Integrating Climate Forecasts and Reforecasts into Decision Making

Kickoff Workshop
Colorado Basin River Forecast Center
October 1, 2012 – October 2, 2012

Project Goals

Demonstrate the potential usefulness of climate forecasts and create an appropriate framework for their application

- Co-generate knowledge concerning system operations between researchers and water managers
- Generate ESP streamflow using reforecasts at partner locations
- Evaluate skill of GFS and CFSv2 and corresponding streamflow in the context of decision making
- Disseminate data, case studies, and recommendations to the broader water community

Goals for Kickoff Meeting

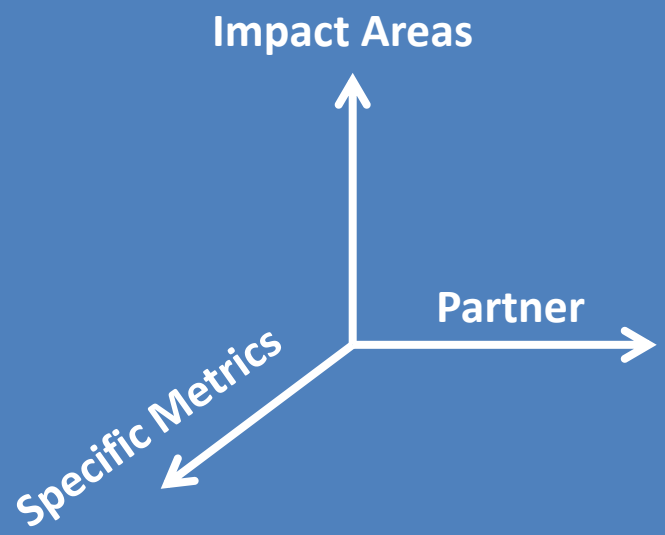
- Inform and educate each other on general and specific needs of each system
- Learn about current and proposed NWS products
- Understand operational challenges and metrics for each system
- Engage larger water community in the use and evaluation of forecasts

Path From Here to There

- Series of presentations by NWS, each partner, and UMass focusing on project specifics

Path From Here to There

- Work from general categories to specific metrics for each system
- Discuss tasks, timelines, and datasets to be produced
- Generate ideas for information dissemination



Projected Schedule

	Year 1				Year 2			
	Q1	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Task 1	Ensemble Streamflow Forecast generation (Hindcast and Real-time) for project locations							
Task 2.1	Framework to identify critical periods where climate forecasts cross the threshold of utility							
Task 2.2		Climate forecast skill in dynamic – evaluating system performance and risk using reforecast data						
Task 2.3			Influence of short and long lead time skill to system performance					
Task 3				Disseminating climate data to end users				

Partner	Simulation Model	Optimization Model	ESP Streamflow	Case Study Report
Dallas	Have combined Dallas – Tarrant model, working on separating Dallas section and operation rules	Plan to complete by March or April	Summer 2013?	Fall 2013
PacifiCorp	Model Skeleton completed, working on interpreting operation rules	Plan to complete by January or February	Winter 2013?	Spring 2013
Salt Lake City	Model Skeleton completed, working on interpreting operation rules	Plan to complete by January or February	Winter 2013?	Fall 2013
SnoPUD	Model Completed	Model Completed	Generated by Fall 2012	Spring 2013

Information Dissemination Discussion

- Communication with NIDIS and RISAs
  - Setup webpage for project
- Communication through Skype/Google
  - Try quarterly meetings
  - More frequent meetings with NWS -> go to Meeting
- Information dissemination to end users
  - Types of data, format, etc…
  - Best way to communicate case studies
- Disseminating final reports and results

Attend National Meetings

- *Academic* - ASCE, AMS, AGU, AWRA
- *Practitioner* - local AWWA, Texas Water Resources Conservation Association, Natural Water Resources Association, Coalition of Western Arid States, Western Governors Association, Western States Water Council, HydroVision, St. George Meeting/Water Users, Spring runoff conference, CIG/JISAO Spring/Fall
- Virtual meetings for Federal Agencies

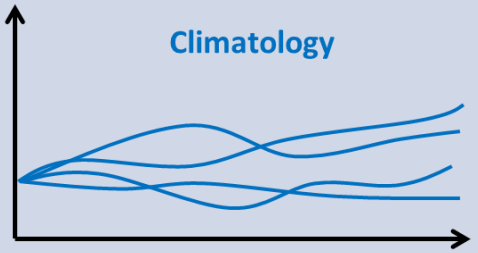
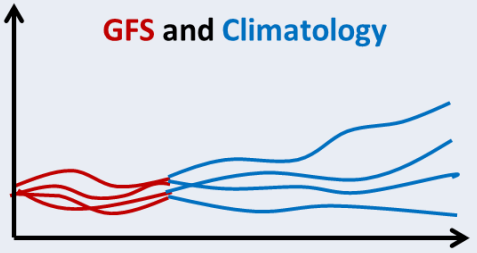
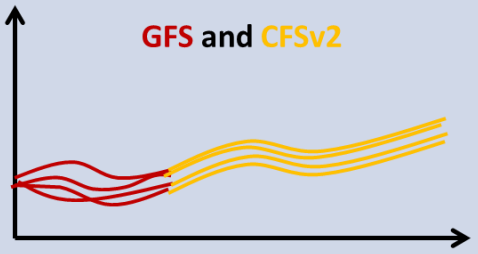
Metrics for Analysis Discussion

Partner	Hydropower	Water Supply	Environmental Flows
Dallas	None	• Firm yield • Frequency of instituting voluntary or mandatory restrictions • Total revenues generated • Minimum storages in reservoirs	None
PacifiCorp Bear Lake	• Energy production lost relative to baseline	• Volume of water provided to irrigation • Annual allocation of water • Accuracy of forecast of water to be allocated • Irrigation supply lost	None
Salt Lake City	• Potential hydropower out of Little Dell	• Appropriate storage level at the beginning of water supply season • Balancing water sources and supplies	• Cannot divert into pipeline until >5 cfs at Lamb's Diversion
SnoPUD	• Mega-watts hours produced per year • Total avoided costs from other purchases • Annual energy value	• Prioritize water supply to Everett per agreements	• Meet Minimum Instream flows • Minimizing peak releases that harm fish • Provide a range of process flows

Partner	Flood Risk	Extraneous Costs – Pumping, etc	Recreation
Dallas	• USACE facilities do	• Pumping Costs • Recoup energy costs	• Lake Levels that support recreation • Lake levels are subject to soft targets
PacifiCorp Bear Lake	• Reaching target storages • Violating channel constraints	• Change in Pumping Costs from baseline	• Lake levels < 5922’
Salt Lake City	• Violating target culvert capacity Flows < 200 cfs • Meet nomograph storages • Between Mar-Jul must meet flood pocket targets • Always have flood reserve (3000, 1000 LD, MD)	• Treatment costs up as levels down (<800-1500) • After flood keep reservoirs high (at 2000)	None
SnoPUD	• Minimize spill from reservoir • Follow Operational Rule Curves	None	• Lake level targets that support recreation • White water recreation flows

Partner	Water Treatment needs – lake levels	Water Quality Considerations	Rule curves and other operational considerations
Dallas	Minimum targets	None	• Want to be at appropriate seasonal storage zones levels • Use guidance charts to inform
PacifiCorp Bear Lake	None	None	• Elevations of 5902 to 5923.65 (ideally max 5922) • Want to be in appropriate seasonal storage zones
Salt Lake City	• Minimum lake levels limit water use, MD target between 1500 and 2000 ac feet, never less than 800	• After flood and satisfying demand keep reservoirs high due to algal blooms	• Want to be at appropriate seasonal storage zones levels
SnoPUD	• Maintain Lake Chaplain at appropriate level	• Possible turbidity problems at certain times of year	• Want to be at appropriate seasonal storage zones levels

Types of Forecasts to be Compared in the Study

Type of Forecast	Forcings	Streamflow
ESP/Climatology	Historic	
HEFS	GFS and Climatology	
HEFS	GFS and CFSv2	

- ESP - Ensemble Streamflow Prediction
- HEFS – Hydrologic Ensemble Forecast System
- CFS – Climate Forecast System
- GFS – Global Forecast System