CBRFC
March 2015
CUWCD Briefing/Meeting

1pm March 9, 2015
Ashley Nielson
March Call Outline

• February Weather Review
• Current conditions driving forecasts
  • Soil Moisture, Snow Conditions
• Water Supply Forecasts
• Upcoming weather (short and long range)
• Peak Flow Forecasts
Winter Precipitation

Monthly Precipitation for December 2014
(Averaged by Hydrologic Unit)

% Average
- > 150%
- 129% - 150%
- 110% - 129%
- 100% - 110%
- 90% - 99%
- 70% - 89%
- 50% - 69%
- < 50%
- Not Reported

Duchesne: 105%
Provo: 120%

Monthly Precipitation for January 2015
(Averaged by Hydrologic Unit)

% Average
- > 150%
- 129% - 150%
- 110% - 129%
- 100% - 110%
- 90% - 99%
- 70% - 89%
- 50% - 69%
- < 50%
- Not Reported

Duchesne: 45%
Provo: 50%
Feb 17 2015 – High Pressure Ridge

Feb 23 2015 – Pattern Change !!
February and Seasonal Precipitation

Monthly Precipitation for February 2015
(Averaged by Hydrologic Unit)

<table>
<thead>
<tr>
<th>% Average</th>
<th>Duchesne</th>
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<tr>
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Seasonal Precipitation, October 2014 - February 2015
(Averaged by Hydrologic Unit)

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February Temperatures

* Warmest February on Record – Several Locations *
* Snowmelt and Increased Streamflow in February *

Monthly Max Temp Deviation for February 2015
(Averaged by Hydrologic Unit)

Degrees (F)
- Above 9
- 7-9 Above
- 5-7 Above
- 3-5 Above
- 1-3 Above
- Normal
- 1-3 Below
- 3-5 Below
- 5-7 Below
- 7-9 Below
- Below 9
- Not Reported

Monthly Min Temp Deviation for February 2015
(Averaged by Hydrologic Unit)

Degrees (F)
- Above 9
- 7-9 Above
- 5-7 Above
- 3-5 Above
- 1-3 Above
- Normal
- 1-3 Below
- 3-5 Below
- 5-7 Below
- 7-9 Below
- Below 9
- Not Reported

Prepared by
NOAA, National Weather Service
Colorado Basin River Forecast Center
Salt Lake City, Utah
www.cbrf.noaa.gov
March Precipitation

March Days 1-7 % of Normal Precipitation
Forecast Drivers: Snow Conditions

SNOTEL SWE – FEB 10 2015

SNOTEL SWE – MAR 7 2015

Percent Median
- No Data
- < 25%
- 25-50%
- 50-75%
- 75-90%
- 90-110%
- 110-125%
- 125-150%
- 150-175%
- > 175%
Forecast Drivers: Snow Conditions

-Snow Rankings as of March 7th

Red – Lowest on Record

Orange – Lowest 2nd-5th on record

Period of Record
Most around 30-36 years
Colorado Basin River Forecast Center
CWHU1 - CHEPETA

Accumulation rate 0.1 in/day averaged over last 3 days.

62% Median
50% Peak

Colorado Basin River Forecast Center
KGCU1 - KINGS CABIN

Accumulation rate 0.0 in/day averaged over last 3 days.

44% Median
37% Peak
Forecast Drivers: Soil Moisture Entering Winter

How will this affect water supply forecasts?

Positive (+):
- Green above Fontenelle
- Upper Colorado/Yampa/Gunnison
- Uinta Range (Bear, Provo, Duchesne)

Negative (-):
- Northern Great Basin (Weber, Provo)
- Sevier/Virgin
- San Juan
March 1st Water Supply Forecasts
Duchesne and Provo River Basins

Forecasts decreased by ~10-15% since February 1
All March 1st April-July volume forecasts are below average
Forecasts: Provo nr Hailstone

Mar 1 Forecast:
10%: 109 KAF
50%: 80 KAF (73% Average)
90%: 61 KAF
Mar 1 Forecast:
10%: 48 KAF
50%: 27 KAF (38% Average)
90%: 22 KAF
Forecasts: Starvation Reservoir

Mar 1 Forecast:
10%: 83 KAF
50%: 53 KAF (47% Average)
90%: 30 KAF
Forecasts: West Fork below Vat

Mar 1 Forecast:
10%: 13.7 KAF
50%: 9.5 KAF (51% Average)
90%: 7.5 KAF
Forecasts: Upper Stillwater Reservoir

Mar 1 Forecast:
10%: 73 KAF
50%: 57 KAF (77% Average)
90%: 42 KAF
ESP Trace Example

• Current forecasts assume average precipitation and temperature into the future
• **What if we want to know volume scenarios for not average weather?**

• A quick reminder of how ESP works:
  • Start with current conditions
  • Apply precipitation and temperature from each historical year (1981-2010) **going forward**
  • A forecast is generated for each of the years (1981-2010) *as if, going forward*, that year will happen
  • This creates 30 possible future streamflow patterns. Each year is given a 1/30 chance of occurring

Current hydrologic states:
- River / Res. Levels
- Soil Moisture
- Snowpack

Past <-> Future Time

1981
1982
1983
....
2010
ESP Trace Example

- 30 possible future streamflow scenarios for Strawberry Reservoir Inflow
- Current forecasts: Sum flows into periods and calculate probabilities

If from now on we had weather like 1995 or 2004 given the current conditions:

2015 April- July Volumes:

1995 Weather: 83 KAF
2004 Weather: 16.5 KAF
Future Weather

Its Back! Ridge of High Pressure continues through Wed

-Satellite image as of 3/8/15-
Future Weather

Weak Storm System Late Thursday/Friday

- Model Guidance for Thursday March 12th-
Quantitative Precipitation Forecast
Weather Prediction Center (WPC)
7 Day Total March 9-16
Long Range Weather
90 Day Outlooks (Mar-May)

Temperature

Precipitation
Long Range Weather

A ~60% chance of weak El Nino conditions for February-April

Early–Mar CPC/IRI Consensus Probabilistic ENSO Forecast

ENSO state based on NINO3.4 SST Anomaly
Neutral ENSO: −0.5°C to 0.5°C

Climatological Probability:
- Red: El Nino
- Green: Neutral
- Blue: La Nina

Time Period:
- FMA 2015
- MAM
- AMJ
- MJJ
- JJA
- JAS
- ASO
- SON
- OND 2015
What is a Peak Flow Forecast?

- Maximum Mean Daily Flow due to snowmelt
  - April-July
- Probabilistic Forecasts
  - Exceedence Probabilities -10%, 25%, 50%, 75%, 90%
- **Regulated flow** - accounting for reservoirs and diversions
  - Planned operations if known (hard with diversions)
  - Assumptions based on past operations
- Only forecast magnitude of peak not time of peak
- Issued twice a month
Where to Find Peak Flow Forecasts

• Map:

• Special Product (Unreg/Reg)
  – http://www.cbrfc.noaa.gov/outgoing/cuwcd_peaks/cuwcd_peakfcst_20150301.txt

• List:
Peak Flow Forecasts

Green = Low probability of reaching flood flow

Red = High probability of reaching flood flow
### Peak Flow Forecast List

**Peak Flood Probability Legend**
- ☃️ No Forecast
- ☇️ No Flood Stage
- ⟩<10
- ⟩>10
- ⟩>25
- ⟩>50

**Options (on/off):** Mean Daily Forecasts  Instantaneous Forecasts  Plot

**Select by Area:** CBRF  Greenwood  Colorado  San Juan  Great  Sewer  Virgin  Low Col

**Columns (on/off):** ID  River  Location  Flood Flow  PI  Issue Date  Observed Peak to Date  Observed Date  Historic Peak  Hist Peak Date  Average Peak  Normal Earliest Date  Normal Latest Date  Date  Notes  Area  Sub Area  DS

Click column heading to sort by that data. Click ID to view point info.

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**Special Product-Unregulated/Regulated**

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<td>810</td>
<td>990</td>
<td>1200</td>
<td>1400</td>
<td>1600</td>
<td>1600</td>
<td>UNREG</td>
</tr>
</tbody>
</table>

**UNREG**=Peak flow forecasts are unregulated and do not account for upstream diversions/regulation.

**REG**=Peak flow forecasts are regulated based on assumptions of upstream diversions/regulation.

**FLOOD**=Flood flow. -9999 = no flood flow

Regulated flow at Provo - Woodland, NR include diversions from the Duchesne Tunnel whereas unregulated flows do not.
Peak Flow: Strawberry nr Solider Springs

10%: 550 cfs
50%: 300 cfs (33% of average)
90%: 150 cfs
Peak Flow: Upper Stillwater

10%: 600 cfs
50%: 850 cfs (69% of average)
90%: 1150 cfs

These graphics are updated approximately every two weeks between 3/1 and 5/1
March Summary

Soil Moisture Impacts
- Still impacting forecasts but not as much as earlier in the season

Snow
- Below normal conditions
- Record low snow in several locations
- Limited low elevation snow left

Forecasts: Volume and Peaks
- Below average volume and peak forecasts
- Decreases in volume forecasts since Feb 1
- Below average peaks, low probability of flooding at this time

Weather
- Warm and dry conditions through mid week
- Weak storm system Thursday/Friday
- Ridge returns for weekend
Discussion

• Forecast discussion
• Operations discussion
• Next briefing date?
  – April 8?
Feedback, Questions, Concerns always welcome....

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