Fish and Wildlife

Management plans for fish and wildlife are developed every five years by the Idaho Department of Fish and Game. Their documents contain valuable descriptions of the status of fish and wildlife values in the basin and establish management goals for species and areas. An excellent discussion of wildlife values is contained in the environmental impact statement for the leasing and development of the Island Park Geothermal Area (1980) which covers a substantial portion of the northern part of the basin.

Wildlife

For wildlife much information is available on some animal species, yet little is available on other species. When possible, information has been quantified. To the extent possible, animals are discussed as individual species or groups of similar species.

For the Island Park area a total of 5 amphibians, 8 reptiles, 179 birds and 61 mammals were identified according to habitat and seasonal use. Migrant and accidentally occurring species are included in the Appendix. Species are oriented to a habitat if they use that type for reproduction and feeding. Table 13 is a partial listing of the number of habitats used by common species and those of special interest (Appendix A contains a summary of all species).

The number of habitats each species uses for feeding and reproduction is a measure of the adaptability of the species. The greater the number of habitats used the more adaptable the species and the less vulnerable it is to habitat manipulation or loss. The more species using the habitat for feeding and reproduction the more important it is to wildlife. Table 14 gives a summary of the wildlife-habitat associations.

Analysis of wildlife in the preceding manner does not allow consideration of certain key components of wildlife management such as winter range, migration routes, reproduction areas or legal considerations. The following discussion considers key points for species or groups of special interest. Wildlife population projects and goals are presented and, when relevant, past trends are discussed.

1. Big Game

The following map shows big game winter range. Deer and moose also winter throughout the middle of the elk winter range. Much of the elk and deer winter range is within the Sand Creek Wildlife Management Area (Figure 5).

Elk (Wapiti) have long been an important game animal in the area. Their occurrence in the area depends mainly upon the presence of their food supply. Their numbers have varied, but the present population is increasing after a 10 to 15 year low, as shown in Table 15.

Most elk migrate by late November and congregate on a major staging area in the lower elevations (Figure 5). Much of this staging area is on lands administered by the Bureau of Land Management and the State of Idaho. The specific function of this staging area is unknown; however, animals spend most of the staging area time feeding, apparently preparing for winter. During mild

winters they use the staging area for winter range. In summer, elk are distributed throughout the forested area. Habitat use patterns vary with climate and various activities in the area (grazing, logging and recreation). Elk wander back and forth across the Yellowstone National Park boundary throughout the summer.

By mid-December of most winters, elk have moved to the Juniper Mountains/Sand Dunes winter range approximately 30 miles southeast of the forest boundary. This winter range is administered by the Bureau of Land Management and the Idaho Department of Fish and Game (IDFG) in cooperation with the Department of Lands and private landowners. Most of the elk that summer in the forest spend the winter on this range.

Since 1974 hunting in Idaho has been "bulls only" during general seasons, with fewer special permits, fewer general hunts and shorter seasons. Some either sex permits issued during special hunts will continue to be used in the future.

There are no discrete elk calving grounds. Calving occurs on the winter, spring and summer range and is totally dependent upon climate. In years with heavy snowfall and a "late" spring, calving takes place on the winter range. In years with light snowfall, elk may calve anywhere in the forest in suitable habitat. However, key calving areas (those used every year of "normal" snowfall) are along Big Bend Ridge and Thurmon Ridge.

Table 13. Some Common and Special Interest Wildlife Species and Number of Habitats Each Uses (See Table 14 for Different Habitats)

Chorus frog	6	Great horned owl	24	House finch	19
Leopard frog	19	*Burrowing owl	4	Pine siskin	22
*Rubber boa	21	*Short-eared owl	14	Green-tailed towhee	11
Racer	20	Common nighthawk	22	*Vesper sparrow	4
Common garter snake	23	Calliope hummingbird	18	Dark-eyed junco	18
*Western grebe	13	Belted kingfisher	17	Brewer's sparrow	5
Great blue heron	19	Common flicker	21	White-crowned sparrow	24
*Black-crowned night heron	5	*Lewis woodpecker	21	Vagrant shrew	24
*American bittern	4	Yellow-bellied sapsucker	15	Little brown myotis	23
*Trumpeter swan	19	*Hairy woodpecker	19	Silver-haired bat	19
Canada goose	12	Eastern kingbird	19	Big brown bat	25
Mallard	23	Western tanager	21	Pika	5
Gadwall	15	Hammond flycatcher	19	Snowshoe hare	18
Pintail	16	Western wood pee-wee	18	Least chipmunk	19
Blue-winged teal	12	Olive-sided flycatcher	22	Yellow pine chipmunk	25
Baldplate	15	Horned lark	7	Yellow-bellied marmot	12
Northern shoveler	15	Tree swallow	24	Richardson's ground squirrel	2
Redhead	16	Bank swallow	17	Red squirrel	18
*Canvasback	11	Gray jay	19	Northern pocket gopher	24
Turkey vulture	25	Black-billed magpie	21	Beaver	24
*Sharp-shinned hawk	23	Common raven	23	Deer mouse	31
*Cooper's hawk	24	Clark's nutcracker	16	Boreal red-back vole	12
Red-tailed hawk	27	Black-capped chickadee	25	Mountain vole	20
*Swainson's hawk	21	Red-breasted nuthatch	18	Muskrat	10
*Ferruginous hawk	5	Brown creeper	14	Western jumping mouse	17
*Golden eagle	29	Dipper	20	Porcupine	25
*Bald eagle	23	Canyon wren	15	Coyote	30
*Marsh hawk	10	American robin	26	*Gray wolf (Northern Rky.Mtn.Wolf)	27
*Osprey	17	Mountain bluebird	26	Black bear	31
*Prairie falcon	7	Golden-crowned kinglet	14	*Grizzly bear	27
*Merlin	23	*Loggerhead shrike	10	Marten	14
*American kestrel	25	Starling	10	*Fisher	21
Blue grouse	25	*Warbling vireo	11	Long-tailed weasel	30
Ruffed grouse	20	*Yellow warbler	5	Mink	26
*Sharp-tailed grouse	8	Yellow-rumped warbler	23	*Wolverine	17
*Sage grouse	6	*Yellow-breasted chat	16	Badger	16
Sandhill crane	14	House sparrow	7	Striped skunk	18
Common snipe	14	Western meadowlark	7	*Canada lynx	19
Spotted sandpiper	11	Yellow-headed blackbird	6	*Bobcat	26
American avocet	12	Red-winged blackbird	7	Elk (Wapiti)	24
California gull	11	Northern oriole	14	Mule deer	23
Mourning dove	17	Brewer's blackbird	15	Pronghorn	25
*Barn owl	17	Evening grosbeak	19	Moose	25

Table 14. Wildlife Habitat Associations Based on Reproduction and Feeding
AF = Subalpine Fir; DF = Douglas Fir; LPP = Lodgepole Pine

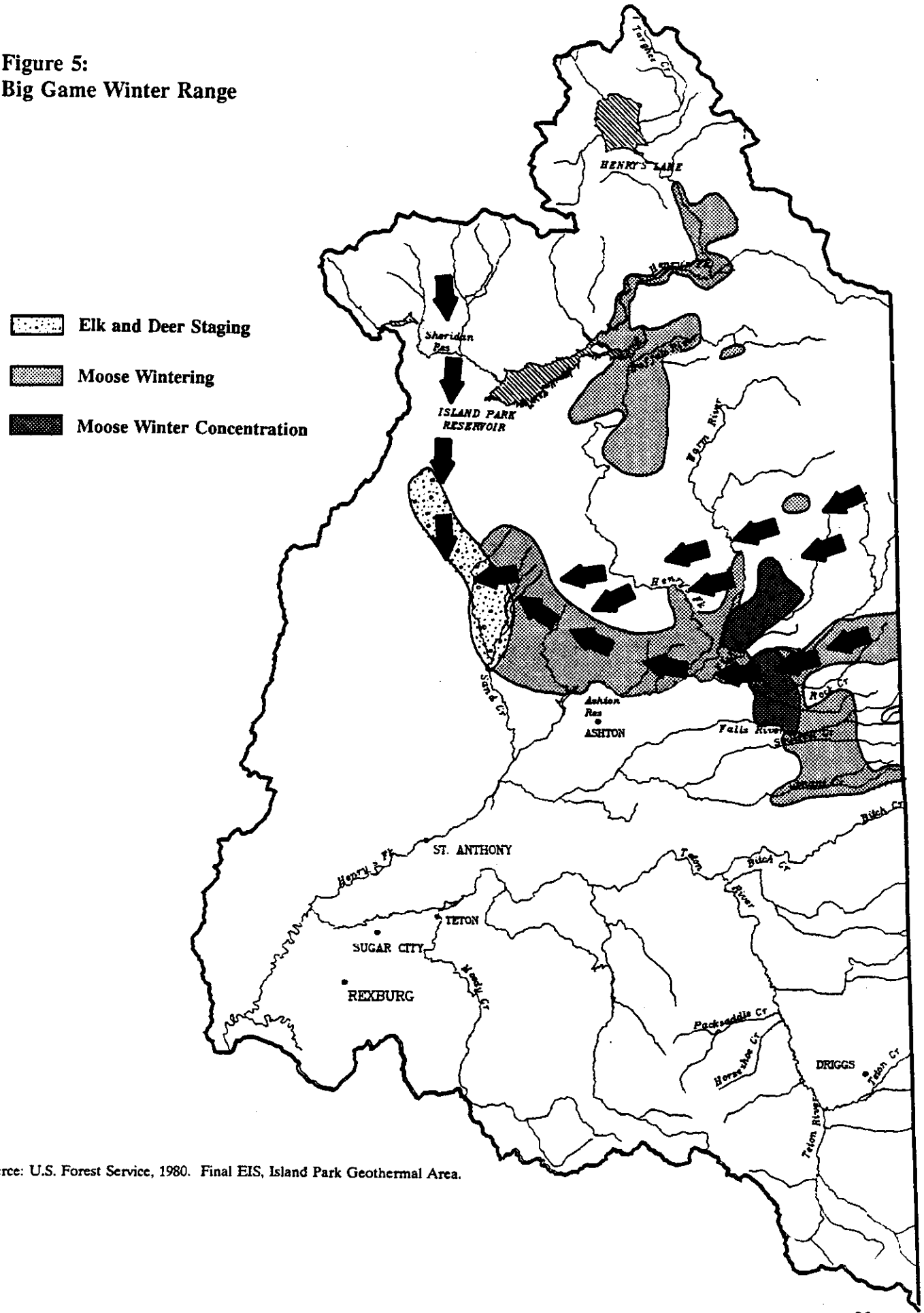
Habitat	Number of Wildlife Species Using Habitat for: Reproduction	Feeding	Total Number of Species Using Habitat
AF/Snowberry	122	141	142
DF/Snowberry	130	160	162
AF/Spirea	121	142	143
AF/Huckleberry	99	106	108
AF/Whortleberry	90	95	96
AF/Pinegrass	94	105	106
DF/Huckleberry	137	162	163
DF/Pinegrass	133	168	168
DF/Spirea	90	116	143
DF/Mountain Maple	127	148	149
LPP/Bitterbrush	72	73	74
Forest Successional stage			
Grass Forb	57	164	165
Shrub - Seedling	85	175	175
Seral pole	83	150	151
Full-size seral	128	142	152
Full-size climax	125	133	143
Old growth	113	127	136
Aspen Groves	77	123	126
Sagebrush	68	103	103
Mountain brush	71	103	104
Dry Meadows	41	122	122
Wet Meadows	48	128	128
Rivers & Streams	132	192	193
Lakes & Reservoirs	82	144	144
Riparian Deciduous	123	170	176
Marshes	109	148	152
Cliffs & Rims	39	48	62
Talus	23	59	61
Caves	21	10	25
Snags	44	43	58
Down Material	45	73	84

Table 15. Status of Big Game in the Island Park Area

	Year	Population	Harvest	Demand (Hunter Days)	Success (Days/Animal)
Elk (Wapiti)	1975	1,700	275	12,712	40.6
	1980	1,920	375	15,750	38.1
Mule Deer	1975	2,700	525	6,220	13.3
	1980	2,300	295	6,000	12.5
Moose	1975	320	22	84	4.7
	1980	200	4	20	5.0
Black Bear	1975	430	25	845	30.8
	1980	465	35	1,630	48.0

Source: Idaho Department of Fish and Game

Figure 5:
Big Game Winter Range



Source: U.S. Forest Service, 1980. Final EIS, Island Park Geothermal Area.

The mule deer is the most important big game species in Idaho in terms of total animals harvested and hunter participation. The entire forest is summer range in fair to good condition with good summer range in short supply. Deer numbers are low (Table 15) due to several factors: mule deer populations have fluctuated over the past 100 years with variations in habitat, climatic conditions, reproductive success and fawn/yearling survival. Low deer numbers are not limited to Idaho, as adjacent states have indicated that deer herds are below desired levels and have declined for the past several years.

The main deer winter range is the Juniper Mountains/Sand Dunes range described above for elk. Approximately 1,200 deer used this range in the winter of 1977-78. Numbers have ranged from 700 to 1,100 in the past 5 to 10 years. Deer use the same migration routes described for elk (Figure 5); fawning occurs along these routes.

Moose are distributed throughout the forest with variable patterns of habitat use. During the summer small groups (2-5) and single individuals are scattered through forest, mountain brush and riparian habitat. Willow areas receive considerable use.

Previous high density moose populations in the forest declined severely in the 1970's. Wintering numbers decreased due to winter mortality, uncontrolled Indian harvest and illegal kills. Within the last ten years the moose numbers have significantly increased with over 100 hunting permits issued for use in the basin for 1990.

The forested area provides extensive winter range for moose. Range condition varies throughout the area, but in most portions is good. The main winter areas are: (1) Fall River-Warm River Butte, which receives heavy use during extreme winters and is rated fair to poor winter range. Moose in portions of this area reach densities of 10-20 animals per square mile. Most move into Yellowstone National Park and Wyoming during the summer. (2) Big Bend Ridge--this range is in good condition, but the population has been declining, possibly due to illegal harvest. The main concentration areas are Snake River Butte and drainages. (3) Island Park-Henrys Lake--the main areas of use are along Henrys Fork with scattered use in the Henrys Flat region. This range is also considered good. Approximately 30 to 40 moose winter along the south shoreline of Island Park Reservoir utilizing willow-covered peninsulas.

Snow depth in extreme winters can be a problem to moose. They are able to get along in deep snow, but depths of six and seven feet can increase mortality of old and young animals. Food availability determines winter range selection and overall well-being of the herds. Important forage species include willow, bitterbrush, chokecherry, serviceberry, subalpine fir, sedges and grasses.

Black bear reach highest numbers in the eastern half of the forest, however, they are present throughout the area. Despite a continual open season and indiscriminate killing, densities remain high in certain portions, especially in the southeastern section.

The mountain lion is present in the area, but its status and numbers are unknown. Total numbers are undoubtedly low since the area has less than optimum mountain lion habitat. Mountain lions are currently protected in Idaho.

Antelope use Henrys Lake Flat. This flat is predominantly private grassland used for livestock grazing, with small pockets of sagebrush throughout. The IDFG estimates that 180 pronghorn use the summer range in and around Henrys Lake Flat. The herd migrates through Raynolds Pass into Montana for the winter. A few permits (muzzleloader or shotgun only), are issued to hunt this herd.

2. *Upland Game*

Sage grouse use sagebrush-grass and mountain brush habitats for summer feeding and brood rearing (Figure 6). Preferred habitats are associated with stream areas where water and meadows with succulent vegetation are available for brood rearing. The strutting grounds are in the northwest portion of the basin. Preferred nesting habitat is usually within a two-mile radius of the strutting grounds. Despite annual fluctuations, sage grouse populations generally have increased since 1960. A peak was reached around 1970, and a decline was evident by 1975. It is projected that populations will gradually rebuild through 1990, with greater hunter demand and essentially the same hunter success rate (Table 16).

Sharp-tailed grouse are rare in the basin with most sightings in mountain brush along the southwestern edge of Big Bend Ridge. Sharp-tailed grouse are associated largely with grasslands interspersed with brush. The sharp-tailed grouse is a species of special concern to the IDFG, which recommends that all possible measures be taken to protect, enhance, and expand existing habitat. A peak in numbers was reached around 1970, and decline was evident by 1975. It is projected that populations will gradually rebuild through 1990, with greater hunter demand and essentially the same hunter success rate (Table 16).

Two species of forest grouse, blue and ruffed grouse, are common in forested areas of the basin. Blue grouse use most habitats and move to higher elevations for wintering. They nest on grassy open slopes and sagebrush covered ridges, usually at the base of a small tree or shrub. Nesting habitat is usually found at elevations below the mature coniferous forest used for wintering. They depend on conifer needles for winter food. Ruffed grouse are also found in the forest. Although these birds eat a variety of food during much of the year, they feed largely on the buds of aspen and other deciduous species during the winter.

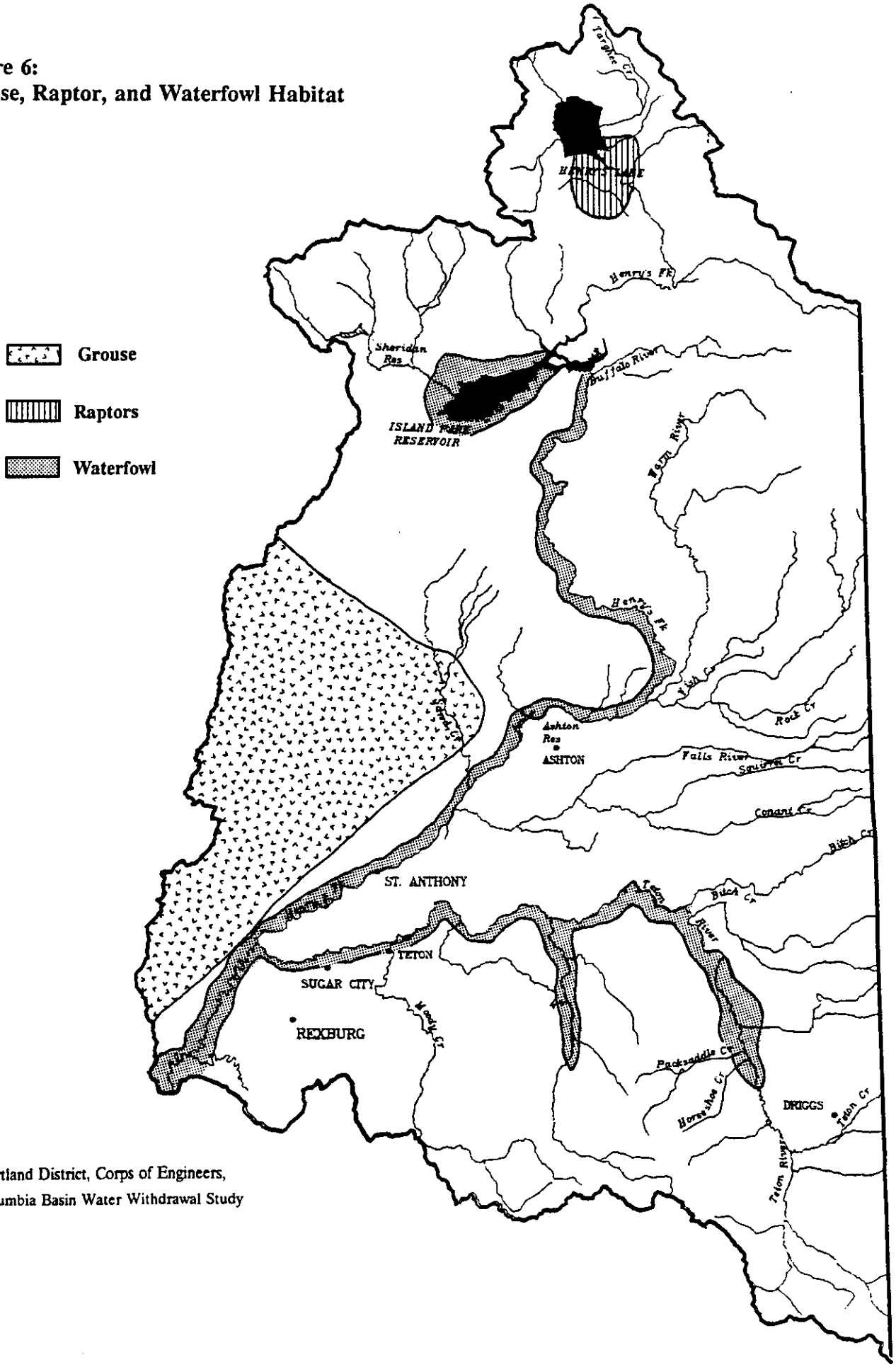
Populations of forest grouse typically fluctuate and may be cyclic. Allowing for these fluctuations, past populations have been relatively stable, and this trend is expected to continue through 1990 (Table 16). Most forest grouse are harvested incidentally during big game hunting, although grouse hunting is increasing in popularity. Harvest levels have steadily increased. Demand and harvest are both projected to continue increasing through 1990, with a fairly consistent hunter success rate.

The mourning dove is common throughout the Henrys Fork Basin; migratory and nesting populations are present. It is associated mainly with sagebrush-grass, mountain brush and riparian habitats, but also occurs in some forested habitat types. Mourning dove populations gradually increased from 1960 through 1975. Under current management levels and habitat trends, populations should remain at present levels through 1990 (Table 16).

Mourning doves fall under the jurisdiction of the Migratory Bird Treaty Act. Under this Act, harvest regulations and management are primarily the responsibility of the U.S. Fish and Wildlife Service. The earliest opening date allowed under this Act is September 1, which coincides with the peak of migration out-of-state and effectively limits hunting.

Mountain cottontails (rabbits) are associated primarily with nonforested habitat, aspen groves and riparian habitats. Essentially stable populations of the last 10-15 years are projected to remain so through 1990. Less than 20 cottontails are harvested annually on the forest. Cottontails are a main constituent in the diet of many raptorial birds.

Figure 6:
Grouse, Raptor, and Waterfowl Habitat



Source: Portland District, Corps of Engineers,
Columbia Basin Water Withdrawal Study

Table 16. Upland Game Bird Statistics for the Island Park Area

Year	Pre-season Population	Total Harvest	Total Hunters	Total Hunting Days	Success (Birds/Day)
		SAGE GROUSE AND SHARP-TAILED GROUSE			
1975	5,500	600	330	790	0.8
1980	5,600	680	340	800	0.8
1985	5,760	860	360	800	1.0
1990	6,000	1,000	400	1,000	1.0
		FOREST GROUSE			
1975	40,000	2,100	700	2,800	0.8
1980	45,000	2,600	1,000	4,000	0.7
1985	45,000	3,000	1,200	4,800	0.6
1990	45,000	3,800	1,500	6,000	0.6
		MOURNING DOVE			
1975	2,000	345	35	117	2.9
1980	2,000	360	40	130	2.8
1985	2,000	380	48	160	2.4
1990	2,000	400	50	170	2.4

Source: Idaho Fish and Game Department

3. *Waterfowl*

The basin is located along a portion of the Pacific waterfowl flyway. Over a million waterfowl migrate over the area in spring and fall. Fall movements begin in mid-to-late-August and continue through December. Large numbers of ducks and geese concentrate on and around Island Park Reservoir, Henrys Lake, Hebgen Lake and Harriman State Park before moving south. These areas are immediately adjacent to the Red Rock Lakes Migratory Water Waterfowl Refuge in Montana, only 15 miles to the northwest. Migrating waterfowl make extensive use of watercourses, lakes, marshes and potholes in the area. The northward migration begins in late March and continues through May.

Resting and feeding habitat in the area for migrating waterfowl is currently adequate to support the numbers passing through or overwintering. These conditions are not expected to change through 1990. Numbers of migratory birds are dependent upon production in out-of-state areas, primarily Canada. Despite annual fluctuations, numbers have been generally stable. Populations of migratory ducks are expected to decrease due to losses of suitable habitat. With growing hunting demands, harvests and success, rates will decrease.

Some waterfowl breed and produce young in the area. The best production areas are small bodies of water, such as beaver ponds, large and small streams, and marshes. Allowing for normal fluctuations, the number of ducks produced in the basin has remained relatively constant since 1960. Harvests vary with duck populations and hunter numbers; success rates are projected to persist through 1990 (Table 17).

Canada geese breed in the nonforested, riparian habitats in the basin. Nesting occurs primarily along rivers and streams, small lakes and potholes. Many migrating geese use the area for nesting and feeding. Numbers have generally increased since 1960. Migratory goose populations and harvests are expected to increase through 1990 (Table 17). The IDFG has a major effort underway to

create new and improved nesting and rearing habitat. As part of this effort nesting platforms have been installed on Island Park Reservoir.

Table 17. Waterfowl Statistics for the Island Park Area

Year	Pre-season Population	Total Harvest	Total Hunters	Total Hunting Days	Success (Birds/Day)
		DUCKS			
1975	13,500	1,000	165	660	1.5
1980	13,500	1,100	175	720	1.5
1985	14,500	1,200	180	800	1.5
1990	15,000	1,400	200	900	1.6
		CANADA GEESE			
1975	1,500	450	360	1,080	0.4
1980	1,500	480	390	1,365	0.4
1985	1,500	525	420	1,640	0.3
1990	1,500	540	435	1,780	0.3

Source: Idaho Department of Fish and Game

4. *Raptors*

A survey of birds of prey in the Targhee National Forest was done by the U.S. Fish and Wildlife Service in 1977. Their report detailing nest locations, breeding territories, reproductive effort and diversity of raptors is on file with the Targhee National Forest. It indicates that 31 species of raptors use the area during some portion of the calendar year. Appendix A has a list of these birds and their habitats.

Birds of prey subsist mainly on small rodents, fish, reptiles, amphibians, carrion and an occasional hoofed animal (ungulate). Shrubs, trees and cliffs provide cover and nesting sites for most of the species. In open country around Henrys Lake Flat utility poles, fence posts, snags and other isolated structures provide important perches for nesting and hunting. Many of these structures are also found around sagebrush flats, meadows and riparian habitats in the area. Raptors are important elements in predator-prey relationships in most ecosystems. They can help control small prey species such as rabbits, hares and rodents.

The U.S. Fish and Wildlife Service raptor report emphasized the importance of Henrys Lake Flat. This high elevation grassland is used by hundreds of fledged falcons and hawks as a staging area during migration in August and September. Nearby ridges funnel birds in from the north, south and west to the Flats, where they use the surrounding forest for hunting. Raptors are completely protected by the Federal Migratory Bird Treaty Act and State regulations.

5. *Species of Special Concern*

Of special concern are species whose restricted range, specific habitat requirements and/or low numbers make them vulnerable if adverse impacts on populations or habitat occur. The following are found in the area: grizzly bear, Northern Rocky Mountain wolf, Canada lynx, fisher, wolverine, trumpeter swan, sharp-tailed grouse, ferruginous hawk, prairie falcon, American peregrine falcon and northern bald eagle. The grizzly, wolf, peregrine falcon, and bald eagle are federal Threatened and Endangered Species.

The bobcat, Canada lynx, fisher and wolverine are common to rare mammalian predators whose numbers have declined in the past 10 to 15 years. Rising prices for bobcat and lynx pelts and

uncontrolled harvest have reduced their numbers drastically. They have been removed from predator lists and placed under Idaho Department of Fish and Game's control. The fisher, requiring forested, wilderness habitat, is also under State control. The wolverine, which also requires wilderness habitat, is extremely rare in the area.

The trumpeter swan is a common resident of the area. While the species is no longer endangered or threatened, in recent years trumpeter breeding populations have experienced extremely high mortality among the young (60-90 percent). Breeding habitat requirements of these birds are:

1. Waters with a relatively static level, not marked by seasonal fluctuations.
2. Quiet waters of lakes, marshes or slough, not subject to current or constant wave action.
3. Shallow waters of lakes or open marshes, not so deep as to preclude digging and foraging for lower aquatic plant parts, roots and tubers.
4. Minimum human disturbance and relatively remote areas.

The open waters of the Henrys Fork drainage are the primary wintering areas for all of Canada's trumpeter swans. In addition to the migrants, approximately 50 percent of the year-round resident trumpeters winter within the area. The relative isolation, abundant submerged vegetation and open waters of the Henrys Fork are critical to the welfare of the remaining trumpeter population of Canada and the United States (Hebgen Lake, approximately four miles north of the basin, also supports wintering trumpeter swans). To prevent downstream freezing, minimum flows of about 500 cfs (300 cfs from Island Park Reservoir and 200 cfs from the Buffalo River) may be needed.

The sandhill crane, considered unique, is common in the basin. It is a summer resident which breeds and nests where there are abundant marsh and riparian habitat. Sandhill cranes congregate on a major staging area in the forest where they feed and prepare for the fall migration.

6. Threatened and Endangered Species

The Endangered Species Act of 1973 (P.L. 93-205) officially recognizes two categories of animals, endangered species and threatened species. Section 7 of the Act requires all federal agencies to take necessary actions to insure critical habitat for endangered or threatened species is not adversely modified or destroyed.

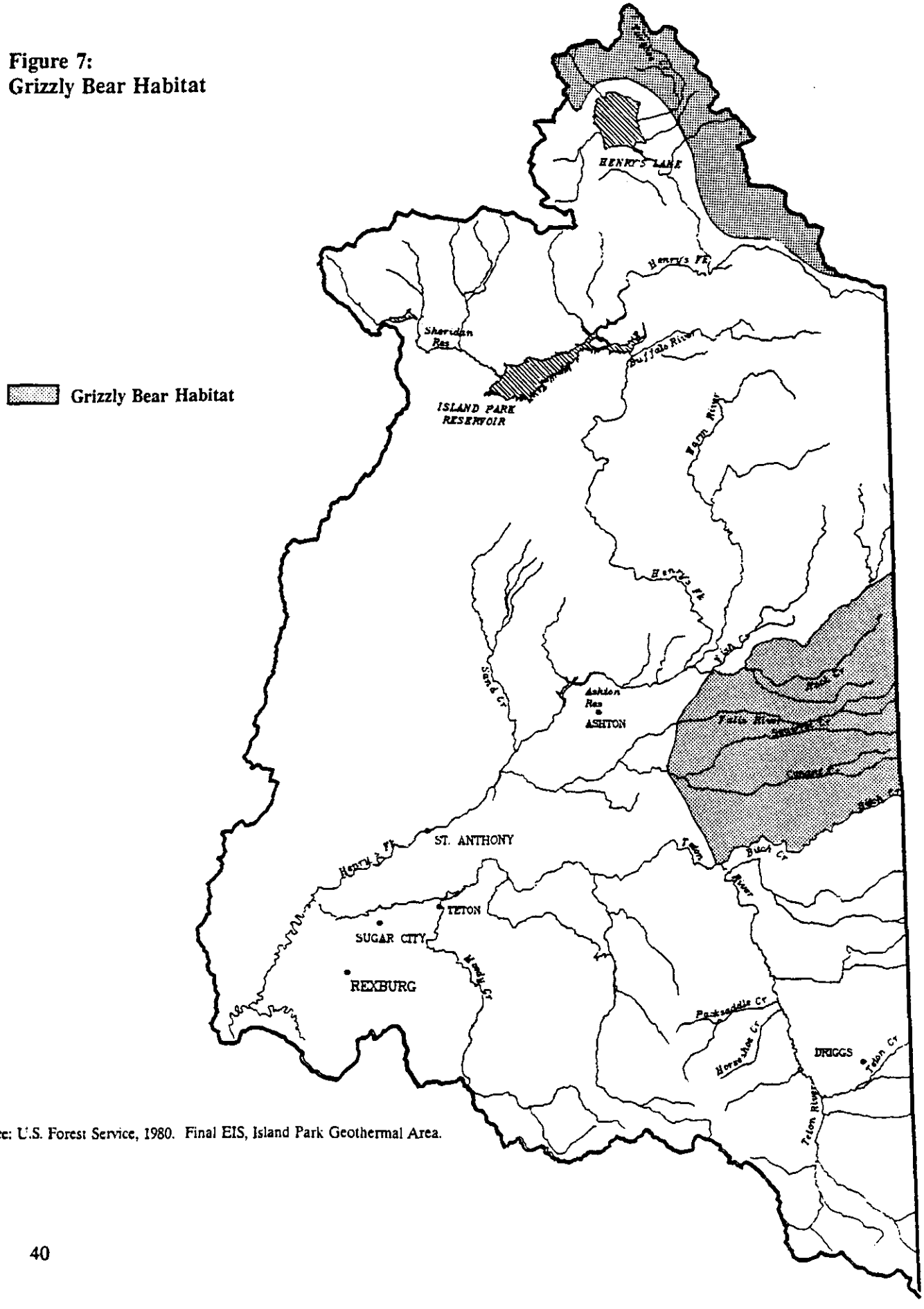
Three endangered and one threatened species inhabit the basin. Although most wildlife lists and maps show the range of the endangered spotted bat (*Euderma maculata*) extending into the basin, no authenticated records of spotted bats have been collected.

The grizzly bear (*Ursus arctos horribilis*), a threatened species, occurs throughout the eastern portion of the forested area. Bears in this area are part of the Yellowstone population, which has been studied since 1973 by an Interagency Grizzly Bear Study Team of research biologists from the National Park Service, Fish and Wildlife Service, Forest Service and the states of Wyoming, Montana and Idaho.

Approximately 94,000 acres of the forested area have been designated as land where the grizzly bear will receive management priority (Figure 7). Pending formal determination of critical habitat, this area will be treated as critical habitat and protected from adverse modification or destruction. Delineation of grizzly bear habitat in the area relied heavily upon past sightings.

In the area, some habitat appears more valuable to grizzlies than other habitat, particularly those lands in the Reas Pass area northeast of Macks Inn and the Winegar Hole area south of Falls River.

Figure 7:
Grizzly Bear Habitat



Source: U.S. Forest Service, 1980. Final EIS, Island Park Geothermal Area.

The Reas Pass and Winegar Hole areas have highly productive forest understories, open wet meadows, bogs, swamps and potholes. Both contain extensive downed timber which supports heavily used food sources (fungi, rodents and insects). Tall huckleberry habitat in Winegar Hole supports some of the most productive rodent populations in the Targhee National Forest. Rodents, particularly pocket gophers (*Thomomys talpoides*), are an important grizzly food. Large numbers of rodents are present in both the Reas Pass and Winegar Hole areas with highest densities in wetter areas.

The Northern Rocky Mountain wolf (*Canis lupus irremotus*), one of 32 subspecies or geographic races of the gray wolf, was listed as endangered and became legally protected in 1974. The historical and current distribution of the wolf includes the Henrys Fork Basin. Unverified sightings have occurred in the area for several years, and verified sightings have been made. The basin is at the edge of the wolf's present range, and thus is used occasionally (Dennis Flath, Team Leader, Northern Rocky Mountain Wolf Recovery Team, 1978).

The American peregrine falcon (*Falco peregrinus anatum*), an endangered species, is known to use the area. Only one active natural nest has been observed in recent years. Hack towers have been installed at two locations in the basin.

The endangered bald eagle (*Haliaeetus leucocephalus*) feeds extensively along lakes and reservoirs in the summer, and some birds winter in the area. There are 15 known active bald eagle nests in the basin.

Fisheries

The Henrys Fork basin provides one of the most important rainbow trout fisheries in the state. In addition to the Henrys Fork itself, important fisheries occur on the tributary Teton, Warm, and Buffalo rivers. Henrys Lake and Island Park Reservoir are important components of the Henrys Fork fishery. Basin streams contain rainbow trout, westslope cutthroat, brook trout, coho, kokanee, mountain whitefish, and grayling. Although cutthroat trout are the native salmonid in the drainage, rainbow trout are the most important game species present. Mountain whitefish are the most numerous game species in the basin.

The Henrys Fork below St. Anthony suffers from impacts associated with irrigation water returns and low flows due to upstream diversions. The ability of the river to support salmonid populations is limited by these impacts. Management goals for this reach of the Henrys Fork project catch rates of 0.3 fish per hour.

The Henrys Fork between St. Anthony and Big Springs attracts fishermen from throughout the nation. Fish and Game surveys have documented annual angler use and harvest along this reach of river at 175,000 hours of effort with catch rates of 1.25 fish per hour (see Table 18). Wild rainbow trout make up the bulk of the fish in the creel with lesser numbers of brook trout, hatchery rainbow trout, mountain whitefish and cutthroat. Native cutthroat make up less than 1 percent of the catch. Management plans will emphasize wild, natural populations without hatchery supplementation. Ashton Reservoir will be managed as a yield fishery with hatchery rainbow trout, under general regulations.

Fishing on the Henrys Fork near Harriman State Park.

Table 18. Angler Effort - Henrys Fork Basin of the Snake River

Reach of Stream	Miles of Stream Surveyed	Fishing Season 1991	Fisherman-Hours 1973/74	1976	198-		Hours/Mile	Trout Per Hour 1976
Railroad Trestle to Macks Inn Bridge	4.2	5/25-11/30	38,600	32,500	25,700	(1988)	6,100	1.12
Macks Inn Bridge to McCrea Bridge	6.1	5/25-11/30	25,100	22,100	—		3,600	1.68
Island Park Dam to Buffalo River	0.5	5/25-11/30	6,300	3,200	3,900	(1982)	7,800	1.28
Buffalo River to No. Boundary Harriman State Park	5	5/25-11/30	20,500	17,500	22,500	(1982)	4,500	1.73
No. Boundary Harriman State Park to Osborne Bridge (main Harriman State Park)	5	6/15-10/15	16,500	25,600	31,000	(1982)	6,200	0.72
Osborne Bridge to South Boundary Harriman State Park	2.5	6/15-10/15	4,800	7,100	4,200	(1982)	1,700	0.77
South Boundary Harriman State Park to Riverside Campground	3.5	5/25-11/30	7,000	6,600	2,500	(1982)	700	.91
Riverside Campground to Lower Mesa Falls	12	5/25-11/30	2,000	4,400	12,000	(1986)	1,000	0.50
Lower Mesa Falls to Warm River	6.5	5/25-11/30	1,700	2,900	—		400	1.12
Warm River to Wendell Bridge	7	5/25-11/30	5,200	8,500	5,100	(1980)	700	.51
Wendell Bridge to Ashton Dam	4	year-round	7,100	5,300	4,700	(1980)	1,200	0.95
Ashton Dam to Chester Dam	6	5/25-11/30	17,500	21,900	19,200	(1980)	3,200	1.27
Chester Dam to St. Anthony	7	year-round	11,500	12,500	9,834	(1980)	1,400	0.67
St. Anthony to North Fork Teton River - (limited data available)								
North Fork Teton River to Mouth - (limited data available)								
Buffalo River	3	5/25-11/30			7,400	(1988)	2,500	
Warm River	9	5/25-11/30			8,000	(1985)	900	
Falls River - No level of use studies known; use estimated to approach Teton Canyon Use.								
Teton River Upper Teton Valley	21.0	5/25-11/30	17,500		21,700 18,100	(1981) (1988)	900	
Teton River Canyon	16.0	5/25-11/30	1,400		6,100 4,800	(1988)	300	
Teton River below the Dam Site	25	5/25-11/30	5,100		29,700 9,000	(1980) (1988)	400	
Henrys Lake	–	5/25-10/31		68,100	63,300 340,000		(1982) (1989)	
Island Park Reservoir (above Lakeside Lodge	–	1/1-3/13 & 5/25-12/31 5/25-11/30)		100,000	124,400 49,000		(1982) (1989)	
Ashton Reservoir	–	5/25-11/30			4,700 12,600		(1980) (1985)	

Source: IDFG, 1990; Angradi and Contor, 1989; Maiolle, 1987; Rohrer, 1984; 1981; Moore et al., 1983; Jeppson, 1982; 1981; Coon, 1977, 1978.

Island Park Reservoir is a widely fluctuating irrigation reservoir on the Henrys Fork. It contains important fisheries for rainbow trout, coho, and kokanee with catch rates of up to 0.6 fish per hour. Drought conditions have had severe impacts on the reservoir fishery, flushing large numbers of fish downstream. Island Park will be stocked with rainbow trout, coho, and kokanee.

From Island Park Reservoir upstream to Henrys Lake the Henrys Fork provides a yield fishery supported by natural reproduction and further supplemented with hatchery rainbow trout. At the Henrys Lake outlet, harvest is supported by emigration of trout from Henrys Lake.

Henrys Lake is a shallow, highly productive lake covering 6,300 acres at the headwaters of the Henrys Fork. It has a long history of supporting an extensive sport fishery for large, native cutthroat trout. The Department of Fish and Game has managed Henrys Lake as a trophy fishery since 1976. The goal for Henrys Lake is to provide catch rates of 0.15 fish per hour for cutthroat-rainbow hybrids, 0.10 fish per hour for brook trout and 0.45 fish per hour for cutthroat trout. Fish and Game hopes to achieve size goals of 20 percent of the hybrids over 20 inches in length, 10 percent of the

cutthroat over 20 inches, and 5 percent of the brook trout over 18 inches. Recent increases in angler use and estimated harvest suggest the resource may soon approach full-capacity use (Table 19).

Table 19. Angler Effort - Henrys Lake

Year	Angler Hours	Estimated Harvest	Catch & Release	Total Catch	Catch Per Hour
1978	85,000	26,000	15,000	41,000	0.48
1979	94,000	19,000	11,000	30,000	0.32
1980	68,000	9,000	5,000	14,000	0.21
1981	66,000	8,000	7,000	15,000	0.23
1982	63,000	7,000	22,000	29,000	0.46
1983	96,000	25,000	97,000	122,000	1.27
1984	163,000	47,000	224,000	271,000	1.66
1985	126,000	38,000	121,000	159,000	1.26
1986	173,000	67,000	88,000	155,000	0.90
1987	150,000	36,000	45,000	82,000	0.54
1988	100,000	20,000	62,000	81,000	0.82
1989	340,000	104,000	156,000	259,000	0.77

The Idaho Department of Fish and Game and the Henrys Lake Foundation are working with local landowners cooperative effort to improve instream habitat and fish passage on tributaries to the lake. This involves fencing and the screening of irrigation diversions.

Warm River is a major tributary to the Henrys Fork. A large spring six miles upstream from its mouth provides the base flow. Warm River has large sections of good spawning gravels and fairly constant temperatures which make for ideal trout spawning conditions. Due to the lack of good spawning habitat in the Henrys Fork between Ashton Dam and Mesa Falls, Warm River is critical to maintenance of wild rainbow and brown trout populations in this section of the Henrys Fork.

Falls River is the largest tributary to the Henrys Fork. It supports an excellent wild rainbow trout fishery. Cutthroat trout also contribute to the angler catch from Falls River.

The Teton River fishery was severely impacted by the construction and failure of Teton Dam. Overall catch rates of 1.42 fish per hour declined to about 0.75 fish per hour. Despite intensive fish stocking efforts, in 1988 the catch rate below the dam site was 0.48 fish per hour. Efforts are now underway to improve both habitat lost through the collapse of the dam and habitat affected by changes in land use practices. Goals are to improve conditions so that the cutthroat population becomes self-sustaining and to maintain a catch rate of at least 1.0 fish per hour.

Most of the smaller tributaries in the Henrys Fork drainage are managed with restrictive regulations to preserve the native cutthroat trout.

Factors Limiting the Fishery in the Henrys Fork

1. Late winter under-ice low oxygen levels in Henrys Lake.
2. Excessive summer-fall blue-green algae blooms in Henrys Lake and Island Park Reservoir reducing zooplankton and littoral zone production that is usable by salmonids.
3. Extreme drawdown of Island Park Reservoir eliminates most summer benthic invertebrate production in that pool.
4. Low fall-winter flows in the Henrys Fork River below Island Park Reservoir and below Henrys Lake.

5. Late summer low flows below St. Anthony and in the lower Falls River as irrigation waters are diverted.
6. Irrigation return flows in the lower Teton and Henrys Fork rivers.

Recommended Action

1. Examine the need for minimum streamflows in basin streams. Where the need for a state protected flow is identified, seek to provide such flow.
2. Support protection of fish passage on existing and future projects. Because of grandfather rights, several streams need corrective action. Prime examples are passage problems at the mouth of the Buffalo River associated with the Ponds Lodge hydroelectric project and highway culverts on Targhee and Howard creeks which are tributary to Henrys Lake.
3. Construct self-cleaning screens on irrigation diversion structures in selected streams to reduce fish mortality.
4. Encourage protection of riparian vegetation which is important to fish and wildlife.
5. Encourage protection of key seasonal habitats such as wildlife calving areas and winter ranges.
6. Give consideration for land use and water use management to aid in recovery of populations of threatened and endangered species.
7. Increase the research program to evaluate and improve the fisheries on important Henrys Fork tributaries such as the Falls, Teton, Warm and Buffalo rivers, and Bitch and Robinson creeks.

Sources

Final Environmental Impact Statement of the Island Park Geothermal Area. U.S. Department of Agriculture - Forest Service and U.S. Department of the Interior - Bureau of Land Management, 1980, Targhee National Forest.

Fishery Research Reports including Regional Fishery Management Investigations, Idaho Department of Fish and Game, 1979-89.

Fisheries Management Plan 1991-1995, Idaho Department of Fish and Game.

Idaho Bald Eagle Research Project, Greater Yellowstone Ecosystem, Annual Production Summary 1991, USBLM, USFS, IDFG, Northern Rockies Conservation Cooperative.

Natural Features and Scenic Values

The Island Park plateau, located above the town of Ashton and the Teton Valley, a high mountain valley, are scenic focal points in the Henrys Fork basin. High snowfall combined with pleasant cool-dry summers support coniferous forests with large open meadows. Porous rock allows for the infiltration of much of the snowmelt providing good summer recreation-season streamflows.

Prominent scenic attractions are the Tetons, a series of mountain peaks in Wyoming, Henrys Lake, Sawtell Peak, Island Park Reservoir, and Mesa Falls. The 6,300-acre Henrys Lake, the 8,400-acre Island Park Reservoir, and the Henrys Fork meandering through the canyons and open meadows of the Island Park plateau attract national notice. The 4,060-acre Harriman State Park complex and the scenic Big Springs-Macks Inn reach are focal points for visitors.

The Teton Range is a prominent scenic feature of the basin.

Mesa Falls, on the Henrys Fork, is one of the most impressive falls in the State. The Upper Falls has a drop of 114 feet, but the Lower Falls, dropping 65 feet one mile downstream, is perhaps more impressive because the river is constricted. Sheep Falls, four miles upstream of Upper Mesa Falls on the Henrys Fork, also is noteworthy with a drop of 35 feet. Sheep Falls on Falls River, about two miles downstream from the Idaho border, has about a 30-foot drop. These falls can be viewed at the end of a two-mile trail.

Northwest of St. Anthony, are many lava caves of which Crystal Falls Cave is one of the most remarkable. The name comes from the ice formations found within the cave.

Mountain Ranges

Centennial Mountains - This part of the Continental Divide between Idaho and Montana reaches from the western boundary of the basin to Red Rock Pass, west of Henrys Lake. This relatively narrow range is one of the most magnificent in the state with high rugged backbones and deep canyons.

Henrys Lake Mountains - This crescent-shaped range arcs around the north of Henrys Lake from Red Rock Pass on the west to the Madison Plateau of Yellowstone National Park southeast of the lake. Located east of the Centennial Mountains, these mountains are also a part of the Continental Divide between Idaho and Montana.

Big Bend Ridge - Approximately eight miles wide, the ridge extends northwest for 18 miles from the Henrys Fork near Ashton to the valley of Island Park Reservoir. It reaches an altitude of 7,500 feet.

Big Hole Mountains - These mountains are west of the towns of Victor, Driggs, and Tetonia and parallel the Teton Range. The extension of these mountains into Wyoming from the south end of the Teton Basin is known as the Snake River Range.

Snake River Range - The South Fork of the Snake River parallels the range to the south. The Teton Basin is to the north. The range extends 40 miles from Wyoming into Idaho, and varies in width from 12 to 24 miles.

Sand Hills (Juniper Buttes) - A prominent group of hills, composed of gently sloping lavas northwest of St. Anthony, beyond the sand dunes.

Teton Range - Perhaps one of the most picturesque mountain ranges in the United States, their highest point, Grand Teton, is 13,766 feet above sea level. These pointed mountains form part of the Henrys Fork basin boundary located just across the state line in Wyoming. This range is a major visual feature seen throughout the basin.

Thurmon Ridge - This low, gently rising ridge is the prominent west background feature for the heavily used recreational stretch of the Henrys Fork, adjacent highway, and resort area starting at the Island Park Reservoir and extending south past Harriman State Park. Likewise, this ridge from its other side is the south background feature for the main body of Island Park Reservoir and adjacent land.

Targhee Peak (10,285) - The highest point in the Idaho portion of the basin, four miles north of Henrys Lake.

Black Mountain (10,237) - Located three miles north of Henrys Lake.

Mount Jefferson (10,196) - Located six miles southwest of Henrys Lake, west of Sawtell Peak. There are really two peaks, each rises steeply 600 feet above timber line, with almost vertical north faces. The summit elevation is the highest in the Centennial Mountains.

Bald Peak (Lionhead Peak) (10,180) - Located six miles northeast of Henrys Lake adjacent to Targhee Peak.

Sawtell Peak (9,866) - This prominent landmark south of Henrys Lake, northwest of Macks Inn, and North of Island Park, forms a backdrop to much of the Upper Island Park recreational area.

Taylor Mountain (9,855) - The highest point in the western part of the Centennial Mountains is located northwest of Island Park Reservoir.

Red Rock Mountain (9,512) - A companion peak to Mount Jefferson, located on the south side of Red Rock Pass, north of Mount Jefferson.

Reas Peak (9,371) - In the Centennial Mountains, located directly north of the middle of Island Park Reservoir.

Garns Mountain (9,016) - Located southwest of Driggs.

Oliver Peak (8,987) - Located south of Victor.

Ryan Peak (8,860) - Located west of Driggs.

Two Top (8,710) - These barren twins are directly east of the southern part of Henrys Lake.

Bishop Mountain (7,810) - Located south of the main body of Island Park Reservoir.

High Point (7,281) - A prominent point located southwest of Harriman State Park is seen from much of the recreation area below Island Park Reservoir.

Menan Buttes (5,619) - These broad, prominent, and picturesque twin crater buttes rise out of the lowland agricultural area near the junction of the Henrys Fork with the Snake River, just west of Rexburg.

Lakes, Reservoirs, and Rivers

Table 20 includes still-water areas of 20 acres or larger. There are many more lakes, most of which range from 1 to 5 acres.

Water areas are associated both with open meadows and with wooded areas. The many streams in the basin cover approximately 3,600 acres. This is probably an underestimate since now many narrow streams and smaller rivers with overhanging vegetation cannot be identified through photo interpretation. The principal creeks and rivers are:

Henrys Fork and Henrys Lake Outlet - While the Idaho Legislature has stated that the Henrys Fork originates at Henrys Lake, local usage is to assume that the Henrys Fork originates at Big Springs, located east and upstream from Macks Inn. Big Springs flows at a nearly constant 170 cubic feet per second. The continuation of the Henrys Fork nine miles into the upper basin above Big Springs is known as Henrys Lake Outlet. The Henrys Fork, including Henrys Lake Outlet, is about 117 miles long. This water area provides outstanding opportunities for recreation and is a major irrigation supply for the lower basin.

Sand Creek/Blue Creek/Pine Creek - Sand Creek and the noted tributaries originate along the west or desert side of Big Bend Ridge, and flow south into the Henrys Fork about five miles downstream of Ashton Dam.

Sheridan Creek - tributaries originate in the Centennial Mountains and flow into the west end of Island Park Reservoir.

Icehouse Creek - originates in the lower hills of the Centennial Mountains and flows into the upper end of Island Park Reservoir.

Sheep Creek and Yale Creek - originate in the east end of the Centennial Mountains and flow into the northeast end of Island Park Reservoir.

Table 20. Lakes and Reservoirs

Name	Size in Acres	Location
Island Park Reservoir	8,400	West of Town of Island Park
Henrys Lake	6,300	Upper End of Basin
Sheridan Reservoir	415	7 Miles Northwest of Island Park Res.
Ashton Reservoir	398	West of Ashton on Henrys Fork
Silver Lake	150	In Harriman State Park
Quayle Lake	≈160	13 Miles West of St. Anthony
Trudes Bay	90	Northwest End of Island Park Res.
Blue Creek Reservoir #4 (aka as Sand Creek)-for fishing	78	16 Miles North of St. Anthony
Lower Arcadia	68	11 Miles North of St. Anthony
Icehouse Creek Reservoir	64	4 Miles North of West End of Island Park Res.
Davis Lake	≈55	6 Miles West of St. Anthony
Blue Creek Reservoir #2	≈45	14 Miles North of St. Anthony
Lemon Lake	≈45	6 Miles West of Ashton
Fish Pond	40	2 Miles Southeast of Harriman State Park Headquarters
Hossner Pond	≈40	1 Mile West of Ashton
Upper Arcadia	40	11 Miles North of St. Anthony
Blue Creek Reservoir #3	39	16 Miles North of St. Anthony
Last Chance Pond	35	1 Mile South of Last Chance
Golden Lake	50	In Harriman State Park
Horseshoe Lake	30	Near Southwest Corner of Yellowstone National Park
Swan Lake	≈30	3 Miles South of Silver Lake
Elk Creek Reservoir	25	1 Mile North of Island Park
Railroad Pond	25	1 Mile Northeast of Fish Pond
Sheep Creek Reservoir	25	1 Mile North of East End of Island Park Res.
Bishop Lake	20	West End of Island Park Res.
Blue Creek Reservoir #1	≈20	14 Miles North of St. Anthony
Robinson Lake	20	Southeast Corner of Yellowstone National Park
TOTAL	15,900	

≈ means about aka - also known as

Duck Creek - drains the north side of the Mount Jefferson-Sawtell Peak area and flows into the west side of Henrys Lake.

Targhee Creek - drains the small but rugged area northeast of Henrys Lake. The creek empties into the east side of Henrys Lake.

Moose Creek - originates near the Wyoming border and flows into Henrys Fork from the southeast at Macks Inn.

Buffalo River - originates from many springs east of Ponds Lodge and flows into the Henrys Fork just below Island Park Dam at an average rate of 170 cfs.

Split Creek originates along the Wyoming border and flows west before moving into the ground-water system east of the settlement of Island Park. Many of the Warm River springs originate from this water source.

Warm River - originates from many springs and highland runoff along the Yellowstone Park boundary. The spring sources give the river a uniform base flow. Warm River discharges into the Henrys Fork just after it drops off the Island Park plateau east of Ashton.

Fish Creek - one of the tributaries of Warm River.

Robinson Creek - originates in the southwest section of Yellowstone National Park and flows into the Warm River just above its mouth. Steep walls and a deep canyon make the middle part of this stream one of the most picturesque in the State.

Rock Creek/Porcupine Creek - are two significant tributaries of lower Robinson Creek.

Falls River (Fall River) - is a large tributary of the Henrys Fork. It has a highly variable flow with runoff equal to the Teton River and perhaps higher peak flows. The unregulated flow varies from an average monthly flow of over 2,000 cubic feet per second (cfs) in May or June to near 400 cfs in the fall and winter. The total runoff is quite large, averaging 600,000 acre-feet. This river drains a major portion of southwest Yellowstone Park. There are many fast water areas along this river with a timbered deep, picturesque, lava canyon above Boone Creek. The lower river is recessed in rolling farmland. Federal agency maps use the term Falls River, while the local people and earlier U.S. Geological Survey water publications use the name Fall River.

Boone Creek - a tributary of Falls River that originates in the northern portion of the Teton Range. Only the lower four miles are in Idaho.

Conant Creek - also originates in the northern portion of the Teton Range and flows into the lower Falls River.

Squirrel Creek - a major tributary of Conant Creek, both of which originate in Wyoming.

Teton River - a 60 mile tributary of Henrys Fork. The Teton River drains a large portion of the southern part of the basin. The river originates from many streams in the Teton Range in Wyoming. It flows through a wide, agricultural, high-mountain valley before entering a lengthy 600-foot deep canyon that transects an agricultural plateau. The Teton River discharges into the lower Henrys Fork River near Rexburg. This river is a major tributary of the Henrys Fork, along with the Falls River. The unregulated flows are very similar to those of Falls River.

Bitch Creek - originates in the Teton Range of Wyoming and flows into the Teton River. The Idaho portion of Bitch Creek is about 15 miles long and lies within a rugged canyon which is inaccessible over much of its length. The name comes from the French word biche meaning doe.

Badger Creek - also originates in the Teton Range of Wyoming and flows into the Teton River. Its drainage area is smaller than that of Bitch Creek.

Teton Creek - originates in the Teton Range of Wyoming near the Grand Tetons and flows into the Teton River near Driggs.

Trail Creek and tributaries - originate in the southern Teton Range of Wyoming at the southern end of the Idaho Teton Basin. Trail Creek is the most upstream source of the Teton River.

Canyon Creek and Calamity Creek - originate east-southeast of Rexburg in the Big Hole Mountains. Canyon Creek flows into the Teton River in the lower portion of the Teton Canyon.

Moody Creek - also originates southeast of Rexburg in the Big Hole Mountains and flows into the lower Teton River near Rexburg, below Canyon Creek.

Other scenic features related to water are incised canyons (see alson Table 21). The named canyons of the basin are listed below. The order of listing will be from north to south.

Table 21. Named Canyons

Name	Location
Garner Canyon	East of Henrys Lake Outlet
Carrot Canyon	North of West Side of Island Park Reservoir
Dry Canyon	North of Island Park Reservoir
* White Elephant Canyon	Southeast Side of Sawtell Peak
Black Canyon	East of Macks Inn
Box Canyon	Below Outlet to Island Park Reservoir
Cooney Canyon	Southwest of Island Park Reservoir
* Porcupine Canyon	Adjacent to Cooney Canyon
* Smead Canyon	Adjacent to Cooney Canyon
* Bear Canyon	Close to Cooney Canyon
* Green Canyon	Close to Cooney Canyon
* South Fork Split Creek Canyon	Near Yellowstone Park Boundary
* Trail Canyon	Upper End of Warm River
* Flat Canyon	Northeast of Settlement of Warm River
Trail Canyon	Northeast of Settlement of Warm River
* Anderson Mill Canyon	West of Lower Mesa Falls
* Hale Canyon	West of Settlement of Warm River
* De Witt Canyon	North of Ashton
* Box Canyon	North of Ashton
* Kerr Canyon	North of Ashton
* Putney Canyon	North of Ashton
* Jump Out Canyon	North of Ashton
* Coleman Canyon	North of Ashton
Teton River	Northeast of Rexburg
Bitch Creek	Northeast of Rexburg
Canyon Creek	East of Rexburg
Moody Creek	Southeast of Rexburg
* Dry Creek Canyon	Off Moody Creek
* Limekiln Canyon	Upper End of Moody Creek
Pole Canyon	South of Victor

* See 1:24,00 scale topographic maps

The open meadows and valleys surrounded by forest are admirable scenic assets of the upper portions of the Henrys Fork basin. Table 22 is a listing of the named valleys and meadows.

Table 22. Valleys and Meadows	
Name	Location
Henrys Lake Outlet Valley	Downstream from Henrys Lake
Shotgun Valley	The North Side of Island Park Reservoir
Toms Creek Meadow	One Mile East of Island Park
North Antelope Flat	South of Eastern Island Park Reservoir
Antelope Flat	South of Eastern Idaho Park Reservoir
Putney Meadow	Three Miles South of Southwest Corner of Yellowstone Park
Moody Meadow	Upper End of Moody Creek
Teton Valley	Valley Surrounding Driggs
Thousand Springs Valley	West of Garns Mountain (W. of Victor)
Harriman State Park (Main River Ranch portion)	Below Island Park

Recommended Action

1. Protect natural vegetation along lake and reservoir shorelands as well as along natural and recreational river shorelands.
2. Encourage development set-backs to preserve both water quality and aesthetics along lakes, reservoirs, rivers and streams.
3. Encourage development of greenbelts along rivers in urban and rural areas.
4. Encourage protection of outstanding scenic resources including canyon environments.

Aquaculture

Aquaculture or the hatchery production of fish has been undertaken in the Henrys Fork Basin. The Ashton hatchery, operated by the Idaho Department of Fish and Game, is ranked seventh in size among the thirteen State of Idaho hatcheries which produce non-anadromous (non-ocean migrating) fish. The Ashton facility is the hatchery serving the Upper Snake River. The non-anadromous State of Idaho fish hatcheries and their percent of total production in pounds are listed in Table 23.

The water temperatures at the Ashton hatchery are a little cooler (52°F) than at the larger production facilities at Hagerman, American Falls, and Nampa (57-59°F), so the growth rates are slightly lower at Ashton. Other water chemistry measurements at Ashton are clearly within limits for good growth rates.

Table 23. Percent of State Hatchery Production of Resident Fish	
Hagerman	34%
American Falls	17%
Nampa	17%
Grace	10%
Mackay	8%
Hayspur (Blaine County)	7%
Ashton	4%
Clark Fork (North Idaho)	2%
Cabinet Gorge (North Idaho)	1%
McCall -- Distribution Center	
Henrys Lake -- Egg Production	
Eagle -- Research Use	

The Henrys Lake hatchery, located on the east shore of Henrys Lake, is used almost exclusively for the production of cutthroat trout eggs which are shipped to other state hatcheries. Fish rearing at the hatchery would not be efficient because of the effect of water temperature (46°F) on growth rates.

The State of Idaho's Warm River Hatchery, located about eight miles upstream of the mouth of Warm River or about 22 miles northeast of Ashton by road, was closed about 5 years ago. The hatchery had a water temperature of 50°F. The hatchery was closed because of restricted available land at the site, the need for installation of pollution control equipment, and higher production costs than at other hatcheries.

There are 30 identified warm water sources in the Henrys Fork Basin with water temperatures in the optimum growth range of 60°F and higher. Generally, these water sources are located in the lower valley, particularly in the Rexburg to Newdale area. A second potential warm water area for aquaculture use is in the Island Park caldera, an approximately twelve-mile circular area bordering the south side of Island Park Reservoir and extending to the southeast. Deeper wells drilled in the area are expected to produce water of suitable temperature for fish culture. However, private land in the area is very limited and has a high value for recreation use. The harsh winter climate in the Island Park area is also a limiting factor.

There are specific water chemistry needs for aquaculture. A preliminary review of some water chemistry from current wells suggests the water chemistry may be satisfactory. The pH level is generally in the range of 7.6 to 8.0. Although a level closer to neutral (7.0) may be optimum, the pH level in itself generally is not a limiting factor. Most of these waters appear to have suitable alkalinity, specific conductance, ammonia and nitrate levels.

In summary, there appears to be potential for private aquaculture development in the basin, although, in most cases some pumping of water will be necessary.

Sources

George W. Klontz and John G. King, Aquaculture in Idaho and Nationwide, Idaho Water Resources Research Institute, 1974.

Idaho Fish and Game Facts, Idaho Department of Fish and Game, 1989.

John C. Mitchell, Linda L. Johnson and John E. Anderson, Geothermal Investigations in Idaho, Part 9, Potential for Direct Heat Application of Geothermal Resources, Idaho Department of Water Resources Water Information Bulletin No. 30, 1980.

Domestic, Commercial, Municipal and Industrial (DCMI) Uses

Domestic water generally refers to systems providing water to one or more suburban or rural private households. Commercial refers to private water systems that serve places of business, including schools. Municipal refers to public water systems for private households, places of business, small manufacturing plants, and irrigation of lands within municipal boundaries. Industrial refers to private water systems for manufacturing plants.

Relative to the large amounts of water diverted for irrigation or required for instream use for fish and recreation or for hydroelectric power production, a minor amount of water is used for domestic, commercial, municipal and industrial (DCMI) needs. In Idaho, and in the Henrys Fork Basin, food processing is the largest industrial use of water. There is some industrial water use associated with lumber manufacturing, however, the major DCMI use is generally associated with municipal water delivery systems. For more populous areas of the nation, DCMI use is significant. For the Henrys Fork Basin it is quite low (Table 24).

Table 24. 1985 DCMI Use (acre-feet)

	Rural Domestic		Domestic, Commercial, Municipal		Industrial		
	Withdrawn	Consumed (24%)	Withdrawn	Consumed (22%)	Withdrawn	Consumed (8%)	Rounded Total
Madison	500	120	3,000	660	400	30	
Fremont	40	10	1,300	290	800	60	
Teton	10		400	90	Minor	–	
Withdrawal	550		4,700		1,200		6,500
Consumption		130		1,040		90	1,300

Total withdrawal in 1985 for DCMI purposes was 6,500 acre- feet--virtually all from ground water. This 6,500 acre-feet is one-half of one percent (0.5%) of the amount diverted for irrigation use (1,153,000 acre-feet) within the Henrys Fork Basin. Total consumption was 1,300 acre-feet. Projections to the year 2010 indicate a 35 percent basin-wide population increase from 1983 population levels. A simplified water use projection would use a proportional increase in domestic, commercial, municipal and industrial water use relative to the population level increase. The projected total water withdrawal for DCMI use in 2010 therefore is 8,700 acre-feet with a total consumption 1,700 acre-feet. The incremental use is 2,200 (8,700-6,500) acre-feet diverted and 400 (1,700-1,300) acre-feet consumed.

Because of the very small future needs for DCMI water use within the basin, there should be little conflict in meeting future needs. The small amount of water needed to meet all anticipated future DCMI growth likely will be provided from new ground-water appropriations.

New withdrawals of ground water within the impact area of the Swan Falls Agreement (see Figure 8) would be part of the trust water assigned for future DCMI use. Ground-water withdrawals in parts of the basin not in the Swan Falls impact area (Idaho Code 42-203B) are regulated by the ordinary water appropriation criteria.

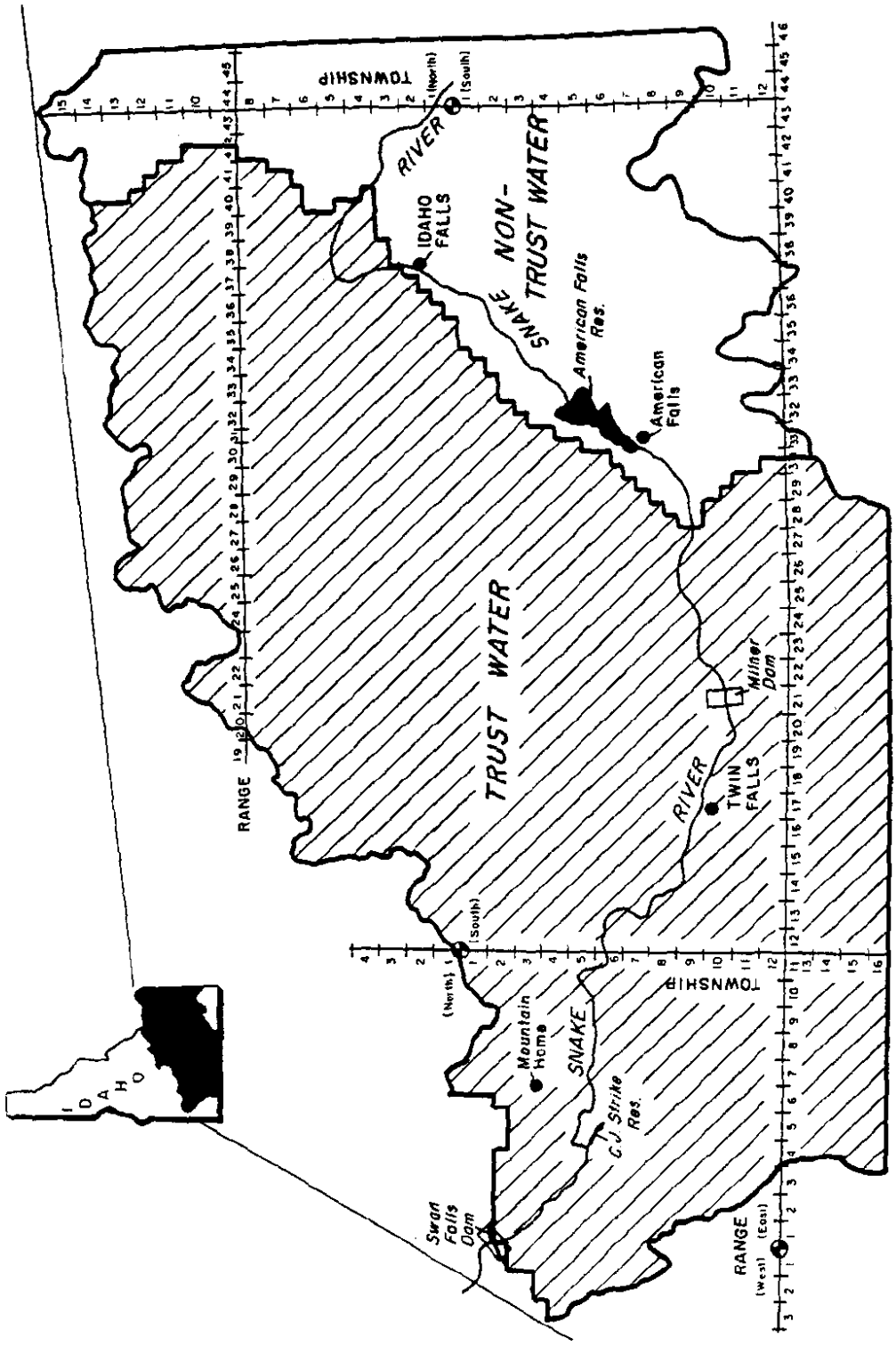
Recommended Action

Future DCMI water needs will likely be met using ground water. Large commercial or industrial water users may have to purchase existing water rights or rely on the water bank.

Sources

Goodell, S.A., 1988, Water Use on the Snake River Plain, Idaho and Eastern Oregon, U.S. Geological Survey Professional Paper 1408-E, pp. E37-E44

Figure 8:
Swan Falls Trust Water Area



Irrigation

Present Status

Irrigated agriculture and related food processing is the main economic activity in the Henrys Fork basin. Most crop production within the basin takes place in areas where mollisols are the general soil type. Mollisols of Idaho's highland plateau areas are similar to the fertile soils of the midwest, and the dryland farmed soils of the Moscow-Grangeville area of northern Idaho. Mollisols formed under considerable grass vegetation and generally are inherently fertile. They contrast to the aridisols of the lower main Snake River plain in that there is much less accumulated salts, lime, and clay and much more accumulated organic matter in the mollisols.

The primary agricultural product is potatoes. In the St. Anthony-Rexburg area this largely is fresh pack potatoes as well as some processing potatoes. Because of the shorter growing season in the St. Anthony-Ashton area and in Teton County, the potato acreage is largely seed potatoes. The primary rotation crops are barley and wheat, generally planted in the spring. In addition, significant livestock production occurs in all the basin counties.

The 1979 estimated total potentially irrigable and irrigated acreage as well as the water source and irrigation method are tabulated below by county (Table 25). A recent (1990) reanalysis using current inventory techniques shows the figures are quite close to being current.

Most of the potentially irrigable land is used for dryland grain production, of which 75 percent is spring barley. In Fremont County a minor amount of dryland potatoes are produced. The 1987 estimated acreages of irrigated land use by county are shown in Table 26. The other lands not listed by crop are largely wild hay, pasture and idle land. The barley, wheat and alfalfa lands, which support a livestock sector, are primarily a rotation crop for potatoes.

The increases in the amount of irrigated land between 1969 (a year in which data is available) and 1990 is noteworthy (see Figure 9). There have been significant changes in both surface-water supplied irrigation and ground-water supplied irrigation. Yet the largest change relative to the original acres is the ground-water supplied irrigation.

Table 25. Irrigated and Potentially Irrigable Acreage

County	Potential Irrigable	Total Irrigated	Irrigated Surface Water	Irrigated Ground Water	Irrigated Gravity	Irrigation Sprinkler
Fremont	87,000	124,000	104,000	20,000	23,000	101,000
Madison	73,000	113,000	60,000	53,000	41,000	72,000
Teton	47,000	84,000	71,000	13,000	13,000	71,000
TOTALS	207,000	321,000	235,000	86,000	77,000	244,000

Table 26. Acreage of Principal Crops

County	1987 Barley and Wheat	1987 Potatoes	1987 Alfalfa	1987 Other
Fremont	42,000	30,000	13,000	32,000
Madison	45,000	39,000	12,000	17,000
Teton	24,000	10,000	14,000	36,000
TOTAL	111,000	79,000	39,000	85,000

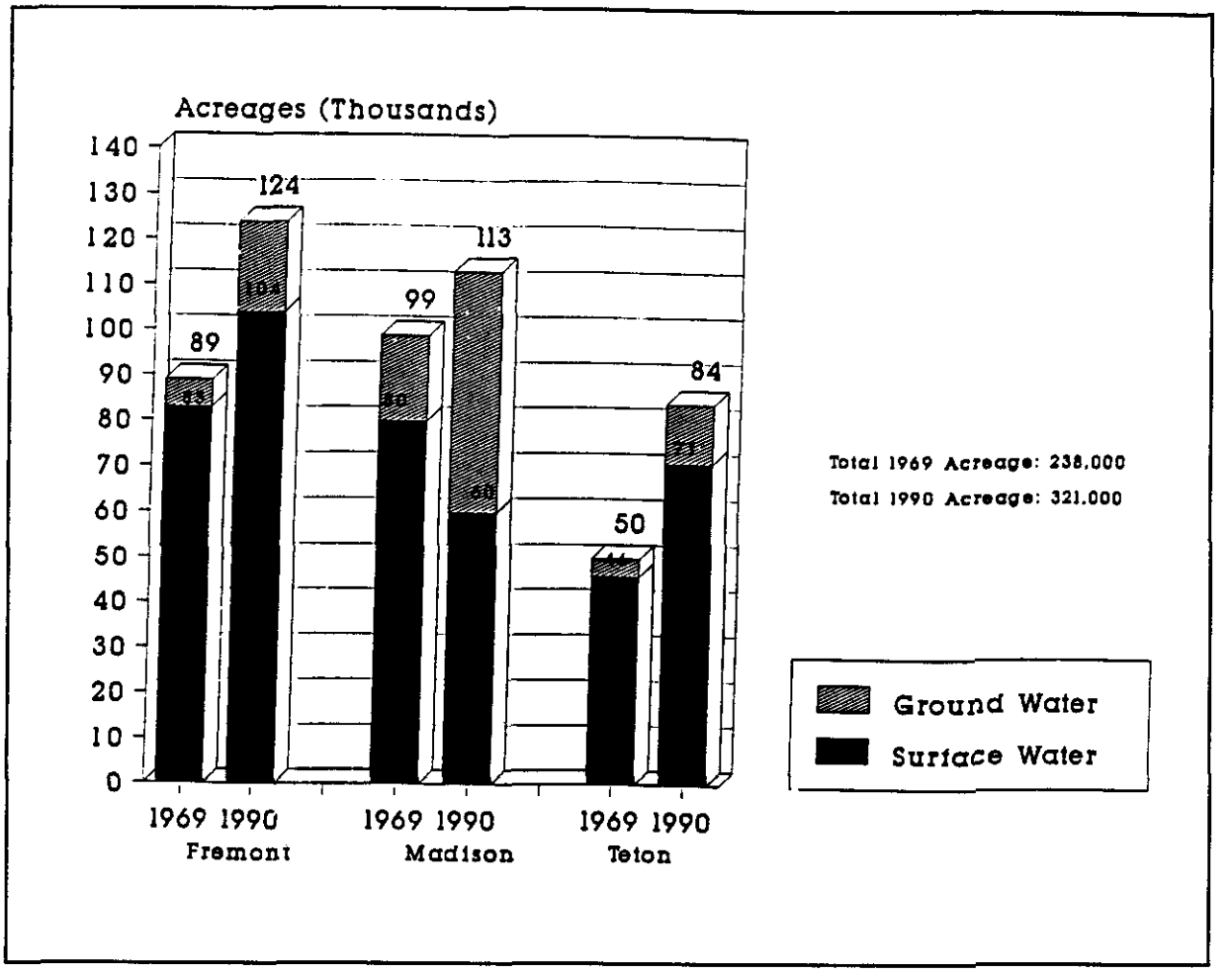


Figure 9. Increase in Irrigated Agriculture 1969-1990

Water Use

The acreages for the main diversion for most of the surface-water irrigated land in the lower Henrys Fork Valley are tabulated in the water supply section. The general location of all surface-water irrigated land and ground-water irrigated land is shown on the maps located toward the end of this section. Also shown are the potentially irrigable lands by a soil land classification rating of 1, 2 or 3.

The Henrys Fork, Lower Teton and Falls River water users are organized into the Fremont-Madison Irrigation District. They collectively have contracted all the storage in Island Park Reservoir and Grassy Lake Reservoir. These two reservoirs are owned and operated by the U.S. Bureau of Reclamation. Six irrigation companies within the irrigation district own and operate the Henrys Lake storage. The many irrigation companies own separate natural flow rights with differing priorities on streams within the basin. Storage reservoirs have water rights with priority dates interspersed with the priority dates of the natural flow rights. The amount of water diverted from natural flow or storage for each right holder is accounted for by Water District 01 (not an irrigation district) which has responsibility for administering water rights within the Snake River Basin above Milner Dam.

Center pivot irrigation in the Henrys Fork Basin.

During the late summer of a low water year, the Fremont-Madison Irrigation District water users continue to divert available natural flows; although, the natural flow rights belong to users below the mouth of the Henrys Fork because of earlier priority dates. This diversion of natural flow in lieu of release of Island Park or Henrys Lake storage is allowed up to the amount of such storage remaining. This water is made available to the lower users from storage water in American Falls Reservoir, Jackson Lake or Palisades Reservoir. The volumes released are charged against the Henrys Fork reservoir for accounting purposes. Thus, through exchange, part of the Island Park Reservoir and Henry's Lake storage may belong to downriver water users. If the reservoirs used in the exchange process fill during the subsequent water year, the water debt is canceled.

However, during a sequence of dry years a large share of Island Park and Henrys Lake storage could be held by others. To meet local storage water needs the Fremont-Madison Irrigation District would need to purchase rental pool water. The current rate is $2.75 per acre-foot. The rental pool is a yearly assignment of storage water by individual canal companies or groups in Water District 01.

As additional demands are placed upon the main-stem Snake River reservoirs, such as winter hydroelectric releases of rental water, there is a reduced chance of fill of these main-stem reservoirs. A last-fill rule assigned to nonirrigation rental water used below Milner Dam protects the Henrys Fork users from being impacted by additional rental water use. Irrigation companies that placed water into the rental pool that is used below Milner Dam are given a later fill for that portion of their allotment.

The following is a U.S. Bureau of Reclamation discussion of how they operate the federal water storage system in conjunction with natural flow water rights:

The Henrys Fork reservoirs are operated along with other Snake River reservoirs to enhance refill capabilities in subsequent years. Natural flows of the Henrys Fork tributaries often provide most of the water demanded for irrigation by direct diversion on the Henrys Fork even after the natural flow rights of these diversions are superseded by earlier rights downstream from Rexburg (downstream from the confluence of the Henrys Fork and Snake River). During the period when water diverted is rightfully stored, downstream demands entitled to natural flow are supplied from Snake River storage facilities.

Stored water is physically maintained in the farthest upstream reservoir in the system while storage use is accounted for according to ownership and contracted space. As the reservoirs are refilling during the subsequent winter, having the water upstream from where it was originally accrued by storage right allows maintenance of streamflows as the water is physically delivered to the correct storage right reservoir.

Having the water upstream also allows water to revert to the rights of the reservoir in which it is held at a rate greater the actual inflow to the reservoir once senior storage rights have filled. If water was held downstream and these reservoirs were filled, runoff occurring below upper basin dams would have to be bypassed and would be lost to the basin.

Since water is held upstream, once the water rights are full, inflow can accrue to upstream storage at the rate of inflow to the downstream reservoir. Federal storage contracts provide for the storage of water from other reservoirs in otherwise empty space. Therefore, water held in the upstream reservoir does not require replacement (from the rental pool) unless it is subsequently diverted. This rarely occurred prior to 1987, however, this practice has been repeated recently and is becoming accepted as standard practice.

Once all reservoirs are full, all the storage rights, regardless of how the water physically got there, are full. Because reservoirs have filled in most years in the Upper Snake River some misunderstandings have developed. Mainly the notion that if American Falls fills, then Henrys Fork reservoirs are entitled to their entire contents has been accepted as fact by many observers.

A more accurate statement is, "once the American Falls water right is filled on paper, regardless of physical contents, then Henrys Fork reservoirs will accrue water to their rights at a rate in excess of their inflows."

When a succession of dry years causes Fremont-Madison Irrigation District canals to divert more storage than they are entitled to, the excess must be purchased from the Upper Snake River Rental Pool. The pool is operated so that irrigators who have water supplies surplus to their present needs can share with those who run short.

After the needs of irrigators are fulfilled remaining water is available to uses below Milner Dam which historically has been utilized by power interests. Irrigators supplying water to the pool may stipulate that their water will not be used below Milner.

Space from which water is used below Milner reverts to last priority in it's refill in the ensuing year because use below Milner is an expansion of the purpose for which the stored water was originally appropriated. This last to fill provision protects the rights of others including Fremont-Madison Irrigation District.

The surface irrigation systems in the Ashton-Rexburg area divert from the Henrys Fork, Falls River and the Lower Teton River as shown in Table 27.

The Crosscut Canal takes water from the Henrys Fork and provides one-third to one-half its flow to the Fall River Irrigation Co. The remaining Crosscut Canal water is diverted to the Teton River above most of the Teton River diversions. Crosscut Canal flows are accounted for in the canal of the ultimate use.

Supplemental Water Needs

The average water diversions for the recent good water years of 1983, 1984 and 1986 is assumed to represent a full water supply. 1988 was a low water year. A rough estimate of the 1988 supplemental water needs can be made by subtracting the actual 1988 diversions from the average good water year diversion (Table 27). A review of rental pool transactions for 1988 shows about one-third of the estimated needs were provided by rental pool leases.

The use of other mechanisms to reduce water use perhaps should be considered. For example, placing some grain ground in a year-to-year government program for payment when no crop is harvested may return nearly as much net income as harvesting a full crop. Grain still might be planted and the limited forage plowed under as a rotation for potatoes. The grain forage may or may not receive one early irrigation.

Another drought-year tactic is to only irrigate hay for the highest yielding first cutting and then market or otherwise use the higher-value, late-season water. A year like 1988 in which a number of companies did not have a full water supply occurs with some regularity (an average of two years in ten). A much greater shortage occurred in 1977. The basinwide shortage of 45 percent had not occurred since the water-short years of 1931 and 1934, which gives it a reoccurrence interval of one year in twenty.

To provide facilities which furnish a full water supply for all users in all years would be quite costly. The U.S. Bureau of Reclamation (USBR) uses a guideline of an allowable shortage of up to 50 percent in any one year, up to an accumulated shortage of 75 percent in two consecutive years, or up to an accumulated shortage of 100 percent in a consecutive ten-year period. The Henrys Fork basin, on average, has a sufficient water supply using this guideline.

The basic economic supply-demand curve provides a graphical view of the difficulty of supplying a 100 percent long-term water supply. The graph (Figure 10) is drawn in general terms in order to show the basic economic principle. The cost per acre-foot of water becomes very expensive as efforts are made to approach a 100 percent supply. At the same time, the willingness to pay for new water decreases as the total quantity approaches 100 percent. Where supply and demand balance is an estimate of economic reasonableness. This is rarely at a 100 percent supply. Figure 10 is drawn for illustration purposes only and is not intended to represent current Henrys Fork conditions.

Table 27. Lower Henrys Fork Basin Diversions (acre-feet)

	1986	1984	1983	Average 1983-84&86	1988	Average less 1988	1977	Average less 1977
Henrys Fork								
Dewey	6,700	4,378	3,658	4,912	4,681	231	2,360	2,552
Last Chance	27,300	27,900	23,300	26,167	26,321	0	12,850	13,317
Farmers Friend	44,300	55,100	44,600	48,000	27,336	20,664[a]	8,650	39,350
Twin Groves	34,700	57,800	53,300	48,600	24,157	24,443[a]	17,830	30,770
St. Anthony Union	161,400	164,800	156,400	160,867	155,166	5,701	115,370	45,497
Salem Union	64,300	66,900	61,500	64,233	61,339	2,894	41,250	22,983
Egin	109,300	121,600	105,800	112,233	103,624	8,609	80,360	31,873
St. Anthony U. Feeder	28,700	46,400	37,800	37,633	27,328	10,305[a]	29,210	8,423
Independent	106,500	114,600	122,400	114,500	121,740	0	28,000	86,500
Consolidated Farmers	78,800	91,500	96,600	88,967	69,910	19,057[a]	47,270	41,697
Crosscut Canal	55,600[b]	54,900[b]	63,600[b]	58,000[b]	128,100[b]	(70,100)[b]	78,900[b]	(20,900)[b]
Subtotal	662,000	750,978	705,358	706,112	621,602	91,904	383,150	322,962
Falls River								
Yellowstone	3,136	1,561	2,172	2,290	3,506	0	1,468	822
Marysville	30,300	27,100	27,300	28,233	24,523	3,710	24,250	3,983
Farmers Own	18,900	16,600	15,800	17,100	15,034	2,066	11,590	5,510
Conant Creek	3,463	1,613	3,187	2,754	3,919	0	2,696	58
Boom Creek	512	280	327	373	695	0	850	0
Squirrel Creek	2,158	2,269	2,596	2,341	1,755	586	1,092	1,249
Orme	123	79	234	145	815	0		145
Enterprise	20,000	20,700	22,700	21,133	25,004	0	20,100	1,033
Fall River	86,800	118,450	95,800	100,350	87,074	13,276[a]	66,800	33,550
Chester	15,100	25,700	25,600	22,133	8,376	13,757[a]	4,890	17,243
McBee	500	780	964	748	113	635	61	687
Silkey	4,748	3,717	3,453	3,973	5,855	0	3,650	323
Curr	17,200	16,600	13,300	15,700	12,135	3,565[a]	9,840	5,860
Subtotal	202,940	235,449	213,433	217,274	188,804	37,596	147,287	70,464
Lower Teton River								
Canyon Creek	5,845	6,659	6,159	6,221	4,050	2,171[a]	1,590	4,631
Wilford	42,200	51,200	69,500	54,300	33,840	20,460[a]	14,960	39,340
Teton Irrigation	23,100	16,100	21,500	20,233	22,102	0	18,140	2,093
Siddoway	1,388	0	0	463	2,477	0		463
Pioneer	2,860	2,660	3,810	3,110	2,959	151	282	2,828
Stewart	3,543	2,233	1,884	2,553	2,786	0	930	1,623
Pincock-Byington	2,817	4,846	3,697	3,787	1,806	1,981[a]	1,154	2,633
Teton Island Feeder	121,700	117,200	130,500	123,133	95,763	27,370[a]	55,690	67,443
North Salem	1,972	502	0	825	1,364	0	48	777
Roxana	5,006	4,098	5,000	4,701	6,087	0	2,610	2,091
Island Ward	7,817	5,617	7,884	7,106	7,711	0	3,130	3,976
Saurey-Sommers	4,046	4,229	4,157	4,144	6,087	0	3,090	1,054
McCormick-Rowe	345	329	272	315	464	0	103	212
Pincock-Garner	1,999	4,699	2,531	3,076	2,665	411	958	2,118
Bigler Slough	1,115	1,797	2,148	1,687	537	1,150[a]	80	1,607
Woodmansee-Johnson	2,462	3,364	2,586	2,804	1,705	1,099[a]	1,610	1,194
City of Rexburg	5,546	6,760	6,383	6,230	3,929	2,301[a]	2,450	3,780
Rexburg Irrigation	54,500	42,300	45,200	47,333	55,883	0	39,310	8,023
Subtotal	288,261	274,593	313,211	292,022	252,215	57,094	146,135	145,887
Total	1,153,201	1,261,020	1,232,002	1,215,408	1,062,621	186,594	676,572	538,836

[a] Significant 1988 Shortages.
[b] Crosscut Canal numbers not included in Henrys Fork subtotal.

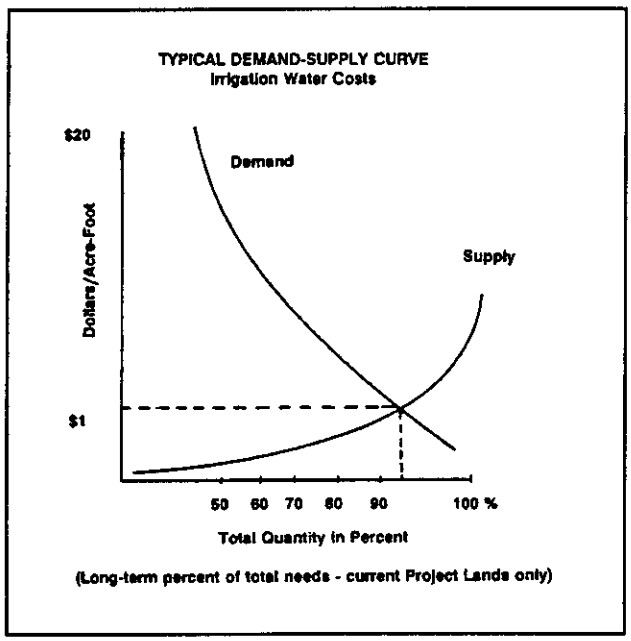


Figure 10. Typical Demand-Supply Curve

Various mechanisms have been proposed for the Henrys Fork Basin to provide a supplemental water supply. For years, the most discussed approach has been to construct new surface-water storage at the Teton damsite. Several other potential surface-water storage sites are discussed in the water supply chapter of this plan.

Recent reevaluations of the Teton site have indicated that costs would exceed benefits for any federal project likely to be built. Only limited project benefits could be credited to water used for supplemental irrigation. The same circumstances are likely to apply at other sites within the basin.

Another constraint on developing new water-storage sites is the lack of unappropriated water in the basin. Existing reservoirs downstream as far as American Falls on the Snake River would all have water rights senior to any new development. As opportunities to lease water from the water bank increase, the amount of water "carried over" in existing reservoirs will decrease. These senior reservoirs would have to fill before water for new storage would be available.

More efficient use of water (e.g. conversion to sprinkler) may result in reductions in the amount of water diverted from basin streams and reservoirs, perhaps making more water available for new storage. The Fremont-Madison Irrigation District, in cooperation with the Bureau of Reclamation, is currently reviewing their water use and operations. The review could lead to a quantification of supplemental irrigation needs and identify ways to improve water use efficiency. The impacts of new ground-water consumption within the basin will have to be considered. There may be a reduction in surface-water availability within the basin because of ground-water use.

Water Savings

Typical irrigated crops in the basin consume 20-30 percent of the water diverted. An enclosed water-delivery system would reduce water losses. Such a system would practically eliminate transportation losses from the open-ditch systems. Open-ditch transportation losses typically range from 20 percent to 30 percent of the river diversion amounts. This is a sizeable amount of water; although, on-farm losses are larger, ranging from 35 to 60 percent of the river diversions on a large canal system. Small amounts of the river diversions pass through the canal and return directly to the river. A small amount of water is consumed by water evaporation and phreatophytes. Any reduction in transportation losses would be beneficial during a dry water year. However, the cost per acre-foot of water saved would be quite high.

The Marysville, Yellowstone, Squirrel Creek, and Conant Creek irrigation companies investigated a joint gravity pressure distribution system in 1981. The proposed project assumed a zero interest loan from the U.S. Bureau of Reclamation, and separately funded hydroelectric facilities. Even with significant water savings and a revenue stream from power production, the likely benefits were not felt to justify the costs at that time.

Significant increases in the financial benefits from water conservation will require changes in Idaho water law. Provisions barring expansion of use, restricting the transfer of priority date, protecting third parties from damage, and loss of ownership through lack of use need to be addressed before conserving water will be truly attractive to water users in Idaho. Assuming that these questions will be addressed over time, there are opportunities in the basin for significant water savings.

Most analyses shows a more cost-effective method would be to provide for more efficient on-farm water application methods. A major shift to sprinkler irrigation has been occurring within the basin. Any increase in the financial incentives associated with water conservation would likely accelerate the shift to sprinklers in the basin. Water is a relatively inexpensive commodity in the basin, except during periods of prolonged drought. Few other non-farm water efficiencies are being adopted at this time.

Water Safety

Large open-ditch water transport systems are a very economical method of transporting water over long distances. There generally is no electric or other power need. Unfortunately, deaths in canals are a usual occurrence in Idaho. Seven lives were lost in 1988, and six more in 1989. Covered or fenced ditches would have been an impossible expense when these systems were built years ago. In most areas there have been few, if any, safety changes to these transport systems. In urban areas a few smaller ditches have been covered.

Fencing and covering ditches are practical safety measures in some areas. However, large laterals and canals are sometimes used for recreation. Fencing and covering these canals would restrict public access. If canal companies encourage recreational use, they could be subject to liability actions.

Another component of a water safety program is public awareness of irrigation ditch hazards. The Idaho Water Users Association has an Otto Otter elementary education program which largely centers on classroom instruction to third grade students. The school contact is arranged by the local irrigation organizations. Although this Otto Otter program is widely used in southwestern Idaho, it is little used in the Henrys Fork basin.

There are other public awareness approaches. Periodic public announcements of water safety hazards are important. The recreation chapter touches on a greater use being made of a learn-to-swim campaign. Part of the solution rests with the water delivery organizations and part of the solution rests with the public, including public officials and the school systems.

Potential for New Irrigation

The Henrys Fork Basin has a substantial amount of land suitable for irrigation development. The 197,000 acres shown in Table 28 is broken down by land class. In addition to soil suitability, the potential for irrigation development depends on the cost of water.

The soil classes identified in the table were evaluated about 25 years ago using criteria which do not fully reflect the economic feasibility of current sprinkler application methods. An updated classification would probably upgrade many of the Class III and IV soils.

Lands identified as Class IV (non-irrigable) may be developable with current technology. The 25 year old data show Class IV lands predominately in the Sand Creek-Camas Creek Plateau located

north of the Henrys Fork and northwest of St. Anthony. Recent U.S. Soil Conservation Service (SCS) mapping, which uses climate as a criteria, also placed these soils in a Class IV designation. This is also the case for some of the higher productivity silt-loam soils (#93 Fremont County). If the SCS did not use climate as a criteria, these soils generally would be mapped as Class III. Figure 17 results from the recent SCS mapping of Fremont County. For the entire county, if climate was disregarded, the classification generally would be upgraded one class rating and in a few places by two classes.

Table 28. Irrigable Acres by Class

	Class I	Class II	Class III	Total
Fremont	18,000	55,000	13,000	86,000
Madison	24,000	32,000	7,000	63,000
Teton	15,000	28,000	5,000	48,000
TOTAL	57,000	115.000	25,000	197,000

U.S. Bureau of Reclamation soils classification criteria do not downgrade soils because of climate. Because of the potential high economic return from these soils as illustrated by the current potato production in the adjacent Hamer area, these described SCS Class IV soils in the Sand Creek-Camas Creek area might more appropriately be shown as Class III soils.

Areas of currently irrigated and potentially irrigable land within the basin are shown on Figures 11-17. There are three areas that appear to have the greatest potential for further irrigation development. These are the Drummond-Lamont area, the Canyon Creek dryland farmed area and the Camas Creek Plateau area. In the higher elevation reaches of all these areas, potato production would primarily be for seed use.

The most extensive of these developable areas is the Drummond-Lamont dryland farmed area and its lower elevation westward extension. In this area ground water in sufficient quantities for irrigation appears to be difficult to develop. As mentioned in the water supply section, a ground-water study of the area is needed. Well enhancement techniques that are used in the petroleum industry have been used where water well yields are low, but water is highly valued. Future development in this area may require the application of such techniques (e.g. hydrofracing or using explosives).

The most obvious method of providing irrigation water to the Drummond-Lamont area is by supplying surface water via canal. Several off-stream storage sites as well as a Falls River site are discussed in the water supply section. An accompanying long-term lease of rental water would be needed.

A second small area that has potential for some additional irrigation development is in the Canyon Creek area. A few of these lands that lay just south of the Teton River could be served by high-lift pumping from the Teton River. Replacement water or new water developed upstream would be needed during most periods. Although highly controversial, one source might be ground-water pumped into the Teton River at the lower end of Teton Valley. Most of the higher ground would need an elaborate water supply. Some water is available for new storage from Canyon Creek; however, some imported water, probably from the upper Teton River, would need to be placed in off-stream storage for use on these lands.

The third area that has potential for further irrigation development is on the Sand Creek-Camas Creek Plateau. As described previously, these lands were identified as Class IV lands. That classification is because the soil has a higher than standard amount of sand. These generally are

loamy sand and sandy loams. The contradictory nature of the classification is that this soil generally is very good for the growing of high value potatoes under sprinkler irrigation. Water can be provided directly from underlying ground water, although consumption here may impact the Mud Lake area. No extended arrangements need be made for canal systems, storage reservoirs or for exchange arrangements.

The main controlling factors are the adequacy of the water supply effect on other users, public interest criteria, and the cost for power to lift the water. Much of the area appears to have water lifts in the 300 to 600 foot range (see the depth to ground-water map located in the water-supply section). The overlying land generally is controlled by the Bureau of Land Management. A transfer into private ownership would be needed.

In addition, there currently is a moratorium on approving new wells within the Sand Creek-Camas Creek Plateau. The moratorium will last at least until 1993 when a U.S. Geological Survey (USGS) study of the impacts of new development on the water available at Mud Lake is completed. It would have been useful if the study also investigated the impact on Mud Lake of reduced gravity irrigation in the Egin Bench-Rexburg area. This might be helpful as a sequel to the study.

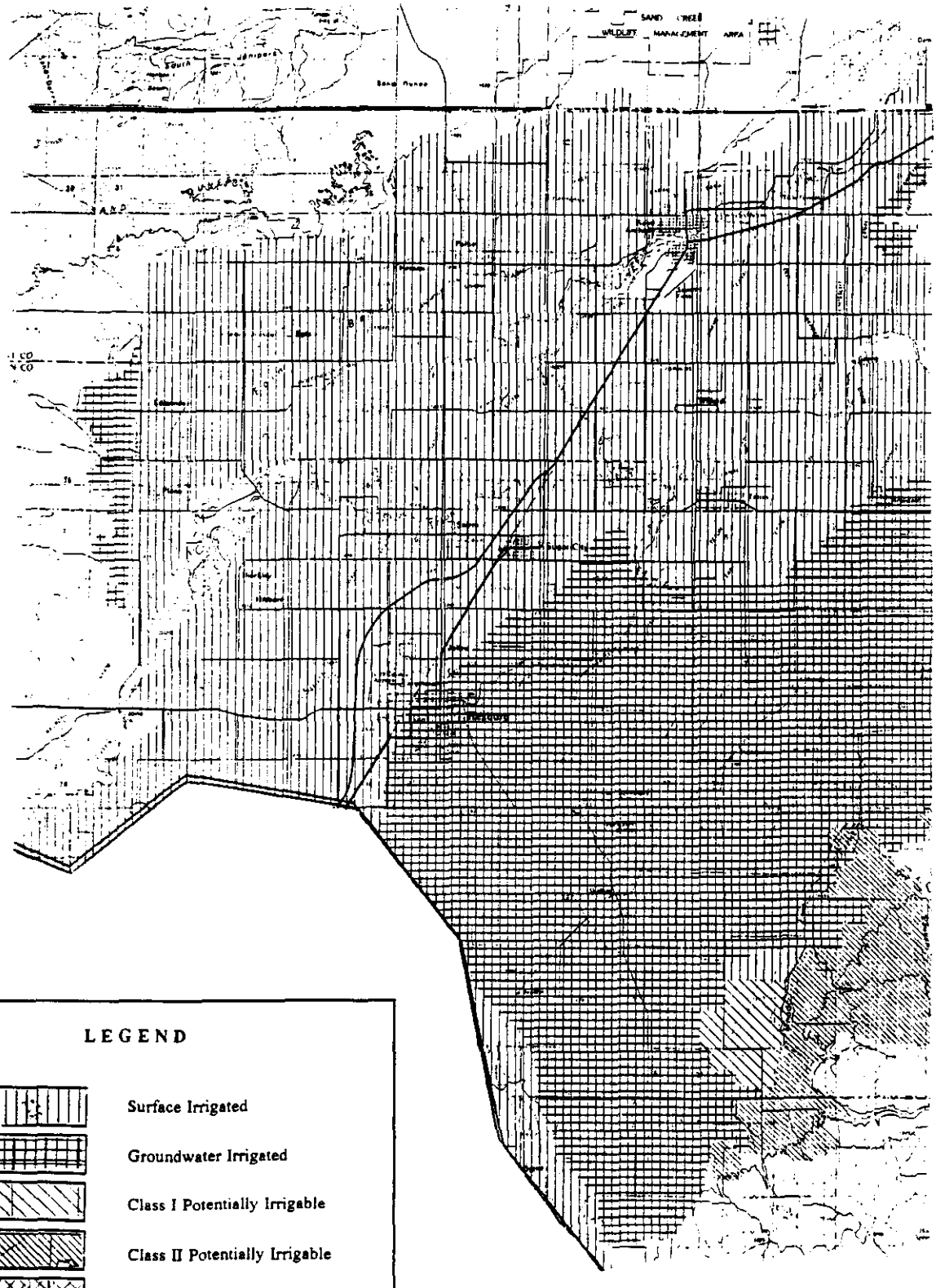
Perhaps of lessor importance, but still a barrier to development, is the trust water area set-aside as part of the Swan Falls Agreement (Idaho Code 42-203C). The Swan Falls impact area includes all ground water tributary to the Snake River below Milner Dam including the Thousand Springs source water. This source area extends into the Henrys Fork Basin (Figure 8). The criteria for allowing ground-water development in the trust water area, including water wells in the Lower Henrys Fork Basin, is whether the development affects the minimum stream flow at the Murphy gage below Swan Falls Dam. Additionally, development per year in the trust water area is limited to no more than 80,000 acres in any four year period. Public interest criteria which must be considered include the direct and indirect benefits to the economy, the project economic impact upon electric rates and the cost of alternate energy sources as well as the promotion of the family farming tradition.

On May 15, 1992 the Idaho Department of Water Resources established a moratorium on the processing and approval of permits for new consumptive uses of ground or surface water in the Snake River Basin above Weiser, Idaho. The moratorium does not apply to applications for domestic purposes. This action is in response to six consecutive years of drought, and will likely be withdrawn when streamflows return to normal levels.

Recommended Action

1. Encourage the development of new irrigation where environmental concerns can be met.
2. Promote new irrigation development on the Class IV lands north and northwest of St. Anthony which appear to overlay an excellent supply of ground water.
3. Encourage ground-water development where conjunctive use problems with surface water do not arise or where the conjunctive use problems can be mitigated.
4. Support incentives for the efficient use of water.
5. Encourage increased irrigation canal safety, through structural improvements, through public awareness and through learn to swim programs.
6. Develop measures and identify funding sources to provide supplemental irrigation water.
7. Quantify the need for a supplemental water supply for water short years on presently irrigated lands for each irrigation company. For shortages not capable of being met from the rental pool, a cost analysis of methods to meet the shortages should be developed.
8. Educate the public about existing water use practices in the basin and the water law that constrains both use and changes in use.

Figure 11: Irrigated and Potentially Irrigable Land - Egin Bench, Rexburg-Wilford, and Rexburg Bench



LEGEND

- Surface Irrigated
- Groundwater Irrigated
- Class I Potentially Irrigable
- Class II Potentially Irrigable
- Class III Potentially Irrigable

Figure 12: Irrigated and Potentially Irrigable Land - Canyon Creek and Eastern Rexburg Bench

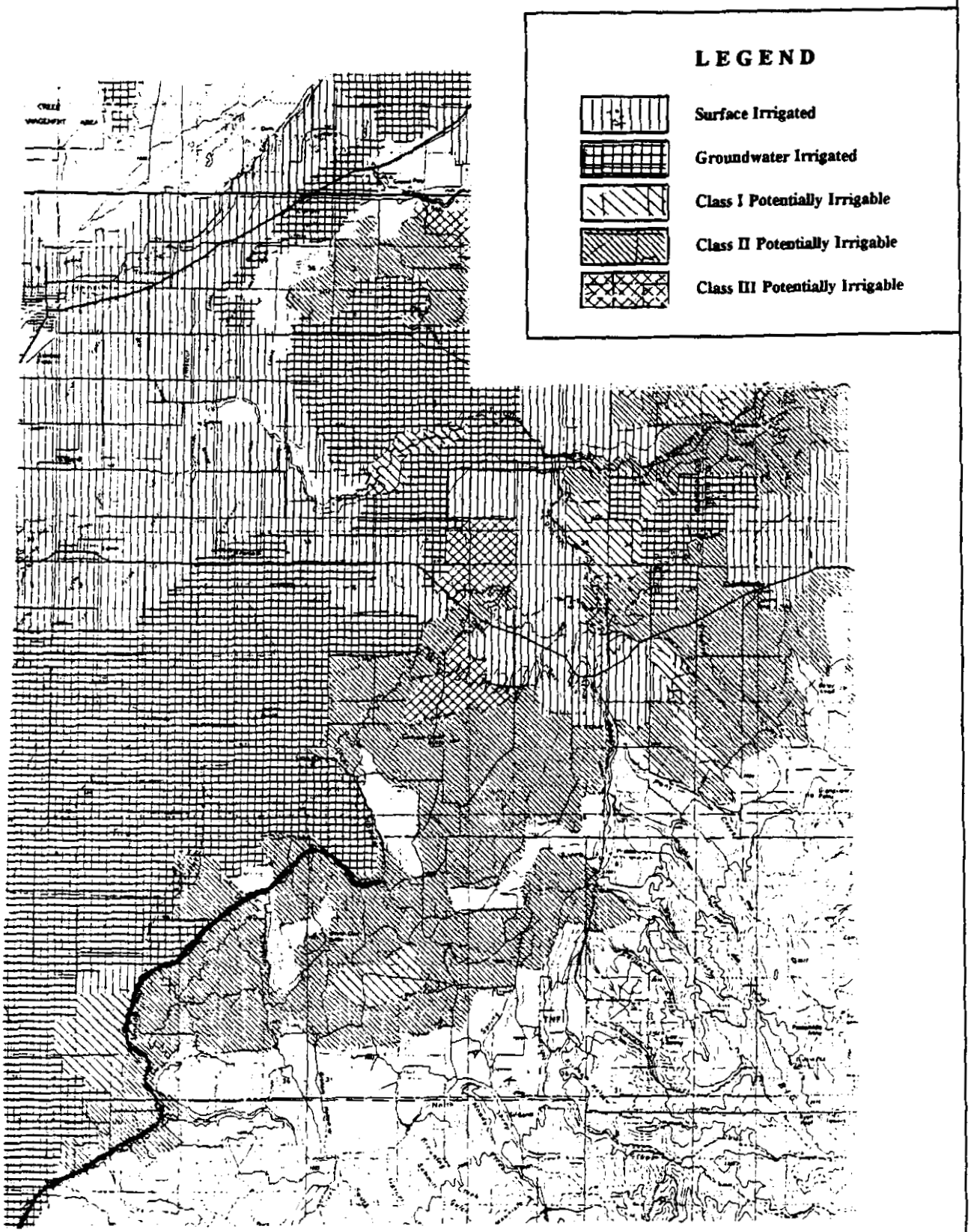
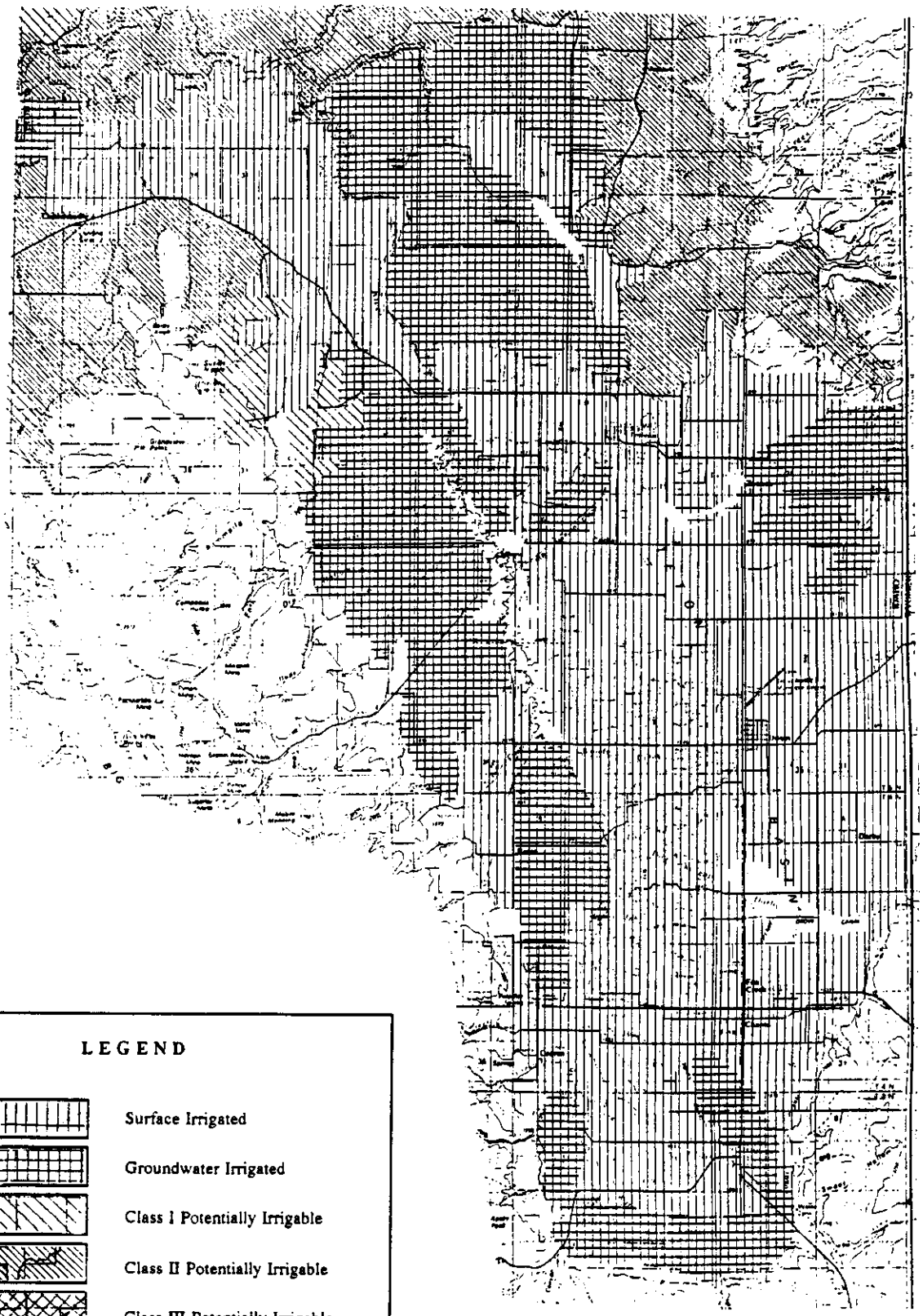


Figure 13: Irrigated and Potentially Irrigable Land - Teton Basin



LEGEND

- Surface Irrigated
- Groundwater Irrigated
- Class I Potentially Irrigable
- Class II Potentially Irrigable
- Class III Potentially Irrigable

Figure 14: Irrigated and Potentially Irrigable Land - Ashton and Drummond-Lamont Plateau

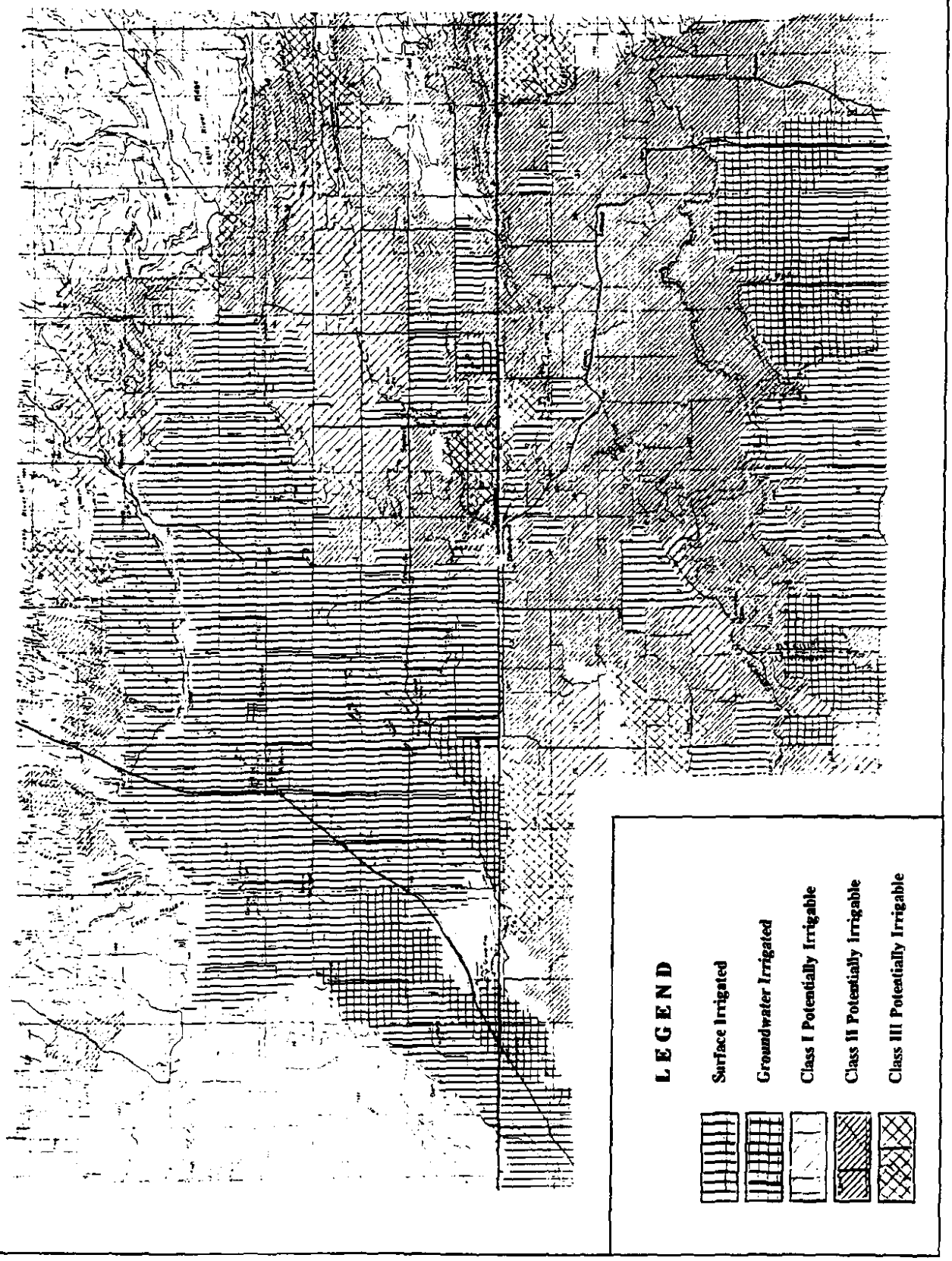


Figure 15: Irrigated and Potentially Irrigable Land - Island Park Reservoir

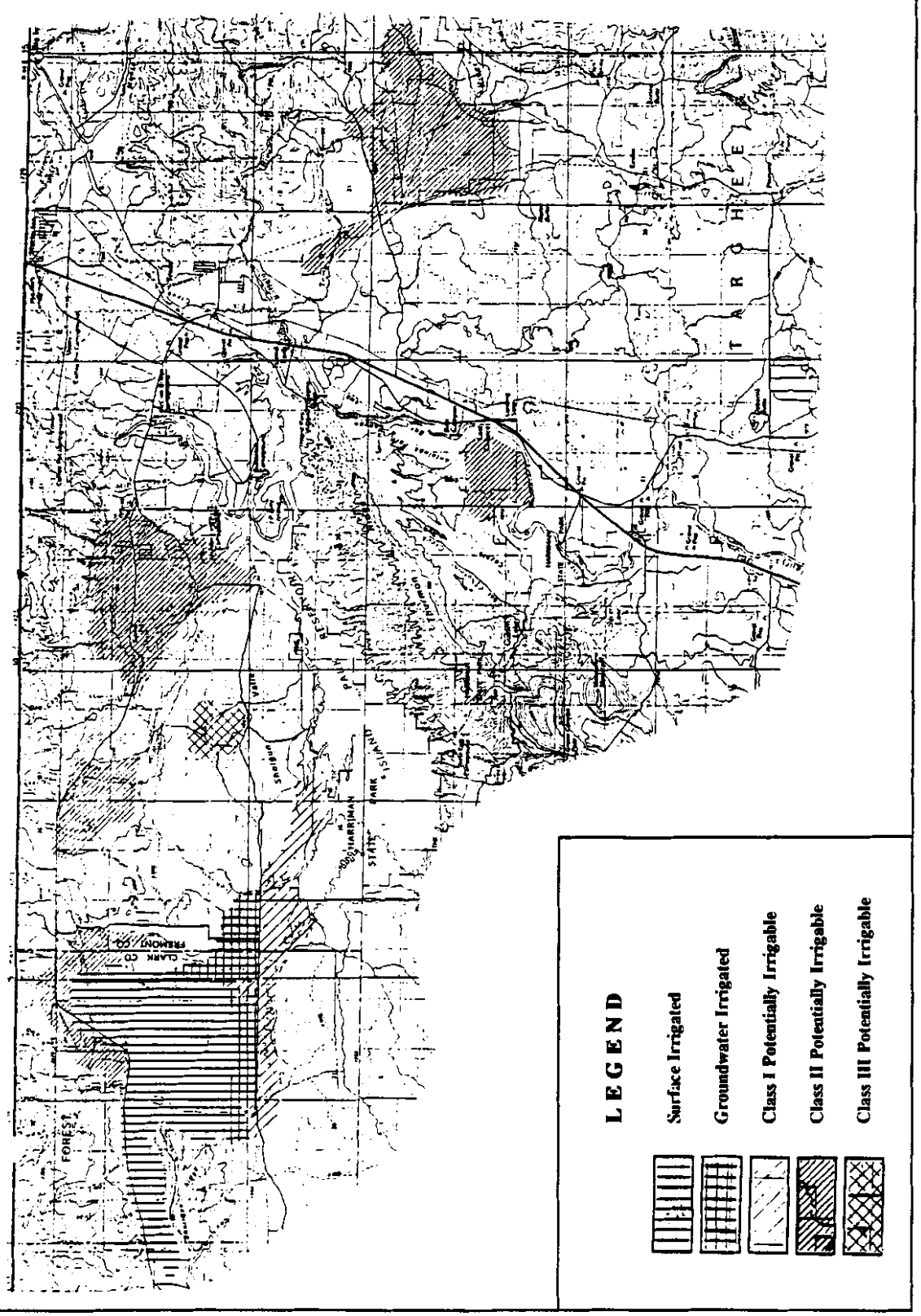


Figure 16: Irrigated and Potentially Irrigable Land - Henrys Lake

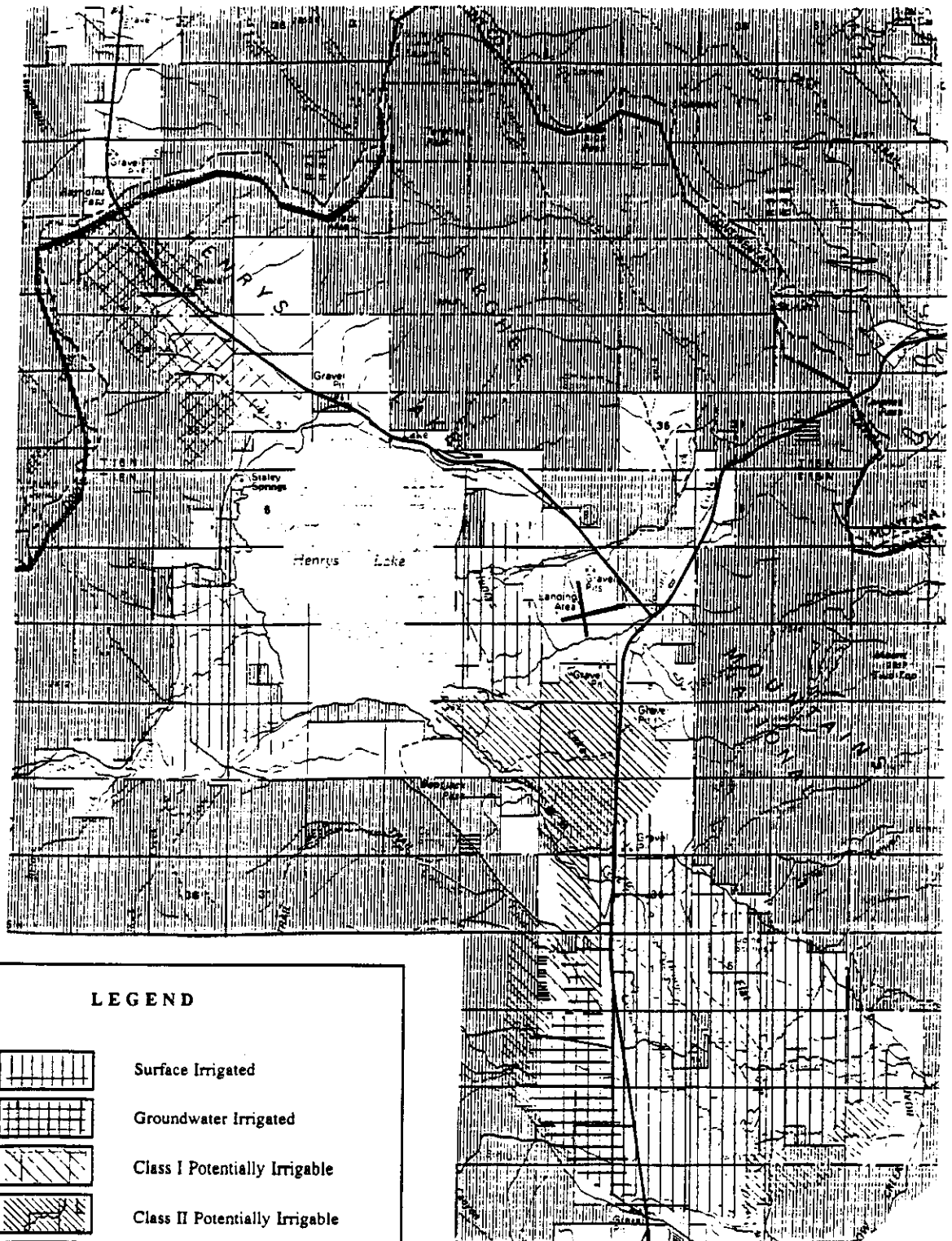
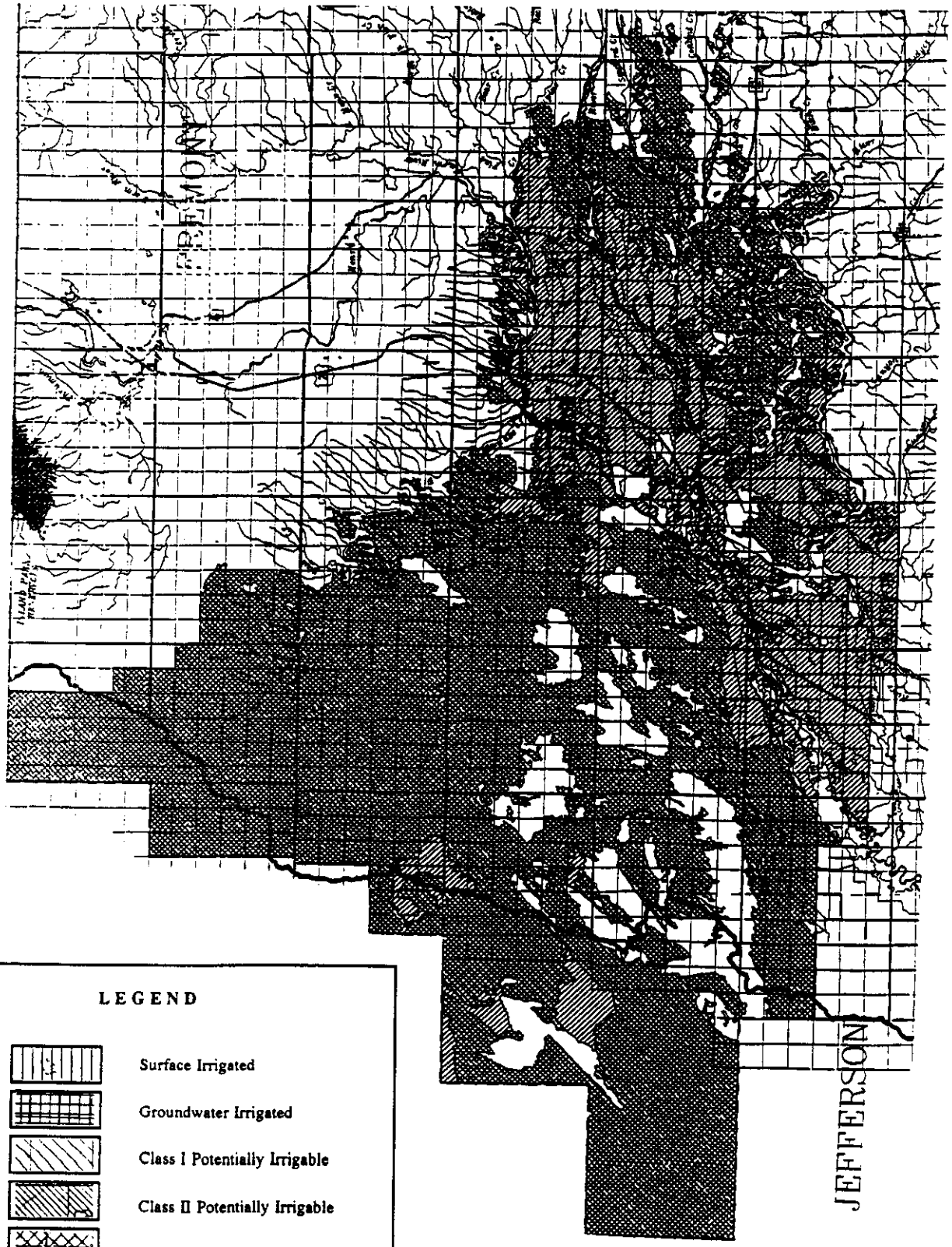


Figure 17: Irrigated and Potentially Irrigable Land - Sand Creek and Camas Creek Plateau



LEGEND

- Surface Irrigated
- Groundwater Irrigated
- Class I Potentially Irrigable
- Class II Potentially Irrigable
- Class III Potentially Irrigable

Sources

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Livestock Water

The 1988 inventory of livestock in the basin is shown in Table 29. As a general rule, the State of Idaho allows 12 gallons of water per day per head for beef cattle, horses, and mules. Up to 35 gallons per day per head may be appropriated for dairy cows. Four gallons per day may be used for each hog, while goats and sheep are limited to no more than two gallons per day per head. A more conservative, and perhaps more realistic estimate of stockwater use (USGS Circular 1001) assumes summer water use for cattle is nine gallons per day with winter use at one-half that amount. The average water use, therefore, is three-fourths the summer use (6.75 gpd). Feeder cattle and calf use is reduced to three-fourths of that amount (5 gpd) because of their reduced average size from adult cattle. The equivalent of five sheep and hogs per cow for water use is assumed. Sheep and hog usage also is reduced by one-quarter because of the inclusion of all age groups in the numbers given. One sheep or hog, therefore, needs approximately one gallon per day. The total livestock water usage shown in Table 29 for 1988 was 440 acre-feet per year. A consumptive use rate of 86 percent (USGS Circular 1001) gives a consumptive use of 380 acre-feet.