CBRFC Forecast Verification

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CBRFC Stakeholder Forum
February 24, 2014

Outline

- Forecast Tool Evaluation
- Next Steps
- Current Verification Tools
  - Water Supply Forecasts
    - Official forecasts and reforecasts
  - Daily Forecasts
- Discussion

Motivation / Goals

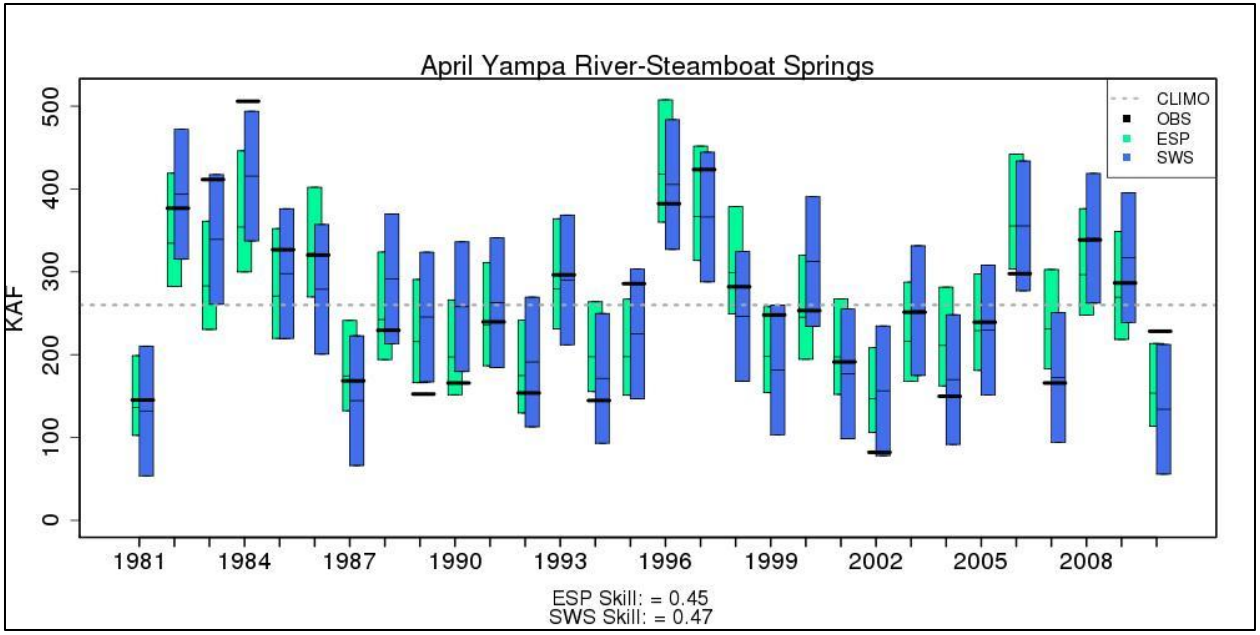
Motivation: ESP is well positioned for:

- Daily forecast updates leveraging daily updating observations (e.g. SNOTEL, other precipitation, temperature, and streamflow)
- Probabilistic forecasts for full hydrograph including peak flows, time to peak, volumes, etc.
- Incorporating both weather and climate prediction
- NOAA investing in improvements to ESP (but not SWS) including data assimilation, connection to ensemble weather and climate prediction, and bias correction.

Key Question: Is the current ESP forecast tool as skillful and reliable as SWS? What are the strengths and weaknesses of each forecast tool?

Methodology

Reforecasts generated for first of month for winter and spring months 1981-2010 using similar assumptions



Assumptions: No weather climate forecast, 1981-2010 climatology, no bias adjustment,

Methodology (con't)

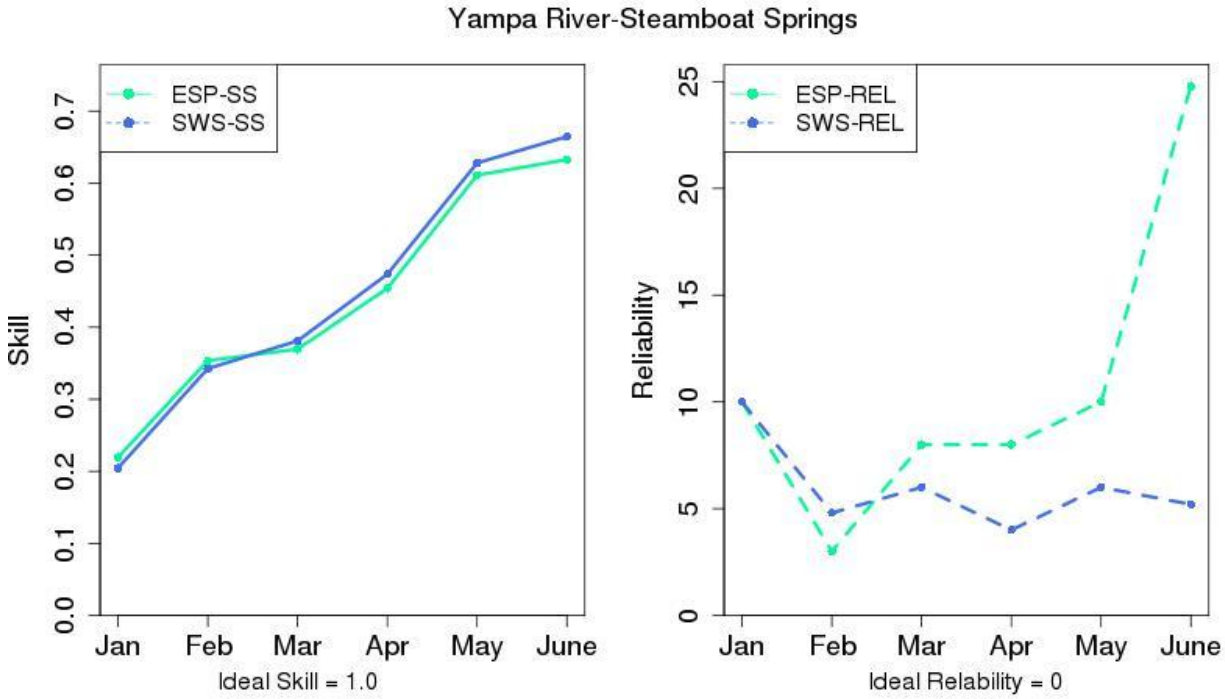
Reforecasts verified against unregulated streamflow observations:

- Skill – MAE SS
- Reliability – Assessed against traditional 10,50,90% forecast thresholds

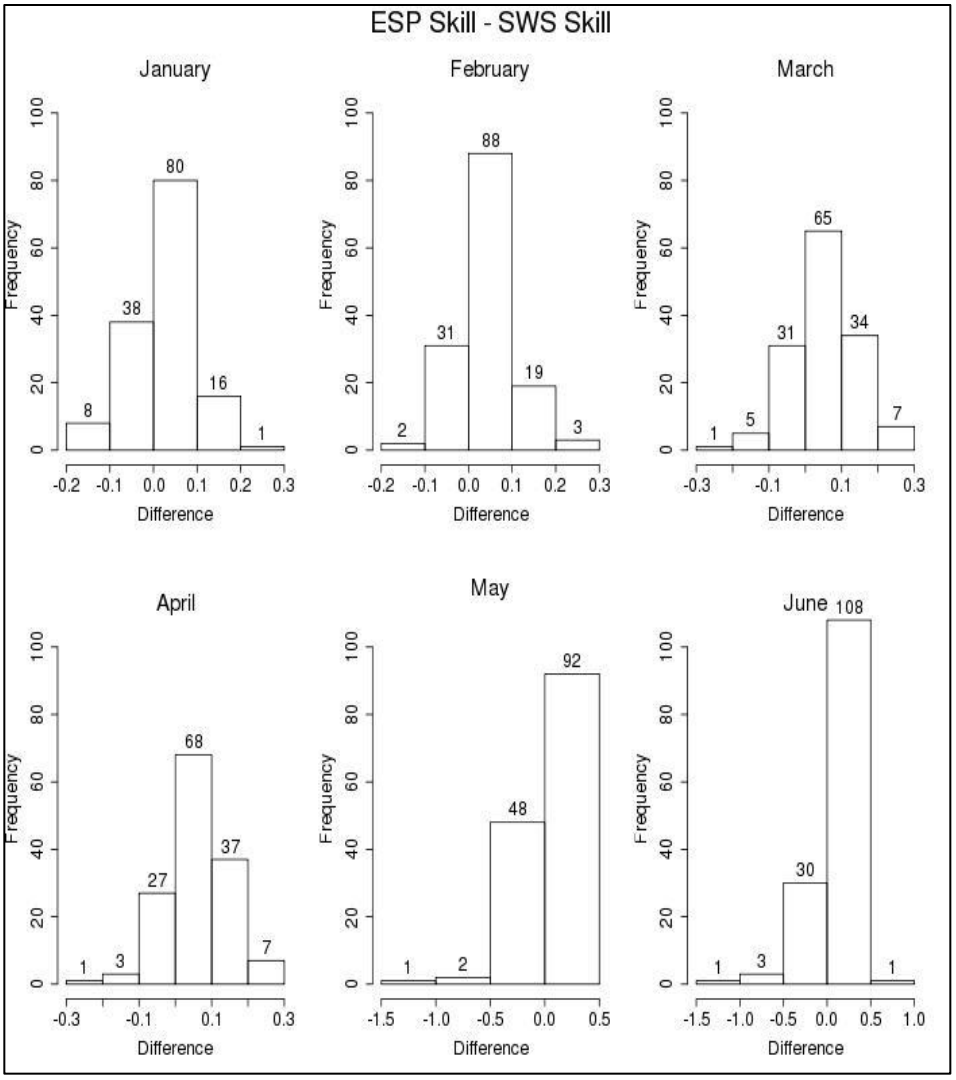
Results conditioned on:

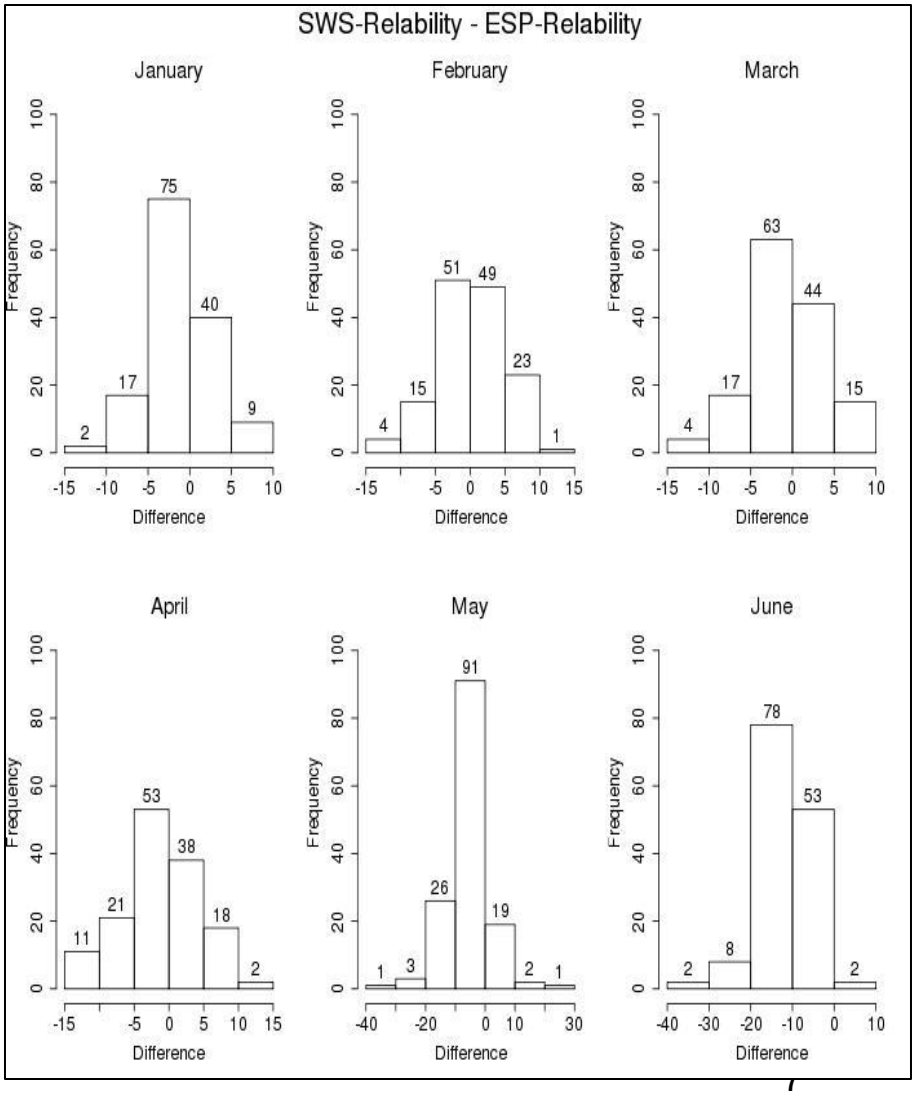
- Lead Time (e.g. Jan 1 issuance, Feb 1 issuance, etc)
- Forecast Point

Results: Lead Time

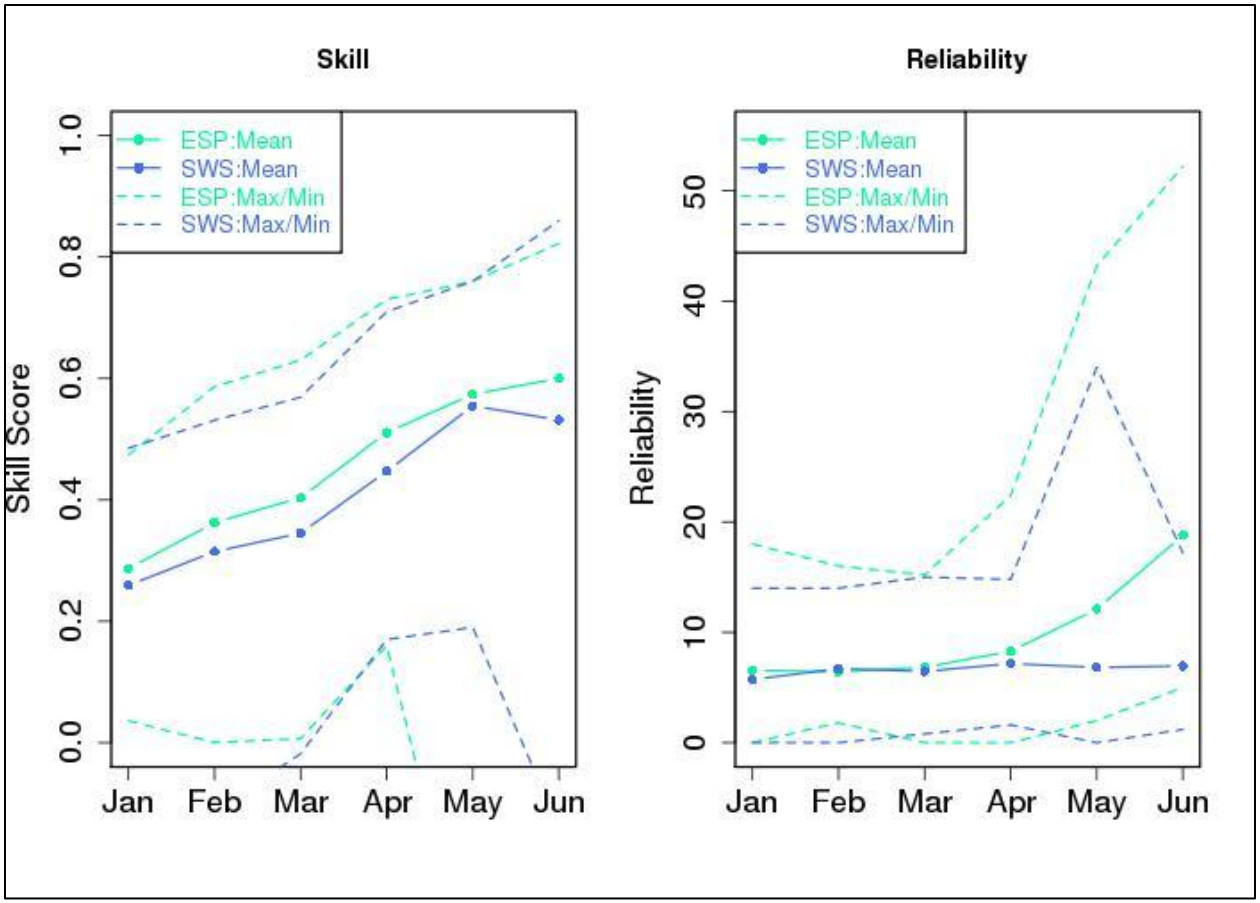


Results: Forecast Point





Results: All Points



Conclusions

1. ESP and SWS have generally comparable skill. ESP generally slightly more skillful.
2. ESP and SWS have generally comparable reliability January through April. ESP is very under-dispersive during the runoff season (e.g. May and June forecasts).
3. ESP and SWS likely have strengths in specific regimes that we have not fully understood.

So What?

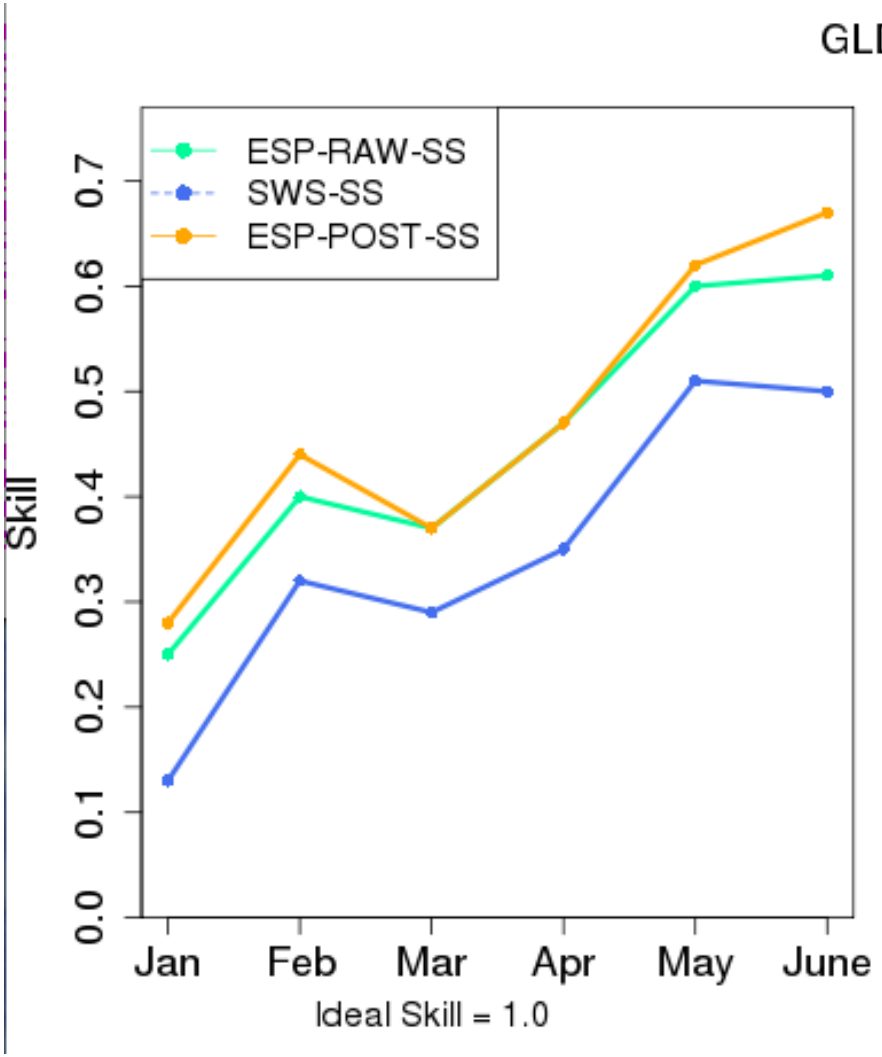
CBRFC is using verification for:

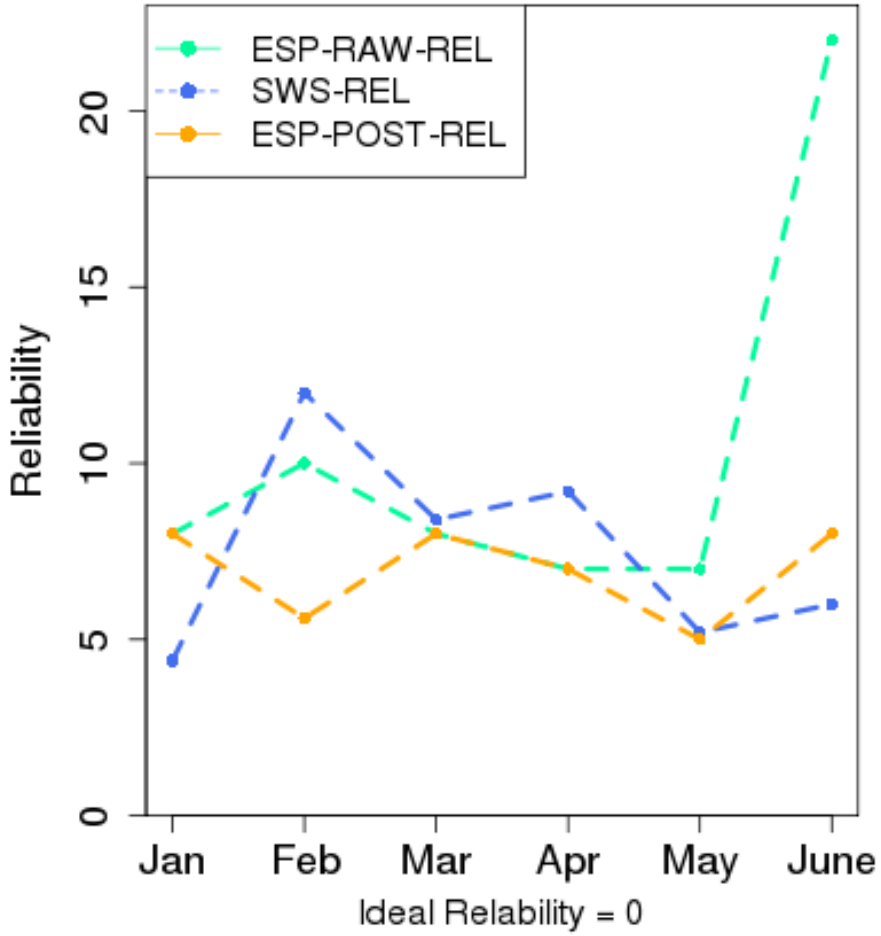
1. Tool development and application (e.g. ESP and post adjustment)
2. Annual lessons learned
3. Identification of errors in forecast process

Next Steps

1. Study validates a focus on ESP particularly given enhancements
2. Similar verification studies should assess improvements proposed to ESP:
    1. Bias adjustment
    2. Headwater vs downstream points
    3. Incorporation of weather, climate forecasts
    4. Weather generator technique
    5. Incorporation of new data sets (e.g. MODIS)

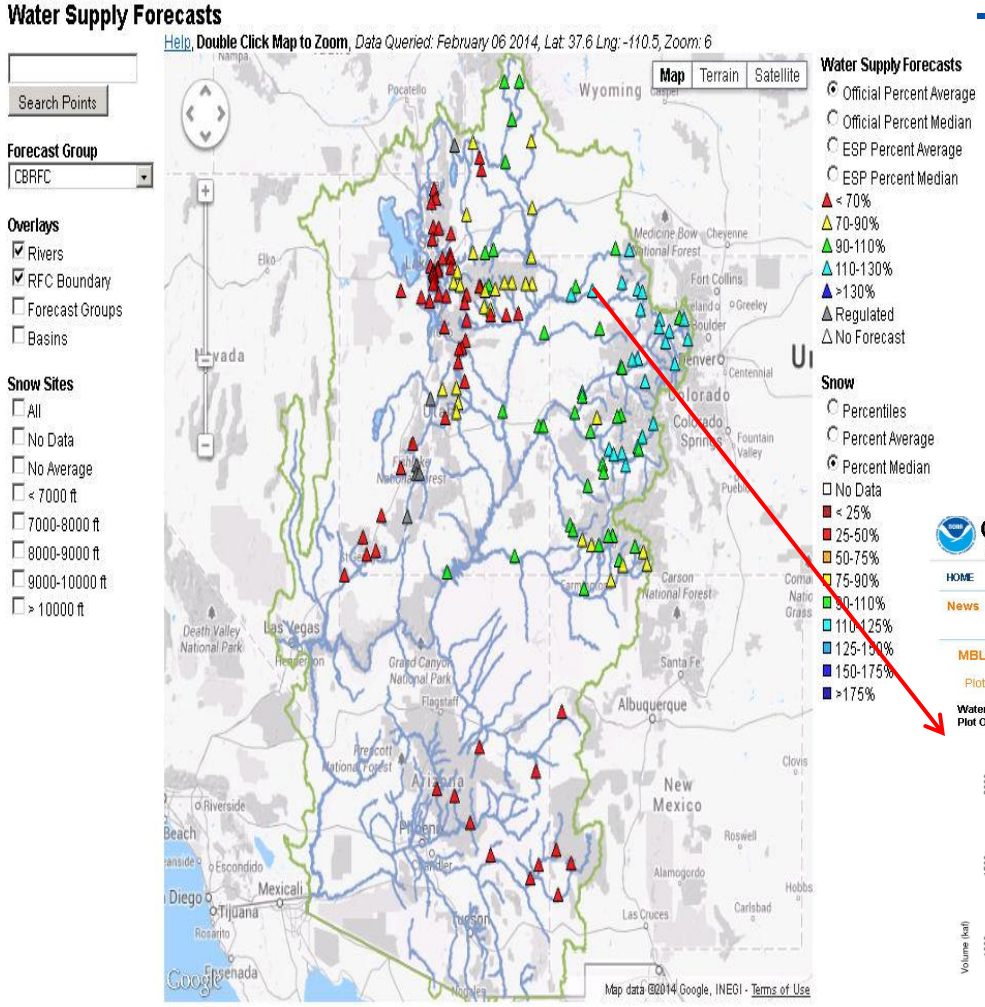
Example: Bias Adjustment

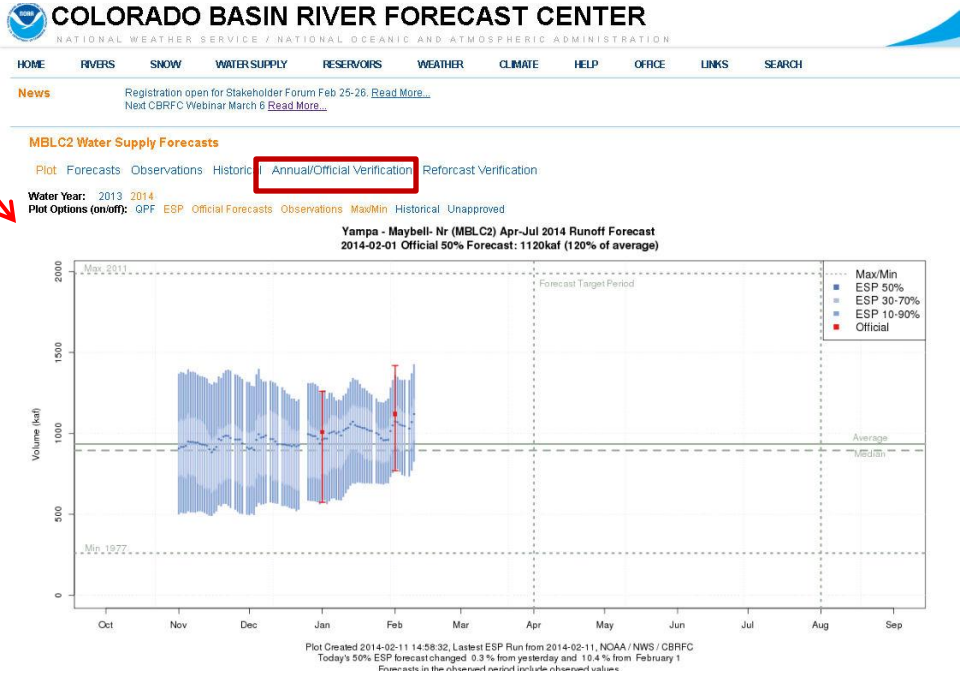




Current Verification Tools

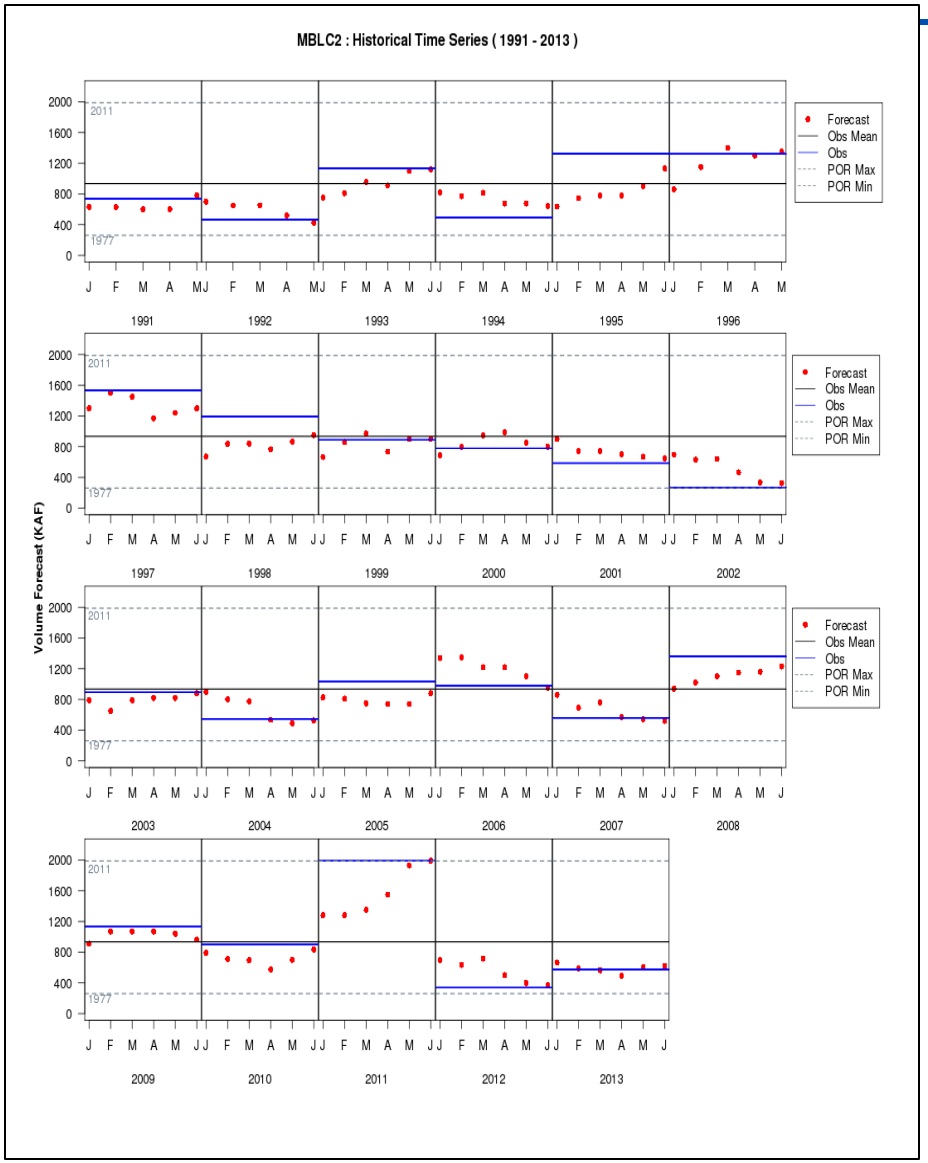
Water Supply Forecasts

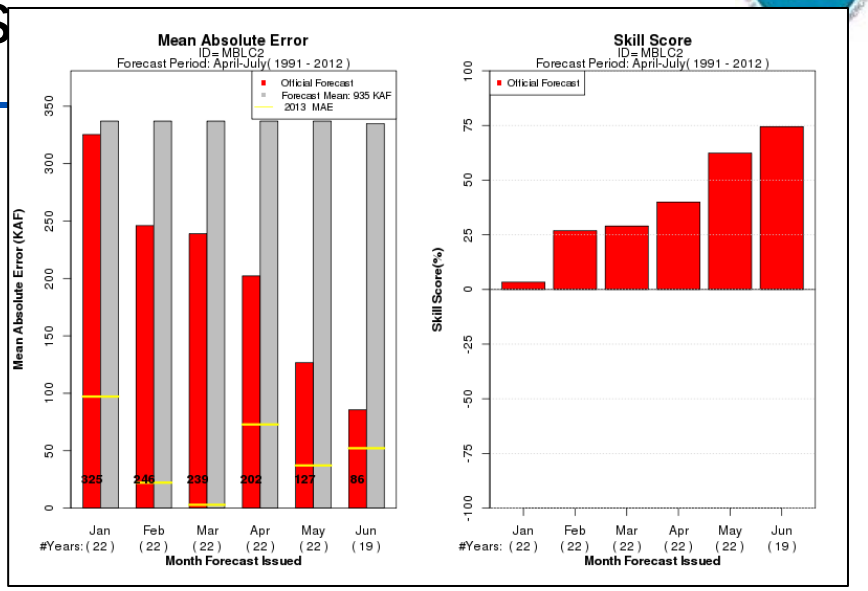


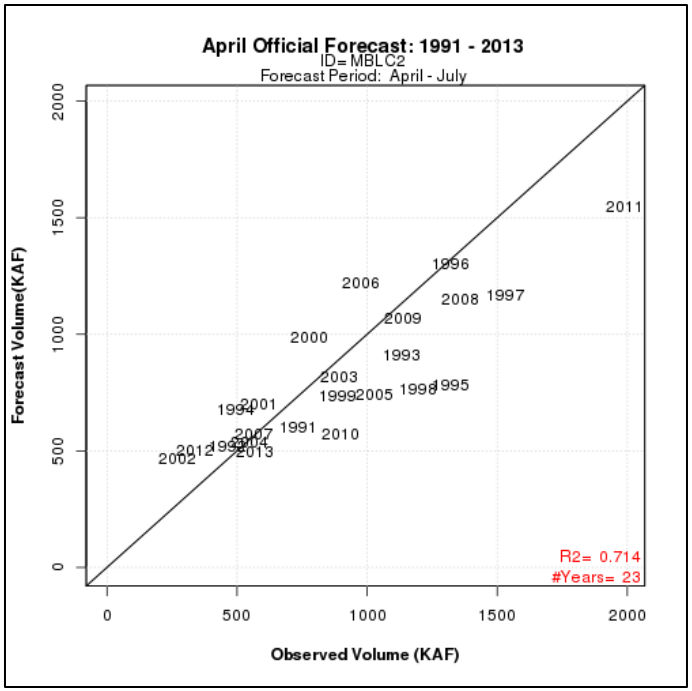


Current Verification Tools

Water Supply Forecasts

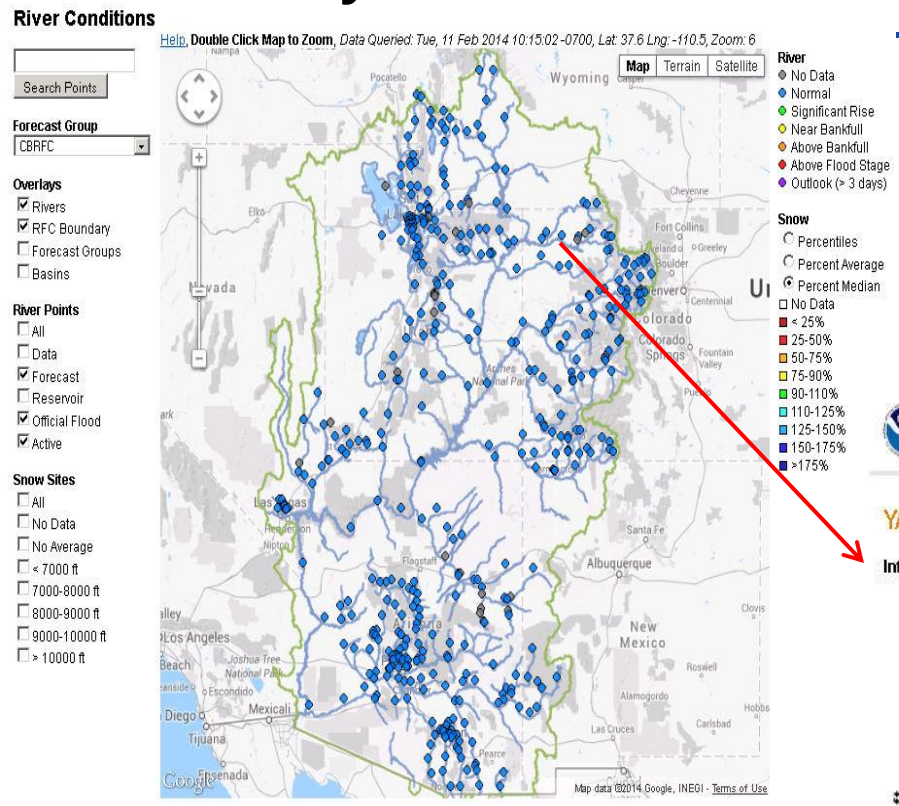


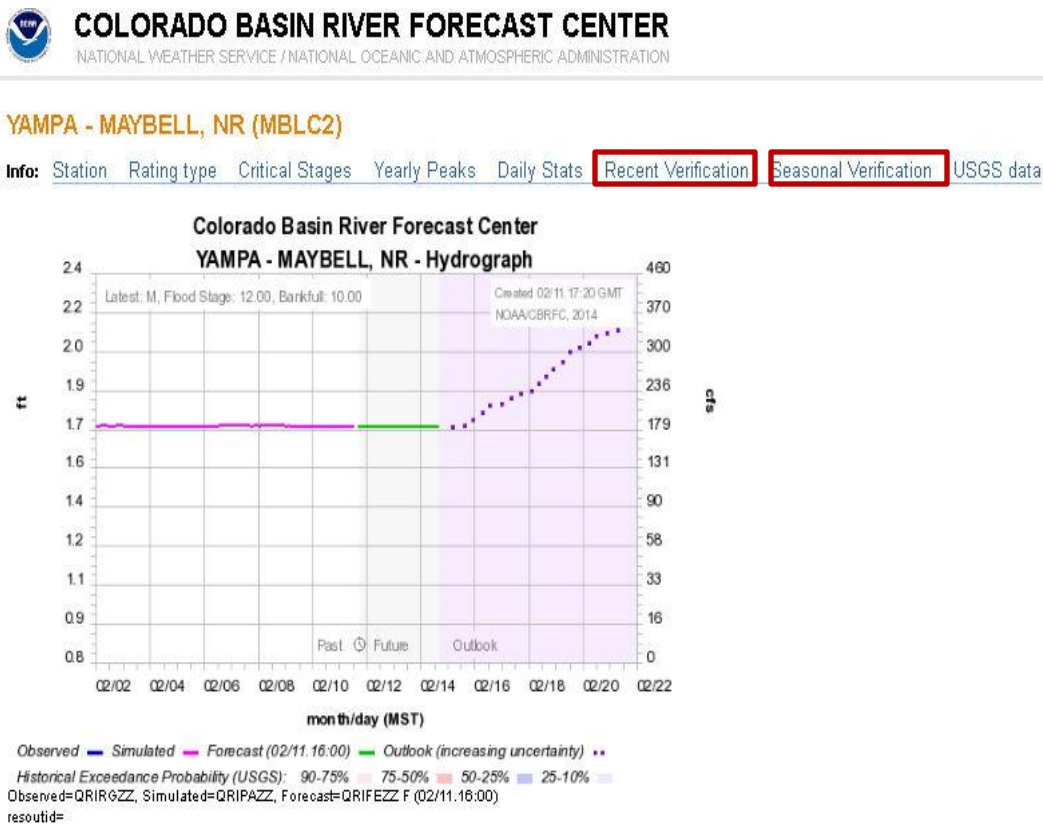




Current Verification Tools

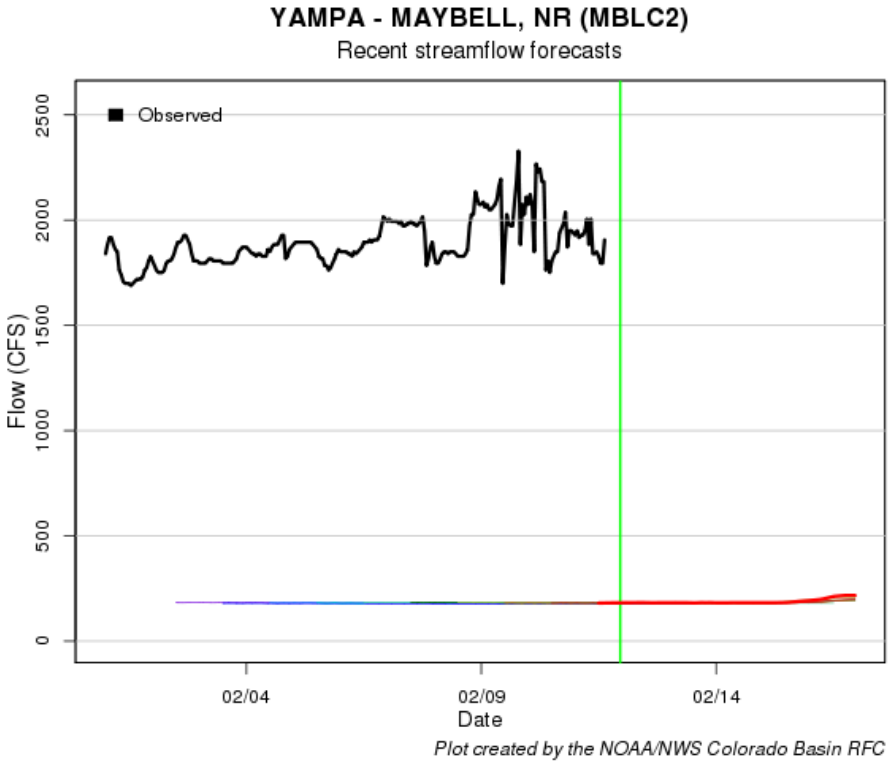
Daily Streamflow Forecasts

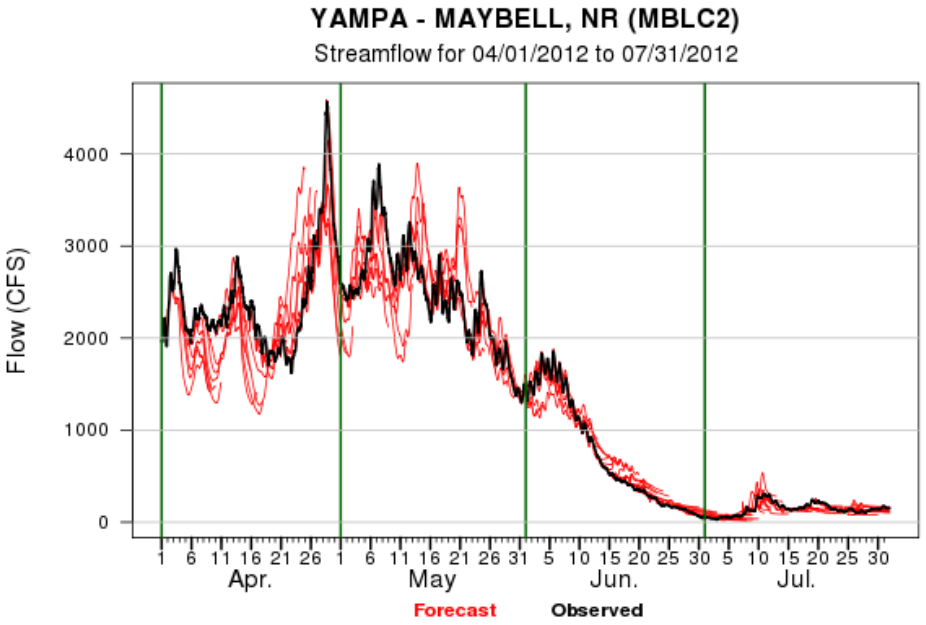




Current Verification Tools

Daily Forecasts





	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	OVERALL
MEAN ERROR (cfs):	-28.1	-29.8	-28	-43.7	-74.9	-40.9
MEAN ABSOLUTE ERROR (cfs):	59.4	108.9	187.6	223.6	257.1	167.3
RELATIVE ABSOLUTE ERROR (%):	9.9	14.9	20.6	24.3	29.1	19.8

Stacie! Help fix please!!

Online tour

Website Coming Attractions: Verification

- Verification web consistency
  - DOCUMENTATION (we know)
  - Spatial view
  - One stop shop
  - Similar to defunct western water page
- Monthly verification (for USBR MTOM and others)

Verification Discussion

- How does CBRFC use verification?

- How easy is it find/understand the verification?
- How useful is the verification information presented here?
- How do you currently use or want to use verification?
- How good do forecasts need to be for your use?