

Resource Program Public Workshop

August 25, 2009

9 a.m. to noon

Rates Hearing Room



Agenda

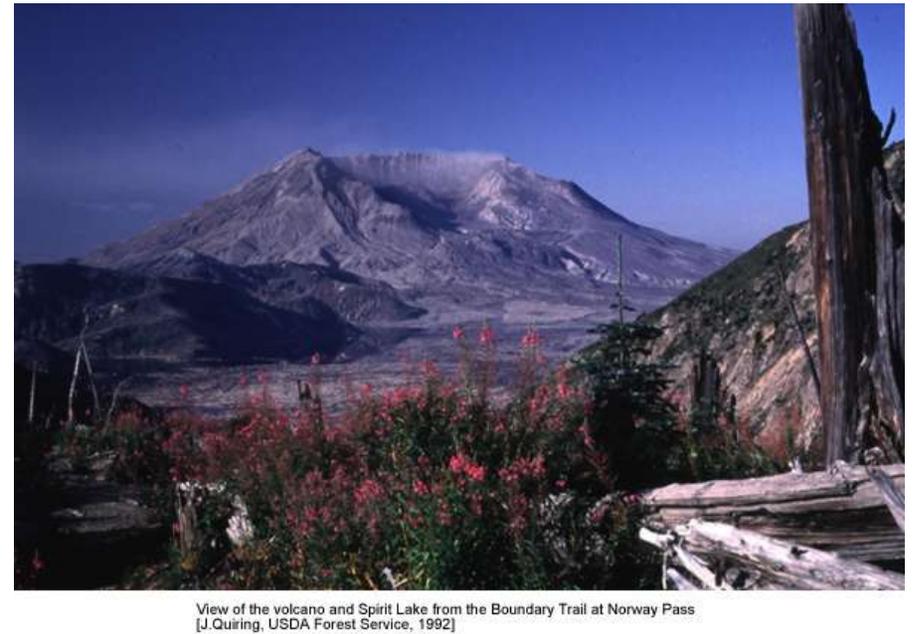
9:00-9:15	Introductions & Review Agenda	Suzanne Cooper
9:15-10:45	Needs Assessment	Birgit Koehler
10:45-11:00	Resource Program Approach	Suzanne Cooper
11:00-11:15	Next Steps	

Needs Assessment

Preliminary Needs Assessment



Needs Assessment 2



- Analogy suggested by Allen Burns.
- Images courtesy of USDA Forest Service, **Mount St. Helens** National Volcanic Monument (J. Hughes and J. Quiring)



Outline

- Background
- Inputs
 - Assumptions
 - Reserves
 - Load
- Metrics and criteria
- Results
 - Energy
 - HLH
 - 18-hr Capacity
- Metrics and criteria revisited
- Risks/Uncertainties
- Next Steps



Background

- Needs Assessment is first step in Resource Program
- Preliminary Needs Assessment showed annual energy, seasonal HLH, 18-hr capacity with old forecasts
- This Needs Assessment 2 adds
 - deeper recession
 - recent 300 MW HLH balancing purchases for Nov-April through 2013 and 2014
 - Lower wind reserve requirement
- Loads and Hydro-regulations from Needs Assessment are inputs into Energy 2020 for portfolio evaluation.
- CV-Auto Vista “Wind Reserves Impact Study” is being updated separately



Assumptions

- Load forecast updated May 2009 (final WP-10 rate case forecast plus 300 MW HLH winter balancing purchases for early years).
- All above-High Water Mark load included except where noted.
- Assume that either there is no “provisional CHWM amount” of load or that it is less than 168 aMW (headroom in T1SFCO) and does not lead to Tier-1 augmentation.
- Assumes 2008 BiOp operations—i.e. stopping spill in August on Lower Snake River (Note: we see a big deficit in August-II that will be even bigger if we spill all month)
- Unless noted, used 60-minute persistence forecast levels to specify required reserves.
 - The final WP-10 Race Case ROD adopted 30-minute level reserves with the option to revert to 45 minutes. This change will reduce our need to acquire reserves, but has a smaller impact on the annual average energy and HLH deficit.
- Conservation at current conservation trend, i.e. roughly at level of 5th Power Plan (about 56 aMW/year) in analysis, and perhaps some additional conservation through utilities’ projection of their future load (BPA still evaluating)
- **No new direct DSI service included in load, no new publics, and no new Federal Agency (DOE Richland) load for this analysis.**



Balancing Reserves for wind and load

	2013	2019	Prelim NA 2013
Wind Fleet Nameplate	5070 growing to 6220	About 11,000	6670
INC (MW) required	1551 growing to 1763	2250	2494
DEC (MW) required	-2076 growing to -2377	-3070	-3300
INC modeled	All	Capped at 1763	All
DEC modeled	Virtually all	Capped at -2377	Half to all (varied by month)



Reserves (continued)

- Required Reserves, based on 60-minute persistence forecast accuracy. (Later slide will show 45 min is fairly similar for energy in Needs Assessment.)
- The system was just short of meeting the 60-minute Decremental Balancing Reserve Requirements for FY2013. Misses: August (-70 MW), September (-80 MW), and April (-450 MW) in model but probably less than half that in actual operations.
- It is our expectation that with 30-minute level balancing reserves, the system will not be deficit for INC and DEC in 2013 and perhaps for several years beyond.
- For 2019, we modeled about 1800 MW INC and 2400 MW DEC reserves which we thought was about the maximum.
- For 2019, reserves are capped at 2013 levels. Wind generation is expected to continue growing post 2013, but the FCRPS cannot produce those additional reserves. Thus we will need to acquire reserves, count on non-Federal sources of reserves, and/or promote additional developments that reduce the amount of required reserves at some point post-2013. (April WIT forecast has about 11,000 MW nameplate with roughly ~2000 MW INC and ~3000 MW DEC.)
- Note, we do not include impact of deployment of the reserves, meaning we do not account for changes in water supply when reserves are deployed and water is consumed or saved unpredictably. This is something we are examining further.



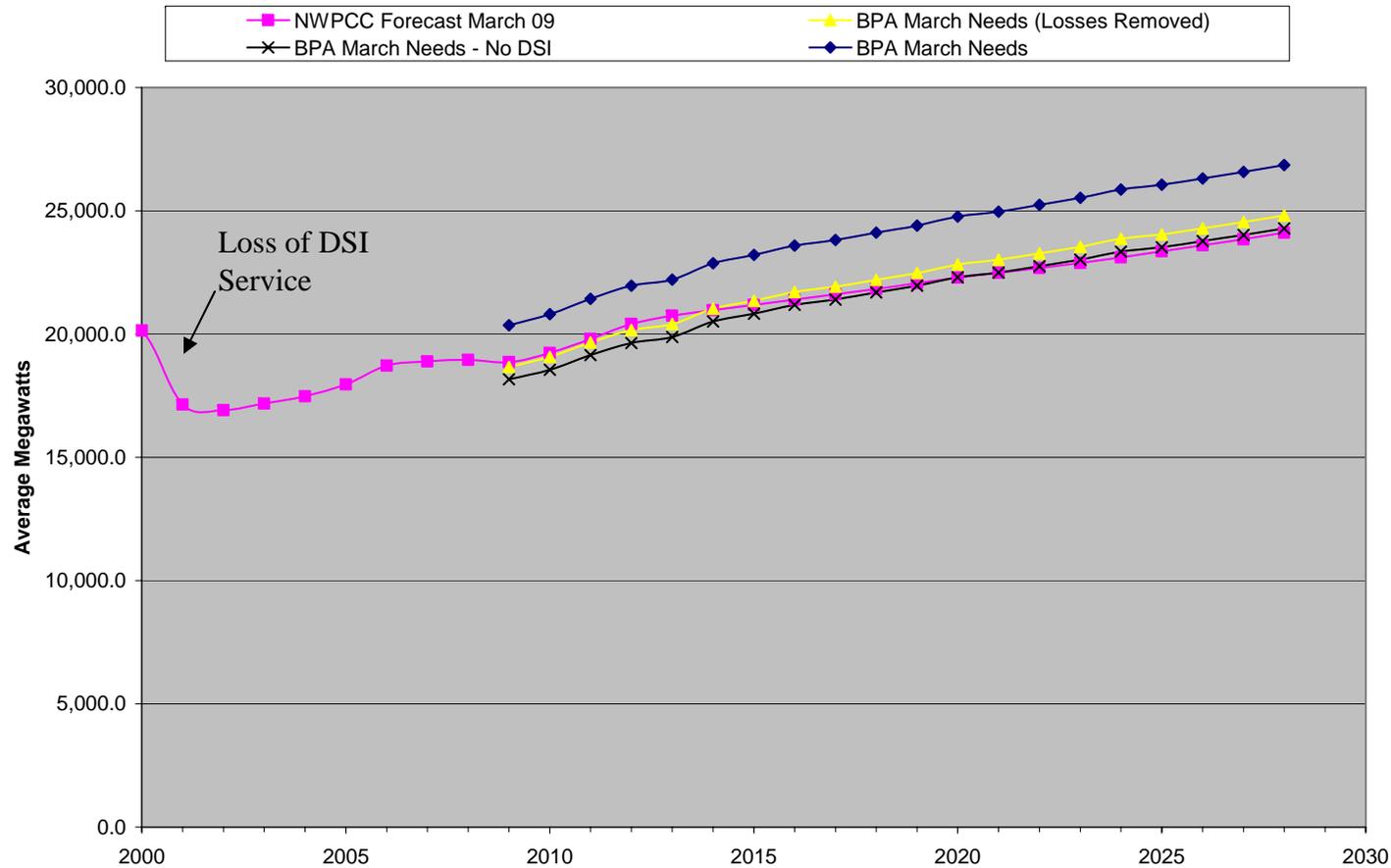
Load Forecast

- Load forecast updated January through March to reflect economic conditions and outlook.
- Expect return to historical growth levels by FY 2010 immediately followed by slightly higher growth rates due to strengthening economy.
- Stable growth rates expected after FY 2014
- Northwest Total Retail load Stable growth rate 1.1%;
Council stable growth rate 1.0%
- Requirements customers stable growth rate 1.7%



Loads Compared to Council's

Forecast Comparisons (Total Regional Loads)



Continuing Uncertainties

Differences between forecasts, both the Council's and Agency's, and changes from of October to March indicate level of uncertainty

- Some of the causes of the uncertainty
 - Length of current economic conditions
 - New technology innovations
 - Customer level of resource development



Metrics and Criteria

- Annual Average Energy at Critical Water:
 - Zero deficit
- Seasonal HLH Energy at P5 (roughly equates to monthly HLH at P10)
- 18-Hour Capacity
 - Zero deficit
- Flexibility/Dispatchability
 - Must be able to meet reserve requirement (to integrate expected wind)



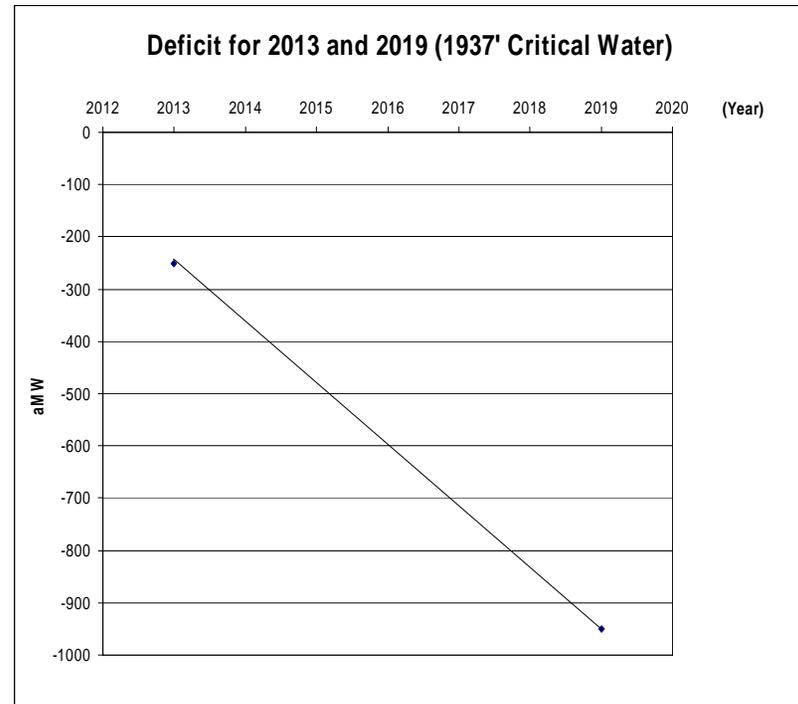
Results Outline

- Annual Average
- 2013 HLH
 - Prelim NA vs NA2
 - w/wo aHWM
 - HLH vs Superpeak, monthly HLH vs monthly avg Energy
- 2013 vs 2019 HLH
 - Winter trend, summer trend
 - 2019 w/wo above-HWM
- Wind (45 and 60 min) in 2013 HLH
- 18-hr Capacity



Annual Energy Results (Critical Water)

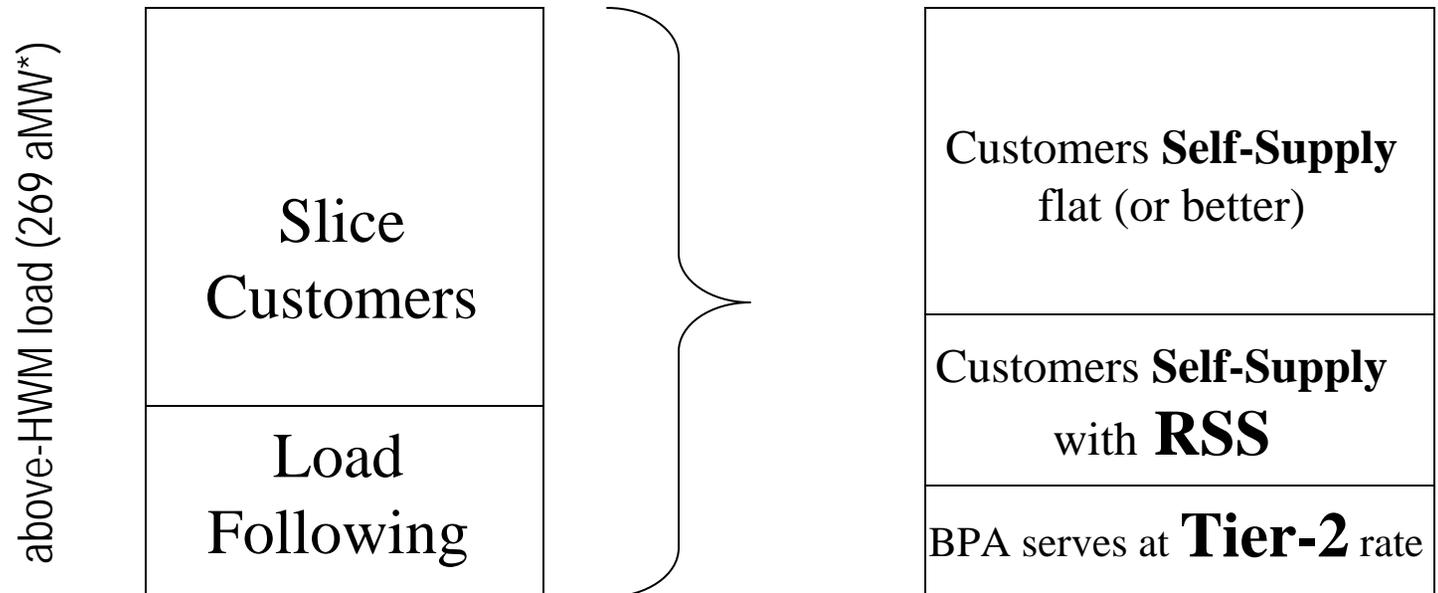
Deficit	2013	2019
All current load including above-HWM (no DSI, new publics, new Fed)	-250	-950
Current Tier-1 only (without above-HWM load)	0	0



- Assumes no Tier-1 Augmentation, i.e. any "Provisional Amount" HWM load is <168 MW, the current "headroom" between 2010 forecast loads and the T1SFCO (system capability).
- Preliminary NA had showed -750 aMW deficit for 2013



Three Options for above-HWM Load



Thus impact to BPA from 'Tier-2' + 'RSS' \leq 269 aMW in 2013

*May 29, 2009 TRM estimate of potential Tier-2 augmentation: 269 MW

- We'll know how much of each in November when customers commit for first period



Crosswalk 2013 Annual Average with TRM

TRM May 29, 2009:

- -269 aMW maximum potential Tier-2 Augmentation (2012/2013 avg)
- -76 aMW more deficit for less resource during CGS-out year
- +83 aMW less deficit from 300 MW HLH balancing purchase (not in TRM calculation)
- Other minor differences (CGS gaming, load gaming, slice calc, loss calc)
- Adjusted TRM deficit: -262 aMW for 2013
- Compare to -250 aMW in NA2



Monthly HLH

- Resource Program metric: P5 (5th percentile) analyzed by season
- HOSS results are monthly
- Risk group at BPA did extensive statistical analysis on HOSS results of Preliminary NA and determined that P10 by month is roughly comparable to P5 by season (since water supply between the months is slightly but not absolutely correlated).
- Thus, we continue to report P10 by month or period.



2013—various graphs follow

- P10 (lowest 10th percentile by month)

6/3/2009	HLH	Spk	Avg	LLH	Grv Yrd
October	-50	250	-150	-300	-500
November	-350	150	-550	-850	-1000
December	-900	-250	-950	-1000	-1000
January	-1000	-500	-1000	-1050	-1000
February	-800	50	-800	-800	-1000
March	-100	1000	-50	-250	-800
April I	-400	-50	-500	-650	-950
April II	500	850	200	-200	-900
May	1400	2050	1000	400	150
June	-100	350	-300	-450	-600
July	450	850	200	-200	-350
August I	-450	-150	-550	-700	-750
August II	-1300	-1250	-1050	-750	-750
September	-700	-400	-650	-600	-650
Average	-250	200	-350	-550	-700

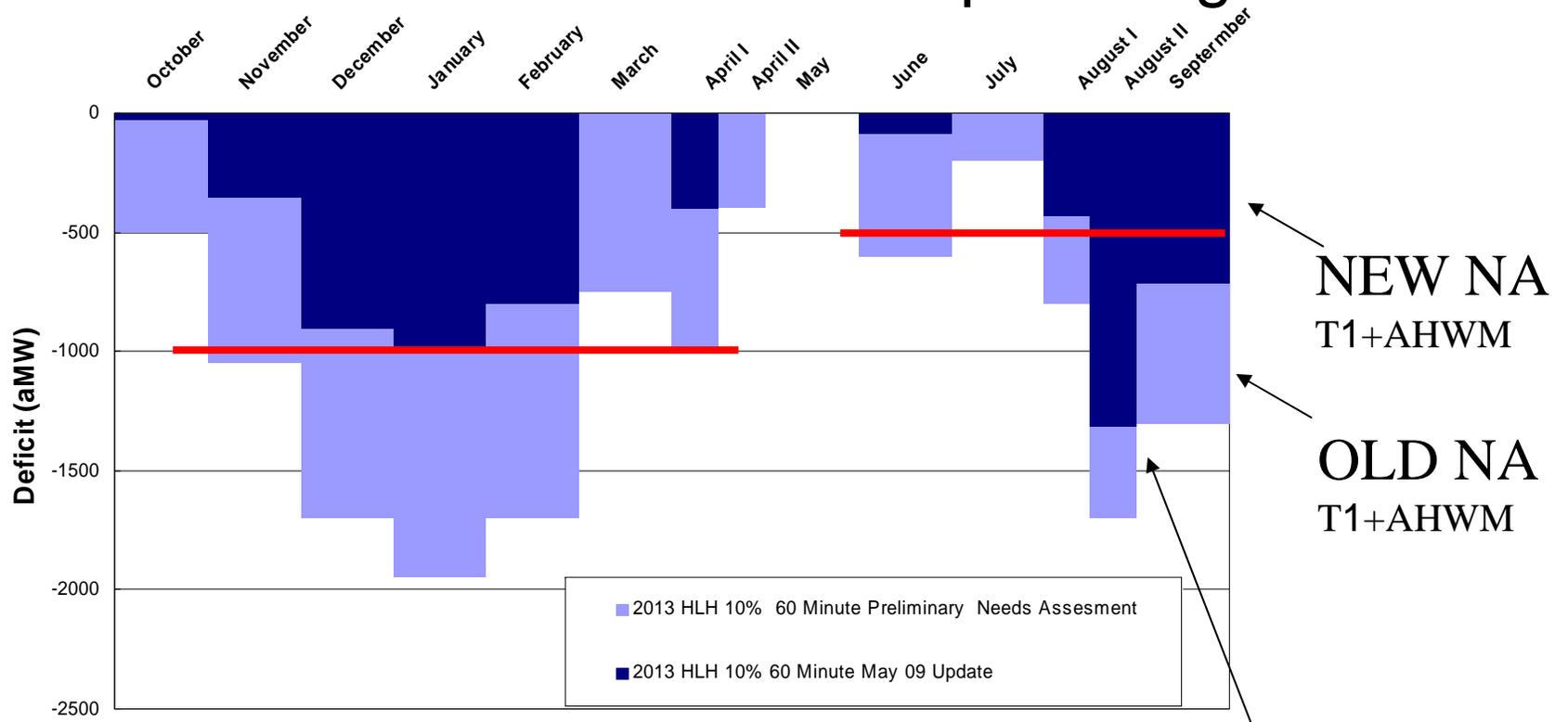
- HLH (P5, P10, P20, critical)

6/3/2009	5%	10%	20%	Critical Water (1937)	Average of all Scenarios
October	-200	-50	150	500	650
November	-550	-350	-150	750	550
December	-1100	-900	-550	-650	700
January	-1350	-1000	-650	-700	1650
February	-1100	-800	-400	-950	1550
March	-100	100	350	-300	1950
April I	-750	-400	100	-800	2050
April II	-450	500	1350	-1250	2700
May	-150	1400	2550	1100	3150
June	-650	-100	1150	-550	2700
July	200	450	950	250	2350
August I	-800	-450	200	1050	1250
August II	-1500	-1300	-1000	-300	50
September	-900	-700	-450	100	200
Average	-700	-250	250	-100	1550

•Tier-1 plus above-HWM load



2013 P10 HLH, Preliminary vs. Needs Assessment2: Deficit is 1000 MW or less except in August-II

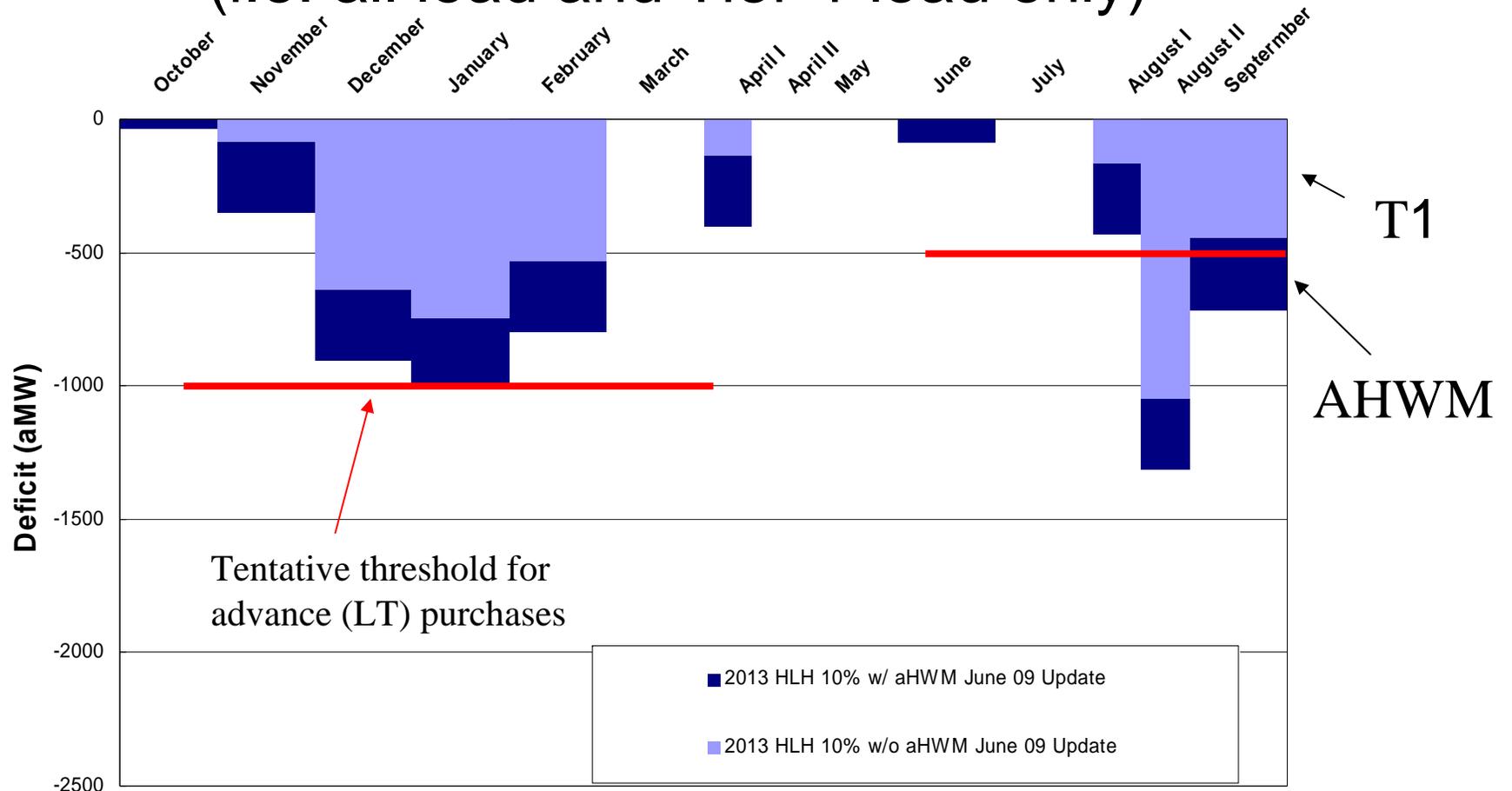


- Load forecast decreased
- Added 300 MW HLH balancing purchases Nov-April
- Wind reserve requirement decreased
- August II is deficit for all water years below median year

Note: We modeled 2008 BiOp. August II deficit will be about 400 MW more if we spill LSN all month.



2013, P10 HLH with and without above-HWM load (i.e. all load and Tier-1 load only)



- TRM above-HWM load estimate May 29, 2009: 269 aMW
- Assumes 2008 BiOp (stopping LSN spill in early August, ~400 MW)



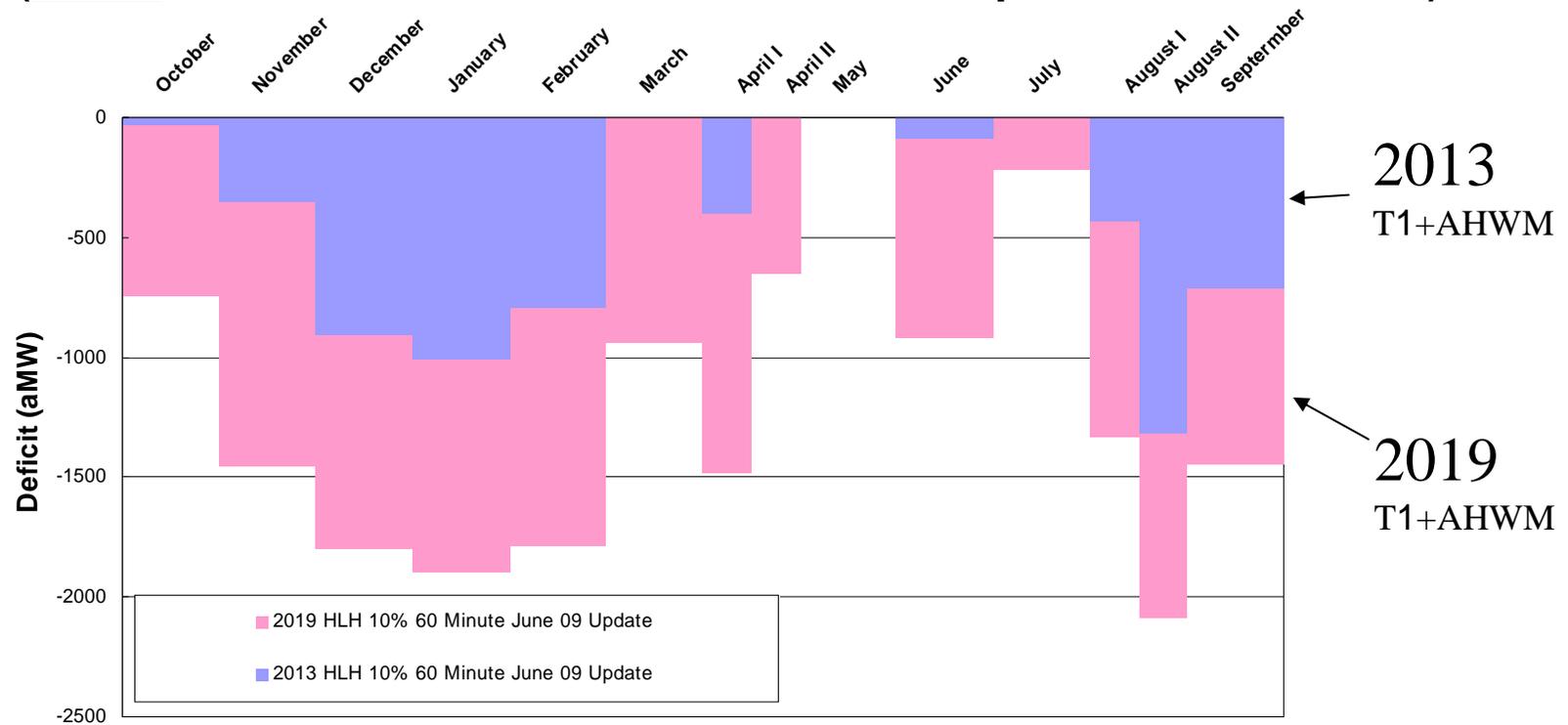
120-hour Superpeak

("120-hr Sustained Peak" in White Book)

- HOSS shapes as much water as it can into HLH and especially into superpeak.
- 120-hour Superpeak (6 hours/day, 5 days/week, 4 weeks/year) is less deficit than HLH.
- The system is able to shape water well into the peaks, and 120-hr Superpeak is not currently a limiting criterium.



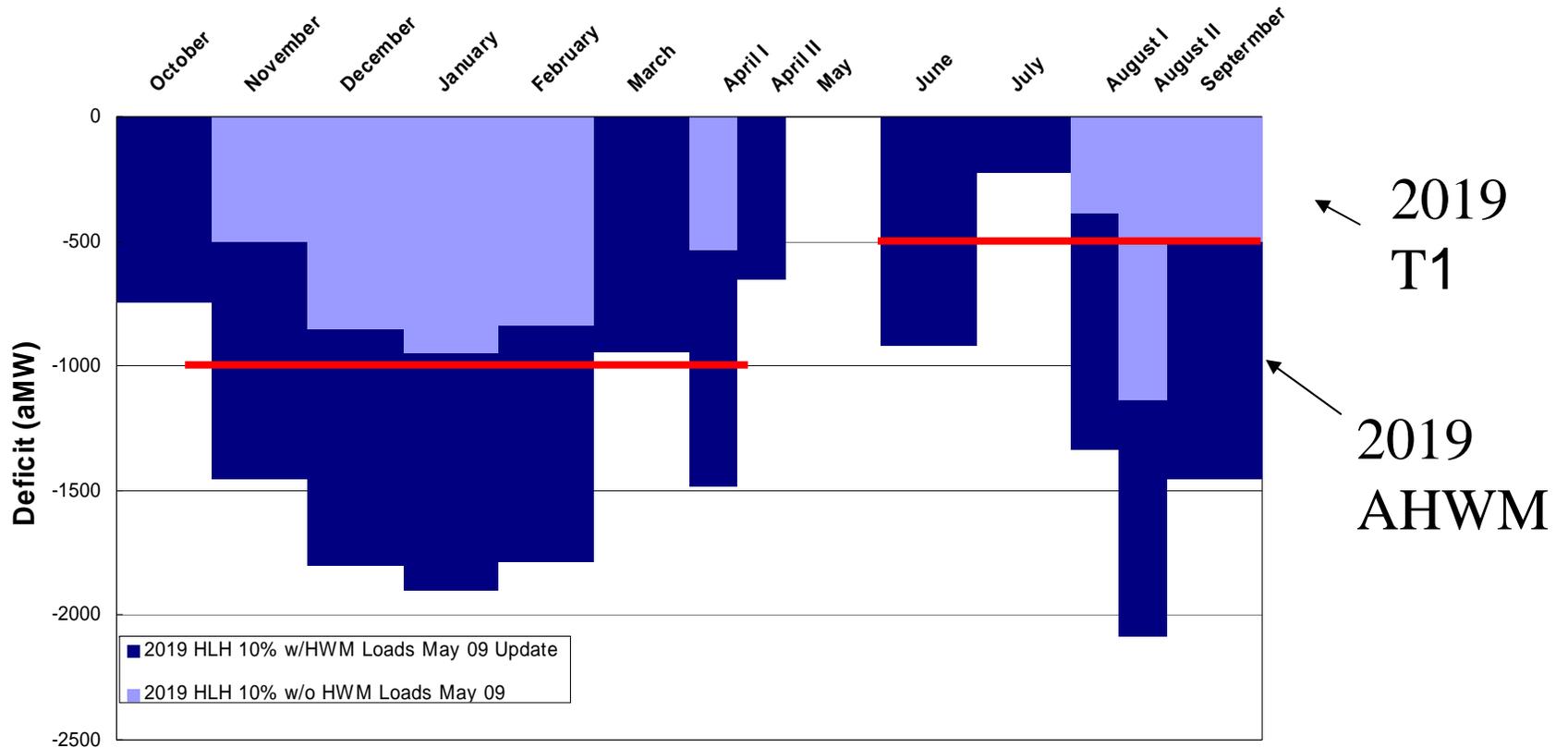
2013 and 2019 HLH P10 (with above-HWM load, i.e. all potential load)



- Large deficits in 2019 if BPA serves all above-HWM load
- August II is a problem in all years



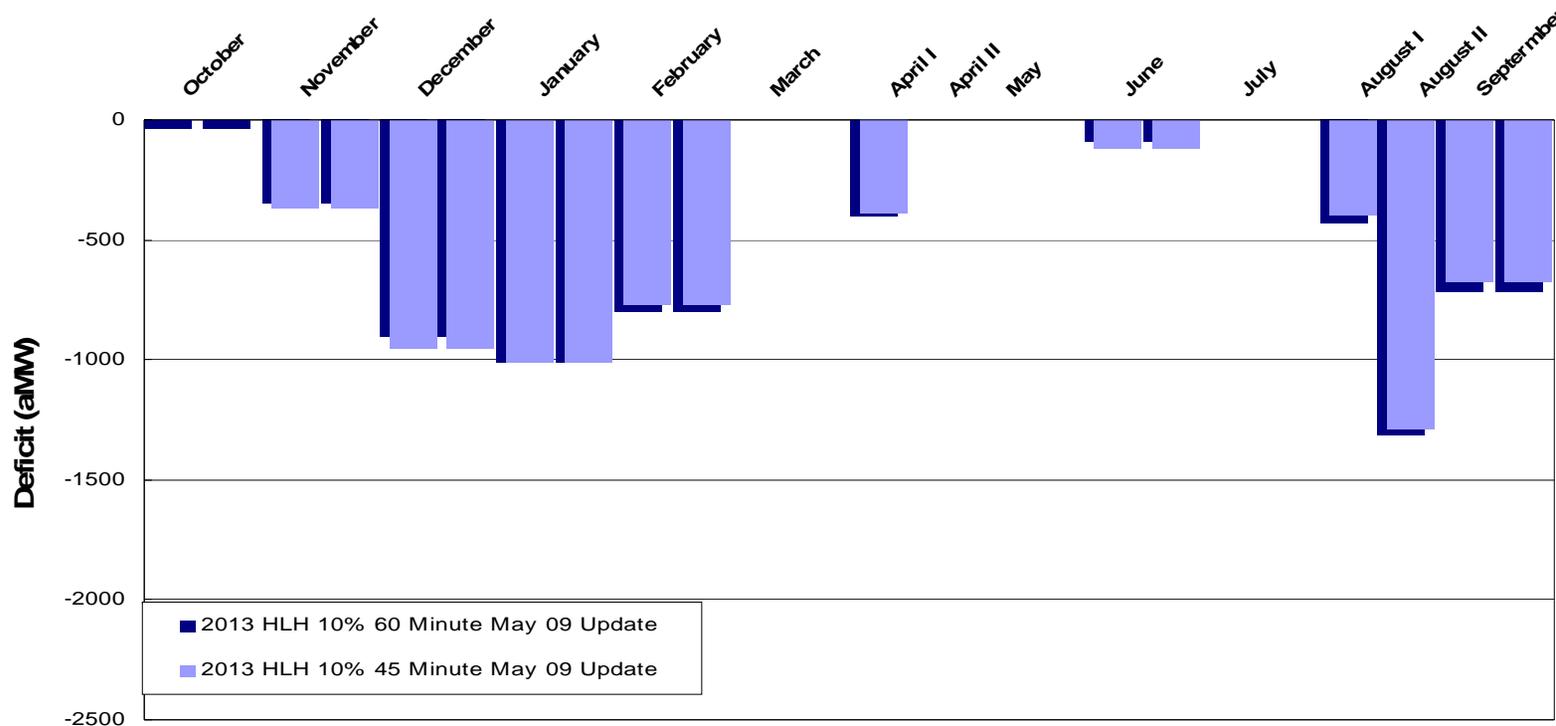
2019, P10 HLH with and without above-HWM load (i.e. all Load and Tier-1 load only)



- Projection for above-HWM load: 950 aMW annual average with critical water based on NA2 annual deficit (not in TRM horizon yet)



There is only a small difference in HLH deficit from 45 vs 60-min wind reserves (2013, P10)—reserve requirement is 163 more INC, 257 more DEC at 45 min, but not all hours are impacted so net HLH effect is modest



- 60 vs 45 vs 30 min reserves impacts need to acquire reserves, but has a smaller impact on HLH monthly deficit
- CV Auto Vista studies are better tool for detailed study of need for reserves



18-hour Capacity

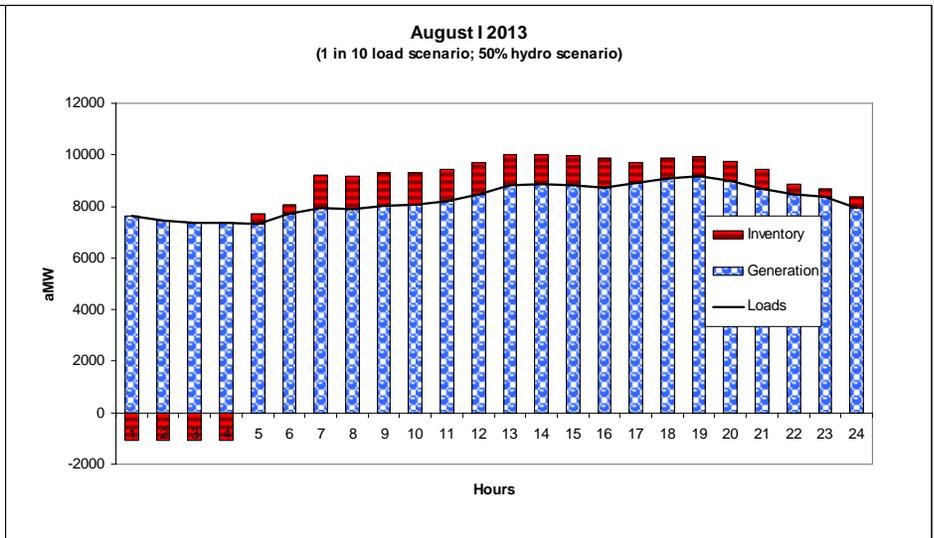
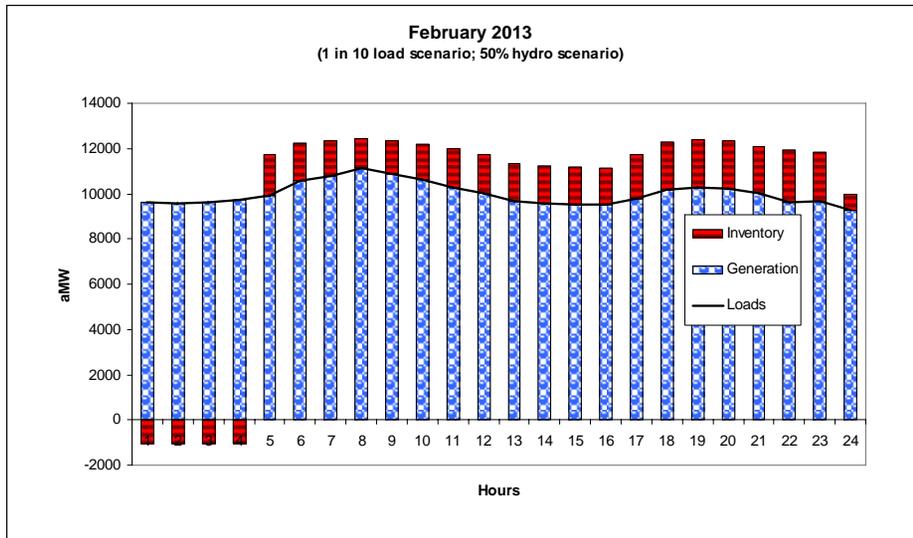
- Extreme temperature event (1-in-10 year cold snap or heat wave) → High loads
- Median generation conditions (water, outages)
- 6 highest hours x 3 days (hours are not necessarily continuous: double peak in winter, single peak in summer)



Surplus 18-Hour Capacity 2013

February Cold Snap

August-I Heat Wave



Energy-Limited Capacity	Peak-Limited Capacity	Final Capacity Inventory
1250	3700	1250

Energy-Limited Capacity	Peak-Limited Capacity	Final Capacity Inventory
700	4100	700

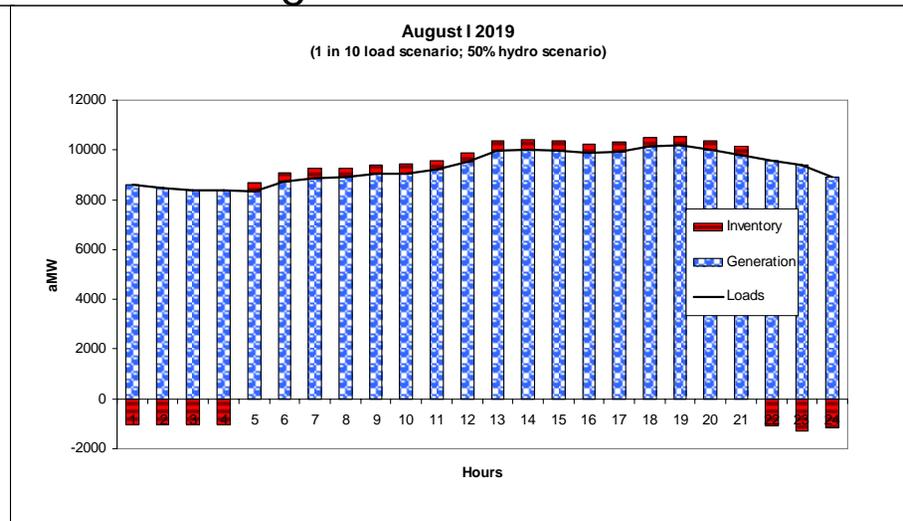
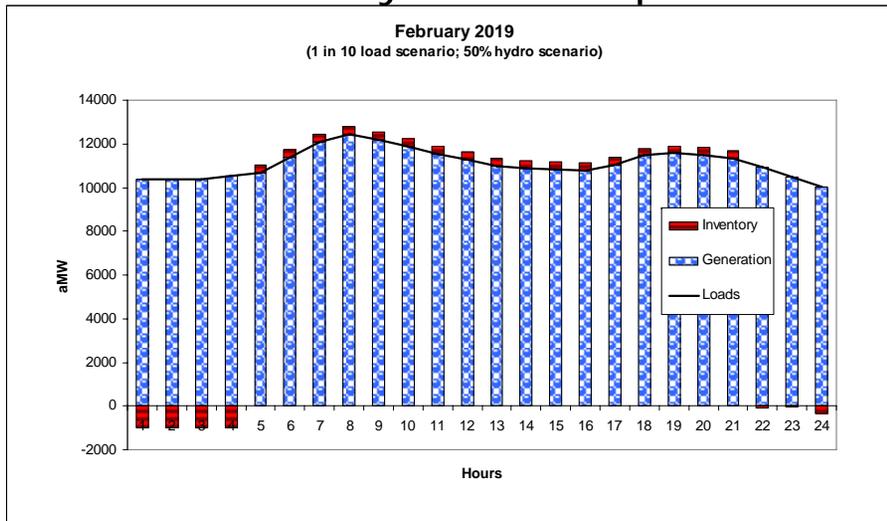
- **Does not include load uncertainty (up to 750 MW)**
- Tier-1 and Above-HWM load included
- Lower load forecasts plus 300 MW winter HLH balancing purchases increase 2013 winter capacity and to a lesser extent summer capacity compared to Preliminary Needs Assessment (200 MW winter, 250 MW summer)



18-Hour Capacity 2019: Essentially Load/Resource Balanced

February Cold Snap

August-I Heat Wave



Energy-Limited Capacity	Peak-Limited Capacity	Final Capacity Inventory
250	1600	250

Energy-Limited Capacity	Peak-Limited Capacity	Final Capacity Inventory
300	1700	300

Does not include load uncertainty

Includes Tier-1 and above-HWM load



Metrics, Criteria, and Results

- Annual Average Energy at Critical Water:
 - Criterion: Zero deficit
 - Result:
 - 2013: -250 aMW deficit if serving all load, 0 deficit for Tier-1 only
 - 2019: -950 aMW deficit if serving all load, 0 deficit for Tier-1 only
- Seasonal HLH Energy at P5 (roughly equates to monthly HLH at P10)
 - Criterion: Agency needs to determine maximum deficit we would leave to within-year marketing
 - Results:
 - 2013: August II deficit greater than -1000 MW (w/wo above-HWM load)
 - 2019:
 - winter and late summer deficits near -2000 MW if BPA serves current above-HWM load.
 - If serving only Tier-1 load then only August II deficit slightly above -1000 MW.



Metrics, Criteria, and Results con't

- 18-Hour Capacity
 - Criterion: zero deficit
 - Result:
 - 2013 surplus (load/resource balanced if load uncertainty is added)
 - 2019 just barely OK
- Flexibility/Dispatchability
 - Criterion: Must be able to meet reserve requirement
 - HYDSIM/HOSS Results—*(to be further informed by new Wind Reserve Impact Study)*
 - Able to meet most of reserve requirements through 2013 (may need up to 200 MW DEC in April 2013) with 60-min reserves.
 - 2019 need up to 500 MW additional INC and 1000 MW additional DEC with 60-min reserves. (Note, this is an extrapolation with large uncertainty.)
 - With 30-minute reserves and DSO 216, BPA will be able to integrate more wind than with 60-minute reserves.



Need Uncertainties

- BiOp changes
- Load Uncertainty (intrinsic fluctuation and economic trends)
- Water year variation
- Prolonged CGS outage



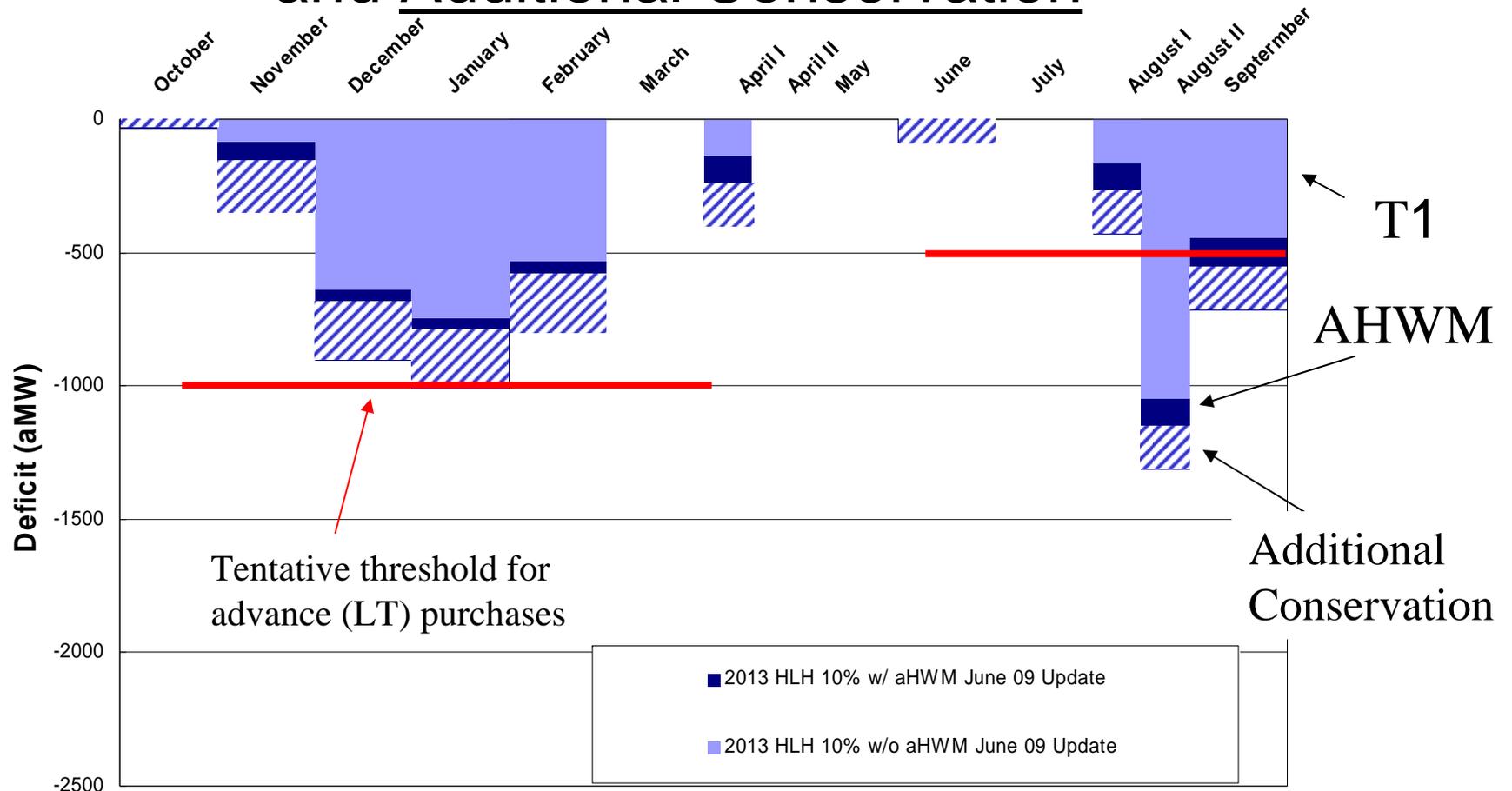
Need Uncertainties

- Tier-2 and RSS elections
- New publics, DSI load, new Federal Agency load not included in base analysis
- If adopted, "Provisional Amounts" that could increase the CHWM and the Tier-1 augmentation calculation.
- Changes in need due to additional conservation beyond what is in the load forecast

	2013	2019
A-HWM	269	950
DSI	460	460
New Publics	50	200
DOE Richland	5	70



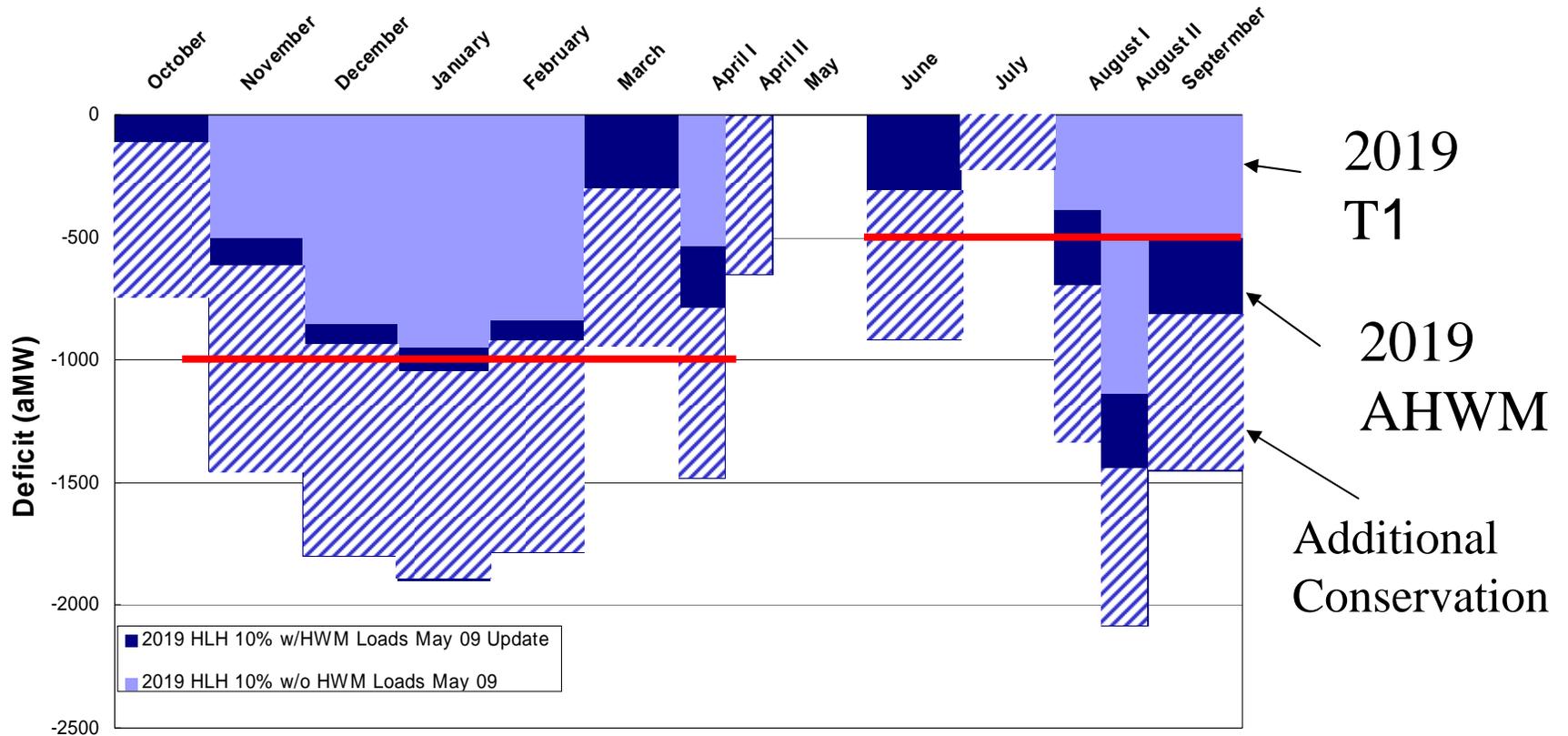
2013, P10 HLH with and without above-HWM load and Additional Conservation



- TRM above-HWM load estimate May 29, 2009: 269 aMW
- Assumes 2008 BiOp (stopping LSN spill in early August, ~400 MW)



2019, P10 HLH with and without above-HWM load and Additional Conservation



- Projection for above-HWM load: 950 aMW annual average with critical water based on NA2 annual deficit (not in TRM horizon yet)

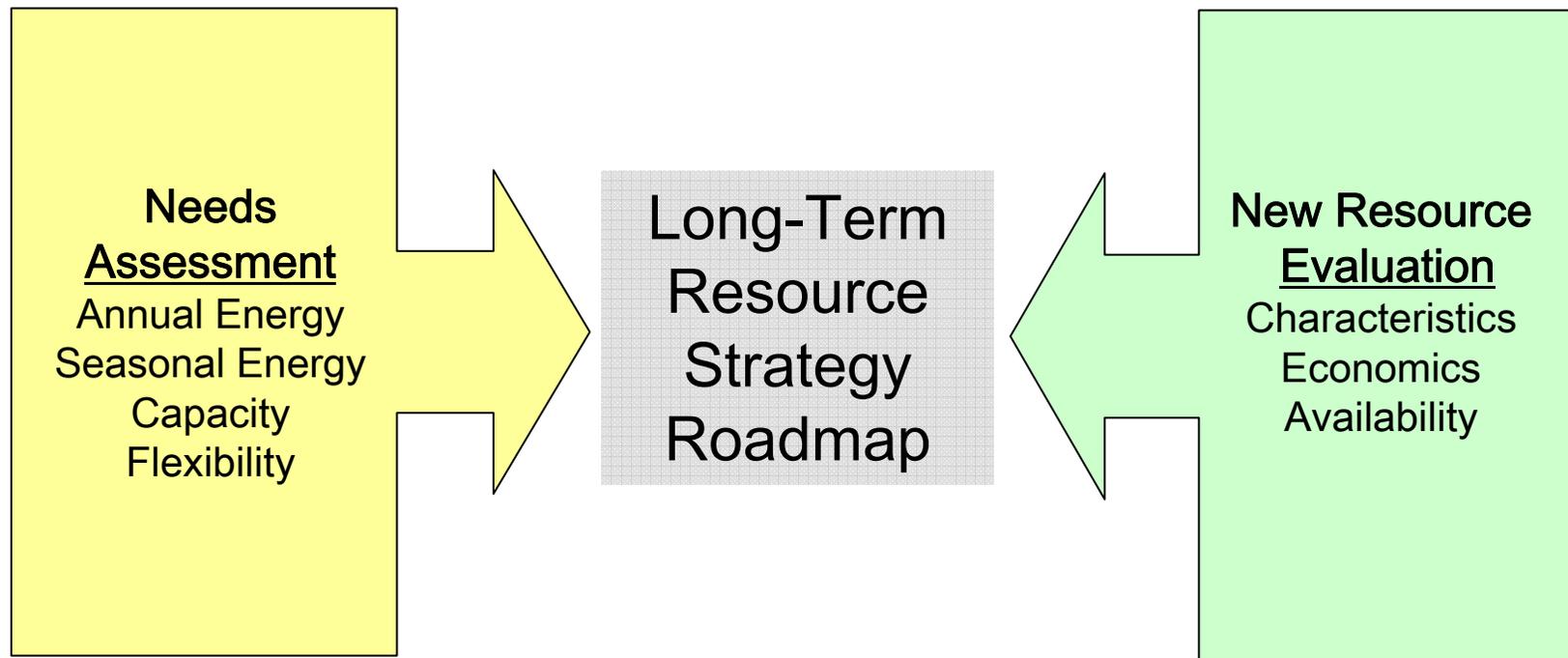


Detailed Conservation Data

2013 - TOTAL (aMWs)	162		386	
	INCREMENTAL HLH	LLH	TOTAL HLH	LLH
October	162.9	123.8	388.2	294.9
November	198.4	141.0	472.7	336.1
December	218.9	155.4	521.5	370.3
January	210.7	157.5	502.0	375.2
February	219.6	170.8	523.2	407.0
March	165.2	129.0	393.6	307.3
April	179.7	139.2	428.2	331.6
May	159.5	125.5	380.1	299.0
June	164.3	136.6	391.5	325.4
July	165.8	112.9	395.0	269.0
August	169.9	120.5	404.8	287.1
September	164.6	125.2	392.1	298.3
2019 - TOTAL (aMWs)	619		1201	
	INCREMENTAL HLH	LLH	TOTAL HLH	LLH
October	622.8	473.1	1,208.3	473.1
November	827.8	588.5	1,606.2	588.5
December	860.1	610.8	1,668.8	610.8
January	828.7	619.3	1,607.8	619.3
February	860.7	669.5	1,670.0	669.5
March	642.1	501.3	1,245.8	501.3
April	692.0	535.9	1,342.6	535.9
May	592.3	466.0	1,149.1	466.0
June	596.2	495.5	1,156.8	495.5
July	609.7	415.3	1,183.0	415.3
August	630.0	446.8	1,222.3	446.8
September	623.3	474.2	1,209.4	474.2



Resource Program Approach



Next Steps

- Finish evaluating resources and determine which best meet different categories of potential needs
- Complete Draft Resource Program Document and Release for Public Comment – September 30
- Workshop on Draft Resource Program – Mid-October

