

CBRFC 2010 Stakeholder Forum

Summary

The Colorado Basin River Forecast Center (CBRFC) held a stakeholder forum on August 17-19. The forum was organized around presentations from CBRFC staff on models, tools, and projects that the RFC uses to make forecasts. Presentations included a description and demonstration of most elements of the CBRFC forecast process, a review of the 2010 runoff and the forecasts for it, discussion on various CBRFC projects including improved evapotranspiration, peak flow forecasts, the community hydrologic prediction service, and an analysis of snow versus runoff for key basins. As part of NOAA, the CBRFC is a service organization and strives to be as relevant to its stakeholders as possible. To that end, active discussion and participation was facilitated throughout the forum. Participants included many of the major stakeholders in the Colorado Basin (see participant list in appendix 1). The forum generated significant ideas, actions, and requests for new and improved ways the CBRFC can meet stakeholder requirements in the basin. These are described below.

Feedback from both participants and NOAA staff was generally very positive. In particular, participants appreciated the openness of CBRFC to adjust to the stakeholder requirements and the service oriented mission of NOAA generally and the CBRFC in particular. The stakeholder forum model was largely endorsed as an appropriate mechanism for engaging with stakeholders on either an annual or bi-annual basis. Demonstrations of forecast tools and discussion of forecast skill and post-mortem event analyses were particularly well received. In the future, many of the stakeholders would appreciate any insight beyond the officially published forecasts that the CBRFC can provide. Complete, unedited feedback is in appendix 2.

The workshop agenda is in appendix 3. Full presentations are available on the CBRFC website (www.cbrfc.noaa.gov).

Follow up items

The following items were identified during the forum:

- Identify a simple way to communicate forecasts relative to specific thresholds – Bill Hasencamp requested participants and the RFC to think about ways to communicate forecasts relative to thresholds (e.g. equalization releases on Lake Powell) for more successful communication with boards and the general public.
- Post-mortems – A more refined event post-mortem for the 2010 runoff was requested by multiple participants

- 30 year average update – Significant interest in the new 30 year averages (e.g. 1981-2010) and their impact on the forecasts was expressed. CBRFC will continue to keep stakeholders informed as this process plays out in 2011.
- Sublimation – How much variation is there in sublimation?
- Stick diagrams – Dave Kanzer requested that CBRFC “stick diagrams” showing how the RFC models each basin be posted to the website.
9/2010 Done: under stick diagrams here:
www.cbrfc.noaa.gov/wsup/doc.php
- Objective forecasts – Concern over the subjective nature of the water supply forecast coordination with NRCS was expressed by multiple participants. CBRFC will prototype an objective water supply forecast system to run in parallel to the current coordination scheme.
Experimental objective forecast system planned for WY11 forecasts starting in January 2011
- CBRFC should be more involved in the 7 basin states technical meetings
CBRFC invited to Oct 2010 meeting
- Probabilistic forecasts – Need for probabilistic forecasts less than two weeks in lead time was noted
- Runoff timing with climate change – Several participants noted concerns about changes in runoff timing related climate change effecting forecasts.
- Consistent forecast toolset for lower basin irrigators – Chuck Cullom requested a consistent toolset (e.g. forecasted precipitation, temperature, etc) that irrigation association in the lower basin could utilize to help plan their water orders
- 2-5 year forecast – Participants noted that any forecast information in the 2-5 year leadtime range could help mid-term planning significantly.
- Monthly forecasts online – Monthly CBRFC forecasts that are typically disseminated over email should be published online as well
9/2010 Done: all text forecasts are available here:
www.cbrfc.noaa.gov/product/oup/oup.php
- Lakes Powell – Mead intervening flow – CBRFC will attempt to account for the gains/losse values reclamation has calculated and include them in our forecast for Lake Mead inflow.

Appendix 1: Participant list

Linda Sullivan – Arizona Power Authority
Ken Curtis – Dolores Water Conservation District
Tim Skarupa – Salt River Project
James Walter – Salt River Project
Mark Hubble – Salt River Project
Nicole Everett – Colorado River Commission of Nevada
W. Paul Miller – Bureau of Reclamation (USBR) – Lower Colorado Region
Vern Harrell – USBR/Western Colorado Area Office
Ryan Christianson – USBR/Western Colorado Area Office
Karen Rademacher – Northern Colorado Conservation District
Chuck Cullom – Central Arizona Project
Chris Rowins – US Air Force
Colby Pellegrino – Southern Nevada Water Authority
Steve Wolff – Wyoming State Engineer's Office
Kristine Blickenstaff – USBR/Upper Colorado Region
Lisa Verzella – USBR/Provo area office
Heather Patno – USBR/Upper Colorado Region
Bill Hasencamp – Metropolitan Water District of Southern California
Dave Kanzer – Colorado River District
Lisa Darby – NOAA/NIDIS
Erik Knight – USBR/Western Colorado Area Office

Appendix 2: Participant Feedback

1. How useful was the workshop to you?

Very useful! I think it was great to hear how our colleagues from MWD, SNWA, CAP, and others interpret the data and where they had questions or concerns. From our perspective, it was great to get some extended time with Greg and Craig to look at some of the technical details of the RFS. Getting to reconcile the differences in our intervening flow forecasts into Mead was very important to us.

The workshop was very useful, partially because I am still new to water operations, but also because the CRBFC continues to change and update products. Very good outreach over the last few years.

The workshop was very useful to me, for both understanding issues that your office deals with, and for conveying my agency's needs. I appreciated the emphasis that the forecast center is a service organization designed to provide information needed by the stakeholders. It was helpful to understand how you do forecasts and the efforts you have made to make as accurate a forecast as possible given your limitations.

The workshop was extremely valuable and I learned a lot. I especially liked the informal atmosphere and the opportunity to ask questions.

I thought the workshop was very useful. It provided a lot of insight into what goes on behind the scenes to produce the RFC products, which is a nice thing to have some basic understanding.

The workshop was very useful. It was a very good primer for anyone who has been using the data (in my sense casually) to become familiar with its development.

Workshop was very useful and informative. I appreciate the time and effort everyone at CBRFC put in.

2. Assuming it was useful, what are your thoughts on future workshops (e.g. frequency, length, content, etc)?

I'd like to see this be at least an annual event. I think the timing coincides well with the AOP, so that this type of information is fresh with people. I thought the length was just about right; I wouldn't mind setting some time for our stakeholders to talk a bit about their forecasting needs in a little more detail. I did love Bill's basketball discussion though.

I would recommend workshops every other year. I'd also like to see upper & lower basins placed on the same day. There was interest in both, but tough getting all 3 days plus travel to get to SLC. If you continue holding every year, having the phone in capabilities is great.

I think an annual stakeholder meeting would be a good idea. I think 3 days is a bit much; 2 days might work better (like 10:00 the first day until 4:00 the second day). I think the content could build upon previous workshops. For example, we discussed the "scoreboard" last week; next year, maybe

someone could present options for meeting that goal. That would be more helpful than starting over each time. And of course, lessons learned over the year would be helpful.

I also think a one-day optional field trip would be helpful. Like taking a trip up Cottonwood Canyon, seeing the streamflow gage, the snowtel site, and showing where they are relative to the "sunny side" of the mountain, or other local issues. Seeing the an area in real life helps one understand the limitations when we get back to the conference room.

I would be interested in attending these workshops on an annual basis; one or two days would be good. As far as content goes:

- I am interested in hearing the "post mortem" on the prior runoff season. What were the forecasting challenges this year? Would be nice to have NRCS forecasters participating and get their perspective too.
- What's new with respect to methods and products
- Can you give us any insight into the coming snow accumulation season (ENSO indicators, etc.)
- Although I'm a big fan of your webinars, it's nice to have an "in person" event once in a while.

length was good (one day plus half for basin focus). Any longer would be hard to fit in to my scheudle. Because we have the bi-annual coordination meetings, I think this "stakeholder fourum" meeting should be maybe every year (or every year and a half) I'm trying to think how to avoid duplication in the two meetings....

I think this should be an annual event. As you all develop new products and improve on the old ones, an annual workshop would be a good way to get the rest of us up to speed on what is available and coming in the future. I thought that the workshop could have gone for another day. Having the "Upper Colorado Day" before the combined day made it difficult because I was unsure what exactly was to be covered the next day. If we broke out after the combined day, I think I would have been able to ask more questions. After a full day on Wednesday, I think everyone was saturated with information, but a following day would have allowed us to process all the information presented and prompted further discussion that was specific to our basin and our needs.

The length of the workshop was great. Two days is short enough to easily escape the office and long enough to get a decent amount of information.

Content suggestions:

Updates on datasets, for example when the 30 year period is changed

Update on forecasting skill and ongoing improvements

Update on NOAA considerations and involvement in emerging issues (dust on snow, sublimation, pine beetles, etc).

Discussion and assessment of previous year forecast. (the 2010 runoff presentation was very helpful)

Update on coordinated operations for forecasts, not just w/NRCS but also w/Reclamation)

3. What were the most important / relevant / useful topics covered at the workshop for you?

Reconciliation of the intervening flow forecasts Development of input precipitation and temperature files in RFS Derivation of percent averages / probability of equalization Brenda and Andy's discussion of development of the April-July forecasts

Most important were the ESP modeling presentations, verification on accuracy and long range studies such as snow vs. runoff.

Understanding how you make your forecasts was helpful, along with the limitations associated with it. I also liked the discussions about what factors affect runoff (or don't), such as dust-on-snow, climate change, deforestation, etc. It was also helpful to get to meet your staff, understand your responsibilities, and efforts you are making to improve your work.

Craig's overview of CBRFC models was great – I was glad to learn about the “inner workings” of your models.

Definition of “regulated flow” was much appreciated.

I appreciated the opportunity to sit down with Brenda and get specifics about your Granby model.

loved the technical presentations of what's involved with calibrating, how the daily forecasts are developed, peak forecast, verification tools, and general direction you're going with incorporating research, verification etc.

I thought Craig's presentations of the model inputs and calibration (especially as he related it to dust on snow) was interesting and helpful. I also appreciated the presentation on predicting peak flows, although I was a little disappointed to hear how generic this process is (mostly relying on climatological data and ESP runs) rather than further SNOTEL analysis such as melt rates and lags, or other techniques that I may not have considered.

LB Intervening flow updates/information

NOAA opinions of dust on snow, etc

Discussions of forecasting skill

La Nina look ahead

Snow vs runoff

Could easily see doing these once a year – at least for the next couple years. One day (noon to noon) format seems to work for folks who travel to SLC. The only criticism of this year's was not enough time to cover all the topics listed. Would rather limit the topics to be covered and allow lots of discussion on those topics.

Having not been involved in any detail of CBRFC activities in the past – all topics were relevant and useful to me. Especially enjoyed talking R&D activities with Andy Wood and with Green River issues with Ashley Nielson.

4. What were the least?

Some of the discussion was a bit technical for my taste, such as the discussion on et. I haven't seen such long integration equations since college and my head was spinning a bit. I know that there is a need for technical discussion; perhaps the really detailed discussions could be moved to the end.

As I look through the agenda, I can't see anything that I wish had been "cut". I guess if you turn this into an annual event, I would want to minimize repetition from year to year.

For me, the overview of the water year (UC-specific day) could be trimmed down or eliminated-- this is mostly because I think a lot of this will be duplicated the at the coordination meeting. But I realize that not everyone at this meeting will go to the coordination meeting... Hmm... so I'm not sure if I'm suggesting getting rid of the UC-specific day, but wonder which topics should be discussed at which meetings. And maybe there needs to be duplication...

I thought there was probably too much time spent on the snow vs. runoff evaluations. These relationships (such as Max SWE vs. runoff volume) can be important and I use them as a check to the coordinated forecast, but they can be far from the most accurate predictors. I look at similar data and have found that that comparing the SWE on the current date (during the snow season) to similar snowpacks on that date is a better indicator of runoff volume than Max SWE, but the May 1st SWE date used in the examples is too late in our basin to have much correlation. In my brief experience, I can correlate SWE to runoff volume much better in early April. Too much melt occurs by May 1st.

Peak flows (mainly because it does not affect us...but it was interesting)

CHPS (mainly because it is not too relevant to us but I was also a little confused here)

SRP presentation was interesting as well but not relevant to SNWA's interest.

5. Are there decision points, meetings, or other avenues that you would like to have the CBRFC more involved in?

I think the Basin States Technical Committee Meeting and River Hydrology Group are good meetings to stay and get more involved in.

Continue to follow the climatological factors, e.g. La Nina throughout the season. Move to PDSO & El Nino as appropriate. Also, any follow up to your long range studies like snow vs. runoff continue to educate.

I've mentioned that it would be good for your office to participate in the biannual Basin States' technical meeting, with the next meeting scheduled for October. I'll forward you information when I receive it.

It would be cool if you guys could post “forecast discussions” like the weather forecasters do (or maybe a blog?). Tell us which forecasts are giving you fits, where you have doubts, what’s driving the forecasts, etc. I’m thinking here of geeky insider stuff, not an “official” publication.

I would really like it if you and/or Tracy Cox could attend one of our Navajo Operations Meetings soon. We would appreciate it if the CBRFC could do a short presentation about the CBRFC and an overview of your products. Also, with the San Juan Recovery Program deciding that we can be more flexible in moving our Navajo Spring Peak Release to match the Animas peak, I would like the CBRFC to be more involved in helping us determine the timing of that peak.

After the water year it would be good to have a joint Reclamation/CBRFC statement about the good, the bad, and the ugly of the year and a look ahead to the next year. Just a succinct document that says here is what we did wrong, here is what went well, in the future we can improve with X. I suggest joint because there are certain decision points Reclamation uses for operations determinations and if we can document whether moving something a few weeks could be a benefit in the interim period (through 2026) it will be useful in negotiations.

6. Other comments?

Again, great workshop. I really hope we make this an annual event. We try to communicate some of what you do and how it impacts us to our stakeholders, but it makes a big difference when they hear it directly from you all.

We really like the CBRFC Map and Quick Start Instructions. Whenever you get a chance, could we get small stack of those? People ask for that type of information all the time from us and we think it's a great handout.

One question I forgot. During the season, the weekly ESP guidance continually came in substantially lower than the monthly coordinated forecast. The forecast was the closer, better number. I'd like to follow up on this apparent discrepancy, maybe how ESP goes from weekly to final forecast. If there is a dry or other bias I would like to know during the season. I could not really use the weekly guidance other than as an indicator of changing conditions.

I thought it was helpful getting an overview of the Salt River Project. Perhaps at future meetings you could have stakeholders give presentations about their operations and what they use data for. Maybe a different state or two each meeting. I would have been happy to give a 15-minute overview of MWD and the importance of Colorado River water to us and how we operate. I got the feeling from the meeting that most people didn't understand much about us or our water supplies.

In general, nice job putting together an informative workshop. I appreciate the efforts of you and your staff to provide an informative and interesting session. And the happy hour was fun, too.

Location was convenient – nice to be able to take advantage of hotel shuttle and not have to rent a car.

Meeting room was a little crowded, however.

Next time I'll arrange my schedule and flights so I can stay for the whole thing!

Great workshop last week! I found it very useful and interesting. Great presentations and discussion. Loved the open format and being open to duck out and go talk with people.

Overall, a great meeting - very informative and a very good use of my time (which seems to be how I judge meetings these days!

It came to my attention during the meeting that the CBRFC could benefit from our future daily Navajo operations so that the OFS can more accurately forecast downstream flows. Brenda mentioned that some of this error was with the USGS gages, but it seems to me that most of the error is lack of communication of our future reservoir operations. I would like to set up a protocol to feed our future daily operations to the CBRFC's OFS model. This would likely be most practical on a weekly basis in the late spring through early fall when changes occur more often.

I also still don't understand how there can be such a difference between the monthly ESP forecast and OFS output even after the monthly forecast is recently released. I thought that both the ESP and OFS use the same precipitation and temperature data for the outlying few days, but I often find that beyond the 14-day output of the OFS, the ESP would have to have daily averages that are record low or high ranges to sum up to the monthly total forecasted. Still seems to me there is a disconnect between those outputs, as I use both in my ALP Operations Model.

May be useful to have "sub-basin" meetings - Upper Colorado, Upper Green, San Juan, etc. Discuss specific on the ground issues.

Appendix 3: Agenda

Goal: Provide participants an overview of and feedback on CBRFC products and services

August 18 (“plenary” session) This section is based on participants’ expressed interests. Each section will include a presentation from CBRFC staff and ample time following for discussion on how CBRFC products are meeting or not meeting stakeholder needs

Remote participation available via:

Telecon: 1.877.929.0660

Passcode: 1706374

Gotomeeting: <https://www1.gotomeeting.com/join/589433624>

8:30am – Welcome and Introductions (Kevin Werner)

- Logistics including lunch
- Overview
- Introductions
- Participant goals, forecast challenges, etc

9:00 – CBRFC Overview (Michelle Schmidt)

- Staff
- Available forecasts, data, etc
- Projects and plans

9:15 – Overview of CBRFC models (Craig Peterson)

- Hydrologic and snow models
- Natural vs observed streamflow
- Modeling anthropogenic activities (e.g. diversions, regulation, etc)

9:45 – Break

10:00 - CBRFC Forecast Demonstration

- QA/QC and Forecast Forcings (e.g. MM, MPE) (Tracy Cox)
- Model run (e.g. IFP) (Brenda Alcorn)

10:30 – Water Supply Forecast Demonstration

- ESP including ESPADP (John Lhotak)
- SWS (Greg Smith)
- Research and Developments in Water Supply Forecasting (Andy Wood)

11:30 – Lunch (catered in – orders will be collected at the beginning)

12:30pm – Forecast Evaluation

- Water Supply: 2010 and 10/90 verification (Kevin Werner)
- Snow vs Runoff evaluation (Kristen Yeager)
- Peak Flow Forecasts Methods and Evaluation (Ashley Nielson)
- Look ahead to La Nina (Kevin Werner)

2:00 – Break

2:15 - CBRFC development activities (3 slides maximum)

- Current Webpage (Bill Reed)
- Web services (Cass Goodman)
- Community Hydrologic Prediction Service (CHPS) (John Lhotak)
- Forecast Ensemble (Andy Wood)
- Decision support (Kevin Werner)

5pm – Adjourn

6pm onwards – Optional social gathering at the Bayou (645 S State St)

August 17 (Upper Colorado day)

½ day session starting at noon

12:00pm – Welcome and Introductions (Kevin Werner)

12:15pm – 2010 Runoff event presentation (Craig Peterson / Brenda Alcorn)

- Runoff recap
- Water Supply Forecast recap
- Daily and Peak Flow Forecast recap
- Verification
- What Happened?

2:30pm – Open discussion on Upper Colorado Issues (moderator: Kevin Werner)

- Improving evapotranspiration in RFC model (Mike Hobbins)
- Analysis of recent dust on snow events (Craig Peterson)
- Predicting and Modeling water demand
- Coordinating operations based on forecasts

August 19 (Lower Colorado day)

8-10am – USBR/LC discussion (Greg Smith / Paul Miller)

- Lakes Powell / Mead intervening flow
- Other topics?

10am-4pm – SRP discussion (Greg Smith / Tim Skarupa)

- SRP Operations (Tim?)
- CBRFC modeling in the Salt system (Greg)
- Data requests (Greg)
- Other topics?