole stands.

Clearcutting can result in adverse effects on populations of game animals. On Bishop Mountain the summer population of elk has declined since clearcutting practices were used although numbers of elk migrating are relatively unchanged. These elk migrate from Yellowstone Park to the desert in a short period (two to three days) and thus do not contribute substantially to the total number taken by hunters. Some individuals indicated that the number of wintering elk have not declined significantly, even though the hunter kill has declined.

It is the opinion of some that clearcutting on even aged stands in areas such as Moose Creek may increase elk production in a few years because the lodgepole is sufficiently dense to limit shrub production and thus indirectly elk production. Others believe that selective cutting would have produced the same results but in a shorter time.

If natural reseeding has not occurred within a three year period, artificial reseeding is undertaken. Costs per acre including overhead may approach $100 per acre. Direct costs just for the seeding average approximately $30 per acre.

Logging also tends to have adverse effects upon the water - retaining capacity of the watershed. Any forest floor is covered with duff and decaying plant materials which serve to insulate the soil. Water from thawing snow or rain tends to be held in the duff or to percolate into the soil which may not have been frozen. After removal of trees and subsequent burning of slash, much of this duff which is high in organic matter tends to erode rapidly if slopes are very steep. The depth to which the ground freezes is increased and water cannot readily percolate into the soil. In this way runoff is increased, thus contributing to flooding of streams and lowlands. Nutrients are more readily leached from the soil and erosion rates tend to increase. Studies in the Hubbard Brook Experimental Forest in New Hampshire have shown significant changes in the chemical composition of streams arising in watersheds where manipulation has occurred (Likens, et. al. 1970). Invertebrates which serve as food for fish tend to be reduced and spawning grounds may be destroyed. To counteract these effects, the U. S. Forest Service

has restricted harvest in areas with shallow soils or in steep-walled ravines. They are to be commended for this restriction and the practice should continue.

In the past, attempts to control beetle infestation relied primarily upon chemical methods. While this attempt control would at first seem justifiable from the standpoint of resource conservation, it proved to be too expensive. In some instances chemical control approached a cost of $4 per tree (Loope, 1972). This cost must be compared to a relatively low return realized in a recent sale of salvage timber located on Snow Creek. At least one successful bidder paid less than 20¢ per tree (personal communication with an anonymous logger).

Recreation

Use of an area for recreation purposes is frequently accompanied by several problems. To prevent pollution of streams and countryside, toilets must be installed wherever intensive use occurs. Toilets should be the self-contained type rather than drain-field type due to a shallow water table throughout much of the study area as in the high mountains, on the borders of the Henry's Fork, in the area of Mack's Inn and by Henry's Lake. Nutrients and bacteria commonly enter the water table from drain-fields and tend quickly to enter wells and streams, rendering them dangerous for human use. However, self contained disposal facilities are expensive to install and maintain.

Litter and garbage problems are becoming greater throughout the area. Fishermen, hunters, boaters, snowmobilers, hikers and picnickers all contribute to the problem. Perhaps the best and most inexpensive way to remedy this problem would be to require each group to carry out all the garbage generated by them. Because this method is probably not practical, personnel must be hired to maintain disposal receptacles. Although expensive, this practice must continue if the area is to remain aesthetically pleasing and attractive to visitors.

Because the area is ideally suited, snowmobile use is heavy in much of the area encompassed in this study. Much of this use is concentrated in areas under dryland farming as well as more remote areas. It is reported

that enthusiasts have been very cooperative in avoiding areas which are heavily utilized as wintering areas by big game. These animals which commonly migrate from the mountainous areas to the desert may not be seriously affected. However, in some areas, such as Falls River Canyon which moose utilize as a winter range, it appears that snowmobile use should be restricted. In summary, snowmobile use presently does not seem to conflict with agriculture, and environmental effects appear to be minimal.

Trail bikes which can cause erosion problems and disturb game do not appear to present a significant hazard. Some complaints were voiced by campers who have to tolerate with noise and smoke in campgrounds which would otherwise be quiet and restful. Some complaints were also heard from hikers, many of whom feel that separate trails should be established.

Float trip use of streams located in public lands has increased greatly in the last fifteen years. Dr. Frank C. Craighead, Jr., in a paper presented at the Teton Dam Symposium stated, "I first floated the upper Snake here in 1945 and fished it and studied its wildlife for many years. On trips of several days I would go without seeing a single raft or boat. Not until about 10 years later did I begin to see rafts on the river and after this boating rapidly increased, then exploded until in 1970 some 50,000 people floated this short stretch of the Snake River within Grand Teton National Park. A year later (1971) the number of floaters had risen to 68,000 and this <u>did not</u> include stretches of the river north of the park nor the canyon to the south. It will be surprising if this number does not double within the next two years. This gives some idea of the recreational use and value of a scenic free-flowing river." (Idaho Environmental Council Report, 1972).

Unofficial records (but agreed upon independently by several people in the area) for Henry's Fork show an increase of 300% in float trips during 1971 over 1970. Until now most of these trips have been by people who use their own boats and equipment. The number of float trips and people involved will, in all likelihood, increase because such trips are now advertized. The use of jet boats, common on the Snake River in Hell's Canyon, has not been practiced on the streams covered in this report.

Seventeen hundred visitor days were recorded by the U. S. Forest Service on the area from Osborne Bridge to Warm River Confluence last year. Because the method of recording this information was not all conclusive, U. S. Forest Service personnel believe that this may reflect approximately one-third of the actual visitor days.

In the state park at Henry's Lake visitor use increased from 9,076 in 1968 to 12,327 in 1969. During the following year nearly 20,000 visited the same facility. As noted elsewhere in this report, such increases cannot continue indefinitely without serious deterioration of those features which attract people in the first place.

Areas which were once planned for development have been found to be unsuitable from an environmental standpoint. An example is the Falls River Drainage Basin. At one time, because of its scenic beauty, it was considered for development of facilities for 5000 people. The West Slope Study indicated that because the water table was too shallow and erosion danger too high, the area would be destroyed by such development. The road into the area has been closed to prevent such destruction. The U. S. Forest Service is to be commended for such stewardship of public lands.

The Island Park Reservoir area has been receiving heavy use by elderly people and people with young children. Many of the users remained camped on the shoreline for the majority of the summer, preventing others from also utilizing the beautiful shoreline and lake. Plans to prevent takeover by a few individuals or groups of individuals who refer to spots as their own have been implemented by the U. S. Forest Service and Idaho Fish and Game Commission using the following plans:

1. Recreation vehicles are not to be left unattended for longer than 24 hours.
2. No camp can remain longer than ten days. A camp cannot be reestablished within ten miles of the original campsite.
3. Camping must be done in designated areas back from the shoreline rather than at the water's edge. This facilitates use by more people.
4. No off road travel by vehicles.

These rules prevent private claim on public shorelines and enable more people to utilize the shore and water edge. Game would be allowed greater access to the reservoir if these rules are implemented.

Agriculture

Much of the dryland farming in the upper drainage takes place on land which has a 5-10^{o} slope. Approximately 263,000 acres of farmland drain into the Teton River. Because poor agricultural practices, slope steepness and exposure, spring runoff may remove up to 200 tons of top soil per acre according to the U. S. Soil Conservation Service personnel. In Madison County 40 miles of terracing has been completed with the goal of reducing this kind of erosion loss. Because water is retained on the fields, more percolates into the soil where it either moves slowly towards streams or is utilized by crop plants. Such terracing also tends to promote contour farming, which also has positive effects on run-off. Another method presently being implemented is that of installing debris or catch basins. Personnel of the U. S. Soil Conservation Service in both Fremont and Madison Counties indicated that in some areas such devices have practically eliminated surface runoff especially if accompanied by basin tilling. They are to be commended for encouraging local farmers to participate in these activities. Not only is there direct benefit to the farmers from reducing loss of top soil, but a concomitant reduction of stream siltation must be regarded as an important benefit.

In areas where attempts to retard runoff have not been implemented, dryland farming tends to increase flooding potential. Denuding soil of all vegetation, as exists if summer fallowing occurs or in preparing land for a harvestable crop, decreases water retention. Doshchanov (1955) found that the density of vegetation cover directly influenced runoff. In some instances surface runoff was completely absent in plots having 90% vegetation cover.

On irrigated land, water delivery practices are complicated and appear to be a natural result of archaic water law. Prior water rights on all water flowing from the drainage adhere to the American Falls area. Rights for land in the Madison-Fremont area are considered junior to

those in American Falls. In the past water that was in excess of the American Falls requirements was purchased by Madison-Fremont District, and over the last 25 years this district has received sufficient water to meet irrigation needs. Because most of this water is stored in Island Park and Grassy Lake Reservoirs, rights have been filed on other streams in the basin some of which are then "used" as replacement for that actually removed from Henry's Fork. An interconnecting system of canals is to be undertaken in conjunction with the Teton Dam Project to effect greater water availability to the Madison-Fremont District. Most of this added water will allow more land to be brought under irrigation. In addition, wells will be drilled in the Ashton area and will be used to replace water used by the Madison-Fremont irrigators during years when American Falls Reservoir does not completely fill.

Grazing

Grazing is currently one of the major commercial uses of both public and private land in the study area. Herds of cattle utilize many privately owned lowland areas which are too wet to till and also the publicly owned steep upland areas. The local populace attributes great national significance to the number of cattle and sheep which graze on public land and regard grass or browse not consumed by livestock as wasted. The philosophy of private owners toward public land too often tend to be one of "getting while the getting is good" and not worrying about what happens to the land. The repeated cycles of spray-seed-overgraze, spray-seed-overgraze indicates that too many land managers and livestock owners do not appreciate the net effects on the land itself or the vegetation it supports. Further, it is not an economical operation when environmental aspects are also considered.

We must question whether it is economically sound to destroy vegetation and top soil for a small return of protoplasm in the form of beef for the table. On a national scale we find that livestock production on public lands is a very small percentage of the total production (Table 9). Examination of these tables reveals that the amount of beef produced on federal land is at most 4.75% of the nation's total beef production. It

Table 9. Cattle on Public Land Compared to Total U.S. Cattle in 1969

Cattle on Forest Service land	1,639,000
Cattle on Taylor Grazing leases	1,141,300
Cattle on BLM permits	2,246,351
TOTAL Number of Cattle on Public Land	5,026,651
Total number of cattle on U. S. Farms	109,885,000
Total number of beef cattle on U. S. Farms	88,269,000
Percent of all cattle on Forest Service land	1.49%
Percent of all cattle on Taylor Grazing leases	1.29%
Percent of all cattle on BLM permits	2.54%
TOTAL Percent of all Cattle in U. S. on Public Land.	4.57%
Percent of all beef cattle only on Forest Service land	1.86%
Percent of all beef cattle only on Taylor Grazing leases	1.29%
Percent of all beef cattle only on BLM Grazing permits	2.54%
TOTAL of all Beef Cattle Only on Public Lands	5.69%

From U.S. Dept. of the Interior BLM, 1970, Public Land Statistics.

U.S. Dept. of Agri. 1971, Agricultural Conservation and Forestry Statistics, 1971.

must be noted that the U. S. Department of Agriculture figures do not differentiate between cattle, horses and swine when referring to grazing permits and the totals include these animals as well. Slaughter data are for cattle only. Thus the true percentage of cattle on public land is actually less than 4.75%. We must question whether it is worth jeopardizing vast areas of our country for at most 4.75% of the nation's beef production and 36.56% of its mutton production.

There are several reasons that grazing of domestic livestock is considered more harmful to a watershed than grazing of wild game. Domestic livestock generally move in large numbers during the grazing season while at that time game moves in pairs or small bands. Large concentrated numbers graze less selectively and more extensively. Fewer organisms select, nibble and walk on. The repeated trampling by large bands crush small plants and lichens leaving the soil exposed to wind and runoff erosion. With fewer animals the plant cover has a chance to recover between tramplings. Cows tend to graze near springs and streams causing siltation and damage to stream bottoms in addition to reducing water holding capacity. Wild game tends to stay away from such areas except in winter and when they obtain water.

Because of herd trampling and overgrazing, some areas lose their productivity, lose their ability to retain water during thaws and after precipitation; and thus the danger of flooding increases. Plant diversity is lessened and weed plants such as large sage, cheat grass, mules ear, rabbit brush and Canadian thistle enter and make the range less desirable for domestic as well as game animals to say nothing of the people who could find recreation in the area. These areas are then regarded as requiring chemical treatment. Public officials interviewed for this report seemed unaware that by spraying they were very effectively reducing plant diversity from 60-70 species in an untreated area to approximately four species in heavily sprayed areas or to 15 species in less heavily sprayed areas. Because the plants were unknown to them, they were regarded as unimportant! Such ignorance or apathy on the part of public officials must be corrected. Large stands of Wyethia (Mule's Ears) testify to past overgrazing and abuse. Areas already abused by overgrazing are thus further abused by spraying. The "correction" is actually further destruction.

Detericration of range has accompanied profit to a select few in region. This has occurred over an extended period of time. Correction of this condition should not be expected to be inexpensive or fast. A cheap application of spray may enhance conditions for livestock for a few years, but it will not provide an area which can be useful to the majority of society. Yet spraying is continuing as a correction for reducing "weeds". A means must be found which will remove only the weeds, allow the top soil to remain and which will foster the return, not the demise, of species diversity. Chaining where suitable is one possible method.

If we compare the number of user or visitor days or visits to public lands (Tables 10, 11, 12), we find that on BLM land cattle and sheep operators are out numbered by every other category of use. Because many who have been classified under the Taylor Grazing Act would also have grazing permits, the total number of operators was actually less than 23,132. Visitor days to BLM lands for recreation use numbered 38,804,000. Even if each person who visited spent 30 days on BLM land, which is highly unlikely, the number would be 1,293,466 visitors. This greatly exceeds the cattle and sheep operators of less than 23,132 U.S. total.

These remarks should not be construed to mean that grazing on public domain should be eliminated. It should, however, be closely scrutinized. Where present practices appear to promote growth of undesirable plant species, grazing rates should be adjusted to prevent such changes. Where cattle or sheep are eliminating browse plants for game, any decisions should consider that game hunters far outnumber livestock owners utilizing public lands. Repeated studies have revealed that plant diversity is necessary for wild animal populations to survive in an area. Domestic stock are dependent upon artificial feeding and shelter for survival during adverse seasons.

The time and money for this report did not allow thorough inspection of range conditions. Most of the range that was inspected appeared to be in relatively good condition except for portions of the Falls River Drainage and scattered areas as evidenced by abundant sage or mules ear.

Table 10. Number of Visitor Days on BLM Lands in 1969

	Camping	Picknicking	Fishing	Hunting	Sightseeing	Water Sports	Winter Sports	Other	Total
Idaho	169,000	66,000	1,370,000	565,000	87,000	50,000	27,000	16,000	2,350,000
U.S.	8,768,000	2,211,000	6,283,000	5,996,800	9,608,000	2,952,000	362,000	2,624,000	38,804,000

Visitor Days on Forest Service Lands 1970

Idaho	9,154,000
U.S.	172,555,000

Estimated Number of Recreation Visits to Public Lands Under the Jurisdiction of the Bureau of Land Management, 1969.

	Camping	Picknicking	Fishing	Hunting	Sightseeing	Water Sports	Winter Sports	Other	Total
Idaho	68,000	66,000	2,740,000	565,000	87,000	50,000	27,000	16,000	3,619,000
U.S.	6,449,000	5,163,000	12,567,800	5,995,800	25,957,000	1,908,000	1,087,000	5,633,000	64,760,600

From U.S. Dept. of the Interior, BLM, "1970 Public Land Statistics" and U.S.D.A., 1971.

Table 11. Sheep on Public Land Compared to Total of All Sheep in U.S. in 1969.

Sheep on Forest Service Land Grazing Permits	2,162,000
Sheep on Taylor Grazing Leases	1,622,400
Sheep on BLM Grazing Permits	3,980,509
Total Sheep and Lambs on Public Lands	7,764,909
Total Sheep and Lambs on U.S. Farms	21,238,000
Percent of all Sheep on Forest Service Permits	10.18%
Percent of All Sheep on Taylor Grazing Lease Lands	7.64%
Percent of All Sheep on BLM Grazing Permits	18.74%
Percent of All Sheep in U.S. on Public Lands	36.56%

From U.S. Dept. of the Interior, BLM, 1970, "Public Land Statistics," 1970.

Table 12. Number of Operators Owning Sheep and Cattle on U.S. Lands Not Including Forest Service Lands

	United States	Idaho
Operators on Taylor Grazing Act Lease Lands	8,200	800
Operators on BLM Grazing Permits	14,932	2,069
Total Operators on Both	22,132	2,869

U.S. Department of Interior, BLM., 1970, "Public Land Statistics."

V. FISH AND WILDLIFE CONSIDERATIONS

Environmentally Sensitive Areas

There is considerable annual flooding of the lower Snake River (Henry's Fork) in its meandering channel near Rexburg. This is well illustrated by the aerial photos in Figures 4, 5 and 6. Farming has been attempted in this low-lying area and is considerably hampered by high water in the spring (see especially Figure 7). One standard method of dealing with this problem has been to construct dams on streams feeding into a problem area, thereby controlling the amount of water released and curtailing downstream floods. In the Henry's Fork basin several such impoundments exist and contribute to flood control. This method has disastrous effects on the inundated canyon lands upstream. These canyons may well be very valuable in themselves for recreation, aesthetics and as a refuge for animals and plants by man from the entire surrounding area. A less ecologically deleterious solution to this problem would, therefore, seem in order. One such solution would be to consider carefully the possibility of buying up this flood prone land and utilizing the land in another fashion, perhaps by establishing a wildlife refuge. This way the flooding would be compatible with the desired land use and the upstream waters would not need containment.

Another possible solution would be the use of off-set levies placed at suitable distances from the river so that any flooding or seepage would be contained. This assumes that the land near the river will not be used for intensive agriculture. Rather, such practices are grazing or growing of alfalfa type crops would be more suitable. At any rate, the area has a high potential for waterfowl and these possibilities should be investigated before any impoundments are constructed.

The only remaining native habitat for animals and plants in the lower Teton River drainage and other similar streams is found in the narrow river canyons (Figures 8, 9, 10, 11). All the relatively flat areas on each side for many miles have been converted to monocultures, especially wheat. There has been no mitigation for the loss of these

Figure 4. Flooding of lowlands on the Snake River near Rexburg and St. Anthony (June, 1972). Farming attempts can be seen in the foreground.

Figure 5. Flooding of Snake River near Rexburg. Note the proximity of cultivated fields to the flooded river.

Figure 6. Flooding of the Snake River (Henry's Fork) on the edge of the lava flows near Rexburg.

Figure 7. Farming of the lowlands near flooding of the Snake River near Rexburg.

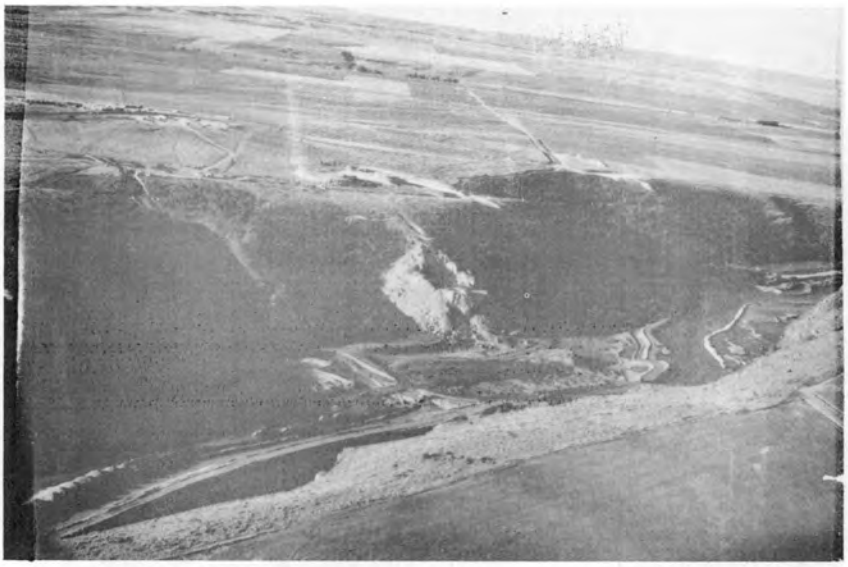


Figure 8. Fremont Dam Site on the Teton River. Note channel modification which has already taken place.

Figure 9. Fremont Dam Site on the Teton River. Note the extensive farming up to the edge of the canyon.

Figure 10. Lower Teton River near the dam site. Note the intensive agriculture up to the canyon edge.

Figure 11. Upper reaches of the South Fork of Teton River where it enters its canyon. Note the cliffs which are utilized as nesting sites for hawks and eagles.

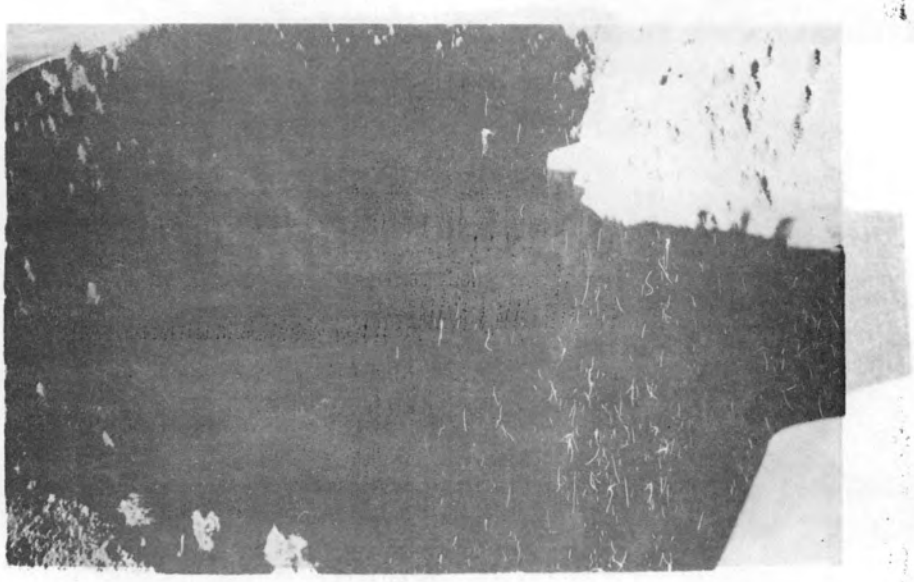


Figure 12. Canyon Creek. Note the cliffs for hawk and eagle nests. This area will be flooded by the Fremont Dam.

myriads of native plants and animals - they have simply been removed. On any future land development for agriculture, such as on the Rexburg bench, consideration for these native species should be given top priority. A considerable portion of this land must be set aside for native species management. Prime examples of animals which have been deprived of habitat by man are the Sharp-tailed Grouse (Pedioecetes phasianellus) and Sage Grouse (Centrocercus urophasianus). Their numbers, as well as many less known and less palatable species, have been continuously declining. Agricultural practices illustrated above are the main reason for this decline rather than depredations from magpies, coyotes or other predators as is sometimes suggested.

In the past canyons have served as refuges for segments of native flora and fauna. Construction of dams in steep walled canyons tend to eliminate these havens and make the land more accessible for the activities of humans. While this may be regarded as a positive benefit from a strictly recreational standpoint, it is disastrous for those species which depend on this habitat for their continued existence. Moreover, eastern Idaho already has more than enough impounded waters for recreational use and a growing shortage of free-flowing streams (Upper Snake Report, 1960). Utilization of reservoirs is accompanied by more mechanized equipment which in itself brings related problems. Once again, the whole pattern of resource use is changed (Figures 8 and 9) if impoundments in the area were to be made. Teton Dam, presently under construction, illustrates this phenomenon (U. S. Bureau of Reclamation Report, 1961) and (Figures 8 and 9). Native cutthroat trout will be replaced with rainbow trout, as much of the spawning area for the cutthroats will be inundated and they do not compete well with rainbows (Fish and Game Brochure, 1969). Many people have made float trips on the free-flowing rivers in the area. Also rivers as this are among "one of the best native trout streams in the West" (Fish and Game, 1972). In addition to the fishery loss, there is considerable unmitigated loss to other forms of life. A sizeable herd of mule deer and some elk use the canyons as winter range (Teton Basin Project, 1961). If this habitat is eliminated there is really no place for the animals to go. The free-flowing rivers remain unfrozen all winter, thus supporting considerable numbers of ducks. Once such areas are

impounded, the reservoir will be frozen in winter; thus, the ducks will be forced out at this most critical time of the year. The destruction of the habitat for the last remnant of the other native plants and animals has already been mentioned. Many of the canyons to be inundated have 50 to 100 foot cliffs on their sides (Figures 11 and 12). These cliffs would appear to be ideal nesting sites for many of our endangered raptors such as Golden Eagles, Ospreys, Prairie Falcons and Peregrine Falcons. Areas considered for impoundments must be searched with consideration for these diminishing values. Should our logic be "If no one looks, it won't be missed?" Finally, how is mitigation found for lost values such as seclusion and privacy? Both of these features are required by Sand Hill Cranes, Trumpeter Swans and an increasing number of people who seek re-creation - they want to escape the macadam and mechanization of our society. The previous discussion of environmental effects may imply a reference to Teton Dam but due to the controversial nature of this project and the court action now pending, the comments are made only to illustrate caution that must be taken if other dam construction were to be considered on streams in the basin. Although discussion of environmental effects related to construction of the Teton Dam is not an integral portion of this report, these remarks were included because precisely the same kinds of conditions would accrue if dam construction were to occur on other streams in the basin. Moreover, a great deal of opposition to the Teton Project has been based on these kinds of effects. Similar reaction and opposition is to be anticipated should future projects be proposed.

The upper portion of the South Fork of the Teton River has been proposed as a dam site. The unmitigatable losses from this proposition have already been enumerated (Teton Basin Project, 1961). We will only comment on some of the land use policies presently in practice. A few farms undoubtedly undergo some spring flooding (Figures 13 and 14). This is indeed a hardship for these landowners, but loss of a considerable portion of the remnant natural system is too high a price to pay for their lack of foresight in trying to farm such an area. The wide, shallow flood plain of this portion of the river should never have been utilized for habitation. If any mitigation should occur, it should be to these few

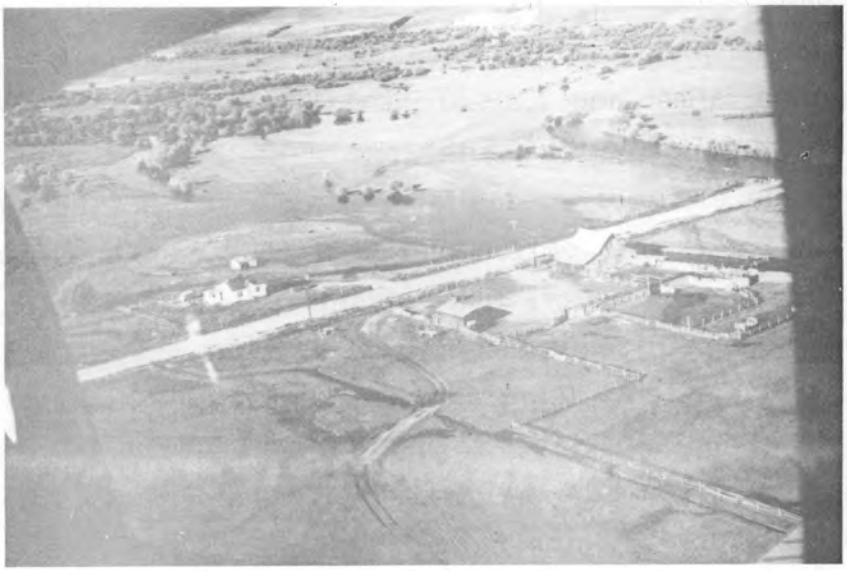


Figure 13. Flooding of the South Fork of the Teton River near Victor. Note the annual flooding problems that have occurred in the foreground. This is a normal spring flood which happens every year.

Figure 14. Flooding of the upper South Fork of the Teton River near Victor. Note how the farm occupies the flood plain of the river.

farmers for their losses rather than to those few defenseless species for which some value can be found. Until now mitigation for habitat destroyed has a poor record (Idaho Environmental Council, 1972). Why not help rectify it by paying the farmer and leaving natural areas alone. There has been some channelization of the South Fork of the Teton River (Figures 15 and 16). This is an extremely undesirable practice as it eliminates the natural fishery production of that portion of the stream, causes siltation downstream and speeds up the water, thus causing increased erosion. This has been a common practice of the highway departments and railroads and has long-lasting side effects (Fish and Game Brochure, 1969). Much of this portion of the Teton River is naturally productive (Figures 17 and 18) and these values should be weighed when considering modification.

The Falls River east of Ashton is fast and free flowing with the exception of a few irrigation diversions. During low water in the fall and winter, this river provides substantial rainbow trout fishery. The upper reaches of Falls River are in Yellowstone Park which preserves its relatively untouched beauty.

On the plateau above the Falls River there are a series of lily ponds, some of considerable magnitude (Figure 19). Some of these ponds appear to be natural basins while many of the smaller ones are beaver ponds (Figure 20). These ponds are on many of the smaller tributaries of the Falls and Warm River and are very desirable features. They provide abundant food during the spring, summer and fall for the many moose frequenting the area. They also provide some of the only fishing for native cutthroat trout in the area.

Another large, wild and beautiful area is a flooded series of meadows in the southwest corner of Yellowstone Park (Figures 21 and 22). These meadows probably dry up later in the summer, but are flooded from snow melt in the spring. Many elk and moose, plus a bison, were seen in this primitive area. Great care should be taken not to disturb this natural haven for these large game animals. This means that no roads should be pushed into this wild area upstream from Cave Falls - there already were flooded jeep tracks into one side of it. If the flooding of this expansive area should be due to beavers, their activities should not be curtailed. Many broods of ducks and Canada Geese, and a pair of

Figure 15. Upper South Fork of the Teton River near Victor with agriculture up to the edge. Stream alteration has also taken place here.

Figure 16. Channeling of the upper South Fork of the Teton River near Victor. The old channel meandered through the trees, but was straightened, resulting in increased water velocity.

Figure 17. Meadering stream and bottomlands of the Upper South Fork of the Teton River near Victor, Idaho. This is near the site of the proposed upper Teton Dam Project.

Figure 18. Upper South Fork of the Teton River near Victor. Note the flat lands and wide flood plain of this river. This is ideal nesting habitat of Canada Geese and Sand Hill Crane.

Figure 19. Lily pond typical of the region along upper Falls River. These areas provide ideal moose and duck habitat.

Figure 20. Beaver pond near Falls River. Such areas should remain undisturbed thus providing wildlife habitat and recreational potential in the form of a cutthroat trout fishery.

Figure 21. Flooded meadows and old meandering streambed in the southwest corner of Yellowstone Park.

Figure 22. Moose in flooded meadows of southwest corner of Yellowstone Park. Many elk and bison were also observed in the area.

Trumpeter Swans were observed in the meadow, attesting to its importance as a productive area.

The canyons of Henry's Fork and Warm River are sufficiently steep in their lower reaches to prevent intensive recreational use. There is now a fine rainbow trout fishery present with the lower reaches stocked and natural reproduction in the upper areas. There is a good breeding population of the endangered osprey in Falls River and in these two canyons. During a float trip of eight miles from lower Mesa Falls to the mouth of Henry's Fork Canyon, a total of eight ospreys were observed. This is an encouraging sign and their numbers should be further documented. The cliffs in both Henry's Fork and the Warm River Canyon appeared to be suitable nesting sites for other endangered raptors.

Above the canyon Henry's Fork goes through a series of meadows and fishing pressure is very high. Some of the area has been set aside for fly fishing only which is probably a good management practice. There is a considerable amount of private land in the area and the increasing numbers of "No Trespassing" signs are mute evidence of the increased population pressure. Between the summer cabins and the weekend tourists, both Island Park Reservoir and Henry's Lake receive heavy fishing pressure. Both lakes appear to be productive, and the rainbow and cutthroat trout as well as coho salmon fishing is rated as excellent. Despite the numbers of boaters, the shallow marshes at the head of both lakes appear to be productive for waterfowl. There were several family groups of Trumpeter Swans, Canada Geese and ducks in these quieter areas on the opposite end of the lake from the major human activity. If possible, the water levels of these lakes and regulated rivers should be managed so as to not raise their level once the waterfowl commence nesting in the spring, thus preventing flooding of the nests. There were also many family groups of the locally abundant, but nationally scarce, Sandhill Cranes throughout the entire area in meadow openings. These drainages appear to be an important breeding locality for this bird.

There was ample evidence of considerable pollution by a stream emptying into Henry's Lake within one-half mile of the outlet. The gravel and mud fan out into the narrow channel and were obvious from the air. Upon investigation on the ground, it was apparent that a man-made stream-

bed was carrying too much water for the gradient and soil during spring melt (Figures 23 and 24). This man-made stream evidently had a history of erosion as the old bed was also eroded. A series of culverts were installed, apparently in an attempt to slow down this erosion (Figures 24, 25 and 26), but the raised pools of water are causing slumping of the side walls. The mess is further intensified by a considerable quantity of car bodies and junk which has been dumped into the chasm (Figures 26 and 27). There was no evidence that the junk was deposited to prevent erosion, but rather just an out of the way place to put junk. This, coupled with the dead cow seen in the streambed (Figure 28) must cause considerable pollution of Henry's Fork in this area. It would be desirable to rectify environmental damage such as this since the major selling point for the area is its wilderness beauty and recreational potential.

Figure 23. Dried channel of stream in Henry's Lake flats.

Figure 24. Downstream view of streambed shown in Figure 23 showing serious erosion problems. Eroded material is deposited in an alluvial fan where the stream joins Henry's Lake Outlet.

Figure 25. Badly eroded stream channels become receptacles for junk and debris dumped there by local residents

Figure 26. Badly eroded stream channels become receptacles for junk and debris dumped there by local residents.

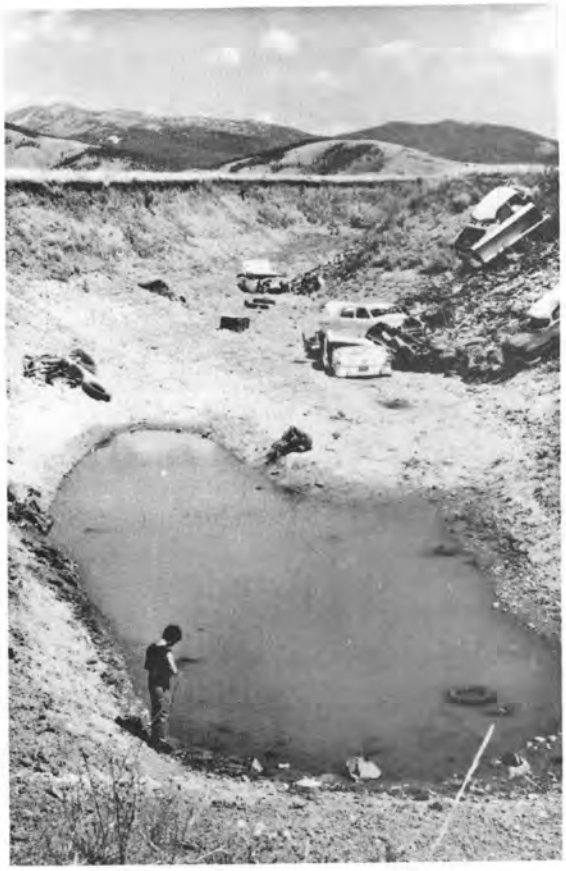


Figure 27. Additional accumulations of debris and dead cow in the eroded stream channel located on the Henry's Lake flats.

Figure 28. Additional accumulations of debris and dead cow in the eroded stream channel located on the Henry's Lake flats.

VI. POPULATION CONSIDERATIONS

Historical Trends

The 1970 National Census estimated the resident population for the State of Idaho at 712,567. This figure represents a 0.7% annual change during the past decade. Most of this growth has occurred along the course of the Snake River and in the panhandle district.

Table 13 compares the historical population trends for Fremont, Madison and Teton Counties during the period 1950-1970. The total 1970 population in these counties represents 3.4 percent of the 1970 population for the State of Idaho. Intercensal growth during the past two decades has been negative for Teton County, has reversed from negative to positive for Fremont County and has expanded greatly in Madison County. Emigration has exceeded immigration in both Fremont and Teton Counties during these decades. This pattern appears to be reversing, however.

Madison County has undergone a marked reversal in net migration patterns during the past decade. The intercensal growth of 4,035 persons during the period 1960-1970 has resulted more from movement into the county than from births.

Birth Trends

Table 14 presents the birth rate and fertility rate for Fremont, Madison and Teton Counties during the period 1967-1971. The birth rate serves as a measure of the number of children born in one year for each 1000 persons in the population at the midpoint of that same year, but changes among years should be interpreted with caution for these counties as they are affected by both the number of children being born and the proportion of women in their childbearing years. The birth rate in all three counties has not declined to the 17.3/1000 level achieved in the United States during 1971, and has exceeded the average birth rate in the State of Idaho during the five year period (HEW, Vital Statistics Report, 1972, Wick, 1972).

Table 13. Historical Population Trends[1]

Area	1960 Population	Intercensal Growth 1950-60	Percent Increase	Net Migration[2]	1970 Population	Intercensal Growth 1960-70	Percent Increase	Net Migration[2]	Annularized % Change 1960-70
Three Counties	20,735	-976	- 4.5	(6014)	24,513	3,778	18.2	339	1.8
Fremont	8,679	-672	- 7.2	(2535)	8,710	31	0.4	(1287)	.04
Madison	9,417	261	2.9	(2090)	13,452	4,035	42.8	2,306	4.3
Teton	2,639	-565	-17.6	(1389)	2,351	-288	-10.9	(680)	-1.1

[1] Source: Idaho Population and Economic Statistics, 1971 and Bureau Census, 1970.

[2] Net Migration = Immigration - Emigration. ( ) - Movement out exceeds movement into area.

Table 14. Birth Rate and Fertility Rate by County of Residence - 1967-1971.

Area	1967	1968	1969	1970	1971[3]	5 yr. average
Fremont						
Birth Rate[1]	23.0	17.8	21.4	19.7	21.8	20.7
Fertility Rate[2]	122.5	94.4	112.7	103.7	116.4	109.9
Madison						
Birth Rate	17.6	22.1	20.8	22.5	22.2	21.0
Fertility Rate	63.5	77.9	71.7	76.3	76.5	73.2
Teton						
Birth Rate	23.9	18.7	15.2	26.8	23.1	21.5
Fertility Rate	138.1	108.4	88.0	155.6	135.8	125.1

Source: Idaho Bureau of Vital Statistics, 1972.

1. Number of births per 1000 population.
2. Number of live births per 1000 women 15-44 years of age.
3. Preliminary estimate. Population base includes recorded births and deaths for 1971.

When age structure is taken into account by considering the general fertility rate or the number of children born each year per 1000 women in the reproductive age group 15 to 44 years, the potential effects of the number of births in these counties comes into clearer focus. The fertility rate in all three counties has not followed the national pattern of decline: 1970, 87,6 per 1000; 1971, 82.3 per 1000 and both Fremont and Teton Counties exceed the Idaho state totals during those years (101,7 and 100.7), (HEW, Vital Statistics Report, 1971, 1972; Wick, 1972). By contrast, the fertility rate in Madison county is below both the State and national fertility level. Should such rates continue at this level for the next 30 years, or the length of an average reproductive cycle, the family size achieved in these counties would be Fremont, 3,3; Madison, 2,2; Teton 3.7 births per woman.

Age Structure

Changes in the age structure of a county affect the potential number of births. Table 15 indicates the age structure in Fremont, Madison and Teton Counties as determined during the 1960 and 1970 National Census. Some shrinkage in the age group 0-4 years is noted for all three counties. A substantial increase in the reproductive age group of 15-44 years is apparent in the 1970 Madison County sample. It is noteworthy that in spite of this increase, the general fertility level for this county is substantially below the State and federal level. This depressed level can be attributed to the inclusion of young married students attending Ricks College in the 1970 Census data.

Population Distribution

The population distribution for the three counties is given in Table 16. Additions to the population in Fremont County occurred in the City of St. Anthony (177) and in the Island Park area (139) during the period of 1960 to 1970 (Bureau Census, 1970). All other cities in Fremont County lost population. The central area of population growth in Madison County is Rexburg. Much of this growth can be attributed to the expanded enroll-

Table 15. County Age Structure

Age in Years	Year 1960 0-4	5-14	15-44	45-up	Year 1970 0-4	5-14	15-44	45-up
AREA								
Fremont								
%	12.3	24.5	36.9	26.3	10.1	23.0	38.6	28.3
Number	1071	2126	3203	2279	878	2004	3364	2464
Madison								
%	12.5	24.3	39.8	23.4	8.5	18.0	53.8	19.7
Number	1173	2292	3750	2202	1139	2422	7236	2655
Teton								
%	14.0	26.8	34.1	25.2	9.0	25.0	33.3	32.7
Number	369	707	899	664	212	588	782	769

Source: Idaho Population and Economic Statistics, 1971.

Table 16. Population Distribution[1]

Area	1970 Population	Land Area Square Miles	Number/ Square Mile	% in Urban Area[3]	Persons in Places of 1000 or More[2]	Persons Rural[2]
Fremont	8,710	1864	4.7	33.0	4064	4646
Madison	13,452	473	28.4	61.5	8272	5180
Teton	2,351	457	5.1	0	0	2351

1. Source: Idaho Population and Economic Statistics, 1971.

2. Source: Forsgren, Perkins and Associates, P.A., 1972.

3. Urban is defined as those cities or towns with 2,500 or more population

ment at Ricks College. The vast majority of the rural growth is diffusely spread across the western third of the county. Approximately one percent of this growth is occurring along the North Fork and ten percent along the South Fork of the Teton River. In the last several years most of the new home starts have occurred along paved roads leading to Hibbard. Little population growth is occurring along Henry's Fork due to the wet conditions that exist in the area although operating farms still exist. This area contains excellent wildlife habitat and population growth along this greenbelt area should be discouraged.

The 1970 population of Teton County is rural. The emigration trend during the past two decades has produced decreases in the population, but potential population growth may occur in this county in response to increased recreational usage of the county.

Population Projections

Projections prepared for the three county area based on the inter-censal growth pattern established from 1960 to 1970 are given in Table 17. Since the birth and fertility rate patterns have not followed the national pattern of decline, the "continued" trend projection should not over-estimate the future growth of these counties if the pattern of movement into Madison County continues. The projected population in 1980 for all three counties is 31,330, a 27.8 percent increase or 6,817 persons over the 1970 Census level. Almost all of this growth is projected in Madison County. Assuming the net migration pattern of Madison County is balanced during the coming decade (immigration - emigration = 0), the population growth of the three counties will be less achieving a projected level of 26,046 (6.3 percent increase) in 1980 and 26,827 by 1985. If the present loss projected in Teton County is ended, the lower projected values above will be increased only 385 persons by 1980 or 576 persons by 1985.

Population projections based on the birth and death trends observed for 1970 and 1971 are slightly lower than projections based on the inter-censal growth pattern from 1960 to 1970. If the present level of net migration continues into the three county area, the annual growth rate is projected at 1.66 percent and the population will double in 41.8 years.

Table 17. Population Projections 1970-1985[1]

Area	Growth Trend	1970 Population	1980 Population	1985 Population
Fremont				
	[2]Continued	8,710	8,740	8,755
	[3]Accelerated		8,780	8,815
Madison				
	[4]Net Migration Unity		15,211	16,091
	Continued	13,452	20,495	24,255
	Accelerated		30,695	42,695
Teton				
	Continued (loss)		2,095	1,981
	Net Migration Unity	2,351	2,736	2,927
Total All Counties	Continued	24,513	31,330	34,991

1. Projections derived from Intercensal Growth Data, 1960-70.
2. Based on the historical growth of the 1960's compounded annually through 1985.
3. Based on a doubling of the historical growth of the 1960's compounded annually through 1985.
4. Based on unity of net migration and natural increase equivalent to period 1960-70.

If, however, migration into the area declines so that the number of people who enter all three counties is equivalent to the number who leave, the annual growth rate will drop to 1.52 percent and the population in all three counties will double in 45.6 years. Unless Ricks College continues to expand, the latter projection should more nearly approximate the population growth expected in Fremont, Madison and Teton Counties over this period. Further, if the birth rate begins to decline in these counties, the population expansion will be decreased even more.

In summary, the historical growth in Fremont, Madison and Teton Counties has followed a pattern of slow increase. Movement into Madison County has contributed a significant portion of the growth observed in the three county•area during the last decade. If this movement declines, the projected population of this area will grow at a much slower pace. Recreational use of the area may reverse this trend, but further flood control measures cannot be supported on the basis of population projections.

Seasonal Population Fluctuations

During the coming decades the hours of leisure time available for summer and weekend residency in recreational areas will increase. This trend is predicted upon a significant rise in income which will nearly double by the year 2000 (Population and the American Future, 1972). A significant increase in the production of truck-campers and camp trailers has already occurred during the period 1961-1971. Yearly unit outputs have increased from 62 thousand to over one-half million during this period. Consequently, both Fremont and Teton Counties may develop marked seasonal fluctuations in resident population size. A slight increase of immigration into these counties can be expected to service this transient population.

Fremont County contains approximately 1,200 summer homes, and it is estimated that 100 such homes will be constructed annually during the next two decades (Forsgren, Perkins and Associates, P.A., 1972). At a peak load of three persons per home, 9,600 non-resident persons could be added to the resident population by the year 1990, but further development of subdivisions in the Island Park area could greatly affect the rate

of projected development. U. S. Forest Service studies suggest an additional seasonal average increase of 1,300 persons at one time. By the year 2000, projected U. S. Forest Service developments could increase the capacity of recreational sites in Fremont County to 50,000 persons at one time.

VII. THE ARCHAEOLOGICAL RESOURCES OF THE TETON RIVER AND THE HENRY'S FORK OF THE SNAKE RIVER, IDAHO

The purpose of this section of the report is to provide information on the archaeological potential of two rivers in northeastern Idaho. This paper is concerned with the present state of knowledge of the region's prehistory and projected needs for future study. Today in the United States archaeological sites are being destroyed at an ever-increasing rate. Destruction comes through urban growth, modern farming techniques, public works projects and illicit digging by non-professionals. Since knowledge of man's prehistoric past is dependent upon a non-renewable resource, it is of paramount importance that steps be taken to avoid wanton destruction of archaeological sites. Finally, it must be understood that the American Indian was an intregal part of his environment. In order to appreciate the cultural adaptation of the Indian, the archaeologist must concern himself with recent and past environments. He cannot afford to ignore the natural setting.

To fully describe the present state of knowledge concerning the prehistoric past of the Henry's Fork and the Teton River, a methodology using a dual approach will be used. First, a review of the ethnographic literature will be presented. This information was originally provided by Native American informants with a firsthand knowledge of the region. It provides valuable data on territorial boundaries and economic activities during historic times. The second aspect deals with the current status of the archaeological knowledge of the region. Both approaches are concerned with establishing the area's archaeological potential and providing insight into future needs and research.

The Ethnographic Evidence

The area of Henry's Fork and the Teton River is the traditional homeland of the Northern Shoshoni, and later, the Bannock. The Shoshoni-Bannock people had a loosely organized society, typical of the peoples of the Great Basin. Small extended family groups made seasonal rounds of

hunting, collecting and fishing activities. The internal organization was fluid with seasonal shifts being common. Families sometimes grouped together to form a larger band, but this depended upon when and where they encountered one another and whether they had horses available. The larger groups often wintered together. The wintering areas are of great importance to the archaeologist, particularly if they were occupied year after year since the build-up of cultural materials in these areas is more intense than in short-term camps. However, both types of sites are equally important to understanding the yearly economic round and the prehistoric settlement pattern.

In our study area the diversity of economic activities pursued by the Shoshoni-Bannock is well documented. The Big Hole mountains between the Teton and Snake Rivers were utilized for berry picking; people passed through the Henry's Fork area and over Targhee Pass to hunt buffalo on the Plains; and just to the north of the confluence of the Teton and Henry's Fork, groups traveled eastward into Yellowstone in pursuit of Mountain Sheep (Steward 1938; Figure 10; Liljeblad 1957:63). On the Snake River Plain bison were found as far north as the Teton River before 1840 (Liljeblad Ibid:56). These activities are described by the Murphys:

> The fall hunt began at the end of August or in early September when the game was growing fat. Some parties went from the Camas Prairie to Jackson Hole and Yellowstone via Idaho Falls and the Snake River. The route used was much the same as that followed by U. S. Highway 26. One informant spoke of Targee Pass and West Yellowstone, Idaho (sic), as being a point of entry to and departure from the Yellowstone country. The Snake River Trail was more commonly used to enter Jackson and Yellowstone, although West Yellowstone seems to have been more frequently traveled on the homeward journey. The west slope of the Tetons, the area drained by Teton River, was also used by hunting parties (1960:329).

Aboriginal peoples did more than pass through the Teton and Henry's Fork region; they often wintered in the area. Again, the Murphys relate:

> The Bannock customarily wintered on the Snake River bottoms above Idaho Falls and at the mouth of Henry's Fork near Rexburg, Idaho . . . The Snake River-Henry's Fork sites were favored because of the abundance of the mule-tailed deer, which came into the bottomlands in the winter (Ibid:327).

Outsiders were also known to utilize the area during the winter.

> Blackfoot war parties, consisting only of men, frequently came south from Montana before the passes were closed by the winter snows and made camp on Henry's Fork, near the present site of St. Anthony, Idaho. From this convenient point they sent small raiding parties against the Bannock camps (Ibid).

The above knowledge provides only a starting point to begin reconstructing events of the past. The information describes basic living patterns the archaeologist seeks to understand and interpret through his study of man's past.

The Archaeological Evidence

Unfortunately, the current archaeological knowledge of the Teton River and Henry's Fork is meager in comparison to that of other river drainages in Idaho. This is primarily the result of historical accident as funds have been limited for research in this vicinity. The Idaho State University Museum archaeological survey files have on record approximately fifty sites on the Teton and Henry's Fork. The majority of sites, about forty, are found along Henry's Fork. Although it is possible Henry's Fork was favored by prehistoric man, the disparity in numbers may reflect a difference in the amount of fieldwork.

The vast majority of fieldwork on Henry's Fork has been concentrated at E. R. Harriman's Railroad Ranch (Swanson and Sneed 1966; Swanson and Ranere 1969-70). The ranch area contains a number of diverse natural habitats which were utilized by prehistoric man. This area is believed of further importance since:

> (1) Railroad Ranch lies at the boundary between the park land and forests of the north and the great sagebrush-grassland communities of the Snake River Plain. It is possible to examine in minute detail, given sufficient time, the effect of changing physical environments upon human settlement over the past 12,000 years. (2) It lies on the path of human migration across the Rockies from the present to at least 12,000 years ago and perhaps beyond (Ibid:20).

Limited excavation and surface collection has already provided evidence of man possibly as early as 10,000 to 12,000 years ago in the heart of the area (p. 27). Furthermore, thirty-seven campsites were located

along the Henry's Fork. This preliminary field investigation has clearly established the need for further research into this area.

The Teton River, primarily the pool area of the proposed dam, underwent cursory archaeological investigation in the past (Swanson 1958a; Gaarder 1967). The number of prehistoric sites recorded and the number of artifacts recovered has been meager. This may simply reflect the nature of the field work; previous work concentrated along the river bottom. The precipitous nature of the canyon walls and a meandering stream are not conducive to archaeological preservation. The statement that the "canyon was not much utilized in prehistoric times" (Gaarder Ibid:20) must be understood in the context it was presented. The ethnographic data clearly documents that the region was commonly exploited by aboriginal peoples. Nevertheless, we can say with some justification that the archaeological resources of the Teton do not appear as promising as those of the Henry's Fork. This is not meant to imply that the area has no archaeological value. On the contrary, it is believed that its potential has not been realized and that more careful research is needed.

The Archaeological Potential of Henry's Fork and the Teton River

The traditional archaeological survey has attempted to obtain a percentage of sites in a specific geographic unit (Harrison 1972b:1). The survey methods are often quite subjective, most obvious being the ease of accessibility of the sites. The sample survey is, therefore, suspect in terms of resource management. The inventory survey, on the other hand, seeks to record a complete archaeological catalogue and by doing so eliminates a sampling bias (Ibid:26). In this section, the inventory survey method is presented as the necessary approach to fully understand the archaeological potential of the Henry's Fork and the Teton River.

The value of the inventory survey to Idaho archaeology has dramatically been demonstrated within the last year (Keeler and Koko 1971; Harrison 1972a). The Snake River in southwestern Idaho and the middle portion of the Salmon River were re-surveyed in order to obtain a total inventory of archaeological sites. These surveys directly bear on our problem since they are part of the same program which provided funds for the original survey

of the Teton Dam project, then known as the Fremont Reservoir (Swanson 1958a).

In 1958 seventy-four archaeological sites were located along a thirty-mile stretch of the Snake River (Touhy, 1958). The survey was conducted in the proposed Guffey Reservoir and was successful mainly through the volunteered efforts of a local amateur archaeologist. Another inventory of the same reservoir was carried out in 1971 and an additional fifty-four sites were recorded. Also, for the first time, eleven distinct environmental localities were recognized. The results of the inventory survey now provide a solid foundation for future problem-orientation archaeology.

A sample survey of the proposed Crevice Reservoir produced twenty-seven archaeological sites along a seventy-mile stretch of the Salmon River (Swanson 1958b). A second sample survey provided an additional thirty-one sites (Swanson 1970). In 1971 at the request of the U. S. Forest Service, an inventory survey of the same stretch of the river recorded two hundred and forty-one new sites (Harrison 1972a)! We now have a complete picture of the prehistoric surface features in the Salmon River Canyon. Thanks to the inventory survey, the avenues to future research are just beginning to open.

The above examples clearly illustrate the need for inventory surveys of Henry's Fork and the Teton River. The inventory survey is quickly emerging as the basic tool in the proper management of archaeological resources. Only when the total resources are known can proper evaluation be made in terms of site protection or the development of archaeological research designs. If public land development continues as a basic practice, the need for inventory surveys must be recognized.

The inventory survey is not an easy task. It requires a complete survey of the land features by foot, often by backpacking for several days at a time. A survey of this type along the Teton and Henry's Fork would obviously present certain difficulties. The braiding nature of the Henry's Fork makes it very difficult for survey work. The fieldworker has to contend with numerous oxbow channels, abandoned meander scars and the like. Farming practices here and on the Teton have disturbed much of the original ground surface, often to the river's edge. Also, a

heavy ground cover hinders on-the-spot inspection in many places making early spring or late fall observation necessary. However, with all its difficulties the inventory survey is still needed to provide a basic reference point for future management practices.

Without question Henry's Fork and the Teton River contain a great wealth of untapped archaeological data. This has been clearly documented in the ethnographic literature and the limited amount of professional archaeological fieldwork. It has been proposed that the archaeological inventory survey method be applied to insure proper resource management practices. Only in this way will the full archaeological potential of the region be realized.

Archaeological Resources

The following supplement is a list of recorded archaeological sites located in Fremont, Madison and Teton Counties. The list reflects the kind and amount of archaeological fieldwork the area has undergone. The record documents the views presented in the original statement.

The actual locations of the sites are omitted to protect them from unwanton destruction by collectors. All site locations are on file at the Idaho State University Museum, Pocatello, and they are open to inspection by qualified persons.

Fremont County

Forty-two archaeological sites are known in this county. Forty-one of the sites are located within the boundaries of Railroad (Harriman) Ranch. The ranch area has been intensively studied whereas the remaining country is virtually unknown. The 42nd site is on BLM land.

All forty-two sites are open camps.

Madison County

Five archaeological sites are recorded in the county. Three are on private land and two are believed to be located on public land. All the sites have been recorded in connection with the Teton Dam project.

Three sites are open camps, one is a rockshelter and the fifth was originally recorded as a village. The village site was test excavated in 1967 (Gaarder) and it appears doubtful if it is a prehistoric occupation.

Teton County

Twelve open camps are recorded in Teton County. Eight of the sites were located and investigated in conjunction with the Trail Creek watershed project (Johnson 1968). The aboriginal occupation is not concentrated or continuous. Instead, it reflects a seasonal hunting pattern. Aboriginal habitation is believed to date between 1000 B.C. and A.D. 1860.

Six of the sites are on private land, one on Forest Service land and the owner is unknown in five instances.

Currently, the Idaho State University Museum is working in cooperation with the Bureau of Reclamation on the Teton project. The area under study is outside the reservoir region and is concentrated below the dam. Two sites have been recorded, one of which lies within a borrow source being used in dam construction. The occupation has been badly disturbed by bulldozing activity and because of this is yielding a minimal amount of information.

Historical Sites

Significant historical sites other than the archaeological sites are difficult to identify. However, a brief review of a summary of history of the Henry's Fork area of the 19th century as reported by Idaho Historical Society would indicate the following sites might be given special consideration for seeking out the exact locations.

1. The expedition path of John Colter in 1808 through Teton Valley into the Henry's Fork.
2. The path of the Peter Wiser expedition in 1809.
3. The Andrew Henry expedition in 1810 and the Old Fort Henry; the site of which apparently is known.
4. The Finnan MacDonald expedition in 1823.

FOR INTERPRET.

5. The Pierre Tetanatagon expedition of 1824 and the designation of Pierre's Hole (the Upper Teton Valley); the rendezvous location and Indian battle areas of 1832 which involved Jim Bridger.
6. F.V. Hayden's geologic investigation of 1871-72 and creation of the Yellowstone Park in 1872.
7. The Indian War at Camas Meadows in August, 1877; a part of General Howard's Nez Perce campaign.
8. Arrival of the Mormons in Egin Bench in 1879.
9. Railway service to St. Anthony in 1899.

Important references that might help on this are:

Beal, Merrill D., 1935, "The Snake River Fork County," Rexburg Journal, Rexburg.

Driggs, Benjamin Woodbury, 1926, "History of Teton Valley, Idaho,"Caxton Printers.

VIII. TIMBER INDUSTRY

Logging is one of the current uses of lands in the study area. While revenue to local governments from timber sales is insignificant, the industry provided an annual average of 162 jobs in the lumber industry for Fremont County, Idaho, in 1970. Monthly fluctuations went from 36 in December to 234 in July. There are some small sawmills in Teton County, Idaho, which apparently do not qualify as full-time operations. The Idaho Department of Employment does not list "Lumber" in its monthly reports of the labor force for Teton County, Idaho. As far as could be determined, none of the timber in the study goes to Teton County, Wyoming. Fremont County, then, becomes the focus of our attention regarding the importance and future of the timber industry which depends on utilization of National Forest lands.

The prospects for the lumber industry in this area are mixed for a variety of reasons. The most immediate problem for the study area is produced by the mountain pine beetle epidemic which has reduced the stock of useable commercial timber. Recent sales based on insect control tend to distort "normal" lumber activities and make it difficult to establish a trend for the area. Prospects for the near future suggest that current rates of cutting cannot be sustained. The O.E.D.P. report for Teton County, Idaho, states that:

> Because of the heavy losses of merchantable timber to the mountain pine beetle, it is doubtful if any more large sales such as this (25 million board foot timber sale) will occur within the next twenty-five years. (p. 17).

While the insect problem need not loom large in the long-run planning for the area, it surely has serious short-run implications for the industry. In 1970 the lumber industry provided 5.9% of the total jobs in Fremont County.

Another question involves the amount of logging which could occur under sustained yield harvesting given that the forest returns to a healthy condition. The major user of logs from the study area is the Idaho Stud Mill in St. Anthony. The O.E.D.P. reports that:

> . . . the Study Mill . . . must process 55 million board feet of timber annually in order to operate economically . . . (p. 17).

Trends in the industry strongly suggest that lumber cannot serve as the basis for an expansion of the local economy. Lumber employment in Idaho has remained approximately constant since 1957 at about 12,000. There have been considerable fluctuations around the mean, but the trend is flat. National industrial growth rates show lumber and wood products to be among the more slowly growing industries. The growth rate from the 1948-1953 period to the 1957-1960 period was +0.9 for lumber contrasted with +3.4 for all manufacturing. The 1957-1960 to 1960-1965 calculations showed a rate of +4.9 for all manufacturing and +1.6 for lumber and wood products.

Growth in the lumber industry is limited by a maximum cut level which can support a sustained yield of timber. Variation in this relationship is produced if the timber cut is below the maximum allowable level or if productivity is increased.

Offsetting expansion is a trend in the technology of the industry which is becoming increasingly capital-intensive. Thus, even if maximum cut is established, the replacement of men by machines in the productive process means that employment of labor in the industry will decline. The placement of the lumber industry of Fremont County within the framework of the above generalizations becomes a technical problem of fact-gathering.

The quality of timber in the area and its importance to the local economy is probably best summarized by the U. S. Forest Service in a description of Unit 8 West Slop Tetons in a Summary Analysis of the Wilderness proposal. The timber resource in the area is low-quality insect-infested lodgepole pine and old growth Douglas-fir. Lodgepole forests are generally productive; Douglas-fir forests occur on steeper slopes in isolated locations where harvest currently is not possible because of the likelihood of environmental degradation. The volumes are currently deleted from the Targhee National Forest allowable cut figures. The potential importance of the timber resource to the economic welfare of local dependent communities is considered to be relatively low.

IX. MINING

There is no indication of significant deposits of mineral resources within the west slope study area. None of the Idaho counties showed any full-time employment in the mining industry in 1970. The Bureau of Mines' Minerals Yearbook lists no production in Fremont during 1969, but $255 thousand was produced in sand and gravel in Teton County. Bollinger's study did show occasional personal income from mining although the amounts are only a few thousand dollars. Teton County, Wyoming, shows summer mining employment at a maximum of 68, but the operation is not in the west slope study area. Correspondence with A.J. Teske, Secretary of the Idaho Mining Association, yielded a reply that he could "not come up with anything of great significance." While any final conclusions should await the results of a minerals survey, it appears that the mining industry would find little of interest within the study area.

X. TOURISM AND RECREATION

Commercial activities related to tourism and recreation are undoubtedly the most rapidly growing major industry in the United States. By 1968 recreation ranked behind manufacturing and agriculture as the nation's third most important industry. It is highly likely that this trend will continue and probably accelerate. The demand for recreation is what economists call "income elastic." Recreation is purchased in proportionally larger quantities as consumer income increases. Given that income and leisure time continue to increase in the future as they have in the past, recreation will expand even more rapidly.

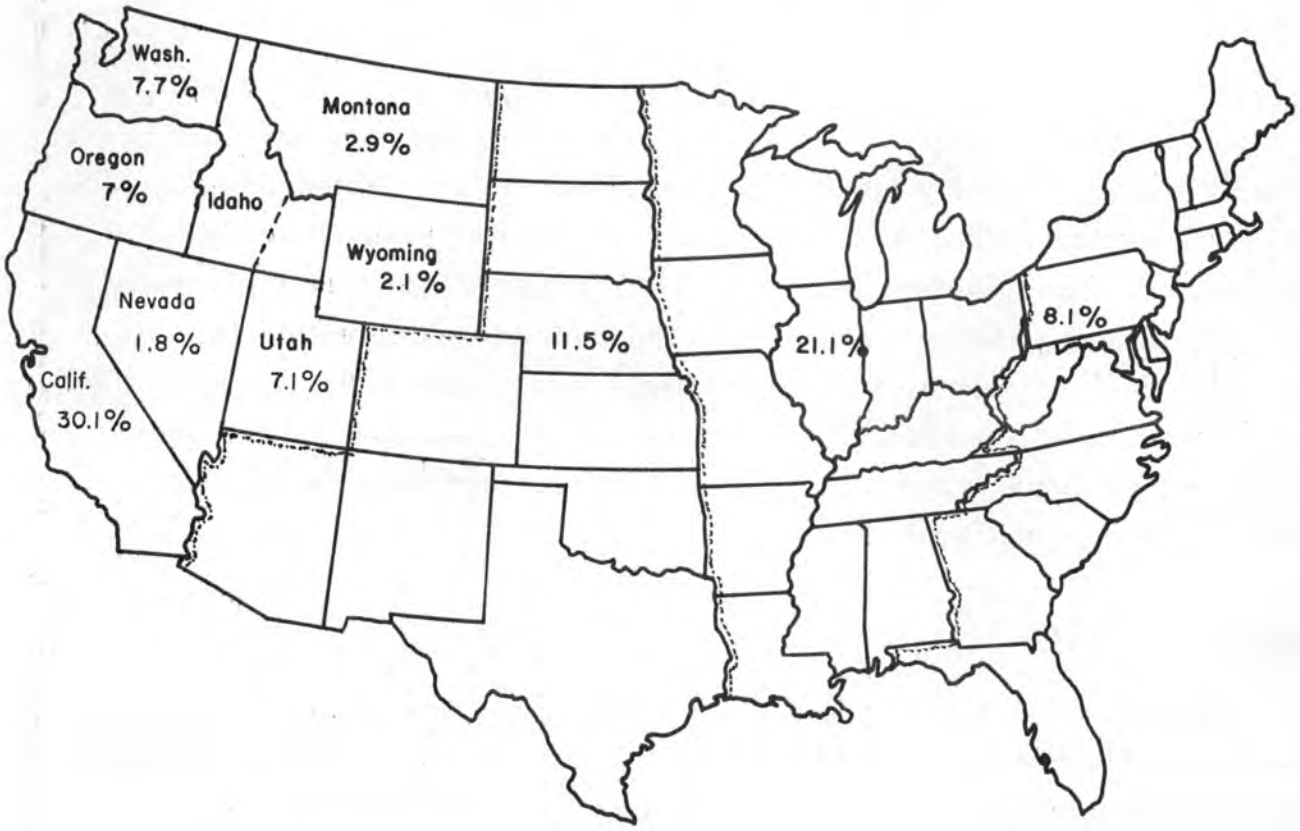
Statistics on Tourism

Although most U. S. Forest Service personnel are convinced that tourism is on the increase, it is useful to observe some of the statistics related to the industry in general and to our study area in particular. Yellowstone and Teton National Parks, which recorded about 1.2 million visitors in 1950, increased to 2 and 2.5 million respectively by 1965. Using the measure of visitor days, Yellowstone went from 2.5 million in 1961 to 3.5 million in 1970 while Teton jumped from 1.4 million to 3.3 million (Figure 29 , 30).

Within the State of Idaho, the "recreation explosion" seems even more pronounced. Visitor numbers at state parks (plus Craters of the Moon National Monument) jumped from 0.9 million in 1967 to 2 million in 1970. Although figures for individual parks were sometimes erratic as the result of construction closures and visiting boy scouts, the sharp upward trend, overall, is unmistakable. Non-resident hunting and fishing license in Idaho mirrored the same type of increase. Big game licenses issued to non-residents went from 8.4 thousand in 1966 to 11.9 thousand by 1970. Non-resident fishing licenses increased from 12.4 thousand to 20.1 thousand during the same period. The 7-day fishing license went from 29.4 thousand to 57.6 thousand (Table 18).

Targhee National Forest personnel indicate that recreational use is "increasing rapidly". Visitor days went from 135 thousand in 1969 to 159 thous. in 1970 (Table 19). Future prospects for the study area are almost certain

Figure 29.
Origin-Destination Sample AREA 3

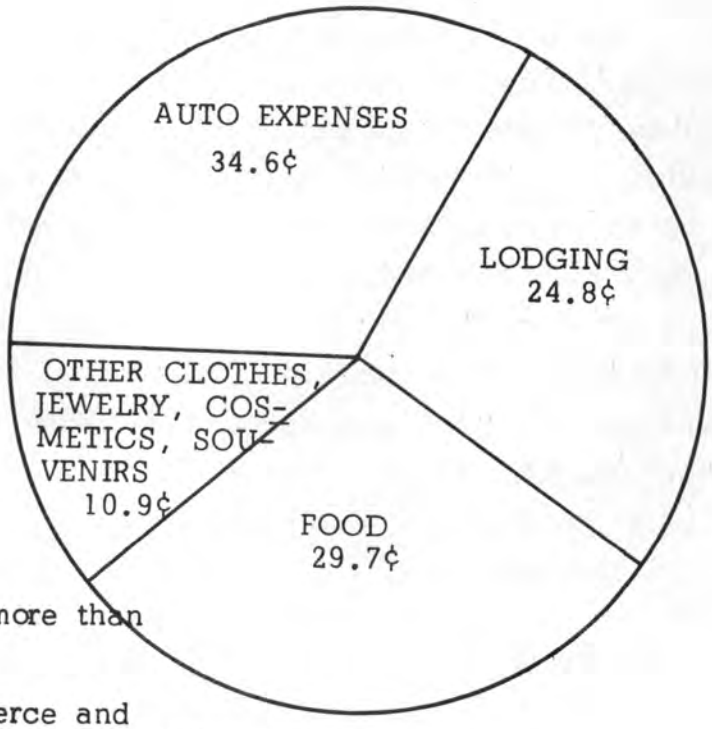


TOURIST CHARACTERISTICS

	AREA 3
Expenditure/day/visitor	$6.65
Average length of trip/group	2.8 days
Coming for business	17.4%
Coming for pleasure	82.6%
People per group	3.7
Lodging:	
Hotels	1.6%
Motels	28.1%
Camping	24.1%
Resorts	4.0%
Relatives, friends	20.2%
Average miles traveled in Ida	472
What attracted each group*:	
Ads	9.9%
Friends	20.9%
Previous visits	31.2%
Passing through	53.0%
Relatives	10.7%
Wanted to see Idaho	10.3%
Business	3.2%
Miscellaneous	7.9%

*Due to multiple answers, total adds to more than 100%

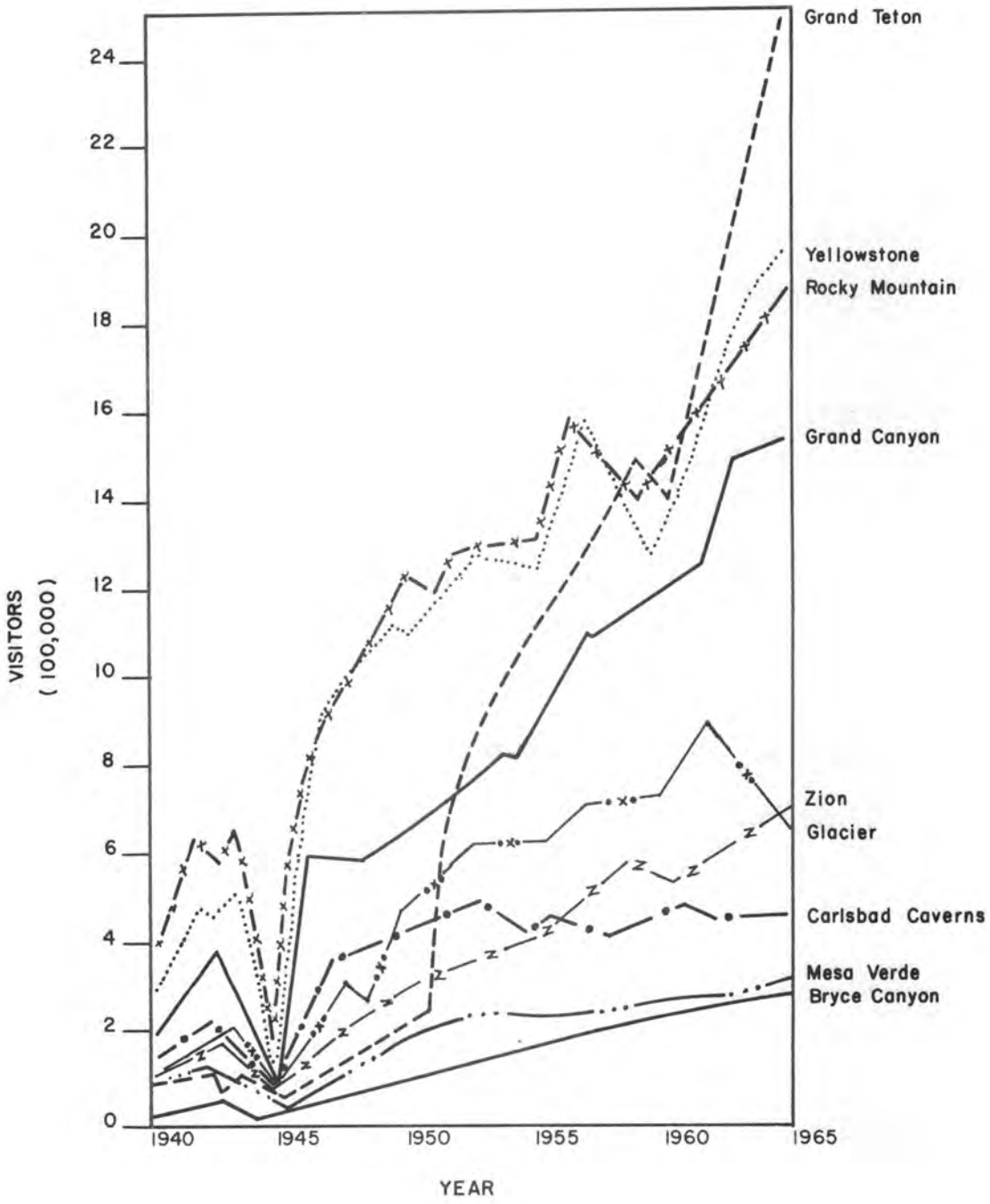
HOW EACH DOLLAR IS SPENT:



State of Idaho, Department of Commerce and Development. Idaho's Growing Tourist Industry. 1967, p. 7.

Figure 30.

NUMBER OF VISITORS TO NATIONAL PARKS
IN THE ROCKY MOUNTAIN
STATES



Source: Data Obtained From The Park Service, Grand Teton National Park.

Table 18. Number of Non-Resident Hunting and Fishing License Holders.

	1966	1967	1968	1969	1970
Non-Resident Big Game	8,423	8,745	11,735	14,325	11,930
Non-Resident Bird	4,425	4,120	5,029	6,560	5,322
Non-Resident Fish	12,474	12,766	13,554	14,409	20,105
7 Day Fish	29,417	31,084	33,872	39,119	57,684
1st Day Fish	67,774	63,062	67,111	77,945	76,931
Additional 1 Day Fish	43,019	39,865	43,239	50,564	0
Non-Resident Non-Game	752	821	1,118	1,244	1,660
Non-Resident Deer-Bear	3,218	3,185	3,579	4,569	0
Non-Resident Deer					4,917
Non-Resident Bear					339
Non-Resident Deer Tags	2,801	2,931	3,274	3,951	0

Source: Idaho Fish and Game Department

Table 19. Visits to Recreational Sites Requiring Use of U. S. Highway 20/191.

	1966	1967	1968	1969	1970	1971
Henry's Lake State Park						
Number of Visitors	not open	not open	8,973	12,450	19,966	14,720
Yellowstone Park West Entrance						
Number of Visitors (auto passengers only)	624,132	630,961	678,701	649,700	667,192	600,800
Total Visitors (includes snowmobiles, bus, and foot traffic)				665,734	689,786	626,017
Targhee National Forest Sites[1]						
Madison County Sites millions of visitor days[3]	16.9	18.7	20.4	16.6	16.4	16.5
Teton Basin Sites[2] millions of visitor days[1]	162.6	125.5	127.7	128.4	151.4	229.1
Fremont County Sites[1] millions of visitor days[3]	557.8	626.9	764.4	830.2	764.6	706.3

(Continued)

[1]Includes all privately operated ski resorts within National Forest.

[2]Includes sites in both Idaho and Wyoming. Access would be from highway 20/191 and U.S. Highway 26. Impossible to separate.

[3]Visitor day = 1 person for 12 hours/ 2 persons for 6 hours/ 3 persons for 4 hours, etc.

Table 19. (Continued)

	1966	1967	1968	1969	1970	1971
Fish and Game Access Sites Administered by Idaho Fish and Game Commission[4]						
Madison County Lec. Access Site (no. of visitors)						350
Fremont County Sand Creek Mang. Area (number of visitors)						9,500
Two unnamed sites on N. Fork of Snake between St. Anthony and Ashton (no. of visitors)						800

[4]Visitation figures are not available prior to 1971.

Source:

1. Henry's Lake State Park from personal communication with Idaho State Parks and Recreation Department, Statehouse, Boise, Idaho 83707.
2. Yellowstone Park from personal communication with Yellowstone National Park Headquarters, Mammoth.
3. Targhee National Forest from Targhee National Forest Supervisory Headquarters, St. Anthony, Idaho. (Jim Morris).
4. Fish and Game Access Sites from Mr. Kaster of Idaho Fish and Game Offices, Teamsters Building, Idaho Falls, Idaho.

to increase in both numbers and rate as a result of what might be termed the "slop-over" effect. The two national parks are already operating at or beyond capacity during the summer season and are following policies designed to disperse visitors to other areas. "Overflow" camping in Yellowstone was eliminated in 1968 and the number of campsites within the park is being reduced. Teton has been limiting fire permits at certain locations in the back country as a means of controlling the density of hiker use. The overflow from the parks, plus the general increase in recreational demand, is certain to place heavier loads on the adjoining U. S. Forest Service lands.

Economics of Recreation and Tourism

The economic impact of tourism is more difficult to measure than for most industries. Richard Renstrom, former Director of Tourism Development for Idaho, recently termed tourism "the Silent Giant" because sufficient data are not available. The general technique for estimating impact of recreation and tourism on income and employment is to multiply visitor days by average expenditures. This total is then divided into expenditure categories where it is generally assumed that so much spending provides so many jobs. For example, if one third of tourist spending goes for services and the average wage is $6,000, then each $18,000 of total spending creates one service job. In 1966, the U. S. Department of Commerce and Development estimated that 5.8 million visitors spent $191 million in Idaho. Since 1966 there has been no attempt to keep the statistics up to date. In view of the trends mentioned above, the numbers have obviously increased by 1971.

There are a variety of problems in evaluating such estimates. The U. S. Department of Commerce does not collect data specifically for the tourist industry, and the effects are subsumed within such categories as wholesale and retail trade, services and others (Tables 20, 21, 22). The present statistics allow only an approximation of the effect of tourism on county economics. Of course, there are examples where the impact of tourism is of paramount importance. Evidence of this is Teton County, Wyoming, where the Wyoming Department of Employment estimates (in 1971) that 90% of the income and employment is the result of tourism and recreation.

Table 20. Number of Service Establishments, by Kind-of-Business Group, Idaho Counties, 1967.

County	Hotels, motels, tourist, courts, camps	Personal services	Miscellaneous business services	Auto repair auto services, garages	Miscellaneous repair services	Motion pictures	Other amusement, recreation services
Total	779	1,750	662	573	760	96	363
Ada	82	294	162	124	144	10	57
Adams	8	5	3	3	6	1	1
Bannock	49	122	54	27	45	7	23
Bear Lake	15	26	2	3	8	3	3
Benewah	7	14	3	5	2	2	3
Bingham	19	58	15	18	23	4	6
Blaine	25	24	5	6	8	--	15
Boise	4	3	1	1	1	--	1
Bonner	44	31	11	14	13	3	8
Bonneville	38	130	53	37	43	5	34
Boundary	15	11	4	4	8	1	2
Butte	7	8	7	2	1	1	1
Camas	2	--	--	--	2	--	--
Canyon	29	160	49	52	63	5	30
Caribou	13	21	8	3	5	4	1
Cassia	18	43	15	19	20	4	7
Clark	2	2	--	--	1	--	--
Clearwater	10	18	6	6	7	--	4
Custer	17	7	2	2	4	1	4
Elmore	23	31	8	8	16	2	5
Franklin	4	23	6	5	12	1	3
Fremont	20	23	5	6	12	2	4
Gem	3	22	9	13	11	1	3
Gooding	10	39	4	8	13	4	6
Idaho	24	32	5	8	16	1	7
Jefferson	9	22	7	10	14	1	5
Jerome	5	24	8	11	13	1	1
Kootenai	79	76	35	42	34	4	24
Latah	17	53	18	12	26	2	6
Lemhi	12	12	7	6	4	2	9
Lewis	7	8	1	2	9	1	1
Lincoln	5	5	1	1	2	1	2
Madison	7	29	9	4	10	2	3
Minidoka	17	27	9	13	19	1	6
Nez Perce	17	77	32	25	30	3	19
Oneida	1	6	2	5	8	1	1
Owyhee	1	18	5	2	3	3	2
Payette	5	36	7	11	10	1	8
Power	6	10	1	4	4	1	2
Shoshone	22	39	14	9	16	3	9
Teton	7	8	2	--	1	1	3
Twin Falls	50	121	54	30	62	5	21
Valley	19	10	6	4	1	--	7
Washington	5	22	7	8	10	1	6

Table 21. Selected Services in Idaho 1967 -- Number of Establishments, Receipts, and Payrolls with Changes Between 1963 and 1967.

Kind of business	Establishments No.	Receipts ($1,000)	Payroll full yr. ($1,000)	% of change 1963 1967 Rects.	Pay roll
All selected services	4,983	147,161	43,529	26.7	48.6
Hotels, motels, tourist courts, camps	779	31,361	8,814	36.9	46.8
Hotels, motor hotels and cts.	399	14,569	2,783	56.3	83.8
Trailer parks	134	1,238	85	95.0	240.0
Sporting and rec. camps	60	1,355	261	-13.7	2.4
Personal services	1,750	29,378	8,336	26.3	30.8
Laundry, cleaning, etc.	338	12,193	4,171	25.1	18.6
Coin operated	109	1,923	284	40.4	132.8

Table 22. Manufacturing Establishments by Employment Size Class for Most Important Major Industry Group -- Idaho Counties, 1967 (Counties with no manufacturing omitted).

County	Number of establishments classed by number of employees in industry group																							
	All manufacturing establishments				Food and kindred products				Lumber and wood products				Printing and publishing				Stone, clay and glass products				Machinery except electrical			
	1-19	20-99	100-249	over 249	1-19	20-99	100-249	over 249	1-19	20-99	100-249	over 249	1-19	20-99	100-249	over 249	1-19	20-99	100-249	over 249	1-19	20-99	100-249	over 249
Fremont	13	2	--	--	3	--	--	--	5	2	--	--	1	--	--	--	2	--	--	--	2	--	--	--
Madison	6	3	1	--	1	2	1	--	1	1	--	--	2	--	--	--	2	--	--	--	--	--	--	--
Teton	5	--	--	--	2	--	--	--	2	--	--	--	1	--	--	--	--	--	--	--	--	--	--	--
Idaho total[1]	828	222	52	29	126	59	18	12	355	94	18	6	97	11	1	1	54	14	1	--	54	16	1	--

[1]In Idaho there were 8 manufacturing establishments that employed more than 500 people. Of these, 1 establishment in "food and kindred products" employed between 1,000 and 2,499 people, and 1 establishment in "Chemicals and allied products" employed 2,500 or more.

The Idaho, Fremont, Madison and Teton Counties present a more difficult case as the economy now depends on a mixture of industries to provide income and employment (Table 23, 24). No responsible estimate were unearthed for the degree of dependence on tourism and recreation in these Idaho counties.

It is significant that the west entrance of Yellowstone (via U. S. Highway 20 and 191) is typically the most popular route of entrance into the park. Tourism undoubtedly offers a prime source of additional income and employment for Madison, Fremont and Teton Counties, Idaho. The OEDP report prepared for Teton County, Idaho, stated that. . .

> It is the general concensus that the most important resource in the county should be tourism and recreation. The contributions which could be made by the development of this resource to the economy of Teton County is unlimited. (p. 24).

The impact of tourism, unfortunately, is a two-edged sword. Beyond the positive effects on local income and employment, there are negative effects on natural resources if visitation reaches the point of overuse. Since the mandate given the U. S. Forest Service by the Multiple Use Act is explicit in emphasizing that it is not always the highest dollar return which determines the best management, officials must frequently decide between alternatives of unequal dollar impact on the local community. Construction of a paved, high-standard road between Ashton and Flagg Ranch would increase the flow of tourists into the Idaho counties with consequent gain to the local economy. The same development, however, is likely to have adverse effects on wildlife, wilderness and other values in the area. It is at this juncture where the land manager must decide where, if at all, one more tourist dollar is worth one less trumpeter swan, etc. Such judgments are outside the realm of economics and must be resolved in the final analysis in terms of the aspirations and philosophy of a democratic society.

Recreation and the Seasonal Factor

As described in the sections on income and employment, the major unemployment problem in the local economy near the study area occurs during the winter and early spring months. During the summer and fall months, unemployment dips to a level which most economists would consider

Table 23. Retail Sales by Counties for Idaho in 1967[1]

County	Total sales	Building materials hardware, farm equip. dealers	General merchandise*	Food stores	Automotive dealers	Gasoline service stations	Apparel-accessory stores	Furniture, home furnishings, equip. stores	Eating drinking places	Drug, stores, proprietory stores	Other retail stores	Nonstore retailers*
Fremont	11,335	2,756	580	2,530	1,832	1,255	(D)	(D)	878	480	717	25
Madison	18,746	3,004	1,038	2,760	3,070	2,800	908	(D)	691	947	2,611	(D)
Teton	2,677	681	(D)	517	641	(D)	(D)	(D)	184	(D)	176	--
State total	1,148,870	143,854	105,547	236,468	229,321	92,124	37,001	47,049	75,833	47,020	121,201	13,452

[1]All sales in $1,000 *Nonstore retailers, part of SIC major group 53, are shown separately in this table.

(D)Withheld to avoid disclosure

-- Represents zero

Table 24. Average Length of Stay in and Receipts of "Resorts" in Idaho: 1967

Item of receipt or classification	Year-round hotels	Seasonal hotels	Motels	Motor hotels	All types
All hotel and motel establishments					
Number	88	31	180	17	316
Receipts from customers ($1,000)	7,977	5,609	9,239	3,610	26,436
All establishments designating themselves as "Resorts"					
Number	4	8	30	2	44
Receipts ($1,000)	(D)	5,000	1,379	(D)	6,911
Reporting length of stay					
Less than 1 week					
Number	3	6	24	2	35
Receipts ($1,000)	426	(D)	1,042	(D)	6,410
1 week to 1 month					
Number	1	1	3	0	5
Receipts ($1,000)	(D)	(D)	(D)	0	443
More than 1 month					
Number	0	0	0	0	0
Receipts ($1,000)	0	0	0	0	0
Not reporting length of stay					
Number	0	1	3	0	4
Receipts $1,000	0	(D)	(D)	0	58
Establishments reporting they are not resorts					
Number	53	0	117	10	180
Receipts ($1,000)	5,755	0	6,105	2,225	14,085

(D) Withheld to avoid disclosure

satisfactory except perhaps in Madison County. The tourism industry has been considered primarily a summer season business. However, there is some evidence that this need not be the case. A highly significant local example of expanded winter employment has apparently been produced by the development of the Grand Targhee ski resort. Time will tell the ultimate impact, but initial indication are highly promising.

Sun Valley, Idaho, illustrates a virtually year-round resort area located in a high mountain setting. Recent trends suggest that the tendency of recreationists to stay home during the winter may be reversing. Snowmobile visitors to Yellowstone increased over 300% during the 1968-70 period (3,497 to 12,095). Although the absolute numbers are still quite small, the increase has been quite dramatic for activity during the "slack" season. Snowmobiles, may pose some difficulty in programs designed to protect such resources as big game on winter range. In addition there is most decidedly a negative effect on aesthetics for many who prefer non-mechanized travel, e.g., ski-touring.

Conclusions

Because of the trend in the industry, as well as the unique scenic assets in the study area, the promotion of tourism offers a promising path for the stimulation of local economy. But such a promotion, if successful, creates additional problems of maintaining these assets. When conflicting interests occur, the U. S. Forest Service must make those difficult decisions which weight the desires of the local economy against the frequently conflicting goals of the general public.

Grand Targhee Resort

The ultimate impact of this development could have far-reaching effects on the local economy of the study area. Capital expenditure at the resort had passed the $2 million mark by the 1970-71 season. Payroll and other operating expenses were somewhat over $300,000 during the 1971 season. Visitation was 16.2 and 50.3 thousand for the first two seasons of operations. Some of the economic effects on Driggs and surrounding areas were described as follows by R. L. Blank, General Manager:

-Land prices have risen tremendously in the Alta area, particularly. Choice building lots are at premium price.
-Many store fronts in the area have been cleaned up and new faces put on many.
-Real estate activity in the entire area has been stimulated since Targhee started. Two new realtys have moved into the Driggs area along with the start of two motels in the area, as well as other businesses.
-The general economy of the area has been stimulated by Grand Targhee developments through new jobs, more purchasing power, etc.

The master plan for further development of the resort submitted to the U. S. Forest Service June 1, 1971, outlined an ambitious program for expansion. While developers are not generally noted for their conservative expectations, some of the projections are of interest. Projections include the building of condominiums and other housing, a summit house above the lift, swimming pools, shops and other facilities. Developers project a daily use of 6,000 skiers of which 1,500 would require overnight accommodations at the resort with another 1,500 staying overnight in Driggs, Victor and the surrounding area.

The benefits of the development to the economy of Teton County under the above assumptions would be enormous. Recreational activity seems ideal as an economic stimulant for a county with extraordinarily low per capita income and exceptionally high winter and spring unemployment level.

X. CONCLUSIONS

The portion of the Upper Snake River Basin included in this study has revealed the existence of many of the same kinds of problems which are associated with other watersheds having particular emphasis on flooding and removal of irrigation water. The pattern is a familiar one involving conflicting uses and environmental impacts of the procedures followed to carry out or control the water resource. In the past too much emphasis has been placed on meeting the needs of a single group of users. This practice should be replaced by a more balanced evaluation of both needs and effects of modification of the watershed or the streams themselves. Because a variety of agencies are involved in managing various components of the watershed, a comprehensive plan should be developed encompassing utilization of both the land and water resources of the basin.

A majority of people interviewed indicated that no additional impoundments were desired for the Henry's Fork or its tributaries. Although at the present time power generation is not of major significance, an installation for this purpose has been proposed for the Henry's Fork in the vicinity of Mesa Falls. It is our opinion that such a proposal should be very carefully examined in light of the unique beauty of this area and that alternative methods of power generation are preferable. Another area that has a severe problem of a different nature is the region around Mack's Inn. During the peak of the summer recreation period fecal bacteria loads approach the hazardous level. Immediate attention should be directed to alleviating this problem both to protect human health and to improve water quality. Similar problems are to be anticipated in other areas undergoing intensive recreational development.

Attention to these and other problems encountered during the field portion of this survey is focused in the section of this report entitled recommendations which follows on the next page.

XI. RECOMMENDATIONS

1. Preliminary planning for present and future sewage treatment capabilities has been completed for those areas currently experiencing intensive recreational use. Such areas include Henry's Lake, Henry's Fork in the vicinity of Mack's Inn and Last Chance, the Buffalo River in the area of Island Park Resort, and camping areas along the south shore of Island Park Reservoir. It appears these sensitive areas present special problems that need immediate attention in planning and management of resource use. The Corps of Engineers could play an important role in implementing these plans by cooperating in the construction of such facilities.

2. Because certain areas within the basin possess unique beauty and aesthetic appeal, they should be given consideration for special protection. We would include in this category the upper reach of Falls River from Sheep Falls upstream, Big Spring, Henry's Fork between Big Springs and Henry's Lake, and that reach from Railroad Ranch to the mouth of Warm River. Special protection might include their designation as green-belt areas, scenic or wild rivers, or state parks. In most instances, such action would necessarily follow land exchanges between the federal government and the state. This recommendation is based upon the belief that establishment of any of these options for the aforementioned areas would be the most expedient way to afford these areas the protection they so richly deserve.

3. It is our position that basic changes in philosophy should be reflected in an attempt to better educate the public to the many benefits (recreational, economic, and aesthetic) which accrue to this region above and beyond the obvious one of agricultural production which is directly tied to the removal of irrigation water from streams and results frequently in the degradation of those streams. This effort might be a natural consequence of comprehensive planning for utilization of the water resource in the basin.

4. That reach of the Henry's Fork including Upper and Lower Mesa Falls constitutes one of the most scenic areas in the basin and should be given protective status which would insure its continued exis-

tence in an unaltered state. The beauty of this area could be enjoyed by much larger numbers of people without serious degradation taking place provided careful planning preceded road construction and recreational development.

5. A comprehensive basin plan should be developed with participation of all state and federal agencies having jurisdiction over any portion of the water resource. Moreover, because the basin cannot be regarded as a separate and distinct entity, planning for this area should be coordinated with similar planning for the entire state and even be considered from the standpoint of the basin as an integral part of the Columbia River System.

6. That portion of Henry's Fork immediately below Lower Mesa Falls could sustain more intensive recreational use, as could other portions of the basin. To attain increased use, access to the river should be improved. Planning and construction of such access routes may legitimately be accomplished under the guidance of the Corps of Engineers.

7. Special protective status, perhaps in the form of refuges, should be considered for selected areas within the basin. Elk, deer, moose, beaver, trumpeter swans, loons and numerous other animals currently utilize many of these habitats. Areas which should be given this consideration include Henry's Fork from Highway 191 Bridge downstream on Henry's Lake Outlet to the vicinity of Big Springs, the west end of Island Park Reservoir, and some portions of Henry's Fork between Rexburg and Rigby (flood plain areas), and the lakes and ponds in the Squirrel Meadows vicinity to the Yellowstone Park boundary.

8. Prior to consideration of construction of additional impoundments, a comprehensive investigation should be made of the water use practices which are now followed. An integral part of such a study should be devoted to whether or not serious water wastage is occurring. Consideration should be given to the alternative of using water presently appropriated for irrigation in this area in other downstream locations where productivity and growing season are more favorable.

9. Those areas presently under dryland farming should be evaluated relating cost of installing runoff abatement structures including debris basins, terracing, and basin tilling to continue farming without these devices. This evaluation should consider costs associated with soil loss and degradation of streams and should also include evaluation of the alterna-

tive of allowing some parcels of land to return to "native" type vegetation cover. Continued agricultural activity on those lands with steep slope contributes an inordinate amount to erosion. They lose top soil at such a rapid rate as to shorten their potential agricultural productivity. It may be possible to regard some of these lands as mitigation areas for loss of wildlife habitat which occurs in bringing other land under cultivation. Continuation of installation of measures to control runoff from these dryland farms should be encouraged. Successful practices to this point in time have been contour plowing, terracing, rotary subsoiling, basin tilling, chizeling, and debris basin construction.

10. Establishment of buffer zones in which agricultural activities would be prohibited should be considered in areas along the margin of the Teton River Canyon. Not only would such areas provide habitat for game, but they would also serve the dual purpose of retarding movement of soil into the stream or reservoir. These areas might also serve as recreational zones during those periods when game or birds were not in the reproductive portion of their life cycles.

11. If any levy or dike works are added to Henry's Fork of the Snake River to prevent flooding of the City of Rexburg or agricultural land near Manan, Rigby, or Rexburg, such construction should be built a sufficient distance from the river to allow for flood capacities. Materials for building should not be taken from the river bottom. Such construction would provide a large channel in times of flood and would have other uses between floods. Pasture or hay crops, but not row crops nor grains which loosen soil, would be suitable cover. Another alternative would be to allow the area to revert to riparian plants, this would provide game habitat for all seasons, would slow flood water, thus alleviating flooding downstream, and would provide the additional benefit of access for sportsmen and recreationists.

12. The destruction of bank cover and willows should be stopped because they stabilize stream banks, thus preventing stream channels from becoming silt clogged. Silt clogged channels lose their carrying capacity and result in floods.

13. One of the strongest recommendations we make is that there be established a guaranteed minimum flow in natural waterways. To attain

this, it might be necessary to reduce all water rights by some fixed percentage to achieve the desired flow. This could be accomplished by purchase of the existing water rights.

14. As in a similar study (Holte, Rose, Trost, 1970), we feel that R. Keith Higginson's statement also applies in this area. "In the past, the method of preventing damage to life and property has been the construction of works. Billions have been spent on dikes, dams, and levees. The federal government has recognized, and the states are recognizing, that this is not the solution. State or local governments should be permitted to institute flood plain zoning in flood-prone areas. As structures already built were damaged or destroyed by floods, they could be destroyed and the land purchased by the government and made available for public use."

15. Although logging appears to be the answer to beetle and spruce budworm infestations to prevent the "loss" of timber, the death of these trees and their subsequent decay in the place of growth may be necessary to enrich the soil for better species to succeed them. Studies should be undertaken to determine whether the harvesting of timber by clearcutting is economically and environmentally wise on a long-term basis. Such studies should consider game use, soil fertility, drainage problems, snow retention and decreased management costs such as road building, cruising timber, marking, etc.

16. No additional major impoundments such as those proposed for Warm River and at Ashton should be considered for the basin. Most individuals that were interviewed seemed to agree that the Teton Dam will provide sufficient flood control, irrigation exchange water, power, and recreation opportunities for the region. However, if future modification of water resources is considered, in-depth studies should be undertaken to examine possible effects of specific projects.

17. In addition to the comprehensive water use plan mentioned above, we strongly recommend that a land use plan be developed. Such a plan necessarily will require the cooperation of several levels of government and should include consideration of flood-plain zoning, assigning use priorities for selected area, and designation of areas which are especially sensitive or easily disturbed, as well as the more routine designation of the various agricultural and domestic uses of land. Indeed, the U. S. Forest Service has already initiated a review of undeveloped

lands in Targhee National Forest which could be incorporated in an area-wide comprehensive plan.

18. An overall recreational plan should be developed for the basin to resolve conflict-of-use activities. Such a plan might include provisions for designation of areas which mechanized vehicles would be permitted and other portions in which these conveyances would be prohibited. Those areas in which intensive recreational use may contribute to serious degradation or harassment of an animal population should be restricted to visitor use at least during some portions of the year. One such area might include the Falls River Ridge which should be closed to snowmobiling on that portion utilized by moose for winter habitat.

19. Wherever land now utilized by wild animals is changed by man's use, such as innundation by reservoirs, agriculture, or campground, that land should be compensated for by areas referred to as mitigation lands. Assuming establishment of mitigation lands, consideration should be given to irrigate these lands at least during the planting and seedling phases so that proper growth and productivity result. Water for this purpose can be obtained by the purchase of existing water rights.

20. All agricultural land under tillage with slopes greater than 15% should be considered for return to grassland and grazing. As a last resort, they should be considered for purchase by the government and returned to cover-crop, native vegetation, or introduced species.

21. In areas where irrigated crops can be economically justified, consideration should be given to the quality as well as the quantity of the harvest. Present scientific knowledge appears to provide opportunity to actually enhance the quality of products and even yields of crops by varying the amounts and timing of water application. Caution should be exercised so that too much land is not put into production for the amount of available water required for a quality product.

22. Future planning for proposed projects having significant environmental impact should involve computer analysis of realistic alternatives. Precedent for utilizing existing models has been established by respected authorities in several regions of the U.S. (Zieman, 1971). The greatest advantage accruing to this methodology resides in the capacity to simultaneously analyze multiple variables, therefore, speeding the planning process and improving reliability.

23. A great amount of energy flow from plants to large carnivores is dependent upon small mammal populations. These populations are distributed along areas of lush and diverse vegetation which is supported by high water input. When possible, areas such as meadows and stream banks should be preserved in order to prevent large carnivor populations from becoming food limited.

24. Two areas which stand out as particularly unique in their beauty are the Mesa Falls on Henry's Fork and the reach of Falls River from Sheep Falls upstream. Under no circumstance should the proposed impoundments be developed on these streams. Both of these sections of streams should be considered for scenic rivers classification so that their unique qualities can be protected for all to enjoy.

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XII. SUMMARY

In summary, the major revenue-producing uses of the study area are agriculture, lumbering, grazing and recreation. The Idaho counties generate income from a variety of activities of which agriculture is the most important. Teton County, Wyoming, derives a high proportion of its income and employment from activities centered around the industry of tourism and recreation.

In Fremont and Teton Counties, Idaho, slightly less than 10% of the sheep grazed on public land utilized the area for a portion of the year. About 25% of the cattle and horses grazed on public lands also use the study area during part of the year. Recreational use is growing rapidly in this area as it is in the state and nation. Teton County, Wyoming, provides a case study of a local economy growing rapidly as a result of the increasing demand for recreation. Logs from the study area provide raw material for a lumber industry which accounts for 5.9% of the jobs in Fremont County. This material source has not been of importance to the other two counties. Industry trends suggest that recreational use will continue to climb. Agricultural production should also increase at a slower rate although technological changes in the industry probably mean fewer jobs.

The future of the lumber industry is cloudy, partially as a result of the timber losses caused by the mountain pine beetle. Employment trends in this industry are showing little growth and forest productivity sets an upper limit to timber harvest under sustained yield principles. As with agriculture, technological changes have been capital intensive which results in fewer jobs per unit of output.

Teton and Fremont Counties have continued to lose population over the years following a trend typical of agriculturally-based communities. Teton County, Wyoming, has shown rapid population growth in percentage terms. However, by national standards all three counties are sparsely populated. The Idaho counties are low income counties in a low income state, mostly the result of a dependence on agriculture and industry which has not shared proportionally in rising national income.

All three counties are dependent for a large portion of their income from agriculture which is heavily subsidized by the government in subsidy payments and indirectly by inexpensive grazing. Agriculture does not provide an expanding source of employment even though farm size continues to increase and more land comes under irrigation. Mechanization and larger energy sources will, in all likelihood, continue to eliminate jobs. Without subsidy, the farm outlook is bleak because the farmer will continue to be caught in the cost-price squeeze.

XIII. BIBLIOGRAPHY

Bollinger, W. LaMar. 1969. Personal Income in Idaho Counties, 1958-1965. Boise, Idaho: Syms-York Company.

Davis, Ray J. 1952. Flora of Idaho. Dubuque, Ia: William C. Brown Co., 836 pp.

Department of Employment, State of Idaho. 1970. Basic Economic Data for Idaho.

Forsgren, Perkins and Associates, P.A. 1971. Comprehensive Water and Sewer Plan for Fremont County, Idaho. Loose-leaf notebook.

Gaarder, Lorin R. 1967. Report on the Archaeological Excavations in the Teton River Canyon, June, 1967. Manuscript on file, Idaho State University Museum, Pocatello.

Hall, E. R. 1965. Names and Species of North American Mammals North of Mexico. University of Kansas, Mus. Nat. Hist., Misce. Publ. No. 43, pp 1 - 16.

Hall, E. R. and K. R. Kelson. 1959. The Mammals of North America. New York: Ronald Press. Vol. I-II, pp. 158.

Harlow, William M. and Ellwood S. Harrar. 1968. Textbook of Dendrology. New York: McGraw-Hill Book Co., Inc. 561 pp.

Harrison, Richard R. 1972a. The Final Report of the Archaeological Survey of the Salmon River Canyon. Manuscript on file, U. S. Forest Service, Ogden.

Harrison, Richard R. 1972b. The Inventory Survey in Modern Archaeology. Unpublished M.S. Thesis, Department of Anthropology, Idaho State University, Pocatello.

Herbst, John R. 1972. A Methodology Study to Develop Evaluation Criteria for Wild and Scenic Rivers, Forest Subproject. Water Resources Research Institute, University of Idaho, Moscow, Idaho 49 pp.

Hitchcock, C. Leo, Arthur Cronquist, Marion Ownbey and J. W. Thompson. 1969. University of Washington Press. Seattle and London.

Idaho Department of Health, Bureau of Vital Statistics, 1972, Idaho Critical Health Indices. 33 p.

Idaho Department of Reclamation, 1968-1970. Twenty-sixth Biennial Report. R. K. Higginson, State Reclamation Engineer. Boise, Idaho.

Idaho Environmental Council. 1972. The Teton Dam Symposium. Papers presented in Idaho Falls, Idaho, June 4, 1972.

Idaho Fish and Game Brochure, 1969.

Idaho Fish and Game Department Commenting on Bureau of Reclamation Environmental Impact Statement, May 14, 1972.

Idaho State Planning and Community Affairs Agency. 1971. Idaho Population and Economic Statistics, Loose-leaf. n.p.

Idaho State Tax Commission. Annual Report 1970. Statehouse, Boise, Idaho.

Idaho Water Resource Board. 1969. Aquatic Life Water Needs. Planning Report Number Three. Prepared by Idaho Fish and Game Department. 39 p.

Idaho Water Resource Board. Idaho Economic Base Study for Water Requirements. Planning Report Number Two, Vol. I and II, 1969.

Idaho Water Resource Board. 1970. Potentially Irrigable Lands in Idaho. Summary Report Number One. 32 p.

Keeler, Robert W. and David G. Koko. 1971. An Archaeological Survey of the Proposed Guffey-Swan Falls Reservoirs, Southwestern Idaho. State University Museum. Pocatello.

Klingeman, P.C., et. al. 1971. Environmental Considerations and the Water Resources of the Silvies Basin. Water Resources Research Institute, Oregon State University. Corvallis, Oregon.

Larrison, E.J. 1967. Guide to Idaho Mammals. J. Idaho Acad. Sci. 7:1-166.

Likens, G. E., et. al. 1970. Effects of Forest Cutting and Herbicide Treatment on Nutrient Budgets in the Hubbard Brook Watershed-Ecosystem. Ecol. Monogr. 49(1):23:47.

Liljeblad, Sven. 1957. Indian Peoples in Idaho. Manuscript on file, Idaho State University Museum. Pocatello.

Linder, Allan. 1968. Unpublished Annotated List and Key to Fishes of Idaho.

Loope, Lloyd. 1972. Time, August 7, 1972, p. 48.

Minshall, G. W. and P. V. Winger. 1968. The Effect of Reduction in Stream Flow on Invertebrate Drift. Ecology, Vol. 49, No. 3, 580-582.

Murphy, Robert F. and Yoland. 1960. Shoshone-Bannock Subsistence and Society. University of California Anthropological Records 16:293-338. Berkeley.

Pacific Northwest River Basins Commission. 1972. A Transcript of Proceedings of an Instream Flow Requirement Workshop, Bonneville Power Auditorium Portland, Oregon. 85 p.

Peterson, R.D. 1968. Economic Structure of Idaho. A Provisional Input-Output Study. Bureau of Business and Economic Research, University of Idaho; Moscow, Idaho.

Rajender, G. R. and Floyd K. Harmston, Dwight M. Blood. 1967. A Study of the Resources, People, and Economy of Teton County, Wyoming. College of Commerce and Industry, Division of Business and Economic Research, University of Wyoming, Laramie, Wyoming.

Renstrom, Richard C. 1970. Tourism, The Silent Giant. Boise Business Vol. 2. No. 6. p. 4.

State of Idaho. Department of Commerce and Development. 1967. Idaho's Growing Tourist Industry, p. 7.

Steward, Julian H. 1938. Basin-Plateau Aboriginal Socio-political Groups. Smithsonian Institution, Bureau of American Ethnology, Bulletin 120, Washington, D.C.

Sutter, R. J. and G. L. Corey. 1970. Consumptive Irrigation Requirements for Crops in Idaho. University of Idaho, College of Agriculture, Bulletin 516. 97 p.

Swanson, Earl H., Jr. 1958a. Archaeological Survey of the Fremont Reservoir, Idaho. Report on file, Idaho State University Museum, Pocatello.

Swanson, Earl H., Jr. 1958b. Archaeological Survey of the Crevice Reservoir, Idaho. Report on file, Idaho State University Museum, Pocatello.

Swanson, Earl H., Jr. 1970. A Methodology Study to Develop Evaluation Criteria for Wild and Scenic Rivers. Report of the Archaeological Resources of the Salmon River Canyon. Water Resources Research Institute, University of Idaho, Moscow, Idaho.

Swanson, Earl H., Jr. and Anthony J. Ranere. 1969-70. Railroad Ranch Prehistory. Idaho Yesterdays 13:19-27, Boise.

Swanson, Earl H., Jr. and Paul G. Sneed. 1967. An Archaeological Reconnaissance of Railroad Ranch in Eastern Idaho 1966. Tebiwa 10:53-59, Poctaello.

Teton County E.D.A. Committee. 1969. Teton County. Idaho: The Land of Opportunity. Driggs, Idaho.

Toohy, Donald R. 1958. An Appraisal of the Archaeological Resources of the Guffey Reservoir in Southwestern Idaho. Report on file, Idaho State University Museum, Pocatello.

U.S. Bureau of Reclamation. 1961. Teton Basin Project - Reconnaissance Report. October, 1961.

U.S. Department of Agriculture. 1971. Fact Sheet West Slope Teton Study Area. Ashton and Teton Basin Ranger Districts, Targhee National Forest, Intermountain Region R-4, St. Anthony, Idaho.

U.S. Department of Agriculture. 1971. Agricultural Conservation and Forestry Statistics, 1971. U.S. Government Printing Office, Washington, D.C.

U.S. Department of Agriculture. Statistical Reporting Service, Idaho Crop and Livestock Reporting Service. Idaho Wheat by Counties, Idaho Barley by Counties, Idaho Potatoes by Selected Counties. Boise, Idaho.

U.S. Department of Commerce. Bureau of Census. Eighteenth Census of the United States: Population, Vol. I, Part 14, Idaho.

U.S. Department of Commerce. Bureau of the Census. 1959 United States Census of Agriculture, Vol. I, Part 39, Idaho.

U.S. Department of Commerce. Bureau of the Census. 1964 United States Census of Agriculture, Vo. I, Part 39, Idaho.

U.S. Department of Commerce. Bureau of the Census. Nineteenth Census of the United States: Population, Preliminary Report, State of Idaho.

U.S. Department of Commerce. Bureau of the Census. Seventeenth Census of the United States: Population, Vol. II, Part 12, Idaho.

U.S. Department of Commerce. Bureau of the Census. Census of Agriculture: 1964-1959-1954.

U.S. Department of Commerce. Bureau of the Census. 1967. Census of Business, Selected Services, Hotels, Motor Hotels, and Motels.

U.S. Department of Commerce. Bureau of the Census. 1967. Census of Manufactur, Area Statistics.

U.S. Department of Commerce. Bureau of the Census. 1967. Selected Services: Idaho BC 67-SA 14. U.S. Government Printing Office, Washington, D.C.

U.S. Department of Health, Education and Welfare. National Center for Health Statistics. 1972. Monthly Vital Statistics Report, Provisional Statistics. Vol. 20, No. 12.

U.S. Department of the Interior, Bureau of Reclamation. 1961. Upper Snake River Basin. Volume III, Part I, Chapter 9.

U.S. Department of the Interior, Bureau of Reclamation. 1961. Upper Snake River Basin. Volume IV, Part I, Chapter 2.

U.S. Department of the Interior, Geological Survey. 1961. Water Distribution and Hydrometric Work, District No. 36, Snake River, Idaho.

U.S. Department of the Interior, Bureau of Land Management. 1970. Public Land Statistics I 53 1/2 970. U.S. Government Printing Office, Washington, D.C.

U.S. Department of the Interior, Geological Survey. 1971. Water Distribution and Hydrometric Work, District No. 01, Snake River, Idaho.

U.S. Department of the Interior. Geological Survey. 1971. Water Resources Data for Idaho. Part 2. Water Quality Records. 142 p.

U.S. Fish and Wildlife Service. 1960. Upper Snake River Basin Vol. III, Part 1. March, 1960.

U.S. Government Printing Office. The Report of the Commission on Population Growth and the American Future. 1972. Population and the American Future. Final Report. 186. p.

University of Wyoming. 1972. Some Ecological Aspects of Clearcutting in the Medicine Bow Forest, Wyoming. Results of an Ecological Study Funded by the National Science Foundation-Student Originated Studies Program.

Wick, J. 1972. Summaries of County Birth and Fertility Data Prepared for B.L. Keller. Idaho Bureau of Vital Statistics. n.p.

Zieman, Joeseph C. 1971. Optimum Pathway Matrix Analysis Approach to the Environmental Decision Making Process, Test Case: Relative Impact of Proposed Highway Alternates. Institute of Ecology, University of Georgia. 13 pp.

XIV. ADDITIONAL READINGS

Hultrantz, Ake

1970 The source literature on the "Tukudika" Indians in Wyoming: facts and fancies. In languages and cultures of western North America, Earl Swanson, ed., pp. 246-264. Idaho State University, Pocatello.

Johnson, Sharon

1968 Final Report on the 1968 Trail Creek Watershed Archaeological Salvage work carried out by the Idaho State University Museum. Report on file, Idaho State University Museum. Pocatello.

Powers, William Roger

1969 Archaeological excavations in Willow Creek Canyon, Southeastern Idaho, 1966. Occasional papers of the Idaho State University Museum, No. 25. Pocatello.

Ranere, Anthony J., Joan C. Ranere and John Lortz

1969 The Monida Pass tipi ring site. Tebiwa 12:39-47. Pocatello.

Stewart, Omer C.

1965 The Shoshoni of the Great Basin. In the Native Americans, Robert F. Specer & J.D. Jennings (et.al.), pp. 273-282. Harper and Row, New York.

1966 Tribal distributions and boundaries in the Great Basin. In The Current Status of Anthropological Research in the Great Basin· 1964, pp. 167-238. Desert Research Institute, Reno.

APPENDIX I

TOURISTS → LOGGING?

APPENDIX I

PARTIAL LIST OF PLANTS KNOWN TO OCCUR IN FREMONT, MADISON AND TETON COUNTIES, IDAHO

The following annotated list of over 530 plants which are found in the study area has been compiled from observations by the investigators and from a systematic search in the Idaho State University Herbarium for plants found in the counties encompassed. The list, although extensive, should not be regarded as complete. After having done research in similar areas found nearby, it is known that several species are certain to be found in this drainage but are not included.

The habitat is extremely varied. Lowland marshes, alpine marshes, high deserts, montaine plateaus, sagebrush plains, coniferous forests, hardwood groves and dry grasslands are but a few of the communities located in the Henry's Fork of the Snake River and Teton River Drainage. Because of the altitude differences and growing season length, it is possible to find the same species blooming in the spring at lower altitudes and in the fall at higher elevations. The constant production is possible because species and habitat diversity makes an area productive from a game or wildlife standpoint. Where this diversity has been altered by agriculture, spraying, overgrazing or other manipulation, game populations have decreased. A monoculture of wheat may provide some game food in the spring or even in late fall, but it will not provide needed protection nor food during the rest of the seasons.

It is the intention of the investigator to show that diversity has been great in this drainage in the past. Some diversity still exists in a few areas, as indicated by the length of this list. In those areas where diversity persists, it should not be destroyed. The economic section of this report reveals the importance of natural areas to tourism. Tourists do not travel to see altered areas, but to appreciate aesthetic beauty which in this instance occurs in naturally productive areas supporting many plants and animals. It further suggests that agriculture is not the only potentially profitable activity in the region. It, therefore, seems logical that other sources of revenue should be sought. One of these is tourism which avoids consumptive use of natural resources, yet continues year after year.

ANNOTATED PLANT LIST

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Aceraceae		
Acer glabrum Torr.	Dwarf Maple	Small tree or shrub; grows in draws and gullies; provides cover and food for birds, big game; aids in flood prevention by holding water until it sinks into the ground; squirrels eat the fruits; eliminated by spray, agriculture, fire and inundation.
Acer grandidentatum Nutt.	Bigtooth Maple	Information same as Acer glabrum except that this species is found at lower elevations.
Acer negundo L.	Box Elder	Although a native tree, it is frequently planted; probably increases by man's use of an area; good shade; good for song bird nesting and game cover; birds and squirrels eat fruit; killed by fire, spray, and inundation.
Amaranthaceae		
Amaranthus blitoides Wats.	Prostrate Pigweed	Annual herb; a weed that increases with man's use of an area; invades fields, gardens, footpaths, etc.; this weed is common, although perhaps not too troublesome; reproduces by seed.
Amaranthus graecizans L.	Tumbleweed	Annual, reproduces by seed; found in fields, gardens, unused yards, and other places where man has destroyed the native vegetation; in nature is found only in disturbed areas such as flood plains; increases with man's use of an area.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Amaranthus retroflexus L.	Redroot	A common annual weed, reproduces by seed; widespread; grows in all areas which are disturbed (native vegetation removed) by man under most soil and moisture conditions; seeds are capable of remaining in the soil for many years without germinating; seeds are produced for a large part of the growing season; increases with man's use and disturbance.
Anacardiaceae		
Rhus trilobata Nutt.	Squaw Bush	Shrub; fruits edible to man and other animals. Grows in native habitats. Will be removed by spray, fire and cultivation.
Toxicodendron radicans (L.) Kuntze	Poison Ivy	Troublesome weed which comes in along fence rows and other places. Frequently found in basalt lava cliffs; no danger of eradication.
Apocynaceae		
Apocynum pusilum (Grey) Greene	Dogbane	Perennial; grows in lodgepole pine forests and in clearings attractive flower; reproduces by seeds and rootstocks; has milky juice will reappear along road cuts. Man's disturbance will reduce numbers by over-grazing and cultivating of high areas.
Asclepiadaceae		
Asclepias speciosa Torr.	Milkweed	An annual weed which appears around irrigation ditches, reservoirs margins, over-grazed pastures, borrow pits, etc.; reproduces by seed; milky juice which contains latex; will increase with man's use.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Berberidaceae		
Mahonia repens Lindl.	Oregon Grape	Perennial low shrub; ripened berries can be eaten raw; sour, make good jelly. Leaves used for Christmas decorations; used for juice and for dye; utilized sparingly by deer and elk and by bears and birds; will decrease with man's use of an area. Grows in dry, rocky areas and in clearings of coniferous forests; spreads by seeds and by creeping rhizomes. Spray, fire, clearing kill it.
Betulaceae		
Betula occidentalis Hook.	Water Birch	A shrub which grows along stream banks; is used for cover by deer which may nibble twigs for winter food; helps to stabilize stream banks; impoundments decrease and remove this species from an area; it does not frequently invade reservoir banks; intense grazing will also remove or damage these shrubs; undisturbed they may become tree-like.
Boraginaceae		
Cryptantha bradburiana Paysen		Plants of dry, open ground; removed by cultivation and intensive use.
Cynoglossum officinale L.	Hound's Tongue	Stout, leafy biennial; naturalized from Europe; reproduces from seeds and from thick, black roots; fruits cling to man's clothing and to fleece of sheep; found in pastures which are overgrazed and other wasteland, frequently on gravelly somewhat alkaline soils; regarded as a weed and will increase with man's use of an area.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Hackeiia floribunda (Lehm.)	Forget-me-not	Biennial or perennial, usually rough, hairy herb; grows in native vegation in hills; is regarded as one of nature's attractive plants; overuse of an area will reduce its abundance and eradicate it from an area; if soil is lost, will not come back until secondary succession occurs.
Hackelia jessicae (Mac. Gr.) Brand	Forget-me-not	Grows in plains and hills; same as above; impoundments will remove it from plains.
Hackelia patens (Nutt.) JTN.	Forget-me-not	Plains and hills; same as the above two species; all of these three species will grow along streams, in brush copses and on hillsides; consequently will be diminished in quantity by impoundments, cultivation, overgrazing, and overuse of an area; seeds cling to wool, clothing, and fur and may travel for long distances.
Lappula echinata Gilib.	Stick-tights, Beggar Ticks	Annual herb; naturalized from Europe; a weed of fields and waste ground; increases with cultivation and overgrazing.
Lappula Redowskii (Horneu) Greene	Stick-tights, Beggar Ticks	Native herb; dry plains; reduced or removed by inundation, spray, overgrazing and cultivation.
Lithospermum ruderale Lehm.	Gromwell	Dry soil with sagebrush; killed by spray cultivation or excessive grazing; leaves can be boiled for a tea; roots can also be boiled and eaten; may have value for legitimate drug market; slow to reinvade an area if removed.
Mertensia alpina (Torr.) G. Don	Alpine Bluebells	Grows at timberline and above; perennial eaten by sheep, elk and deer; rockchucks and pikas are also fond of it; it probably constitutes an important food source for

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
		all of these animals as well as beauty to the hiker; overgrazing by sheep probably constitutes the greatest danger to this plant as do sprays.
Mertensia oblongifolia (Nutt.) Don.	Bluebells	Plains and hills; perennial; also eagerly eaten by sheep, elk, deer, rockchuck and pika; spray constitutes its greatest enemy.
Mertensia ciliata (James) G. Don	Bluebells	Grows from 5,000 to 12,000 feet; perennial; streambanks and in damp mountain parks; will not survive along most eroding impoundment banks; is consequently removed by dams from an area. Constitutes the favorite summer range for elk bands that graze flowers and leaves; hides elk calves during early days; deer and bear feed on the entire plant; domestic sheep are particularly fond of it; rockchucks eat it in summer; pika (rock rabbits) cut, dry and store it for winter use; is easily harmed by spray.
Myosotis alpestris Schmidt.	Forget-me-not	Perennial; found in moist soil of high mountains below timberline to alpine meadows and ridges; grazed during the brief growing season; enemies are overgrazing and spray; is considered one of the most beautiful alpine flowers.
Cactaceae		
Opuntia polyacantha Kaw.	Cactus	Perennial; invades if native plants are removed; will not withstand inundation or cultivation; fruits are edible raw or cooked make excellent jellies; none are known to be poisonous.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Campanulaceae		
Campanula rotundifolia L.	Harebell	Perennial herb; dry to moist soil of open hillsides, prairies and valleys; often among sagebrush from low elevations to 10,000 feet; requires deep, rich soil; because of its adaptability is not endangered but may be reduced in number by inundation overuse or spraying.
Capparidaceae		
Cleome serrulata Pursh.	Rocky Mountain Bee Plant	Annual; prairies, sandy areas, roadsides and waste places to about 6,000 feet; Indians boiled and ate leaves and flowers; will increase by man's use of an area.
Caprifoliaceae		
Linnaea borealis L.	Twin-flower	Perennial, low, creeping shrub; in wet soil along streams, about ponds, springs, and in boggy areas; usually only in shady places up to 9,000 feet; innundation and trampling of cattle around springs and bogs will eradicate it; favorite flower of Linnaeus.
Lonicera involucrata (Richards) Banks	Twin-berry, Bear Berry	Perennial shrub; moist soil of woods and streambanks; provides good erosion control and cover for game; berries are apparently eaten by birds such as ruffed grouse., and by black and grizzly bears; killed by clearing, spray, fire and overgrazing.
Lonicera utahensis Wats.	Red Twin-berry	Same as above.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Sambucus coerulea Raf.	Elderberry	A large shrub which sometimes approaches a small tree; moist soil of plains and hills; eaten by big game animals, most birds and by man; cattle graze and rub on them, destroying the shrubs; enemies are cattle, spray, fire and innundation.
Sambucus microbotrys Rydb.	Elderberry	Same as above; usually found in moist mountain soil.
Symphoricarpos albus (L.) Blake	Snowberry	Erect or nearly prostrate shrubs; fruits eaten by grouse; killed by spray, fire or inundation.
Symphoricarpos oreophilus Gray var utahensis Rydb.	Snowberry	Same as above.
Caryophyllaceae		
Alsine borealis (Bigel.) Briton.	Chickweed	Low perennial, often matted; moist soil of mountains; little forage value; killed by spray, inundation, and overgrazing.
Alsine laeta (Richards) Rydb.	Chickweed	Low, rhizomatous perennial; moist soil rocky slopes; as above.
Arenaria congesta Nutt.	Sandwort	Perennial; plains and mountains; killed by spray or excessive disturbance of soil.
Arenaria lateriflora L.	Sandwort	
Arenaria Nuttalii Pax.	Sandwort	Dry ridges on mountains; same as above.
Cerastium arvense L.	Chickweed	Perennial; calcareous or salty soils; also in sandy or gravelly sites in dry areas; from low elevations to above timberline; in general is a troublesome weed of lawns and pastures; will probably increase with man's use of an area.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Cerastium brachyopodum (Engle) Robins	Mouse-ear Chickweed	Annual; moist soil.
Cerastium strictum L.	Chickweed	Same as above.
Cerastium vulgatum	Chickweed	Perennial or biennial; common weed over most of North America, especially in lawns.
Lychnis alba Mill.	White Campion	Roadsides, borders of fields and waste places; may become troublesome in grain and legume fields; will probably increase with man's use.
Silene acaulis L.	Catchfly	
Silene douglasi H. & M.	Campion	
Silene menziesii Hook	Catchfly, Campion	Roadsides, borders of fields and waste places; may become troublesome in grain and legume fields; will probably increase with man's use.
Silene noctiflora L.	Catchfly	
Stellaria jamesiana Torr.	Catchfly	Moist soil of mountains.
Stellaria longipes Goldie	Starwort	Perennial; meadows; killed by flooding.
Stellaria media (L.) Cyr	Common Chickweed	Common Chickweed; annual; common weed of lawns and waste places, gardens, alfalfa fields, strawberry beds, nurseries.
Stellaria umbellata Jurcz.	Chickweed	Perennial; moist soil of mountains; not endangered.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Celastaceae		
Pachystima myrsinites (Pursh.) Raf.	Mt. Lover, Hedge	An evergreen shrub; perennial; rich moist soils, understory in stands of lodgepole, douglas fir, and aspen; foothills to 8,000 feet; excellent winter food for elk, white-tailed deer, mule deer; pink-sided juncos nest under its shade; reduces erosion; killed by opening canopy if moisture is lacking, but will persist in other places after logging; killed by spray, fire and inundation, used for greenery in bouquets and for winter decorations.
Ceratophyllaceae		
Ceratophyllum demersum L.	Hornwort	An aquatic plant of ponds and streams; weak stemmed; grows in shallow water and not in deep reservoirs.
Chenopodiaceae		
Atriplex canescens (Pursh.) James	Saltbush, Wingscale	Arid, soil; erect shrub; probably only of limited grazing value.
Atriplex confertifolia	Shad-scale	Erect, woody shrub; waste ground, usually where moisture supply comes from below causing an alkaline soil; limited grazing value; used by some nesting birds.
Atriplex hortensis L.	Garden Orache	
Atriplex patula L.	Salt bush, Orache	Saline soil; a weed, but seldom troublesome; seeds may be utilized by birds in winter; herb.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Atriplex rosea L.	Red Orache	Herb; introduced into all the western states; weed of waste areas and disturbed areas; field margins, etc.; a weed which may invade reservoir flood plains as the water level is lowered
Atriplex truncata (Torr.) Gray	Saltbush	Same as above.
Bassia hyssopifolia (Poll.)		Annual herb; introduced from Asia; a weed increases as man removes vegetation and irrigates.
Chenopodium album L.	Lamb's Quarter	An annual weed; reproduces by seed; common in most areas where man has removed the vegetation; hogs and chickens may eat this weed when it is small and tender; noted for the large number of seeds produced; may invade as reservoir water levels are reduced and when inundation reoccurs, seeds are carried downstream into fields.
Chenopodium atrovirens Rydb.	Lamb's Quarter	Annual; found in foothills; not as troublesome as former.
Chenopodium capitatum (L.) Asch.	Goosefoot, Strawberry Blite	An annual weed; dry soil of plains and mountains.
Chenopodium fremontii Wats.	Goosefoot	Dry soil of plains and hills; annual weed.
Chenopodium gigantospermum Aellen.	Pigweed	Plains and hills; annual weed.
Chenopodium glaucum L.	Lamb's Quarter	Low, wet, saline soil; waste areas near reservoirs; increases with man's use; annual weed.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Chenopodium hastatum Rydb.	Goosefoot	Very similar to C. capitatum; annual weed.
Chenopodium leptophyllum Nutt.	Lamb's Quarter	Dry soil of plains and foothills; annual weed.
Chenopodium rubrum L.	Goosefoot, Pigweed	Annual; saline marshes and wet soil; annual weed.
Eurotia lanata (Pursh.) Moq.	Winterfat	Shrubby plants; a very valuable winter feed for sheep; saline, dry soils; not plentiful in this area.
Grayia spinosa (Hook.) Moq.	Hopsage	Erect, branched shrubs; saline soil of plains and foothills, will reenter reservoir margins as far as water will travel through the subsoil; usually forms a clear boundary with big sagebrush; killed by fire, spray, agriculture and inundation.
Halogeton glomeratus C.A. Mey	Hopsage	Annual herb; poisonous to livestock; oxalates are especially troublesome to sheep which do not have an adequate supply of water; found in saline soil of plains and foothills and in abandoned fields and roadsides; often comes in after overgrazing; blacktailed jackrabbits help to eradicate it because they eat a portion of the stem just above ground level and below the level of branching.
Kochia scoparia (L.) Schrad.	Summer cypress	Annual herb; a weed to be found almost universely; troublesome; frequent around reservoirs, gardens, abandoned and utilized fields; increases whenever vegetation is removed.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENTS
Salsola kali F.	Russian Thistle	Annual herb; dry soil of plains; common in overgrazed areas, abandoned fields; introduced weed; troublesome; frequently comes into areas that have been disturbed such as parking lots, roadsides, construction sites.
Sarcobatus vermiculatus (Hook)	Grease Wood	Shrubs; saline soil above high waterline and where water moves through the subsoil and evaporates often leaving a white saline crust on the surface; forms a rather distinct boundary with big sage; is browsed by deer, sheep and cattle; killed by spray, fire, agricul ture and inundation.
Suaeda depressa Wats.	Sea Blite	Annual; strongly saline soil; weed occurs where subbing occurs.
Compositae		
Achillea millefolium L.	Yarrow	Perennial herb; a native of Eurasia; dry to moist soil, but not in shade or wet soil; imparts a disagreeable flavor to milk; comes into native and overgrazed areas; not eaten by animals unless range is depleted; its abundance indicates overgrazing.
Actinea grandiflora T. & G.	Alpine Daisy	Alpine and subalpine species; open places; herb; killed by spray and inundation.
Agoseris aurantiaca (Hook.) Greene	False Dandelion	Meadows and woodlands at moderate and high elevations; taprooted perennial; seeds eaten by small birds; grazed by other larger game animals; killed by spray, overgrazing, agriculture and inundation.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Agoseris glauca (Pursh) D. Dietr.	False Dandelion	Taprooted perennial; meadows and other open places at most elevations; seeds eaten by small birds; herbaceous parts are utilized somewhat by larger animals, especially sheep; killed by spray, overgrazing, agriculture and inundation.
Antennaria alpina Greene	Pussy-toes	Mat-forming perennial; good ground cover; alpine and subalpine areas in mountains; killed by spray and trampling; grazing value doubtful, although it is grazed by deer; killed by logging, spray, clearing and inundation.
Antennaria arida E. Nels	Pussy-toes	Same as above.
Antennaria dimorpha (Nutt.) T. & G.	Pussy-toes	Dwarf perennial; dry open places in foothills and lowlands; an indicator of overgrazing or poor range conditions; killed by spray, and inundation.
Antennaria luzuloides T. & G.	Pussy-toes	Same as for A. alpina, except found at lower elevations.
Antennaria racemosa Hook.	Pussy-toes	Same as for A. alpina, except found at lower elevations.
Antennaria media Greene	Pussy-toes	Same as for A. alpina, except found at lower elevations.
Antennaria rosea Greene	Pussy-toes	Same as for A. alpina, except found at lower elevations.

FAMILY AND SCIENTIFIC NAMES	COMMON NAME	COMMENT
Antennaria pulcherrima (Hook.) Greene	Pussy-toes	Same as for A. alpina, except found at lower elevations.
Antennaria scariosa E. Nels	Pussy-toes	Same as for A. alpina, except found at lower elevations.
Arctium minus Schk.	Burdock	Coarse biennial; roadsides, waste places such as reservoir margins; a troublesome weed that grows in shade or full sunlight in lawns, orchards, cultivated fields; fruits are spiney and hooked; troublesome to livestock, sheep, dogs, etc. because the fruit becomes entangled in the hair or wool; may be used as a tonic and as a diuretic; young leaves can be eaten raw or cooked; animals tend to avoid them.
Arnica Chamissonis Maguire	Arnica	Perennial with rhizomes; meadows and wet places; killed by inundation; grazed by mule deer and sheep.
Arnica cordifolia Hook.	Heart-leaved Arnica	Perennial with rhizomes; moist soil in open woods under aspen, douglas fir, lodgepole pine, etc.; has value in legitimate drug market; may be used to prevent infections; eaten by mule deer and sheep; killed by spray, inundation and logging.
Arnica diversifolia Greene	Arnica	Perennial from freely rooting rhizomes; rocky places at moderate to high elevations; killed by spray and inundation; eaten by deer and sheep.
Arnica longifolia D.C. Eat.	Arnica	Perennial with rhizomes; in well drained soil, but around seeps, springs and along cliffs, and river banks at moderate to high elevations; damaged by raising water levels; killed by spraying.

Arnica mollis Hook.	Arnica	Perennial from freely rooting rhizomes; moist places at higher elevations; some grazing value; killed by spray and raised water levels.
Arnica parryi A. Gray	Arnica	Perennial from freely rooting rhizomes; open forests in foothills and moderate elevations; some value in the legitimate drug trade; some grazing value; killed by spray, logging, agriculture and inundation.
Artemisia cana Pursh	Sage Brush	Similar to big sage
Artemisia dracunculus L.	Sage Brush	Herbaceous perennial; open, dry places; grouse eat flowers and fruits which are abundant; little apparant forage value for big game or domestic livestock; killed as former species.
Artemisia ludoviciana Nutt.	Wormwood, Sage	Aromatic rhizomatous herbaceous perennial; dry and open places; flowers and fruit eaten by grouse; little forage value to large mammals; nibbled by deer in fall and winter; found in area with moderate to heavy herbaceous cover, not in badly disturbed areas; killed by spray, inundation over grazing.
Artemisia tridentata Nutt.	Wormwood, Sage	Woody perennial; dry soils of valleys and hills to timberline; comes in abundantly when overgrazing or other disturbance kills grasses, thus is an indicator of poor management if occuring in high percentage. It is a native plant and has always been a part of this area, but not in present abundance; Because it is a native plant, it is valuable to wildlife as a food and as shelter and nesting sites; the main food source for antelope and is grazed or browsed heavily by deer, elk and moose.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
		especially late in the winter; high in fat content; mourning doves nest most successfully where it is found with other native plants and not where it has been sprayed even as long ago as 25 years; is frequently sprayed to increase grasses that have been killed out by poor management; such spraying destroys the balance in any community because it also kills other broad-leaved plants necessary to sustain the life of wild animals; regarded as a troublesome weed by stockmen, it is a necessary plant for many wild animals such as deer, elk, moose antelope, mourning doves in the West, sage thrashers, sage grouse and many other animals; killed by flooding, fire, spray, plowing and some natural insect enemies.
Aster apricus (Gray) Rydb.	Aster	Perennial herb; some grazing value.
Aster campestris Nutt.	Aster	Slender perennial with creeping rhizomes; open dry areas at moderate and low elevations; found with sage; some forage value for sheep, deer, elk and cattle; killed by spray and inundation.
Aster canescens Pursh.	Aster	Biennial or short-lived perennial from a taproot; dry open areas at low and moderate elevations; good grazing value; killed by spraying, overgrazing and inundation.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Aster chilensis Nels.	Aster	Fibrous rooted perennial with a rhizome; dry open places at moderate and low elevations; with sage; eaten by elk, deer, cattle, sheep; killed by spray, inundation and agriculture.
Aster engelmanni (D.C. Eat.) Gray	Michaelmas daisy, Aster	Fibrous-rooted perennial from a caudex or stout rhizome; forests at moderate elevations; usually with douglas fir or lodgepole pine as most asters, it blooms in the fall; eaten by cows, elk, deer, and sheep; leaves can be boiled and eaten as a pot herb as can on other asters; killed by spray, overgrazing, inundation and logging.
Aster foliaceous Lindl.	Aster	Fibrous-rooted perennial; moist, often wooded areas at moderate and high elevations; same forage value as others.
Aster integrifolius Nutt.	Aster	Stout, fibrous-rooted perennial with a short rhizome; meadows and open woodlands; moderate elevations; same as above.
Aster leucanthemifolius Green	Aster	Same as above.
Balsamorhiza hirsuta Nutt.	Hairy Balsam Root	Similar to B. Hookeri below.
Balsamorhiza Hookeri Nutt.	Balsam Root	Perennial without obvious stem; dry open places at low and moderate elevation; horses select flowering heads, elk, deer, cattle, sheep, and antelope eat the tender young shoots; Bighorn sheep prefer leaves and flowering heads; found with sagebrush; damaged or killed by sage spraying, overgrazing and inundation; many birds utilize the fruits.

FAMILY AND SCIENTIFIC NAMES	COMMON NAMES	COMMENT
Balsamorhiza sagittata (Pursh.) Nutt.	Balsam Root	Same as above except leaves are arrow-shaped rather than dissected; also killed by spray, inundation and agriculture.
Bidens Cernua L.	Bur-marigold	Annual herb; low wet places, frequently on reservoir flood plains, invading after water level drops; nuisance weed because fruits entangle in clothing and animal fur; will probably increase because of man's activities.
Bidens frondosa L.	Beggar's Ticks	Same as above.
Carduus nutans L.	Nodding Thistle, Musk Thistle	Biennial or rarely annual herb; roadsides, waste area and on overgrazed land (an indicator of this); native to Europe; horses and cattle select the spiney flowering heads; flowers are sufficiently attractive to be used for ornaments; a nuisance weed that has spread throughout the West because of poor management practices.
Chaenactis alpina (Gray) Jones	Morning Brides	A small dusty appearing alpine perennial; too small to provide much grazing.
Chaenactis douglasii (Hook.) H. & A.	Dusty Maiden	Biennial, perennial and sometimes an annual plant; dry, open places with sage-brush from lowland to 9,000 feet; does not appear to be heavily utilized except by insects, although occasional field specimens are grazed; killed by spray or addition of water, over grazing.

FAMILY AND SCIENTIFIC NAMES	COMMON NAME	COMMENT
Chrysothamnus nauseosus (Pall.) Britt.	Rabbit Brush	Shrubby perennial; found wherever sagebrush has been disturbed by spraying, ants, plow, etc.; thrives on poor soil indicating erosion and overgrazing; is a reserve food for antelope, jackrabbits, mountain sheep, and mule deer and elk.
Chrysothamnus viscidiflorus (Hook) Nutt.	Rabbit Brush	Shrubby perennial; dry open places with sagebrush; seems to indicate the lack of disturbance; same forage value as above.
Cichorium intybus L.	Chicory	Perennial from a taproot; native of Eurasia, but has invaded most of the U.S.; found in roadsides, waste places, abandoned fields; root can be dried and ground and steeped either with coffee or without a rather bitter drink; found where man removes vegetation and irrigates.
Cirsium arvense (L.) Scop.	Canada Thistle	Probably the most noxious weed present; herbaceous, annual stems arise from a deep, stout rhizome which is perennial; native of Eurasia, but now widespread; enters most cropland and over-pastured areas; cattle will eat dried plants in hay, but seem to avoid it in the green growing stages; grows in patches; is resistant to many herbicides.
Cirsium foliosum (Hook.) DC.	Elk Thistle	Perennial from a taproot; found in mountain meadows with moist to wet solid in open areas; roots used as food by Indians as well as peeled stems; is a favorite spring food of elk and bear; small birds eat the fruit in the fall; not a weed, killed by overuse or spray.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENTS
Cirsium utahense Petrak.	Utah Thistle	Biennial or short-lived perennial; plains and dry open slopes with sagebrush; not a weed; horses and cattle select heads; killed by spray; birds eat seeds as do many rodents.
Cirsium undulatum (Nutt.) Spreng.	Utah Thistle	Similar to the above.
Circium vulgare (Savi.) Airy-Shaw.	Bull Thistle	Biennial weed which moves into overgrazed land or land that has vegetation removed; native of Eurasia now widespread across N.A.; killed by spray; although a weed, it is not troublesome; utilized by small birds.
Conyza canadensis (L.) Cron.	Daisy	Annual weed; a cosmopolitan weed which is native to N.A.; grows in waste places and disturbed areas such as roadsides, abandoned fields, edges of fields that are not cultivated, but have not stabilized due to spraying or occasional plowing, overgrazed areas, etc.
Crepis acuminata Nutt.	Hawksbeard	Perennial; found in open, dry, sagebrush areas in foothills up to moderate elevations; provides some grazing for large mammals; seeds are eaten by birds; is a species which is decreased by spraying; excess overgrazing will also eliminate it; will not tolerate excess water.
Erigeron acris L.	Fleabane	Biennial or perennial; found in rocky places, talus slopes, etc. in the mountains; because of its habitat, provides only occasional nibbles for passing animals; seeds are eaten by birds; not apt to be disturbed by man's activities.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Erigeron Caespitosus Nutt.	Fleabane	Perennial; dry, open areas which tend to be rocky where sagebrush grows; reduced by overgrazing, killed by spray or inundation.
Erigeron compositus Pursh.	Fleabane	Perennial with a taproot and branching underground stem; rocky or sandy areas; provides scatter browing by large animals; killed by spray, reduced by overgrazing.
Erigeron divergens T & G	Fleabane Diffuse Daisy	Taprooted biennial which occasionally lives a few more years; grows in dry and waste areas and in sandy soil; provides some grazing; works as a sand binder if movement is not too severe; killed by spray, reduced by overgrazing; will not tolerate inundation.
Erigeron filifolius Nutt.	Fleabane	Perennial with a taproot and woody branched area near apex of taproot; dry places in sagebrush of foothills and valleys; provides some grazing; killed by spray and overgrazing; cannot tolerate excess water.
Erigeron glabellus Nutt.	Daisy	Fibrous-rooted biennial or short-lived perennial; grows in meadows and moist areas; provides some grazing and bird food; grows in areas which man likes to destroy by draining or by inundation; trails cut through such meadows frequently drain them or lower the water table and plant like this one and its associates cannot compete in the dry soil; is also killed by spray and especially by cattle which congregate in wet areas.

FAMILY AND SCIENTIFIC NAMES	COMMON NAME	COMMENT
Erigeron nanus Nutt.	Daisy	Perennial, taprooted, with caudex; is an associate of sagebrush; killed by spray, damaged by overgrazing; a small plant which provides some diversity, but not a great amount of biomass.
Erigeron peregrinus (Pursh.) Galene	Fleabane	Perennial, from a rhizome, has fibrous roots; moist areas in the mountains; as E. glabellus.
Erigeron perosensis	Fleabane	
Erigeron pumilus Nutt.	Fleabane	Taprooted perennial; grows with sagebrush or in open areas at low and moderate elevations; killed by spray and overgrazing will not tolerate excess water; provides some grazing and bird food.
Erigeron simplex Greene	Fleabane	Perennial; high mountains; provides summer grazing for elk, deer, and sheep; overgrazing will remove topsoil from these fragile areas and will eradicate this also.
Erigeron speciosus (Lindl.) DC.	Daisy	A rather large perennial from a woody caudex; grows in forested areas; large enough to provide good grazing for large mammals; destroying the canopy and topsoil removes this plant.
Erigeron speciosus (Lindl.) DC. var macranthus (Nutt.) Cron.	Daisy	Same as above
Erigeron strigosus Muhl.	Fleabane	Annual; considered a weed; grows in areas where the vegetation has been destroyed such as pastures, fallow land, barnyards, roadsides, etc.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Eriophyllum lanatum (Pursh) Forbes var. integrifolium		Perennial; dry open places in grasslands and sagebrush; killed by spray and overuse; because of its numerous stems provides a fair quantity of biomass; many destroyed by inundation.
Gnaphalium palustre Nutt.	Cudweed	Cudweed; old fields, dry areas, unproductive areas, pastures; regarded as a weed, will increase with man's use.
Grindelia squarrosa (Pursh.) Dund.	Gum-plant	Biennial or perennial; most frequently seen immediately adjacent to asphalt roads in the fall; but also grows in waste places which are very dry or from lava outcrops; used limited; leaves for team, sedative, antipasmodic and expectorant; increases with man's use of an area.
Gutierrezia sarothrae (Pursh.) B. & R.	Matchbrush	Perennial shrub; grows with sagebrush, rabbit brush and associates; if consumed in large quantities is poisonous to livestock; becomes plentiful only when an area is overgrazed; killed by spray, increased by overgrazing.
Haplopappus acaulis (Nutt.) Gray		Perennial; dry open areas at most altitudes below alpine; mat-forming because of it growth habit, provides good erosion prevention; a relative, not found here causes trembling in sheep if eaten over a period of days; it is not known whether this species does or not (a good reason to keep sheep moving across range)

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Helenium autumnale L.	Sneeze Weed	Perennial; reproduces by seed and underground rootstocks; swamps, wet meadows, in waste places and sometimes along roadsides; no forage value, leaves are bitter and have a strong odor which causes animals to sneeze; eaten only if range is greatly depleted and then may be toxic to livestock; frequently found around reservoirs with fluctuating water levels.
Helianthella uniflora (Nutt.) T. &G.	Little Sunflower	Taprooted perennial; medium dry to moist areas, frequently near aspen groves at elevations to timberline; provides excellent forage for all large mammals; may not be damaged by overgrazing unless soil movement occurs.
Helianthus annuus L.	Sunflower	Annual; native to the West; dry soil, waste places, abandoned fields, roadsides; varieties of it are planted into gardens; makes good silage, seeds are nutritious and are used for poultry feed, snakes, oil for paints, margarine, cooking; Indians used the fibers from the stems; a weed that increases with man's use of an area, appearing in most row crops.
Hieracium albiflorum Hook.	Hawkweed	Fibrous rooted perennial; frequently found in lodgepole pine or other open woods or on moist open areas at moderate elevations; readily eaten by large mammals, consequently overgrazing of woodlands erradicated this species thus summer overgrazing by domestic livestock eliminates it from ranges

FAMILY AND SCIENTIFIC NAMES	COMMON NAME	COMMENT
		that game utilize at other times, forcing game animals to eat less desireable species; such ranges are then said to be overgrazed by deer and elk which they would not be if it were not for their favorite and necessary plants, as this one, being removed by domestic stock.
Hieracium gracile Hook.	Hawkweed	Similar to H. Albiflorum. Is also a favorite of Bighorn Sheep; necessary for their protein needs.
Iva axillaris Pursh.	Poverty Weed	Perennial from a creeping rhizome; dry saline or alkaline areas associated with water seeping through soil and evaporating at surface such as margins of fluctuating reservoirs; its common name comes from its habit of growing in very barren soil; increases with man's use.
Iva xanthifolia Nutt.	Marsh Elder	Common annual; reproduces by seed; found in waste places, fields; overgrazed areas, roadsides and fence rows; pollen affects hay fever suffers; need not be sprayed, as mowing will control increases with man's activities.
Lactuca pulchella Pursh.	Blue Flowering Lettuce	Taprooted perennial; a noxious weed; grows in moist areas and consequently comes in around irrigation waste areas that are not cultivated; also in fields; relatives are eaten by grouse and other birds; this one is apt to be also.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Lactuca scariola L.	Lettuce	Biennial or winter-annual; fields, waste places, lawns, pastures, etc.; favorite food of most grouse which eat leaves and the entire flowering and fruiting heads; this plant increases with overgrazing and is one of the few that do this that is of value to game; leaves of this make good salads.
Lygodesmia spinosa Nutt.	Skeleton-weed	Perennial; dry, open places among sagebrush; apparently has no forage value; seeds are eaten by birds; leaves were eaten by Indians with meat; killed by fire, inundation, overgrazing and agriculture.
Madia glomerata Hook.	Tarweed	Strongly scented, glandular, hairy annual; comes into areas which are barred of vegetation or disturbed; usually grows where soil is sandy; too small to have much value; increases with man's use of an area.
Matricaria matricarioides (Less.) Porter	Pineapple Weed	Pineapple scented annual; footpaths, sidewalk edges, immediately adjacent to roads and other waste places; I have never seen it used by anything; increases with man's use.
Ratibia columnifera (Nutt.) W. & S.	Cone-flower	Taprooted perennial; dry to moist soil in open areas of plains; leaves are grazed by large mammals; leaves used for tea by Indians, rare, and west of its main range.
Rudbeckia occidentalis Nutt.	Nigger-heads	Coarse perennial; associated with aspen and open, moist areas in forest openings at moderate elevations; associated with overgrazing because it is not eaten regularly and increases when an area is overgrazed; other than emergency food and bird seed, it has no forage value.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Senecio cymbalarioides Nutt.	Squaw-weed, Butter-weed	Fibrous-rooted perennial; forests and moist open places; forage value, and birds eat fruits; reduced by overgrazing and spray.
Senecio hydrophilus Nutt.	Groundsel, Squaw Bush	Fibrous-rooted perennial; in moist areas; contains alkaloids in minute quantities which if eaten in quantity may poison domestic livestock; will probably decrease with man's activity.
Senecio pauperculus Michx.	Squaw-weed, Butter weed	Fibrous-rooted perennial; meadows, prairies, streambanks, beaches and cliffs at moderate and low elevations will decrease with man's activities, especially inundation.
Senecio serra Hook.	Squaw-weed	Fibrous-rooted perennial; meadows and open places in low and moderate elevations; birds eat seeds; these areas frequently destroyed by man, thus erradicating this species.
Senecio triangularis Hook.	Squaw-weed	Several-stemmed fibrous-rooted perennial; streambanks and similar moist places; removed by man's activities and inundation.
Solidago canadensis L. var. salebross (Piper) Jones	Goldenrod	Tall perennial; open places; seeds eaten by birds; killed by spray, overgrazing and inundation.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Tanacetum vulgare L.	Tansy	Coarse, aromatic perennial; ditchbanks and other moist places, most frequently along irrigation ditches; a weed; increases with man's use of an area; avoided by big mammals.
Taraxicum officinale Weber	Dandelion	Taprooted-perennial; considered a weed; birds readily eat its seeds; man can use leaves for salad, inflorescences for wine; grows at all elevations in forests and open meadows, pastures and lawns; leaves are readily eaten by Canada geese and ruffed grouse; elk, deer, black and grizzly bears, porcupines all eat the leaves, especially when young; increases with man's use; damaged by spray, but difficult to eradicate; tillage keeps it out.
Tetradymia canescens DC.	Horse Brush	Shrub; dry soil of plains and foothills with sagebrush; remains erect even through snow and thus provides browse for game when other food is covered; toxic to sheep in early growth forms; causes at this time bighead malady in domestic sheep (shearing time); its presence thus conflicts with sheep and game use; killed by inundation, fire and spray and overgrazing although it may briefly increase with overgrazing.
Tragopogon dubius Scop.	Goats Beard	Taprooted biennial; moist soils in ditch-banks, fence rows, and meadows; not a troublesome weed except comes into lawns and gardens where it is easily eradicated; birds eat the fruits; leaves are too small to be readily grazed although it may be used intermittently; roots of it and related species may be boiled for human consumption.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Wyethia amplexicaulis Nutt.	Mules Ears	Perennial herb; open hillsides; openings in forests at low and moderate elevations to almost timberline; killed by spray and inundation, indicates overgrazing in an area; regarded as a weed; because it is little utilized by livestock, the plants around it are overutilized resulting in almost pure stands of it in overgrazed areas; utilized by black bears and deer early in the spring; increases with man's overuse and he attempts to eradicate it; tourists tend to regard it as a pretty wild flower.
Wyethia helianthoides Nutt.	White Mules's Ears	Perennial herb; one of the most beautiful wild flowers in this area; it covers meadows with its 2-5 inch broad flowers during mid and late summer; because it is not utilized greatly by domestic livestock, it has undergone widespread attack by spray programs which also kill all broad leaf associates in meadows including many species of wild orchids; it is this ignorant, flagrant violation of nature's diversity which has brought the wrath of tourists, ecologists, and others who have interests and purposes other than livestock in mind and desire true multiple use of public land; this plant is utilized by deer, elk and livestock in early stages; killed by inundation.

FAMILY AND SCIENTIFIC NAMES	COMMON NAME	COMMENT
Xanthium strumarium L.	Cocklebur	An annual weed; grows in all disturbed habitats that receive moisture such as cultivated fields, irrigation ditch banks, flood plains that have vegetation removed from them, and most abundantly of all on the soil left bare when reservoirs recede; at the latter place there may average twenty plants per square yard; definitely increases with man's disturbance of an area; the two seeds within the spiney fruit can be eaten raw or cooked as it was by the Indians; the leaves of the young plants contain a poisonous glucoside called xanghostrumarin that is fatal to sheep, cattle, and hogs; the burs cause problems in clothing, wool and fur of animals, and can also cause mechanical injury to the intestinal tract of animals that consume them.
Cornaceae		
Cornus stolonifera Michx.	Dogwood	Reddish-barked shrub; along streams, in meadows, bogs, up to 7,500 ft.; valuable wildlife food; available early in winter; high in protein, fat and carbohydrates; pheasants, grouse and bears eat the berries; rabbits, moose, deer, elk eat twigs and winter buds; provides valuable winter cover for all wildlife; destroyed by spraying, burning, inundation, and stream channeling, overgrazing around streams destroy its erosion preventing roots.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Crassulaceae		
Sedum lanceolatum Torr. var. lanceolatum	Orpine	Tufted perennial; rocky areas from valleys to ridges to 9,000 ft.; too sparce and scattered to be of much forage value.
Sedum polygamum Rydb.	Stonecrop	Same as S. Lanceolatum
Sedum stenopetalum Pursh.	Orpine, Yellow Stonecrop	Glabrous perennial; grasslands and sagebrush desert to ponderosa pine forests to alpine ridges; may provide some brows; killed by spray, inundation, agriculture and overgrazing.
Cruciferae		
Alyssum alysoides L.	Alyssum	Annual or biennial; a weed of dry places; introduced from Europe; appears in sage brush stands that have been overgrazed; thus increases with man's use; too small to be of great significance; killed by inundation.
Alyssum desertorum staph.	Mustard	Annual or biennial; a weed introduced from Asia Minor; found among sagebrush; seeds are eaten by small mammals and birds; small but common and thus may have some food significance; killed by spray and inundation.
Arabis glabra (L.) Bernh.	Rock Cress	Most commonly a biennial; rocky areas; may be nibbled by passing animals, but too scattered to contribute much brows; killed by spray and inundation.

FAMILY AND SCIENTIFIC NAMES	COMMON NAMES	COMMENT
Arabis holboellii Hornem. var. retrofracta (Graham) Rydb.	Rock Cress	Common perennial in lava cracks and on dry rocky soil; sometimes is found eaten to resette by passing animals; doves eat seeds; because it grows in a harse environment, it cannot tolerate much grazing or spray, although it is in no current danger of becoming extinct.
Arabis lyalli Wats.	Rock Cress	Caespitose perennial; high mountains; summer graze only.
Barbaraca orthoceras Ledeb.	Yellow Watercress	Biennial or short-lived perennial; roadsides, pastures, in timothy, clover grain fields and alfalfa fields where it matures before the crop is cut; seeds can live several years in the soil; increases with man's cultivation; no positive value for wild game, killed by spray and inundation.
Brassica arvensis (L.) Rabenh.	Yellow Mustard	Annual; or biennial; introduced from Europe; a weed over most of the U.S.; grain fields and waste places.
Brassica campestris L.	Mustard	
Brassica nigra (L.) Koch.	Black Mustard	Annual; weed over most of the U.S.; introduced from Europe; is the source of commercial mustard; increases when man removes native vegetation.
Capsella Bursa-pastoris (L.) Medic.	Shepherd's Purse	Annual; weed; lawns, waste ground, sidewalks, roads, etc.; no known value; increases with man's stripping an area of native vegetation against which it cannot compete and with overgrazing.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Cardamine breweri Wats.	Bitter Cress	Perennial; high mountains; some forage value; overgrazing of high fragile areas destroy it, as does spray.
Cardaria Draba (L.) Desv.	White-Top	Perennial; a noxioux weed of roadsides and cultivated ground; spreads by underground growth and seeds; introduced from Europe; roots penetrate to 30 feet; will in time choke out a field of alfalfa;
Descurainia Californica (Gray) Schultz	Tansy-mustard	Annual or biennial; reproduces by seed; cultivated fields, pastures, meadows, waste places, roadsides, overgrazed sagebrush stands, etc.; may reduce crop yields; seeds eaten by birds and man; considered a weed.
Descurainia Richardsonii (Sweet) Schulz.	Tansy-mustard	Same as above.
Draba crassifolia Graham.	Whitlow Grass	Annual or perennial; small native plant; little known of its use.
Draba desifolia Nutt.	Whitlow Grass	Cespitose perennial; alpine; may contribute some of high summer brows and ground cover.
Draba oligosperma Hooker.	Whitlow Grass	Caespitose perennial; subalpine; may contribute some to high summer brows and ground cover.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Lepidium densiflorum Schrad. var. Bourgeauanum (Thell.)	Pepper-grass	Annual; dry soil in disturbed areas; may enter sagebrush stands if they are heavily overgrazed; livestock and game will eat it, but has really little forage value; when eaten by dairy cattle, the milk and dairy products made from this milk are bitter and contain an odor which lowers the milk quality.
Lepidium virginicum L.	Bird-seed	Same as above.
Lesquerella diversifolia Greene	Alpine Bladder-pod	Mountain plants; may provide some summer browse.
Rorippa islandica (Oeder) Barbas.	Yellow Water cress	Annual or biennial; pastures, cropland and waste areas; a weed.
Rorippa nasturtium-aquaticum (L.) S. & T.	Watercress	Floating or creeping in streams of clear water or from and around springs; introduced from Eurasia and has spread over most of U.S.; a favorite food of waterfowl and aquatic mammals; also eaten by man for relish and salads and can be dried and used as a flavoring sprinkled on food; spreads easily by seed and stem sections which readily root from nodes; inundation, "improvement" of springs, and reservoir inundation ruin its habitat and thus the food source for many waterfowl.
Sisymbrium loeselii L.	Mustard	Mostly an annual; introduced from Europe; a weed of waste places and cropland.

FAMILY AND SCIENTIFIC NAMES	COMMON NAMES	COMMENT
Smelowskia calycina (Stephan) Meyer	None	Caespitose perennial; high mountains; some summer browse; killed by spray, inundation and agriculture.
Thlaspi arvensi L.	Penny Cress	Annual; common weed of field and waste places and immediately along road cuts and for the first few years of any exposed bare soil; introduced from Europe; little known value.
Cupressaceae		
Juniperus communis L.	Dwarf Juniper	Shrub; grows in shade of other species such as douglas fir, lodgepole pine, aspen, etc.; provides emergency browse for deer and other big game animals during winter; not affected by most of man's activities, although' logging mechanically damages it and may kill it if lacking in moisture until canopy reforms above it; killed by spray, fire and inundation.
Juniperus utahensis (Englm.) Lem.	Utah Juniper	A rough bushy tree; dry plains and foothills; good for fence posts; provides winter food for deer and elk; shelter from wind and enemies are probably some of its most important aspects; grows on the south facing slope of many river canyons that are inundated by reservoirs; destruction of this tree is one of the reasons canyons become useless to animals when a canyon is inundated; important to deer migration and use of an area; killed by fire and spray.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Cyperaceae		
Carex angustior Mack.	Sedge	The greatest majority of species within the genus Carex are found in marsh and wetland areas. They are climax species which reproduce by rhizome and seed. They can live there only after the soil has been built up and becomes the rich, productive soil characteristic of marshes and wetlands. Their production is high; they provide the majority of the hay that is harvested as wild hay. Draining wetlands, putting in an improper road which results in an erosion ditch which lowers the watertable or inundating the wetland, all destroy the sedge community. While sedges dominate the community, they allow 60-100 other plant species to live with them. This diversity is vital to the survival of the hundreds of other species of animals which also live in the wetland during all or part of their life cycle. These wetlands are important during all seasons of the year to birds, big game, domestic livestock and hundreds of insects which are our friends, not our enemies. Overgrazing of wetlands does not usually eradicate Carex unless it occurs for many years. Because of their tough rhizomes they prevent soil erosion and tenaceously hang on even though cattle graze their leaves and stems to ground level. The other species are eliminated and are replaced by weeds and toxic plants which are less productive to both the cattle and to the game. Remember that cattle depend upon such areas for food only for a few days in the summer. During the winter cattle are fed upon food gathered from other areas. Game is dependent upon wetlands for their food during the winter.

FAMILY AND SCIENTIFIC NAMES	COMMON NAMES	COMMENT
		If man or his cattle has destroyed this food, big game starves. Sedges (Carex) are the main plant responsible for giving wetlands their water holding capacity. If these plants are destroyed, then water rushes downhill to cause flooding at lower elevations. There are approximately twenty species of Carex mentioned here. I am certain that this figure represents only a fraction of the total number to be found in the area.
Carex athrostachya olney	Sedge	Same as for Carex angustior Mack.
Carex aurea Nutt.	Sedge	Same as for Carex angustior Mack.
Carex Brevior (Dewey) Mack.	Sedge	Same as for Carex angustior Mack.
Carex disperma Dewey	Sedge	Same as for Carex angustior Mack.
Carex egglestoni Mackenzie	Sedge	Same as for Carex angustior Mack.
Carex elynoides Holm.	Sedge	Same as for Carex angustior Mack.
Carex festivella Mack.	Sedge	Same as for Carex angustior Mack.
Carex geyeri Boott.	Sedge	Same as for Carex angustior Mack.
Carex hepburnii Boott.	Sedge	Same as for Carex angustior Mack.
Carex hoodii	Sedge	Same as for Carex angustior Mack.
Carex inflata Huds.	Sedge	Same as for Carex angustior Mack.

FAMILY AND SCIENTIFIC NAMES	COMMON NAMES	COMMENT
Carex kelloggii W. Boott.	Sedge	Same as for Carex angustior Mack.
Carex lanuginosa Michx.	Sedge	Same as for Carex angustior Mack.
Carex nebraskensis Dewey	Sedge	Same as for Carex angustior Mack.
Carex nova Bailey	Sedge	Same as for Carex angustior Mack.
Carex nubicola Mack.	Sedge	Same as for Carex angustior Mack.
Carex occidentalis Bailey	Sedge	Same as for Carex angustior Mack.
Carex petasata Dewey	Sedge	Same as for Carex angustior Mack.
Carex Rossii Boott.	Sedge	Same as for Carex angustior Mack.
Carex stipata Muhl.	Sedge	Same as for Carex angustior Mack.
Eleocharis macrostachya Britt.	Spikerush	An emergent perennial with an underground rhizome or extensive root system; seeds are important to birds and to other animals which wade and browse on them; constitutes an important part of wild hay; draining or inundation both eradicate this species.
Eriophorum angustifolium Roth.	Cotton Grass	More rare than the previous two species; soon disappears with overgrazing; will not establish itself along fluctuating reservoir boundaries; will be lost to the area should dredging, draining or damming occur.
Scirpus acutus Muhl.	Hardstem Bulrush, Common Tule	Rhizomatous perennial; important for nesting cover for red-winged blackbirds, marsh wrens, coots, least biggerns, ducks, and Canada geese; staple food for muskrats and other aquatic animals; seeds are consumed by all the above mentioned animals

FAMILY AND SCIENTIFIC NAMES	COMMON NAMES	COMMENT
		and most waterfowl; rootstalks of this plant were eaten by Indians who prepared them in many ways; known to staved off famine in other countries and have saved the lives of many lost individuals; draining kills this plant; it also cannot survive the fluctuating water of a reservoir nor can it tolerate the frequently murky conditions caused by the erosion of the banks around reservoirs.
Elaeagnaceae		
Elaeagnus angustifolia L.	Russian Olive	Small tree; introduced from Russia but escapes cultivation; able to grow in dry habitats; fruits are eaten by numerous birds; pheasants, grouse, magpies; countless other birds take refuge in them during snowstorms; many birds use them for nesting; spraying, fire, cultivation and overgrazing reduce the numbers of these plants.
Elaeagnus canadensis (L.) A. Nels.	Canadian Buffaloberry	Shrub; berries are edible although sour; eaten by birds; provide important cover in open forests for small animals; found mostly in lodgepole pine, douglas fir, and aspen forests; overgrazing, logging, cultivation of former habitat are reducing this species; may be a browse plant for game; killed by fire, spray and inundation.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Equisetaceae		
Equisetum arvense L.	Horsetail	Rhizomatous perennial; in damp or wet soil in forests, thickets, along streams, seepage areas, but also in drier roadsides and embankments such as near railroads; not heavily utilized by game for food; important cover for areas which would otherwise be exposed to erosion. I have never seen it around reservoir margins.
Equisetum prealtum Raf.	Horsetail	A rhizomatous perennial; sandy or rocky soil along streams, ditches and pond banks, but also in woods and thickets, roadsides, and railroad embankments; may be nibbled early before it becomes embedded with silicone; large amounts are said to be toxic to cattle which eat it only after all else is grazed.
Ericaceae		
Arctostaphylos uva-ursi (L.) Spreng.	Manzanita	Low shrub found in the understory of aspen, lodgepole pine, douglas fir, ponderosa pine forests; leaves and twigs eaten by deer; berries eaten by bears, rodents, songbirds, turkeys, grouse; leaves can be smoked, used as an astringent, tonic, and diuretic; extract from leaves can be used to tan hides; clearing, inundating, spraying, excess burning may kill these important plants.

FAMILY AND SCIENTIFIC NAMES	COMMON NAMES	COMMENT
Kalmia polifolia Wang.	Swamp Laurel	Erect shrub; bogs and wet soilsnear streams; leaves contain andromedotoxin which is poisonous to cattle, sheep and humans; honey made from nectar from its flowers may even be poisonous; obviously removal of this plant as far as man is concerned would appear to be a benefit rather than a loss. No one has determined its role in the ecosystem in this area, other poisonous plants have later been found to be important sources of medicines.
Vaccinium caespitosum Michx.	Huckleberry	Low shrub; alpine area; berries important for bears, grouse, ptarmigan, rodents, marten, coyotes, etc.; deer, elk and bears consume leaves and twigs; spray, logging, sheep and cattle grazing can wipe out populations of these.
Vaccinium membraneceum Dougle.	Huckleberry	An erect shrub; same as above.
Euphorbiaceae		
Euphorbia serpyllifolia Pers.	Spurge	Annual; a prostrate plant which grows in disturbed areas such as sandy roadsides, along paths, other waste places as between plants in the garden, flowerbeds, etc.; increases with man's use; regarded as a weed although it prevents soil movement where nothing else can grow.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Fumariaceae		
Dicentra uniflora Kell.	Steer's Head	Perennial spring herb; a rare plant which have found only occasionally; is a rare treat to the naturalist when found; moderate to high elevations among sagebrush, but mostly on ridges and ledges near aspen and douglas fir, lodgepole pine stands; this tiny plant (2-4 inches tall, 1 flowered) is said to be poisonous because it contains cucullarine, an alkaloid; the plants are too rare, too small, and too short in their growing season to be significant as a problem.
Gentianaceae		
Fraseria speciosa Dougl.	Fraseria	A biennial; moist soil of open areas usually near seeps or draws; elk and cattle eat along with other spring plants; dried stems stand above the snow and may be eaten by deer during winter; other members of this genus supply medicines as emitics and cathartics; inundation, overgrazing, spray, draining of wet areas remove this plant from its habitat.
Gentiana Calycosa Griseb.	Gentian	Perennial herb; bogs of high mountains; contains a clear bitter flavor that to man is not palatable, but is used as a medicine; other than its importance for insects, seems to have little forage value; one of the most beautiful mountain meadow flowers.

FAMILY AND SCIENTIFIC NAMES	COMMON NAMES	COMMENT
Gentiana forwoodii Gray	Gentian	Perennial herb; hills and mountains; same as above.
Gentiana tenella Rottboell.	Gentian	Same as above.
Geraniaceae		
Erodium cicutarium (L.) L'Her.	Stork's bill, Filaree	Annual; found in disturbed and overgrazed areas; a prostrate plant of dry areas; seeds germinate in fall and provide forage in the fall as well as the following spring for livestock and deer; young plants can be eaten as greens, raw or cooked.
Geranium Richardsonii Fish. & Traut.	Geranium	Perennial; grows in partial shade of woodlands; valuable forage plant for sheep, deer, elk, moose, cattle, black bear, grizzly bear, easily killed by spray and overgrazing.
Geranium viscossisimum Fish. and Traut.	Geranium	Perennial herb; widespread in moist soils among sagebrush, in forests if open and in meadows; a valuable forage plant with a long growing season constituting a major food item for elk and deer during the spring and summer; it is consumed by the same animals and is more widespread than G. richardsonii; moose are said to select its flowers and upper leaves in preference to all other plants (Craighead, 1963); easily destroyed by spraying and overgrazing as well as by inundation of its habitat; its loss is important to many wild animals.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Gramineae		
Agropyron Bakeri e. Nels	Baker Wheatgrass	Perennial; open slopes of upper altitudes; good forage where abundant; overgrazing will eradicate; good soil binder; native.
Agropyron cristatum (L.) Gaertn.	Crested Wheatgrass	Perennial bunch grass; introduced from Russia; tolerates excessive overgrazing and therefore is planted into reseeded areas; of little forage value for anything but cattle; used only by horned lark in one seeding (Trost 1972).
Agropyron dasystachym (Hook.) Vasey	Thickspike Wheatgrass	Perennial with creeping rhizomes; a good forage grass; native; eradicated by over-grazing; plains and sandy areas.
Agropyron griffithsii Scribn. & Smith	Wheatgrass	Perennial with creeping rhizomes; same as above.
Agropyron pauciflorum (Schwein.) Hitch.		A form of A. trachycaulum.
Agropyron spicatum (Pursh.) Scribn. & Smith	Bluebunch Wheatgrass	A native bundh grass; excellent forage for livestock; cures well; grazed by game animals; one of the first grasses to be eradicated by overgrazing which results in a loss to the cattlemen and sportsman; a good soil binder, when it goes, other go and erosion of valuable topsoil begins.
Agropyron spicatum var. inerme Heller.	Beardless Wheatgrass	A tall bunchgrass; good spring and summer forage plant; because of its height may be used as an emergency food during winter by game animals; resistant to overgrazing; because it grows in low hills and lowlands, much of it is lost by inundation.

FAMILY AND SCIENTIFIC NAMES	COMMON NAME	COMMENT
Agropyron repens L.	Quack Grass	Rhizomatous perennial; troublesome weed introduced from Eurasia; waste places, meadows, pastures, irrigation banks, reservoir margins; does provide grazing and tends to stay green throughout the summer into fall.
Agrostis exarata Trinn.	Bentgrass	Wetlands perennial of moist open ground at low and median altitudes; good spring and fall forage; destroyed by over trampling and inundation.
Agrostis hiemalis (Walt.) B. S. P.	Bentgrass	Open ground of fields and waste places; good forage, same enemies as above.
Agrostis palustris Huds	Bentgrass	Introduced into the interior from the west coast; good forage, used for lawns, golf courses, etc.; increases with man's use of an area.
Agrostis scabra Willd.	Thicklegrass	Excellent forage; widespread; mountain meadows, open fields, open woods; reduced by trampling and inundation.
Alopecurus aequalis		Perennial; in water and wet places; good forage, but not plentiful; same enemies as above except that it will tolerate inundation for longer periods of time.
Alopecurse alpinus J.E. Smith	Meadow Foxtail	Perennial; mountain meadows; good forage; can be trampled out or killed by inundation.
Alopecurus pratensis L.	Meadow Foxtail	Perennial; good forage but disliked because its seeds spread from irrigation reservoirs to fields downstream; will tolerate inundation for several months as it does on the flood plains of Palisades Reservoir; forms a compact mat which retards bottom movement in that situation.

FAMILY AND SCIENTIFIC NAMES	COMMON NAME	COMMENT
Arrhenatherum elatius (L.) Presl.	Tall Oatgrass	Tall perennial; meadows; introduced from Europe; escapes cultivation; good forage.
Avena fatua L.	Wild Oats	Annual; introduced from Europe; a troublesome weed in cultivated fields, waste ground, irrigation banks, abandoned areas; good forage.
Bromus anomalus Rupr.		Good forage grass; native; good forage; open woods; overgrazing, logging, remove this grass.
Bromus carinatus	California Brome	Erect annual or mostly biennial; open ground, open woods; waste places at low and middle altitudes; an excellent forage grass; overgrazing and cultivation remove this grass which is native to the region.
Bromus commutatus Schrad.		A weed introduced from Europe; grows in fields and waste places; increases when man disturbs an area.
Bromus inermis Leyss.	Smooth Brome	Irrigation ditches, fields, roadsides; a rhizomatous tall grass; good forage and for hay; introduced; will stay with us no matter what.
Bromus marginatus Nesx.	California Brome	Similar to B. carinatus.
Bromus polyanthus Scribn.	Mountain Brome-grass	Similar to B. carinatus.
Bromus pumpellianus Scribn.		Similar to but larger than B. inermis.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Bromus tectorum L.	Downy Chess, June Grass	Annual that sometimes overwinters; roadsides, banks, wasteplaces, overgrazed sage area (but not in good stands of native vegetation that have not been over exploited); good spring forage; helps to bind soil that would otherwise be left exposed by poor management; causes problems in mouths of livestock andhorses when fruit ripens; causes fire hazards because it burns readily; is one of the most widespread grasses in Idaho.
Calamagrostis canadensis (Michx.) Beauv.	Reed Grass, Blue joint	Perennial; marshes and wet soil; native, good forage; killed by inundation and overuse.
Calamagrostis rubescens Buckl.	Reed Grass, Blue joint	Open woods, prairies, and banks; good forage; overuse, inundation, logging main eradicators.
Dactylis glomerata L.	Orchard Grass	Tall perennial; cultivated for hay and forage and as borders in gardens; introduced, but escaped; fields, meadows, waste places, open woods, along trails and roads in woods; usual enemies.
Danthonia californica Boland	Oatgrass	Perennial; moist soil; too scattered to provide much forage, but is readily eaten when found; enemies are anything that destroys a native community.
Danthonia intermedia Vasey	Oatgrass	

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Danthonia unispicata Munro.	Oatgrass	Open and rocky ground; perennial; good forage grass; overgrazing is a common enemy.
Deschampsia caespitosa (L.) Beauv.	Tufted Hairgrass	Perennial which grows in tufts; bogs and wet places; fair forage grass; needs a more constant water level than a reservoir provides.
Elymus canadensis L.	Giant Wild Rye	Tall, tufted, perennial; river banks, open ground and sandy soil; fair forage; apparantly needs climax vegetation around it to prosper.
Elymus cinereus Scribn. & Merr.	Canada Rye-grass	Large, tufted, perennial; good forage for winter use; tall culms protrude through the snow and are eaten by cattle and game; birds feed on the seeds; because it is tall and rank it is usually not grazed in late summer, thus remains for winter grazing; river banks, ravines, moist or dry slopes, plains, moderate to higher elevations, observed with both sage brush and salt bush; inundation and cultivation eliminate this grass.
Elymus glaucus Buckl.	Blue Wild Rye	Loose to dense tufted perennial; fair forage plant; open woods in Idaho, drier slopes farther east; overgrazing, inundation, cultivation eradicate this species.
Elymus macounii Vasey		Densely tufted perennial; open meadows and moist open ground; good forage; draining swamps, improving springs and seeps, over-grazing and trampling of wet areas remove this grass.

FAMILY AND SCIENTIFIC NAMES	COMMON NAMES	COMMENT
Festuca elatior		Perennial; meadows and moist soil; introduced from Europe; excellent feed for stock; successfully reseeded into moist areas.
Festuca subulata Trin.	Fescue	Perennial; sandy banks and moist thickets up to 6,500 feet elevation; overgrazing, inundation restrict its range.
Glyceria grandis Wats.	American mannagrass	Rhizomatous perennial; good forage value; meadows and streambanks; trampling and inundation by fluctuating water levels eradicate this grass.
Glyceria striata (Lam.) Hitch.		Rhizomatous perennial; valuable forage grass; meadows and stream banks; trampling and inundation by fluctuating water levels eradicate this grass.
Koeleria cristata (L.) Pres.	Junegrass	Tufted perennial; prairies, open woods, sandy soil; an important forage grass in the western states; will not stand inundation.
Melica bulbosa Geyer	Oniongrass	Perennial; rocky woods and hills; good forage grass; occurs higher than most reservoirs.
Muhlenbergia filiformis	Muhly	Annual; open woods, mountain meadows; fast growth provides some seasonal grazing; disturbance in forests and channeling remove this species.
Oryzopsis hymenoides (R. & Sch.) Ricker	Indian Ricegrass	Tufted perennial; dry or sandy soil; often on hilltops where other grass have difficulty becoming established; good forage grass, good soil binder; removed by overgrazing and inundation or irrigation.

FAMILY AND SCIENTIFIC NAMES	COMMON NAME	COMMENT
Phleum alpinus L.	Alpine Timothy	Tufted perennial, but somewhat creeping rhizomes; wet soil in mountains; good forage grass; overgrazing and soil removal restrict this grass.
Phleum pratense L.	Timothy	Clumped perennial; escaped from cultivation; found in woods, moist slopes, meadows and moist high slopes; is cultivated for grass hay, frequently mixed with alfalfa for hay; one of our most valuable forage grasses; will not tolerate inundation; overgrazing will also eliminate it.
Poa alpina L.	Bluegrass	Tufted perennial; high mountain meadows; short, but good forage; removed by anything that destroys a mountain meadow.
Poa ampla Merr.		Tufted perennial; moist open ground, meadows, or sometimes on drier rocky slopes; good forage, overgrazing, drainage, remove it.
Poa annua	Annual Bluegrass	Annual; a weed in lawns and gardens; some times found near paths, campgrounds; also near paths into the mountains and near meadows; because it prospers only with continuous moisture, usually does not provide much forage except in the spring and fall; extended dry periods or inundation eradicate it as do other grasses which can tolerate such conditions.
Poa arachnifera Torr.	Texas Bluegrass	Dioecious, tufted, perennial; introduced for winter pastures; good forage.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Poa epilis Scribn.		Loose to dense tufted perennial; found usually above timberline in mountain meadows; good summer forage; overgrazing which results in soil loss eradicates it.
Poa fendleriana (Steud.) Vasey	Mutton Grass	Incompletely dioecious, tufted, perennial; open dry woods, rocky hills at median elevations; good forage.
Poa Glaucifolia S. & W.		Tall, loose tufted, perennial; moist places, ditches, open woods at median elevations; good forage; will not tolerate extended dry periods nor inundation.
Poa juncifolia Scribn.	Alkali Bluegrass	Perennial; alkaline meadows; too scattered to provide much forage.
Poa liebergii Scribn.	Leiberg Bluegrass	Short, densely tufted, perennial; alpine meadows and sterile gravel meadows; overgrazing and inundation or draining removes this species.
Poa nervosa (Hook.) Vasey		Perennial; meadows and open woods; forage value good; logging, meadow draining, inundation remove this grass.
Poa pratensis L.	Kentucky Bluegrass	Rhizomatous perenial; open woods, meadows, dry ground, stream banks, lawns, parks; one of the most widely distributed grasses in the U.S.; valuable for forage; introduced from Europe; shallow rooted allowing such deep-rooted plants as Canada Thistle to coinhabit an area; tolerant of overgrazing if moisture is provided; will not tolerate water fluctuation as in reservoirs.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Polypogon monspeliensis (L.) Deaf.	Rabbitfoot Grass	Annual; found in wet meadows, streambanks and even overwatered lawns; forage value slight; will not tolerate long dry periods during the summer; have not observed it near fluctuating reservoirs.
Setania viridis (L.) Beauv.	Green Bristlegrass	Annual; provides some forage although is regarded as a weed; appears in lawns, waste places, fence rows, moist soils which are not cultivated, in row crops, gardens, etc.; seeds eaten readily by birds; introduced from Europe; spreads with man's interruption of native flora.
Sporobolus airoides (Torr.)	Alkali Sacaton	Perennial; a good forage grass in saline regions; will not tolerate fluctuating water above ground.
Sporobolus cryptandrus (Torr.) Gray	Sand Dropseed	Perennial; sandy, open ground; a fair forage plant; will not tolerate overgrazing or inundation.
Stipa comata Trin. & Rupr.	Needle-and-Thread	Tufted perennial; prairies, plains, dry hills; awns can cause problems if fruits are eaten at maturity; has some forage value early; removed by overgrazing soil loss, irrigation.
Stipa occidentalis S. Wats.	Western Needlegrass	Tufted perennial; plains, rocky hills, and open woods; forage value good; removed by overgrazing, soil loss, cultivation.
Triodia pulchella H.B.K.	Fluffygrass	Very low, tufted, perennial; rocky hills in arid and semi-arid conditions; uncommon, north of its usual range.
Trisetum spicatum (Li.) Richt.	Spike Trisetum	Tufted perennial; good forage; Alpine meadows and slopes; overgrazing and meadow damage eradicate it.
Trisetum Wolfii Vasey	Wolf's Trisetum	Loosely tufted perennial with short rhizomes; meadows and moist ground at medium al-

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENTS
		titudes in mountains; grazed by stock; overgrazing and soil loss are effective in eradicating it.
Haloragidaceae		
Hippuris vulgaris L.	Marestail	Submerged pond weed; perennial; affected by silt as occurs in reservoirs; usually found among tules and other taller emergents where water is stilled.
Myriophyllum exalbescens (Fern.	Coontail	Aquatic, submerged, perennial; slow streams and ponds; intolerant of silt and dirty water as usually found in reservoirs at least for several years until stability has occurred.
Myriophyllum spicatum L.	Water Milfoil	
Hydrophyllaceae		
Hydrophyllum capitatum Dougl.	Water Leaf	Moist soil of woods, hills and mountains; spring blooming plant that produces in spring and withers when hot, dry weather appears; eaten by game and stock; is abundant in good, diverse stands of sagebrush; destroyed by spray and overgrazing; will not tolerate inundation.
Phacelia biennis A. Nelson	Scropion Weed	Biennial or short-lived perennial; dry, open places at lower to moderate elevations; good forage for wild game and domestic sheep; killed by overgrazing, spray, inundation and agriculture.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Phacelia heterophylla Pursh.	Scorpion Weed	Biennial or perennial; dry plains and hills; some forage value for stock and big game; overgrazing eradicates this plant as does spray.
Phacelia ivesiana Torrey	Scorpion Weed	Low, diffuse, annual; dry plains and hills; some forage value for big game animals and stock; overgrazing and spray remove this plant.
Phacelia leucophea Pursh.	Scorpion Weed	
Phacelia leucophylla Torr.	Waterleaf	Very similar to B. heterophylla.
Phacelia sericea (Graham) Gray	Scorpion Weed	Perennial; high mountains, 6,000 feet to above timberline; open areas, ridges, along trails, etc.; elk and other big game, sheep, mountain goats and later cattle all utilize this species; it is one of the beautiful wild flowers often photographed by hikers; destroyed by spray and overgrazing, especially by sheep.
Iridaceae		
Sisyrinchium angustifolium Miller	Blue-eyed Grass	Perennial herb; moist to wet soil of meadows; part of the luxurious growth of meadows that is removed by channaling draining, or damming.
Sisyrinchium idahoense Bicknell	Blue-eyed Grass	Perennial herb; moist soil of meadows; same as above.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENTS
Sisyrinchium sarmentosum Suksd.	Blue-eyed Grass	Perennial herb; wet, open meadows in low valleys to about 8,000 ft.; same as above.
Juncaceae		
Juncus brunnescens Rydb.	Rush.	Perennial; wet soil and meadows; good forage and wild hay component; makes a tough turf as does Carex of the Cyperaceae; destroyed by draining or inundating.
Juncus Drummondii E. Meyer	Rush.	Perennial; common in moist areas of high mountains; same as above.
Juncus ensifolius Wike.	Rush.	Rhizomatous perennial; marshland; same as above.
Juncus saximontanus A. Nels.	Rush.	Perennial from stout rootstocks; same as above.
Juncus tenuis Wildd.	Rush.	Perennial; same as above.
Luzula intermedia (Thuill.) A. Nels.	Woodrush.	Perennial; not as abundant as Juncus; plants of wet soils; seeds utilized by birds; plants are grazed by big game.
Luzula walenbergii Rupr.	Woodrush.	High mountain perennial; stems densely tufted; foraged by big game during the summer; removed by overgrazing and soil removal.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Labiatae		
Agastache urticifolia (Kuntze) Rydb.	Giant Hyssop	Tall perennial herbs; mountain meadows and in open douglas fir, aspen, lodgepole pine woods; eaten by both domestic and wild animals; seeds are consumed by smaller birds and humans; leaves can be used to make beverages. Increase with slight overgrazing, but spray and overgrazing remove it; will not tolerate inundation.
Lycopus lucidus Turcz.	Bugleweed, Water Horehound	Rhizomatous perennial; marshes and shores of streams and lakes at lower elevations; tolerant of alkali; can be used for mint tea; browse value slight; sometimes increases around reservoirs; killed by spray, inundation, of its habitat, which then is dislocated.
Mentha arvensis L.	Mint	Perennial from creeping rhizomes; moist places along streams and shores; may increase around reservoirs; used in cosmetics, flavoring, and in medicine; makes a good team; some browse value; killed by spray.
Moldavica parviflora (Nutt.) Britton.		Biennial or short-lived perennial; open, moist places in foothills to moderate elevations; provides some browse; killed by spray, inundation and agriculture.
Moldavica thymiflora (L.) Rydb.		Perennial; one collection from Henry's Lake area; introduced from Europe and Asia; Rare.
Prunella vulgaris L.	Selfheal	Perennial; moist places, abandoned roads, footpaths, openings, streambanks in lodgepole pine forests; overgrazing, logging which loses topsoil, inundation reduce this species.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Leguminosae		
Astragalus agrestis Dougl.	Loco Weed	Perennial from suberranian rootstocks; common in the mountains on moist clay flats, meadows and bottomlands; important because it adds nitrogen to soil; overgrazing and trampling reduce the numbers of this nitrogen producer; also very susceptible to spray.
Astragalus alpinus L.	Vetch	Perennial; moist places along streams or near snow, common in the mountains; same as above.
Astragalus convallarius Greene	Loco Weed	Perennial; dry hillsides, in sand or clay; same as above.
Astragalus purshii Dougl.	Loco Weed	Same as above.
Lupinus argenteus pursh	Blue Bonnet	Perennial herb; plains and hills; lupines are important because they also add nitrogen to soil which is otherwise deficient in this mineral; all contain some alkaloids, but many have such low content that they can be foraged with no harm; overgrazing, cultivation, inundation and spray destroy these valuable plants.
Lupinus argenteus var. parviflorus (Nutt.)	Blue Bonnett	Same as above.
Lupinus candicans Rydb.	Lupine	Same as above.
Lupinus leucophyllus Dougl.	Lupine	Perennial; dry plains and foothills; lupines become safe for forage after the seeds ripen; many species of mice feed on the roots and seeds; black and grizzly bears eat seeds, pods and roots; elk consume the flowers and pods thereby obtaining needed protein.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Lupinus sericeus Pursh.	Lupine	Perennial; dry plains and hills; same as above.
Medicago lupulina L.	Black Medic	Usually an annual; weed of fields and waste places, lawns, next to sidewalks and roads, campgrounds, lookouts and other places of some traffic; like all legumes adds nitrogen; can be grazed lightly; increases with man's use.
Medicago sativa L.	Alfalfa	Perennial; escaped cultivated plant; roadsides and disturbed places; increases with man's use, but will not compete with native plants unless helped by man.
Melilotus alba Desr.	White Sweet Clover	Biennial; roadsides, railroad embankments, other disturbed places; often put into mixtures or reseeding sagebrush areas; good forage for livestock and big game; seeds eaten by birds; adds nitrogen to soil; increases with man's use of an area.
Melilotus officinalis (Lk.) Lam.	Sweet Clover	Same as above.
Trifolium repens L.	White Clover, Dutch Clover	Perennial; introduced from Europe and widely naturalized; lawns, roadsides, paths in open areas in forests, in bluegrass areas that are grazed, along streams; grazed by any herbivore; seeds eaten by birds; increases with man's use.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Liliaceae		
Allium geyeri S. Wats.	Wild Onion	Perennial herbs; moist soil in the mountains; other species of onions are also present; bears and ground squirrels eat the bulbs; elk and deer graze on the herbage until it withers; they make a good addition to camp diets; onions impart flavor to milk products from dairy cattle; inundation kills them, but they seem little affected by overgrazing.
Brodiaea douglasii	Wild Hyacinth	Perennial; dry to moist soil, often in rocky areas, in meadows or open woods of valleys, hills and in elevations up to 9000 ft.; deer and elk feed on the herbage; bears and rodents relish the underground parts, draining or inundation remove these from an area.
Calochortus eurycarpus S. Wats	Sego Lily	Perennial herb; among sagebrush; man, bears and rodents consume the bulbs; big hornsheep, elk, deer, elk and other animals readily consume the flowers and seed pods and leaves, however, the leaves wither early; although spray is not supposed to damage these, there always seems to be none or few in sprayed and reseeded fields; overgrazing does reduce their numbers; they require well drained soils and will not tolerate inundation.
Calochortus macrocarpus	Sego Lily	Same as above.
Camassia quamash (Pursh.) Greene	Camas	Herbaceous perennial; found in wet meadows with white mule's ear; elk deer, and moose graze these early in the spring; the underground parts are eaten by man, bear, rodents, draining or inundating wetlands destroy these.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Disporum trachycarpum (S. Wats.) B. & H.	Fairy Bells	Perennial; found in rich damp soil of woods, canyons in elevations to 8,000 ft.; berries are edible and are relished by man, bears, grouse, small birds and rodents; leaves provide some forage; logging and spray are the species worst enemies.
Fritillaria atropurpurea Nutt.	Leopard Lily	Perennial; rich, damp soil of valleys and open woods and on open slopes in the mountains to near timberline; leaves and flowers are grazed by big game and sheep; underground parts are consumed by rodents and bears as well as man.
Fritillaria pudica (Pursh.) Spreng.	Yellowbells Yellow Fritillary	Found with sagebrush; perennial herb; seen in spring; plants are readily eaten by big game; black and grizzly bears, pocket gophers and ground squirrels dig the bulbs; overgrazed and sprayed areas contain none or few of these; will not tolerate inundation.
Smilacina racemosa (L.) Desf.	False Solomons Seal	Perennial; found in rich woods and higher open slopes; berries are eaten by all herbivores whether mammal or birds; roots are sometimes dug up and eaten; provides forage for grazing animals; logging, spray and inundation kill these.
Smilacina stellata (L.) Desf.	False Solomons Seal	Same as above.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENTS
Streptopus amplexifolius (L.) D.C.	Twisted-stalk	Perennial; usually found in woods, along streams in thickets, wherever the soil is rich; berries are utilized as those of Smilicina; elk and deer as well as domestic sheep graze the green leaves and stems.
Xerophyllum tenax (Pursh.) Nutt.	Bear Grass	Perennial; mountain meadows; although rodents and game animals eat the flowers, flowering stalks, and seed pods, the leaves tend to be avoided by these animals; mountain goats eat the remains which protrude through the snow; drainage, mice and bears may kill this plant.
Zygadenus elegans (Pursh.)	Camas, Mountain Death Camas	Perennial; moist soil of meadows, streambanks, woods, and ledges from 6,000 to 12,000 ft.; contains alkaloids poisonous to livestock and man; hogs are immune; cultivation and overgrazing reduce these.
Zygadenus paniculatus (Nutt.) Wats.	Foothill Death Camas	Perennial; found with sagebrush; same as above except is found mostly in the foothills.
Limanthaceae		
Floerkea prosperinacoides Willd.	Floerkea	Slender annual; rare; I have only seen a collection of it.
Linaceae		
Linum lewisii Pursh.	Blue Flax	Perennial; dry plains and hills with sagebrush; causes a drowsiness in livestock is probably avoided by wild game; stems were utilized for fiber by Indians; seeds were ground for a laxative, an applicant for burns and scalds and as a poultice; linseed oil can be extracted from the seeds; is killed by spray; will not tolerate overgrazing.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Loranthaceae		
Arceuthobium americanum Nutt.	Small Mistletoe	A parasite which lives on lodgepole pine; causes a condition known as witch's broom.
Arceuthobium campylopodum Engelm.	Leafless Mistletoe	Also a parasite on genus Pinus.
Malvaceae		
Iliamna rivularis (Dougl.) Greene	Maple Mallow, Mt. Hollyhock	Perennial herb; rich soil in mountains, along streams, in canyons and along roadsides; appears to be little used during the summer; projects through the snow and may be utilized during the winter; Indians chewed stems as gum; inundation, clearing of land, or spray kill this species.
Malva neglecta Wallr.	Cheese Weed	Annual; roadsides, waste places, near sidewalks, gardens, flowerbeds, etc.; can be utilized by man for greens, pot herb, or for tea; fruits are edible raw or cooked; animals nibble on this plant; increases where man utilizes an area; regarded as a weed.
Sphaeralcea munroana (Doughl.) Spach.	Munroe Globe Mallow	Perennial from a large taproot; dry plains with sagebrush; readily eaten by deer, elk, antelope and mountain sheep; in especially dry areas is a source of water and proteins for fawns; there appears to be a correlation between the amount of it and the success of antelope fawns in some areas; killed by spray, overgrazing, cultivation, inundation.

FAMILY AND SCIENTIFIC NAMES	COMMON NAMES	COMMENT
Monotropaceae		
Pterospora andromedea Nutt.	Pine Drops	Perennial without chlorophyll; rich soil in douglas fir or lodgepole pine forests; not used as forage; value lies in its saprophytic relationship hastening breakdown and recycling of minerals; killed by logging.
Najadaceae		
Potamogeton gramineus	Pondweed	Submerged aquatic; important in food chain; eaten by ducks, insects and some fish; grows in clear streams and ponds; will not prosper in muddy or deep water or in fluctuating water; also eaten by moose.
Potamogeton pectinatus L.	Sego Pondweed	Same as above.
Potamogeton praelongus Wief.	Sego Pondweed	Submerged aquatic; grows in deeper water than the above species; cannot grow in muddy water.
Nymphaeaceae		
Nuphar polysepalum Engelm.	Yellow Pond weed	Aquatic, perennial, floating plant; lives in clear ponds with relatively stable water level and stable bottom; rhizomes are embedded in muck of bottom and send shoots up each year; food source for many aquatic mammals, moose and birds; killed by draining ponds or silting of water; I have not seen it in any fluctuating reservoirs.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Onagraceae		
Epilobium alpinum L.	Willow Herb.	Densely caespitose perennial with stolons; moist rockslides and stony places; eaten by all big game including bears; killed by spray or overgrazing.
Epilobium angustifolium L.	Fireweed	A plant which comes into disturbed areas and after burns; produces numerous small seeds each with a parachute; also lives in moist openings in forests; young leaves are edible as a pot herb; is valuable; range forage plant which is eaten by livestock, deer, elk and bears; killed by spraying, overgrazing, and inundation; seems to be increased by logging.
Epilobium drummondii Hausek.	Willow Herb	
Epilobium paniculatum Nutt.	Willow Herb	Annual; wet places in high mountains; broused by deer, elk and moose; killed by channeling, draining, and spray.
Epilobium watsoni Barbey	Willow Herb	Annual which roots at the nodes; wet places usually near running water; browsed by deer and elk as well as moose; trampling of cattle spray, channeling and inundating kill this species.
Orchidaceae		
Calypso bulbosa (L.) Oakes	Fairy Slipper, Calypso Orchid	Perennial orchid; grows in lodgepole pine and douglas fir forests between 5,000 - 8,000 feet; one of the most beautiful orchids of the area; scenic value exceeds any other; logging, inundation, spray, clearing decreases this species.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Corallorhiza maculata Raf.	Spotted Coral-root	Saprophyte without chlorophyll; rich soil under conifers; use unknown; killed by logging; inundation.
Corallorhiza Striata Lindl.	Striped Coral-root	Same as above.
Goodyeara oblongifolia Raf.	Rattlesnake Plantain	Same as above.
Habenaria dilatata (Pursh.) Hook.	Orchid	Perennial; wet soil of swamps, bogs, spring banks and stream banks; killed by cattle trampling, logging, channeling, spray and inundation; one of the rare plants as are all the members of the orchid family.
Habenaria hyperborea (L.) R. Br.	Orchid	Same as above.
Habenaria unalascensis (Spreng.) S. Wats	Orchid	Same as above.
Pinaceae		
Abies lasiocarpa (Hook.) Nutt.	Alpine fir	Tree; found at elevations exceed 5,000 ft. occurs with douglas fir in this area; forms thickets at high elevations; used by game for cover.
Picea engelmanni (Parry) Engelm.	Engelmann's Spruce	Tree; found scattered throughout area; easily confused with Colorado Blue Spruce which has a larger cone; important for lumber; seeds are eaten by several birds rodents, and squirrels.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Picea pungens Engelm.	Blue Spruce	Less frequently found tree; important for lumber; uses same as above.
Pinus contorta Dougl.	Lodge-pole Pine	Tree; enters after disturbance; important for lumber in this area; dense stands eliminate many shrubs which would otherwise be utilized by game animals; seeds utilized as above.
Pinus flexilis James	Limber Pine	Tree; mostly at higher altitudes on ridges which are windswept; little value for lumber; seeds important for many animals because of their large size; provide cover for game and emergency browse.
Pseudotsuga menziesii (Poir.) Britt.	Douglas Fir	Tree; the most important lumbering tree in the U.S.; provides habitat for many of the species in this list; will not stand inundation as will none of the members of this family.
Plantaginaceae		
Plantago major L.	Common plantain	Perennial weed; comes into lawns and disturbed areas; moist soil; no forage value; seeds may be eaten by rodents; increases with man's use of an area.
Plantago patigonica Roem. and Schult.	Plantain, Ribgrass	Occurs in sagebrush areas; annual herb.
Polemoniaceae		
Collomia linearis Nutt.	Narrow-leaved Collomia	Annual; open thickets, grasslands, and waste places; may have some browse value during early summer; killed by spray and inundation.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENTS
Gilia aggregata (Pursh.) Spreng.	Scarlet Gilia	Biennial; dry soil in valleys, on hillsides and dry ridges of mountains, among sagebrush; eaten by sheep and big game; is eradicated by spray and overgrazing.
Gilia tenerrima Gray	Gilia	Annual; open thickets, dry soil of hills and mountains, usually on gravelly slopes; as above.
Leptodactylon pungens (Torr.) Nutt.	Shrubby Phlox	Short shrub; dry, rocky, slopes and barrens; provides some soil cover; of doubtful forage value; flowers early in spring and becomes brown late in the season; killed by fire, spray.
Linanthastrum nuttallii Gray.	Linanthus	A woody based perennial; rocky, gravelly slopes high in the mountains; beautiful in flower; browsed by big game; killed by spray and overgrazing.
Linanthus septentrionalis	Linanthus	Annual; dry, sandy soil, moderate elevations; grazing value unknown; killed by spray and overgrazed conditions.
Phlox hoodii Richn.	Phlox	Low shrub; common among sagebrush at lower elevations; good ground cover; probably too spiny to be of much forage value; killed by spray, fire and overgrazed conditions, although it increases in early stages of overgrazing; its presence results in its growing on a mound of soil because the soil around it has eroded away; it is thus a good soil cover.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Phlox austromontana Cov.	Phlox	Similar to above.
Phlox diffusa Benth.	Phlox	Caespitose herb; open woods and bar, rocky slopes; browsed by game and sheep; killed by inundation, spray and overgrazing.
Phlox longifolia Nutt.	Phlox	A woody based perennial; among sagebrush; nibbled by most large mammals; killed by spray and overgrazing;
Phlox multiflora A. Nels.	Phlox	Caespitose; dry to medium-moist soil of open forests, ridges, sometimes in grassy areas from foothills to near timberline; apparently is browsed; killed by spray, inundation, and overgrazing.
Polemonium occidentale Greene	Skunk Weed	Perennial herb; moist grassland and wet thickets; I do not know its grazing value, but suspect that it is eaten; spray, drainage, inundation remove this plant.
Polemonium viscosum Nutt.	Skunk Weed	Perennial; bare, rocky, alpine ridges; browsed in summer for a brief period of time when snow is gone; killed by overgrazing, spray; too high elevation to be inundated
Polygonaceae		
Polygonum aviculare L.	Doorweed	Prostrate annual; roadsides, cracks of sidewalks, along paths, flower gardens, abandoned fields, etc.; seeds eaten by birds and rodents; grouse eat this as well as P. douglasii; increases with man's use; regarded as a weed.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENTS
Polygonum bistortoides (Pursh.) Small.	Common Bistort	Perennial wetland plant; wet meadows and swamps; browsed by most animals; seeds are relished by all; killed by spray, draining, overgrazing and inundation.
Polygonum confertifolium Nutt.	Smartweed	Annual; wet areas; provides browse and seeds which are relished by most animals; killed by spray, draining, and inundation.
Polygonum douglasii Greene	Doorweed, Knotgrass	Annual; among sagebrush; eaten by most animals, but heavily utilized by doves, grouse, and other birds; killed by spray, increases with early overgrazing when other plants are killed out; will not tolerate inundation; may or may not return heavily after spray application.
Polygonum watsonii Small.	Smartweed	
Rumex acetosella L.	Sheep Sorrel, Sour Dock	Perennial; meadows; eaten by most big mammals; seeds relished by birds; leaves make good salads and sandwiches; killed by spray, inundation and overgrazing.
Rumex crispus L.	Curly-leaved Dock	A weed over most fields and waste places, along stream and irrigation ditch banks, lawns and sometimes gardens; browsed if protruding through snow; seeds eaten by birds and rodents.
Rumex paucifolius Nutt.	Sorrel	Perennial herb; mountain meadows; browsed by big game; seeds are eaten by birds and rodents; leaves make a good addition to salads or sandwiches; killed by spray, overgrazing and inundation.

FAMILY AND SCIENTIFIC NAMES	COMMON NAMES	COMMENT
Polypodiaceae		
Pteridium aquilinum var languinosum (Bong.) Fernald	Bracken	Coarse fern from stout, creeping rhizome; common in moist soil of open douglas fir, lodgepole pine, aspen woods, also in meadows, thickets, and on high hillsides that remain cool and moist; I don't know about its use; killed by spray and overgrazing; will not tolerate inundation. Many other ferns occur in the area.
Portulacaceae		
Claytonia chammissoi Ledeb.	Miner's Lettuce	Low perennial herb; moist soil of mountains; leaves are relished by most animals; killed by overgrazing, inundation, or spray.
Claytonia lanceolata Pursh.	Spring Beauty	Early spring perennial herb from a tuber; moist soil of open hillsides and mountains and forest openings; tubers relished by many animals including man; flowers and leaves relished by most animals; wiped out by overgrazing, spray, inundation.
Claytonia linearis Dougl.	Spring Beauty	Annual herb; wet places in plains and hills; eaten by most animals; killed by spray, inundation and overgrazing.
Claytonia perfoliata Donn.	Miner's Lettuce	Moist, shady areas under birches, aspen, elder berry, and willow thickets; browsed by most species; leaves make good salads and sandwiches, killed by spray, overgrazing, and inundation.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Lewisia pygmaea (Gray) Robins	Pigmy Bitter Root.	Low perennial; high mountain meadows; rodents eat roots, browsed by many animals; killed by spray, overgrazing, but usually found too high to be inundated.
Primulaceae		
Androsace filiformis Retz.	Androsace	Tufted annual; wet soil of plains and hills; killed by spray, overgrazing, and inundation.
Androsace septentrionalis L.	Androsace	Tufted annual; same as above.
Androsace Septentrionalis L. var. subumbellata - Nels.	Androsace	Same as above.
Dodecatheon conjugens Greene	Shooting Star	Scapose, perennial, herb; moist soil with sagebrush; one of the most beautiful early spring flowers; readily eaten by deer and elk; killed by overgrazing, spray, and inundation.
Primula incana M.E. Jones	Primula, Cowslip	Scapose perennial; browsed some by game; wet soil mostly in the valleys; killed by cultivation, overgrazing, spray, and inundation.
Pyrolaceae		
Chimaphila umbellata (L.) Bart.	Prince's Pine	Moist conifer woods, and along streams to about 8,000 ft.; browsed occasionally; contains glucosides and a volatile oil that are both used for astrigent and tonic; killed by spraying, overgrazing, and inundation.
Pyrola dentata Smith.	Wintergreen	Perennial herb; in forests; I do not know to what extent these species of Pyrola are used by animals; killed by spray, overgrazing and inundation.
Pyrola elliptica Nutt.	Wintergreen	Same as above.

FAMILY AND SCIENTIFIC NAMES	COMMON NAMES	COMMENT
Pyrola minor L.	Wintergreen	Perennial herb; wet soil of streams and forests; killed by overgrazing, spray and inundation, drainage or channeling.
Pyrola secunda L.	Wintergreen	Perennial herb; moist forests; killed by overgrazing, spray, logging and inundation.
Pyrola umbellata (L.) Bart.	Prince's Pine	Same as above.
Pyrola uniflora (L.) A. Gray	Wintergreen	Perennial herb; moist soil of plains and hills; killed by spraying, overgrazing and inundation.
Ranunculaceae		
Anemone patens A. Gray	Pasque flower	Perennial herb; moist soil of meadows, fields and woods from 4000 to 900; contains an oil used as an irritant; poor forage value; may be toxic to domestic sheep.
Anemone tetonensis Porter	Wind-flower	Same as above.
Aquilegia flavenscens Wats.	Columbine	Perennial, erect, almost vine-like herbs; moist woods; rival all other flowers in beauty; too scattered to contribute much to grazing, but help to make up the diversity of a natural area; overgrazing by stock eradicate this plant early; spray, logging, and inundation also eradicate it.
Aquilegia formosa Fish.	Columbine	Same as above.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENTS
Caltha leptosepala D.C.	Marsh Marigold	Perennial herb; wet soil of mountains; although used as a pot herb in the east, it is said to be toxic to cattle; elk consume it in large quantities and is an important spring food for them; draining wetlands, channeling, inundation, spray, overgrazing which causes trampling of wet areas eradicate this important plant.
Clematis columbiana (Nutt.) T & G	Virgin's Bower	Semiwoody vine; moist woods; browsed some by big game; killed by clearing, spray, overgrazing, and inundation of lowlands.
Clematis hirsutissima (Pursh.) Heller	Virgin's Bower	Semiwoody vine to erect perennial; open moist places of hills and plains; same as above.
Clematis ligusticifolia Nutt.	Virgin's Bower	Semiwoody vine; found where-ever choke cherries grow, along streams, growing over thickets; same as above; Indians and settlers chewed leaves for sore throats and colds; eradicated same as above.
Clematis occidentalis Homen.	Virgin's Bower	Similar to C. Columbiana.
Delphinium andersoni (Nels..&Macbr.) Ewan	Larkspur	Perennial herb; subsaline soil of plains and low hills; usually with sagebrush; poisonous to cattle, although sheep are said to be immune in trials where force-fed; elk avoid it early, but feed on it in large amounts in the fall and late summer; killed by overgrazing, spray and inundation.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Delphinium nelsoni Greene	Larkspur	Same as above.
Delphinium occidentale (A.Nels.) Ewan.	Larkspur	Same as above, except is a taller plant found in mountain meadows.
Ranunculus alismaefolius Geyer	Buttercup	Perennial herb; muddy, lake borders and ditches at low election; as a group buttercups are poisonous; are eaten by blue grouse and other birds; habitat destruction and spray are usual eradicators.
Ranunculus cymbalaria Pursh.	Creeping Buttercup	Perennial herb; found in wet areas, seeps, small streams, and meadows; as above.
Ranunculus eschscholtzii Schlecht.	Buttercup	Terrestrial perennial; high alpine meadows and talus slopes; as above.
Ranunculus Eschscholtzii Schlecht. var. eximus (Greene). L. Benson	Buttercup	From Fremont County; alpine meadows at 7,000 to 9,000 ft. elevation; as above.
Ranunculus orthorhynchus Hook.	Buttercup	Perennial; subpalustrine or terrestrial; meadows; as above.
Ranunculus trichophyllus Chaix.	Buttercup	Perennial; meadows; as above.
Thalictrum occidentale A. Gray	Meadow-rue	Perennial herb; common in moist forests; browsed later in season; spray, logging, channeling, and inundation eradicate this species.
Thalictrum sparsiflorum Turcz.	Meadow-rue	Perennial herb; mountain meadows; as above.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENTS
Rhamnaceae		
Ceanothus velutinus Dougl.	Mt. Laurel, Snowbush	Perennial shrub; moist draws on lower slopes and open areas on north facing higher slopes; because it is evergreen, it is a good protein source and winter feed for big game; leaves can be used for tea by humans; good cover for small animals because it forms tight thicket; spray, cultivation, fire and intense overgrazing remove this species.
Rosaceae		
Amelanchier alnifolia Nutt.	Service Berry	Small tree or shrub; moist soil along streams in foothills, open slopes in higher elevations; browsed heavily by deer, elk, moose, mtn. sheep, mtn. goats, rabbits, rodents; pheasants, grouse, birds, and black bears eat berries; human also relish berries; because it is browsed winter and summer, it can be removed by animals if other foods are previously removed and they have to rely on this species, eradicated by clearing, fire, spray, chaining, cultivation and inundation; overgrazing may not directly damage it, but depletes range of other foods and force game to rely too heavily upon this species.
Cercocarpus ledifolius Nutt.	Mt. Mahogany	Small trees or shrubs; dry ridges; important winter food for deer and elk; provides shelter for game birds and big game; killed by spray fire, clearing; overgrazing forces reliance upon it and thus depletes it.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Crataegus douglasii Lindl.	Hawthorn	Small trees or large shrubs; used for food and shelter by pheasants and rabbits; porcupines rely heavily on these for winter food; magpies prefer them for nesting; wood ducks prefer this fruit; rodents consume fruit and seeds; deer and elk browse on food and eat berries; provides a winter starvation food for most game mammals and birds; found in moist soils along ponds and streams to 8,500 ft. This is a species that will prosper around reservoirs if the area is not sprayed or burned and if protected from overgrazing when young; because these form such dense thickets, they should be encouraged in restoration areas.
Fragaria virginiana Duchesne var glavca S. Wats.	Strawberry	Perennial herbs; moist soil of open woods and meadows from lowest elevations to high in the mountains; fruits are utilized by ruffed grouse, robins, turtles, small rodents, black and grizzly bears and other fruit-eating animals; deer and elk browse on leaves; leaves make a good tea; domestic sheep also eat the leaves; spray, logging, clearing and overgrazing eradicate this species.
Geum macrophyllum Willd. var perincisum (Rydb.)	Strawberry	Perennial herb; moist soil of meadows; good browse plant for big game and domestic stock; killed by draining moist areas, channeling, spraying, and overgrazing.
Geum strictum ait.	Strawberry	As former species.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENTS
Holodiscus glabrescense (Greenmen) Heller	Mountain Spray	Shrub; streambanks and moist woods, canyons and hills from lowest elevations to 7,000 ft.; browsed by domestic animals as well as deer, elk and sometimes moose; fruits are eaten by birds and mammals; killed by clearing, spraying and channeling and inundation; overgrazing removes other sources of food and then it is subsequently grazed beyond its capacity to produce and it dies.
Physocarpus malvaceus (Greene) Kuntze	Ninebark	Shrub; moist meadows and woods, also on dry soil; is utilized some by game for browse; killed by clearing, overgrazing, spray and inundation.
Potentilla answerina L.	Goosegrass, Cinquefoil Fivefingers	Moist soil around ponds, reservoirs, and on streambanks; because it can tolerate trampling, this is often found around waterholes; provides some grazing especially for geese and small herbivours; ducks and geese, as well as other animals eat the small strawberry-like fruits; can tolerate the alternating waters of irrigation reservoirs, and increases in density when these are put in.
Potentilla diversifolia Lehm.	Cinquefoil	Perennial herb; high mountains; browsed by deer, elk, and other game animals; fruits are eaten by most animals; spray, clearing and overgrazing are chief enemies.
Potentilla fruticosa L.	Shrubby Cinquefoil	Small shrub; moist soil on ecotone between forest and sagebrush land and in clearings in elevations to 9,000 ft.; because it retains its leaves during winter, it is a critical browse plant; is an indicator of overgrazing; when it becomes depleted, other plants are being destroyed and replaced by less desireable species; killed by clearing, spray, inundation and overgrazing.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Potentilla gracilis Dougl. var pulcherrima (Lehm.)	Five finger	Perennial shrub; common in open meadows and dry areas in sagebrush areas that are moist; eaten by all game animals and domestic stock; killed by spray, overgrazing and inundation.
Potentilla palustris Scop.	Cinquefoil	Perennial herb; grows in moist meadows and wet areas; same as former species.
Potentilla pectinisecta Rydb.	Potentilla, Cinquefoil	Perennial herb; dry hills; browsed by deer elk, antelope, and domestic animals; killed by spray, overgrazing, cultivation and inundation.
Potentilla rectiformis Rydb.	Potentilla	
Prunus virginiana L. var. melanocarpa A. Nels.	Choke Cherry	Small tree or shrub; moist soil along creeks in valleys and on north-facing slopes in higher elevations; eaten by most birds, large and small, and by most mammals, both large and small; twigs and retained dry leaves are browsed by deer, elk and moose in winter; provides a needed protein source in winter also for big horn sheep and for mtn. goats; spring leaves are poisonous to domestic sheep; fruits commonly eaten by man especially in forms of syrup, jelly and wine; eradicated by spray, chaining, clearing, channeling, inundation and pressures of overgrazing.

FAMILY AND SCIENTIFIC NAMES	COMMON NAME	COMMENTS
Purshia tridentata (Pursh.) D.C.	Bitter Brush, Antelope Brush	Evergreen shrub; with sagebrush; favored browse of elk, moose, antelope, mtn. sheep, and livestock; is a range indicator of overgrazing by the amount it is grazed back; small rodent relish seeds; spray, fire, clearing, cultivation, overgrazing all are enemies of this plant.
Rosa macounii Greene	Wild Rose	Shrub; moist soil of draws and in open clearings in aspen and lodgepole pine forests, forming thickets; rose hips are eaten by game animals and by most birds; are reputed to be higher in vitamin C content than oranges; twigs are browsed by deer and elk; fire, spray clearing, logging, and inundation are enemies.
Rosa nutcana Presl.	Rose	Shrub; frequent in open forests of Douglas Fir, lodgepole pine and Aspen; as former species.
Rosa ultramontana (Wats.) Heller	Wild Rose	As former species.
Rosa woodsii Lindl.	Wild Rose	Shrub; moist soil of draws, hillsides, along streams, and open valleys forming thickets; information as former species.
Rubus parviflorus Nutt.	Thimble Berry	Perennial shrub that does not form much woody growth; eaten by deer and elk; fruits also eaten by deer and bear; found in shade, draws in forests, with aspen, lodgepole pine and Douglas Fir; killed by spray, overgrazing, clearing and logging.
Sibaldia procumbens L.	Sibbaldia	Perennial herb; alpine area; provides some browse; spray and overgrazing kill it.
Sorbus scopulina Greene	Mountain Ash	Small trees or shrubs; moist soil of hills and mountains in clearings; twigs readily eaten

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
		by deer, elk, moose and domestic livestock throughout the year; fruits persist throughout the winter and are eaten by grouse, waxwings, grosbeak and bears; fruits can be eaten raw by man or cooked into jelly; killed by spray, overgrazing, fire, clearing.
Spiraea betulifolia pall. var. lucida (Dougl.)	White Spiraea	Low shrub; forests of Douglas Fir, Aspen, and Lodgepole Pine; browsed by game and domestic sheep; spray, fire, logging, clearing and inundation kill them.
Spiraea caespitosa Nutt.	Bridal-wreath	Small shrub; limestone rocks on cliffs of foothills and mountains; information same as former species.
Spiraea densifolia Nutt.	Bridal-wreath	Information same as former species.
Spiraea splendens K. Koch.	Bridal-wreath	Shrub; moist soil of forests, along streams and in mountains to 8,000; form dense cover utilized by ring-necked pheasants; information as previous species.
Rubiaceae		
Galium aparine	Farwell Bedstraw	Annual herb; abundant and widespread, in the mountain and valley forests; eaten by ducks and geese; favorite food of white-tailed deer, probably also eaten by mule deer; killed by clearing, spray, overgrazing, forests, and inundation.
Galium bifolium Wats.	Bedstraw, Cleavers	Annual; shaded or partly shaded meadows in deep moist soil, information same as above.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Galium boreale L.	Bedstraw	Perennial herb; moist soil of forests and meadows; elk, deer and domestic sheep forage on this plant; information same as above.
Galium tinctorium L.	Bedstraw	Perennial herb; information same as above.
Galium triflorum Michx.	Bedstraw	Perennial herb; moist, shaded slopes of streambank and woodland; information same as above.
Salicaceae		
Populus angustifolia James	Poplar, Cottonwood	Trees; common along streams, excellent cover for wintering animals; used by many birds for nests; twigs provide spring and winter browse for deer and elk; fire, spray, clearing and channeling and inundation kill this species.
Populus tremuloides Michx.	Quaking Aspen, Aspen	Trees; common from lowlands to mountains; found in draws on sagebrush slopes; provides good cover for deer and elk; provides shade in which many browse plants can grow which are important to wild game; prevents erosion in draws because of the dense made of vegetation which grows under them, and because of the buildup of organic matter drainage water is held and percolates into the ground even when surrounding ground is frozen, thus preventing flooding of lowlands; good browse for game animals in spring and winter; fire, spray, clearing, channeling, and inundation kill this species.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Salix caudata Ball	Willow	Shrub or small tree; streambanks and valleys to 9,000 ft.; all willows provide good cover for game animals as well as providing spring and winter browse; they provide shade in which several browse plants can grow; stabilize soil of streambanks preventing erosion in time of flooding; removal results in soil loss and loss of game which need their protective cover for visual reason if not from weather; deer, elk and moose heavily utilize willows; killed by fire, spray, cultivation; overgrazing restricts and highlines them; inundation is tolerated if it does not exist for too many months of the year; they will form stands on margins of fluctuating reservoirs, but are frequently sprayed rather than allowed to remain as erosion prevention of game cover; this spraying practice or removal around reservoirs should be stopped.
Salix exigua Nutt.	Sandbar Willow	Small tree or usually a shrub forming thickets on streambanks, sandbars, and reservoir margins, information as above.
Salix glaucops Anders.	Willow	Commonly on streams and meadows, occasionally in dry washes and rocky slopes around 7,600 feet elevation; information as above.
Salix agophylla Nutt.	Willow White-leaf	Streambanks and valleys; frequently on shifting soil; information as above.
Salix Brachycarpa Nutt.	Willow	Alpine shrub; wet places in mountains 6,000 - 12,000 ft.; provides summer browse and cover in high alpine areas; this is not a streambank willow; spray and overgrazing are its main enemies.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENTS
Salix nivalis Hook.	Snow Willow	Moist alpine areas at high elevations; information same as S. brachycarpa.
Salix saximontana Rydb.	Rock Willow	Information same as S. brachycarpa.
Salix Scouleriana Barratt	Scouler Willow	Shrub or small tree; one of the first shrubs to appear on burned areas; common in lodgepole pine, Douglas Fir, aspen forests as patches several yards wide at elevations 5,000 to 8,000 feet; provide browse for big game and cover for many birds; fire, logging, spray, clearing are chief enemies.
Santalaceae		
Comandra pallida A. D.C.	False Toad-Flax	Herbaceous root parasites; open dry ground with sagebrush; browse value limited; fire, spray, cultivation kill this plant.
Comandra umbellata (L.) Nutt.	False Toad-Flax	Information the same.
Saxifragaceae		
Heuchera flabellifolia Rydb.	Heuchera	Perennial from branched caudex; rocky slopes; browsed by deer; killed by spray, overgrazing, and inundation.
Heuchera pentandra Hook.	Miterwort	As above.
Lithophragma parviflorum	Star Flower	Small perennial herb; mostly with sagebrush in wetter sites; bulblets are eaten by rodents, chukar, and partridges (hens); killed by spray, overgrazing, inundation.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Parnassia parviflora D.C.	Grass-of-Parnassus	Small perennial herb; around springs, bogs, streambanks; killed by channeling, spray, trampling and inundation.
Ribes aureum Pursh.	Golden Currant	Shrub; moist woods and streambanks; sometime in fence rows; leaves and twigs are foraged by deer and elk; berries are eaten by birds, bear and rodents as well as deer and elk; killed by spraying, clearing, channeling, inundation and agriculture.
Ribes lacustre (Pers.) Poir.	Swamp Currant	Information same as above.
Saxifraga montanensis Small.	Saxifrage	Perennial, stemless, herb; bogs, streambanks and wet meadowland; occasional browse; killed by channeling, spraying, overgrazing, and inundation.
Saxifraga bronchialis L.	Saxifrage	Tufted perennial; rock crevices and rock slides at low elevations to alpine; information same as above.
Telesonix heucheriformis Rydb.	Saxifrage	Perennial herb; moist crevices and talus slopes; information as above.
Scrophulariaceae		
Castilleja Confusa Greene	Indian Paintbrush	Perennial herb; moist slopes and meadows, but usually in forests; I do not know if any of the paintbrushes are utilized by game, but they are so common in unaltered areas that it is difficult to think that they are not browsed (Forest Service Handbook, 1967, lists Casteilleja spp. as desirable, but does not rate grazing value.) Enemies are spray, overgrazing, clearing and inundation.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Castilleja longispica A. Nels.	Indian Paintbrush	Perennial herb; dry plains and hills among sagebrush.
Castilleja lutea Heller.	Indian Paintbrush	Perennial herb; dry plains and hills among sagebrush.
Castilleja miniata Dougl.	Indian Paintbrush	Perennial herb; moist slopes and meadows and especially in forest and clearings.
Castilleja parviflora Bong.	Indian Paintbrush	Perennial herb; subalpine meadows at 4,000 - 7,500 ft elevation.
Castilleja septentrionalis Lindl.	Indian Paintbrush	Perennial herb; meadows and moist slopes.
Collinsia parviflora Dougl.	Blue-eyed Mary	Annual; common among sagebrush to 7,500 ft. especially abundant where overgrazing occurs; rodents eat fruits; even though a small plant, is sometimes sufficiently abundant to provide some grazing; killed by spray, inundation and cultivation.
Linaria vulgaris (L.) Mill.	Butter-and-Eggs	Tufted perennial; fields and roadsides; introduced from Europe; pretty, but has limited grazing value; killed by spray and inundation.
Mimulus guttatus L.	Monkey-flower	Perennial herb; moist soil along streams, seeps and springs, low elevations to timberline; utilized by muskrats, cattle in the summer and by deer during the winter if the area is not covered by snow; killed by channeling, inundation and spray.
Mimulus lewisii Pursh.	Monkey-flower	Perennial from rhizome; wet soil and stream-banks; receives occasional use from deer, elk and mountain sheep and domestic sheep killed by spray, channeling, inundation and overgrazing.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Mimulus moschatus Dougl.	Monkey-flower	Perennial herb from rhizome; moist soil of mountains; browsed by big game and domestic sheep; killed by spray, draining, channeling, and overgrazing.
Mimulus nanus H & A	Monkey-flower	Annual herb; open, sandy, dry, soil and cinder cones; very small, beautiful plant, causing cinder cones to appear red from the distance; grazing value limited; killed by spray, inundation, cultivation, and over-grazing.
Pedicularis groenlandica Retz.	Elephant's head	Perennial herb; wet meadows; grazed by elk and moose early in season; killed by draining, channeling and overgrazing.
Penstemon cyaneus Hook.	Beard-tongue	Perennial herb; sagebrush slopes; highly palatable to domestic sheep and all wild game; killed by spray, overgrazing and inundation.
Penstemon humilis Nutt.	Beard-tongue	Shrubby based perennial; dry sagebrush or pinyon covered slopes; browsed by domestic sheep and wild game; killed by spray, over-grazing, inundation, and fire.
Penstemon montanus Greene	Beard-tongue	Shrubby perennial; shifting talus slopes and rock crevices at moderate to high elevations; browsed by domestic sheep and big game; killed by overgrazing, spray and fire.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Penstemon pumilus Nuttalii	Beard-tonque	Perennial herb; dry, open plains with sagebrush at lower elevations; information same as above.
Penstemon radicosus A. Nels.	Beard-tonque	Tufted perennial herb; dry, open places often with sagebrush; information same as above.
Scrophularia lanceolata Pursh.	Figwort	Perennial herb; moist, low, ground to moderate elevation; may have some browse value; killed by draining, spray, channeling, and inundation.
Verbascum blattaria L.	Mullein	Waste ground biennial; introduced from Europe; seeds eaten by birds in winter; elk and deer eat dried leaves during winter on overgrazed areas; increased by overgrazing and disturbance.
Verbascum thapsus L.	Mullein	Larger biennial than the former species; more frequently found along roadsides, but also on waste ground and abandoned fields, as the former species; information same as above.
Veronica peregrina L. (H.B.K.) Penn.	Speedwell	Annual herb; wet soil of swales, streambanks, and wet meadows; moose, muskrats, and occasionally deer and cattle eat the tender plants parts; killed by channeling, inundation spray and overgrazing.

FAMILY AND SCIENTIFIC NAMES	COMMON NAME	COMMENTS
Veronica serphyllifolia L.	Speedwill	Perennial from creeping rhizomes; moist meadows and other moist places, often in disturbed sites; browsed by cattle and sometimes by moose, deer and muskrats; killed by channeling and spray, but if overgrazing is light, it is increased.
Sparganiaceae		
Sparganium simplex Huds	Bur-reed	Perennial herb; water plant; emergent in still or moving water; seeds are eaten by ducks and marsh birds; muskrates and moose utilize entire plant; killed by draining deep inundation.
Solanaceae		
Hyoscyamus niger L.	Henbane	Biennial or occasionally an annual; roadsides and waste places; introduced; poisonous weed which is the source of the drug hyoscyamine; increases with man's removal of native vegetation.
Solanum dulcamara L.	Buttersweet	Perennial, vine-like herb; introduced; contains a poisonous alkaloid; gardens, lawns near shrubary, streambanks; fruits eaten by ring-necked pheasants, wood ducks, and most other birds; increases with man's disturbance of an area, but is killed by spray, inundation and channeling.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENTS
Solanum rostratum Dunal	Buffalo Bur	Annual herb; weed which is native of the Great Plains; roadsides, waste places; increases with man's denuding native vegetation.
Umbelliferae		
Angelica arguta Nutt.	Angelica	Large, perennial herb; streambanks, wet meadows, marshes and bottomlands; browsed by sheep, deer, elk; birds eat the seeds; killed by draining, channeling, spray and inundation.
Angelica lyallii Wats.	Angelica	Same information as above.
Angelica pinnata S. Wats.	Angelica	More slender, perennial herb; information as above, except occurs at higher elevations.
Carum carvi L.	Caraway	Biennial herb; waste ground and roadsides; introduced; seeds eaten by birds; increases with man's use.
Cicuta douglasii (D.C.) C. & R.	Water Hemlock	Stout herb from tuberous root, perennial; poisonous; irrigation ditches and streambanks; increases with installation of irrigation ditches; extremely toxic to livestock and humans; killed by spray, draining.
Cymopterus longipes S. Wats.	Cow Parsnip, Cow Cabbage	Perennial herb; dry soil with sagebrush; eaten by deer, elk, sheep and cattle; fruits eaten by most birds; killed by spray, overgrazing, inundation.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENT
Heracleum lanatum michx.	Cow Cabbage Hercules-parsnip Cow-parsnip	Coars, hairy perennial herb; rich, damp soil of meadows and streambanks; readily eaten by domestic livestock, especially sheep; black bears select the fleshy stems; grizzlies, deer, elk, and moose also readily consume it; seeds are eaten by birds; draining, excessive sheep grazing, channeling, inundation kill this plant.
Lomatium montanum C. & R.	Whisk-broom Parsley	Perennial herb; dry plains and hills with sagebrush; information same as above.
Osmorhiza chilensis Hook. & Am.	Sweet Cicely	Perennial herb; moist forests; browsed by elk, deer, and sheep; birds eat the fruits; killed by spray, logging, clearing and inundation.
Osmorhiza occidentalis (Nutt.) Torr.	Sweet Cicely	Information same as above.
Urticaceae		
Parietaria pennsylvanica Muhl.	Parietaria	Annual herb; woods and moist shaded areas; browsed by game; spray, logging, inundation kill this species.
Urtica dioica L. ssp. gracilis var. graciiis	Stinging Nettle	Strongly rhizomatous perennial; sagebrush desert along streams to moist shaded lowland or mountain slopes; eaten by game when young; before stinging hairs harden; increases with man's disturbance and overgrazing; considered a weed, may come in along reservoirs.

FAMILY AND SCIENTIFIC NAME	COMMON NAME	COMMENTS
Urtica dioca L. ssp. gracilis var. Lyallii (Wats.)	Stinging Nettle	Same as above.
Valerianaceae		
Valeriana micrantha E. Nels.	Valerian	Meadowlands to mountains, 3,300 to 9,500 feet; elk, deer, moose, domestic sheep and cattle readily eat the leaves, stems and inflorescences; killed by spray, clearing, logging, inundation.
Valeriana officinalis L.	Tobbacco root, Wild Heliotrope Valeriah	Same information as above.
Violaceae		
Viola adunca J.E. Smith	Violet	Perennial herb; moist soils of plains and hills, often with sage; eaten by all animals found in the area; leaves can be used for tea and salads; killed by spray, and over-grazing and inundation.
Viola rugulosa Greene.	Violet	Perennial herb; moist forests; eaten readily by deer, elk, moose, rabbits and most rodents; killed by spray, clearing, logging, and inundation.

APPENDIX II

APPENDIX II

A LIST OF THE BENTHIC INVERTEBRATES COLLECTED FROM ROBINSON CREEK, FREMONT CO., IDAHO

The benthic invertebrate community found in Robinson Creek is typical of most of the pristine trout streams of southeastern Idaho. The diversity of the community as well as the moderate numerical abundance of the individual populations is a good indication of the excellent water quality and physical habitat presently found in Robinson Creek.

Platyhelminthes

Turbellaria

Polycelis

Mollusca

Gastropoda

Amnicola
Physa

Pelecypoda

Margaritana margaritifera
Pisidium

Annelida

Oligochaeta

Arthropoda

Insecta

Emphemeroptera

Ameletus
Baetis
Cinygmula
Epeorus
Ephemerella
Pseudocloeon

Pleocoptera

Acroneuria pacifica
Alloperla
Pteronarcys

Coleoptera

Elmidae

Trichoptera

Brachycentrus
Dicosmoecus
Hesperophylax
Hydropsyche
Neophylax
Rhyacophila

Diptera

Chironomidae
Simuliidae

Simulium

Tipulidae

Antocha
Tipula

APPENDIX III

APPENDIX III

BIRDS KNOWN TO OCCUR IN THE ISLAND PARK, HENRY'S LAKE AND FALL RIVER AREA

SPECIES (SCIENTIFIC NAME):	COMMENTS:
* 1. Common Loon (Gavia immer)	Breeds in many lily ponds near Falls River.
* 2. Eared Grebe (Podiceps caspicus)	
* 3. Western Grebe (Aechmophorus occidentalis)	Its floating nests and young on back provide much attraction.
* 4. Pied-billed Grebe (Podilymbus podiceps)	
* 5. White Pelican (Pelecanus erythrorhynchos)	Nests in Yellowstone Park
6. Double-crested Cormorant (Phalacrocorax auritus)	
* 7. Great Blue Heron (Ardea herodias)	On Audubon Society's Blue List of possible endangered species.
* 8. Snowy Egret (Leucophoyx thula)	
* 9. Black-crowned Night Heron (Nycticorax nycticorax)	On Audubon Society's Blue List of possible endangered species.
10. American Bittern (Botaurus lentiginosus)	
11. White-faced Ibis (Plegadis chihi)	
12. Whistling Swan (Olor columbianus)	
*13. Trumpeter Swan (Olor buccinator)	Nests throughout the area in remote ponds and reservoirs.

*Birds seen during four visits to Island Park, Henry's Lake and Fall River Area.

SPECIES (SCIENTIFIC NAME):	COMMENTS:
*14. Canada Goose (Branta canadensis)	Much of the area could be prime nesting habitat.
15. White-fronted Goose (Anser albifrons)	
16. Snow-Goose (Chen hyperborea)	
*17. Mallard (Anas platyrhynchos)	Most common duck nesting in the area.
*18. Gadwall (Anas strepera)	
*19. Pintail (Anas acuta)	
*20. Green-winged Teal (Anas carolinensis)	
21. Blue-winged Teal (Anas discors)	
*22. Cinnamon Teal (Anas cyanoptera)	Nesting in the lily ponds.
*23. American widgeon (Mareca americana)	Common nester on the smaller creeks.
*24. Shoveler (Spatula clypeata)	
*25. Redhead (Aythya americana)	Nests in area; numbers are reduced nationally.
26. Canvasback (Aythya valisineria)	
*27. Ring-necked Duck (Aythya collaris)	Nests in area.
28. Greater Scaup (Aythya marila)	
*29. Lesser Scaup (Aythya affinis)	
30. Common Goldeneye (Bucephala clangula)	
*31. Barrow's Goldeneye (Bucephala islandica)	Common nester and spends entire year in the area.

SPECIES (SCIENTIFIC NAME):	COMMENTS:
32. Bufflehead (Bucephala albeola)	
*33. Ruddy Duck (Oxyura jamaicensis)	
34. Hooded Merganser (Lophodytes cucullatus)	
35. Common Merganser (Mergus merganser)	
36. Red-breasted Merganser (Mergus serrator)	
*37. Turkey Vulture (Cathartes aura)	
*38. Goshawk (Accipiter gentilis)	Nests in the pine forests.
*39. Cooper's Hawk (Accipiter cooperii)	Numbers are reduced Nationally.
*40. Sharp-shinned Hawk (Accipiter striatus)	
*41. Red-tailed Hawk (Buteo jamaicensis)	Common breeders in broken timber area.
*42. Swainson's Hawk (Buteo swainson)	Common breeders in broken timber area.
43. Rough-legged Hawk (Buteo lagopus)	
*44. Ferruginous Hawk (Buteo regalis)	Five banded on Henry's Lake Flat, probably common in area; is possibly an endangered species.
*45. Golden Eagle (aquila chrysaetos)	Nests on cliffs near rivers in the area.
*46. Bald Eagle (Haliaeetus leucocephalus)	Winters in the area in reduced numbers.
*47. Marsh Hawk (Circus cyaneus)	On Audbon Society's Blue List.
*48. Osprey (Pandion haliaetus)	Common nester along free-flowing rivers in the area.

SPECIES (SCIENTIFIC NAME):	COMMENTS:
*49. Prairie Falcon (Falco mexicanus)	Cliff nester in this area.
50. Peregrine Falcon (Falco peregrinus)	Not seen, but is endangered species and many cliffs in the area look ideal.
51. Pigeon Hawk (Falco columbarius)	
*52. Sparrow Hawk (Falco sparverius)	Common nester along streams and meadows.
53. Blue Grouse (Dendragapus obscurus)	
54. Spruce Grouse (Canachites canadensis)	
*55. Ruffed Grouse (Bonasa umbellus)	
*56. Sharp-tailed Grouse (Pediocetes phasianellus)	Both these species face declining numbers and habitat as more and more sage is turned to agriculture
*57. Sage Grouse (Centrocercus urophasianus)	" " "
*58. Ring-necked Pheasant (Phasianus colchicus)	Both introduced and doing well near man.
*59. Gray Partridge (Perdix perdix)	" " "
60. Chukar (Alectoris graeca)	
*61. Sandhill Crane (Grus canadensis)	Common nester in the area.
62. Virginia rail (Rallus limicola)	
*63. Sora (Porzana carolina)	Seen in a meadow near Island Park.
*64. American Coot (Fulica americana)	
*65. Killdeer (Charadrius vociferus)	
*66. Common Snipe (Capella gallinago)	Breeds in marshy openings in the timber.

SPECIES (SCIENTIFIC NAME):	COMMENTS:
*67. Long-billed Curlew (Numenuis americanus)	
*68. Spotted Sandpiper (Actitis macularia)	
69. Willet (Catoptrophorus semipalmatus)	
70. Greater Yellow-legs (Totanus melanoleucus)	
71. Lesser Yellow-legs (Totanus flavipes)	
72. Least Sandpiper (Erolia minutilla)	
73. Semipalmated Sandpiper (Ereunetes pusillus)	
74. Long-billed Dowitcher (Limnodromus scolopaceus)	
*75. American Avocet (Recurvirostra americana)	
76. Wilson's Phalarope (Steganopus tricolor)	
77. Herring Gull (Larus argentatus)	
*78. California Gull (Larus californicus)	
*79. Ring-billed Gull (Larus delawarensis)	
*80. Franklin's Gull (Larus pipixcan)	Nests in marshy areas of shallows of reservoirs.
81. Bonaparte's Gull (Larus philadelphia)	
82. Forster's Tern (Sterna forsteri)	
83. Common Tern (Sterna hirundo)	

SPECIES (SCIENTIFIC NAME):	COMMENTS:
84. Caspian Tern (Hydroprogne caspia)	
* 85. Black Tern (Chilidonias niger)	Nests in marshy areas of shallows of reservoirs.
86. Rock Dove (Columba livia)	
* 87. Mourning Dove (Zenaidura macroura)	
88. Black-billed Cuckoo (Coccyzus erythro-pthalmus)	
89. Barn Owl (Tyto alba)	
* 90. Great-horned Owl (Bubo virginianus)	
91. Burrowing Owl (Speotyto cunicularia)	
* 92. Great Gray Owl (Strix nebulosa)	Rare owl which nests in the area; 1 banded in 1971.
* 93. Long-eared Owl (Asio otus)	
* 94. Short-eared Owl (Asio flammeus)	Nests in open marshy areas.
95. Saw-whet Owl (Aegolius acadicus)	
96. Poor-will (Phalaenoptilus nuttallii)	
* 97. Common Nighthawk (Chordeiles minor)	
98. Black-Chinned Hummingbird (Archilochus alexandri)	
99. Broad-tailed Hummingbird (Selasphorus platycercus)	
100. Rufous Hummingbird (Selasphorus rufus)	
101. Calliope Hummingbird (Stellula calliope)	

SPECIES (SCIENTIFIC NAME):	COMMENTS:
102. Belted Kingfisher (Megaceryle alcyon)	
*103. Red-shafted Flicker (Colaptes cafer)	Seen in increased abundance in dying forest near Falls River.
104. Lewis' Woodpecker (Asyndesmus lewis)	
105. Yellow-bellied Sapsucker (Sphyrapicus varius)	
*106. Hairy Woodpecker (Dendrocopus villosus)	Seen in increased abundance in dying forest near Falls River.
*107. Downy Woodpecker (Dendrocopus pubescens)	Seen in increased abundance in dying forest near Falls River.
*108. Black-backed Three-toed Woodpecker (Picoides arcticus)	Seen in increased abundance in dying forest near Falls River.
*109. Eastern Kingbird (Tyrannus tyrannus)	
*110. Western Kingbird (Tyrannus verticalis)	
111. Ash-throated Flycatcher (Myiarchus cinerascens)	
112. Say's Phoebe (Sayornis saya)	
*113. Trail's Flycatcher (Empidonax traillii)	
114. Least Flycatcher (Empidonax minimus)	
115. Gray Flycatcher (Empidonax wrightii)	
116. Western Wood Pervee (Contopus sordidulus)	

SPECIES (SCIENTIFIC NAME):	COMMENTS:
*117. Olive-sided Flycatcher (Nuttalornis borealis)	
*118. Horned Lark (Eremophila alpestris)	Abundant on Henry's Lake Flats
*119. Violet-green Swallow (Tachycineta thalassina)	
*120. Tree Swallow (Iridoprocne bicolor)	
121. Bank Swallow (Riparia riparia)	
*122. Rough-winged Swallow (Stegidopteryx ruficollis)	
*123. Barn Swallow (Hirundo rustica)	
*124. Cliff Swallow (Petrochelidon pyrrhonota)	
*125. Gray Jay (Perisoreus canadensis)	Common in pines, as near Falls River.
126. Steller's Jay (Cyanocitta stelleri)	
*127. Black-billed Magpie (Pica pica)	
128. Common Raven (Corvus corax)	
*129. Common Crow (Corvus brachyrhynchos)	
130. Pinyon Jay (Gymnorhimus cyanocephalus)	
*131. Clark's Nutcracker (Nucifraga columbiana)	
*132. Black-capped Chickadee (Parus atricapillus)	
133. Mountain Chickadee (Parus gambeli)	

SPECIES (SCIENTIFIC NAME):	COMMENTS:
134. Plain Titmouse (Parus inornatus)	
*135. Common Bushtit (Psaltriparus minimus)	
*136. White-breasted Nuthatch (Sitta carolinensis)	Increasing abundance in dead timber.
137. Red-breasted Nuthatch (Sitta canadensis)	
*138. Brown Creeper (Certhia familiaris)	Increasing abundance in dead timber.
*139. Dipper (Cinclus mexicanus)	
*140. House Wren (Troglodytes aedon)	
141. Winter Wren (Troglodytes troglodytes)	
*142. Long-billed Marsh Wren (Telmatodytes palustris)	
*143. Canon Wren (Catherpes mexicanus)	
*144. Rock Wren (Salpinctes obsoletus)	Tallus slopes
*145. Catbird (Dumetella carolinesis)	River bottoms
*146. Sage thrasher (Oreoscoptes montanus)	Decreased with agriculture
*147. Robin (Turdus migratorius)	Abundant
*148. Hermit Thrush (Hylocichla guttata)	Common in wilder areas.
*149. Mountain Bluebird (Sialia currucoides)	Numbers reduced Nationally.

SPECIES (SCIENTIFIC NAME):	COMMENTS:
150. Townsend's Solitaire (Myadestes townsendi)	
*151. Golden-crowned Kinglet (Regulus satrapa)	
*152. Ruby-crowned Kinglet (Regulus calendula)	
153. Water Pipit (Anthus spinoletta)	
154. Bohemian Waxwing (Bombycilla garrulus)	
*155. Cedar Waxwing (Bombycilla cedrorum)	
156. Northern Shrike (Lanius excubitor)	
*157. Loggerhead Shrike (Lanius ludovicianus)	
*158. Starling (Sturnus vulgaris)	Encroaching, especially in areas disturbed by man.
159. Solitary Vireo (Vireo solitarius)	
160. Red-eyed Vireo (Vireo olivaceus)	
*161. Warbling Vireo (Vireo gilvus)	
*162. Orange-crowned Warbler (Vermivora celata)	
163. Virginia's Warbler (Vermivora virginiae)	
*164. Yellow Warbler (Dendroica petechia)	
*165. Audubon's Warbler (Dendroica auduboni)	
166. Townsend's Warbler (Dendroica townsendi)	
167. Black-throated Gray Warbler (Dendroica nigrescens)	
168. Northern Waterthrush (Seiurus noveboracensis)	

SPECIES (SCIENTIFIC NAME): COMMENTS:

*169. MacGillivray's Warbler (Oporornis tolmiei)

*170. Yellow-throat (Geothlypis trichas)

171. Yellow-breasted Chat (Icteria virens)

*172. Wilson's Warbler (Wilsonia pusilla)

*173. House Sparrow (Passer domesticus)

174. Bobolink (Dolichonyx oryzivorus)

*175. Western Meadowlark (Sturnella neglecta)

*176. Yellow-headed Blackbird (Xanthocephalus xanthocephalus)

*177. Red-winged Blackbird (Agelaius phoeniceus)

*178. Bullocks Oriole (Icterus bullockii)

*179. Brewer's Blackbird (Euphagus cyanocephalus)

*180. Brown-headed Cowbird (Molothrus ater)

181. Western Tanager (Piranga ludoviciana)

*182. Black-headed Grosbeak (Pheucticus melanocephalus)

183. Evening Grosbeak (Hesperiphona vespertina)

*184. Lazuli Bunting (Passerina Amoena)

SPECIES (SCIENTIFIC NAME):	COMMENTS:
185. Cassin's Finch (Carpodacus cassinii)	
*186. House Finch (Carpodacus mexicanus)	
187. Pine Grosbeak (Pinicola enucleator)	
188. Gray-crowned Rosy Finch (Leucosticte tephrocotis)	
*189. Pine Siskin (Spinus pinus)	
*190. American Goldfinch (Spinus tristis)	
*191. Red Crossbill (Loxia curvirostra)	
192. White-winged Crossbill (Loxia leucoptera)	
*193. Green-tailed Towhee (Chlorura chlorura)	
194. Rufous-sided Towhee (Pipilo erythrophthalmus)	
*195. Lark Bunting (Calamospiza melanocorys)	Rare in area; a colony seen N. of St. Anthony.
*196. Savannah Sparrow (Passerculus sandwichensis)	
197. Grasshopper Sparrow (Ammodramus savannarium)	
*198. Vesper Sparrow (Pooecetes gramineus)	Numbers increased by agriculture.
*199. Lark Sparrow (Chondestes grammacus)	
*200. Sage Sparrow (Amphispiza belli)	Numbers decreased by agriculture or grazing.
201. Slate-colored Junco (Junco hyemalis)	

SPECIES (SCIENTIFIC NAME):	COMMENTS:
*202. Oregon Junco (Junco oreganus)	
203. Tree Sparrow (Spizella arborea)	
*204. Chipping Sparrow (Spizella passerina)	
*205. Brewer's Sparrow (Spizilla breweri)	Numbers reduced by agriculture.
206. White-crowned Sparrow (Zonotrichia leucophrys)	
*207. Fox Sparrow (Passerella iliaca)	
*208. Lincoln's Sparrow (Melospiza lincolnii)	Common breeder in Willow thickets, rare elsewhere.
*209. Song Sparrow (Melospiza melodia)	
210. Snow Bunting (Plectrophenax nivalis)	

APPENDIX IV

APPENDIX IV

LIST OF MAMMALS OCCURING IN FREMONT, MADISON AND TETON COUNTIES[1]

Order - Insectivora (Insectivores)

Family - Soricidae - Shrews

Scientific name	Common name[2]
Sorex cinereus	Masked shrew
[4]Sorex vagrans	Vagrant shrew
Sorex palustris	Water Shrew

Order - Chiroptera (Bats)

Family - Vespertilionidae - Vespertilionidae Bats

Scientific name	Common name
Myotis lucifugus	Little brown bat
Myotis yumanensis	Yuma myotis
Myotis evotis	Long-eared myotis
Myotis thysanodes	Fringed myotis
Myotis volans	Long-legged myotis
[3]Myotis californicus	California myotis
[3]Myotis subulatus	Small-footed myotis
[3]Lasionycteris noctivagans	Silver-haired bat
Pipistrellus hesperus	Western pipistrelle
Eptesicus fuscus	Big brown bat
Lasiurus cinereus	Hoary bat
Plecotus townsendii	Townsend's big-eared bat

Order - Lagomorpha (Lagomorphs)

Family - Ochotonidae - Pikas

Scientific name	Common name
[4]Ochotona princeps	Pika

Family - Leporidae - Hares and Rabbits

Scientific name	Common name
Sylvilagus idahoensis	Pygmy rabbit
[4]Sylvilagus nuttallii	Nuttall's Cottontail
[3]Sylvilagus audubonii	Desert cottontail
[4]Lepus americanus	Snowshoe rabbit
Lepus townsendii	White-tailed jack rabbit
[4]Lepus californicus	Black-tailed jack rabbit

Order - Rodentia (rodents)

Family - Sciuridae - Squirrels

Scientific name	Common name
[4]Eutamias minimus	Least chipmunk
[4]Eutamias amoenus	Yellow-pine chipmunk
Eutamias umbrinus	Uinta chipmunk
[4]Marmota flaviventris	Yellow-bellied marmot
Citellus towsendii	Townsend's Ground squirrel
Citellus brunneus	Idaho ground squirrel
[4]Citellus armatus	Uinta ground squirrel
[4]Citellus lateralis	Golden-mantled ground squirrel
Citellus richardsonii	Richardson's ground squirrel

Sciurus niger	Fox squirrel
[4]Tamiasciurus hudsonicus	Red squirrel
Glaucomys sabrinus	Northern flying squirrel

Family Geomyidae - Pocket Gophers

Scientific name	Common Name
[4]Thomomys talpoides	Northern pocket gopher

Family - Heteromyidae - Heteromyids

Scientific name	Common Name
Perognathus parvus	Great Basin pocket mouse
Dipodomys ordii	Ord's Kangaroo rat

Family - Castoridae - Beavers

Scientific name	Common Name
Castor canadensis	Beaver

Family - Cricetidae - New World rats and mice

Scientific name	Common name
Reithrodontomys megalotis	Western harvest mouse
Peromyscus maniculatus	Deer mouse
[3]Onychomys leucogaster	Northern grasshopper mouse
Neotoma lepida	Desert wood rat
[4]Neotoma cinerea	Bushy tailed woodrat
Clethrionomys gapperi	Gapper's Red-backed mouse
Phenacomys intermedius	Heather vole
[4]Microtus pennsylvanicus	Meadow vole
Microtus montanus	Montane vole
[4]Microtus longicaudus	Long-tailed vole
Microtus richardsoni	Water vole

Lagurus curtatus	Sagebrush vole
[4]Ondatra zibethicus	Muskrat

Family - Muridae - Old World rats and mice

Scientific name	Common Name
[4]Mus musculus	House mouse

Family - Zapodidae - Jumping Mice

Scientific name	Common name
[4]Zapus princeps	Western jumping mouse

Family - Erethizontidae - New World porcupines

Scientific name	Common name
[4]Erethizon dorsatum	Porcupine

Order - Carnivora (Carnivores)

Family - Canidae - Canids

Scientific name	Common name
[4]Canis latrans	Coyote
[3]Canis lupus	Gray wolf
[4]Vulpes vulpes	Red fox

Family - Ursidae - Bears

Scientific name	Common name
Ursus americanus	Black bear
Ursus horribilis	Grizzly bear

Family - Procyonidae - Procyonids

Scientific name	Common name
Procyon lotor	Racoon

Family - Mustelidae - Mustelids

Scientific name	Common name
Martes americana	Marten
[3]Martes pennanti	Fisher
Mustela erminea	Ermine
Mustela frenata	Long-tailed Weasel
Mustela vison	Mink
Gulo luscus	Wolverine
[4]Taxidea taxus	Badger
Spilogale gracilis	Western spotted skunk
[4]Mephitis mephitis	Striped skunk
Lutra canadensis	River otter

Family - Felidae - Cats

Scientific name	Common name
Felis concolor	Felis concolor
Lynx canadensis	Lynx
Lynx rufus	Bobcat

Order - Artiodactyla (Even-toed ungulates)

Family - Cervidae - Cervids

Scientific name	Common name
[4]Cervus canadensis	Wapiti
[4]Dama hemionus	Mule Deer
Dama virginiana	White-tailed deer
[4]Alces alces	Moose

Family - Antilocapridae - Pronghorn

Scientific name	Common name
Antilocapra americana	Pronghorn

Sources and Information:

1. Hall and Kelson, 1959, Larrison, 1967.
2. Hall, 1965.
3. Probable occurrence, but uncertain.
4. Mammals observed or collected by C. Trost during four visits to the area.

APPENDIX V

APPENDIX V
AMPHIBIANS AND REPTILES OBSERVED

Western Toad (Bufo boreas)	Founding breeding on Henry's Lake Flats
Leopard Frog (Rana pipiens)	
Western Spotted Frog (Rana pretiosa)	Common in beaver ponds
Sagebrush Lizard (Sceloporus graciosus)	
Short-horned Lizard (Phrynosoma douglassi)	
Common Garter Snake (Thamnophis sirtalis)	
Western Garter Snake (Thamnophis elegans)	Eleven collected in dead logs around one beaver pond.
Gopher Snake (Pituophis catenifer)	
Western Rattlesnake (Crotalus viridis)	
Racer (Coluber constrictor)	

APPENDIX VI

APPENDIX VI

FISH OBSERVED OR CAPTURED

Mountain Whitefish (Prosopium williamsoni)	
Grayling (Thymallus signifer)	Not seen, but present in Yellowstone Park
Cutthroat Trout (Salmo clarki)	The native trout to the area.
Rainbow Trout (Salmo gairdneri)	Widely introduced in the area.
Brook Trout (Salvelinus fontinalis)	Widely introduced into the area.
Utah Sucker (Catostomus ardens)	
Piute Sculpin (Cottus beldingi)	
Sockeye Salmon (Oncorhynchus nerka)	Introduced, includes Kokanee which makes runs into Henry's Fork.
Coho Salmon (Oncorhynchus kisutch)	Introduced
Brown Trout (Salmo trutta)	

In addition there are 22 other possible species in the area which are listed by Allan Linder (1968).

APPENDIX VII

APPENDIX VII
ECONOMIC FACTORS

This section is a brief evaluation of the major economic factors of Fremont, Madison and Teton Counties. Also included is Teton County, Wyoming, because it contains approximately the same resources. Instead of consuming its resources through agriculture and logging, Teton County, Wyoming, has utilized them for the non-consumptive, but continuous use of tourism.

Personal Income

Fremont County, Idaho
Composition in 1965

Income generated from agriculture was the most important source of personal income in Fremont County. The income received by farm proprietors plus wages paid to farm workers accounted for more than half of the total personal income in the county. Since 1965 was an extraordinarily good year for farmers, the 1965 figures tend to slightly exaggerate the importance of agriculture. Still, the 1958-1964 agricultural income accounts for 40% to 50% of total income.

The second ranking (and rapidly rising) income source was property income from dividends and interest. This accounted for slightly more than 10% in 1965 and, in absolute amount, nearly doubled since 1958. Close behind in third place was the income of government employees, accounting for approximately 10%. Wholesale and retail trade placed slightly below government and was followed by non-farm proprietor's income, which is somewhat of a catch-all category. Manufacturing, which is mainly food processing, lumber and services, came next.

Madison County, Idaho
Composition in 1965

The most important source of personal income is agriculture which accounts for 31% of the total if wages and proprietors incomes are grouped. As in Fremont County property income ranks second accounting for approximately 19% of personal income. Non-farm proprietors income, wages from services

and commerce rank third, fourth and fifth, respectively. It is interesting to note that if one ranks wages and salaries only, services are first, Federal second, commerce third and professional services fourth. Agricultural wages rank below retail wages and are not in the top four.

Teton County, Idaho
Composition in 1965

As with Fremont County the most important source of personal income was from agriculture. The proprietors' income plus farm wages account for about 40% of the total. Government employees are the second largest source at about 15%. Property income (rent, dividends, and interest) are also a substantial source contributing something under 15%. Non-farm proprietors' income adds about 7%. The bulk of this income is provided by commerce. Wages paid by commerce amount to about 4%. This nearly exhausts the significant categories. The most rapidly growing of the above are government, which grew about 60% during 1958-1965, and property income, which rose about 70% during the same period.

Per Capita Income

Neither Fremont nor Teton County can be considered particulary prosperous in terms of per capita income. Both rated below the average income for the State of Idaho in 1965 ($2,401) with Fremont at $2,038, Madison 25th and Teton last at 44th of 44. Put into national perspective, these are low income counties in a low income state. Per capita income in Idaho has been below the U. S. average every year since the 1920's. The picture in Fremont is somewhat more encouraging in terms of the trend. Fremont improved its ranking among Idaho counties from 35th in 1958 to 29th in 1965, largely as a result of increased farm income. Teton remained in last place over the period until 1969, with per capita income increasing barely over $100 ($1,156 to $1,270). Madison County fluctuated but showed a trend of increase until 1965. Since that time a steady decrease has occurred until it fell below Teton County (Table 25).

Annual figures on personal income have not been updated since 1965 (Tables 26, 27, 28). Bollinger's methodology is extensive, and a replication through 1970 was not attempted. Raw data from Bureau of Census for 1970 can be obtained. Adjusted gross income for 1969 was obtained from the Idaho

Table 25. Per Capita Income in Idaho Counties as a Percentage of the National Average, Selected Years, 1929-1969.

County	Residence adjusted per cent of national average									
	1929	1940	1950	1959	1962	1965	1966	1967	1968	1969
Fremont	57	54	65	62	66	76	68	66	62	68
Madison	44	47	68	68	61	74	64	64	52	54
Teton	37	46	64	51	55	53	52	53	50	59

Source: Special computer run-off from Office of Business Economics, U. S. Department of Commerce.

Table 26. Personal Income for Fremont County
(in thousands of dollars)

FREMONT COUNTY	1958	1959	1960	1961	1962	1963	1964	1965
PERSONAL INCOME	12,582	13,108	13,666	14,467	13,523	15,488	13,534	18,992
Wage and salary disbursements	5,130	5,434	5,305	5,748	5,885	6,477	6,674	6,293
Farms	1,004	995	971	987	967	1,023	992	958
Mining	0	0	0	0	0	0	0	0
Contract construction	202	283	181	156	225	196	165	186
Manufacturing	554	581	431	782	373	507	631	583
Food processing	169	163	138	564	107	106	135	108
Lumber	340	370	247	169	206	340	460	421
Other	45	48	46	49	60	61	36	54
Transportation	194	253	224	230	352	335	345	325
Railroads	124	136	128	120	254	254	262	231
Trucks, buses, and warehouses	10	15	11	29	19	28	45	71
Unclassified	60	102	85	81	79	53	38	23
Public utilities	198	193	223	258	290	272	308	313
Telephone, telegraph, and other communications	47	47	49	51	51	55	59	55
Electric, gas, and other public utilities	130	133	159	196	231	217	246	252
Unclassified	21	13	15	9	8	0	3	6
Commerce	981	1,045	1,103	1,117	1,168	1,160	1,204	1,234
Wholesale	288	293	314	307	282	268	248	281
Retail	693	752	789	810	886	892	956	953
Finance, insurance, and real estate	80	77	72	83	72	75	77	79
Finance	58	57	50	55	50	50	54	54
Insurance and real estate	22	20	22	28	22	25	23	25

(continued)

FREMONT COUNTY (CONT.)	1958	1959	1960	1961	1962	1963	1964	1965
Services	416	450	459	479	471	494	509	591
Hotels and other lodging places	88	108	133	110	105	119	116	156
Personal services and private households	111	117	110	117	110	105	108	120
Business and repair services	35	23	17	21	18	21	23	17
Amusement and recreation	36	37	38	45	44	44	48	71
Professional, social, and related services	146	165	161	186	194	205	214	227
Other industries	14	29	29	14	14	29	29	43
Government	1,487	1,528	1,612	1,642	1,953	2,386	2,414	1,981
Federal, civilian	410	368	396	419	566	962	918	680
State	459	494	518	496	585	580	621	354
Local	618	666	698	727	802	844	875	947
Other labor income	270	294	298	325	323	359	400	393
General	168	191	196	223	221	257	272	265
Military reserve	102	103	102	102	102	102	128	128
Proprietor's income	5,037	5,113	5,675	5,718	4,466	5,750	3,375	8,914
Farm	3,538	3,547	4,181	4,294	2,980	4,332	1,927	7,425
Nonfarm	1,499	1,566	1,494	1,424	1,486	1,418	1,448	1,489
Other	195	195	195	134	134	134	151	151
Contract construction	117	104	104	117	143	96	29	30
Manufacturing	76	91	91	70	70	70	78	78
Communications and public utilities	39	39	39	52	52	52	71	71
Commerce	714	758	700	644	657	631	621	633
Finance, insurance and real estate	56	62	50	39	39	43	53	58
Business services	149	149	139	178	178	178	200	200
Professional services	152	167	175	190	213	213	244	266

(continued)

FREMONT COUNTY (CONT.)	1958	1959	1960	1961	1962	1963	1964	1965
Property income	1,426	1,492	1,603	1,737	1,861	1,892	2,062	2,325
Dividends	155	147	155	170	194	159	201	201
Interest	851	917	1,003	1,097	1,163	1,273	1,340	1,527
Rent	420	428	445	470	504	460	521	597
Transfer payments	916	956	1,017	1,188	1,257	1,297	1,332	1,389
Federal	706	777	832	988	1,055	1,097	1,124	1,187
O.A.S.D.I.	355	406	433	550	633	658	675	734
Unemployment insurance	59	68	85	101	99	85	78	63
Veteran benefits	197	208	225	224	219	210	211	211
Other	95	95	89	113	104	144	160	179
State and local	158	127	122	137	140	127	135	129
Direct relief	103	104	98	102	102	88	93	85
Other	55	23	24	35	38	39	42	44
Business	52	52	63	63	62	73	73	73
Less: Personal contributions for social insurance	197	181	232	249	269	287	309	322
Situs adjustment for commuters	(53)	(56)	(55)	(59)	(61)	(67)	(69)	(65)
Adjusted personal income	12,529	13,052	13,611	14,408	13,462	15,421	13,465	18,927

Table 27. Personal Income for Madison County
(in thousands of dollars)

MADISON COUNTY	1958	1959	1960	1961	1962	1963	1964	1965
PERSONAL INCOME	13,803	14,191	15,159	14,905	15,210	16,252	14,948	21,008
Wage and salary disbursements	5,346	5,599	5,795	5,733	6,005	6,779	7,207	8,097
Farms	931	919	926	966	967	1,051	1,044	1,006
Mining	0	2	6	0	0	0	0	0
Contract construction	389	349	345	200	221	439	301	367
Manufacturing	285	328	317	322	302	368	393	669
Food processing	177	207	224	239	216	266	244	459
Lumber	88	67	64	60	59	71	83	108
Other	20	54	29	23	27	31	66	102
Transportation	136	178	166	158	158	141	146	145
Railroads	27	30	28	26	35	35	36	43
Trucks, buses, and warehouses	52	52	58	55	48	56	74	80
Other	0	0	0	1	0	0	0	0
Unclassified	57	96	80	76	75	50	36	22
Public utilities	331	335	370	417	401	435	418	523
Telephone, telegraph, and other communications	76	69	71	82	78	76	82	82
Electric, gas, and other public utilities	229	250	281	324	313	359	332	434
Unclassified	26	16	18	11	10	0	4	7
Commerce	1,141	1,203	1,253	1,253	1,173	1,234	1,411	1,568
Wholesale	218	235	248	250	233	232	261	155
Retail	923	968	1,005	1,003	940	1,002	1,150	1,413
Finance, insurance, and real estate	85	77	96	119	246	322	332	382
Finance	56	49	58	66	206	276	285	313
Insurance and real estate	29	28	38	53	40	46	47	69

MADISON COUNTY	1958	1959	1960	1961	1962	1963	1964	1965
Services	864	940	978	1,085	1,212	1,368	1,604	1,825
Hotels and other lodging places	27	23	19	18	24	20	18	31
Personal services and private households	156	169	169	180	170	158	170	189
Business and repair services	48	56	62	75	63	57	50	53
Amusement and recreation	37	30	31	38	37	43	42	41
Professional, social, and related services	596	662	697	774	918	1,090	1,324	1,511
Other industries	7	14	14	7	7	14	14	21
Government	1,177	1,254	1,324	1,206	1,318	1,407	1,544	1,591
Federal, civilian	134	131	148	161	169	196	206	220
State	262	282	295	103	117	101	109	99
Local	781	841	881	942	1,032	1,110	1,229	1,272
Other labor income	302	323	341	350	353	397	453	500
General	175	196	214	223	226	270	294	341
Military reserve	127	127	127	127	127	127	159	159
Proprietors' income	5,225	5,176	5,767	5,267	4,757	4,861	2,815	7,496
Farm	3,583	3,471	4,147	3,520	2,911	3,130	816	5,430
Nonfarm	1,642	1,705	1,620	1,747	1,846	1,731	1,999	2,066
Other	49	49	49	82	82	82	185	185
Contract construction	234	210	210	235	289	192	233	244
Manufacturing	56	67	67	60	60	60	48	48
Communications and public utilities	59	59	59	51	51	51	88	88
Commerce	751	797	736	767	783	752	815	830
Finance, insurance and real estate	105	115	94	107	107	119	120	131
Business services	188	188	176	196	196	196	190	190
Professional services	200	220	230	250	280	280	320	350

(continued)

MADISON COUNTY	1958	1959	1960	1961	1962	1963	1964	1965
Property income	2,313	2,402	2,533	2,748	3,224	3,276	3,515	3,931
Dividends	434	413	434	478	543	471	565	565
Interest	1,313	1,413	1,503	1,643	2,013	2,175	2,262	2,579
Rent	566	576	596	627	668	630	688	787
Transfer payments	818	872	953	1,055	1,133	1,224	1,252	1,304
Federal	626	710	774	867	953	1,019	1,036	1,092
O.A.S.D.I.	355	426	473	526	616	672	683	750
Unemployment insurance	42	49	57	82	94	65	63	44
Veteran benefits	163	171	185	185	180	194	195	195
Other	66	64	59	74	63	88	95	103
State and local	120	91	94	104	96	108	119	115
Direct relief	61	66	68	66	54	66	73	67
Other	59	25	26	38	42	42	46	48
Business	72	71	85	84	84	97	97	97
Less: Personal contributions for social insurance	201	181	230	248	262	285	294	320
Situs adjustment for commuters	734	764	799	828	869	906	999	1,061
Adjusted personal income	14,537	14,955	15,958	15,733	16,079	17,158	15,947	22,069

Table 28. Personal Income for Teton County
(in thousands of dollars)

TETON COUNTY	1958	1959	1960	1961	1962	1963	1964	1965
PERSONAL INCOME	3,004	3,200	3,098	3,230	3,836	3,851	3,375	3,808
Wage and salary disbursements	987	1,046	1,056	1,031	1,072	1,145	1,261	1,233
Farms	262	256	263	277	278	312	310	300
Mining	1	1	1	0	1	2	2	1
Contract construction	18	23	21	13	13	10	10	0
Manufacturing	46	38	41	39	34	16	7	21
Food processing	30	32	34	35	33	14	0	0
Lumber	11	0	0	0	0	1	6	21
Other	5	6	7	4	1	1	1	0
Transportation	56	69	68	65	93	87	87	72
Railroads	49	53	50	47	78	78	80	65
Trucks, buses, and warehouses	3	8	12	12	9	5	4	5
Unclassified	4	7	6	6	6	4	3	2
Public utilities	59	57	45	1	1	0	1	1
Electric, gas, and other public utilities	56	55	43	0	0	0	0	0
Unclassified	3	2	2	1	1	0	1	1
Commerce	113	145	142	140	132	138	145	159
Wholesale	11	11	11	11	8	7	11	7
Retail	102	134	131	129	124	131	134	152
Finance, insurance, and real estate	4	4	4	6	4	2	2	4
Finance	2	2	2	3	2	1	1	2
Insurance and real estate	2	2	2	3	2	1	1	2

TETON COUNTY	1958	1959	1960	1961	1962	1963	1964	1965
Services	59	59	52	51	64	64	68	70
Hotels and other lodging places	7	12	12	11	14	12	11	14
Personal services and private households	11	11	9	11	12	12	12	11
Business and repair services	15	9	7	6	3	4	4	5
Amusement and recreation	4	4	4	3	4	3	3	3
Professional, social and related services	22	23	20	20	31	33	38	37
Other industries	4	8	8	4	4	8	8	12
Government	365	386	411	435	448	506	621	593
Federal, civilian	52	48	57	65	76	98	164	132
Federal, military	66	72	75	79	78	83	83	76
State	13	14	15	13	14	17	37	20
Local	234	252	264	279	280	308	337	365
Other labor income	58	63	65	67	66	72	165	84
General	32	37	39	41	40	46	133	52
Military reserve	26	26	26	26	26	26	32	32
Proprietors' income	1,439	1,543	1,418	1,535	2,051	1,941	1,199	1,655
Farm	1,207	1,297	1,185	1,312	1,819	1,721	927	1,377
Nonfarm	232	246	233	223	232	220	272	278
Mining	15	15	15	11	11	11	0	0
Contract construction	0	0	0	19	23	15	0	0
Manufacturing	12	15	15	15	15	15	18	18
Communications and public utilities	9	9	9	4	4	4	0	0
Commerce	150	159	146	131	134	128	188	192
Business services	27	27	26	19	19	19	36	36
Professional services	19	21	22	23	27	27	30	33

TETON COUNTY	1958	1959	1960	1961	1962	1963	1964	1965
Property income	294	307	303	324	379	397	436	496
Dividends	10	9	10	10	12	10	12	12
Interest	180	194	188	206	255	287	311	355
Rent	104	104	105	108	112	100	113	129
Transfer payments	287	292	320	343	342	378	402	434
Federal	222	236	258	285	289	323	342	377
O.A.S.D.I.	118	131	156	166	184	193	204	233
Unemployment insurance	35	35	30	39	27	29	29	26
Veteran benefits	39	41	44	44	43	52	52	52
Other	30	29	28	36	35	49	57	66
State and local	50	42	46	42	38	38	43	40
Direct relief	33	35	39	31	26	26	30	27
Other	17	7	7	11	12	12	13	13
Business	15	14	16	16	15	17	17	17
Less: Personal contributions for social insurance	61	51	64	70	74	82	88	94
Situs adjustment for commuters	28	30	28	33	34	38	37	34
Adjusted personal income	3,032	3,230	3,126	3,263	3,870	3,889	3,412	3,842

Tax Commission. Fremont, Idaho, showed a $5,814 income per tax return and Teton showed $4,284. Note that these are not per capita income and are not comparable with Bollinger's figures. (Taxable income, 1969, and personal income, 1965, are conceptually different, of course. Since the bulk of the tax returns represent family income, a division by family size would also be needed.) In 1969 per capita income for Fremont County had risen to $2,195, Teton County to $1,941 but Madison County had dropped to $1,884.

Employment

There is an obvious link between sources of personal income and sources of employment, but there are also differences which make a separate examination useful. Property income, for example, is income not typically linked with an employment source. There is also what Henry George called the "unearned increment" that comes with increasing land values. Although appreciation in land value is seldom, if ever, realized on annual basis, this income source possibly outranks operational income for most large farms.

For the Idaho counties in 1970, 16% of total employment came from agriculture in Madison, 25% in Fremont and 40% in Teton. Both of the latter are higher than the fraction for the State (18%), and all are much higher than that for the U.S. (about 7%). Over time they have followed the downward trend in agricultural employment; a trend which seems likely to continue.

Employment in Madison County is more evenly distributed than in the other two counties. Services and miscellaneous account for about three out of ten employees. Agriculture ranks second and is less than 2% ahead of wholesale and retail or all other occupations. Government employment ranks fifth. There are more in the unemployed category than there are employed in food processing.

The breakdown of covered employment is shown in the "pie" diagram (Figures 31). Wholesale and retail trade are the largest source of employment in both Fremont and Teton Counties followed in turn by federal and state employees and service and miscellaneous. Lumber ties for third place in Fremont County. Percentage change, 1968-1970, has been calculated although the period is too short to be of much significance.

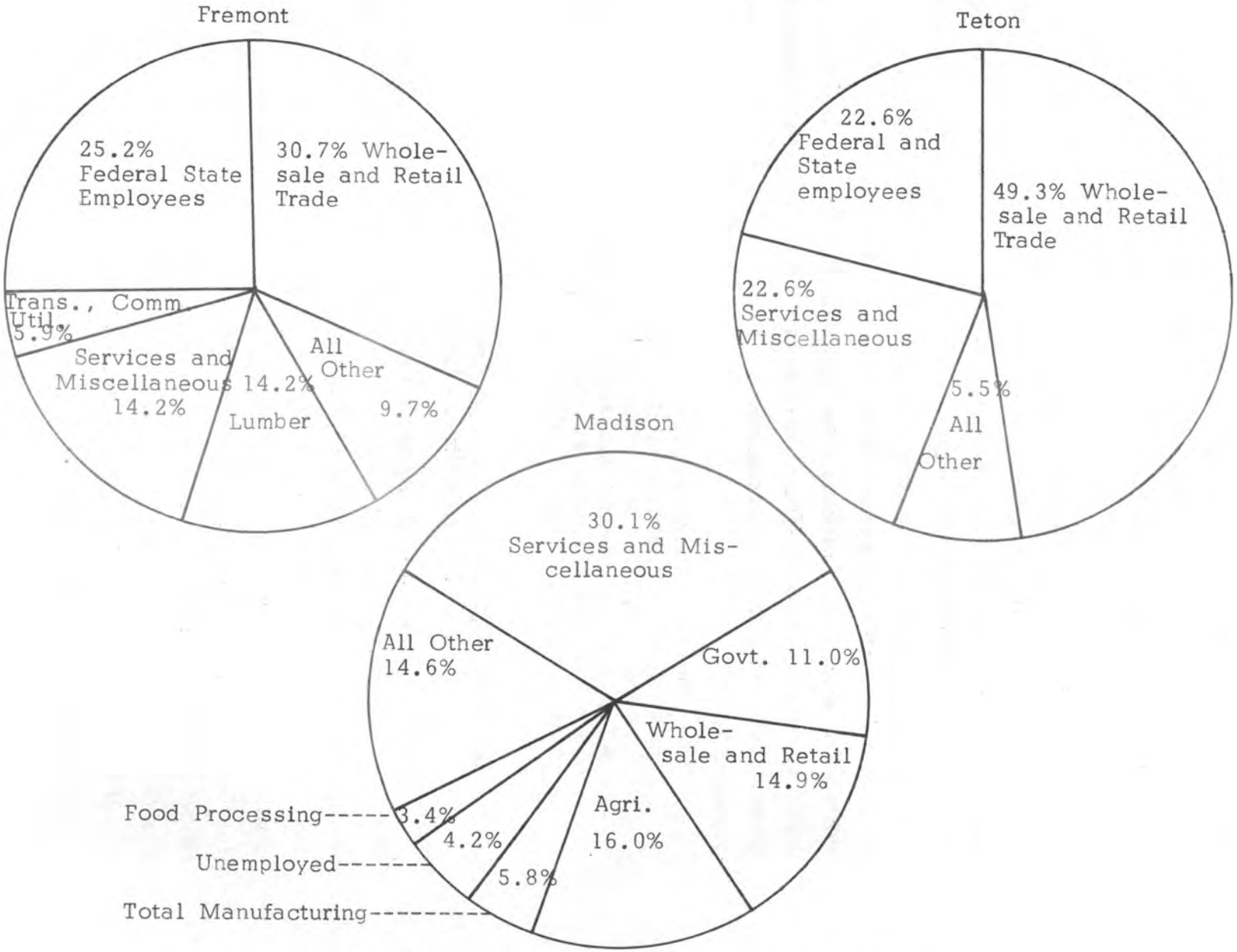

Figure 31. Breakdown of Covered Employment for 1970.

For purposes of analysis, the figures and calculations of total employment are more meaningful for the determination of the economic impact of changes in land use patterns. For example, while lumber represents about 14% of covered employment in Fremont, the figure sinks to 6% when non-covered jobs are included. The same diminution holds true, of course, for all the percentages in the covered category.

Teton County, Wyoming

Data for Teton, Wyoming, were obtained from the State Employment Security Commission in Casper. A breakdown is given by major occupation. One point of interest is the decline in the number of workers in agriculture. The number of workers went from 200 in 1961 to 150 in 1969. Since some of these jobs partially depend on dude ranch operations and should not be considered strictly agricultural, the agriculture definition probably merits some dissection. Most of the categories, if broken down, would show primary dependence on tourism and recreation. To quote the 1967 University of Wyoming study:

> The 1959 Teton county study concluded that "the future of Teton County is so intimately connected with the growth in the American vacation trade, that it is generally thought hardly worth while to consider anything else." The present study has reinforced the fact that the economy of the county is based mostly on the tourist trade. (p. 65).

Seasonal Variation in Covered Employment for Fremont and Teton Counties, Idaho

All three counties show pronounced seasonal fluctuations in employment levels (Tables 29 - 41). Employment typically reaches its lowest level during the winter months of January or February in both Teton and Fremont Counties. The low has come as late as May (Teton county, 1970), but would appear to be the result of a changing employment pattern caused by the Grand Targhee ski resort. Fluctuations from high to low employment show greater magnitudes than for many areas in the state. In Fremont County the low-high increase exceeds 50% while in Teton County it approaches a 100% increase. In 1968 Teton County showed a high-low range of 70-169, considerably in excess of 100%.

Table 29. Teton County, Wyoming, Breakdown of Covered Employment for 1965, 1969

1965

Industry	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
Agriculture	2	12	8	6	14	50	56	7	6	5	19	10	16
Mining	0	0	0	1	2	24	31	30	25	3	0	0	9
Construction	74	85	92	131	193	218	227	218	240	247	213	176	176
Manufacturing	43	36	36	35	65	94	68	77	73	70	59	53	59
Transportation and utilities	24	24	22	28	34	50	75	78	64	52	45	35	44
Wholesale and Retail Trade	154	159	163	207	316	566	649	649	453	268	241	225	337
Finance	14	14	15	16	18	20	19	19	19	22	23	18	18
Services	167	175	200	241	543	1350	1419	1487	1128	410	301	286	642
TOTAL	478	505	536	665	1185	2372	2544	2565	2008	1077	901	803	1303

1969

Industry	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Average
Agriculture	3	0	0	7	2	1	12	2	3	3	3	0	3
Mining	1	0	0	0	4	18	60	68	51	27	42	20	24
Construction	71	67	100	109	140	183	226	266	267	222	223	179	171
Manufacturing	51	52	61	75	82	92	93	109	110	91	83	71	81
Transportation and utilities	38	38	38	43	68	74	88	89	67	61	48	44	58
Wholesale and Retail Trade	334	340	342	345	402	745	881	875	659	352	298	339	493
Finance	31	30	30	33	37	36	37	37	38	39	38	38	35
Services	453	435	449	567	699	1284	2047	1883	1632	646	399	451	912
TOTAL	982	962	1020	1179	1434	2433	3444	3329	2827	1441	1134	1142	1777

State of Wyoming. Employment Security Commission. Casper, Wyoming.

Table 30. Monthly Employment for Fremont County, Idaho, Calendar Year 1967

Monthly Employment by Industry and County Covered by the Idaho Employment Security Law												
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
TOTAL	764	744	746	775	829	1073	1129	971	893	836	855	835
Construction	14	15	18	20	22	44	36	51	37	28	43	32
Manufacturing: Food Processing	32	37	34	33	38	37	28	25	24	23	22	22
Manufacturing: Lumber	67	78	78	61	61	61	66	65	64	63	62	58
Manufacturing: Other	21	21	22	26	28	28	25	25	22	21	19	14
Transportation Communication, & Utilities	85	77	76	69	70	73	74	75	74	76	74	74
Wholesale & Retail Trade	320	324	334	358	366	397	383	402	389	344	333	352
Finance, Insurance & Real Estate	20	19	16	23	25	25	25	24	22	26	25	25
Service & Miscellaneous	121	92	88	100	134	322	405	219	177	173	195	117
State of Idaho	84	81	80	85	85	86	87	85	84	82	82	81
Federal Workers	196	134	131	156	180	239	246	213	187	181	187	189

Table 31. Monthly Employment for Fremont County, Idaho, Calendar Year 1968.

Monthly Employment by Industry and County Covered by the Idaho Employment Security Law												
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Total	771	778	792	829	927	1171	1148	1134	993	907	894	896
Construction	16	8	19	34	40	48	50	61	58	40	42	31
Manufacturing: Food Processing	22	32	33	35	33	28	22	21	23	22	27	26
Manufacturing: Lumber	98	112	116	108	108	150	170	198	162	145	166	166
Manufacturing: Other	14	13	14	18	19	16	23	25	24	21	21	17
Transportation, Communication & Utilities	72	74	73	68	67	73	67	65	67	69	65	65
Wholesale and Retail Trade	334	329	332	335	397	418	373	412	383	357	350	357
Finance, Insurance & Real Estate	27	26	26	27	28	29	26	23	20	25	19	18
Service & Miscellaneous	107	104	98	104	153	324	331	246	171	141	119	133
State of Idaho	81	80	81	80	82	85	86	83	85	87	85	83
Federal Workers	118	124	158	175	204	277	278	220	206	156	150	136

Table 32. Monthly Employment for Fremont County, Idaho, Calendar Year 1969.

Monthly Employment by Industry and County Covered by the Idaho Employment Security Law	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Total	852	829	821	849	966	1241	1256	1210	1113	944	910	878
Manufacturing: Construction	32	31	33	28	35	40	50	72	80	55	46	38
Manufacturing: Food Processing	28	26	27	29	30	28	24	22	23	22	21	15
Manufacturing: Lumber	152	130	110	132	172	225	251	251	230	202	186	167
Manufacturing: Other	14	16	16	19	18	16	17	19	24	14	14	17
Transportation, Communication & Utilities	64	72	69	64	65	68	69	71	70	68	72	73
Wholesale and Retail Trade	346	341	351	370	395	400	385	400	368	336	334	333
Finance, Insurance & Real Estate	20	20	21	20	19	18	21	20	20	21	21	20
Service & Miscellaneous	117	117	119	108	148	362	349	265	209	139	127	129
State of Idaho	79	76	75	79	84	84	90	90	89	87	89	86
Federal Workers	126	121	121	146	184	265	263	228	200	149	146	147

Table 33. Monthly Employment for Fremont County, Idaho, Calendar Year, 1970.

Monthly Employment by Industry and County Covered by the Idaho Employment Security Law												
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Total	828	809	771	804	928	1171	1333	1264	1109	910	840	707
Construction	26	32	30	26	33	55	120	117	93	68	53	32
Manufacturing: Food Processing	14	15	17	16	20	12	19	19	15	19	18	19
Manufacturing: Lumber	173	139	120	111	167	223	234	217	194	176	152	36
Manufacturing: Other	18	17	18	18	17	20	22	22	21	19	25	25
Transportation, Communication & Utilities	72	70	66	64	61	63	67	69	72	68	69	66
Wholesale & Retail Trade	307	327	322	335	366	382	392	406	384	339	314	326
Finance, Insurance & Real Estate	19	20	19	17	18	19	21	20	18	15	17	14
Service & Miscellaneous	116	106	98	105	134	284	328	263	181	117	104	103
State of Idaho	83	83	81	112	112	113	130	131	131	89	88	86
Federal Workers	141	141	141	148	173	249	259	242	211	180	165	153

Table 34. Monthly Employment for Teton County, Idaho, Calendar Year, 1967.

Monthly Employment by Industry and County Covered by the Idaho Employment Security Law												
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Total	80	70	72	71	72	84	161	99	106	121	125	114
Manufacturing Lumber	0	0	0	0	0	0	14	7	5	11	7	7
Manufacturing Other	1	1	1	1	1	0	0	0	0	0	0	1
Transportation, Communication, & Utilities	1	1	1	1	1	1	1	1	1	1	1	1
Wholesale & Retail Trade	61	50	61	56	58	62	64	61	65	63	60	60
Service & Miscellaneous	14	6	6	9	9	18	79	27	32	43	54	42
State of Idaho	3	3	3	4	3	3	3	3	3	3	3	3
Federal Workers	23	25	23	29	36	43	39	34	34	35	42	43

Table 35. Monthly Employment for Teton County, Idaho, Calendar Year, 1968.

Monthly Employment by Industry and County Covered by the Idaho Employment Security Law	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Total	70	73	77	89	117	127	169	153	153	129	121	114
Construction	0	0	0	0	0	0	1	2	1	2	1	0
Manufacturing Lumber	3	3	5	3	10	6	7	7	5	4	2	3
Manufacturing Other	1	1	1	1	1	1	1	1	1	1	1	1
Transportation, Communication & Utilities	1	1	1	0	0	0	0	0	0	0	0	0
Wholesale & Retail Trade	56	50	57	57	71	74	70	78	75	74	83	76
Service & Miscellaneous	6	10	10	25	32	43	87	62	68	44	31	31
State of Idaho	3	3	3	3	3	3	3	3	3	4	3	3
Federal Workers	25	22	23	24	36	38	43	38	37	37	32	29

Table 36. Monthly Employment for Teton County, Idaho, Calendar Year, 1969.

Monthly Employment by Industry and County Covered by the Idaho Employment Security Law												
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Total	87	81	84	96	125	155	152	154	156	127	125	
Construction	0	0	0	0	0	0	1	1	2	0	0	
Manufacturing Lumber	7	3	3	0	2	2	4	5	4	7	7	
Manufacturing Other	1	1	1	0	0	0	1	1	1	5	4	
Wholesale & Retail Trade	67	66	68	80	82	87	82	84	77	75	72	
Service & Miscellaneous	9	8	9	13	38	63	61	60	69	37	39	
State of Idaho	3	3	3	3	3	3	3	3	3	3	3	
Federal Workers	26	26	25	30	31	33	39	44	44	37	36	

Figures not available

Table 37. Monthly Employment for Teton County, Idaho, Calendar Year, 1970.

Monthly Employment by Industry and County Covered by the Idaho Employment Security Law												
	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Total	103	95	104	89	89	116	178	137	125	119	117	117
Construction	1	1	1	1	1	1	2	2	2	11	11	11
Manufacturing Lumber	8	5	7	6	1	1	2	3	3	2	1	2
Manufacturing Other	1	1	1	1	1	1	1	1	1	1	1	1
Wholesale & Retail Trade	66	61	69	66	67	74	81	83	81	69	73	73
Service & Miscellaneous	25	25	23	13	17	36	90	46	36	33	28	29
State of Idaho	2	2	3	2	2	3	2	2	2	3	3	1
Federal Workers	28	26	27	28	30	32	33	33	36	32	29	26

Table 38. Monthly Variation in Employment Categories in Teton County, Idaho, 1971.

Teton County 1971	Jan.	Feb.	March	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Ann. Av.
Civilian Labor Force	685	704	767	742	802	808	812	712	720	912	725	745	761
Unemployment	78	90	101	92	53	48	46	26	28	44	45	80	61
% of Labor Force Unemp.	11.4	12.8	13.2	12.4	6.6	5.9	5.7	3.7	3.9	4.8	6.2	10.7	8.0
Total Employment	607	614	666	650	749	760	766	688	692	868	680	665	700
Agricultural Employment	230	230	280	285	315	305	345	270	300	445	250	250	292
Nonagricultural Employ.	377	384	386	365	434	455	421	418	392	423	430	415	408
Nonagricultural Self-employed & Dom.	75	75	75	75	75	75	75	75	75	75	75	75	75
Nonagricultural Wage & Salary Worker	302	309	311	290	359	380	346	343	317	348	355	340	333
Total Manufacturing	4	4	3	2	1	1	2	2	2	0	0	0	2
Total Non-Manufact.	298	305	308	288	358	379	344	341	315	348	355	340	331
Construction	5	5	4	3	8	13	15	16	16	16	16	16	11
Trans., Comm., Util., (RR)	5	5	5	5	5	5	5	5	5	5	5	5	5
Wholesale & Retail Trade	77	91	94	73	132	139	89	83	87	115	125	112	101
Finance, Ins. & Real Est.	8	8	8	8	8	8	8	8	8	9	9	9	8
Service & Miscellaneous	58	52	53	55	58	57	69	70	46	55	53	54	57
Government	145	144	144	144	147	157	158	159	153	148	147	144	149

Table 39. Monthly Variation in Employment Categories in Fremont County, Idaho, 1971.

Fremont County 1971	Jan.	Feb.	March	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Ann. Ave.
Civilian Labor Force	2443	2461	2478	2463	2769	2944	3102	3029	2862	2974	2628	2488	2721
Unemployment	244	270	255	166	133	137	133	121	132	118	155	186	171
% of Labor Force Unemp.	10.0	11.0	10.3	6.7	4.8	4.6	4.3	4.0	4.6	4.0	5.9	7.4	6.3
Total Employment	2199	2191	2223	2297	2636	2807	2969	2908	2730	2856	2473	2312	2550
Agricultural Employment	485	485	555	780	800	765	920	890	820	1040	610	485	719
Nonagricultural Employment	1714	1706	1668	1517	1836	2042	2049	2018	1910	1816	1863	1827	1831
Nonagricultural Self-emp.	185	186	182	161	196	206	202	198	183	184	196	193	190
Nonagricultural Wage & Salary Workers	1529	1520	1486	1356	1640	1836	1847	1820	1727	1632	1667	1634	1641
Total Manufacturing	141	139	133	143	171	206	270	270	255	209	192	181	193
Food Processing	16	16	14	19	26	20	20	20	18	16	16	16	18
Lumber	104	103	101	105	121	160	223	222	211	167	153	144	152
Other Manufacturing	21	20	18	19	24	26	27	28	26	26	23	21	23
Total Non-Manufacturing	1388	1381	1353	1213	1469	1630	1577	1550	1472	1423	1475	1453	1448
Construction	30	31	30	30	34	39	48	50	44	48	41	30	38
Trans., Comm., Util., (RR)	96	101	102	101	101	98	107	107	104	97	102	101	101
Wholesale & Retail Trade	528	526	498	331	553	561	413	377	381	444	535	543	474
Finance, Insurance & Real Estate	26	29	28	31	31	28	34	33	34	31	32	33	31
Service & Miscellaneous	149	147	147	165	172	270	291	302	241	181	166	156	199
Government	559	547	548	555	578	634	684	681	668	622	599	590	605

Table 40. Monthly Variation in Employment Categories in Madison County, Idaho, 1970.

Madison County, 1970.	Jan.	Feb.	March	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Ann. Ave.
Civilian Labor Force	4337	4310	4464	4731	4693	4020	3929	3837	4726	5109	4781	4825	4480
Unemployment	206	189	227	176	149	192	269	196	176	113	183	190	189
% of Labor Force Unempl.	4.7	4.4	5.1	3.7	3.2	4.8	6.8	5.1	3.7	2.2	3.8	3.9	4.2
Total Employment	4131	4121	4237	4555	4544	3838	3660	3641	4550	4996	4598	4635	4291
Agricultural Employment	510	505	570	795	750	870	900	830	840	1020	540	485	718
Nonagricultural Employment	3621	3616	3667	3760	3794	2958	2760	2811	3710	3976	4058	4150	3573
Nonagricultural Self-empl.	496	492	505	517	526	404	384	389	501	553	569	684	501
Nonagricultural Wage & Salary Workers	3125	3124	3162	3243	3268	2554	2376	2422	3209	3423	3489	3466	3072
Total Manufacturing	252	263	266	285	290	283	202	214	254	280	278	256	260
Food Processing	164	172	172	184	184	168	87	91	136	162	164	147	152
All Other Manufacturing	88	91	94	101	106	115	115	123	118	118	114	109	108
Total Non-Manufacturing	2873	2861	2896	2958	2978	2271	2174	2208	2955	3143	3211	3210	2812
Construction	70	69	68	81	94	110	114	114	100	101	95	86	92
Trans., Comm., Util.	124	120	108	121	111	117	115	120	116	123	126	121	118
Wholesale & Retail Trade	667	670	695	740	750	587	495	523	573	707	792	808	667
Finance, Insurance & Real Estate	82	87	82	87	93	87	97	96	96	95	93	93	91
Service & Miscellaneous	1436	1424	1454	1444	1440	877	867	875	1593	1592	1599	1594	1350
Government	494	491	489	485	490	493	486	480	477	525	506	508	494

Table 41. Monthly Variation in Employment Categories in Madison County, Idaho, 1971.

Madison County, 1971	Jan.	Feb.	March	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Ann. Av.
Civilian Labor Force	4582	4582	4709	4883	5241	4306	4554	5312	5247	5799	5224	5260	4975
Unemployment	218	198	228	138	134	161	244	286	270	183	191	225	206
% of Labor Force Unem.	4.8	4.3	4.8	2.9	2.6	3.7	5.4	5.4	5.1	3.3	3.7	4.3	4.1
Total Employment	4364	4384	4481	4745	5107	4145	4310	5026	4977	5616	5033	5035	4769
Agricultural Employment	490	490	570	835	860	805	830	835	755	1245	570	485	731
Nonagricultural Employment	3874	3894	3911	3910	4247	3340	3480	4191	4222	4371	4463	4550	4038
Nonagricultural Self-Emp.	542	548	547	533	597	468	492	590	572	604	618	625	562
Nonagricultural Wage & Salary Workers	3332	3346	3364	3377	3650	2872	2988	4601	3650	3767	3845	3925	3476
Total Manufacturing	253	246	260	340	352	307	241	257	265	272	297	322	284
Food Processing	163	151	163	225	227	182	97	105	98	159	191	220	165
All Other Manufacturing	90	95	97	115	125	125	144	152	167	113	106	102	119
Total Non-Manufacturing	3079	3100	3104	3037	3298	2565	2747	3344	3385	3495	3548	3603	3192
Construction	61	62	63	89	111	127	135	127	114	112	104	87	99
Trans., Comm., Utl.,	111	107	100	114	116	125	115	111	109	123	128	132	116
Wholesale & Retail Trade	719	741	749	638	866	807	657	651	694	768	854	901	754
Finance, Insurance & Real Estate (Take 22 firms in Teton & Fremont)	94	95	97	91	93	99	103	98	97	94	95	108	97
Service & Miscellaneous	1591	1591	1592	1601	1608	902	1254	1875	1882	1890	1865	1862	1626
Government	503	504	503	504	504	505	483	482	489	508	502	513	500

To the extent that employment loss in the winter is borne by permanent residents of the county, the instability is a rather serious problem. The seriousness of this is mitigated somewhat if the seasonal high results from students who return to school or persons who have winter jobs elsewhere. The ski development in Teton County promises to moderate the seasonal trend in this area.

Madison County has fluctuations which are opposite the other two counties. The unemployment rate climbs during June, July and August and drops again in September. The labor force decreases during the summer months as does employment in all non-agriculture and salary workers. In 1970 service and miscellaneous dropped 39% in the number employed. This increase in unemployment and decrease in the labor force is probably due to the departure of the Ricks College student body during the months of June, July, and August. Obviously, the college has an important influence upon the economy of Madison County.

The only categories to increase in employment during the summer months are agriculture, construction and transportation. Some consideration should be given to planning for increased tourist trade during the slack period to alleviate the situation. The tourist trade needs many of the same services that a student body does.

It is interesting to notice the importance of government payments to farmers (Table 42). In Fremont County subsidies amounted to 12.56% of net income, 15.61% in Madison County and 34.04% in Teton County in 1965. While this seems high, the record was 228.86% in Kootenai County (Bollinger, 1969). Farming demands water which is also needed by other industries for economic gain. Additionally, farm subsidies are required in these counties ranging from 12.56% to 34.04% of net profit. Thus, the importance of these counties to our national food production should be scrutinized.

Agriculture

Agricultural production is the most important type of economic activity in the Idaho counties. This differs greatly from Teton County, Wyoming, where agriculture is only of minor importance. The annual average figures for Teton, Wyoming in 1969 showed employment of 150 out of a county

Table 42. Importance of Government Payments to Idaho Farmers, 1965.

	Government Payments ($ thousands)	Cash Receipts ($ thousands)	Govt. Payments as % of Cash Receipts	Net Income ($ thousands)	Govt. Payments as % of Net Income
Fremont	932.8	14,514.9	6.43	7,424.7	12.56
Madison	788.5	11,411.2	6.91	5,430.1	14.52
Teton	468.6	3,650.8	12.84	1,376.7	34.04
STATE OF IDAHO	29,200.2	505,428.1	5.78	203,404.7	14.36

labor force of 2,940 or approximately 5%. In light of this small contribution to the total, the observations on agriculture will be confined to the Idaho side of the border.

Income Sources

Fremont County

Cash receipts for agricultural production were obtained from Bollinger's study on personal income (Table 43). Of the $14.5 million total in 1965, crops accounted for $8.7 million. Of this amount, $5.7 million came from potatoes, $1.7 million from wheat and a variety of other crops accounted for not more than $.5 million each.

Approximately, $5.8 million in personal income came from the production of poultry and animals. Cattle and calves were, by far, the most important. They contributed $4.2 million, about 80% of the total. Dairy products were second most important at $.7 million, followed by sheep at $.57 million. (The categories of sheep and wool probably should be combined producing a total of $.68 million.) No other items produced a significant fraction of the total.

Madison County

Madison County cash receipts from all agriculture totaled $11.4 million. Crops contributed $8.7 million from Wheat (Table 44). Cattle and calves were the most important livestock commodity with $4.3 million of the total $5.8 million (75%). Sheep were significantly less with $575,000 and were less than dairy products which grossed $722,000.

Teton County

Cash receipts from all agricultural commodities during 1965 contributed $1.9 million of the county's $3.8 million in personal income. (Table 45) This accounted for 1/2 of the total. Receipts from livestock products came to 1.7 m. which included the following major subcategories: cattle and calves, $.8 million; dairy products, $64 million; sheep and wool, $.24 million. No other item exceeded $20,000.

Information obtained from U. S. Department of Agriculture Statistical Reproting Service indicates wheat, barley and potato production has steadily increased between the years 1966 - 1971 in Madison and Fremont Counties.

Table 43. Agricultural Income, Fremont County

(in thousands of dollars)	1958	1961	1963	1965
Cattle and calves	2,093	2,833	3,582	4,270
Sheep	752	582	666	575
Hogs	59	52	50	46
Dairy products	560	691	708	722
Poultry and eggs	115	70	32	18
Wool	58	125	152	126
Miscellaneous livestock	33	37	63	42
Livestock products	3,670	4,391	5,254	5,798
Wheat	2,117	2,030	2,413	1,712
Barley	461	280	443	491
Other grains	104	73	73	62
Hay	219	276	290	390
Potatoes	3,081	3,914	3,545	5,782
Dry peas	13	10	29	36
Sugar beets	23	74	161	176
Other crops	58	63	85	68
Total crops	6,078	6,719	7,040	8,717
Fruits and nuts	1	1	0	0
Cash receipts from all commodities	9,749	11,110	12,294	14,515
Government payments	175	359	660	933
Value of home consumption	249	201	200	186
Gross rental value of farm dwellings	281	230	364	303
Total realized farm income	10,454	11,900	13,518	15,937

Table 43, continued

	1958	1961	1963	1965
Operating expenses	5,627	6,538	7,766	8,195
Depreciation and repairs	798	829	924	982
Taxes on farm property	442	480	499	539
Interest on mortgage debt	205	250	375	370
Net rent to nonfarm landlords	220	270	383	381
Total production expenses	7,292	8,367	9,947	10,467
Realized net farm income	3,162	3,534	3,571	5,470
Net change in farm inventories	375	761	761	1,955
Total net farm income	3,538	4,294	4,332	7,425

W. LaMar Bollinger. Personal Income in Idaho Counties. The College of Idaho, Caldwell, Idaho, 1969, pp. 78, 79, 168.

Table 44. Agricultural Income, Madison County

(in thousands of dollars)	1958	1961	1963	1965
Cattle and calves	1,246	1,042	852	1,016
Sheep	354	280	331	292
Hogs	72	70	77	76
Dairy products	1,258	1,345	1,167	1,095
Poultry and eggs	673	563	431	365
Wool	48	84	83	60
Miscellaneous livestock	143	157	121	120
Livestock products	3,794	3,541	3,062	3,024
Wheat	2,471	2,191	2,974	1,869
Barley	327	343	688	750
Other grains	83	50	46	37
Hay	238	255	234	295
Potatoes	2,373	3,252	2,804	4,980
Dry Peas	3	3	12	17
Sugar beets	133	207	362	373
Other crops	56	60	88	66
Total crops	5,684	6,361	7,208	8,387
Fruits and nuts	8	5	1	1
Cash receipts from all commodities	9,486	9,908	10,272	11,411
Governmental payments	241	163	375	788
Value of home consumption	278	224	223	207
Gross rental value of farm dwellings	199	305	361	495
Total realized farm income	10,204	10,600	11,231	12,902

Table 44, continued

	1958	1961	1963	1965
Operating expenses	5,111	5,697	6,194	6,687
Depreciation and repairs	934	1,061	1,122	1,317
Taxes on farm property	328	413	446	481
Interest on mortgage debt	233	292	360	544
Net rent to nonfarm landlords	203	213	264	263
Total production expenses	6,809	7,676	8,386	9,292
Realized net farm income	3,395	2,924	2,845	3,610
Net change in farm inventories	188	596	285	1,820
Total net farm income	3,583	3,520	3,130	5,430

Table 45. Agricultural Income in Teton County

(in thousands of dollars)	1958	1961	1963	1965
Cattle and calves	735	705	682	813
Sheep	335	240	241	188
Hogs	43	34	26	19
Dairy products	695	754	673	641
Poultry and eggs	31	23	18	14
Wool	31	62	67	52
Miscellaneous livestock	9	10	10	10
Livestock products	1,879	1,828	1,717	1,737
Wheat	1,083	1,062	1,567	774
Barley	216	184	356	241
Other grains	30	21	25	23
Hay	58	80	89	122
Potatoes	243	444	463	733
Dry peas	0	0	1	1
Other vegetables	2	5	7	9
Seed crops	2	2	0	0
Other crops	14	14	14	9
Total crops	1,648	1,812	2,522	1,912
Fruits and nuts	2	1	1	1
Cash receipts from all commodities	3,530	3,641	4,240	3,651
Governmental payments	83	196	234	469
Value of home consumption	121	98	97	90
Gross rental value of farm dwellings	32	31	99	103
Total realized farm income	3,766	3,966	4,670	4,312

Table 45, continued

	1958	1961	1963	1965
Operating expenses	1,846	1,934	2,078	2,166
Depreciation and repairs	438	472	521	572
Taxes on farm property	146	181	187	202
Interest on mortgage debt	66	102	146	173
Net rent to nonfarm landlords	88	95	121	121
Total production expenses	2,584	2,784	3,053	3,234
Realized net farm income	1,182	1,181	1,617	1,078
Net change in farm inventories	25	130	104	299
Total net farm income	1,207	1,312	1,721	1,377

Characteristics of Farms

Changes in the characteristics of farms show a pattern typical of agriculture throughout the United States. The number of farms has declined rather sharply. Between 1954 and 1965 Fremont County dropped from 892 to 669, and Teton County went from 447 and 327. In 1958 Madison County farms dropped from 831 to 691. Farm size continues to increase, a reflection of economies of scale in most types of farming. A University of Idaho study prepared in 1969 for the Public Land Law Review Commission estimated the production costs of a hundredweight of beef as a function of ranch size. Ranches operating with 100 AU's showed a cost of $31.78/cwt; 400 AU's dropped the cost to $21.62/cwt. and 1000 AU's cost an average of $19.59/cwt. With revenue in 1969 at about $27/cwt., it is easy to see why small cattle ranchers must either go out of business or expand their operations.

Further movements toward fewer and bigger farms can be expected as the market restructures to obtain the most efficient scale of production. Acreage of the average farm increased from 482 to 615 in Fremont (1954-1964) and 424 to 574 in Teton (1954-1964). Virtually all of the farms in the counties were operated by either full or part owners.

The number of cattle and calves increased sharply in Fremont County from 21.7 thousand in 1954 to 30.7 thousand in 1964. Teton County increased from 13.5 thousand to 14.8 thousand during the same period. Although the general trend seems to be downward, numbers of hogs and pigs fluctuated in both counties. Sheep showed no apparent trend for the 1954-64 period. Cash receipts showed an increase between 1958 and 1965. Net income also increased in Fremont County but decreased in both Madison and Teton Counties. Because the number of farms decreased, cash receipts per farm showed a false increase in cash receipts per farm, (Table 46).

Grazing

Grazing, along with logging, is currently one of the major commercial uses of the study area. However, of the total amount of grazing on the public lands in Fremont and Teton Counties, the preponderance occurs on U. S. Bureau of Land Management rather than U. S. Forest Service administered lands. BLM land in Fremont and Teton Counties grazed a total of 96 thousand sheep compared with 9.9 thousand in the west slope study area. The same was true, to a lesser degree, for cattle and horses grazed. This

Table 46. Cash Receipts Per Farm in Idaho

	1958 Cash Receipts (thousands)	1958 Number of Farms 1958	1958 Cash Receipts per farm	1965 Cash Receipts (thousands)	1965 Number of Farms 1964	1965 Cash Receipts per farm
Fremont	9,749	770	12,661	14,515	669	21,696
Madison	9,486	831	11,416	11,411	691	16,514
Teton	3,530	409	8,630	3,651	327	11,165
STATE OF IDAHO	396,231	34,687	11,423	505,428	29,661	17,040

	Cash Receipts from Farm Marketing in Idaho (in thousands of dollars)			Net Farm Income in Idaho (in thousands of dollars)		
	1958-59 Average	1964-65 Average	1964-65 % of 1958-59	1958-59 Average	1964-65 Average	1964-65 % of 1958-59
Fremont	10,179	12,814	125.9	3,542	4,676	132.0
Madison	9,863	10,016	101.6	3,527	3,123	88.5
Teton	3,621	3,558	98.2	1,252	1,152	92.0
STATE OF IDAHO	413,099	481,018	116.4	144,211	157,637	109.3

portion of the study area accommodated 1.9 thousand horses and cattle while BLM lands were used by 7.9 thousand. The use of animal numbers, as opposed to animal units, tends to overemphasize the importance that the lower elevation BLM lands can be grazed for a longer period than the lands in the study area, thus making the study area a smaller fraction of the total grazing activity.

Projections and Estimates

Projections through the year 2070 predict a decline in wheat production and a moderate increase in potatoes. Cattle and calves slaughter is more optimistic with a projection of an increase of 127% by 2070. These projections, in the opinion of the authors, must be questioned. While the technique of linear extrapolation used may be appropriate for certain types of time series data, it is a singularly poor method to predict the growth of industry. There is an abundance of data to indicate that curvillinear fits are much more appropriate for industry projections. It is also worthwhile to note that linear fits take no account of resource limitations or institutional changes; they simply extend the line of past experience. This prediction that the future will be like the past is one of the more naive forecasting methods.

Another set of more responsible (although more general) projections was published by the University of California at Davis in March, 1971. These projections are less ambitious and focus on consumption patterns and expenditures through 1980. The prediction is for a decline in the consumption of fresh potatoes but an increase in frozen potatoes. The increase in total demand is predicted to rise a little under 10% by 1980. The future for animal products, as seen in the California report, is more promising. Expenditures on beef is seen to rise over 10%, while lamb and mutton increase by about the same amount.