IV. FUNCTIONAL ACCOMPLISHMENTS

Flood Damages *Electric Energy* *Irrigation* *Navigation* *Recreation* *Water Quality* *Fisheries Operation*

The hydrological conditions and the reservoir regulation described in the preceding two chapters have produced significant effects on many aspects of life in the Pacific Northwest. These effects are discussed and quantified within the following benefit categories: flood control, energy generation, irrigation, navigation, recreation, water quality, and fishery operation. These discussions are not intended to be thorough or complete but are cursory and contain only the salient features.

A. FLOOD DAMAGES

The effect of reservoir regulation on downstream river flow is determined by routing (the calculation of travel time, diversions, etc) and comparing regulated and unregulated (*i.e.*, natural or pre-project) flows. The flood damages given in Table 17 are for selected sites associated with reservoir flood control operation and show both the observed flows and damages and the unregulated flows (those that would have been observed without the flood control dams) and the damages prevented (the additional damages that would have occurred without the flood control reservoir operation). The reduction in the river stage or flow that resulted from the reservoir regulation was used to index the value of damages prevented.

The flood damages prevented by reservoir operation in the Northwest was $182,896,000. These tables of damages and damages prevented are for Corps projects and do not include damages on uncontrolled streams or at Section 7 projects.

Table 18 is a tabulation of damages prevented by major flood control projects in the Columbia Basin for the period since 1948 through 2003. Damages prevented for the lower Columbia and for the entire Columbia Basin represent the damage for the cost and development of the year of occurrence. At today's cost and development level, the amounts in past years would be much larger. The damage prevented by control of winter floods on tributary streams is not shown.

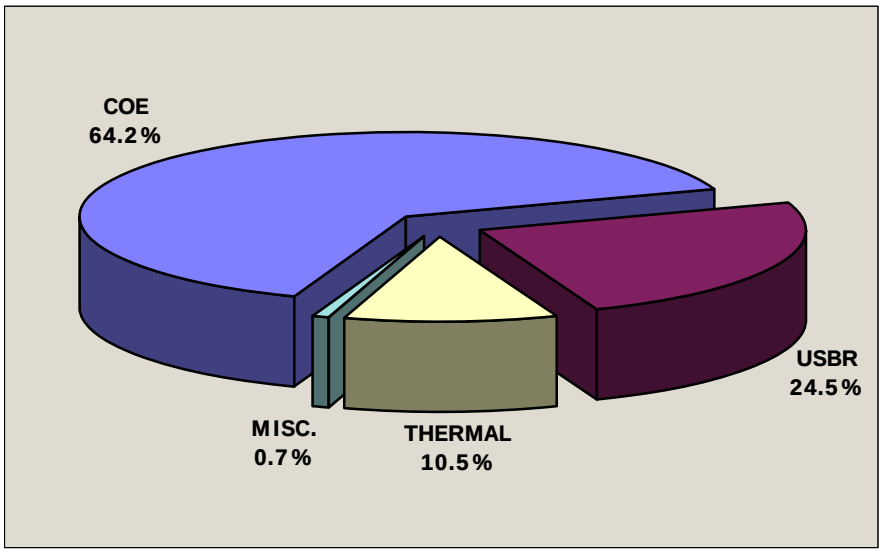
B. ELECTRIC ENERGY

Power operations in this report reference two major entities, the Coordinated System and the Federal Columbia River Power System (FCRPS). The former includes most of the generating facilities, hydro and thermal, in the Pacific Northwest, including the FCRPS projects, which are Federally owned. The Columbia Generating Station (formerly WNP-2) contributes its output to the Federal System. Although participants of the Coordinated System operate their own reservoirs, the power system is operated as a “one owner” system to optimize both energy production and management of the water resources in the Pacific Northwest. BPA continued its support of renewable-energy projects; the agency cut back on acquisition of new projects, but provided other incentives for its customers to develop or acquire renewable energy to supplement power purchased from BPA.

Table 19 shows the breakdown of Federal generation sources: the COE, USBR, thermal and miscellaneous energy sources. Also tabulated are the percentage changes over the previous year.

Table 19
SOURCES OF BPA ENERGY

Source	Amount (MWh)	Percentage	Change from last year (%)
COE	49,392,808	64.2%	-3.98%
USBR	18,834,203	24.5%	-6.17%
THERMAL	8,092,191	10.5%	-13.65%
MISC.	573,516	0.7%	-43.75%
TOTAL	76,892,718		-6.12%



1. Generation

Columbia-basin water year runoff in 2003 was below normal at The Dalles at 107.2 million-acre feet, or 78% of the 30 year normal (1971-2000). Reservoir levels were 89 percent full on July 31, the end of the operating year, slightly below the previous year's percentage. The normal levels are defined in a 2002 Biological Opinion for hydro system operations to protect endangered and threatened fish. The water year was cool and dry through the winter, but March and April brought substantially above-normal precipitation. Drier weather then resumed for the remainder of the water year, which made for exceptionally low July and August flows.

At the beginning of the 2002-03 operating year, the Coordinated System storage level was 67.1 percent full as measured in the Pacific Coordination Agreement (PNCA) Actual Energy Regulation (AER), which includes the Canadian Storage operation from the TSR study. Actual Canadian storage levels on 31 July 2002 were 91.3 percent full. Due to low unregulated streamflows, Canadian storage was unable to refill in 2003, and on 31 July reached 88.7 percent full; Coordinated System storage was 88.7 percent full.

The Columbia River below Bonneville Dam was operated to meet chum needs from November through May. U.S. reservoirs were operated to target the 10 April flood control elevation per the NOAA Fisheries and USFWS BiOps for juvenile fish needs. The wet spring provided sufficient water for spring and summer spill.

2. Marketing

BPA net revenues on the open market were more than $533 in Fiscal Year 2003, the best year since the Trading Floor was created. This was accomplished despite lower FCRPS generation, driven by a January thru July water year that was significantly below the historic average. The overall low flows were partly mitigated by a wet spring that allowed for spot-market energy sales. California's below-average temperatures over the summer kept both demand and prices lower than usual.

Table 20
HISTORICAL POWER PURCHASES

Fiscal Year	*$(million)*
2003	**$796**
2002	**$876**
2001	**$3,000**
2000	**$597**
1999	**$223**
1998	**$118**
1997	**$39**
1996	**$55**

Note: Purchases do not include storage costs.

Table 21
BPA Market Purchases and Sales
(MW-Months)

Period	Purchases	Sales
Oct-02	3109	2699
Nov-02	3107	2856
Dec-02	3395	1021
Jan-03	3060	3409
Feb-03	3186	1970
Mar-03	3068	3212
Apr-03	2385	3167
May-03	2053	3036
Jun-03	2263	3324
Jul-03	3098	2729
Aug-03	2567	2541
Sep-03	2342	1643
TOTAL	**33631**	**31609**

*Sales do not include totals from non-scheduling utilities

3. Intertie / Transmission

A month of concerted effort in the Regional Representatives Group (RRG) has produced three distinct approaches to regional coordination of transmission. BPA and PacifiCorp have jointly produced a proposed cost-benefit assessment format to allow each option to be assessed from a broad regional perspective. The RRG is a public forum conducted by the RTO West filing utilities, including BPA.

4. Power Rates

BPA and its customers agreed to several Cost-Recovery Adjustment Clauses (CRACs) in their rate case settlement for 2002-2006. This approach allows BPA to maintain a low base rate, while providing flexibility to respond to extremely volatile conditions. The CRACs were devised as an alternative to setting rates high throughout the five-year rate period.

There are three types of CRACs, Financial-based, Load-based and Safety-Net. The financial-based CRAC is a one-year adjustment to rates which stays the same all year but can be triggered in all five years of the rate period. The load-based CRAC can be adjusted every 6 months, usually rising in the spring after the winter months, to correct for any higher costs of acquiring resources, and reducing prior to the winter. The Safety-Net CRAC did not trigger in 2003.

Power rates rose about 3 percent on Oct. 1, 2002, the net effect of a lower load-based CRAC and a triggered financial-based CRAC. The combined CRACs resulted in a rate that was slightly below the level that went into effect when BPA initiated the CRAC approach in October 2001. Effective April 1, wholesale power rates from BPA rose about four percent due to the expected increase in the Load-based CRAC for post winter adjustment to cover the cost of acquired resources.

At the end of 2003, the projection for 2004 rates not only included the Financial-based and Load-based CRACS, but also included the Safety-Net CRAC. Even with all three CRACS in place, the 2004 rate increase was less than earlier projections due to additional cost reductions and bond refinancings that helped to reduce the adjustment.

5. BPA's Financial Picture

BPA paid the U.S. Department of the Treasury over $1.057 billion in fiscal year 2003. This represents the 20th straight year BPA has made its payment on time and in full. The payment included $544 million in principal and $466 million in interest for the federal investment in the Federal Columbia River Power System. The payment also included $315 million in advance amortization of federal debt to optimize BPA's debt portfolio, made possible by Energy Northwest debt refinancings. BPA also paid $47 million in other obligations, including $35.1 million to assure that ratepayers, not taxpayers, fully fund BPA employees' civil service retirement. The Treasury payment also includes $220 million in credits to BPA for nonhydro costs Congress has assigned to taxpayers to repay. The largest of these is fish credits of $176 million for fish costs assigned to the nonhydro benefits of the federal dams. Due to poor water conditions, fish credits for 2003 included the last $78.7 million of the Fish Cost Contingency Fund, which is now exhausted.

Not included in the Treasury payment are $208 million for operation and maintenance expenses of U.S. Army Corps of Engineers, Bureau of Reclamation and U.S. Fish and Wildlife Service projects directly funded by BPA.

BPA's preliminary, unaudited expenses for 2003 are $3.050 billion, down almost $700 million compared to start-of-year estimates. After subtracting $463 million of savings due to debt management actions - which

appear as expense reductions on the income statement - BPA cut its expenses by more than $200 million this past year.

BPA's revenues for 2003 came in at $3.558 billion, almost $200 million lower than forecast at the start of the year. Substantial springtime rain partly offset the low volume and produced additional energy sales, and relatively steady market conditions were also beneficial.

C. IRRIGATION

Irrigation service from Bureau of Reclamation projects was available to an estimated 2,870,000 acres in 2000 and there were no reported water shortages. The water came from 52 reservoirs with an active capacity of about 10,090,000 acre-ft (af). This does not include 8,214,000 af of storage in Franklin D. Roosevelt Lake (behind Grand Coulee Dam) and Hungry Horse Reservoir in western Montana.

D. NAVIGATION

The Corps of Engineers operates navigation locks on three waterways in the Pacific Northwest: the Columbia-Snake River Inland Waterway in Washington, Oregon, and Idaho, the Willamette Falls Lock in western Oregon, and the Lake Washington Ship Canal in Seattle. The Columbia-Snake River Inland Waterway, extending 465 river miles from the Pacific Ocean to Lewiston, Idaho, provides safe passage for ocean-going vessels for more than 100 river miles up to Vancouver, Washington, (on the Columbia River) and Portland (on the Willamette River) and for shallow-draft tugs, barges, log rafts, and recreational vessels from Portland, Oregon, to Lewiston, Idaho. Four of the nations top 100 ports, based on total domestic and foreign cargo tonnage, are located on the Columbia/Willamette Rivers, downstream of the dams and navigation locks. The combined tonnage of these ports would place them twelfth in the nation, more than that of either Los Angeles or Norfolk Harbor. The major commodities exported through these ports are farm and timber products while the imports are petroleum products and chemicals.

Navigation on the shallow draft portion of the Columbia Inland Waterway from Portland to Pasco, Washington, is made possible by four locks that elevate the river from 8 ft mean sea level (msl) below Bonneville Dam (river mile 146), 42 miles east of Portland, to the mouth of the Snake River (river mile 324) in McNary Reservoir at an elevation of 340 ft msl. This latter pool extends to Pasco on the Columbia and to Ice Harbor Dam (river mile 9.7) on the Snake River. Navigation on the Snake River from its confluence with the Columbia near Pasco, to Lewiston (river mile 140), is made possible by four locks that elevate the river from 340 ft at Ice Harbor Dam to 738 ft at Lewiston on the Lower Granite reservoir.

The nominal size of these eight locks is 86 ft wide and 675 ft long. All the locks were closed simultaneously during March for annual maintenance.

Navigational flow requirements on the Columbia and Snake rivers were met by streamflows and pool levels determined from other project requirements. Cargo was generally transported without any special operational requirements, although occasionally some unusual navigation requirements demand special regulation. However, these special requirements did not generally alter the Columbia River regulation enough to have a significant effect on other project purposes.

The special project operations were necessary to meet navigational requirements during this year had to do with vessel groundings, emergency operation at projects, and for transportation and off loading of decommissioned defueled submarine nuclear reactor cores at Hanford, Washington. The latter special operations were required at both upstream and downstream projects to hold the McNary pool at a constant elevation during the several hours required to off load the reactor cores.

Commercial cargo through the Columbia-Snake locks consists chiefly of farm, lumber, and petroleum products with down-bound cargo consists mostly of the first two and up-bound the latter. March tonnages are less than other months due to the annual closure for maintenance. More information on these projects can be found on the Corps web site at: https://www.nwp.usace.army.mil/op/s/nl/

The Willamette Falls Lock, located on the Willamette River at Oregon City, uses four chambers to lock vessels, loaded mainly with sand and gravel or wood by-products, around the 40-foot high Willamette Falls. Efforts to rebuild the locks with a single chamber have never been funded. More information on this project can be found on the Corps web site at: https://www.nwp.usace.army.mil/op/wfl/home.asp

E. RECREATION

Although many agencies provide recreational facilities, the only agencies to also have project operational activities are the Corps of Engineers and the Bureau of Reclamation. These operational activities include not only those activities for which the projects were authorized but also those ancillary activities which benefit the public without adversely impacting the authorized operations. The added benefits include maintaining some reservoirs within certain elevation ranges throughout the recreation season while at other projects it may be regulating downstream discharges for the activities. Recreational activities include boating, fishing, sailing, hunting, rafting, wind surfing, hydroplane racing, and cross channel swimming. In some cases, the reservoirs are maintained at high elevations during the camping and picnicking season for aesthetic reasons.

Historically, the Corps and Reclamation use different methods to count visitation-days and consequently they could not be directly compared. Now both agencies will be using the visitor-hour/visitor-day method. The difference in the two systems used in the past was that a recreation-day equaled a visit by one person to an area for all of or any part of a 24-hour day; whereas a visitor-hour equated to actual time spent on an area. Twelve visitor-hours equals one visitor day.

1. Corps of Engineers

The total capital investment in recreation development is over $45 million that generates significant benefits each year. Recreational use at Corps administered water resource projects was an estimated 9.0 million 12-hour visitor-days, or 110 million visitor-hours. Three Corps projects each exceeded half-million visitor-days of use and one project, Bonneville Dam, exceeded 1 million visitor-days.

Sightseeing continues to be the leading recreation activity. Facilities such as visitor centers, overlooks, and interpretive facilities are provided to accommodate this use. Swimming, boating, fishing, and general day use activities are other recreational opportunities sought by visitors to Corps projects. Wind surfing, particularly on the Columbia River projects, has become a highly visible activity over the past several years.

2. Bureau of Reclamation

Reclamation reservoirs provide water-based recreation opportunities unique to the surrounding areas in some of the more arid portions of the region. Reclamation's Pacific Northwest Region has 79 recreation areas on 66 reservoirs, providing 395,000 acres of water surface and 2,400 miles of shoreline. Reclamation works cooperatively with state, county, irrigation districts, and federal agencies, as well as private concessionaires in developing and managing many of the recreation areas at Reclamation reservoirs. Recreation facilities include 6,250 campsites in 148 campgrounds; 150 picnic areas; 39 swimming beaches, and 196 boat-launch ramps. Recreation facilities are evaluated in terms of visitor safety and accessibility and upgraded as needed.

The 2000 recreation season was extremely successful for water dependent recreation activities at Reclamation reservoirs. A new Recreation Use Data Report developed by Reclamation with OMB approval will be implemented in the Fall of 2001 which will more accurately inventory Reclamation recreation facilities, survey the user public and identify the growth rate of recreation use on Reclamation reservoirs. Unfortunately, visitor use data has not been collected since 1992, but demand for water-relation recreation activities on Federal manmade lakes is growing and becoming a powerful recreation attraction according to a National Recreation Lakes Commission study conducted published in June 1999.

The Bureau of Reclamation's general legislative authority to manage recreation on Reclamation lands is the Federal Water Project Recreation Act, (PL 89-72) as amended by the Recreation Management Act of 1992 (Title 28). The major focus and direction of this legislation is developing partnerships to manage and administer the recreation areas and resources at Reclamation projects. These partnerships with state and local governments require that Reclamation participate, on a cost-sharing basis, in the planning, development and expansion of the recreation facilities to meet the recreation and resource needs associated with the area. These partnerships are critical to the continued efficient management of Reclamation lands for public recreation purposes. In general, Reclamation has been able to minimize O&M costs and insure high quality recreation facilities under these authorities. A GAO audit in 1993 directed Reclamation to find non-Federal management partners for recreation areas that did not have them.

The PN Region Title 28 Program obligated $1,096,000, or 99.06 percent of funding in FY 2000. The budget totaled $1,165,000 (includes administrative costs) and a total of 26 projects were cost shared; 19 projects at 50/50 for a total of $958,000 and 7 projects at 75/25 for a total of $138,000. Reclamation=s non-Federal partners have matched or surpassed Federal levels of cost sharing since inception of the Program. This serves as testimony to both the need for rehabilitation of facilities and the good faith efforts of Reclamation in promoting the Program. Examples of Title 28 partnerships in action follow.

#Reclamation cost shared with Washington County, Oregon, at Henry Hagg Lake to continue improving access to and safety of recreation facilities at Scoggins day use area and for a South Shore water conversion project. Henry Haag Lake is located about 1-hour out of Portland and receives very high levels of visitation. These improvements will help to alleviate crowding, sanitation and accessibility problems.

#Reclamation cost shared with Oregon State Parks at Prineville Reservoir in Central Oregon to construct and provide parking at the state managed boat ramp. The site will be paved and designates parking for vehicles and trailers. Public safety will be improved and reservoir water quality protected.

#Reclamation cost shared with Jackson County at Emigrant Lake for RV campground development, a fish habitat enhancement project, and implement needed improvements identified in the Agate Lake Resource Management Plan at Agate Lake.

#In addition, Reclamation has ongoing cost-sharing agreements with the Washington Parks and Recreation Department at Banks Lake, and Potholes Reservoir, Idaho Department of Parks and Recreation at Lake Cascade and lands adjacent to Reclamation's diversion dam below Lucky Peak reservoir, Bonneville County at Ririe Reservoir, and the city of American Falls at American Falls reservoir.

F. WATER QUALITY

The Corps of Engineers lower four Snake River dams and the Corps lower Columbia River dams were operated for consistency with the total dissolved gas variance standards for Oregon, and for the total dissolved gas rule change related to anadromous fish passage for Washington. Project operations to meet 115 percent in the project forebays and 120 percent in the project tailwaters were good for 2002.

Water year 2002 was characterized with almost average weather conditions. The unregulated runoff from January through July at The Dalles was 103.8 Maf, 97% of the 1971-2000 average. The unregulated runoff from April through August was 93.8 Maf at the Dalles, 101% of the 1971 to 2000 average. Two high runoff conditions over 300 kcfs occurred in June 2002. Runoff in June 2002 caused two flow events that were above system generation capacity causing increased total dissolved gas exceedances over previous years.

1. <u>Total Dissolved Gas (TDG) Monitoring.</u> The Columbia/Snake River Total Dissolved Gas Monitoring Program was an annual continuing activity started in 1984. Its primary objective was to collect total dissolved gas and water temperature data needed to schedule real-time reservoir releases and spill operations during the anadromous fish migration season (April-August). Monitoring also continued at a few

stations past August of each year and through the following winter seasons.

Total Dissolved Gas (TDG) and temperature were monitored throughout the Columbia River basin using fixed monitoring stations (FMSs). There were a total of 41 FMSs in the United States portion of the Columbia River basin. The US Bureau of Reclamation, Chelan and Grant County Public Utility District (PUD) maintain four stations each. Two stations were maintained by Douglas County PUD. The US Army Corps of Engineers maintained the remaining stations. It should be noted that the Corps dams on the Pend Oreille River (Albeni Falls Dam) and on the Kootenai River (Libby Dam) were not part of the fixed monitoring station program. Readers can reference the 2000 Total Dissolved Gas Monitoring Columbia and Snake Rivers Report. Appendix A contains a map of the fixed monitoring stations and a brief description of each of the Corps FMSs.

All the data collection instruments were fully automated. All data was compiled and posted along with pertinent reservoir and flow information on the CROHMS database, and the Technical Management Team (TMT) webpage. Reference web site: http://www.nwd-wc.usace.army.mil

The number of total dissolved gas (TDG) exceedances was more than previous water years (since the 2000 US Fish and Wildlife and the National Marine Fisheries Service Biological Opinions). Washington and Oregon State standards, during the spill season, had a total of 491 exceedances on the Lower Columbia and Snake Rivers. Most of the exceedances were caused by forced spill, not fish passage spill. The exceedances of the TDG variance standards were ascribed to a combination of factors, such as intertie line derating; unit outages; lack of load; too high volume of spill for fish passage and spilling for flood control operations caused by a combination of late season rains and warm temperatures. Only a small number of exceedances were attributed to spill amounts for fish passage.

Idaho State standards were exceeded for 272 hours (11.3 days) at Dworshak during the summer spill period. This performance is consistent with spilling for flood control operations, creating unavoidable high TDG levels at Dworshak Dam from June 20 to July 1, 2002.

2. Water Temperature Monitoring. Monitoring of water temperature conditions throughout the Columbia and Snake River main stems were conducted as part of the dissolved gas monitoring. Water temperature had also been recorded at the project turbine scroll case (or comparable location) since construction of each project. These daily data provide an historical database of water temperatures since project construction. Water temperatures were also recorded at the forebay and tailwater FMS.

Water temperature above 68ºF, a threshold level important for anadromous fish, ranged between 41 and 71 days at the monitoring sites on the Columbia River, and between 3 and 63 days at the Snake River sites, and 0 days at the Clearwater sites. Generally, the forebay sites experienced the long-term values above 68ºF because of near-field conditions at the dams while the tailwater sites experiences the lower periods because of the more fully mixed river conditions of the tailwater. Forebay water temperatures generally peaked about 69oF while the tailwater temperatures were generally slightly above, but near, 68 oF at the Snake River dams. At the lower Columbia dams, the forebay location water temperatures peaked slightly above, but near, 70 oF. The lower Columbia dams experienced tailwater temperatures in the 68 to 70 oF range.

3. Reports. See web site at: http://www.nwd-wc.usace.army.mil/TMT/wqwebpage/mainpage.htm

G. FISHERY OPERATIONS

Fishery operations were implemented in accordance with the Corps' Fish Passage Plan (FPP), which describes the manner in which the Corps' mainstem projects on the lower Snake and Columbia Rivers will operate throughout the year to provide safe, efficient fish passage. This was in compliance with National Marine Fisheries Service (NMFS) and U. S. Fish and Wildlife Service (USFWS) 2000 Biological Opinions (BiOps) which contain other measures, including flow augmentation in the Columbia River, additional 427 kaf from the upper Snake River, in-season water management process, flows for chum spawning below Bonneville, and operating the lower Snake River reservoirs at minimum operating pool (MOP) and John Day reservoir to the minimum level needed for irrigation pumping. The Technical Management Team (TMT) again provided in-season management of river operations, while dispute resolution and policy guidance was provided by the Implementation Team (IT), which are made up of representatives from the Corps, Reclamation, BPA, NMFS, USFWS, ODFW, WDFW, IDFG, and the state of Montana. CRITFC still remained withdrawn from the in-season process although they participated in some meetings and made system operations requests.

More detail information on the BiOps can be found at http://www.salmonrecovery.gov/

1. Actual Operation. This water year, the Columbia Basin runoff was below normal. At The Dalles the January – July runoff volume was 88 MAF (Million acre-feet) normal is 107 MAF. This was lower than the 104MAF runoff, during the same period in 2002. This "below normal" amount of runoff allowed the action agencies to implement the hydro system related BiOp actions.

2. Spill and Flows for Fish. The full BiOp spill program was carried out this year. At Lower Granite the Removable Spillway Weir (RSW) was tested. Spill for juvenile fish passage resumed this year at Lower Monumental after not being provided last year due to construction work. Also at Lower Monumental the spill amount was changed to a percentage of the total project release as opposed to spilling to the Total Dissolved Gas (TDG) gas cap 24 hours a day. At Ice Harbor test were conducted of different spill amounts (sometimes no spill) and spill patterns. At John Day different spill percentages (60% and 45%) at night were tested during the spring. During the summer 60% spill at night compared to 30% 24 hours a day was tested. At Bonneville daytime spill levels of 75 kcfs compared to spilling to the TDG gas cap was compared. See details in Table 20 below. For the annual Spring Creek Hatchery release 50 kcfs spill was provided from March 10 to March 12.

The flows provide were close to the flow objectives. At Lower Granite the spring flow objective was 89 Kcfs. Actual flow during the spring period was 90 kcfs. The action agencies were able to meet the flow objective 3 out of the 10 weeks. At McNary the spring flow objective was 220 kcfs. Actual flow during the spring period was 235 kcfs. The flow objective was met 6 out of 11 weeks. At Priest Rapids the spring flow objective was 135 kcfs. The actual flow during the spring period was 141 kcfs. The flow objective was met all 10 out of 11 weeks. At Lower Granite the summer flow objective was 51 kcfs. The actual flow during the summer period was 32 kcfs. The flow objective was not met any of the 10 weeks. At McNary the summer flow objective was 200 kcfs. The actual flow during the summer period was 136 kcfs. The flow objective was not met any of the 8 weeks.

3. Juvenile Fish Runs. Salmonids are hatched either in hatcheries or in rivers (called wild fish) where they grow until their time for migration to the ocean. In some case, selected hatchery fry are placed in the river to grow in a natural setting before beginning their natural migration to the ocean. Some species begin their migration in the year of their hatching while others winter in the river before beginning their migration to the ocean. Juveniles are subjected to many perils while migrating, including predation from other fish and birds, spill at dams that can cause high levels of total dissolved gas and gas bubble disease, physical injuries that may occur during dam passage, stress, diseases, and other problems. Depending upon the location in the basin of the hatcheries or redds, young fish traverse up to nine dams on their out-migration. To help mitigate these dangers an alternate method of transportation has been developed for the juveniles. Specially designed barges and tanker trucks transport the young fish past the dams where they are released back into the river downstream of Bonneville Dam. This reduces their in-river travel mortality rate for most species while maintaining their biological timing for arrival at the ocean.

a. **HATCHERY RELEASES.** In 2003, about 87.5 million juvenile salmon were released from Federal, State, Tribal or private hatcheries into the Columbia River Basin above Bonneville Dam. The 2003 hatchery release totals were nearly equal to the 87 million released the previous season in the Columbia River basin above Bonneville Dam.

The data above are from the Fish Passage Center. A summary of the hatchery releases for the Columbia River basin can be obtained from the FPC website. http://www.fpc.org/

b. COLLECTION OF JUVENILES. Lower Granite, Little Goose, Lower Monumental, and McNary dams are "collector dams" that are equipped with submersible traveling screens, bypass facilities, and raceways capable of holding large number of fish for later transport past the dams in barges or trucks. Operation of the fish collection facilities at Lower Granite, Little Goose, and Lower Monumental continued through October. The facilities at McNary were scheduled to operate as long as fish were present and passing the project and while conditions permitted. It should be noted in the onset that the number of juveniles collected, bypassed, or transported is not a very accurate indicator of the size of the juvenile fish run. Collection efficiency, spill rate and timing, and other factors all play key rolls in juvenile passage. In 2003 the number of juvenile fish collected was about the same as was collected in 2002. The number of juvenile fish bypassed was 60% of the number bypassed in 2002. The this year's counts of juvenile fish collected, transported and bypassed are summarized in Table 22. The last several years' counts of juvenile fish collected, transported and bypassed are summarized in Table 23.

c. TRANSPORTATION. Barge transportation of fish on the lower Snake and Columbia rivers began in 1977, replacing most of the truck transportation which had begun several years earlier. Transportation was initiated to reduce juvenile mortality resulting from passage through powerhouse turbines and project reservoirs. Juveniles are transported from upstream collector projects to a location downstream of Bonneville, the most downstream dam. The juvenile transport season began in late March/ early April and ended in October at Lower Granite, Little Goose, and Lower Monumental. In 2003 juvenile fish were collected and transported at McNary starting late June. Collection facilities at McNary remained in operation as long as juvenile fish continued to arrive at the project or until the facilities had to be closed for safety. In general trucking was limited to periods when daily collection was less than 20,000 fish per day. The total number of fish transported by barge and truck was 121% of the number transported last year.

4. Adult Fish Runs. Adult fish counts were obtained at twelve of the thirteen mainstream Columbia and Snake River dams that have fish passage facilities. Although many species were counted only the salmonid race and species counts at three major dams are reported here, showing their 10-year averages and counts of the previous four years (Table 24). The difference between the McNary and Ice Harbor counts is an index to the mid-Columbia return. This again was a very excellent year for adult fish passage. As shown on Table 24 counts were not quite high as in 2002 but most were well above the 10-year averages. Fall chinook counts at Bonneville and Ice Harbor were the highest recorded in the time period beginning in 1977. All counts shown in Table 24 were higher than the 10-year averages except for Sockeye counts. More detailed information on fish passage can be found on the world wide web at the following sites.
http://www.nwp.usace.army.mil/op/fishdata/adultfishcounts.htm *(the Corps' new adult count page site)*
or http://www.fpc.org/adultsalmon_home.html *(the Fish Passage Center's adult count page)*
or http://www.cbr.washington.edu/dart/adult.html *(University of Washington adult count page)*