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 14 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 $148,539,000. 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 15 is a tabulation of damages prevented by major flood control projects in the Columbia Basin for the period since 1948 through 2005. 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, providing transmission integration and other incentives for its customers to develop or acquire renewable energy to supplement power purchased from BPA.

Table 18 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 18
SOURCES OF BPA ENERGY

Source	Amount (MWh)	Percentage	Change from last year (%)
COE	47,336,341	61.9%	-1.2%
USBR	20,403,873	26.7%	9.6%
THERMAL	8,241,501	10.8%	-8.4%
MISC.	501,142	0.7%	-11.0%
TOTAL	**76,482,857**		**0.5%**

1. Generation

Columbia-basin water year runoff in 2005 was below normal at The Dalles at 109.4 million-acre feet, or 81% of the 30 year normal (1971-2000). This was the sixth consecutive year of below-normal runoff in the Basin. Reservoir levels were approximately 94 percent full on July 31, the end of the operating year, slightly above the previous year's percentage. Once again, winter storms failed to materialize during the snowpack-building months, and a wet spring came too late to overcome the shortfall.

At the beginning of the 2004-2005 operating year on 31 July 2004, actual Canadian Treaty storage (Canadian storage) was 89.1 percent full. Unlike the previous year, Canadian storage refilled to near full by the end of the operating year, reaching 99.0 percent full on 31 July 2005.

The Columbia River was operated to meet chum needs below Bonneville Dam from 8 November 2004 through 5 May 2005. For 2005 Libby Dam released the volume of water requested by the U.S. Fish and Wildlife Service to meet downstream Kootenai River white sturgeon needs. U.S. reservoirs were operated to target the 10 April flood control elevation for juvenile fish needs, but low inflow from January through March prevented this from happening. The U.S. storage projects targeted full by 30 June 2005 per the Biological Opinion. Libby, Dworshak, Hungry Horse and Grand Coulee were all within 2.5 feet from full on June 30. At the end of July 2005 Coordinated System storage was 93.9 percent full.

Summer spill at four lower Snake River dams began June 20 in accordance with an order from District Judge James Redden. The judge ordered additional summer spill at federal dams in granting an injunction requested by tribes and environmental groups. The 9th U.S. Circuit Court of Appeals in San Francisco turned down an appeal of that order. The spill injunction applies only to 2005 hydro operations. Under the order, the Corps of Engineers spilled additional water at Lower Granite, Little Goose, Lower Monumental and Ice Harbor dams on the lower Snake River from June 20 through Aug. 31. The Corps added round-the-clock spill at McNary Dam on the Columbia River for all of July and August.

2. Marketing

Below-average streamflows in the Columbia Basin often yield two results: lower inventory and higher prices as potential customers bid higher for energy in a tighter market. In 2005, market prices were higher than expected, and more energy was available for sale than the previous year; the result was higher trading-floor revenues than 2004.

Table 19
HISTORICAL POWER PURCHASES

Fiscal Year	Expense ($million)
2005	$574
2004	$603
2003	$796
2002	$876
2001	$3,000
2000	$597
1999	$223
1998	$118

Note: Purchases do not include storage costs.

Table 20
BPA Market Purchases and Sales
(MW-Months)

Period	Purchases	Sales
Oct-04	992	1,176
Nov-04	984	1,706
Dec-04	932	2,479
Jan-05	1,154	2,235
Feb-05	1,080	1,978
Mar-05	1,235	2,299
Apr-05	1,612	2,470
May-05	740	3,371
Jun-05	1,134	3,192
Jul-05	771	3,016
Aug-05	936	2,113
Sep-05	882	1,548
TOTAL	12,449	27,583

*Sales do not include totals from non-scheduling utilities

3. <u>Intertie / Transmission</u>

BPA has been working with regional parties for nearly a decade on approaches to restructure transmission service to address the region's transmission needs. Throughout fiscal year 2005, the region worked on two parallel approaches, Grid West and the Transmission Improvements Group, known as TIG. BPA asked the region to explore a strategy to integrate the best of both proposals. However, Grid West declined the integration proposal shortly after the end of the fiscal year and decided to pursue its original proposal. BPA resigned from the Grid West Board after the board limited membership to entities that fund work toward its design for a regional transmission entity. While agreement in the region remains elusive,

BPA continues to believe that a plan that combines the features of the two competing proposals is sound and responsible, and continues to work toward that end.

In January, BPA reached a settlement agreement with customers for a 12.5 percent increase for transmission rates beginning Oct. 1, 2005, for a two-year rate period. This represents an increase of between 1 and 2 percent of a customer's total delivered wholesale power cost. Actual rate increases vary depending on what type of transmission service customers purchase.

The primary driver of the increase was a shortfall in transmission sales and revenues as well as costs associated with major infrastructure projects to improve system reliability. There has been a more than 3,000-megawatt drop in network transmission sales since 2001 due to losses of regional load (especially the direct-service industries) and due to customers finding more efficient ways to use their existing firm transmission rights.

4. Power Rates

At the beginning of fiscal year 2005, BPA implemented a 7.5 percent reduction in its wholesale power rates. A year later, BPA announced it would begin the 2006 fiscal year with a 1.6 percent reduction despite severe challenges. The drop in the fiscal year 2006 rate was possible because of a very strong wholesale power market and expense reductions that offset some of the effects of dry weather and the costs of additional court-ordered operations for listed salmon. The higher prices in wholesale power supply markets are the result of short supplies in the Western U.S. market and high natural gas prices, which tend to drive wholesale electricity prices.

5. BPA's Financial Picture

For the 22nd year in a row BPA made its payment to the U.S. Treasury on time and in full on Sept. 30. The $1.088 billion payment included $616.5 million in principal and $400.7 million in interest. Of the principal, $313 million was a prepayment to retire some Treasury debt early.

Not included in the Treasury payment are 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. Since direct funding began, BPA has invested approximately $560 million in generation reliability and efficiency enhancements. We have budgeted $1 billion over the next 12-15 years to continue to preserve and maintain the existing generation facilities.

The fiscal year ended Sept. 30, 2005, total operating revenues were $3.268 billion, an increase of $70 million from the previous year. Sales from electricity and transmission sales for the fiscal year ended Sept. 30, 2005, increased approximately $78 million from the fiscal year 2004 levels. The increased sales from electricity and transmission sales resulted from higher discretionary sales of surplus power outside the region. U.S. Treasury credits for fish under Northwest Power Act section 4(h)(10)(C) decreased $19 million, in the fiscal year ended Sept. 30, 2005, when compared to the prior year. In total, operating expenses increased $95 million, or 4 percent, in fiscal year 2005.

C. IRRIGATION

Irrigation service from Bureau of Reclamation projects 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.

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.

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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.

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.

1. Total Dissolved Gas (TDG) Monitoring. 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.

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

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.

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) 2005 Biological Opinions (BiOps) which contain other measures, including flow augmentation in the Columbia 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/

a. **HATCHERY RELEASES.**

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.

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.

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. 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).