APPENDIX 4-1—UPPER SNAKE PROVINCE PROJECT INVENTORY

The purpose of the project inventory is to provide a generalized picture of the types of fish and wildlife restoration activities that are currently being conducted in the watershed, along with information as to who is responsible for funding the projects. The information presented here was collected from technical and planning team participants through the project inventory website or through direct submission. Additional information was collected from websites of funding and implementation agencies and through interviews of nonparticipants. Due to the size of the Salmon subbasin and the number of agencies, nonprofit organizations, and private parties actively engaged in fish and wildlife restoration activities, it is unlikely that all activities implemented within the last 5 years have been captured here. However, we believe that the information provided here covers the broad scope of most of the current types of activities taking place.

One of the challenges in building the project inventory is finding summarized descriptions of the work. Some agencies have summary tables of their projects, while others have full descriptions of work proposed or to be done. The various natural forests are examples of that. Some forests have tables listing their projects, while others have pages of scoping documents.

Other projects are part of an overall work effort. Examples are Idaho Department of Fish and Game's habitat improvement projects through the Wildlife Management Areas (WMA) and Habitat Improvement Program (HIP). The work is described in terms of regions, costs, and numbers and types of sites, but not specific watersheds. In the Wyoming watersheds, the primary activities were planning and monitoring. The State of Wyoming and the Bureau of Land Management both had major planning projects for the water resources and land management in the Snake River watersheds.

The other side of that is in cases of small projects. We acquired data from the Bureau of Land Management (BLM) Challis office describing many small projects (those were summarized in our tables). Many of them were low cost and low time expenditure projects like trough or fence installations and maintenance on existing features.

There are also programs that affect the environment such as the noxious weed control programs. The weed control program is conducted by weed control districts composed of communities, counties, or regions. Other weed control projects are conducted outside of the weed control program by the other resource management agencies.

Redundancies in listings also occur because many projects are joint ventures and are listed by each organization. For some organizations, the land holdings are the projects. The Nature Conservancy is an example. Each of their lands is listed as a project. There may be some detail about the restorative or maintenance activities, but not always. The same is true of some regional organizations that establish conservation easements. One such organization is the Teton Regional Land Trust. Their members have contributed funds and set aside properties for conservation. Sometimes there is work done, other times, land is just protected from development.

Table 1. Snake Headwaters subbasin project inventory list, Upper Snake province.

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage				
										SHW	GVT	GHB	PAL	SAL
Rainey Creek Exclosure	Snake, Headwater	Ongoing	1958	1996	Idaho Dept. of Fish and Game	IDFG		There is a striking difference in the shrub height and density between the two grazing treatments: Symphoricarpos oreophilus, Purshia tridentata and Rosa sp. are denser and stature is twice as tall within the section that all grazing is excluded. Also, the treatment that excludes only livestock has much more hedging of Juniper; there is no hedging within the portion that all grazing is excluded.	This is a two-way exclosure erected by the Forest Service and the Idaho Fish and Game in 1958 to "study big game winter range problems". The exclosure is about 5 acres; half excludes all ungulate grazing and the other half excludes only livestock. The exclosure lies on a rounded SE-facing slope and is dominated by Juniperus scopulorum, although shallower soil in the upper part supports Cercocarpus ledifolius instead of Juniper. Understory is a mixture of low shrubs and Agropyron spicatum.				x	
Federal Aid in Fish Restoration: Job Numbers 6--b, -c1, -c2,-d	Snake, Upper	Completed	1987	1988	Idaho Dept. of Fish and Game	IDFG							x	
Federal Aid in Fish Restoration: Project 7. Irrigation Diversion Fish Loss Reduction: Subproject 1. South fork Snake River Canal Investigations	Snake, Headwater	Completed	1996	1997	Idaho Dept. of Fish and Game	IDFG		The number of sample sites needs to increased to variety of streams with different lifecycles, diversion location, and evaluation of mortality needs to be expanded to include fish of all sizes that should be uniquely marked.					x	

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage				
										SHW	GVT	GHB	PAL	SAL
Sport Fish Restoration: Project 3: Wild Trout Investigations. Subproject 1. Whirling Disease Studies. Subproject 2. Evaluations of Salmonid Restricted Harvest Regulations Permitting the Use of Bait.	Snake, Upper	Ongoing	1996	1997	Idaho Dept. of Fish and Game	IDFG		1. Conduct additional sentinel tests in other drainages testing positive for Myxobolus cerebralis. 2. Quantify spore loading and percent of infection of salmonids in drainages testing positive for MC. 3. Surface water from Loving Creek at Hayspur Fish Hatchery is positive for MC and should not be used for rearing any trout for release in MC negative waters in Idaho. 4. Continue population estimates to monitor year class and population trends in selected positive waters.	Sport Fish Restoration: Project 3: Wild Trout Investigations. Subproject 1. Whirling Disease Studies. Subproject 2. Evaluations of Salmonid Restricted Harvest Regulations Permitting the Use of Bait.				x	
BLUE GULCH #13 FENCE	Snake, Upper	Ongoing	1998		Bureau of Land Management	BLM			COOPERATIVE PROJECT WITH IDFG AND PHEASANTS FOREVER. CONSTRUCT 3-WIRE FENCE AROUND PERIMETER OF SIKES ACT WILDLIFE TRACT TO PRO-TECT UPLAND BIRD HABITAT.				x	
DEAN SITE EXCLOSURE	Snake, Upper	Ongoing	1998	1999	Idaho Department of Fish and Game Conservation Data Center	IDFG		The exclosure was probably heavily grazed prior to fencing. This area was first fenced in 1969 as a primitive recreation site. A pit toilet was installed in 1970. Vandalism at the site, including having the outhouse pulled over, resulted in the recreation	A pump house is within the exclosure that pumps water up over the ridge somewhere. The water is taken from the uppermost spring, but appears to be a small amount.				x	
Trail Identification Signs		Completed	2003	2003	Bonneville	RAC Title II							x	
Upper Rainey Creek Trailhead Rehabilitation		Completed	2003	2003	Bonneville	RAC Title II							x	

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage				
										SHW	GVT	GHB	PAL	SAL
Copenhagen Basin Parking Lot Toilet		Approved	2002	2002	Bear Lake/Franklin	RAC Title II								x
Noxious Weed Control		Approved	2002	2002	Caribou	RAC Title II								x
Willow Flat Trail		Approved	2002	2002	Bear Lake/Franklin	RAC Title II								x
Idaho Habitat Management	Southeast	Ongoing	2003	2004	IDFG	IDFG			Annual budget for WMA				x	x
Habitat Improvement Projects (HIP)	Southeast	Ongoing	2002	2003	IDFG	IDFG	feed, cover, and riparian condition		Food plot, shrub and tree planting, fencing, and wetland creation.				x	x
DEQ 319 projects		Ongoing	2003	2004	DEQ	DEQ				x	x	x	x	x
Palisades Creek	Bonneville County				Idaho Department of Fish and Game, Partners for Fish and Wildlife Project	USFWS		Fish passage restoration					x	

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage				
										SHW	GVT	GHB	PAL	SAL
River at a Crossroads: Development in the 100-Year Floodplain of the South Fork Snake River	South Fork Snake River	Complete	2002	2003	Greater Yellowstone Coalition	Greater Yellowstone Coalition		This study was conducted by GYC to assess the number of human-built structures in the 100-year floodplain of the South Fork Snake River. Using GIS technology and county land use records, GYC determined the amount of growth and development located within the floodplain in Bonneville county. The study also discusses the threats posed by floodplain development including bank stabilization projects and the removal of cottonwoods and other riparian vegetation. Recommendations are given at the end of the published study document.	The results of the study show that the South Fork is indeed threatened by development within its floodplain. The recommendations include the adoption of a new floodplain ordinance that prohibits the construction of new buildings in the FEMA designated 100-year floodplain, prohibition of new bank stabilization and stream channelization projects, and prohibition of the clearing of mature riparian vegetation.				x	
Spring Creek Watershed Assessment	Upper Snake Headwaters	to begin this summer pending funding	2004	2006	Teton Science Schools	awaiting EPA funding		addressing issues of development and habitat impact		x				
The Effects of Residential Development on Avian Community Structure Along the Snake River in Jackson Hole, Wyoming.	Upper Snake Headwaters	in progress	2000		Teton Science Schools	federal, private, non-profit grants		assessing impacts of human development and activities on avian habitat		x				
USGS-NAWQA	Snake Headwaters	ongoing	1995		USGS	Grand Teton National Park			NAWQA program sampling being done at the Snake River at Flagg Ranch and the Snake River at Moose, giving an upstream/downstream snapshot of water quality.	x				

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage				
										SHW	GVT	GHB	PAL	SAL
Cutthroat Trout Inventory	Snake Headwaters	ongoing	1999	2005	Grand Teton National Park	NPS, USFS, WYG&F, TU, One-Fly		Our original goal was to document the geographic distributions of Snake River and Yellowstone cutthroat trout over 5 years in an estimated 2,400 km (1,500 mi) of fish bearing streams between Palisades Reservoir and Jackson Lake, Wyoming. We have surveyed approximately 2,590 km (1,609 mi) in 6-years. Portions of two drainages, the Salt River and Buffalo Fork River, remain to be completed. Our original concerns regarding project feasibility have been addressed; these related specifically to sampling logistics, timing of stream occupancy by fishes, capture technique, and cutthroat trout identification. Further sampling above Jackson Lake Dam will provide a continuous and seamless coverage between the NPS and USFS units.	Sampling results to date have supported our systematic approach as opposed to a random, or stratified random sample scheme. When sampling across an environmental gradient, or the logistical demands or cost of systematic sampling approaches that of random sampling, systematic sampling should be pursued (Krebs 1998). This is particularly applicable in the case of Snake River and Yellowstone cutthroat trout in the Snake River headwaters, where we have documented an elevation gradient, with Yellowstone cutthroat trout occupying the upper reaches of streams, Snake River cutthroat trout typically present throughout the occupied length of streams and an area of phenotypic overlap generally being observed at mid-elevations. One final note is the capture of cutthroat trout in GTNP exhibiting spotting and coloration similar to Bonneville cutthroat trout, O. c. utah, in streams with no documentation of historical stocking. ur surveys indicate trout occupy approximately 60% of the perennial stream length sampled, and cutthroat trout are present in 92% of the perennial stream length occupied by trout. Yellowstone cutthroat trout were present in approximately 16% of perennial stream length, where as Snake River cutthroat trout were present in 78%; unidentifiable juvenile cutthroat trout occupied 12% of perennial streams. Yellowstone cutthroat trout occur almost exclusively in sympatry with Snake River cutthroat trout. Allopatric Yellowstone cutthroat trout were present in 4 streams (total 1.35 km or <1% of the total stream length occupied by trout). In addition, our systematic sampling scheme has documented the introduction of fathead minnow, Pimephalas promelas, in the Snake River Canyon, the first recorded collection of leatherside chub, Gila copei, in GTNP and the BTNF since the 1950's, and confirmation of the spatial extent of non-native trout (e.g., brook trout and rainbow trout). Furthermore, we have documented range expansion of non-native trout, as well as their natural extirpation. Rainbow trout were captured in <1.0 km of 1 stream throughout the survey area, although rainbow-cutthroat trout hybrids were present in approximately 13.1 km (<1% of the total stream length occupied by trout) of 4 streams; rainbow trout nor rainbow-cutthroat hybrids are known to have displaced cutthroat trout within the surveyed area. Brook trout were present in approximately 15% of the perennial stream	x				

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage				
										SHW	GVT	GHB	PAL	SAL
Eagle and Sage Grouse Inventory	Snake Headwaters	ongoing	2002	2005	Greater Yellowstone I&M Network	NPS			Science and Resource Management (S&RM) at Grand Teton National Park (GRTE) received funding from the Inventory and Monitoring (I&M) program to conduct 2 sets of bald eagle and sage grouse surveys. These surveys were to identify new bald eagle nest sites and active sage grouse leking areas within the park. In the spring of 2001, high priority eagle nesting habitat was surveyed by helicopter. Eight historical eagle nests and one new nest were located. Also during that spring, suitable sage grouse breeding sites were searched from a fixed-winged airplane, however no new sites were found. Although using fixed winged aircraft is an economical and effective means for surveying sage grouse, they can not fly as low as helicopters and hovering over areas of suitable habitat is not possible. In the spring of 2003, funding for the second eagle flight was used to cover the cost of contracting a helicopter for grouse surveys. One new breeding site was located with 6 males actively strutting. Both new eagle nest and sage grouse breeding sites identified during this project will be monitored in the future as part of S&RM's monitoring program.	x				
Wilson Ditch	Snake Headwaters	ongoing	2002	2005	Grand Teton National park	NPS, RM-CESU, GYCC	Large irrigation diversion removes SRC from the Snake River and strands them when irrigation ceases		Project is working on design for fish screens on the diversion.	x				

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage				
										SHW	GVT	GHB	PAL	SAL
BarBC Spring Creek Restoration	Snake Headwaters	Complete	2003	2003	Grand Teton National Park	NPS, Jackson Hole One-Fly, WYG&F	Area impacted by old fish hatchery	Fish populations need to be monitored in the future to see if there is the expected increase in cutthroat trout spawning	Prior to the dedication of Grand Teton National Park, a fish hatchery was constructed on the East Fork of Upper Bar B C Spring. Dams were constructed on the East Fork, near the hatchery site, to provide rearing ponds. There is evidence that some of the channel above and below the rearing ponds was widened for some unknown purpose. After the hatchery was abandoned, the dams were left intact and sediment continued to accumulate in the ponds. In 1984, in cooperation with Grand Teton National Park, Wyoming Game and Fish Department personnel used a backhoe to remove three of the dam structures, excavate sediments and expose gravels to a limited extent. The work was accomplished on the section of the creek adjacent to and below the hatchery site. The Wyoming Game & Fish Department recommended the project be continued on the East and Main Forks in an attempt to establish a spawning run similar to that in the lower reach of the West Fork. Breeching of the last dam structure was accomplished by hand about ten years ago. This project consisted of removal of sediments; narrowing of the channel to a natural width; reclamation of natural gravels or replacement using commercial washed gravels where natural gravels can not be reclaimed; placement of overhead cover (trees) for protection of spawning fish and escape cover for fry.	X				

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage				
										SHW	GVT	GHB	PAL	SAL
Jackson Lake Fisheries Evaluation	Snake Headwaters	complete	2003	2004	Grand Teton National Park	NPS, USGS, WYG&F			Personnel from the Wyoming Game and Fish Department (WG&F) have entered historical field data into a database and have completed their summary of Jackson Lake Fisheries. "ABSTRACT: Jackson Lake provides a unique angling resource in the Snake River Drainage of Wyoming and management has varied considerably over time. Trend netting, trophy lake trout (LAT) Salvelinus namaycush nett, LAT tagging, programmed and spot creel, and productivity data were summarized for Jackson Lake form 1971-2003. The decrease in relative weight for LAT less tan 20 in., low numbers of stocked LAT in the creel, and no apparent correlation between numbers stocked and trend netting catch per unit effort for ALT indicates that LAT stocking in Jackson Lake should be phased out." Reconnaissance of Jackson Lake was also performed by boat in August 2003. USGS personnel were accompanied by Rob Gipson, WG&F. He identified the locations of annual netting operations currently being performed by the WG&F, and the locations of historical netting operations. The USGS personnel drafted multiple research strategies to accomplish the goals of this project and met with the WG&F personnel again to discuss questions related to specific techniques used during netting operations.	X				
Map and Measure Diversions	Snake Headwaters	ongoing	2003	2005	Grand Teton National Park	NPS, TU	Several headwater drainages (Gros Ventre, Spread Creek) dry out during the summer due to extensive irrigation withdrawals.		Existing irrigation ditches have been mapped and matched with existing water rights as adjudicated by the State Engineer. An interactive database has been created. Flow will be measured in ditches this summer.	x				

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage				
										SHW	GVT	GHB	PAL	SAL
Snake River Hydrology/Geomorphology	Snake Headwaters	Ongoing	2003	2007	Grand Teton National Park, Utah State University	NPS, JH One-Fly, USGS	Jackson Lake Dam has had unknown impacts on the Snake River due to changes in flow regimes	Will be installing field studies to further evaluate the mechanisms involved in sediment and bedload transport and to make recommendations for adaptive management of the dam.	Dr. Jack Schmidt, Utah State University has completed a draft report which includes an analysis of the hydrologic change and variability that have occurred on the Snake River near Moran during the last century, using daily USGS stream-flow data and synthetic natural stream-flow data representative of unregulated conditions that has been compiled by the USBR. "ABSTRACT: The hydrologic regime of the modern Snake River is substantially different from the estimated natural flow regime and from the regulated flow regime that existed prior to 1957, based on analysis of the record of stream flow near Moran, immediately downstream from Jackson Lake Dam, and comparison with the unregulated flow regime, as estimated by the Bureau of Reclamation. Today's late spring floods are much lower and late summer flows are much higher than if the dam did not exist. Today's fall and winter flows are approximately what they would be if there were no dam, and they are much higher than prior to 1957 when base flows were very low. Today's flood regime is much lower than those prior to 1957 but occur in a more "natural" season. Analyses were based on three techniques: traditional comparison of mean daily and instantaneous stream flow, continuous wavelet analysis, and analysis using the Indicators of Hydrologic Alteration software. The utilization of mean daily discharge data and the Bureau of Reclamation's estimated unregulated stream flow represent new contributions to the study of stream flow alteration in Grand Teton National Park."	x				
Two Ocean Creek Fish Passage	Snake Headwaters	Complete	2003	2004	Grand Teton National Park	NPS, Jackson Hole One-Fly, WYG&F	Existing culvert prevented fish from returning to Two Ocean Lake	Need to monitor fish passage through new structures	Work was completed on April 22, 2004. Two rock weirs were installed below the existing culvert to improve fish passage. Streambanks were revegetated with native willows.	x				

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage				
										SHW	GVT	GHB	PAL	SAL
Effects of Lake Drawdown on Park Resources	Snake Headwaters	ongoing	2004		Grand Teton National Park	NPS, RM-CESU	Fluctuating lake levels affect a variety of park resources.		A workshop is scheduled for June 7-9th to establish a set of research priorities for Jackson Lake.	x				
Elk Ranch Reservoir Restoration	Snake Headwaters	ongoing	2004		Grand Teton National park	NPS	This reservoir was used as mitigation for improvement to JL Dam. The headgates are in disrepair. Restoration of native vegetation was never completed. Reservoir serves as trumpeter swan nesting area.		Project not yet funded.	x				

Table 2. Upper Snake subbasin project inventory list, Upper Snake province.

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
Fish Populations in the Sage Creek-Smoky Creek Drainages, Caribou County, Idaho	Snake, Headwater	Completed	1979	1979	Idaho Dept. of Fish and Game	IDFG		The fish populations will have to be monitored in the future in order to assess any impacts from the mining operation.	The project collected baseline data on fish populations in order to assess the effects of a phosphate mine in this drainage.							x					
GOOSE CREEK MESA	Snake, Upper	Completed	1984	1998	Idaho Department of Fish and Game Conservation Data Center	IDFG		The area has been grazed historically by sheep and cattle. There is no evidence of cutting within the site. The site is an established RNA on the Burley Resource Area.	The site is grazed by cattle. The site is within an area of non-intensive to intensive rangeland management.											x	
Federal Aid in Fish Restoration: Project 8. Hatchery Trout Evaluations. Subproject 1. Sterile Trout Investigations	Snake, Upper	Ongoing	1996	1997	Idaho Dept. of Fish and Game	IDFG		The angler survey needs to be extended a number of years to draw any conclusions. The hatchery fish trained to recognize bait items lost the ability in about a week. None of the treatments produced sterile fish in significant numbers, and new or refined treatments should be investigated in the future.								x					

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
BLUE GULCH #27 FENCE	Snake, Upper	Ongoing	1998		Bureau of Land Management	BLM			COOPERATIVE PROJECT WITH IDFG AND PHEASANTS FOREVER. CONSTRUCT 3- WIRE FENCE AROUND PERIMETER OF SIKES ACT WILDLIFE TRACT TO PROTECT UPLAND BIRD HABITAT.									x			
Back Country Weed Treatment		Completed	2003	2003	Bonneville	RAC Title II				x											
Bear Lake Trail Maintenance		Approved	2003	2003	Bear Lake/Caribou	RAC Title II										x					
Blackfoot River Road Hardening		Completed	2003	2003	Caribou	RAC Title II										x					
Ecology of Montane Wetlands		Completed	2003	2003	Fremont/Teton	RAC Title II							x								
Highlands Herbicidal Weed Control		Approved	2003	2003	Caribou	RAC Title II										x					
Huffman Spring		Approved	2003	2003	Oneida	RAC Title II													x		
Morgan Summitt Parking Area		Completed	2003	2003	Madison	RAC Title II							x								
Pritchard Creek Restoration		Completed	2003	2003	Bonneville	RAC Title II				x											
Sawtell Creeks Habitat Improvement		Approved	2003	2003	Fremont	RAC Title II					x										

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
Thunder Mountain Trail Relocation		Approved	2003	2003	Bonneville	RAC Title II				x											
Trail Creek Cedron Bridge		Approved	2003	2003	Teton	RAC Title II							x								
Ecology of Montane Wetlands in the Caribou-Targhee NF		Completed	2002	2002	Fremont	RAC Title II					x										
Fall Creek Road & Trailhead Improvement		Completed	2002	2002	Bonneville	RAC Title II				x											
Garden Creek Fish Passage		Completed	2002	2002	Bonneville	RAC Title II				x											
Golden Lake Culvert Replacement		Completed	2002	2002	Fremont	RAC Title II					x										
Golden Lake Culvert Replacement		Completed	2002	2002	Fremont	RAC Title II					x										
Mesa Marsh Noxious Weed Inventory and Control		Completed	2002	2002	Fremont	RAC Title II						x									
Mesa Marsh Noxious Weed Managment Area		Completed	2002	2002	Fremont	RAC Title II						x									
1135 restoration	Pocatello, PORTNEUF RIVER	Completed		1997	Army Corp of Engineers	Army Corp of Engineers											x				

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
site protection	FORT HALL LANDMARK, SNAKE RIVER	Completed		1997	Army Corp of Engineers	Army Corp of Engineers										x					
flood control	above Blackfoot, SNAKE RIVER	Completed	1996	1996	Army Corp of Engineers	Army Corp of Engineers										x					
flood control	Bancroft, PORTNEUF RIVER DRAINAGE	Completed		1995	Army Corp of Engineers	Army Corp of Engineers											x				
channel clearing	HEISE-ROBERTS, Snake River	Completed	1954	1994	Army Corp of Engineers	Army Corp of Engineers				x											
RIRIE DAM AND LAKE	Willow Creek	Completed		1994	Army Corp of Engineers	Army Corp of Engineers				x											
pre-auth study	Ririe, RIRIE GROUNDWATER STUDY	Completed		1990	Army Corp of Engineers	Army Corp of Engineers				x											
pre-auth study	Idaho, OAKLEY WESTSIDE CHANNEL	Completed		1989	Army Corp of Engineers	Army Corp of Engineers														x	
pre-auth study	Idaho, RIRIE	Completed		1988	Army Corp of Engineers	Army Corp of Engineers				x											
pre-auth study	Bingham County, SNAKE RIVER	Completed		1988	Army Corp of Engineers	Army Corp of Engineers										x					

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
pre-auth study	Idaho, TETON RIVER	Completed		1988	Army Corp of Engineers	Army Corp of Engineers							x								
term 1986	Blackfoot River, BLACKFOOT DAM AND RESERVOIR MODIFICATION	Completed		1986	Army Corp of Engineers	Army Corp of Engineers										x					
study	Fremont County, HENRYS FORK RIVER	Completed		1986	Army Corp of Engineers	Army Corp of Engineers					x										
pre-auth study	Madison County, SOUTH FORK TETON RIVER	Completed		1986	Army Corp of Engineers	Army Corp of Engineers							x								
pre-auth study	Cassia County, CASSIA CREEK	Completed		1985	Army Corp of Engineers	Army Corp of Engineers														x	
dams/not done	Idaho, RAFT RIVER	Completed		1985	Army Corp of Engineers	Army Corp of Engineers													x		
debris removal	Idaho, RAPID CREEK	Completed		1985	Army Corp of Engineers	Army Corp of Engineers											x				
pre-auth study	Bancroft, SQUAW CREEK	Completed		1985	Army Corp of Engineers	Army Corp of Engineers											x				

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
emergency flood control	RIVERSIDE, SNAKE RIVER	Completed		1977	Army Corp of Engineers	Army Corp of Engineers				x											
flood hazard report	Rexburg-Sugar City, TETON RIVER	Completed		1977	Army Corp of Engineers	Army Corp of Engineers							x								
floodplain study	McCammon, PORTNEUF RIVER	Completed		1976	Army Corp of Engineers	Army Corp of Engineers											x				
	Vicinity of Shoshone, DIETRICH AND MILNER-GOODING CANAL DIVERSIONS	Completed		1974	Army Corp of Engineers	Army Corp of Engineers												x			
floodplain study	Vicinity of Inkom, PORTNEUF RIVER	Completed		1974	Army Corp of Engineers	Army Corp of Engineers											x				
flood control	LAVA HOT SPRINGS, PORTNEUF RIVER, LAVA HOT SPRINGS	Completed		1973	Army Corp of Engineers	Army Corp of Engineers											x				
	near Rexburg, LYMAN CREEK	Completed	1970	1971	Army Corp of Engineers	Army Corp of Engineers							x								

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
floodplain study	Pocatello, PORTNEUF RIVER	Completed		1970	Army Corp of Engineers	Army Corp of Engineers											x				
floodplain study	Vicinity of Pocatello, PORTNEUF RIVER AND TRIBUTARIES	Completed		1970	Army Corp of Engineers	Army Corp of Engineers											x				
channel repairs	IDAHO, PORTNEUF RIVER AND MARSH CREEK	Completed	1963	1969	Army Corp of Engineers	Army Corp of Engineers											x				
flood control	Snake River, HEISE-ROBERTS AREA	Completed	1949	1968	Army Corp of Engineers	Army Corp of Engineers											x				
channel repairs	IDAHO, PORTNEUF RIVER AND MARSH CREEK	Completed	1966	1968	Army Corp of Engineers	Army Corp of Engineers											x				
Idaho Habitat Management	Magic Valley	Ongoing	2003	2004	IDFG	IDFG			Anuual budget for WMA									x	x	x	
Idaho Habitat Management	Southeast	Ongoing	2003	2004	IDFG	IDFG			Anuual budget for WMA					x	x	x	x				
Idaho Habitat Management	Upper Snake	Ongoing	2003	2004	IDFG	IDFG			Anuual budget for WMA	x	x	x	x								

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
Habitat Improvement Projects (HIP)	Magic Valley	Ongoing	2002	2003	IDFG	IDFG	feed, cover, and riparian condition		Food plot, shrub and tree planting, stubble, wetland creation, nesting, cover and riparian enhancement.									x	x	x	
Habitat Improvement Projects (HIP)	Southeast	Ongoing	2002	2003	IDFG	IDFG	feed, cover, and riparian condition		Food plot, shrub and tree planting, fencing, and wetland creation.					x	x	x	x				
Habitat Improvement Projects (HIP)	Upper Snake	Ongoing	2002	2003	IDFG	IDFG	feed, cover, and riparian condition		Food plot, shrub and tree planting, fencing, and wetland creation.	x	x	x	x								
Teton River Riparian Restoration	Teton River	Ongoing	2003	2004	USFWS	USFWS		Improve Yellowstone cutthroat trout habitat at five locations on the Teton River. Objectives: overhanging protective vegetation; large woody debris; stabilization of streambank; plants native willows/vegetation in riparian area; fence streambank					x								
Tex Creek I, II	Tex Creek I, II	Ongoing		2004	RMEF, IDFG	RMEF, IDFG				x											
South Hills, Sugarloaf Mountain	South Hills, Sugarloaf Mountain	Completed	2003	2003	Mule Deer Foundation	private, BLM	feed, cover, and riparian condition		native cover planting, seedlings									x			
DEQ 319 projects		Ongoing	2003	2004	DEQ	DEQ				x	x	x	x	x	x	x	x	x	x	x	x

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
								Winter translocation efforts to address trumpeter swan over-crowding in the Island Park area of Idaho began in 1990. Dispersing the wintering population and establishing secure use of other parts of southeastern Idaho might lessen population impacts on habitat and concern over die-offs in Island Park because of disease or starvation. Dispersal to more southerly wintering areas could also increase early spring food resources for the resident segment of the southern Idaho nesting population. Winter translocation efforts up to this time, however, have not adequately achieved the goal of dispersing the population to new wintering grounds. During the winters of 2001-2003 a multi-agency group trapped and translocated cygnets from Harriman State Park (HSP). Trapping and translocating cygnets without accompanying adults from the traditional wintering grounds has not been attempted prior to this project. A control group of marked cygnets was released at Harriman and all other trapped cygnets were released in the Bear River and Bear Lake area. Project objectives are to:1)Determine survival of marked cygnets released at the												

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
Amphibian monitoring		Ongoing	2003	2013	IDFG	IDFG		Basic amphibian surveys and monitoring across the region. Survey three sites each year focusing on high mountain lakes and wildlife management areas.		x	x	x	x	x							
Ashton Groundwater Protection	Lower Henry's Fork		2000	2003	IDEQ - Idaho Falls	319 Program	Water Quality		soil vadose zone monitoring to measure the amount of water leached below the root zone during the irrigation seasons. Spring and fall soil sampling			x									
Blackfoot Southeast Pond Project	Blackfoot River		2002	2003	Blackfoot City Engineer, Public Works	319 Program	Water Quality	Stormwater Retention Pond	water quality							x					
Blackfoot Southwest Pond Project	Blackfoot River		2002	2003	Blackfoot City Engineer, Public Works	319 Program	Water Quality	Stormwater Retention Pond	water quality							x					
Cedar Draw Coulee	Lake Walcott		2003	2004	Twin Falls Canal Company	319 Program	Water Quality	This Coulee drains 9,000 acres of agricultural land and introduces nitrogen, phosphorous, bacteria, and pesticides to return flow irrigation water. BMPs to be installed include a series of three serpentine shaped ponds that will be interconnected with riparian wetland areas.	Water Quality									x			

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
Edson Fichter	Portneuf River		2003	2004	Idaho Fish and Game	319 Program	Water Quality	BMPs to be installed include revetments, seeding along stream bank, restoration of 700 feet of meandering stream channel, installation of 300 feet of pipe to convey water to a settling pond, installation of a small settling pond.	water quality								x				
H17 Drain	Lake Walcott		2001	2002	Burley Irrigation District	319 Program	Water Quality	Sediment basin installed at the bottom end of a six-mile long irrigation canal. The basin is 200 feet long and 50 feet wide. This facility captures sediment from return irrigation water prior to discharge to Goose Creek and Snake River.	Water Quality									x			
Kinsey Corral	Lake Walcott		2003	2004	Twin Falls NRCS	319 Program	Water Quality	fencing, corral relocation	Bacteria and sediment by IDEQ									x			
Main Purrine	Lake Walcott		2003	2004	Twin Falls Canal Company	319 Program	Water Quality	12,000 acres of agricultural land are drained into the Main Perrine Coulee resulting in sediment, nitrogen, phosphorous, and pesticide contamination. BMPs to be implemented include a concrete diversion structure, a large (8 acre) settling pond and several wetlands. These features will treat 80 to 90% of all the water coming through Main Perrine Coulee.	UI & IDEQ BURP									x			

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
Pocatello (1st Street Stormwater Wetland)	Portneuf River		1997	1998	City of Pocatello, Public Works	319 Program	Water Quality	This storm water BMP is successfully capturing and treating storm water runoff from a large portion of Pocatello's city streets resulting in cleaner water being discharged to the Portneuf River.	Idaho State University monitored for sediment, phosphorous and bacteria several years after the project was completed								x				
Pocatello (North City Park Wetland)	Portneuf River		2002	2004	City of Pocatello, Public Works	319 Program	Water Quality	One small catchment basin has been constructed, A conveyance pipeline and infiltration sump have been installed, A large bioinfiltration/wetland basin could be constructed in an oxbow to the Portneuf River	Water Quality, plant survival								x				
Raft River	Raft River		1999	2003	IASCD	319 Program	Water Quality	Rock crossings, Rock drop structures (20), Stream bank stabilization (revetments), Diversion structures (12), Weirs (12), Concrete irrigation return flow structures, Plantings including willows and grass, Grazing management	Photo points, BURP assessments, soil moisture analysis											x		
Rapid Creek Restoration (Upper)	Portneuf River		2001	2004	Idaho Soil Conservation Commission	319 Program	Water Quality	Water well and pump, Corral reclamation and berms, Pipeline, Water troughs, Fencing - 1500 feet, Stream bank restoration and vegetation	Pre-project sampling was conducted along Rapid Creek by ISCC. The same sample locations will be used for post project monitoring for a three year period. After three years sampling will be conducted every other year								x				

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
Rock Creek Rehabilitation	Lake Walcott		2001	2003	Twin Falls County Parks and Waterways Department	319 Program	Water Quality	Two storm water detention ponds, Stream bank stabilization- sloping, geo-matting, seeding, Trees, shrubs, Sprinkler system, Installation of 5000 yards of topsoil, Removal of old concrete from a two acre area, Installation of two pedestrian bridges across rock Creek	Photopoints									x			
Sheridan Creek, Diversion 10 Restoration	Upper Henry's		1996	2003	NRCS, HFF, Sheridan Valley Grazing Association, Idaho Fish and Wildlife Foundation, IDL, IDFG, USFS, CSCD	60% 319 Program, the other 40% will be funded through landowners, Henry's Fork Foundation, and the Henry's Fork Council, IDPR(Harriman State Park)	Water Quality	Stream bank stabilization, fencing, grazing plans, weed control, Nine large diversions, 14 miles of fencing, 10 rock check dams, six culverts, numerous rock drop structures, 0.5 mile of riparian plantings along stream banks, One water well	BURP monitoring will be collected along Sheridan Creek every five years and annual photo points will be revisited		x										

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
Twentyfour Mile Creek TMDL Implementation	Portneuf River		2000	2005	Soda Springs Soil Conservation Commission, Caribou Soil Conservation District	60% of this project will be funded by the 319 monies. The other 40% will come from funding from local entities, both in kind and monies, including landowners, EQUIP funds, CRP funds, and WQPA funds	Water Quality	Stream bank stabilization, fencing, grazing plans, weed control	Parameters sampled for include discharge, temperature, sediment, nutrient and bacteria, photopoints.								x				
Bergman Ditch Replacement – Improved irrigation water delivery – Squirrel Creek State Agricultural Water Quality Project (SAWQP)	Upper Henry's		1994	1994	Private landowners, Squirrel Creek Irrigation and Canal Company, Natural Resources Conservation Service (NRCS)	Yellowstone Soil Conservation District (YSCD)					x										

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
Diamond D Ranch Management Improvement – Riparian exclusion fencing on Targhee and Howard creeks, monitoring of rest-rotation grazing, and improved irrigation efficiency	Upper Henry's		1995	1995	NRCS; U.S. Department of Agriculture, Forest Service (USFS); Henry's Lake Foundation (HLF); The Nature Conservancy (TNC); IDFG; Idaho Soil Conservation Commission (ISCC); Island Park Sportsmen Association (IPSA); Howard Creek Ranch	Idaho Department of Fish and Game (IDFG), Diamond D Ranch					x											
Rocky Mountain Trumpeter Swan Relocation and Range Expansion Project – Hazing to disperse wintering swans from the Henry's Fork area	Upper Henry's		1995	1995	U.S. Bureau of Reclamation (BoR), U.S. Geological Survey (USGS), IDFG	U.S. Fish and Wildlife Service (USFWS)					x											
Henry's Lake SAWQP – Fifteen-year project to protect riparian areas and prevent shoreline erosion	Upper Henry's		1995	1995	Private landowners, NRCS	Yellowstone Soil Conservation District (YSCD)					x											

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
Publication of A Homeowner's Handbook for Living in Teton Valley	Teton River		1995	1995	World Wildlife Fund, Greater Yellowstone Coalition (GYC), Community Association for Responsible Planning, Teton Valley/Regional Land Trust (TRLT), USFS	Teton County Economic Development Council							x								
Site-Specific Technology for Agriculture			1995	1995	Idaho National Engineering/and Environmental Laboratory (INEEL), NRCS, Ricks College	Hess Farms					x	x	x								
North Leigh Creek Amphibian Enhancement Project – Educate public about western boreal toad and spotted frog habitat	Teton River		1995	1995	Wildlife Forever	USFS							x								
Buffalo River Fish Passage Facilities	Upper Henry's		1996	1996	IDFG, HFF, USFS, USFWS, Federal Energy Regulatory Commission (FERC)	Buffalo Hydro, Inc.					x										

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
Warm River Fish Hatchery – Reopen hatchery to produce rainbow and Yellowstone cutthroat trout	Upper Henry's		1996	1996		Shoshone-Bannock Tribes					x										
Henry's Lake Flat Water Development – Riparian exclusion fencing and development of alternative water source for livestock	Upper Henry's		1996	1996	Idaho Department of Parks and Recreation (IDPR), TNC, Farm Services Administration (FSA), NRCS, Howard Creek Ranch	Idaho Department of Lands (IDL)					x										
Targhee National Forest Revised Forest Plan – Comments submitted to the Supervisor of the Targhee National Forest			1996	1996		Council					x	x	x								
Davis Lake Allotment Well Construction – Develop a well water source for livestock to allow restoration of flow in Sheridan Creek	Upper Henry's		1996	1996	HFF, IDL, IDPR, Idaho Department of Water Resources (IDWR), NRCS, USFS, Davis Lake Allotment Permit Holders, ISCC	Clark Soil Conservation District (CSCD)					x										

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
Teton Watershed Integrated Resource Analysis Project – Develop an information management system for the Teton subbasin	Teton River		1997	1997	IDFG, HFF, TRLT, IDEQ, Fremont-Madison Irrigation District (FMID)	INEEL							x								
Operation of Ashton Gage on Fall River for 1997	Upper Henry's		1997	1997	IdaWest/Marysville Hydro, WD1, FMID, USGS	FMID					x										
Native Cutthroat Trout Conservation Project – Inventory of streams in upper Henrys subbasin	Upper Henry's		1997	1997	HFF, IDFG, Idaho State University (ISU), Gregory Aquatics	USFS					x										
Henry's Fork Weed Management Area Project – Noxious weed information and education			1997	1997	BLM; BoR; Fremont County, ID; Teton County, WY; Idaho Department of Agriculture (IDA); IDPR; Idaho Department of Transportation (IDT); IDL; IDFG; Rocky Mountain Elk Foundation; Fall River Rural Electric Cooperative (FRREC); Union Pacific Railroad	USFS, National Park Service (NPS)					x	x										

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
Squirrel Meadows - Grand Targhee Resort Land Exchange	Lower Henry's		1997	1997		USFS						x									
Willow Creek Vegetation Management Project – Restore aspen-dominated plant community	Upper Henry's		1998	1998		USFS					x										
Ashton Visitor Center, Phase Two – Staffing and publication of brochures	Upper Henry's		1998	1998		Ashton Area Development Committee					x										
Henry's Fork Springs Investigation – Research into the mechanisms of spring recharge in the upper Henry's subbasin	Upper Henry's		1998	1998	USGS; FMID; INEEL; Utah State University (USU); University of Utah; University of Oregon	HFF					x										
Thurmon Creek Yellowstone Cutthroat Trout Restoration – Eliminate nonnative trout and reintroduce cutthroat trout	Upper Henry's		1998	1998	USFS, IDFG, IDPR, BoR	Native Trout Subcommittee					x										

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
Upper Snake River Managed Groundwater Recharge – Augment flow at Thousand Springs by recharging aquifer in Henry's Fork basin	Upper Henry's		1998	1998	Egin Bench Canals, Inc.; Fall River Irrigation Co.; Salem Union Canal Co.; Twin Groves Irrigation Co.; FMID; WD1; BLM; Private landowners	Idaho Water Resources Board (IWRB					x										
Teton Dam Reservoir – Future Management Study, Phase I – Collect and analyze data to determine future management of area inundated by the reservoir upstream of the Teton Dam	Teton River		1998	1998	IDFG, USGS, BLM	BoR							x								
Assessment of Nutrient Concentrations in Groundwater, Lower Henrys Fork and Lower Teton River Basins – Measurement of nitrate concentrations in ground and drinking water	Lower Henry's Fork and Teton		1999	1999	IDEQ, IDWR, District Seven Health Department, IDA, Lockheed-Martin Idaho	USGS						x	x								

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
The Henry's Fork Ag Corridors Conservation Project – Perform education and outreach to preserve farmland and open space	Lower Henry's Fork		1999	1999	Private landowners, NRCS, IDFG, Land Trust Alliance, Fremont County Commissioners, HFF	TRLT						x									
1999 Henry's Fork Weed Management Area Cooperative Early Detection/Eradication Project			1999	1999	TNC, Fremont County (ID) Weed Control, Teton County (WY) Weed and Pest, IDA, IDPR, IDT, IDL, IDFG, USFS, BLM, NPS, NRCS, BoR, National Fish and Wildlife Foundation (NFWF)	Henry's Fork Weed Management Area Working Group					x	x									
Publication of Aquatic Resources of the Henry's Fork Watershed, Idaho, a Special Issue of the Intermountain Journal of Sciences			1999	1999	American Fisheries Society, FRREC, Federation of Fly Fishers, HFF, IDFG, Montana Cooperative Fisheries Research Unit at Montana State University, Trout Unlimited (TU), USFS	Intermountain Journal of Sciences					x	x									

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
Greater Yellowstone Trumpeter Swan Initiative – Coordinate private and agency efforts to restore a regional population of swans	Upper Henry's		1999	1999	USFS, HFF, IDFG, FMID, IDPR	The Trumpeter Swan Society					x										
Ashton Reservoir Water Quality Protection – Proposal for Clean Water Act § 319 funding	Upper Henry's		2000	2000	Private landowners	TRLT					x										
2000 Henry's Fork Weed Management Area Cooperative Early Detection/Eradication Project – Mapping noxious weeds			2000	2000	TNC, Fremont County (ID) Weed Control, Teton County (WY) Weed and Pest, IDA, IDPR, IDT, IDL, IDFG, USFS, BLM, NPS, NRCS, BoR, National Fish and Wildlife Foundation (NFWF)	Henry's Fork Weed Management Area Working Group					x	x									

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
Teton River Hydrologic Monitoring and Spring Creek Study – Install stream gages and monitor discharge, monitor water quality	Teton River		2001	2001	Private landowners, Teton Valley Trout Unlimited (TVTU), IDFG, IDEQ, Idaho Association of Soil Conservation Districts (IASCD), USGS, Intermountain Aquatics, Inc., TRLT	Friends of the Teton River							x								
Ecology of Montane Wetlands in the Caribou-Targhee National Forest – Year 1 – Field research to better understand montane wetlands dynamics	Upper Henry's		2002	2003	University of Missouri-Columbia, IDFG, USFWS, BoR,	USFS					x										
Habitat Assessment and Restoration – Research and implementation to improve habitat for Yellowstone cutthroat trout	Upper Henry's		2002	2002	IDFG, TRLT, ISU, Intermountain Aquatics, Inc., TVTU, USFS	Friends of the Teton River					x										

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
Foster's Slough Restoration Project	Teton River		2002	2002	Private landowners, NRCS, TSCD, IDFG, TVTU, Intermountain Aquatics, Inc., Ducks Unlimited, SAIC, NFWF	TRLT							x								
Marysville Pipeline Project – Conduct a feasibility study to replace Marysville Canal with a pipeline to improve water quality in Fall River and the Henry's Fork River	Upper Henry's		2002	2002	NRCS	Marysville Canal Company					x										
Sawtell Creeks Yellowstone Cutthroat Trout Restoration Project – Restore stream connectivity to allow fish passage	Upper Henry's		2003	2003	Private landowners, IDFG, NRCS	USFS on behalf of the Native Trout Subcommittee					x										
Watershed Perspectives on Hydrologic Alteration in the Henry's Fork Basin – Research and data analysis			2003	2003	USGS, HFF, TNC, TU, GYC, FMID, ISU Undergraduate Research Committee	ISU					x	x									

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
Henry's Fork Greenway – Construction of signs	Lower Henry's Fork		2003	2003	Henry's Fork Greenway Committee, City of St. Anthony Parks and Recreation Committee, Fremont County, BLM, TRLT, HFF, IDEQ, IDT, U.S. Army Corps of Engineers	City of St. Anthony						x									
Gray's Lake/Willow Creek Basin Review	Willow Creek Subbasin and Gray's Lake Area	Ongoing	2004	2005	Greater Yellowstone Coalition	Greater Yellowstone Coalition		GYC is currently conducting a review of conservation opportunities in the Willow Creek Subbasin and Gray's Lake area. A review of historical information is underway and talks with landowners, agencies and other NGO's have begun as well. Depending upon the outcome of our review and assessment, GYC will begin a collaborative process to protect and restore the lands, water and wildlife in these locations. Our main concerns are private land development; water and land issues related to the Gray's Lake NWR, and Yellowstone Cutthroat Trout populations in the Willow Creek Subbasin.	Special use permits to access across USDA Administered lands must be acquired					x							

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
Kirk Wetland,	Teton				Ducks Unlimited, Partners for Fish and Wildlife Project;	USFWS			Teton Valley Wetlands Restoration				x								
Flat Ranch Wetland restoration	Upper Henry's				The Nature Conservancy, Partners for Fish and Wildlife Project;	USFWS					x										
Flying R Ranch Riparian habitat restoration	Upper Henry's				The Nature Conservancy, Partners for Fish and Wildlife Project;	USFWS					x										
Diamond D Ranch Habitat protection and restoration	Upper Henry's				The Nature Conservancy, Partners for Fish and Wildlife Project;	USFWS					x										
Foster/Fox Creek Wetland protection	Teton				Teton Valley Land Trust, Partners for Fish and Wildlife Project	USFWS							x								
Hill Project Wetland protection and fish passage restoration	Teton				Teton Valley Land Trust, Partners for Fish and Wildlife Project	USFWS							x								

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
Fox Creek and Teton River restoration	Teton				Teton Valley Land Trust, Partners for Fish and Wildlife Project	USFWS							x								
Woods Creek Fen	Lower Henry's				Teton Valley Land Trust, Partners for Fish and Wildlife Project	USFWS		Peatland restoration in Henry's Fork watershed				x									
Six S Ranch	Cassia County				Six S Ranch, Partners for Fish and Wildlife Project	USFWS		Habitat development and management												x		
Si Ellen Dairy	Jerome County				Si Ellen Dairy, Partners for Fish and Wildlife Project	USFWS		Wetland and upland restoration														x
Salisbury Habitat development and management	Fremont County				Salisbury, Partners for Fish and Wildlife Project	USFWS						x										
Reid Ranch	Bingham County				North Bingham Soil and Water Conservation District, Reid Ranch	USFWS		Riparian protection and management on the Blackfoot River								x						
Sellars Creek	Bingham County				Idaho Department of Fish and Game	USFWS		Riparian development, restoration, and management								x						
Davis-Bond WRP	Madison County				Bond, Davis-Bond WRP, Partners for Fish and Wildlife Project	USFWS		Slough restoration on the Henry's Fork					x									

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage											
										IFA	UHF	LHF	TET	WIL	AMF	BFT	PTF	LWT	RFT	GSE	USR
Bradley/Blackfoot River	Bingham County				Central Bingham Soil and Water Conservation District, Bradley, Partners for Fish and Wildlife Project	USFWS		Riparian restoration and development								x					
Klausmann Marsh	Teton				Idaho Department of Fish and Game, Partners for Fish and Wildlife Project	USFWS		Wetland development and management					x								

Table 3. Closed Basin subbasin project inventory list, Upper Snake province.

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage				
										BCM	MDL	BCK	LLR	BLR
Summit Creek Exclosure and Instream Habitat Improvement	Snake, Upper Closed	Ongoing	1968	1998	Idaho Department of Fish and Game Conservation Data Center	IDFG	Unpaved roads in the area receive considerable amount of traffic and may be a source of sediment to the stream and wetlands						x	
GRASSLAND KIPUKA	Snake, Upper	Unknown	1979	1988	Idaho Department of Fish and Game Conservation Data Center	IDFG			7-28-96: U.S. Route 20-26-93, which bisects the RNA, was widened within the last month and is currently being paved. During construction, the two road cuts were enlarged considerably, destroying part of the west slope once covered by excellent stands of low sagebrush. Observation by Bob Moseley, Idaho CDC.					x
GAME CREEK	Snake, Upper	Unknown	1996	1997	Idaho Department of Fish and Game Conservation Data Center	IDFG		Game Creek is within Upper Snake River Districts BLM, Medicine Lodge RA. It is managed as a Research Natural Area.			X			
Mesa Marsh Noxious Weed Control		Completed	2003	2003	Fremont	RAC Title II				x				
Webber Creek Trailhead Toilet Replacement		Approved	2003	2003	Clark	RAC Title II					x			
Restriction and Information Signing		Completed	2002	2002	Clark	RAC Title II					x			

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage				
										BCM	MDL	BCK	LLR	BLR
Travel Management and Information Signing		Approved	2002	2002	Clark	RAC Title II					x			
Crooked Creek Ranch	Crooked Creek Ranch	Ongoing	2001	2004	The Nature Conservancy, North American Grouse, Partnership, native Seed Network	private, BLM		Model for sage steppe grassland management			x			
DEQ 319 projects		Ongoing	2003	2004	DEQ	DEQ				x	x	x	x	x
Amphibian monitoring		Ongoing	2003	2013	IDFG	IDFG		Basic amphibian surveys and monitoring across the region. Survey three sites each year focusing on high mountain lakes and wildlife management areas.		x	x	x	x	x
Lost Rivers National Learning Site in Holistic Management	Big Lost & Little Lost	Ongoing	2002	2007	USDA FS & Allan Savory Center for Holistic Management	USDA FS		To assist our communities in building this kind of approach, members of the community have used a variety of models in a few projects, including Holistic Management decision-making (see www.holisticmanagement.org) . This planning and decision making process has a track record of helping rural producers and diverse community groups create more productive land (including wildlife habitat) and increased wealth.					x	x
Thousand Springs, Chilly Slough	Big Lost	Complete	2003	2003	RMEF, USFWS, IDFG	RMEF								x

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage				
										BCM	MDL	BCK	LLR	BLR
Medicine Lodge (Irving Creek)	Medicine Lodge		2002	2003	Clark County Conservation District	319 Program, Additional funding sources include Continuous CRP (Conservation Reserve Program) for fencing and willows, EQUIP for AFOs, Idaho Soil Conservation Commission	Water Quality	Willow Clumps, Willow pole plantings, Toe rock rip rap, Vertical bundles of willows, V-Notch weirs used for drop structures, Grass, Fencing			x			
Medicine Lodge (Warm Creek)	Medicine Lodge		2003	2004	Clark County Conservation District	319 Program, Additional funding sources include Continuous CRP (Conservation Reserve Program) for fencing and willows, EQUIP for AFOs, Idaho Soil Conservation Commission	Water Quality				x			
Romrell WRP Habitat development and management	Clark County				Romrell WRP, Partners for Fish and Wildlife Project	USFWS					x			

Project Name (BPA contract #)	Subbasin/ Location	Status	Begin Year	End Year	Implementing/ Principal Agency	Funding/ Sponsor	Cause of Limiting Factors	Project Description	Comments/ Results/ Monitoring	Geographic area of coverage				
										BCM	MDL	BCK	LLR	BLR
Beller Farm	Butte County				Butte Soil and Water Conservation District, Beller Farm, Partners for Fish and Wildlife Project	USFWS		Riparian habitat restoration						x
Freeman	Custer County				Butte Soil and Water Conservation District, Freeman, Partners for Fish and Wildlife Project	USFWS		Riparian and wetland habitat protection						x

APPENDIX 4-2—LOSS ASSESSMENT

1 Introduction

The Pacific Northwest Electric Power Planning and Conservation Act of 1980 (Public Law 96-501) established a process for protecting, mitigating, and enhancing fish and wildlife affected by the construction and operation of hydropower projects in the Columbia River Basin. The act formed the Northwest Power Planning Council (NPPC). The council's purpose was to ensure the region a reliable supply of inexpensive power and balance that goal with the needs of fish and wildlife. In 1982, the council introduced a fish and wildlife program. The council's program takes an adaptive approach to fish and wildlife mitigation and has been amended several times. In 1995, program amendments included a two-step process for resident fish mitigation (Section 10; NPPC 1995). The amendment requested that fish and wildlife managers complete assessments of resident fish losses related to the construction and operation of hydropower facilities. Secondly, the amendment called for the development of biological objectives for mitigation (e.g., escapement, harvest, and production goals).

The purpose of this document is to quantify lotic habitat lost from construction of Minidoka Dam and Palisades Dam. Preliminary estimates of the number of native salmonids (Yellowstone cutthroat trout (YCT) *Oncorhynchus clarki* and mountain whitefish *Prosopium williamsoni)* that likely would have inhabited the lotic habitat lost following dam and reservoir construction are presented here. Losses dealt with here are primarily associated with inundation. A thorough evaluation of fish losses associated with the operational and construction impacts of these projects were beyond the resources and time frames available for the subbasin assessment.

Some would argue that reservoirs created behind dams create a net benefit to fish populations. They would argue that post-reservoir fish populations expand and increased fishermen benefits result. That may be true, but benefits do not accrue to native fish populations and benefits are highly dependent on water levels that are subject to fluctuation due to availability and demand. In addition, fish management costs increase post-reservoir construction, as most reservoir fisheries require substantial supplemental stocking with hatchery fish or new species introduction to support fisheries in the altered habitat.

In August 1998 YCT were petitioned for listing as threatened under the Endangered Species Act, 1973 as amended. While listing was found unwarranted, creation of migration barriers and reservoir construction were included as threats to species persistence in the petition.

Background and Description of Study Area

Minidoka Dam and Walcott Reservoir

Minidoka Dam was completed in 1906 and a power plant was added in 1909. The hydroelectric power plant was one of the first built by the federal government in the northwest (Martin and Meuleman 1989). Minidoka Dam is located 16 km northeast of the Rupert, Idaho (Figure 9). The Dam is a rock-fill structure with a concrete core and stands 26 m high (Figure 10). The dam's crest length is 1,364 m. Elevation at full pool is 1,294 m, which is the optimal elevation for diverting water during the irrigation season. Water storage capacity is 259×10^6 m^3 (BOR 1997). Average annual inflow to the reservoir is $5{,}778 \times 10^6$ m^3/yr.

The climate in the area of Minidoka Dam is considered semi-arid. Annual precipitation is 32 cm. Summers are hot and dry and winters are cold with a mean annual temperature of 9.4°C. Sagebrush/ wheat grass steppe is the dominant vegetation with the occasional stand of junipers. Riparian vegetation includes sedges and forbs with mixed willow, alders, and cottonwoods (Lay 1999).

Palisades Dam and Reservoir

Palisades Dam was completed in 1957 with the first reservoir spill in 1959. Palisades provides water for irrigation, flood control, recreation, and electrical power generation. The dam was initially equipped with four power-generating units, which provided a total generating capacity of 118 megawatts. These were later upgraded (in the 1990's) to provide a continuous power output of 168 megawatts (Simonds 1995).

Palisades Dam is located 11.3 km southeast of Irwin, in Bonneville County, Idaho near river km 1,450 on the South Fork Snake River (BOR 1996; Figure 11). The concrete gravity-type structure stands 82 m high with a crest length of 640 m (Figure 12). At maximum pool, the reservoir is 1,716 m above sea level. The dam impounds 1,481 x 10^6 m^3 of water at full pool. The South Fork Snake River drainage area above Palisades Dam is 13,468 km^2 (BOR 1996). Average annual inflow to the reservoir is 5,923 x 10^6 m^3/yr.

Fish Species

Historically, YCT populations exhibited resident and migratory life history strategies. Resident populations generally spend their entire lives in tributary and headwater streams. Migratory forms rear in tributary streams for several years and migrate to more productive downstream habitat in larger rivers (fluvial) or lakes (adfluvial). Migratory trout link resident populations to the species' gene pool. Barriers to migration isolate resident populations, which cause isolated populations to become vulnerable to catastrophic loss through habitat degradation, continued loss of genetic diversity, and potentially local extirpation (USFWS 1999).

Minidoka

Yellowstone cutthroat trout and mountain whitefish are the dominant native salmonids. Utah sucker *C. ardens*, Utah chub *Gila atraria*, and mottled sculpin *Cottus bairdi* are other fishes commonly found above Shoshone Falls (Simpson and Wallace 1982). The construction of Minidoka dam inundated approximately 51.5 km of the Snake River and 4.5 km of tributary streams. Rock Creek and the Raft River are the two largest tributaries entering the Snake River within the boundaries of Walcott Reservoir.

Palisades

Prior to the completion of Palisades Dam, the native sport fish community was dominated by YCT and mountain whitefish. Other native fish found in the South Fork Snake River included sculpin *Cottus sp.*, suckers *Catostomus sp.*, and dace *Rhinichthys sp.* We did not differentiate among the phenotypic variations of YCT.

Prior to the construction of Palisades Dam, The South Fork Snake River supported a good quality cutthroat trout fishery. Catch rates were estimated at 0.68 fish/h in the river above the dam site, similar to the river downstream (Miller and Roby 1957). Fishing in the river was reported as highly seasonal due to the heavy spring flows and fluctuations from Jackson Lake (USFWS 1947). Historically the South Fork Snake River was known for its large cutthroat trout and it was not uncommon to harvest up to 2.3 kg trout (Moore et al. 1981). Local anglers reported these large fish became scarce within three to

five years following the completion of Palisades Dam (Miller and Roby 1957).

Palisades Dam is an impassible barrier to migrating cutthroat trout. The completion of Palisades ended upstream spawning runs of cutthroat trout beyond that point. Large numbers of trout were reported in the afterbay of the dam in 1957. These fish were thought to be remnants of fish that spawned in tributaries above the dam (Miller and Roby 1957).

Methods

Estimating native sport fish losses is exceptionally difficult, especially when pre-impoundment data are nonexistent or qualitative in nature. However, attempts have been made using post-impoundment fisheries information (Zubic and Fraley 1987; Marotz et al. 1998; Fraley et al. 2003). In both studies, the authors estimated native fish losses by averaging population data (e.g., fish / 100 m^2) from tributary and river reaches in the same geographical area; and then applied those values to the amount of inundated habitat. We used a similar approach to estimate the losses of YCT and mountain whitefish resulting from the construction of Minidoka, and Palisades dams and reservoirs.

An extensive literature search provided information on pre- and post-reservoir conditions including fish assemblages, available/lost habitat, environmental impacts, and fish densities. When information from the study area was not available or limited in scope, data was pooled from adjacent or similar systems

River kilometers (km) and tributary length lost to inundation were measured using All Topo Maps (ATM), a computerized map viewing software package (Gage 1999). Lengths of inundated tributaries and river channels were measured on USGS 1:250,000 scale topo maps with the ATM software. Maps were enlarged to 150%, and length distances measured using the tracing tool. As a check of the accuracy of ATM, distances measured by the described protocol were compared to distances measured using the odometer in a vehicle. An arbitrary distance on a road (approximately 2.5 km) was measured using ATM and compared to the odometer reading.

Tributary width was determined from IDFG stream survey records, and/or the ATM tracing tool. Mean width of inundated tributaries was estimated by stream order using mean stream width from the same stream above inundated reaches or from similar order streams near the inundated stream reach. Inundated area was calculated by multiplying mean width by inundated length.

Stream order was determined using ATM to view a reservoir tributary from its mouth to the headwaters. Stream order was designated using a hierarchical classification. Intermittent streams, those flowing for only a portion of the year, were recorded separately from perennial streams. Intermittent streams were designated on the maps by a series of dots followed by a straight line. The smallest perennial stream was named a first order and when two streams of the same order (n) joined they became a new order (n +1), (Allan 1995).

Fish abundance information from streams near inundated reaches was used to approximate pre-inundation fish abundance. Fish loss post-inundation was estimated by multiplying average fish density by inundated area. Fish loss estimates were stratified by stream order. Pre-impoundment fish populations were estimated for each tributary by multiplying the area inundated by the average fish density for that stream order.

Minidoka Dam and Walcott Reservoir
Density estimates data were provided by Lukens (1988). Lukens (1988) sampled fish from the Snake River near Shelley, which is about 120 km upstream from Walcott Reservoir (Figure 1). Fish abundance was estimated using a Schnabel mark recapture method. Fish densities (fish / 100 m^2) found in the upriver reach were used to estimate fish loss in the inundated area of the Snake River.

Palisades Dam and Reservoir
Width of inundated stream tributaries was estimated using USFS and IDFG streams survey data. The average width of the South Fork Snake River and Salt River were estimated using the mapping software because there were insufficient data on fifth order streams to provide an average width.

Density estimates from the South Fork Snake River Drainage were used to estimate pre-dam fish densities in the flooded tributaries and the Snake River mainstem. Fish abundance data were provided by the United States Forest Service (USFS) and Idaho Department of Fish and Game (IDFG). Past data from the South Fork Snake River below the dam were used to estimate losses in the main river (Moore and Schill 1984; Elle and Corsi 1994; Gamblin et al. 1998; Dillon et al. 1999). Tributary densities were estimated from population data in tributaries within the impacted reach of the South Fork Snake River (USFS, unpublished data). Average fish densities are shown.

Similar to tributary estimates, existing population data were pooled to estimate pre-impoundment abundance for the South Fork Snake River. Some of the tributary surveys were single pass electrofishing estimates. Single pass data were expanded to total fish abundance using the equation: y = first pass abundance X 1.6236; $r2 = 0.75$, $p < 0.01$. The regression equation was derived by plotting total fish abundance estimates (three pass depletion) from 20 (3 removed as outliers) stream reaches as a function of first pass abundance.

Results

Minidoka Dam and Lake Walcott
Lake Walcott inundated 51.5 km of the Snake River. No fish bearing tributaries were inundated by Lake Walcott. Mean width of the Snake River was 269.1 m. Total area inundated of the Snake River was 1,385.84 ha.

Yellowstone cutthroat trout occupy the upper reaches and feeder streams of tributaries but are absent lower in the drainages (Lay 1999; DEQ 1994-97, unpublished data). Mountain whitefish are also absent from the lower reaches of the tributaries near the reservoir. Most of the water that reaches the reservoir is degraded irrigation return water (Lay 1999). Because the diversions are not related to the construction of Minidoka Dam, fisheries losses within 4.5 km of inundated tributaries are insignificant.

Lukens (1988) estimated YCT and whitefish density in the Snake River 120 km upstream from Lake Walcott was .004 and 7.180 fish per 100 m^2, respectively.

Habitat for 554 YCT and 995,051 whitefish was inundated by lake Walcott and annual loss caused by inundation of the Snake River by Lake Walcott was 554 YCT and 995,051 whitefish beginning in 1906.

Palisades Dam and Reservoir
Palisades Reservoir inundated 27.4 km of the South Fork Snake River and 27.1 km of tributary streams. Mean width of 1^{st} to 5^{th} order streams was 1.2, 2.2, 4.9, 8.0, 9.1, and 35 m, respectively. Mean width of the South Fork Snake River was 117.9 m. Estimated

area inundated of 1st to 5th order streams, and the South Fork Snake River was 346.826 ha. Area inundated by stream order (1st to 5th, and the South Fork Snake River), was .089, 2.124, 3.007, 6.203, 12.383, and 323.020 ha, respectively.

Average YCT and whitefish density was estimated from 2, 10, 17, and 3, for 1st through 4th order streams (except McCoy Creek), respectively. Yellowstone cutthroat trout and whitefish density in McCoy Creek were 6.0 and 1.0. Yellowstone cutthroat trout and whitefish density in the South Fork Snake River were 1.82 and 5.99, respectively. Fish density in the South Fork Snake River was used to estimate Salt River fish density. Yellowstone cutthroat trout and whitefish density ranged between 1.82 and 15.38, and .00 and 5.99 fish per 100 m^2, respectively.

Habitat for 9,413 YCT and 291 whitefish was lost in tributaries inundated by Palisades Reservoir. An additional 2,253 and 58,790 YCT were lost in the Salt and South Fork Snake Rivers, respectively. Also, an additional 13,495 and 193,489 whitefish were lost to inundation of the Salt and South Fork Snake Rivers, respectively. Annual loss from inundation each year since 1957 includes 70,456 YCT and 207,275 whitefish.

Literature Cited

BOR. 1996. A Combined Report: A Description of BOR System Operations Above Milner Dam, A Description of BOR System Operations of the Boise and Payette Rivers, A Description of BOR System Operations of the Miscellaneous Tributaries of the Snake River.

BOR. 1997. A Combined Report: A Description of BOR System Operations Above Milner Dam, A Description of BOR System Operations of the Boise and Payette Rivers, A Description of BOR System Operations of the Miscellaneous Tributaries of the Snake River.

Dillon, J., W. Schrader, and M. Gamblin. 1999. Regional fisheries management investigations. Idaho Department of Fish and Game, Annual Performance Report, Program F-71-R-23, Project 1, Job C[1].

Elle, S. and C. Corsi. 1994. Regional fisheries management investigations. Idaho Department of Fish and Game, Job Performance Report, Project F-71-R-13, Job 6(IF)-c.

Fraley, J., B. Marotz, J. DosSantos. 2003. Hungry Horse Mitigation Plan. Report to Bonneville Power Administration Project No. 1993-01900, 82 electronic pages, (BPA Report DOE/BP-00004100-1).

Gamblin, M., J. Dillon, and W. Schrader. 1998. Regional fisheries management investigations. Idaho Department of Fish and Game, Annual Performance Report, Program F-71-R-22, Project 1, Job C[1].

Gage. 1999. All Topo Maps: Idaho. CD ROM software of topographic maps covering the entire state of Idaho, Yellowstone National Park, Grand Teton National Park, and the National Elk Refuge.

Lay, C.H. 1999. The Lake Walcott Subbasin Assessment and Total Maximum

Daily Load. Public Review Draft. Idaho Department of Environmental Quality, Twin Falls, Idaho.

Lukens, J.R. 1988. Rivers and Streams Investigations. Snake River Game Fish Populations, Fishing Pressure and Harvest, American Falls Reservoir to South Fork. Idaho Department of Fish and Game, Job Completion Report, Project F-73-R-10, Job 1. Boise, Idaho.

Marotz, B,, S. Dalbey, C. Muhlfeld, S. Snelson, G. Hoffman, J. DosSantos, and S. Ireland. 1998. Fisheries Mitigation and Implementation Plan For Losses Attributable to the Construction and Operation of Libby Dam. Montana Fish Wildlife and Parks, Confederated Salish and Kootenai Tribes, and Kootenai Tribe of Idaho. Report for Bonneville Power Administration. 54pp.

Martin, B. and G.A. Meuleman. 1989. Minidoka Dam Wildlife Impact Assessment. Bonneville Power Administration, Division of Fish and Wildlife. Contract No. DE-AI79-88BP919454. Project No. 88-110.

Moore, V., K. Aslett, and C. Corsi. 1981. River and stream investigations: South Fork Snake River fisheries investigations. Idaho Department of Fish and Game, Job Performance Report, Project F-73-R-3, Job I.

Moore, V. and D. Schill. 1984. River and stream investigations: South Fork Snake River Fisheries Investigations. Idaho Department of Fish and Game, Job Performance Report, Project F-73-R-5, Job 3.

NPPC. 1995. Columbia River Basin Fish and Wildlife Program. Resident fish and wildlife amendments. Northwest Power Panning Council, Portland, Oregon. Document 95-20.

Zubik, R. and J. Fraley. 1987. Determination of Fisheries loss in the Flathead system resulting from the construction of Hungry Horse Dam. Montana Department of Fish Wildlife and Parks, Kalispell, MT, report for Bonneville Power Administration. 33pp.

APPENDIX 4-3— RESEARCH, MONITORING AND EVALUATION ACTIVITIES.

Information for the Research, Monitoring and Evaluation sections were originally taken from the respective Subbasin Summary documents (NWPPC 2002a, NWPPC 2002b, NWPPC 2002c, NWPPC 2002d, NWPPC 2002e) edits and additions to the information contained in the original documents were made by technical team members to update information where necessary.

Upper Snake Subbasin- Henrys Fork Watershed

Research, Monitoring, and Evaluation Activities

Fisheries

BPA funded – Subbasin level

The Snake River Native Salmonid Assessment (Project No. 980002) is an ongoing IDFG research project initiated in August 1998 to: 1) assess the current status of native salmonids in the middle and upper Snake River provinces in Idaho, 2) identify factors limiting populations of native salmonids, and 3) develop and implement recovery strategies and plans. The inventory phase is being used to assess presence/absence and abundance of native salmonids in all major watersheds of the middle and upper Snake River provinces, and concurrent habitat measurements are being used to preliminarily examine factors that influence this presence/absence and abundance. Genetic samples are also being collected to assess the purity of populations and the degree of genetic variability among and within populations of native salmonids. Based on these findings, major limiting factors will be investigated during the second phase of the project. In the third phase, recovery strategies for individual or groups of subbasins will be developed to address the factors most important in limiting the patterns of distribution and abundance of native salmonids.

In the first three years of the project, fish and habitat surveys have been made at a total of 757 sites on private and public lands across southern Idaho in nearly all major watersheds, including the Teton in the Henrys Fork subbasin. Genetic samples of redband trout and Yellowstone cutthroat trout have been collected at a total of 155 sites, and results are available for 15 sites. Water temperature has been measured and/or obtained from other agencies at 97 stream sites across the middle and upper Snake River provinces. A comprehensive database has been developed that includes data on native salmonid abundance and distribution, genetic samples, habitat summaries, and herpetofauna observations. This project is also evaluating the effectiveness of electrofishing to remove non-native brook trout as a means of reducing threats to native salmonids; after three years of removal in test streams, the brook trout population has not been reduced (Meyer 2000; Meyer and Lamansky in review). Other removal techniques (e.g., Young 2001) may be evaluated in subsequent years in an attempt to find a more viable method of removing non-native salmonids where the long-term persistence of native salmonids is being threatened by the presence of exotic species.

Because the inventory phase is still underway and not yet completed for any one species (Yellowstone cutthroat trout will be completed in 2002), analysis to date for the most part has been preliminary and cursory (Meyer 2000; Meyer and Lamansky in review). However, in a study of Yellowstone cutthroat trout in southeast Idaho, cutthroat trout densities have remained unchanged and size structure has improved over the last 20 years, suggesting that at least at some locations in the middle and upper Snake River provinces, native salmonid populations may currently be relatively stable (Meyer et al. in review).

Non-BPA funded - Subbasin level

Research efforts that involve aquatic resources in the Henrys Fork subbasin are extensive and have been compiled in a bibliography by Van Kirk (2000). Recent

research, monitoring, and habitat improvement projects have been included in this section.

From 1996 to 1999 the Henry's Fork Foundation conducted a recognizance level fish and fish habitat assessment of all the fish-bearing streams in the upper and lower Henrys Fork hydrologic units (Gregory 1997a, 1998a, 2000a, and Gregory and Van Kirk 1998). This study, when combined with work conducted by the USFS (as reported in Jaeger et al. 2000) and IDEQ on Teton hydrologic unit streams (Hill 2001) provides a subbasin-wide assessment of trout distributions (Appendix A) and a nearly complete subbasin view of fish habitat.

The IDEQ has completed a water quality assessment for the Upper Henrys hydrologic unit (Hill and Mebane 1998) and a draft assessment and TMDL for the Teton hydrologic unit (Hill 2001). The Lower Henrys hydrologic unit, which is essentially the main river from Ashton Dam to the mouth and the Fall River drainage, contains no Water Quality Limited (Clean Water Act §303(d)) streams. Therefore, neither a water quality assessment nor a TMDL is required for the Lower Henrys hydrologic unit. The IDEQ's TMDL program is a three-step process that includes 1) preparation of a water quality assessment, 2) development of a TMDL or Watershed Management Plan, and 3) development of an Implementation Plan (Hill 2001). The purpose of the assessment is to:

- describe the physical, biological, and cultural attributes of the hydrologic unit, particularly in relation to surface water resources,
- summarize existing water quality information available for the hydrologic unit,
- describe applicable water quality standards,
- identify and evaluate pollution sources and disturbance activities that contribute to impairment of water quality,
- summarize past and present pollution control efforts, and
- outline water quality management needs including identification of those water bodies that a) require development of a TMDL, b) may be removed from the § 303(d) list because they are not impaired, c) are not subject to TMDL development because the pollutant responsible for impairment is habitat modification or flow alteration, or d) are candidates for § 303(d) listing.

If the water quality assessment demonstrates that a water body identified on Idaho's § 303(d) list is not water quality-impaired and does not require development of a TMDL, IDEQ will develop a revised § 303(d) list that excludes that water body. If EPA approves the revised list, a TMDL will not be developed for the excluded water body. Conversely, if the subbasin assessment demonstrates that a water body is water quality-impaired, the water body will be included on the next § 303(d) list prepared for submission to EPA. Development of a TMDL or management and control plan for newly listed water bodies will be delayed until at least 2006, following completion of the current TMDL schedule. During this time, it is possible that the water body will be restored to a condition that meets water quality standards, making development of a TMDL unnecessary. Currently, 14 stream segments in the subbasin are listed on the §303(d) list.

A whirling disease risk assessment has been conducted for the Henrys Fork subbasin (Gustafson 1998). This assessment is based on occurrence of *Tubifex tubifex,* the only

known secondary host for the parasite *Myxobolus cerebralis*, which is the causative agent of whirling disease. Risk was considered high when *Tubifex* was present in the stream or when invertebrate biodiversity was low. Eight areas were identified as "high risk" areas based on these criteria. These areas were streams from Henrys Lake Flat downstream to Island Park Reservoir, the lower watershed of Sheridan Creek, Island Park Dam tail water, Osborne Springs, Lower Warm River, Porcupine Creek, Lower Fall River and the entire lower elevation area of the Teton River drainage. All of the large springs of the Henrys Fork headwaters and most of the mountain forest streams were listed at low risk. Risk may be reduced in some areas by high summer temperatures and large numbers of non-host worm species.

IDFG Project Level

Henrys Lake

IDFG uses gill nets annually to monitor trends in cutthroat, hybrid, and brook trout populations. Gill nets are also used to monitor abundance and trends in the population of non-native Utah chubs. A creel survey is conducted on an alternate year basis to assess catch rates, total harvest, and angler effort. Gill net and creel data are used to evaluate stocking numbers and stocking strategies as well as evaluate growth and survival of sterile hybrid trout and brook trout. Otoliths are collected annually to assess length-at-age and assess cohort strength in an attempt to understand factors (biotic and abiotic) that affect survival and abundance. Stomach content samples are also collected annually to identify food habits of salmonids and Utah chubs.

Hatchery released fish are marked annually to assess contribution of hatchery fish to the population and evaluate and refine the production of sterilized triploid hybrid and brook trout. Outmigrating juvenile trout are trapped in tributaries on alternate years to estimate production of naturally produce cutthroat trout. Several irrigation diversions have been screened on Henrys Lake tributaries, and several miles of riparian fence are maintained by IDFG.

Henrys Fork

Populations of trout and mountain whitefish are annually or semi-annually assessed by electrofishing in representative reaches throughout the mainstem Henrys Fork. Otoliths are collected from a sub-sample of fish to enable assessment of cohort strength and evaluate the relationship between flows and year-class strength. Electrofishing surveys and angler catch are being used to evaluate the success of a Yellowstone cutthroat supplementation program in the reach of the river above Island Park Reservoir.

Teton River

Populations of trout are assessed on alternate years in representative reaches in the Teton Valley by electrofishing. Juvenile trout production in tributaries to the Teton River is being evaluated in an effort to better understand factors limiting the Yellowstone cutthroat trout population in the mainstem Teton River. The infection rate of juvenile trout to whirling disease is being evaluated by the use of sentinel cutthroat trout in tributaries and in the mainstem.

BPA funded – Project level

None

Wildlife

BPA funded – Subbasin level

None

Non-BPA funded - Subbasin level

None

BPA funded – Project level

Non

Upper Snake Subbasin- Remainder of Upper Snake Watershed

Research, Monitoring and Evaluation Activities

Fisheries

BPA-funded Research, Monitoring and Evaluation Activities

Snake River Native Salmonid Assessment (Project No. 980002)

The Snake River Salmonid Assessment is an ongoing research project initiated in August 1998 to assess the current status of native salmonids in the Middle and Upper Snake River Provinces in Idaho (Phase I), identify factors limiting populations of native salmonids (Phase II), and develop and implement recovery strategies and plans (Phase III). The inventory phase is being used to assess presence/absence and abundance of native salmonids in all major watersheds of the Middle and Upper Snake River Provinces, and concurrent habitat measurements are being used to examine factors that influence this presence/absence and abundance. Genetic samples are also being collected to assess the purity of populations and the degree of genetic variability among and within populations of native salmonids. Based on these findings, major limiting factors will be investigated during the second phase of the project. Recovery strategies for individual or groups of subbasins will be developed to address the factors most important in limiting the patterns of distribution and abundance of native salmonids.

Results

In the first 3+ years of the project, fish and habitat surveys have been made at a total of 757 sites on private and public lands across southern Idaho in nearly all major watersheds, including the Goose, Raft, Rock, Bannock, Portneuf, Blackfoot. Genetic samples of redband trout and Yellowstone cutthroat trout have been collected at a total of 155 sites, and results are available for 15 sites. Water temperature has been measured and/or obtained from other agencies at 97 stream sites across the middle and upper Snake River provinces. A comprehensive database has been developed that includes data on native salmonid abundance and distribution, genetic samples, habitat summaries, and herpetofauna observations. This project is also evaluating the effectiveness of electrofishing to remove non-native brook trout as a means of reducing threats to native salmonids; after three years of removal, the brook trout population has not been reduced (Meyer 2000; Meyer and Lamansky 2001, in progress). Other removal techniques (e.g., Young 2001) may be evaluated in subsequent years in an attempt to find a more viable method of removing non-native salmonids where the long-term persistence of native salmonids is being threatened by the presence of exotic species.

Because the inventorying phase is ongoing and not completed for any one species (Yellowstone cutthroat trout will be completed in 2002), analysis to date for the most part has been preliminary and cursory (Meyer 2000; Meyer and Lamansky 2001). However, in a study of Yellowstone cutthroat

trout densities across southeast Idaho, densities remained unchanged and fish size structure improved over the last 20 years, suggesting that at least at some locations in the middle and upper Snake River provinces, native salmonid populations may be relatively stable (Meyer *et al.* in review). Maturity of Yellowstone cutthroat trout has been determined for a number of locations across southeast Idaho to assess effective population size for extinction risk analysis in Idaho.

Non BPA funded Research, Monitoring and Evaluation Activities

None reported.

Wildlife

BPA-funded Research, Monitoring and Evaluation Activities

None reported.

Non BPA-funded Research, Monitoring and Evaluation Activities

None reported.

Snake Headwaters Subbasin

Research, Monitoring and Evaluation Activities

BPA-funded

Snake River Native Salmonid Assessment Research (Project No. 980002)

This project is conducted by the Idaho Department of Fish and Game. The overall goal of this research is to protect and rebuild populations of native salmonids in the middle and upper Snake River provinces to self-sustaining, harvestable levels. Associated with this goal are three specific objectives, which are being implemented in phases:

Objective 1. Assess current stock status and population trends of native salmonids and their habitat.

Strategy 1: Coordinate with other ongoing projects and entities to avoid data duplication and to prioritize sampling efforts.

Strategy 2: Use electrofishing and snorkeling to estimate presence/absence and abundance of salmonids throughout the middle and upper Snake River provinces.

Strategy 3: Identify, describe, and measure stream habitat and landscape-level characteristics at the fish sampling sites.

Strategy 4: Collect genetic samples (fin clips) from native salmonids to determine (using microsatellite DNA markers) the purity of populations and the degree of genetic variability among and within populations.

Strategy 5: Develop models that explain the occurrence and abundance of native salmonids based on measurable characteristics of stream habitat and landscape features. Results will identify populations at risk and in need of recovery strategies, and will guide study design for Objective 2.

Objective 2: Based on results from Objective (or Phase) 1, initiate studies to identify major limiting factors and life history and habitat

needs for native salmonid populations throughout the middle and upper Snake River provinces, especially for populations most at risk of extirpation.

Objective 3: Develop and implement recovery and protection plans based on results from Objectives (or Phases) 1 and 2.

Project Description: This is an ongoing research project initiated in August 1998 to assess the current status of native salmonids in the middle and upper Snake River provinces in Idaho (Phase I), identify factors limiting populations of native salmonids (Phase II), and develop and implement recovery strategies and plans (Phase III). The inventorying phase is being used to assess presence/absence and abundance of native salmonids in all major watersheds of the middle and upper Snake River provinces, and concurrent habitat measurements are being used to preliminarily examine factors that influence this presence/absence and abundance. Genetic samples are also being collected to assess the purity of populations and the degree of genetic variability among and within populations of native salmonids. Based on these findings, major limiting factors will be investigated during the second phase of the project. Recovery strategies for individual or groups of subbasins will be developed to address the factors most important in limiting the patterns of distribution and abundance of native salmonids.

Results: In the first 3+ years of the project, fish and habitat surveys have been made at a total of 757 sites on private and public lands across southern Idaho in nearly all major watersheds, including the Weiser, Owyhee, Payette, Boise, Goose, Raft, Rock, Bannock, Portneuf, Blackfoot, Willow, South Fork Snake, and Teton. Genetic samples of redband trout and Yellowstone cutthroat trout have been collected at a total of 155 sites, and results are available for 15 sites. Water temperature has been measured and/or obtained from other agencies at 97 stream sites across the middle and upper Snake River provinces. A comprehensive database has been developed that includes data on native salmonid abundance and distribution, genetic samples, habitat summaries, and herpetofauna observations. This project is also evaluating the effectiveness of electrofishing to remove non-native brook trout as a means of reducing threats to native salmonids; after three years of removal, the brook trout population has not been reduced (Meyer 2000; Meyer and Lamansky 2001, in progress). Other removal techniques (e.g., Young 2001) may be evaluated in subsequent years in an attempt to find a more viable method of removing non-native salmonids where the long-term persistence of native salmonids is being threatened by the presence of exotic species.

Because the inventorying phase is ongoing and not completed for any one species (Yellowstone cutthroat trout will be completed in 2002), analysis to date for the most part has been preliminary and cursory (Meyer 2000; Meyer and Lamansky 2001). However, in a study of Yellowstone cutthroat trout densities across southeast Idaho, densities remained unchanged and fish size structure improved over the last 20 years, suggesting that at least at some locations in the middle and upper Snake River provinces, native salmonid populations may be relatively stable (Meyer et al. in review). Maturity of Yellowstone cutthroat trout has been determined for a number of locations across southeast Idaho to assess effective population size for extinction risk analysis in Idaho.

Southern Idaho Wildlife Mitigation (Project 1995-057-01)

This project is conducted by IDFG and the Shoshone-Bannock Tribes to implement projects to achieve full mitigation for construction and inundation losses in southern Idaho from development of the federal hydropower system. Monitoring and evaluation actions take place on all acquisitions and easements administered by project managers. The Habitat Evaluation Procedure (HEP) is used to estimate habitat value for protection and/or enhancement credit to BPA. Photopoints and transects are used to monitor changes in vegetation and habitat. Neotropical birds are monitored using established protocols.

Non BPA funded

National Park Service, Grand Teton National Park

Sensitive, threatened and endangered species inventory and monitoring. -- The requirement for the National Park Service to conserve rare species is specifically stated in *NPS Management Policies*: "Consistent with the purposes of the Endangered Species Act, the National Park Service will identify and promote the conservation of all federally listed threatened, endangered, or candidate species within park boundaries and their critical habitats...Active management programs will be conducted as necessary to perpetuate the natural distribution and abundance of threatened or endangered species...The National Park Service also will identify all state and locally listed threatened, endangered, rare, declining, sensitive, or candidate species that are native to and present in the parks, and their critical habitats...(p. 4:11).

Furthermore, *NPS-77 Natural Resources Management Guideline*, states as the first major program objective: "Inventory and monitor sensitive, candidate, and listed species. This includes mapping species' distribution in the park, identifying critical habitats (if any), and determining numbers of individuals, threats to the species, and population trends" (p. 270).

Currently, the Park contains small breeding populations of one endangered (peregrine falcon) and two threatened species (grizzly bear and bald eagle). One species listed as experimental (gray wolf) uses the Park on occasion, but is not a resident at this time. Two additional resident species, the lynx and northern goshawk, are under review for listing by the U.S. Fish and Wildlife Service. The Park lists 33 avian species and 9 mammals as "Species of Special Concern". The Wyoming Natural Diversity Database lists 66 "Plant Species of Concern" as occurring in the Park.

Threatened and Endangered (T & E) Species

As a rare species, the bald eagle has the longest history of monitoring within Grand Teton National Park, with efforts beginning in 1968 (detailed histories of all species addressed can be found in the Resources Management Plan). Studies were conducted on the population by various researchers until 1989. Since that time, Park biologists have maintained a monitoring and banding program in coordination with the U.S. Fish and Wildlife Service and the Wyoming Game and Fish Department (WGFD). Bald eagle territories increased from 3-4 in the Park in 1968 to 10 in 1997.

The Park was active in a peregrine falcon reintroduction program from 1980 to 1986, with 52 birds released during a hacking program. The first documented nesting attempt was observed in 1987. That territory has been active every year since that time. In

1990 and 1991, extensive surveys for peregrines were performed, funded by a regional NRPP initiative. No additional eyries were found. A new territory was located in the Park in 1995, and a third in 1996.

Grizzly bear research and monitoring within the Park has been conducted primarily by WGFD through the Interagency Grizzly Bear Committee (IGBC). In 1994, the first grizzly bear mauling in the Park occurred, when a runner was attacked injured in the Two Ocean Lake area. In 1995, grizzly bears were responsible for several domestic cattle depredations within Park boundaries in the Elk Ranch grazing allotment. The following year (1996), depredations continued, and the offending grizzly bear was caught and killed by WGF in accordance with IGBC guidelines. Three additional grizzly bears were caught by Park biologists, one for human habituation, and two for habituation to human attractants. In 1997, grizzly bears again preyed upon domestic cattle in the Elk Ranch allotment, however losses were acceptable and no action was taken. During this situation, WGFD personnel verbally stated that they were relinquishing all responsibility for grizzly bear management within Park boundaries due to staffing constraints. A second grizzly bear mauling occurred in the fall of 1997 in the Parkway during the moose archery season.

Gray wolves have been documented within the Park prior to the 1994 reintroduction effort in Yellowstone National Park, however they did not become established. In 1996, a pair reintroduced in Yellowstone began using areas immediately adjacent to the Park in Buffalo Valley, but finally settled down north of Dubois. In 1997, an entire pack from the Heart Lake area traveled south and began using areas within Park boundaries in the Two Ocean Lake area. They have since returned to Yellowstone, but are expected to use Park lands on a more frequent basis now that they are familiar with the area. Wolf biologists expect pack establishment within Park boundaries in the unspecified future.

Sensitive Species

Monitoring of a variety of sensitive species has occurred in the Park since the early 1960's when the monitoring of trumpeter swan nests began. Surveys of great blue heron rookeries began in 1968, and the monitoring of osprey nests began in 1972, and both continue on an annual basis. A monitoring program for amphibians was begun in 1991 by an outside researcher, but has since been maintained by Park biologists. Annual harlequin duck surveys began in 1984 but ceased in 1995 due to staffing constraints. Annual sage grouse counts have occurred since the late 1980's. A radiotelemetry research project on bighorn sheep was initiated in 1994 and is maintained by Park biologists, along with helicopter and ground surveys.

Sensitive Species Processes

Aside from formal surveys, additional information on sensitive species is collected through the Park Natural History Field Observation reporting process whereby visitors and staff report observations of sensitive species. Significant observations are followed up with verbal or written interviews and/or site visits to better assess to accuracy and importance of the report.

The current Inventory and Monitoring (I & M) program is the primary responsibility of the Project Biologist, with direction from the Senior Wildlife Biologist. Since 1995, a Resource Management Biologist has not been availed to the park. These duties (both I & M related and otherwise) have been reapportioned upon existing staff, reducing the effectiveness of the current I & M program.

Further Park status changes include an increase in:

a) the number of T & E species (the addition of the gray wolf, possible additional listing of the lynx and the northern goshawk)

b) the population of all resident T & E species (grizzly bear, bald eagle, peregrine falcon)

c) the complexity of management of T & E species (grizzly bear depredations, maulings, human habituation)

d) the complexity of non-T & E wildlife related issues (brucellosis, bison management, black bear management)

Due to decreased staffing and funding levels, some I & M projects had to be eliminated, while the information gained in other projects was severely reduced, resulting in inadequate information in some instances. For example, following the periodic changes in nest trees, the locations of two of the ten bald eagle nests in the Park are currently unknown due to insufficient resources to locate the nests. Although peregrine falcons are expanding in the Park, thorough surveys to search for new sites have not been instituted since 1991.

Idaho Department of Environmental Quality

Programs to assess water quality -- Monitoring activities in Idaho have focused on beneficial uses and ambient water quality trends. Data from Idaho DEQ's monitoring are used to document the existence of uses, the degree of use support, and reference conditions. This monitoring is made up of primarily the collection of biological and physical data. The ambient trend-monitoring network is designed to document water quality trends at the river basin and watershed scales through the collection of mainly water column constituent data. Biological parameters are being added to this network as well. Fifty-six monitoring stations are currently sampled on a rotating basis to provide data for water quality trend assessment.

The Idaho Department of Environmental Quality is engaged in ongoing research to obtain the most recent and site specific scientific knowledge available for the purposes of refining water quality criteria. DEQ also monitors chemical, physical and biological components of the aquatic environment through the Beneficial Use Reconnaissance Project. DEQ continues to refine the water body assessment guidance for evaluating BURP data. The primary assessments are designed to determine the support status of the two main aquatic life beneficial uses, Cold Water Biota and Salmonid Spawning.

Jackson Fish Hatchery

Currently, evaluations for individual stocking programs are underfunded and are accomplished only if incorporated into a larger, overall study of the habitat or watershed. This information would determine if the wild trout program has benefits over and above the annual production costs or, if the extra costs of this program exceed the benefits derived.

Safari Club International

Mule Deer Recruitment in Southern Idaho -- The SE Idaho Chapter of Safari Club International partnered with the Idaho Department of Fish and Game (IDF&G) for this project. The study area is in Game Management Units 54, 55, 56, 57, 70, and 73A located in the Upper Snake subbasin, with additional studies in Game Management

Unit 67 in the Upper Snake Headwaters subbasin and Game Management Units 59 and 59A in the Upper Snake Closed basin. The study period is from 1998 through 2003. The Idaho Chapter of Safari Club International, to date, has donated $10,000.00 and has supplied hundreds of man-hours trapping deer for the study. $125,000.00 has been leveraged towards this study through the U.S. Forest Service, the Bureau of Land Management, National Shooting Sports Foundation, National Fish and Wildlife Foundation and Safari Club International. This research has 2 major emphases that will identify factors that influence deer populations in Southern Idaho. The first will determine the effect of predation on mule deer population characteristics such as population growth, recruitment, and mortality. This will include an evaluation of the effectiveness of coyote control as a means to increase deer populations. The second emphasis will identify habitat factors influencing population levels of mule deer in southern Idaho. Without a thorough understanding of how deer and predator populations interact on a large scale, management of deer populations on the typical big game unit level is difficult.

Sharp-tailed Grouse Lek Inventory -- This project is a partnership between the SE Idaho Chapter of Safari Club International and the Idaho Department of Fish and Game (IDF&G), and the Southeast Idaho, Jefferson County and Upper Snake River Chapters of Pheasants Forever. The study area is in portions of Bingham, Bonneville, Fremont, Jefferson, Madison and Teton counties located in the Upper Snake Headwaters subbasin and the Upper Snake Closed Basin. The study period is scheduled for March and May 2002. The Idaho Chapter of Safari Club International with matching grants and private contributions has donated $6,500.00 towards this study. The study partners have pledged an additional $6,250.00. Biological aides will be hired by the IDF&G to systematically ground search suitable habitat in the identified study area. Additional survey personnel will include Idaho Chapter volunteers. Columbian sharp-tail grouse (*Tympanuchus phasianellus columnianus)* leks will be located and mapped, and the number of birds occupying will be recorded. This project will provide scientifically collected information on distribution and relative abundance of sharp-tailed grouse in a portion of eastern Idaho where only limited data currently exists. This data will be used to develop population management recommendations and prioritize habitat conservation areas.

United States Geological Survey

Interior Columbia Basin Ecosystem --The USGS provides earth science information to the U.S. Forest Service (USFS) and the Bureau of Land Management (BLM) project staff, which is completing a scientific assessment of all land in a seven-State region of the Columbia River Basin east of the Cascade Mountains. Goals of the scientific assessment are to understand the development and current state of land, water, plants, animals, and society within the basin and to model future conditions that could result from different management alternatives and disturbances. In coordination with the scientific assessment, the USFS and BLM staff also is developing regional management strategies for Federal lands in the Basin. Goals of the management strategies are to maintain and improve ecological integrity by promoting the natural processes that operate in healthy aquatic, terrestrial, and landscape ecosystems and to provide sustainable flows of resources from Federal lands. Mineral-resource potential of the Interior Columbia Basin is a partial indicator of the potential for economic development, land use, and environmental hazards. USGS scientists have provided detailed digital geologic, hydrologic, and mineral-resource information to USFS and BLM staff biologists, botanists, forest

ecologists, sociologists, and economists; participated in systems modeling; provided data to be used by the agencies in the development of management alternatives; and contributed to several reports.

Hydrologic and Water-Quality Data--Idaho has seven major river basins--the Kootenai, the Pend Oreille, the Spokane, the Clearwater, the Salmon, the Snake, and the Bear. Rivers in these basins supply surface water for agriculture, industry, hydroelectric-power generation, recreation, fish and wildlife habitat, and other uses within Idaho and in adjacent States. Aquifers supply ground water for these same uses in many parts of the State. Water from geothermal aquifers also is used for space heating. Hydrologic and water-quality data are critical for the day-to-day administration and management of water resources; for determining the extent and severity of droughts; for characterizing and predicting conditions during floods; and for monitoring the effects of people's activities on streamflow, ground-water supply, and water quality. The data also are essential to plan development activities and to carry out interpretive studies that provide information for making decisions about water issues that affect millions of people.

The USGS, in cooperation with the Idaho Department of Water Resources, the Bureau of Reclamation, and more than 20 other local, State, and Federal agencies, collects surface- and ground-water and water-quality data at numerous sites throughout the State. For example, streamflow discharge was measured at 279 gaging stations; water-quality data were collected at 124 of those stations in 1996.

South Fork Snake River

IDFG (with funding from the Bureau of Reclamation) annually monitors populations of cutthroat, rainbow, and brown trout in 2 representative reaches of the South Fork. These data were used in a cooperative project with Idaho State University to assess the relationship between discharge (hydrologic regime) and recruitment of the different species of trout. The relationships are being used to modify the flow regime with the intent of enhancing recruitment of cutthroat trout and inhibit production of rainbow trout. The effects of the flows on recruitment will be monitored by annual electrofishing surveys. The effects on rainbow trout redd success will be evaluated using radio tags buried in rainbow trout redds.

IDFG is currently using fish traps to monitor spawning runs of cutthroat trout and control rainbow trout invasion into tributaries. Various weir and trap designs are being tested in and effort to identify an effective, but low maintenance system.

IDFG conducts creel surveys on the South Fork periodically to monitor angler catch, catch rates, harvest, and effort. Creel surveys will be particularly important to gage the success of the efforts to educate anglers and encourage rainbow trout harvest in the South Fork.

IDFG is working with a biometrician in a project funded by Trout Unlimited to construct a model to help predict the trends in rainbow and cutthroat trout abundance under a range of management scenarios. The intent is to assess the likelihood of management actions to successfully suppress rainbow trout over a long period of time.

Selected Ongoing or Recently Completed Research Projects

An investigation of coyote (*Canis latrans*) habitat use-movement patterns, and mortality in developed and undeveloped land in Jackson Hole, Wyoming -- A study of coyote (*Canis latran*s) habitat use-movement patterns, and mortality in Grand Teton National Park and the suburban-agricultural areas surrounding Jackson, WY was conducted between 15 August 1999 and 15 August 2000. This research focused on the influence of human development, habitat type, topography, and simulated wolf presence on fine scale coyote habitat use and movement (travel paths). This project also investigated the causes of mortality for marked coyotes, and compares the spatial habitat use, gender, social status, and activity cycles of coyotes that died vs. coyotes that survived. Eight coyotes were captured and fitted with radio collars equipped with activity and mortality sensors to add to the twenty-one surviving coyotes collared by Nate McClennen and Rachel Wigglesworth in 1998. There were a total of fifteen collared coyotes in the suburban-agricultural area and fourteen collared coyotes in Grand Teton National Park and adjacent areas of Bridger Teton National Forest. Marked coyotes were located twice a week by radio telemetry to determine habitat use patterns, response to wolf urine scent grids, and mortalities. Marked coyote movements were tracked weekly using short interval (5-15 minute) relocations to determine patterns of travel paths. During the winter track transects were skied weekly and coyote trails were backtracked and mapped using hand held GPS units to determine travel path patterns. Data analyses on coyote travel paths suggest that coyotes use travel paths mainly in sagebrush-grasslands or forest shrub-grass edge areas. Coyotes frequently used trails and roads, south facing slopes, and ridges when moving long distances. We also observed frequent use of riparian corridors to move between open meadows mainly in the suburban-agricultural area. There is some evidence that suggests coyotes selectively travel fences and irrigation ditches for long distances in agricultural areas. The data on coyote locations suggests some avoidance of wolf urine scent grids in the National Park area, but not in the suburban agricultural area. We have recorded 9 mortalities (31%) of 29 marked animals. Human caused mortalities made up 88% of the overall mortalities. The influence of spatial habitat use, gender, social status, and activity on mortality is currently being assessed. Radio telemetry locations and travel paths, as well as snow tracking will continue at least through spring of 2001. The goal of this project is to provide information on the baseline parameters of the coyote population in Jackson Hole that can be used in the future to determine what if any impacts wolves, and human developments may have on coyotes in Jackson Hole.

An investigation of wild ungulate impacts on landbirds and their upland aspen habitat in Jackson Hole, Wyoming**.** --The purpose of this study is to compare the consequences of varying densities of elk (*Cervus elaphus*) and other wild ungulates on:

1) landbirds (i.e., smaller, upland-nesting, nongame species) in upland aspen communities and

2) habitat parameters within these aspen communities across Jackson Hole, WY.

Recent studies indicate
1) wild ungulate browse-induced impacts on landbirds in this and other regions and

2) a decline in the condition of woody vegetation on the USFWS National Elk Refuge (NER). Fieldwork

seasons include the summers of 2000 and 2001.

We selected 34 upland aspen stands satisfying a suite of biotic and abiotic criteria, and their location across a broad spatial scale should permit inference into the consequences of browsing over a range of ungulate densities and management jurisdictions. The unique challenge of this study lies in establishing a link between ungulates and birds that may or may not share spatial scale, yet generally do not share temporal scale. To this end, in addition to comparisons of avian and habitat parameters among all stands (e.g. habitat use analyses) and among categories defined by management jurisdictions, comparisons will be made at multiple spatial scales and among categories of aspen stands defined by differential proximate evidence of ungulate use (e.g. twig-browsing and bark-stripping). Analyses underway include comparisons among these categories of, for instance, avian diversity and abundance by nesting guild, understory vegetation parameters, and rates of aspen regeneration and recruitment to overstory. We designed methodologies to provide insight into the cause of hypothesized aspen stand area decay and its incremental consequences on landbird species. Landscape-scale analyses will consider the role of aspen stand size, adjacent landscape composition and stand proximity to feed sites in structuring avian communities. Findings of this study will contribute to an EIS documenting the broader effects of the NER supplemental feeding program, as well as to the NER Comprehensive Conservation Plan required by the USFWS National Wildlife Refuge Improvement Act of 1997. The longevity, mobility and diversity of responses to environmental change characteristic of bird species provide motivation for the study of bird communities as early indicators of habitat decline impacting entire faunas.

Diet and habitat use of coyotes in developed and undeveloped areas of Jackson Hole, Wyoming. -- Coyotes (Canis latrans) are ubiquitous. They adapt extremely well to most environments, including areas dominated by people. Coyotes have been moving into urban and suburban areas in increasing numbers as human development encroaches upon open space. The purpose of this study was to examine the differences in diet and habitat use in coyotes that live in suburban and agricultural areas of Jackson Hole, Wyoming with coyotes that live in undisturbed areas of Grand Teton National Park. Coyote scat was collected and washed and will be dissected to determine prey use. Additionally, small mammal live traps were used to determine if prey availability was different between the two areas. Habitat use was measured by using radio telemetry to determine which habitat types coyotes were located in most frequently. Blood was drawn from the coyotes that were captured. Serological tests found that coyotes had been exposed to tularemia, leptospirosis, plague, canine distemper, and brucellosis. The data collected during this study may also be used as baseline data from which to compare how coyote populations might change as wolves (Canis lupis) continue to move into Jackson Hole.

Effects of suburban development on the home range and activity of the coyote (*Canis latrans*) in Jackson Hole, Wyoming.-- Despite substantial research on coyotes, few studies have compared coyote ecology in protected areas such as national parks with adjacent areas of suburban and agricultural development. Research in this area could potentially aid in the understanding and management of wildlife found at the interface between developed and undeveloped areas. Twenty-seven coyotes were captured and radio-collared in Jackson Hole, Wyoming during the spring and fall of 1998. Eleven coyotes resided in the suburban/agricultural

areas in the south end of the valley and 17 coyotes were located in Grand Teton National Park. Home ranges were calculated from 1,966 relocations collected from July 1998 through August 1999. Resident coyote home ranges were significantly smaller in the developed areas as compared to the national park during pair formation/gestation and pup rearing seasons. Predictive models indicated that core home range size decreased as suburban development increased and transient coyotes tolerated or were relegated to more developed areas during all biological seasons. Activity of coyotes in the suburban/agricultural areas was significantly lower during the diurnal hours as compared to the coyotes in undeveloped areas. As development continues in Jackson, open space will be reduced, forcing coyotes and other adaptable species closer to human activity. This data suggested that coyotes in suburban/agricultural lands of Jackson Hole adapted to increased human presence by reducing core area size, relegating transient coyotes to higher density developments, and reducing diurnal activity.

The Jackson Hole pronghorn and Sublette mule deer studies -- Western Wyoming is home to the largest, most diverse ungulate populations in the western states. Maintenance of these populations and protection of their habitats is a primary concern among public and private sectors. The objective of this cooperative research effort is to gather baseline movement and distribution data to assist agencies with management decisions and minimize potential negative effects of natural gas development on big game winter ranges and migration corridors. The pronghorn study focuses on a small (~300) herd that summers in the Jackson Hole area and annually migrates ~150 miles to winter in the Green River Basin. We captured and radio-collared 35 pronghorn in Grand Teton National Park and the Gros Ventre River drainage. Telemetry work identified the unusually long migration route and seasonal ranges this unique pronghorn population depends upon. The mule deer project centers on the Mesa and other winter ranges near Pinedale, where 160+ radio-collars were distributed. Subsequent monitoring has documented extremely long (>85 miles) north by northwest movements into 5 different mountain ranges.

Sage grouse seasonal habitat use in Grand Teton National Park -- The Jackson Hole sage grouse population has experienced a 63% decline since 1995, based on maximum rooster counts on known leks. The current population is 400% below its peak in 1950, and is estimated at less than 175 individuals. The current population needs to increase by 133% to reach viable population levels. It is imperative that potential causative factors be investigated before this population is extirpated. A 3-year project funded by the Wyoming Game and Fish Department and the National Park Service examining seasonal habitat selection and survival of sage grouse in Grand Teton National Park was initiated in 1999. The project is concerned with identifying seasonal habitat inadequacies, important seasonal ranges, and seasonal survival throughout the park. PI: Stanley Anderson RS(s): Matt Holloran, Alison Lyon MFA(s): WY Game & Fish Dept., National Park Service

Determination of factors affecting natural recruitment of Snake River cutthroat trout in spring streams tributary to the Salt River. Four spring streams were studied to provide information on the value of spring streams and habitat improvements on reproduction of the Snake River cutthroat trout in the Salt River Valley, Wyoming. Two of the streams (Christensen and Perk) have had a number of habitat improvements and the other two (Andersen and Bee) have had minimal habitat improvements. Christensen and Andersen creeks were

studied intensively and Perk and Big creeks were studied in less detail to determine if similar trends were occurring among streams.

Project objectives were to:
(1) determine if spawning adults migrate from the mainstem of the Salt River into spring streams and the proportion of adults comprised of migrants;

(2) describe the habitat used for spawning;

(3) determine if rainbow trout are successfully spawning and if hybridization is occurring between Snake River cutthroat trout and rainbow trout;

(4) describe the habitat being used by age-0 fish; and

(5) determine the impact of whirling disease on survival of age-0 fish during the summer.

Preliminary results suggest that:

(1) a larger number of fish migrate into the streams with habitat improvements than into streams without improvements, but the migrants make up less than half the spawning population in both types of streams;

(2) more spawning occurs in the improved streams and there is more spawning habitat available in the improved streams;

(3) adult rainbow trout were observed in Perk Creek and may be hybridizing with Snake River cutthroat trout;

(4) abundance of age-0 fish in unimproved streams was too low to make inferences about habitat use, but in the improved streams where the abundance was greater there seemed to be ontogenetic changes in habitat use by age-0 fish over the summer and fall;

(5) none of the age-0 fish captured in Perk Creek by electrofishing in 1999 showed clinical signs of whirling disease (blacktail and spinal deformities), but greater than 25% of the age-0 fish captured by electrofishing in Christensen Creek had clinical signs of whirling disease, and

(6) of 200 fish from Christensen Creek out for histological analysis, 80% were infected by Myxobolus cerebralis the causative agent of whirling disease.

(PI: Wayne Hubert G: Mike Joyce (MS) MFA: WY Game & Fish Dept.)

Sport fish and habitat in the Salt River drainage -- There is a need for information on the status of fish and habitat because a variety of land and water uses are having cumulative effects. This is part of a larger study by the WGFD. The Unit's component is to determine the distribution patterns of fishes and habitat over the watershed; describe the features influencing sport fish; and suggest management activities that may enhance sport fisheries. The study encompasses the entire Salt River and 18 of its tributaries. Studies during 1996 and 1997 have shown that fragmentation of the stream system due to irrigation practices and variation in water temperature due to the geomorphology of the surrounding ranges are having substantial effects in fish distribution patterns.

The effects of landscape features on the distribution of *Myxobolus cerebralis* and occurrence of whirling disease among age-0

salmonids in the Salt River drainage, Wyoming-Idaho -- The purpose of this study is to evaluate possible relationships between spatial variation in channel slope, summer water temperatures, seasonal variation in stream flow, and fine sediment deposition among mainstem river reaches and tributaries to the Salt River and the spatial distribution patterns of age-0 trout and whitefish infected with M. cerebralis and exhibiting clinical and histological signs of whirling disease. The objectives of this study are to:

(1) determine to what extent spatial variation in stream habitat features contribute to infection by *M. cerebralis* and signs of whirling disease,

(2) develop a risk assessment tool that will determine where impacts from M. cerebralis may occur, and

(3) identify possible management interventions that my circumvent outbreaks of whirling disease within the Salt River watershed.

Age-0 salmonids and associated habitat data were collected from 110 locations representing the variety of spatial characteristics within the watershed during summer 2000. Polymerase chain reaction (PCR) analysis is being conducted at the WGFD laboratory to determine *M. cerebralis* infection in individual fish. Histological analysis will be conducted on fish testing positive for *M. cerebralis* to determine the extent of whirling disease. Spatial analyses will be conducted using multivariate statistics and a GIS.

Breeding Ecology of Sandhill Cranes at Grays Lake National Wildlife Refuge -- Historically, Grays Lake supported the largest breeding concentration of greater Sandhill cranes (*Grus canadensis tabida*) in the Rocky Mountain Population. The purpose of this study is to collect current information on population numbers and breeding success to compare with data collected in the 1950's and 1969-1971. The 4 main objectives of this project are to 1) determine the number of breeding and non-breeding Sandhill cranes; 2) determine nest success and evaluate the factors that affect nest success; 3) describe habitat use by breeding Sandhill cranes; and 4) determine how many pairs successfully raise chicks and how many migrating cranes use the Grays Lake valley. Data was collected during 1997-2000.

In 1997-2000, Sandhill crane nests throughout much of the Grays Lake basin were located by using a spotting scope and binoculars. Nests in tall vegetation or areas not easily viewed were located either on foot or by canoe. For each nest, information was collected on nest height and width, nest site vegetation, water depth, number of eggs, incubation stage, and nest fate (successful, destroyed, abandoned, or other). Data used in this study include those collected on cranes nesting in experimental units (12 Fish and Wildlife Service units where the Habitat Management is conducted), as well as on other public and private lands (non-experimental units) in the valley. A total of 129 nests were monitored in 1997 (60 on experimental units and 69 on non-experimental units); 131 in 1998 (66 and 65), 143 in 1999 (54 and 89), and 173 in 2000 (53 and 120). Apparent nest success rates of all nests averaged 43% in 1997, 66% in 1998, 55% in 1999, and 59% in 2000. Rates in experimental and non-experimental units differed by <7% in 1997 and 1998; larger differences in 1999 (44% vs. 61%) and 2000 (45% vs. 65%) were likely due to very high (>90%) nest success in areas searched only in those 2 years. Rate of renesting seems to vary among years with lower rates corresponding to years of higher nest success (4.6-9.2% of nests in 1997, 1.5-4.5% in 1998, and approximately 10% in 1999 and 2000).

Greater than 57% of monitored crane nests were located in Baltic rush/spikerush and wet meadow plant communities, in water depths averaging <10 cm. Nest success seems to be higher when the nests are more isolated by deep (>40 cm) water.

Spring population surveys were conducted from 17 April to 11 May, 1998-2000, to determine number and distribution of breeding and non-breeding Sandhill cranes in the Grays Lake basin. All cranes seen in the marsh and in adjoining pastures and uplands in the valley were counted during surveys. Mean population counts for 1998-2000 was 728 (n =14, range 613 to 831). Population counts were usually highest at the end of April then counts gradually declined as nesting began in early May and visibility began to deteriorate with rapid growth of vegetation. Each year the number of actual pairs was consistent among counts at 230-250.

Fall population counts were conducted from mid-August through the end of September, 1998-2000. Counts in mid-August include primarily resident Sandhill cranes and their young. Juvenile cranes are distinguished from adult cranes by plumage characteristics in order to determine the proportion of pairs at Grays Lake that successfully raised chicks. Counts during mid-August averaged 729 (n =5, range 628-847) for 1998-2000; 4.9% (1998), 4.4% (1999), and 2.0% (2000) of identifiable cranes were juveniles. Crane numbers started to increase after 20 August as cranes moved into the valley from other areas. Peak numbers (1,203-1,217 in 1998 and 1,485-1,574 in 1999) were counted during mid-September. In 2000, peak numbers (1,579-1,674) occurred in early September. Most cranes departed soon after 23 September, similar to records for earlier years.

Data is currently being analyzed; reports and final manuscripts will be completed by early summer 2001. Proposals are currently being submitted for continued ecological and management related research of Sandhill cranes. (Austin, J., J. Ball, and A. Henry, September 2000, Breeding Ecology of Sandhill Cranes at Grays Lake National Wildlife Refuge, Idaho USGS, Northern Prairie Research Center, SE, Jamestown, ND [http://www.npwrc.usgs.gov/grayslk])

Biologically Based System Management -- The declines of native plants and animals associated with, and dependant upon, the integrity of river/floodplain structure and function requires an examination of the management approaches that have been employed to either protect these resources and/or efforts for the restoration of rivers. This 3-phase Upper Snake River Biologically Based System Management Project is examining the river/floodplain structure and function to improve aquatic resource conditions between Palisades Dam and Heise. Phase 1 synthesized the significant scientific literature of the focal study. Phase 2 evaluated the hydrogeomorphic structure and function of the Snake River reaches in the focal area and will provide the detailed site-specific understanding of geomorphic and hydrologic processes and form the information platform for building Phase 3. Phase 3, will use hyperspectral imagery to extend the utility and application of on-site field work conducted in Phase 2, and will allow a landscape scale analysis of the entire focal study area resulting is restoration prescriptions this key river reach. One of the primary goals of this project is to accurately predict, and scientifically defend, flow rates requisite for conserving the fishery.

Closed Basin Subbasin

Research, Monitoring and Evaluation Activities

BPA-funded

The Snake River Native Salmonid Assessment (Project No. 980002) is an ongoing IDFG research project initiated in August 1998 to: 1) assess the current status of native salmonids in the middle and upper Snake River provinces in Idaho, 2) identify factors limiting populations of native salmonids, and 3) develop and implement recovery strategies and plans. The inventorying phase is being used to assess presence/absence and abundance of native salmonids in all major watersheds of the middle and upper Snake River provinces, and concurrent habitat measurements are being used to preliminarily examine factors that influence this presence/absence and abundance. Genetic samples are also being collected to assess the purity of populations and the degree of genetic variability among and within populations of native salmonids. Based on these findings, major limiting factors will be investigated during the second phase of the project. In the third phase, recovery strategies for individual or groups of subbasins will be developed to address the factors most important in limiting the patterns of distribution and abundance of native salmonids.

In the first 3+ years of the project, fish and habitat surveys have been made at a total of 757 sites on private and public lands across southern Idaho in nearly all major watersheds, including the Weiser, Owyhee, Payette, Boise, Goose, Raft, Rock, Bannock, Portneuf, Blackfoot, Willow, South Fork Snake, and Teton. Genetic samples of redband trout and Yellowstone cutthroat trout have been collected at a total of 155 sites, and results are available for 15 sites. Water temperature has been measured and/or obtained from other agencies at 97 stream sites across the middle and upper Snake River provinces. A comprehensive database has been developed that includes data on native salmonid abundance and distribution, genetic samples, habitat summaries, and herpetofauna observations. This project is also evaluating the effectiveness of electrofishing to remove non-native brook trout as a means of reducing threats to native salmonids; after three years of removal, the brook trout population has not been reduced (Meyer 2000; Meyer and Lamansky 2001, In progress). Other removal techniques (e.g., Young 2001) may be evaluated in subsequent years in an attempt to find a more viable method of removing nonnative salmonids where the long-term persistence of native salmonids is being threatened by the presence of exotic species.

Because the inventorying phase is ongoing and not completed for any one species (Yellowstone cutthroat trout will be completed in 2002), analysis to date for the most part has been preliminary and cursory (Meyer 2000; Meyer and Lamansky 2001, In progress). However, in a study of Yellowstone cutthroat trout densities across southeast Idaho, densities remained unchanged and fish size structure improved over the last 20 years, suggesting that at least at some locations in the middle and upper Snake River provinces, native salmonid populations may currently be relatively stable (Meyer et al. in review). Maturity of Yellowstone cutthroat trout has been determined for a number of locations across southeast Idaho to assess effective population size for extinction risk analysis in Idaho

Non-BPA funded

USDS Forest Service

The Challis Ranger District of the USDA Forest Service is conducting or participating in the following research/assessment activities in the Little Lost River basin:

- A study assessing the relationship between summer stream

temperature and bull trout distribution and abundance.

- A study assessing the relationship between groundwater temperature and juvenile bull trout distribution in small stream basins.
- A study assessing the feasibility of electrofishing to remove exotic brook trout from small streams.
- A study assessing the relationship between water temperature and brook trout distribution to determine the influence of water temperature on brook trout invading bull trout streams.
- A study to identify which species of fish was native to the Sinks Drainages and the manner in which they were established.
- A study to determine the temporal nature of bull trout spawning.
- An assessment of fish entrainment through water diversions.
- An assessment of fish passage barriers (culverts and bridges) associated with roads and trails.
- A study to determine sculpin species occurrence and distribution.

The Forest Service monitors the following fish and fish habitat parameters in the Little Lost River:

- Fish populations
- Fish habitat
- Riparian vegetation
- Depth fines
- Stream temperatures

The Challis Ranger District of the USDA Forest Service is conducting or participating in the following research/assessment activities in the Big Lost River basin:

- A study assessing the relationship between water temperature and brook trout distribution to determine the influence of water temperature on brook trout invading bull trout streams.
- A study to identify which species of fish was native to the Sinks Drainages and the manner in which they were established.
- An assessment of fish entrainment through water diversions.
- A study to determine sculpin species occurrence and distribution.

The Forest Service monitors the following fish and fish habitat parameters in the

Big Lost River:

- Riparian vegetation
- Depth fines
- Stream temperatures

Idaho Department of Environmental Quality

The Idaho Department of Environmental Quality is engaged in ongoing research to obtain the most recent and site specific scientific knowledge available for the purposes of refining water quality criteria.

Monitoring activities in Idaho have focused on beneficial uses and ambient water quality trends. Data from DEQ's monitoring are used to document the existence of uses, the degree of use support, and reference conditions. This monitoring is made up of primarily the collection of biological and physical data. The ambient trend-monitoring network is designed to document water quality trends at the river basin and watershed scales through the collection of mainly water column constituent data.

Biological parameters are being added to this network as well. Fifty-six monitoring stations are currently sampled on a rotating basis to provide data for water quality trend assessment. DEQ also monitors chemical, physical and biological components of the aquatic environment through the Beneficial Use Reconnaissance Project. DEQ continues to refine the water body assessment guidance for evaluating BURP data. The primary assessments are designed to determine the support status of the two main aquatic life beneficial uses, Cold Water Biota and Salmonid Spawning.

United States Geological Survey

Interior Columbia Basin Ecosystem --The USGS provides earth science information to the U.S. Forest Service (USFS) and the Bureau of Land Management (BLM) project staff, which is completing a scientific assessment of all land in a seven-State region of the Columbia River Basin east of the Cascade Mountains. Goals of the scientific assessment are to understand the development and current state of land, water, plants, animals, and society within the basin and to model future conditions that could result from different management alternatives and disturbances. In coordination with the scientific assessment, the USFS and BLM staff also is developing regional management strategies for Federal lands in the Basin. Goals of the management strategies are to maintain and improve ecological integrity by promoting the natural processes that operate in healthy aquatic, terrestrial, and landscape ecosystems and to provide sustainable flows of resources from Federal lands. Mineral-resource potential of the Interior Columbia Basin is a partial indicator of the potential for economic development, land use, and environmental hazards. USGS scientists have provided detailed digital geologic, hydrologic, and mineral-resource information to USFS and BLM staff biologists, botanists, forest ecologists, sociologists, and economists; participated in systems modeling; provided data to be used by the agencies in the development of management alternatives; and contributed to several reports.

Idaho National Engineering and Environmental Laboratory

The Idaho National Engineering and Environmental Laboratory (INEEL) which is operated by the U.S. Department of Energy, is located on the eastern Snake River Plain in southeastern Idaho. The USGS has monitored hydrologic conditions in the Snake River Plain aquifer at the INEEL since the early 1950's. A multiphase project began in 1987 to characterize the fate and transport of radioactive and chemical constituents in the aquifer. In the first phase of this project, stratigraphic, geochemical, and hydraulic studies are being incorporated to define the ground-water flow system at the INEEL. Complementary studies include the use of environmental tracers to provide information about the rate of ground-water flow and geochemical-reaction experiments to evaluate the chemical processes that affect the transport of waste constituents in the subsurface. In the second phase, numerical flow models are developed to simulate the occurrence and movement of water in the aquifer system. These models integrate data obtained from the first-phase studies and are

used to evaluate the conceptual model of the flow system. In the third phase, a solute-transport model is developed to test hypotheses about the movement of radiochemical constituents in the aquifer. In addition to the large-scale characterization study, the USGS began a flood-plain study in 1994 to delineate the possible extent, volume, and velocity of floods in relation to INEEL processing and storage facilities. Other USGS activities at the INEEL include regional and local surface geologic mapping and subsurface stratigraphic, isotopic, and paleomagnetic studies to help develop hazard assessments for potential threats from earthquakes and volcanic eruptions for the INEEL and for specific reactor and radioactive waste storage facilities. An extensive bibliography of USGS publications and reports relative to the INEEL is in Appendix F.

Hydrologic and Water-Quality Data --Idaho has seven major river basins—the Kootenai, the Pend Oreille, the Spokane, the Clearwater, the Salmon, the Snake, and the Bear. Rivers in these basins supply surface water for agriculture, industry, hydroelectric power generation, recreation, fish and wildlife habitat, and other uses within Idaho and in adjacent States. Aquifers supply ground water for these same uses in many parts of the State. Water from geothermal aquifers also is used for space heating. Hydrologic and water-quality data are critical for the day-to-day administration and management of water resources; for determining the extent and severity of droughts; for characterizing and predicting conditions during floods; and for monitoring the effects of people's activities on streamflow, ground-water supply, and water quality. The data also are essential to plan development activities and to carry out interpretive studies that provide information for making decisions about water issues that affect millions of people.

The USGS, in cooperation with the Idaho Department of Water Resources, the Bureau of Reclamation, and more than 20 other local, State, and Federal agencies, collects surface- and ground-water and water-quality data at numerous sites throughout the State. For example, streamflow discharge was measured at 279 gaging stations; water-quality data were collected at 124 of those stations in 1996.

U.S. Department of Energy, Idaho Operations Office

DOE-ID has had an air, soils, water and foodstuffs monitoring network in place throughout the Snake River Plain since the early 1950s, specifically to monitor radiation levels. Details of this effort can be found in Saffle et al. (2000). DOE-ID also sponsors five remote-area and eight near-facility annual Breeding Bird Surveys (Belthoff et al., 1995), winter and summer big-game counts, and an annual jackrabbit count (Luft and Warren, 2000). Moreover, DOE-ID historically supported a rigorous program of environmental and ecological research of the sagebrush-steppe ecosystem.

Safari Club International Mule Deer Recruitment in Southern Idaho -- The SE Idaho Chapter of Safari Club International partnered with the Idaho Department of Fish and Game (IDF&G) for this project. The study area is in Game Management Units 54, 55, 56, 57, 70, and 73A located in the Upper Snake subbasin, with additional studies in Game Management Unit 67 in the Upper Snake Headwaters subbasin and Game Management Units 59 and 59A in the Upper Snake Closed basin. The study period is from 1998 through 2003. The Idaho Chapter of Safari Club International, to date, has donated $10,000.00 and has supplied hundreds of man-hours trapping deer for the study. $125,000.00 has been leveraged towards this study through the U.S. Forest Service, the Bureau of Land Management, National Shooting Sports Foundation, National Fish and Wildlife Foundation and Safari Club International. This research has 2 major emphases that will identify factors that influence deer populations in Southern Idaho. The first will determine the effect of predation on mule deer population characteristics such as population growth, recruitment, and mortality. This will include an evaluation of the effectiveness of coyote control as a means to increase deer populations. The second emphasis will identify habitat factors influencing population levels of mule deer in southern Idaho. Without a thorough understanding of how deer and predator populations interact on a large scale, management of deer populations on the typical big game unit level is difficult.

Sharp-tailed Grouse Lek Inventory --This project is a partnership between the SE Idaho Chapter of Safari Club International and the Idaho Department of Fish and Game (IDF&G), and the Southeast Idaho, Jefferson County and Upper Snake River Chapters of Pheasants Forever. The study area is in portions of Bingham, Bonneville, Fremont, Jefferson, Madison and Teton counties located in the Upper Snake Headwaters subbasin and the Upper Snake Closed Basin. The study period is scheduled for March and May 2002. The Idaho Chapter of Safari Club International with matching grants and private contributions has donated $6,500.00 towards this study. The study partners have pledged an additional $6,250.00. Biological aides will be hired by the IDF&G to systematically ground search suitable habitat in the identified study area. Additional survey personnel will include Idaho Chapter volunteers. Columbian sharp-tail grouse (*Tympanuchus phasianellus columnianus)* leks will be located and mapped, and the number of birds occupying will be recorded. This project will provide scientifically collected information on distribution and relative abundance of sharp-tailed grouse in a portion of eastern Idaho where only limited data currently exists. This data will be used to develop population management recommendations and prioritize habitat conservation areas

Idaho Department of Fish and Game

Big Lost River

IDFG assesses trout and mountain whitefish populations in 3 reaches below Mackay Dam every 2-3 years by electrofishing. Otoliths are collected from a sub-sample of fish to evaluate cohort strength and assess factors affecting year-class strength.

IDFG has subcontracted with Trout Unlimited to conduct an inventory of irrigation diversions in the Big Lost drainage to assess sites that constitute potential barriers to fish passage or are areas of entrainment.

IDFG is conducting periodic electrofishing surveys and angler interviews to evaluate the success of a Yellowstone cutthroat trout stocking program in the East Fork of the Big Lost River.

IDFG annually assesses fish populations in high mountain lakes to evaluate benefits of fish stocking. These surveys include catch rates, growth rates, presence and abundance of amphibians, and indices of anglers use. These surveys are used to refine stocking rates, or in some instances, discontinue stocking.

Little Lost River

IDFG is working with USFS to translocate bull trout from Sawmill Canyon to Bunting Canyon and Squaw Creeks. IDFG will monitor for establishment of self-sustaining populations.

Snake Headwaters Subbasin (Idaho)

Bald Eagle: Annual nest site monitoring is conducted at 1 nesting territory in the subbasin.

For discussion pertaining to the Wyoming portions of this subbasin, see section above addressing research monitoring and evaluation activities in Teton and Yellowstone National Parks.

Upper Snake Subbasin

Bald Eagle: Annual nest site monitoring is conducted at 70 nesting territories in the subbasin.

Peregrine Falcon: Annual nest site monitoring is conducted at 16 nesting territories in the subbasin.

Closed Basin Subbasin

No research monitoring or evaluation activity was submitted for the Closed Basins.