HYDROLOGIC MODELING APPLIED TO THE COLUMBIA RIVER SYSTEM

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Stefan Söderberg
**Stefan.Soderberg@ThomsonReuters.com**

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HYDROLOGIC MODELING APPLIED TO THE COLUMBIA RIVER SYSTEM

AGENDA

1. The Dalles forecast. Two examples
2. Hydrological models
   1. Concept
   2. Results
3. Forecasts
   1. California
   2. BPA
   3. Columbia River
   4. The latest forecast for The Dalles
4. Connection SDDP

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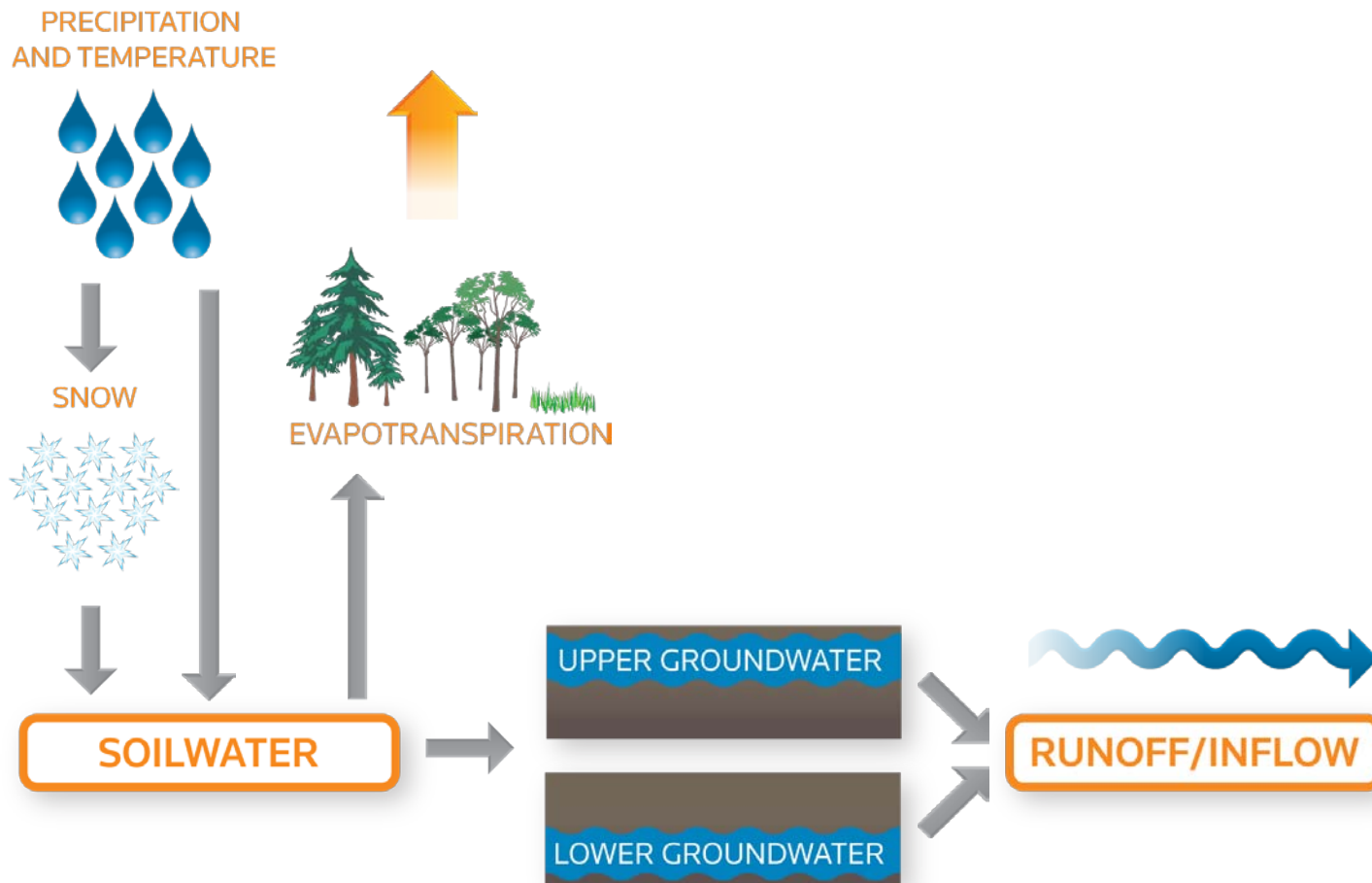# DALLES 2010 & 2011

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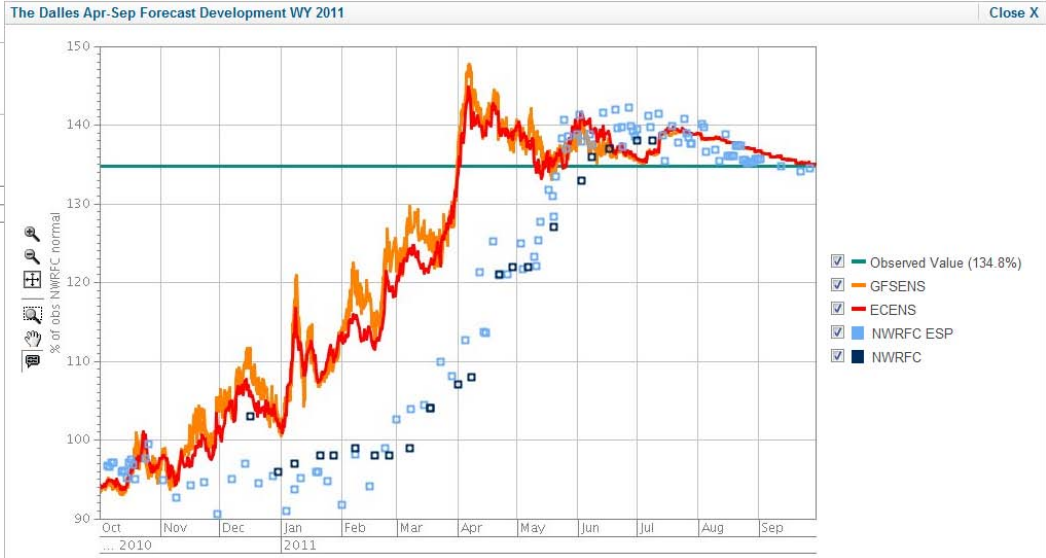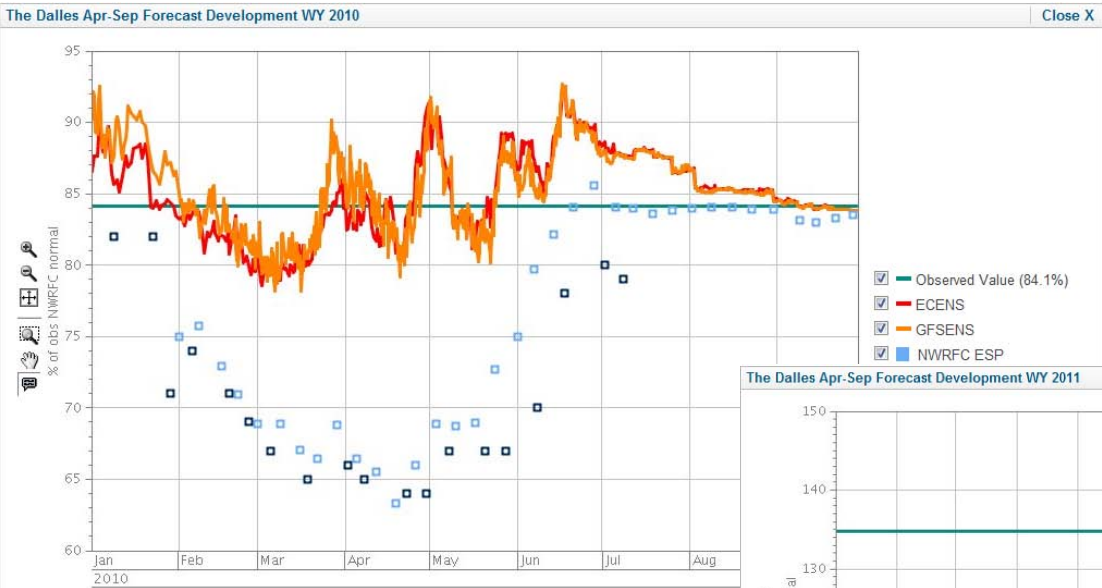
HYDROLOGICAL MODELS

- Neural Networks
- Multi linear regression
- Physical models
- Conceptual models
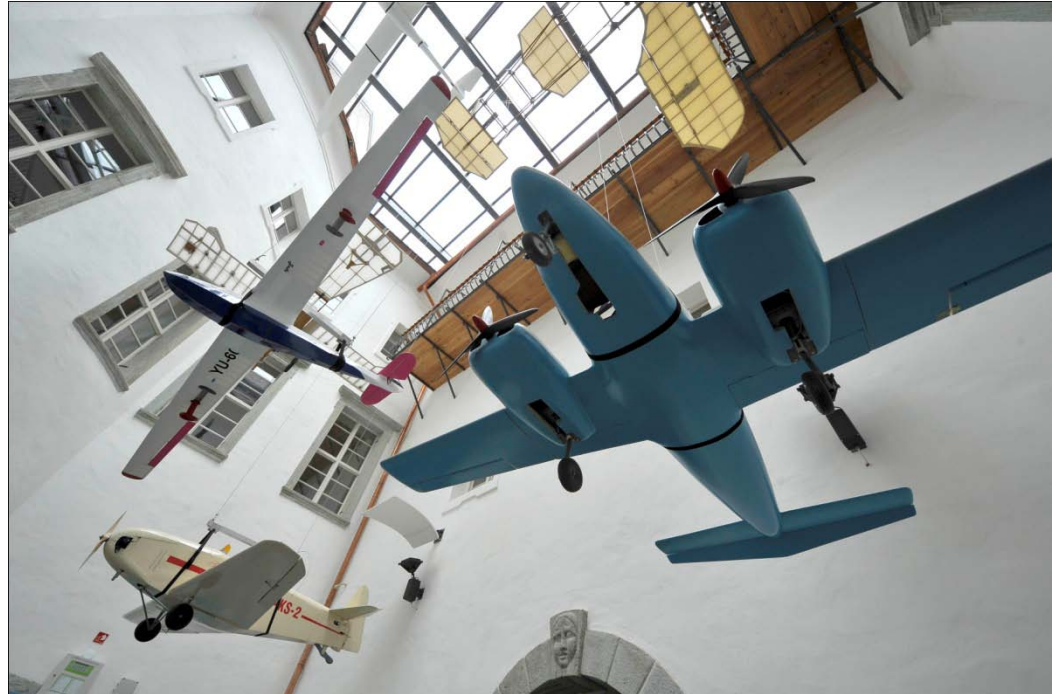
REUTERS/SRDJAN ZIVULOVIC

Which model can fly?

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CONCEPTUAL HYDROLOGIC MODEL: HBV

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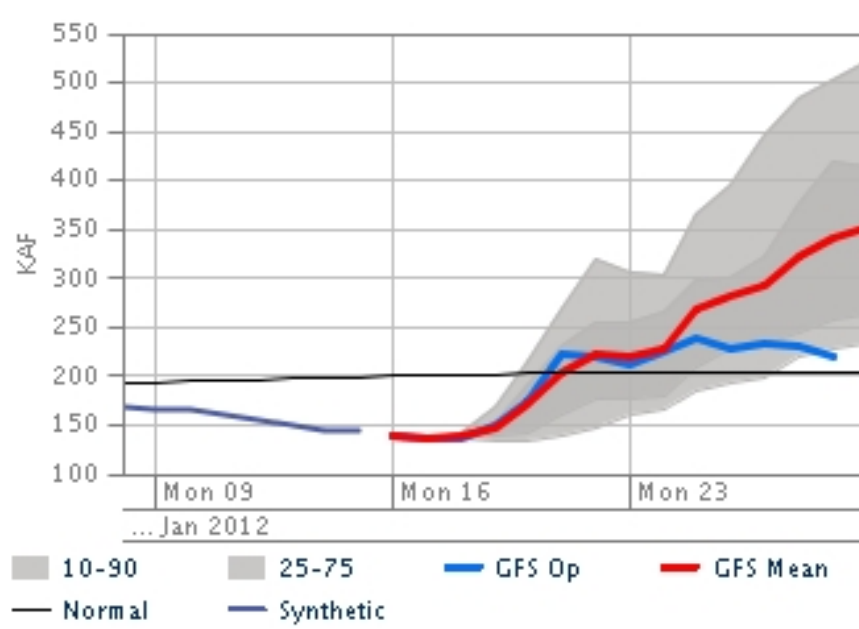
THE HBV MODEL...
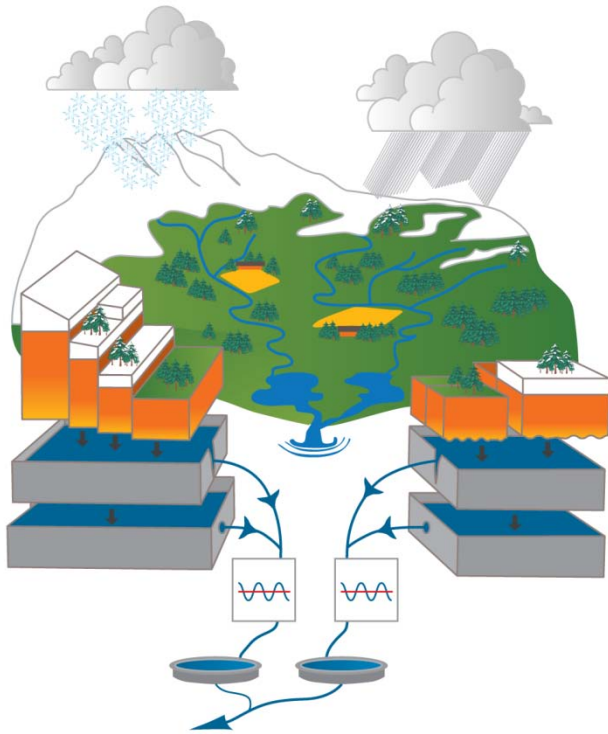
SOURCE: WWW.SMHI.SE

- Precipitation/Runoff model. Top ranked by WMO!

- Conceptual semi distributed

- Forecasts inflow/runoff, snow, soil

- Thomson Reuters has developed a model in GWh for several markets

- Widely used by players in Scandinavian and Continental Europe markets

- Excellent forecast quality and speedy delivery based on all major weather forecast

- Model result in GWh or KAF/m3, updated 2 times daily on EC weather forecast and 4 times GFS

- Main input to the medium term price forecast model – SDDP

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SHORT TERM HYDROLOGICAL FORECASTS
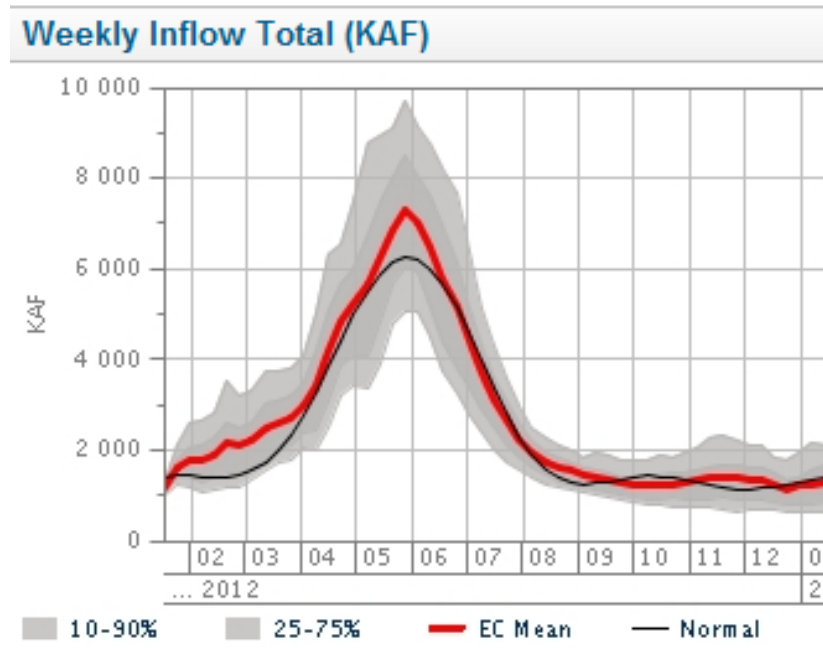
SHORT TERM

- 15days
- EC & GFS
- Operational
- Ensembles

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# LONG TERM HYDROLOGICAL FORECASTS

LONG TERM

- 12 month
- 15 days EC EPS
- 50 weeks statistics
 - **Weather of 1981-2005**

Weekly Inflow Total (KAF)

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HBV MODELLING OF US West.

- GWh model for BPA powerplants
  - Based on production and reservoir changes

- KAF model for Columbia river
  - Based on natural inflow from BPA

- GWh model for California
  - Based on production and reservoir changes

- Short term forecasts (EC, GFS)
  - 1-15 days

- Long term forecasts
  - 1-50 weeks
  - Combines short term forecasts, EC-monthly and statistics
  - Including El Niño & La Niña

- Forecasting The Dalles water supply
  - Compares with NWRFC forcasts
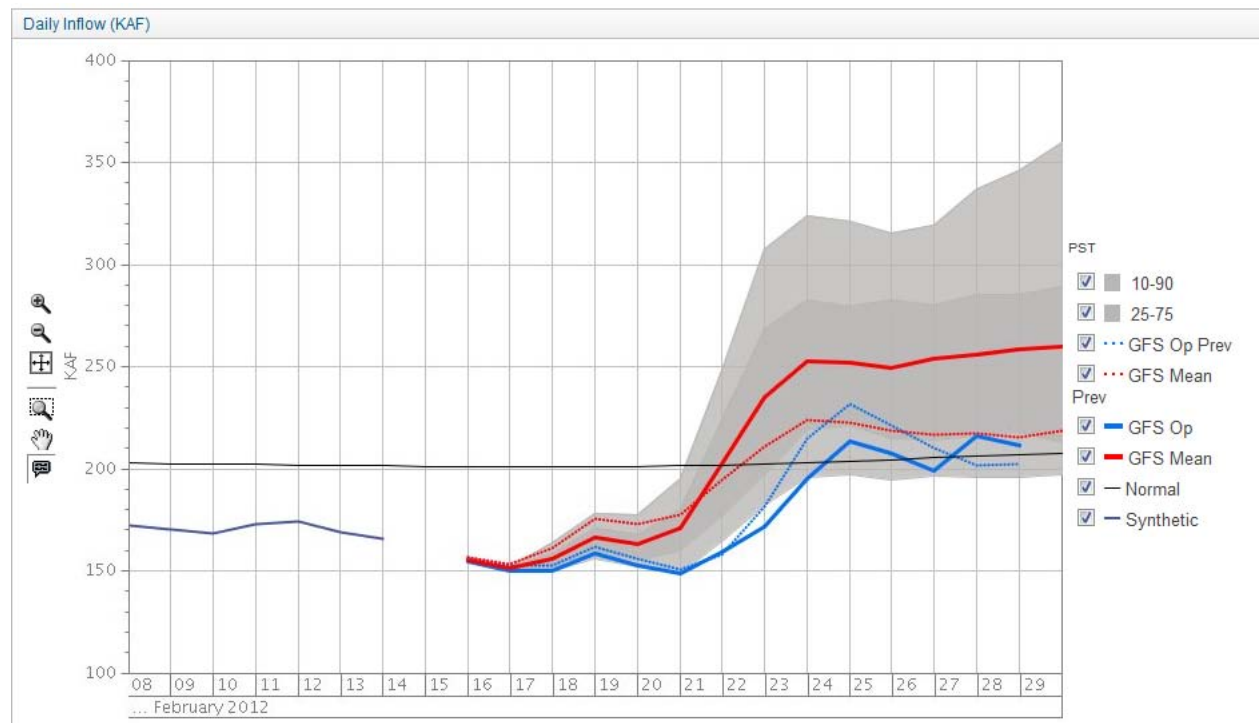

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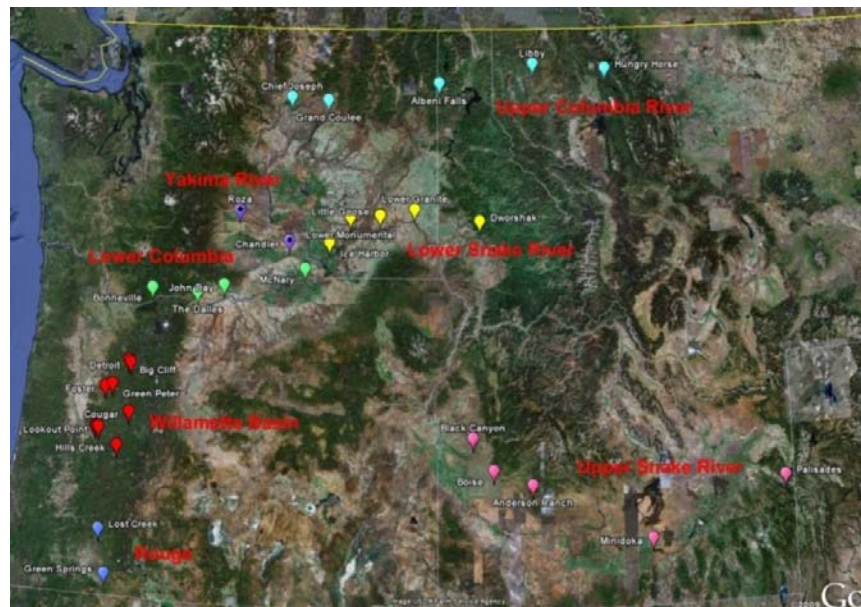
CALIFORNIA (GWH)
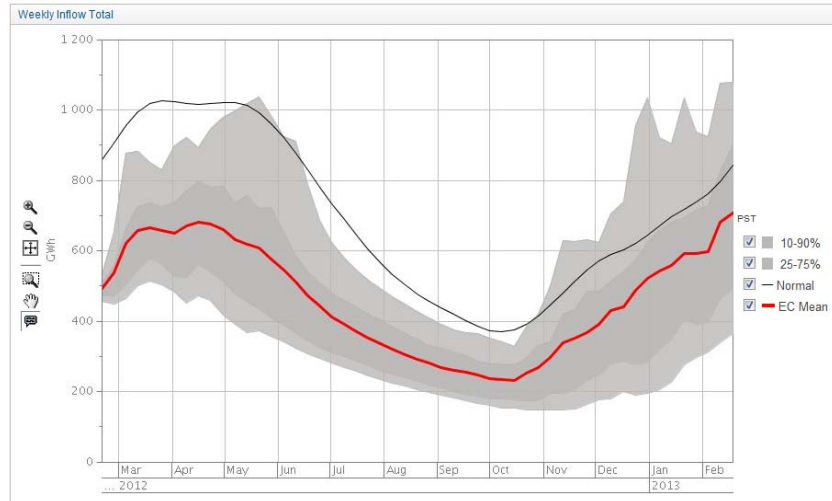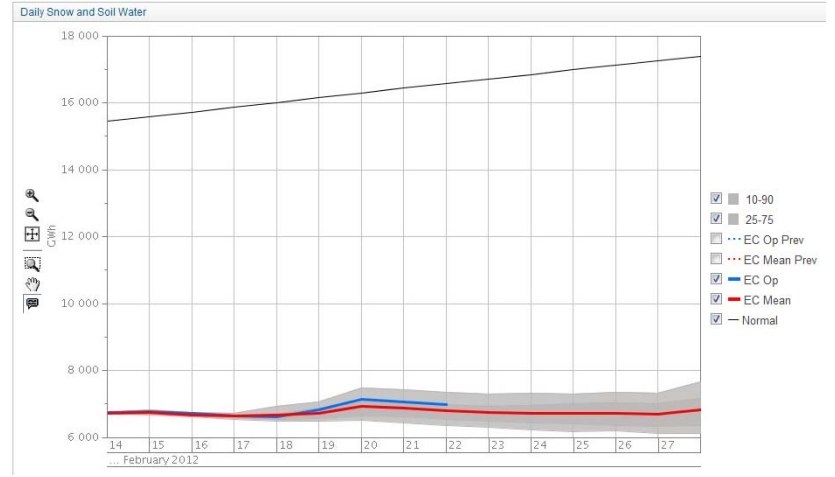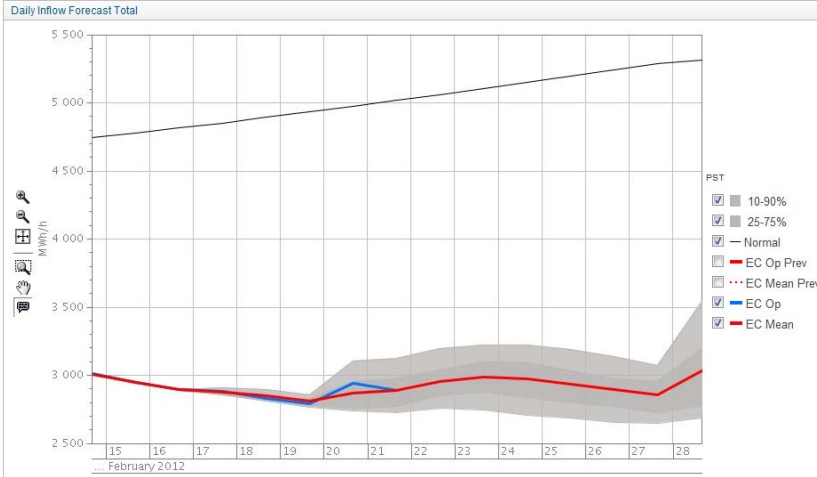
BPA (GWh)
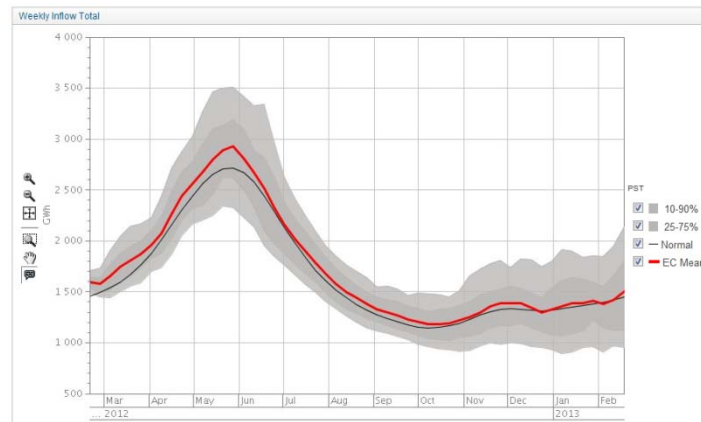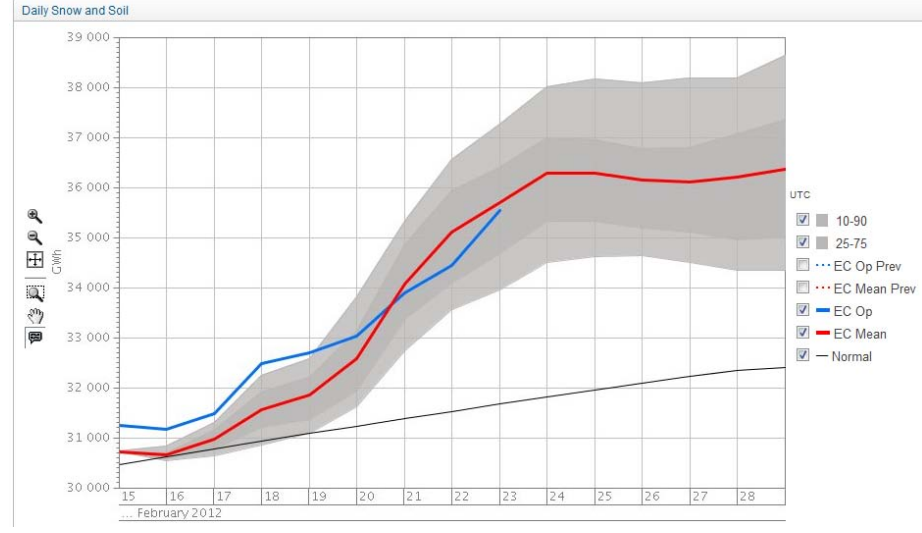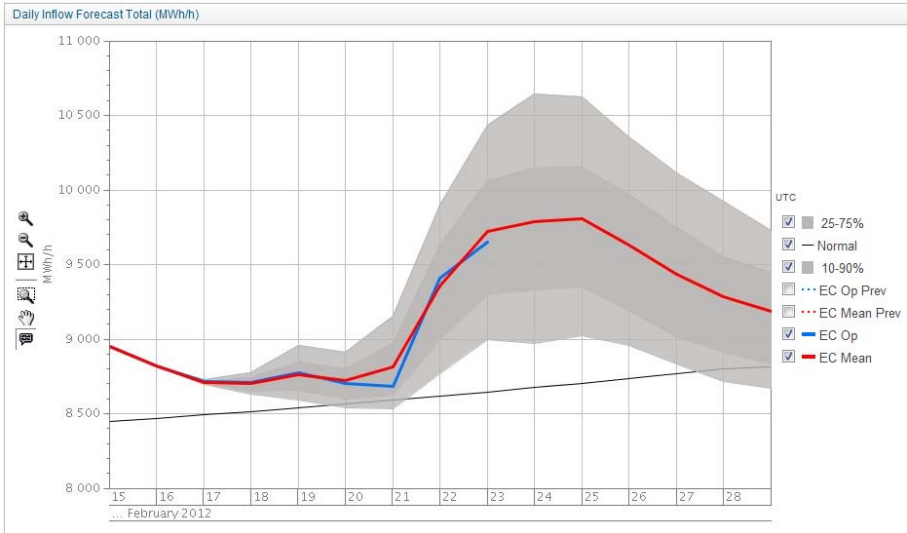
COLUMBIA RIVER (KAF).
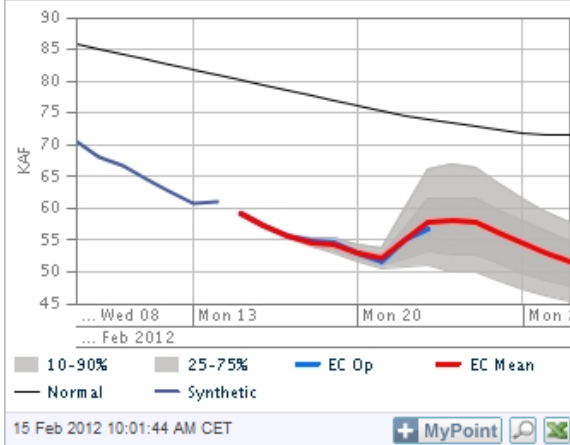
Locally modeled projects in Columbia River

- Duncan Dam
- Arrows Dam
- Albeni Falls
- Grand Coulee
- Priest Rapids
- Brownlee
- Dworshak
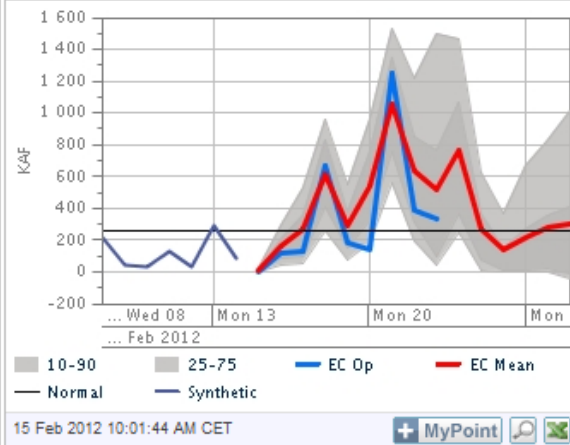- Ice Harbor
- The Dalles

- **Natural inflow!**

The Dalles total. Short term natural inflow forecast
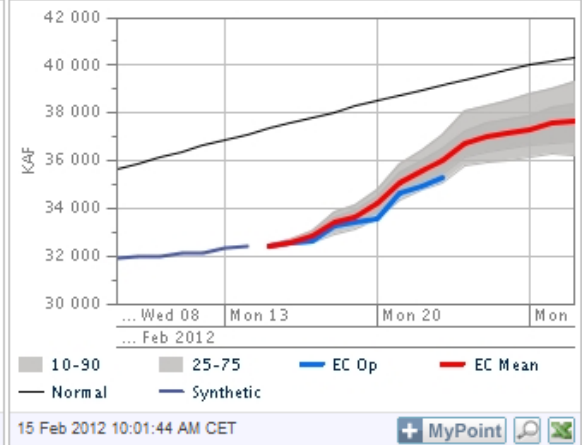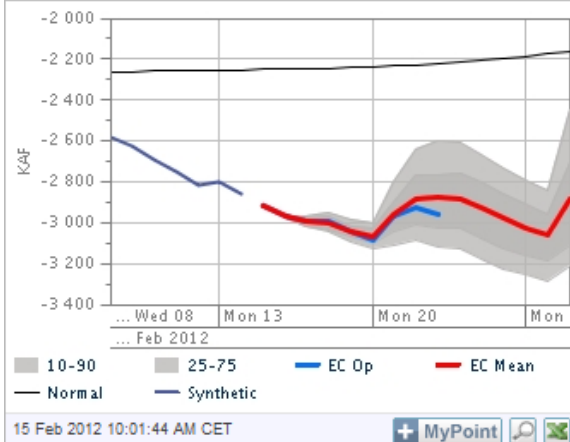
COLUMBIA RIVER (KAF). Grand Coulee example

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DALLES 2012

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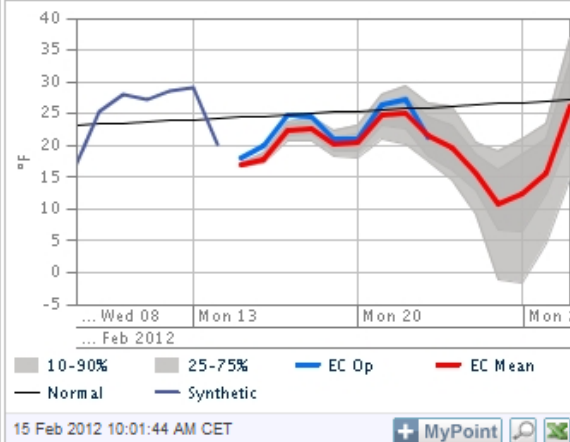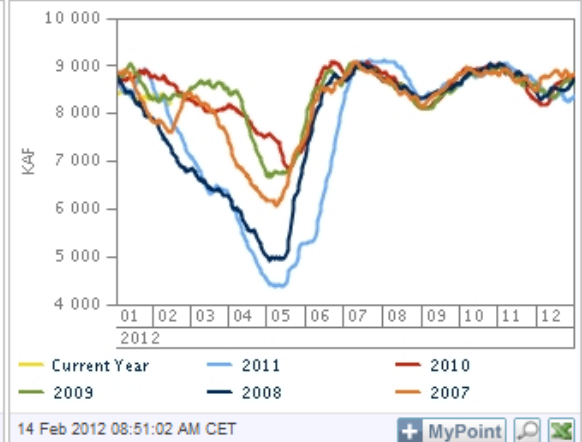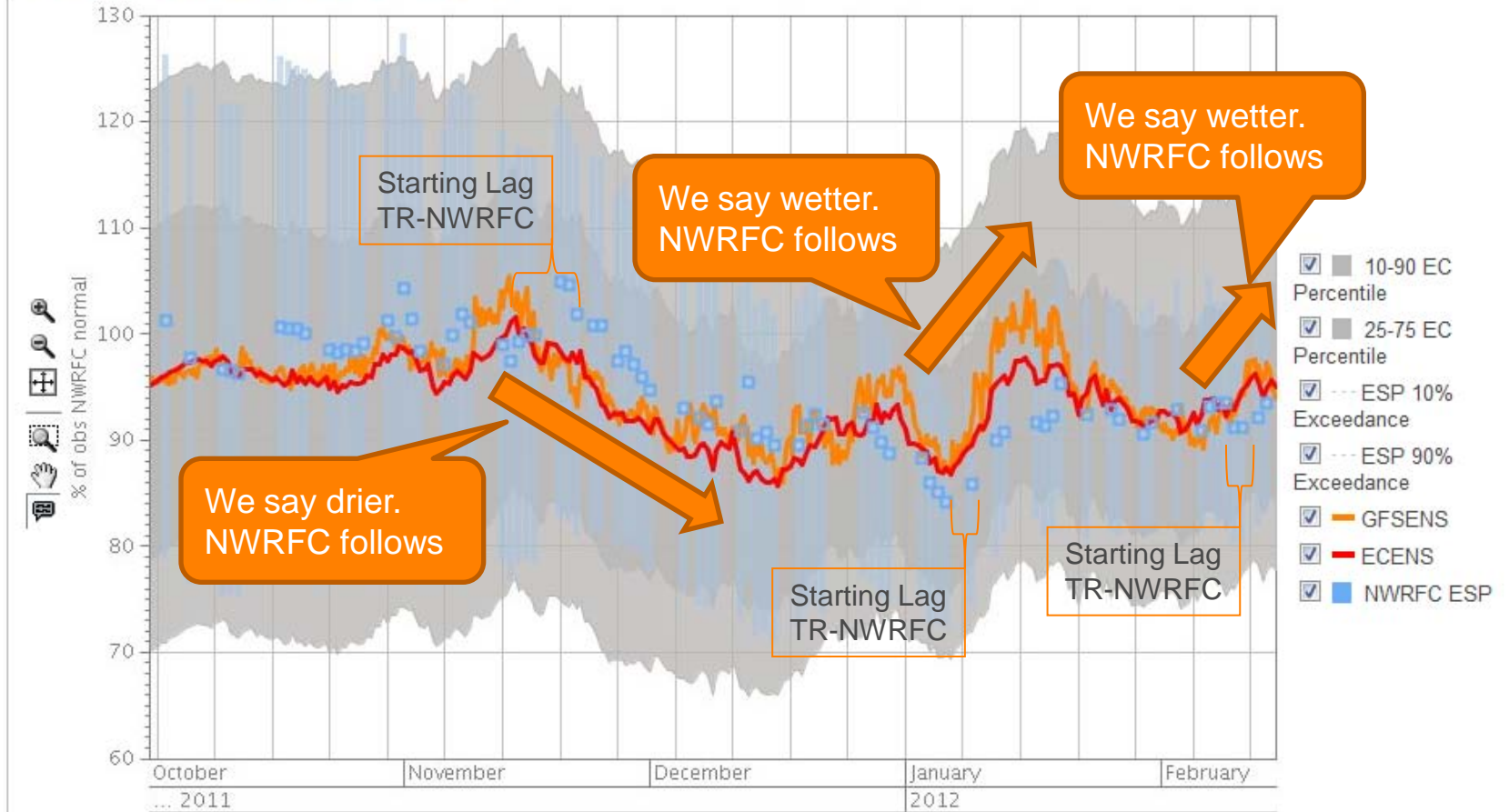
DIRECT LINK BETWEEN HBV AND SDDP

| Snow, Soil reservoir, base +X% | + | 25 YR temp & precip history |

| Snow, Soil reservoir, base scenario | + | 25 YR temp & precip history | → | HBV | → | inflow scenarios | → | SDDP |

| Snow, Soil reservoir, base -Y% | + | 25 YR temp & precip history |
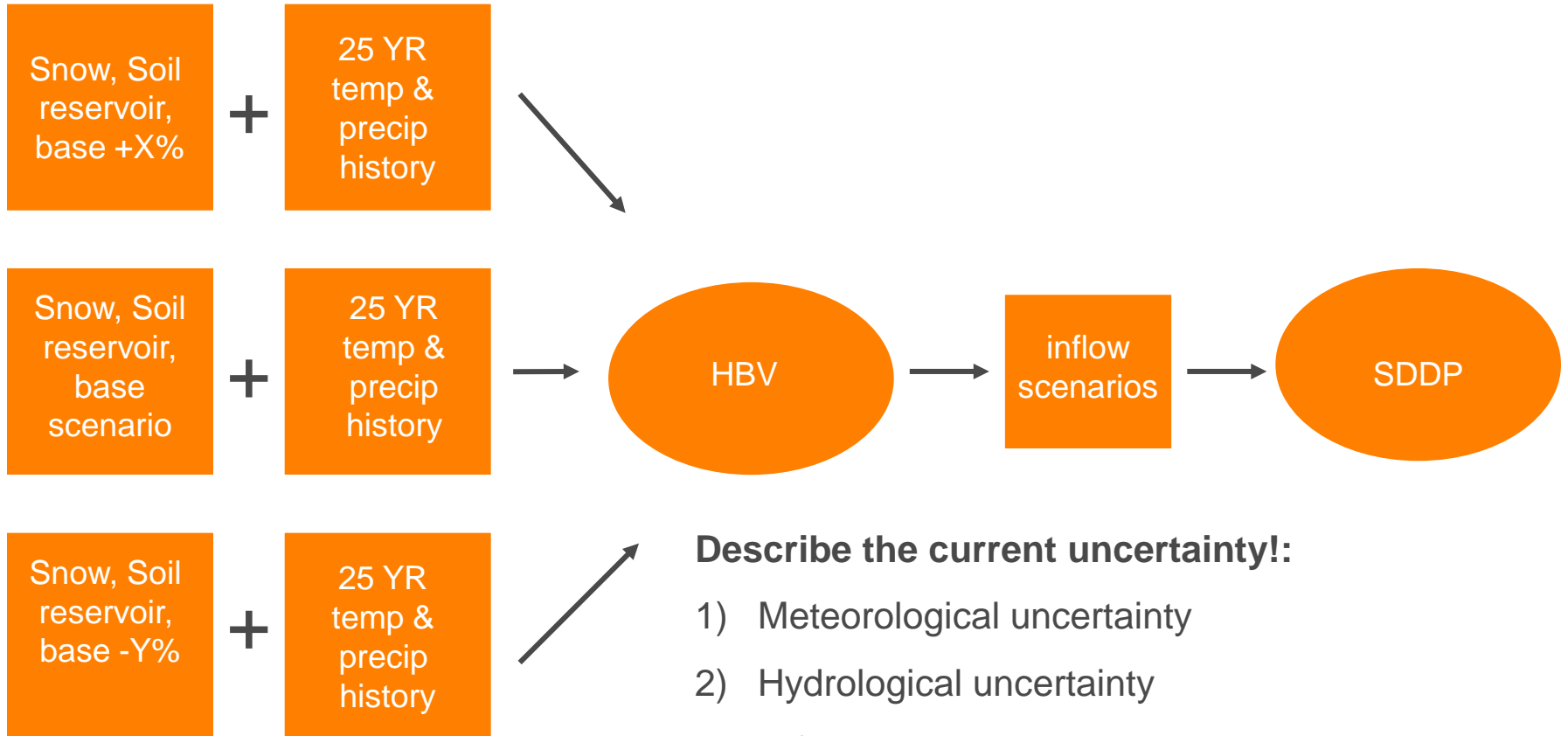
Describe the current uncertainty!:

1) Meteorological uncertainty

2) Hydrological uncertainty

    1) Use current situation

    2) Snow uncertainty

    3) Soil water uncertainty

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…QUESTIONS ?

Thank you for your attention!

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