2011 Pacific Northwest Loads and Resources Study

May 2011

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Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

POWER SERVICES

September 20, 2011

In reply refer to: PGPR-5

Dear Interested Parties:

This document is Bonneville Power Administration's (BPA) "*2011 Pacific Northwest Loads and Resources Study"*, commonly called the "White Book." The 2011 White Book is a snapshot as of May 27, 2011, of both the Federal system and Pacific Northwest (PNW) region loads and resources for Operating Years (OY) 2012 through 2021. This analysis incorporates BPA's estimates of PNW total retail loads, contract obligations, contract purchases, and resource capabilities. BPA compiles these estimates with annual data submittals provided by PNW Federal agencies, public agencies, cooperatives, U.S. Bureau of Reclamation (USBR), U.S. Army Corps of Engineers (USACE), and investor-owned utilities (IOUs). These are combined to provide projections of the Federal system and the PNW region load and resource capabilities for the 10-year study horizon.

The White Book does not guide day-to-day operations of the Federal Columbia River Power System (FCRPS); it is not used for determining BPA revenues or rates, but provides one of the analyses that inform the agency of its load and resource conditions for sales and purchases. As a guide, the White Book is a 10-year look at the expected obligations and resources in the PNW region and the Federal power system. The White Book is developed as a planning tool for the Columbia River Treaty (Treaty) Studies, as an information tool for customers and regional interests, and as a publication of information used by other planning entities for their analyses. The 2011 Pacific Northwest Loads and Resources Study is an update to the 2010 White Book.

Hydro projections for this White Book are produced for the regulated regional hydro projects, by the HYDSIM model, using plant characteristics derived from: 1) 2010 PNCA planning criteria and plant data; 2) the 2008 NOAA Fisheries FCRPS BiOp; 3) the United States Fish and Wildlife Service (USFWS) 2006 BiOp; 4) the USFWS 2000 BiOp; 5) operations described in the Northwest Power and Conservation Council's Fish and Wildlife Program; and 6) other fish mitigation measures. The regulated hydro generation projections where modeled to reflect operating reserve levels associated with 30-minute wind persistence scheduling accuracy forecasts.

The White Book presents loads and resource's findings based on the outlined study. A simple summary of these findings follow:

Annual Energy Surplus/Deficit, Under Critical Water conditions

- The Federal system is projected to have annual energy deficits throughout the study period. These deficits range from -257 aMW in OY 2012 to -29 aMW in 2014, up to -401 aMW in OY 2017, to -250 aMW in OY 2021. See Section 4, *Federal System Analysis*, page 23.
- The PNW region is expected to experience firm energy surplus's throughout this period, with surpluses ranging from 3,972 aMW in OY 2012 to a low of 663 aMW in OY 2021, assuming

3,287 aMW of uncommitted IPP generation is available to serve PNW loads. See Section 6, *Pacific Northwest Regional Analysis*, page 61.

Annual 1-Hour Capacity Surplus/Deficit, Under Critical Water conditions

- The Federal system is projected to experience annual surpluses in 1-Hour Peak Capacity through the study period, however is forecasted to see 1-Hour Capacity deficits in October of almost every year, with the February to April periods being very close in later years of the study period. See Section 4, *Federal System Analysis*, page 23.
- The PNW region is projected to experience annual surpluses in 1-Hour Peak Capacity through the study period. By the last year of the study period the region is forecasted to see very slight 1-Hour Capacity deficits in October and the February to April periods. See Section 6, *Pacific Northwest Regional Analysis*, page 61.

This year's White Book also introduces BPA's LOLP (Loss-of-Load-Probability) model and preliminary findings. This initial attempt to identify, develop and apply resource adequacy metrics and standards for the Federal System remains an educational effort for BPA. BPA will continue to refine the metrics and standards and intends to update this analysis annually in the White Book, and may incorporate it into future Needs Assessments. See Section 5, *Federal System Resource Adequacy*, page 49.

In 2011, BPA did not issue a Needs Assessment or Resource Program. However, in reviewing the basic inputs for the 2010 Needs Assessment and Resource Program and comparing those to the 2011 White Book, the results of the Needs Assessment and Resource Program appear to remain valid. BPA is continuing to monitor these results and will issue a new Needs Assessment and Resource Program in the future.

Additional copies of the 2011 White Book can be obtained from BPA's Public Information Center, 1-800-622-4520. The 2011 Pacific Northwest Loads and Resources Study Technical Appendices present regional loads, grouped by major PNW utility categories and detailed contract and resource information. The Technical Appendices are available only in electronic form. Both the Technical Appendices and the Pacific Northwest Loads and Resources Study document are available on BPA's website at: *www.bpa.gov/power/whitebook*

Please send questions or additional comments to Tim Misley (503) 230-3942.

Sincerely,

/s/ Stephen R. Oliver

Stephen R. Oliver
Vice President, Generation Asset Management

Enclosure

2011 PACIFIC NORTHWEST LOADS AND RESOURCES STUDY

The White Book

BONNEVILLE POWER ADMINISTRATION
May 2011

Cover Picture:

Source: BPA Photo archive

Pictured is of The Dalles Dam. The Dalles Dam is a hydroelectric dam on the Columbia River, at river mile 191.5. It is located in The Dalles, Oregon and bridges the Columbia River between Oregon and Washington. It is owned and operated by the U.S. Corps of Engineers.

The Dalles Dam was authorized in 1950, dam construction was completed in 1957, with the completion of generating units 1 through 14 in 1960.and units 15 through 22 completed in 1973. The nameplate generating capability is 2052 megawatts.

ACKNOWLEDGMENTS

Preparation of the annual Pacific Northwest loads and resources study is a complex, multidisciplinary effort. BPA wishes to acknowledge the team—BPA staff and others—whose diligence and dedication result in a reliable, high quality document.

Bonneville Power Administration

Generation Asset Management:

Resources and Loads Analysis Group
Regional Coordination Group
Operational Planning Group

NW Requirements Marketing:

Western Customer Services Group
Eastern Customer Services Group

Bulk Marketing and Transmission Services:

Long Term Sales and
Purchasing Group

Customer Support Services:

Load Forecasting and Analysis Group

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Loads and Resources Information System

2011 Pacific Northwest Loads and Resources Study
For Operating Year 2012 through 2021

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Section 1: Introduction

Description of the White Book

The Pacific Northwest Loads and Resources Study (White Book) is published annually by the Bonneville Power Administration (BPA). It contains projections of regional and Federal system load and resource capabilities along with relevant definitions and explanations. The White Book is a compilation of information obtained from formalized resource planning reports and data submittals, including those from individual utilities, the Northwest Power and Conservation Council (Council), and the Pacific Northwest Utilities Conference Committee (PNUCC).

The White Book is a 10-year projection of the power supply obligations and resources in the Pacific Northwest (PNW) region and BPA's Federal power system. This study is developed as a planning tool for Columbia River Treaty (Treaty) Studies, an informational tool for customers and regional interests, and as a published information source used by other planning entities for their analyses. The White Book does not guide day-to-day operations of the Federal Columbia River Power System (FCRPS); it is not used for determining BPA revenues or rates, but provides one of the analyses that inform the agency of its load and resource conditions for sales and purchases.

Although the database that generates the data for the White Book analysis contributes to the development of BPA's inventory and ratemaking processes the White Book itself is not used in these processes. FCRPS day-today operations are based on a set of criteria different from that used for resource planning decisions. Operational planning is dependent upon real-time or near-term knowledge of system conditions that include expectations of river flows and runoff, market opportunities, amount of available reservoir storage, energy exchanges, environmental conditions, and other factors affecting the dynamics of operating a power system.

The load resource balance of both the Federal system and the region is determined by comparing resource availability to an expected level of total retail electricity consumption for both energy and peaking capacity. Energy is the unit of measure for power delivered over a specific time period such as a month or annually for a given year, and is usually expressed in average megawatts (aMW). Peaking capacity is the unit of measure for the maximum power delivered at a given instant or within a given specified on-peak time period. Resources include projected project capabilities plus contract purchases. Loads include a forecast of retail obligations plus contract or treaty obligations. Surplus energy and/or capacity may be available when resources are greater than loads. These power surpluses may be marketed to regional or extra-regional purchasers and increase utility revenues. A utility's deficits occur when its total resources are less than its loads. These deficits will be met or reduced by some combination of the following: better-than-critical water conditions, demand-side management and conservation programs, permanent loss of loads (due to economic conditions or closures), additional contract purchases, and/or the addition of new generating resources.

This study incorporates information on PNW regional retail loads, contract obligations, and contract resources and simulates the operation of the power system in the PNW. The simulated hydro operation incorporates plant characteristics, streamflows, and non-power requirements from the current Pacific Northwest Coordination Agreement (PNCA). Additional resource capability estimates were provided by BPA, PNW Federal agency, public body, cooperative, U.S. Bureau of Reclamation (USBR); and investor-owned utility (IOU) customers furnished through direct submittals to BPA and/or annual PNUCC data submittals.

The 2011 White Book is presented in two documents: 1) this summary document of Federal system and PNW region loads and resources; and 2) a technical appendix which presents regional loads, grouped by major PNW utility categories, and detailed contract and resource information. The technical appendix is available only in electronic form. Individual customer information for marketer contracts is not detailed due to confidentiality agreements. The 2011 White Book analysis, updates the previous 2010 White Book published September 30, 2010.

This analysis shows projections of the Federal system and region's yearly average annual energy consumption and resource availability for the study period, OY 2012-2021. As in past years, this study presents projections of Federal system and PNW region; monthly energy demand, expected 1-hour monthly peak demand, monthly energy generation, and monthly 1-hour and 120-hour peak generating capability, for OY 2012, 2016, and 2021. The White Books analyzes multiple analysis projections, each based on a different set of assumptions, as a method to fully evaluate the Federal system and the Regional loads and resources condition. Each analysis (annual, monthly, energy, 1-hour and 120-hour) looks at a specific scenario, as a group they give a more complete picture over short and long periods. Based on changes in the load shape and/or changes in the resource mix, different timeframes can be constraining. Therefore, the White Book examines more than just one metric.

This document analyzes the PNW's projected loads and available generating resources in two parts: 1) the loads and resources of the Federal system, for which BPA is the federal power marketing agency; and 2) the larger PNW regional power system loads and resources that include the Federal system as well other PNW entities. The *Federal System Analysis* is presented in Section 4, beginning on page 23. The Pacific *Northwest Regional Analysis* is presented in Section 6, beginning on page 61. Section 7 presents a comparison of BPA's regional loads with the *Northwest Power and Conservation Council* beginning on page 79. A glossary of terms and a list of acronyms are included in Section 10, beginning on page 173.

This document and the "2011 Pacific Northwest Loads and Resources Study Technical Appendix" are available on-line at: www.bpa.gov/power/whitebook

Additional hard copies of this summary document are available from BPA's Public Information Center, toll-free, 1-800-622-4520.

Section 2: Background

Columbia River Treaty

The Columbia River Treaty requires the U.S. Entity, the Chairman of which is the Bonneville Power Administrator, to plan and determine loads and resources at least six years into the future. *Columbia River Treaty, Annex A (9).* The Treaty, its Annexes, and its Protocol were adopted and memorialized by exchanges of diplomatic notes between Canada and the U.S. Upon final ratification of the Treaty in 1964, its Protocol reiterated the requirements for projecting loads and resources in the Columbia River Treaty, Annex B (1-7), used in determining Canada's share of the Treaty's Downstream Benefits ("Canadian Entitlement") owed to Canada. *Columbia River Treaty Protocol (VII-X).*

Northwest Power Act

With the passage of the 1980 Pacific Northwest Electric Power Planning and Conservation Act (Northwest Power Act), P.L. 96-501, Congress directed BPA to assure the Pacific Northwest an adequate, efficient, economic, and reliable power supply. *16 U.S.C. §839(2).* In order to carry out this mandate, BPA was directed by Congress to offer new power sales contracts (PSCs) to its regional firm power customers and to plan and acquire firm resources sufficient to meet these firm power loads. *16 U.S.C. §839c(g).* These initial contracts had provisions that, under certain conditions, allowed purchasers to add or remove their non-federal firm resources. Notably, the load and resources, as determined in the White Book, was referenced within such provisions.

In 2001, BPA executed new 10-year take-or-pay Subscription PSCs with its customers. These contracts modified the terms for additions or removal of customers' nonfederal resources, and will expire on September 30, 2011. For the period beginning October 1, 2011, and extending through September 30, 2028, BPA executed new 2012 Regional Dialogue PSCs in December 2008. These new contracts are termed "Contract High Water Mark" contracts and are fully described in BPA's Long Term Regional Dialogue Policy of 2007, RD Contract ROD of 2008, and its 2009 Tired Rates Methodology Rate Policy as supplemented and adopted. Power deliveries under these new Regional Dialogue contracts include different provisions and terms from Subscription PSCs. The RD contracts allow BPA customers an election to add their own nonfederal resources or to have BPA supply power to meet their load growth.

Section 5(b)(1) of the Northwest Power Act obligates BPA to serve, in accordance with the terms of contracts, the net firm power load requirements of utilities in the PNW including Federal agencies, public bodies and cooperatives—collectively called Public Agencies, and IOUs. Section 5(d) authorizes BPA to serve up to a defined amount of the firm power load requirements of its existing DSI customers. *16 U.S.C. §839c(b)(1) and (d).* Under section 5(b)(1), BPA is to offer to sell firm

power from the Federal system to meet the firm regional loads of a customer in excess of its firm resources, if any, which the customer must dedicate to use or has dedicated to use for service of its own regional firm loads. *16 U.S.C. §839c(b)(1)(A) and (B).* BPA is also to provide electric power for those firm loads that were served by a customer's dedicated resource if the Administrator determines that a customer's dedicated resource is no longer available to serve its loads due to obsolescence, retirement, loss of the resource, or loss of contractual rights. BPA's obligation to supply firm power to its PNW customers may be adjusted by a determination made under section 9(c) of the Northwest Power Act or section 3(d) of the Northwest Preference Act, regarding a customer's sale or disposition of firm power outside the PNW region. *16 U.S.C. 839f(c); 837b(d).*

Section 6(a)(2) of the Northwest Power Act obligates BPA to acquire sufficient resources, on a planning basis, to meet its firm load obligations, including its section 5(b)(1) and 5(d) contract obligations. BPA's obligations to provide firm electric power to its utility customers' for their regional firm loads and its contract obligations to provide firm power to its DSI customers comprise the largest portion of BPA's firm power contract obligations. *16 U.S.C. §839c(b)(1) and (d).*

Pacific Northwest Planning Area

The PNW regional planning area is represented by BPA's marketing area for this study. BPA's marketing area is defined by section 3(14) of the Northwest Power Act and includes Oregon, Washington, Idaho, Montana—west of the Continental Divide, and portions of Nevada, Utah, and Wyoming that lie within the U.S. Columbia River drainage basin in the U.S.. BPA's marketing area also includes the service areas of rural electric cooperative customers which were customers served by BPA on the effective date of the Northwest Power Act, December 5, 1980, that are within 75 air miles and contiguous to but not in the geographic area described above. *16 U.S.C. §839(14).*

White Book Study Assumptions

This loads and resources analysis for the Federal system and PNW region has been produced using a specific set of assumptions concerning contracts and non-hydro and hydro resources. The Federal system assumptions are detailed in Section 4, *Federal System Analysis Assumptions,* page 23. Regional assumptions are presented in Section 6, *Regional Analysis Assumptions,* page 61.

Total Retail Load Forecast

A utility's total retail load (TRL) is the sum of the retail electric power consumption within that utility's distribution system, as measured at metering points, with adjustments for system distribution losses, net metered contracts, system resources, and unmetered loads and generation. TRL forecasts are not the same as BPA's PSC load obligations to a utility, but they may be equal if a utility does not have its own resources or contract purchases that it has applied to meet its retail load.

The PNW regional TRL is the sum of the TRLs of all retail utilities in the PNW region. PNW regional TRL forecasts are used by BPA for regional planning purposes such as HydSim hydro generation forecasts, Columbia River Treaty (Treaty) studies that determine Treaty storage operating policy, and the calculation of BPA and other regional utilities' obligations to Canada under Canadian Entitlement.

The TRL forecasts are also used by BPA's Agency Load Forecasting group to produce projections of BPA's PSC load obligations, used for planning and ratemaking purposes. For this study, the TRL forecasts were produced separately for each regional PNW customer group in the following manner:

Public Agencies TRL Forecast: TRL forecasts for most Federal agency, public body and cooperative (Public Agency), and USBR customers[1] were produced using BPA's Agency Load Forecasting system (ALF). The ALF forecasting tool uses a statistical approach that is based on time-series-based regressions that reflect a fundamental assumption that historical electrical retail consumption patterns will continue into the future. Forecasts produced by ALF allow customer TRL forecasts to be influenced by heating and cooling weather conditions, and explicitly model new industrial production sites in a customer's service territory. The TRL forecasts for some generating public agency customers were developed by BPA and incorporate data submitted to BPA through their PNUCC submittals or total retail load forecasts furnished directly to BPA.

Investor-Owned Utilities TRL Forecast: BPA reviews and assesses load forecasts for the regional IOUs' total retail load within the PNW. The TRL forecasts for the IOUs were developed by BPA. As a starting point for review and planning for the IOU TRL forecast, BPA uses data submitted through their PNUCC submittals and forecasts furnished directly to BPA. BPA's IOU TRL assessment takes into account factors such as characteristics of the load, economic conditions, and load variability.

Direct Service Industry TRL Forecast: Direct Service Industries' (DSI) total retail load estimates were prepared by BPA and incorporate current and future estimates of industrial and economic conditions for specific DSIs within the PNW. For load forecasting purposes, these industries are assumed to continue to operate at existing load levels, regardless of who their energy supplier is.

The TRL forecast is reduced for estimates of BPA funded conservation through the 2012 Rate Case period. These embedded conservation reductions range from 69 aMW in 2012 and 90 aMW beginning in 2013 through the remaining years of the study horizon. As more utilities report planned or implemented conservation measures, those impacts will be reflected in future TRL forecasts.

[1] While USBR receives statutorily based reserved power, which is distinct from the firm power load service BPA provides other Federal agency customers, USBR load is still included in the TRL forecast.

The non-coincidental and coincidental peak megawatts (MW) TRL forecast for each retail utility serving customer load is calculated using recent historical relationships. Though not specifically published in this document, these TRL forecasts are also split into heavy load hour megawatt hours (HLH MWh) and light load hour megawatt-hours (LLH MWh) segments in megawatt-hours (MWhs). BPA monitors TRL levels for factors that may influence or alter energy consumption levels. Those factors may be taken into account in TRL forecasts. The 2011 White Book TRL forecast was completed May 27, 2011, and reflects updated economic conditions beginning in October 2011 that reduce the TRL when compared to the 2010 Study. Current TRL forecasts in this study do not reflect future climate change impacts, although climate change forecasting methods may be are introduced into BPA TRL modeling and impacts incorporated in future studies.

BPA Power Sales Contract Obligations

BPA's existing Subscription Power Sales Contracts (PSCs) with its PNW preference utility and cooperative and federal agency customers continue in effect until September 30, 2011 (2001 PSCs). Beginning October 1, 2011, and extending through September 30, 2028, BPA will supply power services under the Regional Dialogue "Contract High Water Mark" PSCs to preference customers and Federal agency customers (2012 RD PSCs). BPA also executed new power sales contracts for the same period with most regional IOUs.

Forecasts for BPA's PSC obligations for most of the public bodies and cooperatives, Federal agency customers, and USBR customers are produced by BPA's Agency Load Forecasting group using the ALF tool. ALF calculates BPA's PSC load obligation for a customer, by netting BPA's customer TRL forecast minus its nonfederal resources and power contract purchases that the customer has specified under their contract to meet their own retail load. Some BPA's PSC load obligation forecasts for generating Public Agency customers incorporate TRL data received by BPA through PNUCC data submittals or direct submittals. The 2011 White Book's total BPA PSC load obligations forecast was completed May 27, 2011, and reflects then current economic conditions that reduced the PSC obligations when compared to the 2010 Study. BPA's PSC obligations do not reflect future climate change impacts.

As noted, BPA has existing 2001 Subscription PSCs with its PNW customers that began October 1, 2001, that expire on September 30, 2011, and 2012 Regional Dialogue "Contract High Water Mark" PSCs that begin power deliveries on October 1, 2011, through September 30, 2028. The terms and conditions of these new PSCs are different than those of the current PSC. The following summary briefly describes BPA's PSC load obligations associated with specific customer classes:

2001 Subscription Power Sales Contracts:

- These contracts include full service, partial service, block, and slice purchases based on each customer's need. BPA's Slice obligations are based on the power and service from 22.63 percent of a specified set of Federal System resources, and are coupled with a Slice block purchase established by the 2001 PSC agreements. See The Slice Product, page 12;
- BPA's obligation to the IOUs under sections 5(b) and 5(c) of the Northwest Power Act, 16 U.S.C. §839c(c)(1) was established for five of the six regional IOUs when they signed "Bridge" New Resource Firm Power Block power sales agreements (Bridge NR Block contracts) and "Bridge" Residential Purchase and Sale Agreements (RPSA) contracts effective on or about October 1, 2008, and continuing through September 30, 2011. Under these contracts, BPA's obligations to the IOUs will be satisfied through financial benefits or power deliveries, or both. At this time, the IOUs are not currently purchasing power under the Bridge NR Block contracts; and
- Power sales to BPA's DSI customers do not have uniform terms; but rather individual contracts that include conditioned power service to Alcoa (320 MW) and Port Townsend Paper Company (20.5 MW). Deliveries totaling 340 aMW are assumed through September 30 2011, and continue through September 30, 2017.

2012 Regional Dialogue Power Sales Contracts:

These contacts include load following and Slice/Block power services. Under these contracts customers must make elections to add new non-federal resources or purchases or to have BPA supply power for their load growth. This study assumes above-high water mark customer elections will result in customer load growth amounts on BPA of 16 aMW in OY 2012 increasing to 180 aMW in OY 2021. This is the operating year equivalent to the 2012 Rate Case Above-high water mark customer elections shown in FY of 16 aMW in FY 2012 increasing to 180 aMW in FY 2021. The 2010 Study assumed that BPA would serve customer load growth of 17 aMW in OY 2012, increasing to 126 aMW in OY 2020. The following describes BPA's PSC obligations associated with specific customer classes:

- Power sold under the 2012 RD contracts is subject to rates established under BPA's Tiered Rates Methodology. The Slice product is based on a 27.027 percent of a specific set of Tier 1 Federal System Slice resources and is combined with a block purchase, both of which can not exceed the customer's forecasted annual net requirement loads as established by the RD PSC agreements. See The Slice Product, page 12;
- BPA's power supply obligations to the IOUs are based upon the IOUs' "Bridge" New Resource Firm Power Block power sales agreements (Bridge NR Block contracts) and their Residential Exchange Program Settlement Implementation Agreements (REPSIA). Under the IOU's Bridge NR Block contracts, the IOUs have a contractual right, but no obligation, to place requirements load on BPA. To date, no IOU has placed such requirements load on BPA and this study assumes that no federal power deliveries will occur through the study horizon. The IOUs also are currently engaging in exchanges with BPA pursuant to section 5(c) of the Northwest Power Act

under their REPSIAs. Although the exchange is described as a simultaneous exchange of power, BPA has traditionally implemented it as a financial transaction. This study assumes that the REP will continue to be implemented as a financial transaction for the period covered by this study; and

- Power sales to BPA's DSI customers do not have uniform terms. Individual contracts include conditioned power service to Alcoa (320 MW) through September 30, 2017, and to Port Townsend Paper Company (20.5 MW) through August 31, 2013. This study assumes Port Townsend will continue purchasing and hence an average of 340 aMW DSI load obligation is assumed through September 30, 2017.

In actual annual deliveries to customers, BPA's PSC obligations may be higher or lower depending on actual system conditions and actual loads than those shown in this analysis.

Pacific Northwest Hydro Resources

BPA uses its HydSim model to estimate the Federal system's energy production that can be expected from regulated hydroelectric power projects in the PNW Columbia River Basin. For the 70-water years of record (October 1928 through September 1998) that are modeled, hydro energy production is maximized by coordinating hydro operations while continuing to meet power and non-power requirements. Although the regulated hydro generation forecasts are submitted to BPA in fiscal year, they are presented in operating year (OY) format (August 1928 through July 1998) for consistency within this Study. Physical characteristics of each hydro project are provided by annual PNCA data submittals from regional utilities and government agencies involved in the coordination and operation of regional hydro projects.

PNCA Hydro Operating Characteristics: The PNCA incorporates NOAA Fisheries and U.S Fish and Wildlife Service's Biological Opinions (BiOps). The BiOps set the shape of hydro energy generation by increasing flow requirements in the spring and summer to aid in the downstream migration of juvenile salmon. In order to retain water for spring and summer flow requirements, reservoirs are no longer fully drafted to meet firm loads in the fall and winter. As a result, the ability to shift and shape hydro energy production to meet firm loads is greatly reduced. The PNCA will remain in place through September 15, 2024. This Study incorporates the operating requirements from the 2010 PNCA data submittals and BiOps currently in effect. These requirements include, but are not limited to storage content limits as determined by rule curves, maximum project draft rates determined by each project, and flow and spill objectives required by the BiOps. Deviations from the PNCA data submittals occur when specific operating decisions are made subsequent to the date of submission in order to implement the BiOps.

Regulated Hydro Generation: BPA's HydSim model is used to estimate the generation produced by the regional regulated hydro projects using plant characteristics, power and non-power requirements, and streamflows to simulate the coordinated operation of the hydro system. These operating characteristics are

derived from: 1) 2010 PNCA planning criteria and plant data; 2) the 2008 NOAA Fisheries FCRPS BiOp; 3) the United States Fish and Wildlife Service (USFWS) 2006 BiOp; 4) the USFWS 2000 BiOp; 5) operations described in the Northwest Power and Conservation Council's Fish and Wildlife Program; and 6) other fish mitigation measures. The operating characteristics of the regulated hydro projects include, but are not limited to, storage content limits determined by rule curves; maximum project draft rates determined by each project; and flow and spill objectives determined by the BiOps and the 2010 PNCA data submittals. Deviations from the PNCA data submittals occur when specific operating decisions are made subsequent to the date of submission in order to implement the BiOps. The hydro regulation studies specify particular hydroelectric project operations for fish, such as seasonal flow objectives, minimum flow levels, spill, reservoir target elevations and drawdown limitations, and turbine operation efficiency requirements that can vary by operating year and water conditions. The regulated hydro generation projections from BPA's HydSim model reflect operating reserve levels associated with 30-minute wind persistence scheduling accuracy forecasts and customer-supplied (*i.e.,* self-supplied) reserves as part of BPA's Variable Energy Resources Balancing Services.

Independent Hydro: The regional independent hydro projects are dams that are not modeled or regulated in the HydSim model. These projects are owned and operated by the USBR, the U.S. Army Corps of Engineers (USACE), and/or other nonfederal project owners. Independent hydro generation estimates are provided by individual project owners for the 70-water years (August 1928 through July 1998). The independent hydro generation forecast can vary by operating year and water year throughout the Study.

To illustrate the monthly variability of the hydro system using PNCA plant characteristics, streamflows, and BPA's best estimate of non-power requirements, this document presents the Federal system and the Regional firm power surpluses and deficits for OY 2012 through 2021 for 70-historical water conditions (August 1928 through July 1998). The results are shown in Exhibits 11 through 20, starting on page 111, for the Federal system, and in Exhibits 31 through 40, starting on page 151, for the region.

Hydro Energy: This study estimates the monthly energy capability of the Columbia River Basin's regulated and independent hydro projects, based on their average monthly river discharge that reflects river constraints and storage limitations. The generation from these hydro projects is estimated for each OY, by water year, for 1928-29 through 1997-98 historical water conditions. This study uses one of the lowest water years, 1937 (August 1936 through July 1937), to represent the "critical period" during which the hydro system would produce the lowest hydro generation estimate for the Federal system's firm hydro energy capability.

Instantaneous Hydro Capacity: The estimated monthly instantaneous capacity of Columbia River Basin regulated and independent hydro projects are based on individual project full-gate-flow maximum generation at mid-month reservoir elevation using 1929 through 1998 historical water conditions. The instantaneous hydro capacity estimates, however, do not consider the ability of the hydro system to sustain generation levels needed to meet day-to-day and month-to-month hydro

operations. This inability to sustain full hydro capacity is due to the fact that there are more hydro generating units than fuel (water) available to operate all units on a continuous basis. For this reason, the Federal hydro capacity estimates are reduced to show an operational peaking capability to better reflect BPA's actual ability to generate the hydropower needed to meet expected peak load obligations throughout each month given quantities of water available.

Calculation of the Operational Peaking Capability: The operational peaking capability of the hydro system maximizes available energy and capacity associated with the monthly distribution of water and streamflow runoff to produce the energy and capacity while meeting non-power requirements and load obligations. The difference between the instantaneous hydro peaking capability and operating peaking capability is the hydro system's ability to continuously produce power for a specific time period by utilizing the limited water supply while meeting power and non-power requirements, scheduled maintenance, and operating reserves—including reserves to support variable energy resources, such as wind.

BPA uses its Hourly Operating and Schedule Simulator (HOSS) model to simulate the relationship of hydro energy to operational hydro peaking capability. The operational hydro peaking capability assumes monthly HLH hydro generation was maximized and is not an indication of the Federal hydro system's ability to react to system distress. This relationship was simulated for a variety of hours per month and the 1929 through 1998 historical water conditions. The operational hydro peaking capability projections are reduced to the extent required to provide operating reserve levels that assume: 1) BPA will support variable energy resources 99.5 percent of the time; (2) the wind fleet schedules operate at a 30-minute persistence scheduling accuracy level; and (3) a certain quantity of the imbalance portion of the Variable Energy Resources Balancing Service (VERBS) reserve will be customer-supplied *(i.e.,* self-supplied). This is consistent with the 2012 Rate Case. Below are two separate HOSS operational peaking methodologies included in this study:

- 1-Hour Operational Peaking: Forecasts the monthly Federal system hydro generating capability based on the single largest 1-hour of hydro generation in that month, while meeting the Federal load obligations for that month; and
- 120-Hour Operational Peaking: Forecasts the monthly Federal system hydro generating capability by averaging the generation of the top 6 heavy load hours (HLHs) per day, 5 days per week, and 4 weeks per month (6*5*4=120 hours), while continuing to meet Federal load obligations for that entire month.

Consequently, after accounting for these operational peaking methods for the Federal and regional capacity analysis, the hydro system capability can be estimated monthly for 1-Hour and 120-Hour sustained periods. Operational peaking capability estimates take into account forecasted scheduled hydro maintenance, and operating reserves, which are netted out for reporting purposes.

BPA is developing a Federal system Loss-of-Load Probability (LOLP) model that will be available to assess Federal system resource adequacy to meet a broad range of load obligations, resources, and temperature variations for the future. The LOLP model is discussed in Section 5, *Federal System Resource Adequacy*, starting on page 49.

Hydro Projects' Multiple-Use Planning: Federal hydro projects in the PNW have many purposes in addition to power generation. The projects provide flood control, supply irrigation for farming, assist in river navigation, provide for reservoir recreation, and contribute to municipal water supplies. In addition, operational constraints are in place to protect and enhance resident and anadromous fish and wildlife populations. Non-power reservoir operating requirements may reduce or increase hydropower production. BPA's resource planning takes into account all currently known non-power operating requirements when assessing regional hydro system capability.

The Council, BPA, other Federal agencies, and other PNW entities will continue to evaluate ways to enhance conditions for fish and wildlife. Future proposals could include additional amendments to the Council's Columbia River Basin Fish and Wildlife Program, revision of the PNCA, the potential retention, termination, or amendment of the Columbia River Treaty and/or implementation of additional actions and programs taken to comply with the Endangered Species Act. The impacts of future proposals are unknown. These proposals, however, will most likely impact non-power requirements on the hydro system, potentially changing a combination of operating flexibility, the monthly shape and timing of streamflows, and/or the availability of operational Federal system capacity. Future studies will incorporate any known new impacts.

Pacific Northwest Non-Hydro Resources

The expected output of regional non-hydro resources is based on the energy and capacity capability information submitted to BPA by the project owners. These projects include nuclear, coal, gas-fired, oil-fired, and renewable resources such as wind, geothermal, solar, and biomass projects. Total plant output was reduced to account for scheduled maintenance, spinning reserves, and forced outage reserves. Independent Power Producer (IPP) projects that have been built or that are in the process of construction have been added to the regional resource stack. IPP projects are assumed dedicated to meet PNW regional loads unless otherwise specified. The discussion of the Federal resources is in Section 4: *Federal Firm Resources,* page 23. *Regional resources are discussed* in Section 6, *Regional Firm Resources,* page 61.

Analysis of Federal System Firm Loads and Resources

In the PNW, BPA is the Federal power-marketing agency charged with marketing federal power and providing transmission to serve the firm requirements loads of its customers. BPA does not own or operate generating resources, but markets the power made available to the Administrator by the USACE and USBR from federal projects and power from nonfederal generation that BPA has purchased. BPA's contractual customer load obligations, combined with the Federal and non-Federal

resources from which BPA acquires the power it sells, are collectively called the "Federal system" in this study. BPA owns and operates the federal transmission grid, which includes more than 14,800 circuit miles of transmission lines above 115 kilovolts (high voltage) and 368 circuit miles below 115 kilovolts in the PNW.

The Federal system load obligations are comprised of BPA's power sales to public bodies and cooperatives; Federal agency, IOU, and DSI customers and USBR load, as well as other firm contractual obligations to deliver power. BPA sells Federal power at wholesale and other than DSI contracted deliveries, does not sell to retail customers.

BPA is the designated marketer of federal power in the Region that includes the generation from hydro resources of the Federal system, which includes 31 dams owned and operated by the USBR and the USACE. BPA also markets power from generation from hydro projects owned by Lewis County Public Utility District (PUD) and Idaho Falls Power, thermal generation from the Columbia Generating Station nuclear plant operated by Energy Northwest, Inc. (ENW), and the output from several wind projects and other renewable power plants that BPS buys under power purchase contracts. The expected energy generation production from wind turbines is included in the analysis. Since wind power production is intermittent and cannot be guaranteed to be available to meet peak hour loads, no capacity contribution from wind generation is assumed. The *Federal System Analysis* is shown in Section 4, beginning on page 23.

The Slice Product

The Slice Product (Slice) is a requirements product offered only to preference customers that provides both firm and non-firm energy and capacity deliveries based on their net requirements load. It differs from traditional requirements products in that it is comprised of the following three components:

- Firm power sales based on a percentage of the planned output and shape from a specific set of resources and contracts based on the Federal system. These include: Federal system resources, purchased nonfederal resource generation, and contracted power purchases; which are then reduced for Federal treaty, statutory, and contract obligations;
- Annual amounts of non-firm power on a monthly or seasonal basis based on the actual power production made available to BPA from generation from the same set of resources and contracts described above that include: Federal system resources, purchased nonfederal resource generation, and contracted power purchases; which are then reduced for Federal treaty, statutory, and contract obligations; and
- Slice customers also purchase a firm Block product to meet a portion of the delivery of power and services to meet their net requirements load.

2001 Slice Product: Customers signed 10-year 2001 Slice contracts with power deliveries from October 1, 2001, through September 30, 2011. The 2001 Slice product terms and provisions provide participants with a share of power made available to BPA from a specific set of Federal system resources, purchased

nonfederal resources, contract purchases, and contract deliveries, after reductions for Federal treaty, statutory and certain contract obligations — termed the Slice System Resource stack. It is used only for calculating the Slice product purchases and is not the same as the Federal System resource stack. See Slice of the System Product, Product Description, published October 8, 1999, and Exhibits H and L of the Block and Slice Power Sales Agreement that began October 1, 2001. The 2001 Slice Product contains the following components:

- 2001 Slice Power Deliveries: Public customers signed Slice contracts for power purchases based on power output made available to BPA from 22.63 percent of the Slice System Resource stack. The amount of power available to a customer from the Slice product for delivery is dependent on the actual magnitude of the components of the Slice Resource stack in real-time operations. The actual magnitude of the components of the Slice Resource stack varies due to water conditions, forced outages, maintenance, Federal treaty, statutory and other contract obligations, operating decisions, generation from non-hydro Federal resources and other factors which may affect the Slice Resource stack; and
- Block Deliveries: All Slice customers purchased a planned amount of power as a Block purchase with a 100 percent load factor for each month. Under provisions of the Block and Slice contract, Slice customers were allowed to select a step up in their Block purchases for the second 5-year period of the contract to cover load growth during the first 5-years of their Block and Slice contract.

2012 Slice Product: In 2008, customers signed 20-year Slice/Block contracts for 17 years of BPA power service that begin October 1, 2011, and run through September 30, 2028. Some of the 2012 Slice product contract terms and provisions differ from those in the 2001 Slice contracts. However, the 2012 Slice product still provides purchasers with a share of available power from a specific set of Federal system resources, purchased nonfederal resources, contract purchases, and contract deliveries, after reductions for Federal treaty, statutory and certain contract obligations — termed the Adjusted Annual Rate-Period High Water Mark Tier 1 System Capability (AART1SC). See Tiered Rate Methodology Rate Case, Tiered Rate Methodology, TRM-12-A-02, Tables 3.1 through 3.5, pages 121-126. Rates for the 2012 Slice product will be set through the Tiered Rates Methodology. The number of customers buying Slice has increased so that 2012 Slice customers purchase amounts differ from the 2001 Slice contracts and cannot be directly compared:

- 2012 Slice Deliveries: 2012 Slice deliveries begin October 1, 2011, and is currently based on 27.027 percent of the AART1SC. The amount of power from the 2012 Slice product available to each purchaser for delivery is dependent upon actual system operations of the system adjusted by Federal operating decisions, hydro production that varies by water conditions, and generation from non-hydro Federal resources; and
- Block Deliveries: All Slice customers also purchased a Block product under their contracts, having a 100 percent load factor for each month.

Analysis of Regional Firm Loads and Resources

The PNW regional analysis includes the Federal system loads and resources, plus non-Federal regional loads, contractual obligations, and generating resources in the PNW region. The region has several groups that represent load sectors: Federal agencies, public agencies, cooperatives, USBR, IOUs, and DSIs. The regional hydro resources are owned and operated by various Federal entities, public bodies, cooperatives, and IOUs. The regional thermal generating resources, fueled by biomass, coal, natural gas, oil, or nuclear power, are owned and operated by various regional entities. The regional analysis is presented in Section 6, beginning on page 61.

Treaty Downstream Benefits

The Treaty between the United States and Canada enhanced the volume of storage in the Columbia River Basin with the construction of three large storage projects in Canada (Mica, Duncan, and Keenleyside). These Canadian Treaty projects provide downstream power benefits by increasing the firm power generating capability of U.S. hydro projects. Under the terms of the Treaty, the downstream power benefits are shared equally between the two countries. The Canadians' share of benefits is called "Canadian Entitlement." Both Canada and the U.S. have the option to terminate the Treaty after September 15, 2024, with 10 years' advance written notice. The Determination of Downstream Power Benefits analysis is performed annually and establishes the amount of downstream power benefits for each succeeding sixth year. Under the Treaty, BPA and each of the non-Federal mid-Columbia project owners are obligated to return their share of the downstream power benefits owed to Canada, in proportion to the benefit they receive. The non-Federal mid-Columbia projects are Wells, Rocky Reach, Rock Island, Wanapum, and Priest Rapids. The non-Federal Canadian Entitlement obligations are delivered to BPA, which, in turn, delivers both federal and the non-federal participants' obligations to Canada. BPA's delivery of the Canadian Entitlement Return obligation to Canada is presented in Table 1, below, and is considered a Federal export in this study.

Values depicted in Table 1, below, forecast Canadian Entitlement Return obligations estimated for OY 2012 through 2021.

Table 1

Federal System Export of Canadian Entitlement to Canada
Energy and Capacity Obligations[†]

Energy in Average Megawatts

Operating Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Federal System	526	505	506	470	497	492	486	480	475	470

January Capacity in Megawatts

Operating Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Federal System	1,314	1,321	1,336	1,350	1,350	1,350	1,350	1,350	1,350	1,350

[†] Values are estimated for OY 2015 through 2021.

Table 2, below, shows the Non-Federal entities' share of Canadian Entitlement Return obligations delivered to BPA for the mid-Columbia hydro projects.

Table 2

Non-Federal Canadian Entitlement Return Obligations Delivered to BPA
Energy and Capacity Obligations[††]

Energy in Average Megawatts

Operating Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Total Project Energy Obligation	141	138	137	136	135	134	133	131	130	128

January Capacity in Megawatts

Operating Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Total Project Energy Obligation	249	245	239	238	237	235	234	231	228	226

[††] Values are estimated for OY 2015 through 2021.

Major Sources of Uncertainty

This study reflects several potential major changes in regional resources and power sales products that could affect regional and Federal loads and resources.

Loads and Resources Uncertainty: Future Federal system and regional firm surpluses/deficits are subject to a number of uncertainties over the 10-year study period. Some of these uncertainties include:

- Federal system and regional water availability that affects hydro generation available to meet load obligations. See Section 4, *Potential Variability of Federal System Resources*, page 32, and Section 6, *Potential Variability of Regional Resources*, page 67;
- Implementation of the 2012 RD PSCs that set BPA power supply PSC obligations beginning October 1, 2011, including but not limited to customer's application of new non-federal resources to their load growth under the PSC or their placement of load at a Tier 2 rate on BPA;
- Potential increases in load due to service to new public utilities, Department of Energy Richland vitrification plant operations and DSIs;
- Deviations in BPA's PSC load service obligations due to changes in economic conditions;
- Volatility in short- and long-term electricity market prices;
- Deviation from forecasted regional total retail loads due to changes in the economy or future climate change impacts;
- Failure of existing or contracted generating resources to operate at anticipated times and output levels;
- The potential retention, termination, or amendment of the Columbia River Treaty Canadian Entitlement obligations and/or modifications in PNW hydro and thermal operations that could change power amounts owed by the U.S. to Canada;
- The availability of new and existing regional resources that can be purchased to serve firm loads in the PNW region;
- Additional changes to existing hydro system operation in response to actions and programs developed to address the Endangered Species Act or other environmental considerations; and
- BPA's future purchasing and marketing efforts that include contract purchases, contract sales, demand-side management programs, conservation measures, and the purchase of the output of new or existing resources.

These uncertainties could affect the size of projected surpluses and/or deficits, the duration, and the times at which they occur.

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Section 3: Changes in the 2011 Pacific Northwest Loads and Resources Study

This section describes the major data updates and changes in the assumptions for the 2011 White Book analysis compared to the 2010 White Book. Specific resource and contract changes are detailed in the 2011 Pacific Northwest Loads and Resources Study Technical Appendix. The 2011 Technical Appendix will be available on BPA's external website at: www.bpa.gov/power/whitebook

The 2011 Technical Appendix presents auxiliary tables (A-tables) that contain aggregate information summarized by customer type.

Federal Firm Sales and Obligations

The 2011 White Book analysis reflects the following Federal system contract and obligation changes compared to the 2010 study:

- Federal Agency, pubic bodies, cooperatives, and USBR PSC obligations were updated using BPA's agency load forecasting tool (ALF) based on:
- BPA's 2001 PSCs through September 30, 2011;
- BPA's 2012 RD PSCs that begin deliveries October 1, 2011 including Tier 2 load placement elections on BPA;
- Public bodies and cooperative Slice customer obligations were updated to include the 2012 Slice and Block PSCs that begin October 1, 2011. See Section 2, *The Slice Product*, page 12; and
- Updated Federal system contract sales.

Federal Resource Stack

The 2011 White Book analysis reflects the following Federal system resource stack changes compared to the 2010 study:

- Regulated hydro: The hydro regulation study was updated to incorporate BPA's most recent estimate of power, non-power requirements, and include updated hydro performance curves;
- Independent hydro:
  - Generation forecasts for the Willamette projects operated by the USACE
  - Bonneville Fishway – Generation included in Bonneville dam
- NUG Resources:
  - Hydro – Elwha and Glines Canyon decommissioned June 1, 2011
  - Renewable - Fourmile Hill start date outside of study period
- Updated Federal system contract purchases; and
- Slice Transmission Loss Returns begin October 1, 2011.

Future studies will reflect new information as it becomes available.

PNW Total Retail Load

The 2011 White Book utilizes updated customer-by-customer regional retail load forecasts. The forecasts are based on a combination of the customers' historical electrical load consumption and data submittals. If available, the information and growth trends were verified with Federal Energy Regulatory Commission (FERC) filings. The methods used to arrive at the load forecasts which are aggregated for each of the following customer classes are:

Total Retail Load Updates:

- Federal agency, public bodies, cooperatives, and USBR retail load forecasts were developed by BPA using ALF, and incorporate historical retail load data and their 2012 PSCs' submittals. Some Public Agency customer loads were developed from their 2010-11 PNUCC data submittals or direct submittals to BPA;
- IOU retail load forecasts were developed by BPA using ALF and data provided in IOUs' 2010-11 PNUCC data submittals; and
- Updated PNW regional export contracts.

PNW Regional Resource Stack

In addition to the Federal system resource stack updates presented on page 19, the 2011 White Book analysis reflects the following regional resource and contract changes compared to the 2010 study:

Regional resource additions:

- Combustion Turbine:
    - Langley Gulch CT (21 aMW in 2012, and 251 aMW in 2013-2021);
- Renewables:
    - Goshen North/Ridgeline (35.8 aMW in 2012);
    - Big Horn II (15.2 aMW);
    - Burley Butte Wind (5.61 aMW);
    - Camp Reed (6.47 a MW);
    - Golden Valley Wind (3.45 a MW);
    - Grayland Wind (Coastal) (1.89 aMW)
    - Juniper Canyon I (45.9 aMW);
    - Kittitas Valley Wind (29 aMW);
    - Leaning Juniper 2a (SCPPA) (27.6 aMW);
    - Leaning Juniper 2b (SCPPA) (33.9 aMW);
    - Linden Wind Project (15.5 aMW);
    - Lower Snake River Wind (101 aMW);
    - Milner Dam (5.61 aMW);
    - Oregon Trail (3.9 aMW);
    - Patu Wind (2.87 aMW);

    - Paynes Ferry (6.04 aMW);
    - Pilgrim Stage Station (3.02 aMW);
    - River Bend Landfill (4.3 a MW);
    - Salmon Falls (6.04 a MW);
    - Thousand Spring (3.02 aMW)
    - Threemile Canyon Wind (2.44 aMW);
    - Tuana Gulch (3.02 aMW);
    - Tuana Springs Wind (4.83 aMW);
    - Vantage Wind (25.9 aMW);
    - Yahoo Creek (6.04 a MW)
- Cogeneration:
    - Lakeview BioMass (18 aMW);
    - Seneca Sawmill Cogen (17.5 aMW)
- NUG Hydro:
    - Juniper Ridge Hydro (3.37 aMW)
- NUG Renewable:
    - Bellevue Solar (Amity, OR) (0.15 aMW);
    - Bettencourt B6 anaerobic digester (0.69 aMW);
    - Farm Power Lynden (0.7 aMW);
    - Farm Power Rexville (0.7 aMW);
    - Yamhill Solar (Amity, OR) (0.23 aMW)

Regional resources removed:

- Renewables:
    - Barr-Tech Bio Park – removed from study;

Additionally, PNW regional import contracts updated. Future studies will reflect new information as it becomes available.

Resource Adequacy

BPA is actively developing a Federal system Loss-Of-Load-Probability (LOLP) model to be incorporated in long-range planning. For this analysis, BPA is using a stochastic power system LOLP model that incorporates major forces of uncertainty in the Federal power system that affect both the supply of generating resources (water, wind, and forced outages), and the load obligations (temperature). Given variations in these uncertainties, the analysis examines the planned adequacy of the federal power system is in meeting BPA load obligations under many possible futures of supply and demand. This initial attempt to identify, develop and apply resource adequacy metrics and standards for the Federal System remains an educational effort for BPA. BPA will continue to refine the metrics and standards and intends to update this analysis annually in the White Book, and may incorporate it into future Needs Assessments. The LOLP model and preliminary results are described in Section 5, Federal System Resource Adequacy, page 49.

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Section 4: Federal System Analysis

Federal System Assumptions

The Federal system loads and resources analysis is based on Federal system resources, Federal contracts, including power purchased from Non-Federal resources, and Federal power sales contract obligations as of May 27, 2011. The assumptions used for the Federal system analysis are as follows:

- Forecasted Federal load obligations reflect normal weather conditions and do not reflect future climate change impacts;
- Regulated hydro generation estimates incorporate PNCA plant characteristics, streamflows, and BPA's best estimate of non-power requirements. The regulated hydro generation projections reflect operating reserve levels associated with 30-minute wind persistence scheduling accuracy forecasts;
- Generation forecasts for independent hydro and other generating resource projects are provided to BPA by the project owners;
- BPA's Federal agency, public bodies, cooperatives, and USBR PSC obligations to preference customers continue through the study horizon. (2001 PSCs through September 30, 2011, and 2012 Regional Dialogue "Contract High Water Mark" PSCs beginning October 1, 2011);
- BPA's power obligations to the IOUs under sections 5(b) and 5(c) of the Northwest Power Act, *16 U.S.C. §839c(b), 839c(c)(1)* was established for five of the six regional IOUs based on the IOUs' Bridge NR Block contracts and the "Bridge" Residential Purchase and Sale Agreements (RPSA) contracts in effect on May 27, 2011. No IOUs are currently purchasing power from BPA under the Bridge NR Block contracts. Five of the six IOUs are currently engaging in purchases and sales with BPA under RPSAs associated with the REP. Although the RPSA describes the REP as a purchase and sale of energy, BPA implements the REP as a financial transaction. For purposes of this study, the purchases and sales of power under the RPSAs are assumed to be netted out and, consequently, are not reflected in the loads or sales included in the study horizon;
- Power sales to BPA's DSI customers do not have uniform terms. This study assumes DSI power service of 340 aMW through September 30, 2017, though DSI conditioned power service contracts may end before that date;
- All existing Federal contractual arrangements for power purchases and sales that are not included under BPA's regional net requirements service PSCs, follow individual contract terms through expiration. They are not assumed to be renewed. The long-term Federal surplus capacity sale contract with PacifiCorp expires August 31, 2011;
- No capacity contribution from wind generation is assumed;
- Firm hydro energy and capacity for hydro generation estimates are based on 1937-critical water conditions, unless otherwise specified; and
- Transmission losses are treated as a resource reduction.

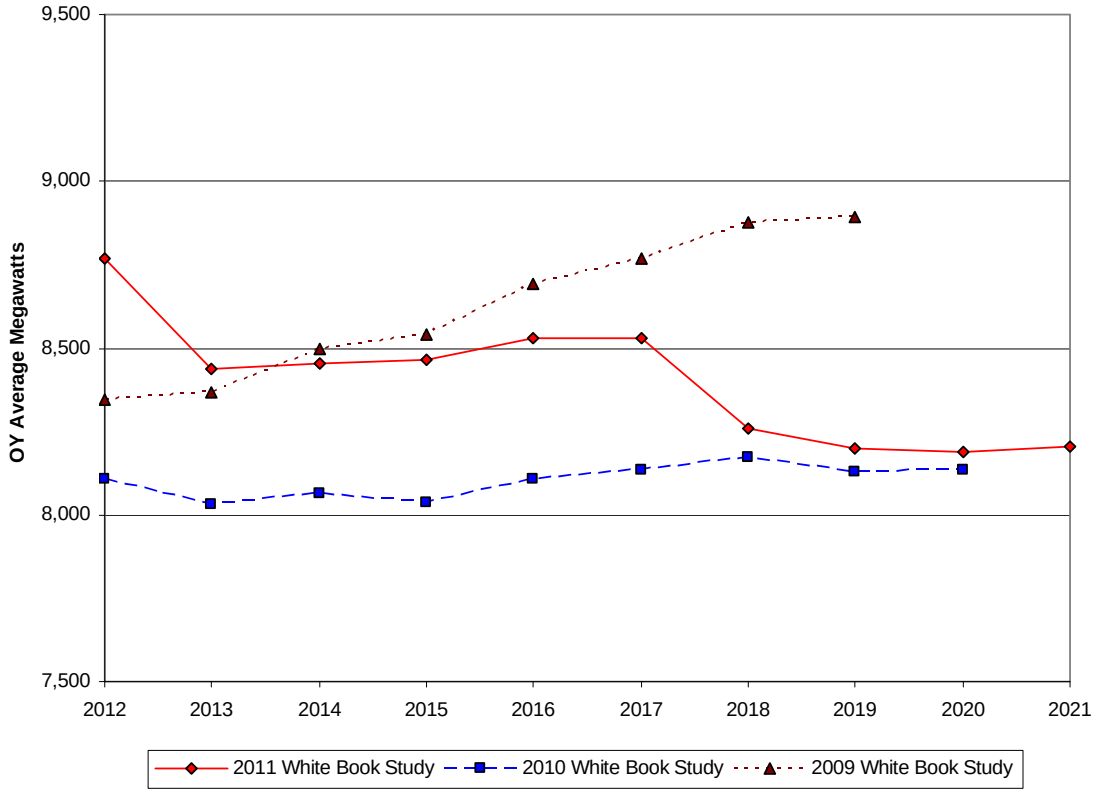
Federal Firm Energy Load Obligations

In this study, the annual Federal system firm energy load obligations incorporate the preceding "Federal System Assumptions" and include BPA's forecasted 2001 and 2012 RD PSC obligations for PNW Public Agencies, USBR, IOUs, and DSIs. The methodology and key elements of BPA's PSC obligation forecasts are presented in Section 2, *BPA Power Sales Contract Obligations*, page 6 and Section 2, *The Slice Product* discussed on page 12. The forecast assumes that PNW Federal agencies, public bodies, and cooperatives purchase power from BPA under their RD PSCs to meet net regional firm energy loads not served by their own resources. Though not served under PSCs, USBR customers receive statutorily based reserve power which is included in this forecast. The Federal obligations also include contracted Federal system power deliveries within the PNW region and export contracts delivered outside the PNW. The methods and assumptions used to complete this year's Federal power sales contract obligations are based on the forecasts of individual entities' total retail load discussed in Section 2, *Total Retail Load Forecast*, page 4.

Figure 1, below, illustrates the differences between the forecasted 2011 White Book annual Federal system energy load obligations for OY 2012 through 2021 and the previous 2010 and 2009 studies. BPA's load obligation forecast reflects current economic conditions that reduced load obligations. In addition, beginning October 1, 2011, the forecast of the 2012 RD PSCs incorporates tiered rates delivery service to customers—including customer elections of load growth service, which has resulted in lower BPA PSC load obligations. The 2009 White Book study tends to be higher than both the 2010 and 2011 studies because the forecast was completed prior to realizing the depth of the recent economic downturn and did not include the concept of tiered rates as applied to BPA's net requirement load service. The 2010 study is lower than the 2009 study due to including BPA's tiered rates obligation forecast and incorporating the downturn in the economy. The 2011 study tends to be higher than the 2010 study due to market activity for 2012 and including 340 aMW of DSI loads in 2012 through 2017 which was not included in the 2010 analysis. The annual Federal firm energy load obligations for OY 2012 through 2021 are presented in Exhibit 1, page 84.

Figure 1

Annual Federal Firm Energy Load Obligations†
For OY 2012 through 2021



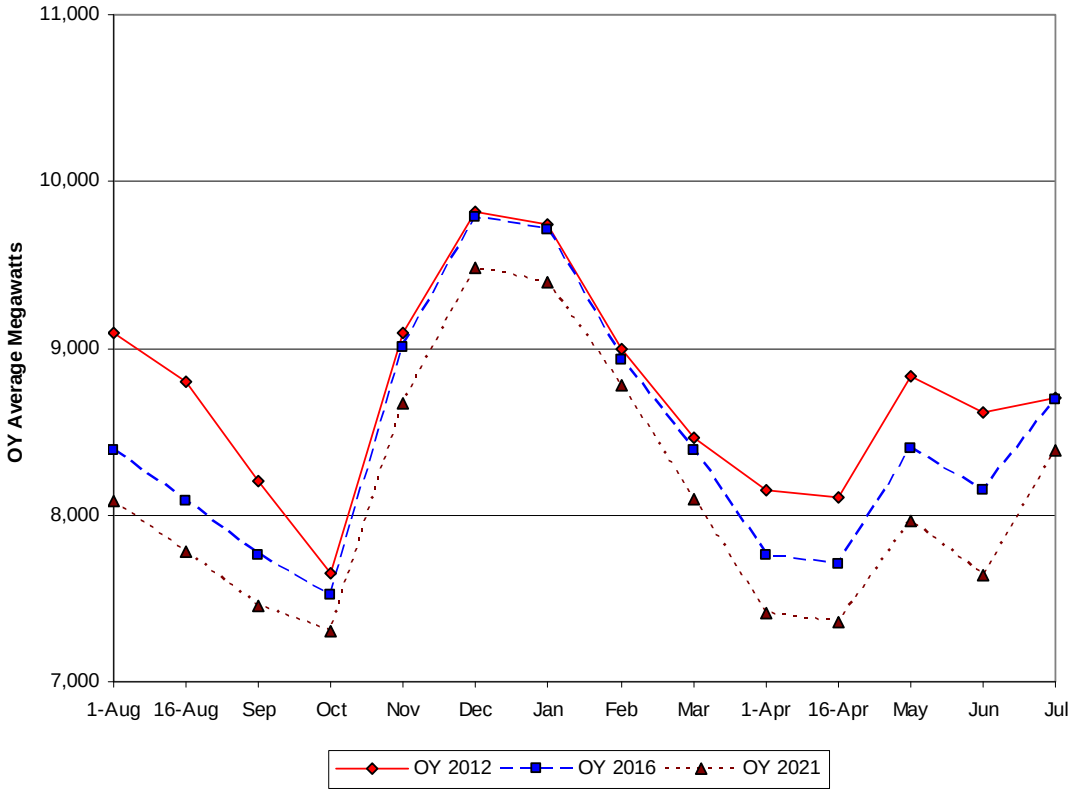
† 2010 White Book projections were published through OY 2020. 2009 White Book projections were published through OY 2019.

Monthly Federal Firm Energy Load Obligations

Figure 2, below, illustrates the monthly Federal firm energy load obligations for OY 2012, 2016, and 2021 and incorporates the same load components detailed in *Federal System Assumptions*, beginning on page 23, and the *Federal Firm Energy Load Obligations* beginning on page 24.

Figure 2

Monthly Federal Firm Energy Load Obligations†
For OY 2012, 2016, and 2021



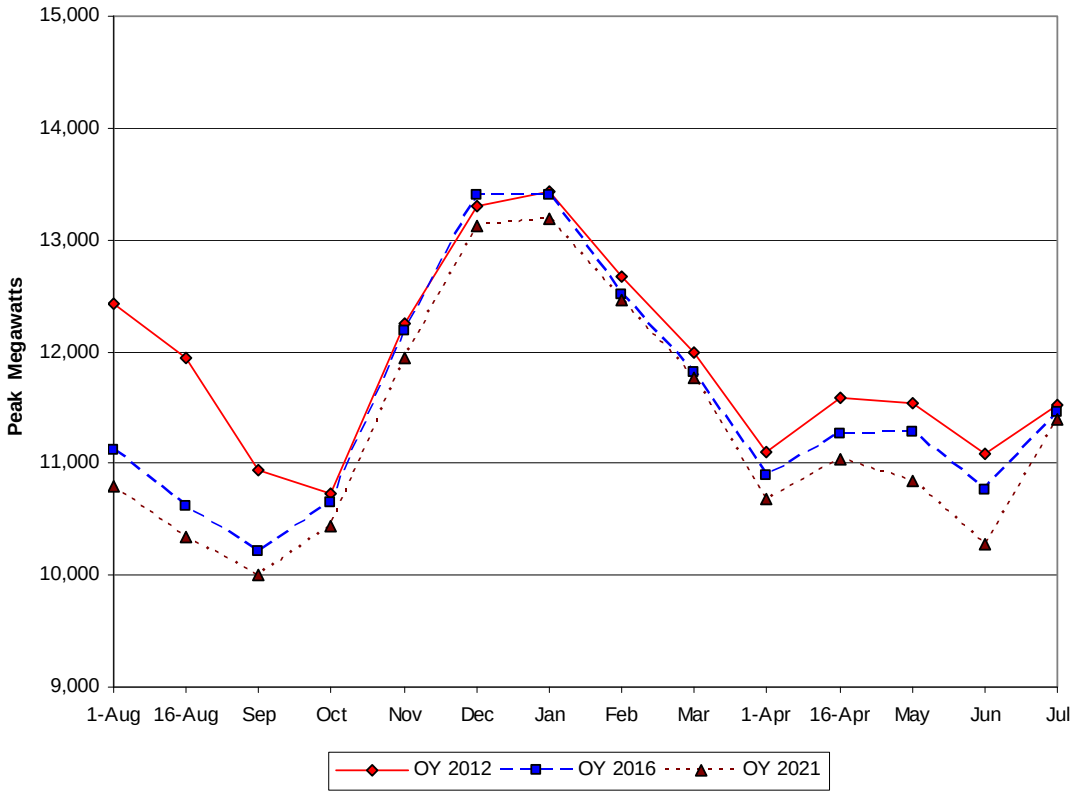
† BPA load obligations in August and September of OY 2012 show the final months of the 2001 PSC's.

The monthly Federal firm energy load obligations for OY 2012, 2016, and 2021, assuming 1937-critical water conditions, are shown in Exhibits 2 through 4, starting on page 88.

1-Hour Federal Peak Load Obligations: Figure 3, below, illustrates the monthly Federal firm 1-hour peak load obligations for OY 2012, 2016, and 2021. The forecast assumes that BPA serves all of the customers' net requirements loads, including load growth through September 30, 2011. Beginning October 1, 2011, BPA's load obligations reflect the 2012 RD PSCs that incorporate tiered rates as applied to BPA's net requirement load service to customers—including customer elections of load growth service. Federal peak load obligations include BPA's exports and intra-regional contract sales. The peak load obligations assume normal weather conditions and do not reflect future climate change impacts. The forecast also assumes a 50 percent probability that the actual peak load obligations could be exceeded. The peak load projections are also reduced by a 1-hour diversity component to address the fact that BPA's peak electrical demands do not occur simultaneously throughout the region.

Figure 3

Monthly Federal Firm 1-Hour Peak Load Obligations†
For OY 2012, 2016, and 2021



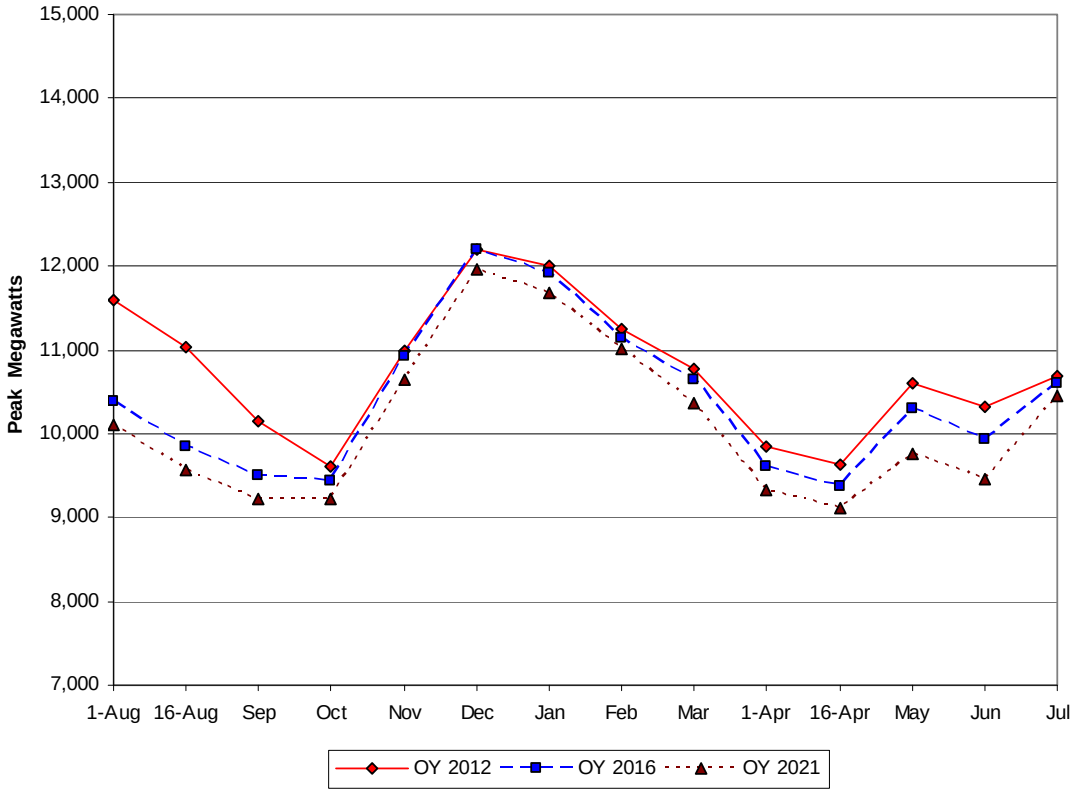
† BPA load obligations in August and September of OY 2012 show the final months of the 2001 PSC's.

The monthly 1-hour Federal firm peak loads are presented in Exhibits 5 through 7, starting on page 96.

120-Hour Federal Peak Load Obligations: Figure 4, below, illustrates the monthly Federal firm 120-hour peak load obligations for OY 2012, 2016, and 2021. The 120-hour monthly demand forecast uses the same assumptions as those described in *1-Hour Federal Peak Load Obligations*, page 27, with the exception of incorporating a 120-hour diversity reduction.

Figure 4

Monthly Federal Firm 120-Hour Peak Load Obligations†
For OY 2012, 2016, and 2021



† BPA load obligations in August and September of OY 2012 show the final months of the 2001 PSC's.

The monthly 120-hour Federal firm peak loads are presented in Exhibits 8 through 10, starting on page 104.

Federal Firm Resources

Table 3, below, summarizes the Federal system firm energy resources and contract purchases available to BPA to meet Federal load obligations for OY 2012. Federal system energy resources are comprised of approximately 79 percent hydropower, 12 percent from one nuclear power plant, and 9 percent from BPA's power purchase contracts and small thermal and renewable resources.

Table 3

Federal Firm Total Resources for OY 2012[†]
Based on 1937-Critical Water Conditions

Project Type	1-Hour Operational Peaking Capacity (January Peak MW)	Percent of Operational Peaking Capacity	Firm Energy (OY in aMW)	Percent of Firm Energy
Hydro	14,219	85.8%	6,885	78.6%
Nuclear	1,130	6.8%	1,030	11.8%
Contracts/Wind/ Renewables/Cogen. Resources	1,224	7.4%	843	9.6%
Total Federal Firm Resources	**16,573**	**100.0%**	**8,758**	**100.0%**

[†] Federal firm resource estimates are before adjustments for reserves, maintenance, and transmission losses.

The Federal system hydro resources from which BPA markets power are detailed in Table 4, page 30. BPA also markets power purchased from non-Federally owned resources. In addition, BPA's capacity/energy exchange contracts provide marketable energy to BPA as payment for the capacity BPA delivers. Table 5, page 31, shows the non-Federally owned resources, return energy associated with BPA's existing capacity/energy exchanges, contractual resources, and other BPA hydro-related contracts. Some hydro projects, presented in Table 4 and Table 5, have winter operating characteristics that may create lower expected January capacity than the annual firm energy generation.

Table 4

Federal System Hydro Projects
Capacity and Energy for OY 2012

Project	Initial Year of Service	Number of Units	Nameplate Rating (MW)	Instantaneous Generating Capacity † (Peak MW)	Firm Energy †† (aMW)
U.S. Bureau of Reclamation (USBR) Hydro Projects					
Boise Diversion	1908	3	3	0	1
Grand Coulee	1941	27	6,735	6,162	1,914
◦ GCL Pump Generation	1973	6	314		
Hungry Horse	1952	4	428	365	82
Palisades	1957	4	176	34	64
Anderson Ranch	1950	2	40	36	15
Green Springs	1960	1	18	20	6
Minidoka	1909	4	28	13	15
Roza	1958	1	13	4	8
Black Canyon	1925	2	10	9	8
Chandler	1956	2	12	9	9
Total USBR Projects		**56**	**7,777**	**6.652**	**2,122**
U.S. Army Corps of Engineers Hydro Projects					
Chief Joseph	1955	27	2,614	2,535	1,102
John Day	1968	16	2,480	2,484	811
The Dalles *	1957	24	2,052	2,034	607
Bonneville **	1938	20	1,195	1,054	414
McNary	1953	14	1,120	1,127	494
Lower Granite	1975	6	930	930	191
Lower Monumental	1969	6	930	922	191
Little Goose	1970	6	930	928	193
Ice Harbor	1961	6	693	693	169
Libby	1975	5	605	579	177
Dworshak	1974	3	465	445	148
Lookout Point	1954	3	138	17	36
Detroit	1953	2	115	100	42
Green Peter	1967	2	92	20	28
Lost Creek	1975	2	56	19	29
Albeni Falls	1955	3	49	28	26
Hills Creek	1962	2	34	6	18
Cougar	1964	2	28	5	16
Foster	1968	2	23	5	13
Big Cliff	1954	1	21	7	10
Dexter	1955	1	17	4	9
Total Corp of Engineer Projects		**153**	**14,587**	**13,942**	**4,723**
Total USBR and USACE Projects		**209**	**22,364**	**20,594**	**6,845**

† This is the maximum hydro generation using optimum conditions for January 2012 assuming 1937-critical water conditions and does not reflect reductions for Idled Federal Hydro Capacity of 4,991 MW and hydro maintenance of 1,408 MW.

†† Firm energy is a 12-month annual average for OY 2012 assuming 1937-critical water conditions.

* Though not purchased by BPA, The Dalles Fishway has two units that produce approximately 5 aMW which are not included in this table.

** Bonneville Dam includes the Bonneville Fishway in the total.

Table 5

Non-Federally Owned BPA Resources and Contracts
Capacity and Energy for OY 2012

Project	Type	Operator	Date in Service	Capacity † (Peak MW)	Firm Energy (aMW)
Existing Non-Federally Owned BPA Resources					
Columbia Generating Station	Nuclear	ENW	1984	1130	1030
Cowlitz Falls	Hydro	Lewis County PUD	1994	13.1	26.2
Idaho Falls Bulb Turbines	Hydro	Idaho Falls Power	1982	9.7	14.1
Dworshak/Clearwater Small Hydro	Hydro	State of Idaho DWR	2000	3.0	2.6
Rocky Brook	Hydro	Mason PUD No 1	1999	1.6	0.3
Georgia Pacific Paper Wauna	Cogen.	Georgia Pacific	1996	24.0	19.2
Foote Creek 1	Wind	Foote Creek 1, LLC	1999	0	5.1
Foote Creek 2	Wind	Foote Creek 2, LLC	1999	0	0.6
Foote Creek 4	Wind	Foote Creek 4, LLC	2000	0	5.6
Stateline Wind Project	Wind	PPM, FLP	2001	0	21.9
Condon Wind Project	Wind	Condon Wind Project, LLC	2002	0	10.4
Klondike Phase I	Wind	NW Wind Power	2001	0	7.6
Klondike Phase III	Wind	NW Wind Power	2007	0	15.9
Fourmile Hill Geothermal ††	Geo.	Calpine	Unknown	0	0
Ashland Solar Project	Solar	City of Ashland, OR	2000	0	0
White Bluffs Solar	Solar	Energy Northwest	2002	0	0
1. Total Non-Federally Owned BPA Resources				**1,181**	**1,160**
Firm Contracts					
Canadian Entitlement for Canada (non-Federal)				249	141
Canadian Imports				1	1
Pacific Southwest Imports				0	20
Inland Southwest Imports				45	60
Eastern Imports				400	160
Intra-Regional Transfers In (Pacific Northwest Purchases)				422	339
2. Total BPA Firm Contracted Resources				**1,117**	**721**
3. Transmission Loss Returns				**78**	**31**
4. Total Non-Federally Owned BPA Resource Contracts (Lines 1 + 2 +3)				**2,376**	**1,912**

† This is the maximum generation using optimum conditions for January 2012. Hydro projects assume 1937-critical water conditions.

†† Fourmile Hill is not assumed to be in operation within the study period.

Potential Variability of Federal System Resources

Variability Due to Water Conditions: To illustrate the potential variability of Federal system resources for OY 2012 through 2021, this study compares different scenarios using varying levels of Federal system generation based on differing water conditions. Table 6, below, compares the estimated annual Federal system resources under four scenarios using: 1) 1937-critical water conditions (the base case of this study); and the averages of 2) the bottom ten percent; 3) the middle 80 percent; and 4) the top ten percent of the historical 70-water year conditions (1929 through 1998).

Table 6

Potential Variability of Total Federal Net Resource Projections[†]
For OY 2012 through 2021
Utilizing Different Levels of Water Conditions
Energy in Average Megawatts

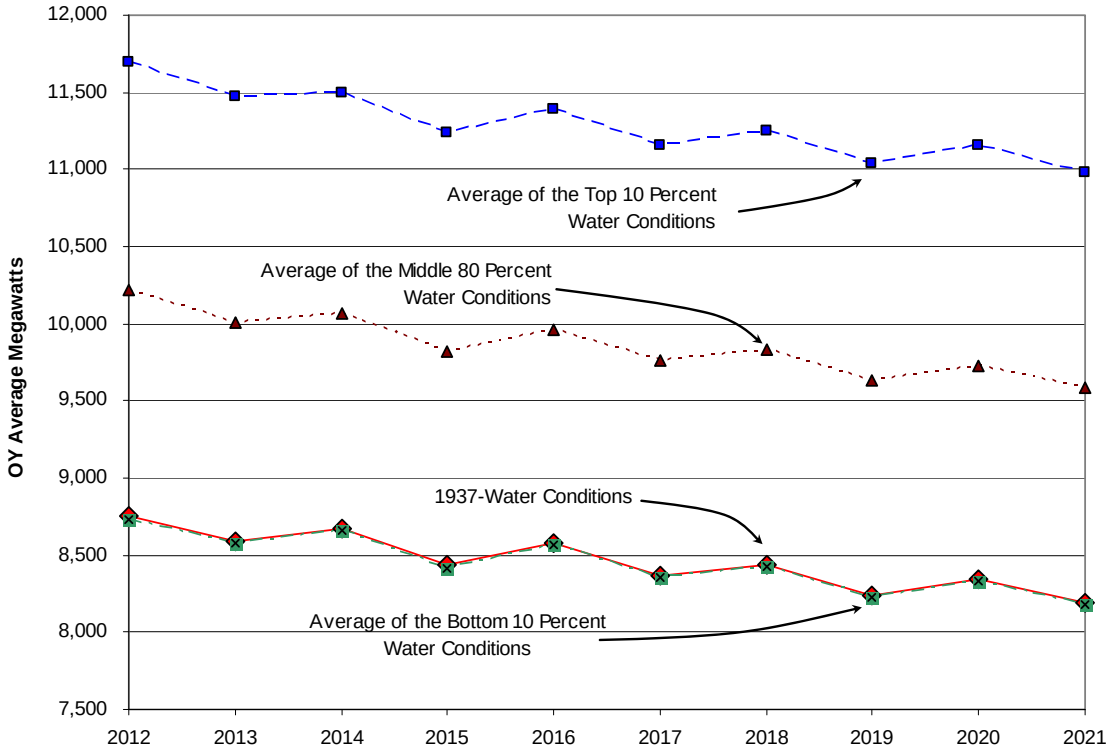
Operating Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1937-Critical Water Conditions	8,757	8,586	8,667	8,435	8,576	8,367	8,442	8,242	8,340	8,187
Average Bottom 10% Water Conditions	8,729	8,574	8,655	8,419	8,562	8,354	8,428	8,230	8,326	8,175
Average Middle 80% Water Conditions	10,214	10,010	10,066	9,822	9,966	9,760	9,830	9,636	9,730	9,581
Average Top 10% Water Conditions	11,701	11,470	11,495	11,239	11,387	11,157	11,247	11,033	11,152	10,979

[†] Total Federal net resource estimates include adjustments for reserves, maintenance, and transmission losses.

Figure 5, below, illustrates the four scenarios for the annual Federal system resources.

Figure 5

Potential Variability of Total Federal Net Resource Projections†
For OY 2012 through 2021
Utilizing Differing Water Conditions
Energy in Average Megawatts



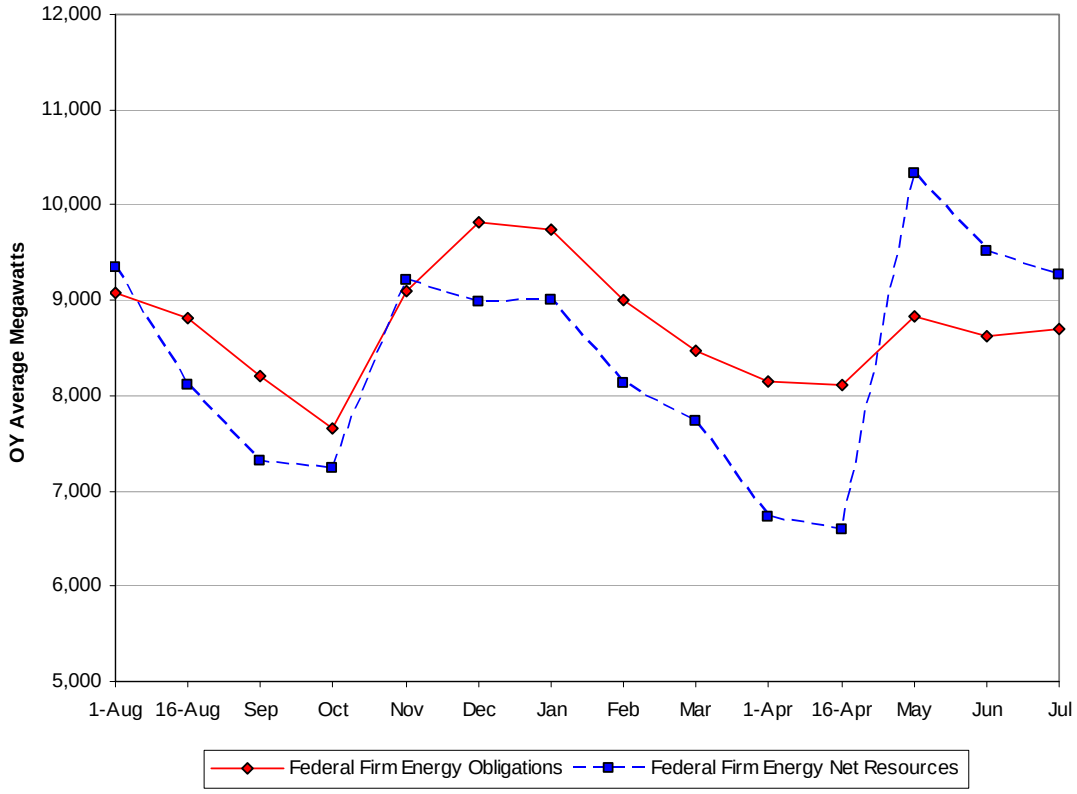
† Total Federal net resource estimates include adjustments for reserves, maintenance, and transmission losses.

Monthly Shape of Federal System Energy Load Obligations and Resources

Figure 6, below, illustrates the monthly Federal system firm energy loads and net federal system resources for OY 2012. This figure shows an example of the monthly timing of Federal system surpluses and deficits using the 2008 NOAA Fisheries FCRPS BiOp, the USFWS 2006 BiOp, and the USFWS 2000 BiOp. Exhibits 2 through 4, starting on page 88, show the monthly variability of the components of the Federal System loads and net resources using 1937-critical water conditions for OY 2012, 2016, and 2021.

Figure 6

OY 2011 Monthly Federal Firm Energy Loads and Net Resources
Using 1937-Critical Water Conditions



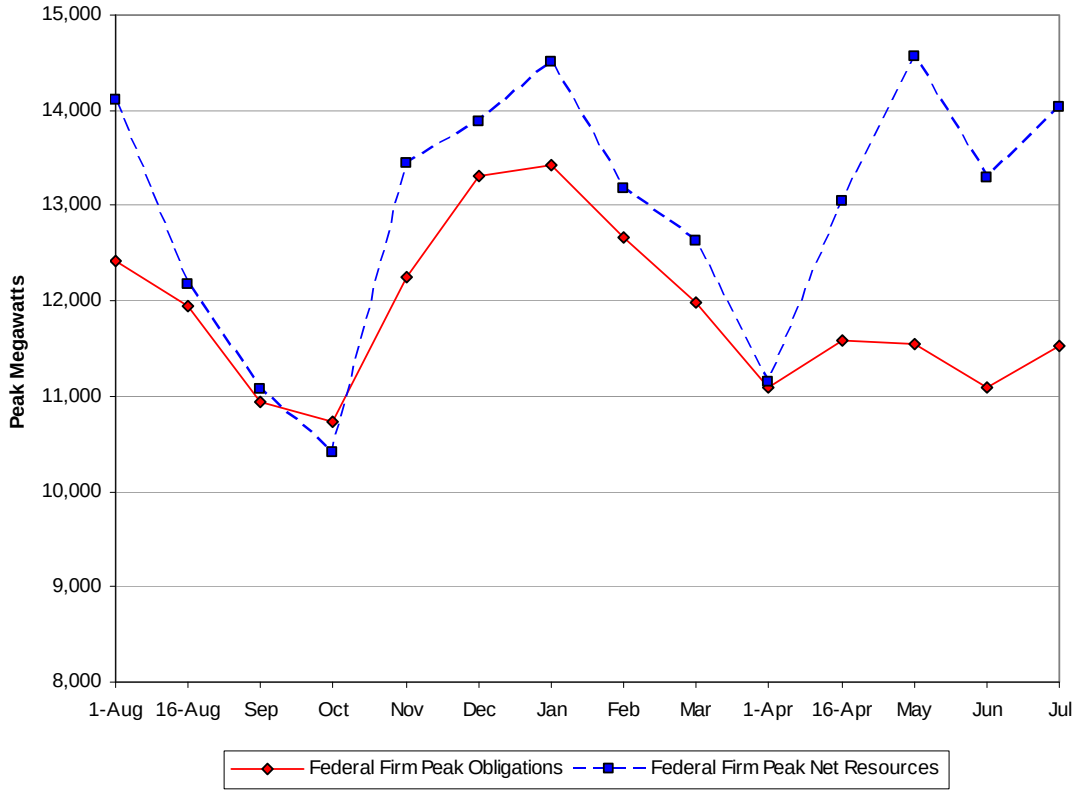
Using critical water conditions, Federal hydro resources are generally operated at lower power production levels during January through March to allow the reservoirs to store water for release in the spring to assist fish passage as identified in current BiOp flow requirements.

In addition to the monthly variability of the Federal surplus/deficit using critical water conditions, the Federal surplus/deficit can also vary greatly depending on water conditions in the PNW. Exhibits 11 through 20, starting on page 112, illustrate the Federal firm energy surplus/deficit projections using the 70-water years of record.

1-Hour Federal Load Obligations and Resources: Figure 7, below, illustrates the monthly 1-hour Federal system peak loads and net resources for OY 2012. These projections assume hydro resource generation under 1937-critical water conditions and incorporate normal weather peak load obligations and do not reflect future climate change impacts. The peak load obligations assume a 50 percent probability that the actual peak loads will be either higher or lower than the forecast. In addition, the Federal hydro capacity simulates hourly capability by reducing instantaneous hydro capacity by hourly operational constraints, operating reserves, and hydro maintenance. This figure illustrates an example of how the timing and magnitude of the Federal system capacity surpluses and deficits could potentially occur within one operating year using 1937-critical water conditions.

Figure 7

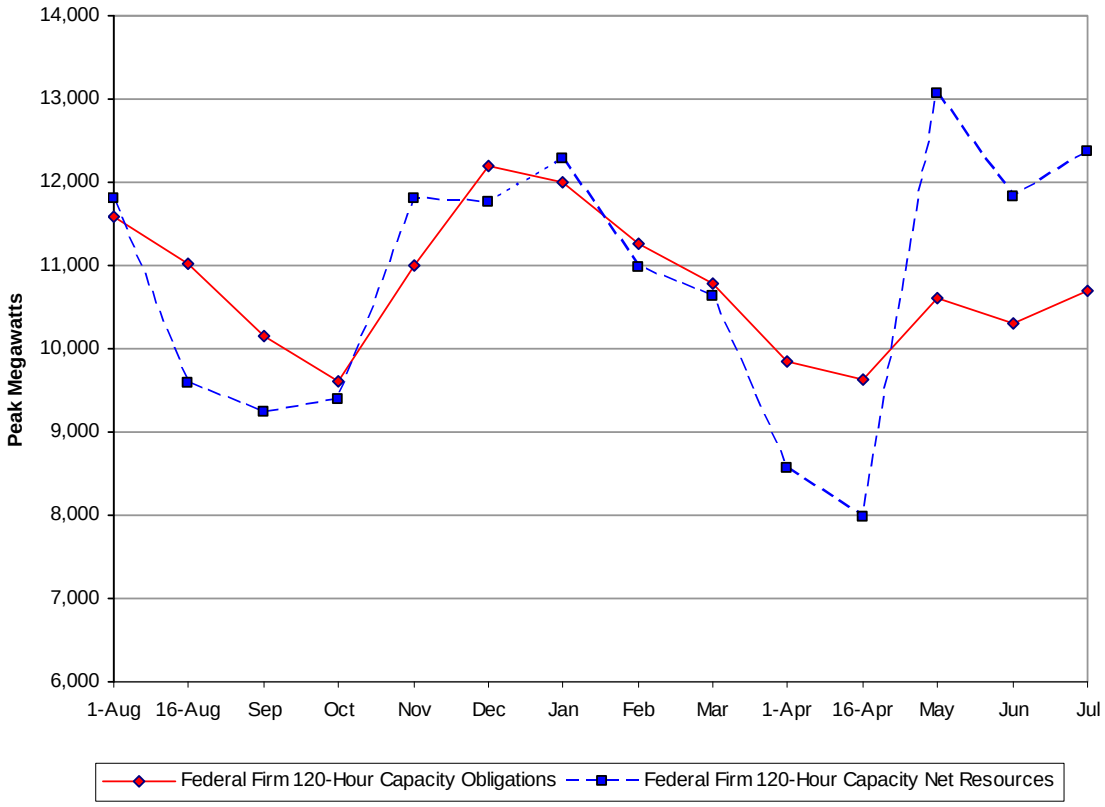
OY 2012 Monthly Federal System Firm 1-Hour Obligations and Net Resources Using 1937-Critical Water Conditions



120-Hour Federal Load Obligations and Resources: The monthly 120-hour Federal system load obligations and resources for OY 2012 are shown below in Figure 8. Similar to the 1-hour Federal system capacity analysis, these projections assume hydro resource generation under 1937-critical water conditions, incorporate normal weather peak load obligations, and do not reflect future climate change impacts. The peak load obligations assume a 50-percent probability that the actual peak loads will be either higher or lower than the forecast. In addition, the Federal hydro capacity simulates hourly capability by reducing instantaneous hydro capacity by hourly operational constraints, operating reserves, and hydro maintenance. This figure illustrates an example of how the timing and magnitude of the Federal system capacity surpluses and deficits could potentially occur within any one operating year using 1937-critical water conditions.

Figure 8

OY 2012 Monthly Federal Firm 120-Hour Obligations and Net Resources Using 1937-Critical Water Conditions



BPA would meet these deficits using the methods described in *Planning to Meet Federal System Deficits*, page 47.

Annual Federal Firm Energy Surplus/Deficit Projections

The projections for annual Federal firm energy surpluses and deficits under critical water conditions for OY 2012 through 2021 are presented in Table 7, below. The Federal system is projected to have annual energy deficits throughout the study period. These deficits range from -257 aMW in OY 2012 to -29 aMW in 2014, up to -401 aMW in OY 2017, to -250 aMW in OY 2021. BPA will most likely meet these deficits using a combination of methods described in *Planning to meet Federal System Deficits*, page 47.

Table 7

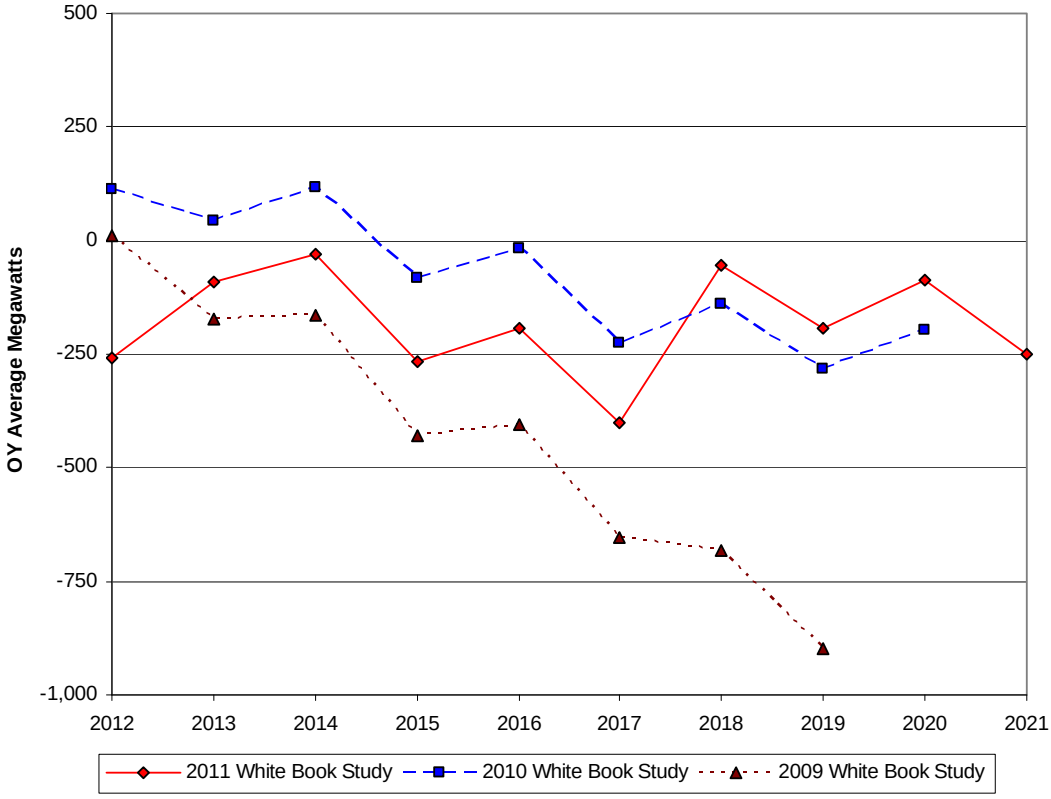
Annual Federal Firm Energy Surplus/Deficit Projections
For OY 2012 through 2021
Using 1937-Critical Water Conditions
Energy in Average Megawatts

Operating Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Federal Surplus/Deficit	-257	-92	-29	-266	-194	-401	-56	-192	-85	-250

Figure 9, below, illustrates how the 2011 White Book Federal energy surpluses and deficits compare to the previous 2010 and 2009 studies.

Figure 9

Annual Federal Firm Energy Surplus/Deficit Projections†
For OY 2012 through 2021††
Using 1937-Critical Water Conditions
Assuming Existing Loads, Resources, and Contracts



† 2010 White Book projections were published through OY 2020. 2009 White Book projections were published through OY 2019.

†† 2011 White Book shows reduced deficits beginning in OY 2018 due to the expiration of DSI contracts on September 30, 2017.

The components of the annual Federal energy loads and resources balance using 1937-critical water conditions for OY 2012 through 2021 are presented in Exhibit 1, page 84.

Potential Variability of Annual Federal Energy Surplus/Deficit Projections

To illustrate the potential variability of annual Federal system energy surpluses and deficits for OY 2012 through 2021, this study compares different scenarios using varying levels of Federal system generation based on water conditions, normal weather conditions, and do not reflect future climate change impacts. Table 8, below, compares the annual Federal system surpluses and deficits under four resource scenarios: 1) 1937-critical water conditions (the base case of this study); and the averages of 2) the bottom ten percent; 3) the middle 80 percent; and 4) the top ten percent of the historical 70-water year conditions (1929 through 1998).

Table 8

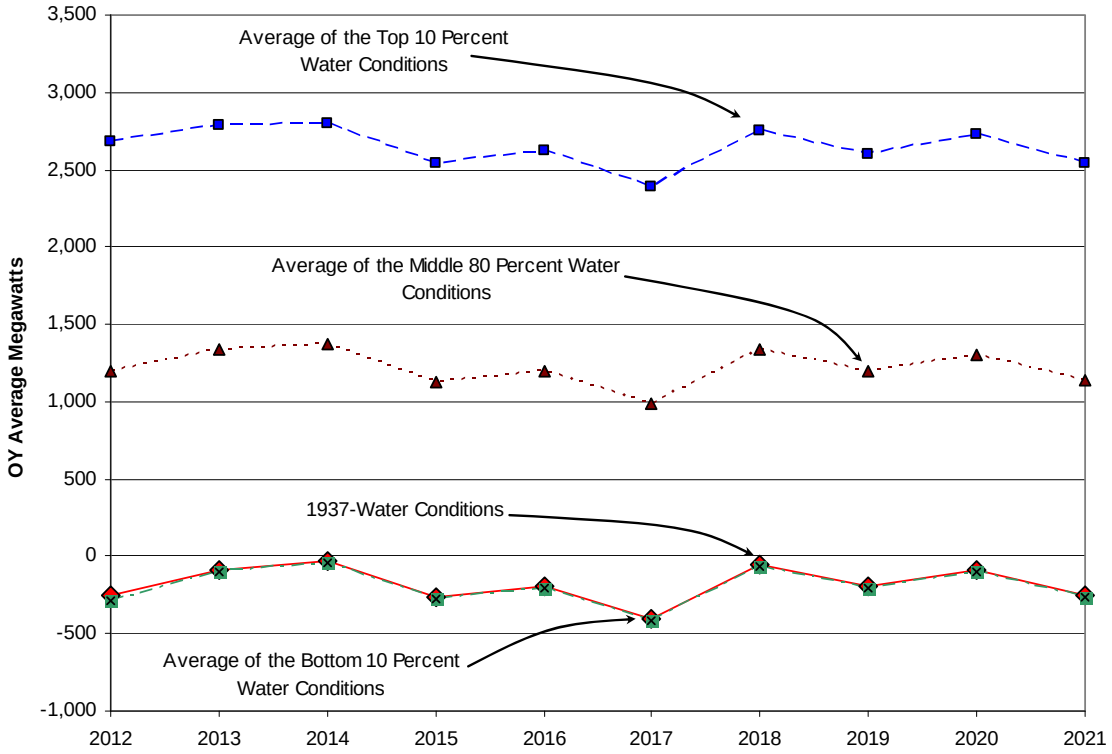
Potential Variability of Annual Federal Energy Surplus/Deficit
For OY 2012 through 2021
Utilizing Differing Water Conditions

Operating Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1937-Critical Water Conditions	-257	-92	-29	-266	-194	-401	-56	-192	-85	-250
Average Bottom 10% Water Conditions	-285	-104	-41	-281	-208	-414	-70	-205	-99	-263
Average Middle 80% Water Conditions	1,199	1,332	1,370	1,121	1,197	992	1,332	1,202	1,305	1,144
Average Top 10% Water Conditions	2,686	2,792	2,798	2,538	2,618	2,388	2,749	2,599	2,726	2,541

Figure 10, below, graphically compares the annual Federal system surpluses and deficits under those four scenarios.

Figure 10

Potential Variability of Annual Federal Energy Surplus/Deficit Projections
For OY 2012 through 2021
Utilizing Differing Water Conditions

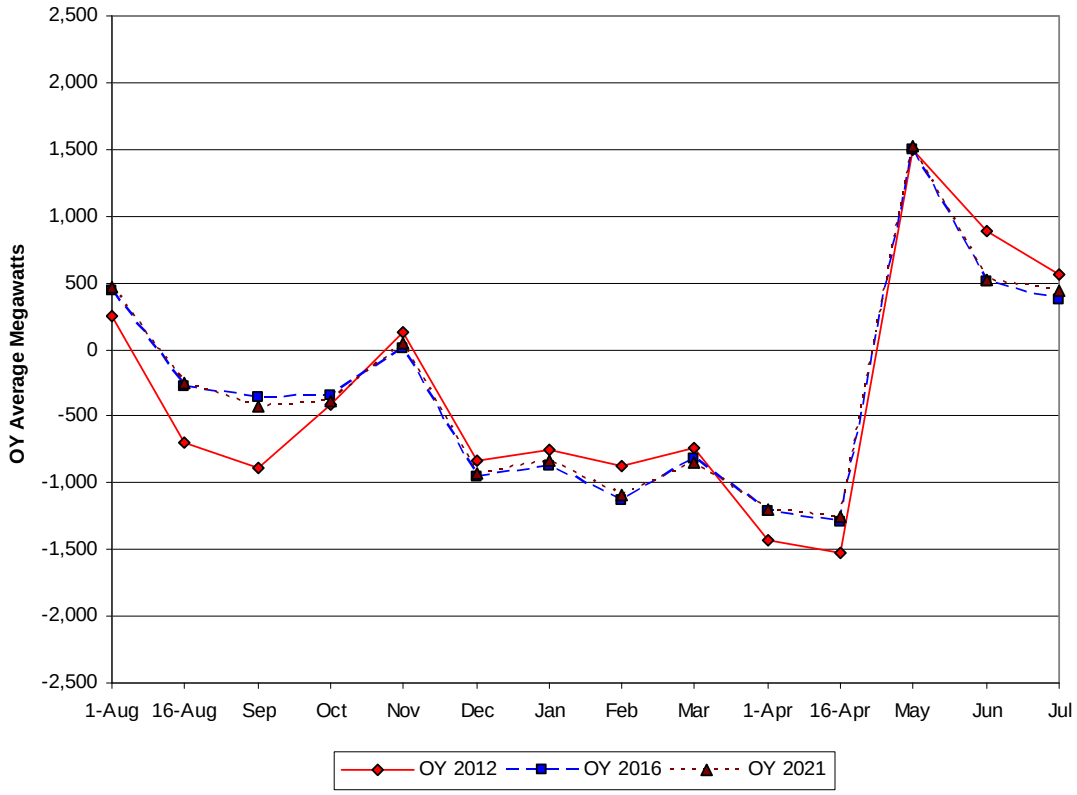


Monthly Federal Firm Energy Surplus/Deficit Projections

Figure 11, below, shows the monthly Federal firm energy surpluses and deficit projections for OY 2012, 2016, and 2021.

Figure 11

Monthly Federal Firm Energy Surplus/Deficit Projections
Using 1937-Critical Water Conditions
For OY 2012, 2016, and 2021



Monthly Federal Firm Capacity Surplus/Deficit Projections

The installed capacity at Federal projects is greater than the available fuel supply (water), particularly in low water scenarios. Traditionally, the over-installed hydro capability coupled with historic flexibility in hydro operation made capacity considerations a lower priority concern within the region for studies. Because of these factors, planning for the FCRPS has historically been focused on providing sufficient hydro energy over time rather than meeting capacity or sustained capacity needs.

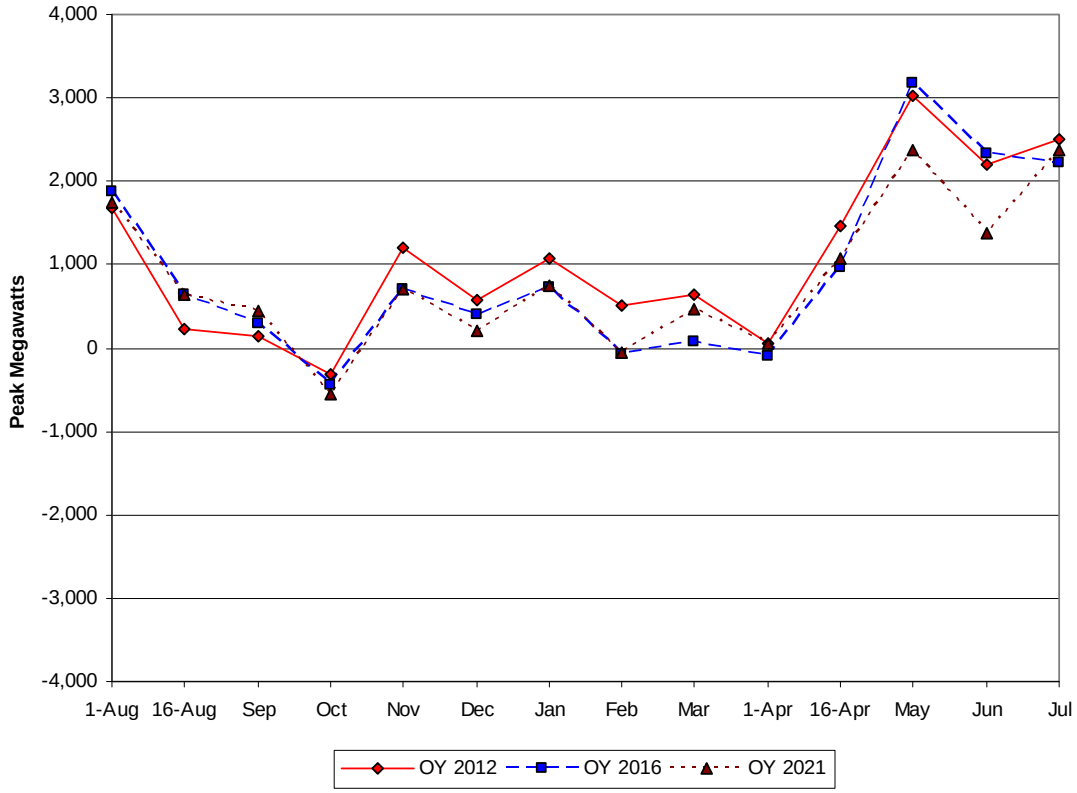
BPA's firm capacity analysis takes into account the following Federal system hydrologic constraints:

- The Federal hydro capacity simulates hourly capability by reducing instantaneous hydro capacity by hourly operational constraints, operating reserves, and hydro maintenance;
- Limitations on moving water between projects, including upstream storage;
- Pondage limitations due to hydraulic imbalance from reservoir to reservoir;
- Navigation, recreation, and geologic and bank sloughing constraints, including restrictions on the rate of rise or fall of tailwater and forebay elevations; and
- Fish and Biological Opinion requirements from:
    - 2010 PNCA planning criteria;
    - 2008 NOAA Fisheries Biological Opinion;
    - 2006 USFWS Biological Opinion;
    - 2000 USFWS Biological Opinion;
    - The Council's Fish and Wildlife Program; and
    - Other fish mitigation measures.

1-Hour Operational Peaking: The forecast for the monthly Federal system surplus/deficit projections are based on the single largest 1-hour of hydro generation and load projections for that month, while meeting the Federal load obligations for that month, are shown below in Figure 12, below, for OY 2012, 2016, and 2021.

Figure 12

Monthly 1-Hour Federal Capacity Surplus/Deficit Projections
Using 1937-Critical Water Conditions
For OY 2012, 2016, and 2021

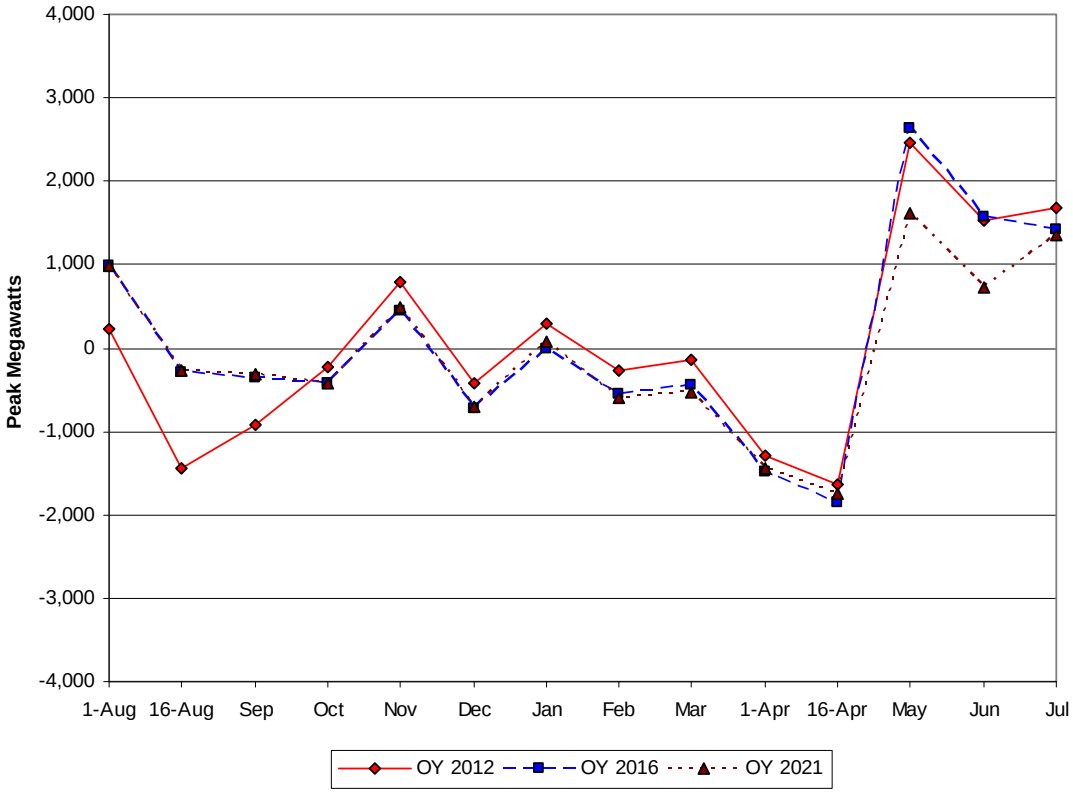


The 1-hour Federal capacity surplus/deficit projections, assuming normal weather conditions and 1937-critical water conditions for OY 2012, 2016, and 2021, are shown in Exhibits 5 through 7, starting on page 96.

120-Hour Operational Peaking: The forecast for the monthly Federal system surplus/deficit projections are based on the average of the top 120-hours of hydro generation and load projections in that month, while meeting that month's Federal load obligations. These projections are shown below in Figure 13, below, for OY 2012, 2016, and 2021.

Figure 13

Monthly 120-Hour Federal Capacity Surplus/Deficit Projections
Using 1937-Critical Water Conditions
For OY 2012, 2016, and 2021



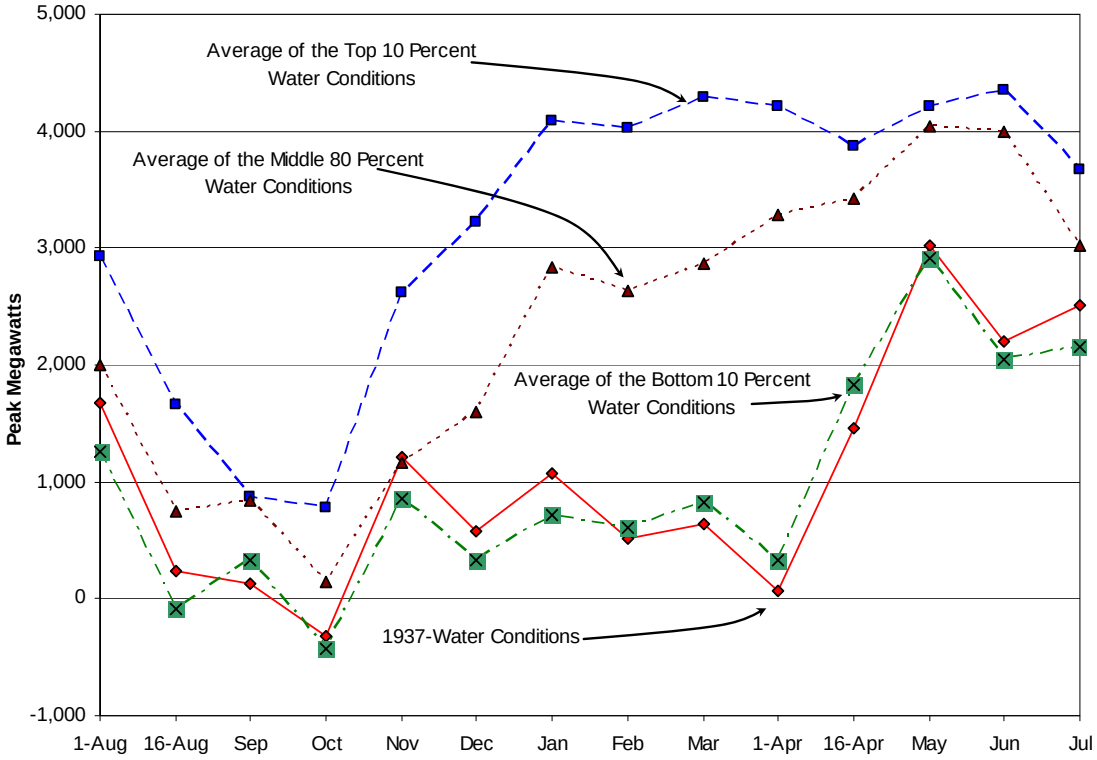
The 120-hour Federal capacity surplus/deficit projections, assuming normal weather conditions and 1937-critical water conditions for OY 2012, 2016, and 2021, are shown in Exhibits 8 through 10, starting on page 104.

Potential Variability of Surplus/Deficit Projections

1-Hour Operational Peaking: To illustrate the potential variability of 1-hour Federal system capacity surpluses and deficits, this study compares different scenarios using varying levels of Federal system generation based on water conditions, normal weather loads, and do not include future climate change impacts. Figure 14, below, compares the 1-hour Federal system capacity surpluses and deficits for OY 2012 under four resource scenarios: 1) 1937-critical water conditions (the base case of this study); the averages of 2) the bottom ten percent; 3) the middle 80 percent; and 4) the top ten percent of the historical 70-water year conditions (1929 through 1998).

Figure 14

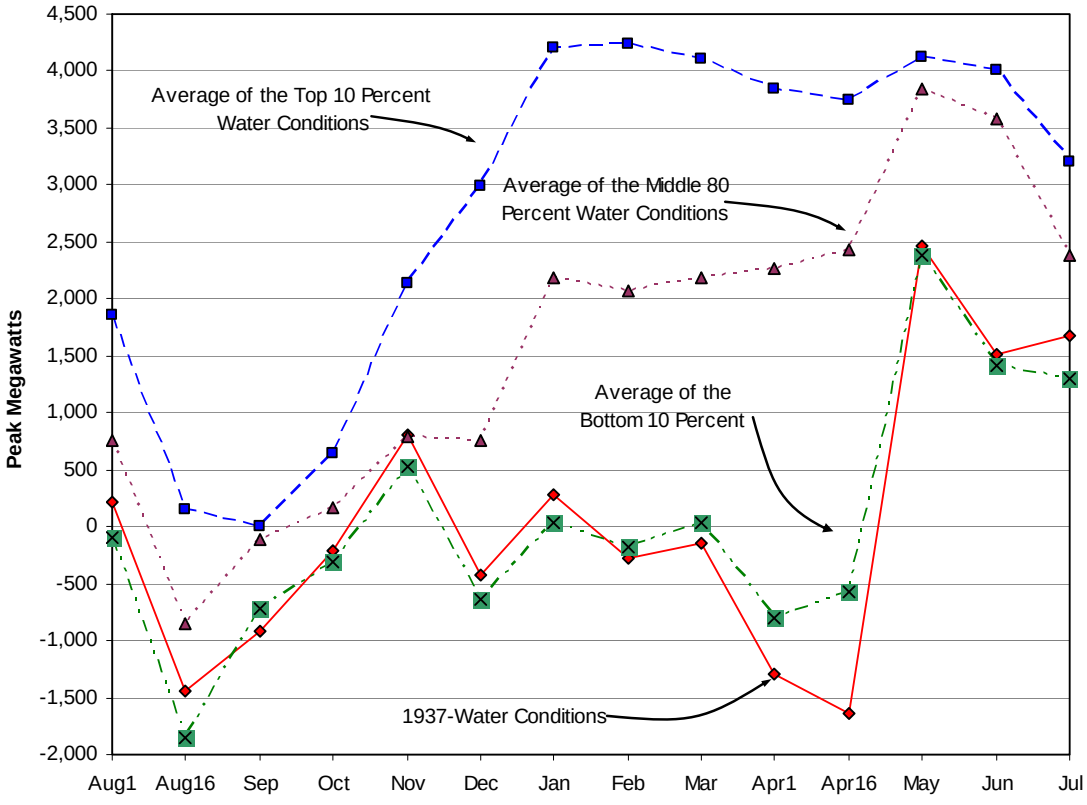
Potential Variability of 1-Hour Capacity Federal Surplus/Deficit Projections Utilizing Differing Water Conditions For OY 2012



120-Hour Operational Peaking: Figure 15, below, compares the 120-hour Federal system capacity surpluses and deficits under the same four resource scenarios: 1) resources using 1937-critical water conditions (the base case of this study); the averages of 2) the bottom ten percent; 3) the middle 80 percent; and 4) the top ten percent of the historical 70-water year conditions (1929 through 1998). Similar to the 1-hour Federal system analysis, the availability of 120-hour capacity surpluses increases as the Federal system experiences better water conditions—especially in the January through May time period.

Figure 15

Potential Variability of 120-Hour Capacity Federal Surplus/Deficit Projections
Utilizing Differing Water Conditions
For OY 2012



Planning to Meet Federal System Deficits

The Federal system energy and capacity load resource projections use the *Federal System Assumptions*, presented on page 23. This analysis assumes Federal system hydro generation using 1937-critical water conditions, Federal non-hydro resources operating at expected generation levels, and Federal contract obligations and purchases delivered at full contract levels. Federal system deficits can vary annually due to weather conditions, water conditions, and economic conditions that affect load, future load placement on BPA, and resource availability and performance. Federal system deficits could be met through a combination of the following:

- Achievement of the Public Agencies' share of the energy conservation targets in the Council's Sixth Power Plan;
- Market power purchases including acquisitions of generation from uncommitted IPP projects;
- Continued wind integration initiatives;
- Support of development of small renewable and high-efficiency resources;
- Purchase power from natural gas-fired generation, pumped storage, or other generating resource projects to provide seasonal heavy load hour energy and balancing reserves;
- Continued support of emerging technologies that may provide cost-effective alternatives to new generation such as Smart Grid and demand response technologies;
- Amount of PSC net requirement load obligation reductions achieved through customer use of non-federal resources to self-supply more of their load; and
- Purchase of off-system storage and exchange agreements that allow for monthly seasonal shaping of Federal hydropower with other PNW entities or other west coast regions.

As the Federal system is augmented by additional power purchases, or generation acquisitions from new and existing resources, those amounts will be incorporated into future White Book studies.

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Section 5: Federal System Resource Adequacy

Resource adequacy refers to the ability of the power system to meet the aggregate energy and capacity demand at any time. It is a component of reliability, with the other component being security, defined by NERC as the ability of the system to withstand sudden disturbances. In the 2010 White Book, it was noted that BPA is developing a Federal system loss-of-load-probability model to assess Federal system resource adequacy under a variety of load obligations, resources, and temperature variations. BPA is introducing its initial resource adequacy analysis to the White Book with results for fiscal year 2013. For this analysis, BPA will be using a stochastic power system model that incorporates major forces of uncertainty in the Federal power system that affect both the supply of generating resources (water, wind, and forced outages), and the load obligations (temperature). Given these uncertainties, the analysis examines a measure of how adequate the power system is in meeting federal load obligations under many possible futures of supply and demand.

Resource Adequacy Metrics and Standards

Ideally, a power system should be both economic (by providing power at the lowest possible costs) and adequate (such that there will be no interruptions in power supply to customers). However, there exists a trade-off between these objectives: higher levels of resource adequacy require larger investments in the power system and consequently will raise power rates. Utilities develop metrics and standards incorporating their views on risk as a means to determine the best trade-off between these objectives.

While there is no national standard industry metric, according to National Energy Reliability Corporation (NERC) surveys and other utility documentation, most utilities and regional transmission organizations consider loss of load events occurring at a rate less than 1 day in 10 years as an acceptable standard. However, this metric and standard was designed for utilities with thermal-dominated systems that are subject only to peak supply shortfalls, because the coal, natural gas, and oil supplies used to run these power plants are assumed to be not limited. These types of outages for thermal-dominated systems usually last from several minutes to several hours as the thermal units return to service. Typically, these analyses only consider peak hours and take into account only forced outages and temperature-driven load fluctuations.

The Federal power system, a largely hydro-based system with limited and restricted reservoir storage and a highly variable fuel supply, is both energy and capacity constrained. Water in reservoirs is the Federal system's form of energy storage, and is limited to 40% of the annual runoff volume. Use of this storage is further constrained by operating constraints such as flood control and BiOp requirements. There is not enough water on an historical basis to run the turbines at their designed capacity for extended periods. Unlike the thermal-dominated systems, shortages

can result by the lack of fuel, which is primarily water for the Federal power system. As a result, the BPA system is more complex and requires detailed chronological simulations across all hours of the year as opposed to only examining the peak hours.

For the Pacific Northwest, applying a metric and a standard that was not developed for a complex hydro power system does not capture the trade-off between an economic and an adequate power system. Additionally, the thermal-system standard is only concerned with outages that occur over peak load hours and does not attempt to capture the duration and magnitude of events. For these reasons, BPA and the Pacific Northwest Resource Adequacy Forum (RA Forum) in cooperation with the Council are moving towards multidimensional metrics and standards. The Forum can be accessed at: http://www.nwcouncil.org/energy/resource/Default.asp.

Initial BPA Resource Adequacy Metrics and Standards

BPA is presently considering applying two metrics for resource adequacy standards for 2013: 1) Loss-Of-Load Probability (LOLP); and 2) conditional value at risk (CVaR) to evaluate the likelihood, magnitude, duration, and seasonality of Energy-Not-Served (ENS) events.

The first metric, LOLP, which is based on a stochastic simulation, is defined as the number of games with significant ENS divided by the total number of games (with and without significant ENS), expressed as a percent. Significant ENS is defined as more than 50 average annual megawatts of ENS. Possible standards for this metric are:

- Use the 5 percent standard of the RA Forum. However, the 5 percent is designed as a standard for a regional "smoke alarm" when regional resource development is not keeping pace with regional load growth. It is not designed for any particular individual utility. BPA does not have the diversity of resources that are available to the region (coal and natural gas) so this standard may not be conservative enough for BPA;
- Use 2.5 percent as the standard for this metric. A 2.5 percent standard would be consistent with the BPA standard for financial risk tolerance of 97.5 percent. The BPA standard for financial risk tolerance is not directly correlated to BPA's options for meeting load on the Federal system. BPA's current financial risk standard used to set the U.S. Treasury repayment is a probability of 95 percent in a two-year rate case, and is equivalent to a 97.5 percent chance of not missing a Treasury payment for a single year. The ability to repay the Treasury for its investment in the Federal power system is a mandate in setting rates to recover costs. However, the agency standard for risk is a financial measure of risk and may not translate directly into a reliability measure of risk; or
- Use zero percent as the standard for this metric. This standard may be too conservative, because it would not likely meet the trade-off between an adequate resource supply and an economic one. Furthermore, not all bad futures are modeled (such as catastrophic events), and this may give a false impression that a zero percent standard could be achievable.

The second metric, CVaR, is designed to evaluate the tail games, which are the games with the greatest amounts of annual ENS. A traditional CVaR analysis might evaluate the expected annual ENS over some percentage of worst games. BPA is presently planning to examine the 2.5 percent of games that have the greatest amounts of annual ENS to determine the monthly magnitudes and seasonality of the ENS. For example, with a 1000-game simulation, the 25 games with the greatest amounts of annual ENS are examined by month to determine the monthly expected ENS within the 2.5 percent tail.

Stochastic Model and Assumptions

The stochastic analysis was produced through the Genesys model which was developed by the Council. The Council created Genesys to develop a consensus-based resource adequacy framework and make annual assessments for the Pacific Northwest. In a joint effort, BPA and the Council have been making changes to the model to improve its stochastic capability. A Federal system version of the Genesys model was developed through a series of modifications. There are two major components in Genesys: 1) a monthly hydro-regulator; and 2) a dispatch module that dispatches resources monthly and hourly to meet the demand.

The Federal Genesys model incorporates the largest uncertainties inherent in the Federal power system:

- Water Supply: The January to July Columbia River runoff measured at The Dalles from 1928 to 1998 has varied from 53.81 million acre-feet in 1977 to 158.64 million acre-feet in 1997 and can impact the amount of hydroelectric power production that the Federal system can produce. For example, the difference in generation between 1937-critical water conditions and the highest 10 percent of water conditions is approximately 2,800 average megawatts;
- Load Obligations: Nearly half of the load that BPA serves under the 2012 RD PSCs fluctuates because of temperature variation in the Pacific Northwest. BPA is responsible for meeting this load and the variability surrounding it;
- Wind: 248 megawatts of installed wind capacity serves system load and has a variable output depending primarily on pressure differences between weather systems. While there are 3,500 MW of installed wind capacity in the control; area, only a small portion of it serves Federal loads. The rest of the wind generation is exported out of the balancing area. This wind generation is not modeled, but the generation imbalance reserves required to integrate the full amount of wind in the balancing area are included; and
- Forced Outages: The Columbia Generation Station (CGS) is a 1,130 MW nuclear power plant subject to forced outages.

The Genesys model incorporates the preceding variables in possible futures. Each future is one fiscal year (FY) and draws a wind and load obligation condition independently. For the hydro system, studies are conducted for the 1929 to 1998 sequential set of continuous water conditions. CGS is gamed hourly for forced outages during each future.

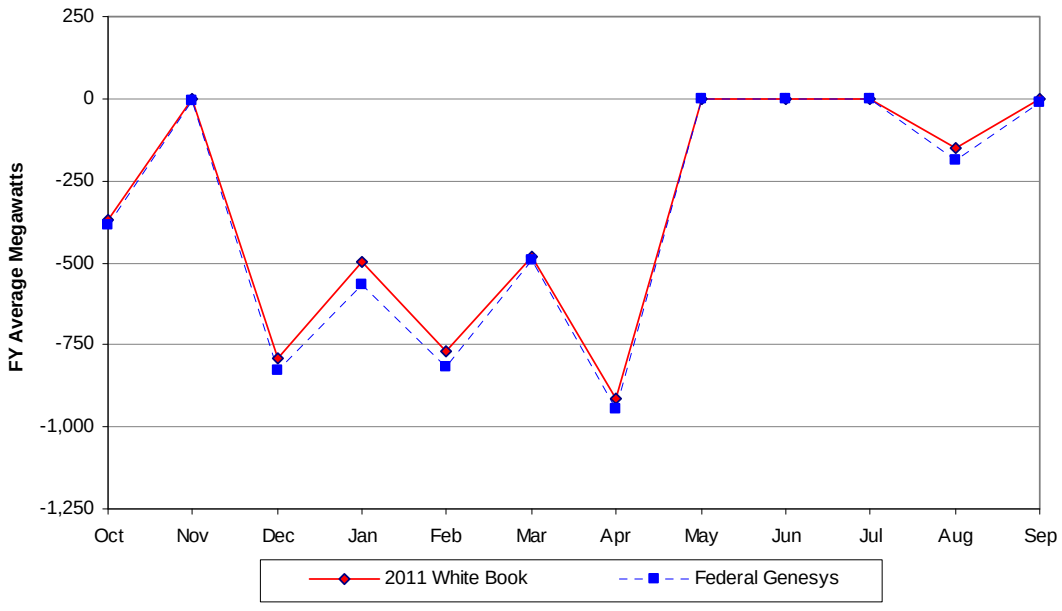
The model also incorporates loads and resources that are not subject to variability and are reflected in White Book studies. These include: service to DSIs; USBR; pumping loads, Block sales to Slice customers; Imports; Exports; and Intra-Regional Transfers. The Slice Product is calculated directly in the model as a function of generation and load obligations. The analysis also includes potential market purchases if necessary of 1,000 MW during the winter and 500 MW in the summer per the 2010 Needs Assessment.

FY 2013 Control and Benchmarking Studies for the Federal Genesys Model

Federal Energy Surplus/Deficit Comparison using Critical Water: The results of a control study comparing the 2011 White Book monthly Federal firm energy surplus/deficit projections using 1937-critical water conditions for FY 2013 to the Federal Genesys average monthly deficit are summarized in Figure 16, below.

Figure 16

Monthly Federal Firm Energy Deficit Projections
For FY 2013 Using 1937-Critical Water Conditions
Adjusted 2011 White Book Deficit vs. Federal Genesys Average Monthly Deficit



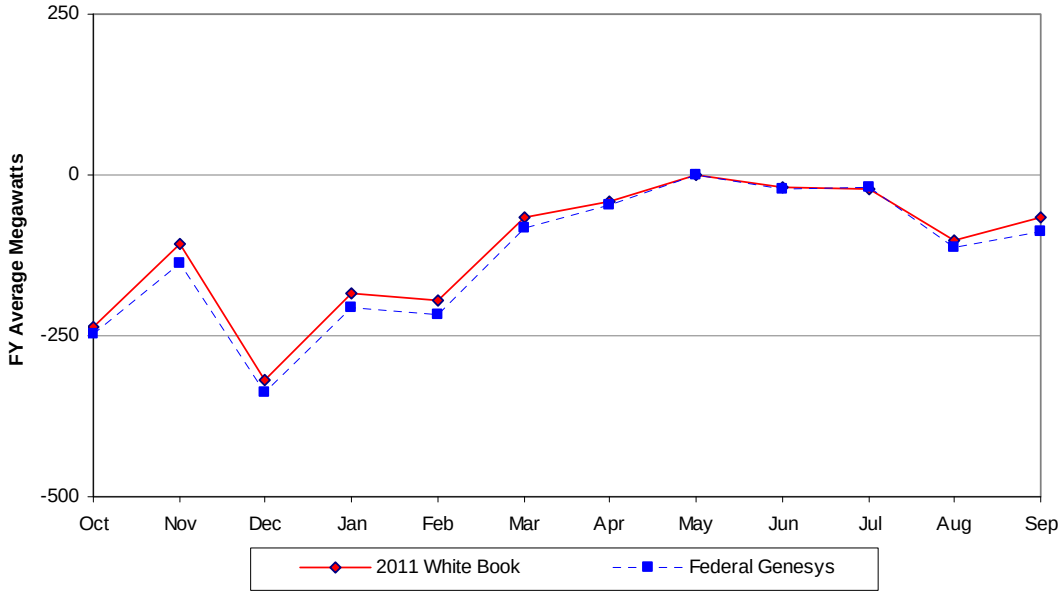
Variations to the assumptions of the model for the purposes of the control study include placing CGS on expected rather than forced outages, using a single load year representing average load rather than drawing randomly, including loads and resources from White Book studies that are usually excluded from Federal Genesys studies, such as wind storage and shaping agreements, and excluding any loads and resources that are not included in White Book studies, such as market resources. Minor differences between the White Book and the model, such as the basis for the calculation of transmission losses, were neglected. Some adjustments to White Book results were required for comparison purposes. The model records deficits, while the White Book projects both surpluses and deficits. To compare deficits only, the White Book monthly projections were adjusted to neglect the contribution from surpluses. Furthermore, the 14-period format was adjusted to a 12-month format.

Federal System Energy Surplus/Deficit Comparison Utilizing 70 Water Conditions: The results of a benchmarking study comparing the averages of the 2011 White Book monthly Federal firm energy surplus/deficit projections for FY 2013 utilizing 70 water conditions to the Federal Genesys average monthly deficit over 70 water conditions are summarized in Figures 17, below and Figure 18, page 54.

Figure 17, compares the average monthly deficits by month for the 70 water year benchmarking study, between the White Book and the Federal Genesys model. Adjustments for the benchmarking study are similar to those in the control study.

Figure 17

Monthly Federal Firm Energy Deficit Projections†
For FY 2013 Using 70 Water Conditions
Adjusted 2011 White Book Deficit vs. Federal Genesys Average Monthly Deficit

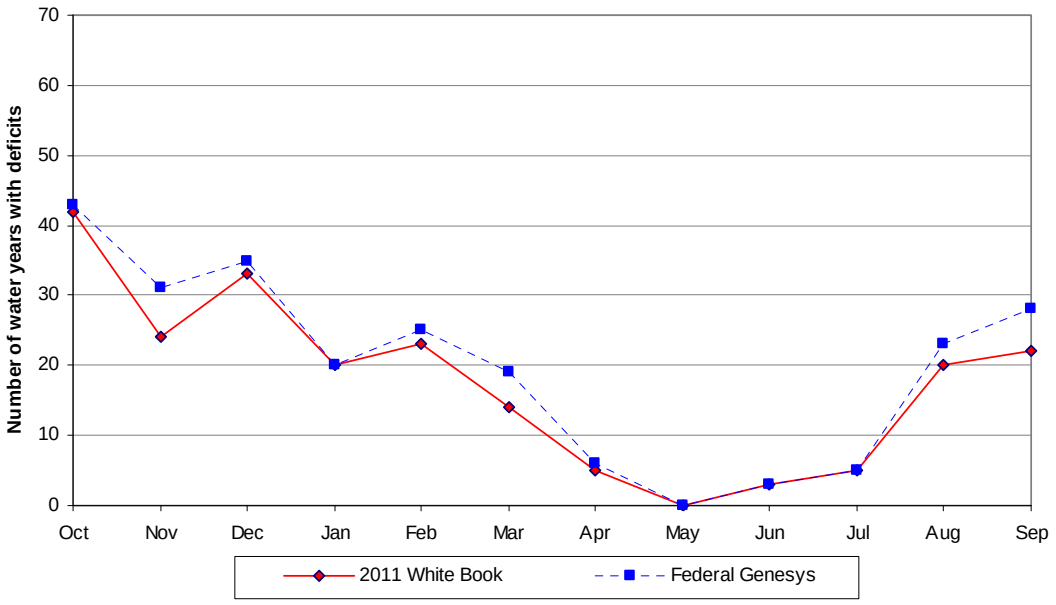


† This comparison neglected deficits less than 50 average megawatts.

Figure 18, below, compares the number of water conditions with deficits by month for the 70 water year benchmarking study, between the White Book and the Federal Genesys model. Adjustments for the benchmarking study are similar to those in the control study.

Figure 18

Number of Water Conditions with Deficits Greater than 50 Average Megawatts By Month for FY 2013 Using 70 Water Conditions†



† This comparison neglected deficits less than 50 average megawatts.

Fiscal Year 2013 Studies

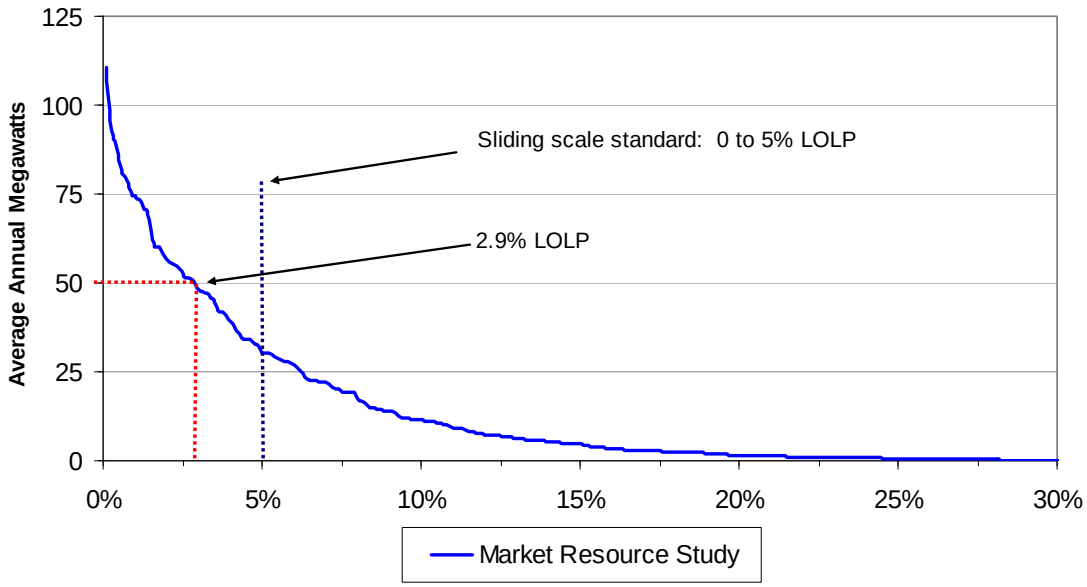
Two studies were developed for this analysis: 1) a study with available market resources; and 2) a study without available market resources. The market resource study assumed 1,000 megawatts of market resource available for purchase on each hour from October through April, and 500 megawatts of market resource available for purchase on each hour from May through September. The market purchase assumption is similar to the 2010 Needs Assessment. The study without available market resources assumed no market availability. For both studies, 1,000 futures were analyzed for fiscal year 2013.

Fiscal Year 2013 Study Results - Market Resource Study

LOLP Metric: Figure 19, below, shows the annual ENS by game in descending order versus the percent of total games. For the LOLP metric, 29 games out of the total 1,000 drawn had significant ENS of more than 50 average annual megawatts, therefore LOLP is 2.9 percent. The results fall between the 2.5 percent and 5 percent standards that BPA is presently considering.

Figure 19

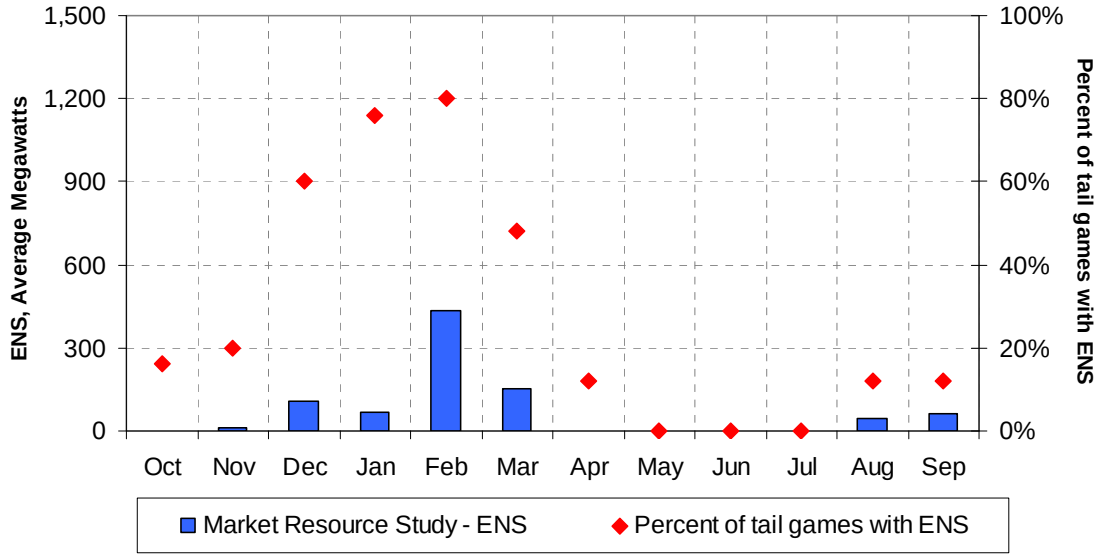
Market Resource Study – ENS and LOLP for 2013 Compared to LOLP Metric



CVaR Metric: The CVaR analysis examines the 25 tail games that have the highest annual amounts of ENS. Figure 20, below, shows the average monthly amounts of ENS plotted against the left axis, and the percent of tail games in which each month had ENS plotted against the right axis. February, for example, has 435 average megawatts of ENS, occurring across 80% of the tail games. For this study, the set of 25 worst futures are centered in the month of February.

Figure 20

Market Resource Study – ENS and Percent of Tail Games with ENS by Month



For a 1000-game simulation, each water year in a sequential set of 70 water years is drawn at least 14 times. Table 8, below, displays the water years represented in the 25 tail games which have the greatest ENS. The number of times that each water year was represented in a tail game ranges from one time to eight times. The majority of the water years in the 25 tail games are dry in terms of the January to July volume runoff. Furthermore, Table 8 shows that most of the water years immediately prior to those represented in the 25 tail games that are also dry in terms of January to July volume runoff. For this study, droughts that exceed two years are a primary cause of the worst futures. Drought planning is of critical importance in order to manage bad future years.

Table 8

Water Year Representation in the 25 Tail Games

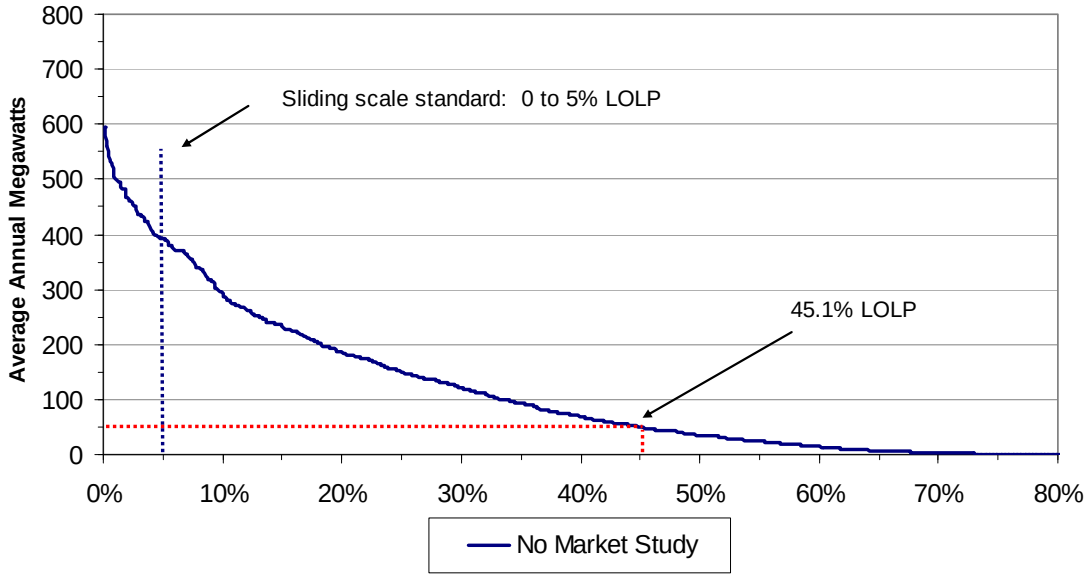
Water Year	Occurrences in a tail game	Percent of tail games	Jan-July Volume Runoff at The Dalles (Maf)	Percent Exceedance	Prior Water Year	Prior Water Year Jan-July Volume Runoff at The Dalles (Maf)	Prior Water Year Percent Exceedance
1931	5	20%	65.15	96.34%	1930	71.24	90.24%
1932	6	24%	107.53	41.46%	1931	65.15	96.34%
1945	3	12%	83.78	78.05%	1944	60.8	97.56%
1977	1	4%	53.81	100.00%	1976	122.13	19.51%
1992	2	8%	73.02	89.02%	1991	112.23	32.93%
1993	8	32%	90.01	73.17%	1992	73.02	89.02%

Fiscal Year Results 2013 – No Market Study

LOLP metric: This study assumed no market purchases were available (a highly unlikely scenario), and illuminates the importance of having access to a power market of significant depth. Figure 21, below, illustrates results for this study. Without a market, 45.1 percent of the games had ENS greater than 50 average annual megawatts. This significantly exceeds any of the three proposed LOLP standards and the market resource study LOLP of 2.9 percent.

Figure 21

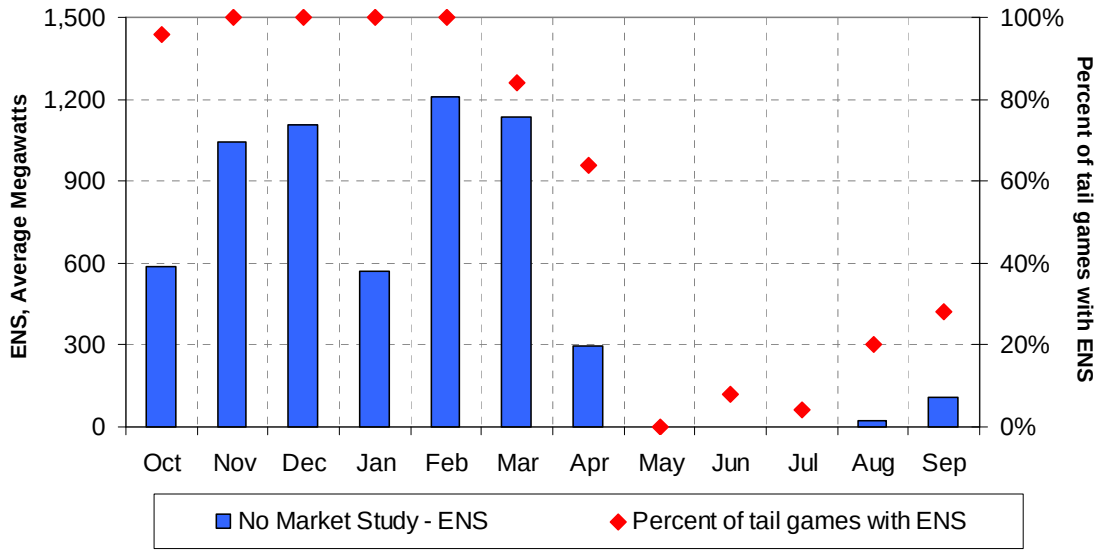
No Market Study – ENS and LOLP for 2013 Compared to LOLP Metric



CVaR metric: For the CVaR analysis metric, the months of November through February had ENS events in all 25 games. The magnitude of ENS peaks in February with ENS reaching 1,211 average megawatts. Figure 22, below, illustrates the average monthly ENS and percent of tail games with ENS by month.

Figure 22

No Market Study – ENS and Percent of Tail Games with ENS by Month



Resource Adequacy Summary

This initial attempt to identify, develop and apply resource adequacy metrics and standards for the Federal System remains an educational effort for BPA. The results of these initial studies suggest that multiyear droughts have a considerable impact on the ability of BPA to meet its proposed resource adequacy standards. In addition, having access to a power market of a significant depth is also a major driver for meeting resource adequacy standards. BPA will further refine the model through fiscal year 2012 to give it the ability to use random water years as well as sequential water years such as in these studies. BPA will continue to develop metrics and standards and has not made any decision on final metrics. BPA will continue to refine the metrics and standards and intends to update this analysis annually in the White Book, and may incorporate it into future Needs Assessments. As the Needs Assessment is integrated in the BPA Resource Program and resource planning processes, it will identify the timing and the amount of resources BPA may need to acquire or plan for to reliably meet its obligation.

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Section 6: Pacific Northwest Regional Analysis

Regional Analysis Assumptions

This regional loads and resources analysis is based on regional loads, resources, and contracts that were finalized as of May 27, 2011. Study assumptions for the regional analysis are as follows:

- Total retail load forecasts reflect normal weather conditions and do not reflect future climate change impacts;
- Regulated hydro generation estimates incorporate PNCA plant characteristics, streamflows, and BPA's best estimate of non-power requirements. The regulated hydro generation projections reflect operating reserve levels associated with 30-minute wind persistence scheduling accuracy forecasts;
- Generating forecasts for independent hydro and other generating resource projects are provided to BPA by the project owners;
- All existing regional import and export contracts expire by the terms of their agreements and are not renewed;
- Uncommitted PNW IPP generation is included in the regional resource stack and is assumed available to meet regional load unless otherwise specified;
- No capacity contribution from wind generation is assumed;
- Firm hydro energy and capacity estimates are based on 1937-critical water conditions, unless otherwise specified; and
- Transmission losses are treated as a resource reduction.

Annual Regional Firm Energy Load Projections

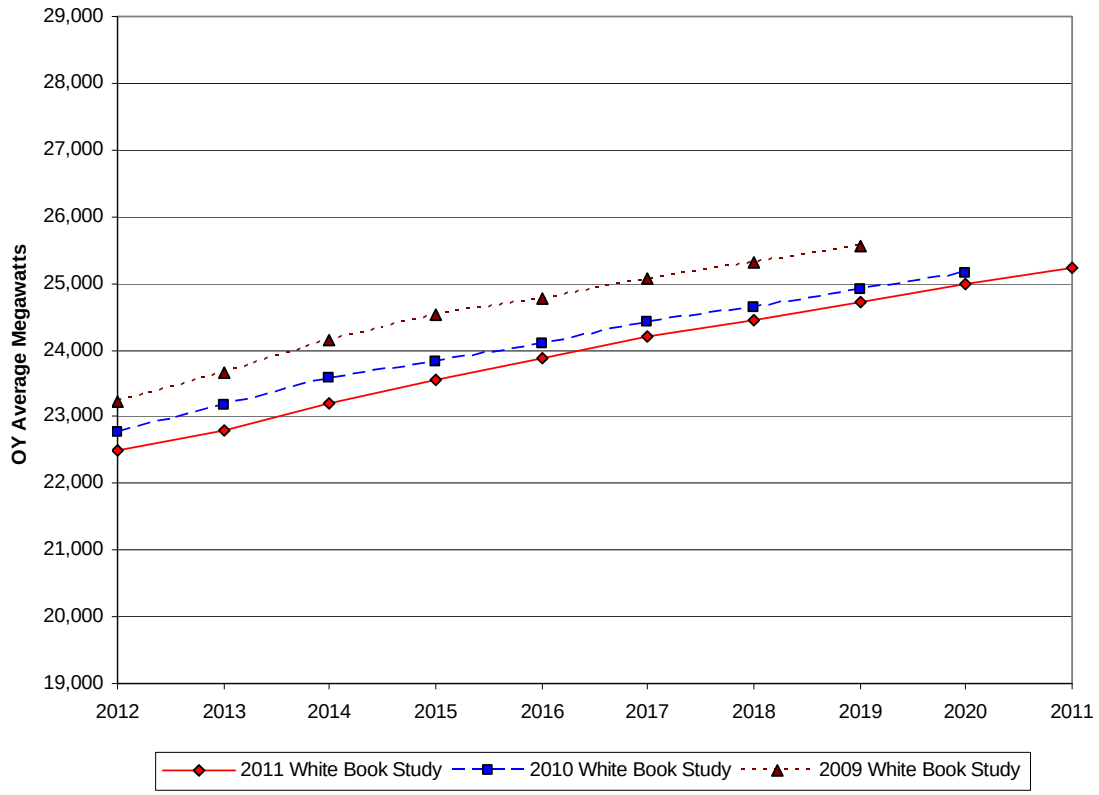
BPA's 2011 White Book annual regional firm energy load projections are comprised of two components:

- Total retail load consumption which is based on the individual entity's total retail load forecast as discussed in Section 2, *Total Retail Load Forecast*, page 4; and
- Reported long-term and multi-year export contracts made by PNW entities, including BPA.

Figure 23, below, graphically illustrates how the 2011 White Book regional firm energy load projections compare to the previous 2010 and 2009 studies. The differences reflect updates in the regional total retail load forecasts and export contracts for the Public Agencies, USBR, IOUs, and DSIs.

Figure 23

Annual Regional Firm Energy Load Projections†
Including Exports
For OY 2012 through 2021



† 2010 White Book projections were published through OY 2020. 2009 White Book projections were published through OY 2019.

For this study, the PNW region is defined by the Northwest Power Act, section 3(14) of P.L. 96-501, and is consistent with that definition as used by the Council and PNUCC. For forecasting and reporting purposes, other entities may have different definitions of the PNW region making direct comparisons impossible. For example, load forecasts or data provided by the Northwest Power Pool (Power Pool), tend to be much higher than those presented here due to their use of a larger PNW regional area which also includes British Columbia and Alberta, Canada, and Sierra Pacific Power located in the state of Nevada.

Table 9, below, compares the relative size of regional firm loads by customer class for OY 2012.

Table 9

Annual Regional Firm Energy Load by Customer Class For OY 2012

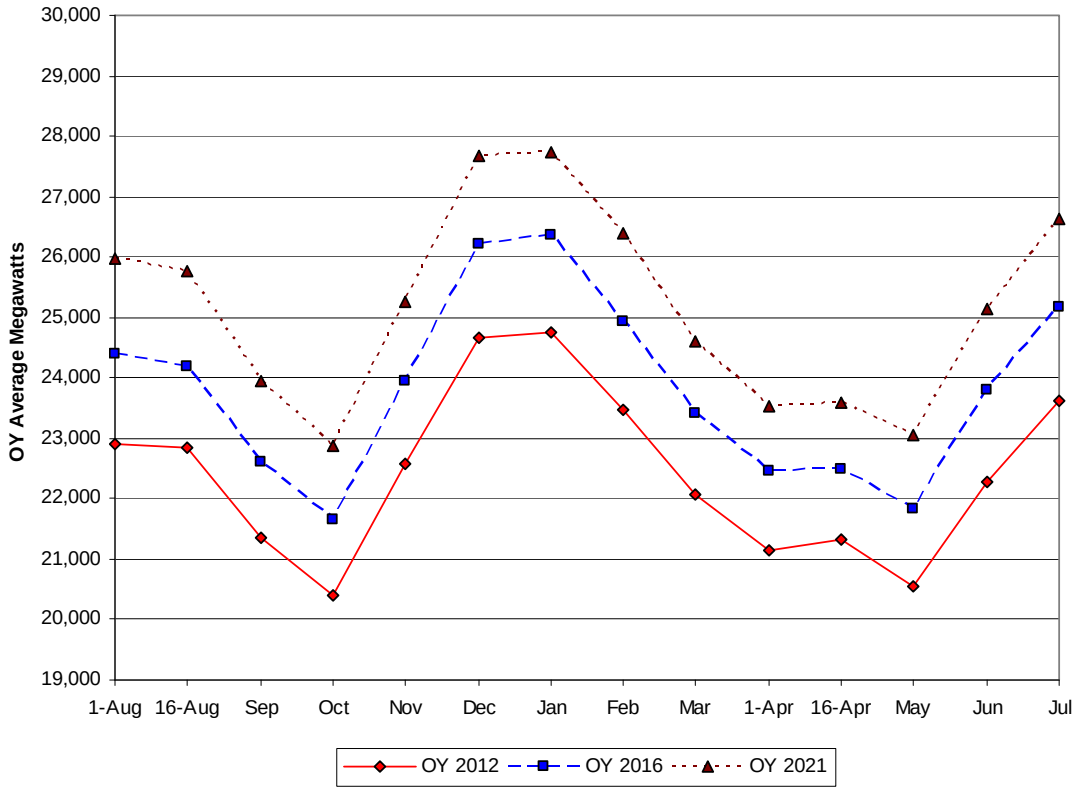
Customer Class	Firm Energy (OY in aMW)	Firm Energy (Percent of Total)
Investor-Owned Entities	10,839	48.2%
Public Entities	8,892	39.5%
Exports	1,636	7.3%
Direct Service Industries	440	2.0%
Federal and Other Entities	682	3.0%
Total Regional Firm Load	**22,489**	**100.0%**

The annual regional firm energy loads are presented in Exhibit 21, page 137, and monthly firm energy loads for OY 2012, 2016, and 2021 are presented in Exhibits 22 through 24, starting on page 140.

Figure 24, below, graphically illustrates the monthly Regional firm energy load projections for OY 2012, 2016, and 2021.

Figure 24

Monthly Regional Firm Energy Load Obligations
For OY 2012, 2016, and 2021



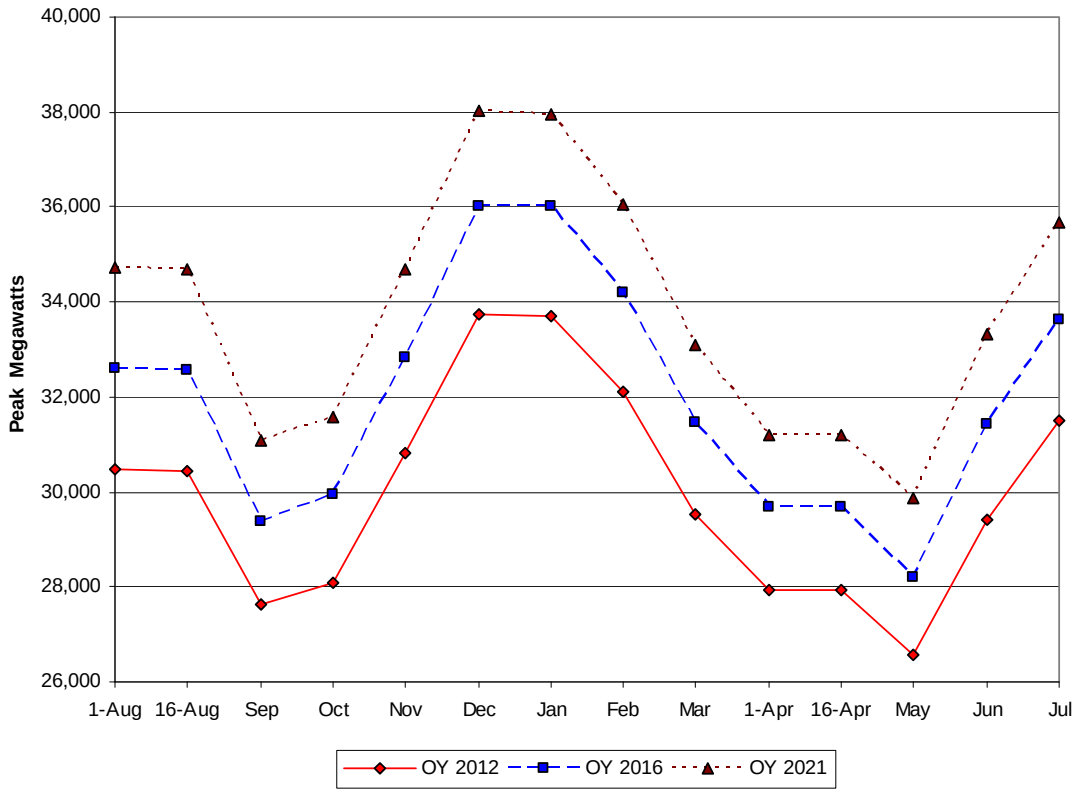
Monthly Regional Firm 1-Hour Peak Load Projections

BPA's 2011 White Book total retail load peaks are based on the individual entity forecasts of expected 1-hour monthly peak demand. The peak load obligations assume a 50 percent probability that the actual peak loads will be either higher or lower than the forecast and incorporates the same assumptions as those described in Section 4, *1-Hour Federal Peak Load Obligations*, page 27. In addition, the projected regional peak loads include export contracts made by PNW utilities, including those in the Federal system.

Figure 25, below, illustrates the monthly regional 1-hour firm peak loads for OY 2012, 2016, and 2021.

Figure 25

Monthly Regional Firm 1-Hour Peak Load Projections
For OY 2012, 2016, and 2021



The monthly regional firm 1-hour peak loads are presented in Exhibits 25 through 27, starting on page 144.

Regional Firm Resources

Hydro resources represent a smaller share of the total regional resource stack than that of the Federal system, because regional entities own the majority of non-hydro resources in the region such as thermal resources, which are primarily comprised of coal, gas, and oil-fired projects. New generating projects are included when they have been placed into operation or are in the actual construction process. The projects are detailed in Section 3, *Changes in the 2011 Pacific Northwest Loads and Resources Study*, starting on page 19.

Table 10, below, summarizes the PNW regional resource capacity and energy by generation type for OY 2012.

Table 10

Total Regional Firm Resources for OY 2012[†]
Based on 1937-Critical Water Conditions

Project Type	1-Hour Operational Peaking Capacity (January Peak MW)	Percent of Operational Peaking Capacity	Firm Energy (OY in aMW)	Percent of Firm Energy
Hydro	25,232	57.9%	11,973	44.9%
Coal	5,866	13.5%	4,529	17.0%
Combustion Turbines	5,697	13.1%	3,469	13.0%
Cogeneration	2,962	6.8%	2,623	9.8%
Imports	1,982	4.5%	910	3.4%
Nuclear	1,130	2.6%	878	3.3%
Non-Utility Generation	600	1.4%	603	2.3%
Miscellaneous	110	0.3%	1,656	6.2%
Total Firm Resources	**43,579**	**100.0%**	**26,640**	**100.0%**

[†] Regional firm resource estimates before adjustments for reserves, maintenance and transmission losses.

Potential Variability of Regional Resources

Variability Due to Water Conditions: To illustrate the potential variability of regional resources, this study compares different scenarios using varying levels of regional hydro generation based on water conditions for OY 2012 through 2021. Table 11, below, compares four scenarios of expected annual regional resources: 1) 1937-critical water conditions as the base case; and the averages of 2) the bottom ten percent; 3) the middle 80 percent; and 4) the top ten percent of the historical 70-water year conditions (1929 through 1998). For OY 2012, regional resource estimates can potentially vary up to about 6,687 aMW, ranging from an estimated 26,434 to 33,121 aMW, due to potential hydro variability.

Table 11

Potential Variability of Total Regional Net Resource Projections†
For OY 2012 through 2021
Utilizing Different Levels of Water Conditions
Energy in Average Megawatts

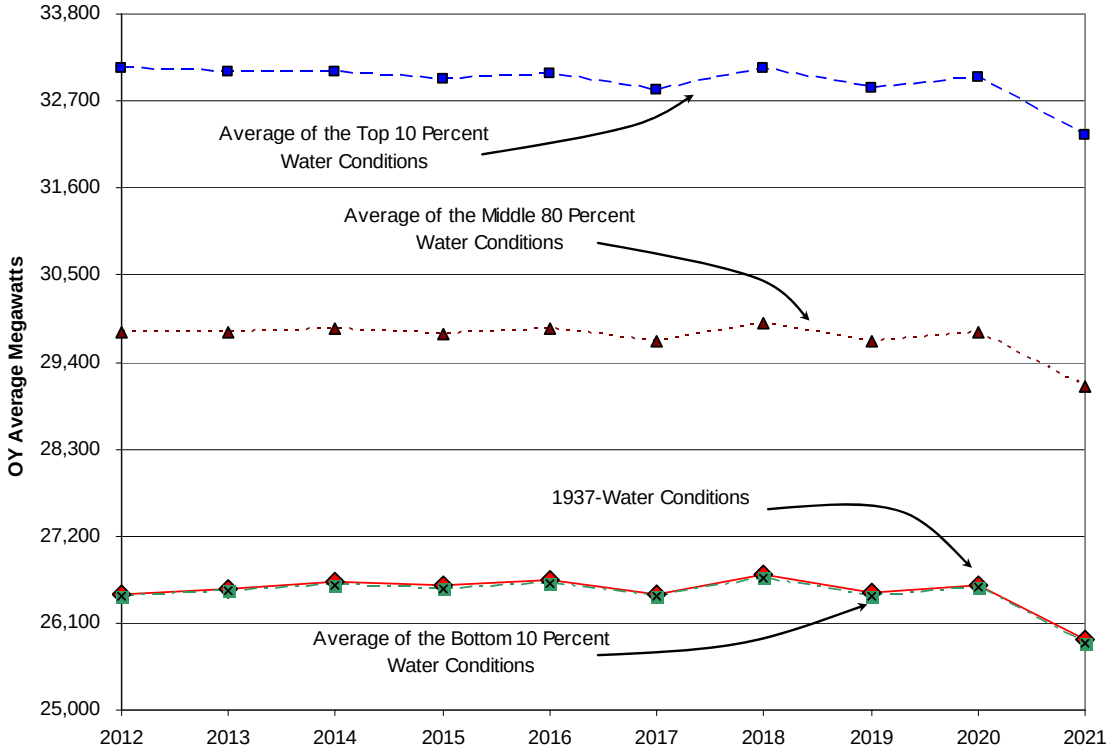
Operating Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1937-Critical Water Conditions	26,460	26,542	26,623	26,571	26,637	26,468	26,703	26,475	26,589	25,890
Average of Bottom 10% Water Conditions	26,434	26,509	26,588	26,537	26,603	26,435	26,669	26,442	26,555	25,857
Average of Middle 80% Water Conditions	29,785	29,778	29,819	29,755	29,825	29,660	29,885	29,667	29,774	29,082
Average of Top 10% Water Conditions	33,121	33,064	33,061	32,979	33,054	32,850	33,105	32,857	33,003	32,272

† Regional firm resource estimates before adjustments for reserves, maintenance and transmission losses.

Figure 26, below, graphically compares the potential annual regional net resources under those four scenarios.

Figure 26

Potential Variability of Total Regional Net Resource Projections†
For OY 2012 through 2021
Utilizing Different Levels of Water Conditions



† Total regional net resource estimates include adjustments for reserves, maintenance, and transmission losses.

Annual Regional Firm Energy Surplus/Deficit Projections

The annual regional firm energy surplus and deficit projections for OY 2012 through 2021, assuming 1937-critical water conditions, are presented below in Table 12. The PNW regional resource stack assumes that all regional IPP generation is available within the region. The region is expected to be in firm energy surplus throughout this study, with surpluses ranging from 3,972 aMW in OY 2012 to 663 aMW in OY 2021.

Table 12

Regional Firm Energy Surplus/Deficit Projections
For OY 2012 through 2021
Using 1937-Critical Water Conditions
Energy in Average Megawatts

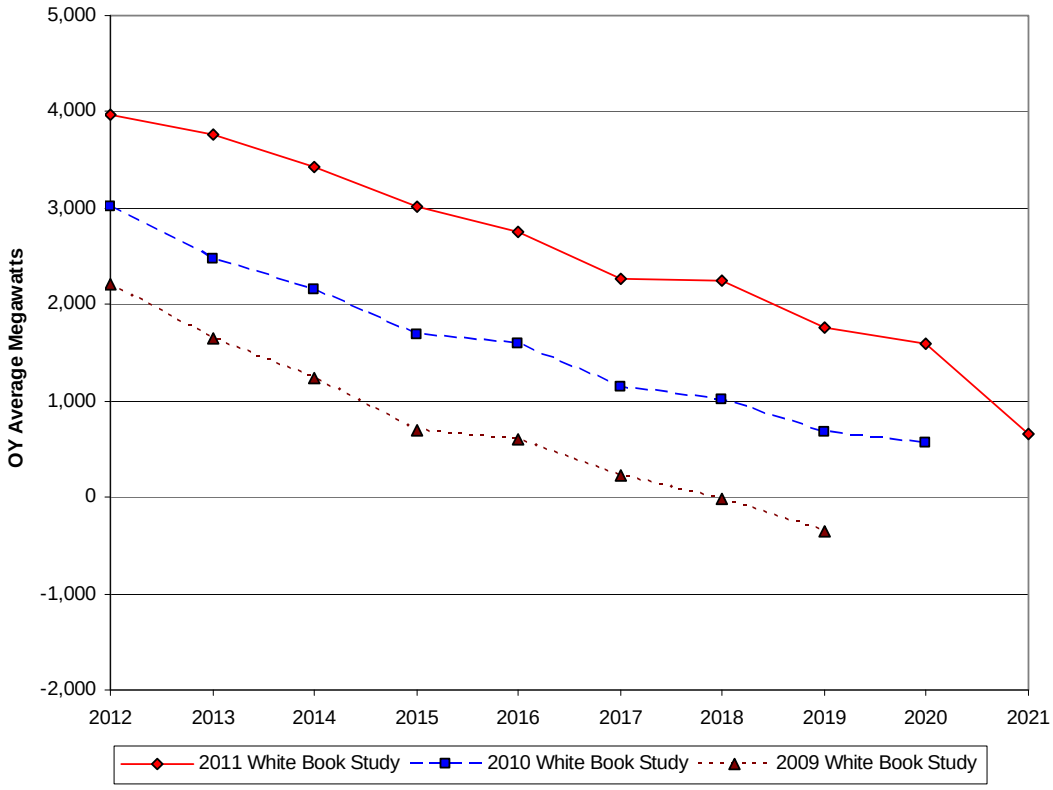
Operating Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021[†]
Regional Surplus/Deficit	3,972	3,761	3,419	3,008	2,748	2,274	2,257	1,758	1,594	663

[†] Surpluses in OY 2021 decline due to the scheduled retirement of Centralia #1 on December 1, 2020 and Boardman on January 1, 2021.

Figure 27, below, graphically illustrates how the 2011 White Book regional energy surplus/deficits compares to the previous 2010 and 2009 studies. The 2011 study shows larger regional energy surpluses—especially when compared to the 2010 and 2009 studies—mainly due to lower total retail load forecasts based on the current economical downturn.

Figure 27

Annual Regional Firm Energy Surplus/Deficit Projections†
Using 1937-Critical Water Conditions
For OY 2012 through 2021



† 2010 White Book projections were published through OY 2020. 2009 White Book projections were published through OY 2019.

Components that make up the regional energy surplus/deficits for OY 2012 through 2021 are presented in Exhibit 21, page 137. Monthly firm energy loads and resources balances for OY 2012, 2016, and 2021 are presented in Exhibits 22 through 24, starting on page 140. In addition to the monthly variability of the regional energy surplus/deficit, the region's surplus/deficit can vary greatly depending on water conditions in the PNW. Exhibits 31 through 40, starting on page 152, contain the regional firm energy surplus/deficit projections under the historical 70-water years of record (OY 1929 through 1998).

Potential Variability of Annual Regional Energy Surplus/Deficit Projections

Variability Due to Water Conditions: To show the potential variability of regional surpluses and deficits, this study compares the surplus/deficits for OY 2012 through 2021 using four different levels of regional generation based on different levels of water conditions. These scenarios include: 1) 1937-critical water conditions (the base case of this study); and the averages of 2) the bottom ten percent: 3) the middle 80 percent; and 4) the top ten percent of the historical 70-water year conditions. Table 13, below, presents the range of estimated regional surplus/deficits assuming the four differing levels of regional hydro generation. For OY 2012, regional surplus/deficit estimates can potentially vary up to 6,687 aMW, annually ranging from approximately 3,972 to 10,632 aMW, due to possible hydro variability.

Table 13

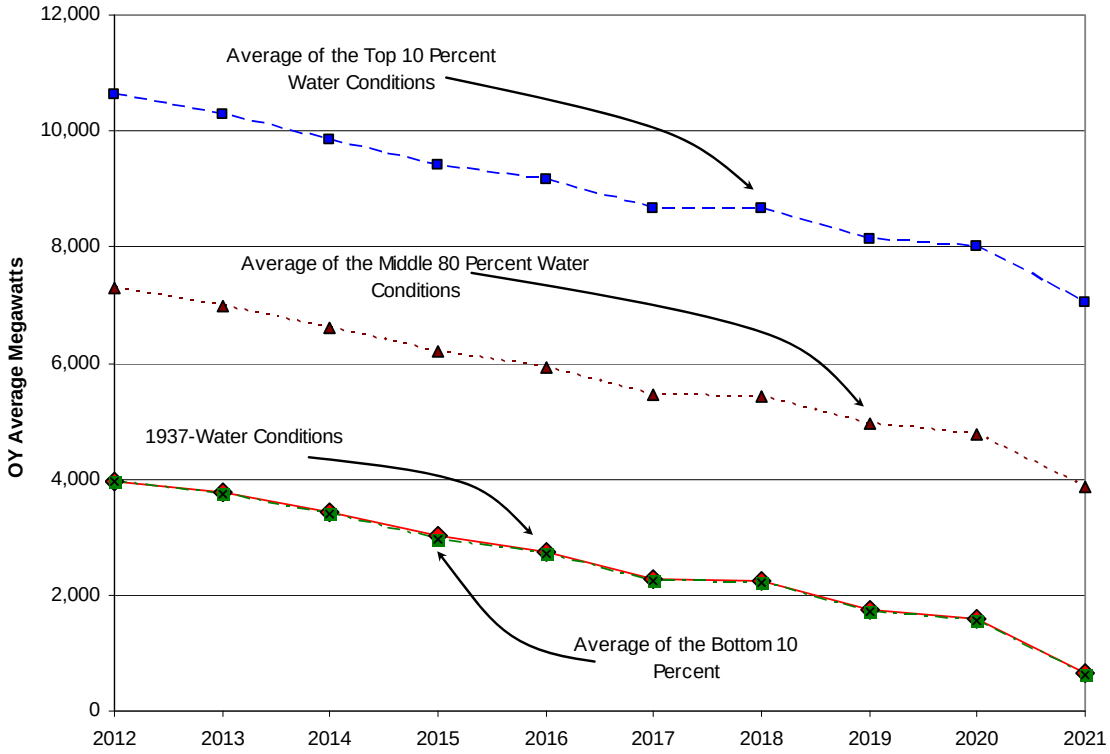
Potential Variability of Annual Regional Firm Energy Surplus/Deficit
For OY 2012 through 2021
Based on Different Levels of Water Conditions
Energy in Average Megawatts

Operating Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
1937-Critical Water Conditions	3,972	3,761	3,419	3,008	2,748	2,274	2,257	1,758	1,594	663
Average Bottom 10% Water Conditions	3,945	3,728	3,383	2,973	2,714	2,241	2,222	1,725	1,560	630
Average Middle 80% Water Conditions	7,296	6,997	6,614	6,192	5,936	5,466	5,439	4,950	4,780	3,855
Average Top 10% Water Conditions	10,632	10,283	9,856	9,415	9,165	8,656	8,659	8,140	8,009	7,045

Figure 28, below, illustrates the range of estimated regional surplus/deficits assuming differing levels of regional hydro generation as discussed previously on page 71.

Figure 28

Potential Variability of Annual Regional Firm Energy Surplus/Deficit Based on Different Levels of Water Conditions For OY 2012 through 2021



Variability Due to IPP Generation Amounts Delivered to the Region: This study assumes approximately 3,615 peak MW with an associated energy capability of 3,287 aMW of uncommitted PNW IPP generation as regional resources. Generation forecasts for these uncommitted regional resources were updated; however, these IPP resources may not be available when needed to serve PNW regional loads. While this assumption is reasonable from an electrical reliability standpoint, resulting regional surpluses may understate the potential for price volatility and overstate the availability of IPP generation for use within the PNW. The PNW region may have to compete with other western markets to secure uncommitted IPP generation to meet electricity demand. Table 14, below, details the peak annual energy of the regional uncommitted IPP projects as well as their fuel type. Annual generation projections may change due to variations in maintenance schedules. The 2010 White Book estimated about 3,177 aMW of uncommitted IPP generation.

Table 14

Expected PNW Uncommitted IPP Projects
As of May 27, 2011

Project	Peak (MW)	Energy (aMW)	Fuel Type
Big Hanaford CCCT	248	224	Natural Gas
Centralia #1 †	670	577	Coal
Centralia #2 ††	670	626	Coal
Hermiston Power Project	630	568	Natural Gas
Juniper Canyon Wind	0	46	Wind
Kittitas Valley Wind	0	29	Wind
Klamath Cogeneration Project	484	436	Natural Gas
Klamath Peaking Unit	100	14	Natural Gas
Leaning Juniper 2a	0	25	Wind
Leaning Juniper 2b †††	0	0	Wind
Satsop	650	585	Natural Gas
Sierra Pacific Aberdeen (Sierra Pacific)	15.3	14	Wood Waste
SP Newsprint Cogen	104	104	Natural Gas
Stateline Wind (0.05% for OY 2012)	0	3	Wind
Weyerhaeuser Longview (Weyerhaeuser)	44	35	Wood Waste
White Creek (1.5%)	0	1	Wind
Total Uncommitted IPP Generation	**3,615**	**3,287**	

† Centralia #1 (Coal plant) is scheduled for retirement on December 1, 2020.

†† Centralia #2 (Coal Plant) is scheduled for retirement on December 1, 2025.

††† Leaning Juniper 2b (33.8 aMW) is scheduled for commercial operation on September 1, 2013.

Table 15, below, shows the potential variability of the PNW region annual firm energy surplus/deficits by assuming four different IPP generation levels that are available to the region. The potential variability of regional firm annual energy surplus/deficits can differ depending on the level of IPP generation assumed to be delivered in the region: 100 percent (3,287 aMW), 75 percent (2,466 aMW), 50 percent (1,644 aMW), and 25 percent (822 aMW). Table 15, shows that for OY 2012, regional energy surplus estimates can vary up to 2,466 aMW annually, ranging from a surplus of 1,525 aMW to 3,972 aMW, depending on IPP generation commitment levels to the PNW.

Table 15

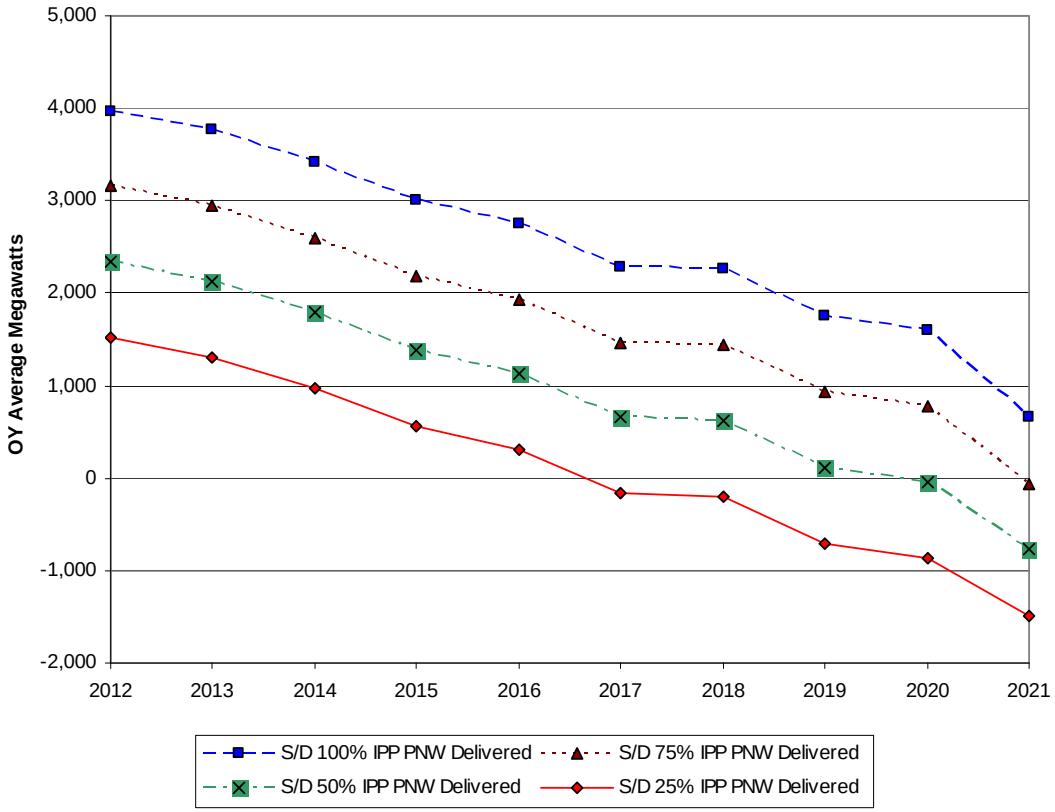
Potential Variability of PNW Region Annual Firm Energy Surplus/Deficit
Based on Different Levels of IPP Generation Available to the Region
Using 1937-Critical Water Conditions
Energy in Average Megawatts

Operating Year	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
100% (3,287 aMW) IPP Delivered to PNW	3,972	3,761	3,419	3,008	2,748	2,274	2,257	1,758	1,594	663
75% (2,466 aMW) IPP Delivered to PNW	3,156	2,944	2,602	2,191	1,937	1,463	1,440	936	772	-54
50% (1,644 aMW) IPP Delivered to PNW	2,340	2,127	1,784	1,374	1,126	652	623	114	-49	-772
25% (822 aMW) IPP Delivered to PNW	1,525	1,310	967	557	315	-159	-194	-707	-871	-1,489

Figure 29, below, graphically illustrates the potential variability of regional surpluses and deficits by assuming the four different levels of IPP generation available to the region—100 percent, 75 percent, 50 percent, and 25 percent.

Figure 29

Potential Variability of Annual Regional Firm Energy Surplus/Deficit Based on Different Levels of IPP Generation Available to the Region Using 1937-Critical Water Conditions

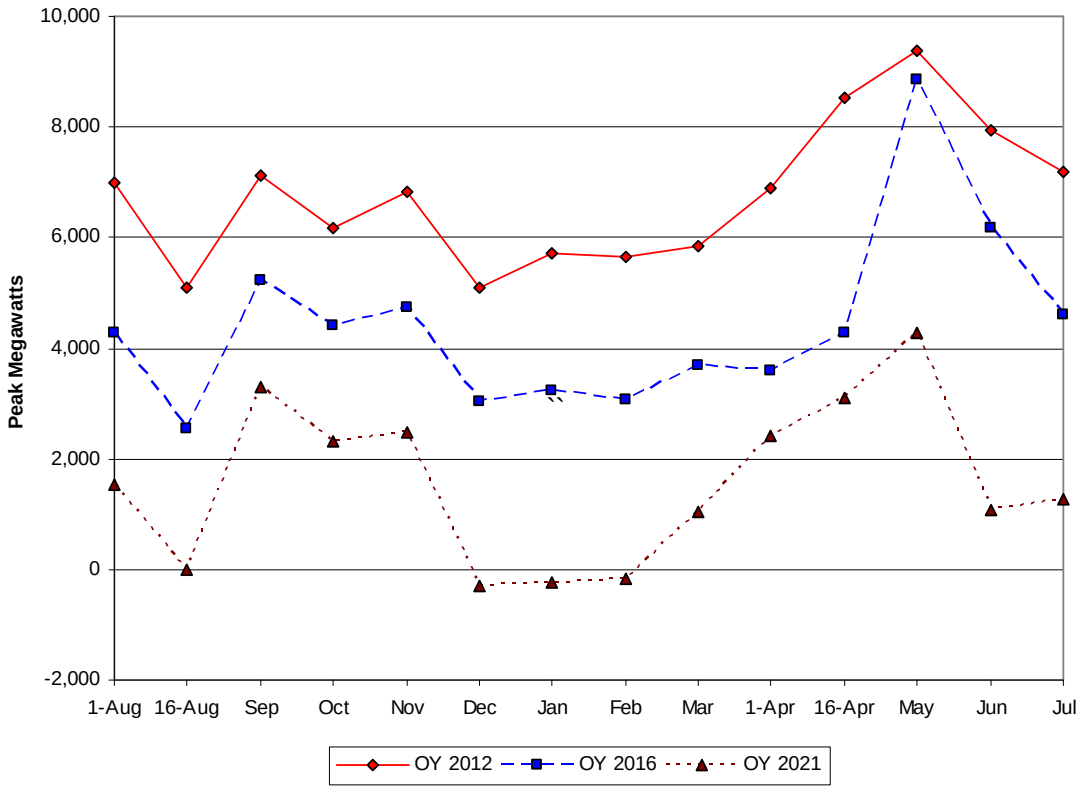


Monthly Regional Firm 1-Hour Capacity Surplus/Deficit Projections

Figure 30, below, graphically illustrates the monthly regional 1-hour capacity surplus and deficit projections for OY 2012, 2016, and 2021. The projections assume 1937-critical water conditions, normal weather conditions, do not include future climate change impacts, and a 50 percent probability that the actual peak loads will be either higher or lower than the forecast. The study assumes 3,615 peak MW (3,287 aMW) of uncommitted PNW IPP generation in OY 2012 as regional resources, though potentially these resource may not be available when needed to serve PNW regional loads, shown in Table 14, *Expected PNW Uncommitted IPP Projects,* page 73. Regional surplus firm capacity values take into account hydrologic constraints detailed in Section 4, *Monthly Federal Firm Capacity Surplus/Deficit Projections*, on page 42.

Figure 30

Monthly Regional Firm 1-Hour Capacity Surplus/Deficit Projections
Using 1937-Critical Water Conditions
For OY 2012, 2016, and 2021



Regional 1-hour capacity surplus/deficit projections, assuming normal weather conditions and 1937-critical water conditions for OY 2012, 2016, and 2021, are shown in Exhibits 25 through 27, starting on page 144.

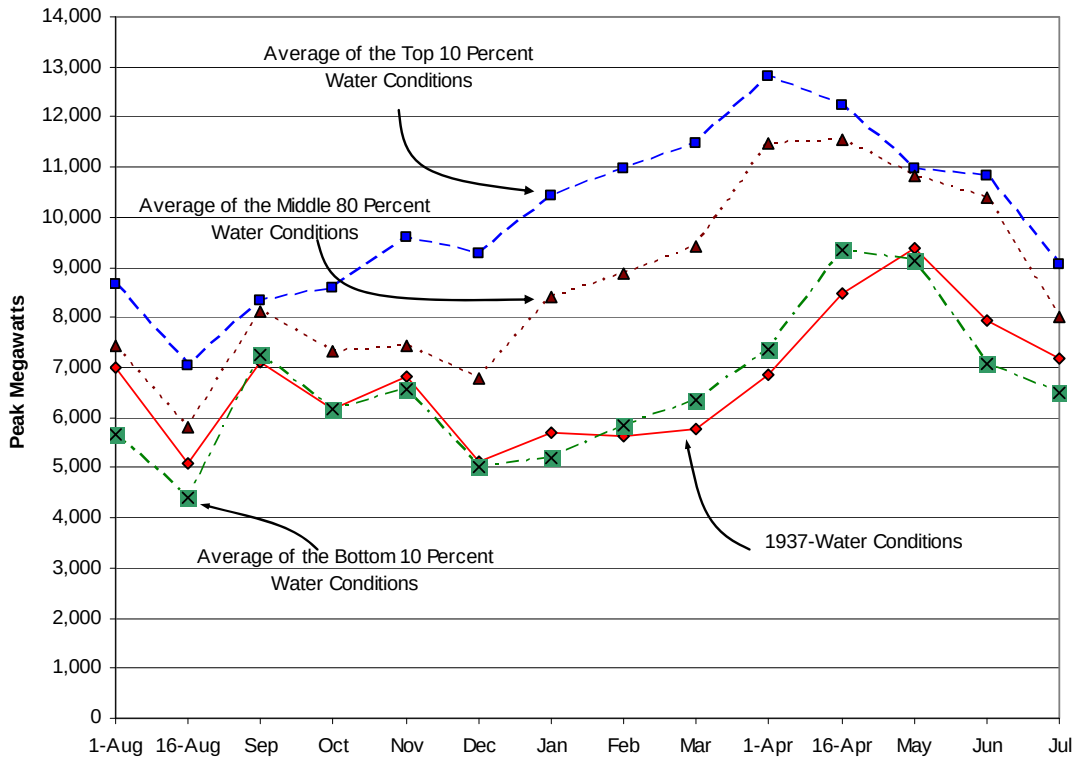
Variability of PNW Region 1-Hour Capacity Surplus/Deficit Projections

Variability Due to Water Conditions: To illustrate the potential variability of 1-hour PNW region capacity surplus/deficits, this study compares different scenarios using varying levels of regional generation based on water conditions and normal weather loads and are unadjusted for potential climate changes. Figure 31, below, compares the 1-hour regional system capacity surplus/deficits for OY 2012 under four scenarios: resources using: 1) 1937-critical water conditions (the base case of this study); the averages of 2) the bottom ten percent; 3) the middle 80 percent; and 4) the top ten percent of the historical 70-water year conditions (1929 through 1998). As the region experiences better water conditions, the availability of 1-hour capacity surpluses increases, especially in the December through May time period.

Figure 31

Monthly Potential Variability of 1-Hour Capacity PNW Regional Firm Surplus/Deficit Projections

Utilizing Differing Water Conditions for OY 2012



Planning to Meet Regional Deficits

The regional energy and capacity loads and resource projections use the "*Regional Analysis Assumptions*" presented on page 61 and are considered conservative with the exception of the treatment of uncommitted IPP resources. This analysis assumes regional hydro generation using 1937-critical water conditions, non-hydro resources operating at expected generation levels, and contract obligations and purchases delivered at maximum contract levels. IPP plants are assumed to be available to meet regional loads unless otherwise contracted. However, regional surpluses may understate the potential for price volatility because the PNW region may have to compete with other western markets to secure these sources of supply. Regional deficits can vary month to month and annually due to weather conditions, water conditions, load variability due to economic conditions, and resource availability and performance. Even though the regional analysis shows annual average energy surpluses throughout the study period (through OY 2021), there is potential for monthly energy deficits within any operating year.

Any regional deficits could be met by any combination of the following, and which are described in the Council's Sixth Power Plan:

- Achievement of the energy conservation targets set forth by the Council's Sixth Power Plan;
- Support development of small renewable and high-efficiency resources;
- Purchase power from natural gas-fired generation, pumped storage, or other generating resource projects to provide seasonal heavy load hour energy and balancing reserves;
- Continue wind integration initiatives;
- Market power purchases including acquisitions of generation from uncommitted IPP projects; and
- Purchase of off-system storage and exchange agreements with other regions that allow for monthly seasonal shaping of regional hydropower.

As the region executes new contracts for additional power purchases or generation from new or existing resources, those amounts will be included in future analyses.

Section 7: Northwest Power and Conservation Council Perspective

Non-DSI Regional Load Comparison: 2011 White Book to Council

The following discussion compares the non-DSI regional firm total retail loads between BPA's 2011 White Book and the Northwest Power and Conservation Council's Sixth Northwest Electric Power and Conservation Plan (February 2010). To provide consistency for this comparison, the regional DSI load component was removed from both forecasts. It should be noted that the regional total retail loads do not include regional exports, which are a separate component of load obligations to the PNW region.

2011 White Book Non-DSI Total Retail Load Forecast: The 2011 White Book total retail load projections were initially estimated separately, for each individual entity and then grouped into the following categories: Public Agencies, USBR, and IOUs. The total retail load forecasts were finalized on May 27, 2011.

The total retail load forecasts for the Federal agencies, public agencies, cooperatives, and USBR were developed as follows:

- Federal agency, public bodies and cooperatives' retail load forecasts and USBR loads were developed by BPA using ALF which incorporates historical retail load data from regional utility PSC submittals;
- Some public retail load forecasts were sent directly to BPA through their PNUCC submittals; and
- IOU retail load forecasts were developed from both data submitted in their PNUCC submittals and load forecasts sent directly to BPA.

BPA's TRL forecast is reduced for estimates of BPA funded conservation through the 2012 Rate Case period. These embedded conservation reductions range from 69 aMW in 2012 and 90 aMW beginning in 2013 through the remaining years of the study. As more utilities report planned or implemented conservation measures, those impacts will be reflected in future TRL forecasts.

Council Non-DSI Total Retail Load Forecast: The Council's Sixth Northwest Electric Power and Conservation Plan (February 2010) for the near-term reflects lower non-DSI electricity demand due to current economic trends. The expected lower level of demand estimates anticipated levels of permanent load loss not expected to return as part of economic recovery. The Council's Sixth power Plan is available at: *http://www.nwcouncil.org/energy/powerplan/6*

Comparison of the Non-DSI Total Retail Load Forecast: The differences between the 2011 White Book and the Council's Sixth Power Plan non-DSI load forecasts before Council conservation targets shows the White Book load forecast to be an average of

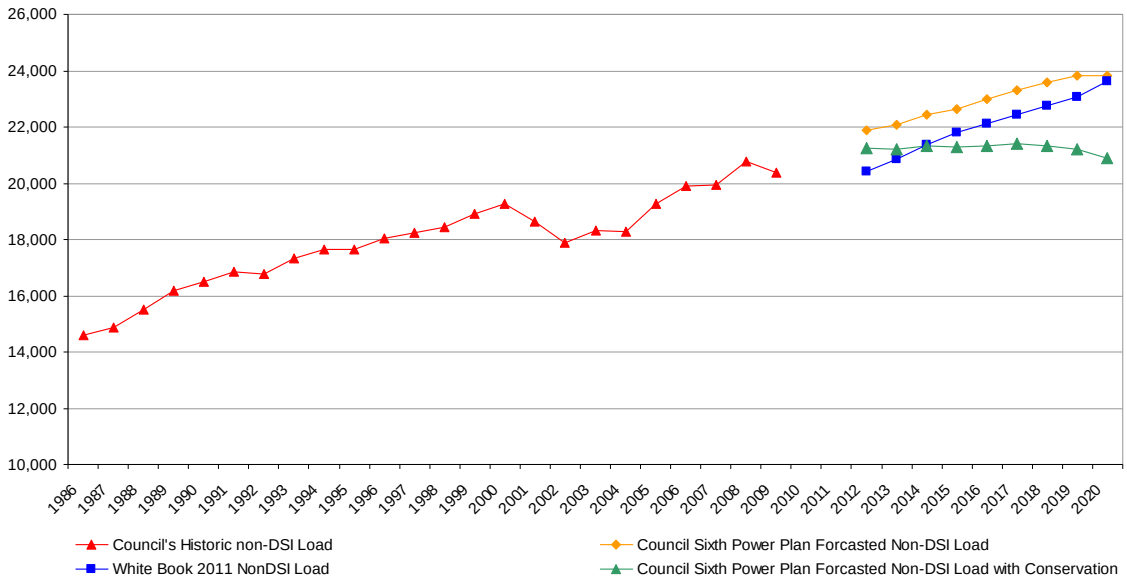
3.9 percent lower over the study period. The difference is the extent of the economic down turn reflected in BPA's ALF forecast, when compared to the Council's estimates. BPA's forecast is 7.1 percent lower than the Sixth Power Plan in OY 2012 and 0.8 percent lower in OY 2021.

When comparing the 2011 White Book and the Council's Sixth Power Plan non-DSI load forecasts including Council conservation targets shows the White Book load forecast to be an average of 4.1 percent higher over the study period. The difference is the amount of economic down turn reflected in BPA's ALF forecast and the inclusion of long-term Council conservation targets in the Council's estimates. BPA's forecast is 4.1 percent lower then Sixth Power Plan in OY 2012 and 11.8 percent higher in OY 2021.

Figure 32, below, graphically illustrates the expected non-DSI regional firm total retail loads (Historic and Forecasted) from the Council's Draft Sixth Power Plan (February 2010) based on both Council conservation scenarios compared to BPA's 2011 White Book. The Council forecast with conservation reductions assumes savings of 606 aMW in 2012 increasing to 2,941 aMW in 2020.

Figure 32

Non-DSI Regional Firm Total Retail Loads Comparison
BPA 2011 White Book Load Projections† and the
Council's Sixth Northwest Electric Power and Conservation Plan††
(February 2010)



† BPA's TRL forecast is reduced for estimated BPA funded conservation through the 2012 Rate Case period, ranging from 69 aMW in 2012 and 90 aMW beginning in 2013 through the study horizon.

†† Council conservation targets assume savings of 616 aMW in 2012 increasing to 2,941 aMW in 2020.

Section 8: Federal System Exhibits

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Exhibit 1

Federal System Annual Energy Analysis Using 1937-Water Conditions for 10 Operating Years

Loads and Resources - Federal System
PNW Loads and Resource Study
2012 - 2021 Operating Years
1937 Water Year
[76] 2011 White Book (Final)

5/27/2011

Energy (aMW)	2012 Avg.	2013 Avg.	2014 Avg.	2015 Avg.	2016 Avg.	2017 Avg.	2018 Avg.	2019 Avg.	2020 Avg.	2021 Avg.
Non-Utility Obligations										
1 Fed. Agencies 2002 PSC	17	0	0	0	0	0	0	0	0	0
2 USBR Obligation	173	174	174	174	173	174	174	174	173	174
3 DSI Obligation	340	340	340	340	340	340	57	0	0	0
4 Fed. Agencies 2012 PSC	100	119	125	136	143	161	174	176	177	178
5 Total Firm Non-Utility Obligations	630	633	639	650	657	675	404	350	350	352
Transfers Out										
6 NGP 2002 PSC	490	0	0	0	0	0	0	0	0	0
7 GPU 2002 PSC	341	0	0	0	0	0	0	0	0	0
8 NGP 2002 Slice PSC	91	0	0	0	0	0	0	0	0	0
9 GPU 2002 Slice PSC	151	0	0	0	0	0	0	0	0	0
10 IOU 2002 PSC	0	0	0	0	0	0	0	0	0	0
11 NGP 2012 PSC	2769	3356	3428	3462	3485	3522	3552	3598	3611	3642
12 GPU 2012 PSC	1304	1571	1565	1597	1586	1622	1623	1663	1645	1673
13 NGP 2012 Slice PSC	321	373	379	373	378	369	379	372	382	374
14 GPU 2012 Slice PSC	1309	1520	1547	1522	1542	1507	1547	1516	1557	1526
15 IOU 2012 PSC	0	0	0	0	0	0	0	0	0	0
16 Exports	842	692	608	572	593	579	543	493	475	470
17 Regional Transfers (Out)	520	291	285	285	286	259	211	211	170	170
18 Federal Diversity	0	0	0	0	0	0	0	0	0	0
19 Total Transfers Out	8137	7803	7812	7812	7871	7857	7855	7852	7840	7855
20 Total Firm Obligations	8767	8436	8452	8462	8527	8532	8260	8202	8190	8207
Hydro Resources										
21 Regulated Hydro	6518	6554	6540	6546	6545	6546	6545	6546	6545	6546
22 Independent Hydro	367	368	368	368	367	368	368	368	367	368
23 Hydro Maintenance	0	0	0	0	0	0	0	0	0	0
24 Total Hydro Resources	6885	6922	6908	6914	6912	6914	6913	6914	6912	6914
Other Resources										
25 Small Thermal & Misc.	0	0	0	0	0	0	0	0	0	0
26 Combustion Turbines	0	0	0	0	0	0	0	0	0	0
27 Renewables	67	67	67	67	67	67	67	67	67	67
28 Cogeneration	19	19	19	19	13	0	0	0	0	0
29 Imports	241	241	241	241	237	221	192	161	161	161
30 Regional Transfers (In)	340	282	226	141	141	114	67	52	0	0
31 Non-Fed CER (Canada)	141	138	137	136	135	134	133	131	130	128
32 Transmission Loss Returns	31	36	37	36	37	36	37	36	37	36
33 Large Thermal	1030	878	1030	878	1030	878	1030	878	1030	878
34 Non-Utility Generation	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
35 Augmentation Purchases	0	0	0	0	0	0	0	0	0	0
36 Augmentation Resources	0	0	0	0	0	0	0	0	0	0
37 Total Other Resources	1872	1664	1760	1521	1663	1453	1529	1328	1428	1273
38 Total Resources	8757	8586	8667	8435	8576	8367	8442	8242	8340	8187
Reserves & Losses										
39 Contingency Reserves (Non-Spinning)	0	0	0	0	0	0	0	0	0	0
40 Contingency Reserves (Spinning)	0	0	0	0	0	0	0	0	0	0
41 Generation Imbalance Reserves	0	0	0	0	0	0	0	0	0	0
42 Load Following Reserves	0	0	0	0	0	0	0	0	0	0
43 Federal Transmission Losses	-247	-242	-244	-238	-242	-236	-238	-232	-235	-231
44 Total Reserves & Losses	-247	-242	-244	-238	-242	-236	-238	-232	-235	-231

Loads and Resources - Federal System
PNW Loads and Resource Study
2012 - 2021 Operating Years
1937 Water Year
[76] 2011 White Book (Final)

Continued **5/27/2011**

Energy (aMW)	2012 Avg.	2013 Avg.	2014 Avg.	2015 Avg.	2016 Avg.	2017 Avg.	2018 Avg.	2019 Avg.	2020 Avg.	2021 Avg.
45 Total Net Resources	8510	8344	8423	8197	8334	8131	8204	8010	8105	7956
46 Total Firm Surplus/Deficit	-257	-92	-29	-266	-194	-401	-56	-192	-85	-250

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Exhibits 2 - 4

Federal System Monthly Energy Analysis Using the 2010 White Book Load Forecast for 1937-Water Conditions

Loads and Resources - Federal System
PNW Loads and Resource Study
2011 - 2012 Operating Year
1937 Water Year
[76] 2011 White Book (Final)

5/27/2011

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
Non-Utility Obligations															
1 Fed. Agencies 2002 PSC	107	108	94	0	0	0	0	0	0	0	0	0	0	0	17
2 USBR Obligation	310	308	293	96	17	18	2.5	7.1	57	228	218	322	314	416	173
3 DSI Obligation	340	340	340	340	340	340	340	340	340	340	340	340	340	340	340
4 Fed. Agencies 2012 PSC	0	0	0	100	124	149	144	131	129	108	109	97	101	111	100
5 Total Firm Non-Utility Obligations	758	756	727	536	482	508	487	479	526	676	667	759	756	868	630
Transfers Out															
6 NGP 2002 PSC	3061	3064	2809	0	0	0	0	0	0	0	0	0	0	0	490
7 GPU 2002 PSC	1991	1992	2103	0	0	0	0	0	0	0	0	0	0	0	341
8 NGP 2002 Slice PSC	637	534	503	0	0	0	0	0	0	0	0	0	0	0	91
9 GPU 2002 Slice PSC	1060	890	838	0	0	0	0	0	0	0	0	0	0	0	151
10 IOU 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 NGP 2012 PSC	0	0	0	2916	3335	3854	3783	3488	3176	3057	3081	3023	3163	3415	2769
12 GPU 2012 PSC	0	0	0	1413	1792	1981	2005	1806	1736	1407	1409	1196	1063	1253	1304
13 NGP 2012 Slice PSC	0	0	0	327	414	400	401	356	336	273	268	486	435	423	321
14 GPU 2012 Slice PSC	0	0	0	1333	1687	1630	1637	1453	1372	1114	1095	1983	1773	1726	1309
15 IOU 2012 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 Exports	934	933	915	812	800	796	795	794	799	840	845	872	877	865	842
17 Regional Transfers (Out)	647	635	310	311	578	649	639	623	519	784	744	511	548	151	520
18 Federal Diversity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19 Total Transfers Out	8330	8048	7479	7113	8607	9310	9260	8521	7938	7476	7441	8072	7859	7833	8137
20 Total Firm Obligations	9087	8804	8206	7649	9088	9817	9748	9000	8464	8152	8109	8831	8615	8701	8767
Hydro Resources															
21 Regulated Hydro	6941	5727	5393	5409	7211	7054	7086	6240	5692	4529	4422	8385	7364	7513	6518
22 Independent Hydro	390	366	313	311	284	198	176	162	251	377	414	705	759	472	367
23 Hydro Maintenance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24 Total Hydro Resources	7331	6094	5706	5721	7495	7252	7262	6402	5942	4906	4836	9090	8123	7985	6885
Other Resources															
25 Small Thermal & Misc.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26 Combustion Turbines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27 Renewables	68	64	57	59	66	59	65	56	83	80	72	73	80	65	67
28 Cogeneration	12	12	14	18	20	23	24	23	23	22	22	19	14	18	19
29 Imports	171	156	154	206	284	355	356	334	321	322	265	130	134	165	241
30 Regional Transfers (In)	854	836	424	241	401	336	342	335	371	385	383	92	217	89	340
31 Non-Fed CER (Canada)	142	142	142	142	142	142	142	142	142	139	139	139	139	139	141
32 Transmission Loss Returns	0	0	0	32	40	39	39	34	32	26	26	47	42	41	31
33 Large Thermal	1030	1030	1030	1030	1030	1030	1030	1030	1030	1030	1030	1030	1030	1030	1030
34 Non-Utility Generation	2.6	2.6	2.6	2.7	2.8	3.2	3.2	3	3.1	3.1	3.1	2.8	2.7	2.6	2.9
35 Augmentation Purchases	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36 Augmentation Resources	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37 Total Other Resources	2280	2244	1825	1731	1986	1987	2002	1958	2006	2007	1940	1532	1659	1549	1872
38 Total Resources	9611	8337	7532	7452	9481	9240	9264	8360	7948	6913	6776	10622	9782	9534	8757
Reserves & Losses															
39 Contingency Reserves (Non-Spinning)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40 Contingency Reserves (Spinning)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 Generation Imbalance Reserves	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42 Load Following Reserves	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43 Federal Transmission Losses	-271	-235	-212	-210	-267	-261	-261	-236	-224	-195	-191	-300	-276	-269	-247
44 Total Reserves & Losses	-271	-235	-212	-210	-267	-261	-261	-236	-224	-195	-191	-300	-276	-269	-247

Loads and Resources - Federal System
PNW Loads and Resource Study
2011 - 2012 Operating Year
1937 Water Year
[76] 2011 White Book (Final)

Continued **5/27/2011**

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
45 Total Net Resources	9340	8102	7319	7241	9214	8979	9002	8125	7724	6718	6585	10323	9506	9266	8510
46 Total Firm Surplus/Deficit	252	-702	-887	-407	126	-838	-745	-875	-740	-1434	-1523	1492	891	565	-257

Loads and Resources - Federal System
PNW Loads and Resource Study
2015 - 2016 Operating Year
1937 Water Year
[76] 2011 White Book (Final)

5/27/2011

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
Non-Utility Obligations															
1 Fed. Agencies 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 USBR Obligation	303	314	293	96	17	18	2.5	7.1	57	223	223	322	314	416	173
3 DSI Obligation	340	340	340	340	340	340	340	340	340	340	340	340	340	340	340
4 Fed. Agencies 2012 PSC	127	126	111	123	155	188	179	162	158	132	132	120	125	136	143
5 Total Firm Non-Utility Obligations	771	781	745	559	513	547	522	510	555	696	696	782	780	892	657
Transfers Out															
6 NGP 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 GPU 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 NGP 2002 Slice PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9 GPU 2002 Slice PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 IOU 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 NGP 2012 PSC	3484	3459	3173	3095	3530	4077	3993	3685	3370	3248	3248	3205	3352	3616	3485
12 GPU 2012 PSC	1332	1331	1471	1461	1859	2055	2082	1875	1801	1456	1456	1245	1106	1299	1586
13 NGP 2012 Slice PSC	403	350	326	325	411	398	400	355	335	272	267	484	430	423	378
14 GPU 2012 Slice PSC	1645	1429	1329	1324	1677	1624	1631	1448	1368	1109	1088	1975	1756	1726	1542
15 IOU 2012 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 Exports	629	629	618	582	570	566	564	563	568	610	614	612	617	612	593
17 Regional Transfers (Out)	124	109	97	180	448	518	518	493	388	367	340	101	108	118	286
18 Federal Diversity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19 Total Transfers Out	7617	7307	7013	6966	8495	9238	9189	8420	7830	7061	7011	7622	7369	7795	7871
20 Total Firm Obligations	8388	8088	7758	7526	9007	9785	9711	8930	8385	7756	7707	8404	8149	8687	8527
Hydro Resources															
21 Regulated Hydro	7054	6060	5618	5409	7211	7054	7086	6240	5692	4529	4422	8365	7256	7513	6545
22 Independent Hydro	390	366	313	311	284	198	176	162	251	377	414	705	759	472	367
23 Hydro Maintenance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24 Total Hydro Resources	7443	6427	5932	5721	7495	7252	7262	6402	5942	4906	4836	9070	8015	7985	6912
Other Resources															
25 Small Thermal & Misc.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26 Combustion Turbines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27 Renewables	68	64	57	59	66	59	65	56	83	80	72	73	80	65	67
28 Cogeneration	12	12	14	18	20	23	24	23	23	0	0	0	0	0	13
29 Imports	165	151	146	202	281	351	352	330	319	319	265	130	134	150	237
30 Regional Transfers (In)	83	67	161	157	162	147	160	142	175	192	188	70	196	67	141
31 Non-Fed CER (Canada)	136	136	136	136	136	136	136	136	136	135	135	135	135	135	135
32 Transmission Loss Returns	39	34	32	32	40	39	39	35	33	26	26	47	42	41	37
33 Large Thermal	1030	1030	1030	1030	1030	1030	1030	1030	1030	1030	1030	1030	1030	1030	1030
34 Non-Utility Generation	2.6	2.6	2.6	2.7	2.8	3.2	3.2	3	3.1	3.1	3.1	2.8	2.7	2.6	2.9
35 Augmentation Purchases	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36 Augmentation Resources	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37 Total Other Resources	1536	1497	1579	1636	1737	1787	1808	1754	1801	1785	1719	1488	1619	1490	1663
38 Total Resources	8979	7924	7511	7357	9232	9040	9070	8156	7744	6692	6556	10557	9634	9475	8576
Reserves & Losses															
39 Contingency Reserves (Non-Spinning)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40 Contingency Reserves (Spinning)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 Generation Imbalance Reserves	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42 Load Following Reserves	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43 Federal Transmission Losses	-253	-223	-212	-207	-260	-255	-256	-230	-218	-189	-185	-298	-272	-267	-242
44 Total Reserves & Losses	-253	-223	-212	-207	-260	-255	-256	-230	-218	-189	-185	-298	-272	-267	-242

Loads and Resources - Federal System
PNW Loads and Resource Study
2015 - 2016 Operating Year
1937 Water Year
[76] 2011 White Book (Final)

Continued **5/27/2011**

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
45 Total Net Resources	8726	7700	7299	7149	8972	8785	8814	7926	7525	6503	6371	10259	9363	9208	8334
46 Total Firm Surplus/Deficit	338	-387	-459	-376	-35	-1000	-896	-1004	-859	-1254	-1336	1856	1214	521	-194

Loads and Resources - Federal System
PNW Loads and Resource Study
2020 - 2021 Operating Year
1937 Water Year
[76] 2011 White Book (Final)

5/27/2011

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
Non-Utility Obligations															
1 Fed. Agencies 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 USBR Obligation	303	314	293	96	17	18	2.5	7.1	57	223	223	322	314	416	174
3 DSI Obligation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 Fed. Agencies 2012 PSC	160	159	140	155	197	242	220	204	193	161	161	147	153	166	178
5 Total Firm Non-Utility Obligations	463	473	433	251	215	260	223	211	250	384	384	469	467	582	352
Transfers Out															
6 NGP 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 GPU 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 NGP 2002 Slice PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9 GPU 2002 Slice PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 IOU 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 NGP 2012 PSC	3644	3618	3324	3233	3674	4235	4152	3937	3509	3383	3383	3345	3508	3782	3642
12 GPU 2012 PSC	1375	1374	1513	1546	1955	2155	2184	2039	1895	1541	1541	1325	1182	1381	1673
13 NGP 2012 Slice PSC	402	349	325	325	420	407	409	364	339	277	273	453	382	412	374
14 GPU 2012 Slice PSC	1640	1425	1326	1325	1714	1662	1668	1485	1383	1129	1113	1847	1559	1680	1526
15 IOU 2012 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 Exports	470	470	470	470	470	470	470	470	470	470	470	470	470	470	470
17 Regional Transfers (Out)	88	74	68	154	217	289	288	267	255	225	196	63	67	83	170
18 Federal Diversity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19 Total Transfers Out	7619	7310	7026	7052	8450	9218	9171	8563	7850	7025	6976	7501	7169	7808	7855
20 Total Firm Obligations	8082	7783	7459	7303	8665	9478	9393	8774	8100	7409	7360	7970	7636	8389	8207
Hydro Resources															
21 Regulated Hydro	7054	6060	5618	5409	7211	7054	7086	6240	5692	4529	4422	8303	7328	7513	6546
22 Independent Hydro	390	366	313	311	284	198	176	162	251	377	414	705	759	472	368
23 Hydro Maintenance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24 Total Hydro Resources	7443	6427	5932	5721	7495	7252	7262	6402	5942	4906	4836	9008	8087	7985	6914
Other Resources															
25 Small Thermal & Misc.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26 Combustion Turbines	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27 Renewables	68	64	57	59	66	59	65	56	83	80	72	73	80	65	67
28 Cogeneration	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 Imports	80	66	60	146	207	278	278	257	247	217	188	55	59	75	161
30 Regional Transfers (In)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31 Non-Fed CER (Canada)	129	129	129	129	129	129	129	129	129	127	127	127	127	127	128
32 Transmission Loss Returns	39	34	32	32	41	40	40	35	33	27	27	44	37	40	36
33 Large Thermal	1030	1030	1030	1030	1030	1030	1030	1030	1030	1030	1030	465	0	797	878
34 Non-Utility Generation	2.6	2.6	2.6	2.7	2.8	3.2	3.2	3.1	3.1	3.1	3.1	2.8	2.7	2.6	2.9
35 Augmentation Purchases	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36 Augmentation Resources	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37 Total Other Resources	1348	1325	1311	1399	1476	1539	1545	1510	1524	1484	1447	767	306	1107	1273
38 Total Resources	8792	7752	7242	7119	8971	8791	8807	7912	7467	6390	6283	9775	8393	9092	8187
Reserves & Losses															
39 Contingency Reserves (Non-Spinning)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
40 Contingency Reserves (Spinning)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
41 Generation Imbalance Reserves	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
42 Load Following Reserves	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
43 Federal Transmission Losses	-248	-219	-204	-201	-253	-248	-248	-223	-211	-180	-177	-276	-237	-256	-231
44 Total Reserves & Losses	-248	-219	-204	-201	-253	-248	-248	-223	-211	-180	-177	-276	-237	-256	-231

Loads and Resources - Federal System
PNW Loads and Resource Study
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Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
45 Total Net Resources	8544	7533	7038	6918	8718	8543	8558	7689	7256	6210	6106	9499	8157	8836	7956
46 Total Firm Surplus/Deficit	461	-250	-421	-384	53	-934	-835	-1085	-844	-1199	-1254	1529	521	446	-250

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Exhibits 5 – 7

Federal System Monthly 1-Hour Capacity Analysis
Using the 2010 White Book Load Forecast for 1937-Water Conditions

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Capacity (MW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul
Non-Utility Obligations														
1 Fed. Agencies 2002 PSC	132	132	125	0	0	0	0	0	0	0	0	0	0	0
2 USBR Obligation	653	653	578	516	160	263	14	300	411	463	463	580	609	670
3 DSI Obligation	340	340	340	340	340	340	340	340	340	340	340	340	340	340
4 Fed. Agencies 2012 PSC	0	0	0	141	171	194	188	170	177	142	142	133	135	140
5 Total Firm Non-Utility Obligations	1125	1125	1044	998	672	798	543	811	929	946	946	1053	1085	1150
Transfers Out														
6 NGP 2002 PSC	3674	3674	3763	0	0	0	0	0	0	0	0	0	0	0
7 GPU 2002 PSC	2539	2539	2489	0	0	0	0	0	0	0	0	0	0	0
8 NGP 2002 Slice PSC	954	790	727	0	0	0	0	0	0	0	0	0	0	0
9 GPU 2002 Slice PSC	1588	1317	1211	0	0	0	0	0	0	0	0	0	0	0
10 IOU 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 NGP 2012 PSC	0	0	0	4360	4819	5630	5453	5116	4703	4531	4531	4307	4319	4510
12 GPU 2012 PSC	0	0	0	1468	1847	2039	2079	1890	1793	1459	1459	1224	1096	1293
13 NGP 2012 Slice PSC	0	0	0	418	575	589	636	554	522	440	539	639	571	606
14 GPU 2012 Slice PSC	0	0	0	1705	2345	2404	2593	2259	2130	1796	2201	2606	2330	2474
15 IOU 2012 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 Exports	1785	1785	1778	1633	1586	1587	1585	1586	1586	1614	1614	1678	1678	1680
17 Regional Transfers (Out)	1265	1266	493	475	682	778	833	764	685	771	771	509	490	204
18 Federal Diversity	-508	-546	-567	-332	-283	-520	-287	-305	-358	-459	-474	-478	-480	-392
19 Total Transfers Out	11297	10825	9894	9728	11572	12507	12892	11865	11061	10152	10641	10486	10004	10375
20 Total Firm Obligations	12422	11950	10938	10726	12244	13305	13435	12676	11989	11097	11587	11539	11089	11525
Hydro Resources (1 Hour.)														
21 Regulated Hydro	16570	14006	13236	12345	15252	15056	15296	14378	13621	12184	13802	15650	14211	16379
22 Independent Hydro	606	618	552	611	579	388	330	380	535	585	704	830	895	665
23 Hydro Maintenance	-3263	-2761	-2770	-2752	-2705	-1866	-1408	-1883	-1915	-2061	-1805	-1756	-1635	-2785
24 Total Hydro Resources	13912	11863	11018	10205	13126	13578	14219	12875	12240	10707	12701	14724	13471	14260
Other Resources														
25 Small Thermal & Misc.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26 Combustion Turbines	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27 Renewables	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28 Cogeneration	12	12	14	18	20	23	24	23	23	22	22	19	14	18
29 Imports	206	206	208	313	346	444	446	381	382	413	413	238	184	206
30 Regional Transfers (In)	592	592	297	179	479	422	422	422	422	422	422	122	122	122
31 Non-Fed CER (Canada)	249	249	249	249	249	249	249	249	249	245	245	245	245	245
32 Transmission Loss Returns	0	0	0	51	71	72	78	68	64	54	66	79	70	75
33 Large Thermal	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130
34 Non-Utility Generation	3.5	3.5	3	4.1	4.5	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.1	3.2
35 Augmentation Purchases	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36 Augmentation Resources	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37 Total Other Resources	2193	2193	1902	1945	2299	2345	2354	2278	2275	2291	2303	1837	1770	1799
38 Total Resources	16105	14056	12919	12150	15425	15923	16573	15153	14515	12998	15003	16561	15241	16059
Reserves & Losses (1 Hour.)														
39 Contingency Reserves (Non-Spinning)	-394	-364	-346	-347	-406	-430	-434	-409	-377	-358	-387	-379	-375	-402
40 Contingency Reserves (Spinning)	-394	-364	-346	-347	-406	-430	-434	-409	-377	-358	-387	-379	-375	-402
41 Generation Imbalance Reserves	-311	-311	-338	-290	-290	-290	-290	-290	-294	-320	-320	-320	-320	-320
42 Load Following Reserves	-415	-415	-432	-403	-403	-403	-403	-403	-408	-419	-419	-419	-419	-419
43 Federal Transmission Losses	-489	-422	-384	-361	-466	-481	-503	-457	-438	-387	-452	-505	-461	-486
44 Total Reserves & Losses	-2002	-1876	-1846	-1748	-1972	-2036	-2065	-1968	-1893	-1841	-1964	-2001	-1950	-2029

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Continued **5/27/2011**

Capacity (MW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul
45 Total Net Resources	14103	12180	11073	10402	13453	13887	14508	13185	12623	11157	13040	14560	13291	14030
46 Total Firm Surplus/Deficit	1681	230	135	-324	1209	582	1073	509	633	60	1453	3021	2202	2505

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Capacity (MW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul
Non-Utility Obligations														
1 Fed. Agencies 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 USBR Obligation	653	653	578	517	160	263	14	300	411	463	463	580	609	670
3 DSI Obligation	340	340	340	340	340	340	340	340	340	340	340	340	340	340
4 Fed. Agencies 2012 PSC	153	153	144	172	212	237	223	201	211	164	164	159	161	165
5 Total Firm Non-Utility Obligations	1146	1146	1063	1029	712	841	577	841	963	967	967	1079	1111	1175
Transfers Out														
6 NGP 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 GPU 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 NGP 2002 Slice PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9 GPU 2002 Slice PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 IOU 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 NGP 2012 PSC	4594	4594	4361	4613	5088	5942	5752	5391	4968	4785	4785	4565	4564	4761
12 GPU 2012 PSC	1372	1372	1507	1520	1918	2118	2162	1964	1861	1511	1511	1276	1142	1344
13 NGP 2012 Slice PSC	553	461	426	406	559	596	625	526	495	433	508	633	563	590
14 GPU 2012 Slice PSC	2257	1880	1738	1657	2279	2432	2551	2145	2018	1768	2074	2583	2296	2408
15 IOU 2012 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 Exports	1498	1498	1496	1466	1420	1421	1419	1420	1420	1448	1448	1434	1435	1425
17 Regional Transfers (Out)	171	174	167	300	508	603	608	539	460	470	472	209	155	170
18 Federal Diversity	-478	-513	-542	-350	-299	-549	-303	-320	-377	-483	-498	-504	-505	-411
19 Total Transfers Out	9969	9466	9154	9612	11473	12562	12814	11664	10844	9932	10301	10197	9649	10286
20 Total Firm Obligations	11115	10611	10217	10642	12186	13403	13391	12506	11807	10899	11268	11275	10760	11462
Hydro Resources (1 Hour.)														
21 Regulated Hydro	16264	13891	13170	12684	15522	15770	15672	14387	13628	12558	13702	16025	14538	16547
22 Independent Hydro	606	618	552	611	579	388	330	380	535	585	704	830	895	665
23 Hydro Maintenance	-3263	-2761	-2770	-2752	-2705	-1866	-1408	-1883	-1915	-2061	-1805	-1756	-1635	-2785
24 Total Hydro Resources	13606	11748	10952	10543	13396	14292	14594	12884	12248	11081	12601	15099	13797	14428
Other Resources														
25 Small Thermal & Misc.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26 Combustion Turbines	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27 Renewables	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28 Cogeneration	12	12	14	18	20	23	24	23	23	0	0	0	0	0
29 Imports	206	206	208	313	346	444	446	381	382	413	413	238	184	206
30 Regional Transfers (In)	100	100	100	100	100	100	100	100	100	100	100	100	100	100
31 Non-Fed CER (Canada)	237	237	237	237	237	237	237	237	237	235	235	235	235	235
32 Transmission Loss Returns	68	57	52	50	69	74	77	65	61	54	63	78	70	73
33 Large Thermal	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130
34 Non-Utility Generation	3.5	3.5	3	4.1	4.5	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.1	3.2
35 Augmentation Purchases	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36 Augmentation Resources	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37 Total Other Resources	1757	1746	1745	1853	1906	2012	2019	1941	1938	1936	1946	1786	1723	1747
38 Total Resources	15363	13494	12697	12396	15302	16304	16613	14825	14186	13017	14546	16885	15520	16175
Reserves & Losses (1 Hour.)														
39 Contingency Reserves (Non-Spinning)	-390	-363	-346	-351	-410	-441	-440	-409	-377	-353	-375	-395	-380	-404
40 Contingency Reserves (Spinning)	-390	-363	-346	-351	-410	-441	-440	-409	-377	-353	-375	-395	-380	-404
41 Generation Imbalance Reserves	-543	-543	-543	-543	-543	-543	-543	-543	-543	-543	-543	-543	-585	-585
42 Load Following Reserves	-592	-592	-592	-593	-593	-593	-593	-593	-593	-593	-593	-593	-624	-624
43 Federal Transmission Losses	-451	-390	-364	-354	-447	-479	-489	-431	-412	-374	-424	-501	-454	-474
44 Total Reserves & Losses	-2366	-2251	-2192	-2193	-2403	-2497	-2504	-2385	-2301	-2217	-2311	-2427	-2422	-2491

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Capacity (MW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul
45 Total Net Resources	12997	11243	10505	10204	12900	13807	14109	12440	11885	10800	12235	14459	13098	13684
46 Total Firm Surplus/Deficit	1883	632	288	-438	714	404	718	-66	78	-99	967	3183	2338	2223

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Capacity (MW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul
Non-Utility Obligations														
1 Fed. Agencies 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 USBR Obligation	653	653	578	516	160	263	14	300	411	463	463	580	609	670
3 DSI Obligation	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 Fed. Agencies 2012 PSC	186	186	176	213	265	294	264	242	252	190	190	189	193	195
5 Total Firm Non-Utility Obligations	838	838	754	729	425	558	278	542	663	653	653	769	802	865
Transfers Out														
6 NGP 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 GPU 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 NGP 2002 Slice PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9 GPU 2002 Slice PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 IOU 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 NGP 2012 PSC	4816	4816	4569	4814	5294	6169	5987	5683	5176	4991	4991	4775	4780	4986
12 GPU 2012 PSC	1420	1420	1554	1610	2020	2224	2270	2131	1961	1601	1601	1360	1223	1430
13 NGP 2012 Slice PSC	539	458	434	401	563	588	633	540	526	444	515	581	499	603
14 GPU 2012 Slice PSC	2199	1871	1770	1636	2296	2399	2581	2204	2146	1812	2103	2370	2037	2461
15 IOU 2012 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 Exports	1350	1350	1350	1350	1350	1350	1350	1350	1350	1350	1350	1350	1350	1350
17 Regional Transfers (Out)	139	139	141	276	316	414	416	351	345	346	346	171	117	139
18 Federal Diversity	-505	-543	-573	-368	-315	-577	-319	-340	-396	-507	-523	-530	-532	-433
19 Total Transfers Out	9958	9511	9245	9718	11524	12567	12916	11919	11108	10037	10384	10076	9474	10536
20 Total Firm Obligations	10797	10350	9999	10447	11949	13125	13195	12460	11771	10689	11036	10845	10276	11401
Hydro Resources (1 Hour.)														
21 Regulated Hydro	16101	13962	13446	12669	15575	15580	15797	14648	14319	12828	13899	16146	14376	16885
22 Independent Hydro	606	618	552	611	579	388	330	380	535	585	704	830	895	665
23 Hydro Maintenance	-3263	-2761	-2770	-2752	-2705	-1866	-1408	-1883	-1915	-2061	-1805	-1756	-1635	-2785
24 Total Hydro Resources	13443	11819	11228	10529	13449	14102	14719	13145	12938	11352	12798	15220	13636	14766
Other Resources														
25 Small Thermal & Misc.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26 Combustion Turbines	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27 Renewables	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28 Cogeneration	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 Imports	131	131	133	268	301	399	401	336	337	338	338	163	109	131
30 Regional Transfers (In)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31 Non-Fed CER (Canada)	226	226	226	226	226	226	226	226	226	223	223	223	223	223
32 Transmission Loss Returns	67	57	54	50	70	73	78	67	65	55	64	72	62	75
33 Large Thermal	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	0	0	1130
34 Non-Utility Generation	3.5	3.5	3	4.1	4.5	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.1	3.2
35 Augmentation Purchases	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36 Augmentation Resources	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37 Total Other Resources	1557	1547	1546	1678	1731	1832	1840	1763	1763	1751	1759	463	398	1562
38 Total Resources	15000	13367	12774	12207	15180	15935	16559	14908	14701	13102	14557	15683	14034	16328
Reserves & Losses (1 Hour.)														
39 Contingency Reserves (Non-Spinning)	-394	-370	-356	-357	-417	-445	-447	-418	-392	-372	-393	-377	-367	-415
40 Contingency Reserves (Spinning)	-394	-370	-356	-357	-417	-445	-447	-418	-392	-372	-393	-377	-367	-415
41 Generation Imbalance Reserves	-610	-610	-610	-610	-610	-610	-610	-610	-610	-610	-610	-610	-610	-610
42 Load Following Reserves	-637	-637	-637	-637	-637	-637	-637	-637	-637	-637	-637	-637	-637	-637
43 Federal Transmission Losses	-434	-381	-362	-343	-439	-462	-483	-430	-424	-372	-420	-458	-404	-477
44 Total Reserves & Losses	-2468	-2368	-2321	-2304	-2519	-2599	-2624	-2513	-2455	-2362	-2452	-2458	-2384	-2554

Loads and Resources - Federal System
PNW Loads and Resource Study
2020 - 2021 Operating Year
1937 Water Year
[76] 2011 White Book (Final)

Continued **5/27/2011**

Capacity (MW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul
45 Total Net Resources	12532	10998	10453	9903	12662	13335	13936	12395	12247	10740	12106	13224	11650	13774
46 Total Firm Surplus/Deficit	1735	649	453	-544	713	211	741	-65	476	50	1069	2379	1374	2373

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Exhibits 8 – 10

Federal System Monthly 120-Hour Capacity Analysis
Using the 2010 White Book Load Forecast for 1937-Water Conditions

Loads and Resources - Federal System
PNW Loads and Resource Study
2011 - 2012 Operating Year
1937 Water Year
[76] 2011 White Book (Final)

5/27/2011

Capacity 120 (MW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul
Non-Utility Obligations														
1 Fed. Agencies 2002 PSC	132	132	125	0	0	0	0	0	0	0	0	0	0	0
2 USBR Obligation	653	653	578	516	160	263	14	300	411	463	463	580	609	670
3 DSI Obligation	340	340	340	340	340	340	340	340	340	340	340	340	340	340
4 Fed. Agencies 2012 PSC	0	0	0	141	171	194	188	170	177	142	142	133	135	140
5 Total Firm Non-Utility Obligations	1125	1125	1044	998	672	798	543	811	929	946	946	1053	1085	1150
Transfers Out														
6 NGP 2002 PSC	3674	3674	3763	0	0	0	0	0	0	0	0	0	0	0
7 GPU 2002 PSC	2539	2539	2489	0	0	0	0	0	0	0	0	0	0	0
8 NGP 2002 Slice PSC	759	570	572	0	0	0	0	0	0	0	0	0	0	0
9 GPU 2002 Slice PSC	1265	949	953	0	0	0	0	0	0	0	0	0	0	0
10 IOU 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 NGP 2012 PSC	0	0	0	4360	4819	5630	5453	5116	4703	4531	4531	4307	4319	4510
12 GPU 2012 PSC	0	0	0	1468	1847	2039	2079	1890	1793	1459	1459	1224	1096	1293
13 NGP 2012 Slice PSC	0	0	0	364	487	477	518	437	417	303	272	560	494	518
14 GPU 2012 Slice PSC	0	0	0	1487	1988	1947	2114	1783	1700	1236	1110	2283	2015	2114
15 IOU 2012 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 Exports	1785	1785	1778	1633	1586	1587	1585	1586	1586	1614	1614	1678	1678	1680
17 Regional Transfers (Out)	1265	1266	493	475	682	778	833	764	685	771	771	509	490	204
18 Federal Diversity	-817	-884	-933	-1179	-1084	-1068	-1125	-1133	-1038	-1004	-1077	-1011	-864	-782
19 Total Transfers Out	10470	9900	9114	8609	10326	11390	11458	10445	9845	8910	8680	9550	9228	9537
20 Total Firm Obligations	11595	11025	10158	9607	10998	12188	12001	11255	10773	9856	9626	10603	10313	10687
Hydro Resources (120 Hour.)														
21 Regulated Hydro	14131	11237	11289	11272	13500	12812	12946	12042	11509	9438	8450	14061	12666	14615
22 Independent Hydro	606	618	552	611	579	388	330	380	535	585	704	830	895	665
23 Hydro Maintenance	-3263	-2761	-2770	-2752	-2705	-1866	-1408	-1883	-1915	-2061	-1805	-1756	-1635	-2785
24 Total Hydro Resources	11473	9094	9071	9132	11374	11334	11868	10539	10129	7961	7349	13135	11926	12495
Other Resources														
25 Small Thermal & Misc.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26 Combustion Turbines	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27 Renewables	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28 Cogeneration	12	12	14	18	20	23	24	23	23	22	22	19	14	18
29 Imports	206	206	208	313	346	444	446	381	382	413	413	238	184	206
30 Regional Transfers (In)	592	592	297	179	479	422	422	422	422	422	422	122	122	122
31 Non-Fed CER (Canada)	249	249	249	249	249	249	249	249	249	245	245	245	245	245
32 Transmission Loss Returns	0	0	0	45	60	59	64	54	51	37	33	69	61	64
33 Large Thermal	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130
34 Non-Utility Generation	3.5	3.5	3	4.1	4.5	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.1	3.2
35 Augmentation Purchases	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36 Augmentation Resources	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37 Total Other Resources	2193	2193	1902	1939	2288	2331	2339	2263	2262	2274	2270	1828	1760	1788
38 Total Resources	13666	11287	10972	11071	13663	13665	14208	12803	12391	10235	9619	14963	13686	14283
Reserves & Losses (120 Hour.)														
39 Contingency Reserves (Non-Spinning)	-358	-324	-318	-331	-380	-398	-400	-375	-346	-318	-309	-356	-353	-376
40 Contingency Reserves (Spinning)	-358	-324	-318	-331	-380	-398	-400	-375	-346	-318	-309	-356	-353	-376
41 Generation Imbalance Reserves	-311	-311	-338	-290	-290	-290	-290	-290	-294	-320	-320	-320	-320	-320
42 Load Following Reserves	-415	-415	-432	-403	-403	-403	-403	-403	-408	-419	-419	-419	-419	-419
43 Federal Transmission Losses	-409	-332	-320	-325	-409	-408	-426	-381	-368	-297	-277	-453	-410	-429
44 Total Reserves & Losses	-1852	-1706	-1726	-1681	-1863	-1897	-1919	-1824	-1762	-1671	-1633	-1903	-1855	-1919

Loads and Resources - Federal System
PNW Loads and Resource Study
2011 - 2012 Operating Year
1937 Water Year
[76] 2011 White Book (Final)

Continued **5/27/2011**

Capacity 120 (MW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul
45 Total Net Resources	11814	9581	9246	9389	11799	11768	12288	10979	10629	8564	7986	13060	11831	12364
46 Total Firm Surplus/Deficit	219	-1444	-912	-218	801	-420	288	-276	-144	-1292	-1640	2457	1518	1677

Loads and Resources - Federal System
PNW Loads and Resource Study
2015 - 2016 Operating Year
1937 Water Year
[76] 2011 White Book (Final)

5/27/2011

Capacity 120 (MW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul
Non-Utility Obligations														
1 Fed. Agencies 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 USBR Obligation	653	653	578	517	160	263	14	300	411	463	463	580	609	670
3 DSI Obligation	340	340	340	340	340	340	340	340	340	340	340	340	340	340
4 Fed. Agencies 2012 PSC	153	153	144	172	212	237	223	201	211	164	164	159	161	165
5 Total Firm Non-Utility Obligations	1146	1146	1063	1029	712	841	577	841	963	967	967	1079	1111	1175
Transfers Out														
6 NGP 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 GPU 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 NGP 2002 Slice PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9 GPU 2002 Slice PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 IOU 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 NGP 2012 PSC	4594	4594	4361	4613	5088	5942	5752	5391	4968	4785	4785	4565	4564	4761
12 GPU 2012 PSC	1372	1372	1507	1520	1918	2118	2162	1964	1861	1511	1511	1276	1142	1344
13 NGP 2012 Slice PSC	468	371	355	343	478	474	509	428	405	292	261	553	479	503
14 GPU 2012 Slice PSC	1911	1515	1447	1401	1950	1933	2077	1748	1654	1193	1065	2255	1954	2053
15 IOU 2012 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 Exports	1498	1498	1496	1466	1420	1421	1419	1420	1420	1448	1448	1434	1435	1425
17 Regional Transfers (Out)	171	174	167	300	508	603	608	539	460	470	472	209	155	170
18 Federal Diversity	-768	-830	-892	-1242	-1146	-1128	-1188	-1191	-1094	-1055	-1132	-1065	-908	-821
19 Total Transfers Out	9248	8694	8442	8402	10215	11362	11339	10299	9673	8643	8410	9227	8820	9435
20 Total Firm Obligations	10393	9840	9505	9431	10928	12203	11917	11140	10636	9611	9377	10306	9931	10610
Hydro Resources (120 Hour.)														
21 Regulated Hydro	14559	12095	11741	11423	13895	13305	13333	12424	11828	9719	8719	14408	12850	14795
22 Independent Hydro	606	618	552	611	579	388	330	380	535	585	704	830	895	665
23 Hydro Maintenance	-3263	-2761	-2770	-2752	-2705	-1866	-1408	-1883	-1915	-2061	-1805	-1756	-1635	-2785
24 Total Hydro Resources	11901	9952	9523	9282	11769	11827	12256	10921	10448	8242	7617	13482	12109	12675
Other Resources														
25 Small Thermal & Misc.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26 Combustion Turbines	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27 Renewables	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28 Cogeneration	12	12	14	18	20	23	24	23	23	0	0	0	0	0
29 Imports	206	206	208	313	346	444	446	381	382	413	413	238	184	206
30 Regional Transfers (In)	100	100	100	100	100	100	100	100	100	100	100	100	100	100
31 Non-Fed CER (Canada)	237	237	237	237	237	237	237	237	237	235	235	235	235	235
32 Transmission Loss Returns	58	46	44	42	59	59	63	53	50	36	32	68	59	62
33 Large Thermal	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130
34 Non-Utility Generation	3.5	3.5	3	4.1	4.5	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.1	3.2
35 Augmentation Purchases	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36 Augmentation Resources	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37 Total Other Resources	1747	1735	1736	1845	1896	1997	2005	1929	1927	1919	1915	1776	1712	1737
38 Total Resources	13648	11687	11259	11128	13665	13824	14260	12850	12375	10161	9532	15258	13822	14412
Reserves & Losses (120 Hour.)														
39 Contingency Reserves (Non-Spinning)	-365	-337	-326	-333	-386	-405	-405	-380	-350	-312	-303	-371	-355	-378
40 Contingency Reserves (Spinning)	-365	-337	-326	-333	-386	-405	-405	-380	-350	-312	-303	-371	-355	-378
41 Generation Imbalance Reserves	-543	-543	-543	-543	-543	-543	-543	-543	-543	-543	-543	-543	-585	-585
42 Load Following Reserves	-592	-592	-592	-593	-593	-593	-593	-593	-593	-593	-593	-593	-624	-624
43 Federal Transmission Losses	-395	-331	-317	-312	-394	-398	-412	-367	-353	-281	-261	-448	-399	-417
44 Total Reserves & Losses	-2260	-2140	-2104	-2115	-2302	-2345	-2360	-2263	-2190	-2042	-2003	-2326	-2318	-2382

Loads and Resources - Federal System
PNW Loads and Resource Study
2015 - 2016 Operating Year
1937 Water Year
[76] 2011 White Book (Final)

Continued **5/27/2011**

Capacity 120 (MW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul
45 Total Net Resources	11388	9547	9156	9013	11363	11479	11901	10587	10185	8119	7530	12932	11504	12030
46 Total Firm Surplus/Deficit	994	-293	-349	-418	435	-724	-16	-553	-451	-1491	-1848	2625	1573	1419

Loads and Resources - Federal System
PNW Loads and Resource Study
2020 - 2021 Operating Year
1937 Water Year
[76] 2011 White Book (Final)

5/27/2011

Capacity 120 (MW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul
Non-Utility Obligations														
1 Fed. Agencies 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2 USBR Obligation	653	653	578	516	160	263	14	300	411	463	463	580	609	670
3 DSI Obligation	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 Fed. Agencies 2012 PSC	186	186	176	213	265	294	264	242	252	190	190	189	193	195
5 Total Firm Non-Utility Obligations	838	838	754	729	425	558	278	542	663	653	653	769	802	865
Transfers Out														
6 NGP 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7 GPU 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8 NGP 2002 Slice PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9 GPU 2002 Slice PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10 IOU 2002 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11 NGP 2012 PSC	4816	4816	4569	4814	5294	6169	5987	5683	5176	4991	4991	4775	4780	4986
12 GPU 2012 PSC	1420	1420	1554	1610	2020	2224	2270	2131	1961	1601	1601	1360	1223	1430
13 NGP 2012 Slice PSC	464	369	353	343	483	478	518	436	399	295	267	485	423	499
14 GPU 2012 Slice PSC	1891	1504	1440	1399	1971	1951	2113	1777	1630	1203	1088	1977	1727	2037
15 IOU 2012 PSC	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16 Exports	1350	1350	1350	1350	1350	1350	1350	1350	1350	1350	1350	1350	1350	1350
17 Regional Transfers (Out)	139	139	141	276	316	414	416	351	345	346	346	171	117	139
18 Federal Diversity	-812	-878	-943	-1308	-1209	-1184	-1251	-1264	-1150	-1108	-1188	-1122	-957	-864
19 Total Transfers Out	9268	8720	8463	8484	10225	11402	11402	10464	9711	8678	8454	8996	8663	9577
20 Total Firm Obligations	10107	9558	9218	9213	10650	11960	11681	11005	10374	9331	9107	9765	9465	10442
Hydro Resources (120 Hour.)														
21 Regulated Hydro	14579	12149	11812	11497	13968	13367	13482	12537	11765	9819	8880	14202	12843	14789
22 Independent Hydro	606	618	552	611	579	388	330	380	535	585	704	830	895	665
23 Hydro Maintenance	-3263	-2761	-2770	-2752	-2705	-1866	-1408	-1883	-1915	-2061	-1805	-1756	-1635	-2785
24 Total Hydro Resources	11921	10006	9594	9357	11842	11888	12404	11035	10385	8343	7779	13276	12102	12670
Other Resources														
25 Small Thermal & Misc.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26 Combustion Turbines	0	0	0	0	0	0	0	0	0	0	0	0	0	0
27 Renewables	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28 Cogeneration	0	0	0	0	0	0	0	0	0	0	0	0	0	0
29 Imports	131	131	133	268	301	399	401	336	337	338	338	163	109	131
30 Regional Transfers (In)	0	0	0	0	0	0	0	0	0	0	0	0	0	0
31 Non-Fed CER (Canada)	226	226	226	226	226	226	226	226	226	223	223	223	223	223
32 Transmission Loss Returns	57	46	44	42	60	59	64	54	49	37	33	60	52	62
33 Large Thermal	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	1130	0	0	1130
34 Non-Utility Generation	3.5	3.5	3	4.1	4.5	4.6	4.6	4.6	4.6	4.6	4.6	4.6	4.1	3.2
35 Augmentation Purchases	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36 Augmentation Resources	0	0	0	0	0	0	0	0	0	0	0	0	0	0
37 Total Other Resources	1548	1536	1536	1671	1721	1819	1826	1751	1747	1732	1729	451	389	1549
38 Total Resources	13469	11542	11130	11027	13563	13707	14230	12785	12132	10075	9507	13726	12491	14219
Reserves & Losses (120 Hour.)														
39 Contingency Reserves (Non-Spinning)	-371	-344	-332	-340	-393	-413	-413	-388	-354	-328	-320	-348	-344	-384
40 Contingency Reserves (Spinning)	-371	-344	-332	-340	-393	-413	-413	-388	-354	-328	-320	-348	-344	-384
41 Generation Imbalance Reserves	-610	-610	-610	-610	-610	-610	-610	-610	-610	-610	-610	-610	-610	-610
42 Load Following Reserves	-637	-637	-637	-637	-637	-637	-637	-637	-637	-637	-637	-637	-637	-637
43 Federal Transmission Losses	-385	-322	-309	-305	-386	-390	-407	-361	-341	-274	-255	-395	-354	-409
44 Total Reserves & Losses	-2374	-2256	-2220	-2231	-2419	-2462	-2480	-2382	-2297	-2176	-2141	-2338	-2289	-2424

Loads and Resources - Federal System
PNW Loads and Resource Study
2020 - 2021 Operating Year
1937 Water Year
[76] 2011 White Book (Final)

Continued **5/27/2011**

Capacity 120 (MW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul
45 Total Net Resources	11095	9286	8910	8796	11144	11245	11750	10403	9836	7898	7366	11388	10202	11795
46 Total Firm Surplus/Deficit	988	-272	-307	-417	493	-715	69	-602	-538	-1432	-1741	1624	737	1353

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Exhibits 11 – 20

Federal System Energy Surpluses and Deficits Using the 2010 White Book Load Forecast for 70 Historical Water Conditions

Table A-30: Federal Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2011 - 2012 Operating Year **5/27/2011**
[76] 2011 White Book (Final)

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1929 Federal Surplus/Deficit	954	-888	-485	-185	-46	-919	-900	-769	-618	-771	-148	928	1542	-41	-162
1930 Federal Surplus/Deficit	-195	-1132	-619	-390	-159	-896	-796	-769	-361	-776	-597	862	462	596	-284
1931 Federal Surplus/Deficit	-690	-997	-791	-633	3.3	-823	-926	-737	-1624	-367	-1800	1581	-156	379	-470
1932 Federal Surplus/Deficit	302	-692	-323	-493	-505	-996	-1417	-1259	667	1126	3717	4410	4067	519	574
1933 Federal Surplus/Deficit	-234	-459	-216	-214	-470	244	1400	1941	1803	1734	1367	3081	4399	3451	1383
1934 Federal Surplus/Deficit	2271	912	64	548	2151	3874	4507	4218	3203	4386	3801	3600	2709	489	2580
1935 Federal Surplus/Deficit	-586	-1080	-463	-421	-845	-793	990	1581	840	1900	984	2593	1800	1810	638
1936 Federal Surplus/Deficit	1499	-678	-750	-379	-99	-970	-1702	-763	-474	239	3135	4035	3217	752	411
1937 Federal Surplus/Deficit	252	-702	-887	-407	126	-838	-745	-875	-740	-1434	-1523	1492	891	565	-257
1938 Federal Surplus/Deficit	424	-513	-503	-397	-559	-227	1081	1376	1600	2765	3663	3815	2891	1512	1142
1939 Federal Surplus/Deficit	-275	-1020	-147	-110	-174	-973	-612	-471	-117	2264	2033	3376	1253	472	332
1940 Federal Surplus/Deficit	-643	-1234	-917	-153	211	-294	-895	-102	924	1944	2399	2952	2165	71	430
1941 Federal Surplus/Deficit	-882	-1233	-536	-49	-386	-395	-1099	-747	-440	-331	295	1993	1041	497	-98
1942 Federal Surplus/Deficit	56	-559	75	-532	5	353	1315	-318	-373	-214	1756	2423	2998	2273	731
1943 Federal Surplus/Deficit	1527	38	-334	-268	-578	-457	2031	2183	1197	4492	4718	3826	4061	1368	1524
1944 Federal Surplus/Deficit	896	-855	-1249	-282	-22	-945	-803	-536	-185	-851	511	888	-293	-126	-308
1945 Federal Surplus/Deficit	21	-734	-180	-568	-303	-1440	-1188	-1028	-819	-1848	-1784	2947	2485	-1	-188
1946 Federal Surplus/Deficit	-46	-930	-777	-572	-224	-126	724	759	1771	3204	4314	3873	3276	1719	1138
1947 Federal Surplus/Deficit	948	-506	-246	-327	132	2251	3042	3286	2231	2099	1871	3662	3589	2059	1819
1948 Federal Surplus/Deficit	694	-766	-398	1768	1381	993	2898	1793	1250	2082	3433	4688	4262	2864	2018
1949 Federal Surplus/Deficit	2076	947	-38	59	-62	-55	624	-173	2801	2941	3783	4530	3194	27	1318
1950 Federal Surplus/Deficit	-427	-1353	-1163	-315	-175	-720	2476	2547	3389	3719	2920	3787	3600	2055	1486
1951 Federal Surplus/Deficit	1267	137	-236	634	1744	2520	4071	4189	4291	3801	3635	3872	3085	2868	2617
1952 Federal Surplus/Deficit	1932	-421	-410	1195	717	1076	2305	1915	1888	3830	4210	4543	3406	1863	1936
1953 Federal Surplus/Deficit	881	-598	-796	-361	-153	-924	70	838	1049	1264	1570	3506	4338	2843	994
1954 Federal Surplus/Deficit	1087	-464	-374	35	199	632	2596	2554	1720	2414	2127	3826	3664	3799	1766
1955 Federal Surplus/Deficit	3508	2716	1517	64	792	233	-349	-710	-264	-578	951	2835	4243	3952	1307
1956 Federal Surplus/Deficit	2298	651	-594	183	1222	2418	3852	4045	3474	3414	4318	4081	4150	3085	2599
1957 Federal Surplus/Deficit	1190	4.8	-294	221	-81	666	776	-180	1801	3951	2413	5050	4466	1081	1443
1958 Federal Surplus/Deficit	68	-1020	-480	-239	2.1	-771	1226	1401	1174	2537	2863	4809	4204	987	1204
1959 Federal Surplus/Deficit	64	-653	-605	-360	588	1705	3348	3215	2663	2944	1969	3202	3782	1755	1782
1960 Federal Surplus/Deficit	1445	-123	1768	2350	2226	1816	2007	1110	1735	4655	3304	3132	3233	1666	2137
1961 Federal Surplus/Deficit	461	-883	-316	-119	51	-121	1426	1797	2851	2521	1578	3730	4031	1062	1347
1962 Federal Surplus/Deficit	582	-198	-748	-573	-15	-274	934	1076	-168	4098	4093	3759	3660	-50	981
1963 Federal Surplus/Deficit	192	-643	-785	256	864	1539	1740	1213	1089	801	1202	2878	2651	1858	1174
1964 Federal Surplus/Deficit	1283	-405	-360	-331	-206	-27	67	294	-77	2773	1504	3341	4075	3569	1075
1965 Federal Surplus/Deficit	2305	15	297	556	526	2477	4733	4242	3308	2092	4375	4000	3690	1783	2494
1966 Federal Surplus/Deficit	1616	607	-185	166	248	191	803	750	-340	3841	1948	2844	2258	1978	1058
1967 Federal Surplus/Deficit	1146	-595	-710	-378	-271	229	3088	3312	2000	1249	-182	3225	3714	2366	1443
1968 Federal Surplus/Deficit	1802	-243	-235	-18	297	229	2295	1891	1739	757	558	1963	3072	2348	1248
1969 Federal Surplus/Deficit	1703	457	874	603	1347	1121	3813	3558	2264	3682	3797	4299	3505	2236	2362
1970 Federal Surplus/Deficit	578	-955	-564	-108	108	-718	1096	571	732	1813	1085	3101	4089	937	870
1971 Federal Surplus/Deficit	5.0	-1026	-783	-374	-85	-550	3792	4928	3004	3661	3315	4223	4101	3451	2044
1972 Federal Surplus/Deficit	2589	886	-66	205	164	363	3603	4234	5415	4378	2660	4159	4021	3619	2577
1973 Federal Surplus/Deficit	3241	1817	82	60	170	134	1045	-131	-99	-1278	246	1984	1671	68	588
1974 Federal Surplus/Deficit	-693	-1329	-886	-533	-412	466	5178	4855	4245	4113	4323	4073	4135	4063	2357
1975 Federal Surplus/Deficit	2130	976	-269	-470	-28	-218	1509	1321	1417	959	1261	3768	4258	3856	1485
1976 Federal Surplus/Deficit	694	47	79	727	1665	3337	3378	3651	3499	4043	3872	4208	3702	3187	2644
1977 Federal Surplus/Deficit	3570	3451	2408	83	25	-845	-816	-432	-227	-1403	105	319	-490	-434	206
1978 Federal Surplus/Deficit	233	-457	-342	-714	-709	749	732	1061	948	3511	1769	3387	2166	1962	980
1979 Federal Surplus/Deficit	552	-419	947	232	57	-737	454	-672	1366	883	1552	3842	1496	51	697
1980 Federal Surplus/Deficit	-817	-1230	-921	-462	-101	-1165	-539	-639	-658	2223	2797	4440	3555	438	450
1981 Federal Surplus/Deficit	-148	-1009	-378	-103	-48	2023	2684	1760	1648	-220	1281	3049	4418	3001	1502
1982 Federal Surplus/Deficit	2618	1427	-375	-76	383	725	1636	4602	4503	3208	2585	4070	3829	2802	2243
1983 Federal Surplus/Deficit	2445	575	792	732	478	957	2754	2562	4178	3225	2489	4062	3588	2763	2269
1984 Federal Surplus/Deficit	2344	578	64	70	1872	880	2596	2681	2665	4354	4007	3828	4211	2678	2257
1985 Federal Surplus/Deficit	1374	-646	-27	-21	465	127	1398	362	-331	2678	2858	3876	2126	-662	866
1986 Federal Surplus/Deficit	-1192	-1456	-683	-341	785	-436	1254	2473	5407	3597	3315	2790	3058	1297	1470
1987 Federal Surplus/Deficit	702	-846	-844	-656	251	85	-528	-1157	609	370	1137	3631	2179	-125	347
1988 Federal Surplus/Deficit	-592	-1316	-1021	-696	-312	-1217	-1157	-889	-547	-966	553	1782	860	413	-328
1989 Federal Surplus/Deficit	243	-672	-637	-755	-504	-686	-713	-450	403	2390	3256	3018	2174	166	382
1990 Federal Surplus/Deficit	-1093	-1213	-775	-540	87	199	1720	2296	1285	1698	4097	2938	3494	1437	1148
1991 Federal Surplus/Deficit	1012	-126	-880	-682	1727	1083	2684	2798	1799	2784	2262	3626	3038	3149	1770
1992 Federal Surplus/Deficit	2378	423	-656	-531	-64	-716	67	-653	1303	-201	425	1868	1569	-393	278

Table A-30: Federal Surplus/Deficit - By Water Year
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2011 - 2012 Operating Year
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Continued **5/27/2011**

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1993 Federal Surplus/Deficit	-945	-1150	-1128	-655	-227	-725	-882	-1604	-511	202	65	3441	1987	820	-27
1994 Federal Surplus/Deficit	381	-449	-1159	-642	151	-690	-958	-297	-417	-868	788	1832	1636	-69	-59
1995 Federal Surplus/Deficit	-733	-1210	-1010	-835	-516	-1172	-741	1128	1876	2589	1223	2934	3301	1872	641
1996 Federal Surplus/Deficit	306	-636	-453	89	2447	4549	4726	5131	4454	3653	4810	4236	4206	3738	3092
1997 Federal Surplus/Deficit	2244	-54	-353	-49	261	806	4852	4984	4969	3828	4546	3952	4091	3673	2697
1998 Federal Surplus/Deficit	2075	486	893	2003	1327	603	922	1261	1253	1148	2221	4616	4301	1609	1811
-Ranked Averages-															
Top Ten Percent	1667	278	-222	334	1379	2552	4142	4350	4186	3929	3949	4016	3709	2951	2686
Middle Eighty Percent	821	-302	-281	-83	178	125	1216	1224	1391	2040	2270	3441	3173	1630	1199
Bottom Ten Percent	92	-946	-747	-452	-102	-1011	-931	-800	-699	-1002	-684	1497	827	255	-285

Table A-30: Federal Surplus/Deficit - By Water Year
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Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1929 Federal Surplus/Deficit	833	-271	245	-148	-19	-872	-654	-662	-359	-210	420	992	1330	2.3	20
1930 Federal Surplus/Deficit	245	-533	-28	-353	-132	-849	-549	-662	-103	-215	-30	928	287	640	-88
1931 Federal Surplus/Deficit	273	-423	17	-596	30	-776	-679	-630	-1366	194	-1232	1619	-324	423	-238
1932 Federal Surplus/Deficit	-242	-893	-390	-455	-478	-949	-1171	-1152	926	1687	4266	4378	3487	563	602
1933 Federal Surplus/Deficit	356	-49	411	-176	-443	291	1646	2048	2061	2295	1934	3106	3777	3394	1528
1934 Federal Surplus/Deficit	2172	1478	122	586	2162	3878	4705	4281	3435	4860	4313	3587	2402	532	2665
1935 Federal Surplus/Deficit	-310	-551	-115	-384	-819	-746	1453	1404	1098	2461	1551	2639	1568	1827	788
1936 Federal Surplus/Deficit	1294	-139	-522	-341	-73	-923	-1456	-656	-216	800	3703	4053	2881	795	532
1937 Federal Surplus/Deficit	402	-345	-388	-370	152	-791	-499	-768	-482	-873	-956	1556	704	608	-92
1938 Federal Surplus/Deficit	140	-618	65	-360	-533	-180	1517	1429	1658	3324	4210	3825	2534	1536	1247
1939 Federal Surplus/Deficit	126	-342	93	-73	-147	-926	-366	-364	142	2825	2600	3425	1083	516	501
1940 Federal Surplus/Deficit	28	-658	-176	-115	238	-247	-649	5	1183	2505	2960	3009	1955	115	643
1941 Federal Surplus/Deficit	-295	-829	-167	-12	-359	-348	-853	-640	-182	230	862	2045	861	540	76
1942 Federal Surplus/Deficit	79	-315	229	-495	31	400	1561	-211	-115	347	2323	2461	2602	2275	835
1943 Federal Surplus/Deficit	1002	258	566	-231	-552	-410	2270	2282	1455	4941	5158	3832	3391	1368	1626
1944 Federal Surplus/Deficit	454	-108	-279	-245	4.5	-898	-556	-429	73	-290	1079	953	-460	-82	-111
1945 Federal Surplus/Deficit	-114	-566	101	-531	-277	-1393	-942	-921	-560	-1287	-1217	3008	2189	42	-69
1946 Federal Surplus/Deficit	381	-345	-101	-535	-198	-79	970	866	2029	3735	4871	3836	2907	1613	1300
1947 Federal Surplus/Deficit	927	156	220	-290	158	2290	3267	3386	2489	2660	2438	3703	3296	2063	1964
1948 Federal Surplus/Deficit	859	85	26	1790	1408	1040	3137	1893	1508	2643	3982	4543	3615	2826	2132
1949 Federal Surplus/Deficit	2042	1388	404	96	-35	-7.8	870	-66	3051	3489	4319	4556	2959	71	1467
1950 Federal Surplus/Deficit	-329	-898	-412	-278	-149	-673	2702	2647	3639	4251	3473	3807	3044	2021	1624
1951 Federal Surplus/Deficit	1827	1056	152	671	1763	2559	4284	4289	4523	4308	4146	3853	2672	2811	2763
1952 Federal Surplus/Deficit	1676	515	202	1226	744	1123	2544	2262	1871	4359	4741	4460	3171	1872	2089
1953 Federal Surplus/Deficit	804	-22	-434	-323	-126	-877	316	1046	1207	1825	2138	3526	3918	2806	1116
1954 Federal Surplus/Deficit	1372	607	145	72	226	679	2835	2653	1978	2975	2695	3841	3034	3702	1912
1955 Federal Surplus/Deficit	2704	2671	1909	101	818	280	-103	-603	-5.6	-17	1518	2845	3640	3862	1360
1956 Federal Surplus/Deficit	2160	834	-98	220	1248	2457	4082	4108	3724	3928	4804	3996	3457	3036	2665
1957 Federal Surplus/Deficit	1140	489	40	258	-55	713	1022	-73	2060	4495	2977	4867	3730	1125	1528
1958 Federal Surplus/Deficit	117	-422	15	-202	29	-724	1468	1500	1432	3098	3431	4749	3612	1031	1329
1959 Federal Surplus/Deficit	233	-184	-77	-323	614	1744	3578	3315	2921	3504	2518	3186	3270	1750	1908
1960 Federal Surplus/Deficit	1985	811	2187	2372	2237	1855	2248	1217	1993	5138	3827	3167	2949	1683	2316
1961 Federal Surplus/Deficit	840	-141	-263	-82	77	-74	1664	1896	3101	3082	2146	3735	3500	1103	1463
1962 Federal Surplus/Deficit	222	30	-187	-536	12	-227	1180	1183	91	4602	4607	3787	3261	-6.4	1098
1963 Federal Surplus/Deficit	416	-47	-327	293	890	1578	1978	1312	1348	1362	1770	2934	2306	1876	1330
1964 Federal Surplus/Deficit	1028	38	177	-294	-180	20	314	401	181	3334	2071	3354	3422	3522	1181
1965 Federal Surplus/Deficit	2084	656	641	593	553	2517	4931	4322	3558	2639	4898	3981	3331	1802	2603
1966 Federal Surplus/Deficit	1865	1190	-143	203	275	238	1049	857	-82	4359	2505	2879	1970	1975	1181
1967 Federal Surplus/Deficit	1003	45	-144	-341	-245	275	3301	3411	2259	1810	386	3245	3152	2315	1561
1968 Federal Surplus/Deficit	1461	295	91	19	323	276	2533	2197	1756	1318	1125	1985	2845	2317	1364
1969 Federal Surplus/Deficit	1696	911	1174	640	1373	1168	4043	3651	2522	4208	4311	4173	3130	2213	2460
1970 Federal Surplus/Deficit	483	-235	-30	-71	134	-671	1334	780	889	2374	1652	3142	3618	981	1017
1971 Federal Surplus/Deficit	455	-172	-240	-337	-59	-503	4023	4975	3262	4188	3846	4146	3411	3399	2167
1972 Federal Surplus/Deficit	2481	1264	374	243	190	410	3816	4333	5624	4841	3181	4085	3551	3551	2663
1973 Federal Surplus/Deficit	2697	2073	611	97	196	181	1291	-24	159	-717	814	2041	1476	111	721
1974 Federal Surplus/Deficit	46	-603	60	-496	-385	513	5365	4904	4495	4601	4807	4039	3472	3987	2517
1975 Federal Surplus/Deficit	2270	1590	291	-432	-1.5	-171	1748	1428	1675	1520	1828	3773	3610	3763	1610
1976 Federal Surplus/Deficit	1426	852	620	764	1691	3376	3609	3750	3750	4556	4389	4182	3262	3117	2806
1977 Federal Surplus/Deficit	2905	2862	2583	120	52	-798	-570	-325	31	-842	672	385	-658	-391	272
1978 Federal Surplus/Deficit	-145	-988	-547	-677	-683	789	979	1168	1206	4042	2336	3433	1915	1977	1013
1979 Federal Surplus/Deficit	669	14	1386	269	83	-690	701	-565	1624	1444	2120	3885	1341	95	862
1980 Federal Surplus/Deficit	-368	-755	-351	-425	-75	-1118	-292	-532	-400	2784	3353	4381	3366	482	628
1981 Federal Surplus/Deficit	18	-639	87	-66	-22	2062	2914	1859	1906	341	1849	3090	3834	2947	1617
1982 Federal Surplus/Deficit	2370	1696	194	-39	409	772	1874	4682	4746	3760	3145	4063	3218	2744	2331
1983 Federal Surplus/Deficit	2313	1600	1203	769	504	1004	2985	2662	4421	3757	3043	4059	3227	2727	2410
1984 Federal Surplus/Deficit	2056	986	482	107	1890	927	2830	2780	2916	4872	4534	3871	3710	2636	2356
1985 Federal Surplus/Deficit	1017	73	280	16	491	174	1645	469	-73	3239	3425	3928	1856	-618	1002
1986 Federal Surplus/Deficit	-587	-1070	-299	-304	811	-389	1492	2568	5616	4109	3848	2834	2690	1336	1615
1987 Federal Surplus/Deficit	617	-178	-245	-619	278	132	-282	-1050	867	931	1705	3689	1977	-81	525
1988 Federal Surplus/Deficit	-470	-1161	-240	-659	-286	-1171	-911	-782	-289	-405	1120	1839	678	456	-151
1989 Federal Surplus/Deficit	-87	-575	-149	-718	-478	-639	-467	-343	661	2937	3792	3043	1909	209	504
1990 Federal Surplus/Deficit	-20	-684	-203	-503	113	246	2155	2138	1543	2259	4667	3009	2954	1452	1324
1991 Federal Surplus/Deficit	1413	460	-224	-645	1754	1130	3110	2857	1802	3345	2812	3677	2656	3077	1927
1992 Federal Surplus/Deficit	2284	1388	-52	-494	-37	-669	314	-546	1562	360	993	1932	1391	-350	470

Table A-30: Federal Surplus/Deficit - By Water Year
PNW Loads and Resource Study
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Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1993 Federal Surplus/Deficit	-643	-1121	-510	-618	-201	-678	-636	-1497	-253	763	633	3503	1798	859	141
1994 Federal Surplus/Deficit	57	-480	-76	-604	178	-643	-712	-190	-158	-307	1355	1897	1445	-25	116
1995 Federal Surplus/Deficit	-39	-741	-2.1	-797	-490	-1125	-495	1228	2134	3149	1790	2989	3134	1885	870
1996 Federal Surplus/Deficit	299	-130	493	126	2462	4541	4924	5175	4687	4142	5288	4225	3569	3639	3208
1997 Federal Surplus/Deficit	2206	827	-240	-12	287	853	5039	5028	5177	4312	5001	3889	3679	3620	2778
1998 Federal Surplus/Deficit	2132	1246	1172	2024	1354	650	1169	1537	1341	1709	2789	4642	3653	1652	1928
-Ranked Averages-															
Top Ten Percent	1796	883	203	371	1400	2582	4351	4423	4417	4421	4446	3974	3227	2901	2792
Middle Eighty Percent	868	169	188	-47	204	171	1469	1328	1623	2588	2824	3453	2772	1631	1332
Bottom Ten Percent	232	-487	-82	-414	-75	-964	-684	-693	-441	-441	-117	1556	629	299	-104

Table A-30: Federal Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2013 - 2014 Operating Year **5/27/2011**
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Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1929 Federal Surplus/Deficit	935	-168	348	-52	43	-822	-812	-818	-504	-350	280	1332	1950	2.1	85
1930 Federal Surplus/Deficit	347	-430	76	-256	-70	-799	-707	-818	-247	-355	-170	1280	931	626	-21
1931 Federal Surplus/Deficit	375	-320	121	-500	92	-726	-837	-786	-1512	54	-1373	1922	325	426	-173
1932 Federal Surplus/Deficit	-140	-791	-286	-359	-416	-899	-1329	-1308	782	1549	4052	4589	4071	563	650
1933 Federal Surplus/Deficit	458	53	514	-80	-382	342	1490	1894	1919	2157	1796	3266	4253	3151	1546
1934 Federal Surplus/Deficit	2256	1580	226	683	2218	3880	4502	4053	3249	4599	4086	3651	2916	497	2668
1935 Federal Surplus/Deficit	-208	-449	-12	-288	-757	-696	1297	1250	954	2323	1413	2779	2156	1736	826
1936 Federal Surplus/Deficit	1396	-37	-418	-245	-10	-873	-1615	-812	-361	661	3566	4179	3496	785	578
1937 Federal Surplus/Deficit	503	-242	-285	-274	214	-741	-657	-924	-627	-1014	-1097	1892	1336	579	-29
1938 Federal Surplus/Deficit	242	-515	168	-264	-471	-129	1361	1275	1515	3187	4032	3965	3154	1476	1289
1939 Federal Surplus/Deficit	228	-240	196	24	-85	-876	-523	-520	-2.7	2688	2462	3537	1682	482	542
1940 Federal Surplus/Deficit	130	-556	-72	-19	300	-196	-807	-151	1039	2367	2786	3195	2546	104	691
1941 Federal Surplus/Deficit	-193	-727	-63	85	-297	-297	-1011	-796	-326	91	723	2328	1497	528	137
1942 Federal Surplus/Deficit	181	-213	333	-398	94	451	1405	-367	-259	208	2185	2721	3211	2187	886
1943 Federal Surplus/Deficit	1104	361	669	-135	-490	-360	2114	2128	1312	4822	4955	3866	3976	1302	1656
1944 Federal Surplus/Deficit	556	-6	-175	-148	67	-848	-714	-584	-72	-430	940	1306	187	-75	-42
1945 Federal Surplus/Deficit	-12	-463	205	-435	-214	-1344	-1100	-1077	-705	-1428	-1358	3212	2775	46	-18
1946 Federal Surplus/Deficit	483	-243	2.7	-439	-135	-28	814	711	1886	3595	4671	3798	3624	1540	1333
1947 Federal Surplus/Deficit	1029	259	324	-193	221	2330	3094	3225	2346	2522	2300	3822	3936	1982	2004
1948 Federal Surplus/Deficit	961	187	129	1880	1471	1091	2982	1739	1365	2506	3809	4474	4191	2698	2147
1949 Federal Surplus/Deficit	2126	1490	507	192	27	43	714	-222	2903	3358	4152	4580	3632	55	1507
1950 Federal Surplus/Deficit	-228	-796	-309	-182	-86	-623	2529	2493	3490	4106	3350	3816	3573	1935	1645
1951 Federal Surplus/Deficit	1925	1158	256	768	1819	2596	4112	4120	4338	4181	3996	3888	3323	2680	2787
1952 Federal Surplus/Deficit	1778	617	306	1324	807	1175	2613	1827	1729	4217	4585	4377	3822	1809	2114
1953 Federal Surplus/Deficit	906	81	-331	-227	-64	-827	159	892	1063	1686	1999	3645	4396	2705	1143
1954 Federal Surplus/Deficit	1473	709	249	168	288	730	2680	2499	1836	2838	2557	3901	3658	3480	1936
1955 Federal Surplus/Deficit	2788	2756	1997	198	881	331	-260	-759	-150	-157	1380	3078	4039	3649	1378
1956 Federal Surplus/Deficit	2243	936	5.4	317	1312	2494	3928	3930	3575	3799	4561	3988	3983	2861	2671
1957 Federal Surplus/Deficit	1242	592	144	355	7.8	765	865	-229	1917	4339	2843	4778	4370	1100	1557
1958 Federal Surplus/Deficit	219	-320	119	-106	91	-674	1312	1346	1288	2961	3294	4677	4306	1000	1363
1959 Federal Surplus/Deficit	335	-81	27	-226	677	1789	3424	3154	2779	3361	2344	3298	3786	1691	1939
1960 Federal Surplus/Deficit	2069	913	2275	2463	2293	1900	2092	1062	1850	4872	3650	3290	3600	1601	2349
1961 Federal Surplus/Deficit	942	-38	-159	15	139	-24	1509	1742	2960	2945	2008	3812	4021	1075	1497
1962 Federal Surplus/Deficit	323	133	-83	-440	74	-177	1024	1029	-54	4455	4367	3806	3994	-2.0	1141
1963 Federal Surplus/Deficit	517	56	-224	390	953	1622	1822	1157	1204	1223	1631	3120	2899	1792	1373
1964 Federal Surplus/Deficit	1130	140	281	-198	-118	71	157	246	37	3197	1933	3507	3893	3309	1200
1965 Federal Surplus/Deficit	2168	758	745	690	615	2554	4727	4136	3409	2515	4649	4119	4047	1727	2641
1966 Federal Surplus/Deficit	1949	1292	-105	300	337	289	893	702	-226	4172	2375	3032	2557	1857	1211
1967 Federal Surplus/Deficit	1105	147	-40	-245	-183	327	3128	3250	2116	1672	246	3373	3631	2212	1587
1968 Federal Surplus/Deficit	1545	397	195	116	386	327	2378	2043	1613	1179	986	2295	3460	2187	1416
1969 Federal Surplus/Deficit	1780	1013	1270	738	1437	1220	3875	3472	2380	4055	4078	4144	3828	2108	2484
1970 Federal Surplus/Deficit	585	-133	73	26	197	-621	1178	625	746	2236	1513	3327	4265	961	1070
1971 Federal Surplus/Deficit	557	-69	-136	-241	3.6	-453	3869	4764	3120	4049	3692	4107	4001	3175	2174
1972 Federal Surplus/Deficit	2565	1366	477	339	253	461	3644	4171	5324	4633	3079	4049	4098	3282	2651
1973 Federal Surplus/Deficit	2781	2158	714	193	259	232	1135	-180	15	-858	674	2349	2090	99	781
1974 Federal Surplus/Deficit	147	-501	164	-400	-323	565	5150	4650	4337	4465	4591	4020	4005	3779	2511
1975 Federal Surplus/Deficit	2354	1693	360	-336	61	-121	1592	1273	1532	1381	1690	3869	4210	3589	1635
1976 Federal Surplus/Deficit	1528	954	724	861	1751	3414	3455	3587	3600	4428	4183	4114	4001	2942	2827
1977 Federal Surplus/Deficit	2989	2946	2635	217	114	-748	-728	-481	-113	-983	533	760	-9.7	-377	338
1978 Federal Surplus/Deficit	-44	-886	-443	-581	-621	832	822	1052	1024	3847	2198	3510	2511	1897	1045
1979 Federal Surplus/Deficit	771	116	1474	366	145	-639	544	-721	1481	1305	1981	3948	1929	84	899
1980 Federal Surplus/Deficit	-266	-652	-248	-329	-13	-1068	-450	-688	-545	2646	3179	4374	4035	472	666
1981 Federal Surplus/Deficit	120	-536	190	31	41	2107	2760	1705	1763	201	1710	3308	4319	2814	1650
1982 Federal Surplus/Deficit	2454	1780	297	58	472	823	1718	4478	4551	3609	3015	4372	3796	2677	2375
1983 Federal Surplus/Deficit	2397	1702	1294	866	567	1051	2830	2500	4263	3612	2919	4247	3963	2625	2460
1984 Federal Surplus/Deficit	2140	1088	585	204	1947	978	2675	2627	2764	4723	4383	4089	4244	2572	2396
1985 Federal Surplus/Deficit	1119	175	383	113	554	225	1489	314	-217	3093	3288	3989	2444	-607	1042
1986 Federal Surplus/Deficit	-485	-968	-196	-207	874	-339	1336	2403	5394	3976	3737	3046	3341	1271	1661
1987 Federal Surplus/Deficit	719	-75	-141	-523	340	183	-440	-1206	724	791	1566	3782	2527	-78	564
1988 Federal Surplus/Deficit	-368	-1070	-141	-563	-224	-1121	-1069	-938	-433	-545	981	2136	1311	447	-89
1989 Federal Surplus/Deficit	15	-473	-46	-622	-416	-588	-624	-499	517	2813	3625	3193	2485	195	548
1990 Federal Surplus/Deficit	82	-582	-99	-407	176	297	1999	1984	1400	2121	4474	3130	3557	1407	1364
1991 Federal Surplus/Deficit	1511	563	-121	-549	1816	1182	2938	2704	1659	3204	2638	3743	3271	2897	1951
1992 Federal Surplus/Deficit	2368	1478	51	-398	25	-619	156	-702	1419	220	854	2247	2016	-347	533

Table A-30: Federal Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2013 - 2014 Operating Year
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Continued **5/27/2011**

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1993 Federal Surplus/Deficit	-541	-1018	-406	-522	-139	-628	-794	-1653	-398	623	493	3685	2392	814	187
1994 Federal Surplus/Deficit	159	-377	27	-508	240	-593	-870	-346	-303	-447	1217	2218	2070	-29	180
1995 Federal Surplus/Deficit	63	-639	101	-701	-428	-1075	-653	1326	1727	3012	1652	3190	3785	1821	918
1996 Federal Surplus/Deficit	401	-27	597	223	2518	4522	4721	4934	4502	4030	5069	4335	4291	3413	3221
1997 Federal Surplus/Deficit	2290	929	-137	84	350	897	4824	4867	4865	4205	4776	3878	4246	3361	2764
1998 Federal Surplus/Deficit	2216	1348	1267	2115	1417	701	1012	1383	1198	1571	2651	4858	4342	1668	1988
-Ranked Averages-															
Top Ten Percent	1887	985	307	468	1460	2609	4169	4237	4208	4268	4250	3986	3837	2719	2798
Middle Eighty Percent	965	269	288	49	266	221	1314	1168	1471	2444	2669	3581	3373	1557	1370
Bottom Ten Percent	334	-386	21	-318	-13	-914	-842	-849	-586	-581	-257	1868	1259	293	-41

Table A-30: Federal Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2014 - 2015 Operating Year **5/27/2011**
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Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1929 Federal Surplus/Deficit	872	-210	276	-117	-166	-1037	-1025	-1028	-702	-543	87	933	1020	-234	-163
1930 Federal Surplus/Deficit	284	-472	3.2	-322	-279	-1013	-920	-1028	-446	-548	-362	883	109	404	-259
1931 Federal Surplus/Deficit	312	-362	48	-565	-117	-941	-1050	-996	-1710	-139	-1566	1551	-475	187	-409
1932 Federal Surplus/Deficit	-203	-833	-359	-425	-626	-1114	-1542	-1518	584	1349	3900	4206	2805	327	377
1933 Federal Surplus/Deficit	395	12	442	-145	-591	127	1266	1672	1720	1964	1603	3007	3000	3083	1295
1934 Federal Surplus/Deficit	2176	1523	153	617	1993	3665	4224	3851	3053	4314	3834	3458	1946	296	2423
1935 Federal Surplus/Deficit	-271	-490	-84	-353	-966	-911	1069	1040	756	2131	1220	2539	1211	1584	596
1936 Federal Surplus/Deficit	1320	-78	-491	-311	-219	-1088	-1828	-1022	-559	468	3373	3887	2596	560	341
1937 Federal Surplus/Deficit	441	-284	-358	-339	5.4	-956	-870	-1134	-825	-1207	-1290	1501	510	373	-266
1938 Federal Surplus/Deficit	179	-557	96	-329	-680	-344	1133	1062	1317	2944	3844	3647	2166	1290	1043
1939 Federal Surplus/Deficit	165	-281	124	-42	-294	-1091	-736	-730	-201	2495	2270	3318	880	280	322
1940 Federal Surplus/Deficit	67	-597	-145	-84	91	-411	-1019	-360	841	2170	2632	2894	1651	-121	456
1941 Federal Surplus/Deficit	-257	-769	-136	19	-506	-512	-1224	-1006	-525	-102	530	1953	684	305	-99
1942 Federal Surplus/Deficit	118	-254	260	-464	-115	236	1189	-577	-458	15	1992	2346	2418	2050	659
1943 Federal Surplus/Deficit	1041	320	597	-200	-699	-575	1886	1903	1114	4428	4698	3640	2613	1149	1380
1944 Federal Surplus/Deficit	493	-47	-248	-214	-142	-1063	-927	-794	-270	-623	747	905	-616	-318	-281
1945 Federal Surplus/Deficit	-75	-505	132	-500	-423	-1559	-1313	-1287	-904	-1621	-1551	2899	1792	-193	-264
1946 Federal Surplus/Deficit	420	-285	-70	-504	-344	-243	601	501	1688	3311	4457	3609	2586	1377	1095
1947 Federal Surplus/Deficit	967	218	251	-259	12	2099	2882	2991	2148	2316	2094	3580	2808	1829	1755
1948 Federal Surplus/Deficit	899	146	57	1799	1262	876	2754	1513	1167	2294	3652	4456	2792	2597	1901
1949 Federal Surplus/Deficit	2046	1450	435	127	-182	-172	501	-432	2689	3083	3933	4408	2510	-165	1257
1950 Federal Surplus/Deficit	-291	-838	-382	-247	-295	-838	2331	2268	3276	3811	3077	3633	2315	1810	1389
1951 Federal Surplus/Deficit	1845	1118	183	703	1602	2366	4212	4077	3131	3872	3757	3659	2517	2582	2519
1952 Federal Surplus/Deficit	1713	576	233	1249	598	959	2384	1602	1530	3893	4342	4285	2858	1637	1883
1953 Federal Surplus/Deficit	844	40	-404	-292	-273	-1042	-33	656	865	1493	1807	3423	3077	2575	886
1954 Federal Surplus/Deficit	1412	669	176	103	79	515	2451	2274	1637	2627	2346	3651	2381	3406	1682
1955 Federal Surplus/Deficit	2663	2682	1926	133	672	116	-473	-969	-348	-350	1187	2753	2812	3558	1119
1956 Federal Surplus/Deficit	2164	896	-67	252	1101	2263	3692	3696	3361	3473	4274	3837	2567	2792	2401
1957 Federal Surplus/Deficit	1180	551	71	289	-201	550	653	-438	1719	4080	2606	4807	2936	890	1301
1958 Federal Surplus/Deficit	156	-361	46	-171	-118	-889	1083	1121	1090	2747	3080	4692	3097	796	1125
1959 Federal Surplus/Deficit	272	-123	-46	-292	468	1566	3188	2920	2581	3132	2177	3069	2441	1533	1672
1960 Federal Surplus/Deficit	1989	873	2192	2381	2068	1676	1864	853	1652	4595	3413	3051	2488	1449	2095
1961 Federal Surplus/Deficit	880	-80	-232	-51	-70	-238	1280	1718	2542	2737	1801	3604	2701	870	1228
1962 Federal Surplus/Deficit	260	91	-156	-505	-135	-391	811	819	-252	4118	4087	3612	2864	-242	884
1963 Federal Surplus/Deficit	455	14	-297	325	744	1400	1594	932	1006	1030	1438	2822	1891	1628	1130
1964 Federal Surplus/Deficit	1067	99	208	-263	-327	-144	-56	36	-161	3004	1740	3278	3052	3249	988
1965 Federal Surplus/Deficit	2088	718	673	625	406	2323	4495	3876	3195	2255	4421	3882	2918	1556	2383
1966 Federal Surplus/Deficit	1869	1252	-113	235	128	74	680	492	-424	3938	2109	2774	1606	1731	982
1967 Federal Surplus/Deficit	1043	106	-113	-310	-392	112	2928	3017	1918	1479	53	3143	2247	2111	1326
1968 Federal Surplus/Deficit	1465	356	122	50	177	112	2150	1818	1415	986	793	1889	2449	2086	1168
1969 Federal Surplus/Deficit	1700	973	1198	672	1228	1005	3653	3238	2182	3726	3807	4039	2703	1981	2241
1970 Federal Surplus/Deficit	522	-174	0.7	-40	-12	-836	950	415	548	2043	1320	3042	2958	746	800
1971 Federal Surplus/Deficit	494	-111	-209	-306	-205	-667	3632	4487	2922	3754	3474	3945	2618	3149	1914
1972 Federal Surplus/Deficit	2486	1326	405	274	43	246	3443	3937	5123	4326	2758	3877	2741	3248	2392
1973 Federal Surplus/Deficit	2656	2100	642	128	50	17	922	-390	-183	-1051	482	1961	1205	-125	535
1974 Federal Surplus/Deficit	84	-542	91	-466	-533	346	4856	4429	4123	4100	4300	3800	2652	3657	2232
1975 Federal Surplus/Deficit	2274	1653	322	-402	-148	-336	1363	1059	1334	1188	1497	3586	2882	3536	1380
1976 Federal Surplus/Deficit	1466	914	652	796	1534	3184	3218	3353	3386	4113	3938	3928	2808	2885	2576
1977 Federal Surplus/Deficit	2864	2843	2528	151	-95	-963	-941	-691	-312	-1175	340	342	-809	-627	89
1978 Federal Surplus/Deficit	-107	-928	-517	-646	-830	610	609	842	826	3663	1984	3299	1578	1736	817
1979 Federal Surplus/Deficit	708	75	1403	301	-64	-854	331	-931	1283	1113	1788	3724	1117	-141	676
1980 Federal Surplus/Deficit	-329	-694	-321	-394	-222	-1283	-663	-898	-743	2445	3027	4283	2921	246	430
1981 Federal Surplus/Deficit	57	-578	118	-35	-168	1884	2523	1480	1565	8.4	1517	2994	3010	2708	1385
1982 Federal Surplus/Deficit	2346	1722	225	-7.8	263	609	1490	4298	4191	3326	2756	3974	2478	2544	2082
1983 Federal Surplus/Deficit	2318	1662	1222	801	358	828	2593	2267	4042	3329	2659	3921	2802	2506	2196
1984 Federal Surplus/Deficit	2060	1048	513	138	1730	763	2439	2397	2558	4391	4125	3754	2920	2439	2116
1985 Federal Surplus/Deficit	1057	134	311	47	345	9.7	1260	104	-415	2869	3082	3765	1502	-855	803
1986 Federal Surplus/Deficit	-549	-1010	-269	-273	665	-554	1108	2166	5192	3666	3450	2729	2548	1101	1423
1987 Federal Surplus/Deficit	656	-117	-214	-589	131	-32	-653	-1416	526	599	1373	3564	1681	-317	338
1988 Federal Surplus/Deficit	-431	-1101	-209	-628	-433	-1336	-1282	-1148	-631	-738	788	1761	496	221	-325
1989 Federal Surplus/Deficit	-49	-515	-118	-687	-625	-803	-837	-709	319	2569	3428	2952	1544	-26	311
1990 Federal Surplus/Deficit	19	-624	-172	-472	-33	82	1771	1759	1202	1901	4308	2889	2378	1229	1111
1991 Federal Surplus/Deficit	1431	522	-194	-615	1599	967	2740	2479	1461	2993	2478	3453	2446	2808	1732
1992 Federal Surplus/Deficit	2288	1420	-22	-463	-184	-834	-56	-912	1220	27	661	1864	1192	-586	293

Table A-30: Federal Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2014 - 2015 Operating Year
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Continued **5/27/2011**

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1993 Federal Surplus/Deficit	-605	-1061	-479	-587	-348	-843	-1006	-1863	-596	431	300	3370	1523	625	-45
1994 Federal Surplus/Deficit	96	-419	-45	-574	31	-808	-1083	-555	-501	-640	1024	1819	1214	-261	-62
1995 Federal Surplus/Deficit	-0.4	-680	29	-767	-637	-1290	-865	1343	1272	2817	1456	2877	2739	1650	668
1996 Federal Surplus/Deficit	339	-69	525	157	2293	4280	4455	4645	4306	3670	4758	4145	3076	3366	2957
1997 Federal Surplus/Deficit	2211	889	-210	19	141	675	4576	4591	4662	3854	4464	3720	2926	3328	2500
1998 Federal Surplus/Deficit	2137	1308	1196	2034	1208	486	792	1158	1000	1377	2457	4588	3115	1418	1721
-Ranked Averages-															
Top Ten Percent	1812	942	234	403	1244	2383	3974	4022	3860	3946	3969	3804	2654	2642	2538
Middle Eighty Percent	894	226	216	-17	57	4.3	1093	957	1260	2213	2460	3328	2282	1392	1121
Bottom Ten Percent	271	-426	-51	-384	-222	-1129	-1055	-1059	-784	-774	-450	1490	405	63	-281

Table A-30: Federal Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2015 - 2016 Operating Year **5/27/2011**
[76] 2011 White Book (Final)

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1929 Federal Surplus/Deficit	770	-313	175	-154	-207	-1081	-1052	-898	-737	-589	42	1290	1782	-86	-86
1930 Federal Surplus/Deficit	181	-576	-98	-359	-320	-1058	-947	-898	-480	-594	-408	1234	825	553	-186
1931 Federal Surplus/Deficit	210	-466	-53	-602	-158	-985	-1077	-865	-1746	-184	-1613	1901	230	335	-336
1932 Federal Surplus/Deficit	-306	-936	-461	-462	-667	-1158	-1570	-1388	551	1308	3863	4593	3532	476	451
1933 Federal Surplus/Deficit	292	-92	341	-182	-632	85	1557	1870	1179	1922	1560	3379	3704	3130	1353
1934 Federal Surplus/Deficit	2092	1436	52	581	1955	3627	4204	3988	3024	4274	3794	3832	2612	445	2504
1935 Federal Surplus/Deficit	-374	-594	-186	-390	-1008	-955	1045	1173	724	2088	1177	2918	1937	1738	676
1936 Federal Surplus/Deficit	1232	-182	-593	-348	-260	-1132	-1856	-891	-593	423	3333	4284	3240	708	412
1937 Federal Surplus/Deficit	338	-387	-459	-376	-35	-1000	-896	-1004	-859	-1254	-1336	1856	1214	521	-194
1938 Federal Surplus/Deficit	76	-661	-5.5	-366	-721	-387	1108	1195	1285	2906	3807	4024	2879	1445	1122
1939 Federal Surplus/Deficit	62	-385	22	-78	-335	-1136	-763	-599	-235	2453	2228	3677	1581	429	394
1940 Federal Surplus/Deficit	-36	-701	-246	-121	51	-454	-1046	-229	809	2130	2592	3272	2352	26	530
1941 Federal Surplus/Deficit	-359	-872	-237	-17	-548	-556	-1251	-875	-559	-148	486	2290	1393	453	-28
1942 Federal Surplus/Deficit	16	-358	159	-501	-156	194	1165	-445	-492	-30	1950	2684	3131	2182	729
1943 Federal Surplus/Deficit	939	216	496	-237	-740	-618	1863	2037	1082	4392	4659	4058	3379	1277	1466
1944 Federal Surplus/Deficit	391	-151	-350	-251	-183	-1107	-954	-664	-304	-669	703	1259	82	-171	-208
1945 Federal Surplus/Deficit	-178	-609	31	-538	-465	-1604	-1340	-1157	-938	-1669	-1597	3281	2495	-46	-191
1946 Federal Surplus/Deficit	318	-388	-171	-541	-386	-286	576	634	1657	3273	4421	4009	3262	1515	1170
1947 Federal Surplus/Deficit	864	114	150	-296	-29	2059	2860	3127	2118	2280	2058	3931	3498	1969	1833
1948 Federal Surplus/Deficit	796	43	-45	1765	1223	835	2732	1647	1135	2255	3615	4783	3512	2716	1973
1949 Federal Surplus/Deficit	1962	1347	334	91	-223	-215	476	-301	2659	3048	3899	4858	3231	-18	1339
1950 Federal Surplus/Deficit	-394	-941	-483	-284	-336	-882	2308	2597	3056	3770	3036	3997	3031	1931	1466
1951 Federal Surplus/Deficit	1761	1014	82	667	1563	2326	4192	4211	3102	3828	3713	4067	3203	2695	2601
1952 Federal Surplus/Deficit	1613	473	132	1214	558	918	2362	1736	1499	3863	4313	4654	3566	1778	1960
1953 Federal Surplus/Deficit	741	-64	-505	-329	-314	-1086	-58	789	833	1450	1764	3789	3805	2710	963
1954 Federal Surplus/Deficit	1309	565	75	67	39	473	2429	2409	1606	2591	2310	4031	3107	3421	1753
1955 Federal Surplus/Deficit	2578	2597	1809	96	633	74	-499	-838	-382	-396	1143	3119	3519	3600	1181
1956 Federal Surplus/Deficit	2080	792	-169	215	1061	2223	3671	3833	3332	3426	4228	4228	3356	2904	2489
1957 Federal Surplus/Deficit	1077	447	-30	253	-242	508	628	-307	1688	4041	2565	5184	3706	1039	1379
1958 Federal Surplus/Deficit	54	-465	-55	-208	-159	-933	1059	1254	1058	2711	3044	5013	3798	945	1198
1959 Federal Surplus/Deficit	170	-226	-147	-329	428	1526	3166	3056	2551	3098	2142	3412	3241	1658	1757
1960 Federal Surplus/Deficit	1905	769	2087	2348	2030	1635	1841	985	1621	4559	3376	3427	3318	1589	2180
1961 Federal Surplus/Deficit	777	-183	-333	-88	-110	-282	1256	1852	2512	2704	1767	3960	3451	1016	1309
1962 Federal Surplus/Deficit	158	-12	-257	-543	-176	-435	786	952	-286	4072	4041	4003	3537	-95	959
1963 Federal Surplus/Deficit	352	-89	-398	288	705	1359	1570	1065	974	986	1395	3186	2585	1782	1205
1964 Federal Surplus/Deficit	965	-4.9	107	-300	-368	-187	-82	168	-195	2963	1698	3630	3759	3306	1053
1965 Federal Surplus/Deficit	2004	614	572	589	366	2283	4475	4008	3165	2216	4386	4248	3596	1706	2463
1966 Federal Surplus/Deficit	1785	1148	-214	198	88	31	655	625	-458	3903	2072	3145	2285	1863	1055
1967 Federal Surplus/Deficit	940	2.5	-214	-347	-433	69	2906	3153	1887	1436	8.4	3509	3048	2218	1412
1968 Federal Surplus/Deficit	1381	252	21	14	136	69	2127	1952	1383	942	749	2259	3130	2210	1244
1969 Federal Surplus/Deficit	1616	869	1089	636	1189	964	3632	3375	2151	3700	3781	4421	3371	2098	2319
1970 Federal Surplus/Deficit	420	-278	-101	-76	-53	-880	925	547	515	2001	1277	3399	3767	894	884
1971 Federal Surplus/Deficit	391	-214	-310	-343	-246	-711	3611	4619	2892	3719	3438	4334	3319	3236	1995
1972 Federal Surplus/Deficit	2402	1222	304	238	2.9	203	3422	4074	5096	4282	2712	4298	3472	3289	2472
1973 Federal Surplus/Deficit	2572	2015	541	92	9.4	-26	897	-258	-217	-1097	437	2322	1933	23	611
1974 Federal Surplus/Deficit	-18	-646	-10	-503	-574	304	4837	4567	4095	4056	4256	4229	3433	3679	2316
1975 Federal Surplus/Deficit	2190	1549	221	-439	-189	-379	1339	1193	1303	1145	1454	3968	3620	3606	1454
1976 Federal Surplus/Deficit	1364	810	550	760	1495	3145	3197	3490	3357	4059	3884	4356	3507	2976	2655
1977 Federal Surplus/Deficit	2780	2758	2429	115	-136	-1007	-968	-560	-345	-1222	296	694	-101	-480	163
1978 Federal Surplus/Deficit	-209	-1032	-618	-684	-872	568	907	585	794	3632	1952	3653	2295	1885	891
1979 Federal Surplus/Deficit	606	-28	1285	264	-104	-898	306	-800	1251	1069	1746	4099	1766	6.3	743
1980 Federal Surplus/Deficit	-432	-798	-422	-431	-263	-1327	-689	-767	-777	2407	2990	4639	3605	394	500
1981 Federal Surplus/Deficit	-46	-682	16	-71	-209	1844	2501	1613	1534	-37	1475	3374	3752	2771	1459
1982 Federal Surplus/Deficit	2262	1637	123	-44	223	567	1466	4430	4162	3281	2710	4330	3213	2662	2165
1983 Federal Surplus/Deficit	2233	1559	1105	765	317	786	2571	2402	4014	3289	2618	4312	3483	2611	2269
1984 Federal Surplus/Deficit	1976	944	412	102	1691	722	2416	2532	2528	4352	4085	4132	3725	2554	2201
1985 Federal Surplus/Deficit	954	31	210	11	305	-33	1236	236	-449	2831	3044	4155	2167	-708	876
1986 Federal Surplus/Deficit	-651	-1114	-370	-310	625	-597	1083	2295	5166	3626	3410	3103	3261	1245	1503
1987 Federal Surplus/Deficit	554	-220	-315	-626	91	-75	-679	-1286	493	554	1330	3931	2342	-170	405
1988 Federal Surplus/Deficit	-534	-1205	-310	-666	-474	-1380	-1309	-1018	-666	-784	745	2127	1196	369	-252
1989 Federal Surplus/Deficit	-151	-618	-220	-725	-667	-847	-864	-578	286	2537	3397	3306	2237	121	383
1990 Federal Surplus/Deficit	-83	-727	-273	-510	-74	39	1747	1893	1170	1863	4274	3238	3111	1368	1190
1991 Federal Surplus/Deficit	1346	418	-295	-652	1561	925	2849	2574	1180	2964	2447	3907	3150	2890	1801
1992 Federal Surplus/Deficit	2204	1334	-123	-500	-225	-878	-82	-781	1188	-18	617	2229	1901	-439	367

Table A-30: Federal Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2015 - 2016 Operating Year
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Continued **5/27/2011**

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1993 Federal Surplus/Deficit	-707	-1164	-580	-624	-389	-887	-1033	-1734	-630	386	256	3731	2207	774	23
1994 Federal Surplus/Deficit	-7.0	-522	-147	-611	-9.4	-851	-1110	-424	-535	-686	980	2183	1933	-114	13
1995 Federal Surplus/Deficit	-103	-784	-73	-805	-678	-1335	-892	1477	1240	2776	1414	3256	3450	1790	747
1996 Federal Surplus/Deficit	236	-172	423	121	2256	4242	4435	4778	4278	3628	4717	4500	3779	3435	3032
1997 Federal Surplus/Deficit	2126	785	-311	-18	100	633	4624	4605	4635	3798	4418	4102	3627	3367	2572
1998 Federal Surplus/Deficit	2052	1204	1080	2000	1169	444	768	1291	967	1334	2417	4944	3834	1567	1797
-Ranked Averages-															
Top Ten Percent	1723	841	133	366	1205	2343	3964	4140	3832	3899	3924	4198	3365	2730	2618
Middle Eighty Percent	797	124	114	-54	16	-38	1082	1087	1211	2173	2421	3700	2998	1518	1197
Bottom Ten Percent	168	-529	-152	-421	-263	-1173	-1082	-929	-818	-820	-495	1849	1118	211	-208

Table A-30: Federal Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2016 - 2017 Operating Year **5/27/2011**
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Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1929 Federal Surplus/Deficit	767	-339	161	-232	-318	-1195	-1196	-1196	-869	-702	-17	725	1051	-291	-291
1930 Federal Surplus/Deficit	178	-601	-112	-436	-431	-1172	-1092	-1196	-612	-707	-467	673	47	348	-394
1931 Federal Surplus/Deficit	206	-491	-67	-680	-269	-1099	-1222	-1164	-1878	-297	-1672	1340	-573	130	-547
1932 Federal Surplus/Deficit	-310	-962	-475	-540	-778	-1273	-1714	-1687	419	1194	3765	3957	3002	271	258
1933 Federal Surplus/Deficit	289	-117	327	-260	-743	-30	1413	1571	1047	1809	1501	2726	3332	2958	1170
1934 Federal Surplus/Deficit	2072	1396	38	504	1828	3461	3997	3653	2847	4130	3736	3033	2006	240	2264
1935 Federal Surplus/Deficit	-378	-620	-200	-468	-1119	-1069	900	875	592	1975	1117	2265	1305	1527	468
1936 Federal Surplus/Deficit	1215	-207	-608	-425	-371	-1247	-2000	-1190	-725	310	3273	3595	2584	504	203
1937 Federal Surplus/Deficit	335	-413	-474	-454	-146	-1115	-1041	-1303	-992	-1367	-1395	1285	451	316	-401
1938 Federal Surplus/Deficit	73	-687	-20	-444	-832	-502	964	896	1153	2797	3722	3335	2318	1266	920
1939 Federal Surplus/Deficit	58	-410	8.5	-156	-446	-1250	-907	-897	-367	2340	2168	3046	807	224	181
1940 Federal Surplus/Deficit	-40	-727	-261	-199	-60	-569	-1191	-528	676	2017	2509	2671	1691	-178	327
1941 Federal Surplus/Deficit	-364	-899	-252	-95	-659	-670	-1396	-1174	-691	-261	427	1740	627	248	-234
1942 Federal Surplus/Deficit	12	-383	145	-579	-267	79	1021	-744	-624	-143	1891	2156	2423	2018	533
1943 Federal Surplus/Deficit	936	191	482	-315	-852	-733	1718	1738	950	4296	4532	3259	2829	1121	1255
1944 Federal Surplus/Deficit	388	-176	-364	-328	-294	-1222	-1099	-962	-436	-782	644	697	-710	-375	-418
1945 Federal Surplus/Deficit	-182	-634	17	-615	-576	-1718	-1485	-1456	-1070	-1782	-1657	2642	1966	-251	-385
1946 Federal Surplus/Deficit	314	-414	-186	-619	-497	-401	432	335	1524	3169	4349	3195	2712	1473	972
1947 Federal Surplus/Deficit	861	89	136	-373	-140	1944	2683	2828	1985	2162	1994	3229	3036	1792	1632
1948 Federal Surplus/Deficit	794	18	-59	1671	1112	720	2583	1348	1003	2145	3522	3927	2997	2542	1760
1949 Federal Surplus/Deficit	1942	1324	320	13	-334	-329	331	-599	2519	2948	3832	4077	2738	-222	1137
1950 Federal Surplus/Deficit	-398	-968	-498	-362	-448	-996	2133	2298	2916	3677	3010	3271	2493	1789	1262
1951 Federal Surplus/Deficit	1741	991	68	590	1444	2212	3986	3872	2962	3746	3664	3132	2429	2533	2349
1952 Federal Surplus/Deficit	1608	448	118	1120	447	803	2217	1437	1367	3752	4238	3821	2929	1617	1741
1953 Federal Surplus/Deficit	738	-89	-520	-407	-425	-1201	-203	490	700	1337	1705	3064	3369	2569	772
1954 Federal Surplus/Deficit	1307	541	61	-11	-72	359	2283	2110	1474	2474	2247	3274	2585	3269	1549
1955 Federal Surplus/Deficit	2513	2511	1785	19	521	-41	-644	-1137	-514	-509	1084	2561	3099	3412	1001
1956 Federal Surplus/Deficit	2060	768	-183	138	943	2109	3518	3498	3192	3347	4149	3381	2829	2740	2270
1957 Federal Surplus/Deficit	1075	423	-44	175	-353	393	483	-606	1555	3925	2518	4190	3186	834	1158
1958 Federal Surplus/Deficit	50	-490	-69	-286	-270	-1047	915	955	926	2596	2983	4125	3303	740	983
1959 Federal Surplus/Deficit	166	-252	-162	-406	317	1411	3014	2757	2419	2971	2043	2721	2642	1509	1549
1960 Federal Surplus/Deficit	1885	745	2037	2254	1903	1521	1696	687	1489	4410	3314	2735	2688	1420	1969
1961 Federal Surplus/Deficit	774	-208	-348	-165	-221	-396	1112	1553	2372	2584	1700	3214	2895	814	1099
1962 Federal Surplus/Deficit	154	-37	-272	-620	-287	-549	642	653	-418	4003	4004	3260	3047	-300	759
1963 Federal Surplus/Deficit	349	-114	-412	211	594	1244	1426	766	842	873	1336	2563	2076	1612	1015
1964 Federal Surplus/Deficit	962	-30	93	-378	-479	-302	-227	-130	-327	2849	1638	2994	2911	3146	837
1965 Federal Surplus/Deficit	1985	590	558	511	255	2169	4268	3688	3025	2128	4300	3461	3135	1537	2250
1966 Federal Surplus/Deficit	1765	1125	-228	121	-23	-83	511	326	-591	3770	2044	2495	1736	1660	857
1967 Federal Surplus/Deficit	938	-22	-228	-425	-544	-46	2717	2829	1755	1322	-51	2837	2513	2050	1205
1968 Federal Surplus/Deficit	1361	228	7.1	-64	25	-45	1980	1654	1251	829	690	1701	2548	2027	1049
1969 Federal Surplus/Deficit	1596	845	1073	559	1078	849	3465	3040	2019	3600	3704	3567	2886	1921	2101
1970 Federal Surplus/Deficit	416	-303	-115	-154	-164	-995	781	249	383	1888	1218	2804	3232	689	691
1971 Federal Surplus/Deficit	388	-240	-325	-421	-357	-826	3459	4260	2760	3619	3371	3544	2885	3093	1786
1972 Federal Surplus/Deficit	2383	1199	290	160	-108	89	3233	3739	4889	4149	2701	3277	2925	3118	2228
1973 Federal Surplus/Deficit	2506	1974	527	14	-102	-140	753	-557	-349	-1211	378	1731	1205	-182	402
1974 Federal Surplus/Deficit	-22	-672	-24	-580	-685	189	4625	4214	3955	3961	4197	3396	2890	3540	2092
1975 Federal Surplus/Deficit	2171	1526	208	-516	-300	-493	1195	894	1170	1032	1395	3251	3116	3481	1260
1976 Federal Surplus/Deficit	1362	786	537	682	1376	3031	3044	3155	3217	3978	3836	3492	3011	2780	2438
1977 Federal Surplus/Deficit	2715	2672	2374	37	-247	-1122	-1112	-858	-478	-1335	236	144	-908	-685	-55
1978 Federal Surplus/Deficit	-213	-1058	-633	-761	-983	453	762	286	662	3467	1889	2935	1634	1716	678
1979 Federal Surplus/Deficit	603	-53	1265	187	-215	-1013	161	-1099	1119	956	1687	3380	1063	-198	529
1980 Federal Surplus/Deficit	-436	-824	-436	-509	-374	-1442	-834	-1066	-910	2298	2904	3800	3124	189	293
1981 Federal Surplus/Deficit	-50	-707	2.4	-149	-320	1729	2348	1315	1402	-150	1415	2782	3317	2562	1273
1982 Federal Surplus/Deficit	2225	1508	110	-122	111	452	1322	4071	4007	3181	2678	3719	2656	2532	1958
1983 Federal Surplus/Deficit	2214	1536	1084	688	206	672	2419	2103	3860	3185	2582	3646	3028	2498	2082
1984 Federal Surplus/Deficit	1956	921	398	24	1573	607	2264	2233	2388	4235	4023	3486	3179	2425	2005
1985 Federal Surplus/Deficit	951	5.7	196	-67	194	-148	1092	-63	-582	2707	2989	3441	1610	-913	673
1986 Federal Surplus/Deficit	-656	-1140	-384	-387	514	-712	939	1990	4959	3532	3384	2472	2455	1050	1279
1987 Federal Surplus/Deficit	551	-245	-330	-704	-20	-190	-824	-1585	360	441	1271	3221	1658	-375	195
1988 Federal Surplus/Deficit	-538	-1231	-325	-743	-585	-1495	-1454	-1316	-798	-898	685	1534	442	164	-461
1989 Federal Surplus/Deficit	-155	-644	-234	-803	-778	-962	-1008	-877	153	2422	3300	2660	1639	-83	181
1990 Federal Surplus/Deficit	-87	-753	-288	-587	-185	-75	1603	1595	1038	1748	4177	2579	2583	1191	991
1991 Federal Surplus/Deficit	1326	394	-309	-730	1442	811	2661	2275	1048	2848	2350	3106	2381	2661	1561
1992 Federal Surplus/Deficit	2176	1293	-137	-578	-336	-992	-227	-1080	1056	-131	558	1646	1122	-644	156

Table A-30: Federal Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2016 - 2017 Operating Year
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Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1993 Federal Surplus/Deficit	-712	-1191	-595	-702	-500	-1001	-1178	-2033	-762	273	197	3104	1520	572	-180
1994 Federal Surplus/Deficit	-11	-548	-161	-689	-120	-966	-1254	-723	-667	-799	921	1596	1188	-319	-196
1995 Federal Surplus/Deficit	-107	-810	-87	-882	-789	-1449	-1037	1178	1108	2663	1354	2653	2892	1626	553
1996 Federal Surplus/Deficit	232	-197	410	43	2129	4066	4229	4412	4102	3550	4640	3729	3258	3240	2801
1997 Federal Surplus/Deficit	2107	761	-325	-95	-11	518	4412	4245	4447	3714	4339	3284	3134	3213	2346
1998 Federal Surplus/Deficit	2033	1181	1060	1906	1052	330	623	993	835	1221	2357	4314	3327	1363	1601
-Ranked Averages-															
Top Ten Percent	1651	728	158	339	1138	2509	3922	3789	3399	3513	4095	3359	2829	2326	2388
Middle Eighty Percent	793	105	93	-139	-102	-190	913	784	1109	2097	2328	3005	2411	1367	992
Bottom Ten Percent	165	-555	-166	-498	-374	-1288	-1227	-1228	-951	-933	-554	1271	382	5.9	-414

Table A-30: Federal Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2017 - 2018 Operating Year **5/27/2011**
[76] 2011 White Book (Final)

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1929 Federal Surplus/Deficit	679	-424	28	54	36	-844	-867	-866	-575	-386	241	1516	1945	121	52
1930 Federal Surplus/Deficit	90	-687	-245	-151	-77	-821	-762	-866	-317	-391	-210	1460	987	760	-48
1931 Federal Surplus/Deficit	118	-577	-200	-395	85	-748	-893	-834	-1584	18	-1416	2128	392	543	-199
1932 Federal Surplus/Deficit	-398	-1048	-608	-254	-424	-921	-1386	-1357	714	1512	4063	4821	3696	683	592
1933 Federal Surplus/Deficit	200	-202	194	26	-389	322	1743	1903	1342	2126	1759	3607	3868	3339	1488
1934 Federal Surplus/Deficit	1966	1293	-95	790	2200	3866	4391	4021	3188	4479	3994	4060	2775	652	2634
1935 Federal Surplus/Deficit	-467	-705	-333	-183	-765	-718	1230	1206	887	2292	1376	3145	2100	1946	811
1936 Federal Surplus/Deficit	1109	-292	-740	-140	-17	-895	-1672	-860	-431	626	3533	4512	3404	916	550
1937 Federal Surplus/Deficit	246	-498	-606	-168	208	-763	-712	-973	-697	-1051	-1138	2083	1376	729	-56
1938 Federal Surplus/Deficit	-16	-772	-152	-158	-478	-150	1294	1227	1448	3110	4008	4252	3042	1653	1258
1939 Federal Surplus/Deficit	-30	-495	-124	130	-92	-899	-578	-567	-72	2657	2427	3905	1743	636	533
1940 Federal Surplus/Deficit	-128	-812	-393	87	294	-217	-862	-197	971	2333	2792	3499	2515	234	668
1941 Federal Surplus/Deficit	-452	-984	-384	191	-305	-318	-1067	-844	-397	55	685	2517	1555	661	110
1942 Federal Surplus/Deficit	-76	-468	12	-293	87	432	1351	-414	-329	172	2149	2911	3295	2391	868
1943 Federal Surplus/Deficit	848	106	350	-29	-498	-381	2049	2070	1245	4597	4860	4286	3542	1484	1601
1944 Federal Surplus/Deficit	299	-261	-497	-43	60	-870	-770	-632	-141	-467	902	1485	243	36	-71
1945 Federal Surplus/Deficit	-270	-720	-116	-330	-222	-1367	-1156	-1126	-776	-1467	-1400	3508	2658	161	-52
1946 Federal Surplus/Deficit	226	-499	-318	-334	-142	-49	761	666	1820	3478	4622	4237	3426	1723	1308
1947 Federal Surplus/Deficit	773	3.9	3.4	-88	214	2298	3046	3160	2281	2484	2258	4159	3662	2178	1966
1948 Federal Surplus/Deficit	705	-68	-191	1974	1467	1073	2918	1680	1298	2459	3816	5011	3676	2924	2110
1949 Federal Surplus/Deficit	1836	1238	187	299	20	23	661	-269	2823	3252	4100	5086	3395	190	1478
1950 Federal Surplus/Deficit	-486	-1053	-630	-76	-93	-645	2494	2630	3220	3975	3236	4225	3195	2139	1599
1951 Federal Surplus/Deficit	1635	905	-65	876	1807	2565	4379	4245	3266	4033	3914	4295	3366	2904	2732
1952 Federal Surplus/Deficit	1502	363	-15	1422	801	1156	2548	1769	1662	4068	4514	4882	3730	1986	2097
1953 Federal Surplus/Deficit	650	-174	-652	-122	-71	-849	127	821	995	1653	1963	4017	3969	2918	1099
1954 Federal Surplus/Deficit	1219	456	-72	275	282	711	2615	2442	1769	2795	2510	4259	3271	3630	1887
1955 Federal Surplus/Deficit	2360	2361	1618	304	876	311	-314	-807	-220	-193	1342	3346	3683	3809	1308
1956 Federal Surplus/Deficit	1954	683	-316	424	1305	2462	3858	3867	3496	3631	4429	4456	3520	3112	2621
1957 Federal Surplus/Deficit	986	337	-177	461	0.9	745	813	-275	1851	4245	2765	5412	3870	1247	1520
1958 Federal Surplus/Deficit	-38	-576	-202	-0.2	84	-696	1245	1286	1221	2915	3244	5242	3962	1152	1334
1959 Federal Surplus/Deficit	78	-337	-294	-121	671	1764	3353	3089	2715	3302	2341	3640	3404	1866	1890
1960 Federal Surplus/Deficit	1779	660	1871	2557	2274	1874	2027	1018	1784	4764	3576	3654	3481	1797	2313
1961 Federal Surplus/Deficit	686	-294	-481	120	133	-44	1442	1884	2675	2909	1966	4188	3615	1224	1444
1962 Federal Surplus/Deficit	66	-122	-405	-335	68	-197	972	984	-123	4277	4241	4231	3700	112	1095
1963 Federal Surplus/Deficit	260	-200	-545	497	948	1597	1756	1097	1137	1190	1594	3414	2748	1990	1342
1964 Federal Surplus/Deficit	874	-115	-40	-92	-125	50	103	200	-33	3167	1897	3858	3923	3514	1192
1965 Federal Surplus/Deficit	1878	505	426	797	610	2522	4662	4042	3329	2420	4587	4476	3759	1914	2594
1966 Federal Surplus/Deficit	1659	1039	-361	407	331	269	841	657	-296	4108	2271	3372	2448	2072	1191
1967 Federal Surplus/Deficit	849	-108	-361	-140	-190	307	3093	3186	2050	1639	207	3737	3212	2427	1543
1968 Federal Surplus/Deficit	1254	143	-126	222	380	307	2313	1985	1546	1145	948	2486	3294	2419	1377
1969 Federal Surplus/Deficit	1490	760	925	845	1433	1202	3819	3408	2315	3904	3982	4649	3535	2306	2450
1970 Federal Surplus/Deficit	328	-389	-248	132	190	-643	1111	579	677	2205	1476	3627	3931	1102	1021
1971 Federal Surplus/Deficit	300	-325	-458	-135	-3.2	-474	3798	4653	3056	3923	3639	4562	3483	3445	2124
1972 Federal Surplus/Deficit	2233	1114	157	446	246	441	3609	4108	5261	4487	2912	4526	3635	3498	2601
1973 Federal Surplus/Deficit	2354	1871	395	300	253	212	1083	-227	-54	-895	636	2549	2096	230	743
1974 Federal Surplus/Deficit	-110	-757	-157	-295	-331	541	5024	4601	4259	4261	4457	4457	3597	3888	2447
1975 Federal Surplus/Deficit	2064	1428	75	-231	54	-142	1525	1225	1466	1348	1653	4196	3783	3815	1589
1976 Federal Surplus/Deficit	1273	701	404	969	1739	3384	3383	3523	3521	4264	4085	4585	3671	3185	2790
1977 Federal Surplus/Deficit	2562	2522	2207	323	107	-770	-783	-528	-183	-1020	494	921	61	-273	284
1978 Federal Surplus/Deficit	-302	-1143	-765	-476	-629	806	1092	617	957	3837	2152	3881	2458	2093	1028
1979 Federal Surplus/Deficit	515	-139	1117	473	139	-661	491	-769	1414	1272	1945	4327	1929	214	881
1980 Federal Surplus/Deficit	-524	-909	-569	-224	-20	-1090	-505	-736	-615	2611	3190	4867	3768	602	640
1981 Federal Surplus/Deficit	-138	-793	-130	137	34	2082	2687	1646	1697	166	1674	3602	3916	2979	1595
1982 Federal Surplus/Deficit	2046	1485	-23	164	466	804	1652	4465	4327	3486	2910	4558	3377	2870	2289
1983 Federal Surplus/Deficit	2108	1450	936	974	561	1024	2757	2435	4179	3493	2818	4540	3647	2819	2402
1984 Federal Surplus/Deficit	1850	835	265	310	1936	960	2603	2565	2691	4557	4286	4360	3889	2763	2336
1985 Federal Surplus/Deficit	863	-80	63	219	548	204	1422	268	-287	3035	3244	4383	2330	-501	1014
1986 Federal Surplus/Deficit	-744	-1225	-517	-102	869	-360	1269	2328	5331	3831	3610	3331	3425	1453	1638
1987 Federal Surplus/Deficit	462	-331	-463	-418	334	162	-494	-1255	655	757	1529	4159	2505	37	546
1988 Federal Surplus/Deficit	-627	-1316	-458	-458	-231	-1143	-1125	-986	-504	-582	943	2354	1359	576	-115
1989 Federal Surplus/Deficit	-243	-730	-367	-517	-424	-610	-679	-546	448	2741	3598	3534	2400	329	522
1990 Federal Surplus/Deficit	-176	-839	-420	-302	169	277	1933	1926	1333	2067	4474	3465	3274	1576	1324
1991 Federal Surplus/Deficit	1220	309	-442	-444	1805	1163	3036	2607	1343	3168	2647	4135	3313	3099	1934
1992 Federal Surplus/Deficit	2018	1204	-270	-293	18	-640	103	-750	1352	185	816	2456	2064	-232	501

Table A-30: Federal Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2017 - 2018 Operating Year
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Continued **5/27/2011**

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1993 Federal Surplus/Deficit	-800	-1276	-728	-417	-146	-649	-849	-1703	-468	589	454	3959	2370	982	164
1994 Federal Surplus/Deficit	-99	-633	-294	-403	234	-614	-925	-393	-373	-484	1179	2410	2096	93	150
1995 Federal Surplus/Deficit	-195	-895	-219	-597	-435	-1098	-708	1509	1403	2981	1614	3484	3614	1998	881
1996 Federal Surplus/Deficit	144	-283	277	329	2500	4482	4623	4812	4443	3832	4918	4729	3943	3644	3164
1997 Federal Surplus/Deficit	2001	676	-458	190	344	871	4811	4639	4800	4003	4618	4330	3791	3576	2702
1998 Federal Surplus/Deficit	1927	1095	911	2209	1413	682	953	1324	1130	1538	2616	5172	3998	1775	1932
-Ranked Averages-															
Top Ten Percent	1601	727	-13	575	1449	2582	4151	4174	3996	4104	4124	4426	3529	2939	2749
Middle Eighty Percent	687	6.8	-38	154	259	199	1268	1119	1374	2377	2620	3928	3161	1726	1332
Bottom Ten Percent	76	-640	-299	-213	-20	-936	-898	-898	-656	-618	-297	2076	1280	418	-70

Table A-30: Federal Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2018 - 2019 Operating Year **5/27/2011**
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Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1929 Federal Surplus/Deficit	972	-132	324	-65	-92	-983	-958	-956	-659	-475	183	916	1224	-16	-81
1930 Federal Surplus/Deficit	382	-394	50	-270	-205	-959	-853	-956	-402	-480	-267	864	220	623	-185
1931 Federal Surplus/Deficit	410	-284	95	-514	-43	-886	-983	-924	-1669	-71	-1473	1531	-400	405	-338
1932 Federal Surplus/Deficit	-106	-756	-313	-373	-553	-1060	-1476	-1447	629	1421	3968	4150	3177	546	468
1933 Federal Surplus/Deficit	493	91	490	-93	-518	183	1652	1813	1258	2036	1702	2918	3507	3234	1380
1934 Federal Surplus/Deficit	2278	1604	201	671	2055	3676	4238	3895	3059	4359	3938	3226	2180	515	2475
1935 Federal Surplus/Deficit	-174	-413	-38	-302	-894	-857	1140	1116	802	2203	1318	2457	1479	1803	678
1936 Federal Surplus/Deficit	1420	0.2	-445	-259	-146	-1034	-1762	-950	-516	537	3475	3787	2759	779	413
1937 Federal Surplus/Deficit	539	-206	-311	-287	79	-902	-803	-1062	-782	-1141	-1196	1476	624	591	-192
1938 Federal Surplus/Deficit	277	-480	143	-277	-607	-289	1203	1138	1363	3025	3925	3528	2493	1541	1130
1939 Federal Surplus/Deficit	263	-203	171	11	-221	-1037	-669	-657	-157	2568	2370	3238	981	499	391
1940 Federal Surplus/Deficit	164	-520	-98	-32	166	-356	-953	-287	887	2244	2710	2863	1865	96	537
1941 Federal Surplus/Deficit	-159	-692	-89	72	-433	-457	-1157	-934	-481	-34	627	1931	801	523	-25
1942 Federal Surplus/Deficit	216	-176	308	-412	-41	293	1260	-504	-414	83	2092	2348	2598	2294	743
1943 Federal Surplus/Deficit	1141	399	645	-148	-626	-520	1958	1980	1160	4525	4734	3451	3004	1397	1465
1944 Federal Surplus/Deficit	592	31	-202	-162	-68	-1009	-860	-722	-226	-556	844	888	-537	-101	-209
1945 Federal Surplus/Deficit	23	-427	180	-449	-350	-1506	-1246	-1216	-861	-1556	-1457	2833	2141	24	-175
1946 Federal Surplus/Deficit	519	-207	-23	-453	-271	-188	671	576	1735	3397	4551	3387	2887	1749	1182
1947 Federal Surplus/Deficit	1066	297	299	-207	86	2159	2923	3071	2197	2390	2195	3422	3211	2068	1843
1948 Federal Surplus/Deficit	998	225	104	1839	1338	934	2824	1590	1213	2373	3724	4120	3172	2818	1970
1949 Federal Surplus/Deficit	2148	1532	483	180	-108	-116	570	-359	2730	3176	4034	4270	2913	52	1347
1950 Federal Surplus/Deficit	-194	-761	-335	-195	-222	-784	2373	2540	3128	3905	3212	3463	2668	2065	1473
1951 Federal Surplus/Deficit	1947	1199	231	757	1671	2426	4227	4114	3174	3975	3866	3324	2604	2809	2560
1952 Federal Surplus/Deficit	1814	656	281	1287	673	1017	2457	1679	1578	3981	4440	4014	3104	1893	1952
1953 Federal Surplus/Deficit	943	118	-357	-241	-199	-988	36	731	911	1564	1906	3256	3544	2846	982
1954 Federal Surplus/Deficit	1512	748	224	156	153	572	2523	2352	1685	2702	2449	3466	2760	3545	1759
1955 Federal Surplus/Deficit	2719	2719	1949	185	748	172	-405	-896	-305	-282	1285	2753	3274	3689	1211
1956 Federal Surplus/Deficit	2266	976	-20	305	1169	2323	3759	3741	3404	3575	4351	3573	3004	3016	2481
1957 Federal Surplus/Deficit	1280	630	118	342	-128	607	722	-365	1766	4154	2720	4383	3361	1109	1368
1958 Federal Surplus/Deficit	254	-283	93	-119	-44	-834	1154	1197	1137	2824	3184	4317	3478	1015	1193
1959 Federal Surplus/Deficit	371	-44	0.9	-240	543	1625	3254	3000	2630	3199	2244	2913	2816	1785	1759
1960 Federal Surplus/Deficit	2090	953	2201	2422	2130	1735	1936	928	1699	4639	3516	2927	2863	1696	2180
1961 Federal Surplus/Deficit	979	-1.3	-185	1.4	4.4	-183	1351	1795	2583	2812	1901	3406	3070	1090	1309
1962 Federal Surplus/Deficit	359	170	-109	-454	-61	-336	881	894	-208	4232	4206	3452	3222	-25	969
1963 Federal Surplus/Deficit	553	93	-250	378	820	1458	1666	1007	1052	1101	1537	2755	2251	1888	1225
1964 Federal Surplus/Deficit	1167	177	256	-211	-253	-89	12	110	-117	3078	1839	3186	3086	3422	1047
1965 Federal Surplus/Deficit	2190	798	721	678	481	2383	4509	3931	3237	2355	4503	3653	3310	1813	2461
1966 Federal Surplus/Deficit	1971	1333	-66	288	202	130	750	567	-381	3999	2245	2686	1910	1936	1067
1967 Federal Surplus/Deficit	1143	185	-66	-259	-318	168	2958	3072	1966	1550	149	3029	2687	2326	1415
1968 Federal Surplus/Deficit	1566	435	170	103	251	168	2220	1895	1462	1056	891	1892	2723	2303	1259
1969 Federal Surplus/Deficit	1801	1053	1236	726	1304	1063	3706	3282	2230	3829	3906	3760	3061	2197	2312
1970 Federal Surplus/Deficit	621	-96	48	13	62	-782	1020	490	593	2116	1419	2996	3407	965	901
1971 Federal Surplus/Deficit	593	-32	-162	-254	-132	-613	3699	4503	2972	3847	3573	3736	3059	3369	1997
1972 Federal Surplus/Deficit	2588	1407	453	327	118	302	3474	3982	5102	4377	2903	3469	3100	3395	2439
1973 Federal Surplus/Deficit	2712	2182	690	181	124	73	992	-316	-139	-984	578	1922	1379	93	612
1974 Federal Surplus/Deficit	182	-465	138	-414	-459	403	4866	4457	4167	4190	4399	3588	3065	3817	2302
1975 Federal Surplus/Deficit	2376	1734	370	-350	-74	-280	1434	1135	1381	1259	1596	3443	3291	3758	1470
1976 Federal Surplus/Deficit	1567	994	700	850	1603	3245	3285	3397	3429	4207	4038	3684	3186	3056	2649
1977 Federal Surplus/Deficit	2921	2881	2538	204	-21	-909	-874	-618	-268	-1109	437	335	-735	-410	155
1978 Federal Surplus/Deficit	-9.2	-851	-470	-595	-758	667	1002	527	872	3695	2090	3127	1808	1991	888
1979 Federal Surplus/Deficit	807	154	1429	354	10	-800	400	-859	1330	1183	1888	3572	1236	76	739
1980 Federal Surplus/Deficit	-232	-617	-274	-343	-148	-1229	-595	-826	-700	2526	3106	3993	3299	464	503
1981 Federal Surplus/Deficit	155	-501	165	18	-95	1944	2588	1556	1612	77	1616	2974	3492	2838	1483
1982 Federal Surplus/Deficit	2430	1716	272	45	337	666	1561	4314	4219	3410	2880	3911	2831	2808	2169
1983 Federal Surplus/Deficit	2420	1744	1248	855	432	885	2659	2345	4072	3413	2784	3839	3202	2774	2292
1984 Federal Surplus/Deficit	2162	1128	561	191	1799	821	2504	2475	2599	4464	4226	3679	3354	2702	2216
1985 Federal Surplus/Deficit	1156	213	359	100	420	66	1331	178	-372	2935	3191	3633	1784	-639	883
1986 Federal Surplus/Deficit	-452	-933	-222	-221	740	-499	1178	2232	5171	3761	3586	2664	2629	1325	1489
1987 Federal Surplus/Deficit	755	-38	-167	-537	206	24	-585	-1345	571	668	1472	3414	1832	-100	404
1988 Federal Surplus/Deficit	-334	-1024	-162	-577	-359	-1282	-1215	-1076	-588	-671	886	1725	616	439	-252
1989 Federal Surplus/Deficit	49	-437	-72	-636	-552	-749	-770	-636	364	2650	3501	2852	1813	191	391
1990 Federal Surplus/Deficit	117	-546	-125	-421	41	138	1842	1836	1248	1976	4379	2771	2757	1466	1201
1991 Federal Surplus/Deficit	1531	601	-147	-563	1669	1025	2901	2517	1259	3077	2552	3298	2556	2938	1771
1992 Federal Surplus/Deficit	2381	1501	25	-412	-110	-779	12	-839	1267	96	758	1838	1295	-369	366

Table A-30: Federal Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2018 - 2019 Operating Year
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Continued **5/27/2011**

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1993 Federal Surplus/Deficit	-508	-984	-433	-536	-274	-788	-940	-1793	-553	500	397	3296	1694	848	29
1994 Federal Surplus/Deficit	194	-341	1.7	-522	105	-753	-1016	-483	-458	-573	1122	1787	1362	-44	14
1995 Federal Surplus/Deficit	97	-603	76	-716	-564	-1237	-798	1420	1318	2891	1555	2845	3067	1902	762
1996 Federal Surplus/Deficit	437	9.7	573	210	2356	4281	4470	4655	4314	3779	4843	3922	3433	3517	3012
1997 Federal Surplus/Deficit	2313	969	-163	71	215	732	4654	4488	4660	3943	4541	3476	3309	3490	2557
1998 Federal Surplus/Deficit	2239	1389	1223	2074	1278	543	862	1234	1046	1449	2559	4507	3501	1638	1812
-Ranked Averages-															
Top Ten Percent	1857	935	320	506	1364	2724	4163	4032	3611	3742	4297	3551	3004	2602	2599
Middle Eighty Percent	998	312	256	28	124	23	1152	1025	1320	2325	2529	3197	2586	1642	1202
Bottom Ten Percent	369	-348	-3.8	-332	-148	-1075	-988	-987	-741	-707	-354	1462	555	281	-205

Table A-30: Federal Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2019 - 2020 Operating Year **5/27/2011**
[76] 2011 White Book (Final)

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1929 Federal Surplus/Deficit	899	-193	204	-111	-59	-948	-924	-747	-665	-484	176	1459	1823	59	22
1930 Federal Surplus/Deficit	309	-456	-69	-315	-172	-925	-820	-746	-408	-489	-275	1403	866	698	-77
1931 Federal Surplus/Deficit	338	-345	-25	-559	-10	-852	-950	-714	-1674	-79	-1481	2071	271	481	-228
1932 Federal Surplus/Deficit	-179	-817	-433	-419	-520	-1026	-1443	-1237	624	1414	3998	4764	3575	621	560
1933 Federal Surplus/Deficit	420	29	370	-139	-485	218	1686	2023	1252	2028	1694	3550	3747	3277	1463
1934 Federal Surplus/Deficit	2187	1525	81	625	2104	3762	4334	4141	3098	4382	3929	4003	2654	591	2612
1935 Federal Surplus/Deficit	-247	-474	-157	-347	-861	-822	1173	1325	796	2195	1311	3088	1979	1884	785
1936 Federal Surplus/Deficit	1329	-61	-565	-304	-113	-1000	-1729	-740	-521	529	3468	4455	3283	854	519
1937 Federal Surplus/Deficit	466	-267	-431	-333	112	-868	-769	-853	-788	-1149	-1203	2026	1255	667	-85
1938 Federal Surplus/Deficit	204	-541	23	-323	-574	-255	1237	1347	1358	3013	3943	4195	2921	1591	1232
1939 Federal Surplus/Deficit	190	-264	51	-35	-188	-1003	-635	-447	-162	2559	2362	3848	1622	574	503
1940 Federal Surplus/Deficit	92	-581	-218	-78	199	-321	-919	-78	881	2236	2727	3442	2394	172	639
1941 Federal Surplus/Deficit	-232	-753	-209	26	-400	-423	-1124	-724	-487	-42	619	2460	1434	599	81
1942 Federal Surplus/Deficit	143	-237	188	-458	-8.4	327	1294	-294	-420	75	2084	2854	3174	2329	838
1943 Federal Surplus/Deficit	1068	338	525	-194	-593	-486	1992	2190	1155	4500	4795	4229	3421	1423	1575
1944 Federal Surplus/Deficit	519	-30	-321	-207	-35	-975	-827	-512	-232	-564	837	1429	122	-25	-100
1945 Federal Surplus/Deficit	-50	-489	60	-494	-317	-1471	-1213	-1006	-866	-1564	-1465	3452	2537	100	-82
1946 Federal Surplus/Deficit	446	-268	-143	-498	-238	-153	704	786	1730	3381	4557	4180	3305	1661	1279
1947 Federal Surplus/Deficit	993	236	179	-252	119	2193	2989	3280	2191	2387	2192	4102	3541	2116	1943
1948 Federal Surplus/Deficit	926	164	-16	1809	1371	968	2861	1800	1208	2362	3750	4954	3555	2863	2083
1949 Federal Surplus/Deficit	2057	1470	363	134	-75	-82	604	-149	2733	3155	4035	5029	3274	128	1447
1950 Federal Surplus/Deficit	-267	-822	-455	-241	-189	-749	2437	2750	3130	3878	3171	4168	3074	2078	1575
1951 Federal Surplus/Deficit	1856	1137	111	711	1712	2460	4322	4365	3176	3936	3849	4238	3245	2842	2709
1952 Federal Surplus/Deficit	1723	595	161	1258	706	1051	2491	1889	1572	3971	4449	4825	3609	1924	2069
1953 Federal Surplus/Deficit	870	57	-477	-286	-166	-954	69	941	905	1556	1898	3960	3848	2857	1072
1954 Federal Surplus/Deficit	1439	687	104	110	186	607	2558	2562	1679	2698	2445	4202	3150	3568	1862
1955 Federal Surplus/Deficit	2581	2594	1795	140	781	207	-372	-687	-310	-291	1277	3289	3562	3747	1276
1956 Federal Surplus/Deficit	2175	915	-140	259	1210	2358	3801	3987	3406	3533	4364	4399	3399	3051	2598
1957 Federal Surplus/Deficit	1207	569	-1.5	297	-95	641	756	-156	1761	4148	2700	5356	3749	1185	1488
1958 Federal Surplus/Deficit	182	-344	-27	-165	-11	-800	1188	1406	1131	2818	3179	5185	3841	1090	1307
1959 Federal Surplus/Deficit	298	-105	-119	-285	576	1659	3296	3209	2624	3205	2276	3583	3283	1804	1867
1960 Federal Surplus/Deficit	1999	892	2047	2393	2179	1769	1970	1138	1694	4667	3511	3597	3360	1735	2283
1961 Federal Surplus/Deficit	906	-62	-305	-44	37	-149	1385	2004	2585	2811	1901	4131	3494	1162	1419
1962 Federal Surplus/Deficit	286	109	-229	-500	-28	-302	915	1104	-214	4179	4176	4174	3579	50	1068
1963 Federal Surplus/Deficit	480	32	-370	332	853	1492	1699	1217	1047	1092	1529	3357	2627	1928	1315
1964 Federal Surplus/Deficit	1094	116	136	-257	-220	-54	46	320	-123	3069	1832	3801	3802	3453	1162
1965 Federal Surplus/Deficit	2099	737	602	633	514	2417	4605	4162	3239	2323	4522	4419	3638	1852	2572
1966 Federal Surplus/Deficit	1880	1272	-185	242	235	164	783	777	-386	4010	2206	3315	2327	2010	1163
1967 Federal Surplus/Deficit	1070	124	-186	-304	-285	202	3036	3306	1960	1542	142	3680	3091	2365	1521
1968 Federal Surplus/Deficit	1475	374	50	57	284	202	2256	2105	1456	1048	883	2429	3173	2357	1352
1969 Federal Surplus/Deficit	1710	992	1101	680	1337	1097	3762	3528	2224	3807	3917	4593	3414	2244	2426
1970 Federal Surplus/Deficit	548	-157	-72	-33	95	-747	1054	699	587	2107	1411	3570	3810	1040	993
1971 Federal Surplus/Deficit	520	-94	-282	-300	-99	-578	3741	4773	2966	3826	3574	4505	3362	3383	2104
1972 Federal Surplus/Deficit	2454	1346	333	281	151	336	3552	4228	5171	4389	2847	4469	3514	3436	2579
1973 Federal Surplus/Deficit	2575	2103	571	135	157	107	1026	-107	-145	-993	571	2493	1975	168	714
1974 Federal Surplus/Deficit	109	-526	19	-460	-426	437	4967	4721	4169	4163	4392	4401	3476	3826	2426
1975 Federal Surplus/Deficit	2285	1660	250	-396	-41	-246	1468	1345	1375	1251	1588	4139	3662	3753	1561
1976 Federal Surplus/Deficit	1494	933	580	804	1644	3280	3326	3643	3431	4167	4020	4528	3550	3123	2766
1977 Federal Surplus/Deficit	2783	2755	2384	158	12	-875	-840	-408	-273	-1117	429	864	-60	-335	255
1978 Federal Surplus/Deficit	-82	-912	-590	-641	-725	701	1035	737	866	3739	2087	3824	2337	2032	1000
1979 Federal Surplus/Deficit	735	93	1293	308	43	-766	434	-649	1324	1175	1880	4270	1808	152	850
1980 Federal Surplus/Deficit	-305	-678	-394	-388	-115	-1195	-562	-616	-706	2513	3125	4810	3647	540	609
1981 Federal Surplus/Deficit	82	-562	45	-28	-62	1978	2630	1766	1607	69	1609	3545	3795	2918	1568
1982 Federal Surplus/Deficit	2266	1717	152	-1.0	370	700	1595	4584	4237	3388	2845	4501	3256	2809	2268
1983 Federal Surplus/Deficit	2329	1683	1112	809	465	920	2700	2555	4089	3396	2753	4483	3526	2757	2376
1984 Federal Surplus/Deficit	2071	1067	441	145	1840	855	2546	2685	2601	4460	4221	4304	3768	2701	2310
1985 Federal Surplus/Deficit	1083	152	239	54	453	100	1365	388	-377	2938	3179	4326	2209	-563	986
1986 Federal Surplus/Deficit	-525	-995	-342	-266	773	-464	1212	2448	5241	3733	3545	3274	3304	1391	1613
1987 Federal Surplus/Deficit	682	-99	-287	-583	239	58	-552	-1135	565	660	1464	4102	2384	-24	514
1988 Federal Surplus/Deficit	-407	-1086	-282	-623	-326	-1248	-1182	-866	-594	-680	878	2297	1238	515	-144
1989 Federal Surplus/Deficit	-24	-498	-191	-682	-519	-715	-737	-427	358	2644	3533	3477	2279	267	492
1990 Federal Surplus/Deficit	44	-608	-245	-466	74	172	1876	2046	1243	1969	4409	3408	3153	1514	1299
1991 Federal Surplus/Deficit	1440	540	-267	-609	1709	1059	2979	2727	1253	3070	2582	4078	3192	3037	1910
1992 Federal Surplus/Deficit	2239	1436	-94	-457	-78	-745	46	-630	1261	88	750	2399	1943	-294	471

Table A-30: Federal Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2019 - 2020 Operating Year
[76] 2011 White Book (Final)

Continued **5/27/2011**

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1993 Federal Surplus/Deficit	-581	-1045	-553	-581	-241	-754	-906	-1583	-558	491	389	3902	2249	920	132
1994 Federal Surplus/Deficit	121	-402	-118	-568	138	-719	-983	-273	-463	-581	1114	2353	1975	32	122
1995 Federal Surplus/Deficit	24	-664	-44	-762	-531	-1202	-765	1629	1313	2883	1548	3427	3493	1936	856
1996 Federal Surplus/Deficit	364	-51	453	164	2405	4378	4565	4932	4353	3735	4853	4672	3822	3582	3142
1997 Federal Surplus/Deficit	2222	908	-283	26	248	766	4754	4759	4710	3905	4553	4274	3670	3514	2680
1998 Federal Surplus/Deficit	2147	1328	1087	2044	1317	577	896	1444	1040	1440	2551	5115	3877	1714	1903
-Ranked Averages-															
Top Ten Percent	1822	959	162	410	1353	2477	4094	4294	3906	4007	4059	4369	3408	2877	2726
Middle Eighty Percent	907	238	138	-10	164	95	1211	1239	1284	2279	2555	3871	3040	1664	1305
Bottom Ten Percent	296	-409	-124	-378	-115	-1041	-955	-778	-747	-715	-362	2019	1159	356	-99

Table A-30: Federal Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2020 - 2021 Operating Year **5/27/2011**
[76] 2011 White Book (Final)

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1929 Federal Surplus/Deficit	894	-176	214	-162	-119	-1015	-990	-979	-721	-534	125	968	1121	-161	-140
1930 Federal Surplus/Deficit	304	-438	-59	-367	-232	-992	-885	-979	-464	-539	-325	916	116	478	-243
1931 Federal Surplus/Deficit	333	-328	-14	-610	-70	-919	-1015	-946	-1731	-129	-1531	1584	-504	260	-396
1932 Federal Surplus/Deficit	-184	-799	-422	-470	-579	-1092	-1508	-1470	567	1362	3910	4202	3074	401	410
1933 Federal Surplus/Deficit	415	47	380	-190	-544	151	1620	1790	1196	1978	1644	2970	3404	3090	1322
1934 Federal Surplus/Deficit	2200	1560	91	574	2029	3644	4206	3873	2997	4300	3880	3278	2076	370	2417
1935 Federal Surplus/Deficit	-252	-456	-147	-398	-920	-889	1107	1093	740	2144	1260	2509	1375	1658	620
1936 Federal Surplus/Deficit	1342	-44	-555	-355	-172	-1067	-1794	-973	-577	479	3417	3840	2655	634	355
1937 Federal Surplus/Deficit	461	-250	-421	-384	53	-934	-835	-1085	-844	-1199	-1254	1529	521	446	-250
1938 Federal Surplus/Deficit	199	-523	34	-374	-634	-321	1171	1115	1302	2966	3867	3580	2389	1396	1072
1939 Federal Surplus/Deficit	185	-247	62	-86	-247	-1070	-701	-680	-219	2509	2312	3291	877	354	333
1940 Federal Surplus/Deficit	87	-564	-208	-129	139	-388	-985	-310	825	2186	2652	2916	1761	-48	479
1941 Federal Surplus/Deficit	-237	-736	-199	-25	-460	-489	-1189	-956	-543	-93	569	1984	697	379	-83
1942 Federal Surplus/Deficit	138	-220	198	-509	-68	261	1228	-526	-476	25	2034	2401	2494	2149	685
1943 Federal Surplus/Deficit	1063	355	536	-245	-653	-552	1926	1957	1099	4466	4676	3503	2900	1252	1407
1944 Federal Surplus/Deficit	514	-13	-311	-259	-95	-1041	-892	-745	-288	-614	786	940	-641	-246	-267
1945 Federal Surplus/Deficit	-55	-471	70	-546	-377	-1538	-1279	-1238	-923	-1614	-1515	2886	2037	-121	-233
1946 Federal Surplus/Deficit	441	-250	-133	-549	-298	-220	639	553	1674	3339	4494	3439	2784	1604	1124
1947 Federal Surplus/Deficit	988	253	189	-304	59	2127	2891	3048	2135	2332	2137	3474	3107	1923	1785
1948 Federal Surplus/Deficit	921	181	-5.6	1742	1312	902	2791	1567	1152	2314	3667	4172	3069	2673	1912
1949 Federal Surplus/Deficit	2070	1488	373	83	-135	-149	538	-381	2669	3118	3977	4322	2810	-92	1289
1950 Federal Surplus/Deficit	-272	-805	-445	-292	-249	-816	2341	2518	3066	3847	3154	3516	2564	1920	1415
1951 Federal Surplus/Deficit	1869	1155	121	660	1644	2394	4195	4092	3112	3916	3808	3376	2500	2665	2502
1952 Federal Surplus/Deficit	1736	612	171	1191	646	984	2425	1656	1516	3923	4382	4067	3000	1748	1893
1953 Federal Surplus/Deficit	865	74	-467	-337	-226	-1020	3.8	709	849	1506	1848	3308	3440	2701	924
1954 Federal Surplus/Deficit	1434	705	114	59	127	540	2491	2330	1623	2644	2391	3518	2656	3401	1701
1955 Federal Surplus/Deficit	2641	2675	1839	89	721	140	-437	-919	-366	-341	1227	2805	3170	3544	1153
1956 Federal Surplus/Deficit	2188	932	-130	208	1142	2291	3727	3718	3342	3517	4293	3626	2900	2871	2423
1957 Federal Surplus/Deficit	1202	586	8.8	246	-154	574	690	-388	1704	4096	2662	4435	3258	965	1310
1958 Federal Surplus/Deficit	177	-327	-16	-216	-71	-867	1122	1174	1075	2765	3127	4370	3374	870	1135
1959 Federal Surplus/Deficit	293	-88	-109	-337	516	1593	3222	2977	2568	3140	2186	2966	2713	1640	1701
1960 Federal Surplus/Deficit	2013	909	2092	2326	2103	1703	1904	905	1638	4581	3458	2980	2759	1551	2122
1961 Federal Surplus/Deficit	901	-45	-295	-95	-22	-215	1319	1772	2521	2753	1843	3459	2966	945	1251
1962 Federal Surplus/Deficit	281	126	-219	-551	-88	-368	849	872	-270	4174	4148	3505	3118	-170	911
1963 Federal Surplus/Deficit	475	49	-359	281	793	1426	1633	985	990	1042	1479	2808	2147	1743	1167
1964 Federal Surplus/Deficit	1089	134	146	-308	-280	-121	-20	88	-179	3019	1782	3238	2982	3277	989
1965 Federal Surplus/Deficit	2112	754	612	582	454	2351	4477	3908	3175	2297	4445	3706	3207	1668	2403
1966 Federal Surplus/Deficit	1893	1289	-175	191	176	98	718	544	-443	3941	2187	2739	1807	1791	1009
1967 Federal Surplus/Deficit	1065	141	-175	-355	-345	136	2926	3049	1904	1491	91	3081	2584	2181	1357
1968 Federal Surplus/Deficit	1488	391	60	6.2	224	136	2188	1873	1400	997	833	1945	2619	2158	1201
1969 Federal Surplus/Deficit	1723	1009	1127	629	1277	1031	3674	3259	2168	3770	3848	3812	2958	2052	2254
1970 Federal Surplus/Deficit	543	-140	-62	-84	35	-814	988	467	531	2057	1361	3049	3304	820	843
1971 Federal Surplus/Deficit	515	-76	-272	-351	-159	-645	3667	4480	2910	3789	3515	3789	2956	3224	1939
1972 Federal Surplus/Deficit	2511	1363	343	230	91	270	3442	3960	5040	4319	2845	3521	2996	3250	2380
1973 Federal Surplus/Deficit	2634	2139	581	84	97	41	960	-339	-201	-1043	521	1975	1276	-52	554
1974 Federal Surplus/Deficit	104	-509	29	-511	-486	370	4834	4434	4105	4132	4342	3641	2961	3672	2244
1975 Federal Surplus/Deficit	2298	1691	261	-447	-101	-313	1402	1113	1319	1200	1538	3496	3188	3613	1412
1976 Federal Surplus/Deficit	1489	950	591	753	1576	3213	3253	3375	3367	4149	3980	3736	3082	2911	2591
1977 Federal Surplus/Deficit	2843	2837	2428	107	-48	-941	-906	-641	-330	-1168	379	388	-838	-555	96
1978 Federal Surplus/Deficit	-87	-895	-580	-692	-784	635	970	505	810	3637	2032	3179	1705	1847	830
1979 Federal Surplus/Deficit	730	110	1319	257	-16	-832	368	-882	1268	1124	1830	3625	1133	-69	681
1980 Federal Surplus/Deficit	-310	-661	-384	-439	-175	-1261	-627	-848	-762	2467	3048	4045	3195	320	445
1981 Federal Surplus/Deficit	77	-544	55	-79	-121	1911	2556	1534	1551	18	1558	3027	3389	2693	1425
1982 Federal Surplus/Deficit	2353	1672	163	-52	311	633	1529	4292	4157	3351	2822	3964	2727	2664	2111
1983 Federal Surplus/Deficit	2342	1700	1138	758	406	853	2627	2322	4011	3354	2726	3891	3099	2629	2234
1984 Federal Surplus/Deficit	2084	1085	451	94	1773	788	2472	2453	2537	4406	4168	3731	3251	2557	2158
1985 Federal Surplus/Deficit	1078	169	249	3.2	393	33	1299	155	-433	2877	3133	3686	1680	-783	825
1986 Federal Surplus/Deficit	-530	-977	-332	-317	714	-531	1146	2209	5110	3702	3529	2717	2526	1181	1431
1987 Federal Surplus/Deficit	677	-82	-277	-634	179	-8.6	-617	-1367	509	610	1414	3466	1728	-245	346
1988 Federal Surplus/Deficit	-412	-1068	-272	-674	-386	-1314	-1248	-1099	-650	-730	828	1778	512	294	-310
1989 Federal Surplus/Deficit	-29	-481	-181	-733	-579	-781	-802	-659	302	2591	3444	2904	1710	47	333
1990 Federal Surplus/Deficit	39	-590	-235	-518	14	106	1810	1814	1187	1917	4321	2823	2654	1322	1143
1991 Federal Surplus/Deficit	1453	558	-256	-660	1642	992	2869	2495	1197	3018	2494	3351	2452	2793	1713
1992 Federal Surplus/Deficit	2303	1457	-84	-508	-137	-812	-20	-862	1205	37	700	1890	1192	-514	308

Table A-30: Federal Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2020 - 2021 Operating Year
[76] 2011 White Book (Final)

Continued **5/27/2011**

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1993 Federal Surplus/Deficit	-586	-1028	-542	-632	-301	-821	-972	-1815	-614	441	339	3348	1590	703	-29
1994 Federal Surplus/Deficit	116	-385	-108	-619	79	-785	-1048	-505	-519	-631	1064	1840	1258	-189	-44
1995 Federal Surplus/Deficit	20	-647	-34	-813	-591	-1269	-830	1397	1256	2832	1497	2897	2963	1757	704
1996 Federal Surplus/Deficit	359	-34	463	113	2329	4249	4438	4633	4252	3720	4785	3975	3329	3372	2954
1997 Federal Surplus/Deficit	2235	925	-272	-25	188	700	4622	4466	4598	3884	4483	3529	3206	3345	2499
1998 Federal Surplus/Deficit	2161	1345	1113	1977	1251	511	830	1211	984	1390	2501	4560	3398	1493	1754
-Ranked Averages-															
Top Ten Percent	1779	892	211	409	1338	2692	4131	4009	3549	3683	4239	3604	2900	2458	2541
Middle Eighty Percent	920	268	146	-69	97	-9.2	1120	1003	1258	2266	2471	3249	2482	1498	1144
Bottom Ten Percent	291	-392	-113	-429	-175	-1108	-1021	-1010	-803	-766	-412	1515	452	136	-263

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Section 9: Pacific Northwest Regional Exhibits

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Exhibit 21

Regional Annual Energy Analysis Using 1937-Water Conditions for 10 Operating Years

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Loads and Resources - Pacific Northwest Region
PNW Loads and Resource Study
2012 - 2021 Operating Years
1937 Water Year
[76] 2011 White Book (Final)

5/27/2011

Energy (aMW)	2012 Avg.	2013 Avg.	2014 Avg.	2015 Avg.	2016 Avg.	2017 Avg.	2018 Avg.	2019 Avg.	2020 Avg.	2021 Avg.
Firm Regional Loads										
1 Regional Firm Loads	20853	21304	21814	22277	22643	22968	23273	23579	23864	24166
2 Exports	1636	1478	1391	1286	1246	1226	1174	1138	1130	1060
3 Federal Diversity	0	0	0	0	0	0	0	0	0	0
4 Total Firm Regional Loads	22489	22781	23205	23564	23889	24194	24446	24717	24994	25227
Non-Firm Regional Loads										
5 Regional Non-Firm Loads	11	11	11	11	11	11	11	11	11	11
6 Total Non-Firm Regional Loads	11	11	11	11	11	11	11	11	11	11
7 Total Loads	22500	22792	23215	23574	23900	24205	24457	24727	25005	25238
Hydro Resources										
8 Regulated Hydro	10815	10929	10916	10922	10920	10922	10921	10922	10920	10922
9 Independent Hydro	1031	1032	1043	1063	1063	1063	1063	1063	1063	1063
10 Regional Hydro Maintenance	-12	-12	-12	-12	-12	-12	-12	-12	-12	-12
11 Total Hydro Resources	11834	11949	11946	11973	11971	11973	11972	11973	11971	11973
Other Resources										
12 Small Thermal & Misc.	0	0	0	0	0	0	0	0	0	0
13 Combustion Turbines	3237	3472	3465	3471	3470	3470	3470	3467	3462	3469
14 Renewables	1617	1621	1653	1654	1653	1656	1656	1656	1654	1656
15 Cogeneration	2603	2612	2619	2627	2618	2620	2626	2628	2636	2623
16 Imports	1110	1057	975	980	958	948	924	899	905	910
17 Large Thermal	6231	6000	6135	6034	6138	5966	6225	6018	6131	5407
18 Non-Utility Generation	596	601	602	603	603	603	603	602	602	603
19 Resource Acquisition	0	0	0	0	0	0	0	0	0	0
20 Total Other Resources	15394	15364	15450	15370	15439	15263	15505	15270	15389	14668
21 Total Resources	27228	27313	27396	27343	27410	27236	27478	27243	27360	26641
Reserves & Losses										
22 Contingency Reserves (Non-Spinning)	0	0	0	0	0	0	0	0	0	0
23 Contingency Reserves (Spinning)	0	0	0	0	0	0	0	0	0	0
24 Generation Imbalance Reserves	0	0	0	0	0	0	0	0	0	0
25 Load Following Reserves	0	0	0	0	0	0	0	0	0	0
26 Regional Transmission Losses	-768	-770	-773	-771	-773	-768	-775	-768	-772	-751
27 Total Reserves & Losses	-768	-770	-773	-771	-773	-768	-775	-768	-772	-751
28 Total Net Resources	26460	26542	26623	26571	26637	26468	26703	26475	26589	25890
Surplus/Deficits										
29 Firm Surplus/Deficit	3972	3761	3419	3008	2748	2274	2257	1758	1594	663
30 Total Surplus/Deficit	3961	3751	3408	2997	2737	2263	2246	1747	1583	652

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Exhibits 22 – 24

Regional Monthly Energy Analysis Using the 2011 White Book Load Forecast for 1937-Water Conditions

Loads and Resources - Pacific Northwest Region
PNW Loads and Resource Study
2011 - 2012 Operating Year **5/27/2011**
1937 Water Year
[76] 2011 White Book (Final)

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
Firm Regional Loads															
1 Regional Firm Loads	20843	20852	19510	18871	21083	23253	23309	22092	20454	19464	19599	19037	20469	21771	20853
2 Exports	2055	1984	1842	1521	1491	1426	1448	1373	1602	1668	1726	1524	1817	1861	1636
3 Federal Diversity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 Total Firm Regional Loads	22898	22836	21352	20392	22574	24679	24757	23465	22056	21131	21325	20562	22286	23633	22489
Non-Firm Regional Loads															
5 Regional Non-Firm Loads	0	0	14	0	0	0	3.5	24	54	34	34	0	0	0	11
6 Total Non-Firm Regional Loads	0	0	14	0	0	0	3.5	24	54	34	34	0	0	0	11
7 Total Loads	22898	22836	21366	20392	22574	24679	24761	23489	22111	21165	21359	20562	22286	23633	22500
Hydro Resources															
8 Regulated Hydro	11530	9342	8437	8830	11064	11597	11775	10612	9156	8954	7885	13715	13392	12307	10815
9 Independent Hydro	962	941	818	884	822	848	735	766	936	1209	1250	1558	1638	1180	1031
10 Regional Hydro Maintenance	-30	-25	-8.6	-9	-3.8	0	0	0	-5.2	-7.4	-7.6	-20	-14	-49	-12
11 Total Hydro Resources	12462	10258	9246	9705	11882	12445	12509	11379	10087	10155	9127	15253	15015	13438	11834
Other Resources															
12 Small Thermal & Misc.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13 Combustion Turbines	3419	3419	3254	3293	3355	3629	3599	3362	3330	3133	3133	1682	3150	3647	3237
14 Renewables	1965	1780	1446	1380	1391	1141	1292	992	1809	2107	2179	1957	2194	1767	1617
15 Cogeneration	2726	2725	2734	2777	2768	2789	2816	2780	2073	2781	2783	1799	2485	2734	2603
16 Imports	985	971	867	917	1287	1544	1462	1430	1109	964	908	811	904	1082	1110
17 Large Thermal	6400	6400	6400	6400	6400	6400	6400	6400	6333	6416	6237	4806	6126	6400	6231
18 Non-Utility Generation	669	668	608	529	486	478	462	469	485	627	630	770	796	765	596
19 Resource Acquisition	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 Total Other Resources	16165	15964	15311	15297	15688	15983	16032	15433	15139	16029	15870	11825	15655	16395	15394
21 Total Resources	28627	26222	24557	25002	27569	28428	28541	26812	25226	26184	24997	27077	30670	29833	27228
Reserves & Losses															
22 Contingency Reserves (Non-Spinning)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23 Contingency Reserves (Spinning)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24 Generation Imbalance Reserves	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25 Load Following Reserves	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26 Regional Transmission Losses	-807	-739	-693	-705	-777	-802	-805	-756	-711	-738	-705	-764	-865	-841	-768
27 Total Reserves & Losses	-807	-739	-693	-705	-777	-802	-805	-756	-711	-738	-705	-764	-865	-841	-768
28 Total Net Resources	27820	25483	23865	24297	26792	27626	27736	26056	24515	25446	24293	26314	29805	28992	26460
Surplus/Deficits															
29 Firm Surplus/Deficit	4922	2647	2513	3905	4218	2947	2979	2591	2459	4315	2968	5752	7519	5359	3972
30 Total Surplus/Deficit	4922	2647	2499	3905	4218	2947	2976	2567	2404	4281	2934	5752	7519	5359	3961

Loads and Resources - Pacific Northwest Region
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Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
Firm Regional Loads															
1 Regional Firm Loads	22817	22694	21210	20496	22806	25189	25304	23938	22196	21132	21132	20647	22321	23705	22643
2 Exports	1572	1505	1398	1160	1131	1034	1059	985	1211	1314	1370	1173	1464	1457	1246
3 Federal Diversity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 Total Firm Regional Loads	24390	24199	22608	21656	23937	26222	26363	24922	23407	22446	22502	21819	23785	25162	23889
Non-Firm Regional Loads															
5 Regional Non-Firm Loads	0	0	14	0	0	0	3.5	24	54	34	34	0	0	0	11
6 Total Non-Firm Regional Loads	0	0	14	0	0	0	3.5	24	54	34	34	0	0	0	11
7 Total Loads	24390	24199	22622	21656	23937	26222	26366	24946	23461	22479	22536	21819	23785	25162	23900
Hydro Resources															
8 Regulated Hydro	11598	9768	9588	8830	11064	11597	11775	10612	9156	8954	7885	13695	13284	12307	10920
9 Independent Hydro	989	967	842	903	835	886	753	793	977	1251	1297	1605	1685	1217	1063
10 Regional Hydro Maintenance	-30	-25	-8.6	-9	-3.8	0	0	0	-5.2	-7.4	-7.6	-20	-14	-49	-12
11 Total Hydro Resources	12557	10711	10421	9724	11894	12483	12528	11405	10128	10198	9174	15279	14954	13474	11971
Other Resources															
12 Small Thermal & Misc.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13 Combustion Turbines	3680	3680	3505	3544	3606	3880	3850	3613	3581	3384	3384	1946	3412	3647	3470
14 Renewables	2045	1868	1478	1403	1415	1160	1317	1013	1846	2153	2226	1989	2242	1810	1653
15 Cogeneration	2730	2729	2701	2748	2806	2824	2785	2815	2162	2378	2334	2065	2702	2732	2618
16 Imports	829	815	755	809	1094	1271	1185	1151	1002	905	851	757	854	926	958
17 Large Thermal	6400	6400	6400	6400	6400	6400	6400	6400	6273	4971	4418	5063	6416	6400	6138
18 Non-Utility Generation	675	675	615	535	492	487	470	476	493	636	637	776	803	771	603
19 Resource Acquisition	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 Total Other Resources	16359	16167	15454	15440	15814	16023	16008	15468	15358	14427	13851	12597	16428	16286	15439
21 Total Resources	28916	26878	25875	25164	27708	28506	28535	26874	25486	24624	23024	27876	31382	29761	27410
Reserves & Losses															
22 Contingency Reserves (Non-Spinning)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23 Contingency Reserves (Spinning)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24 Generation Imbalance Reserves	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25 Load Following Reserves	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26 Regional Transmission Losses	-815	-758	-730	-710	-781	-804	-805	-758	-719	-694	-649	-786	-885	-839	-773
27 Total Reserves & Losses	-815	-758	-730	-710	-781	-804	-805	-758	-719	-694	-649	-786	-885	-839	-773
28 Total Net Resources	28101	26120	25145	24455	26927	27703	27730	26116	24767	23930	22375	27090	30497	28922	26637
Surplus/Deficits															
29 Firm Surplus/Deficit	3711	1921	2537	2799	2989	1480	1367	1193	1360	1484	-127	5271	6712	3759	2748
30 Total Surplus/Deficit	3711	1921	2523	2799	2989	1480	1364	1170	1306	1450	-161	5271	6712	3759	2737

Loads and Resources - Pacific Northwest Region
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Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
Firm Regional Loads															
1 Regional Firm Loads	24572	24438	22717	21850	24231	26756	26891	25631	23610	22484	22484	22006	23925	25428	24166
2 Exports	1412	1333	1235	1029	1030	933	832	752	989	1058	1111	1045	1209	1196	1060
3 Federal Diversity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 Total Firm Regional Loads	25984	25771	23952	22879	25261	27689	27723	26383	24599	23542	23595	23051	25134	26624	25227
Non-Firm Regional Loads															
5 Regional Non-Firm Loads	0	0	14	0	0	0	3.5	24	54	34	34	0	0	0	11
6 Total Non-Firm Regional Loads	0	0	14	0	0	0	3.5	24	54	34	34	0	0	0	11
7 Total Loads	25984	25771	23966	22879	25261	27689	27727	26406	24653	23576	23628	23051	25134	26624	25238
Hydro Resources															
8 Regulated Hydro	11598	9768	9588	8830	11064	11597	11775	10612	9156	8954	7885	13633	13356	12307	10922
9 Independent Hydro	989	967	842	903	835	886	753	794	977	1251	1297	1605	1685	1217	1063
10 Regional Hydro Maintenance	-30	-25	-8.6	-9	-3.8	0	0	0	-5.2	-7.4	-7.6	-20	-14	-49	-12
11 Total Hydro Resources	12557	10711	10421	9724	11894	12483	12528	11407	10128	10198	9174	15217	15026	13474	11973
Other Resources															
12 Small Thermal & Misc.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13 Combustion Turbines	3680	3680	3505	3544	3606	3880	3850	3613	3581	3384	3123	2049	3412	3665	3469
14 Renewables	2045	1868	1478	1403	1415	1160	1317	1013	1846	2153	2226	1998	2264	1799	1656
15 Cogeneration	2727	2726	2735	2738	2804	2822	2782	2813	2040	2741	2331	2207	2572	2729	2623
16 Imports	773	758	695	780	1046	1228	1138	1101	955	826	797	709	811	887	910
17 Large Thermal	6400	6400	6400	6400	6400	5774	5240	5240	4979	5124	4927	3984	4017	5007	5407
18 Non-Utility Generation	676	675	614	535	492	486	472	475	493	635	636	776	802	770	603
19 Resource Acquisition	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 Total Other Resources	16302	16108	15428	15400	15763	15349	14800	14254	13894	14863	14040	11722	13878	14858	14668
21 Total Resources	28858	26819	25849	25124	27657	27833	27327	25661	24022	25061	23214	26939	28904	28332	26641
Reserves & Losses															
22 Contingency Reserves (Non-Spinning)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
23 Contingency Reserves (Spinning)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
24 Generation Imbalance Reserves	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25 Load Following Reserves	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26 Regional Transmission Losses	-814	-756	-729	-709	-780	-785	-771	-724	-677	-707	-655	-760	-815	-799	-751
27 Total Reserves & Losses	-814	-756	-729	-709	-780	-785	-771	-724	-677	-707	-655	-760	-815	-799	-751
28 Total Net Resources	28045	26062	25120	24416	26878	27048	26557	24938	23344	24354	22559	26180	28089	27533	25890
Surplus/Deficits															
29 Firm Surplus/Deficit	2061	291	1168	1537	1616	-641	-1167	-1445	-1254	812	-1036	3128	2955	910	663
30 Total Surplus/Deficit	2061	291	1154	1537	1616	-641	-1170	-1469	-1309	778	-1069	3128	2955	910	652

Exhibits 25 – 27

Regional Monthly 1-Hour Capacity Analysis
Using the 2011 White Book Load Forecast for 1937-Water Conditions

Loads and Resources - Pacific Northwest Region
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1937 Water Year
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Capacity (MW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul
Firm Regional Loads														
1 Regional Firm Loads	28330	28330	25558	26294	29107	32268	31978	30410	27877	26374	26374	25039	27377	29372
2 Exports	2653	2653	2646	2140	2007	2005	2003	2004	2006	2035	2043	2012	2516	2518
3 Federal Diversity	-508	-546	-567	-332	-283	-520	-287	-305	-358	-459	-474	-478	-480	-392
4 Total Firm Regional Loads	30475	30437	27638	28102	30831	33752	33694	32109	29525	27950	27943	26573	29413	31499
Non-Firm Regional Loads														
5 Regional Non-Firm Loads	0	0	14	0	0	0	3.5	23	54	34	34	0	0	0
6 Total Non-Firm Regional Loads	0	0	14	0	0	0	3.5	23	54	34	34	0	0	0
7 Total Loads	30475	30437	27652	28102	30831	33752	33698	32132	29579	27984	27977	26573	29413	31499
Hydro Resources (1 Hour.)														
8 Regulated Hydro	27087	24437	23414	22049	25013	25255	25416	24337	23211	22157	23509	25663	24743	26847
9 Independent Hydro	1581	1589	1633	1670	1619	1464	1377	1446	1635	1738	1862	2040	2100	1754
10 Regional Hydro Maintenance	-4595	-4032	-3787	-3208	-2935	-2037	-1561	-2286	-2626	-2751	-2483	-2360	-2202	-3720
11 Total Hydro Resources	24074	21994	21260	20511	23697	24682	25232	23498	22220	21144	22888	25343	24641	24881
Other Resources														
12 Small Thermal & Misc.	32	32	32	32	32	32	32	32	32	32	32	32	32	32
13 Combustion Turbines	5360	5360	5423	5517	5631	5685	5697	5662	5614	5457	5457	4190	4797	5653
14 Renewables	78	78	78	78	78	78	78	78	78	78	78	78	31	78
15 Cogeneration	2882	2882	2899	2932	2948	2959	2962	2955	2291	2938	2938	2389	2898	2890
16 Imports	1253	1253	1111	1216	1646	1969	1982	1950	1381	1227	1227	1111	1173	1379
17 Large Thermal	6996	6996	6996	6996	6996	6996	6996	6996	6996	6996	6996	5746	6842	6996
18 Non-Utility Generation	824	823	757	676	620	609	600	612	591	753	754	896	911	903
19 Resource Acquisition	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 Total Other Resources	17425	17423	17296	17447	17950	18327	18347	18285	16983	17480	17482	14441	16684	17932
21 Total Resources	41499	39418	38556	37958	41647	43008	43579	41782	39203	38624	40370	39784	41325	42813
Reserves & Losses (1 Hour.)														
22 Contingency Reserves (Non-Spinning)	-996	-965	-913	-908	-994	-1054	-1056	-1013	-954	-923	-948	-922	-972	-1020
23 Contingency Reserves (Spinning)	-996	-965	-913	-908	-994	-1054	-1056	-1013	-954	-923	-948	-922	-972	-1020
24 Generation Imbalance Reserves	-311	-311	-338	-290	-290	-290	-290	-290	-294	-320	-320	-320	-320	-320
25 Load Following Reserves	-415	-415	-432	-403	-403	-403	-403	-403	-408	-419	-419	-419	-419	-419
26 Regional Transmission Losses	-1299	-1231	-1205	-1188	-1305	-1347	-1366	-1309	-1226	-1207	-1264	-1246	-1295	-1341
27 Total Reserves & Losses	-4018	-3888	-3801	-3696	-3986	-4148	-4173	-4028	-3835	-3793	-3899	-3828	-3977	-4120
28 Total Net Resources	37481	35530	34755	34262	37661	38860	39406	37754	35368	34831	36471	35955	37348	38693
Surplus/Deficits														
29 Firm Surplus/Deficit	7006	5093	7118	6160	6830	5108	5712	5645	5843	6881	8528	9382	7936	7195
30 Total Surplus/Deficit	7006	5093	7103	6160	6830	5108	5708	5622	5788	6847	8494	9382	7936	7195

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Capacity (MW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul
Firm Regional Loads														
1 Regional Firm Loads	30948	30948	27778	28510	31482	34915	34691	32885	30196	28500	28500	27164	29899	32017
2 Exports	2142	2142	2140	1779	1645	1644	1642	1643	1645	1674	1681	1523	2028	2018
3 Federal Diversity	-478	-513	-542	-350	-299	-549	-303	-320	-377	-483	-498	-504	-505	-411
4 Total Firm Regional Loads	32612	32577	29376	29939	32828	36009	36029	34207	31464	29691	29684	28184	31421	33624
Non-Firm Regional Loads														
5 Regional Non-Firm Loads	0	0	14	0	0	0	3.5	23	54	34	34	0	0	0
6 Total Non-Firm Regional Loads	0	0	14	0	0	0	3.5	23	54	34	34	0	0	0
7 Total Loads	32612	32577	29390	29939	32828	36009	36033	34230	31519	29725	29718	28184	31421	33624
Hydro Resources (1 Hour.)														
8 Regulated Hydro	26764	24289	23420	22388	25283	25969	25792	24345	23218	22531	23409	26038	25069	27015
9 Independent Hydro	1635	1643	1687	1724	1673	1518	1431	1500	1689	1792	1916	2094	2154	1808
10 Regional Hydro Maintenance	-4595	-4032	-3787	-3208	-2935	-2037	-1561	-2286	-2626	-2751	-2483	-2360	-2202	-3720
11 Total Hydro Resources	23805	21900	21321	20903	24021	25450	25662	23560	22281	21572	22843	25772	25021	25103
Other Resources														
12 Small Thermal & Misc.	32	32	32	32	32	32	32	32	32	32	32	32	32	32
13 Combustion Turbines	5660	5660	5723	5817	5931	5984	5998	5962	5914	5757	5757	4515	5097	5653
14 Renewables	78	78	78	78	78	78	78	78	78	78	78	31	31	78
15 Cogeneration	2886	2886	2903	2932	2948	2959	2962	2955	2291	2466	2466	2652	2898	2890
16 Imports	1073	1073	1010	1113	1438	1613	1625	1593	1278	1171	1171	1059	1130	1206
17 Large Thermal	6996	6996	6996	6996	6996	6996	6996	6996	6996	5586	5056	6416	6996	6996
18 Non-Utility Generation	831	829	764	682	626	615	607	619	598	760	761	903	918	910
19 Resource Acquisition	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 Total Other Resources	17555	17554	17506	17651	18050	18277	18297	18235	17186	15850	15321	15608	17102	17764
21 Total Resources	41359	39453	38827	38554	42071	43727	43959	41795	39468	37422	38164	41379	42123	42868
Reserves & Losses (1 Hour.)														
22 Contingency Reserves (Non-Spinning)	-1025	-997	-940	-940	-1027	-1098	-1096	-1044	-983	-928	-937	-967	-1010	-1055
23 Contingency Reserves (Spinning)	-1025	-997	-940	-940	-1027	-1098	-1096	-1044	-983	-928	-937	-967	-1010	-1055
24 Generation Imbalance Reserves	-543	-543	-543	-543	-543	-543	-543	-543	-543	-543	-543	-543	-585	-585
25 Load Following Reserves	-592	-592	-592	-593	-593	-593	-593	-593	-593	-593	-593	-593	-624	-624
26 Regional Transmission Losses	-1279	-1217	-1200	-1191	-1303	-1353	-1361	-1292	-1218	-1153	-1178	-1283	-1303	-1325
27 Total Reserves & Losses	-4464	-4345	-4215	-4206	-4493	-4685	-4690	-4517	-4320	-4145	-4188	-4354	-4532	-4645
28 Total Net Resources	36895	35108	34612	34348	37578	39042	39269	37278	35148	33277	33976	37026	37591	38223
Surplus/Deficits														
29 Firm Surplus/Deficit	4283	2531	5236	4409	4750	3033	3239	3071	3684	3586	4292	8842	6169	4599
30 Total Surplus/Deficit	4283	2531	5222	4409	4750	3033	3236	3048	3630	3552	4258	8842	6169	4599

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Capacity (MW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul
Firm Regional Loads														
1 Regional Firm Loads	33311	33311	29732	30351	33437	37048	36849	34966	32092	30291	30291	28963	32057	34341
2 Exports	1923	1923	1923	1592	1556	1556	1412	1412	1412	1412	1420	1420	1780	1780
3 Federal Diversity	-505	-543	-573	-368	-315	-577	-319	-340	-396	-507	-523	-530	-532	-433
4 Total Firm Regional Loads	34730	34692	31082	31575	34678	38027	37941	36038	33107	31196	31188	29852	33304	35687
Non-Firm Regional Loads														
5 Regional Non-Firm Loads	0	0	14	0	0	0	3.5	23	54	34	34	0	0	0
6 Total Non-Firm Regional Loads	0	0	14	0	0	0	3.5	23	54	34	34	0	0	0
7 Total Loads	34730	34692	31097	31575	34678	38027	37945	36061	33161	31230	31222	29852	33304	35687
Hydro Resources (1 Hour.)														
8 Regulated Hydro	26601	24360	23696	22373	25336	25779	25916	24606	23909	22802	23607	26159	24908	27354
9 Independent Hydro	1635	1643	1687	1724	1673	1518	1431	1500	1689	1792	1916	2094	2154	1808
10 Regional Hydro Maintenance	-4595	-4032	-3787	-3208	-2935	-2037	-1561	-2286	-2626	-2751	-2483	-2360	-2202	-3720
11 Total Hydro Resources	23642	21971	21596	20888	24075	25260	25786	23821	22972	21843	23040	25893	24860	25442
Other Resources														
12 Small Thermal & Misc.	32	32	32	32	32	32	32	32	32	32	32	32	32	32
13 Combustion Turbines	5370	5370	5429	5514	5621	5669	5681	5650	5605	5451	5451	4259	4803	5363
14 Renewables	79	79	79	79	79	79	79	79	79	79	79	32	32	79
15 Cogeneration	2882	2882	2899	2929	2944	2955	2958	2952	2287	2934	2462	2385	2617	2886
16 Imports	1031	1031	965	1097	1422	1599	1610	1578	1260	1122	1122	1014	1093	1172
17 Large Thermal	6996	6996	6996	6996	6996	6326	5746	5746	5746	5746	5746	3946	4462	5746
18 Non-Utility Generation	831	829	764	682	626	615	607	619	598	760	761	903	918	910
19 Resource Acquisition	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 Total Other Resources	17220	17219	17162	17329	17720	17275	16712	16655	15606	16123	15653	12571	13958	16188
21 Total Resources	40862	39190	38759	38217	41795	42535	42499	40476	38578	37966	38693	38463	38818	41630
Reserves & Losses (1 Hour.)														
22 Contingency Reserves (Non-Spinning)	-1050	-1025	-966	-959	-1049	-1119	-1114	-1063	-1005	-970	-979	-958	-1002	-1080
23 Contingency Reserves (Spinning)	-1050	-1025	-966	-959	-1049	-1119	-1114	-1063	-1005	-970	-979	-958	-1002	-1080
24 Generation Imbalance Reserves	-610	-610	-610	-610	-610	-610	-610	-610	-610	-610	-610	-610	-610	-610
25 Load Following Reserves	-637	-637	-637	-637	-637	-637	-637	-637	-637	-637	-637	-637	-637	-637
26 Regional Transmission Losses	-1257	-1202	-1192	-1174	-1288	-1308	-1307	-1243	-1183	-1165	-1189	-1183	-1191	-1280
27 Total Reserves & Losses	-4604	-4500	-4370	-4339	-4634	-4792	-4782	-4615	-4439	-4352	-4394	-4346	-4442	-4687
28 Total Net Resources	36257	34690	34388	33878	37161	37742	37717	35860	34139	33614	34299	34117	34376	36943
Surplus/Deficits														
29 Firm Surplus/Deficit	1528	-2	3306	2303	2483	-284	-224	-178	1032	2419	3111	4265	1072	1256
30 Total Surplus/Deficit	1528	-2	3292	2303	2483	-284	-228	-201	977	2385	3077	4265	1072	1256

Exhibits 28 – 30

Regional Monthly 120-Hour Capacity Analysis
Using the 2011 White Book Load Forecast for 1937-Water Conditions

Loads and Resources - Pacific Northwest Region
PNW Loads and Resource Study
2011 - 2012 Operating Year **5/27/2011**
1937 Water Year
[76] 2011 White Book (Final)

Capacity 120 (MW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul
Firm Regional Loads														
1 Regional Firm Loads	28330	28330	25558	26294	29107	32268	31978	30410	27877	26374	26374	25039	27377	29372
2 Exports	2653	2653	2646	2140	2007	2005	2003	2004	2006	2035	2043	2012	2516	2518
3 Federal Diversity	-817	-884	-933	-1179	-1084	-1068	-1125	-1133	-1038	-1004	-1077	-1011	-864	-782
4 Total Firm Regional Loads	30166	30099	27271	27255	30030	33204	32856	31281	28845	27405	27340	26040	29029	31108
Non-Firm Regional Loads														
5 Regional Non-Firm Loads	0	0	14	0	0	0	3.5	23	54	34	34	0	0	0
6 Total Non-Firm Regional Loads	0	0	14	0	0	0	3.5	23	54	34	34	0	0	0
7 Total Loads	30166	30099	27285	27255	30030	33204	32860	31304	28899	27439	27374	26040	29029	31108
Hydro Resources (120 Hour.)														
8 Regulated Hydro	24648	21668	21467	20976	23261	23011	23066	22001	21099	19411	18158	24074	23197	25083
9 Independent Hydro	1581	1589	1633	1670	1619	1464	1377	1446	1635	1738	1862	2040	2100	1754
10 Regional Hydro Maintenance	-4595	-4032	-3787	-3208	-2935	-2037	-1561	-2286	-2626	-2751	-2483	-2360	-2202	-3720
11 Total Hydro Resources	21635	19225	19313	19438	21945	22437	22882	21162	20108	18398	17537	23754	23095	23117
Other Resources														
12 Small Thermal & Misc.	32	32	32	32	32	32	32	32	32	32	32	32	32	32
13 Combustion Turbines	5360	5360	5423	5517	5631	5685	5697	5662	5614	5457	5457	4190	4797	5653
14 Renewables	78	78	78	78	78	78	78	78	78	78	78	78	31	78
15 Cogeneration	2882	2882	2899	2932	2948	2959	2962	2955	2291	2938	2938	2389	2898	2890
16 Imports	1253	1253	1111	1216	1646	1969	1982	1950	1381	1227	1227	1111	1173	1379
17 Large Thermal	6996	6996	6996	6996	6996	6996	6996	6996	6996	6996	6996	5746	6842	6996
18 Non-Utility Generation	824	823	757	676	620	609	600	612	591	753	754	896	911	903
19 Resource Acquisition	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 Total Other Resources	17425	17423	17296	17447	17950	18327	18347	18285	16983	17480	17482	14441	16684	17932
21 Total Resources	39060	36648	36609	36885	39896	40764	41228	39446	37091	35878	35018	38195	39780	41049
Reserves & Losses (120 Hour.)														
22 Contingency Reserves (Non-Spinning)	-961	-925	-885	-892	-968	-1021	-1022	-979	-923	-883	-870	-899	-949	-994
23 Contingency Reserves (Spinning)	-961	-925	-885	-892	-968	-1021	-1022	-979	-923	-883	-870	-899	-949	-994
24 Generation Imbalance Reserves	-311	-311	-338	-290	-290	-290	-290	-290	-294	-320	-320	-320	-320	-320
25 Load Following Reserves	-415	-415	-432	-403	-403	-403	-403	-403	-408	-419	-419	-419	-419	-419
26 Regional Transmission Losses	-1220	-1141	-1141	-1153	-1248	-1274	-1289	-1233	-1157	-1118	-1090	-1195	-1244	-1284
27 Total Reserves & Losses	-3867	-3717	-3681	-3630	-3878	-4010	-4028	-3884	-3705	-3624	-3569	-3731	-3882	-4011
28 Total Net Resources	35192	32931	32928	33255	36018	36754	37201	35562	33386	32254	31450	34465	35898	37037
Surplus/Deficits														
29 Firm Surplus/Deficit	5026	2831	5657	6000	5988	3550	4344	4281	4542	4849	4110	8424	6869	5929
30 Total Surplus/Deficit	5026	2831	5643	6000	5988	3550	4341	4258	4488	4815	4076	8424	6869	5929

Loads and Resources - Pacific Northwest Region
PNW Loads and Resource Study
2015 - 2016 Operating Year **5/27/2011**
1937 Water Year
[76] 2011 White Book (Final)

Capacity 120 (MW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul
Firm Regional Loads														
1 Regional Firm Loads	30948	30948	27778	28510	31482	34915	34691	32885	30196	28500	28500	27164	29899	32017
2 Exports	2142	2142	2140	1779	1645	1644	1642	1643	1645	1674	1681	1523	2028	2018
3 Federal Diversity	-768	-830	-892	-1242	-1146	-1128	-1188	-1191	-1094	-1055	-1132	-1065	-908	-821
4 Total Firm Regional Loads	32322	32260	29025	29047	31980	35431	35145	33336	30747	29118	29050	27623	31018	33214
Non-Firm Regional Loads														
5 Regional Non-Firm Loads	0	0	14	0	0	0	3.5	23	54	34	34	0	0	0
6 Total Non-Firm Regional Loads	0	0	14	0	0	0	3.5	23	54	34	34	0	0	0
7 Total Loads	32322	32260	29039	29047	31980	35431	35148	33359	30801	29152	29083	27623	31018	33214
Hydro Resources (120 Hour.)														
8 Regulated Hydro	25059	22493	21991	21127	23656	23504	23453	22383	21418	19692	18426	24421	23381	25263
9 Independent Hydro	1635	1643	1687	1724	1673	1518	1431	1500	1689	1792	1916	2094	2154	1808
10 Regional Hydro Maintenance	-4595	-4032	-3787	-3208	-2935	-2037	-1561	-2286	-2626	-2751	-2483	-2360	-2202	-3720
11 Total Hydro Resources	22100	20104	19891	19642	22394	22984	23323	21598	20481	18733	17859	24155	23333	23351
Other Resources														
12 Small Thermal & Misc.	32	32	32	32	32	32	32	32	32	32	32	32	32	32
13 Combustion Turbines	5660	5660	5723	5817	5931	5984	5998	5962	5914	5757	5757	4515	5097	5653
14 Renewables	78	78	78	78	78	78	78	78	78	78	78	31	31	78
15 Cogeneration	2886	2886	2903	2932	2948	2959	2962	2955	2291	2466	2466	2652	2898	2890
16 Imports	1073	1073	1010	1113	1438	1613	1625	1593	1278	1171	1171	1059	1130	1206
17 Large Thermal	6996	6996	6996	6996	6996	6996	6996	6996	6996	5586	5056	6416	6996	6996
18 Non-Utility Generation	831	829	764	682	626	615	607	619	598	760	761	903	918	910
19 Resource Acquisition	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 Total Other Resources	17555	17554	17506	17651	18050	18277	18297	18235	17186	15850	15321	15608	17102	17764
21 Total Resources	39655	37657	37397	37293	40444	41262	41620	39832	37668	34582	33180	39762	40435	41115
Reserves & Losses (120 Hour.)														
22 Contingency Reserves (Non-Spinning)	-1000	-971	-919	-921	-1003	-1062	-1062	-1016	-956	-886	-865	-943	-986	-1030
23 Contingency Reserves (Spinning)	-1000	-971	-919	-921	-1003	-1062	-1062	-1016	-956	-886	-865	-943	-986	-1030
24 Generation Imbalance Reserves	-543	-543	-543	-543	-543	-543	-543	-543	-543	-543	-543	-543	-585	-585
25 Load Following Reserves	-592	-592	-592	-593	-593	-593	-593	-593	-593	-593	-593	-593	-624	-624
26 Regional Transmission Losses	-1223	-1158	-1153	-1150	-1250	-1273	-1285	-1228	-1160	-1061	-1016	-1231	-1248	-1268
27 Total Reserves & Losses	-4359	-4234	-4127	-4128	-4392	-4533	-4546	-4396	-4209	-3970	-3881	-4254	-4428	-4537
28 Total Net Resources	35296	33423	33271	33165	36051	36729	37074	35436	33459	30613	29299	35508	36007	36579
Surplus/Deficits														
29 Firm Surplus/Deficit	2974	1163	4246	4119	4071	1298	1929	2100	2712	1494	250	7886	4988	3364
30 Total Surplus/Deficit	2974	1163	4231	4119	4071	1298	1926	2077	2657	1460	216	7886	4988	3364

Loads and Resources - Pacific Northwest Region
PNW Loads and Resource Study
2020 - 2021 Operating Year
1937 Water Year
[76] 2011 White Book (Final)

5/27/2011

Capacity 120 (MW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul
Firm Regional Loads														
1 Regional Firm Loads	33311	33311	29732	30351	33437	37048	36849	34966	32092	30291	30291	28963	32057	34341
2 Exports	1923	1923	1923	1592	1556	1556	1412	1412	1412	1412	1420	1420	1780	1780
3 Federal Diversity	-812	-878	-943	-1308	-1209	-1184	-1251	-1264	-1150	-1108	-1188	-1122	-957	-864
4 Total Firm Regional Loads	34423	34357	30712	30635	33784	37419	37010	35114	32353	30595	30522	29261	32879	35256
Non-Firm Regional Loads														
5 Regional Non-Firm Loads	0	0	14	0	0	0	3.5	23	54	34	34	0	0	0
6 Total Non-Firm Regional Loads	0	0	14	0	0	0	3.5	23	54	34	34	0	0	0
7 Total Loads	34423	34357	30726	30635	33784	37419	37014	35137	32407	30629	30556	29261	32879	35256
Hydro Resources (120 Hour.)														
8 Regulated Hydro	25079	22547	22062	21201	23728	23565	23602	22496	21355	19793	18588	24215	23374	25258
9 Independent Hydro	1635	1643	1687	1724	1673	1518	1431	1500	1689	1792	1916	2094	2154	1808
10 Regional Hydro Maintenance	-4595	-4032	-3787	-3208	-2935	-2037	-1561	-2286	-2626	-2751	-2483	-2360	-2202	-3720
11 Total Hydro Resources	22120	20157	19963	19716	22467	23046	23472	21711	20418	18834	18021	23948	23326	23346
Other Resources														
12 Small Thermal & Misc.	32	32	32	32	32	32	32	32	32	32	32	32	32	32
13 Combustion Turbines	5370	5370	5429	5514	5621	5669	5681	5650	5605	5451	5451	4259	4803	5363
14 Renewables	79	79	79	79	79	79	79	79	79	79	79	32	32	79
15 Cogeneration	2882	2882	2899	2929	2944	2955	2958	2952	2287	2934	2462	2385	2617	2886
16 Imports	1031	1031	965	1097	1422	1599	1610	1578	1260	1122	1122	1014	1093	1172
17 Large Thermal	6996	6996	6996	6996	6996	6326	5746	5746	5746	5746	5746	3946	4462	5746
18 Non-Utility Generation	831	829	764	682	626	615	607	619	598	760	761	903	918	910
19 Resource Acquisition	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20 Total Other Resources	17220	17219	17162	17329	17720	17275	16712	16655	15606	16123	15653	12571	13958	16188
21 Total Resources	39340	37376	37125	37045	40187	40321	40184	38366	36025	34957	33674	36519	37284	39534
Reserves & Losses (120 Hour.)														
22 Contingency Reserves (Non-Spinning)	-1028	-999	-942	-942	-1026	-1086	-1080	-1032	-967	-926	-906	-930	-980	-1049
23 Contingency Reserves (Spinning)	-1028	-999	-942	-942	-1026	-1086	-1080	-1032	-967	-926	-906	-930	-980	-1049
24 Generation Imbalance Reserves	-610	-610	-610	-610	-610	-610	-610	-610	-610	-610	-610	-610	-610	-610
25 Load Following Reserves	-637	-637	-637	-637	-637	-637	-637	-637	-637	-637	-637	-637	-637	-637
26 Regional Transmission Losses	-1207	-1143	-1139	-1136	-1236	-1236	-1232	-1174	-1100	-1067	-1026	-1119	-1142	-1212
27 Total Reserves & Losses	-4511	-4388	-4270	-4267	-4535	-4656	-4639	-4485	-4282	-4166	-4085	-4226	-4347	-4558
28 Total Net Resources	34830	32988	32856	32778	35652	35665	35545	33880	31743	30791	29589	32293	32936	34976
Surplus/Deficits														
29 Firm Surplus/Deficit	407	-1369	2144	2142	1869	-1754	-1465	-1234	-610	196	-933	3032	57	-280
30 Total Surplus/Deficit	407	-1369	2130	2142	1869	-1754	-1469	-1257	-665	162	-967	3032	57	-280

Exhibits 31 – 40

Regional Energy Surpluses and Deficits for 70 Historical Water Conditions

Table A-30: Regional Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2011 - 2012 Operating Year **5/27/2011**
[76] 2011 White Book (Final)

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1929 Regional Surplus/Deficit	5562	2749	3583	5304	5178	3297	2557	3094	2684	5694	6310	5140	8154	4202	4436
1930 Regional Surplus/Deficit	4134	1918	3107	4004	3904	2898	3302	2858	3128	5099	5235	4374	5596	5232	3879
1931 Regional Surplus/Deficit	2736	1878	2782	3555	4546	3133	3330	2989	875	5219	2977	5959	4106	4444	3508
1932 Regional Surplus/Deficit	4514	2560	3567	3722	3237	3319	1976	1740	5428	9036	13837	11739	13734	5526	5741
1933 Regional Surplus/Deficit	4243	3232	3722	4610	4697	5902	7965	7941	7677	10211	8651	9414	14482	12134	7635
1934 Regional Surplus/Deficit	8450	5761	4937	7129	10213	13257	14429	13018	10905	15181	13425	10394	10283	5351	10093
1935 Regional Surplus/Deficit	3291	1971	3322	4291	4296	3977	7303	7770	5673	10214	8118	8779	9377	7901	6193
1936 Regional Surplus/Deficit	6558	3207	3021	4158	4391	3144	1435	2629	3083	7247	12357	11404	12096	5386	5443
1937 Regional Surplus/Deficit	4922	2647	2499	3905	4218	2947	2976	2567	2404	4281	2934	5752	7519	5359	3961
1938 Regional Surplus/Deficit	5355	3083	3263	4241	4411	5065	7375	6971	7287	12129	14096	11678	11106	7333	7161
1939 Regional Surplus/Deficit	4106	2206	3868	4836	4508	3713	3585	3369	3950	11118	10333	10072	7739	5491	5412
1940 Regional Surplus/Deficit	3044	1579	2502	4504	4426	4264	2789	4150	6316	10545	10785	8537	8826	4369	5295
1941 Regional Surplus/Deficit	2498	1624	3140	4814	3826	3910	2211	2783	2965	5631	6240	6432	6410	4999	4122
1942 Regional Surplus/Deficit	3906	2594	4233	4095	4784	5814	6905	3603	3031	6057	9704	7660	11382	8618	5937
1943 Regional Surplus/Deficit	6439	3813	3929	4568	4490	4584	9107	8839	6643	16429	16128	11590	14304	8254	8117
1944 Regional Surplus/Deficit	5913	3020	2396	4599	4757	3508	2947	3200	3496	5616	7227	4544	4269	3777	4028
1945 Regional Surplus/Deficit	3788	2302	3820	3756	4012	2421	2780	2381	2358	3667	2425	8840	10167	4175	4230
1946 Regional Surplus/Deficit	4351	2281	2853	3904	4709	5222	7113	6023	7784	13288	14959	12002	12673	8086	7307
1947 Regional Surplus/Deficit	5684	3634	3989	4721	5874	10078	10956	11517	9095	11398	10546	10256	12587	8315	8568
1948 Regional Surplus/Deficit	5099	3223	3727	9511	8453	7299	10557	7863	6521	10909	12978	12728	14827	10207	8979
1949 Regional Surplus/Deficit	8083	6027	4821	5637	5365	4975	6035	4073	9587	12951	14104	12415	12450	5121	7588
1950 Regional Surplus/Deficit	4124	1710	2426	4367	4773	3894	10341	9925	11689	14465	12740	11068	13651	9975	8201
1951 Regional Surplus/Deficit	6964	5154	4298	7424	9639	11452	13479	13674	13073	14999	14076	11582	12144	10544	10645
1952 Regional Surplus/Deficit	7736	4044	4025	8530	7176	7698	9424	8329	7970	14240	14939	12633	12693	8076	8910
1953 Regional Surplus/Deficit	5517	3414	3110	4227	4247	3727	5467	6657	6252	9363	9312	10822	14284	10323	6899
1954 Regional Surplus/Deficit	6161	3857	3858	5558	5865	7006	10531	10175	8025	12269	10894	11140	13583	13036	8770
1955 Regional Surplus/Deficit	10580	9263	7875	5808	7302	5844	4388	3251	3593	6319	7448	8403	14495	12835	7555
1956 Regional Surplus/Deficit	8443	5262	3799	6259	8538	10715	13286	12428	11552	13942	15744	12281	14978	11182	10545
1957 Regional Surplus/Deficit	6493	4830	4132	6268	5351	7070	6684	4677	8200	14827	11106	13122	14683	6260	7923
1958 Regional Surplus/Deficit	4809	2259	3431	4612	4854	3679	7729	7888	6644	12134	11939	12663	13412	6060	7191
1959 Regional Surplus/Deficit	4705	2925	3202	4342	6755	8957	11791	10947	9543	12986	10738	10074	13505	8630	8601
1960 Regional Surplus/Deficit	6747	4490	8217	11139	10417	9030	8727	7076	7888	16533	13127	9673	12002	7718	9349
1961 Regional Surplus/Deficit	5744	2647	3834	4933	5779	4937	8170	8627	10006	11965	9079	10487	13584	6301	7595
1962 Regional Surplus/Deficit	5106	3837	2965	3750	4721	4505	6784	6409	3579	15264	14926	10743	12543	4648	6661
1963 Regional Surplus/Deficit	5140	2970	2884	5541	7079	8569	8190	7821	6280	8419	8404	8974	10928	7907	7213
1964 Regional Surplus/Deficit	6135	3639	3782	4638	5083	5209	5487	5024	4107	12473	9006	9988	14919	11849	7135
1965 Regional Surplus/Deficit	8360	4107	5467	6599	6402	10732	14544	13200	10965	11017	15366	11705	12217	8087	9928
1966 Regional Surplus/Deficit	7213	5303	4525	5829	5776	5469	6584	5754	3843	14912	10282	9151	10096	8250	7002
1967 Regional Surplus/Deficit	6027	3476	3336	4272	4548	5917	11425	11368	8552	9783	6056	10150	14246	9426	7976
1968 Regional Surplus/Deficit	7178	3959	3974	5781	6085	5783	9777	9141	8507	8044	6738	7094	12066	9128	7513
1969 Regional Surplus/Deficit	7014	5034	6757	7113	8526	7760	12448	11398	8455	14850	14666	12548	12825	8790	9762
1970 Regional Surplus/Deficit	4786	2654	3574	4947	5347	3751	7343	5921	5754	10312	8051	9750	13246	6156	6544
1971 Regional Surplus/Deficit	4698	2156	2872	4290	4379	4067	13128	14840	10724	14177	13171	12377	14904	12155	9205
1972 Regional Surplus/Deficit	8986	5633	4639	6079	6039	6102	12733	13451	16456	16575	12481	12351	14886	12523	10576
1973 Regional Surplus/Deficit	10268	7694	5236	5652	5758	6156	7148	4279	3942	5064	6561	6831	8266	4595	6059
1974 Regional Surplus/Deficit	2902	1331	2793	3967	4463	6458	16006	14897	13280	15365	15313	11858	14653	13441	9916
1975 Regional Surplus/Deficit	8330	5980	4370	4496	5260	5191	8737	7338	7057	8831	8636	11343	14364	12613	8054
1976 Regional Surplus/Deficit	5466	5006	4912	7381	9278	12873	12256	11765	11472	14981	14151	12067	13262	11272	10521
1977 Regional Surplus/Deficit	11025	10671	9435	5505	5172	3297	2783	3275	3550	4480	6361	3538	3740	2761	4942
1978 Regional Surplus/Deficit	4263	2895	3486	3593	3868	6629	6311	6340	6198	13856	10066	10458	9524	8285	6680
1979 Regional Surplus/Deficit	4930	3867	6610	5693	5107	3539	5396	3575	7258	8089	8839	10866	8299	4770	6167
1980 Regional Surplus/Deficit	2490	1513	2617	3822	4098	3002	3815	3824	3045	10997	12112	12387	12828	5162	5666
1981 Regional Surplus/Deficit	4232	2182	3740	4854	5162	10015	10514	8970	7548	6308	8454	9247	14153	10082	7900
1982 Regional Surplus/Deficit	8482	6364	4012	5173	6021	6873	8661	14173	13932	13004	10889	11685	14063	10503	9515
1983 Regional Surplus/Deficit	8518	4970	6258	7064	6461	7591	11287	10195	12755	13309	11287	11588	12696	10449	9609
1984 Regional Surplus/Deficit	8631	5215	5062	5570	9679	7280	11196	10434	9780	15072	13511	10239	13783	9736	9475
1985 Regional Surplus/Deficit	6578	3439	4479	5409	6735	5409	7443	5028	3819	12226	11968	11315	10080	3405	6672
1986 Regional Surplus/Deficit	2072	1336	3393	4702	6998	3896	8053	9545	15663	13982	12834	8787	11624	6533	7837
1987 Regional Surplus/Deficit	4978	2616	3039	3867	5421	5204	4005	2490	6069	7401	8295	10183	8935	4135	5419
1988 Regional Surplus/Deficit	2977	1398	2532	3312	3653	2829	2532	2244	2907	4719	7281	6239	6702	4651	3812
1989 Regional Surplus/Deficit	4645	2632	2956	3451	4401	3716	3761	3663	5093	11740	13350	9469	9834	4846	5603
1990 Regional Surplus/Deficit	2446	1944	2996	3775	5476	5913	9263	9140	6916	10279	13882	9259	12619	7480	7237
1991 Regional Surplus/Deficit	5788	4348	2787	3714	9603	7514	10156	10569	8174	12510	10482	10442	11550	11041	8493
1992 Regional Surplus/Deficit	8266	4842	3462	3779	4823	3715	5090	3812	7149	6147	6792	6063	7542	3435	5156

Table A-30: Regional Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2011 - 2012 Operating Year
[76] 2011 White Book (Final)

Continued **5/27/2011**

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1993 Regional Surplus/Deficit	2048	1450	2065	3477	4168	3378	3281	748	3167	7341	6787	9803	8716	6071	4482
1994 Regional Surplus/Deficit	4602	3424	2335	3684	4802	3547	3703	3647	3591	4896	7821	6426	7864	4068	4497
1995 Regional Surplus/Deficit	2673	1524	2326	3202	3846	2977	3681	7467	8497	12061	8445	9020	12255	7955	6111
1996 Regional Surplus/Deficit	5193	2981	3468	5693	11211	14813	14879	15671	13897	14525	16349	12140	13479	11644	11347
1997 Regional Surplus/Deficit	7990	3821	4178	5363	6045	7233	15060	14613	14791	14878	15858	12000	14731	12463	10624
1998 Regional Surplus/Deficit	8228	5147	6812	10268	8265	6554	7701	7406	7469	9400	10646	12125	13759	7670	8721
-Ranked Averages-															
Top Ten Percent	7356	4803	4319	6475	8709	10921	13732	13517	13164	15012	14584	11831	13395	10711	10621
Middle Eighty Percent	5730	3645	4016	5096	5623	5573	7547	7122	7130	10963	10790	10159	11942	7778	7285
Bottom Ten Percent	3853	2112	2896	3992	4131	3092	2868	2718	2590	4890	4902	6020	6396	4662	3934

Table A-30: Regional Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2012 - 2013 Operating Year **5/27/2011**
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Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1929 Regional Surplus/Deficit	5399	3506	5095	5211	5097	3084	2457	2905	2714	4174	5158	4478	7463	3633	4266
1930 Regional Surplus/Deficit	4707	2749	4139	3911	3822	2684	3202	2669	3158	3579	4084	3715	4956	4663	3707
1931 Regional Surplus/Deficit	4466	2902	3787	3463	4464	2919	3230	2800	905	3699	1826	5261	3477	3875	3386
1932 Regional Surplus/Deficit	3062	1643	3645	3629	3156	3106	1876	1551	5458	7516	12662	10947	12543	4957	5281
1933 Regional Surplus/Deficit	5073	3402	4393	4517	4615	5689	7864	7752	7708	8691	7500	8699	13235	11428	7344
1934 Regional Surplus/Deficit	8312	6737	4501	7036	10110	12984	14263	12769	10900	13543	12198	9627	9465	4782	9714
1935 Regional Surplus/Deficit	3302	2590	3420	4198	4215	3763	7604	7053	5703	8693	6967	8094	8660	7296	5886
1936 Regional Surplus/Deficit	6080	3836	3340	4065	4310	2931	1335	2440	3113	5727	11205	10679	11044	4817	5126
1937 Regional Surplus/Deficit	4978	3046	3565	3812	4136	2734	2875	2378	2434	2761	1783	5090	6864	4790	3751
1938 Regional Surplus/Deficit	4633	2609	3780	4148	4330	4852	7647	6696	6938	10606	12917	10942	10219	6737	6796
1939 Regional Surplus/Deficit	4567	3229	3824	4743	4427	3499	3485	3180	3980	9597	9181	9390	7106	4922	5157
1940 Regional Surplus/Deficit	3982	2402	4031	4411	4344	4051	2689	3961	6346	9025	9625	7865	8139	3800	5173
1941 Regional Surplus/Deficit	3155	1903	3207	4721	3745	3696	2110	2594	2995	4111	5089	5753	5763	4430	3849
1942 Regional Surplus/Deficit	3802	2870	3907	4002	4703	5600	6805	3414	3061	4536	8553	6963	10443	7994	5572
1943 Regional Surplus/Deficit	5443	3960	4953	4475	4409	4370	8996	8639	6673	14756	14799	10850	12990	7627	7763
1944 Regional Surplus/Deficit	4992	4016	4164	4506	4675	3295	2847	3011	3526	4095	6076	3885	3640	3208	3862
1945 Regional Surplus/Deficit	3370	2486	3666	3663	3931	2207	2679	2192	2388	2147	1273	8173	9364	3606	3880
1946 Regional Surplus/Deficit	4882	3124	3954	3811	4627	5008	7013	5834	7815	11728	13846	11203	11375	7315	7057
1947 Regional Surplus/Deficit	5473	3958	4520	4628	5793	9854	10825	11318	9125	9878	9395	9563	11491	7692	8240
1948 Regional Surplus/Deficit	5245	4265	4082	9397	8372	7086	10446	7663	6551	9389	11802	11782	13545	9527	8652
1949 Regional Surplus/Deficit	8079	6771	5017	5544	5284	4761	5935	3884	9606	11413	12911	11596	11352	4552	7272
1950 Regional Surplus/Deficit	3662	2196	3761	4274	4691	3681	10213	9725	11708	12905	11570	10347	12494	9300	7925
1951 Regional Surplus/Deficit	7974	6383	4573	7331	9547	11228	13332	13474	13068	13406	12848	10807	11099	9837	10364
1952 Regional Surplus/Deficit	7237	4931	4865	8429	7095	7485	9313	8615	7487	12675	13738	11771	11580	7460	8606
1953 Regional Surplus/Deficit	5285	4202	3702	4134	4165	3514	5367	6664	6092	7843	8161	10100	13312	9646	6610
1954 Regional Surplus/Deficit	6384	5014	4490	5465	5784	6793	10420	9975	8055	10749	9743	10411	12325	12276	8484
1955 Regional Surplus/Deficit	9519	9388	8124	5716	7221	5631	4288	3062	3623	4799	6297	7667	13273	12084	7159
1956 Regional Surplus/Deficit	8293	5462	4366	6166	8456	10491	13164	12179	11571	12358	14481	11417	13633	10487	10167
1957 Regional Surplus/Deficit	6284	4970	4324	6175	5270	6856	6583	4488	8231	13283	9950	12125	13281	5691	7533
1958 Regional Surplus/Deficit	4665	3135	4078	4519	4773	3465	7622	7688	6674	10614	10788	11741	12206	5491	6885
1959 Regional Surplus/Deficit	4784	3576	3890	4249	6674	8733	11669	10747	9573	11466	9562	9303	12407	7995	8305
1960 Regional Surplus/Deficit	7669	5444	8848	11025	10315	8806	8620	6887	7919	14907	11915	8972	11001	7113	9119
1961 Regional Surplus/Deficit	5418	4125	3617	4840	5698	4723	8059	8427	10026	10445	7928	9745	12459	5729	7257
1962 Regional Surplus/Deficit	4726	3447	4174	3657	4640	4291	6684	6220	3610	13667	13717	10046	11304	4079	6350
1963 Regional Surplus/Deficit	4844	3907	3813	5448	6998	8345	8079	7621	6310	6899	7252	8302	10058	7303	6971
1964 Regional Surplus/Deficit	5417	3860	4328	4546	5002	4995	5386	4835	4137	10952	7855	9258	13629	11158	6776
1965 Regional Surplus/Deficit	8053	5154	5526	6506	6321	10507	14378	12974	10985	9477	14161	10919	11153	7484	9575
1966 Regional Surplus/Deficit	7504	6298	3999	5736	5695	5255	6483	5565	3873	13334	9117	8450	9304	7618	6673
1967 Regional Surplus/Deficit	5487	4395	4339	4179	4467	5704	11278	11169	8582	8263	4905	9429	13080	8729	7683
1968 Regional Surplus/Deficit	6538	4184	4193	5688	6004	5570	9665	9352	8087	6523	5587	6376	11083	8457	7140
1969 Regional Surplus/Deficit	7022	5794	6729	7020	8445	7547	12326	11189	8485	13283	13443	11628	11657	8129	9387
1970 Regional Surplus/Deficit	5038	3505	4080	4854	5266	3537	7232	5929	5594	8792	6900	9057	12205	5587	6277
1971 Regional Surplus/Deficit	5305	3560	4113	4197	4298	3854	13006	14570	10754	12611	11970	11524	13565	11456	8961
1972 Regional Surplus/Deficit	8898	6220	4827	5987	5958	5889	12586	13251	16420	14921	11266	11502	13550	11803	10181
1973 Regional Surplus/Deficit	9646	8224	5657	5560	5677	5942	7047	4090	3972	3544	5410	6159	7600	4026	5773
1974 Regional Surplus/Deficit	3976	2469	4247	3875	4382	6244	15824	14629	13300	13745	14051	11064	13351	12711	9694
1975 Regional Surplus/Deficit	8665	7066	4806	4404	5179	4978	8626	7149	7088	7311	7485	10601	13081	11859	7757
1976 Regional Surplus/Deficit	6727	5779	5507	7288	9197	12649	12134	11565	11492	13396	12931	11282	12071	10549	10253
1977 Regional Surplus/Deficit	10250	10058	9440	5412	5091	3084	2682	3086	3580	2960	5210	2878	3111	2192	4569
1978 Regional Surplus/Deficit	3345	1901	2463	3500	3787	6405	6210	6151	6228	12295	8915	9772	8781	7678	6179
1979 Regional Surplus/Deficit	5063	3779	7112	5600	5026	3325	5295	3386	7288	6568	7688	10177	7686	4201	5896
1980 Regional Surplus/Deficit	3184	2251	3761	3729	4017	2789	3715	3635	3075	9476	10944	11499	11739	4593	5449
1981 Regional Surplus/Deficit	4288	2610	4047	4761	5080	9790	10392	8770	7578	4788	7303	8554	12958	9380	7560
1982 Regional Surplus/Deficit	8015	6812	4450	5080	5939	6660	8550	13947	13942	11472	9727	10886	12830	9795	9140
1983 Regional Surplus/Deficit	8188	6774	6483	6971	6379	7378	11165	9996	12766	11750	10118	10835	11597	9772	9310
1984 Regional Surplus/Deficit	7929	5800	5211	5477	9587	7066	11079	10234	9800	13495	12304	9550	12700	9051	9104
1985 Regional Surplus/Deficit	5858	4593	4531	5317	6654	5195	7343	4839	3849	10706	10817	10637	9312	2836	6370
1986 Regional Surplus/Deficit	2991	1841	3549	4609	6917	3683	7942	9339	15626	12395	11635	8098	10669	5958	7543
1987 Regional Surplus/Deficit	5101	3507	4214	3774	5339	4990	3904	2301	6099	5881	7152	9519	8258	3566	5245
1988 Regional Surplus/Deficit	2869	1290	3793	3220	3572	2615	2432	2055	2938	3199	6130	5568	6052	4082	3590
1989 Regional Surplus/Deficit	3713	2478	3114	3359	4320	3503	3661	3474	5123	10201	12156	8753	9072	4277	5239
1990 Regional Surplus/Deficit	4178	2723	4081	3682	5395	5699	9481	8498	6946	8759	12747	8654	11468	6872	7059
1991 Regional Surplus/Deficit	6411	4627	4254	3621	9522	7301	10364	10315	7729	10990	9306	9764	10553	10315	8261
1992 Regional Surplus/Deficit	8221	6508	4494	3686	4742	3501	4989	3623	7179	4627	5641	5401	6898	2866	4995

Table A-30: Regional Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2012 - 2013 Operating Year
[76] 2011 White Book (Final)

Continued **5/27/2011**

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1993 Regional Surplus/Deficit	2453	1243	2853	3384	4086	3165	3181	559	3197	5821	5636	9139	8058	5496	4243
1994 Regional Surplus/Deficit	4347	3231	3792	3591	4721	3333	3602	3458	3621	3376	6670	5765	7203	3499	4279
1995 Regional Surplus/Deficit	3638	2036	3632	3109	3765	2763	3580	7267	8527	10541	7294	8345	11248	7344	5921
1996 Regional Surplus/Deficit	4595	3481	4734	5600	11113	14525	14713	15397	13892	12908	15076	11376	12211	10881	11008
1997 Regional Surplus/Deficit	7982	5341	3854	5270	5964	7020	14878	14338	14753	13254	14554	11165	13413	11761	10221
1998 Regional Surplus/Deficit	8309	6411	6826	10154	8184	6340	7601	7540	7180	7880	9495	11295	12476	7101	8393
-Ranked Averages-															
Top Ten Percent	7540	5629	4623	6382	8621	10684	13582	13282	13157	13398	13336	11025	12206	10014	10273
Middle Eighty Percent	5672	4218	4571	5002	5541	5359	7462	6934	7112	9425	9621	9421	10922	7151	6986
Bottom Ten Percent	4077	2627	3760	3899	4049	2879	2768	2529	2621	3370	3751	5349	5731	4093	3718

Table A-30: Regional Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2013 - 2014 Operating Year **5/27/2011**
[76] 2011 White Book (Final)

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1929 Regional Surplus/Deficit	4930	3038	4802	4863	4680	2608	1764	2255	1904	4552	4749	4737	7683	3243	3926
1930 Regional Surplus/Deficit	4238	2281	3847	3563	3405	2209	2508	2018	2347	3957	3674	3987	5206	4244	3368
1931 Regional Surplus/Deficit	3997	2434	3495	3114	4047	2444	2536	2150	95	4077	1416	5468	3735	3480	3044
1932 Regional Surplus/Deficit	2593	1175	3352	3281	2738	2630	1182	901	4647	7894	12147	10794	12712	4570	4898
1933 Regional Surplus/Deficit	4604	2934	4100	4169	4198	5213	7171	7102	6897	9069	7090	8711	13255	10711	6939
1934 Regional Surplus/Deficit	7818	6269	4208	6687	9682	12438	13501	12016	10029	13751	11667	9504	9522	4331	9285
1935 Regional Surplus/Deficit	2833	2122	3128	3850	3797	3288	6911	6403	4892	9071	6557	8077	8835	6780	5509
1936 Regional Surplus/Deficit	5611	3368	3047	3717	3892	2455	641	1790	2302	6104	10796	10565	11335	4409	4758
1937 Regional Surplus/Deficit	4508	2578	3272	3464	3719	2259	2182	1728	1624	3138	1373	5343	7100	4359	3408
1938 Regional Surplus/Deficit	4164	2141	3488	3800	3912	4376	6954	6046	6127	10984	12452	10782	10434	6254	6410
1939 Regional Surplus/Deficit	4098	2761	3531	4395	4010	3024	2791	2530	3170	9975	8772	9336	7297	4489	4784
1940 Regional Surplus/Deficit	3513	1933	3739	4063	3927	3576	1996	3311	5536	9403	9166	7911	8306	3382	4806
1941 Regional Surplus/Deficit	2686	1435	2915	4373	3327	3221	1417	1944	2184	4489	4679	5926	5995	4009	3500
1942 Regional Surplus/Deficit	3333	2402	3614	3654	4285	5125	6112	2763	2250	4914	8143	7109	10638	7479	5209
1943 Regional Surplus/Deficit	4974	3492	4660	4127	3992	3895	8303	7989	5862	15158	14303	10616	13161	7147	7367
1944 Regional Surplus/Deficit	4523	3548	3871	4158	4258	2819	2154	2361	2716	4473	5666	4161	3895	2816	3526
1945 Regional Surplus/Deficit	2901	2018	3373	3315	3513	1732	1986	1542	1577	2524	864	8245	9535	3213	3520
1946 Regional Surplus/Deficit	4413	2656	3661	3463	4210	4533	6319	5184	7004	12101	13297	10944	11848	6826	6680
1947 Regional Surplus/Deficit	5004	3490	4227	4280	5376	9361	10108	10657	8315	10255	8985	9518	11734	7186	7862
1948 Regional Surplus/Deficit	4776	3797	3789	9038	7954	6610	9753	7013	5740	9766	11343	11478	13703	8962	8241
1949 Regional Surplus/Deficit	7585	6303	4725	5196	4866	4286	5242	3234	8787	11798	12460	11339	11705	4148	6895
1950 Regional Surplus/Deficit	3193	1728	3468	3926	4274	3206	9495	9075	10887	13270	11179	10152	12588	8798	7524
1951 Regional Surplus/Deficit	7499	5915	4280	6982	9119	10731	12614	12802	12197	13795	12421	10633	11431	9256	9968
1952 Regional Surplus/Deficit	6768	4463	4572	8081	6677	7010	9024	7435	6677	13045	13301	11450	11927	6982	8212
1953 Regional Surplus/Deficit	4815	3734	3409	3786	3748	3038	4674	6014	5281	8221	7751	10056	13336	9119	6217
1954 Regional Surplus/Deficit	5915	4546	4197	5117	5366	6317	9727	9325	7244	11126	9333	10214	12548	11529	8075
1955 Regional Surplus/Deficit	9025	8895	7810	5367	6803	5156	3594	2412	2812	5177	5887	7777	13189	11358	6749
1956 Regional Surplus/Deficit	7799	4994	4074	5817	8039	9994	12471	11493	10749	12746	13927	11198	13723	9862	9744
1957 Regional Surplus/Deficit	5815	4502	4031	5827	4852	6381	5890	3838	7420	13634	9545	11795	13523	5260	7140
1958 Regional Surplus/Deficit	4196	2667	3785	4171	4355	2990	6929	7038	5863	10992	10379	11435	12518	5045	6500
1959 Regional Surplus/Deficit	4315	3108	3597	3901	6256	8247	10976	10086	8762	11835	9103	9250	12483	7525	7916
1960 Regional Surplus/Deficit	7175	4976	8534	10666	9886	8320	7926	6237	7108	15108	11452	8933	11223	6604	8729
1961 Regional Surplus/Deficit	4949	3657	3324	4492	5280	4248	7366	7777	9215	10823	7518	9643	12541	5295	6871
1962 Regional Surplus/Deficit	4257	2979	3882	3309	4222	3816	5991	5570	2799	14029	13150	9850	11725	3695	5982
1963 Regional Surplus/Deficit	4375	3439	3521	5100	6581	7859	7386	6971	5500	7277	6843	8347	10235	6793	6598
1964 Regional Surplus/Deficit	4948	3392	4035	4197	4584	4520	4693	4185	3326	11330	7445	9258	13578	10482	6367
1965 Regional Surplus/Deficit	7560	4686	5233	6158	5903	10011	13616	12277	10163	9875	13591	10771	11498	6987	9183
1966 Regional Surplus/Deficit	7010	5830	3541	5388	5277	4780	5790	4915	3062	13643	8718	8452	9477	7068	6277
1967 Regional Surplus/Deficit	5018	3927	4046	3831	4049	5228	10560	10508	7771	8641	4495	9395	13106	8193	7287
1968 Regional Surplus/Deficit	6045	3716	3900	5340	5587	5094	8972	8702	7276	6901	5178	6593	11271	7884	6777
1969 Regional Surplus/Deficit	6528	5326	6425	6672	8027	7071	11613	10504	7674	13638	12901	11380	11981	7592	8987
1970 Regional Surplus/Deficit	4568	3037	3787	4506	4849	3062	6539	5279	4784	9170	6490	9102	12458	5163	5919
1971 Regional Surplus/Deficit	4836	3092	3820	3848	3880	3378	12313	13838	9943	12985	11537	11264	13742	10766	8540
1972 Regional Surplus/Deficit	8405	5752	4535	5638	5540	5413	11869	12587	15391	15201	10905	11245	13669	11050	9734
1973 Regional Surplus/Deficit	9153	7731	5365	5211	5259	5467	6354	3440	3161	3922	5000	6372	7809	3612	5424
1974 Regional Surplus/Deficit	3507	2001	3954	3526	3964	5769	15046	13839	12465	14123	13529	10830	13447	11932	9244
1975 Regional Surplus/Deficit	8171	6598	4424	4055	4761	4503	7933	6499	6277	7689	7075	10437	13271	11231	7350
1976 Regional Surplus/Deficit	6258	5311	5215	6939	8773	12152	11441	10900	10670	13784	12428	10983	12449	9923	9851
1977 Regional Surplus/Deficit	9757	9565	9077	5064	4673	2608	1989	2435	2770	3337	4800	3185	3366	1811	4229
1978 Regional Surplus/Deficit	2876	1433	2170	3152	3369	5919	5517	5576	5345	12594	8505	9669	8965	7170	5791
1979 Regional Surplus/Deficit	4594	3311	6798	5252	4608	2850	4602	2736	6478	6946	7278	10055	7860	3794	5517
1980 Regional Surplus/Deficit	2715	1783	3468	3381	3600	2313	3022	2985	2264	9854	10485	11192	12067	4184	5066
1981 Regional Surplus/Deficit	3819	2142	3755	4412	4663	9305	9699	8120	6768	5166	6893	8644	12990	8803	7174
1982 Regional Surplus/Deficit	7522	6320	4158	4732	5522	6184	7857	13226	13057	11830	9329	10766	12991	9315	8742
1983 Regional Surplus/Deficit	7694	6306	6173	6623	5962	6895	10471	9335	11931	12116	9726	10751	11971	9244	8936
1984 Regional Surplus/Deficit	7435	5332	4919	5129	9159	6591	10386	9584	8975	13854	11874	9519	12801	8573	8717
1985 Regional Surplus/Deficit	5388	4125	4238	4968	6236	4720	6649	4189	3039	11073	10407	10512	9486	2456	5994
1986 Regional Surplus/Deficit	2522	1373	3256	4261	6499	3207	7249	8673	14704	12778	11261	8180	10870	5472	7170
1987 Regional Surplus/Deficit	4632	3039	3922	3426	4922	4515	3211	1651	5288	6259	6734	9430	8374	3170	4866
1988 Regional Surplus/Deficit	2400	778	3486	2871	3154	2140	1739	1405	2127	3577	5720	5767	6290	3676	3241
1989 Regional Surplus/Deficit	3244	2010	2821	3010	3902	3027	2968	2824	4312	10597	11705	8751	9230	3866	4869
1990 Regional Surplus/Deficit	3709	2255	3788	3334	4977	5224	8788	7848	6136	9137	12247	8565	11675	6417	6679
1991 Regional Surplus/Deficit	5936	4159	3961	3273	9102	6825	9647	9665	6918	11364	8847	9646	10799	9675	7865
1992 Regional Surplus/Deficit	7728	6024	4201	3338	4325	3026	4296	2973	6369	5005	5231	5624	7123	2479	4651

Table A-30: Regional Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2013 - 2014 Operating Year
[76] 2011 White Book (Final)

Continued **5/27/2011**

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1993 Regional Surplus/Deficit	1984	775	2560	3036	3669	2689	2488	-92	2386	6199	5227	9074	8240	5043	3866
1994 Regional Surplus/Deficit	3878	2763	3499	3243	4303	2858	2909	2808	2811	3753	6261	5996	7427	3103	3936
1995 Regional Surplus/Deficit	3169	1567	3339	2761	3347	2288	2887	7113	7220	10918	6885	8412	11477	6864	5553
1996 Regional Surplus/Deficit	4126	3013	4442	5252	10685	13950	13951	14624	13021	13319	14554	11086	12565	10179	10573
1997 Regional Surplus/Deficit	7489	4873	3561	4922	5546	6535	14100	13718	13650	13671	14023	10943	13516	11014	9765
1998 Regional Surplus/Deficit	7815	5943	6522	9795	7767	5865	6907	6890	6370	8257	9085	11127	12784	6729	8022
-Ranked Averages-															
Top Ten Percent	7056	5161	4331	6034	8198	10174	12850	12592	12244	13752	12846	10799	12411	9373	9846
Middle Eighty Percent	5196	3748	4271	4653	5123	4882	6771	6276	6287	9795	9187	9353	11118	6655	6603
Bottom Ten Percent	3608	2153	3466	3551	3632	2403	2075	1878	1810	3748	3342	5557	5965	3685	3372

Table A-30: Regional Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2014 - 2015 Operating Year **5/27/2011**
[76] 2011 White Book (Final)

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1929 Regional Surplus/Deficit	4450	2697	4401	4472	4321	2169	1457	1972	1682	4660	5198	4266	6111	2720	3501
1930 Regional Surplus/Deficit	3755	1937	3440	3152	3032	1777	2203	1761	2121	4077	4124	3519	3781	3741	2957
1931 Regional Surplus/Deficit	3516	2090	3085	2715	3689	2002	2243	1883	-124	4197	1862	5035	2339	2954	2638
1932 Regional Surplus/Deficit	2108	829	2945	2882	2392	2196	890	626	4431	8005	12652	10578	10682	4048	4462
1933 Regional Surplus/Deficit	4118	2589	3698	3773	3856	4789	6864	6809	6676	9183	7536	8431	11243	10417	6515
1934 Regional Surplus/Deficit	7316	5905	3805	6297	9316	12013	13125	11762	9815	13746	12036	9314	7895	3855	8871
1935 Regional Surplus/Deficit	2363	1784	2735	3452	3456	2865	6601	6144	4671	9181	7007	7823	7241	6370	5115
1936 Regional Surplus/Deficit	5107	3023	2644	3313	3540	2023	355	1512	2083	6213	11247	10319	9550	3901	4337
1937 Regional Surplus/Deficit	4028	2237	2868	3055	3345	1829	1870	1452	1404	3255	1824	4883	5669	3876	2997
1938 Regional Surplus/Deficit	3680	1796	3082	3398	3567	3951	6646	5765	5903	11025	12906	10565	8717	5799	5998
1939 Regional Surplus/Deficit	3617	2420	3125	3990	3660	2598	2506	2262	2945	10095	9222	9110	5898	4012	4402
1940 Regional Surplus/Deficit	3028	1588	3331	3665	3578	3152	1697	3050	5321	9517	9669	7574	6781	2873	4404
1941 Regional Surplus/Deficit	2205	1091	2509	3975	2972	2792	1120	1667	1951	4599	5115	5489	4581	3504	3092
1942 Regional Surplus/Deficit	2848	2057	3207	3266	3938	4702	5808	2492	2020	5032	8590	6670	8937	7091	4791
1943 Regional Surplus/Deficit	4488	3146	4269	3713	3645	3471	7987	7706	5632	15005	14518	10454	10999	6737	6908
1944 Regional Surplus/Deficit	4040	3203	3462	3758	3899	2388	1857	2091	2491	4592	6113	3687	2495	2284	3115
1945 Regional Surplus/Deficit	2420	1674	2967	2916	3165	1300	1694	1279	1357	2641	1314	7891	7890	2685	3102
1946 Regional Surplus/Deficit	3929	2312	3264	3065	3868	4105	6032	4918	6787	12090	13719	10759	10013	6403	6265
1947 Regional Surplus/Deficit	4519	3145	3833	3878	5029	8914	9816	10366	8096	10356	9416	9262	9892	6776	7442
1948 Regional Surplus/Deficit	4294	3452	3383	8630	7612	6188	9443	6725	5516	9849	11842	11526	11492	8623	7824
1949 Regional Surplus/Deficit	7078	5958	4325	4800	4520	3858	4940	2966	8550	11805	12874	11178	9807	3645	6466
1950 Regional Surplus/Deficit	2716	1396	3070	3533	3925	2779	9223	8791	10650	13252	11521	9975	10535	8426	7092
1951 Regional Surplus/Deficit	7001	5574	3877	6595	8763	10288	12875	12930	10136	13758	12806	10407	9575	8921	9471
1952 Regional Surplus/Deficit	6290	4133	4170	7681	6328	6578	8695	7151	6449	12986	13684	11397	10049	6546	7794
1953 Regional Surplus/Deficit	4330	3389	3003	3371	3372	2591	4427	5704	5059	8330	8201	9826	11233	8740	5779
1954 Regional Surplus/Deficit	5433	4201	3789	4721	5022	5896	9418	9047	7023	11220	9757	10014	10502	11284	7658
1955 Regional Surplus/Deficit	8459	8506	7404	4970	6456	4728	3302	2148	2581	5296	6330	7406	11211	11083	6318
1956 Regional Surplus/Deficit	7303	4664	3680	5429	7695	9549	12152	11188	10505	12685	14249	11065	11489	9566	9297
1957 Regional Surplus/Deficit	5349	4165	3628	5435	4510	5956	5590	3566	7203	13665	9935	11906	11265	4772	6711
1958 Regional Surplus/Deficit	3718	2326	3384	3765	3999	2567	6622	6760	5638	11072	10801	11528	10565	4565	6093
1959 Regional Surplus/Deficit	3833	2762	3190	3505	5912	7812	10660	9789	8545	11906	9584	9010	10345	7109	7472
1960 Regional Surplus/Deficit	6665	4629	8114	10259	9521	7884	7604	5975	6882	15114	11839	8680	9243	6195	8287
1961 Regional Surplus/Deficit	4467	3314	2936	4096	4938	3823	7057	7898	8589	10924	7948	9432	10437	4814	6426
1962 Regional Surplus/Deficit	3772	2641	3480	2916	3876	3390	5702	5303	2567	13950	13482	9657	9880	3167	5549
1963 Regional Surplus/Deficit	3891	3094	3115	4705	6232	7425	7068	6691	5277	7395	7291	8014	8555	6368	6184
1964 Regional Surplus/Deficit	4477	3054	3635	3796	4242	4095	4408	3924	3105	11451	7895	9018	11541	10198	5950
1965 Regional Surplus/Deficit	7053	4343	4829	5767	5552	9565	13300	11953	9920	9889	13994	10520	9655	6552	8749
1966 Regional Surplus/Deficit	6521	5502	3317	4993	4930	4347	5497	4643	2840	13707	9068	8173	7876	6694	5891
1967 Regional Surplus/Deficit	4537	3587	3644	3433	3701	4805	10292	10217	7549	8746	4928	9154	10916	7853	6849
1968 Regional Surplus/Deficit	5539	3372	3493	4951	5241	4666	8664	8422	7058	7020	5624	6113	9528	7545	6354
1969 Regional Surplus/Deficit	6021	4982	6019	6285	7685	6646	11307	10196	7448	13572	13246	11309	10142	7218	8575
1970 Regional Surplus/Deficit	4086	2705	3395	4109	4494	2632	6224	5020	4562	9288	6933	8786	10372	4668	5470
1971 Regional Surplus/Deficit	4354	2747	3421	3452	3531	2948	11991	13490	9723	12966	11948	11116	11552	10529	8104
1972 Regional Surplus/Deficit	7897	5406	4137	5240	5199	4988	11597	12295	15171	15167	11179	11083	11515	10801	9301
1973 Regional Surplus/Deficit	8595	7367	4965	4806	4906	5034	6063	3164	2932	4026	5445	5916	6297	3106	5003
1974 Regional Surplus/Deficit	3035	1664	3558	3128	3618	5342	14644	13564	12227	14011	13846	10604	11299	11674	8794
1975 Regional Surplus/Deficit	7664	6251	4109	3642	4407	4077	7625	6231	6054	7790	7513	10211	11158	10957	6928
1976 Regional Surplus/Deficit	5792	4977	4812	6546	8421	11706	11124	10607	10421	13736	12805	10802	10519	9644	9429
1977 Regional Surplus/Deficit	9192	9148	8626	4659	4319	2177	1691	2164	2544	3455	5249	2689	1971	1269	3805
1978 Regional Surplus/Deficit	2405	1105	1771	2750	3026	5483	5226	5311	5121	12716	8925	9454	7388	6749	5400
1979 Regional Surplus/Deficit	4110	2973	6402	4845	4258	2422	4296	2472	6260	7064	7726	9822	6446	3285	5129
1980 Regional Surplus/Deficit	2233	1446	3079	2976	3232	1887	2726	2722	2044	9958	10991	11206	10197	3675	4664
1981 Regional Surplus/Deficit	3335	1796	3348	4002	4317	8871	9370	7833	6538	5280	7343	8289	10902	8456	6728
1982 Regional Surplus/Deficit	6974	5956	3763	4339	5171	5760	7543	13071	12528	11817	9685	10499	10890	8931	8275
1983 Regional Surplus/Deficit	7188	5962	5772	6230	5614	6458	10151	9039	11682	12106	10080	10511	10085	8880	8505
1984 Regional Surplus/Deficit	6933	4991	4521	4723	8807	6160	10068	9296	8746	13781	12230	9255	10691	8191	8264
1985 Regional Surplus/Deficit	4913	3784	3843	4567	5894	4290	6329	3914	2807	11151	10838	10279	7896	1918	5585
1986 Regional Surplus/Deficit	2042	1030	2852	3865	6151	2769	6937	8371	14484	12732	11580	7821	9124	5038	6734
1987 Regional Surplus/Deficit	4148	2693	3517	3024	4577	4086	2917	1388	5069	6376	7185	9205	6916	2643	4474
1988 Regional Surplus/Deficit	1917	478	3096	2457	2786	1706	1436	1141	1909	3697	6171	5329	4872	3167	2836
1989 Regional Surplus/Deficit	2760	1666	2413	2612	3553	2600	2675	2559	4090	10643	12147	8496	7642	3363	4462
1990 Regional Surplus/Deficit	3229	1914	3387	2936	4628	4796	8474	7561	5914	9216	12732	8310	9763	5972	6251
1991 Regional Surplus/Deficit	5431	3817	3560	2875	8742	6398	9374	9378	6696	11455	9340	9323	9053	9352	7458
1992 Regional Surplus/Deficit	7223	5658	3800	2940	3975	2598	4003	2708	6147	5121	5679	5176	5694	1951	4241

Table A-30: Regional Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2014 - 2015 Operating Year
[76] 2011 White Book (Final)

Continued **5/27/2011**

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1993 Regional Surplus/Deficit	1504	434	2158	2637	3319	2261	2195	-357	2164	6315	5675	8822	6749	4583	3476
1994 Regional Surplus/Deficit	3398	2421	3098	2844	3954	2430	2616	2543	2589	3869	6709	5526	5955	2585	3524
1995 Regional Surplus/Deficit	2689	1226	2937	2362	2998	1860	2594	7305	6514	11031	7328	8059	9633	6429	5121
1996 Regional Surplus/Deficit	3646	2672	4040	4854	10314	13485	13586	14252	12802	13207	14840	11003	10604	9912	10139
1997 Regional Surplus/Deficit	6984	4532	3160	4524	5197	6097	13759	13362	13422	13573	14309	10800	11413	10766	9323
1998 Regional Surplus/Deficit	7310	5602	6120	9375	7417	5437	6604	6604	6148	8372	9532	10993	10808	6186	7590
-Ranked Averages-															
Top Ten Percent	6563	4819	3930	5641	7843	9732	12603	12342	11753	13696	13175	10639	10430	9067	9404
Middle Eighty Percent	4705	3403	3873	4253	4774	4452	6468	6015	6041	9858	9610	9107	9274	6231	6181
Bottom Ten Percent	3126	1816	3061	3147	3270	1970	1775	1611	1587	3865	3789	5119	4518	3173	2962

Table A-30: Regional Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2015 - 2016 Operating Year **5/27/2011**
[76] 2011 White Book (Final)

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1929 Regional Surplus/Deficit	4134	2381	4056	4215	3965	1820	951	1689	1584	2856	3213	4657	7231	2603	3247
1930 Regional Surplus/Deficit	3438	1621	3096	2896	2677	1428	1697	1479	2023	2273	2140	3902	4841	3624	2699
1931 Regional Surplus/Deficit	3199	1774	2740	2459	3334	1653	1737	1601	-221	2392	-123	5416	3386	2837	2380
1932 Regional Surplus/Deficit	1791	513	2600	2626	2037	1847	384	344	4334	6204	10672	11003	11753	3931	4201
1933 Regional Surplus/Deficit	3802	2273	3353	3517	3501	4440	6956	6683	5628	7378	5552	8839	12282	10158	6232
1934 Regional Surplus/Deficit	7024	5613	3460	6041	8960	11664	12619	11480	9718	11942	10052	9723	8886	3740	8622
1935 Regional Surplus/Deficit	2047	1468	2390	3196	3101	2516	6095	5861	4573	7377	5022	8242	8314	6259	4868
1936 Regional Surplus/Deficit	4810	2707	2299	3057	3185	1674	-151	1230	1985	4408	9262	10759	10509	3784	4072
1937 Regional Surplus/Deficit	3711	1921	2523	2799	2989	1480	1364	1170	1306	1450	-161	5271	6712	3759	2737
1938 Regional Surplus/Deficit	3363	1480	2737	3142	3211	3602	6140	5483	5805	9225	10926	10979	9730	5689	5742
1939 Regional Surplus/Deficit	3301	2104	2780	3733	3305	2249	2000	1980	2848	8291	7238	9500	6937	3896	4140
1940 Regional Surplus/Deficit	2711	1273	2986	3408	3223	2803	1191	2768	5223	7715	7686	7989	7818	2757	4146
1941 Regional Surplus/Deficit	1889	775	2164	3719	2616	2443	614	1385	1853	2794	3131	5851	5630	3387	2831
1942 Regional Surplus/Deficit	2532	1741	2863	3010	3582	4353	5302	2210	1923	3227	6606	7034	9916	6950	4519
1943 Regional Surplus/Deficit	4171	2830	3924	3457	3290	3122	7481	7424	5534	13205	12538	10922	12123	6591	6666
1944 Regional Surplus/Deficit	3724	2887	3117	3502	3543	2039	1351	1809	2393	2788	4129	4075	3532	2167	2856
1945 Regional Surplus/Deficit	2104	1358	2623	2659	2810	951	1188	996	1260	836	-671	8313	8931	2568	2844
1946 Regional Surplus/Deficit	3612	1996	2919	2808	3513	3756	5526	4635	6689	10290	11738	11205	11015	6270	6006
1947 Regional Surplus/Deficit	4202	2829	3488	3622	4674	8565	9310	10083	7999	8560	7440	9639	10914	6646	7191
1948 Regional Surplus/Deficit	3978	3136	3038	8374	7256	5839	8937	6443	5418	8048	9862	11870	12554	8463	7560
1949 Regional Surplus/Deficit	6786	5642	3980	4544	4165	3509	4434	2684	8453	10009	10898	11705	10871	3529	6216
1950 Regional Surplus/Deficit	2399	1080	2725	3277	3570	2430	8717	8899	10179	11447	9536	10372	11626	8271	6842
1951 Regional Surplus/Deficit	6709	5258	3532	6339	8407	9939	12369	12643	10038	11949	10817	10863	10590	8752	9224
1952 Regional Surplus/Deficit	5977	3817	3825	7424	5973	6229	8189	6868	6351	11196	11714	11799	11094	6417	7538
1953 Regional Surplus/Deficit	4014	3073	2658	3115	3017	2242	3920	5421	4961	6526	6216	10225	12305	8601	5525
1954 Regional Surplus/Deficit	5116	3885	3444	4464	4667	5547	8912	8765	6925	9423	7780	10432	11574	10981	7395
1955 Regional Surplus/Deficit	8167	8214	7038	4714	6101	4379	2796	1865	2483	3491	4345	7806	12255	10816	6039
1956 Regional Surplus/Deficit	7011	4348	3335	5172	7340	9200	11646	10905	10407	10872	12256	11497	12645	9395	9055
1957 Regional Surplus/Deficit	5033	3849	3283	5179	4155	5607	5084	3284	7105	11862	7951	12318	12394	4655	6456
1958 Regional Surplus/Deficit	3402	2010	3039	3509	3643	2218	6116	6477	5540	9274	8823	11864	11602	4448	5835
1959 Regional Surplus/Deficit	3516	2446	2845	3249	5556	7463	10154	9507	8447	10111	7609	9379	11516	6958	7229
1960 Regional Surplus/Deficit	6373	4313	7764	10003	9165	7535	7098	5693	6784	13314	9859	9093	10454	6065	8041
1961 Regional Surplus/Deficit	4150	2998	2591	3840	4582	3474	6551	7616	8491	9131	5975	9817	11540	4693	6180
1962 Regional Surplus/Deficit	3456	2326	3135	2660	3521	3041	5196	5021	2469	12136	11489	10090	10878	3050	5292
1963 Regional Surplus/Deficit	3574	2778	2770	4449	5877	7076	6562	6409	5179	5591	5306	8411	9584	6256	5930
1964 Regional Surplus/Deficit	4160	2738	3290	3540	3886	3746	3902	3641	3008	9646	5911	9399	12610	9952	5680
1965 Regional Surplus/Deficit	6761	4027	4484	5511	5197	9216	12794	11664	9822	8089	12014	10964	10659	6436	8505
1966 Regional Surplus/Deficit	6229	5186	2972	4736	4574	3998	4991	4360	2743	11909	7090	8579	8883	6554	5630
1967 Regional Surplus/Deficit	4220	3271	3299	3176	3346	4456	9786	9935	7451	6942	2943	9553	12089	7678	6609
1968 Regional Surplus/Deficit	5247	3056	3148	4695	4886	4317	8158	8139	6960	5216	3640	6520	10538	7393	6101
1969 Regional Surplus/Deficit	5729	4666	5663	6029	7330	6297	10801	9914	7350	11787	11281	11730	11134	7055	8320
1970 Regional Surplus/Deficit	3770	2389	3050	3853	4139	2283	5718	4738	4464	7483	4949	9174	11555	4551	5225
1971 Regional Surplus/Deficit	4037	2431	3076	3195	3176	2599	11485	13200	9625	11168	9970	11545	12589	10324	7859
1972 Regional Surplus/Deficit	7605	5090	3792	4983	4843	4639	11091	12012	15073	13356	9187	11555	12591	10535	9051
1973 Regional Surplus/Deficit	8303	7076	4620	4549	4550	4685	5557	2881	2834	2221	3461	6311	7373	2990	4748
1974 Regional Surplus/Deficit	2719	1348	3213	2872	3263	4993	14138	13282	12129	12200	11856	11088	12444	11379	8552
1975 Regional Surplus/Deficit	7372	5935	3764	3385	4052	3728	7119	5949	5956	5986	5529	10631	12243	10728	6668
1976 Regional Surplus/Deficit	5475	4661	4467	6290	8065	11357	10618	10325	10324	11912	10800	11285	11552	9445	9175
1977 Regional Surplus/Deficit	8899	8857	8285	4402	3964	1828	1185	1881	2447	1651	3264	3074	3023	1152	3548
1978 Regional Surplus/Deficit	2088	789	1426	2494	2671	5134	5345	4291	5024	10925	6954	9838	8447	6632	5140
1979 Regional Surplus/Deficit	3793	2657	6035	4589	3902	2073	3790	2190	6162	5259	5741	10232	7415	3169	4860
1980 Regional Surplus/Deficit	1916	1130	2734	2720	2876	1538	2220	2440	1946	8158	9011	11580	11209	3558	4399
1981 Regional Surplus/Deficit	3018	1480	3004	3745	3962	8522	8864	7550	6440	3475	5358	8708	11993	8220	6471
1982 Regional Surplus/Deficit	6682	5665	3418	4082	4815	5411	7037	12782	12430	10007	7695	10919	11973	8770	8036
1983 Regional Surplus/Deficit	6896	5646	5406	5974	5258	6109	9645	8757	11584	10302	8096	10943	11093	8700	8245
1984 Regional Surplus/Deficit	6641	4675	4176	4466	8451	5811	9561	9014	8649	11977	10245	9670	11868	8026	8021
1985 Regional Surplus/Deficit	4596	3469	3498	4310	5538	3941	5823	3632	2709	9351	8858	10710	8886	1801	5325
1986 Regional Surplus/Deficit	1726	714	2507	3608	5795	2420	6431	8082	14386	10928	9595	8233	10143	4914	6482
1987 Regional Surplus/Deficit	3832	2377	3172	2768	4221	3737	2411	1106	4971	4572	5200	9606	7899	2526	4206
1988 Regional Surplus/Deficit	1601	162	2751	2200	2431	1357	930	859	1812	1893	4186	5731	5911	3050	2576
1989 Regional Surplus/Deficit	2443	1350	2068	2356	3198	2251	2169	2276	3992	8852	10176	8879	8669	3246	4200
1990 Regional Surplus/Deficit	2912	1598	3042	2679	4272	4447	7968	7279	5816	7418	10754	8686	10843	5842	6000
1991 Regional Surplus/Deficit	5139	3501	3215	2618	8387	6049	9109	9042	6136	9666	7370	9842	10094	9141	7190
1992 Regional Surplus/Deficit	6931	5366	3455	2683	3620	2249	3497	2425	6049	3316	3695	5576	6743	1834	3984

Table A-30: Regional Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2015 - 2016 Operating Year
[76] 2011 White Book (Final)

Continued **5/27/2011**

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1993 Regional Surplus/Deficit	1188	118	1813	2381	2964	1912	1689	-639	2067	4510	3690	9215	7765	4467	3208
1994 Regional Surplus/Deficit	3081	2105	2753	2588	3599	2081	2110	2260	2491	2065	4724	5924	7018	2468	3268
1995 Regional Surplus/Deficit	2372	910	2592	2106	2643	1511	2088	7023	6417	9228	5346	8477	10682	6298	4873
1996 Regional Surplus/Deficit	3330	2356	3695	4597	9959	13136	13080	13962	12705	11400	12853	11438	11643	9682	9888
1997 Regional Surplus/Deficit	6692	4216	2815	4267	4841	5748	13401	12863	13325	11746	12302	11220	12449	10496	9062
1998 Regional Surplus/Deficit	7018	5286	5756	9119	7062	5088	6098	6322	6050	6569	7549	11457	11868	6070	7339
-Ranked Averages-															
Top Ten Percent	6264	4506	3585	5384	7488	9383	12118	12027	11656	11882	11181	11083	11479	8864	9154
Middle Eighty Percent	4395	3089	3526	3997	4418	4103	5988	5728	5911	8057	7629	9518	10331	6082	5925
Bottom Ten Percent	2809	1500	2716	2890	2914	1621	1269	1328	1489	2061	1804	5508	5563	3056	2703

Table A-30: Regional Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2016 - 2017 Operating Year **5/27/2011**
[76] 2011 White Book (Final)

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1929 Regional Surplus/Deficit	3873	1972	3805	3979	3642	1502	597	1183	854	3180	3575	3679	5779	2060	2778
1930 Regional Surplus/Deficit	3178	1212	2845	2660	2354	1110	1343	973	1293	2597	2502	2930	3325	3081	2223
1931 Regional Surplus/Deficit	2939	1366	2489	2223	3011	1335	1384	1095	-951	2716	239	4444	1836	2294	1901
1932 Regional Surplus/Deficit	1531	104	2349	2390	1713	1529	30	-162	3604	6526	10982	9714	10574	3388	3732
1933 Regional Surplus/Deficit	3541	1864	3102	3281	3177	4122	6602	6177	4898	7702	5913	7740	11317	9659	5790
1934 Regional Surplus/Deficit	6739	5181	3209	5805	8616	11277	12181	10925	8928	12223	10415	8428	7602	3197	8100
1935 Regional Surplus/Deficit	1787	1060	2139	2960	2777	2198	5741	5355	3843	7701	5384	7144	6996	5708	4391
1936 Regional Surplus/Deficit	4530	2298	2048	2821	2861	1356	-505	724	1255	4732	9624	9440	9428	3241	3607
1937 Regional Surplus/Deficit	3451	1512	2272	2563	2666	1162	1010	664	576	1774	201	4285	5217	3216	2263
1938 Regional Surplus/Deficit	3103	1071	2486	2906	2888	3284	5787	4977	5075	9554	11253	9732	8614	5180	5276
1939 Regional Surplus/Deficit	3040	1696	2530	3497	2982	1930	1647	1474	2118	8615	7600	8433	5427	3352	3659
1940 Regional Surplus/Deficit	2451	864	2735	3173	2899	2485	837	2262	4493	8039	8015	6963	6461	2213	3678
1941 Regional Surplus/Deficit	1628	366	1913	3483	2293	2124	260	879	1123	3118	3493	4893	4131	2844	2358
1942 Regional Surplus/Deficit	2271	1332	2612	2774	3259	4034	4948	1704	1193	3551	6968	6107	8890	6461	4095
1943 Regional Surplus/Deficit	3911	2421	3674	3221	2967	2804	7127	6918	4804	13552	12886	9627	10917	6115	6189
1944 Regional Surplus/Deficit	3463	2478	2866	3266	3220	1720	998	1303	1663	3112	4490	3101	1997	1624	2379
1945 Regional Surplus/Deficit	1844	949	2372	2424	2487	632	835	490	530	1160	-309	7234	7753	2025	2389
1946 Regional Surplus/Deficit	3352	1587	2668	2572	3190	3438	5172	4129	5959	10625	12083	9888	9906	5948	5553
1947 Regional Surplus/Deficit	3942	2420	3237	3386	4350	8247	8912	9577	7269	8878	7795	8476	9826	6139	6722
1948 Regional Surplus/Deficit	3717	2728	2787	8116	6933	5521	8578	5937	4688	8376	10178	10498	11395	7961	7079
1949 Regional Surplus/Deficit	6501	5233	3729	4308	3841	3191	4080	2178	7712	10351	11249	10418	9783	2985	5754
1950 Regional Surplus/Deficit	2139	672	2474	3041	3247	2112	8321	8393	9438	11797	9943	9175	10436	7813	6371
1951 Regional Surplus/Deficit	6424	4849	3281	6103	8073	9620	11931	12082	9298	12314	11191	9368	9487	8267	8718
1952 Regional Surplus/Deficit	5713	3409	3574	7167	5650	5911	7835	6363	5621	11523	12053	10458	9998	5933	7067
1953 Regional Surplus/Deficit	3754	2664	2407	2879	2694	1924	3567	4916	4231	6850	6578	9029	11253	8145	5073
1954 Regional Surplus/Deficit	4856	3476	3193	4229	4343	5228	8557	8259	6195	9742	8137	9179	10405	10510	6923
1955 Regional Surplus/Deficit	7819	7718	6771	4478	5777	4060	2442	1359	1753	3815	4707	6838	11226	10297	5605
1956 Regional Surplus/Deficit	6727	3939	3084	4936	7006	8882	11281	10350	9667	11241	12591	10136	11469	8907	8564
1957 Regional Surplus/Deficit	4772	3440	3033	4943	3832	5289	4730	2778	6375	12183	8330	10758	11228	4112	5965
1958 Regional Surplus/Deficit	3142	1601	2788	3273	3320	1899	5762	5971	4810	9595	9182	10447	10469	3905	5347
1959 Regional Surplus/Deficit	3256	2038	2594	3013	5233	7145	9789	9001	7717	10415	7917	8230	10243	6490	6752
1960 Regional Surplus/Deficit	6088	3904	7462	9745	8821	7217	6744	5187	6054	13590	10217	7943	9334	5571	7579
1961 Regional Surplus/Deficit	3890	2589	2340	3604	4259	3155	6197	7110	7751	9444	6327	8594	10325	4154	5699
1962 Regional Surplus/Deficit	3195	1917	2884	2424	3198	2723	4842	4515	1739	12521	11881	8871	9753	2507	4829
1963 Regional Surplus/Deficit	3314	2369	2519	4213	5553	6758	6208	5903	4449	5915	5668	7355	8433	5761	5476
1964 Regional Surplus/Deficit	3900	2329	3039	3304	3563	3428	3549	3135	2278	9970	6273	8324	11623	9470	5246
1965 Regional Surplus/Deficit	6476	3619	4233	5275	4874	8897	12356	11128	9082	8446	12340	9639	9574	5942	8015
1966 Regional Surplus/Deficit	5945	4777	2721	4500	4251	3679	4637	3854	2013	12207	7495	7486	7678	6012	5169
1967 Regional Surplus/Deficit	3960	2862	3048	2940	3023	4138	9372	9396	6721	7266	3305	8429	10901	7185	6132
1968 Regional Surplus/Deficit	4962	2648	2897	4459	4562	3999	7801	7633	6230	5540	4001	5551	9453	6879	5653
1969 Regional Surplus/Deficit	5444	4257	5409	5793	7006	5979	10418	9358	6620	12130	11617	10360	10016	6550	7831
1970 Regional Surplus/Deficit	3510	1980	2799	3617	3815	1965	5364	4232	3734	7807	5310	8155	10368	4008	4770
1971 Regional Surplus/Deficit	3777	2022	2825	2960	2853	2280	11121	12612	8895	11509	10320	10261	11539	9864	7377
1972 Regional Surplus/Deficit	7320	4682	3541	4748	4520	4321	10677	11457	14243	13652	9615	9958	11389	10037	8524
1973 Regional Surplus/Deficit	7955	6643	4369	4313	4227	4366	5203	2375	2104	2545	3822	5298	5924	2446	4271
1974 Regional Surplus/Deficit	2459	939	2962	2636	2939	4675	13693	12703	11389	12550	12218	9746	11246	10926	8050
1975 Regional Surplus/Deficit	7087	5526	3513	3149	3729	3410	6765	5443	5226	6310	5891	9302	11099	10294	6199
1976 Regional Surplus/Deficit	5215	4253	4216	6054	7732	11039	10254	9770	9583	12280	11177	9900	10418	8913	8687
1977 Regional Surplus/Deficit	8552	8360	7974	4166	3641	1510	831	1375	1717	1974	3626	2117	1467	609	3059
1978 Regional Surplus/Deficit	1828	380	1175	2258	2347	4816	4991	3785	4294	11178	7310	8651	7091	6136	4659
1979 Regional Surplus/Deficit	3533	2249	5774	4353	3579	1755	3436	1684	5432	5583	6103	9046	6000	2626	4378
1980 Regional Surplus/Deficit	1656	721	2483	2484	2553	1220	1866	1934	1216	8488	9338	10174	10118	3015	3923
1981 Regional Surplus/Deficit	2758	1071	2753	3509	3638	8204	8499	7044	5710	3799	5720	7694	10943	7671	6023
1982 Regional Surplus/Deficit	6410	5052	3167	3846	4492	5093	6683	12194	11668	10348	8094	9645	10756	8329	7535
1983 Regional Surplus/Deficit	6611	5237	5144	5738	4935	5791	9280	8251	10825	10638	8490	9658	10014	8282	7782
1984 Regional Surplus/Deficit	6356	4266	3925	4230	8118	5492	9197	8508	7908	12296	10603	8509	10668	7585	7554
1985 Regional Surplus/Deficit	4336	3060	3247	4074	5215	3623	5469	3126	1979	9661	9226	9530	7669	1258	4857
1986 Regional Surplus/Deficit	1465	305	2256	3372	5472	2101	6078	7567	13555	11278	10002	7166	9087	4385	6023
1987 Regional Surplus/Deficit	3571	1968	2921	2532	3898	3418	2057	600	4241	4896	5562	8432	6510	1983	3729
1988 Regional Surplus/Deficit	1340	-247	2500	1965	2108	1038	576	353	1082	2217	4548	4715	4428	2507	2101
1989 Regional Surplus/Deficit	2183	941	1817	2120	2874	1932	1815	1770	3262	9173	10486	7791	7397	2703	3735
1990 Regional Surplus/Deficit	2652	1189	2791	2443	3949	4129	7614	6773	5086	7739	11065	7581	9666	5336	5536
1991 Regional Surplus/Deficit	4854	3093	2964	2382	8053	5730	8695	8536	5406	9987	7681	8543	8945	8565	6697
1992 Regional Surplus/Deficit	6634	4933	3204	2447	3297	1931	3143	1920	5319	3640	4057	4574	5225	1291	3505

Table A-30: Regional Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2016 - 2017 Operating Year
[76] 2011 White Book (Final)

Continued **5/27/2011**

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1993 Regional Surplus/Deficit	927	-291	1563	2145	2641	1594	1335	-1145	1337	4834	4052	8152	6372	3928	2743
1994 Regional Surplus/Deficit	2821	1697	2502	2352	3275	1763	1757	1754	1761	2389	5086	4917	5546	1925	2792
1995 Regional Surplus/Deficit	2112	502	2341	1870	2319	1193	1734	6517	5687	9551	5706	7447	9632	5811	4426
1996 Regional Surplus/Deficit	3069	1947	3444	4361	9614	12733	12642	13365	11915	11772	13190	10026	10475	9153	9363
1997 Regional Surplus/Deficit	6407	3807	2564	4031	4518	5429	12957	12275	12519	12110	12651	9898	11320	10023	8560
1998 Regional Surplus/Deficit	6734	4877	5495	8862	6730	4770	5745	5816	5320	6893	7910	10149	10719	5526	6860
-Ranked Averages-															
Top Ten Percent	5986	4094	3334	5148	7154	9043	11703	11460	10879	12227	11547	9674	10309	8357	8645
Middle Eighty Percent	4124	2672	3272	3759	4094	3785	5626	5215	5177	8382	7985	8340	9137	5574	5456
Bottom Ten Percent	2549	1091	2465	2655	2591	1303	915	822	759	2385	2166	4515	4098	2513	2231

Table A-30: Regional Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2017 - 2018 Operating Year **5/27/2011**
[76] 2011 White Book (Final)

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1929 Regional Surplus/Deficit	3551	1649	3529	3733	3411	1195	315	906	969	4028	4144	4099	6346	1938	2756
1930 Regional Surplus/Deficit	2855	889	2569	2414	2122	804	1061	695	1408	3445	3070	3344	3956	2959	2206
1931 Regional Surplus/Deficit	2616	1042	2214	1977	2779	1029	1102	817	-837	3564	808	4858	2500	2171	1887
1932 Regional Surplus/Deficit	1208	-219	2073	2144	1482	1223	-252	-440	3718	7376	11602	10445	10868	3265	3716
1933 Regional Surplus/Deficit	3219	1541	2827	3035	2946	3816	6321	5900	5013	8550	6482	8281	11396	9492	5735
1934 Regional Surplus/Deficit	6392	4833	2934	5559	8405	11040	11983	10696	9103	13114	10982	9165	8000	3074	8115
1935 Regional Surplus/Deficit	1464	736	1864	2714	2546	1891	5459	5078	3958	8549	5953	7684	7429	5594	4369
1936 Regional Surplus/Deficit	4183	1975	1772	2575	2630	1050	-787	446	1370	5580	10193	10201	9624	3119	3583
1937 Regional Surplus/Deficit	3128	1189	1997	2317	2435	856	728	386	691	2622	770	4713	5827	3094	2246
1938 Regional Surplus/Deficit	2781	748	2210	2660	2657	2978	5505	4700	5190	10397	11857	10421	8844	5023	5248
1939 Regional Surplus/Deficit	2718	1372	2254	3251	2750	1624	1365	1196	2233	9463	8168	8942	6052	3230	3650
1940 Regional Surplus/Deficit	2128	540	2460	2927	2668	2179	555	1984	4608	8887	8617	7431	6932	2091	3655
1941 Regional Surplus/Deficit	1306	43	1638	3237	2062	1818	-22	601	1238	3966	4061	5293	4745	2722	2339
1942 Regional Surplus/Deficit	1949	1009	2336	2528	3028	3728	4666	1427	1307	4399	7536	6476	9031	6284	4030
1943 Regional Surplus/Deficit	3588	2098	3398	2975	2735	2498	6845	6640	4919	14377	13469	10364	11238	5926	6168
1944 Regional Surplus/Deficit	3141	2155	2591	3020	2988	1414	716	1025	1778	3960	5059	3517	2646	1501	2364
1945 Regional Surplus/Deficit	1521	626	2096	2178	2255	326	553	213	644	2008	260	7755	8045	1903	2353
1946 Regional Surplus/Deficit	3029	1264	2393	2326	2958	3132	4890	3852	6074	11461	12669	10647	10129	5605	5514
1947 Regional Surplus/Deficit	3619	2097	2961	3140	4119	7941	8674	9300	7384	9732	8371	9081	10028	5980	6688
1948 Regional Surplus/Deficit	3395	2404	2512	7892	6702	5215	8301	5659	4803	9220	10792	11312	11668	7797	7067
1949 Regional Surplus/Deficit	6154	4910	3453	4062	3610	2885	3798	1900	7838	11181	11829	11147	9986	2863	5728
1950 Regional Surplus/Deficit	1816	348	2199	2795	3015	1806	8081	8116	9563	12619	10466	9814	10741	7605	6341
1951 Regional Surplus/Deficit	6077	4526	3006	5857	7852	9314	11733	11860	9423	13120	11747	10305	9705	8086	8717
1952 Regional Surplus/Deficit	5365	3085	3299	6942	5418	5605	7553	6085	5736	12368	12644	11241	10209	5752	7043
1953 Regional Surplus/Deficit	3431	2341	2131	2633	2462	1617	3285	4638	4346	7698	7146	9667	11420	7935	5029
1954 Regional Surplus/Deficit	4533	3153	2918	3983	4112	4922	8277	7981	6310	10595	8711	9874	10688	10316	6896
1955 Regional Surplus/Deficit	7409	7307	6449	4232	5546	3754	2160	1082	1868	4663	5276	7248	11370	10151	5535
1956 Regional Surplus/Deficit	6379	3616	2809	4690	6785	8576	11010	10122	9792	12043	13186	10939	11759	8730	8553
1957 Regional Surplus/Deficit	4450	3117	2757	4697	3600	4983	4448	2500	6490	13034	8882	11760	11509	3990	5969
1958 Regional Surplus/Deficit	2819	1278	2513	3027	3089	1593	5480	5694	4925	10446	9753	11306	10716	3782	5337
1959 Regional Surplus/Deficit	2933	1714	2318	2767	5001	6839	9518	8723	7832	11283	8540	8821	10630	6292	6727
1960 Regional Surplus/Deficit	5740	3581	7140	9521	8611	6910	6463	4909	6169	14486	10790	8535	9569	5399	7541
1961 Regional Surplus/Deficit	3568	2266	2065	3358	4028	2849	5915	6832	7876	10303	6906	9259	10655	4027	5680
1962 Regional Surplus/Deficit	2873	1594	2609	2178	2966	2417	4560	4237	1854	13308	12420	9532	9992	2384	4797
1963 Regional Surplus/Deficit	2991	2046	2244	3967	5322	6452	5926	5625	4564	6763	6236	7853	8698	5590	5433
1964 Regional Surplus/Deficit	3577	2006	2764	3058	3331	3122	3267	2858	2392	10818	6841	8841	11724	9286	5190
1965 Regional Surplus/Deficit	6129	3295	3957	5029	4642	8591	12158	10880	9207	9261	12945	10406	9774	5770	7998
1966 Regional Surplus/Deficit	5597	4454	2446	4254	4019	3373	4356	3577	2127	13081	8020	8021	7998	5888	5136
1967 Regional Surplus/Deficit	3637	2539	2772	2694	2791	3832	9150	9152	6836	8114	3874	8995	11203	7013	6105
1968 Regional Surplus/Deficit	4615	2324	2622	4213	4331	3692	7523	7356	6345	6388	4570	5962	9653	6727	5598
1969 Regional Surplus/Deficit	5097	3934	5112	5547	6775	5673	10166	9130	6735	12959	12211	11172	10248	6389	7816
1970 Regional Surplus/Deficit	3187	1657	2523	3371	3584	1658	5082	3954	3849	8655	5879	8616	10669	3885	4731
1971 Regional Surplus/Deficit	3454	1699	2550	2714	2621	1974	10850	12417	9010	12340	10900	10987	11703	9658	7349
1972 Regional Surplus/Deficit	6915	4358	3266	4502	4288	4014	10456	11229	14458	14528	10118	10997	11706	9869	8543
1973 Regional Surplus/Deficit	7545	6295	4093	4067	3995	4060	4922	2098	2219	3393	4391	5753	6487	2324	4248
1974 Regional Surplus/Deficit	2136	616	2687	2390	2708	4369	13502	12498	11514	13372	12786	10530	11558	10714	8044
1975 Regional Surplus/Deficit	6740	5185	3238	2903	3497	3103	6483	5165	5341	7158	6459	10073	11357	10063	6171
1976 Regional Surplus/Deficit	4892	3929	3940	5808	7511	10733	9983	9542	9709	13084	11731	10727	10667	8780	8677
1977 Regional Surplus/Deficit	8142	7950	7652	3920	3409	1203	549	1098	1832	2823	4194	2516	2137	486	3033
1978 Regional Surplus/Deficit	1505	57	900	2012	2116	4510	4709	3508	4408	12097	7884	9280	7561	5966	4647
1979 Regional Surplus/Deficit	3211	1925	5477	4107	3348	1449	3154	1406	5547	6431	6672	9674	6529	2503	4369
1980 Regional Surplus/Deficit	1334	398	2208	2238	2321	914	1584	1656	1331	9330	9942	11022	10324	2893	3909
1981 Regional Surplus/Deficit	2435	748	2477	3263	3407	7898	8228	6767	5825	4647	6288	8150	11108	7555	5973
1982 Regional Surplus/Deficit	5930	4868	2892	3600	4260	4786	6401	11999	11815	11179	8625	10361	11087	8104	7517
1983 Regional Surplus/Deficit	6264	4914	4847	5492	4703	5485	9009	7973	10969	11474	9027	10385	10207	8035	7744
1984 Regional Surplus/Deficit	6009	3943	3650	3984	7897	5186	8926	8231	8034	13149	11176	9112	10983	7360	7521
1985 Regional Surplus/Deficit	4013	2736	2972	3828	4984	3317	5187	2849	2094	10523	9789	10152	8000	1135	4834
1986 Regional Surplus/Deficit	1143	-18	1980	3126	5241	1795	5796	7298	13771	12100	10525	7675	9258	4249	5982
1987 Regional Surplus/Deficit	3249	1645	2646	2286	3667	3112	1775	323	4356	5744	6130	9048	7014	1861	3719
1988 Regional Surplus/Deficit	1018	-570	2224	1718	1876	732	294	75	1196	3065	5117	5173	5026	2384	2086
1989 Regional Surplus/Deficit	1860	618	1542	1874	2643	1626	1533	1493	3377	10024	11107	8321	7784	2580	3710
1990 Regional Surplus/Deficit	2329	866	2515	2197	3718	3823	7332	6495	5201	8590	11685	8128	9958	5176	5501
1991 Regional Surplus/Deficit	4507	2769	2688	2136	7832	5424	8473	8258	5521	10838	8301	9284	9208	8476	6687
1992 Regional Surplus/Deficit	6210	4616	2929	2201	3065	1625	2862	1642	5434	4488	4625	5018	5858	1169	3487

Table A-30: Regional Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2017 - 2018 Operating Year
[76] 2011 White Book (Final)

Continued **5/27/2011**

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1993 Regional Surplus/Deficit	605	-614	1287	1899	2409	1288	1053	-1423	1452	5682	4620	8657	6880	3802	2723
1994 Regional Surplus/Deficit	2498	1373	2226	2106	3044	1457	1475	1477	1876	3237	5654	5366	6133	1803	2775
1995 Regional Surplus/Deficit	1789	178	2066	1624	2088	886	1452	6239	5802	10400	6276	7919	9796	5632	4372
1996 Regional Surplus/Deficit	2747	1624	3169	4115	9404	12511	12445	13179	12090	12572	13783	10880	10758	9016	9381
1997 Regional Surplus/Deficit	6060	3484	2288	3785	4286	5123	12766	12080	12710	12918	13233	10662	11563	9830	8554
1998 Regional Surplus/Deficit	6386	4554	5198	8637	6507	4464	5463	5538	5435	7741	8479	10899	10982	5404	6841
-Ranked Averages-															
Top Ten Percent	5637	3767	3059	4902	6933	8759	11482	11244	11041	13054	12112	10525	10594	8198	8648
Middle Eighty Percent	3787	2348	2993	3515	3864	3478	5353	4944	5296	9229	8559	8960	9446	5417	5428
Bottom Ten Percent	2226	768	2190	2409	2360	997	633	545	874	3233	2735	4950	4678	2391	2211

Table A-30: Regional Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2018 - 2019 Operating Year **5/27/2011**
[76] 2011 White Book (Final)

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1929 Regional Surplus/Deficit	3213	1311	3203	3465	3122	882	16	612	616	2666	3252	3171	5363	1516	2262
1930 Regional Surplus/Deficit	2517	551	2243	2146	1834	490	762	402	1055	2083	2179	2422	2909	2537	1707
1931 Regional Surplus/Deficit	2278	705	1888	1709	2491	715	803	524	-1190	2203	-84	3936	1420	1749	1385
1932 Regional Surplus/Deficit	870	-556	1747	1876	1193	909	-551	-733	3365	6013	10659	9206	10158	2844	3216
1933 Regional Surplus/Deficit	2881	1203	2500	2767	2657	3502	6022	5606	4660	7189	5590	7232	10901	9115	5274
1934 Regional Surplus/Deficit	6079	4520	2607	5291	8095	10658	11600	10354	8690	11709	10092	7920	7186	2652	7584
1935 Regional Surplus/Deficit	1126	399	1537	2446	2257	1578	5160	4784	3605	7187	5061	6636	6580	5164	3875
1936 Regional Surplus/Deficit	3870	1637	1446	2307	2341	736	-1086	153	1017	4219	9301	8932	9012	2697	3091
1937 Regional Surplus/Deficit	2790	852	1670	2048	2146	542	429	92	338	1261	-122	3777	4801	2672	1747
1938 Regional Surplus/Deficit	2443	410	1884	2391	2368	2664	5206	4406	4837	9041	10930	9224	8198	4636	4760
1939 Regional Surplus/Deficit	2380	1035	1928	2983	2461	1311	1066	903	1880	8101	7277	7924	5012	2808	3143
1940 Regional Surplus/Deficit	1790	203	2133	2658	2379	1865	256	1690	4255	7525	7692	6455	6045	1669	3162
1941 Regional Surplus/Deficit	968	-295	1312	2969	1773	1505	-321	308	885	2605	3170	4385	3715	2300	1842
1942 Regional Surplus/Deficit	1611	671	2010	2260	2739	3415	4367	1133	954	3038	6645	5598	8475	5917	3579
1943 Regional Surplus/Deficit	3250	1760	3072	2707	2447	2184	6546	6347	4566	13038	12563	9119	10501	5571	5673
1944 Regional Surplus/Deficit	2803	1818	2264	2752	2700	1101	417	732	1425	2598	4167	2593	1581	1079	1863
1945 Regional Surplus/Deficit	1183	288	1770	1909	1966	13	254	-81	291	647	-632	6726	7337	1481	1873
1946 Regional Surplus/Deficit	2691	926	2066	2058	2669	2818	4591	3558	5721	10112	11760	9380	9491	5404	5038
1947 Regional Surplus/Deficit	3281	1759	2635	2872	3830	7627	8331	9006	7031	8364	7472	7968	9410	5595	6206
1948 Regional Surplus/Deficit	3057	2067	2185	7602	6413	4901	7997	5365	4450	7862	9855	9990	10979	7417	6563
1949 Regional Surplus/Deficit	5840	4572	3127	3794	3321	2571	3499	1606	7474	9837	10926	9909	9367	2441	5238
1950 Regional Surplus/Deficit	1478	11	1873	2527	2726	1492	7740	7822	9200	11283	9620	8666	10020	7269	5855
1951 Regional Surplus/Deficit	5763	4188	2679	5588	7553	9001	11350	11511	9059	11801	10868	8860	9071	7723	8202
1952 Regional Surplus/Deficit	5052	2748	2972	6652	5129	5291	7254	5791	5383	11009	11730	9949	9582	5389	6551
1953 Regional Surplus/Deficit	3093	2003	1805	2365	2174	1304	2986	4344	3993	6336	6255	8521	10837	7600	4557
1954 Regional Surplus/Deficit	4195	2815	2591	3714	3823	4609	7976	7688	5957	9229	7814	8671	9989	9966	6407
1955 Regional Surplus/Deficit	7158	7057	6169	3964	5257	3441	1861	788	1515	3302	4384	6330	10810	9752	5089
1956 Regional Surplus/Deficit	6066	3279	2482	4422	6486	8262	10700	9779	9429	10728	12267	9628	11053	8363	8048
1957 Regional Surplus/Deficit	4112	2779	2431	4429	3311	4669	4149	2207	6137	11669	8007	10249	10813	3568	5449
1958 Regional Surplus/Deficit	2481	940	2186	2759	2800	1280	5181	5400	4572	9081	8859	9939	10053	3360	4831
1959 Regional Surplus/Deficit	2595	1377	1992	2499	4713	6525	9208	8429	7479	9902	7594	7722	9827	5946	6236
1960 Regional Surplus/Deficit	5427	3244	6860	9231	8300	6597	6164	4616	5816	13076	9894	7435	8918	5026	7063
1961 Regional Surplus/Deficit	3230	1929	1738	3090	3739	2536	5616	6539	7513	8931	6003	8085	9909	3610	5183
1962 Regional Surplus/Deficit	2535	1256	2282	1910	2678	2103	4262	3944	1501	12007	11558	8363	9337	1962	4313
1963 Regional Surplus/Deficit	2653	1708	1917	3699	5033	6138	5627	5332	4211	5401	5345	6847	8017	5216	4960
1964 Regional Surplus/Deficit	3239	1668	2437	2790	3043	2808	2968	2564	2039	9456	5950	7816	11207	8926	4730
1965 Regional Surplus/Deficit	5816	2958	3631	4761	4353	8278	11775	10557	8843	7932	12017	9131	9158	5397	7499
1966 Regional Surplus/Deficit	5284	4116	2119	3986	3731	3060	4057	3283	1774	11693	7171	6977	7263	5468	4653
1967 Regional Surplus/Deficit	3299	2201	2446	2426	2502	3518	8791	8825	6483	6752	2982	7921	10486	6640	5616
1968 Regional Surplus/Deficit	4302	1987	2295	3945	4042	3379	7220	7062	5992	5026	3678	5043	9037	6335	5137
1969 Regional Surplus/Deficit	4784	3596	4807	5279	6486	5359	9837	8787	6382	11616	11294	9851	9600	6006	7315
1970 Regional Surplus/Deficit	2849	1320	2197	3103	3295	1345	4783	3661	3496	7294	4987	7647	9953	3463	4254
1971 Regional Surplus/Deficit	3116	1362	2223	2445	2332	1661	10540	12041	8657	10996	9997	9753	11123	9320	6861
1972 Regional Surplus/Deficit	6660	4021	2939	4233	4000	3701	10096	10886	14005	13139	9292	9450	10973	9493	8008
1973 Regional Surplus/Deficit	7294	5982	3767	3799	3707	3747	4623	1804	1866	2032	3499	4789	5509	1902	3755
1974 Regional Surplus/Deficit	1798	278	2360	2122	2419	4055	13112	12132	11150	12036	11895	9237	10830	10382	7534
1975 Regional Surplus/Deficit	6426	4865	2911	2635	3208	2790	6184	4872	4988	5796	5567	8793	10683	9750	5683
1976 Regional Surplus/Deficit	4554	3592	3614	5540	7211	10419	9673	9199	9345	11766	10854	9392	10003	8369	8171
1977 Regional Surplus/Deficit	7891	7700	7372	3652	3121	890	250	804	1479	1461	3303	1609	1051	65	2543
1978 Regional Surplus/Deficit	1167	-281	573	1744	1827	4196	4410	3214	4055	10664	6987	8143	6675	5592	4143
1979 Regional Surplus/Deficit	2873	1588	5172	3839	3059	1135	2855	1112	5194	5070	5780	8537	5584	2081	3862
1980 Regional Surplus/Deficit	996	61	1881	1970	2033	600	1285	1363	978	7974	9014	9666	9702	2471	3407
1981 Regional Surplus/Deficit	2097	410	2151	2995	3118	7584	7918	6473	5472	3286	5397	7185	10527	7127	5507
1982 Regional Surplus/Deficit	5749	4392	2565	3332	3972	4473	6102	11623	11430	9835	7770	9137	10341	7785	7019
1983 Regional Surplus/Deficit	5950	4576	4542	5224	4415	5171	8699	7680	10587	10125	8167	9150	9599	7738	7266
1984 Regional Surplus/Deficit	5696	3605	3323	3716	7597	4873	8616	7937	7670	11782	10280	8001	10252	7041	7038
1985 Regional Surplus/Deficit	3675	2399	2645	3560	4695	3003	4888	2555	1741	9147	8903	9022	7253	713	4341
1986 Regional Surplus/Deficit	805	-355	1654	2858	4952	1482	5497	6996	13317	10765	9679	6657	8671	3840	5507
1987 Regional Surplus/Deficit	2911	1307	2320	2017	3378	2799	1476	29	4003	4382	5239	7924	6094	1439	3213
1988 Regional Surplus/Deficit	680	-908	1898	1450	1588	419	-4.5	-218	843	1703	4225	4207	4012	1963	1585
1989 Regional Surplus/Deficit	1522	280	1215	1606	2354	1313	1234	1199	3024	8659	10163	7283	6982	2158	3219
1990 Regional Surplus/Deficit	1991	529	2189	1929	3429	3509	7033	6202	4848	7226	10742	7073	9250	4792	5020
1991 Regional Surplus/Deficit	4194	2432	2362	1868	7533	5111	8114	7965	5168	9473	7358	8035	8530	8021	6181
1992 Regional Surplus/Deficit	5973	4272	2602	1933	2776	1311	2563	1348	5081	3127	3733	4066	4810	747	2989

Table A-30: Regional Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2018 - 2019 Operating Year
[76] 2011 White Book (Final)

Continued **5/27/2011**

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1993 Regional Surplus/Deficit	267	-951	961	1631	2120	974	754	-1716	1099	4321	3729	7644	5956	3384	2227
1994 Regional Surplus/Deficit	2160	1036	1900	1838	2755	1143	1176	1183	1523	1875	4763	4408	5130	1381	2276
1995 Regional Surplus/Deficit	1451	-159	1740	1356	1799	573	1153	5946	5449	9037	5383	6938	9216	5267	3910
1996 Regional Surplus/Deficit	2409	1287	2842	3847	9094	12113	12062	12794	11677	11259	12867	9518	10059	8609	8847
1997 Regional Surplus/Deficit	5747	3146	1962	3517	3998	4810	12376	11704	12281	11596	12327	9390	10904	9479	8044
1998 Regional Surplus/Deficit	6073	4216	4893	8347	6210	4150	5164	5245	5082	6379	7587	9641	10303	4982	6344
-Ranked Averages-															
Top Ten Percent	5325	3433	2732	4634	6634	8423	11122	10889	10641	11714	11224	9165	9893	7813	8129
Middle Eighty Percent	3464	2012	2670	3245	3574	3165	5045	4644	4939	7869	7662	7832	8721	5030	4940
Bottom Ten Percent	1888	430	1863	2140	2071	683	334	251	521	1871	1843	4006	3682	1969	1715

Table A-30: Regional Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2019 - 2020 Operating Year **5/27/2011**
[76] 2011 White Book (Final)

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1929 Regional Surplus/Deficit	2885	993	2960	3203	2817	588	-281	518	390	2811	2856	3292	5725	1258	2094
1930 Regional Surplus/Deficit	2189	233	2000	1884	1529	196	465	307	829	2228	1782	2537	3335	2279	1545
1931 Regional Surplus/Deficit	1950	387	1645	1446	2186	421	505	429	-1416	2348	-481	4051	1879	1491	1226
1932 Regional Surplus/Deficit	542	-874	1504	1613	888	615	-848	-827	3139	6160	10314	9639	10247	2586	3048
1933 Regional Surplus/Deficit	2553	886	2258	2505	2352	3208	5724	5512	4434	7333	5194	7474	10775	8812	5078
1934 Regional Surplus/Deficit	5726	4177	2365	5029	7812	10432	11387	10309	8523	11897	9694	8358	7379	2394	7465
1935 Regional Surplus/Deficit	798	81	1295	2184	1952	1284	4863	4690	3379	7332	4664	6877	6807	4914	3714
1936 Regional Surplus/Deficit	3517	1319	1203	2044	2036	442	-1383	59	791	4363	8904	9394	9003	2439	2917
1937 Regional Surplus/Deficit	2462	534	1428	1786	1841	248	132	-1.6	111	1406	-519	3906	5205	2414	1583
1938 Regional Surplus/Deficit	2114	93	1641	2129	2063	2370	4908	4312	4611	9180	10568	9614	8223	4344	4589
1939 Regional Surplus/Deficit	2052	717	1685	2721	2156	1017	769	809	1653	8246	6880	8135	5431	2550	2986
1940 Regional Surplus/Deficit	1462	-115	1891	2396	2074	1571	-41	1596	4029	7670	7328	6625	6311	1411	2993
1941 Regional Surplus/Deficit	640	-612	1069	2707	1468	1211	-618	214	659	2749	2773	4487	4124	2042	1677
1942 Regional Surplus/Deficit	1283	353	1767	1998	2434	3121	4070	1039	728	3183	6248	5669	8410	5604	3365
1943 Regional Surplus/Deficit	2922	1442	2829	2445	2142	1890	6249	6253	4339	13161	12181	9557	10617	5246	5512
1944 Regional Surplus/Deficit	2475	1500	2022	2490	2395	807	119	638	1199	2743	3771	2710	2025	822	1703
1945 Regional Surplus/Deficit	855	-29	1527	1647	1662	-281	-44	-175	65	792	-1028	6948	7424	1223	1690
1946 Regional Surplus/Deficit	2363	608	1824	1796	2364	2524	4294	3464	5495	10245	11380	9840	9508	4925	4852
1947 Regional Surplus/Deficit	2953	1442	2392	2610	3525	7333	8078	8912	6804	8516	7082	8275	9407	5300	6038
1948 Regional Surplus/Deficit	2729	1749	1943	7362	6108	4607	7705	5271	4224	8003	9504	10505	11047	7117	6406
1949 Regional Surplus/Deficit	5488	4254	2884	3532	3016	2277	3202	1512	7258	9965	10540	10341	9365	2183	5061
1950 Regional Surplus/Deficit	1150	-307	1630	2265	2421	1198	7485	7728	8984	11402	9178	9007	10120	6925	5688
1951 Regional Surplus/Deficit	5411	3870	2437	5326	7259	8707	11137	11472	8844	11904	10459	9498	9084	7406	8068
1952 Regional Surplus/Deficit	4699	2430	2730	6412	4824	4997	6957	5697	5157	11151	11356	10434	9588	5072	6383
1953 Regional Surplus/Deficit	2765	1685	1562	2103	1869	1010	2689	4250	3766	6481	5858	8860	10799	7255	4371
1954 Regional Surplus/Deficit	3867	2498	2349	3452	3518	4314	7680	7593	5730	9379	7422	9067	10067	9636	6242
1955 Regional Surplus/Deficit	6742	6652	5880	3702	4952	3147	1564	694	1289	3446	3988	6442	10749	9471	4866
1956 Regional Surplus/Deficit	5713	2961	2240	4160	6191	7968	10414	9734	9213	10827	11898	10132	11138	8050	7900
1957 Regional Surplus/Deficit	3784	2462	2188	4167	3006	4375	3852	2113	5911	11817	7594	10953	10888	3310	5302
1958 Regional Surplus/Deficit	2153	622	1943	2497	2495	986	4884	5306	4346	9229	8465	10499	10095	3102	4681
1959 Regional Surplus/Deficit	2267	1059	1749	2237	4408	6231	8922	8335	7253	10066	7252	8014	10009	5612	6076
1960 Regional Surplus/Deficit	5074	2926	6571	8991	8017	6303	5866	4522	5590	13269	9502	7728	8948	4719	6877
1961 Regional Surplus/Deficit	2901	1611	1496	2828	3434	2242	5319	6444	7297	9086	5618	8452	10034	3347	5026
1962 Regional Surplus/Deficit	2207	938	2040	1648	2373	1809	3964	3849	1275	12092	11131	8726	9371	1704	4138
1963 Regional Surplus/Deficit	2325	1391	1675	3437	4728	5844	5330	5237	3984	5546	4948	7047	8077	4910	4776
1964 Regional Surplus/Deficit	2911	1350	2195	2528	2738	2514	2670	2470	1813	9601	5553	8034	11103	8607	4526
1965 Regional Surplus/Deficit	5463	2640	3388	4499	4048	7984	11562	10493	8627	8044	11656	9599	9153	5090	7349
1966 Regional Surplus/Deficit	4931	3798	1877	3724	3426	2765	3759	3189	1548	11864	6732	7214	7377	5208	4474
1967 Regional Surplus/Deficit	2971	1884	2203	2164	2197	3224	8554	8764	6256	6897	2586	8188	10582	6333	5456
1968 Regional Surplus/Deficit	3949	1669	2053	3682	3737	3085	6926	6968	5765	5171	3282	5155	9032	6047	4945
1969 Regional Surplus/Deficit	4431	3279	4543	5017	6181	5065	9569	8742	6156	11743	10923	10365	9627	5709	7162
1970 Regional Surplus/Deficit	2521	1002	1954	2841	2990	1051	4486	3567	3270	7438	4591	7809	10048	3205	4071
1971 Regional Surplus/Deficit	2788	1044	1981	2183	2027	1367	10253	12029	8431	11123	9612	10180	11082	8978	6705
1972 Regional Surplus/Deficit	6249	3703	2697	3971	3695	3407	9859	10841	13879	13311	8830	10190	11085	9189	7893
1973 Regional Surplus/Deficit	6879	5640	3524	3537	3402	3453	4325	1710	1639	2176	3103	4946	5866	1644	3585
1974 Regional Surplus/Deficit	1470	-39	2118	1860	2114	3761	12906	12111	10935	12155	11498	9723	10937	10034	7399
1975 Regional Surplus/Deficit	6073	4529	2669	2373	2903	2496	5887	4777	4762	5941	5171	9266	10736	9383	5511
1976 Regional Surplus/Deficit	4226	3274	3371	5277	6917	10125	9386	9154	9129	11867	10443	9920	10046	8100	8022
1977 Regional Surplus/Deficit	7476	7294	7083	3390	2816	596	-47	710	1252	1606	2906	1709	1516	-193	2370
1978 Regional Surplus/Deficit	839	-598	331	1482	1522	3902	4113	3120	3829	10880	6596	8473	6940	5286	3986
1979 Regional Surplus/Deficit	2544	1270	4907	3577	2754	841	2558	1018	4968	5214	5384	8867	5908	1823	3704
1980 Regional Surplus/Deficit	667	-257	1638	1708	1728	306	988	1269	752	8113	8653	10215	9703	2213	3246
1981 Regional Surplus/Deficit	1769	93	1908	2733	2813	7290	7632	6379	5246	3430	5000	7343	10487	6875	5318
1982 Regional Surplus/Deficit	5264	4213	2323	3070	3667	4179	5805	11611	11236	9962	7337	9555	10466	7425	6872
1983 Regional Surplus/Deficit	5598	4258	4278	4962	4110	4877	8413	7586	10390	10258	7739	9579	9586	7355	7087
1984 Regional Surplus/Deficit	5343	3287	3081	3454	7303	4579	8330	7843	7454	11932	9888	8305	10362	6680	6865
1985 Regional Surplus/Deficit	3347	2081	2403	3298	4390	2709	4591	2461	1514	9307	8501	9345	7379	456	4171
1986 Regional Surplus/Deficit	477	-673	1411	2596	4647	1188	5199	6911	13192	10883	9237	6868	8637	3569	5328
1987 Regional Surplus/Deficit	2583	990	2077	1755	3073	2505	1179	-65	3777	4527	4842	8241	6393	1181	3052
1988 Regional Surplus/Deficit	351	-1226	1655	1188	1283	125	-302	-313	617	1848	3828	4366	4405	1705	1423
1989 Regional Surplus/Deficit	1194	-38	973	1343	2049	1019	937	1105	2798	8807	9819	7514	7163	1901	3047
1990 Regional Surplus/Deficit	1663	211	1946	1667	3124	3215	6736	6107	4621	7373	10396	7321	9337	4496	4847
1991 Regional Surplus/Deficit	3841	2114	2119	1606	7239	4817	7877	7871	4942	9621	7013	8477	8587	7796	6034
1992 Regional Surplus/Deficit	5544	3960	2359	1671	2471	1017	2265	1254	4854	3272	3337	4211	5237	489	2824

Table A-30: Regional Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2019 - 2020 Operating Year
[76] 2011 White Book (Final)

Continued **5/27/2011**

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1993 Regional Surplus/Deficit	-61	-1269	718	1369	1815	680	457	-1811	872	4465	3332	7850	6259	3122	2054
1994 Regional Surplus/Deficit	1832	718	1657	1576	2450	849	878	1089	1296	2020	4366	4560	5512	1123	2114
1995 Regional Surplus/Deficit	1123	-477	1497	1094	1494	279	856	5851	5222	9183	4988	7112	9175	4952	3719
1996 Regional Surplus/Deficit	2081	969	2600	3585	8810	11904	11848	12791	11510	11355	12495	10073	10137	8336	8734
1997 Regional Surplus/Deficit	5394	2829	1719	3255	3693	4516	12170	11692	12130	11701	11945	9855	10942	9151	7906
1998 Regional Surplus/Deficit	5720	3898	4628	8107	5913	3856	4866	5151	4856	6524	7191	10092	10361	4724	6180
-Ranked Averages-															
Top Ten Percent	4971	3112	2490	4372	6340	8151	10886	10856	10461	11837	10823	9718	9973	7518	7998
Middle Eighty Percent	3120	1693	2424	2985	3270	2871	4756	4557	4716	8012	7271	8153	8825	4737	4769
Bottom Ten Percent	1560	112	1621	1878	1766	389	37	157	295	2016	1447	4144	4057	1711	1550

Table A-30: Regional Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2020 - 2021 Operating Year **5/27/2011**
[76] 2011 White Book (Final)

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1929 Regional Surplus/Deficit	2483	751	2687	2954	2592	-301	-1583	-949	-1031	2184	2305	2522	3517	-247	1167
1930 Regional Surplus/Deficit	1788	-9.3	1726	1634	1304	-693	-837	-1160	-591	1601	1231	1773	1063	775	612
1931 Regional Surplus/Deficit	1548	144	1371	1197	1961	-468	-797	-1038	-2836	1720	-1032	3287	-426	-13	290
1932 Regional Surplus/Deficit	141	-1117	1230	1364	664	-274	-2150	-2295	1719	5530	9712	8557	8312	1081	2120
1933 Regional Surplus/Deficit	2151	643	1984	2255	2128	2319	4422	4045	3014	6706	4643	6584	9056	7353	4179
1934 Regional Surplus/Deficit	5349	3959	2091	4779	7566	9474	10001	8792	7043	11227	9144	7272	5341	890	6489
1935 Regional Surplus/Deficit	396	-162	1021	1934	1728	395	3561	3223	1959	6705	4114	5987	4734	3402	2780
1936 Regional Surplus/Deficit	3140	1077	929	1795	1812	-447	-2685	-1409	-629	3736	8353	8284	7166	934	1995
1937 Regional Surplus/Deficit	2061	291	1154	1537	1616	-641	-1170	-1469	-1309	778	-1069	3128	2955	910	652
1938 Regional Surplus/Deficit	1713	-150	1367	1880	1838	1481	3606	2844	3190	8558	9982	8576	6352	2874	3664
1939 Regional Surplus/Deficit	1650	474	1411	2472	1932	127	-534	-659	233	7619	6329	7276	3166	1046	2048
1940 Regional Surplus/Deficit	1060	-358	1617	2147	1849	682	-1343	129	2609	7043	6744	5806	4199	-93	2067
1941 Regional Surplus/Deficit	238	-855	795	2457	1243	321	-1920	-1254	-761	2122	2222	3736	1870	537	747
1942 Regional Surplus/Deficit	881	111	1493	1748	2209	2231	2768	-428	-692	2555	5697	4950	6629	4155	2484
1943 Regional Surplus/Deficit	2521	1200	2555	2195	1917	1001	4947	4785	2919	12556	11615	8470	8656	3809	4578
1944 Regional Surplus/Deficit	2073	1257	1748	2240	2170	-82	-1183	-830	-221	2115	3220	1944	-264	-683	768
1945 Regional Surplus/Deficit	453	-272	1253	1398	1437	-1171	-1346	-1642	-1355	164	-1579	6077	5491	-282	777
1946 Regional Surplus/Deficit	1962	366	1550	1547	2140	1635	2992	1997	4074	9629	10812	8731	7645	3641	3942
1947 Regional Surplus/Deficit	2552	1199	2118	2360	3301	6444	6732	7445	5384	7881	6525	7319	7564	3833	5111
1948 Regional Surplus/Deficit	2327	1506	1669	7091	5883	3718	6398	3804	2803	7380	8907	9341	9133	5654	5468
1949 Regional Surplus/Deficit	5111	4012	2610	3282	2791	1388	1900	45	5828	9355	9979	9261	7521	679	4143
1950 Regional Surplus/Deficit	749	-550	1356	2015	2197	309	6141	6261	7553	10801	8673	8018	8175	5506	4760
1951 Regional Surplus/Deficit	5034	3628	2163	5077	7024	7818	9750	9949	7413	11318	9921	8211	7225	5960	7107
1952 Regional Surplus/Deficit	4322	2187	2456	6141	4600	4108	5655	4230	3736	10527	10783	9301	7737	3627	5456
1953 Regional Surplus/Deficit	2363	1442	1288	1853	1644	121	1386	2783	2346	5853	5307	7872	8991	5838	3462
1954 Regional Surplus/Deficit	3466	2255	2075	3203	3294	3425	6377	6126	4310	8746	6867	8022	8143	8203	5312
1955 Regional Surplus/Deficit	6429	6497	5653	3452	4728	2257	261	-773	-131	2819	3437	5682	8964	7990	3994
1956 Regional Surplus/Deficit	5336	2718	1966	3911	5956	7079	9101	8217	7782	10245	11320	8979	9207	6601	6953
1957 Regional Surplus/Deficit	3382	2219	1914	3917	2782	3486	2550	645	4490	11186	7059	9601	8967	1806	4354
1958 Regional Surplus/Deficit	1751	380	1670	2247	2270	96	3582	3839	2926	8599	7911	9290	8207	1598	3736
1959 Regional Surplus/Deficit	1866	816	1475	1987	4183	5342	7609	6868	5832	9419	6646	7073	7981	4184	5141
1960 Regional Surplus/Deficit	4697	2683	6343	8720	7771	5414	4564	3054	4170	12594	8947	6786	7073	3264	5968
1961 Regional Surplus/Deficit	2500	1368	1222	2578	3209	1352	4017	4977	5866	8448	5056	7437	8063	1847	4088
1962 Regional Surplus/Deficit	1805	695	1766	1398	2148	920	2662	2382	-146	11525	10611	7714	7491	200	3218
1963 Regional Surplus/Deficit	1924	1148	1401	3187	4503	4955	4028	3770	2564	4919	4397	6198	6172	3454	3865
1964 Regional Surplus/Deficit	2509	1108	1921	2278	2513	1625	1368	1003	393	8974	5002	7167	9361	7163	3635
1965 Regional Surplus/Deficit	5086	2397	3114	4249	3824	7094	10175	8996	7197	7450	11070	8483	7312	3635	6404
1966 Regional Surplus/Deficit	4554	3555	1603	3475	3201	1876	2457	1722	128	11211	6224	6329	5417	3706	3558
1967 Regional Surplus/Deficit	2570	1641	1929	1915	1973	2335	7192	7263	4836	6270	2035	7273	8640	4878	4521
1968 Regional Surplus/Deficit	3572	1426	1779	3433	3513	2196	5621	5501	4345	4543	2731	4394	7191	4572	4042
1969 Regional Surplus/Deficit	4054	3036	4290	4767	5956	4176	8237	7226	4735	11134	10347	9203	7754	4243	6220
1970 Regional Surplus/Deficit	2119	759	1680	2591	2766	162	3184	2099	1849	6811	4040	6998	8107	1701	3159
1971 Regional Surplus/Deficit	2387	801	1707	1934	1803	478	8940	10480	7010	10513	9049	9104	9277	7557	5766
1972 Regional Surplus/Deficit	5930	3460	2423	3722	3470	2518	8497	9325	12358	12656	8345	8801	9128	7731	6913
1973 Regional Surplus/Deficit	6565	5421	3250	3288	3177	2564	3023	243	219	1549	2552	4141	3663	140	2660
1974 Regional Surplus/Deficit	1068	-282	1844	1610	1890	2872	11513	10570	9504	11553	10947	8589	8984	8620	6439
1975 Regional Surplus/Deficit	5696	4305	2395	2124	2679	1607	4585	3310	3342	5314	4620	8145	8837	7987	4588
1976 Regional Surplus/Deficit	3825	3031	3097	5028	6682	9236	8073	7637	7699	11284	9906	8743	8157	6606	7075
1977 Regional Surplus/Deficit	7162	7139	6855	3141	2591	-293	-1350	-757	-168	978	2355	960	-795	-1698	1448
1978 Regional Surplus/Deficit	437	-841	57	1232	1298	3013	2810	1653	2409	10182	6039	7495	4829	3830	3048
1979 Regional Surplus/Deficit	2143	1027	4655	3327	2529	-48	1256	-449	3547	4587	4833	7889	3738	319	2767
1980 Regional Surplus/Deficit	266	-500	1365	1458	1503	-583	-314	-199	-668	7492	8067	9018	7856	709	2312
1981 Regional Surplus/Deficit	1367	-150	1634	2484	2589	6401	6319	4912	3825	2803	4449	6537	8681	5365	4412
1982 Regional Surplus/Deficit	5019	3831	2049	2821	3442	3290	4503	10061	9784	9352	6823	8488	8495	6022	5924
1983 Regional Surplus/Deficit	5221	4016	4026	4712	3885	3988	7100	6118	8940	9642	7220	8501	7753	5976	6170
1984 Regional Surplus/Deficit	4966	3045	2807	3205	7068	3689	7016	6375	6024	11300	9333	7352	8406	5279	5943
1985 Regional Surplus/Deficit	2946	1838	2129	3049	4165	1820	3289	994	94	8665	7956	8373	5407	-1049	3246
1986 Regional Surplus/Deficit	75	-916	1137	2347	4422	299	3897	5434	11670	10282	8732	6009	6825	2078	4412
1987 Regional Surplus/Deficit	2181	747	1803	1506	2848	1615	-123	-1533	2356	3900	4291	7275	4248	-324	2118
1988 Regional Surplus/Deficit	-50	-1468	1381	939	1058	-765	-1604	-1780	-803	1220	3278	3559	2166	200	490
1989 Regional Surplus/Deficit	792	-281	699	1094	1825	129	-365	-362	1378	8177	9215	6634	5136	396	2124
1990 Regional Surplus/Deficit	1261	-32	1672	1418	2899	2326	5434	4640	3201	6743	9794	6424	7404	3030	3925
1991 Regional Surplus/Deficit	3464	1871	1845	1357	7003	3927	6515	6403	3521	8991	6410	7387	6684	6258	5086
1992 Regional Surplus/Deficit	5243	3712	2086	1422	2247	128	963	-213	3434	2644	2786	3417	2964	-1015	1894

Table A-30: Regional Surplus/Deficit - By Water Year
PNW Loads and Resource Study
2020 - 2021 Operating Year
[76] 2011 White Book (Final)

Continued **5/27/2011**

Energy (aMW)	Aug1	Aug16	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr1	Apr16	May	Jun	Jul	Avg
1993 Regional Surplus/Deficit	-463	-1512	444	1119	1591	-209	-845	-3278	-548	3838	2781	6996	4110	1621	1131
1994 Regional Surplus/Deficit	1431	475	1383	1326	2226	-40	-424	-378	-124	1392	3815	3760	3284	-382	1181
1995 Regional Surplus/Deficit	721	-720	1223	844	1269	-610	-446	4384	3802	8555	4436	6290	7370	3505	2815
1996 Regional Surplus/Deficit	1679	726	2326	3336	8564	10930	10462	11232	10030	10776	11920	8869	8214	6846	7752
1997 Regional Surplus/Deficit	5017	2586	1445	3006	3468	3626	10776	10143	10635	11114	11380	8742	9058	7716	6949
1998 Regional Surplus/Deficit	5343	3656	4376	7836	5680	2967	3564	3683	3435	5897	6640	8992	8457	3220	5249
-Ranked Averages-															
Top Ten Percent	4596	2873	2216	4123	6104	7240	9523	9328	8994	11231	10277	8517	8047	6050	7034
Middle Eighty Percent	2734	1451	2154	2734	3044	1982	3446	3083	3292	7386	6714	7184	6875	3268	3845
Bottom Ten Percent	1159	-130	1347	1629	1541	-500	-1265	-1310	-1125	1389	896	3358	1836	206	619

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Section 10: Glossary and Acronyms

Average Megawatts (aMW) – A unit of electrical consumption or production over a year. It is equivalent to the energy produced by the continuous use of 1 megawatt of capacity served over a period of 1 year. One average megawatt is equivalent to 8,760 megawatt hours or 8.76 gigawatt hours.

Bonneville Power Administration (BPA) – BPA is a Federal power marketing agency (PMA), responsible for acquiring and delivering power to meet contractual obligations and electrical needs of its customers.

Canadian Entitlement Return (CER) for Canada – The public agencies' obligation to deliver the Canadian Entitlement allocation to Canada under the Columbia River Treaty that began April 1, 1998.

Capacity – The maximum power that an electrical system or machine such as a hydro-powered or thermal-powered generating plant can produce under specified conditions, or that a power transmission line can carry.

Capacity Factor – The ratio of the average load on a machine or piece of equipment over a given period to maximum power rating of the machine or equipment.

Cogeneration – The sequential production of more than one form of energy, such as heat and electricity. Large industrial plants often are sources of electricity co-generated as a byproduct of a heating process.

Conservation – Any reduction in electrical power as a result of increases in the efficiency of energy end use, production, or distribution.

Critical Period – That portion of the historical streamflow record during which the recorded streamflows, combined with all available reservoir storage, produced the least amount of energy.

Dedicated Resources – Generating resources owned by a utility and used to serve its firm loads. These resources are declared in each utility's power sales contract with BPA.

Direct Service Industry(s) (DSIs) – An industrial customer or group of industrial customers that purchase electric power directly from BPA. Most DSIs are aluminum and other primary metal smelting plants.

Energy Load – The demand for power averaged over a specified period of time.

Export – Electricity generated in the Pacific Northwest that is sold to another region, such as California.

Federal Columbia River Power System (FCRPS) – The FCRPS consists of 31 Federal hydroelectric projects constructed and operated by the U.S. Army Corps of Engineers (USACE) and the U.S. Bureau of Reclamation (USBR), operated as a single, integrated power system.

Federal System – The Federal system is a combination of BPA's customer loads and contractual obligations, transmission facilities, and resources from which BPA acquires the power it sells. The resources include plants operated by the U.S. Army Corps of Engineers (USACE), U.S. Bureau of Reclamation (USBR), and hydroelectric projects owned by the city of Idaho Falls, Lewis County PUC, and Energy Northwest (ENW). BPA markets the generation from the nuclear Columbia Generating Station, operated by ENW.

Firm Capacity – Maximum on-peak electrical energy that is considered assured to meet all contractual peak load requirements over a defined period for a customer or customer group.

Firm Energy – Electric power that is considered assured to the customer to meet all contractual energy load requirements over a defined period for a customer or customer group.

Fiscal Year – In this study, fiscal year (FY) is the 12-month period October 1 to September 30. For example, FY 2008 is October 1, 2007, through September 30, 2008.

Forced Outage Reserve – Capacity that is held in reserve, for use in case a generating unit malfunctions.

Historical Water Conditions (50 Water Year) – The unregulated streamflow database of the 50 years from August 1928 through July 1978.

Hydroregulation – A study simulating operation of the Pacific Northwest electric power system that incorporates the historical streamflow record, monthly loads, thermal and other non-hydro resources, hydroelectric plant data for each project, and the constraints limiting each project's operation.

Independent Hydro – The output from hydropower plants that are not part of the regulated system. These plants are generally run-of-river. Examples are Cowlitz Falls or other small hydro plants whose output is used to serve load in the utility service territory in which it is located.

Import – Electricity that comes to the Pacific Northwest from another region. Examples would be purchases within the region from Canada, California, or western Montana.

Intraregional Transfer – Sales of power between two parties within the Pacific Northwest region. Sales from an IOU to a public utility within the region are intraregional transfers, such as firm power sales from BPA to PNW entities.

Investor-Owned Utility (IOU) – A privately owned utility organized under State law as a corporation to provide electric power service and earn a profit for its stockholders.

Load Diversity – An adjustment applied to peak loads to reflect the fact that all peaking electrical demands do not occur simultaneously across the region.

Megawatt (MW) – A unit of electrical power equal to 1 million watts or 1,000 kilowatts.

Non-firm Energy – Electrical power produced by the hydro system that is available with water conditions better than those of the critical period without appreciably jeopardizing reservoir refill. It is available in varying amounts depending upon season and weather conditions.

Non-firm Energy Load – Load served by additional hydro energy available in "better-than-critical period" water conditions or can be interrupted in the event of a power deficiency on the supplying system.

Non-utility Generation – A generating project that is not owned by a utility, rather the project is owned by a third party, such as an independent power producer. The project output could be sold short- or long-term in the market.

Operational Peaking Adjustment – Federal hydro system monthly maximum operational capacity that is available to meet the 1-hour expected peak load for each of the 1929 through 1978 historical water conditions.

Operating Year – For this study, operating year (OY) is the 12-month period August 1 through July 31. For example, OY 2009 is August 1, 2008, through July 31, 2009.

Peak Load – The maximum demand for power during a specified period of time. There are usually two peaks to load each day (morning and evening, driven by residential patterns), six peaks to the week (Monday through Saturday, during "working hours"), and one or two months-long peaks to the year depending upon heating and/or cooling needs. The pattern of peak loads is called its "shape."

Power Sales Contract Obligation – Capacity and energy the Federal system is required to provide to Federal agencies, public agencies, cooperatives, USBR, IOUs, and DSIs under their 1981 or 2001 power sales contracts with BPA.

Publicly-Owned Utility - One of several types of not-for-profit utilities created by a group of voters, and can be a municipal utility, a public utility district, a cooperative, a mutual company, or a rural electric association.

Region – A geographic area. The geographic area defined by the Pacific Northwest Electric Power Planning and Conservation Act. It includes Oregon; Washington; Idaho; Montana west of the Continental Divide; portions of Nevada, Utah, and Wyoming that lie within the Columbia River drainage basin; and any rural electric cooperative customer not in the geographic area described above but served by BPA on the effective date of the Northwest Power Planning Act is the Pacific Northwest Region.

Regional Total Retail Load - The sum of all total retail load consumed in the PNW region as defined in the 1980 Pacific Northwest Electric Power Planning and Conservation Act.

Regulated Hydro – Hydropower plants that are part of the Columbia River hydro system that is operated jointly by BPA, the USACE, and the Bureau. Most of these are part of the mainstem system on the Columbia and Snake Rivers.

Renewable Resources – Resources that use solar, wind, hydro, geothermal, biomass, or a similar source of energy that is converted into electricity.

Resource Acquisitions – Conservation or generating resources acquired in order to meet projected firm energy deficits.

Resource Adequacy (Council RA) – Council-adopted standard for the regional power supply based on recommendations from the Resource Adequacy Forum which included BPA and other PNW entities. Standard includes both a regional energy metric and a framework capacity metric. At this time, standards do not imply mandatory compliance or methods for enforcement, but is meant to be a gauge used to assess whether the region's power supply capability is adequate to "keep the lights on".

Run-of-River plant - Hydroelectric plant which depends chiefly on the flow of a stream as it occurs for generation, as opposed to a storage project, which has sufficient storage capacity to carry water from one season to another. Some run-of-river projects have a

limited storage capacity which permits them to regulate stream flow on a daily or weekly basis.

Slice of the System Product - A public-preference 10-year power sales contract product based on the customer's net requirements that provides firm and secondary energy using a fixed percentage of the output generated by the Federal system Slice resources.

Spill – [a] Water moved past a dam without driving a turbine and running an electrical generator; or [b] Electrical energy that cannot be accepted into the system and must either be sold or spilled due to constraints and limitations of hydro projects.

Spinning Reserves – Reserve generating capacity maintained for immediate response to meet load variations. This provides a regulating margin for controlling the automatic generation and frequency of power in the region and Federal system.

Surplus Firm Capacity – The maximum amount of assured electrical energy above the firm energy loads served by the power system.

Sustained Peak – The peaking capacity necessary to sustain a load for a given period of time.

Thermal Resources – Resources that burn coal, natural gas, or oil, or use nuclear fission to create heat which is then converted into electricity.

Total Retail Load (TRL) – TRL is all electric power consumption including distribution system losses, within a utility's distribution system as measured at metering points, adjusted for unmetered loads or generation. No distinction is made between load that is served with BPA power and load that is served with power from other sources.

White Book Document Acronyms

aMW	Average megawatt
BiOp	Biological Opinion
BPA	Bonneville Power Administration
CER	Canadian Entitlement Return
Council	Pacific Northwest Power and Conservation Council
DSI	Direct Service Industry (Industries)
ENW	Energy Northwest, Inc. (formerly Washington Public Power Supply System)
FCRPS	Federal Columbia River Power System
FERC	Federal Energy Regulatory Commission
FPS	Federal Power System
FY	Fiscal Year
HOSS	Hourly Operating and Scheduling Simulator
IOU	Investor-Owned Utility
IPP	Independent Power Producer
LOLP	Loss of Load Probability
Council RA	Council Resource Adequacy Standard
MW	Megawatt
MSR	MSR Public Power Agency[whose members include the Modesto Irrigation District and the cities of Santa Clara and Redding, California]
NOAA	National Oceanographic and Atmospheric Administration
NUG	Non-utility generating resources
OY	Operating Year
PNCA	Pacific Northwest Coordination Agreement
PNUCC	Pacific Northwest Utilities Conference Committee
PNW	Pacific Northwest
PSC	Power Sales Contract
PUD	Public Utility District
RPSA	Residential Purchase and Sales Agreement
ROD	Record of Decision
TRL	Total Retail Load
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USFWS	U.S. Fish and Wildlife Service

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BONNEVILLE POWER ADMINISTRATION
DOE/BP-4354 ▪ May 2011