Table 29. 1988 Livestock Numbers and Water Usage

	Beef Cows	Dairy Cows	Feeders & Calves	Sheep	Hogs
Madison	9,800	2,200	15,000	3,900	1,090
Fremont	8,700	1,800	11,500	11,000	630
Teton	4,900	1,700	5,900	15,000	30
TOTAL	23,400	5,700	32,400	29,900	1,750
Present water usage in AF	177	43	184	34	2
Total = 440 AF					
Future water usage in AF	236	57	245	68	4
Total = 610 AF					

Current Idaho cattle numbers are about 75 percent of the peak for the last 15 years, while sheep and hog numbers are less than one-half the previous high. It is possible livestock numbers could return to these peak values. Future water use is projected to be equal to the historic high. This gives a Henrys Fork Basin livestock water use of 610 acre-feet per year or a consumptive use of 520 acre-feet.

Livestock water use is very low relative to other uses. For accounting purposes, the Idaho Department of Water Resources assumes livestock consumptive use to be inconsequential. Using the U.S. Geological Survey's numbers, current livestock consumption might increase by 140 acre-feet to a total of 520 acre-feet.

Recommended Action

1. Encourage livestock operators to file a claim for instream watering rights where there are or potentially will be upstream water users.
2. Educate livestock operators on the requirement that any stream-bank construction to alter the natural drinking pattern done after 1971 requires a water right.
3. Provide for instream watering of livestock in such a manner as to limit erosion, pollution and interference with instream recreation.

Sources

1988 Idaho Agricultural Statistics, Idaho Agricultural Statistical Service. Also previous issues.

Solley, W.B., Chase, E.B., and Mann, W.B., IV, 1983, Estimated Use of Water in the United States in 1980: U.S. Geological Circular 1001, p. 14.

Mining

There are some potentially commercial mineral deposits in the Henrys Fork Basin, however commercial production currently occurs only on a sporadic basis other than for sand and gravel extraction. The primary use of sand and gravel is for road construction. The 40 to 60 developed deposits, appear to be sufficient to serve local needs. Two quarries located east of Rexburg also provide crushed basalt for road aggregate. To produce asphaltic concrete, some nonconsumptive water is used for washing the crushed aggregate. Local construction also uses a minor amount of sand, gravel, and water for concrete production.

Local coal deposits have been mined sporadically in open-pit operations. The best quality deposit in Idaho occurs at the headwaters of Horseshoe Creek, located ten miles west of Driggs. The coal ranges from subbituminous to bituminous and is low in ash content. Lower grade coal, known as lignite, is found in thin beds in several Idaho areas, primarily in southwest Idaho. Lignite is better used for gasification or for carbonization instead of as a heat source. Carbonization is an initial step in the production of ammonia, synthetic fibers, and asphalt.

The Horseshoe Creek coal deposit is about five miles long and two miles wide, and is part of the Teton Basin coal field which extends nearly 15 miles in a southeast direction along the Big Hole Mountain Range. Nine separate beds over 14 inches thick have been described in this formation. The two largest beds are five and nine feet thick, although the nine-foot layer has an inner layer of sandy clay about one foot thick. The beds are extensive, but the coal grades to a lower quality to the southwest near the Pine Creek campground outcrops (Sec. 24, T3N, R44E). Because the coal beds dip steeply to the southwest, open-pit mining is limited. However, there is some potential for future development of this deposit. There likely will be no direct consumptive water use for coal mining. Even short distance movement to a valley floor-plant use would probably be by conveyor instead of with a slurry pipeline.

Similar to coal in origin, the small peat deposits located along the Teton River near Driggs and Victor also have had past commercial uses. Other locations in Idaho, Bear Lake (near Montpelier) and the Kootenai River area, have more extensive deposits. The Teton River deposits have some potential for soil conditioner use.

Another potential mineral resource in the basin is phosphate. Most Idaho phosphate deposits are located south of the Henrys Fork Basin. However, there are phosphate deposits within the Big Hole Mountain Range in the same sedimentary rock formation as the coal deposits previously described. These deposits extend into southeast Madison County with levels up to 18 percent phosphatepentaoxide (P_20_5). Additionally, there are phosphate deposits in the Centennial Mountain Range. About 1700 acres currently are under lease four miles north of Sheridan Reservoir, northwest of Island Park Reservoir at the Idaho border. A limited amount of phosphate ore has been taken from this deposit to reduction facilities outside the basin, but mining has not continued. Phosphate rock is also found east of Henrys Lake around Howard Creek. A by-product of phosphate mineral producing is vanadium, largely used in hardened steel. All of these phosphate deposits evidently dip to such a degree that open-pit mining is not feasible. This reduces the economic potential of these deposits relative to other Idaho deposits.

Oil and gas potential in the basin centers in the same Big Hole Mountains where coal and phosphate deposits are located. The geologic structure in the Teton Basin-Big Hole Mountains-Snake River Range area is an extension of the overthrust belt of Wyoming. In Idaho some of the potential reservoir rocks are too highly fractured to make good traps for oil and gas. Recent volcanism is an additional negative influence upon the collection of oil and gas into reservoirs. Federal land between the Teton Basin and the Snake River is covered with oil and gas leases. Several exploratory holes have been drilled within this area with no success.

Some oil shales in the Big Hole Mountains-Snake River Range have yielded as much as 38 gallons of oil per ton. However, these oil shale beds are thin, of limited areal extent, and generally dip steeply making open-pit mining difficult.

There is one known decorative building stone quarry located north of Island Park Reservoir in the Tin Cup Creek area. The only other minable product in the basin is gem stones. While the potential

economic importance of gem stones is not great, for the part-time collector there are a few noteworthy occurrences of gem stones in the Henrys Fork Basin. The best source of jade in Idaho appears to be in the bedrock of Bitch Creek, perhaps extending down as far as the canyon mouth of the Teton River. The quality is poor to medium with an occasional piece of "excellent" gem quality.

Variscite, a mineral with similar characteristics to turquoise but with a rich yellowish-green color, has been reported in a private claim in the Mount Two Top area, east of Henrys Lake. This mineral results from phosphate-impregnated water seeping through aluminous rocks.

With various coloring, chalcedony is a translucent relative of crystalline quartz found in pegmatities, a large-grained, slow-cooled granite. Agate is chalcedony, with impurities causing patterns and bands, of a quality suitable for gem cutting. Jasper is an impure opaque variety of chalcedony. These chalcedony minerals have from time to time been reported in Fremont County, however, good prospecting sites may only be located outside the Henrys Lake Basin. The naming of Crystal Butte located 23 miles north of St. Anthony relates to these chalcedony minerals but the current availability of the mineral is questionable.

Sources

Land Management Plan for the Targhee National Forest, 1985.

Columbia-North Pacific Region Comprehensive Framework Study, Appendix IV, Land and Minerals, Subregion 4.

Mineral and Water Resources of Idaho, U.S. Geological Survey Special Report No. 1, November 1964.

Gem Minerals of Idaho by John A. Beckwith, The Caxton Printers, Ltd., 1987.

Navigation

There is no commercial navigation in the Henrys Fork Basin. Waterway use for recreational purposes does take place and is discussed in the recreation section.

Title to the beds of all navigable bodies of water was granted to the State of Idaho at statehood. Only in rare exceptions has this title been transferred. With title, "The State will exercise its authority over beds of navigable lakes and streams in their present location as far as use of the beds are concerned to provide for their commercial, navigational, recreational or other public uses," Kootenai Environmental Alliance v. Panhandle Yacht Club, 105 Idaho 622, 671 P.2nd 1085 (1983).

Title rests with the State for Henrys Lake, the Buffalo River (mouth through Sec. 21, T13N, R44E (above Buffalo Springs)), and the Henrys Fork (mouth to Henrys Lake including Big Springs). In addition, for streams capable of floating six-inch diameter cut timber during normal high water, a public right-of-way below the ordinary high-water marks must be allowed (Idaho Code 36-1601). This allows for public use of the above listed water areas, but also all the other main water courses in the basin. Such use does not include access across private land.

Discussion of navigation related goals, objectives, and recommendations is within the recreation section.

Recreation

Recreational opportunities in the Henrys Fork Basin cater to local residents and visitors from throughout the United States. Proximity to Yellowstone and Grand Teton National Parks contributes to recreational use, but the basin charms visitors with its own outstanding attractions: Big Springs, Mesa Falls, Harriman State Park and fishing in Henrys Lake or the Henrys Fork of the Snake River. Sightseeing, nature study, fishing, boating and winter sports attract thousands of people annually to the basin.

The 1987 Idaho Leisure Travel and Recreation Study estimates that nine percent of all Idaho leisure travelers visit or travel through Region VI, which includes the Henrys Fork basin. (Region VI is composed of Fremont, Teton, Bonneville, Madison, Jefferson and Clark counties.) Only about one third of the travelers are visiting the Region as a major destination; two-thirds of the travelers to the Region are passing through, on their way to other destinations. Twenty percent of all Region VI travelers are headed for Yellowstone or Grand Teton National Park (Harris et al., 1988). The Henrys Fork basin, however, provides annually more than 1,000,000 visitor days of recreation use. A visitor day is defined as 12 visitor hours, e.g., one visitor spending 12 hours or 12 visitors spending one hour involved in a recreation activity. Recreation visitor days in the basin average an annual 1.4 percent increase, with dispersed use growing more rapidly than the use of developed facilities. Approximately 50 percent of the recreation visitors to the basin are from out-of-state. About three-quarters of the Idaho users are from the local counties (USFS-BLM, 1980; IDPR, 1983; 1989; U.S.F.S., TNF, 1985; 1989; Harris et al., 1988; Nellis, 1989b).

Federal agency personnel estimate and record recreational use on federal lands as Recreational Visitor Days (RVDs). To estimate RVDs, a sample is taken by patrol personnel. Table 30 describes and estimates recreational use in the basin, and separately estimates recreational use along three river segments. Recorded RVDs do not reflect total recreation use. Visitor use estimates are unavailable for all activities and areas of the basin.

Estimated use suggests a significant difference between summer and winter use as do entrance data for Yellowstone National Park (see Table 31). The 1987 Idaho Leisure Travel Study indicates that the largest proportion of travel to the region occurs in the summer (about 40%), with equal proportions (about 20%) spread across the other three seasons (Harris et al., 1988).

Recreation is a primary use of the northern portion of the basin, generally upstream of the town of Ashton, and the upper Teton basin. Camping and sight-seeing are the most popular summer activities. Fishing, boating, and swimming are the largest direct water-use activities. In the fall over a third of the leisure travelers to the basin are hunting, and almost 60 percent of all winter travelers participate in winter sports (Harris et al., 1988). Water-based recreation averages a five month season, from May to the first week of October. Table 32 summarizes 1987 Region VI resident and tourist surveys of recreation activity.

Accessibility

Recreational use is a function of access to points of interest. In the basin, recreational use is greatest at attractions near major roadways. U.S. Highway 20/191 traverses the basin, and is a main artery for traffic to the Henrys Fork, Island Park Reservoir, Henrys Lake and Yellowstone National Park. National Park Service (N.P.S.) records indicate that 40 percent of all visitors to Yellowstone

Table 30. Recreation Use - Henrys Fork Basin

Summer

Developed Sites	Close to Island Park Reservoir, Henrys Lake, Henrys Fork, Moose Creek, Buffalo River, Warm River, Rock Creek
Undeveloped Sites	Close to streams and rivers - widely distributed
Dispersed Activities:	
Hiking/Backpacking	Lionhead Mtn. Area, Two-Top Mtn. Area, Henrys Fork, Warm River
ORV Riding	Roads throughout the basin, Sand Mountain
Boating/Swimming	Henrys Fork, Teton River, Falls River, Warm River, Bitch Creek, Henrys Lake, Island Park Reservoir
Fishing	Lakes, rivers, and streams throughout the basin
Viewing	Along primary roadways and rivers

Winter

Developed Sites	Grand Targhee (in Wyoming)
Concentrated Use	Island Park Siding, between Coffee Pot Rapids & Island Park Reservoir, Big Springs Area
Dispersed Activities:	
Skiing (X-C)	Warm River Trail, Bear Gulch, Buffalo River, Harriman State Park
Snowmobiling	Trails and roads throughout the basin

Source: USFS-BLM, 1980

Estimated Use and Annual Recreational Visitor Days

Activity	Percent of Total Use
Dispersed:	
Driving for Pleasure	20
Trails	6
Reservoirs & Lakes	7
Rivers & Streams	6
Backcountry	16
Subtotal	55
Developed:	
Boating	1
Campgrounds	18
Picnic Areas	1
Hotel, Lodge-Resort	3
Private Organization Sites	5
Recreation Residence	6
Winter Sports	8
Other	3
Subtotal	45

Activity	RVDs
Sight-Seeing	172,800
General Day Camping	140,800
Snowmobiling*	87,800
Fishing	80,000
Picnicking	63,100
Recreation Cabin Use	57,200
Boating, Swimming and Water Play	34,000
Hunting**	29,000
Motorcycle/Trail Riding	27,200
Horseback Riding	21,500
Hiking and Walking	18,100
Organization Camping	10,200
Skiing and Snow Play*	9,000
Bicycling	4,400
Sand Mtn. ORV Riding	4,000
Nature Study	3,800
Other	29,600
TOTAL	792,000

* Primarily Winter	12½%	97,000
** Primarily Fall	3½%	29,000
Mostly Summer	84%	666,000

Source: U.S.F.S., Targhee National Forest, 1985; U.S.F.S., TNF, 1990 - RVD estimates for 1988; IDPR, 1990 - Henrys Lake and Harriman State Parks attendance records for 1989 and 1990; U.S. BLM, Medicine Lodge Wilderness EIS 1988, - estimate of Off-Road Vehicle RVDs at Sand Mountain.

Estimated Recreational Visitor Days in River Corridors

	Henrys Fork Big Springs to the Warm River 1987	2000	Warm River Warm River Springs to Henrys Fork - 1987	Falls River Yellowstone Park Boundary to Targhee NF Boundary - 1987
Camping: Developed	69,500	100,000	11,400	4,500
Dispersed	9,400	14,000		
Boating/Water Play	2,000	2,000	3,800	
Fishing	24,900	36,500	6,700	2,000
Hiking	1,000	1,500	1,200	3,500
Viewing/Scenery	35,600	41,500	17,200	11,500
Snowplay		5,500		
Total	142,400	201,000	40,300	21,500

Source: U.S.F.S., Targhee National Forest, Wild and Scenic Rivers Preliminary Study, 1989.

Table 31. Yellowstone National Park-West Gate Entrance (1989):

January	11,000	May	77,000	September	141,000
February	16,000	June	146,000	October	46,000
March	8,000	July	224,000	November	6,000
April	14,000	August	197,000	December	9,000

travel through the West Yellowstone gate, and will therefore cross the Henrys Fork basin. Entrance through West Yellowstone in 1989 was 895,000 visitors (N.P.S., Yellowstone National Park, 1990). National Park visitors use facilities in the Henrys Fork basin on their way to and from Yellowstone and Grand Teton, or as an alternative camping or lodging base when the Parks are crowded. Preliminary figures for 1991 indicate an annual increase of approximately seven percent since 1989.

The road network and access to Henrys Lake, Island Park Reservoir and the Henrys Fork, between Big Springs and Riverside Campground, is fairly extensive. U.S. Highway 20/191 crosses the river at Macks Inn and Osborne Bridge, and parallels the river for a short distance at Last Chance. Access to the upper Teton drainage, Canyon Creek and Moody Creek is provided by state Highways 32 and 33, and county and Forest Service gravel or dirt side roads. A Forest road off of Highway 33 also provides access to the Grand Targhee ski resort. The ski resort is located above Alta, Wyoming, just across the state line, but the only road access is through Driggs, Idaho. Numerous Forest roads, both all season and paved, provide access to developed recreation sites both on public and private lands. Spur roads head to the Centennial Mountains and the adjacent Madison River drainage. U.S. Highway 20/191 meets the Henrys Fork again near St. Anthony, and below St. Anthony rural roads provide frequent access to the river.

Access to the Henrys Fork between Riverside Campground and the Warm River confluence is limited. From Riverside Campground to the Targhee Forest boundary, the Henrys Fork is accessed in six places with unimproved roads and foot trails. Undeveloped trails, resultant from big game and fisherman use, parallel both sides of the river from Riverside Campground to Lower Mesa Falls. The Targhee National Forest plans to develop a hiking trail parallel to the Henrys Fork from Osborne Bridge to the Warm River confluence, to improve access to the river along this stretch (U.S.F.S., TNF, 1989).

In 1989 State Highway 47 was classified as the Mesa Falls National Scenic Byway, by the U.S. Forest Service. The paved two-lane road provides an alternative scenic loop to U.S. Highway 20/191 between Ashton and Harriman State Park. The road provides access to the Falls River, the Warm River, and the Henrys Fork between Ashton and the Warm River confluence. Recreation use and

traffic is expected to increase in the area with designation of the Scenic Byway, planned developments at Upper and Lower Mesa Falls and an overlook facility at Sheep Falls (U.S.F.S., TNF, 1989).

Table 32. Activity Participation Rates for Region IV Residents and Travelers

Activity	Percent of Resident Households with at least One Participant	Occasions per Household*	Annual Activity Occasions	Percent of Resident Travelers	Percent of Non-resident Travelers
Fishing from Boat	39	2.6	291,500		
Fishing from Bank/Dock	59	3.7	411,300		
Fishing (Lakes/Reservoirs)				32	32
Fishing (Streams/Rivers)				75	77
Swimming (Beach)	18	1.1	122,800		
Swimming (Lakes)				8	8
Swimming (Rivers)				24	8
Visiting Beach (not swimming)	15	0.5	60,200	12	15
Power Boating (River)	7	0.1	15,200		
Power Boating (Lake)	18	0.6	67,000		
Power Boating				23	2
Water Skiing	15	0.8	88,600	3	0
Non-Motorized Boat (Lake/Reservoir)	12	0.7	80,200		
Non-Motorized Boat (River/Stream)	16	0.9	98,500		
Rafting				19	11
Canoeing				15	21
Other Tubes/Boats				19	3
Nature Study	85	8.5	947,400	50	60
Hiking/Walking	88	35.6	3,960,700	39	30
Camping	64	5.8	642,500	28	32
Snow Activities	49	8.5	946,000		
Skiing				35	43
Snowmobiling				41	23
Snow Play				18	41
ORV Driving	44	4.5	504,500		
4 x 4 ORV				70	30
Motorcycle/ATV				29	70
Bicycling/Horseback Riding	61	12.7	1,412,900		
Bicycling				21	56
Horseback Riding				79	44
Sight-Seeing	88	21.4	2,374,700	71	79
Hunting	50	7.7	854,500		
Big Game Hunting				89	55
Waterfowl Hunting				8	39

* Four month period

Source: Idaho Department of Parks and Recreation. *1989 Idaho Outdoor Recreation Plan.*

The Falls River has good access from its mouth upstream to Yellowstone Dam, located two miles above the Targhee Forest boundary. Two graveled roads parallel the river, the Cave Falls Road, and the Ashton-Flagg Ranch Road. These roads are not kept open during the winter, but are groomed for snowmobile use. From Yellowstone Dam upstream past the Idaho border the only access is by trails.

Much of the lower portion of the Warm River is visible from Idaho State Highway 47, located near the canyon rim. The highway is only kept open to Bear Gulch during the winter, however, this plowed stretch provides spectacular views of the river during that time. Warm River is generally inaccessible by road, however, a two lane dirt road accesses the Warm River Spring. The river may also be accessed by foot via the abandoned Yellowstone Branch of the Union Pacific and Oregon Short Line Railroad. The rail bed parallels the river, and now serves as a high-standard recreation

trail. In summer the trail is managed for non-motorized use and in winter it is used by snowmobiles and cross-country skiers.

There are extensive well maintained all-season forest access roads throughout the plateau between the Henrys Fork and Yellowstone National Park. These roads allow for sightseeing in the area. Most Forest Service Roads and county roads, located on the plateau above Ashton, are not kept open during the snow season.

Fishing

The sport fishery of the Henrys Fork above St. Anthony attracts fishermen from throughout the nation with a reputation as one of the best trout fishing areas in the United States. With an annual use of nearly 80,000 visitor days in the basin the net economic value of the Henrys Fork fishery is estimated at $2.8 million (Loomis, 1985). The Henrys Fork above Ashton is possibly the most important fishing stream in the State of Idaho. Angler hours vary by segment and year in response to regulations and fish population fluctuations. Despite variability, total angler hours increased over 27 percent from 1976 through the 1980s, (U.S.F.S., TNF, 1990; IDFG, 1990; Angradi and Contor, 1989; Brostrom, 1987; Rohrer, 1984; 1981; Moore et al., 1983; Jeppson, 1982; 1981; Coon, 1977; 1978). Angradi and Contor (1989) found that approximately 45 percent of the anglers surveyed on the Henrys Fork were Idaho residents, and 55 percent were nonresidents. Ninety-one percent of the Idaho residents were from eastern Idaho.

Outfitters use the Henrys Fork and the Teton River extensively for commercial fishing/float trips. To date nine outfitters are licensed to operate on the Henrys Fork, and six outfitters are licensed to operate on the Teton River by the Idaho Outfitters and Guides Licensing Board.

Sorg et al. (1985) found that the net economic value (consumer surplus) of a fishing trip on the Henrys Fork was worth $37. This means the typical angler would be willing to pay an additional $37 per trip over and above current expenditures. The gross value is the sum of expenditures (transportation, lodging, food, tackle) and the consumer surplus, which totaled $82 per trip for the Henrys Fork. The gross value for Henrys Lake totaled $160, and $107 for fishing on Island Park Reservoir in 1982. Comparative estimates of gross value for other Idaho fishing areas are listed in Table 33.

Table 33. Comparative Values of Coldwater Fishing (1982 Survey)

Henrys Fork	$ 82
Teton River	73
Henrys Lake	160
Island Park Reservoir	107
Snake River (above Am. Falls)	63
Swan Valley	73
Blackfoot River	59
Blackfoot Reservoir	78
American Falls Reservoir	55

Source: Sorg et al., 1985 Net Economic Value of Cold and Warm Water Fishing in Idaho

Hunting

The Idaho Department of Fish and Game estimated 40,000 hunter days for 1989 in the Game Management Units of the basin. Bird hunting estimates totaled an additional 16,900 hunter days in

the three basin counties (IDFG, 1989). The total number of hunter days in Idaho has increased approximately five percent annually since 1983 (IDFG, 1990). Consecutive annual estimates for hunting in Units 60, 61, 62, 64 and 65, Management Units of the basin, indicate annual fluctuations in deer and elk hunter days (see Table 34). Units 60 and 61 are the most used while Unit 65 is the least used (see the following map). The variability in hunter days is due to fluctuations in big game populations and controlled hunt permits. The net economic benefit for deer and elk hunting in the basin is over $2,000,000 based on a $50 per day value (Sorg and Nelson, 1986; U.S.F.S., TNF, 1985).

Table 34. Big Game Hunter Days Estimate

Year	Unit 60	Unit 61	Unit 62	Unit 62A	Unit 64	Unit 65	Total Estimate
1983	15,550	17,400	6,210	6,270	5,410	1,760	52,600
1984	9,150	12,190	3,430	3,480	4,750	1,250	34,250
1985	13,210	17,940	4,240	3,820	6,650	2,260	48,120
1986	15,730	11,240	6,030	4,800	7,120	3,330	43,250
1987	15,430	16,310	5,760	3,920	7,330	2,360	51,110
1988	15,770	17,410	6,420	4,670	6,000	3,160	53,430
1989	11,520	11,930	4,840	4,410	5,130	2,280	40,110

Source: Idaho Department of Fish and Game Harvest Estimates

Wildlife Observation

Great opportunity for wildlife observation is available in the Henrys Fork basin. The basin is rich in prime wildlife habitat and sanctuaries. Nature study ranks high in Region VI recreation activity surveys (see Table 32). The Idaho Leisure Travel surveys (1987) also indicate that nature study is a popular activity in the region year-round (Harris, et al., 1988). The Idaho Department of Fish and Game estimates over 1,400 visitor days annually for wildlife education, photography and viewing at the Sand Creek and Cartier Wildlife Management Areas (see Table 35). Harriman State Park is popular with bird watchers and offers environmental education programs to approximately 2,000 local school children each fall.

The Idaho Department of Fish and Game owns and manages recreation areas in the Henrys Fork basin. IDFG Managed Access Areas are listed below, and are located on Figure 18.

Henrys Fork

Sand Creek Wildlife Management Area	Camping, fishing, waterfowl, upland bird, and big game hunting
Ashton Reservoir	Camping, boat ramp, fishing
Chester Reservoir	Camping, fishing
Davenport Island	Fishing
Warm Slough	Camping, boat ramp, fishing, waterfowl, upland bird and big game hunting
Cartier Wildlife Management Area	Fishing, waterfowl, upland bird and big game hunting

Moody Creek — Fishing

Teton River

Badger Creek	Fishing
Harrops Bridge	Fishing
Cache Bridge	Boat ramp, fishing
Raineer	Camping, boat ramp, fishing, waterfowl hunting
Bates Bridge	Boat ramp, fishing
Teton Creek	Boat ramp, fishing
Fox Creek West	Camping, boat ramp, fishing, waterfowl hunting
Fox Creek East	Camping, fishing, waterfowl hunting

Table 35. Wildlife Management Area User Days

Use	Sand Creek User Days	Cartier User Days
Fishing	10,000	90
Hunting	5,920	310
Education and Scientific	60	200
Photography	50	–
Wildlife Observation	400	20
Sight-seeing	600	120
Other Recreation Activities	6,240	10
Total	23,000	700

Source: Idaho Department of Fish and Game, Region 6 Wildlife Management Area Plans 1986-1990

Walking, Hiking, and Trail Riding

Recreational visitors make use of maintained hiking, skiing and snowmobiling trails in the basin. Trails frequently follow basin streams, however, developed trails along the Henrys Fork and the Falls River on Forest Service land are limited. Two short trails parallel the Henrys Fork: one at Upper Coffeepot Campground and another at Box Canyon Campground. Another short trail between Big Springs and Big Springs Boat Launch is planned for the near future. Undeveloped trails, resultant from big game and fisherman use, parallel both sides of the Henrys Fork from Riverside Campground to Lower Mesa Falls. Developments being studied for the Henrys Fork from Osborne Bridge to the Warm River confluence include a hiking trail paralleling the river (U.S.F.S., TNF, 1989).

Other developed trails following streams include the Targhee Creek Trail, in the northeast corner of the basin, the Moose Creek, Bitch Creek and Canyon Creek trails, and along the Warm River an abandoned railroad right-of-way trail (U.S.F.S., TNF, 1989). In the Teton Basin, several trails extend up drainages and over the mountain passes into Grand Teton National Park. Warm River is generally inaccessible by road, however, the abandoned Yellowstone Branch of the combined Union Pacific and Oregon Short Line Railroad company parallels the river, and now serves as a high standard recreation trail. In summer the trail is managed for nonmotorized use and in winter it is used by snowmobiles and cross-country skiers.

Camping

Numerous campgrounds situated along basin reservoirs, lakes and rivers, afford visitors opportunity for an intimate lakeside or riverside experience, and often provide easy foot access to the water. Over 22 public, developed recreational sites, containing picnic tables and campsites, are available in the basin. Existing facilities are generally operating within or below capacity, but some campgrounds are over-utilized during summer weekends. The most popular campgrounds are located adjacent to major water courses. Public campgrounds containing picnic tables and campsites are located on Figure 18 (U.S.F.S., TNF, 1985; 1989). Public campground sites and estimated use are listed in Table 36. Small city parks are located in several local communities and private recreation facilities: lodges, inns, resorts and restaurants, are common along reservoir and lake shorelines and major roadways.

Fremont County maintains the William Frome County Park on the northwest side of Henrys Lake. The site provides an open area for camping, parking, a boat ramp and dock facilities. Two State Parks are located in the basin: Henrys Lake and Harriman. The principal activities at Henrys Lake (680 acres) are fishing and camping. Harriman State Park (4,060 acres along the Henrys Fork, 11,700 acres total holdings) attracts fishermen, bird watchers, hikers, horseback riders and cross-

country skiers to its wildlife preserve. Attendance figures for Henrys Lake and Harriman State Parks are shown in Table 37. Expansion is planned at Henrys Lake Campground to 50-60 units (IDPR, 1990).

The Targhee National Forest operates 16 developed sites in the basin. Four campgrounds are at Island Park Reservoir, six along the Henrys Fork (three above and three below Island Park Reservoir), one on the Buffalo River, one at Howard Spring, two in the upper Teton drainage, and two on the Warm River.

Warm River Campground is unique in offering wheelchair and other handicapped visitors exceptional access to the river. This 285 person capacity campground is often full during the summer months. The campground is also used as a snowmobile and cross-country skiing trailhead during the winter. The Warm River Fish Hatchery has been dismantled and the site is slated for development as a trailhead, picnic, and scenic attraction area by the Targhee National Forest.

Along the Falls River the Cave Falls Campground, located in Wyoming, is receiving increased use over time. This campground has 23 units plus a group use site. Yellowstone National Park has developed an overlook, trail system, and picnic facilities just above the campground and up to Cave Falls.

There are no developed recreation facilities on BLM land in the basin, but the BLM has designated the sand dune area west of St. Anthony as a special recreation management area for off-road vehicles (ORVs). Most BLM land is used at times for such dispersed activities as hunting, fishing, camping and rock climbing. The BLM does not have reliable estimates of the total recreational use of its lands in the basin, but annual use of the Sand Mountain dunes area is estimated at 4,000-5,000 Recreational Visitor Days. Two developments, a campground and a day-use facility, are planned for the Sand Mountain recreation area. The campground would contain 40-50 units for overnight camping and would be located north of the Sand Hill Resort. The day-use facility would consist of a parking area to provide access to the open sand dunes. It would be located south of the Sand Mountain recreation area boundary (BLM, 1988).

Figure 18:
Campgrounds, Sportsman Access, and Boating Access Points

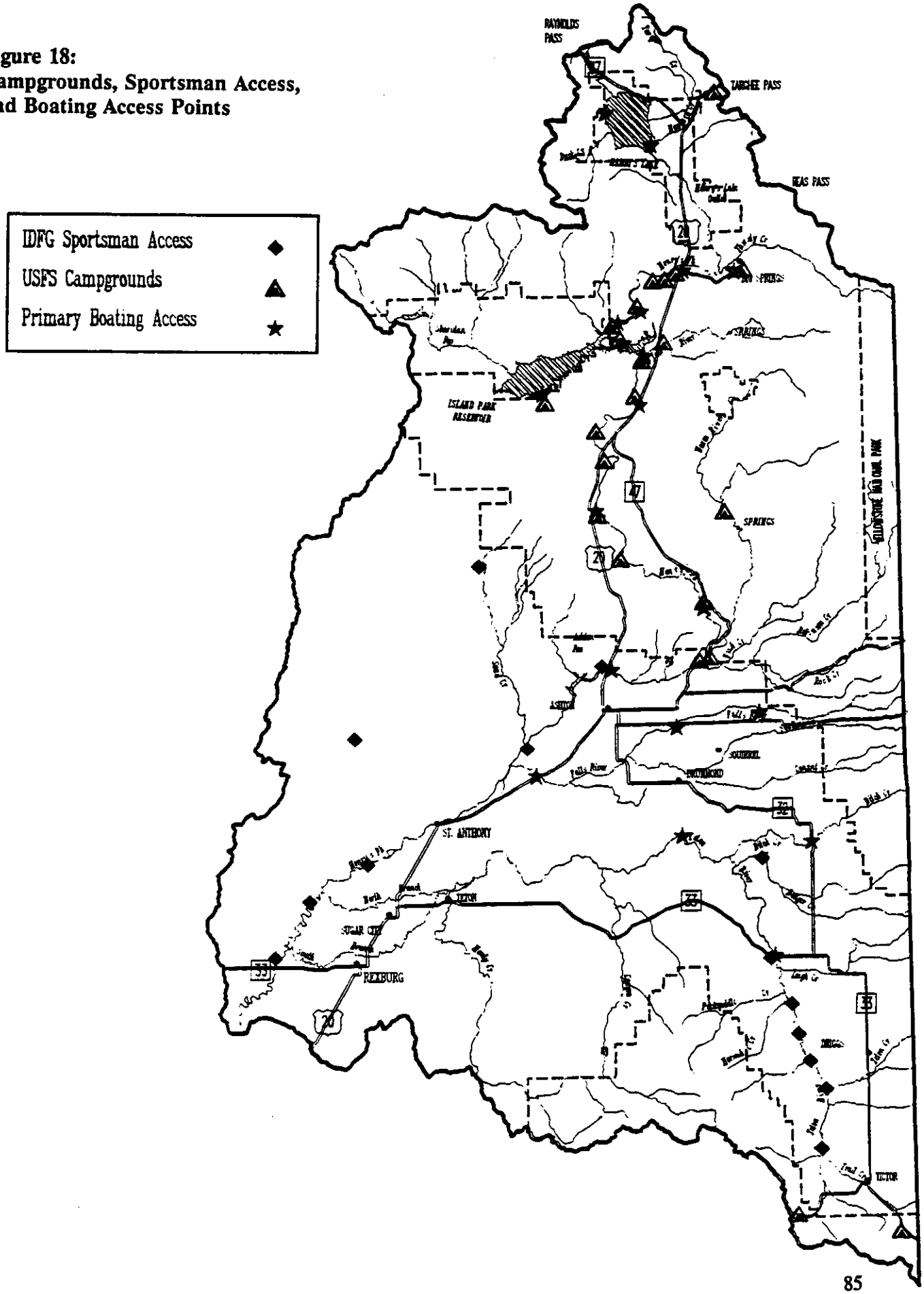


Table 36. Henrys Fork Basin Developed Public Campgrounds

	Units	Visitors	RVDs	
State of Idaho				
Henrys Lake	33	28,860	20,590	
Harriman	Group Camping	28,210	16,130	
Targhee National Forest (1988)				
Buttermilk	66	12,850	19,280	
Mill Creek	12	2,220	3,330	
McCrea Bridge	25	5,970	8,960	
West End	25	8,780	13,160	
Howard Spring		19,380	400	(Picnicking)
Big Springs	15	2,190	3,280	
Flat Rock	45	10,240	15,370	
Upper Coffee Pot	14	5,520	8,270	
Buffalo	127	22,760	33,170	
Box Canyon	19	4,200	7,370	
Riverside	55	9,700	7,470	(Picnicking)
Pole Bridge	20	2,300	4,600	
Grandview	5	650	1,300	
Warm River	12	5,600	11,200	
Pine Creek	11		1,340	
Mike Harris	12		2,560	
Fremont County				
William Frome	Open Camping			

Source: Targhee National Forest - Island Park Ranger District, Gene Hardin; Ashton Ranger District, Doug Muir; Teton Basin Ranger District, Linda Merigliano Nellis, 1989b; Idaho Department of Parks and Recreation, 1990.

Table 37. Henry's Lake and Harriman State Parks Attendance Figures

	Campers			Day Users		
Henry's Lake State Park	**Resident**	**Non Resident**	**Total**	**Resident**	**Non Resident**	**Total**
1980	3629	4596	8225	7915	4362	12277
1981	4041	4629	8643	4098	2016	6114
1982	3410	4227	7647	2685	999	3684
1983	4092	4822	8914	5232	769	6001
1984	5154	4389	9543	9908	3648	13556
1985	5016	4389	9405	12892	4367	17259
1986	4492	4484	8976	15917	5672	21589
1987	9664	4730	14394	12208	5384	17592
1988	3785	4266	8051	7143	3139	10282
1989	4372	1789	6161	17571	5127	22698
	Campers			**Day Users**		
Harriman State Park	**Resident**	**Non Resident**	**Total**	**Resident**	**Non Resident**	**Total**
1982	-	-	-	9146	2910	12056
1983	-	-	-	8235	3546	11781
1984	-	-	-	8376	4964	13340
1985	417	62	479	12895	10434	23329
1986	665	332	997	13562	10361	23923
1987	853	70	923	15043	10164	25207
1988	1487	584	2071	15746	8654	24400
1989	1484	540	2024	16025	10158	26183

Source: Idaho Department of Parks and Recreation, 1990.

Boating/Floating

In 1981 approximately four miles of the Henrys Fork, from the Big Springs boat ramp to the U.S. Highway 20/191 crossing at Macks Inn, were designated as a National Recreation Trail by the U.S. Secretary of Agriculture. Termed the Big Springs Water Trail, this trail is the first water trail in the National Recreation Trail System, testifying to its unique float-boating opportunity. This calm water stretch of the Henrys Fork offers abundant opportunity for wildlife viewing. The area is administered by the Island Park Ranger District of the Targhee National Forest. During the summer, the Macks Inn Resort rents canoes, rafts, tubes and paddle boats, and offers a shuttle service between Macks Inn, the Big Springs boat ramp, and Upper Coffee Pot Campground. Because of its close proximity to several resorts, a corridor highway, and summer homes, and its relatively short floating time and easy access, the Big Springs-McCrae Bridge stretch of the Henrys Fork receives recreational use throughout the week during the summer. The Targhee National Forest has plans to improve their launch site on the upper end of the Big Springs Water Trail with a parking lot, small boat ramp and toilet facilities (U.S.F.S., TNF, 1989).

Boating surveys done in 1983 and 1989 indicate an increase in boating recreation from Island Park Dam to the Last Chance Resort Village. This Whitewater Class II segment runs through a basalt canyon. Fir trees and a dense undergrowth of shrubs line stretches of the river through the canyon until it opens near Last Chance. Because the rim of the canyon is much higher than the water, developments on top cannot be seen by boaters. Boaters and fly fishermen have potential conflicts in this area, and for the next several miles, where there is easy access to the river. After passing Last Chance, the river enters the boundaries of Harriman State Park. There are no boating access points within the Park, however, several access points are available both above and below the Park. Local businesses provide boats for rent. The Targhee National Forest plans a parking lot, small boat ramp and toilet facilities for the Box Canyon and Last Chance boat launch areas (U.S.F.S., TNF, 1989).

Kayaker on the Falls River.

Below Riverside Campground the Henrys Fork enters a deep steep-sided canyon. This reach of the river offers a challenging float-boating experience characterized by steep rapids, rocks, and pools. Because of steep undisturbed slopes and the general lack of vehicle or trail access, the 18 miles of canyon to Sheep Falls affords visitors the solitude often associated with a primitive recreation experience. Boaters who go beyond Riverside Campground must plan ahead as there are few access points downstream, and they must take out before Upper Mesa Falls. In the first few miles below Lower Mesa Falls there are several Whitewater Class II+ and III rapids, including a seven-foot waterfall. This lower area has significant boating use. The river then becomes progressively easier going downstream. This section of the river is floated by commercial fishing guides in drift boats. Primary put-in and take-out points along the Henrys Fork are shown on Figure 18.

The primary recreation activity on both the Warm River and the Falls River is fishing. The Falls River has not been popular for floating above the Targhee Forest boundary because of the numerous waterfalls and cascades. Near the Warm River Campground floating is very popular. Most of the water play activities occur below the cascades, in the first 4.5 miles upstream of the campground. There has not been significant conflict between fishing and water play activities because fishing activity is concentrated around the early morning and late evening hours. Falls River, Bitch Creek and the Teton River are cited for boating potential in whitewater literature (Moore and McClaran, 1989). The last two miles of the Buffalo River, below Elk Creek, and one mile of Elk Creek, from the reservoir to its mouth, have good canoeing potential. The 4.5 mile section of the Upper Buffalo River, from Buffalo Springs (SW1/4, Sec. 21) to just below the old railroad grade, has good floating potential.

Henrys Lake, Island Park Reservoir, Ashton Reservoir and smaller lakes and reservoirs within the basin provide flat-water boating opportunities. Boat counts at Henrys Lake (IDPR, 1980-1990) indicate a 100 percent increase over 1980 figures. Most boating is associated with fishing. Data is not available for Island Park and Ashton Reservoirs. The east end of Island Park Reservoir has high boating use because of nearby summer home facilities.

Optimum instream flows for boating vary with the reach and the craft. Kayaks, rafts, driftboats and canoes are used on the Henrys Fork and tributaries. Motorized boats are used primarily at Island Park Reservoir, Henrys Lake and Ashton Reservoir. Irrigation releases from Island Park Reservoir enhance late summer boating on the Henrys Fork below the reservoir. Optimum stream flow and craft categories are listed in Table 38 by reach.

The non-motorized boating estimate for the Henrys Fork basin is 10,200 Recreational Visitor Days. Motorized boating is approximately 15,000 RVDs, primarily at Island Park Reservoir, Henrys Lake and Ashton Reservoir (U.S.F.S., TNF, 1990; IDPR, 1990). Most boating activity occurs between March and September, dependent on snowmelt variability and reservoir release schedules. Annual Outfitter and Guides Licensing Board reports and the 1983 and 1989 boater surveys, conducted by the Idaho Department of Parks and Recreation (IDPR), estimate boater use of the specific reaches shown in Table 39. Boaters responding to the IDPR survey (1983) said they chose boating on the Henrys Fork because of its accessibility, fishing opportunity, and scenery.

According to the IDPR 1989 boating survey, Idaho residents comprise 54 percent of the weekend boaters and 39 percent of the weekday boaters on the Henrys Fork from Big Springs to Island Park Reservoir. From Island Park Dam to Hatchery Ford, 63 percent of the weekend boaters and 45 percent of weekday boaters are Idaho residents. Ninety percent of the Idaho boaters are from eastern Idaho.

Launches on the Henrys Fork seem evenly split between weekends or holidays (47%) and weekday use (53%). Weekend use increased 17 percent over 1983 (IDPR, 1983; 1989). The IDPR Survey seems to indicate a drop in the number of boaters on the Big Springs Water Trail. However, IDPR personnel believe the drop may be due to a shorter survey day (hours/day) in 1989. Surveyors spent a longer day on the river in 1983.

Table 38. Optimum Stream Flow for Boating

	Optimum cfs	Craft
Big Springs to Island Park Reservoir	500-1750	Canoe, raft, kayak, powerboat, tubes
Island Park Dam to Hatchery Ford	1000-3000	Canoe, raft, kayak, drift boat
Lower Mesa Falls to Ashton Reservoir	1000-3000	Raft, kayak, drift boat
Ashton Dam to St. Anthony		Canoe, drift boat
Teton River	500-1000	Raft, kayak, drift boat
Falls River	500-2000	Canoe, raft, kayak, drift boat
Buffalo River	Unknown	Canoe, Kayak

Source: G. Moore and D. McClaran, 1989. Idaho Whitewater.

Table 39. Outfitter Reports and Boating Estimates

	1989		1988		1987		1986		1983
	Res	NonRes	Res	NonRes	Res	NonRes	Res	NonRes	
Henrys Fork: Big Springs to Island Park Reservoir									
IDPR Survey Estimate	3,130	3,640							8,377
Henrys Fork: Island Park Dam to Hatchery Ford									
Outfitters Total	48	613	27	619	86	509	41	636	
IDPR Survey Estimate	1,872	1,602							2,375
Total Estimate	1,920	2,215							2,375
Henrys Fork: Mesa Falls to St. Anthony									
Outfitters Total	25	764	32	707	76	375	29	259	
Henrys Fork: St. Anthony to Confluence									
Outfitters Total	55	31	47	8	30	14	-	-	
Teton River: Upper Put-in to Cache Bridge									
Outfitters Total	7	317	10	185	14	70	0	64	
Teton River: Cache Bridge to Harrop Bridge									
Outfitters Total	230	396	236	164	230	173	0	36	
Teton River: Harrop Bridge to Henrys Fork									
Outfitters Total	2	26	8	257	10	10	0	4	

Outfitters Total from Idaho Outfitters and Guides Licensing Board.
IDPR 1989 Boater Estimates are based on weekend and weekday averages for 12 surveyed weekends and 24 surveyed weekdays for the season May 29 to September 10, 1989 minus Outfitters.
IDPR 1983 Boater Estimates are based on weekend and weekday averages for 7 surveyed weekends and 14 surveyed weekdays for the season May 25 to September 3, 1983.

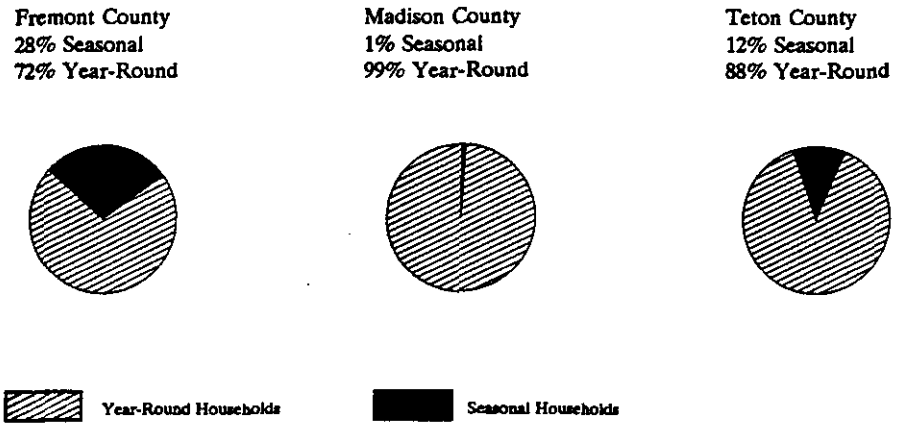
Special Recreation Use and Winter Sports

Special recreation uses in the basin include camping sites for large groups run by religious and scout organizations, second homes and the operation of winter sports areas. Private camps are scattered throughout the northern portion of the basin. Most of the recreation homes are adjacent to the Henrys Fork and U.S. Highway 20/191, or near West Yellowstone, Island Park Reservoir, or Henrys Lake. There are six recreation home areas located along the Henrys Fork: Big Springs, North Fork, Macks Inn, Box Canyon, Last Chance and Pinehaven. Moose Creek also has a developed summer home area. New recreation home building is prevalent at Henrys Lake, Island Park Reservoir and near Victor, in Teton County (Idaho Statesman, 1990;1989a)(see Figure 19).

With the increased popularity of winter recreation in the basin, many recreation homes are being used year-round (USFS-BLM, 1980).

Although Rexburg is not a major tourist center, it has developed an unusual travel economy. In the summer approximately 800 to 1,000 couples, largely from Sun City, Arizona, stay in empty student housing in and around Ricks College. Residents have been encouraged to develop events to keep the "sunbirds" coming back (Idaho Statesman, 1989b). The summer residents travel extensively throughout the basin and adjacent areas in day and extended-day trips.

Figure 19:
Secondary/Recreational Housing by County



Source: 1980 Housing Census, U.S. Department of Commerce

Recreation and the Economy

The 1987 Leisure Travel Survey found that the average expenditure of a group traveling to the northeast section of the state as a major destination was $143 for a two-day period. This average is greater than three other Idaho regions, but significantly less than expenditures in the Boise and Sun Valley areas (See Table 40, Harris et al., 1988). Nellis (1989a) reports that recreation-tourism dollars average 20 percent of total sales for Fremont and Teton counties (see Table 41). The tourism impact appears greater in Teton County because of its low population base. Activity centers on spill-over from high-priced development at Jackson, Wyoming, and the adjacent Grand Targhee ski resort.

The basin's winter recreation popularity appears to grow yearly. The Two Top Snowmobile Trail on the Targhee National Forest is now a designated National Recreation Trail. The Warm River Campground is a trailhead for snowmobiles and cross-country skiing along the abandoned river railway. Two roads along the Falls River are groomed for snowmobile use. Fremont County and the Targhee National Forest have cooperated to establish over 500 miles of groomed snowmobile trails in

the basin. Winter weekend use in the basin often exceeds 2,000 snowmobiles per day (USFS-BLM 1980; Nellis, 1989b). Cross-country skiing is popular at Harriman State Park, Bear Gulch and Warm River. Two developed alpine ski areas are adjacent to the basin: Grand Targhee near Driggs, and Kelly Canyon located east of Ririe. Teton County is particularly dependent on Grand Targhee Ski Area tourism, although receipts from the ski resort are registered in Teton County, Wyoming (Nellis, 1990).

As a growth driving industry, tourism in the Henrys Fork basin has not done as well as Sun Valley, McCall, Coeur d'Alene, and Jackson, Wyoming. One reason for the lack of comparable growth may be lack of a focal point for the recreation industry. The Fremont County recreation area is large. A focal point that could be emphasized more is Henrys Lake. A successful major development near the lake could have spin-off effects throughout the Island Park plateau. Major winter season use, such as a ski development, would assist in providing a good growth foundation.

Table 40. Average Traveler Expenditures

Region	Average Group Expenditure - 2 days
1 Lakes	$116
2 Clearwater	109
3 Southwest	172
4 South-Central	153
5 Southeast	133
6 Northeast	143
7 Sawtooth/Salmon	256

Source: The 1987 Idaho Leisure Travel and Recreation Study: Analysis for Region VI.

Table 41. Comparative Sales in Tourism-Related Sectors: FY 1989

Sector County	% Sales in Idaho	% Fremont County	% Teton County	% Madison
Eating and Drinking Places	7.1	9.0	9.9	.1
Lodging	2.1	3.8	4.9	.01
Amusements and Recreation Facilities	1.8	4.9	1.5	.01
Outfitters and Guides	.02	--	4.1	--
Service Stations	1.1	2.2	2.4	.01
TOTAL	12.3	19.9	22.7	.12

Note: Sales from service stations do not include the sale of fuel. Service stations are included to cover truck stops and convenience stores that sell meals, groceries, and similar items to travelers.
Source: Nellis, 1989a.

The recreation economy in the basin also appears, in many respects, to be an immature industry. In comparison to the typical four-stage life-cycle of an industry: introduction, growth, maturity and decline, the Henrys Fork basin might be said to be only in a late introduction stage. There are many small operators attempting to provide services, but recreation needs are not being met, particularly for the large out-of-state market. As the basin's recreation industry moves through the growth stage, managers will develop new services, greater experience, and financing in order to capitalize on recreational opportunities.

Market expenditures do not reflect the full value or net economic benefit to consumers, do not account for any external costs associated with production, and ignore resource intangibles, for example, wildlife, scenic beauty, water quality, and recreational opportunity. This divergence between economic and market values requires the careful measurement of net economic benefit in evaluating resources. Input/output models, used to estimate impacts on revenues, wages, and taxes, etc., measure levels of economic activity, but not net benefit from that activity.

The economic net benefit to society is a sum of the producer's surplus (profit) plus the consumer's surplus (willingness to pay above the price). The net benefit measures the addition to

well-being (welfare) in society from the use of a resource. To estimate the value of recreation, or the willingness to pay, it is necessary to rely upon methods of implicit pricing. Two standard methods used for this purpose are the travel cost method (TCM) and the contingent valuation method (CVM). Sorg and Loomis (1984) reviewed empirical estimate studies for recreation amenities. These studies, along with fishing and hunting surveys conducted in the Henrys Fork basin, report the net willingness to pay for recreational opportunities by participants (Sorg et al., 1985; Sorg and Nelson, 1985).

Recreation net benefits consist of user benefits and intrinsic or preservation value. User benefits are derived directly by recreationists in the course of on-site recreation activities like camping, fishing, boating, hiking, etc. In addition, people realize intrinsic or preservation value for the recreational opportunities of an area. Many people who do not currently participate in recreational use of an area, derive value from the existence of the natural quality of the region, from the opportunity to visit the site in the future, and from the knowledge that their children will be able to enjoy the natural resource in the future. The nonuser's willingness to pay for this existence value (Krutilla, 1967), option value (Weisbroad, 1964) and bequest value (Walsh et al., 1984) measures satisfaction with preservation of the natural quality of the area and the recreation opportunities it provides. Together these values are referred to as intrinsic value or preservation value, and they should be regarded in natural resource decision making (Weisbroad, 1964; Krutilla, 1967; Walker, 1990). Research has found that this intrinsic value accounts for 81 percent of the total willingness to pay for natural/recreational rivers (Walsh et al., 1984) or natural areas.

The most likely estimate of recreation benefits anticipates growth in recreation use at rates approximately equal to recent trends. RVDs are projected to increase at 1.4 percent annual rate, the same as the trend for developed recreation in the Targhee National Forest (U.S.F.S., TNF, 1985).

In 1989 dollars, real net benefit from recreation is approximately $100 million annually (see Table 42 and Table 43). Recreation net benefit estimates may err because the basin is not completely surveyed for recreation use. Without data to support an adjustment, no arbitrary compensation for unsurveyed activity was attempted. Recreation is potentially a major use of the Henrys Fork basin with large net benefits likely to accrue to residents of the region. Recreationists and tourists may also impact public facilities and services in any community. Visitors to the Henrys Fork basin sometimes need the assistance of local public safety services. The demand for public safety services could be much higher than normally expected in the area based solely on resident population.

Table 42. Estimated Net Value of Recreation Use in the Henry's Fork Basin (Real 1989 $)

Activity	Current Use Value $/Day	Hours/Day	Current Use Value $/RVD	RVDs	Current Use Value $/Year	Current Use Plus Preservation Value[a]
Sight-Seeing	3.47	4	10.42	172,800	1,800,576	9,476,716
General Day Camping	10.42	12	10.42	140,800	1,467,136	7,721,768
Snowmobiling	21.77	6	43.54	87,800	3,822,812	20,120,063
Fishing	21.30	4	62.65	80,000	5,012,000	26,378,947
Picnicking	10.79	4	32.37	63,100	2,042,547	10,750,247
Recreation Cabin Use	10.42	-	10.42	57,200	596,024	3,136,968
Motorcycle/Trail Riding	8.61	4	25.83	27,200	702,576	3,697,768
Hunting						
Big Game	48.72	7	83.53	24,200	2,021,426	10,639,084
Upland Bird	44.59	3	155.54	4,800	746,592	3,929,432
Boating						
Motorized	17.99	5	43.18	15,000	647,700	3,408,947
Non-motorized	23.77	7	40.75	10,200	415,650	2,187,632
Horseback Riding	14.58	-	14.58	21,500	313,470	1,649,842

Hiking and Walking	14.58	-	14.58	18,100	263,898	1,388,937
Organization Camping	10.42	-	10.42	10,200	106,284	559,389
Skiing and Snow Play	14.58	-	14.58	9,000	131,220	690,632
Swimming and Water Play	13.18	6	26.36	8,800	231,968	1,220,884
Bicycling	8.61	5	20.66	4,400	90,904	478,442
Sand Mtn. ORV Riding	13.30	5	31.92	4,000	127,680	672,000
Nature Study	3.47	4	10.42	3,800	39,596	208,400
Other	10.42	-	10.42	29,600	308,432	1,623,326

Table 43. Potential Increase (Likely Growth) in Net Value of Recreation (Real 1989 $)

Activity	Growth Rate % per Year	Use Value $ per Year [b]	Use Plus Preservation Value [a,b]
Sight-Seeing	1.4	2,297,534	12,982,278
General Day Camping	1.4	1,872,065	9,852,976
Snowmobiling	1.4	4,877,908	25,673,200
Fishing	1.4	6,395,312	33,659,536
Picnicking	1.4	2,606,289	13,717,315
Recreation Cabin Use	1.4	760,527	4,002,771
Motorcycle/Trail Riding	1.4	896,487	4,718,352
Hunting			
Big Game	1.4	2,579,339	13,575,471
Upland Bird	1.4	952,651	5,013,954
Boating			
Motorized	1.4	826,465	4,349,816
Non-motorized	1.4	530,369	2,791,417
Horseback Riding	1.4	399,988	2,105,198
Hiking and Walking	1.4	336,734	1,772,283
Organization Camping	1.4	135,618	713,781
Skiing and Snow Play	1.4	167,437	881,246
Swimming and Water Play	1.4	295,991	1,557,848
Bicycling	1.4	115,994	610,492
Sand Mtn. ORV Riding	1.4	162,920	857,472
Nature Study	1.4	50,524	265,918
Other	1.4	393,559	2,071,364

a - Use Plus Preservation Value is based on the assumption that use value equals 19% of total use plus preservation value (Walsh, Sanders and Loomis, 1984)
b - Levelized annual value over 40 year period with 3% real discount rate

Recommended Action

1. Encourage opportunities for dispersed recreation in primitive or natural areas.
2. Preserve access to outstanding scenic/recreational attractions and identify where additional access may be needed including access through private lands.
3. Seek a study of the recreational carrying capacity of the Henrys Fork from Big Springs to St. Anthony.
4. Designate state natural and recreational rivers in outstanding fish and wildlife, recreational, geologic or aesthetic areas.
5. Having adopted a plan for the Henrys Fork Basin, the State will oppose actions by any other entity which do not recognize and are not compatible with this plan.
6. Protect the quantity and quality of water that maintains and enhances good quality recreational experiences while providing for other water uses.
7. Encourage private sector commercial recreation development adjacent to public lands, or on suitable public lands if public need warrants.
8. Promote safety for all outdoor recreation including public campaigns relating to water safety, including learn to swim programs.

9. Encourage consideration of recreation as a significant planned use in new public and private water development projects.

Sources

Angradi, T. and C. Contor, 1989. Henrys Fork Fisheries Investigations: Job Completion Report for 1986-1987, Project No. F-71-R-12, Subproject III, Jobs 7a and 7b. Idaho Department of Fish & Game, Boise, ID.

Brostrom J., 1987. Henrys Fork Fisheries Investigations: Job Completion Report, Project F-73-R-8, Subproject IV, Study III, Job 1. Idaho Department of Fish & Game, Boise, ID.

Coon, John 1978. Henrys Fork Fisheries Investigations. Idaho Department of Fish & Game, Boise, ID.

Coon, John 1977. Henrys Fork Fisheries Investigations: Job Performance Report Project F-66-R-2, Job VII. Idaho Department of Fish & Game, Boise, ID.

Harris, C.C., J.F. Tynon, S.E. Timko, and W.J. McLaughlin, 1988. The 1987 Idaho Leisure Travel and Recreation Study: Analysis for Region VI. University of Idaho, Moscow, ID.

Idaho Dept. of Fish and Game 1989. Summary of 1988 Big Game Harvest Estimates. Boise, ID.

Idaho Dept. of Fish and Game 1990. Communication with: Steve Elle, Region VI Fisheries, Idaho Falls.

Idaho Statesman 1989a. Teton County, September 18, 1989, pg. C1.

Idaho Statesman 1989b. Madison County, November 13, 1989, pg. C1.

Idaho Statesman 1990. Fremont County, January 29, 1990, pg. C1.

Jeppson, 1982. Teton River Investigations: Job Performance Report, Project F-71-R-6, Job VIc. Idaho Department of Fish & Game, Boise, ID.

Jeppson, 1981. Teton River Investigations: Job Performance Report, Project F-71-R-3, Subproject IV, Study XII. Idaho Department of Fish & Game, Boise, ID.

Krutilla, J.V. 1967. "Conservation Reconsidered," American Economic Review 57(4):777-786.

Loomis, J., D. Donnelly, and C. Sorg, 1985. Quantifying the Economic Effects of Hydropower Development on Recreational Fisheries: A Case Study of Idaho. Unpublished Paper.

Maiolie, M.A. 1987. Ashton Reservoir Fishery Enhancement Evaluation. Idaho Dept. of Fish and Game, and Utah Power and Light Company.

Moore and McClaran, 1989. Idaho Whitewater. McCall, Idaho: Class VI - Publishers.

Moore, V., M. Reingold, C. Corsi, J. Curran, B. Penske, E. Jochum and B. Sellars, 1983. Regional Fishery Management Investigations: Job Performance Report, Project F-71-R-6, Job VIa-e. Idaho Department of Fish & Game, Boise, ID.

Nellis, Lee 1988. Fremont County, Idaho: A Social and Economic Profile. St. Anthony, ID.

Nellis, Lee 1989a. Unpublished tourism data for Fremont, Madison and Teton Counties, 1989.

Nellis, Lee 1989b. Public Facilities Inventory. St. Anthony, ID.

Nellis, Lee 1990. Personal Communication, April, 1990.

N.P.S., Yellowstone National Park, 1990. Communication with Shelton Johnson.

Rohrer, Robert L. 1981. Henrys Fork Fisheries Investigations: Job Performance Report, Project F-73-R-3, Subproject IV, Study XI. Idaho Department of Fish & Game, Boise, ID.

Rohrer, Robert L. 1984. Henrys Fork Fisheries Investigations: Job Performance Report, Project F-73-R-5, Subproject IV, Study XI. Idaho Department of Fish & Game, Boise, ID.

Sorg, C.F. and J.B. Loomis, 1984. Empirical Estimates of Amenity Forest Values: A Comparative Review. United States Forest Service, General Technical Report RM-107. Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado.

Sorg, C.F., J.B. Loomis, D.M. Donnelly, G.L. Peterson, and L.J. Nelson, 1985. Net Economic Value of Cold and Warm Water Fishing in Idaho. United States Forest Service, Resource Bulletin RM-11. Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado.

Sorg, C.F., and L.J. Nelson, 1985. Net Economic Value of Elk Hunting in Idaho. United States Forest Service, Resource Bulletin RM-12. Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colorado.

U.S. Bureau of Land Management, 1988. Medicine Lodge Wilderness Final Environmental Impact Statement. Idaho Falls, Idaho.
U.S. Forest Service, Targhee National Forest 1985. Land Management Plan. St. Anthony, ID.

U.S. Forest Service, 1986. Final Environmental Impact Statement: 1985-2030 Resources Planning Act Program. U.S. Department of Agriculture, Forest Service FS-403.

U.S. Forest Service, Targhee National Forest 1989. Henrys Fork of the Snake River, Warm River, and Falls River Preliminary Wild and Scenic River Study.

U.S. Forest Service, Targhee National Forest 1990. Communication with: Robert G. Williams, Supervisor's Office, Forest Planner; John Ferebauer, Supervisor's Office, Economist; Bart Andreasen, Supervisor's Office, Recreation.

U.S. Forest Service and U.S. Bureau of Land Management 1980. Final Environmental Impact Statement of the Island Park Geothermal Area.

Walker, David, and N.K. Whittlesey, 1990. Economic Evaluation of Alternative Water Uses for the Payette River. Report submitted to Idaho Department of Water Resources under contract #91-01-10-191-15.

Walsh, R.G., L.D. Sanders, and J.B. Loomis 1984. Measuring the Economic Benefits of Proposed Wild & Scenic Rivers. Paper presented at the National River Recreation Symposium. Louisiana State University, Baton Rouge. November 1984.

Weisbroad, B. 1964. "Collective-Consumption Services of Individual Consumption Goods," *Quarterly Journal of Economics* 73(Aug):471-477.

Timber, Grazing, and Dry Farming

Logging, grazing, and dry farming are land based activities generally guided or regulated by other agencies. Acreage in the basin, by category, is shown in Table 44. Water-related issues are water yield and water quality.

Table 44. Land Areas (in acres)

	Forest	Grazing	Irrigated	Dry Farming	Other Land and Water	Total
Fremont	518,000	418,000	124,000	87,000	63,000	1,220,000
Madison	46,000	76,000	113,000	63,000	16,000	306,000
Teton	60,000	96,000	84,000	47,000	9,000	294,000
	624,000	590,000	321,000	197,000	88,000	1,820,000

(Irrigated land and dry-farming land (potentially irrigable) acreage updated to 1990 acreage from 1976. Deduction made to grazing land in Fremont County for 9,000 acres.)

Timber

Of the forested land, approximately 55.5 percent, 347,000 acres, are classified as commercial (able to produce 20 cubic feet of wood per acre per year). Just under one-half of the commercial acreage is lodgepole pine while Douglas fir with some subalpine fir and spruce accounts for the other half. There also is a small amount (8%) of aspen acreage.

The 1988 North Fork fire in Yellowstone National Park burned about 20,000 acres of high plateau forested lands in the Henrys Fork drainage. The epidemic kill of most of the lodgepole pine forest by the mountain pine beetle has resulted in large timber sales to salvage mature and drying trees. Lodgepole pine stands will continue to deteriorate and be salvaged for the next 20 years. Timber harvests are administered by the Targhee National Forest, the Bureau of Land Management, the Idaho Department of Lands, and private owners.

Water Yield

The management of vegetation can impact runoff. For example, rangeland brush control will increase the water yield. The replacement of forest cover with a grass cover gives considerable increased water yield. This method of increasing water yield is a planning consideration on federal lands in the southwest states, but water yield is a limited consideration in the Northwest.

In the Henrys Fork basin the economic value of timber production and other forest uses relative to a limited need for additional water, other than in drought years, makes water yield a low consideration in forest management. For rangeland management the same is true.

The mountain pine beetle epidemic in lodgepole pine allows for a temporary increase of water yield. Estimates of the increased water yield are about seven percent. This increase will gradually

diminish as new timber stands become established. For an average water yield of eight inches over 400,000 acres, the increased yield would be approximately 20,000 acre-feet. For the 20,000-acre North Fork fire with 20 inches of precipitation, a seven percent yield increase would be 2,000 acre-feet. A negative impact is that the runoff peak occurs earlier in the year.

Water Quality

On National Forest lands there appear to be good management practices in the Henrys Fork basin. For example, erosion and sedimentation are controlled with buffer strips next to streams. Riparian vegetation slows sediment transport and scouring, helping to modify and alleviate turbidity and bank erosion. State and federal water quality regulations control the amount and type of logging immediately adjacent to streams and rivers.

Grazing

On grazed land the maintenance of a good level of grass productivity will minimize sheet erosion or general soil erosion. Water quality is also impacted by the grazing of stream banks by cattle. Sheep are believed to do less damage because they are continuously controlled by a herder. The land management agencies appear to balance ecological and economic concerns in their grazing management practices.

Dry Farming

Best management practices established by the local Soil Conservation Districts provide guidelines for erosion control. Best management practices associated with soil tillage greatly reduce erosion and sedimentation. Soil Conservation District personnel have been educating growers about these tillage procedures. Most growers have been using soil conservation methods for several years. New techniques are being developed, such as chemical weed control for summer fallow land and no-till planting. These practices, as they become more accepted will, in turn, further reduce sediment runoff from dry-farmed land.

Sources

Land Management Plan for the Targhee National Forest, U.S. Department of Agriculture - Forest Service, 1985.

Medicine Lodge Resource Management Plan - Environmental Impact Statement, Idaho Falls District Draft 1984, U.S. Department of Interior - Bureau of Land Management.

Snake River Basin Idaho and Wyoming Cooperative Study Land Resource Data, U.S. Department of Agriculture - Soil Conservation Service, 1976.

Energy Conservation

Conservation, the more efficient use of electricity, is a key resource for meeting future electrical energy needs. Conservation resources are measures that enable residential and commercial buildings, appliances, and industrial and irrigation processes to use energy more efficiently. Less electricity is used to support the same level of amenity or production that existed before the conservation measure was implemented. For example, buildings that cut down heat loss through insulation and tight construction require less electricity for heating. Conservation also includes measures to reduce electricity losses in generation, transmission and distribution systems.

Conservation is a uniquely flexible resource. If the economy grows rapidly, the conservation resource expands quickly, but if the economy slows, the conservation resource grows slower. Some conservation programs automatically match growth in electrical demand. Such is the case when new buildings are mandated by code to be energy efficient. Each new building adds load to the electrical system, but also can save energy if it is better insulated. In this regard, cost-effective conservation resources may be lost if not secured at the appropriate time. For example, if new buildings do not incorporate conservation measures at the time of construction, it is much more costly, and sometimes impossible, to retrofit them.

The Northwest Power Planning Council estimates that 7,692 megawatts of cost-effective electric power are achievable region-wide through conservation and high efficiency operations. The estimate is based on a high electric-demand scenario through the year 2010. The Northwest Power Planning Council believes energy codes are the most effective means for securing savings from new buildings. It is, however, also emphasizing utility incentive programs to gain energy savings rather than relying entirely on regulatory authorities (NPPC, 1990).

Residential Sector

Space heating is by far the largest single use of electricity in the residential sector; water heating is second followed by refrigerators and freezers. About 60 percent of potential residential energy conservation would come from reducing the energy required to heat homes. Energy savings can be achieved by improving insulation, adding storm windows, and reducing air leakage. Table 45 provides representative thermal savings and cost data as an example of possible energy savings.

Table 45. Representative Thermal Data for 1,350 Square Foot House Located in an Idaho Mid-Level Mountain Valley. Costs for Retrofitting.

Features	Incremental Cost	Cumulative Cost	Annual Use Kwh/yr	Levelized Costs Cents/Kwh
Northwest Power Planning Council New Construction Standards if Adopted by a City or County				
Ceiling R-0 to R-19 (6 inch)	$ 651	$ 651	33,032*	0.179
Walls R-0 to R-11 (4 inch)	841	1492	25,949	0.513
Air Changes Per Hour 0.6 to 0.4	109	1601	23,874	0.718
Ceiling R-19 to R-30 (10 inch)	222	1823	22,658	0.787
Crawl Space R-0 to R-19 (6 inch)	1094	2917	16,762	0.801
Single to Triple Pane Windows	1898	4815	12,193	2.400
Ceiling R-30 to R-38 (12 inch)	163	4978	11,919	2.566
Idaho Residential Energy Standards (required for new construction after January 1, 1991)				
Wood to Insulated Outside Metal Doors	615	5593	11,359	6.344
Crawl Space R-19 to R-30 (10 inch)**	947	6540	10,751	6.727
Ceiling R-38 to R-49 (16 inch)				
Walls R-11 to R-19 (6 inch)				
Wall R-19 to R-26 (6 inch with foam boards and advanced framing)				

* Without any insulation, use is 48,709 Kwh/yr.
** The cost of this feature includes an estimate for extending the joist to accommodate R-30 insulation.

Source: 1989 Supplement to the 1986 Northwest Conservation and Electric Plan, Volume II, Northwest Power Planning Council, p. 3-21.

NOTE: The residential rate within the Fall River Rural Electric Cooperative service area is 4.8 cents per Kwh for usage above 1400 Kwh/month; a typical usage for electric heated house. For Utah Power and Light the cost is 5.8 cents.

For new residential buildings other than mobile homes, the meeting of specific conservation standards is being encouraged by the electric supply utility through lump sum payments to the owner or builders. Both utilities serving the Henrys Fork Basin, Fall River Rural Electric Cooperative and Utah Power & Light Co., are participating in the program. Idaho Residential Energy Standards

required for new construction after January 1, 1991 will result in energy savings for most kinds of site-built homes.

Water heating energy savings are next in importance. Energy savings accrue from better insulated water heaters, pipe wraps and more efficient appliances that use hot water as well as the use of these appliances (for example, clotheswashers, dishwashers). For refrigerators and freezers, the National Appliance Energy Conservation Act was enacted in 1987. It sets an initial maximum energy consumption level for refrigerators and freezers (plus other home appliances) sold in and after 1990. The federal law also requires a review of the initial standards in 1990. California has set for implementation in 1993 more stringent standards that the Department of Energy is expected to generally follow after 1990.

Commercial and Industrial Sectors

Space heating, space cooling, and lighting dominate commercial energy consumption. Office buildings and retail stores consume almost 50 percent of the electricity used in the commercial sector. The energy conservation potential in commercial buildings is felt to equal that of residential buildings.

In the Henrys Fork Basin the primary industrial user of electricity is food processing. Since each industrial plant is different, it is difficult to estimate the exact amount of energy savings. However, cost-effective energy conservation appears possible since past reviews of similar industrial plants show considerable energy saving potential.

Irrigation Sector

Because of the large amount of irrigation in the Henrys Fork Basin, there are considerable energy savings available through the use of more efficient water application systems, and through water scheduling improvements. This savings is largely from system improvements in existing sprinkler systems but also in the design of new sprinkler systems for conversion from gravity to sprinkler irrigation. Many new systems are installed each year in order to improve labor and water efficiency. Worn bowls in deep well pumps, excess water use from worn sprinkler nozzles, main lines installed in a less than efficient size, and operating pressures all contribute to larger irrigation electric-use loads.

Total Conservation Potential

The Northwest Power Planning Council staff has made a region-wide estimate of the amount of cost-effective electric power conservation achievable by year 2010. The potential savings were calculated with a high electric-demand scenario. The following projected savings would be less with any of the four lower demand scenarios: medium high, medium, medium low, or low. Energy conservation potential in the basin has been estimated through the use of population ratios for the residential and commercial sectors, the employment ratio for the industrial sector, and the ratio of irrigated acres for the irrigation sector. Achievable electric energy conservation in the Henrys Fork basin, by the year 2010, is estimated at 12,800 kilowatts (average) in the following amounts per sector: Residential - 4,400 KW, Commercial - 4,200 KW, Industrial - 1,000 KW, and Irrigation - 3,200 KW. This compares with 23,000 KW of average generating capacity for present and active proposed power plants in the Henrys Fork basin.

Recommended Action

1. Encourage the development of programs to retrofit for heat conservation of existing residences, commercial buildings and businesses.

2. Encourage county and city governments to adopt Northwest Power Planning Council standards for new construction, including commercial and business buildings.
3. Support continued research and education programs on energy-efficient design of new irrigation systems.
4. Continue programs to make irrigators aware of irrigation energy conservation financing programs.

Source

1989 Supplement to the 1986 Northwest Conservation and Electric Power Plan, Volume One, pp 23-39, Northwest Power Planning Council.

Geothermal

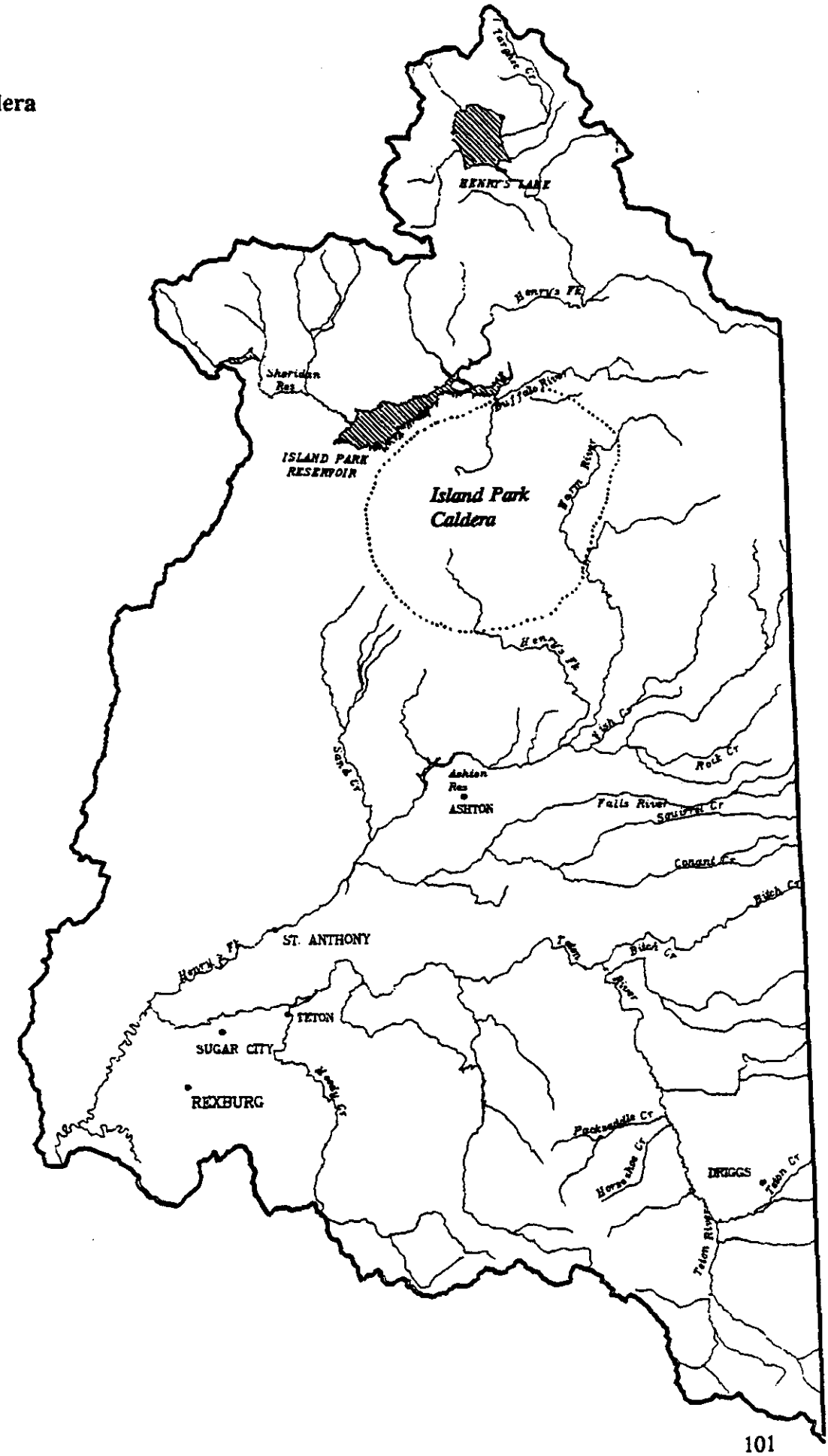
The geology of northern Fremont County suggests geothermal development potential. The Island Park caldera, a collapsed shield volcano, is somewhat egg shaped with a general north-south axis. The caldera extends from Island Park Reservoir south to Sheep Falls. The Henrys Fork flows south through, and just west of, the center of the caldera, then flows over the volcanic rim in a series of falls and rapids including Upper and Lower Mesa Falls (see Figure 20). The Island Park caldera generally has filled with sediment and appears as a level plateau.

In the vicinity of most volcanos, there are good geothermal prospects. In the Island Park area, the general absence of hot springs suggests an old geothermal system. Geophysical survey data implies that the caldera has cooled with little rock alteration, so the area is not now a very promising geothermal exploration target (see Hoover and Long, 1975).

Approximately ten years ago there was considerable interest in leasing areas near Island Park for geothermal purposes. In the early 1980's there were 200 lease applications within the caldera and east to the Yellowstone Park boundary. The Forest Service, after going through an environmental impact analysis, stated they will not consent to geothermal leases until the Department of the Interior shows that Island Park geothermal development will not adversely affect the Yellowstone National Park geothermal features, or the habitat of threatened or endangered wildlife, and that a valuable geothermal resource exists. Industry has not pursued further research in the area.

Geothermal potential exists south of Rexburg, and in the Newdale and Ashton areas. Chemicals in solution measured in selected samples in these areas indicated temperatures near 170°F. For direct home heating, water temperatures as low as 100°F have been used. With deep drilling, direct space heating potential may be available over wide areas of the lower Henrys Fork basin. Ground-water heat pumps may be used with normal depth wells, especially in the south Rexburg and Newdale areas where water in existing wells is around 80°F. The water chemistry suggests warmer water with

Figure 20:
Island Park Caldera



deeper drilling. Ground-water heat pumps are highly efficient with water in the 70° to 100°F range and are quite economic with normal ground-water temperatures.

Recommended Action

1. State and local government should encourage the use of ground-water heat pumps for space heating, especially for rural properties and others that have an existing well and for buildings located near known warm water sources.
2. Deep drilling for high-temperature water or for large uses of low-temperature geothermal water on the Island Park plateau is to be discouraged unless no damage to the Yellowstone thermal system can be shown.
3. A geothermal study in the Rexburg area as a basis for the development of a district heating project is encouraged.

Sources

Hoover, D.B. and C.L. Long, Audio-magnetotelluric methods in reconnaissance geothermal exploration: Proceedings, 2nd United Nations Symposium on the Development and Use of Geothermal Resources, San Francisco, 1975, v.2, p. 1,062.

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

Mitchell, John C., Linda L. Johnson and John E. Anderson, Geothermal Investigations in Idaho, Part 9, Potential for Direct Heat Application of Geothermal Resources, Idaho Water Resource Water Information Bulletin No. 30, 1980. Also see separate plate 1 map.

Power Development

Hydropower has been the electric generator of choice in the Henrys Fork basin as it has for the state. The basin contains active hydroelectric generating plants, projects that are actively being pursued, and a number of potential sites that do not seem feasible at this time. Significant barriers to new hydropower development exist in that except for the Island Park project, federal law prohibits new projects on the Henrys Fork River. Minimum stream flows are in place on Warm River, Teton River, Bitch Creek, and the Henrys Fork. This comprehensive water plan will designate river reaches in the basin as state protected rivers where new hydropower projects are prohibited by state law.

The following listing serves to identify potential hydropower sites in the basin. Their identification does not constitute an endorsement or mean that they are proposed for development. Indeed, many of these projects will likely have additional barriers to development created by this plan.

Existing Power Plants

St. Anthony (FERC #2381) - This 500 KW power plant is located in Sec. 1, T. 7 N., R. 40 E, along the Henrys Fork in downtown St. Anthony. The plant was constructed in 1915. The design head is 18 feet. This project is owned by Utah Power and Light Co., a recently acquired division of Pacific Corporation of Portland, Oregon. The average annual generation has been 3,900 MWH for an average of 450 KW. Average generation is 90 percent of capacity. There is more capacity at this

site. In 1982 the City of St. Anthony applied for a preliminary permit to construct an adjacent facility that would more than double the capacity (650 KW would be added). The filing, #6956, is no longer active.

Ashton (FERC #2381) - This power plant is located at Ashton Reservoir on the Henrys Fork, two miles west of the town of Ashton. The plant was originally constructed in 1917 with generating units number two and three added in 1925. The total nameplate rating is 5,800 KW with a total head of 56 feet. The power plant is owned by Utah Power and Light Co. Average generation is 4,000 KW from an annual average generation of 35,000 MWH (69 percent of capacity). There is a proposal to upgrade the oldest of the three generators from 1,300 KW to 3,400 KW. This would give a total plant rating of 7,900 KW. The upgrading of one generator would likely require some powerhouse rebuilding, but this is still a low cost improvement.

Felt (FERC #5089) - This is a recently enlarged power plant located on the Upper Teton River, just past where the river enters the canyon below Teton Valley and about 10 miles northwest of Tetonia. The power plant was built in 1921 using an actual head of 90 feet (80 feet design head). The original powerhouse contained three generators, one rated at 150 KW and two rated at 250 KW, with a single tunnel. In 1947 a 500 KW and a 720 KW generator were added in an adjacent new powerhouse with two new tunnels. In 1968 the original three units ceased operation. In 1980 generation was increased to 2,000 KW. In 1985 two more generators, totaling 5,500 KW, were added in a third powerhouse located 1500 feet downstream. The design head was increased to 159 feet and the facility used the two tunnels built in 1947. The original tunnel was routed to the 2,000 KW generating units. Total generating capacity is 7,500 KW. Total usable water flow is 884 cfs. The average generation is 3,400 KW (29,000 MWH) which gives a plant capacity of 44 percent. Fall River Rural Electric Cooperation of Ashton has leased the project to Hydro Valley Development, Inc., a subsidiary of Bonneville Pacific Co. of Salt Lake City.

Ponds Lodge (FERC #1413) - This 200 KW power plant with a 30-foot head is located at the mouth of the Buffalo River just below Island Park Dam on the Henrys Fork (Sec. 33, T. 13 N., R. 43 E., at the U.S. Highway 20 crossing of the Buffalo River). With a 1939 water right, production started in 1940. The electric power was used at the lodge. The power plant was damaged by lightening and fire in 1986 and is not now in production. In 1989 the Federal Energy Regulatory Commission license was transferred from Island Park Resorts Inc. to Buffalo Hydro Inc. The project must be rebuilt by October 31, 1993 to retain its license.

Briggs (FERC #8083) - This 300 KW power plant built about 1987 is located in Sec. 31, T. 7 N., R. 41 E. adjacent to the north side of the settlement of Teton. About two miles upstream of the powerplant, water is diverted from the Teton River into the Teton Irrigation and Manufacturing Canal (Teton Canal). From the canal the water drops about 20 feet back into the Teton River. The estimated average annual generation is 1,800 MWH or an average of 200 KW. The owner is Turbine Generator Service Inc. of Salt Lake City but they provide royalties to Robert and Carla Olson of Idaho Falls. The project has received exemption from licensing.

Potential Developments - Active FERC Filings

Island Park (FERC #2973) - This 4,800 KW power plant is to be located at the existing Island Park Dam where 74 feet (45 to 79) of head is available. The average annual generation is estimated at 26,900 KWH for an average of 3,100 KW. Fall River Rural Electric Cooperative, Inc. of Ashton is the project owner, while Bonneville Pacific Corporation of Salt Lake City is the project operator. The FERC license stipulates that project construction must start by October 17, 1992

Falls River (FERC #9885) - This proposed 7,500 KW power plant is located on the Falls River. The 46,000 MWH estimated annual generation would provide an average generation of 5,000 KW. The diversion point would be the existing Marysville Canal diversion from the Falls River in Sec. 35, T. 9 N., R. 44 E., two miles below the National Forest boundary. The powerhouse would be located six miles downstream where the canal is still within one-half mile of the river, and the drop to the river is about 130 feet. Enlargement of the canal is proposed to enable power production year-round. A reduction in power generation may occur during midwinter high icing conditions. The owner is Grant Durtschi, Environmental Energy Co. of Riverton, Utah. This project has been approved by FERC for construction with the requirements that construction start by May 24, 1993 and be completed by May 24, 1995.

Upper Teton River (FERC #10613) - This proposed 4,500 KW power plant is located on the Teton River. The 25,000 MWH of estimated annual generation would provide a 2,800 KW average. The diversion would be located just below the Tetonia dam site in Sec. 3, T 6 N., R. 44 E., just after the Teton River leaves the Teton Valley northwest of Tetonia. The proposal locates the powerhouse about two miles downstream in Sec. 33, T. 7 N., R. 44 E. The developer is Lower Patterson Inc. managed by Richard L. Graves of Gooding, Idaho.

Other Potential Hydropower Sites

The following discussion of potential hydropower plants only addresses the physical potential of hydraulic head and water flow (Table 46). Legal, environmental, and social issues have not been addressed and may preclude many of the identified potential projects. Total potential installed capacity in the basin is about 200 MW (200,000 KW). The 200 MW of installed capacity compares to a single coal-fired generating plant sized at 1,000 MW. Potential average generation basin-wide is 134 MW (134,000 KW) with an estimated annual generating plant factor of 67 percent. Probable installed sizes of potential hydropower projects range from 30,000 KW to very small installations. For comparison purposes, the Grace and Cove powerplant capacity in Caribou County is 40,500 KW while the present Ashton power plant is 5,800 KW. Table 46 lists potential hydropower sites in the basin.

All potential projects on the Henrys Fork from Henrys Lake (including Big Springs) to Ashton Reservoir are prohibited unless specifically approved by congress. This restriction is contained in PL 99-495, Section 15A(C), October 16, 1986.

Warm River - See "Surface Water Storage Sites" under "Water Supply" for information on this site.

Mesa Falls - Several development alternatives have been proposed for hydroelectric power in this area of the Henrys Fork. Preliminary indications are that an average of 18,000 KW (158,000 MWH) might be generated using three miles of the river for a 320-foot drop. As currently envisioned there are large environmental conflicts associated with such a development. Mesa Falls is a heavily used scenic attraction during much of the warm-weather recreation season.

Table 46. Potential Hydropower Sites - Henrys Fork Basin

Site	Stream	Usable Storage if any in ac-ft[1]	Conduit Length in miles[1]	Average Annual Flow in cfs[2]	Power Head in feet[1]	Average Annual Generation in avg. KW[1]
Warm River	Henrys Fork	75,000	-	1,440	220	22,000
Mesa Falls[4]	Henrys Fork		3	950	320	18,000
Lookout Butte	Henrys Fork		12	870	300	18,000
Teton	Teton R.	200,000	-	710	295	14,000
Anderson	Falls R.		6	745	260	(13,000)[3]
Sheep Falls	Falls R.		4'& 200' dam	430	400	12,000
Last Chance	Henrys Fork		7	≈900	190	11,000
Squirrel	Falls R.		-	745	140	(7,000)[3]
Judkins	Bitch Cr.		≈6	140	525	5,000
Tetonia	Teton R.		-	390	140	4,000
Warm River Butte	Warm R.		6	170	320	4,000
Partridge	Warm R.		3	150	270	3,000
Boone Cr.	Trib. to Falls R.		2.5	≈10	560	3,000
Lower Ashton	Henrys Fork		26' drop	≈1,500	25	2,000
Victor	Teton R.		4 & 120' dam	≈80	400	2,000
Canyon Cr.	Canyon Cr.		6 & 200' dam	≈40	675	2,000
Fish Cr.	@ Warm R. Butte		12	≈100	440	2,000
Buffalo R.	Buffalo R.		100' dam	≈190	175	≈2,000
Upper Badger	Badger Cr.		12 & 130' dam		440	≈2,000
Ashton (enlarge)				≈1500		≈1,400
Cross-Cut Diversion	Cross-Cut Canal		10' drop		10	1,200
Coffee Pot Rapids	Henrys Fork		45' drop	≈350	45	≈1,000
Enterprise	Falls River				100	600
St. Anthony Canal	St. Anthony Canal		1	250		≈400
Marysville Drop[2]	Marysville Canal		1	40	66	200
					Total	129,000
Present and Active Proposed Powerplants						23,000
Grace & Cove (for comparison)	Bear R.					18,000
C.J. Strike (for comparison)	Snake R.					79,000

[1] Water Power Resources of Idaho by USGS
[2] Tudor Report
[3] May be developed by an active proposed power plant
[4] Several options for same area

Hatchery Ford/Riverside Campground Diversion - A second proposal for the Mesa Falls area would pick water up below Hatchery Ford, and move it south into a small off-stream holding area. Water could be pumped into the holding area at night and removed for generation during peak demand periods. From the holding area, the water would be moved to Ashton Reservoir, a total distance of 7.5 miles with a net drop of 730 feet (see map at the end of "Water Supply").

An alternate method of developing the powerhead is to make the initial diversion at a point one-fourth mile below Riverside Campground. After a lift of 80 feet, the water would be moved southwest five miles to a reregulating reservoir at the north base of Big Bend Ridge. A three-fourths mile tunnel and a six-mile penstock would allow the development of 880 feet of net head at Ashton Reservoir.

The average generation might be near 30,000 KW or about 50 percent of nameplate rating. The in-place regulating capability at Ashton Reservoir would reduce construction cost over similar peaking projects elsewhere since a re-regulating reservoir would not be needed. Summer time minimum flow rights held by the Idaho Water Resource Board (1,000 cfs - April 1 to September 30) could prevent

most natural flow diversions, however, releases from Island Park reservoir apparently would be available for diversion.

Lookout Butte - The five miles above the Riverside Campground generally has a very easy gradient. Ambitious development proposals would capture the river drop in this five mile reach with a 20-30 feet high diversion dam placed just above Riverside Campground. From the diversion dam a seven-mile parallel canal and/or penstock would move the water to Upper Mesa Falls. About 300 feet of gross head would be developed. The estimated average annual generation for the total reach could be 18,000 KW. The generators would be somewhat larger.

Teton - See "Surface Water Storage Sites" under "Water Supply" for this project.

Anderson - This project on the Falls River would divert water for a distance of approximately six miles. Roughly 260 feet of head would be developed. Average annual generation would be approximately 13,000 KW.

Sheep Falls (Falls River) - This project, identified in Waterpower Resources of Idaho, would have a 200-foot dam on the Idaho border in Sec. 17, T. 9 N., R. 46 E. From the reservoir a canal would extend downstream four miles. Average generation is estimated at 12,000 KW. An altered non-dam project would be a river level diversion two miles above the Idaho border, just below Cave Falls Campground. A ten-mile canal could extend downstream to the Yellowstone diversion. The canal would need to be a buried conduit to reduce wildlife disturbance.

Last Chance - The seven-mile reach of the Henrys Fork from Island Park Dam to the Osborne Bridge has 190 feet of drop with a fairly consistent grade, although the upper area is slightly more steep. Lower gradient hydroelectric potential is usually developed by diverting a portion of the river into an adjacent canal to keep a level gradient until dropped to the powerhouse. A total potential of 11,000 KW of average annual energy may exist in this river reach.

Squirrel - See Yellowstone Hydro, the Yellowstone Hydro project would develop the Squirrel proposal.

Judkins - See site labeled "Bitch Creek" under "Surface Water Storage Sites" in the "Water Supply" section.

Tetonia - See "Surface Water Storage Sites" under "Water Supply Section."

Warm River Butte - In Waterpower Resources of Idaho, this site would develop the power head between elevations 5,800 and 5,480 or 320 feet on the Warm River. The diversion point would be in Sec. 3, T. 10 N., R. 44 E., and a six-mile conduit would move the water to a powerhouse in Sec. 32, T. 10 N., R. 44 E. This would develop an average 4,000 KW of energy. Picking the water up only 15 feet lower would shorten the conduit length one mile and would allow using flow from Warm River Springs.

An alternative potential development could lift water about 200 feet, to the top of the plateau, from a point just above the cascades. At a distance of one and one-half miles, a net drop of 370 feet down Bear Gulch into the Henrys Fork would allow for the development of about 1,500 KW (3,000 KW peaking). About 70 cubic feet per second are available above the state designated minimum flow.