

**The White Book
BPA's Long-Range Load Resource Planning Document**

**Regional Coordination Group
7/18/2008**

For Informational Purposes ONLY
PRE-DECISIONAL and for TRM USE ONLY



White Book

The White Book and the Data Contained in the Loads and Resources Information System (LaRIS)

The Loads and Resources Information System (LaRIS) contains the data for use in BPA's White Book, Inventory, and Rate Case studies. The data from the White Book document and Inventory studies are input or historical record for many of the following:

- BPA's permanent record of mid to long-term Load Resource planning for BPA and the region
- Official record for BPA contracts and documents, such as the Canadian Treaty, the Official Statement, bond refinancing, Slice analysis, excess Federal power, fish cost credits, and evidence in BPA lawsuits
- Official record for calculating the Council budget, WECC, PNUCC, PNCA and FERC data submittals. Additionally provides data for the Regional Dialogue, BPA Fast Facts, Official Statement, bond refinancing, 9f3 Financing, and Fish cost credits
- Official record for base data for the Inventory, Rate Case, and RiskMod analyses. Internal and external data requests



White Book **Data Collection For Planning**

Compiles data and information from customers and many reporting groups.

Incorporates information on Pacific Northwest (PNW) regional retail loads, contract obligations, and contract resources and simulates the operation of the power system in the PNW.

- Uses data obtained from formalized resource planning reports and data submittals such as the PNUCC and FERC
- Incorporates BPA estimates of total retail loads, contracts, and resources for non-reporting utilities such as small publics agencies
- Contains BPA's best estimate of hydro generation utilizing plant characteristics, streamflows, and non-power requirements from the current Pacific Northwest Coordination Agreement (PNCA and maintenance schedules of PNW resources
- Estimates load obligations, contracts, and resources monthly for 1-Hour Capacity, 120-Hour Capacity, HLHmwh, LLHmwh, and energy



White Book
Difference Between the Federal System
White Book and Rates Studies

| | White Book | Rate Case |
|------------------|--|---|
| Purpose | Provides Federal and regional load resource analysis used for mid- and long-range planning | Provides Federal load resources analyses using base data incorporated in the ratemaking process |
| Audience | Available for public distribution | Available for public distribution |
| | Conservative-based on signed contracts, resources, and forecasted load obligations | Based on White Book data that may be adjusted to reflect operational estimates of load obligations, contracts, and resources |
| Contracts | Does not include contracts that are not exercised, unspecified, or not contractually signed | Based on White Book contract data that may be adjusted to reflect unexercised contracts such as Augmentation, unspecified contracts, or not contractually signed contract estimates |
| | WNP-3 Settlement returns are shown as a contract purchases-however, due to timing and price, BPA usually does not purchase this energy | WNP-3 Settlement returns are not included as contract purchases since, due to timing and price, BPA usually does not purchase this energy |
| Resources | Studies do not include resources that are unspecified or not contractually signed | Studies may include resources that are unspecified or not contractually signed |



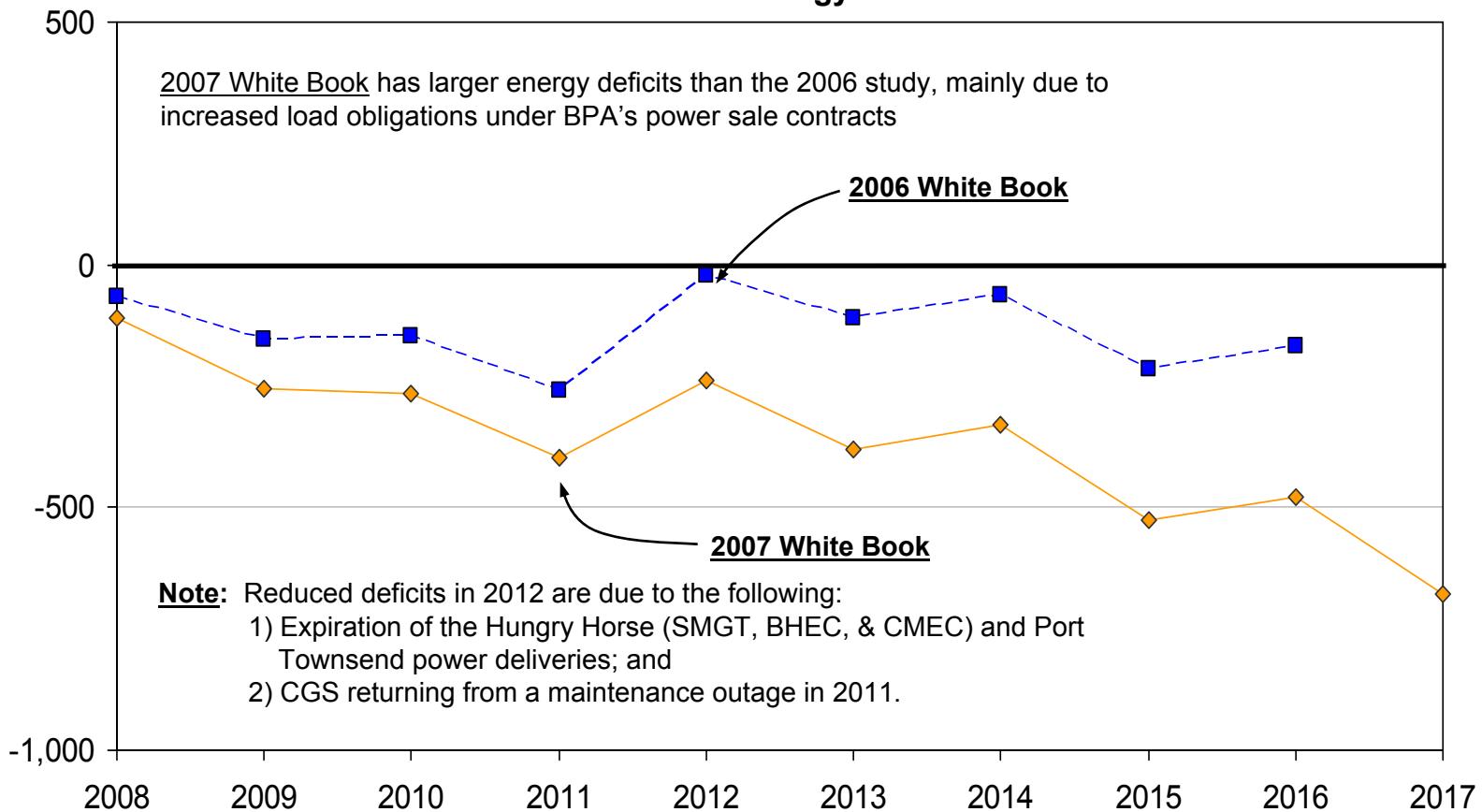
White Book

Federal System Assumptions For 2007 White Book

- Analysis is based on Federal resources, contracts, and Power Sales Contract (PSC) obligation estimates that were finalized March 31, 2007
- Study assumptions:
 - Federal agency, public agency, cooperative, and USBR PSC obligations, including Slice products, that expire September 30, 2011, continue through OY 2017. (Post-2011 Federal system PSC obligations assume like agreements including Slice and stepped up Slice Block. The forecast does not include Tier constructs)
 - IOU RPSA settlement contracts reflect only financial benefits and no power is delivered for FY 2007 through 2011. Consistent with BPA and IOU RPSA amendments made May 28, 2004, they continue through OY 2017
 - BPA's DSI obligations incorporate the policies adopted in BPA's Supplemental DSI ROD, dated May 31, 2006, and reflect monetary benefits only with no power delivered. These benefits are dependent on their operating levels through September 30, 2011. Service to Port Townsend is included as a 17 aMW contract through a local preference customer
 - Includes signed firm intra-regional sales and purchases, imports, and exports
 - Generation estimates provided by BPA, US Army Corp of Engineers (USACE), USBR, and other project owners
 - CGS generation estimates reflect 5-years of history with a 2-year maintenance cycle and assumes 54 outage days for maintenance years. The non-maintenance year's annual generation is estimated to be 1,030 aMW (up 30 aMW from the 2006 Study). The maintenance year's annual generation estimate remained unchanged at 878 aMW due to a longer estimate of outage days
 - Elwha (8.6 aMW) and Glines Canyon (15 aMW) acquisitions continue through September 30, 2009
 - Idaho Falls Bulb Turbines (18.6 aMW) acquisition contract continues through September 30, 2011
 - Fourmile Hill (50 aMW) is projected to be in service beginning October 1, 2009. There is potential for contract termination due to project delays, making the completion date uncertain



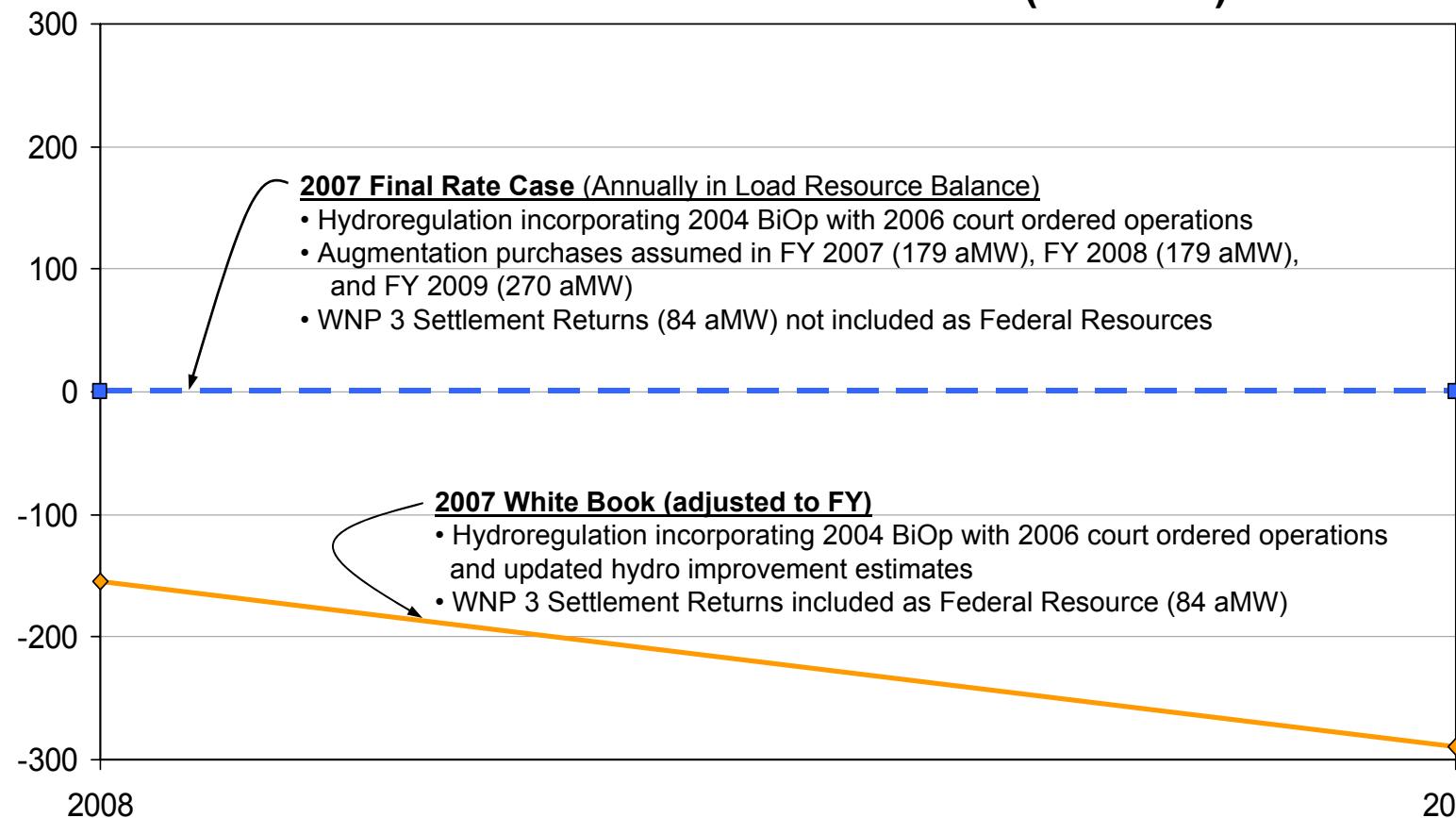
White Book
Federal System Annual Energy Surplus/Deficits
2007 White Book and 2006 White Book Studies
1937 Critical Water Conditions
OY Annual Energy in aMW



Note: Reduced deficits in 2012 are due to the following:
1) Expiration of the Hungry Horse (SMGT, BHEC, & CMEC) and Port Townsend power deliveries; and
2) CGS returning from a maintenance outage in 2011.

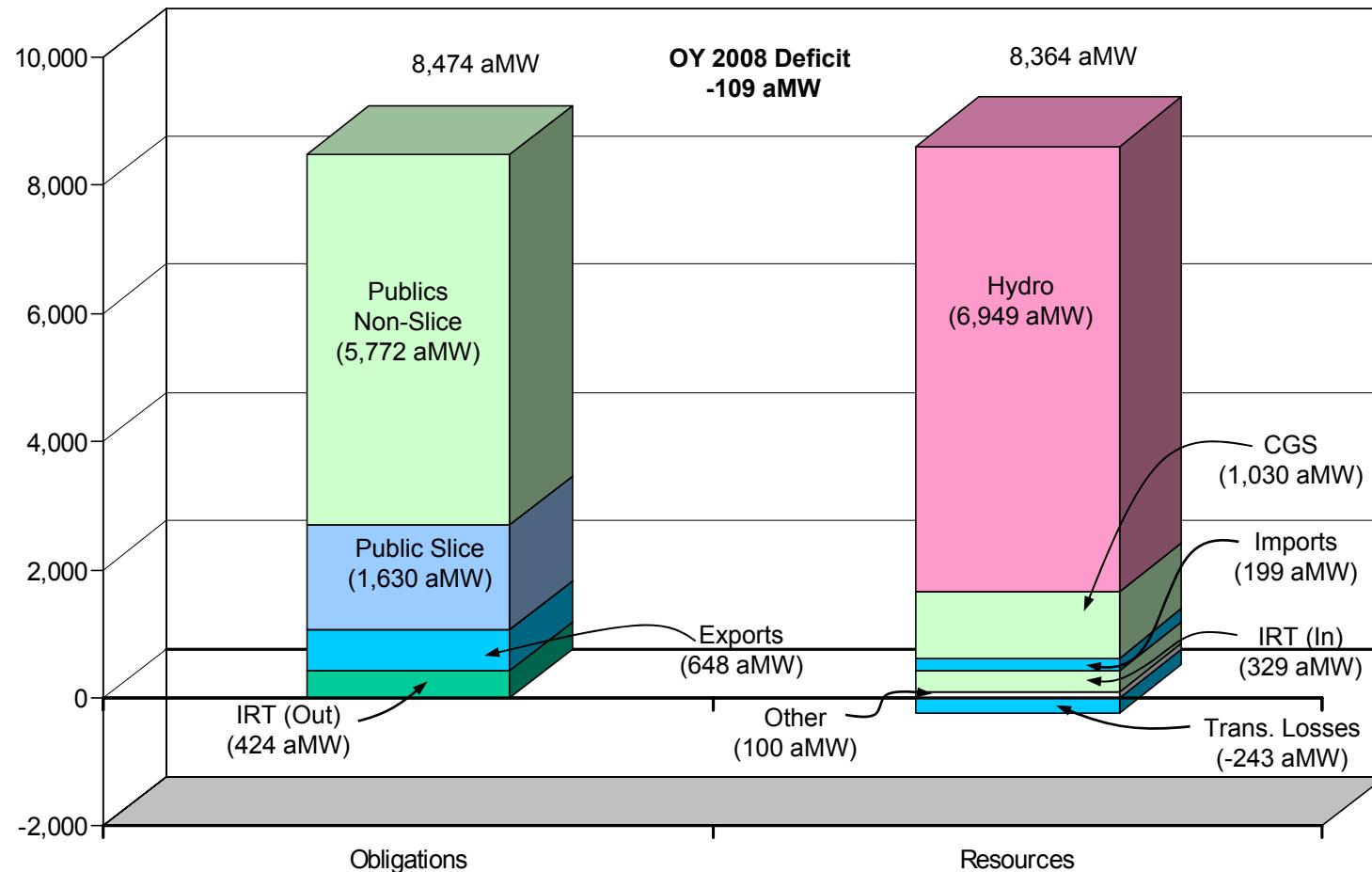


White Book
Fiscal Year Difference Between
Federal System Energy Surplus/Deficits
2007 White Book and 2007 Final Rate Case Study
1937 Critical Water Conditions (FY aMW)



2007 White Book
OY 2008 Federal System Energy Load Resource Stack
1937 Critical Water Conditions
Annual Energy in aMW

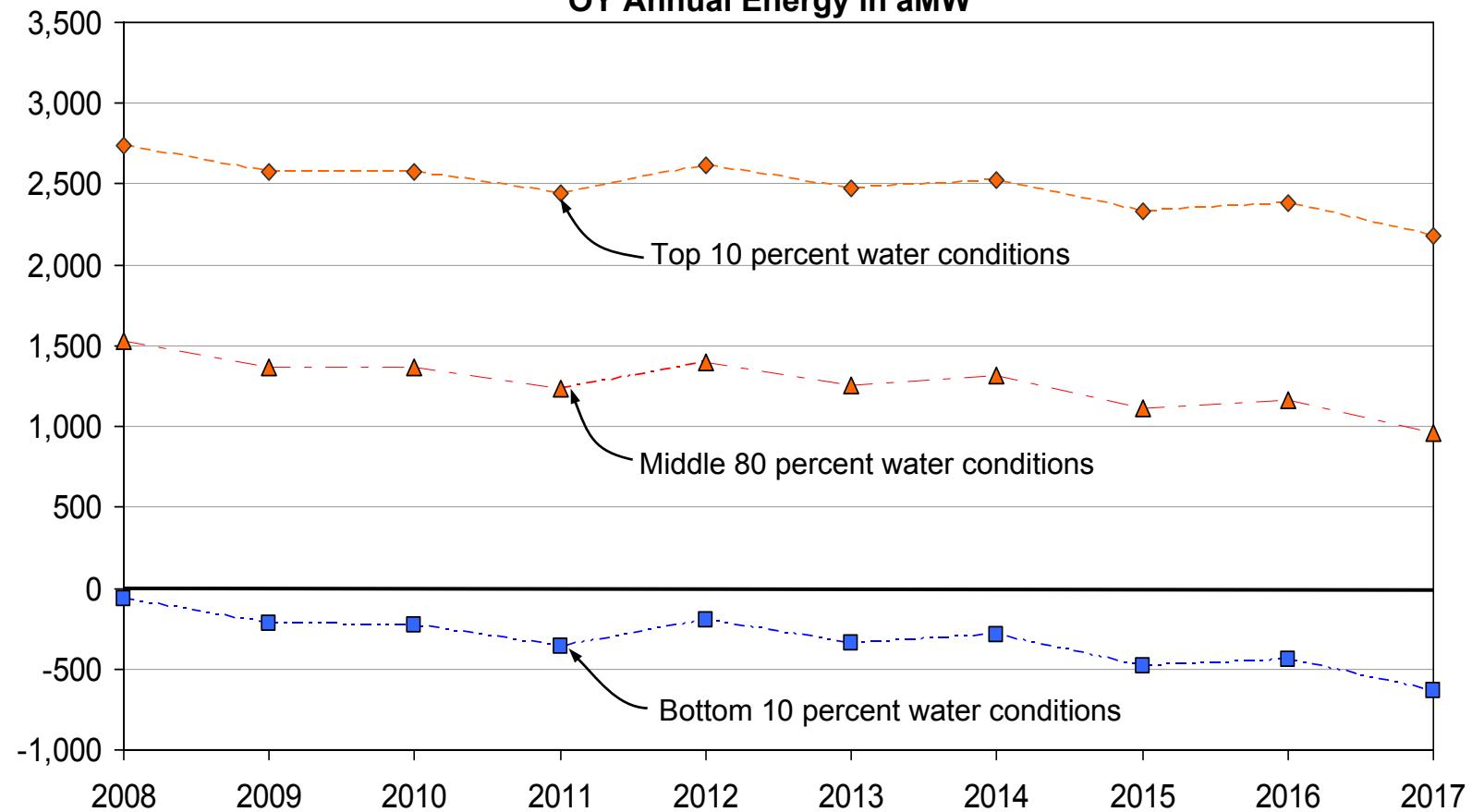
Note: FY 2008 Total Public Slice = 2,891 aMW (Slice Block 1,261 aMW plus Slice Resource 1,630 aMW)



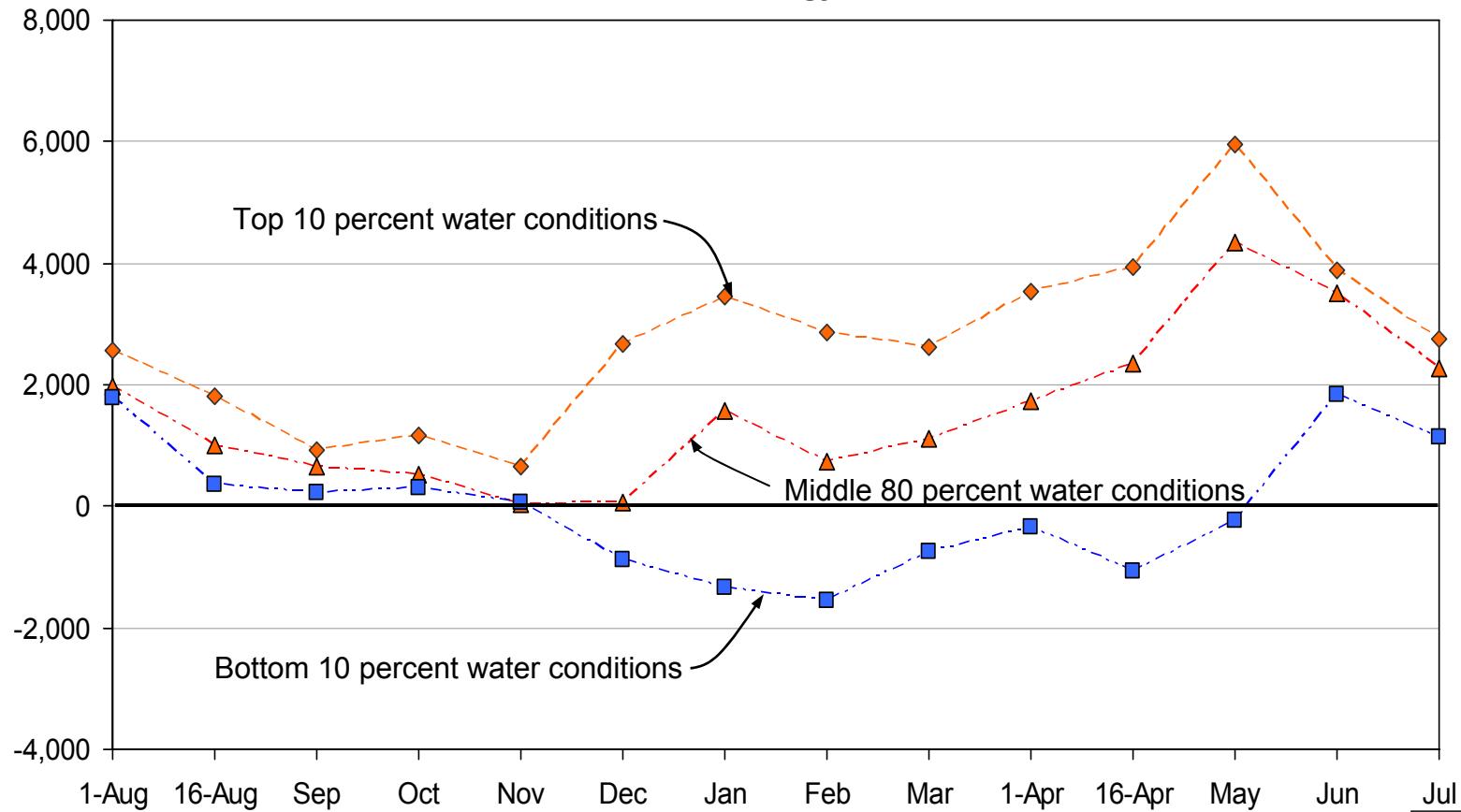
Note: Some numbers may not be exact due to rounding



2007 White Book
Annual Variability of Federal System
Energy Surplus/Deficit Projections
Due to Water Conditions
OY Annual Energy in aMW



2007 White Book
Monthly Variability of Federal System
Energy Surplus/Deficit Projections
Due to Water Conditions
OY 2008 Energy in aMW

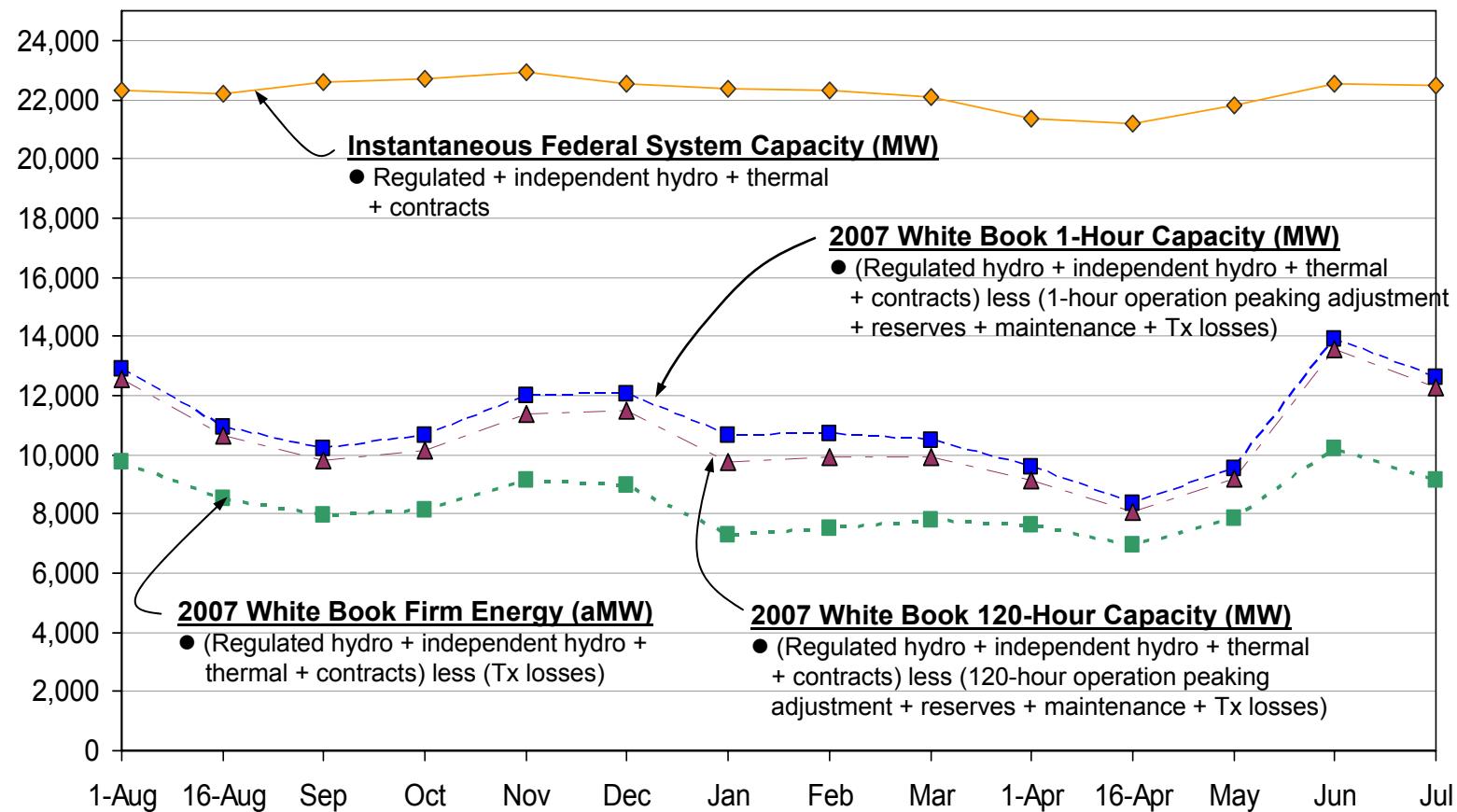


White Book
**Federal System Regulated Hydro Operational Peaking Reduction
For BPA Planning**

- Capacity amounts shown in the White Book are not equivalent to those presented by the Council for regional reliability planning. The White Book analysis depicts how the water would be used over the whole month to meet expected peak of the Federal system. The Council regional reliability planning uses an LOLP model and thousands of simulations to find the availability of the region to meet extreme summer or winter loads
- Planning incorporates regulated and independent hydro estimates from HYDSIM to reflect monthly instantaneous hydro capacity which is based on maximum full-gate-flow generation--at mid-month reservoir elevations--using 1929 through 1978 historical water conditions
- Instantaneous Federal hydro capacity projections overstate the amount of Federal hydro capacity actually available to meet firm load obligations on a month after month, year after year basis due to the fact that Federal hydro projects have more generating units than hydro fuel (water) available to operate all units on a continuous basis
- The instantaneous Federal hydro capacity planning estimates are reduced by an operational peaking reduction to better reflect BPA's actual ability to meet expected peak load obligations throughout each month. This adjustment also reflects hydro maintenance, FOR, and spinning reserves



2007 White Book
Federal System 1-Hour & 120-Hour Operational Peaking Capacity Comparison
For a Typical Operating Year
1937 Critical Water Conditions

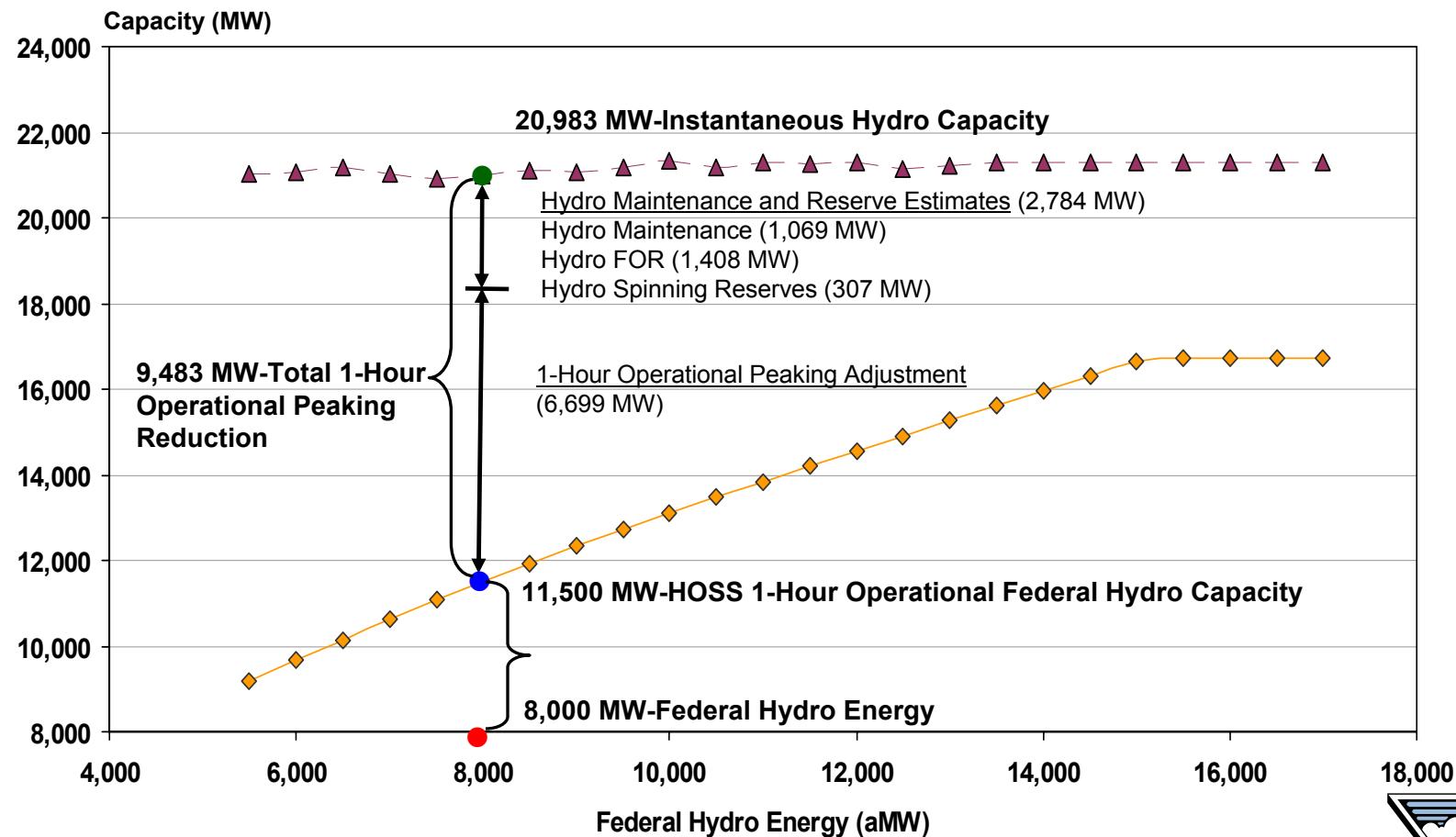


White Book **Methodology for Calculating** **Hydro Operational Peaking Reduction**

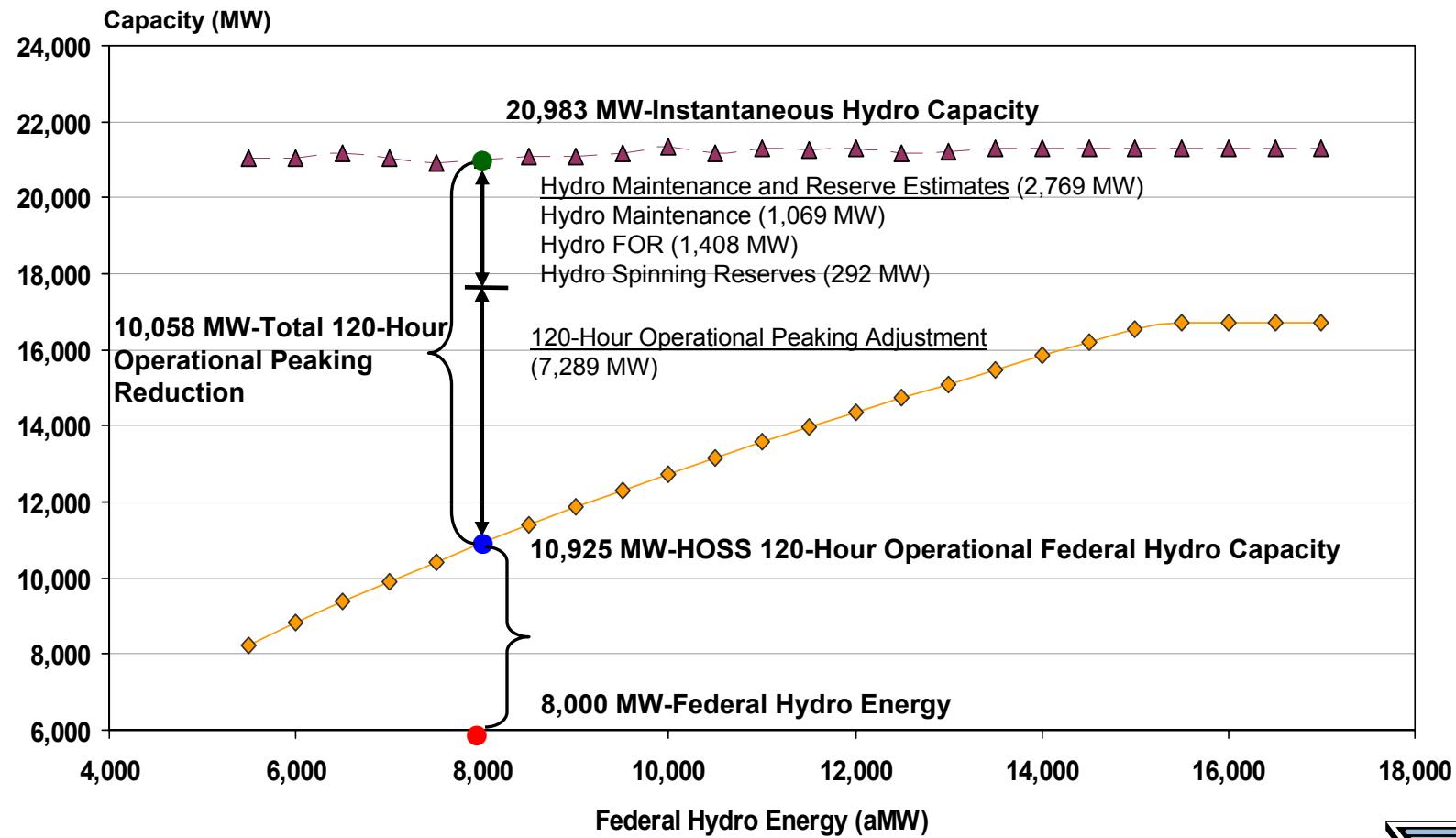
- The operational peaking reduction was developed using hourly HOSS simulations of Federal system generating resource operations needed to meet Federal system obligations for 50 historical water conditions. The HOSS model maximized the use of hydro energy in the month and did not borrow water from future weeks or months
 - HOSS results produced an hourly Federal system hydro generation matrix by month and by water conditions. Equations were developed to equate the monthly Federal system hydro energy to both the Federal hydro maximum 1-hour generation and 120-hour capacity for each water condition
 - 1-hour operational capacity estimates the maximum Federal hydro system monthly operational capacity that is available to meet the 1-hour expected peak load--for each of the 1929 through 1978 historical water conditions
 - 120-hour operational capacity represents an averaged monthly Federal system hydro generating capability. This average is calculated monthly, over the top 6 HLHs per day, 5 days per week, and 4 weeks per month ($6*5*4=120$ hours)--for each of the 1929 through 1978 historical water conditions
- The magnitude of the total operational peaking reduction can vary widely depending on the month and water conditions. During low water conditions, the instantaneous hydro capacity would be reduced by about 10,000 to 11,000 MW, due to lack of water behind the dams thus limiting the ability of the hydro system to peak. Under better than average water conditions, the instantaneous hydro capacity would be reduced by only 3,000 to 4,000 MW



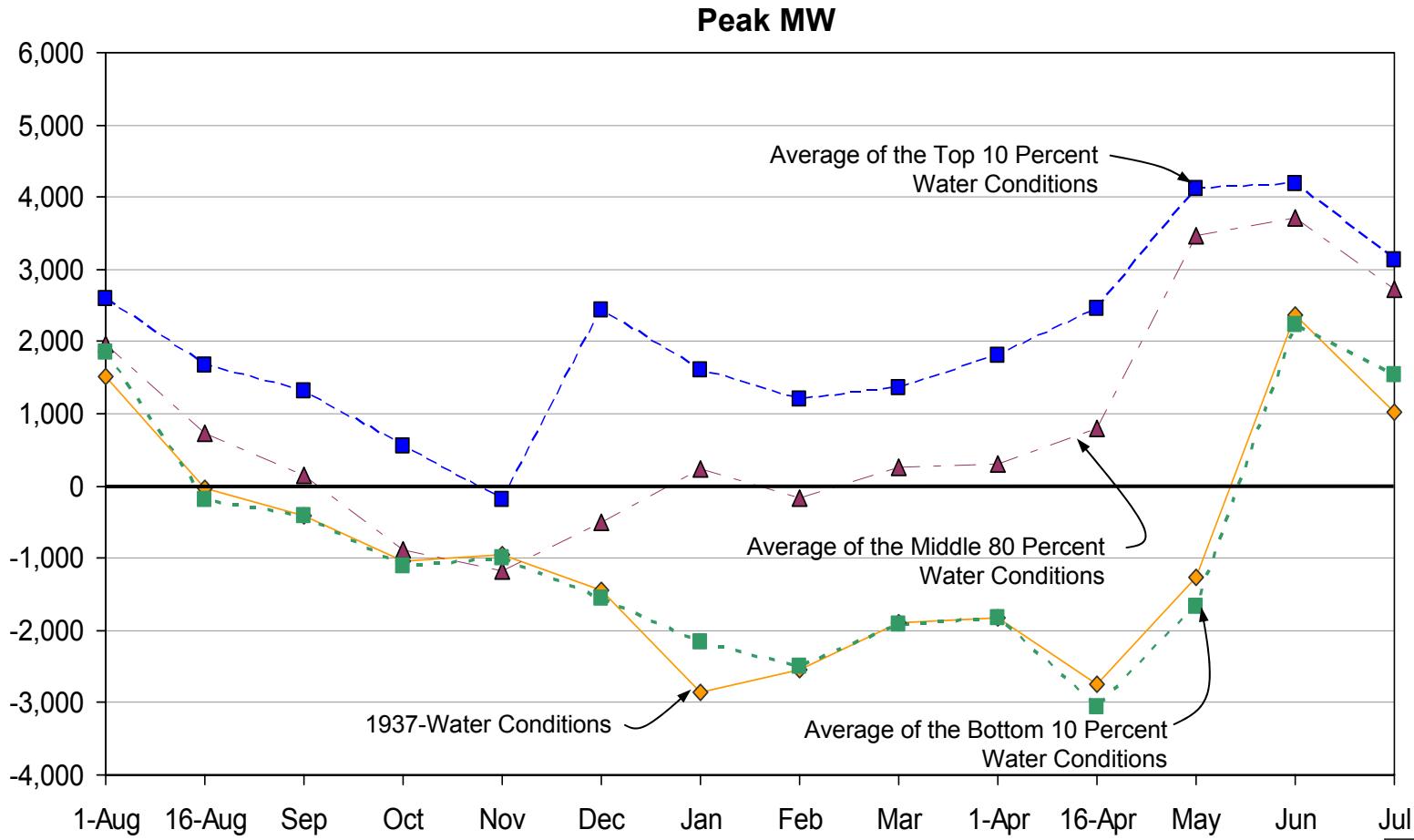
2007 White Book
Federal System 1-Hour Operational Peaking Reduction
Relationship of HOSS 1-Hour Operational Capacity to Hydro Energy
For a Typical January Under 50-Water Conditions



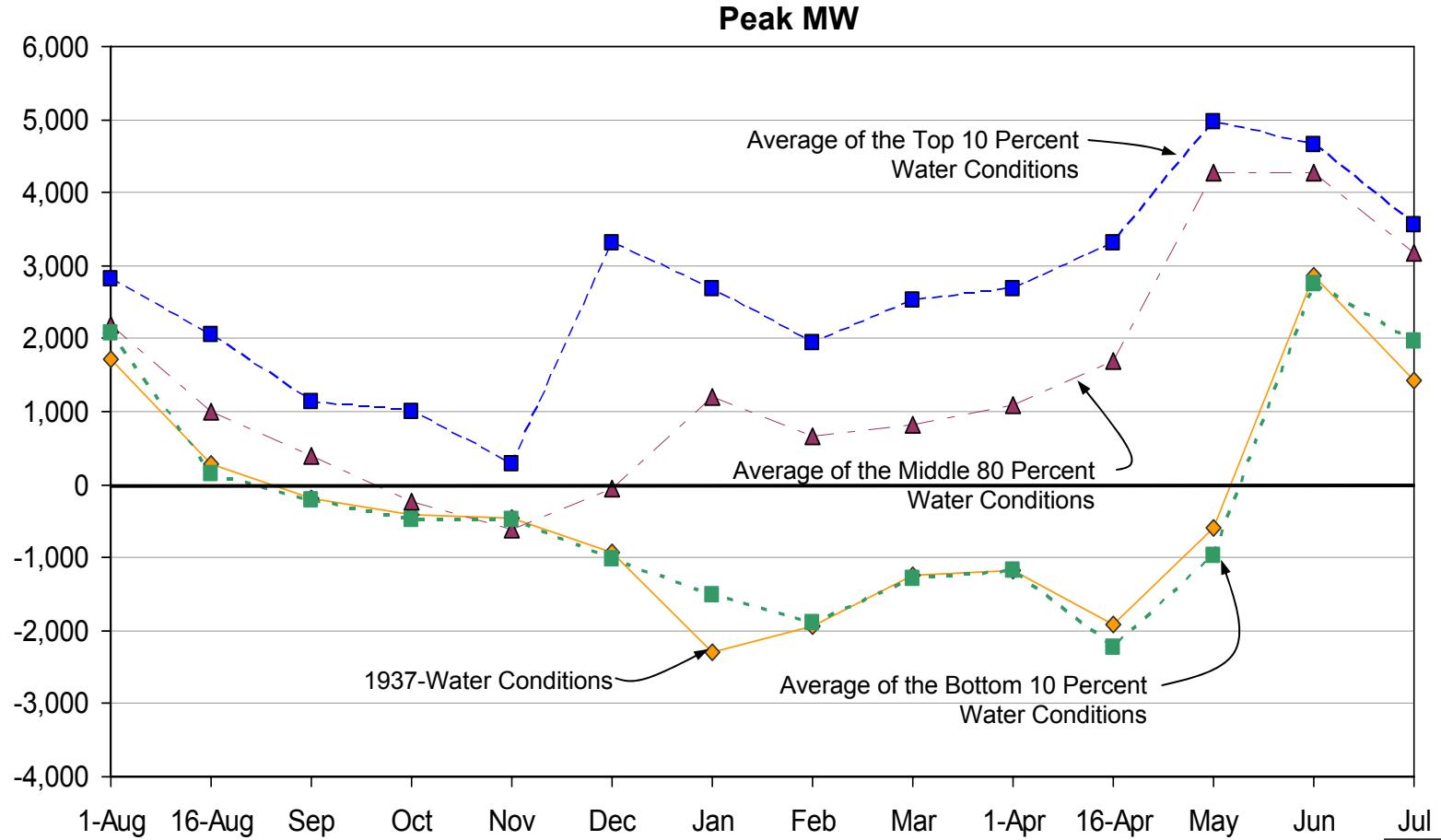
2007 White Book
Federal System 120-Hour Operational Peaking Reduction
Relationship of HOSS 120-Hour Operational Capacity to Hydro Energy
For a Typical January Under 50-Water Conditions



2007 White Book
Potential Variability of 1-Hour Operational Capacity Federal Surplus/Deficit Projections
Utilizing Differing Water Conditions for a Typical OY

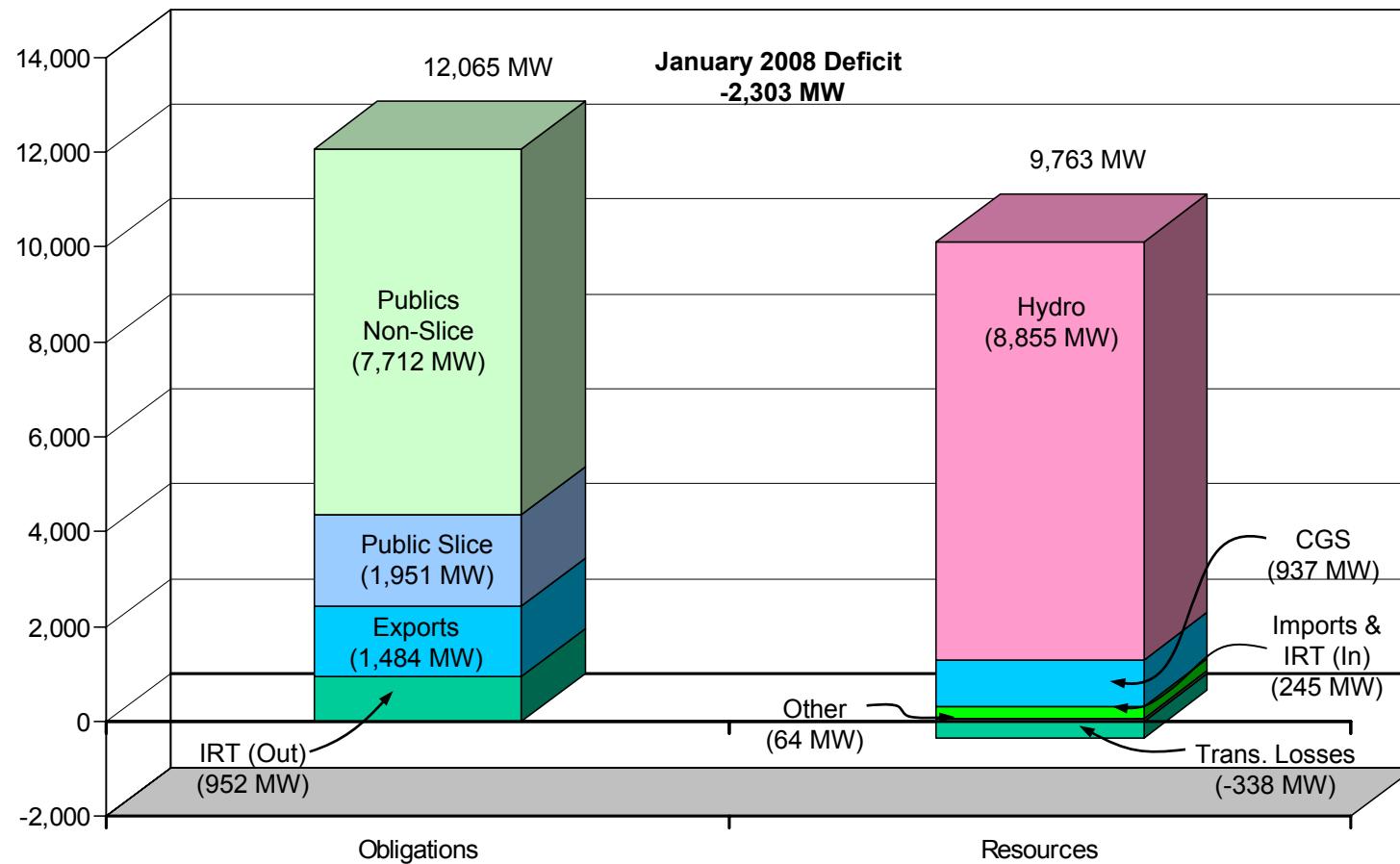


2007 White Book
Potential Variability of 120-Hour Operational Capacity Federal
Surplus/Deficit Projections
Utilizing Differing Water Conditions for a Typical OY



2007 White Book**January 2008****Federal System 120-Hour Operational Capacity Load Resource Stack
1937 Critical Water Conditions****120-Hour Capacity in MW**

Note: Loads are reduced for diversity and resources are reduced for 120-Hour Peaking, reserves and maintenance



White Book

LaRIS Editor Main Input Program

Loads and Resources Information System Editor - [Account Maintenance]

File Edit View Tools Window Help

Search Criteria

| | | | | | |
|----------------|---------------------------------|----------|-------|---------------|-----------|
| Entity Filter | Contracts | NonHydro | Hydro | Update | Megawatts |
| Class Number | 60 Large Thermal Resources | | | Delete | |
| Account Number | 106 Columbia Generating Station | | | Clear | |
| | | | | Exit | |

Primary Owner: 400 BPA - Power Business

Account Name: Columbia Generating Station

Start Date: 1/1/1999

End Date: 9/30/2030

Revision Date: 3/26/2007 10:47:00 AM

Availability Factor: 0.95

Forced Outage Rt.: 0.15

Spin Reserve Rt.: 0.035

Fuel Type: 29 Uranium

Is Slice Resource: No Yes

Contract

| | |
|-------------------|--|
| Name | |
| BPA Contract # | |
| Contract Type | |
| Execution Date | |
| Strike Date | |
| Contract Status | |
| Rate Range | |
| Subscription Type | |
| Product Type | |

NonHydro Participants

| | EntityID | StudyMapID | ProprietaryTypeID | InceptionRegionID | DeliveryRegionID |
|--|----------------------|--|-------------------|-------------------|------------------|
| | BPA - Power Business | 47 - Inventory 2007 Updates 10/12/2007 -12/31/2007 | Non-Proprietary | PNW | PNW |
| | BPA - Power Business | 50 - Inventory 2008 Updates 1/1/2008 - | Non-Proprietary | PNW | PNW |

Ready



White Book
LaRIS Main Report Screen
Auxiliary Tables

PNW Loads & Resources (A Tables)

File Options Studies Tools Windows Help

A-Tables D-Tables M-Tables U-Tables F-Tables R-Tables

Table 1: Total Retail Loads
 Table 2: Exports
 Table 3: Regulated Hydro
 Table 4: Independent Hydro
 Table 5: Imports
 Table 6: Small Thermal & Misc.
 Table 7: Large Combustion Turbines
 Table 8: Renewables
 Table 9: Cogeneration
 Table 10: Large Thermal
 Table 11: Restoration
 Table 12: Canadian Entitlement Return (CSPE)
 Table 13: CSPE Purchase Assignment & Export

Reset Reset

| Year | Water |
|------|-------|
| 2003 | 1929 |
| 2004 | 1930 |
| 2005 | 1931 |
| 2006 | 1932 |
| 2007 | 1933 |
| 2008 | 1934 |
| 2009 | 1935 |
| 2010 | 1936 |
| 2011 | 1937 |
| 2012 | 1938 |
| 2013 | 1939 |

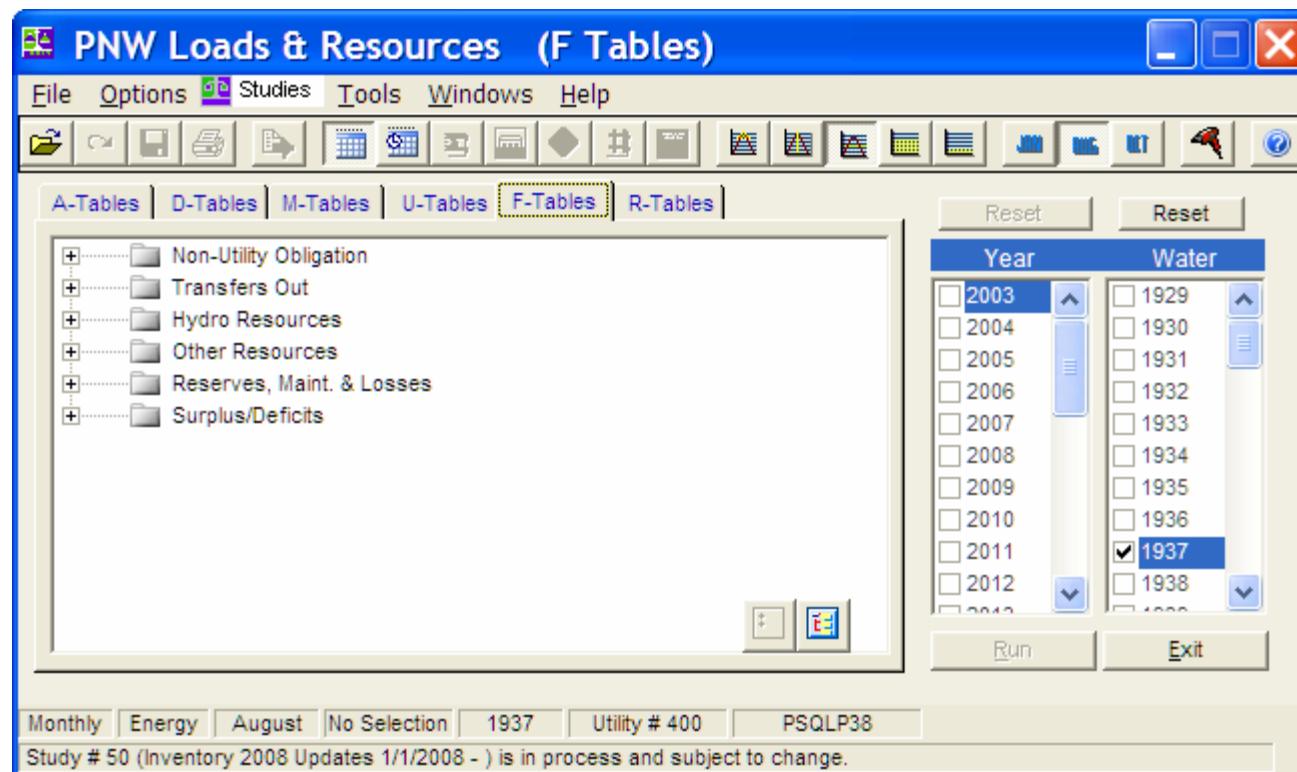
Run Exit

Monthly Energy August No Selection NA No Selection PSQLP38

Study # 50 (Inventory 2008 Updates 1/1/2008 -) is in process and subject to change.



White Book
LaRIS Main Report Screen
Federal Table



BONNEVILLE POWER ADMINISTRATION

Loads and Resources - Federal System

PNW Loads and Resource Study

2008 - 2009 Operating Years

3/31/2007

1937 Water Year

[43] 2007 White Book (Final)

| Energy (aMW) | 1-Aug | 16-Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | 1-Apr | 16-Apr | May | Jun | Jul | Avg |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Non-Utility Obligations | | | | | | | | | | | | | | | |
| Fed. Agencies 2002 PSC | 129 | 129 | 117 | 131 | 151 | 163 | 166 | 160 | 146 | 130 | 130 | 126 | 128 | 138 | 140 |
| USBR 2002 PSC | 252 | 259 | 219 | 94 | 14 | 31 | 70 | 79 | 50 | 206 | 242 | 290 | 287 | 310 | 160 |
| DSI 2002 PSC | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Firm Non-Utility Obligations | 382 | 388 | 336 | 225 | 165 | 195 | 237 | 239 | 197 | 336 | 372 | 416 | 414 | 448 | 301 |
| Transfers Out | | | | | | | | | | | | | | | |
| NGP 2002 PSC | 3085 | 3089 | 2800 | 2897 | 3287 | 3648 | 3698 | 3578 | 3191 | 3002 | 2994 | 2967 | 3083 | 3228 | 3205 |
| GPU 2002 PSC | 2093 | 2093 | 2235 | 2130 | 2604 | 2859 | 2882 | 2849 | 2662 | 2235 | 2229 | 2005 | 1910 | 2050 | 2376 |
| NGP 2002 Slice PSC | 734 | 627 | 568 | 593 | 677 | 659 | 520 | 546 | 573 | 553 | 499 | 543 | 701 | 687 | 606 |
| GPU 2002 Slice PSC | 1223 | 1044 | 946 | 988 | 1127 | 1097 | 865 | 910 | 955 | 921 | 831 | 905 | 1168 | 1143 | 1010 |
| IOU 2002 PSC | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Exports | 639 | 637 | 633 | 579 | 573 | 583 | 580 | 578 | 572 | 591 | 591 | 619 | 620 | 614 | 598 |
| Regional Transfers (Out) | 214 | 214 | 253 | 308 | 609 | 622 | 619 | 564 | 411 | 379 | 379 | 184 | 244 | 243 | 387 |
| Federal Diversity | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Transfers Out | 7988 | 7705 | 7435 | 7494 | 8876 | 9467 | 9164 | 9025 | 8363 | 7680 | 7523 | 7223 | 7727 | 7966 | 8182 |
| Total Firm Obligations | 8369 | 8093 | 7771 | 7719 | 9041 | 9662 | 9400 | 9264 | 8560 | 8017 | 7895 | 7638 | 8141 | 8414 | 8483 |
| Hydro Resources | | | | | | | | | | | | | | | |
| Regulated Hydro | 7979 | 6694 | 5949 | 6176 | 7160 | 7040 | 5439 | 5760 | 5946 | 5720 | 5036 | 5941 | 8326 | 7692 | 6512 |
| Independent Hydro | 413 | 404 | 390 | 341 | 283 | 201 | 157 | 173 | 259 | 401 | 468 | 686 | 722 | 433 | 374 |
| Operational Peaking Adj. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Non-Fed CER (Canada) | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 130 | 137 | 137 | 137 | 137 | 137 | 132 |
| Total Hydro Resources | 8523 | 7228 | 6469 | 6647 | 7573 | 7371 | 5726 | 6063 | 6335 | 6258 | 5641 | 6764 | 9185 | 8261 | 7018 |



BONNEVILLE POWER ADMINISTRATION

Loads and Resources - Federal System

PNW Loads and Resource Study

2008 - 2009 Operating Years

1937 Water Year

3/31/2007

[43] 2007 White Book (Final)

| Energy (aMW) | 1-Aug | 16-Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar | 1-Apr | 16-Apr | May | Jun | Jul | Avg |
|---|-------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Other Resources | | | | | | | | | | | | | | | |
| Small Thermal & Misc. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Combustion Turbines | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Renewables | 20 | 20 | 21 | 22 | 25 | 26 | 27 | 27 | 26 | 25 | 25 | 22 | 12 | 20 | 23 |
| Cogeneration | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Imports | 109 | 111 | 145 | 182 | 251 | 304 | 278 | 233 | 204 | 203 | 173 | 83 | 101 | 132 | 184 |
| Regional Transfers (In) | 194 | 194 | 339 | 328 | 374 | 310 | 334 | 322 | 300 | 295 | 295 | 177 | 291 | 159 | 285 |
| Large Thermal | 1030 | 1030 | 1030 | 1030 | 1030 | 1030 | 1030 | 1030 | 1030 | 1030 | 1030 | 498 | 0 | 764 | 878 |
| Non-Utility Generation | 71 | 69 | 53 | 62 | 79 | 80 | 76 | 70 | 97 | 100 | 100 | 95 | 81 | 68 | 78 |
| Augmentation Purchases | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Augmentation Resources | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Other Resources | 1424 | 1425 | 1588 | 1624 | 1759 | 1750 | 1745 | 1682 | 1656 | 1654 | 1624 | 874 | 485 | 1143 | 1447 |
| Total Resources | 9947 | 8652 | 8057 | 8271 | 9332 | 9122 | 7471 | 7745 | 7991 | 7912 | 7265 | 7638 | 9670 | 9404 | 8466 |
| Reserves & Maintenance | | | | | | | | | | | | | | | |
| Hydro Reserves | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Small Thermal & Misc. Reserves | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Contract Reserves | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Large Thermal Reserves | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Federal Hydro Maint. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spinning Reserves | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Federal Trans. Losses | -280 | -244 | -227 | -233 | -263 | -257 | -211 | -218 | -225 | -223 | -205 | -215 | -273 | -265 | -239 |
| Total Reserves, Maintenance & Lc | -280 | -244 | -227 | -233 | -263 | -257 | -211 | -218 | -225 | -223 | -205 | -215 | -273 | -265 | -239 |
| Total Net Resources | 9666 | 8408 | 7830 | 8038 | 9069 | 8864 | 7261 | 7527 | 7766 | 7689 | 7060 | 7423 | 9397 | 9139 | 8227 |
| Total Firm Surplus/Deficit | 1297 | 315 | 59 | 318 | 28 | -798 | -2139 | -1737 | -794 | -328 | -835 | -216 | 1256 | 725 | -256 |



White Book **The White Book for the Future**

- The White Book will be evolving and will address:
 - How to model new power sales contracts
 - Hourly forecasts for long-range planning
 - Incorporate new energy technologies
 - Transition to address Federal system and regional reliability using an LOLP-type model
 - Many other unknown issues that will come up over the life of the new power sales contracts

This is not an exhaustive list, rather a starting point in the future of BPA long-range planning

