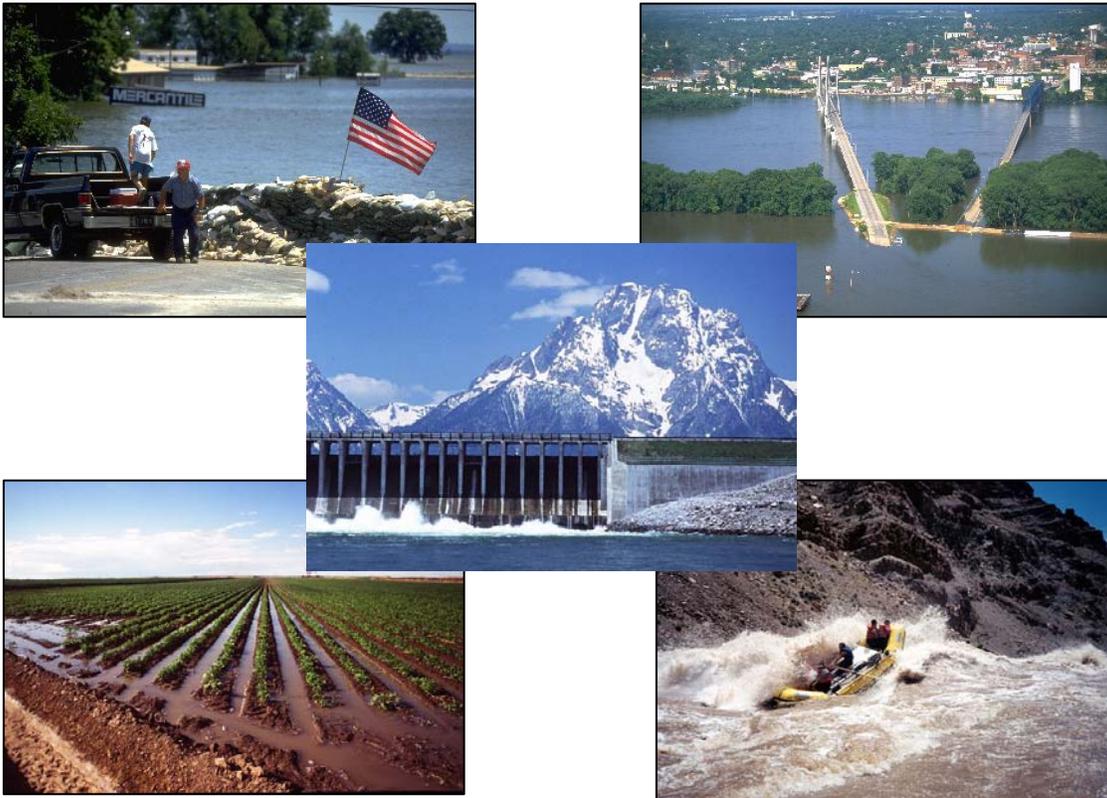




Advanced Hydrologic Prediction Service Quarterly Report 1st Quarter FY 2010



February 01, 2010

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Collaborative Research

On-going Competitive and Collaborative Research (Grants and CREST)

Theme: Innovation

Management Lead: Pedro J. Restrepo

Objective: Coordinate the evaluation and management of the collaborative grants program

Milestones

Task	Due Date	Status
On-going competitive grants- Renewal	March 2006	Completed

1st Quarter FY08

- The Federal Funding Opportunity Announcement was published in the Federal Register at the end of December. The deadline for the submission of proposals on probabilistic river regulation is 1/28. We expect to convene a panel during the first full week of February and to issue a recommendation to Gary shortly after that.

2nd Quarter FY08

- Two proposals that address the River Regulation problem were recommended for funding. One of the proposals was already awarded, and the other should be awarded soon.

3rd Quarter FY08

- All proposals were awarded. OHD has now 5 on-going collaborative research projects with UCLA (2), New Mexico Institute of Mining and Technology, Aptima, Hydrologic Research Center; one congressionally directed soft earmark to Boise State University; 2 matching grants to NOAA-CREST; One student fellowship to the U. of Texas, Austin.

4th Quarter FY08

- Projects are progressing.

1st Quarter FY09

- Received and approved progress reports. Prepared omnibus announcement of the December notice on the Federal Register.

2nd Quarter FY09

- Received 11 proposals for our omnibus announcement. Eight proposals were disqualified from the competition due to administrative non-compliance. The panel met on 3/27 and unanimously recommended one proposal for funding. We are conducting negotiations.

3rd Quarter FY09

- With the exception of one additional proposal for which we were able to find funds after the 6/30 deadline, all proposals were submitted to the Grants Management Division on time. All but 2 of those are finalized. The 2 still in progress are the Boise State earmark and the transfer of a grant from New Mexico Tech to Arizona State, which required special treatment.

4th Quarter FY09

- All proposals were awarded

1st Quarter FY10

- Projects are on-going. The two river regulation projects will be finishing on Q3. The PIs will give

a presentation to the HICs before the HIC meeting.

Problems Encountered/Issues

1st Quarter FY08 - None

2nd Quarter FY08 - None

3rd Quarter FY08 - None

4th Quarter FY08 - None

1st Quarter FY09 - None

2nd Quarter FY09 - None

3rd Quarter FY09 – Bugs in GrantsOnline delayed processing of grants.

4th Quarter FY09 - None

1st Quarter FY10 - None

Snow Science Plan

Core Goal: Innovation

Management Lead: Mike Smith

Objective: This proposal is meant to address issues raised by the Snow Science Steering Team (SSST) and Eric Anderson. These issues largely revolve around the need for a strategy for snow science directions (See Appendix). In general, NOHRSC and OHD agree that SNODAS and Snow-17 will continue to be used/needed for the foreseeable future. However, a coherent strategy for addressing both common and unique needs is lacking.

Milestones

Task	Due Date	Status
<ul style="list-style-type: none"> • Review existing plans and projects; determine snow plan updates 	Q3	Work to start in Q3
<ul style="list-style-type: none"> • 		
<ul style="list-style-type: none"> • 		
<ul style="list-style-type: none"> • 		

Accomplishments/Actions

2nd Quarter FY09

- Funding approved

3rd Quarter FY09

- Eric Anderson provided comments on approved AHPS plan for SNODAS/Snow-17 project; Mike forwarded plan to NOHRSC for comments.

4th Quarter FY09

- Directed by Donna Page to work with NOHRSC and Eric Anderson to revise plan with new work items after agreement by all.

1st Quarter FY10

- Mike tried several times to get updated comments on Eric Anderson's plans.

Problems Encountered/Issues

2nd Quarter FY09

- None

3rd Quarter FY09

- None

4th Quarter FY09

- None

1st Quarter FY 10

- Lack of response to request for comments on Eric Anderson's plan.

Quantify Uncertainty (Ensembles)

Hydrologic Routing Data Assimilation (DA)

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Dong-Jun Seo (Project Lead: Yuqiong Liu)

Objective: Develop CHPS-compatible DA for hydrologic routing via OpenDA

Milestones

Task	Due Date	Status
Gain familiarity with OpenDA	Q1	Completed
Comparative evaluation of 3-parameter Muskingum with operational Lag/K	Q2	
Interface the prototype 1DVAR with OpenDA	Q3	
the prototype 1DVAR in hindcasting mode in the CHPS environment at OHD	Q4	

Accomplishments/Actions

1st Quarter FY10

- Completed the HOSIP Gate 2 review for the 1DVAR project.
- Studied the OpenDA example prepared by Deltares to gain familiarity with OpenDA and to better understand how the 1DVAR prototype can work with OpenDA. Discussed with Albrecht Weerts from Deltares regarding the next steps to integrate 1DVAR into OpenDA.
- Started discussions with ABRFC for collaborative efforts on testing 1DVAR for a few ABRFC basins and inter-comparing 1DVAR with Lag/K for these test basins; waiting for the datasets from ABRFC.

Problems Encountered/Issues

1st Quarter FY10

- None

Snow and Streamflow DA

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Dong-Jun Seo (Project lead: Yuqiong Liu)

Objective: Develop a prototype data assimilator for snow water equivalent and streamflow observations

Milestones

Task	Due Date	Status
Gain familiarity with OpenDA	Q1	Completed
Examine competing/complementary techniques	Q2	
Design the OpenDA-compliant prototype data assimilator and develop a prototype code	Q3	
Generate/obtain the regression-based snow updating results for comparison	Q4	

Accomplishments/Actions

1st Quarter FY10

- Completed the HOSIP Gate 2 review for the snow/streamflow DA project.
- Started discussions with NWRFC regarding the collaboration with NOHRSC on snow data assimilation.
- Gained familiarity with OpenDA through discussions with Deltares and the OpenDA example provided by Deltares.

Problems Encountered/Issues

1st Quarter FY10

- None

DA for RDHM

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Dong-Jun Seo (Project Leader: Haksu Lee)

Objective: Develop OpenDA compliance of the research prototype DA for RDHM for compatibility with CHPS and improve performance under timing errors

Milestones

Task	Due Date	Status
Gain familiarity with OpenDA	Q2	
Design DA for RDHM interface with OpenDA. Enhance the research prototype DA for RDHM code for OpenDA compliance	Q4	
Literature review on timing errors. Develop an on-line timing error estimation procedure for the research prototype DA for RDHM	Q3	
Test and evaluate the performance of the research prototype DA for RDHM with and without the procedure	Q4	

Accomplishments/Actions

1st Quarter FY10

- Discussed w/ Deltares on how to develop OpenDA model wrapper.
- Searched for methods to compile the OpenDA source code on linux.

Problems Encountered/Issues

1st Quarter FY10

- Deltares is trying to find methods to compile the OpenDA source code on linux. Compiling OpenDA code on linux machines is a prerequisite for developing and testing OpenDA model wrapper for the research prototype DA for RDHM. Therefore, the progresses of DA for RDHM work with respect to developing OpenDA compliance of the prototype DA will highly depend on the progresses Deltares make on this issue.

eXperimental Ensemble Forecast System (XEFS)

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Geoff Bonnin

Objective: Implement an experimental short-to-long term hydrologic ensemble capability for use by all RFCs and which meets the recommendations provided by the "Design and Gap Analysis" report published May 11, 2007.

Milestones:

Task	FY08 Due Date	Status
XEFS Phase 1 Implementation: Pass OSIP Gate 1	FY09 Q2 (formerly FY08 Q2)	See new HEFS template
XEFS Phase 1 Implementation: Pass OSIP Gate 2	FY09 Q3 (formerly FY08 Q3)	See new HEFS template
XEFS Phase 1 Implementation: Pass HOSIP Gates 1, 2 and 3	FY09 Q3 (formerly FY08 Q4)	See new HEFS template
XEFS Phase 1 Implementation: Reconcile differences between prototype and operational Ensemble Post Processor (pass HOSIP Gate 3)	FY09, Q2	HOSIP P-2005-005 "Ensemble Post Processor Evaluation" in Stage 3
XEFS Phase 1 Science Algorithm Development: Pass HOSIP Gate 3	FY09, Q4	HOSIP P-2006-010 "Hydrologic Ensemble Preprocessor 3" in Stage 1
XEFS Science Infusion	TBD	HOSIP project P-2005-022 "VAR Verification, Validation & Enhancement" in Stage 3
Integrate prototype Ensemble Preprocessor 3 (EPP3) into CHPS	FY09, Q4	EPP3 and model adapters are under integration test
Integrate prototype Ensemble Post Processor (EnsPost) into CHPS	FY09, Q4	Ens Post and model adapter are under integration test
Integrate prototype HMOS into CHPS	FY09, Q4	HMOS and model adapter are under integration test

Accomplishments/Actions:

1st Quarter FY08

- Budget discussions continued during this quarter.
- On October 19 HSEB submitted a "High Level Analysis and Design" document to the XEFS Implementation Team for review.
- In December HSEB held a meeting to address feedback received on the XEFS document. However the discussion prompted a re-think of the implementation strategy, which will now be based on Delft-FEWS in light of the CAT recommendation for CHPS.
- The HEP group continued its science discovery activities (these are reported under separate projects).

2nd Quarter FY08

- On January 17 the NOAA Hydrology Program Manager announced his approval of the Community Hydrologic Prediction System (CHPS) Acceleration Team (CAT) recommendation to proceed with implementation of the ready-made Deltares software package "Flood Early Warning System" (FEWS) as the infrastructure solution for CHPS. The draft XEFS software design, based on service-oriented concepts, must be adapted to accommodate FEWS as the infrastructure.

- Hence the XEFS implementation project is now heavily dependent on the CHPS implementation project; Deltares expects to play an important role in this effort later in the CHPS project cycle.
- Meanwhile HSEB began converting HSMB HEP's existing prototype software to the FEWS Pilot environment. The goal is to provide the HEP group with a CHPS environment for familiarization purposes and to facilitate the future ensemble science-to-operations path.
- The XEFS Execution Manager, Chris Dietz, delivered a draft version of the XEFS Implementation Plan to the XEFS Oversight Group for review and discussion; a final version of the plan is expected in Q3. This plan will provide input for the OSIP Gate 1 project plan.
- HOSIP project P-2007-019 has been delayed (refer to problems/issues below).

3rd Quarter FY08

- Preparation activities continued; some interactions with Deltares took place regarding FEWS capabilities
- Completed and delivered FEWS-based prototypes (EPP2, HMOS, etc.) to HSMB. Training provided. Intention is that HSMB will now continue XEFS prototyping activities in a CHPS environment instead of its alternative software structure.
- Completed port of most NWSRFS long-term ensemble components to CHPS. ESPADP will be more complicated; work will begin next quarter.
- The annual Hydrologic Ensemble Prediction Experiment (HEPEX) conference was held in Delft, Netherlands in June. Deltares continues to collaborate with the NWS on hydrologic ensembles.
- Activities related to ensembles capabilities in CHPS are not scheduled to begin until CY 2009.

4th Quarter FY08

- HSEB modified the NWSRFS climate-based ensembles application (ESPADP) to work with CHPS. This is a BOC requirement until XEFS is implemented.
- Hank Herr of HSEB formed a team and conducted an Ensembles Product Generator (EPG) project kick-off meeting on August 29. The goal is to define requirements for the EPG. Hank has begun the task of gathering all known ideas regarding desired ensemble products for users.
- OHD hosted a visit from Albrecht Weerts (Deltares ensembles focal point) during the week of September 8. Albrecht gave presentations and demonstrations of Delft-FEWS; he also reviewed preliminary plans for CHPS-based ensembles. Albrecht documented details for the CHPS Preparation Workshop #2 at NERFC in September (see status report for Core Goal #13 - CHPS).

1st Quarter FY09

- Deltares initiated routine (bi-weekly) conference calls with OHD to define how the requirements for XEFS map onto the FEWS-based CHPS architecture.

2nd Quarter FY09

- New HSEB Project Area Leader started in January: Mark Fresch
- OHD initiated weekly conference calls with XEFS Planning Team which includes members from Deltares, HSD, CNRFC, NWRFC, HSMB, and HSEB.
- Held planning and design discussions with Deltares. Deltares began implementing framework for EPG.
- EPG: completed draft high-level requirements and started Phase 1 design.
- XEFS EPP3 prototype was partially delivered, and integration into FEWS began.

3rd Quarter FY09

- A new and separate AHPS status sheet was created for implementing the Hydrologic Ensemble Forecasting System (HEFS), i.e. implementing new ensemble functionality into the operational baseline.
- The EPP3 prototype code has been nearly completed and model adapters have been written to enable EPP3 to run within CHPS. EPP3 and the model adapters are undergoing integration testing.

4th Quarter FY09

- EPP3 beta testing at CNRFC was delayed a few weeks in order to rebuild EPP3 with the latest FEWS release. EPP3 and the model adapter are being retesting, and the installation instructions are being written.
- Updated HMOS prototype code was completed by HSMB, and the model adapter was updated to enable HMOS to run within CHPS. HMOS and the model adapters are undergoing integration testing.
- Updated EnsPost prototype code was completed by HSMB – no changes to the model adapter are needed. EnsPost and the model adapters are undergoing integration testing.
- The XEFS support web-page was drafted. Next quarter, the Ensemble Verification System will be the first XEFS component provided on that web-page.

1st Quarter FY10

- EPP3, HMOS, and EnsPost and their model adapters passed integration by HSEB.
- The Ensemble Verification System (EVS) was made available for distribution on the HSMB web-page.

Problems Encountered/Issues:

1st Quarter FY08 - None

2nd Quarter FY08

- Due to the requirement to implement a CHPS-based XEFS, HSEB in-house resources are necessarily focused on development of an operational CHPS before attention can be paid to an operational XEFS. Consequently, HSEB has only 1 software engineer (Hank Herr) assigned to the XEFS project. Deltares resources will not become available to assist the NWS with hydrologic ensemble forecasting until Q4 FY09. This delays the date of providing an experimental hydrologic forecast capability to all RFCs (as part of CHPS) until mid-2011 when CHPS is deployed. Milestones listed above have been adjusted accordingly.

3rd Quarter FY08 - None

4th Quarter FY08 - None

1st Quarter FY09 - None

2nd Quarter FY09

- Some AHPS due dates will need to be adjusted to reflect realistic schedules.

3rd Quarter FY09 – None

4th Quarter FY09

- XEFS prototype code was completed later than scheduled.
- Some XEFS components will need to be rebuilt with each new CHPS and FEWS delivery.
- Due to the risk and resources associated with beginning of CHPS BOC operations, OHD will likely need to provide more support to RFCs participating in XEFS field tests.

1st Quarter FY10

- EPP3, HMOS, and EnsPost await beta-testing by CNRFC.

XEFS Operational Support

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Dong-Jun Seo

Objective: Support calibration, testing and experimental operation of XEFS components at RFCs

Milestones

Task	Due Date	Status
<ul style="list-style-type: none">Identify test basins and obtain necessary data	Q1	In progress
<ul style="list-style-type: none">Calibrate test basins	Q2	
<ul style="list-style-type: none">develop data description documents, user's guides and scientific training materials	Q3	
<ul style="list-style-type: none">Support RFCs	Q1-Q4	

Accomplishments/Actions

1st Quarter FY10

- Identified new tests basins in NW- and ABRFCs. The NWRFC test basins are AUBW1 and HHDW1 of the Green River. The ABRFC test basins are BLUO2, GLOO2, MORA4 and TALO2.

Problems Encountered/Issues

1st Quarter FY10

- None

XEFS Implementation

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Dong-Jun Seo

Objective: Support integration of EPP, EnsPost and HMOS calibration processors in CHPS

Milestones

Task	Due Date	Status
<ul style="list-style-type: none">Support integration of EPP, EnsPost and HMOS calibration processors in CHPS	Q1-Q4	In progress
<ul style="list-style-type: none">Integration-ready calibration processors for EPP, EnsPost and HMOS	Q4	
<ul style="list-style-type: none">Test data sets and results for EPP, EnsPost and HMOS calibration processors	Q4	

Accomplishments/Actions

1st Quarter FY10

- Developed regression test plans and procedures for EPP3
- Carried out the test for the updated version of EPP3

Problems Encountered/Issues

1st Quarter FY10

- Discovered an error in EPP3 time stamping of hindcast files.

XEFS Evaluation and Improvement

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Dong-Jun Seo

Objective: Evaluate performance of EPP, EnsPost and HMOS via hindcasting for AB-, CN- and NWRFC test basins

Milestones

Task	Due Date	Status
Improve uncertainty propagation modeling in HMOS	Q1	Complete
Obtain data for hindcasting and design hindcasting experiments	Q2	
Carry out hindcasting experiments	Q3	
Generate verification results	Q4	
Analyze and summarize the results	Q4	

Accomplishments/Actions

1st Quarter FY10

- Implemented the improved uncertainty propagation modeling in the prototype HMOS.
- Carried out hindcasting experiments using the improved model.
- Carried out verification of the HMOS hindcasts using EVS.

Problems Encountered/Issues

1st Quarter FY10

- None

HEFS Phase I Implementation

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Jon Roe, Mark Fresch

Objective: Implement Phase 1 HEFS into the operational baseline, including the CHPS Graphics Generator, and XEFS components EPP3, EnsPost, HMOS, and Ensemble Verification Service

Milestones

Task	Due Date	Status
HEFS Graphics Generator: Pass HOSIP Gate 2	FY10, Q2	Requirements and ConOps were drafted
HEFS Graphics Generator: Pass OSIP combined Gate ½	FY10, Q2	Requirements and ConOps were drafted
Complete the Phase 1 Graphics Generator Implementation	FY10, Q1	Delayed until Feb 2010
Complete the Phase 2 Graphics Generator Implementation	FY10, Q4	Not started

Accomplishments/Actions

3rd Quarter FY09

1. A new HOSIP project P-2009-007 "Implementation of Hydrologic Ensemble Forecast Service (HEFS) passed HOSIP Gate 1 was created to replace HOSIP project 2007-019, Experimental Ensemble Forecasting System (XEFS). The new HEFS project is the implementation of new ensemble related functionality into the CHPS baseline. Whereas XEFS encompasses several experimental ensemble sub-projects. The new HEFS project is an umbrella projects, and as a result, it will not continue through HOSIP. However, the XEFS components ready for implementation into the CHPS operational baseline will be sub-projects of the HEFS umbrella project which will go through HOSIP and OSIP. The Graphics Generator is the first of these sub-projects and also passed HOSIP Gate 1 during the quarter.

4th Quarter FY09

2. The Graphics Generator Phase 1 code is nearly complete. An early limited functionality version was provided to the steering team for feedback. The completed Phase 1 code will be released in coming weeks to get feedback from RFCs. In addition, the Graphics Generator Phase 2 requirements were drafted.

1st Quarter FY10

3. Additional preliminary versions of the Graphics Generator Phase 1 were made available to RFCs for feedback. Additional Phase 1 functionality was added, and the Graphics Generator was rebuilt using the latest CHPS and IFD releases. Installation instructions were written. More thorough in-house testing has been done and several minor bugs were fixed. As a result of these activities and on-going testing, the final Phase 1 delivery has been delayed until the end of February.

Problems Encountered/Issues

3rd Quarter FY09

- None

4th Quarter FY09

- Extra Graphics Generator coding was needed to provide better usability with the CHPS Interactive Forecast Display (IFD).
- Due to the risk and resources associated with beginning of CHPS BOC operations, the milestone of making the Graphics Generator part of the CHPS baseline may need to be delayed.

1st Quarter FY10

4. Due to the high priority nature of CHPS development and migration, little feedback was received from the field and some IFD functionality was not available to the Graphics Generator. As a result, more thorough testing was done, and some IFD functionality was reproduced and customized within the Graphics Generator. In addition, software development activities were underestimated.

NCEP Collaboration (THORPEX)

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Dong-Jun Seo

Objective:

- Accelerate development of reliable and skillful hydrometeorological (precipitation, temperature and potential evaporation) ensemble forecast products for hydrology and water resources applications
- Fast-track infusion of new and improved hydrometeorological ensemble and probabilistic guidance products into the RFC operations through the EXperimental Ensemble Forecast System (XEFS)

Milestones

Task	Due Date	Status
Implement downscaled NAEFS forecasts for Alaska domain, including additional new near-surface variables for CONUS (2m min/max & dewpoint temp, 10m wind speed and direction).	Q2	EMC had CCB (Change Control Board) meeting in Jan. 13, in preparation of charter and RFCs (Request For Changes)
Produce verification metrics for RFC-based spatial areas (RFC areas, main carryover groups, and main forecast groups) for GEFS and NAEFS.	Q2	
Implement operational generation of combined (RFC & CPC) precipitation and pseudo-precipitation dataset for bias correction and downscaling of NAEFS ensembles.	Q3	In final stage for evaluation and unified codes/scripts for RFCs.
Test climatological downscaling of NAEFS precipitation forecasts over CONUS.	Q3	

Accomplishments/Actions

1st Quarter FY10

- Nothing to report

Problems Encountered/Issues

1st Quarter FY10

- None

Compare Post Processors

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Dong-Jun Seo (Project Lead: James D. Brown)

Objective: Compare the performance of competing statistical post-processors. The project will be conducted in two phases. The first phase, to be completed by Q4 FY10, will compare the performance of Ensemble post-processors or Ensemble Model Output Statistics (EMOS) for basin-scale precipitation forcing and will focus on their lead-time specific statistics (rather than ensemble statistics across several lead times). Phase II will involve a wider intercomparison, also extended to streamflow, and will involve external collaborators.

Milestones

Task	Due Date	Status
Identify the candidate post-processors for Phase I	Q1	Complete
Develop a post-processor inter-comparison tool (PIT) to orchestrate the hindcasting and verification of each post-processor (including relative skill assessment) with dependent and independent validation modes.	Q1	Complete
Implement Indicator Cokriging (ICK) within the PIT framework.	Q1	Complete
Implement Bayesian Model Averaging (BMA) within the PIT framework.	Q2	
Implement logistic regression (LGR) within the PIT framework.	Q2	
Prepare the precipitation and streamflow data sets.	Q2	
Carry out the comparison experiments for post-processor Phase I.	Q3	
Analyze and summarize the results.	Q4	
Write a draft paper for an international journal on the results of the Phase I intercomparison.	Q4	

Accomplishments/Actions

1st Quarter FY10

- Identified the candidate post-processors for Phase I of the intercomparison experiment, namely Bayesian Model Averaging (BMA), logistic regression (LGR), and indicator co-kriging (ICK). Each of these post-processors is known to be suitable for bias-correction of precipitation. The techniques were selected to cover a range of complexity in terms of the number of parameters that must be estimated. The BMA technique is based on a parametric model of the predicted distribution (e.g. a gamma distribution with point mass at zero). The LGR technique is also parametric, based on the "S-shaped" logistic distribution, but is applied on a threshold-by-threshold basis (i.e. prediction of the unbiased precipitation amount not exceeding a given threshold). The ICK technique is non-parametric and employs a threshold-by-threshold correction without a distributional assumption.
- Developed a post-processor intercomparison tool in Java to orchestrate the hindcasting and dependent/independent validation (via verification with EVS) for each post-processor. First, a post-processor must be implemented within the PIT framework. This is straightforward, since

the PIT tool allows an executable to be called directly and can also interface with code in R and Matlab. One implementation of each post-processor (i.e. with one input/parameter set) is identified as a “scenario” in the PIT framework. The PIT tool takes an XML input file with each scenario identified and executes each scenario consecutively.

- Finished implementing a prototype version of BMA in the PIT framework using the R package “ensembleBMA”. This framework currently allows for modeling of precipitation from one forecasting model with a predicted distribution that is assumed to be gamma distributed with a point mass at zero.
- Started identifying suitable datasets for the intercomparison experiment. Evaluation of sensitivity to sample size will be evaluated with the frozen GFS precipitation hindcast dataset (20+ years). We also have access to the operational GEFS (5 years) and SREF datasets (2+ years).

Problems Encountered/Issues

1st Quarter FY10

- None.

Hydrologic Uncertainty in Extreme Events

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Dong-Jun Seo

Objective: Develop requirements, science strategy and proof-of-concept capability for modeling hydrologic uncertainty in extreme events. The initial focus will be on extreme floods

Milestones

Task	Due Date	Status
Literature review & diagnostic analysis of ensemble hindcasting results for past extreme floods	Q1	In progress
Develop model framework for accounting of hydrologic uncertainty in extreme floods	Q2	
Design & carry out simulation experiments for proof-of-concept demonstration and analysis	Q3	
Analyze and summarize the results	Q4	

Accomplishments/Actions

1st Quarter FY10

- The initial literature review has been carried out.
- A subset of the past extreme flood events have been identified.

Problems Encountered/Issues

1st Quarter FY10

- None

Evaluate Climate Forecasts

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Dong-Jun Seo (Project lead: Satish Regonda)

Objective: NCEP's climate forecasts, including CFS and consolidation, for their effective use in EPP

Milestones

Task	Due Date	Status
Obtain/update and prepare data	Q1	Completed
Design the evaluation experiment	Q2	
Carry out the evaluation experiment	Q3	
Analyze and summarize the results	Q4	

Accomplishments/Actions

1st Quarter FY10

-

Problems Encountered/Issues

1st Quarter FY10

- None

Gridded Water Resources

Distributed Model - SAC-SMA Parameters

Core Goal: Provide, then improve, gridded water resource data production capability

Management Lead: Mike Smith

Objective: The objective of FY08 work will be to conduct research on usage of SSURGO data and verify whether the use of the data can improve current SAC-SMA parameter estimation and further our distributed modeling. Download data for various projects. Procedures will be developed to store and process the massive data sets.

Milestones

Task	Due Date	Status
Evaluate performance of SSURGO-based and STATSGO based parameters on soil moisture simulation over DMIP 2 basins where data available.	FY09 Q3	In process
Derive and test a priori parameters by using combination of STATSGO and Curve Number Grids	FY07 Q3	complete
Complete hydrograph analysis of STATSGO-SSURGO parameters and hydrologic simulations, journal paper and RFC recommendations.	FY09 Q3	Analysis completed; paper draft for comments
Derive SSURGO parameters for remaining states (including Hawaii, Alaska and Puerto Rico if possible)	FY09 Q3	CONUS Complete; Puerto Rico In progress

Accomplishments/Actions

1st Quarter FY08

- Ziya Zhang ran simulations using new parameter sets on 16 basins, and started results analyses for a journal paper which is under preparation.

2nd Quarter FY08

- Ziya Zhang nearly done with analysis of simulations from SSURGO and STATSGO parameters. HOSIP Stage III plan conditionally approved March. Yu Zhang and Seann Reed helped APRFC derive SAC parameters for Hawaii. Yu provided the processing scripts to APRFC. The RFC gathered the SSURGO data and use land use / land cover data from a local university in the absence of the USGS LULC data. Processing nearly complete: now need to aggregate up to 4km scale. Assessed availability of STATSGO and SSURGO data for Puerto Rico and provided this update to SERFC.

3rd Quarter FY08

- Ziya Zhang has completed the comparison of a priori SAC parameters based on SSURGO and STATSGO soil data and analysis of simulations for 16 selected basins using derived parameters. Draft paper has been finished for group members to comment. Results were presented in Spring AGU (2008) meeting and DOH conference. Ziya Zhang started work with Yu Zhang to derive SSURGO based SAC parameters for the rest of CONUS.

4th Quarter FY08

- Ziya Zhang has downloaded available SSURGO data (as well as land cover data) for the rest of CONUS. Started deriving SSURGO-based a priori SAC parameters.

1st Quarter FY09

- Ziya Zhang derived SSURGO-based a priori SAC parameters for 23 states in the scales of HRAP, half HRAP and a quarter HRAP. The result grids only cover CONUS where data are

available so far. Newly derived grids need to be combined with those derived before for the rest of CONUS states.

2nd Quarter FY09

- Ziya Zhang derived SSURGO-based a priori SAC parameters for 23 states and combined with the results for 25 other states after correcting some problems. Applied climate adjustment factors from STATSGO parameters to newly derived SSURGO-based a priori SAC parameters covering CONUS. Filled the missing values from STATSGO-based a priori SAC parameters. A new mask grid is created to tell users whether the value for a specific grid cell is SSURGO-based or STATSGO-based or is water body (as missing values).
- Ziya began work on Puerto Rico SSURGO parameters.

3rd Quarter FY09

- Ziya Zhang has finished deriving SSURGO-based a priori SAC parameters for CONUS and delivered the grids to RFCs and other users to use.
- Ziya Zhang finished a draft paper on the comparison of SSURGO-based and STATSGO-based a priori SAC parameters and their effect on distributed modeling and soil moisture estimates.

4th Quarter FY09

- Ziya Zhang has downloaded raw SSURGO data for all states.
- Ziya Zhang finished revisions to the paper on the comparison of SSURGO-based and STATSGO-based a priori SAC parameters and their effect on distributed modeling and soil moisture estimates based on co-authors' comments.

1st Quarter FY10

- None for this period. Concentrated on DMIP2 related project. Wait for co-authors' comments on the draft paper.

Problems Encountered/Issues

1st Quarter FY08 - None

2nd Quarter FY08 - None

3rd Quarter FY08 - None

4th Quarter FY08

- Disk space problem has been resolved and 150GB of disk space became available. Final derived SAC parameters may not cover all counties for some states due to the SSURGO data unavailability. These holes can be filled later once the SSURGO data become available

1st Quarter FY09

- Ran out of disk space during the data process. Additional disk space of 100GB was requested. Some of procedures were run twice due to a header error in scripts.

2nd Quarter FY09

- Uncovered a geographic projection problem caused either by HRAP window not being big enough at the beginning (for the case of state Maine) or the initial USGS land cover (1992) as a template was not compatible with 2001 data set (for the case of state Florida). The problem associated with Florida caused extra work of re-processing previously processed data of 25 states.
- Given the climate adjusted parameters, need to recompute the frequency plots of parameters over CONUS for summary paper.
- Scripts and programs used to derive SSURGO parameters for CONUS didn't apply to Puerto Rico due to HRAP coordinates being limited.
- Discovered that OHD does not have the intermediate data on hand containing soil texture data. These data would be good to have for SAC-HT and future parameterization work.

3rd Quarter FY09

- Due to the introduction of a new algorithm to estimate one of the SAC parameters, it's necessary to download raw SSURGO data for all states. Disk space needs to be resolved before downloading and processing the SSURGO data.

4th Quarter FY09

- Summer student hired to download raw SSURGO data departed early; Ziya completed the downloading tasks.

1st Quarter FY10 - None

Distributed Model - Evaluate New Parameter Approaches

Core Goal: Provide, then improve, gridded water resource data production capability

Management Lead: Mike Smith

Objective: The objective will be to evaluate a parameter regionalization approach for SAC and Snow-17 using lumped calibrated parameters. Value of soil moisture data for evaluation and calibration of *a priori* parameters will be also analyzed.

Milestones

Task	Due Date	Status
<ul style="list-style-type: none"> Derive relationships between lumped calibrated SNOW-17 parameters and watershed properties 	Mar. 31, 2005	On schedule
<ul style="list-style-type: none"> Generate SNOW-17 parameter grids over Susquehanna River basin 	Apr. 30, 2005	On schedule
<ul style="list-style-type: none"> Evaluate and calibrate derived SNOW-17 parameter grids using snow observations and streamflow 	Dec. 30, 2005	On schedule
<ul style="list-style-type: none"> Evaluate <i>a priori</i> SAC-SMA parameters over Oklahoma Mesonet using runoff and soil moisture data at different spatial scales 	Sep. 30, 2005	Completed April 2005
<ul style="list-style-type: none"> Initial evaluation of possibility of using soil moisture data to calibrate <i>a priori</i> SAC-SMA parameters 	Sep. 30, 2005	completed
<ul style="list-style-type: none"> Develop a physically-based procedure to derive <i>a priori</i> values of the most critical SNOW-17 parameters over CONUS 	Mar 30, 2006	Completed for MF-max, MF-min.
<ul style="list-style-type: none"> Evaluate <i>a priori</i> STATSGO-based SAC parameters over selected regions (e.g., Oklahoma) by comparing to available measurement (e.g., soil moisture, runoff, evaporation) 	May 31, 2006	completed
<ul style="list-style-type: none"> Analyze effect of climatological PE on the water balance simulation results, and develop a calibration approach of the spatial adjustment of climatological PE grids. Modify HL-RDHM code to incorporate developed PE calibration approach. 	FY08 Q4	completed
<ul style="list-style-type: none"> Test PE adjustment approach on a large region, e.g., Oklahoma Mesonet using soil moisture data. 	FY08 Q4	completed
<ul style="list-style-type: none"> Perform calibration of SAC parameters, and analyze their relationships to <i>a priori</i> and climatologic indexes 	FY08 Q4	completed
<ul style="list-style-type: none"> Test SAC and SNOW-17 derived parameters over uncalibrated areas/basins 	FY07 Q1	Snow-17 initial tests of 2 parameters nearly complete. Being done in DMIP2 western basins.
<ul style="list-style-type: none"> Evaluate soil moisture simulations over DMIP2 basins from lumped and distributed models. 	FY07 Q3	Completed in Q4 for DMIP 2
<ul style="list-style-type: none"> Extend analysis and tests of a climate adjustment to <i>a priori</i> parameters (increase time period and basins) 	FY09 Q1	complete
<ul style="list-style-type: none"> Compare long-term climatologic variables (precipitation, evapotranspiration) to their averages over shorter test periods, and evaluate effect of their differences on the climate adjustment factors. 	FY09 Q1	Complete

<ul style="list-style-type: none"> • Test PE adjustment approach to large region i.e., uncalibrated areas/basins from lumped and distributed simulation results. 	FY09 Q2	Completed, parameters put on FTP site.
<ul style="list-style-type: none"> • Investigate other sources of Snow-17 <i>a priori</i> parameter ranges: use energy budget model results 	FY08 Q4	Complete for MFMAX and MFMIN
<ul style="list-style-type: none"> • Derive and test first-cut <i>a priori</i> values of Snow-17 parameters SCF and UADJ 	FY08 Q4	Completed FY09 Q4, parameters delivered with report
<ul style="list-style-type: none"> • Evaluate new ZPERC algorithm, provide recommendations to RFCs. Deliver new ZPERC grid. 	FY09 Q4	Completed FY09 Q4; new ZPERC put in new STATSGO parameters and put on ftp site.
<ul style="list-style-type: none"> • Finish journal paper on derivation of Snow-17 parameters 	FY10 Q1	On track.

Accomplishments/Actions

1st Quarter FY05

- Task 1: Similar analysis was performed for Cont-API model
- Task 4: Runoff and soil moisture data for the Oklahoma Mesonet region are collected.

2nd Quarter FY05

- Task 1. Basic relationships developed.
- Task 2, 3. Completed. Fekadu Moreda and Zhengtao Cui delivered distributed model and all parameter grids to MARFC. Fekadu presented paper on this work at the conference of the International Association of Hydrologic Science (IAHS) in Brazil in April.
- Task 4. Ziya Zhang has acquired and processed fine scale soils data for the Oklahoma areas. Victor completed this task and presented work at the conference of the International Association of Hydrologic Science (IAHS) in Brazil in April.

3rd Quarter FY05

- Victor and Fekadu tested the distributed model for a multiyear period over the OK. Mesonet domain to evaluate against soil moisture estimates from the NLDAS project run by NCEP.

4th Quarter FY05

- Victor extended the analysis of Oklahoma Mesonet simulation results. Developed climate adjustment factor to modify the existing a-priori parameters. A grid of these adjustment factors was developed for CONUS. Testing with OK Mesonet soil moisture justifies again the physics of the modified SAC-SMA model. Hypothesis is that the climate index can improve a-priori parameter identification and thus simplify the calibration of distributed and other models.

1st Quarter FY06

- Developed CONUS data set of *a priori* parameters for Snow-17 based on Eric Andersons initial suggestions.

2nd Quarter FY06

- Ongoing work on evaluation and calibration Sacramento parameters over Oklahoma region and 20 selected river basins. Distributed and lumped approaches are used in these tests. Tests of climate adjustments are ongoing.

3rd Quarter FY06

- Published two papers (IAHS Red Book) on evaluation of *a priori* SAC parameters over the Oklahoma Mesonet region.
- Extended analysis of *a priori* parameter performance over Oklahoma Mesonet basins for lumped-based simulations using runoff and soil moisture measurements.
- Soil moisture measurements were incorporated into the automatic calibration process as an

additional performance measure. Preliminary results suggest that the use of soil moisture data can improve a parameter estimation procedure and reliability of model parameters. They are also helpful in manual calibration to be sure that 'good results are achieved for scientifically sound reasons'.

4th Quarter FY06

- More soil moisture tests were performed at 2 New Mexico sites. These tests led to development of an approach that allowed rescaling of soil moisture states simulated using HRAP scale *a priori* parameters into point soil moisture states by using local soil properties (porosity and wilting point). It has potential for simulation/prediction of soil moisture at a local scale. However, wide range tests need to be performed.

1st Quarter FY07

- SAC-HT: Additional soil moisture tests conducted at the request of New Mexico State researchers (for the Economics Study of the NOAA Water Resources program). The developed approach to rescale soil moisture states simulated using HRAP-scale *a priori* parameters into point soil moisture states by using local soil properties was tested for 48 Oklahoma Mesonet soil measurement sites. These simulations show much higher accuracy at Mesonet sites comparing to just use of HRAP-scale *a priori* parameters without rescaling. This shows promise for end-users to get site-specific soil moisture information during coarse-scale (i.e., 4km grid) executions of the SAC-HT model. End-users can obtain local soil properties from field-collected soil samples or perhaps SSURGO data would be useable.
- Snow-17: Developed CONUS estimates of MF-MAX, MF-MIN using Eric Anderson's recommended ranges modified by topographic attributes such as aspect and forest cover. Delivered estimates to CBRFC. Began testing parameters for selected areas in the Juniata River basin (MARFC).

2nd Quarter FY07

- Developed CONUS Sacramento model parameters from STATSGO data and variable NRCS Curve Number (CN). Parameters developed at 1km and 4km scale. Developed parameters for Maryland to support Baltimore Flash Flood Project with DHM-TF. Began initial evaluation of the STATSGO parameters with/without variable CN.
- Obtained calibrated SNOW-17 parameters of several basins from ED Clark (CBRFC). Started comparing these parameters with *a priori* Snow-17 parameters.
- Updated HOSIP documents to reflect the current status of these tasks.
- Investigators at U. New Mexico report 'promising' results using Victor's soil moisture simulations for an agricultural economics study. Draft journal paper being prepared.

3rd Quarter FY07

- Victor Koren performed analyses and prepared presentation on the use of soil moisture observations for calibration for IUGG conference in Italy, July 2007.
- Reviewed draft report from U. New Mexico: "Exploratory Case Study on the Value of Improving Soil Moisture Forecast Information for Rangeland Management" which showed the value of soil moisture data from the SAC-HT model.

4th Quarter FY07

- Victor completed analysis of using soil moisture data to aid model calibration. Victor developed paper from July IUGG conference and submitted to Journal of Hydrology for publication. Results showed that more consistent SAC model parameters can be developed when using additional data for calibration (not just basin outlet streamflow)
- Received request to provide CONUS 1/8 degree scale SAC parameters for NCEP's North American Land Data Assimilation System (NLDAS) project. This will provide more independent testing and evaluation of the soils-based parameters at a national scale.
- Began testing of *a priori* Snow-17 parameters in western DMIP 2 basins.
- Completed analysis of distributed model soil moisture simulations for DMIP 2. Presented results at DMIP 2 workshop September 10-12, 2007.

1st Quarter FY08

- Evaluated *a priori* grids of MFMAX and MFMIN over DMIP2 basins.
- Processed CONUS-wide NARR wind data and generated monthly climatological grids. A preliminary HRAP grid of UADJ parameter was generated using these climatological grids.

2nd Quarter FY08

- Developed new approach to derive ZPERC SAC parameter from infiltration theory and first principles. Delivered SAC and SNOW-17 parameters for DMIP 2 western basins to NASA for testing in the NASA Land Information System. Monthly UADJ and SCF grids (October through June) have been created for CONUS. They are under evaluation. Used simplified energy-budget snow model equations to derive another set of MFMAX and MFMIN parameters for CONUS: evaluation underway.

3rd Quarter FY08

1. Obtained DEM and forest grid to start investigation on a snow-17 parameterization for Alaska
2. Completed MFMAX and MFMIN parameters for CONUS with simplified energy-budget snow model and Naoki Mizukami presented the methodology in National DOH conference. The parameter grids were also created at 1/2 HRAP for mountainous regions. Evaluation still underway.

4th Quarter FY08

1. Completed the first phase of climate adjustment to a priori PE and SAC-HT parameters. Technical note on this analysis is close to finish. The next step will be application of the adjustment to regional/CONUS a priori grids and testing in lumped and distributed modes.
2. Completed preliminary MFMAX and MFMIN grids for Alaska using simplified energy budget model. Next step, ratio of MFMIN to MFMAX needs to be evaluated to refine parameter values for Alaska and possibly for CONUS.

1st Quarter FY09

1. Prepared a Technical note of the first phase of climate adjustment to a priori PE and SAC-HT parameters. Generated CONUS grids of adjusted UZTWM and LZTWM parameters. Started tests of the climate adjusted parameters.
2. Victor presented his lumped model results with newly derived climate adjusted parameters in dry areas. Presentations made to RFCs and OHD.
3. Modified the melt factor parameterization methodology (aforementioned as energy-budget based temperature index model) based on the results of observed snow data analysis. Recomputed MFMAX and MFMIN parameter grids for CONUS (1 hrap, 1/2 hrap, 1/4 hrap) and Alaska (1 hrap). Naoki Mizukami presented the methodology and evaluation in AGU conference. Computed monthly UADJ parameter grid for Alaska.

2nd Quarter FY09

- a. Revised energy-budget based temperature index model based on documents obtained from Russia. Recomputed MFMAX and MFMIN over CONUS and Alaska based on the revised model. Recomputed UADJ with winter month average wind for CONUS and Alaska. Extend the grid domain to Canadian portion of RFCs. Started evaluation (comparison with lumped parameter, sensitivity tests).

3rd Quarter FY09

- i. Analyzed sensitivity of streamflow simulation to parameters (MFMAX and MFMIN). Tested scaling effect on simulation, random error effect on simulation. Started writing a separate paper (from SNOW17 melt factor parameterization paper) regarding this analysis.

4th Quarter FY09

- ii. Wrote a report on three major *a priori* parameterization work (MFMAX and MFMIN and UADJ) and delivered it to RFCs along with HRAP-scale parametric grids (CONUS and AK). The majority of the evaluation of *a priori* parameters is based on comparison with SNOTEL observed melt factors. Sensitivity tests (random error effect on simulation) are completed (focusing on MFMAX and MFMIN). More analysis will be performed with journal paper preparation if necessary.

- iii. CONUS STATSGO -based parameters with new climate adjustment delivered to RFCs via FTP site. Also, these parameters are being tested in NCEP's 30yr reanalysis.
- iv. Climate adjustment also applied to the CONUS SSURGO parameters and delivered to RFCs via FTP site.

1st Quarter FY10

- v. Finished a journal paper draft on a priori melt factor parameterization method and put it in the OHD internal review process.
- vi. Initial analyses on melt factor sensitivity of distributed hydrologic simulations (streamflow and basin average SWE) were performed using the east folk of Carson basin (one of DMIP2 western basins) and the results revealed ensembles of the simulations with perturbed melt factor grids (100 random error added MFMAX and MFMIN grids) is heavily biased compared to a priori simulation. Currently under investigation on this behavior.

Problems Encountered/Issues

1st Quarter FY05 - None

2nd Quarter FY05 – None

3rd Quarter FY05 – None

4th Quarter FY05 - None

1st Quarter FY06 – None

2nd Quarter FY06 - None

3rd Quarter FY06 - None

4th Quarter FY06

- Planned work delayed to work on SnowMIP and New Mexico soil moisture simulations to support Water Resources Economics study. However, the use of soil moisture in the auto-calibration process and a technique of relating point-to-grid soil textures from the New Mexico work will lead to better calibrated parameters to use in the analysis of a climatological adjustment.

1st Quarter FY07

- Delays again due to additional tests requested by the New Mexico Economics study.

2nd Quarter FY07 - None

3rd Quarter FY07

- Hydro group currently managing over 30 projects; OHD prioritization needed to reduce workload.

4th Quarter FY07

- PE adjustment of parameters delayed due to Cold Regions workshop, DMIP 2 gridded data derivation for FY07 OHD AOP item, results analysis, preparation of OHD Science Plan, and other projects.
- Fekadu Moreda leaving Hydrologic Modeling Group to join River Mechanics group. Fekadu worked on the *a priori* estimates of the Snow-17 parameters. Replacement won't start until November 13, 2007

1st Quarter FY08 - None

2nd Quarter FY08

- Testing of *a priori* Snow-17 parameters SCF and UADJ delayed due to group turnover and need to analyze DMIP 2 precipitation data sets for HMT testing.

3rd Quarter FY08 - None.

4th Quarter FY08 - None

1st Quarter FY09 – None

2nd Quarter FY09 - None

3rd Quarter FY09 – Issue with SCF parameterization - difficulty in relating physical basin characteristics and parameter values. Hold off this task. Slight delay due to new DMIP2 QPE analysis, Red River flooding investigation

4th Quarter FY09 – None

1st Quarter FY10 - None

Snow Model - Plans for using SNODAS Output

Core Goal: Provide, then improve, gridded water resource data production capability

Management Lead: Michael Smith

Objective: Develop plan and approach to use SNODAS output to generate run-time modifications to Snow-17 in operational setting.

Milestones

Task	Due Date	Status
<ul style="list-style-type: none"> • Review existing Snow-17 modifications 	May 2006	completed
<ul style="list-style-type: none"> • Familiarization with SNODAS processes and products 	July 2006	Complete
<ul style="list-style-type: none"> • Devise approach 	Aug 2006	Draft plan delivered 9/06
<ul style="list-style-type: none"> • Acquire data & write draft code 	Sept 2006	On hold
<ul style="list-style-type: none"> • Test approach. 	Nov 2006	On hold
<ul style="list-style-type: none"> • Allocate funding for 4 months (\$50K) for a contractor to support the SSST. Locate contractor 	FY08 Q3	On hold
<ul style="list-style-type: none"> • Support SSST by developing draft plan 	Q4	

Accomplishments/Actions

1st Quarter FY06

- No work this period

2nd Quarter FY06

- Developed draft outline of tasks and approach (no. 3 above), gave to Eric for comment after his return to Virginia in March.

3rd Quarter FY06

- Eric Anderson began in-depth planning of project; began coordinating with NOHRSC on details of data and SNODAS model outputs. Eric completed the review of run-time mods such as those with AESC.

4th Quarter FY06

- Eric completed draft plan. Sent to OHD for review. Final plan will be submitted in October 2006.

1st Quarter FY07

- AHPS funding of \$38K approved for HL portion of this work.

2nd Quarter FY07

- The Snow Science Steering Team needs to approve this project

3rd Quarter FY07

- The Snow Science Steering Team needs to approve this project. Discussions at the August Cold Regions workshop may lead to a plan or decision for this work.

4th Quarter FY07

- This project was briefly discussed at the Cold Regions Hydrology (CRH) Workshop in August.

No word yet on the actions to be taken from the CRH workshop.

1st Quarter FY08

- Need approval from the Snow Science Steering Team prior to continuing the project

2nd Quarter FY08

- Determined that OHD needs to develop a more concise plan for the direction of the NWS Snow Hydrology program

3rd Quarter FY08

- See issues

4th Quarter FY08

- See 'issues' section.

1st Quarter FY09

- Mike prepared FY09 AHPS plan based on Eric Anderson's recommendations. Submitted plan to the AHPS/Water Resources Innovation Theme team for consideration. Sent AHPS plan to Don Cline to keep him in loop.

2nd Quarter FY09

- AHPS funding for this project appears likely.

3rd Quarter FY09

- AHPS funding approved for NOHRSC for this project. Eric Anderson provided updates to plan and sent to Don Cline and OHD.

4th Quarter FY09

- None

1st Quarter FY10

- None

Problems Encountered/Issues

1st Quarter FY06

- No work started as Eric was finishing Snow-17 coding changes and final documentation. Also, the AHPS funding amounts weren't finalized.

2nd Quarter FY06 - None

3rd Quarter FY06 - None

4th Quarter FY06

- Snow Science Steering Team created to provide overall direction. This project is included in the list of all OHD, NWS. NOHRSC plans for coordination. Data needed for this project is not available will have to be generated via 'Re-analysis' at NOHRSC; may be a large effort. (note: AHPS SLF Theme Team assigned this item a fairly high priority.)

1st Quarter FY07

- The Snow Science Steering Team needs to approve this project.

2nd Quarter FY07

- The Snow Science Steering Team needs to approve this project

3rd Quarter FY07

- The Snow Science Steering Team needs to approve this project

4th Quarter FY07

- The Snow Science Steering Team needs to approve this project

1st Quarter FY08

- Need approval from the Snow Science Steering Team prior to continuing the project

2nd Quarter FY08

- Determined that OHD needs to develop a more concise plan for the direction of the NWS Snow Hydrology program

3rd Quarter FY08

- SSST has not acted on Eric Anderson's emails and recommendations.

4th Quarter FY08

- SSST has not acted on Eric Anderson's emails and recommendations. Mike will re-submit this plan for FY09.

1st Quarter FY09

- None

2nd Quarter FY09

- none

3rd Quarter FY09

- Project would benefit from having NOHRSC review Eric's most recent suggestions to the plan.

4th Quarter FY09

- Project would benefit from having NOHRSC review Eric's most recent suggestions to the plan, especially in regard to the required re-analysis

1st Quarter FY10

- No activity on this project. It needs to be jump-started.

Auto Calibration for Distributed Model

Core Goal: Provide, then improve, gridded water resource data production capability

Management Lead: Mike Smith

Objective: The objectives of this work include developing tools and procedures for auto-calibrating the HL-RDHM to generate parameters for the AWIPS DHM delivered in OB7.2. Two phases are identified for this area of research. First, initial work will focus on auto-optimization of the scalar multipliers of all the gridded parameters (SAC, Snow-17, and routing) so that all parameters are adjusted uniformly. This was done manually in DMIP 1 with good success. A prerequisite for this work is the development of sound lumped hourly parameters. Second, future funding will support work to optimize individual gridded parameters for groups of grids. FY07 work dovetails with the DMIP 2 and other projects.

Milestones

Task	Due Date	Status
1. Modify RDHM to be called by a generic 'wrapper'	FY07 Q2	complete
2. Test initial auto calibration with OK DMIP 2 basins.	FY07 Q2	complete
3. Explore performance issues in context of DMIP 2	FY07 Q4	complete
4. Evaluate multi-time scale objective function.	FY07 Q2	complete
5. Test Rosenbrock and/or Davidon-Fletcher-Powell search algorithms	FY07 Q3	Put on hold
6. Automatic calibration extended to lumped Snow-17	FY08 Q1	Complete
7. Investigated separate procedures for elevation zones for mountainous areas.	FY08 Q4	In progress
8. Evaluate combined automatic and manual calibration strategy	FY08 Q4	Complete for non-snow basins; in progress for basins including snow
9. Develop outline for overall strategy for distributed model calibration	FY08 Q3	In progress
10. Develop approach for auto calibration of elevation zone parameters	FY09 Q1	Delayed to put HL-RDHM components into FEWS

Accomplishments/Actions

1st Quarter FY07

- Developed initial HL-RDHM 'wrapper' algorithm to test various minimization approaches.

2nd Quarter FY07

- Simple direct search algorithm added to 'wrapper' to find best parameter scalar multipliers. This was tested for DMIP 2 with good success. Rosenbrock search algorithm is being tested now. Additionally, a promising new search algorithm developed in 2006 called Dynamically Dimensioned Search (DDS) was located and the code obtained for use free of charge. Coding advances in HL-RDHM were provided to HSEB.
- Developed HOSIP documents for this project.

3rd Quarter FY07

- HL-RDHM with calibration feature presented to all RFCs at the June distributed modeling workshop at ABRFC. Training provided to workshop participants. Minor bugs corrected and continued streamlining of the procedure achieved.

4th Quarter FY07

- HL-RDHM with calibration feature testing in DMIP 2 Oklahoma basins; showed good performance evidenced by comparing results to other models.
- Paper on use of simplified search algorithm and soil moisture data using multi-time scale objective function prepared.
- Hydro modeling group began Multi-step Automatic Calibration Strategy ('MACS') type calibration procedure combining manual calibration with automatic calibration in an iterative process. This used in DMIP 2.
- Presented multi-time scale objective function to DMIP 2 participants at DMIP 2 workshop; several participants want to use it.
- Field support of RFC use of calibration tool

1st Quarter FY08

- RDHM automatic calibration module was restructured (mostly dealing with parametric data and model states) that led to significant reduction in run time.
- Automatic calibration was extended to SNOW17 operation and tested for DMIP2 basins.
- Created off-line scripts to perform zone adjustment of RDHM parametric grids. This approach was tested for the Carson basin in manual calibration of SAC-SMA and SNOW17 models. Linkage to RDHM software needs to be performed for an automatic option.

2nd Quarter FY08

- Planned work put on hold until strategy for distributed model calibration developed. Mike to develop initial outline.

3rd Quarter FY08

- None

4th Quarter FY08

- Mike and Victor reviewed U. Arizona DMIP 2 journal paper reporting on use of *a priori* parameters, regularization, multi-objective optimization, and spatially-variable parameter adjustment for distributed model calibration. Hydro group will review and make recommendations as part of DMIP 2 results analysis.

1st Quarter FY09

- Victor prepared revised AHPS/Water Resources plan for scaling based on elevation zones or other defined property. Mike presented Victor's plan to the Distributed Modeling Team.
- Evaluated DMIP 2 western basin results. OHD's calibration strategy produced very reasonable results compared to other DMIP 2 participants.

2nd Quarter FY09

- Hydrogroup studied various papers on calibration of distributed models.

3rd Quarter FY09

- Mike began ideas for HOSIP SON to incorporate U. Arizona's work on calibration strategies.
- Zhengtao and Victor added the frozen ground options to the existing auto-calibration component of HL-RDHM and posted updated code on AWIPS LAD.

4th Quarter FY09

- Various bugs fixed in the auto calibration routine
- Hydro group discussed including the U. Arizona work for FY-10 AHPS/WR funding.

1st Quarter FY10

- Various bugs fixed in the auto calibration routine: most notable was the improper handling of scalar multipliers.
- Hydro group developed and presented AHPS/WR proposal to investigate U. Arizona's parameterization (regularization) approach and to explore their MATLAB version of HL-RDHM containing multi-objective calibration routines.
- Mike evaluated the uncalibrated and calibrated results of DMIP 2 in the Oklahoma basins.

Results indicate that the strategy used for HL-RDHM works well. Other results from DMIP 2 show that if a model does not perform well with initial parameters, then calibration alone cannot greatly improve its performance compared to other DMIP 2 models.

Problems Encountered/Issues

1st Quarter FY07 - None

2nd Quarter FY07

- Long HL-RDHM calibration run times noticed. This was solved by adding code from the older HL-RMS to the new version HL-RDHM so that the calibration routines execute a streamlined version of the distributed model.

3rd Quarter FY07 - None

4th Quarter FY07

- Planned activities such as testing the Rosenbrock search procedure delayed due to other projects' priority.

1st Quarter FY08 - None

2nd Quarter FY08

- Planned work put on hold until strategy for distributed model calibration developed. Mike to develop initial outline.

3rd Quarter FY08

- The development of a strategy for distributed model calibration may need to be coordinated via the to-be-formed Distributed Modeling Investment Team.

4th Quarter FY08 - None

1st Quarter FY09 - None

2nd Quarter FY09

- No funding for contractor support provided for FY09.

3rd Quarter FY09

- Limited work until SON is developed for U. Arizona's work.

4th Quarter FY09

- Limited work as HL-RDHM components are being migrated to FEWS environment.

1st Quarter FY10

- Limited work as HL-RDHM components are being migrated to FEWS environment.

Distributed Modeling Spatial Display and Analysis Tool (DHM-SDAT)

Core Goal: Provide, then improve, gridded water resource data production capability

Management Lead: Mike Smith

Objective: Analyze existing display tools for Distributed Hydrologic Modeling.

Milestones

Task	Due Date	Status
1. Coordinate with Distributed Modeling Gap analysis team and the data assimilation work within the XEFS project.	TBD	Team being formed
2. Investigate existing display tools for gridded data to be used in research and in prototype testing.	FY10 Q1	Complete

Accomplishments/Actions

1st Quarter FY08

- Project initiated

2nd Quarter FY08

- Team being formed to perform a survey of existing tools to support distributed modeling spatial display and analysis

3rd Quarter FY08

- Investigated potential for using GrADS visualization software to view DHM-TF output. Software is versatile and performs well, but can only display HRAP output in an interpolated lat/lon view.
- Examined GRASS GIS as a platform for visualizing DHM-TF output. Although featuring a steeper learning curve than GrADS, the software can directly display DHM-TF output on the native HRAP grid, as well as ingest relevant hydrological and geographic shape files.
- This work to be coordinated via the to-be-formed Distributed Model Investment Team

4th Quarter FY08

- Created several GRASS GIS scripts for automated and simple-interactive viewing of DHM-TF output
- Started initial investigation of Google Earth and AWIPS as two possible means of visualizing DHM-TF output data. Investigated CHPS (FEWS) display of gridded information. Configured FEWS to display gridded XMRG time series in GRIB format successfully. However, the configuration for FEWS to display gridded time series in ArcInfo ascii raster format was not successful.

1st Quarter FY09

- Refined GRASS GIS scripts for viewing of DHM-TF data
- Created several Google Earth scripts for automatic generation of KML formatted files necessary for viewing DHM-TF data within Google Earth
- Created Fortran programs which can be used to reformat any gridded or point data into KML format for viewing in Google Earth
- Worked with OHD personnel to obtain in-house XrmgViewer software to view XMRG formatted files. Currently testing software to determine potential usefulness.

2nd Quarter FY09

- Refined Google Earth Fortran conversion programs, making them general enough for use with

most HRAP/XMRG files.

3rd Quarter FY09

- Continued to refine Google Earth Fortran conversion programs, expanding their flexibility and capabilities.
- Presented a Google Earth GoToMeeting detailing the usefulness of Google Earth to hydrologic visualization efforts
- Consulted with several WFOs regarding their openness to using Google Earth to visualize DHM-TF output versus another method such as D2D. Response has been positive.

4th Quarter FY09

- Further developed Google Earth Fortran conversion programs, increasing their stability, and expanding their flexibility and capabilities.
- Developed GRASS GIS visualization scripts for use with DHM-TF at Pittsburgh WFO
- Gathered feedback from Pittsburgh WFO concerning usability of Google Earth and GRASS GIS DHM-TF output images

1st Quarter FY10

- Refined Google Earth conversion tool to enable use in visualizing DMIP2 related data

Problems Encountered/Issues

1st Quarter FY08 - None

2nd Quarter FY08 - None

3rd Quarter FY08 - None

4th Quarter FY08

- Need to coordinate with investigation of GFE. Mary Mullusky says that personnel associated with GFE are very interested in hydro requirements.

1st Quarter FY09 - None

2nd Quarter FY09

- No FY09 funding for contractor support.

3rd Quarter FY09

- None

4th Quarter FY09

- None

1st Quarter FY10

- None

Distributed Model Intercomparison Project (DMIP II)

Core Goal: Provide, then improve, gridded water resource data production capability

Management Lead: Mike Smith

Objective: Develop then Refine Gridded Water Resources Products.

Milestones

Task	Due Date	Status
<ul style="list-style-type: none"> Complete analysis of simulations from the Oklahoma experiments 	Q4	On track
<ul style="list-style-type: none"> Submit papers for DMIP 2 Special Issue 	Q4	On track
<ul style="list-style-type: none"> Design OK forecast mode experiment 	FY09 Q1	On track
<ul style="list-style-type: none"> DMIP 2 Western Basin Experiments: generate and analyze basic (w/o HMT data) distributed and lumped simulations 	FY09 Q1	On track
<ul style="list-style-type: none"> Finalize the 'basic' (non-HMT) gridded QPE and QTE data and make available to DMIP 2 participants. 	FY10 Q1	On track.
<ul style="list-style-type: none"> Complete analyses of participants' western basin 'basic' simulations. Q4 	FY10 Q4	On track
<ul style="list-style-type: none"> (Jointly with Hydrometeorology Group) Support ESRL and NSSL in the derivation and evaluation of the HMT products for DMIP 2. Q4 	Fy10 Q4	On track
<ul style="list-style-type: none"> Deliver to DMIP 2 the HMT advanced data for 2005-2006 with new modeling instructions. Q3 	FY10 Q3	On track
<ul style="list-style-type: none"> OHD support for DMIP 2 participants 	ongoing	On track

Accomplishments/Actions

1st Quarter FY08

- Completed Western Basins lumped and distributed simulations using HL-RDHM with Snow-17 at one hour time step. Begin to analyze the HMT QPE estimates. Sent out summary of DMIP 1 results in Oklahoma to RFCs and Regions.

2nd Quarter FY08

- Received all final simulations from OK participants. Began writing journal papers. OHD Hydromet group performing MPE analysis of NSSL/ESRL 'merged' radar QPE with in situ rain gauge data. Final product will be 'best' QPE from HMT gap filling radar.

3rd Quarter FY08

- Wrote paper for DMIP 2 Special Issue on the overview of the Oklahoma experiments. Began writing the overall results paper. Results confirm that OHD model is very sound.
- OHD co-chaired a session at Spring AGU in Florida on DMIP 2 results. Mike gave invited presentation on OHD distributed modeling.
- OHD tested HMT radar QPEs from the NSSL SmartR and ESRL-XPOL radars from the 2005-2006 period. This effort used MPE to bias-adjust the radar fields using 12 rain gauges. These data sets were successfully run through the OHD distributed model, showing that the proposed method of evaluating the HMT 'gap filling' radar QPEs is valid.
- Mike and Dave Kitzmiller attended annual HMT workshops in Sacramento.
- Ezio Todini from Italy and U. Arizona will submit western basin simulations.

4th Quarter FY08

- Ezio Todini from Italy submitted western basin simulations.
- Mike presented Oklahoma and Western basin results at July DOH conference.
- Mike and Hydro-group writing the overall results journal paper for the Oklahoma experiments.
- Mike coordinated DMIP 2 journal papers for the Journal of Hydrology Special Issue.
- Vrije U. of Brussels will continue their participation with a new PhD student; will develop soil moisture simulations per DMIP 2 modeling instructions and submit them to OHD.

1st Quarter FY09

- Began preliminary evaluation of all participants' simulations for western basin experiments. A wide range of performance was noted by the models for the two western basins. The OHD results are very reasonable in comparison.
- Mike prepared presentation on DMIP 2 results for AMS conference session on 'Comparison of Distributed Models'. Mike will also chair the session.
- Provided reviews and Guest Editor comments on several DMIP 2 journal papers.
- Mike continued to write the overall results paper for the Oklahoma experiments
- Mike and student of Ezio Todini from Italy discussed their modeling approaches.

2nd Quarter FY09

- Hydro and Hydromet groups in OHD developed plan to use the calibration MAP preprocessor and MPE to generate gridded QPE fields as a second approach. The MAP preprocessor was modified to output complete hourly time series of precipitation at NCDC and Snotel sites. Initial testing of these point time series shows promise. These data will then be fed into MPE. A small data set consisting of four station data was used for preliminary testing of MPE to generate a gauge-only QPE field.
- Work began in earnest to fix the previous QPE derivation problems and generate a new data set in the west. Initial delivery of gridded QPE data for 2001-2006 in April.
- DMIP 2 Special Issue of the Journal of Hydrology: submitted papers were pushed through the review process. OHD papers being refined. Murugesu Sivapalan will submit two papers.
- ABRFC gridded QPF data acquired for DMIP 2 forecast experiments.

3rd Quarter FY09

- Revised QPE data set (2001-2006) for the Western Basins delivered. Initial analysis shows that the North Fork American River data are reasonable, but the data for the East Fork Carson river are not. The East Fork Carson River data seem to be inconsistent over time.
- Hydromet and Hydrogroups derived another approach to compute gridded gauge-only QPE in the mountains: Use point hourly time series from NCDC and SNOTEL stations as input to MPE to compute a gauge-only gridded field. This method was successfully tried last year with for a 3 month simulation period using 12 hourly stations around the North Fork. Mike and Zhengtao modified the Calibration MAP preprocessor to write out hourly time series generated at hourly and daily station locations. These are being used as input for MPE. If found to produce good QPE estimates, this approach is can be easily used in the field as it is based on existing and known algorithms.
- Mike and Hoshin Gupta continued to process papers for the Special Issue of the Journal of Hydrology covering the Oklahoma experiments.
- Coordination meeting held with Marty Ralph, Tim Schneider, David Kingsmill (ESRL) and OHD to map out tasks to get best forcing data for DMIP 2 Western Basins. Data requirements were reviewed and plan was developed. Gary Carter approved plan. Radar-based QPE for the western basins will be developed with David Kingsmill leading the effort.

4th Quarter FY09

- Continued processing of the papers for the DMIP 2 Special Issue of the Journal of Hydrology.
- Hydro and Hydromet groups in OHD tested an alternative method to generate gridded QPE estimates. Gridded data were produced from 1980 to 2006 and run through HL-RDHM. Simulations with these data look reasonable, even though there are many daily NCDC values

which are not time distributed.

- Continued to QC the NCDC data used as input to MAP and MPE. Many errors found: the data often show -999 for missing data, but the NCDC paper records show that the data should be -998 for missing accumulation values.
- Held coordination meeting with ESRL, NSSL, and Marty Ralph. OHD work is on schedule.

1st Quarter FY10

- Hydro group continued to make progress with a new method for deriving hourly gridded gauge-only QPE fields. Zhengtao Cui made several modifications to the Calibration MAP preprocessor: it outputs hourly times series at each station, it flags non-distributed daily values over 0.5" in depth. Zhengtao wrote a script to time-disaggregate the flagged values uniformly over a user-specified time interval of say 12 or 24 hours.
- Feng created gauge-only gridded QPE fields for the North Fork American and the East Fork Carson basins.
- Mike announced to the RFCs the availability of the modified MAP code and the use of MPE to create historical gridded hourly precipitation fields. NWRFC began using the approach and requested several updates which Zhengtao performed. They derived gridded 6-hour historical data sets for their entire RFC domain.
- Ziya Zhang performed QC of NCDC and Snotel data for the Carson basin. He downloaded and processed precipitation data for 68 stations in and around Carson River Basin used as input to MAP and MPE. Manually quality controlled procedures have been done and xmrgr grids have been generated. Ran HL-RDHM and stat_q programs to check consistency of generated precipitation data.
- He began evaluating the QPE grids via cumulative plots and runs with HL-RDHM. Initial tests indicate the data and approach to deriving gridded QPE are sound
- Mike completed the data QC of the North Fork data (300 corrections in 20 years). The goal here is to provide guidance to the RFCs on how much data QC is needed when deriving hourly gridded QPE fields.
- Brian Cosgrove used Google Earth display software developed for the DHM-TF project to display gridded precip fields to analyze errors in the time distribution of NCDC and SNOTEL data. Mike announced that the RFCs could use this tool as well.

Problems Encountered/Issues

1st Quarter FY08

1. Two Hydro group members transferred to other OHD HSMB groups.

2nd Quarter FY08

- Gauge only gridded precipitation and temperature data found to have problems. Temperature problems were with time stamp and code for missing data in the underlying SNOTEL data. Temperature data fixed and posted to DMIP 2 web site. Precipitation data for 2003 to 2006 appear to be inconsistent with 1987 to 2002 data. Investigation underway as to cause. We would like to understand the inconsistency before using these data as a basic forcing into which we insert the HMT QPE data. One Hydro group member left to take over River Mechanics group; replacement won't start until Q3.
- Unsure whether to wait for HMT QPE data from winter 2006-2007 before using the data in DMIP 2: must analyze resources at ESRL, OHD, and NSSL.
- Third Hydrogroup member transferred to another HSMB group, leaving Mike to write both the DMIP 2 overview and results papers.

3rd Quarter FY08

- HMT radar QPE fields for 2005-2006 found to be deficient. The artifacts are visible at the 1 degree by 1km scale, but not really at the final 4km scale. The radar data needs to be reprocessed before it can be used for DMIP 2 or other HMT evaluations.
- Evaluation of OHD 'basic' gridded gauge-only QPE data being performed by CNRFC. These data were found to be deficient from 2003 onward but may be deficient from 1987 to 2002 as well.

4th Quarter FY08

- John Schaake worked at CNRFC to analyze the 1987-2006 gauge-only QPE grids: found the 2003-2006 period unusable. John developed a new strategy for estimating the obs times for daily stations and will regenerate the gridded time series data. His method was approved by Art Henkel and Rob Hartman.
- OHD Hydromet group found that reprocessed HMT radar QPE fields are still deficient. The OHD Hydromet group is working with ESRL and NSSL to solve the problems.

1st Quarter FY09

- Newly derived gauge-only precipitation grids for 1987-2006 should be finished by Jan. 31, 2009.
- Group discovered small problem with temperature data for a SNOTEL station outside of the North Fork basin boundary. Investigation revealed that the errors are only for a certain few years and that there are no impacts.

2nd Quarter FY09

- Another delay in deriving the QPE for the western basins. However, the work was started and put on a fast track. Another approach was planned as a back up. This second approach uses the Calibration MAP program and MPE.
- Hydro group found a small anomaly in the lumped, uncalibrated simulations for SLOA4; problem is the result of two slightly different parameter sets and is easily resolved.

3rd Quarter FY09

- Evaluation of the revised gauge only QPE data set for the Western Basins showed that the Carson Data are not consistent over time.
- Work on this project and others postponed to focus attention on the analysis of the Red River of the North flooding in March and April of this year. Work resumed in July on DMIP 2.

4th Quarter FY09

- Many NDCD data errors in translation from the raw data to the OH Datacard time series. Many miss-coded values of -999 should be -998 in the data. Also, many of the SNOTEL observations cannot be time distributed and they lead to spatial 'bull's eyes' in the resultant gridded QPE grids from MPE.
- NSSL work to develop the approach to process the HMT radar data was delayed 3-4 months. A revised schedule was developed and approved by Marty Ralph.

1st Quarter FY10

- Longer than expected time required to QC the NCDC data for both the American and Carson basins.

OHD – NCEP Coordination

Core Goal: Provide, then improve, gridded water resource data production capability

Management Lead: Pedro Restrepo

Objective: Coordinate OHD and NCEP hydrologic modeling efforts

Milestones

Task	Due Date	Status
NCEP assign point of contact for coordination with OHD	Q2	Complete
Develop Detailed Work Plan	Q4	Complete

Accomplishments/Actions

1st Quarter FY08

1. N/A

2nd Quarter FY08

1. NCEP hired Jairui Dong to provide point of contact for coordination with OHD on NCEP hydrologic modeling activities

3rd Quarter FY08

1. Work plan in progress

4th Quarter FY08

2. Jiarui finished and presented the work plan. It was reviewed and accepted by OHD.

1st Quarter FY09

3. Work in progress

2nd Quarter FY09

4. Jiarui presented the progress report. Work is progressing according to schedule

3rd Quarter FY09

5. Work in progress

4th Quarter FY09

6. Jiarui prepared a 30 year reanalysis that will be used by the HEP group at OHD.

1st Quarter FY10

7. Work in progress.

Problems Encountered/Issues

1st Quarter FY08 - N/A

2nd Quarter FY08 - None

3rd Quarter FY08 - None

4th Quarter FY08 - None

1st Quarter FY09 - None

2nd Quarter FY09 - None

3rd Quarter FY09 - None

4th Quarter FY09 - None

1st Quarter FY10 - None

Support Distributed Model Implementation

Core Goal: Provide, then improve, gridded water resource data production capability

Management Lead: Mike Smith

Objective: Provide training and support to RFCs as necessary to support implementation for river, flash flood, and new product forecasting.

Milestones

Task	Due Date	Status
<ul style="list-style-type: none"> • Provide training and support to RFCs as necessary to support implementation for river, flash flood, and new product forecasting. 	Ongoing	
<ul style="list-style-type: none"> • 		
<ul style="list-style-type: none"> • 		
<ul style="list-style-type: none"> • 		

Accomplishments/Actions

1st Quarter FY09

5. OHD hosted NERFC personnel for 3 days of hands-on training.

2nd Quarter FY09

- MARFC requested hands-on training for early summer 2009
- At OHD's request, ABRFC modified the XDMS program to display gridded temperature
- OHD provided RFCs with guidance on how to derive channel routing parameters given that USGS event observations are no longer easily available.
- OHRFS spinning up use of HL-RDHM: OHD provided guidance on how to generate soil moisture simulations.
- Victor provided 'filled' Sac parameter grids to NERFC. Shane provided assistance to SERFC for Puerto Rico and the Tar basin. Shane helped John Halquist with Sac parameters for CONUS runs. Shane, Victor, and Naoki helped NERFC noted problems along the coastline with missing Snow-17 values.

3rd Quarter FY09

- Per CBRFC request, Victor and Zhengtao developed a channel loss addition to HL-RDHM. This algorithm mimics the CHANLOSS NWSRFS operation.
- Victor and Zhengtao helped OHRFC fix a problem with generating soil moisture fields.
- Hydro group began working with MARFC for training at OHD July 21-24
- Paula Cognitore of MARFC requested the program that converts MAP time series into XMRG grid time series. Zhengtao sent her the code and instructions.

4th Quarter FY09

- Hydro group provided 3 days of hands-on training to MARFC in July.
- Hydro group assisted OHRFC in the development of soil moisture products for their entire RFC domain.
- Grids of the Snow-17 Melt factors for CONUS and Alaska were delivered to the RFCs via an ftp site.
- Work continued to migrate HL-RDHM components to the CHPS environment.
- Hydro group and Hydromet group provided revised "R" scripts for the derivation of the channel routing parameters.
- Hydro group assisted LMRFC with the set-cell-value function to set values in the xmrgr

format grids.

1st Quarter FY10

- Zhengtao made multiple bug fixes to HL-RDHM per field and OHD researcher requests. These were put on the AWIPS LAD for availability to the RFCs. He and Victor fixed a bug in the auto-calibration routine in which the scalar multipliers were not stored correctly.
- Zhengtao was nominated by one of the RFCs for his 'tireless' efforts to support their distributed model implementation.
- Zhengtao assisted OHRFC with getting HL-RDHM to run the Snow-17 model in their area.
- Zhengtao assisted CBRFC with a routing problem.
- Zhengtao located the source of slowness when running HL-RDHM over CONUS at NOHRSC. He fixed the bug and now a 6-hour run of HL-RDHM over CONUS at an hourly time step takes under 5 minutes when before it was 88 minutes.

Problems Encountered/Issues

1st Quarter FY08

- None

2nd Quarter FY08

- Loss of contractor Shane Sheldon March 31.

3rd Quarter FY09

- An emerging problem is the need for a consistent approach for deriving gridded temperature data.
- The USGS flow measurements that we use for estimating initial channel routing parameters were taken off-line by USGS. USGS has concerns about the validity of the measurements because they are sometimes taken at different points in the channel reach. Users of these data must now request them from USGS offices.

4th Quarter FY09

- None

Hydrologic Verification

Improve Hydrologic Hindcasting

Core Goal: Verify our forecast and uncertainty information

Management Lead: Julie Demargne

Objective: Support the validation of the components of the Experimental Ensemble Forecast System (XEFS) through end-to-end hydrologic hindcasting in the NWS’s Community Hydrologic Prediction System (CHPS) environment. The large samples of ensemble hindcasts will be used for systematic verification of the XEFS components with the Ensemble Verification System. This activity will include producing XEFS streamflow ensemble hindcasts from the combination of the EPP3 ensemble preprocessor, the hydrologic processor, the EnsPost ensemble postprocessor, and from the HMOS streamflow ensemble processor and for the different forecasting options of each component. This is done via the configuration of customized CHPS workflows using the existing operational single-valued forecasting workflows defined by the RFCs, the latest XEFS prototypes and CHPS model adapters. This activity includes the following:

- 1) Develop hindcast workflows in the CHPS environment in collaboration with the RFCs and Deltares to generate the XEFS streamflow ensembles from the EPP3, the hydrologic processor, the EnsPost, and from the HMOS. To quantify the skill in the XEFS output ensembles, reference ensemble forecasts will be defined as the streamflow ensembles produced from climatological forcing inputs. Hindcast workflows will be developed for at least one test basin for each of the CAT RFCs in FY10 and each of the CAT-II RFCs in FY-11, depending on the RFC progress made for CHPS implementation.
- 2) Develop user’s manual for installation and operation of the CHPS hindcasting workflows to release the hindcasting workflows to the RFCs.
- 3) Produce large sample hindcast datasets for various test basins and XEFS forecasting scenarios to support the validation of the different XEFS components across several climate regions and for different hydrologic processes (e.g., regulations).
- 4) Enhance the hindcasting workflows to include newly developed XEFS processes, XEFS components (e.g., data assimilation), and CHPS model adapters, and to analyze the different sources of uncertainty and error in the ensemble forecasts.
- 5) Support hindcasting studies done by the RFCs, the HSMB and other CHPS collaborators. This will include the coordination with the HSMB/Hydraulics Group to integrate the HEC-RAS hydraulic model in the CHPS hindcasting workflows.

Milestones

Task	Due Date	Status
Release CHPS hindcast workflows for test basins at the 4 CAT RFCs	FY10 – Q3	Ongoing
Develop user’s manual for installation and operation of CHPS hindcast workflows	FY10 – Q3	
Release CHPS hindcast workflows for test basins at the CAT-II RFCs along with user’s manual	FY11 – Q3	
Produce large sample hindcast datasets for different test basins and XEFS forecasting scenarios to support XEFS validation	FY10 – Q4	
Enhance CHPS hindcast workflows to include new XEFS processes and analyze sources of uncertainty and error	FY11 – Q4	

Accomplishments/Actions**1st Quarter FY10**

- Participated in the XEFS meetings with Deltares and HSEB to discuss the integration of the XEFS components into the CHPS environment. Successfully tested the FEWS import workflow to ingest the EPP3 ensemble hindcast files into the FEWS database. This routine will be used for streamflow hindcasting with the EPP3 ensembles based on the GFS and CFS reforecast files (which are in a different format than the real-time GFS and CFS forecast files and therefore cannot be processed inside the current CHPS-XEFS system).

Problems Encountered/Issues**1st Quarter FY10 - None**

Improve Hydrologic Forecast Verification Strategies

Core Goal: Verify our forecast and uncertainty information

Management Lead: Julie Demargne

- Objective:**
- 1) Support the NWS Hydrologic Forecast Verification team to produce, evaluate and improve the standard verification metrics and products proposed in the September 09 verification team report (available at http://www.nws.noaa.gov/oh/rfcdev/docs/NWS-Hydrologic-Forecast-Verification-Team_Final-report_Sep09.pdf) for the NWS's Community Hydrologic Prediction System Verification Service (CHPS-VS). This activity will include:
 - supporting the existing software and prototypes (the Interactive Verification Program (IVP), the Ensemble Verification System (EVS), and the EVS Confidence Interval prototype (evsCI)) to run verification case studies;
 - supporting the new/expanded verification case studies at all RFCs for deterministic and probabilistic forecasts;
 - developing a guidance report for the RFCs on different verification scenarios (e.g., to identify observed and forecast datasets, spatio-temporal scales, key metrics and products, stratification) for a range of forecasting situations (e.g., flood, drought, tide) and for different applications; it will include EVS project file templates and CHPS display documentation;
 - enhancing the display prototype capabilities to generate the proposed verification standards with existing software (EVS, Graphics Generator, other CHPS displays) for the RFC verification case studies;
 - developing a second team report on improved verification standards with RFC verification case studies and XEFS verification case study to demonstrate how verification helps guide the improvements of the forecasting system.
 - Perform a user analysis of the verification products with the NWS Hydrologic Forecast Verification team, the RFC Service Coordination Hydrologists, and OCWWS/HSD to define requirements for the dissemination of verification products. This will include:
 - soliciting feedback from the RFC forecasters and forecast users on proposed standard verification products; this will be coordinated with the real-time verification survey about summary diagnostic verification products, which is part of the AHPS project entitled "Improve Ensemble Forecast Verification";
 - developing a report on forecasters' and users' feedback and providing an initial list of verification products recommended for dissemination;
 - coordination with the AHPS Web Evolution Team to disseminate RFC forecast verification products along with the forecast products.
 - Support the development of additional verification training material, including:
 - supporting the development of the second COMET training module on hydrologic verification with an IVP case study using OHRFC datasets and an EVS case study with MARFC datasets;
 - developing verification training material for RFC workshops (e.g., ensemble workshop).
 - Test the proposed verification strategies (metrics, products, and diagnostic analyses) with the datasets of the verification test-bed of the Hydrological Ensemble Prediction EXperiment (HEPEX) to help improve the verification standards proposed in the second team report. Compare existing and emerging verification methodologies and software with the other test-bed participants (e.g., Environment Canada, Hydro-Québec, and ECMWF) and collaborate on a joint verification paper.
 - 5) Support the National Verification Focal Point to coordinate the verification activities within NWS (e.g., with the WR Water Supply Team), advocate for verification activities (AHPS, HOSIP/OSIP), represent hydrologic verification with respect to National Performance Management Committee (NPMC), contribute to verification policy decisions, and collaborate with academia, Deltares, NCEP and other research agencies (e.g., NCAR). This activity will include providing NCEP with RFC specific areas to be used to report NCEP ensemble verification results.

Milestones

Task	Due Date	Status
Support existing verification software and prototypes	As necessary	Ongoing
Support RFC verification case studies	As necessary	Ongoing
Develop guidance report on verification scenarios	FY10 – Q4	
Enhance display prototype capabilities to produce verification standards	FY11 – Q2	
Propose improved verification standards in the second NWS Hydrologic Forecast Verification Team report with case studies	FY11 – Q4	
Solicit feedback on proposed standard verification products	FY10 – Q2	Ongoing
Develop report on forecasters' and users' feedback on standard verification products and list products for dissemination	FY10 – Q3	
Support the development of verification training material	FY11 – Q4	Ongoing
Test proposed standard verification strategies with HEPEX verification test-bed datasets and compare methodologies with test-bed participants	FY11 – Q2	
Provide NCEP with RFC specific areas to report verification statistics	FY10 – Q4	
Support the National Verification Focal Point activities	As necessary	Ongoing

Accomplishments/Actions

1st Quarter F10

- Finalized the second team charter for the NWS Hydrologic Forecast Verification Team and updated the team website (http://www.nws.noaa.gov/oh/rfcdev/projects/rfcHVT_chart.html).
- The NWS verification team met on 12/03/09 to discuss the survey on the real-time verification functionality and summary verification products. MBRFC and NCRFC presented their initial verification results of the CR QPF horizon case study.
- Presented the user analysis of verification products planned for FY10 to the Service Coordination Hydrologists (SCH) on 11/09/2009. The SCHs agreed on working with forecast users to provide feedback.
- Presented the hydrologic forecast verification strategies proposed in the verification team report for the CHPS-VS at the Eleventh Northeast Regional Operational Workshop in Albany, NY, in November.
- Developed the verification work plan for FY10-11 with the OHD/HSMB/HEP group, the OHD/HSEB, and the AHPS Verification Planning Team. The FY10 verification work plan was presented to the OHD management and the ARC/HIC committee in November and December 2009.
- Discussed the second COMET training module on hydrologic verification with Matt Kelsch, Tom Adams from OHRFC and Andrew Philpott from MARFC. Produced a first draft of the EVS case study (including results of confidence intervals for a couple of EVS metrics with the evsCI_0.0 prototype) in coordination with Andrew Philpott. Discussed the initial IVP results with Tom Adams.
- Continued to support the verify-hydro list server to answer questions on verification software and science.
- Participated in the NPMC meetings to discuss progress on verification applications.

Problems Encountered/Issues

1st Quarter FY10 - None

Improve Ensemble Forecast Verification

Core Goal: Verify our forecast and uncertainty information

Management Lead: James Brown

- Objective:**
- 1) Conduct a systematic evaluation of hydrometeorological and hydrologic ensemble forecasts produced by the components of the Experimental Ensemble Forecast System (XEFS) for different forecasting options and across several climate regions, including predictions for regulated and unregulated basins. Including:
 - to evaluate the quality of ensemble hindcasts produced by the EPP3 Ensemble Preprocessor, the hydrologic processor, the EnsPost ensemble postprocessor, and the HMOS streamflow ensemble processor, including the factors responsible for model error and skill in different situations using the Ensemble Verification System (EVS).
 - to evaluate the sampling uncertainties of the verification metrics using the experimental prototype for confidence intervals.
 - to document the results in a scientific manuscript for publication in an international journal.
 - 2) Evaluate methods for quantifying the sampling uncertainties of various ensemble verification metrics (e.g. through confidence intervals), focusing on the metrics available in the EVS. Including:
 - to develop an improved prototype for computing confidence intervals for the EVS verification metrics.
 - to develop prototype displays for the sampling uncertainties surrounding the EVS metrics.
 - to document the prototype for computing confidence intervals, which includes a literature review of the available techniques and why the chosen techniques were adopted, together with tests that demonstrate the quality of the chosen techniques.
 - 3) Develop additional, simple, diagnostic verification measures for the EVS and examine integrated measures of forecast quality that combine information from several metrics. Including:
 - to develop a prototype version of the EVS in which a few candidate measures are included for evaluation at the RFCs.
 - to collaborate with the Verification Testbed of the Hydrological Ensemble Prediction EXperiment (HEPEX) and the National Centers for Environmental Prediction (NCEP), under the auspices of THORPEX-HYDRO.
- Evaluate methods for diagnosing the phase (timing) and amplitude errors in flow forecasts, initially focusing on single-valued flow forecasts, then extending the technique to ensemble forecasts. Including:
 - to develop an enhanced prototype of the Cross Wavelet Transform (XWT) tool previously developed for decomposing predicted flow hydrographs into amplitude and phase (timing) error (implemented in Matlab).
 - to evaluate the performance of the XWT across several test basins, both with and without regulations and for both single-valued and ensemble forecasts.
 - to develop a draft paper documenting the XWT technique for publication in an international scientific journal.
 - to document the potential uses and pitfalls of timing-error decomposition in an operational context.
 - Identify and evaluate criteria for selecting historic analogs to real-time ensemble forecasts.

Including:

- solicitation of feedback from operational forecasters at the RFCs about the forecasting situations under which historic analogs would be most useful, and the parameters on which specific queries should be built.
 - a software prototype for evaluating analog queries against a file database.
 - a brief report documenting the results from the example queries, problems identified, anticipated value and future work.
- Develop prototype displays of real-time verification information (which include historic analogs and summary verification maps) to be implemented in the NWS's Community Hydrologic Prediction System CHPS Verification Service (CHPS-VS). Including:
 - solicitation of feedback from operational forecasters at the RFCs about the summary verification statistics and products that would be the most useful and for which forecasting situations.
 - improved prototype map displays for selected verification measures and additional map displays for new verification measures.
 - prototype displays for historic analog events, together with a report on the software enhancements necessary to implement these within CHPS (specifically, the Graphics Generator component).
 - guidance for the RFCs on how to extract summary verification information for various verification scenarios.
 - Extend the EVS with known and ongoing feature requirements and bug-fixes. Including:
 - the inclusion of additional metrics and integrated measures of forecast quality.
 - enhancements in the Graphical User Interface (GUI) and software operation, such as the ability to predefine metrics to be displayed in the GUI.
 - enhancements to the documentation that accompanies the EVS, including the developer documentation and user's manual.
 - delivery of a new version of the EVS (3.0) to the public.
 - Extended testing of the EVS within the CHPS environment. Including:
 - testing the prototype EVS-CHPS Model Adapter for the EVS within a workflow context.
 - making any necessary bug fixes or enhancements to the EVS-CHPS Model Adapter.
 - delivery of a new version of the EVS-CHPS Model Adapter to the RFCs.

Milestones

Task	Due Date	Status
Evaluate quality of XEFS ensembles	FY10 Q4	Ongoing
Evaluate sampling uncertainties of verification metrics	FY10 Q4	Ongoing
Prepare a draft manuscript on the quality of XEFS ensembles	FY10 Q4	Ongoing
Develop improved prototype for computing confidence intervals for the EVS verification metrics	FY10 Q3	Ongoing
Develop prototype displays for the sampling uncertainties surrounding the EVS metric	FY10 Q4	Ongoing
Develop an Algorithm Description Document (ADD) for the confidence interval prototype	FY10 Q4	Ongoing
Implement additional diagnostic measures in the EVS for experimental testing at the RFCs	FY10 Q4	Ongoing
Develop an enhanced version of the Cross Wavelet Transform (XWT) prototype for timing error decomposition in Matlab	FY10 Q3	Ongoing
Evaluate the performance of XWT for several test basins	FY10 Q3	Ongoing
Prepare a draft manuscript on the XWT	FY10 Q4	Ongoing

Solicit feedback from RFC forecasters on real-time verification for analog selection and summary verification products	FY10 Q1	Complete
Develop a software prototype to select historic analogs from hindcast datasets using predefined queries	FY10 Q3	Ongoing
Enhance the real-time verification display prototypes of mapped statistics	FY10 Q3	Ongoing
Develop real-time verification display prototypes for the analog forecasts	FY10 Q3	Ongoing
Report on the results of the real-time verification work, together with future steps necessary	FY10 Q4	Ongoing
Enhance the GUI/software operation of the EVS	FY10 Q3	Ongoing
Enhance the documentation of the EVS	FY10 Q3	Ongoing
Release an enhanced version of the EVS (30) and associated documentation	FY10 Q4	Ongoing
Conduct extended testing of the EVS Model Adapter within a workflow context	FY10 Q2	Ongoing
Release an enhanced version of the EVS to CHPS Model Adapter and associated documentation	FY10 Q2	Ongoing

Accomplishments/Actions

1st Quarter FY10

1. Defined a new HOSIP project entitled "Improve Ensemble Forecast Verification" for FY10/FY11.
2. Designed and sent a survey to solicit feedback from RFC forecasters on the real-time verification functionality. It includes questions about the forecasting situations and parameters important for analog selection and the summary verification statistics and products that would be the most meaningful for specific forecasting situations.
3. Completed minor revisions to the EVS manuscript, which has now been accepted for publication in the international journal *Environmental Modeling and Software*.
4. Completed minor revisions of the ensemble verification paper that has been accepted for publication in *Atmospheric Science Letters* for the special issue on the HEPEX June 09 workshop.
5. Prepared the EVS Version 2.0 and associated documentation for public release (including completion of required security checks and disclaimer).
6. Designed a website for public download of the EVS Version 2.0 and made the first public release of the EVS via that website (<http://www.nws.noaa.gov/oh/evs.html>).
7. Started working on the manuscript for preliminary work on timing error analysis, focusing on testing the reliability of using XWT for timing error estimation and application to single-valued streamflow simulations in a number of test basins. Presented the methodology and initial results at the AGU Fall 09 conference in San Francisco, CA, in December 09.
8. A Beta version of the prototype (evsCI_0.0) for computing confidence intervals for EVS metrics was completed and released to HEP for internal testing. It was used to generate graphics of confidence intervals for a couple of EVS metrics; these graphics are part of the second verification training module being developed by COMET (see the AHPS project entitled "Improve Hydrologic Forecast Verification Strategies").

Problems Encountered/Issues

1st Quarter FY10 - None

Inundation Mapping

Static Flood Inundation Maps Web-Page Development and Deployment

Core Goal: **Improve Flood forecast Inundation Maps – Static Maps**

Management Lead: Victor Hom

- Objectives:**
- 1) Develop AHPS web page interface,
 - 2) Deploy flood inundation maps in a nationally consistent, scientifically sound, and objective manner, and
 - 3) Implement program elements to assure quality deliverables and maintenance of viability.

Team Members:

- Brian Astifan – Eastern Region
- Frank Bell – Southern Region
- Brent Bower – Western Region
- Laurie Hogan – Eastern Region
- Victor Hom – Office of Climate Water and Weather Services / HSD
- Kris Lander – Central Region
- Doug Marcy – National Ocean Service / Coastal Services Center
- Seann Reed – Office of Hydrologic Development / HSMB
- Wendy Pearson – Central Region

This AHPS Core Goals team have been in operations since Q4 of FY07.

I. FY10 Main Objectives and Task Areas

- Main FY10 Objectives:**
- (1) Update the NOAA Flood Inundation Map Guidelines to document the recommended methods and standards to produce Flood Inundation Map Libraries affected by levees and bridges.
 - (2) Implement, via the AHPS web portal, additional flood inundation mapping libraries and provide assistance to the regions for development/implementation of other AHPS flood inundation mapping.

Prioritized Task Areas	Responsible Organization
1. AHPS Flood Mapping Web Portal and Display	NOAA NWS and NOAA CSC
2. Quality Assurance and Consistency of Regional Flood Maps	NOAA NWS and NOAA CSC
3. National Flood Inundation Mapping Guidelines and Program Standards	NOAA NWS, NOAA CSC, and Federal Partners
4. Regional Flood Mapping Development	NOAA NWS, NOAA CSC, FEMA, USGS, USACE, and local Partnerships
5. Maintenance and Servicing Maps	NOAA NWS and NOAA CSC

II. FY10 Milestones

Task Area #1 - AHPS Flood Mapping Web Portal and Display		
Subtask 1-1 AHPS Web Portal for Bridges (FIM09-8P)	Due Date	Status
Evaluate and Prioritize Changes to AHPS Portal for bridges and roadway infrastructure.	FY10Q1	Completed
Work with Contractor on Project Scope	FY10Q2	Proposed/Awaiting Funds
Contractor Delivers FY10 AHPS Web Changes	FY10Q3	
Evaluate and Prioritize Changes to AHPS Portal for extended mapping for bridges and roadway infrastructure at risk.	FY10Q4	.
Work with Contractor on Project Scope	FY11Q1	
Contractor Delivers FY10 AHPS Web Changes	FY11Q3	
Subtask 1-2 AHPS Web Portal for Levees and Flood Risk Areas (FIM09-9P)	Due Date	Status
Evaluate and Prioritize Changes to AHPS Portal for Levees/Risk Areas	FY10Q1	Completed
Work with Contractor on Project Scope	FY10Q2	Proposed/Awaiting Funds
Contractor Delivers FY10 AHPS Web Changes	FY10Q3	
Evaluate and Prioritize Changes to AHPS Portal for extended mapping of E-19 impacts	FY10Q4	.
Work with Contractor on Project Scope	FY11Q1	
Contractor Delivers FY11 AHPS Web Changes	FY11Q3	

Task Area #2 Quality Assurance and Consistency of Regional Flood Maps		
Subtask 2-1 Quality Assurance and Phase 2 Quality Control Training Workshop (FIM08-8P)	Due Date	Status
Overview of Flood Mapping Process	FY10Q1	Completed
Flood Mapping: Hydraulics & Hydrology	FY10Q1	Completed
Flood Mapping: GIS Analysis	FY10Q1	Completed
Quality Assurance and Checking: Phase 2	FY10Q1	Completed.
CSC will create training modules for Residence Workshop.	FY10Q1	Ongoing
Conduct Webinars and QAQC Hands-on Workshop	FY10Q2	Planned for late Feb/early March 2010

Task Area #3 - National Flood Inundation Mapping Guidelines and Program Standards		
Subtask 3-1 Federal Guidelines and Statement of Work Templates (FIM08-2P)	Due Date	Status
Review Federal Guidelines V.2	FY10Q2	Proposed/Awaiting Funds
Evaluate Changes to SOW V.2	FY10Q3	
Meet with FEMA Stakeholders and NFIP Coordinators	FY10Q3	
Update Federal Guidelines to V.3 and SOW Templates V.3	FY10Q4	.
Update Federal Guidelines to V.4	FY11Q4	
Update SOW to V.4	FY11Q4	

Subtask 3-2 Partnered Program/Project Management Support Tool (FIM09-7P)	Due Date	Status
Define Scope and Deliverables	FY11Q1	Proposed/Deferred to FY11 due to AHPS Funding
Review QAQC Reports, Lessons Learned, Guidelines, SOW Templates, QAQC Training Modules	FY11Q2	
Complete AHPS Management System Tools	FY11Q4	
Complete QA Inundation/Depth Tools	FY12Q1	
Complete QA Metadata Tools	FY12Q2	

Task Area #4 - Regional Flood Mapping Development		
Subtask 4-1 Southern Region's Gulf Coast Libraries (FIM08-1P)	Due Date	Status
Implement 9 to 11 Flood Inundation Map Libraries	FY10Q4	Ongoing
Subtask 4-2 Eastern Region's Susquehanna River Flood Inundation Libraries (FIM08-4P)	Due Date	Status
Implement up to 3 Flood Inundation Map Libraries	FY10Q4	Ongoing
Subtask 4-3 Eastern Region's Delaware River Flood Inundation Libraries (FIM08-4P)	Due Date	Status
Implement up to 7 Flood Inundation Map Libraries	FY10Q4	Ongoing
Subtask 4-4 Central Region's Indiana Inundation Libraries (FIM08-4P)	Due Date	Status
Implement up to 2 Flood Inundation Map Libraries	FY10Q4	Ongoing
Subtask 4-5 Eastern Region's Killbuck Creek, OH (FIM09-3P)	Due Date	Status
Implement 1 Demonstration Flood Inundation Map Library	FY10Q4	Ongoing
Subtask 4-6 Central Region's Iowa Inundation Libraries (FIM10-1P)	Due Date	Status
Implement 1 Flood Inundation Map Libraries	FY10Q4	Ongoing
Subtask 4-7 QAQC Technical Review and Oversight Support (FIM10-2P)	Due Date	Status
Provide assistance to the regions for development/implementation of AHPS flood inundation mapping.	FY10Q4	Proposed/Awaiting Funds
Subtask 4-8 Demonstration AHPS Flood Map Libraries (FIM10-3P)	Due Date	Status
Implement 2 AHPS Flood Map Libraries one in Central and one in Western Region	FY10Q4	Proposed/Awaiting Funds

Task Area #5 - Maintenance and Servicing Maps		
Subtask 5-1 Maintain AHPS Flood Maps (FIM09-10P)	Due Date	Status
Evaluate and Prioritize Map Updates	FY10Q3	Proposed/Awaiting Funds
Work with Contractor on 1 st Priority	FY10Q4	
Supply Revisions on Test Platform for NWS Evaluation	FY11Q2	Proposed/Deferred to FY11 due to AHPS Funding
Implement Updates on Regional Servers	FY11Q3	
Evaluate and Prioritize 2 nd set of Map Updates	FY11Q2	
Work with Contractor on 2 nd Priority	FY11Q3	
Supply Revisions on Test Platform for NWS Evaluation	FY11Q4	

III. FY10 Accomplishments/Actions

AHPS Web Portal for Bridges (FIM09-8P)

- Evaluate and Prioritize Changes to AHPS Portal for bridges and roadway infrastructure.

AHPS Web Portal for Levees and Flood Risk Areas (FIM09-9P)

- Evaluate and Prioritize Changes to AHPS Portal for Levees/Risk Areas

Quality Assurance and Phase 2 Quality Control Training Workshop (FIM08-8P)

- NOAA NWS and CSC worked on the 8 modules in topic areas such as: Overview of Flood Mapping Process, Flood Mapping: Hydraulics & Hydrology, Flood Mapping: GIS Analysis, Quality Assurance and Checking: Phase 2 and provided NWS AHPS Flood Mapping Core Goals team to review.
- AHPS FIM core goals team provided new requirements to CSC and HSD for revision of the Workshop/Training to include a 90 minute webinar repeated three times and the on-site training to focus mainly on hands-on portion for QC Phase 2 in the AHPS Flood Mapping process.
- HSD and CSC put together a revised agenda to meet the new requirements.

Southern Region's Gulf Coast Libraries (FIM08-1P)

- AECOM delivered all remaining flood inundation shapefiles to CSC for review. CSC completed the review and forwarded files to the respective SR RFCs for further processing of bridges/overpasses above the main channel.

Eastern Region's Susquehanna River Flood Inundation Libraries (FIM08-4P)

- SRBC, Dewberry, and NWS completed recommendations and guidelines to proper modeling levees and conveying of levee risk areas. A white paper addresses this issue and will be incorporated into the revised National guidelines Version 3 on NOAA AHPS Flood Inundation Mapping.

Eastern Region's Delaware River Flood Inundation Libraries (FIM08-4P)

- USACE and FEMA have agreed upon the hydraulic models. This will allow USACE to develop the flood mapping shapefiles and then deliver to NWS for QC.

Central Region's Indiana Inundation Libraries (FIM08-4P)

- Project is 50% into Phase 2. USGS performed H&H/Geospatial Analyses and provided NWS Flood Maps for CR QC team to review.

Eastern Region's Killbuck Creek, OH (FIM09-3P)

- Phase 2 QC of AHPS Flood Map Libraries for KIL01 is complete. Contractor will be working on K Phase 3 AHPS Implementation.

Central Region's Iowa Inundation Libraries (FIM10-1P)

- University of Iowa IHR provided NWS a technical review of the hydraulics model and inundation mapping in the vicinity of the Iowa River at Iowa City. The technical review identified there were no levees to contend with, but flood mapping for bridges and approach ways will need checking upon delivery of flood mapping shapefiles.

QAQC Technical Review and Oversight Support (FIM10-2P)

- NWS and USGS have been providing support to the city of Albany Georgia to develop a flood map library for the Flint River at Albany Georgia (ABNG1). USGS will be rerunning the models based on NOAA guidelines and the local county GIS department will be working with NWS/USGS to review the flood mapping shapefiles.
- Boise River near Eagle Bridge n Boise, Idaho.

IV. Problems Encountered/Remaining Issues

FY10

1st Quarter FY10

General

- There is a need for storage of technical data and models used in AHPS Flood Mapping. Since CHPS is focus on near-term issues, the storage of topographic and hydraulic data have not been addressed by CHPS. This will need to be considered into the AHPS Flood Mapping Core Goals.
- Additional resources to manage the technical oversight Phase 2 of the program are needed to handle the numerous partners who have expressed interest in partnering with NWS to produce AHPS flood maps. Tools proposed in the FY10 Workplan to assist this gap was deferred to FY11, so the regions are being challenged to turn down potential projects. Regions do a pretty good job with Phase 1 scoping, but phase 2 is pressing NWS resources. Regions need support and have enough resources to handle 3-4 libraries per year.

Southern Region's Gulf Coast Libraries (FIM08-1P)

- Many of the shapefiles in the recent AECOM deliverable required clipping for bridges/overpasses which are clearly above the main channel. CSC provided the shapefiles (SHEA1, BIRN7, BLTN7, CTPN7, HOLL1, TKS7, CART2, and VICT2) to respective SR RFCs for clipping. RFCs will be following white-paper guidance on clipping before the shapefiles could be sent to Phase 3.

Eastern Region's North Carolina Libraries (FIM07-1P)

- A review of the first set of AHPS flood map libraries from North Carolina lacked a rigorous review by NWS field offices, therefore maps have elements which needed revision. Currently, these maps remain in place because maintenance funds necessary for the Tar River maps were withheld or lacked the prioritization. The withholding of these funds did not pose any adversity to NWS in FY08 and FY09 because North Carolina has been in a drought. This may not be the case in FY10 as above average precipitation is expected for the Southeast. The reduction of maintenance funds in FY10 will result in this liability, as well as some of the libraries in Southern region.

Remaining Issues from Prior Years

FY09

Central Region's Upper Midwest Flood Libraries – Indiana (FIM09-2P)

- NWS/USGS/Polis Center was not able to start work due to lack of funding FEMA did not approve the proposal submitted by the State of Indiana through FEMA's Hazard Mitigation Grant Program (HGMP), because the state needed to better demonstrate how the flood maps are to be incorporated into the State Flood Mitigation plan. FEMA also indicated to the USGS and Indiana's DHS, that the HGMP will no longer support engineering/modeling/ technical aspects of the project, nor anything related to operational warning systems. This strict interpretation has recently been implemented at the FEMA national level. The USGS is now seeking matching funds from the USACE Public Assistance to States (PAS) and assistance from the Silver Jackets Program. USGS is planning to fund one demonstration library on the White River at the Nora gage in Central Indiana.

Develop and Maintenance for North Carolina Libraries - (FIM07-1P)

- HSD have collected the review comments and will prioritize actions to get these map libraries fixed with other flood mapping and AHPS priorities in Q4. Funding for this activity and

maintenance has not been made available.

Develop Gulf Coast Libraries - (FIM08-1P)

- Local partners and users of the AHPS Flood Inundation Mapping would like to see an improved depiction of roadways, bridges, and overpasses. The improved depiction would show neither depth grids nor inundation shading on the shapefile for those portions of a bridge/overpass which are above water. The current depiction is to show the water surface profile and the corresponding depth grid. The initial web concept was that there was good information, which the user may want to know underneath an overpass, that flooding on overpasses was more intuitive and recognizable via the downloaded feature when extracted into a GIS system. This has resulted in a delay for implementing TODA1, HOLL1, and CART2. Clipping techniques have been developed and put in place. WGRFC and LMRFC are helping address this issue.

Eastern Region’s Susquehanna River Flood Libraries (FIM08-4P)

- ER HSD led a discussion amongst OCWWS HSD, NOAA CSC, AHPS Flood Mapping Core Goals Team, SRBC, and SRBC contractor on an approach to communicate flood risk for communities within the landward side behind a levee. A proposal to represent this risk area has been forwarded to AHPS contractor for pricing on the cost of modification to the existing AHPS Flood Mapping Web Interface to accommodate this partnered requirement. This issue is gaining importance, because levees are being nationally reviewed and some could be decertified. As a result, a new line item for Subtask 4-1: AHPS Web Portal Updates have been added with a hopefully target due date of Feb 2010, subject to request and availability of AHPS Funds.

FY08
- NONE -

FY07
- NONE -

V. Summary of All Milestones and Prior Activities under AHPS Core Goals Team’s Oversight

Task Area #1 - Regional Flood Mapping		
Subtask 1-1 Southern Region’s Gulf Coast Libraries (FIM08-1P)	Due Date	Status
Implemented 4 map libraries for locations in Texas in Q3FY08.	May 2008	Completed
Implemented 13 map libraries in Q4 FY08 (i.e. a total of 17 map libraries in FY08) courtesy of Hurricane Katrina Supplemental Funds.	Sep 2008	Completed
Implemented 5 Flood Inundation Map Libraries	Jun 2009	Completed
Subtask 1-2 Southern Region’s Lower Colorado River Flood Libraries (FIM08-3P)	Due Date	Status
Implemented 3 libraries for Texas sites in the Lower Colorado Basin	Sep 2008	Completed
Implement up to 5 libraries in Texas (4 in the Lower Colorado and cross transfer WGRFC/LCRA technique to 1library for the San Antonio River)	Jun 2009	Completed
Subtask 1-3 Eastern Region’s Susquehanna River Flood Libraries (FIM08-4P)	Due Date	Status
.	-	Ongoing
Subtask 1-4 Eastern Region’s Delaware River Flood Libraries (FIM09-1P)	Due Date	Status
.	-	Ongoing
Subtask 1-5 Central Region’s Upper Midwest Flood Libraries – Indiana (FIM09-2P)		
.	-	Ongoing
Subtask 1-6 Eastern Region’s Ohio Flood Libraries (FIM09-3P)	Due Date	Status

Implement remaining library within WFO Cleveland HSA	Dec 2009	1 library was implemented in April 2009, 2 nd library In-progress
Subtask 1-7 Eastern Region's North Carolina Libraries (FIM07-1P)	Due Date	Status
Implemented 16 map libraries for sites in North Carolina	Sep 2007	Completed
Implement map library for Tar River at Rocky Mount NC		.

Task Area #2 - Flood Mapping Training		
Subtask 2-1 Develop and BetaTest Goto Training (FIM08-8P)	Due Date	Status
Overview of Flood Mapping Process	Mar 2009	Completed
CSC Contractor's Report on QC/QA (work was partially funded via FY08 subtask FIM08-6P)	Aug 2009	Completed
AHPS Contractor's Report on Depth Grid processing (work was partially funded via FY08 subtask FIM08-8P)	Jun 2009	In-progress
Subtask 2-2 Develop Formal Residence Training and Hands-On Workshop (FIM09-4P)	Due Date	Status

NOTE: The task area #2 is an enhancement to FIM08-8P, previously titled "Develop Training". FY09 goals are to provide more detailed Training in different media formats, capture new QAQC goals in the AHPS Flood Mapping Process, and develop hands-on-workshop for the Regional Flood Mapping QC board.

Task Area #3 – Program Policy and Strategic Planning		
Subtask 3-1 Federal Guidelines and Statement of Work Templates (FIM08-2P)	Due Date	Status
Completed Guidelines Version 2.0	Jun 2008	Completed
Completed SOW Version 1.0 templates for H&H/GIS and AHPS Implementation (previous subtask FIM08-5P)	Jun 2008	Completed
Subtask 3-2 Evaluate the Need for Real-time vs. Static Inundation Mapping at NWS Forecast Points (FIM08-7P)	Due Date	Status
Preliminary Analysis, Development HOSIP SON, HOSIP Plan (work was partially funded via FY08 subtask FIM08-7P and HSMB Labor Funds).	Sep 2008	Completed
HOSIP Research and Analysis Phase 1 – Research and Collect Basic Data	Jun 2009	On Hold
Subtask 3-3 Western Region Flood Mapping Scoping and Planning for Partnered Candidates (FIM09-5P) (~FIM08-9P)	Due Date	Status
Present at NHWC about Flood Maps and Risk Mapping to Western partners, Meet with NHWC and Stakeholders.	May 2009	Completed
Scope and plan for FY10-FY11 AHPS Flood Inundation Map Libraries with Western Region.	Sep 2009	Completed
Subtask 3-4 Better Leverage with Risk Mapping Partnerships (FIM09-6P) (~FIM08-9P)	Due Date	Status
The objectives of this deliverable were to document Incentives (e.g. CRS Credits, StormReady, etc) and plan to develop Partnership Programs for Future AHPS Flood Mapping Sites.	June 2010	On-hold due to funding
Subtask 3-5 Program Management Support (FIM09-7P)	Due Date	Status
Develop conceptual linkage of Inundation Libraries to AHPS Probability Forecasts - (FIM08-10P)	Jul 2008	Completed -See Aptima Report
The objectives of this deliverable were (a) to develop a Long Term Plan based on Lessons Learned and Partnered Activities to ensure continuity and consistency in AHPS Flood Maps and (b) to provide governing principles to maintain the plan and assistance where necessary for OCWWS/OHD such as creation/maintenance of the AHPS Flood Mapping Toolkit, refreshing of OCWWS intranet Flood Mapping webpage, document management tracking of Federal Guidelines, and further enhancements/expansion of SOWs to meet the various partnership needs.	June 2010	Flood Mapping Website Update is now part of HSD FY10 AOP Goals, Other activities are On-hold due to funding

NOTE: Subtask 3-1 is dependent on in-kind support, therefore time delivery schedule is subjected to change. Subtasks 3-2, 3-4, and 3-5 are on-hold due to funding.

Task Area #4 – Web Evolution		
Subtask 4-1 AHPS Web Portal Updates (FIM09-8P)		
AHPS Web Portal Updates for bridges, levees, and flood risk area programmed into FY10. See Priority Task Area 1 for FY10.	-	Programmed
Subtask 4-2 Google Map (FIM09-9P)	Due Date	Status
The objectives of this deliverable were to evaluate AHPS Flood Inundation Mapping and identify features that could be more effectively and efficiently implemented and rendered on Google.	-	Withdrawn
Subtask 4-3 Prior Web Enhancements	Due Date	Status
Enhance AHPS Inundation Zoom Features (work was partially funded via FY08 subtask FIM08-5P)	Dec 2009	Moved from 6/2010, In-progress Delayed due to AHPS prioritization, Moved from 6/09

Task Area #5 – Maintenance/Service Maps		
Subtask 5-1 Maintain AHPS Flood Maps (FIM09-10P)	Due Date	Status
Partially programmed into FY10 and part in FY11. See Priority Task Area 5 for FY10.	-	Programmed

Inputs and Forcings

Prototyping NMQ for FFMP

Core Goal: Improve the quality of physical inputs and forcings

Management Lead: Ken Howard and Jian Zhang, NSSL; Mary Mullusky and David Kitzmiller, NWS

Objective: To test a high resolution Cartesian based regional multisensor QPE and QPF as input into FFMP and to facilitate a NCEP implementation of NMQ system for the national creation of QPI products and prototype dissemination to individual RFCs and weather forecast offices. The following project builds upon the FY05 NMQ to FFMP demonstration project and a FAA sponsored project for the implementation of the NMQ 3-D reflectivity mosaic code set within NCEP operational environment. Through an NCEP implementation, the full NMQ product suite can be prototyped and enhanced for potential utilization within RFC operations as well as within WFOs in FFMP.

Milestones FY08

Task	Due Date	Status
Customization of NMQ Q2 product real time dissemination per RFC domain	December 1, 2008	Completed
Infusion of Canadian and TDWR radar data as available into NMQ NCEP QPI grids	April 1, 2008	Completed for NMQ system
National prototype 2.5 minute update cycle for NMQ and QPE products	July 1, 2008	Completed in FY09Q4
Initial development and testing of a multi sensor 'best of the science' QPE product	August 30, 2008	Will be part of NCEP Implementation
Development strategies and testing protocols for Dual polarization data in Q2	September 20, 2008	Ongoing

Milestones FY09

Task	Due Date	Status
Customization of NMQ Q2 product real time dissemination per RFC domain	Continuous	Completed
Evaluation and testing of VPR corrected QPE using case studies	May 1, 2009	Completed
Complete hardware and software design/configuration for national NMQ implementation	July 1, 2009	Completed
Assessment of Q2 performance in collaboration with RFC	August 30, 2009	Ongoing with several initial reports completed
Implementation of new PERSIANN satellite rainfall estimation algorithm in NMQ/Q2	September 20, 2009	Removed

Milestones FY10

Milestones for FY10 are pending final approval and funding.

Accomplishments/Actions

1st Quarter FY08

- Completed scripts and communication protocol for providing River Forecast Centers with real time Q2 products.
- Completed code and configuration changes to ingest real time high resolution 88D L2 for NMQ

and Q2 products.

2nd Quarter FY08

- Providing, in real time, Q2 product suite to the following RFCs: ARBRFC, WGRFC, CBRFC, and ORFC.
- Continued interactions with RFC staff on Q2 product strengths and weakness. Feedback from RFCs continues to be favorable towards improved coverage, continuity, and quality of Q2 QPE products for potential use in operations.
- Revised several thresholds and system parameters for the tropical precipitation identification. System updates can viewed at http://docs.google.com/View?docid=dcf7xh8d_31gkwggj54

3rd Quarter FY08

- Established new NMQ/Q2 server and website – nmq.ou.edu
- Documentation for establishing the NMQ systems as a stand-alone operational system has been provided to NCEP and OHD. The documentation included hardware specifications, software and system configuration.
- With the assistance of the Salt River Project and the PHX FO, Q2 products are being made available to 4 forecast offices for use in FFMPA. An evaluation protocol will be established to receive feedback from individual offices in Q4.
- Canadian radar 3D mosaics are being generated in real –time every 5-minutes at 1x1km resolution within the NMQ system. Product grids containing the Canadian radar data will be made available in Q4.

4th Quarter FY08

- Updated NMQ and Q2 QPE products grids to encompass 33 Canadian radars. The products are available in digital form and viewable on the NMQ website – nmq.ou.edu.
- Testing is currently underway for hardware and software configurations required for 2.5-minute update cycle for the NMQ products.
- A detailed assessment of Q2 performance during calendar year 2008 has been completed and made available to OHD in PowerPoint form.
- Q2 products were made available in real time to the Phoenix forecast office as an input into FFMPA beginning July 15 to current. Evaluation is ongoing.

1st Quarter FY09

- N/A

2nd Quarter FY09

- Q2 QPE products produced during the 2008 PUFFS project are being validated as input for FFMPA. 8 FF events are being analyzed and compared to Stage 2 MS in collaboration with the Phoenix forecast office.
- Testing and evaluation of a VPR-corrected QPE algorithm has been completed on 14 cases. A VPR corrected Q2 QPE product will be implemented in real time CONUS in FY09 Q3.
- Q2 QPE products are currently being disseminated in real-time to 7 RFCs in addition to NOHRSC in FY09 Q2.
- Activities and discussions continue with OHD and NCEP regarding documentation of NMQ/Q2 hardware and software specs, configuration, and costs for a NCEP implementation

3rd Quarter FY09

- A final set of technical specifications for the NMQ/Q2 hardware and software were provided to NCEP and OHD.
- The new VPR correction methodology was expanded and further refined using case data from the 2006 HMT field program. Based upon cool season HMT cases in the northern Sierra Nevada, it was clear that the VPR correction algorithm required enhancements to allow corrections for radar beams extending above the melting layer. The revised VPR is being further tested and a final code set for real time implementation is expected in fy10 Q1. A formal write up of the VPR correction algorithms to address the bright band has been completed and is in formal review.

4th Quarter FY09

- A new feedback forum was established at <http://q2-collaborations.ning.com/>. The forum is to facilitate feedback from NWS RFCs and FOs on issues related to improving QPE science through the use of Q2.
- Updated distribution of Q2 products to RFCs is shown in the following table.

RFC	Primary Contact	Data Protocol	Q2 Radar-only HSR	Q2 Gauge-corrected	Q2 Radar-only HSR
ABRFC	Bill Lawrence	HTTP	Y	Y	N
CBRFC	Michelle Schmidt	HTTP	Y	Y	N
LMRFC	Glenn Carrin	LDM	Y	Y	N
MBRFC	John LaGue	LDM	Y	Y	N
NCRFC	Bob Wavrin	LDM	Y	Y	N
NERFC	Rob Shedd	HTTP	Y	N	Y
OHRFC	Jim Myers	LDM	Y	Y	N
SERFC	Judi Bradberry	HTTP	Y	Y	N
WGRFC	Greg Story	HTTP	Y	N	N

- The NMQ verification system (<http://nmq.ou.edu>) was enhanced during the 3rd and 4th QRs to include new verification tools and displays.
- A 2.5 minute update cycle for NMQ and Q2 QPE products was completed. Q2 radar only HSR QPEs are available CONUS every 2.5 minutes.

1st Quarter FY10

- A Q2 feed was established for the MARFC
- Q2 performance Input from RFCs was obtained through conference calls held on 16 September and 4 November. Comments included issues related to MPE and SSHP in addition to more general meteorological issues. Minutes from the conference calls have been compiled and provided to OHD as well as the Q2 development team.
- NSSL has been working with ESRL and NCDC to formulate a robust gauge QC program based on manual efforts at RFCs. Efforts are ongoing to compare NSSL automatic gauge QC with manual RFC bad gauge lists.
- David Kitzmiller delivered an OSIP briefing on progress on December 1 - an extension for the OSIP Gate 3 review for the NMQ implementation project 06-039 has been granted to CY 2010.

Problems Encountered/Issues

1st Quarter FY08 - None

2nd Quarter FY08

- The NMQ verification system moved to University of Oklahoma computing infrastructure.

3rd Quarter FY08

- A major effort was expended during this period to address issues related to ingest and QC of super_res base level data. New QC applications for super_res are currently being evaluated.
- 14 -dual processors HP servers were procured and will be added to the NMQ level 2 processing server farm. The additional servers will facilitate an increased in temporal and spatial resolution of NMQ products starting in Q4.

4th Quarter FY08

- The super_res base level data was found to be extremely noise and required significant investigation in to mitigating the noise in base QC as well as impacts on VPRs. Initial changes

were made in the QC code, which were not effective and introduced a low bias in Q2 QPEs with tropical events in June, July and August. Techniques are being reassessed, modified and tested to mitigate the impacts of super_res on QPE products.

1st Quarter FY09 - None

2nd Quarter FY09 - None

3rd Quarter FY09 - None

4th Quarter FY09

- The new PERSIANN satellite rainfall estimation algorithm source code was not released to NSSL for implementation into NMQ. Discussions are ongoing to facilitate the transfer and testing of the code. For now the task has been removed.

1st Quarter FY10 - None

Quantitative Precipitation Estimate Evaluation for CI-FLOW

Core Goal: Improve the quality of physical inputs and forcings

Management Leads: David Kitzmiller, OHD and Suzanne VanCooten, NSSL/OAR

Objective: Evaluate significant precipitation event(s) over the Tar River basin (North Carolina) to identify an optimum set of techniques as an initial step towards a state-of-the-science NOAA multi-sensor *quantitative precipitation information* (QPI) for NWS operations. The evaluation will include an assessment of OHD, NSSL and NEDSIS QPI algorithm components towards determining strengths as well as areas requiring collaborative research and development. Evaluations will include comparisons with independent rain gauge data, operational stage 4 products, *and impact tests on hydrologic simulations.*

Milestones

Task	Due Date	Status
Create multisensor gridded precipitation analyses for the cool-season event 10 December 2004 – 15 January 2005	May 4, 2007	Complete
Assess the performance of various QPI components towards the overall performance of gridded precipitation estimates	June 30, 2007	Complete
Complete radar-gauge multisensor analyses for Dec 2004-Jan 2005 cool season case, run RDHM hydrologic simulations, report on results	June 30, 2008	Complete
Collect and quality control all necessary rain gauge data for Sep 2003 and Jun 2006 warm season cases	June 30, 2008	Complete
Create radar-gauge multisensor analyses for Sep 2003 and Jun 2006 warm season cases, run RDHM hydrologic simulations	Aug 31, 2008	Complete
Compile and document components from each QPI algorithm that, based on the assessment, would contribute towards an optimum MSQPE solution for NWS operations	Sep 30, 2008	Slip to FY10 Q1
Report on the evaluation and develop collaborative research strategy (draft preprint for AMS Hydrology Conference; draft journal article)	Dec 31, 2008	Complete journal article and submit for management review Jan 2010

Accomplishments/Actions

1st Quarter FY07

- OHD – created basic radar input to MPE and High-Resolution Precipitation (HPE, formerly EMPE) for remaining test events
- NSSL – prepared reference data sets for computing various QPI grid fields
- Limited activity due to lack of funding.

2nd Quarter FY07

- NSSL- Assembled data sets of rain gauge observations collected under the radar umbrellas of KAKQ, KRDX, and KMHX for a period encompassing November 1, 2004 to February 28, 2005. NWS HADS provides the rain gauge data within the radar umbrellas but outside the Tar Basin itself.
15 minute precipitation data from 38 USGS precipitation sites, AWOS locations
1 Hour precipitation data from USGS, RAWs sites, North Carolina Econet, ASOS and AWOS
24 Hour reports from NWS COOP observers
- NSSL, OHD, NCDC – Performed QA/QC on data set to document erroneous reports and questionable values
- NSSL - Coordinating FTP site and access criteria for all research partners to access one

common rain gauge data set with accompanying documentation on possible erroneous values discovered from QA/QC procedures

- OHD – established necessary raingauge and radar databases for running MPE and HPE, began test runs with cool season case

3rd Quarter FY07

- OHD – Created one set of MPE (4-km) and HPE (1-km) hourly gridded analyses for periods with precipitation during the December-January 2004-05 period. Carried out initial evaluation, indicating a few suspect hourly gauge values were still in the dataset; then reran the analyses. Overall performance of the precipitation algorithms is as expected for a winter situation – most information in the precipitation grids appears to come from gauge input.
- OHD – made arrangements for running hydrologic model HL-RDHM with precipitation input
- NSSL, NCDC, OHD – agreed to rerun the MPE/HPE, and run Q2 algorithms, using ASOS gauge reports not included in the original analysis.

4th Quarter FY07

- NSSL – completed a set of radar-only and multisensor precipitation grids for the cool season case and forwarded them to other participants. Rainrate grids forwarded to NESDIS for input to SCaMPR satellite/radar algorithm
- OHD – completed a set of MPE/HPE radar-only, gauge-only, and multisensor precipitation grids, and carried out an initial analysis of their quality with respect to the reference rain gauges. It appears that the radar information in the multisensor grids adds slightly to the quality of the gauge-only analyses, possibly because the study period was dominated by stratiform rainfall with only one convective event
- Some further analysis of the OXFO rain gauge site record was carried out by OHD and NCDC – it now appears there were problems with freezing precipitation and/or gauge mechanics during part of the period, which will be dropped from the reference dataset
- Examination of the meteorological record indicated frozen precipitation over the basin during one of the storm events. Therefore the hydrologic model simulations must be run with hourly surface temperature input – a dataset from RUC and Eta model analyses and forecasts was gridded for this purpose
- AMS Hydrology Committee accepted an abstract for a paper to be presented at the upcoming Hydrology Conference (January 2008)

1st Quarter FY08

- Compared and analyzed the NMQ and HPE radar-only QPE analyses for the Dec 2004 – Jan 2005 period. It appears the NMQ handled challenging situations with unusual Z-R relationships better than did the NEXRAD PPS-based HPE. This resulted in the NMQ estimates having the smaller bias and smaller random error components. Results for both rain gauge and RDHM hydrologic model intercomparisons were consistent.
- Compiled results into a preprint for the AMS 22nd Hydrology Conference in January
- Funding to complete the analysis of warm season cases was applied for through AHPS process

2nd Quarter FY08

- Results of cool-season study were presented in a poster session at AMS Hydrology Conference
- After re-examination of rain gauge reports, reran MPE/HPE for the cool-season period, and obtained multisensor (gauge-radar) as well as radar-only fields
- Reran RDHM hydrologic simulations with MPE and HPE input fields – results will be analyzed next quarter
- Carried out manual inspection and QC of HADS hourly gauge reports for September 2003 and June 2006 study periods

3rd Quarter FY08

- NSSL submitted Q2 gauge-radar precipitation analyses for cool season case; OHD converted them to xmrg format
- Researchers collaborated on collection and quality control of gauge data for the two warm season cases
- OHD completed generation of input radar products for warm season cases

4th Quarter FY08

- Completed rain gauge QC and selection of reference gauges for two warm-season events. OHD created radar-gauge MPE products for Sep 2003 Isabel case.
- An abstract on the project results was accepted for presentation at upcoming AMS hydrology conference
- NSSL completed generation of input radar products and created radar-gauge Q2 products for Sep 2003 Isabel case and June 2006 Alberto case

1st Quarter FY09

- Completed generation of MPE/HPE datasets for June 2006 case
- For the June 2006 (TS Alberto) case: completed analysis of HPE and NMQ radar-only and gauge-radar accuracy, in terms of rain gauge-reference verification scores and RDHM simulations of discharge at 7 gauging points.
- For Sep 2003 Hurricane Isabel case, discovered a problem with NMQ radar analysis, and prepared for case reruns.
- Based on issues with changes in code versions and algorithm improvements since the start of the experiment, decided to rerun NMQ analyses for all cases prior to making a final analysis.
- NSSL verification system and case study library updated and configured to include HPE results to use common verification system and calculations

2nd Quarter FY09

- Completed radar-only QPE analyses for NMQ and MPE/HPE for all three storm periods
- Obtained stream discharge measurements for all study basins, January 2003 through June 2006
- Ran RDHM with SERFC operational precipitation estimates for the period January 2003 through June 2006 and obtained some verification statistics on its performance
- Began re-checking rain gauge data after closer examination revealed some problems with time shifts in reconstructing hourly rainfall totals from 15-minute totals

3rd Quarter FY09

- Completed checking of all rain gauge data
- Elected to use only ASOS rain gauges, which are supplied with heating elements, as multisensor input for the Dec-Jan 2004-2005 events
- Completed RDHM simulation runs for all seven study basins, using radar-only and MPE/HPE gauge-radar input precipitation. Results appear reasonable; in particular NMQ radar-only precipitation yielded discharge simulation results similar to those which were generated using operational Stage 4 precipitation
- On track to complete journal article during August

4th Quarter FY09

- Completed draft journal article and carried out review among working group members
- Presented seminar for OHD and NSSL staff September 8; based on comments received we will revise the draft article
- New draft article to be completed in time for HOSIP Gate3 meeting in November

1st Quarter FY10

- HOSIP gate3 conditionally passed in November
- Journal article under revision to include information on effects of different QPE input on simulated river stage errors as well as discharge errors

Problems Encountered/Issues

1st Quarter FY07 - None

2nd Quarter FY07 – None

3rd Quarter FY07 - None

4th Quarter FY07

- Some delays required to track down potential problems with reports from one reference gauge, and to collect/prepare temperature input to RDHM.

1st Quarter FY08

- Some delays required to track down potential problems with reports from several rain gauge sites; must rerun multisensory analyses for the cool-season case Jan-Dec 2004-2005. Results to date are sound, however.

2nd Quarter FY08 - None

3rd Quarter FY08

- Some delays to perform thorough QC on warm-season rain gauge data, and to track down rain gauge reports from different sources that appeared or vanished between 2003 (the Isabel case) and June 2006

4th Quarter FY08

- Had to recreate Q2 radar-gauge multisensor analyses for Dec-Jan 2004-05 events, due to metadata error.

1st Quarter FY09

- Discovered problems with NMQ radar analyses for Sep 2003 event – will reanalyze

2nd Quarter FY09

- Need to re-check and recreate some rain gauge information; still anticipate completion by Q4 of FY09

3rd Quarter FY09

- None this quarter

4th Quarter FY09

- None this quarter

1st Quarter FY10

- None this quarter

Gauge-Radar Analyses in High-Resolution Precipitation Estimator (HPE)

Core Goal: Improve the quality of physical inputs and forcings

Management Lead: David Kitzmiller

Objective: Include a capability for rapid-update gauge-only or gauge-radar gridded precipitation analyses in HPE

Milestones

Task	Due Date	Status
Demonstrate features of 15-minute gauge-radar analyses based on continuous-reporting rain gauges and HPE 15-minute radar estimates	FY08 Q3	Complete
Advise on appropriate radius of influence for individual gauge reports	FY08 Q3	Complete
Develop software for inserting rain gauge information from Point Data Control application in radar-based rain estimate grids from HPE; <i>anticipate initial field trials through AWIPS Test and Notification (ATAN) procedure</i>	FY08 Q4	Software tested; implementation awaiting AWIPS II

Accomplishments/Actions

2nd Quarter FY08

- Collected requirements for the application from staff at WFO Monterey and Sacramento and Western Region headquarters
- Derived basic gauge-radar merging algorithm, which preserves gauge-based values in the grid

3rd Quarter FY08

- Using the gauge-radar merging algorithm, applied to 15-minute rain accumulations from radar and dense rain gauge networks over Florida, a set of graphics were developed and sent to field sites and HSEB for comment

4th Quarter FY08

- After examining experimental objective analyses using different interpolation methods, will advise use of a 10-km radius of influence for the gauge data. It can be blended with radar data in a range annulus of 5-10 km relative to the nearest gauge.
- Algorithm description document drafted – for nearest neighbor and inverse distance weighting approaches to grid interpolation

1st Quarter FY09

- Worked on modifying existing Point Data Control codes to estimate 15-minute rain gauge totals from randomly-timed sub-hourly accumulation reports
- Ran performance tests of nearest-neighbor and inverse-distance weighting analysis algorithms

2nd Quarter FY09

- Visited WFO PSR (Phoenix) and learned about their use of reports from a dense rain gauge network covering the Phoenix metropolitan area
- Tested an AWIPS version of the rain gauge-only HPE algorithm in NHOR, using a locally-available, sparse gauge database. Within that limitation, the algorithm appears to function properly

3rd Quarter FY09

- Limited work this quarter, due to staff time allocation to CHPS acceleration tasks

4th Quarter FY09

- Task on hiatus, pending availability of AWIPS II platform

1st Quarter FY10

- Got information on NSSL work on real-time high-resolution radar-gauge analyses for Phoenix AZ CWA area – will work to start HOSIP project this quarter

Problems Encountered/Issues

2nd Quarter FY08 - None

3rd Quarter FY08 - None

4th Quarter FY08 - None

1st Quarter FY09

- Encountered some difficulty in locating adequate sub-hourly reporting rain gauge databases for testing; proceeded with available data

2nd Quarter FY09

- Work is on hiatus, with personnel concentrating on CHPS forcings code needed in FY09

3rd Quarter FY09

- Work still on hiatus, but possibility for restarting in FY10

4th Quarter FY09

- Work still on hiatus

1st Quarter FY10 - None

Satellite Based Analysis for Potential Evaporation

Core Goal: Improve the quality of physical inputs and forcings

Management Lead: David Kitzmiller; project lead Yu Zhang

Objective: To provide satellite-based, real-time PET estimates and nowcasts as input forcing for the Community Hydrologic Prediction system (CHPS)

Milestones

Task	Due Date	Status
1. Research results and recommendations of PET estimation and forecast frameworks*	FY10/Q1	On track
2. System for infusing temperature, humidity, wind data	FY10/Q1	
3. Preprocessors of GOES-based solar radiation	FY10/Q1	
4. PET computation and corroboration	FY10/Q2	
5. Research paper on evaluating estimated PET*	FY10/Q4	
6. Preprocessor for NDFD gridded forecasts	FY11/Q1	
7. PET forecast framework	FY11/Q1	
8. Research paper on evaluating PET and soil moisture forecast*	FY11/Q2	

Accomplishments/Actions

2nd Quarter FY09

- Initial research underway – literature review and review of OHD’s previously supported research by U. New Hampshire
- Collected some RTMA GOES-based cloud cover grids for the CONUS, for potential use as a proxy for manual sky cover

3rd Quarter FY09

- Drafted HOSIP statement of need and began draft project plan
- Reviewed methodology being worked on involving other GOES radiation products, such as sky cover, at other locations
- Continued product collection

4th Quarter FY09

- Drafted project plan and met with HOSIP admin on the project details
- Coordinated with field sponsors at ABRFC on the status and the need of ABRFC RTMA-based PET project; retrieved ABRFC PET module (written for GFE)
- Coordinated with OHD/HL/HSMB Hydrology Group, where MODIS-based PET project is carried out. It appears the two observing platforms offer distinct advantages over different geographic regions (i.e. GOES cannot cover Alaska), and there is reason to investigate both satellite-based products for potential operational application.

1st Quarter FY10

- Contacted Judy Ghirardelli at MDL to obtain their archive of GOES sounder data (since 2006). Communicated with Judy on the gaps and artifacts in the sounder data; discussed with Dave K about performing preliminary evaluation of the data set prior to actual ingest.
- Project approved through Gate1, final project plan depends on the quality of the data as seen in MDL archives

Problems Encountered/Issues

2nd Quarter FY09

- Funding not committed until FY09 Q3

3rd Quarter FY09

4th Quarter FY09

- Had issues locating full archival RTMA and GOES sky cover data (only 4 years of former data are available from NCEP, and the latter data is not archived by NCEP). An RTMA archive at NCDC and a corresponding Effective Cloud Amount product archive at U. Wisconsin SSEC are being investigated.

1st Quarter FY10

- Contacted Judy Ghirardelli at MDL for their archive of GOES sounder data. Judy indicated presence of gaps and artifacts in the data set which may complicate its use. Will retrieve the data and investigate the frequency of these problems first to determine its usability in operations.

Short-range radar-based quantitative precipitation forecasts

Core Goal: Improve the quality of physical inputs and forcings

Management Lead: David Kitzmiller

Objective: To develop and deliver a statistically-based 0-6 hour probabilistic quantitative precipitation forecasting system using remote-sensor and numerical prediction model input. The system is based on a Model Output Statistics approach requiring several years' data. Most work for which funding is requested is to be done in first two years.

Milestones

Task	Due Date	Status
9. Archive necessary radar, lightning, and RUC2 numerical model output	Continuous	Ongoing – started FY09 Q2
10. Develop 6-h extrapolation prediction algorithm and codes based on operational High-Resolution Precipitation Nowcaster (HPN)	FY09/Q4	Done
11. Construct dataset with collocated radar extrapolation forecasts, satellite precipitation extrapolation forecasts, RUC2 precipitation forecasts, and Stage4 verifying precipitation, for available CY2009 data	FY10/Q1	Done
12. Deliver interim report on data evaluation, including CONUS-wide statistics on RUC2 and radar forecast correlations with observed precipitation	FY10/Q2	Done – EWRI conference preprint
13. Prepare and submit OSIP documents for implementation process	FY10/Q3	On track
14. Prepare and journal article on initial results from CY2009 data	FY11/Q1	

Accomplishments/Actions

2nd Quarter FY09

- Began collecting necessary input radar data from NMQ sources
- Began collecting necessary RUC2 forecasts (precipitation and other fields)

3rd Quarter FY09

- Continued data collection
- Began adapting operational HPN code to make extrapolation radar forecasts out to 6 hours

4th Quarter FY09

- Continued data collection
- Got radar extrapolation forecast code working
- Collected input from field sponsors to refine operational requirements (timing, product suite)
- Began work on preparing extrapolation forecasts of satellite rainfall rate based on operational Hydroestimator fields
- Abstract on the project submitted for presentation at EWRI congress in 2010

1st Quarter FY10

- Continued data collection
- Got verification statistics for RUC2 and radar extrapolation QPF in the 0-3, 3-6, and 0-6h timeframes (warm season, 1800-0000 UTC) demonstrating the manner in which radar and physical-dynamical QPFs complement each other
- Began preparation of preprint article for EWRI Congress scheduled May 2010

Problems Encountered/Issues

2nd Quarter FY09

- Funding not committed until FY09 Q3

3rd Quarter FY09

- None

4th Quarter FY09

- None

1st Quarter FY10

- None

Evaluation of Radar Precipitation Estimates from NMQ and from WSR-88D DPA Products over Conterminous United States

Core Goal: Improve the quality of physical inputs and forcings

Management Lead: Project lead Wanru Wu

Objective: To assess strengths and weaknesses of NMQ radar-only and NEXRAD PPS precipitation estimates over the conterminous United States, in a variety of weather situations, and to determine effective limits of areal coverage of both products

Milestones

Task	Due Date	Status
Literature review	FY09Q4	Complete
Data collection (NMQ radar-only, NCEP Stage2 radar-only, ASOS rain gauge reports)	Through FY10/Q3	Ongoing
Analysis and evaluation (spatial characteristics of radar/gauge errors, regions of effective radar coverage, radar QPE errors in cold weather situations)	FY10/Q3	On track
Review of research results	FY10/Q4	
Prepare journal article	FY10/Q4	

Accomplishments/Actions

3rd Quarter FY09

- Began data archiving
- Began preparation of HOSIP project plan

4th Quarter FY09

- Project plan approved, passed HOSIP Gate2 review (project P-2009-006)
- Collected initial results of evaluation; presented results in AMS Radar Conference preprint and poster (early October 2009)

1st Quarter FY10

- Continued data collection in real time
- Got NSSL assistance to retrieve NMQ data covering some missing periods in early 2009
- Collected fresh statistics using recent NCEP Stage1 radar-only data without any gauge bias correction; there was only minor influence on Stage1 (DPA) verification statistics, generally positive
- Processed and applied mosaic data to replace bias-corrected Stage2 data as original DPA products from January 1st - September 31, 2009 and reevaluated NMQ radar-only QPE during the period, with ASOS rain gauge 24-h precipitation as the verification.

Problems Encountered/Issues

3rd Quarter FY09

- Funding not committed until FY09 Q3

4th Quarter FY09

- Discovered error in NCEP Stage1 processing that introduced gauge/radar bias correction into

gridded radar QPE products; worked on alternative methods of getting around the problem (an alternative data source for mosaicked DPA data appeared in Oct 2009)

1st Quarter FY10

- None

Gridded Hydrometeorological Forcings for Community Hydrologic Prediction System (CHPS) – FY10-FY11

Core Goal: Improve the quality of physical inputs and forcings

Management Lead: David Kitzmiller

Objectives: To facilitate RFC studies on biases or statistical differences between current operational basin-average forcings (precipitation, temperature, potential evapotranspiration [PET], and freezing level) and new gridded versions such as are intended to be used in CHPS. In many instances the forcings now entering the river forecast system are calculated from a weighted sum of point measurements; operational practice is shifting to calculating all basin-average forcings from grids, and in some documented instances the grid calculation is biased relative to point-based values, or relative to the calibration dataset. We will consolidate and summarize results reported by RFCs into a final document;

To consolidate and summarize any results on the impact of the new gridded forcings on hydrologic simulations with NWSRFS;

Identify methodologies and any ongoing projects for deriving a gridded calibration dataset of precipitation, temperature, and PET for all RFCs, based on in-house reanalysis, Analysis of Record (AOR), or other means; produce a report on preferred options for generating long-term calibration datasets for these variables at 4-km, 1-hour resolution;

Assist and coordinate with RFCs in cataloging archives of point and gridded hydrometeorological data using in constructing calibration datasets.

Proposed Milestones:

Task	Due Date	Status
15. Archive forcings data from CAT sites (ABRFC, NERFC, CNRFC, NWRFC)	Continuous	Ongoing – started FY09 Q4
16. Initiate real-time archive development from all remaining RFCs)	Initiate FY10/Q2	Ongoing at most sites – FY10 Q2
17. Document statistical differences between point-based and gridded forcings from MPE, Mountain Mapper/Daily QC, GFE, and report on findings.	FY10/Q3	Ongoing at RFCs
18. Execute parallel streamflow simulations driven by point-based and grid-based basin average precipitation, temperature; report on magnitude of differences in simulations and differences in quality relative to gauge observations	FY10/Q3	
19. Coordinate with RFC staff to locate historical point or gridded inputs (precipitation, temperature, cloud cover, winds, relative humidity) used to construct hydrologic calibration datasets – needed for either development of new datasets or verification of calibration datasets from an outside source such as AOR.	FY10/Q3	

<p>20. Report on potential and preferred methods of deriving gridded calibration datasets (other than precipitation and PET) of at least 50 year duration – possibly a re-analysis of historical data, or an external source such as the Analysis of Record (AOR) now under development, possibly other methods of reanalysis. Calibration datasets will be ~4-km mesh length, 1-h time series.</p>	<p>FY10/Q4</p>	
<p>21. Report on potential and preferred methods of deriving gridded precipitation calibration dataset, 50-year duration, including reanalysis with archive of RFC raingauge and radar data; available satellite products, and disaggregation of climatic datasets with daily-to-monthly total precipitation</p>	<p>FY10/Q4</p>	<p>Concerned partners were contacted prior to AMS town hall meeting in January</p>
<p>22. Report on potential and preferred methods of deriving gridded potential evapotranspiration (PET) calibration dataset, focusing on geostationary satellite estimates of cloud cover and/or surface radiation balance, with other weather elements (temperature, humidity, winds) to come from item 6.</p>	<p>FY11/Q1</p>	
<p>23. Evaluate methods of improving MPE/DQC disaggregation of multi-hour precip accumulations to 1-h, including spatial interpolation of 1-h radar QPE when necessary, use of RUC2 precipitation forecasts</p>	<p>FY11/Q1</p>	
<p>24. Re-analysis for precipitation from point (gauge) observations: develop offline capability for gridded record of precipitation for ≥ 10 years. Report on methods for further disaggregating to hourly time series.</p>	<p>FY11/Q2</p>	
<p>25. Re-analysis for precipitation from radar/remote sensor observations: Determine if CPC and/or NCDC efforts to produce long-term high-resolution gridded precipitation are moving forward. Depending on schedules, either prepare to utilize one of these sources or re-analyze existing StageIII/StageIV grids using external high-reliability sources such as PRISM monthly totals.</p>	<p>FY11/Q2</p>	
<p>26. Reanalysis for sky cover and remote-sensor PET: Determine availability/reliability of RTMA or research sky cover datasets; create PET grids from these data and temperature, wind and relative humidity information from NARR</p>	<p>FY11/Q4</p>	

Accomplishments/Actions

1st Quarter FY10

- Project plan reviewed and refined based on RFC staff input

- Presentations to ARC and other NWS staff in December
- Data collection (gridded and basin average forcings, some other hydrometeorological inputs) was organized by RFC staff and hosted at NOHRSC
- OHD and field staff met at AMS conference to open dialog on science possibilities for long-term (50-year) reanalysis of precipitation and temperature, yielding hourly high-resolution grids for hydrologic model calibration

Problems Encountered/Issues

1st Quarter FY10

- Final disposition of funding still at issue – but proceeding on the assumption the plan will see only minor changes

Flash Flood Services

Distributed Hydrologic Model with Threshold Frequencies (DHM-TF)

Core Goal: Improve forecasts of fast response hydrologic events

Management Lead: Michael Smith

Objective: Understand the nature of the model errors when running a distributed hydrologic model forced by WFO type data streams (e.g. 15 minute resolution observations and nowcasts). Do additional historical precipitation analysis to support the threshold frequency approach. Collaborate with the Sterling WFO to evaluate the model applied to two domains in MD.

Milestones

Task	Due Date	Status
1. Help Sterling and Pittsburgh set up prototype model	FY10 Q1	Ongoing
2. Run historical hydrologic simulations to generate gridded statistics.	Q3	Complete
3. Complete historical analysis begun in 2007 (events and overall statistics for selected basins)	Q4	Complete
4. Monitor real-time HL-RDHM runs; archive and analyze case studies	FY09 Q1	Complete
5. Maintain and monitor MPN runs within OHD	FY09 Q1	Complete
6. Additional work to improve and understand the limitations of the Poor Person's re-analysis; develop data set for a second RFC	FY09 Q2	Complete
7. Recommend high level requirements for operational development	FY10 Q2	Ongoing
8. Publish results	FY10 Q2	Ongoing

Accomplishments/Actions

1st Quarter FY08

- Completed 2007 task: corrected statistical algorithms to properly account for zero flows in dry areas

2nd Quarter FY08

- Completed 2007 task: completing first cut Poor Person's re-analysis for MARFC

3rd Quarter FY08

- Began initial 4km simulations and analysis of Maryland case study.
- Constructed basic set of GRASS GIS visualization scripts needed by OHD and MARFC.
- Communicated with Joe Ostrowski of MARFC to ensure close collaboration on DHM-TF project.

4th Quarter FY08

- Finalized parameterizations for 4km and 2km implementations
- Completed historical simulations needed to compute gridded statistics
- Conducted initial set of historical analyses to further study behavior of DHM-TF system
- Monitored real-time HL-RDHM simulations and MPN runs within OHD

1st Quarter FY09

- Completed Grass GIS and Google Earth scripts needed to visualize DHM-TF output
- Modified code to deal with low and high flow cases with return periods not solvable by traditional technique
- Began coordination work with Sterling WFO necessary to implement DHM-TF on Sterling

computer system.

- Presented DHM-TF at MARFC WFO and secured agreement to implement DHM-TF at MARFC after the system has been implemented at the Sterling WFO.

2nd Quarter FY09

- Enhanced Google Earth scripts needed to visualize DHM-TF output
- Contacted Pittsburgh WFO and obtained their support and necessary WFO computer account access for efforts to implement DHM-TF prototype at WFO
- Began derivation of routing parameters over Pittsburgh domain
- Redeveloped HOSIP project plan for DHM-TF, also, work will be continued under new AHPS project
- Investigated potential collaborative opportunities with ABRFC, in particular with respect to their low water crossing survey effort
- Developed new DHM-TF case study over Maryland and published in EWRI Water Congress 2009 paper

3rd Quarter FY09

- Continued to enhanced Google Earth programs and scripts needed to visualize DHM-TF output
- Transferred DHM-TF code and supporting data to Pittsburgh server and began initial setup and testing of model
- Completed derivation of routing parameters over Pittsburgh domain
- Traveled to CBRFC to define areas of collaboration between their DHM-FSR research and OHD's DHM-TF research. Bi-monthly telecons will be conducted to share information on WFO feedback, visualization and verification efforts, and model performance
- Ran baseline simulation necessary to support local routing option. Tested local routing option against channel routing option on June flash flooding event in Maryland.
- Presented DHM-TF overview at EWRI 2009 Water Congress.

4th Quarter FY09

- Further enhanced GRASS GIS and Google Earth programs and scripts needed to visualize DHM-TF output at Pittsburgh WFO
- Gathered feedback from WFO concerning Google Earth and GRASS GIS plots, and altered image production as necessary
- Completed initial setup and testing of model on Pittsburgh server and began real-time automated prototype operations. This includes standard as well as local routing configurations.
- Analyzed August 2007 flash flood test case and produced evaluation report and presentation per AOP item
- Presented DHM-TF material at NOAA SMAP satellite conference and NASA Water Management Program conference

1st Quarter FY10

- Further enhanced GRASS GIS and Google Earth programs and scripts needed to visualize DHM-TF output at Pittsburgh WFO
- Gathered feedback from WFO concerning Google Earth and GRASS GIS plots, and altered image production as necessary
- Continued to monitor operation of model on Pittsburgh's server. Altered scripts as necessary to account for minor bug fixes and for server reconfiguration.
- Worked with Bob Davis at PBZ on analysis of 2007 Millvale flash flood event, determining that standard precipitation forcing under represents the precipitation that actually fell during the event. Bob has provided more realistic gridded AMBER precipitation which will soon be used in a comparison model run.
- Began selection process of next WFO location for installation of DHM-TF.
- With Seann Reed, began derivation and validation of CONUS-wide a priori routing parameters which will be used in DHM-TF operations (and by the broader RDHM modeling community as well)

Problems Encountered/Issues

1st Quarter FY08

- We got a basic real-time run setup for the 4-km MD domain in the fall of 2007, but we did not have time to monitor, archive, and analyze case studies due to Seann's move to the Hydraulics Group and Ziya's extended leave in the fall.

2nd Quarter FY08

- Seann Reed, DHM-TF developer and leader, has been reassigned to the River Mechanics group. Replacement is planned to start work in Q3 FY08.

3rd Quarter FY08

- Overall progress was greatly slowed by staff changes. Replacement for Seann Reed was hired and began work on DHM-TF project in June.

4th Quarter FY08

- Investigation is currently underway to determine the length of flow history needed for accurate computation of return periods. Computation may not be robust under certain situations if only 10 years of data is used.

1st Quarter FY09

- Certain low and high flow cases lead to return periods that are not solvable by traditional approach. A temporary solution has been put in place, but a more robust (higher precision) solver needs to be implemented.

2nd Quarter FY09

- Due to personnel resource issues at the Sterling WFO, work with them was put on hold. Pending resource availability, work will resume with Sterling over the next quarter.
- Routing parameters are proving to be challenging to derive due to the size of the mainstem rivers in the Pittsburgh domain

3rd Quarter FY09

- Progress slowed as resources were diverted to conduct research into the Red River flooding events of Spring 2009.

4th Quarter FY09

- Availability of software libraries on AWIPS platform as well as upgrade of operating system slowed progress

1st Quarter FY10

- Initial approach for derivation of CONUS-wide routing parameters was unstable and has necessitated a comparison of several additional techniques.

Evaluate Gridded Flash Flood Guidance (GFFG) Approaches

Core Goal: Improve forecasts of fast response hydrologic events

Management Lead: Michael Smith

Objective: Quantitatively evaluate the ABRFC and OHD TF-GFFG approaches. Use observed streamflow data from small basins, grid inter-comparison techniques, and new verification data collected by NSSL. Evaluate NOAA-NESDIS percent impervious surface area (ISA) data for modeling applications in urban/suburban basins.

Milestones

Task	Due Date	Status
9. Develop joint Project Plan with NSSL for evaluating ABRFC and OHD GFFG approaches	FY08 Q2	Complete
10. Support NSSL led efforts to collect new verification data (advisory role only)	Q3	Complete
11. Finalize and check TF-GFFG codes	Q3	Complete for 1 hr GFFG
12. Complete initial assessment of impervious surface area data for small basins	Q3	This should be re-scoped as a separate project.
13. Provide TF-GFFG programs and analysis scripts to NSSL	Q3	Complete
14. Assist NSSL with running HL-RDHM and generating TF-GFFG	Q4	Complete
15. Assist NSSL in documenting results	FY09 Q2	Delayed*
16. Continue assessment of flash flood events and utility of SHAVE data	FY10 Q2	Ongoing

*See "Problems Encountered" for 1st and 2nd Quarter FY09.

Accomplishments/Actions

1st Quarter FY08

- Revised plans due to personnel changes. Reduced the project scope. NSSL work will fill in some gaps.

2nd Quarter FY08

- Worked with NSSL on the project plan. NSSL got ABRFC involved and their feedback significantly improved the plan.

3rd Quarter FY08

- Replacement for Seann Reed hired and is rapidly coming up to speed.
- Seann visited NSSL to review project plan with JJ Gourley. JJ and students are wrapping up the 2008 SHAVE experiments (including flash flood verification data collection) and are now ready to begin analysis for this project.

4th Quarter FY08

- Provided NSSL with TF-GFFG analysis scripts and programs
- Gave guidance to NSSL in the execution of HL-RDHM and production of TF-GFFG fields

1st Quarter FY09

- NSSL has wisely re-scoped this project and put in a new AHPS proposal for FY09.

2nd Quarter FY09

- JJ Gourley at NSSL is continuing work on this project. His student, Jessica Erlingis prepared a pre-print for AMS describing the SHAVE flash flood observation data collection experiment.

3rd Quarter FY09

- JJ Gourley at NSSL continued to work on this project.

4th Quarter FY09

- JJ Gourley at NSSL continued to work on this project
- Computed contingency table statistics for various rainfall thresholds exceeding FFG and GFFG. Results show no advantage to GFFG over FFG.
- Presented results at the 34th AMS Conference on Radar Meteorology
- Prepared to evaluate GFFG and FFG performance using SHAVE spotter reports

1st Quarter FY10

- Journal article describing data collection strategy and an analysis of flash flood observations from SHAVE and how they can contribute to NWS Storm Data for building flash flood climatologies and conducting rainfall-runoff process studies has been submitted to the Journal of Hydrology's special issue on flash flooding.
- Downloaded the polygons from the StormDat FF event database, provided by Ernie Wells. The csv data have been downloaded and converted into shapefile format for use in GIS.

Problems Encountered/Issues

1st Quarter FY08

- Seann's move to the hydraulics group has delayed this work.

2nd Quarter FY08

- None

3rd Quarter FY08

- Initial analysis of impervious percent area in Tulsa, OK, shows benefits of using this data but a more complete assessment in the broader context of rainfall-runoff a-priori parameter estimation procedures is recommended. This will require a separate project.

4th Quarter FY08

- Need to continue interacting with NSSL and Ernie Wells to gauge project progress. NSSL is currently working through some issues in comparing regenerated TF-GFFG to the archived ABRFC GFFG. The comparison is complicated by the fact that they are based on different precipitation grids.

1st Quarter FY09

- Since no AHPS resources were actually allocated to this project in FY08, only small amounts of Seann's time and some of JJ Gourley's time were available during the past year. JJ has put together an improved proposal for FY09 compared to what we had in FY08 to try to get enough resource for a student to work on this project at NSSL. OHD will likely remain a supporting role as we have no explicit resources allocated for this.

2nd Quarter FY09

- JJ is still working on this project but with limited resources so the schedule is delayed. He currently has only one undergraduate student working 10 hours per week. They plan to present initial results at the AMS Radar Conference to be held Oct. 5 - 9, 2009.

3rd Quarter FY09

- JJ is still working on this project but with limited resources so the schedule is delayed.

4th Quarter FY09

- None

1st Quarter FY10

- Previously, we were working with the FF event locations specified by county and were not aware the polygon-specific events were available for our dataset. We will need to conduct our analysis of FFG and GFFG skill for the NWS StormDat FF polygons.

Improve Guidance for DamBreak Forecasting

Core Goal: Improve forecasts of fast response hydrologic events

Management Lead: Seann Reed

Objective: Identify a nationally supportable, consensus set of dam break modeling procedures and document them in a NWS Dam Break Forecasting Guidance Document. Provide any prototype tools necessary to implement these procedures. Identify formal software engineering requirements to develop improved tools

Milestones*

* Milestones updated based on FY2009 accomplishments. See also “Problems Encountered” section.

Task	Due Date	Status
1. Review existing dam break procedures.	FY09 Q3	Complete
2. Gather information on USACE “Mapping Inundation and Production Center” activities	FY09 Q3	Complete
3. Develop/evaluate procedures to convert existing dam break models (in SMPDBK, FLDWAV, or DAMBRK) to HEC-RAS.	FY09 Q4	Complete
4. Identify/document best method to quickly derive cross-sections for dams with existing models	FY09 Q4	Complete
5. Coordinate with Army Corps of Engineers to get updates on the NID database and identify how these updates are used at RFCs and WFOs.	FY09 Q4	In progress, delayed
6. Write guidance document for existing procedures (first draft)	FY10 Q3	On track
7. Develop and document tool to quickly derive cross-sections for SMPDBK and HEC-RAS applications.	FY10 Q3	On track
8. Add ability to quickly map SMPDBK results to ArcGIS Toolkit	FY10 Q4	On track
9. Identify software engineering requirements to develop improved tools	FY10 Q4	On track
10. Finalize documentation	FY10 Q4	On track
11. Develop training materials and deliver training	FY11 Q1	On track

Accomplishments/Actions

1st Quarter FY10

- Presented project updates and plans to Hydraulics AHPS Theme, HICs and ARC. Adapted plans based on feedback.
- Analyzed results from FLDWAV, HEC-RAS, and SMPDBK simulations.
- Wrote a program that prepares input data for SMPDBK from RAS/HEC-GEO-RAS format cross-section file. This tool will be part of the GIS tool that will be used quickly prepare cross-sections data for SMPDBK

2nd Quarter FY10

- Prepared a paper for an ASCE-EWRI conference: “Towards Improved Guidance And Tools For NWS Dam Break Forecasting”

3rd Quarter FY10

4th Quarter FY10

Problems Encountered/Issues

1st Quarter FY10

- Some schedule delay is due to extended sick leave for a team member.
- FY10 milestones have also been adjusted anticipating that team members will need to spend time on more urgent tasks for the “Transition to HEC-RAS: Model Development and Implementation” project early in the year. The total resource requirement is unchanged.

2nd Quarter FY10

3rd Quarter FY10

4th Quarter FY10

FFMP Small Basin Support

Core Goal: Improve forecasts of fast response hydrologic events

Management Lead: Ami Arthur, NSSL

Objective: To provide training and assistance to all WFOs for customization of the FFMPA small-basin shapefile datasets and to coordinate and facilitate the sharing of customized files to prevent duplication of effort among WFOs.

Milestones

Task	Due Date	Status
6. FFMPA Dataset Tier II/ III Customization Webinars	Jan 2010	In progress
7. Coordination of dataset sharing via the Basin Customization Repository	Ongoing	In progress
8. Provide technical assistance for dataset customization	Ongoing	In progress

Accomplishments/Actions

1st Quarter FY08

- During this quarter, the Basin Customization Repository was populated with customized datasets that had been submitted for sharing with other WFOs. We also continued to provide instructions and assistance to WFOs for several issues related to their datasets and basin customization efforts.

2nd Quarter FY08

- During this quarter, several potential workarounds/solutions for reducing the number of FFMP basin names seen in WarnGen output were investigated. We also continued to provide instructions and assistance to WFOs for their datasets and customization efforts.

3rd Quarter FY09

- Material is being assembled for the customization webinars. The dates for the webinars have not yet been set, but they will likely begin during the early Fall with the intent of maximizing attendance by avoiding the summer vacation season. In this quarter, we have also continued to provide technical assistance to FFMPA dataset users.

4th Quarter FY09

- The following dates have been set for the webinars:

Thursday, 5 Nov 2009 - Stream Name Verification and Editing and Introduction to the Basin Customization Repository

Thursday, 19 Nov 2009 - The Basin Customization Repository: How to Share Your Customization and Incorporate Your Neighbor's Customization

Thursday, 3 Dec 2009 - Merging and Subdividing Basins and Manual Editing

Thursday, 17 Dec 2009 - Clipping Lakes/Reservoirs and Wide River Polygons

- During the 4th quarter, we continued to assemble and finalize customization tools and instruction sets and provided assistance to fill users' requests related to the FFMP dataset and customization efforts.

1st Quarter FY10

- Three of the webinars were given during this quarter, and the Basin Customization Repository was updated with relevant training materials and data for the topics covered.
- Due to scheduling conflicts, the fourth webinar that was originally set for 17 Dec 2009 was rescheduled for Thursday, 28 Jan 2010.
- We also continued to provide technical assistance to FFMPA dataset users.

Problems Encountered/Issues

1st Quarter FY08

- none

2nd Quarter FY08

- none

3rd Quarter FY09

- none

4th Quarter FY09

- none

1st Quarter FY10

- none

Routing (Hydraulics)

Transition to HEC-RAS: Model Development and Implementation

Core Goal: Improve the routing techniques used to connect forecast locations

Management Lead: Seann Reed

Objective: Support RFCs in the transition to HEC-RAS.

Milestones

Task	Due Date	Status
Support FLDWAV/DWOPER conversions for non-CAT RFCs.	Q4	Ongoing
Assist with HEC-RAS configuration in CHPS as needed and HEC-RAS troubleshooting during parallel operations.	Q4	Ongoing
Assist in the transitioning of Red River flood mapping service to CHPS.	Q4	On track
Recommend how to segment HEC-RAS models operationally.	Q4	On track
Lead a NWS HEC-RAS Workshop on advanced topics.	FY11 Q1	On track

* We will define a new HOSIP project to cover these tasks.

Accomplishments/Actions

1st Quarter FY10

- Seann converted the NCRFC M19 model to HEC-RAS and did initial calibration work. Some additional work is recommended to examine different ways to account for the effects of the lock and dam structures.
- Seann participated in HEC-RAS/CHPS software acceptance testing.
- Seann reported on HEC-RAS transition status to the CAT RFCs and received feedback/suggestions.
- Fekadu answered questions from NERFC.
- HSMB Hydraulics Group had a conference call with NCRFC. Seann and Fekadu scheduled travel to NCRFC during January 2010.
- Seann prepared the HOSIP Statement of Need. This project follows on from the completed project: Transition from FLDWAV to HEC-RAS; Forecast Implications and Transition Tools” (HOSIP Project P2007-21).
- Hydraulics Theme Team and ARC members provided suggestions on scope of work.

2nd Quarter FY10

- Seann assisted Deltares in troubleshooting a HEC-RAS adapter problem identified by NERFC.
- Fekadu signed up for CHPS migration training..

3rd Quarter FY10

4th Quarter FY10

Problems Encountered/Issues

1st Quarter FY10

- None

2nd Quarter FY10

- None

3rd Quarter FY10

- None

4th Quarter FY10

- None

River-Estuary-Ocean Modeling to Enhance Operational River Forecasting -- Chesapeake Bay Study Area

Core Goal: Improve the routing techniques used to connect forecast locations

Management Lead: Seann Reed

Objective: Provide an accurate hydraulics model that extends from river mouths upstream to at least existing forecast points and beyond if necessary to achieve accuracy. Provide accurate river flow forecasts to NOS operational estuary models. Evaluate 2D/3D models or a combination of HEC-RAS and 2D/3D models to meet the goals.

Milestones*

* Milestones are updated for 2010 based on progress in 2009.

Task	Due Date	Status
9. Develop plans (identify models to use, connect with collaborators, identify resources)	FY09 Q2	Complete
10. Acquire software and initial models from collaborators (HEC-RAS and ADCIRC)	FY09 Q2	Complete
11. Build and test HEC-RAS (Potomac) and ADCIRC (Chesapeake) models	FY09 Q4	Complete
12. Calibrate HEC-RAS	FY10 Q2	On track
13. Calibrate ADCIRC	FY10 Q3	On track
14. Compare HEC-RAS and ADCIRC scenarios	FY10 Q4	On track
15. Publish results – journal article	FY11 Q2	On track
16. Coordinate with NOAA Storm Surge Team	Ongoing	Ongoing

Accomplishments/Actions

1st Quarter FY10

- HOSIP Project Plan revised again and submitted.
- Conference paper prepared for FIHMC: Toward Modeling Of River-Estuary-Ocean Interactions To Enhance Operational River Forecasting In The NOAA National Weather Service

2nd Quarter FY10

- We are preparing a proposal to the HPCC Incubator Program to acquire funds so that we can develop a more robust computational framework for model testing and add CIPS ELCIRC to our suite of models being tested.

3rd Quarter FY10

4th Quarter FY10

Problems Encountered/Issues

1st Quarter FY10

- None

2nd Quarter FY10

- We are not expecting substantial FY10 AHPS/WR funds for this project. Some time from Cecile Aschwanden (contractor) is still available to wrap-up FY09 funded tasks.

3rd Quarter FY10

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4th Quarter FY10

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Incorporate Wind Information into HEC-RAS

Core Goal: Improve the routing techniques used to connect forecast locations

Management Lead: Seann Reed

Objective: Define specific NWS requirements for adding wind modeling capabilities into HEC-RAS and provide them to HEC. Recommend source(s) of wind data, the method to apply 2D wind data in a 1D model, and the shear stress algorithm.

Milestones*

* Milestones adjusted based on FY2009 accomplishments. See issues section for explanations.

Task	Due Date	Status
17. Collect data	FY09 Q2	Ongoing
18. Build models (HEC-RAS and Sobek)	FY09 Q3	Complete
19. Calibrate models during low wind period	FY10 Q2	On track
20. Compare models and document recommendations	FY10 Q2	On track
21. Provide requirements to HEC	FY10 Q3	On track
22. Publish Results documentation: presentation and paper	FY10 Q3	On track

Accomplishments/Actions

1st Quarter FY10

- Data analysis for Sobek runs partially completed
- Continued support for MARFC learning the Potomac HEC-RAS model
- Prepared preliminary draft of HEC recommendations.

2nd Quarter FY10

- Prepared an abstract for the 64th Interdepartmental Hurricane Conference.

3rd Quarter FY10

4th Quarter FY10

Problems Encountered/Issues

1st Quarter FY10

- No AHPS/WR funds expected in FY10. Can finish analysis with FY09 and FTE funds. Initially we planned to provide requirements to HEC in early FY10; however, we will wait to provide requirements to HEC until our analysis is complete, since we do not anticipate having the necessary funds to proceed with implementation until FY11.

2nd Quarter FY10

3rd Quarter FY10

4th Quarter FY10

Dynamic Inundation Mapping

Core Goal: Improve the routing techniques used to connect forecast locations

Management Lead: Seann Reed

Objective: Develop a method to quantify the limitations of static inundation mapping versus dynamic. Test the method at several NWS forecast points. Evaluate current technologies to generate inundation maps

Milestones

Task	Due Date	Status
1. Develop methods to compare static and dynamic mapping approaches	FY09 Q2	Complete
2. Test method for selected North Carolina static inundation mapping points	FY09 Q3	Complete
3. Finalize documentation for North Carolina points	FY09 Q4	Delayed*
4. Begin evaluating available technologies for dynamic mapping	FY09 Q4	Complete, See 4 th quarter accomplishments

* Keren Cepero's NC State Master's Thesis will serve as final documentation. There was never AHPS funding for this portion of the project. Keren now plans to finish her thesis during the Spring semester 2010.

Accomplishments/Actions

1st Quarter FY09

- Prepared dynamic models
- Began developing evaluation methodology

2nd Quarter FY09

- Prepared a pre-print for ASCE EWRI focusing on Tar River analysis.
- Presented methodology at Federal ESRI User Conference in Washington, D.C.
- Keren Cepero (graduate student from NC State) joined us for the Spring Semester. She began building a HEC-RAS model for the Neuse River so that we can expand our sample of analysis points.

3rd Quarter FY09

- Seann presented a paper co-authored by Cecile and Keren: "A Comparison of Static and Dynamic Forecast Mapping Techniques" at the ASCE EWRI Conference.
- Keren made progress building a Geo-referenced HEC-RAS model for the Neuse River to expand our sample size for analysis. Several group members provided assistance to Keren. Seann provided lateral inflows generated from RDHM and using SAC parameters provided by SERFC. Calibration and checking of the HEC-RAS model is still needed.
- Keren will continue to work on this project and write her thesis, with plans to complete by September of 2009.
- We've begun gathering information on the new RAS Mapper being developed by (a Windows only application). Also, Mississippi State and LMRFC have received a grant with the Northern Gulf Institute to develop a new Linux-based mapping tool. LMRFC will visit OHD in August.

4th Quarter FY09

- OHD hosted four visitors from LMRFC August 11-13. Among other topics, we discussed their joint project with Mississippi State to develop real-time flood map visualization tools compatible with AWIPS. The LMRFC-MSU initiative is a promising direction to move forward with dynamic mapping capabilities (inland rivers) for NWS offices.

- We also gathered and shared information about the FEWS Flood Mapping capabilities and our limited knowledge of the new HEC-RAS Mapper that is under development.
- Seann followed up with LMRFC to provide some additional information with respect to HEC-RAS in CHPS. LMRFC continues to follow up with HEC.
- Cecile and Seann participated in static inundation mapping calls, learning about the Indiana USGS 2D modeling (steady-state only) and the difficulties encountered in ongoing static mapping projects: (e.g. no good way to account for levee overtopping; modeling extent limitations in Binghamton, NY exacerbated by a tributary and gauging station/forecast point locations).
- Although not strictly a mapping issue, Seann and Cecile continued formulating ideas (through literature review) to develop a tool for assessing where dynamic models can provide the most benefit.
- Cecile continued to provide IT support for all OHD users of ArcGIS. This supports us in using HEC-GeoRAS as well as other projects in Hydraulics, Hydrometeorology, Hydrology, and the Hydrometeorological Design Studies Center (HDSC).

1st Quarter FY10

- None this quarter.

Problems Encountered/Issues

1st Quarter FY09

- None

2nd Quarter FY09

- It has taken longer than expected to acquire cross-section data for the Neuse but we are still on track.
- The Neuse River model will depend more on the accuracy of lateral inflows from the hydrologic model compared to the Tar River. The radar-based precipitation data we would like to use may not provide good simulations for time periods of interest such as Hurricane Floyd. We are working to address this.

3rd Quarter FY09

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4th Quarter FY09

- We are waiting to hear from Keren Cepero on the status of her thesis work. We were originally anticipating that she would complete her thesis in September.

1st Quarter FY10

- No AHPS funding for documentation portion of this project.

Hydrologic Models

Physically-Based Modifications to the Sacramento Model

Core Goal: Improve the forecasts by improving hydrologic models

Management Lead: Mike Smith

Objective: The objectives of this work are to investigate further modifications to the Sacramento model. These include: investigate/modify SAC model to run over cascading planar elements; better treatment of vegetation, perhaps from the NCEP LSM model; treatment of old water/new water in runoff process; treatment of re-infiltration of runoff, etc.

Milestones

Task	Due Date	Status
1. Evaluate need for adding vegetation component to Sac Model. This could include: 1) Evaluate NOAA LSM treatment of vegetation in context of DMIP 2 in OK and Western basins. 2) Evaluate benefit of better PE estimates versus adding vegetation component (i.e. collaborate with Martha Anderson of Beltsville, ARS; get NCEP's PE estimates, evaluate NASA Marshal PE).	FY07 Q4	Done via DMIP 2 and investigation of dry area SAC parameterization.
2. Identify basins with clear evidence of channel re-infiltration. Coordinate with Dave Goodrich of ARS for this; set up RDHM runs for analysis 3. Modify RDHM to test approach if necessary.	FY07 Q4	Delayed
4. Evaluate need for treatment of Mean residence times and old/new water as per seminar by Jeff McDonnell.	FY07 Q4	Delayed
5. Evaluate new NASA PE time series to assess value for hydrologic simulations.	FY08 Q3	In progress
6. Investigate linkage of sub-surface flows in gridded Sac model	Fy09 Q4	In progress
7. Modify SAC-HT for better evapotranspiration treatment	FY10 Q3	On track

Accomplishments/Actions

1st Quarter FY07

- Initiated new project for physically-based modifications to the Sacramento Model

2nd Quarter FY07

- Time estimates developed for potential modifications to SAC-SMA. Identified NCEP actual PE values as possible path. Evaluation of Blue River in Oklahoma for channel re-infiltration not conclusive. McDonnell commented during the seminar on 'old water' that this concept is probably most geared towards hillslope runoff processes.

3rd Quarter FY07

- Identified Blue River in Oklahoma as one that has channel losses from karst formations. Contacted Dr. Todd Halihan, a hydrogeologist from Oklahoma State University who is very familiar with the Blue River and springs and karst formations. Requested any data for this basin.

4th Quarter FY07

- Provided Guidance to NASA researchers on Joint OHD/NASA project for PE estimates. This work will test the combination of MODIS satellite-derived cloud mask information with ASOS ceilometer data to derive a replacement for the manual sky cover observations required for SYNTRAN. Initial interim results look promising.
- Obtained many papers etc from Dr. Todd Halihan on the hydrogeology of the Blue River basin. Sent one presentation to ABRFC for their use. Hopefully, these will provide useful data.
- Some DMIP 2 participants used the NARR data for evaporation; must evaluate these results

1st Quarter FY08

- Shane Sheldon began analysis to compare the impacts of several different PE sources on simulations in the Blue River.

2nd Quarter FY08

- Found USGS data for the spring in the Blue River (largest in Oklahoma). Sent data to ABRFC. Shane Sheldon tried various values of SAC 'side' parameter to improve simulations for this basin.
- Evaluation of daily PE time series is underway on two basins in Oklahoma: Blue River and Black Bear Creek. The Blue River is somewhat problematic so we switched to the Black Bear Creek. Analyzing 3 PE time series: derived from ASOS cloud height, MODIS cloud mask, and combination of ASOS and MODIS. Advantages compared to monthly climate PE approach not initially obvious, but the PE time series are certainly within a reasonable range.
- Dr. Soroosh Sorooshian of the U. California at Irvine will send a PhD student to work at OHD over the summer. One aspect of the work will be to develop sub-surface linkages of gridded Sac elements.

3rd Quarter FY08

- PhD student Behnaz Kahkbasz from UCI started June 9 at OHD for summer internship. She and Victor developed a physically-based strategy to use the soil moisture levels computed by SAC-HT and channel invert elevations to determine the proportion of interflow and baseflow that would be routed to the downstream grid cell's storages. The SAC fland1.f subroutine was modified for proof-of-concept testing. Hypothetical tests of the modifications showed reasonable results.

4th Quarter FY08

- Concept and initial results of using SAC-HT to model sub surface flow connections presented at DOH 2008 conference. Work continued at UC Irvine.
- Victor Koren developed outline for modifying the SAC-HT model to account for better treatment of vegetation, canopy, and evapotranspiration losses using experience from Noah land surface model. This will be submitted as an AHPS/WR FY09 proposal. This modification is primarily focused on work in dry climates.

1st Quarter FY09

- Behnaz Khakbasz modified the HL-RDHM to generate a grid cell water exchange for primary and supplemental baseflow based on a concept developed earlier. Started tests with the new structure.
- Victor presented results of his SAC *a priori* parameterization work in dry areas and the deficiency of the SAC model regarding evaporation. Presentation made to RFCs and OHD.
- Victor prepared plan for modifying SAC model for refined evapotranspiration approach. Mike presented plan to AHPS/Water Resources Innovation Theme Team.

2nd Quarter FY09

- SON approved for modifying SAC-HT for advanced evapotranspiration; HOSIP Stage III project plan begun. OHD (Victor Koren) provided guidance and SAC-HT code to U. Washington for their unified land surface model consisting of SAC-SMA and the Noah models.
- Daily PE 4km grids delivered to OHD for 2006 and 2007 for Oklahoma and Texas. Evaluation underway. Initial spatial analyses indicate that a better method is needed to interpolate ASOS observations of meteorological variables to a grid.
- Linkage of sub-surface elements: Victor Koren provided much guidance to UCI researcher Behnaz Khakbasz. She finished coding of a water exchange component into HL-RDHM. Generated needed parametric data to run the new RDHM version for the Eldon basin. She is planning sensitivity tests using Eldon data. Ms. Khakbasz generated many simulations and experiments noting the sensitivity of model performance to the relationship of channel invert to SAC lower zone storages.

3rd Quarter FY09

- HOSIP Stage III plan approved for this project.

- Modification SAC-HT project: Completed Task 3, formulated SAC-HT water exchange mechanism based on the Noah evapotranspiration parameterization, adjusted software, and performed water balance tests. The algorithm has two options: a) original SAC-HT water exchange mechanism, and b) mixing of Noah-type diffusive mechanism (for tension water) and SAC-HT mechanism (for free water).
- Linkage of sub-surface elements: Behnaz Khakbaz is performing sensitivity tests with the new HL-RDHM water exchange component to quantify effects of subsurface water exchange on greek cell runoff at different scales.

4th Quarter FY09

- Tested and implemented air temperature based approaches for estimation of solar radiation and water vapor pressure to be implemented into canopy resistance component.
- Finishing implementation of a canopy resistance component into SAC-HT software
- Linkage of sub-surface elements: Behnaz Khabaz at U. California Irvine is finishing evaluation of HL-RDHM modification that accounts for the subsurface water exchange between grid cells.

1st Quarter FY10

- Purchased, collected, and processed input fluxes data for four sites of the Oklahoma Mesonet.
- Downloaded and generated xmrq-type grids of air temperature over ABRFC from 30-year NCEP reanalysis database.
- Performed tests of a few options of canopy resistance formulation using Oklahoma Mesonet sites data
- Behnaz Khabaz at U. California Irvine is summarizing research results on the subsurface water exchange in her PhD Thesis.

Problems Encountered/Issues

1st Quarter FY07 - None

2nd Quarter FY07

- Hydro group is currently managing 38 major tasks...need prioritization and final budget resolution before moving ahead with new projects.

3rd Quarter FY07

- Hydro group is currently managing 38 major tasks...need prioritization and final budget resolution before moving ahead with new projects.

4th Quarter FY07 - None

1st Quarter FY08 - None

2nd Quarter FY08 - None

3rd Quarter FY08 - None

4th Quarter FY08 – Some delays in receiving time series from NASA Marshall SFC of gridded PE derived from MODIS and ASOS cloud observations. These are expected FY09 Q1.

1st Quarter FY09

- Continued delays in receiving gridded PE data from Marshall SFC.

2nd Quarter FY09

- Continued delays in receiving gridded PE data from Marshall SFC.

3rd Quarter FY09

- None

4th Quarter FY09

- There is difficulty with obtaining meteorological data for the Oklahoma Mesonet to test the modified SAC-HT. No response yet from the Mesonet staff despite repeated requests.

1st Quarter FY10

- There was a general space problem on the Linux machines which delayed progress. Also, the /fs/h smb5 file system was damaged and needed to be fixed.

Calibration - Complete IDMA Study

Core Goal: Improve the forecasts by improving hydrologic models

Management Lead: Mike Smith

Objective: The objective of the work begun in FY-08 work will be to continue and finish a scientific study to evaluate the impacts of not performing (historical) data quality control procedures on precipitation data during hydrologic model calibration. This work will leverage the recent DMIP 2 activities in the North Fork of the American River Basin.

Milestones

Task	Due Date	Status
1. Obtain data for additional analyses	FY08 Q3	On track
2. Calibrate basin with uncorrected/corrected data	FY08 Q3	On track
3. Analyze calibration results	FY08 Q4	On track
4. Develop and deliver recommendations for the RFCs	FY09 Q4 FY10 Q3	Delayed On Track

2nd Quarter FY08

- Analyzed gauge only gridded precipitation for the North Fork American River for the 2002 -2006 time period and found consistency issues that resulted in time-varying model biases. Will try to use these data to restart the study. Also found journal paper on the impact of biased and randomly corrupted inputs on the efficiency and the parameters of watershed models. The paper showed: 1) random errors in precipitation significantly affect model performance and parameter values and 2) systematic errors in rainfall time series (biases) when large enough can be very detrimental to model performance. Will send paper to RFCs

3rd Quarter FY08

- None this period

4th Quarter FY08

- None this period

1st Quarter FY09

- Naoki wrote draft paper on DMIP 2 precipitation data inconsistencies in the North Fork American River basin. Reviewed by Hydro group. Mike provided Naoki with references on effects of inconsistent data on model calibration. Mike, Victor, and Naoki discussed continuation of data correction problem by Naoki. Mike will review status of work on Baron Fork at Eldon, OK in order to give to Naoki.

2nd Quarter FY09

- Naoki and Victor continued to revised draft paper on impact of QPE bias in model calibration and simulation using the North Fork American River.

3rd Quarter FY09

- None

4th Quarter FY09

- Analyzed revised QPE data for North Fork American River and East Fork Carson River. Carson River data is not consistent over time.
- Performed QC of NCDL data for the North Fork. Corrected many (~200) errors resulting from

NCDC data being coded as -999 when it should be -998 as shown in the NCDC paper monthly records.

- Made HL-RDHM simulations with NCDC data that was not QCed as in the previous item. This run will be the standard of comparison.

1st Quarter FY10

- Completed QC of NCDC data for North Fork American River and began QC of data for East Fork Carson river. Encountered many cases of -999 values that should be -998.
- Mike gave a presentation to the HMT leaders on the impact of not correcting the problems with the NCDC data. Daily precipitation values that can't be time-disaggregated by the new Calibration MAP preprocessor are put into one hour of the station time series and can create 'bull's-eyes' in the resultant MPE hourly grids and lead to anomalous hydrograph peaks.

Problems Encountered/Issues

2nd Quarter FY08

- Task on hold due to loss of 3 group members and other higher priority projects.

3rd Quarter FY08

- Task on hold

4th Quarter FY08

- Task on hold

1st Quarter FY09

- None

2nd Quarter FY09

- Delays getting journal paper through group review.

3rd Quarter FY09

- Delays getting journal paper through group review

4th Quarter FY09

- Need to add additional analyses to paper

1st Quarter FY10

- Group leader review of Naoki's paper delayed.

Software Refresh

Community Hydrologic Prediction System (CHPS)

Core Goal: Enhance the usability and/or internal workings of existing software

Management Lead: Jon Roe

Objective: Provide an improved software infrastructure for operational use at RFCs, as a replacement for the existing NWSRFS, and which will meet the future forecasting needs of all RFCs.

FY10 Milestones (from FY10 Workplan):

Task/Subtask FY10 Milestones	FY10 Due Date	Current Status
1 FEWS for CHPS Implementation (Deltares)		
1.1 Deliver BOC to 4 CAT RFCs	Q1	Completed
1.2 Conduct User Training (IFD) for 4 CAT RFCs	Q1	Completed
1.3 Conduct Migration & Configuration Training for CAT-II RFCs	Q2	
1.4 Deliver BOC-II to CAT-II RFCs	Q2	
1.5 Conduct System Manager Training for CAT-II RFCs	Q3	
1.6 Conduct Advanced FEWS Configuration Training for CAT RFCs	Q3	
1.7 Lead quarterly CHPS workshops	Q1, Q2, Q3, Q4	Q1: Completed
1.8 Conduct Software Acceptance Testing at OHD for all routine releases of CHPS	Q1, Q2, Q3, Q4	Q1: Completed
1.9 Provide support to CAT RFCs for delivered software releases, Migration, and other CHPS issues	Q1-Q4	Q1: Completed
1.10 Deliver all system documentation to CAT RFCs	Q3	
2 FEWS for CHPS Implementation supplement (Deltares)		
2.1 Deliver additional User (IFD) Training to NERFC	Q1	Completed
2.2 Conduct on-site visits for all CAT-II RFCs immediately following Migration Training	Q2	
2.3 Deliver additional functionality for the IFD as part of CHPS BOC	Q2	
2.4 Deliver additional FEWS software to support the FFG/FFH emulation work by OHD	Q2	
2.5 Deliver system and configuration training to OHD (software developers, scientists) and OCWWS HSD	Q2-Q3	
2.6 Deliver support to CAT-II RFCs to during their Migration activities	Q2 – Q4	
2.7 Deliver a 4 th CAT workshop in FY10	Q4	
2.8 Deliver User (IFD) Training to CAT-II RFCs	FY11 Q1	

3 CHPS Implementation: OHD BOC/BOC-II development		
3.1 Develop and deliver OHD software for CHPS BOC/BOC-II	Q2	
3.2 Provide software maintenance support for Task 3.1		
3.3 Deliver all OHD software documentation to CAT RFCs	Q3	
3.4 Establish a CHPS software CM environment	Q3	
3.5 Establish a CHPS software distribution mechanism	Q4	
3.6 Support quarterly SAT meetings at OHD	Q1, Q2, Q3, Q4	Q1: Completed
3.7 Develop a Calibration service for CHPS	Q3	
4 CHPS Implementation: OHD forcings development		
4.1 Deliver updated MPE/DQC to CAT and CAT-II RFCs for use in CHPS BOC/BOC-II	Q2	
4.2 Provide software maintenance support for nc2grib	Q1 – Q4	Q1: Completed
4.3 Develop improved MAT algorithm	Q3	
4.4 Implement operational software based on an improved MAT algorithm	Q4	
5 CHPS Implementation: Testing, Training, Workshops, and Other Meetings		
5.1 Attend 1 st CAT-II workshop in Tulsa, OK in October 2009	Q1	Completed
5.2 Attend User Training in Tulsa, OK in October 2009	Q1	Completed
5.3 Travel to NERFC in November 2009 to finalize installation instructions	Q1	Completed
5.4 Attend Software Acceptance Testing (SAT) in Silver Spring in December 2009	Q1	Completed
5.5 Attend CAT workshop in Silver Spring in January 2010	Q2	
5.6 Travel to CAT-II RFCs to install CHPS software January-February 2010	Q2	
5.7 Attend Migration & Configuration Training at the NWSTC in February 2010	Q2	
5.8 Travel to CAT-II RFCs after Migration 2010 (“Buddy” visits) in February/March; plus an additional 2 repeat visits over the Summer 2010	Q2	
5.9 Attend Software Acceptance Testing (SAT) in Silver Spring in March 2010	Q2	
5.10 Attend CAT-II workshop [at central location TBD] in March/April 2010	Q2	
5.11 Attend System Manager’s Training in April 2010 [central location TBD]	Q3	
5.12 Attend Advanced FEWS Configuration Training in June 2010	Q3	

5.13 Attend CAT-II workshop [at central location TBD] in June 2010	Q3	
5.14 Attend Software Acceptance Testing (SAT) in Silver Spring in June 2010	Q3	
5.15 Attend Software Acceptance Testing (SAT) in Silver Spring in September 2010	Q4	
6 CHPS Implementation: Migration hardware (final)		
6.1 Update Hardware Installation instructions based on existing equipment at RFCs and deliver the instructions to all RFCs. Also involves Travel to NERFC (covered under Task 5.3)	Q1	Completed
6.2 Purchase and deliver final 3 servers to each CAT-II RFC and OCWWS HSD	Q3	
7 CHPS Implementation: Support & Maintenance (Deltares)		
7.1 Provide 40 hours per month for 12 months of support and maintenance for FEWS to CAT/CAT-II RFCs. Includes contract overhead.	Q1-Q4	Q1 : Not Applicable
8 CHPS Implementation: Support & Maintenance for HEC software (RMA)		
8.1 Provide 20 hour per month for 12 months of support and maintenance for ResSim, HEC-RAS, and the FEWS adapters to OHD. Includes contract overhead. Includes contract overhead.	Q1-Q4	Q1 : Not Applicable
9 RFC Archive prototype		
9.1 Deliver additional hardware to support RFC archive prototyping activities	Q4	

Accomplishments/Actions:

1st Quarter FY08

- o For more detailed information, please visit the CHPS news and activities page on the Web at: <http://www.nws.noaa.gov/oh/hrl/chps/news.html>.
- o Apex Digital Systems and Dr. Michael Piasecki from Drexel University submitted to OHD a HydroXC proposal for the FY08 Hydrology budget that would build upon work completed in previous fiscal years, and help make the HydroXC work successful and self-sustaining.
- o At a workshop hosted by the NCRFC in Chanhassen, MN during the week of December 17, Delft Hydraulics (now Deltares) presented and demonstrated the final version of the CHPS FEWS Pilot system to a group of HICs and RFC hydrologists.
- o Based on the CHPS FEWS Pilot system, the CHPS Acceleration Team (CAT) is now satisfied that FEWS is a comprehensive platform which can be adapted to meet the current operational needs of NWS RFCs (i.e., is a suitable foundation for an NWSRFS replacement); and additionally has the potential to meet future needs of CHPS as a whole. The CAT delivered a final recommendation report to Gary Carter summarizing their findings. The NOAA Hydrology Program Manager accepted the findings and endorsed the implementation of FEWS for CHPS.
- o Raytheon concluded their analysis of CHPS (FEWS), and delivered a proposal to OHD at the end of October for an approach to the CHPS-AWIPS II interface.
- o Acceptance testing of the new ResSim at CNRFC occurred during November. An adequately functional version of ResSim was installed, along with OHD's/Apex's enhanced version of NWSRFS.

- Phase 1 of the HEC-RAS into CHPS project began with a kick-off conference call in December where a proposed project schedule was discussed.
- On October 19 HSEB submitted a "High Level Analysis and Design" document to the XEFS Implementation Team for review.
- In December HSEB held a meeting to address feedback received on the XEFS document. However the discussion prompted a re-think of the implementation strategy, which will now be based on Delft-FEWS in light of the CAT recommendation for CHPS.

2nd Quarter FY08

- On January 1 Delft joined forces with several other Dutch water-focused institutes to form Deltares. Visit http://www.deltares.nl/xmlpages/page/deltares_en for more information.
- The CAT delivered its recommendation report to Gary Carter on January 9; the recommendation to proceed with FEWS as the infrastructure component for CHPS was approved. Chris Dietz was named as the CHPS Implementation project leader.
- A successful HOSIP Gate 4 for the CHPS FEWS Pilot Enhancements project was held on February 20.
 - The first draft high-level implementation plan was developed; the CAT is holding weekly conference calls to refine details of the plan. A planned 2-day workshop to accelerate development of the plan was postponed at the last minute due to increased flood forecasting operations at NWRFC.
 - Karel Heynert from Deltares visited OHD in Silver Spring on February 21, 2008, to discuss and refine the proposed implementation and migration schedule.
 - Apex held a series of fact-finding interviews with each of the CAT RFCs, resulting in a report delivered to OHD on March 24 entitled "FEWS Pilot Results".
 - OHD HSEB developers have begun work on 7 NWSRFS model operations: CONS_USE, LAG/K, RES-SNGL, SARROUTE, SSARRESV, TATUM, and UNIT-HG. The PAL for these activities is Joe Gofus.
 - HSEB initiated the process of securing access to Deltares through the NWS AWIPS contract with Raytheon.
 - Deltares and OHD traveled to LMRFC in February to discuss functional requirements for the HEC-RAS capability in CHPS. OHRFC also attended. The Deltares-OHD team then traveled on to Davis, CA to meet with USACE HEC and its contractor Resource Management Associates (RMA); RMA is the contractor that built the Corps Water Management System (CWMS) in collaboration with HEC. The goal of the meeting in Davis was to discuss potential solutions. Delft, HEC, LMRFC came to an agreement concerning the overall technical solution, which allowed Deltares and HEC to draw up technical proposals; the Deltares proposal was reviewed by the Hydraulics team on March 25. Phase 1 of the project is now complete. Phase 2 - implementation of the proposed solution - will begin once contracts/MOAs are in place with Deltares and HEC.
 - The HydroXC effort did not receive any FY08 funding; all work has now been placed on indefinite hold

3rd Quarter FY08

- The CAT met in Portland (NWRFC) on May 1-2 to accelerate progress on planning activities. An implementation plan for CHPS migration was completed.
- In mid-June Rob Shedd, the Development and Operations Hydrologist (DOH) at Northeast RFC (NERFC), became a CAT member. NERFC is now a "CHPS forerunner" site. John Halquist remains a CAT member, but now represents NOHRSC.
- On March 24 Apex Digital Systems, Inc. (Apex) delivered the final version of their document entitled "FEWS Pilot Results".
- Deltares made significant progress on the migration mapping document during a visit between Deltares and OHD the week of April 14.
- The CAT identified requirements for a CHPS Baseline Operational Capability (BOC), defined to be the minimal set of functionality required at the CAT RFCs to migrate to CHPS. BOC document for the CAT RFCs is now complete.
- Joe Gofus was assigned leadership of the OHD CHPS software development team which will focus on converting NWSRFS models to CHPS.
- A CAT-OHD-Deltares workshop was held June 17-19 in Silver Spring, MD

- Karel Heynert from Deltares gave a Delft-FEWS presentation to the Integrated Water Resources Science and Services (IWRSS) workshop participants on June 16.
- Deltares delivered to the CAT a proposed set of hardware specifications.
- HSEB submitted to NOAA Procurement a request for quotes based on final specifications drawn up by OHD, OCWWS, and Deltares for a partial system (i.e., without a duty standby, and without an offline system). The goal is to install this partial CHPS system at CAT sites in October 2008.
- HSEB initiated a "chps_info" mailing list to broadcast information and attempt to familiarize subscribers with terminology; also a new rfc.chps@noaa.gov email account was created as a supplemental way of disseminating CHPS information.
- Deltares is waiting for authorization from NOAA Procurement to proceed with work on the HEC-RAS adapter. Funds for HEC were transferred to the USACE at the end of June; HSEB is waiting for HEC to advise when they can begin work.

4th Quarter FY08

- After Raytheon declined to submit a joint proposal with Deltares for CHPS implementation under the AWIPS contract, NOAA proceeded with a sole source solicitation from Deltares (ref. solicitation number NWWC0000-8-39992 on FedBizOpps.gov). A contract was awarded on September 17.
- CHPS web page (<http://www.nws.noaa.gov/oh/hrl/chps/index.html>) was re-designed and updated in August.
- CHPS Preparation Workshop #2 was held at NERFC in Taunton, MA during the week of September 29.
- Deltares led a Usability Analysis meeting during the week of August 4, beginning the process of designing a user interface for Delft-FEWS that will meet the need of NWS forecasters. Initial screen mock-ups were developed and presented to representatives from all 4 CAT RFCs.
- HSEB modified the NWSRFS "ofsde" program to deliver files for CHPS. The new version was successfully tested at NWRFC.
- HSEB began implementation of changes to support run-time modifications (MODs) based on design information provided by Deltares.
- HSEB completed the purchase for prototype hardware, to be delivered to the CAT RFCs in October.
- HEC began work on the changes to RAS; the task for Deltares through the RTi/AHPS contract was awarded. RTi has scheduled a kick-off meeting for the start of October. HSMB continued to make good progress with their task on the project (see status report for "Transition from FldWav to HEC-RAS").
- Deltares visited NERFC on August 14-15 to provide first level FEWS training to RFC staff. Some additional training was provided to NERFC after the Workshop #2. NERFC will now also be the primary site for testing the HEC-RAS implementation in CHPS.
- On September 8, HSEB made its first delivery to Deltares of most of the migrated models; Deltares tested them in their facility during September.
- The NWS Employees Organization (NWSEO) nominated Ron Horwood, Senior HAS Forecaster at NERFC, to be the bargaining unit's representative to the CHPS project.
- HSEB presented a CHPS project status update to OSIP Gate 3 on September 23.

1st Quarter FY09

- CHPS prototype hardware delivered and installed at all 4 CAT RFCs. "Mod note" developed by OCWWS HSD (Randy Rieman).
- FEWS server software installed at NERFC and NWRFC (ABRFC and CNRFC due next quarter).
- CHPS Data Forcings team created to develop short and long term strategies for providing grids and other forcings to CHPS (lead: Mark Gaudemans)
- Harold Opitz, Joe Intermill (both NWRFC), and Ron Horwood (NERFC) attended Software Acceptance Testing in Silver Spring. Goal was for Deltares to demonstrate to OHD that BOC operations migrated from NWSRFS work the same when plugged into FEWS as when run independently of FEWS (i.e., standalone). Individual operations did well, and the source of most discrepancies was identified. Forecasters were additionally able to run catchments end-to-end using FEWS, although the results were not always correct due to the known individual operation discrepancies.
- Jon Roe gave a CHPS presentation to the new Director of OS&T (Don Berchhoff). Berchhoff

requested more information on the hardware issue (ref. Issue 4Q FY08), which was delivered to him on Dec 31; OHD expects OS&T follow-up during January.

- HEC delivered a Linux-based version of the RAS to Deltares on Dec 8; this now permits Deltares to finalize the RAS-FEWS adapter development and testing.

2nd Quarter FY09

- OCWWS HSD completed hardware and software installations at remaining CAT RFCs.
- Began next phase of introducing other RFCs to CHPS. 9 follow-on RFCs now referred to as “CAT-II”
- OHD provided monthly status briefings to CAT-II and Regions on January 8, February 12, and March 12
- OHD supported the CAT members on “CHPS Day” during the national HIC conference on February 26
- Weekly conference calls with CAT-II initiated on March 10 (led by Rob Hartman, HIC CNRFC); focus has been getting requirements captured (“BOC-II”)
- CHPS Migration training (for the CAT) held at the NWSTC, Kansas City, MO the week of February 9. This was followed by on-site visits by Deltares to CAT RFCs to help with migration kick-off
- Formal start of CAT Migration from NWSRFS to CHPS: 2/17/09. At end of Q2, ABRFC had completed migrating ALL their NWSRFS segments!
- CHPS Preparation Workshop #3 (for the CAT) was held in Silver Spring, MD the week of January 26
- CHPS Implementation Workshop #1 (for the CAT) was held at CNRFC in Sacramento, CA the week of March 30
- New info lists set up: cat_2 (for CAT-II information sharing); chps_ops (for migration support and information sharing). New operational support email set up: nws.chps_support@noaa.gov
- OHD delivered first release of modeling software for CHPS; Software Acceptance Testing (SAT) for integrated package (FEWS + OHD software) scheduled for week of April 6
- OHD began work on models required by CAT-II sites (“BOC-II”)
- CHPS Data Forcings team met approximately weekly; CAT has focused heavily on the implementation and use of GFE, MPE/DQC, and local applications for BOC. OHD also began work on a temperature processing software application. OHD began to consider requirements for and approaches to CHPS forcings for the CAT-II RFCs.
- Deltares resumed work on the expanded FEWS Interactive Forecast Display (IFD) for the CHPS project. Design meetings (screen mockups, prototypes) began on March 4.
- OHD and Deltares began to document requirements for a CHPS Calibration capability, which will be implemented using a new Application Programming Interface (API) to the FEWS infrastructure provided by Deltares.
- Dates for HEC-RAS training were finalized as follows: basic/steady-state provided by HEC in Davis, CA for all CAT and CAT-II RFCs – April 13-17; advanced/unsteady-state provided by OHD HSMB in Taunton, MA for CAT – April 28-May 1 (lecture portions to be presented as webinars, so CAT-II can also attend)
- Issues (see 2nd Quarter FY09 below) resulted in the agreement between OHD and Deltares to include displays for HEC-RAS as part of the general CHPS Interactive Forecaster Displays
- A “national CHPS workshop” evolved into two events: 1. “buddy visits” where CAT RFCs travel to their partner RFCs with Deltares and OHD during May, June, and July to introduce the CAT-IIs to CHPS; 2. A CAT-II Preparation Workshop #1 in September. CAT-CAT-II partnerships are as follows: NERFC/MARFC & OHRFC; ABRFC/WGRFC & LMRFC & SERFC; NWRFC/APRFC & MBRFC; CNRFC/CBRFC & NCRFC.

3rd Quarter FY09

- Deltares continued work on the expanded FEWS Interactive Forecast Display (IFD) for the CHPS project; after a series of screen mock-up reviews, Deltares developed and delivered a demonstration version of the IFD to the CAT RFCs at the end of April.
- A significant amount of Deltares and OHD time was dedicated in the support of migration activities for the 4 CAT RFCs. OCWWS HSD also participated.
- OHD continued work on CHPS-based modeling software required by the CAT-II sites (“BOC-II”).

- OHD's CHPS Data Forcings team completed development of a software application to transform netCDF grids into GRIB(I) for ingest into CHPS. OHD also implemented some CHPS-related enhancements to MPE/DailyQC. Team members worked closely with Deltares to demonstrate that these AWIPS-generated grids were successfully ingested by FEWS.
- Software Acceptance Testing (SAT) occurred in Silver Spring at OHD during the week of April 6; another SAT occurred during the week of June 15. Forecasters from the CAT RFCs attended both; the NWSEO representative also attended. An early version of the IFD was included for the first time in the June tests.
- "Buddy" visits to introduce CAT-II RFCs to the CHPS project, identify initial CAT-II basins for configuration within FEWS, and provide a list of pre-implementation tasks began in May. Eight of the nine CAT-II RFCs were visited during Q3; the final CAT-II visit to NCRFC will occur in Q4. A small number of new BOC-II requirements surfaced during these visits.
- During May and June, Deltares completed another round of site support visits for each of the CAT RFCs; additional training and familiarization was provided. The CAT RFCs are now expected to finish up their migration activities in the early part of Q4 (delayed from Q3).
- A CHPS Implementation Workshop #2 for the CAT RFCs was held in Portland, OR at NWRFC during the week of June 22, 2009.
- OHD provided monthly status briefings to CAT-II RFCs and Regions on April 9, May 14, and June 9.
- Purchase of the second set of prototype hardware for the CAT RFCs and the first set of hardware for the CAT-II RFCs was initiated in June. Delivery is expected to be in early October 2009.
- Deltares and HEC met at the Resource Management Associates (RMA) facility in California during the final week of June to address outstanding technical issues with interoperability between FEWS and the Linux version of RAS. During this visit Deltares provided the necessary training for RMA to assume RAS-FEWS adapter software ownership and maintenance.
- During June Deltares demonstrated to NERFC a Linux version of HEC-RAS and the associated FEWS adapter as part of their CHPS configuration. A further demonstration was provided to OHD and the CAT forecasters during SAT in June.
- During the week of April 13 HEC conducted a basic (steady-flow) course for all RFCs.
- During the week of April 27 OHD HSMB provided the CAT RFCs with hands-on training at NERFC (Taunton, MA) in advanced HEC-RAS topics (unsteady flow)

4th Quarter FY09

- "Buddy" visits for the CAT-II RFCs were completed in July.
- During the Software Acceptance Testing (SAT) at OHD on September 21-23, forecasters from NWRFC, NERFC, CNRFC, and ABRFC conducted further tests of the new Interactive Forecast Displays (IFD).
- During the SAT, OHD hosted a visit from Dr. Jack Hayes, Director NWS.
- HSEB developers worked closely with Deltares developers to improve the performance of CHPS model runs, especially for ensembles. These improvements were formally tested during the September SAT in Silver Spring.
- HSEB developers finished migration and testing of the legacy models required for BOC II. These will not undergo Acceptance Testing until December.
- Deltares conducted tests of the HEC-RAS during SAT; most tests passed but HEC has been asked to implement one more fix before HEC-RAS will be considered fully ready for operational use with CHPS.
- Deltares conducted tests of the ResSim during SAT; all tests passed. However OHD is waiting for a revised version of HEC's software which correctly handles warm states; formal testing for this version is expected to occur in December. See Problems/Issues below.
- At the conclusion of the September SAT, CHPS OHD release 2.0.1 was disseminated to the CAT RFCs for CHPS pre-operational use.
- HSEB developers also provided assistance to Deltares and HSD in support of the CAT RFC migration efforts.
- Work on the IFD continued at Deltares, with the majority of all changes expected in the November release (scheduled for SAT the week of December 7). Deltares held several joint design meetings with the CAT IFD team members.
- A CHPS Forcings listserver was set up to allow for the exchange of emails between CAT RFC

team members. The minutes from the CHPS Forcings teleconferences were posted to the listserver.

- HSEB completed upgrades to MPE/DailyQC to generate grids in netCDF and GRIB1 formats, targeted for AWIPS OB9.2. Developers are currently working on a few further enhancements which have been identified as being necessary for smooth operations in CHPS. These enhancements will be completed and tested under an ATAN at the CAT RFCs after OB9.2 has been deployed.
- The NC2GRIB application was completed; it is used to transform netCDF format files (output from GFE or MPE/DailyQC) into GRIB1 format.
- The third CHPS Implementation Workshop for the CAT RFCs was held 28 - 30 September at ABRFC in Tulsa, OK.

1st Quarter FY10

- Deltares delivered a maintenance release of the CHPS BOC software to the RFCs in November, followed by a full release in mid-December. Since the December release still contains bugs, another maintenance release is expected in January 2010, and another full release in March 2010.
- Deltares provided User Training (IFD) at 4 CAT RFCs in October. Deltares also delivered additional User Training to NERFC in December.
- Deltares provided support for a CHPS workshop for the CAT-II in October.
- Deltares conducted a routine quarterly Software Acceptance Testing (SAT) at OHD in December. Wyle contractor staff provided necessary support. CAT representatives traveled to Silver Spring to participate.
- Deltares provided support to the CAT RFCs for delivered software releases, Migration scripts, and other CHPS issues.
- Wyle contractor staff provided software maintenance support for nc2grib, as well as software enhancement and maintenance support for MPE/DQC during Q1.
- CAT and CAT-II representatives attended the 1st CAT-II workshop in Tulsa, OK in October 2009.
- OHD attended User Training in Tulsa, OK in October 2009.
- OCWWS HSD traveled to NERFC in November 2009 to finalize CHPS hardware installation instructions.
- In December OCWWS HSD updated the existing CHPS hardware installation instructions, delivered an advance copy to the CAT and CAT-II via the RFC support website, and initiated the formal Mod Note process.
- In December HSEB submitted for processing a new Statement Of Objectives (SOO) to cover CHPS Operations Support and Maintenance (O&M) by Deltares. Operational support during Q1 was provided by Deltares via the sole source CHPS Implementation contract.
- HSEB began crafting a SOO for a new contract task to give OHD a mechanism to acquire software support & maintenance services from the USACE HEC's contractor RMA. Support & maintenance services will be required for the FEWS software adapters developed for ResSim and HEC-RAS. Although development of this SOO is behind schedule, the delay has not impacted the overall CHPS schedule.

Problems Encountered/Issues:

1st Quarter FY08

- An outstanding issue concerning ResSim's ability to execute a warm start in the manner expected by RFC forecasters was never resolved. As the necessary changes to ResSim would be extensive, CNRFC agreed that their plan to move forward with ResSim in their operations could proceed with minor impact. The USACE HEC will submit a proposal to the YCWA to make the necessary design and code changes to ResSim. This HEC activity will delay Phase 2, which is expected to add processing of ensemble forecasts in ResSim.

2nd Quarter FY08 – None

3rd Quarter FY08

- As we approach the final quarter for FY08 we expect NOAA Procurement to be slow to respond to CHPS-related spending requests. Delays may jeopardize the CHPS schedule.

- The CAT continues to struggle with ways to involve all RFCs. GoToMeetings, Webinars, and the like have been suggested but have never materialized. The lack of a signed contract between OHD and Deltares hinders HSEB's ability to task them. The DOH workshop in July holds some promise.

4th Quarter FY08

- Although the Hydrology program purchased the initial prototype hardware for CHPS, it is unclear what the future strategy will be, given that the AWIPS budget through 2012 contains no provision for increased computing resources at RFCs, and given that the Hydrology budget does not cover hardware (or sustaining support thereof). OS&T has imposed a requirement that CHPS must function within the same performance envelope as NWSRFS. OSIP project 07-059 ("RFC AWIPS Configuration") will identify computing needs for RFCs based on NWSRFS, but not for CHPS.

1st Quarter FY09

- Completion of necessary tools by Deltares to allow CAT RFCs to begin migration slipped by one month, pushing the milestone from Q1 FY09 to Q2 FY09.
- A national CHPS workshop was pushed out by the CAT, to the summer of 2009 (estimate Q4 FY09).
- Syllabus for HEC-RAS training, scheduled for 2Q FY09, has been changed to provide all RFCs with basic (steady flow) instruction. CAT RFCs require advanced (unsteady flow) training – OHD HSMB agreed to provide this training itself (dates to be determined).

2nd Quarter FY09

- Some technical problems with FEWS-RAS adapter arose during this quarter, but they are expected to be resolved during Q3
- A concern regarding ownership and maintenance of the HEC-FEWS software adapters (for HEC-RAS and for HEC ResSim access to FEWS) was addressed during this Quarter. OHD will meet with HEC on April 1 in Sacramento, CA. This issue meant that software maintenance training by Deltares for HEC has been deferred until early summer; which also resulted in a necessary extension to the contract and a new deliverable date of Q3. This is still in time for BOC, but it increases the risk to the project, as the CAT RFCs must wait longer to test CHPS/HEC-RAS.

3rd Quarter FY09 - None

4th Quarter FY09

- We are still awaiting an official version of ResSim from the HEC which includes a corrected "warm start" capability (problem was identified in early 2008).

1st Quarter FY10 - None

Dissemination (Web Pages)

AHPS Web Page Activities

Core Goal: Generate and disseminate information to and for our users

Management Lead: Donna Page

Objective: Provide a standard look and feel for the presentation of AHPS hydrologic and forecast information on the World Wide Web by all NWS weather offices. Also, complete the implementation of a single national database that aggregates information on hydrologic observation and service locations used by WFOs and RFCs (National Rivers Location Data Base - NRLDB).

Milestones

Task	Due Date	Status
1. Phase VI development and testing	FY10Q2	In progress – delayed to Q2 FY10
2. Phase VI deployment	FY10Q2	Depends on web consolidation – new target Q2 FY10
3. Phase VII definition	FY10 Q3	Delayed to Q3 FY10
4. Phase VII development	FY10 Q4	Not started – depends on definition task and funding

Accomplishments/Actions

1st Quarter FY08

- Provided 5 Texas inundation locations for review by Government on AHPS staging server.
- Worked on new inundation water-depth process to merge Triangulated Irregular Network (TIN) and Digital Elevation Model (DEM) datasets for Texas and North Carolina locations.
- Finished beta version of new hydrograph generation software for future consolidated web-farms. Waiting to test on AHPS backend blade servers.
- Started documenting NRLDB tables to move to AHPS-CMS database for web operations.

2nd Quarter FY08

- Started processing new inundation data for 10 Texas and 1 North Carolina location.
- Worked with OCWWS and South Region Headquarters on QC processes for 5 Texas inundation locations.
- Finished work on two new inundation water-depth processes.
- Worked on documenting NRLDB to move to AHPS-CMS database for web operations.
- Started working with AHPS blade server on NWS HQ web-farm

3rd Quarter FY08

- Implemented four inundation locations in Texas.
- Provided nine new inundation locations for review by OCWWS and Southern Region Headquarters
- Started work on inundation zoom feature overlap which was requested by OCWWS
- Implemented development CMS database at HQ web-farm
- Started processing NWS HML products to create hydrographs on HQ AHPS blade servers

4th Quarter FY08

- Implemented nine inundation locations along the Gulf Coast
- Based on discussions with and algorithm approval by OCWWS and NOAA Coastal Services,

modified the inundation water depth shapefile TIN/DEM merge process to improve on shallow water depth estimates.

- Updated beta version Web-HydroGen code to fix known issues.
- Worked with OCWWS to reestablish NRLDB version 2 process and deployment testing

1st Quarter FY09

- Worked with OCWWS HSD to test NRLDB version 2 and made code changes at their request
- Delivered four LCRA inundation sites for review by WGRFC
- Worked on development and implementation of new database driven HIC web site
- Worked with Web CCB to implement/test AHPS Phase VI checklist dependencies

2nd Quarter FY09

- Worked with OCWWS HSD to test NRLDB version 2 and made code changes at their request
- NRLDB version 2 now deployed at all WFOs
- Updated inundation data for LCRA inundation sites per request by WGRFC
- Implemented new database driven HIC web interface
- Worked on implementation AHPS Phase VI checklist

3rd Quarter FY09

- Processed new inundation locations and provided staging of data for review
- Updated inundation locations and worked to deploy on SRH web-farm
- Worked on implementation of AHPS Phase VI checklist

4th Quarter FY09

- Processed new inundation locations
- Implemented NWS approved inundation locations on SRH web-farm
- Met OCWWS Inundation AOP goals
- Worked on implementation of AHPS Phase VI checklist

1st Quarter FY10

- Reprocessed inundation locations at the request of OCWWS HSD
- Worked on implementation of AHPS Phase VI checklist
- Worked on modifications to national precipitation interface and downloadable datasets

Problems Encountered/Issues

1st Quarter FY08

- Delays in web consolidation hardware implementation adversely affecting AHPS Phase VI
- Delays in web consolidation data/file synchronization adversely affecting AHPS Phase VI development
- Delays in obtaining necessary web consolidation documentation from OCIO adversely affecting AHPS Phase VI development architecture planning
- Continued issues with missing products in HQ product database. NWS OCIO is aware of the ongoing issue
- New text product issue caused missing NWS products for all AHPS pages. NWS OCIO is aware of issue and has indicated that they will address their PHP code.

2nd Quarter FY08

- Delays in web consolidation hardware implementation adversely affecting AHPS Phase VI
- Delays in web consolidation data/file synchronization adversely affecting AHPS Phase VI development
- Delays in obtaining necessary web consolidation documentation from OCIO adversely affecting AHPS Phase VI development architecture planning
- Continued to have issues with missing products in HQ product database. NWS OCIO is aware of the ongoing issue

3rd Quarter FY08

- Delays in web consolidation hardware implementation adversely affecting AHPS Phase VI
- Delays in web consolidation data/file synchronization adversely affecting AHPS Phase VI development
- Delays in obtaining necessary web consolidation documentation from OCIO adversely affecting AHPS Phase VI development architecture planning

4th Quarter FY08

- Delays in web consolidation hardware implementation adversely affecting AHPS Phase VI
- Delays in web consolidation data/file synchronization adversely affecting AHPS Phase VI development
- Delays in obtaining necessary web consolidation documentation from OCIO adversely affecting AHPS Phase VI development architecture planning

1st Quarter FY09

- Delays in web consolidation hardware implementation adversely affecting AHPS Phase VI
- Delays in web consolidation data/file synchronization adversely affecting AHPS Phase VI development
- Delays in obtaining necessary web consolidation documentation from OCIO adversely affecting AHPS Phase VI development architecture planning

2nd Quarter FY09 - None

3rd Quarter FY09

- Database system at NWS HQ had several outages during the period.

4th Quarter FY09

- Waiting for several OCIO consolidated web-farm activities to be completed so that AHPS Phase VI can be tested/implemented

1st Quarter FY10

- Waiting for several OCIO consolidated web-farm activities to be completed so that AHPS Phase VI can be tested/implemented

Western Water Supply Forecast Service Improvement

Core Goal: Dissemination

Management Lead: Kevin Werner

Objective: Improve western water supply forecast services by incorporating all NWS water supply forecasts, ensemble forecasts, forecast verification, and data access into web services.

FY09 Milestones

Task	Due Date	Status
9. Launch enhanced web site for water supply and water resources outlooks	Q1	Complete
10. Develop goals for CY09 developments	Q3	Complete
11. Develop new capabilities based on goals in (2)	Q4 / FY10Q1	In Progress
12. Conduct outreach activities at water management meetings	Q4	Ongoing
13. Pass OSIP gate 2	Q4	Delayed to FY10Q2

1st Quarter FY09

- Project passed OSIP gate 1 and OSIP IWT formed for gate 2
- Web site reviewed by participating RFCs
- Ongoing development addressed review comments and suggestions
- Briefing conducted for all RFCs, regions, and NWSH personnel on status and potential for a nation wide water resources outlook in Nov 2008
- All RFCs except APRFC named a focal point to work with on including their AHPS points in the national water resources outlook
- CBRFC conducted verification studies using verification tool
- Project presented at fall AGU meeting (Dec), WCM/SCH course (Dec), RFC verification workshop (Nov), Nevada's Colorado River Commission (Dec), and the October NIDIS planning meeting (Oct)
- Planning meeting for FY09 early FY10 developments tentatively slated for late 2nd quarter FY09 depending on FY09 AHPS funding. Meeting would include subset of RFCs. Major new development opportunities include:
 - Expansion of water resources outlook capabilities (e.g. further leveraging existing AHPS products for low flow probabilities)
 - Refinement of database
 - Refinement of climate change capabilities
 - Development of water resources outlook verification
- Continuing to add additional RFCs into water resources outlook as their forecasts and data become available

2nd Quarter FY09

- Launched new version of NWS water supply / water resources outlook website in January 2009
- Integrated ESP forecasts into water resources outlook from the following RFCs: NW, CN, CB, MB, AB, WG, OH, MA, and NE.
- Partially completed ESP integration from SE and LM RFCs
- Project presented at COMET climate variability course (Mar), Climate Prediction and Applications Workshop (Mar), and Border Governors Conference (Mar)
- Management briefings held for WRH (Feb) and OHD and OCWWS/HSC (Apr 1)
- Planning meeting for FY09/FY10 developments delayed to 3rd quarter because of budget uncertainty. Targeting early June for planning meeting in Salt Lake to include principles. See 1st quarter report for meeting goals.

- Teleconference for RFCs held in early April to discuss status and future directions
- IWT for OSIP gate 2 work being formed.

3rd Quarter FY09

- Planning meeting scheduled for July 21-22.
 - Meeting will include participants from CB, NW, NC, SE, and OHRFC as well as NOHRSC and NOAA RISAs.
 - Near term development objectives will be determined at meeting
 - RISAs will facilitate user feedback and marketing plan development
- All RFCs except APRFC are contributing ESP forecasts
- Project presented at WR climate change workshop (Apr), Grand Junction water outlook meeting (Apr), USBR uncertainty workshop (June), and California DWR climate variability workshop (June).
- Teleconferences held in April and June to update progress and help planning.

4th Quarter FY09

- Planning meeting held July 21-22.
 - Participants from CB, NW, NC, SE, and OHRFC as well as NOHRSC and NOAA RISAs.
 - Developed plans for three major program areas:
 - Development – Identified top problems and areas for improvement with existing website (version 3). Also created a mock-up and plans for version 4 of the website.
 - User Interactions – With significant help from NOAA RISAs, the group came up with a strategy for engaging users with social science methods.
 - Institutional Support – A strategy for going through OSIP was identified (see also “issues” below).
- All RFCs except APRFC are contributing ESP forecasts. However, forecast update cycles vary substantially between RFCs.
- Teleconferences held in August and September to update progress and help planning.
- Briefed NIDIS program office staff in August to facilitate more interactions between this effort and NIDIS. Strong interest from NIDIS staff.
- Version 4 due FY10Q1
- OSIP gate 2 due FY10Q2

1st Quarter FY10

- Version 4 released (Jan 2010)
- Teleconferences held in October and November to update progress, collect requirements, and coordinate planning
- NOAA HPCC Incubator proposal drafted for hardware and back-end work
- Discussions held with NIDIS office on coordinating and funding future efforts
- OSIP gate 2 work ongoing with gate meeting expected FY10Q3
- Presented at 2009 Drought Monitor Forum in October, 2009

Problems Encountered/Issues

1st Quarter FY09

- Web site deployment delayed until early 2nd quarter FY09 due to conflicting schedules and unforeseen difficulties addressing key comments
- No APRFC focal point named for water resources outlook

2nd Quarter FY09

- Planning meeting delayed to late 3rd quarter due to budget uncertainties
- 2nd quarter travel activities financed on “credit” since budget was not available.

3rd Quarter FY09

- Planning meeting delayed to early 4th quarter (July 21-22)

4th Quarter FY09

- OSIP gate 2 work delayed. Jeff Zimmerman (and Kevin Werner) formed a team to draft the gate 2 paperwork. This effort is expected to be complete in FY10Q2

1st Quarter FY10

- 1st quarter travel financed on “credit” since budget not available

New Service Locations

AHPS Implementation APRFC

Management Lead: Ben Balk, APRFC

Objective: Implement probabilistic hydrologic forecasts for basins in the Alaska/Pacific Forecast Center's (APRFC) area of responsibility.

Milestones

Task	Forecast Points Planned	Due Date	Actual to Date 1 st Qtr FY10	Variance
Identify 4 potential basins for new calibrations (includes carryover basins from FY09)		1 st Qtr	Complete	
Calibrate 4 new basins for non-AHPS implementation (includes 3 carryover basins from FY09)	4	4 th Qtr	0	4
Implement 4 new forecast points (non-AHPS)	4	4 th Qtr	0	4
Identify 8 locations for AHPS implementation for FY10		1 st Qtr	Complete	
Implement 8 new AHPS points	8	4 th Qtr	0	0
Total	8		0	8

Accomplishments/Actions

1st Quarter FY10

- Identified 8 new AHPS points that will be implemented this fiscal year.
- Identified 4 new basins to calibrate. Three of these basins are carryovers from FY09. Began calibration of these three FY09 carryover basins.

Problems Encountered/Issues

1st Quarter FY10

- The workload associated with CHPS migration may preclude completing all the work necessary for the new calibrations. From our core development team of hydrologists, 3 of 4 will be focused on CHPS migration and GFE. We were denied funding to outsource additional calibrations to RTi.

FY10 AHPS Implementation for - NCRFC

Team Lead: Mike DeWeese

Objective: Implement probabilistic forecasts for basins in the North Central River Forecast Center's area of responsibility. For FY10, this would include a total of six new forecast points in Eastern Wisconsin, the Rock River Basin in Northern Illinois, the Illinois River Basin, as well as the Kankakee, Des Plaines and Fox River Basins in Illinois and northern Indiana.

Milestones

Implementation Area	Forecast Points Planned	Due Date	Actual to Date (1st Qtr FY10)	Variance
Eastern Wisconsin Streams	1	2 nd Qtr		-1
Rock River Basin	1	2 nd Qtr		-1
Illinois River Basin	1	2 nd Qtr		-1
Kankakee, Des Plaines and Fox River Basins	3	2 nd Qtr		-3
New, unplanned forecast points				
Total	6			-6

Accomplishments/Actions

1st Quarter FY10

- none

Problems Encountered/Issues

1st Quarter FY10 - Operational demand was higher than anticipated; delayed points planned in 1st Quarter to 2nd Quarter.

FY10 AHPS Implementation for - MBRFC

Team Lead: Tom Gurss, Gregg Schalk

Objective: Implement probabilistic forecasts for basins in the Missouri Basin River Forecast Center’s area of responsibility. For FY10, this would include portions of the North Platte River basin, Marais des Cygnes River basin, Upper Republican River basin, and Babb in the Milk River Basin.

Milestones

Implementation Area	Forecast Points Planned	Due Date	Actual to Date (1st Qtr FY10)	Variance
Marais Des Cygnes River Basin	4	4th Qtr		-4
North Platte River Basin	22	4th Qtr		-22
Upper Republican River Basin	10	2nd Qtr		-10
Milk River Basin	1	4th Qtr	1	0
New, unplanned forecast points				
Total	37			-36

Accomplishments/Actions

1st Quarter FY10

- Water supply point in Milk River Basin implemented in December 2009

Problems Encountered/Issues

1st Quarter FY10 - none

AHPS Implementation for MARFC

Management Lead: Peter Ahnert (HIC/MARFC), Joe Ostrowski (DOH), Patti Wnek (SCH)

Objective: Implement probabilistic hydrologic forecasts for basins in the Middle Atlantic River Forecast Center's (MARFC) area of responsibility. MARFC implemented basic AHPS for existing forecast points in the entire MARFC area of responsibility in FY 2006.

Milestones

Implementation Area	Forecast Points Planned	Due Date	Actual to Date (1 st Qtr FY10)	Variance
(WALN6) - West Branch Delaware	1	Q1	1	0
Total	1		1	0

Accomplishments/Actions

1st Quarter FY10

- MARFC completed basic AHPS implementation for the entire service area in FY2006.
- A new AHPS point at Walton, NY (WALN6) in the West Branch of the Delaware River was added.
- AHPS Outreach:
 - Nurture Nature Foundation: HIC interviewed and filmed for PSA on RSS feeds.
 - Rutgers University: Gave a talk on how the NWS forecasts rivers at a seminar of the Civil and Environmental Engineering Department. Contact was made with Dr. David Hill, an engineer professor interested in data observing networks, decision support services and bringing research to operations. MARFC introduced him to NYC DEP and invited him to participate in their data network vision team. In addition, several engineering students requested more information on careers in NWS Hydrology.
 - NJ Association of Floodplain Managers Annual Meeting: Made a presentation about the NWS Hydrologic Forecast Process. Assisted WFO PHI with staffing a NWS outreach booth. Contacts were made with several floodplain managers interested in AHPS, flood inundation mapping and ensemble forecasting.
 - Safe Harbor Hydro Electric Plant: Provided office tour of RFC Operations to two dam operators.
 - Held 2nd informational meeting of the MARFC Customer Advisory Board. Provided familiarization training on the river forecast process.
 - Assisted DRBC with comparisons and verification of a Flood Analysis Model.
 - Provided RFC Operational tour for Shippensburg University students.
 - Participated in WFO CTP & RNK(s) Winter Weather Workshops providing MMEFS training.
 - At a DRBC Flood Mitigation Task Force (FMTF) meeting, highlighted recent NWS accomplishments that address recommendations from the FMTF Report.
 - Participated in the quarterly meeting of the Passaic Flood Warning Users Group.
 - Met with NOAA CREST staff at CUNY to explore potential research collaboration and academic partnership opportunities.
 - Responded to ICPRB request concerning major flood levels along the Potomac indicative of biological effects.

- At the Susquehanna Flood Forecast and Warning System (SFFWS) Interagency Committee annual meeting, highlighted significant NWS service enhancements and improvements that were implemented within the watershed during FY2009.
- Hydrologic Modeling:
 - Monitored SAC-SMA real-time performance of 6 test segments. Looking to expand the evaluation through calibration of the SAC-SMA model, SNOW-17 model and unit hydrographs for a complete forecast group (likely the North Branch Susquehanna).
 - Segment definition and routing improved at Cannonsville Dam.
 - Several basins in the Susquehanna were redefined using lat/lon delineations derived by MARFC with the national IHABBS program. This resulted in more accurate computations of areal quantities, including MAPX, MAP, and MAT.
 - The following new forecast services were implemented:
 - Improved forecast for Jersey Shore, PA on the West Branch of the Susquehanna from a crest-only to a full time series.
 - Established a new daily river forecast point with a 48 hour full time series forecast at Walton, NY on the Delaware.
 - Extending time series forecasts from 48 to 72 hours at:
 - Potomac River at Paw Paw, WV
 - James River at Scottsville, VA
 - James River at Bent Creek, VA
 - James River at Holcomb Rock, VA
 - James River at Buchanan, VA
 - Led conference call with WFO(s) to reach consensus on need/request to make all forecast points daily points and also on methodology for action stages set for points requiring no real “action.” The proposal is currently under review by the LOT.
 - Redesignated Williamsport, PA segment and routing schemes for the mid-West Branch of the Susquehanna.
 - Tested OFS operations added to CHPS at OHD.
 - Participated in CHPS CAT II calls & preparation activities.
 - Post-flood events service reviews underway for two December moderate floods.
 - Continued work to analyze potential evapotranspiration calculations and to identify, explain, and where possible, facilitate correction of biases.
 - Monitored test segments and developed unit hydrographs in the Chesapeake Bay estuaries.
 - Set up email delivery for NYC DEP to provide future releases and diversions for the upcoming week.
 - Migrated Flood Climatology to ACCESS database and improved summaries through the addition of weather and precip maps.
 - Began participation in weekly SWE coordination calls with NOHRSC, NERFC, NYC DEP and WFOs BGM & ALY.
- Gages/Observations/Data
 - Eight new precipitation and temperature gages upstream of the NYC water supply reservoirs have been added to operations.
 - Configured AWIPS to handle new data path for IFLOWS data.
 - Stream gage inventory update is underway. Notified WFO(s) of several new USGS gages in their HSA(s) that would be helpful to the river model. NWSLI assignments requested.
 - Participated in 1st meeting of NYCDEP Snow Science Group. Will use this venue to share data and research.
 - Continue to add new CoCoRaHS precipitation stations and delete inactive ones.
 - Initiated and completed project with Baltimore COE on redesign of their daily product; now has consistent IDs and gage locations.
 - Inventoried and implemented new temperature sensors for operational use.
 - Defined 3 new pseudo future temperature stations to fill in data gaps.
 - Coordination with NSSL, ERH and NOAA Net to enable receipt of Q2 data.

- Training
 - Participated in 1st ER SCH meeting at ERH. Meeting included learning from customer service experience of WCM(s), MIC(s), HIC(s) and other SCH(s).
 - Winter weather HAS and Hydro forecaster training was presented at the staff meeting.
 - Training provided to staff on manually adjusting Neversink forecasts based on pulse releases.
 - Newest hydrologist completed WDTB DLOC Radar course.
- Ensemble River Forecasts (MMEFS):
 - Completed prototype web interface to present MMEFS information at ER website.
 - Wrote changes to code to address necessary changes due to AWIPS build OB 9.1.
 - Feeding the web and ftp sites.
 - Troubleshooting RSYNC problems with ER website.
 - Assisting NERFC with adoption of the latest code.
 - Continued web page Help documentation.
- Flash Flood Guidance
 - Continued configuration work to set up GFFG version which employs the distributed model (HL-RDHM) to account for soil moisture changes and the Natural Resource Conservation Service (NRCS) Curve Number Model to account for physical characteristics.
 - Prepared for transition of responsibility for Rockland County, NY FFG, precip departure and drought info from NERFC to MARFC by completing OFS definitions and commencing computation and archival of model states and mean areal data.
- Service Backup
 - Substantial progress made on MARFC service backup through configuration and population of our backup server.
- Climate
 - Participated in planning meeting sponsored by the Maryland Water Monitoring Council to create a statewide climate change monitoring network in non-tidal MD Waters and promoted MARFC & AHPS information to provide needed data.

Problems Encountered/Issues

1st Quarter FY10 - None

AHPS Implementation for NERFC

Management Lead: David Vallee (HIC/NERFC), Robert Shedd (DOH), Ed Capone (SCH)

Objective: Implement probabilistic hydrologic forecasts for basins in the Northeast River Forecast Center's (NERFC) area of responsibility. The NERFC goal is to have AHPS implementation for long-term forecasts for the entire NERFC area of responsibility by the end of FY 2010.

Milestones

Implementation Area	Forecast Points Planned	Due Date	Actual to Date (1 st Qtr FY10)	Variance
Thames River	4	FY11Q3		
Naugatuck River	1	FY11Q3		
(TMCV3) - Connecticut River	0		1	+1
Total	5		1	+1

Accomplishments/Actions

1st Quarter FY10

- CHPS Acceleration Team activities
- The following segment was implemented and is now generating ESP ensembles: TMVC3 – Connecticut River at Thompsonville, CT
- Formal commencement of parallel operations began December 4, 2009.
- All gridded forcings are being produced on a routine basis and running CHPS basins becomes part of assigned daily shift responsibilities.
- Exported data archived to support validation exercises.
- Detailed temperature forcing comparisons to develop best practices for handling precipitation type and elevation temperatures for snowmelt purposes.
- Using GFE operationally for QPF out to 48-60 hours, past average temperatures (MATs), future surface and upper zone (>2kft) temperature forecasts utilizing the WFO ISC Temperature grids as primary input through 72 hours, and implementation of the Daily QC application to produce Gage-Only 6 and 24 hour basin average precipitation.
- SREF ensembles running in CHPS.
- AHPS 30 day ensemble runs in CHPS are functional.
- HEC-RAS running at several locations.
- DOH conducting staff training.
- CAT and CAT-II meetings.
- Attended FEWS User Days in Delft, the Netherlands making a presentation on the use of FEWS for the Community Hydrologic Prediction System in the USA.
- The new version of the experimental MMEFS is up and running.
- Tested RFC remote backup capabilities at WFO Albany discovering a few connectivity and IP address issues.

Problems Encountered/Issues

1st Quarter FY10

- Much of the focus on parallel operations is identifying and correcting bugs.
- MPE/DailyQC has proven to be challenging during a few snow events due to the large number of bad precipitation gage reports. Working to streamline the gage list that this application uses.

AHPS Implementation for OHRFC

Management Lead: Craig Hunter (HIC/OHRFC), Tom Adams (DOH), Jim Noel (SCH)

Objective Implement probabilistic hydrologic forecasts for basins in the Ohio River Forecast Center's (OHRFC) area of responsibility. The OHRFC implemented basic AHPS for all existing long-term forecast points in the OHRFC area of responsibility in FY 2006.

Milestones

Implementation Area	Forecast Points Planned	Due Date	Actual to Date (1 st Qtr FY10)	Variance
FRDI3 - OHL	0		1	+1
BELT1 - CML	0		1	+1
Total	0			+2

Accomplishments/Actions

1st Quarter FY10

Forecast Points and Hydrologic Modeling:

- Implemented 2 additional forecast points. OHRFC AHPS total is 274.
 - FRDI3 - Fredericksburg, IN – Ohio River Louisville Segment for WFO LMK
 - BELT1 - Bellevue, TN – Lower Cumberland Segment for WFO OHX
- SAC-SMA model recalibrations completed in the SAY & EFW forecast groups.
- Development of the Community Ohio River HEC-RAS model proceeding with calibrations from Point Pleasant including the Kanawha River.
- Establishing data communication with LMRFC to get downstream boundary conditions for points on the Mississippi River.
- Work continues to implement HEC-RAS forecast pass off to LMRFC.
- Continued assistance to USACE LRD Cincinnati Division HQ w/ CWMS implementation with RTi.

Service Backup

- Progress made toward onsite and offsite service backup upgrades.

Ensemble River Forecasts (MMEFS)

- Implemented web-based interface.
- Providing MMEFS Summary graphic to USACE Huntington and LRD for dam safety coordination with approval from NWS ERH.

Gages/Observations/Data

- On-going appraisal of gage inventory; QC of database
- Participated in Pittsburgh Tri-Agency Meeting on improvement of rain gage quality within the Pittsburgh USACE District

Gridded Flash Flood Guidance

- RDHM has been running routinely since September
- Working on a process to ingest both observed and forecast temperature grids

Outreach

- Coordination with the USGS & WFO Wilmington on plans to provide new forecast service in the Muskingum River Basin
- Coordination with the USGS and USACE on plans to design and deploy a flood warning system in the City of Marietta, OH
- NWS Chat implementation began
- Attended the Ohio River Basin Water Resources Summit in Cincinnati, OH in October, presented on what NOAA/NWS can provide with regards to water resource products, was a panel member for the breakout session on water quantity and began developing long-term relationships with 43 partners within the Ohio Valley. Next summit is in Columbus, OH Feb 23-25, 2010.
- Attended the Mississippi River Federal Tri-Agency Coordination Meeting in Memphis, TN
- Attended the USACE Huntington District / NWS Coordination Meeting in Huntington, WV
- Participated in the City of Pittsburgh Waterman's Meeting
- NWS Service Assessment Team member for the September 2009 Atlanta, GA Flooding
- Hosted Ohio River Basin & Great Lakes Tri-Agency Partner Meeting in Wilmington, OH with USGS & USACE.
- Attended the Forecaster Summit in Minneapolis - St Paul, MN.
- Provided national SSHP training on new technologies such as integration of SSHP with River Monitor, Q2 use in MPE for SSHP, VAR.
- Submitted abstract to the AMS Annual Meeting on the OHRFC and National Water Resources Outlook.
- Participating member of the National WRO through the OSIP Gate 2 process.
- Participated in the Regional Flood Risk Management Meeting with CR for FEMA etc in early December
- Member of the AHPS Flash Flood Services Team
- Provided webinar on national SCH call for the National WRO.
- Provided input into the Pittsburgh Tri-Agency meeting for improved rainfall gauging in the USACE Pittsburgh District's area of OHRFC.

Training

- Reviewed OHRFC March 2009 Case Study with Staff.

Problems Encountered/Issues

1st Quarter FY10 – None

AHPS Implementation for ABRFC

Management Lead: Billy Olsen, HIC

Objective: Implement probabilistic forecasts for basins in the Arkansas-Red Basin River Forecast Center's (ABRFC) area of responsibility.

Milestones: Initial implementation of probabilistic forecasts for ABRFC was completed in 2009. No new areas are planned for 2010.

Implementation Area	Forecast Points Planned	Due Date	Actual to Date 1 st Qtr FY10	Variance
Total	0		0	0

Accomplishments/Actions

1st Quarter FY10

- N/A

2nd Quarter FY10

- N/A

3rd Quarter FY10

- N/A

4th Quarter FY10

- N/A

Problems Encountered/Issues

1st Quarter FY10 – None

2nd Quarter FY10 – None

3rd Quarter FY10 – None

4th Quarter FY10 – None

AHPS Implementation for LMRFC

Management Lead: Dave Reed, HIC

Objective: Implement probabilistic hydrologic forecasts for basins in the Lower Mississippi River Forecast Center's (LMRFC) area of responsibility. For FY10 this includes the Black, White, Ouachita, and Lower Arkansas River basins.

Milestones:

Implementation Area	Forecast Points Planned	Due Date	Actual to Date 1 st Qtr FY10	Variance
Black River Basin, AR/MO	5	Q1	5	0
White River Basin, AR/MO	2	Q1	2	0
Black River Basin, AR/MO	2	Q2	2	+2
White River Basin, AR/MO	7	Q2	1	+1
White River Basin, AR/MO	7	Q3	0	0
Lower Arkansas River Basin, AR	1	Q4	0	0
Ouachita River Basin, AR	4	Q4	0	0
Total	27		10	+3

Accomplishments/Actions

1st Quarter FY10

- AHPS outreach activities this month.
 - September 30 – October 2, Jeff Grascchel, Dave Reed, and David Welch attended ABRFC's CAT II CHPS Workshop in Tulsa, OK.
 - October 5 – Office visit by Dr. Philip Amburn, Dr. Robert Moorhead, Dr. Jamie Dyer, Jibonananda Sanyal, and 4 other Mississippi State University professors and graduate students. They took a tour of LMRFC operations and facilitated a Q&A session for their Visual Analytics/Mapping software development and LMRFC needs with CHPS implementation.
 - October 6 - 9, Dave Reed and Amanda Roberts attended the 2009 Pearl River Coordination meeting between Ross Barnett Reservoir, USGS, Vicksburg U.S. Corps of Engineers, and numerous state and local emergency managers with interests along the Pearl River. They also visited WFO JAN in Jackson, MS.
 - October 16, LMRFC participated in Georgia Service Assessment conference call.
 - October 17, LMRFC participated in U.S. Fish and Wildlife Service's Wild Things Outreach event attended by over 3,200 people and distributed over 500 AHPS brochures.
 - October 19 - 20, Jeff Grascchel attended the Rainfall-River Forecasting Summit II in Minneapolis, MN.
 - October 19, Dave Reed attended the New Orleans Ocean Policy Task Force Meeting in New Orleans, LA.
 - October 21, Katelyn Costanza, Angelo Dalessandro, Amanda Roberts, and Gina Tillis-Nash visited the Hydraulics and Hydrology section of the New Orleans U.S. Corps of Engineers and observed daily operations and coordination efforts with LMRFC in New Orleans, LA.
 - October 22, Jessica Smith and Gina Tillis-Nash participated in Ocean Commotion 2009, an NOAA Sea Grant outreach event targeting over 2,000 students and 500 teachers and parents. Over 1,000 AHPS brochures were distributed.
 - October 27, Dave Reed, Dave Rameriez, David Welch, and Jeff Grascchel attended the Oceans 2009 Conference in Biloxi, MS. Dave Reed presented "NWS Tools to Forecast

- Stages in the Coastal Zone” during the afternoon session.
 - October 28, Jessica Smith provided support to the NOAA marketing booth at the Oceans 2009 Conference in Biloxi, MS.
 - October 28 – 29, David Welch attended the Real-Time Inundation Meeting in Atlanta, GA and visited SERFC and WFO FFC in Peachtree City, GA.
 - November 3 - 5, Jeff Grascchel and Dave Reed attended the TVA meeting in Huntsville, AL.
 - November 12, OB9.1 Build.
 - November 16 – 18, Jeff Grascchel, Dave Reed, and Angelo Dalessandro attended the Tri-Agency meeting in Memphis, TN.
 - November 18, 20 Social Security Administration managers took a tour of LMRFC operations.
 - November 19 – 20, Jeff Grascchel, Dave Reed, and Angelo Dalessandro visited the Little Rock Army Corps of Engineers in Little Rock, AR.
 - November 30 – December 2, Jeff Grascchel attended the FEMA RISC meeting
 - December 1-2, David Welch participated in the USACE-STL, LMRFC, and NCRFC Forecast Operations GoTo meetings
 - December 1 – 3, Glenn Carrin attended the NWSTC’s Climate Variability Course in Kansas City, MO.
 - December 3, Dave Reed, David Welch, Jeff Grascchel, and Kai Roth participated in the Baton Rouge/Amite Flood Awareness Workshop in Baton Rouge, LA to showcase LMRFC products and services for local emergency managers and discuss potential flooding scenarios with the upcoming El Nino season.
 - December 16, Daniel Pearce, Jessica Smith, and Glenn Carrin visited the Hydraulics and Hydrology section of the New Orleans U.S. Corps of Engineers and observed daily operations and coordination efforts with LMRFC in New Orleans, LA.
- Implemented 11 new AHPS sites (CRGA4, EMCM7, VNBM7, DNZM7, POCA4, RVSA4, IMBA4, BKRA4, BVGA4, GLNM7, and BRYA4) for WFOs PAH, SGF, TSA and LZK in the Black and White River Basins.
 - Developing scripts to create and transmit AHPS probabilistic forecasts using espadp output tables. The ESG product request came as a result of the July AHPS outreach trip to WFO PAH.
 - LMRFC provided parametric data to WFO LCH to support running BVCL1 and VSHL1 for the SSHP model.
 - LMRFC continues support of AHPS activities with in-house calibrations for remaining basins east of the Mississippi River and generation of MAP calibrations for upcoming FY10 – FY13 calibrations.

Problems Encountered/Issues

1st Quarter FY10 –

- None

AHPS Implementation for SERFC

Management Lead: John Feldt, HIC

Objective Implement probabilistic hydrologic forecasts for basins in the Suwannee and Alabama Rivers within SERFC's area of responsibility. For FY10 this would include ...

Milestones

Implementation Area	Forecast Points Planned	Due Date	Actual to Date (4 th Qtr FY08)	Variance
Suwannee	7	1 st Qtr	0	-7
Alabama	6	2 nd Qtr		
	6	3 rd Qtr		
	6	4 th Qtr		
Total	25	FY10	0	-7

Accomplishments/Actions

1st Quarter FY10

- Due to excessive rainfall and operational issues, the 7 points that needed to be implemented during this quarter were not finished during this time. Attempts will be made to finish during the winter season (2nd quarter)
- SERFC (John Schmidt and Jeff Dobur participated in the NIDIS meeting held at Lake Blackshear in Georgia.

2nd Quarter FY10 – None

3rd Quarter FY10

4th Quarter FY10

Problems Encountered/Issues

1st Quarter FY10 - We continue to have a problem with ESP concerning historical simulations. Sometime last year, the ESP batch program stopped producing historical simulations. For the ones that had already been created, old historical simulations were used. However, for the most recent 13 points, there is no historical simulation. We are looking into the problem and would like to have it solved before the end of this quarter.

2nd Quarter FY10 -

3rd Quarter FY10 -

4th Quarter FY10 -

AHPS Implementation for WGRFC

Management Lead: Thomas Donaldson, WGRFC

Objective: Implementation of probabilistic hydrologic forecasts for the Guadalupe and Upper Rio Grande basins in the West Gulf River Forecast Center's area of responsibility.

Milestones

Implementation Area	Forecast Points Planned	Due Date	Actual to Date 1 st Qtr FY09	Variance
Guadalupe	32	30 Sep. 2010	0	
Upper Rio Grande	2	31 Mar. 2010	0	
Total	34			

Accomplishments/Actions

1st Quarter FY10

- Held project call with RTi for contract RTi T9-0009 on 10/28.
- Held project call with RTi for contract RTi T9-0009 on 11/24.
- Participated in webinar with RTI on methods and operation of SNOW17 model.
- Held project call with RTi for contract RTi T9-0009 on 12/16.
- Continued work to integrate regulated flow model for points on the upper Rio Grande.
- Completed initial installation of probabilistic forecasts on Guadalupe River.
- Completed first cut of historical MAPs for use in ESP for Guadalupe.
- Coordinated FY 2010 implementation points in the Guadalupe River Basin with effected WFOs (EWX, HGX).
- Began assimilation of reservoir elevation, inflow, and outflow timeseries for Guadalupe River Reservoir projects to support reservoir modeling.
- Developed new test forecast group for water supply forecasting.
- Began MAP & MAT development for Upper Rio Grande.
- Created and implemented 4 new basins on Upper Rio Grande.
- Accepted new modeling from RTI for new basins and reviewed calibration results.
- Installed Upper Rio Grande water supply model for 4 basins provided by RTI through the State of Colorado Grant.
- Successfully set up ensemble runs on the 4 Upper Rio Grande basins and ran preliminary forecast for January 2010 using new SNOW17 SACSMA model.
- Initial installation of daily QC software.

2nd Quarter FY10

3rd Quarter FY10

Problems Encountered/Issues

1st Quarter FY10 – None

2nd Quarter FY10 –

3rd Quarter FY10 -

AHPS Implementation for CBRFC

Management Lead: Michelle Schmidt, HIC/CBRFC

Objective: Implement probabilistic hydrologic forecasts in the Colorado Basin River Forecast Center's (CBRFC) area of responsibility.

Milestones

Implementation Area	Forecast Points Planned	Due Date	Actual to Date 1 st Qtr FY10	Variance
Total	0		0	0

Accomplishments/Actions

1st Quarter FY10

- N/A

Problems Encountered/Issues

1st Quarter FY10

- Implementation for regulated points is delayed until delivery of new software.

AHPS Implementation CNRFC

Management Lead: Robert Hartman, HIC/CNRFC

Objective: Implement probabilistic hydrologic forecasts in the California-Nevada River Forecast Center's (CNRFC) area of responsibility.

Milestones

Implementation Area	Forecast Points Planned	Due Date	Actual to Date 1 st Qtr FY10	Variance
Total	0		0	0

Accomplishments/Actions 1st Quarter FY10

- N/A

Problems Encountered/Issues

1st Quarter FY10

- Implementation for regulated points is delayed until delivery of new software.

AHPS Implementation for NWRFC

Management Lead: Harold Opitz, HIC/NWRFC

Objective: Implement probabilistic forecasts for basins in the Northwest River Forecast Center's (NWRFC) area of responsibility.

Milestones

Implementation Area	Forecast Points Planned	Due Date	Actual to Date 1 st Qtr FY10	Variance
Total	0		0	0

Accomplishments/Actions

1st Quarter FY10

- N/A

Problems Encountered/Issues

1st Quarter FY10

- Implementation for regulated points is delayed until delivery of new software.

Training

Hydrologic Science Training - COMET

Core Goal: Provide science and software training on hydrology program applications throughout the research to operations cycle

Management Lead: Mark Glaudemans

Objective: Develop training and education materials to facilitate the implementation of new science and technologies into hydrologic operations.

Milestones

Task (COMET-led unless noted)	Due Date	Status
Estimation of Observed Precipitation Distance Learning Module	Complete	(Part I completed Q3 FY2009.) Part II completed Q1 FY10
Flash Flood/QPE Residence Workshop [HY11]	March 2010	Preparations for workshop on track.
Communicating and Understanding Hydrologic Ensemble Information – Distance Learning Module (FDTB) [HY20]	Q3 FY10	Scheduled for May 2010
Quantitative Precipitation Forecasting Virtual Course [HY19]	Q4 2010	Course scheduled for August 2010. Similar to June 2009.
Techniques in Hydrologic Forecast Verification Distance Learning Module [HY21]	Q2 FY 2010	Planned for Q2 FY2010
QPF Verification I Distance Learning Module [HY29]	Q2 FY 2010	On schedule for Q2 FY2010.
QPF Verification II Distance Learning Module [HY29]	Q3 FY 2010	On schedule for Q3 FY2010.
Distributed Modeling for Flow Forecast Distance Learning Module	Q2 FY 2010	(Part I completed in Q4 FY09.) Part II scheduled for Q2 FY2010

Accomplishments/Actions

1st Quarter FY10

- Estimation of Observed Precipitation Distance Learning Module completed January 2010 (Q1 FY10) and available on Learning Management System (LMS).

2nd Quarter FY10

-

3rd Quarter FY10

-

4th Quarter FY10

-

Problems Encountered/Issues

1st Quarter FY10

- Distributed Modeling for Flow Forecast module slipped from Q1 to Q2 FY10.
- QPF Verification Part I slipped from Q1 to Q2 FY10
- QPF Verification Part II slipped from Q2 to Q3 FY10

2nd Quarter FY10

3rd Quarter FY10

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4th Quarter FY10

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Outreach

FY10 Hydrology Program Outreach Work Plan

Theme: Hydrologic Services Outreach

Management Lead: Tom Graziano, Larry Wenzel, Regional Hydrologic Services Program Representatives

Objectives: Accomplish outreach with national, regional, and local partners and customers with emphasis on locations where AHPS or water resource services are being or will soon be implemented. Develop clear and consistent outreach materials for use by national, regional, and local personnel.

Milestones

Tasks	Org	Cost (\$1000)	Due Date	Status
National Safety Council Annual Congress and Expo, Orlando, FL (Travel) OCWWS/HSD will host a NWS booth and local WFOs will be invited to participate.	OCWWS	5.0	Q1	Completed
National Safety Council Annual Congress and Expo, San Diego, CA (Booth Registration, etc)	OCWWS	5.0	Q2	
Flood Safety Awareness Week	OCWWS	0	Q2	In Progress
Annual FEMA Flood Conference, San Diego, CA	OCWWS	8.0	Q3	In Progress
Provide for publishing a TADD awareness and flood safety article for publication in the American Association of Motor Vehicles Administrators (AAMVA) MOVE Magazine	OCWWS	0	Q3	
Update and reprint Floods the Awesome Power brochure	OCWWS	9.0	Q3	In Progress
ASFPM Conference, booth, HSD/Rgnl Registrations, and travel to Oklahoma City, OK (Plan to send 2 OCWWS/HSD and 4 Regional personnel)	OCWWS	12.0	Q3	In Progress
Update and reprint "Guide to Hydrologic Information on the Web" brochure	OCWWS	6.0	Q3	In Progress
Contact state DMV to promote the inclusion of TADD and other weather-related messages in state Driver License Manual and Student Workbook	OCWWS	0	Q4	
Produce and distribute TADD Warning Road Signs	OCWWS	4.0	Q4	In Progress
Develop new AFWS brochure in coordination with the NHWC	OCWWS	5.0	Q4	In Progress
Sub Total		54.0		
AHPS ESP presentation & training at the Ohio River Basin Water Summit (OHRFC); Location: Cincinnati, OH	ER	.1	Q1	Completed
Customer Outreach Visit in Champlain Basin to promote AHPS services and solicit customer hydrologic service requirements (NERFC); Location: TBD	ER	1.2	Q1	Completed
AHPS ESP presentation & training at the Mississippi Water Control Meeting (OHRFC); Location: Memphis, TN	ER	3.0	Q1	Completed
Participate in semi-annual New York City Water Supply Meetings and review AHPS deployment and operations in the NYC water supply system. (NERFC, ALY, BGM, MARFC, HSD); Location: Grahamville, NY	ER	.3	Q3	
Participate in South Carolina Water Resources Conference to promote AHPS services in State (SERFC); Location: TBD	ER	.8	Q3	
Participate in WMO Sponsored-Saint John River Hydrology Committee Meeting. Share AHPS development and deployment activities in northern New England. (NERFC, HSD, CAR); Location: Albany, NY	ER	3.6	Q3	
Enhanced AHPS services presentations at the ASCE Environmental & Water Resources Congress (OHRFC, NERFC); Location: Providence, RI	ER	2.1	Q3	
Customer Outreach Visit in New England and New York to promote AHPS services and solicit customer hydrologic service requirements (NERFC); Locations: TBD	ER	1.0	Q3	
Coordination visit to Dominion Power & SC Gas & Electric to review AHPS product suites and review hydrologic services (SERFC); Location: TBD	ER	.6	Q4	
Enhanced Care Taker Program Basin Review Visits to 2 ER WFO(s) to review and	ER	1.0	Q4	

assess AHPS services and requirements (SERFC); Location: TBD				
Participate in semi-annual New York City Water Supply Meetings and review AHPS deployment and operations in the NYC water supply system. (NERFC, ALY, BGM, MARFC, HSD); Location: Grahamville, NY	ER	.3	Q4	
Sub Total		14.0		
AHPS presentation to St. Joseph River Basin Commission and local officials (NCRFC) Location: Elkhart, IN	CR	1.1	Q1	Completed
AHPS presentation to MN and WI Association of Flood Plain Managers (NCRFC) Location: Superior, WI	CR	.7	Q1	Completed
AHPS presentation at NWA meeting (NCRFC) Location: Norfolk, VA	CR	1.5	Q1	Completed
Participate in Tri Agency Meeting (NCRFC 1.5K and MBRFC 0.9K) Location: Memphis, TN	CR	2.4	Q1	Completed
Participate in Missouri Basin River Forecasters Meeting (MBRFC) Location: Omaha, NE	CR	.8	Q2	Moved from Q1 to Q2
AHPS presentation at Red River Basin Commission River Forecast Summit (NCRFC) Location: Grand Forks, ND	CR	.9	Q2	
RTI AHPS Contract Meeting (MBRFC) Location: Fort Collins, CO	CR	1.5	Q2	
Participate in Red River Basin Commission Ex-Officio Meeting (NCRFC) Location: Grand Forks, ND	CR	.5	Q4	
Participate in Mississippi Valley Annual River Forecasters Meeting (MBRFC) Location : St. Paul, MN	CR	2.6	Q4	
High Water Mark Signs (CRH)	CR	1.0	Q4	
Stormwater Floodplain Simulation System (CRH)	CR	1.0	Q4	
Sub Total		14.0		
AHPS Outreach and Customer Requirements Meetings.(ABRFC) Location: CO/KS	SR	.6	Q1	Completed
Tri-Agency Meeting and Outreach visit to COE-Little Rock (ABRFC) Location: Memphis TN/Little Rock, AR	SR	.35	Q1	Completed
Oklahoma Governor's Water Conference (ABRFC) Location: Oklahoma City, OK	SR	.3	Q1	Completed
Pearl River Coordination Meeting (LMRFC) Location: Jackson, MS	SR	.5	Q1	Completed
Tri-Agency Meeting (LMRFC) Location: Memphis, TN	SR	1	Q1	Completed
WFO Office Visit (ABRFC) Location: Topeka, KS	SR	.3	Q2	
Louisiana Hurricane Conference (LMRFC) Location: Baton Rouge, LA	SR	.5	Q2	
WFO LCH/Southeast Texas Water Managers Workshop (WGRFC) Location: Beaumont, TX	SR	.5	Q2	
National Association of State Flood Plain Managers (ASFPM) Conference (ABRFC) Location: Oklahoma City, OK	SR	.3	Q3	
National Association of State Flood Plain Managers (ASFPM) Conference (WGRFC) Location: Oklahoma City, OK	SR	1	Q3	
International Boundary Water Commission Flood Workshops Location: Various locations along the Texas portion of Rio Grande	SR	.5	Q3	
WFO AHPS Outreach Visits (LMRFC) Location: WFOs SGF, OHX, MRX, and GSP	SR	2	Q4	
St John's Hydraulics Coordination Meeting (SERFC) Location: Jacksonville, FL	SR	.8	Q4	

WFO Office Visits - 2 (SERFC)	SR	.8	Q4	
Customer outreach for FY 2010 AHPS Probabilistic Forecast Implementation for the Guadalupe and San Antonio River Basins Location: Throughout South Texas	SR	.8	Q4	
Customer outreach for FY 2010 AHPS Probabilistic Forecast Implementation for the Upper Rio Grande River Basin Location: Rio Grande Valley throughout CO and NM	SR	1.5	Q4	
High Water Mark Signs (SRH)	SR	1.25	Q4	
Stormwater Floodplain Simulation System (SRH)	SR	1	Q1	
Sub Total		14.0		
Purchase Watershed Model (WFO MFD)	WR	\$1.1	Q4	On Schedule
Purchase Watershed Model (WFO EKA)	WR	\$1.1	Q4	On Schedule
Purchase Watershed Model (WFO VEF)	WR	\$1.1	Q4	On Schedule
Purchase Turn Around Don't Drown Signs (WFO PQR)	WR	\$1.5	Q4	On Schedule
Purchase Turn Around Don't Drown Signs (WFO PSR)	WR	\$1.0	Q4	On Schedule
Purchase High Water Mark Signs (WFO LKN)	WR	\$0.2	Q4	On Schedule
Conduct Montana Hydrology Conference (WFO TFX)	WR	\$3.0	Q4	On Schedule
Purchase Outreach Materials (WFO SEW)	WR	\$2.0	Q4	On Schedule
Purchase Materials for Office Outreach Exhibit (WFO LOX)	WR	\$3.0	Q4	On Schedule
Sub Total		\$14.0		
Preparation of material for user conferences	AK	\$.7	Q2	
Participation in Anchorage NWS User Conference	AK	\$.3	Q3	
Participation in Fairbanks User Conference	AK	\$2.0	Q3	
Participation in Juneau Users Conference	AK	\$2.0	Q3	
Sub Total		\$5.0		
Grand Total		\$115		

Accomplishments/Actions

1st Quarter FY10 - none

2nd Quarter FY10

3rd Quarter FY10

4th Quarter FY10

Problems Encountered/Issues

1st Quarter FY10 - none

2nd Quarter FY10

3rd Quarter FY10

4th Quarter FY10

Program Management

Program Management

Theme: Program Management

Management Lead: Donna Page

Objective: Provide national program management; coordinate and track AHPS budgets and project plans; manage AHPS contracts; and foster Agency, Departmental, and Legislative Interface.

Milestones

Tasks/Subtask FY10 Milestones	Responsible	FY10 Quarter Completion Date
AHPS Planning/ Execution/ Reporting <ul style="list-style-type: none"> • Quad Charts • E-CPIC Updates • Monthly Status for NWS Monthly Report 	OHD/Regions OHD OHD	Quarterly Quarterly Monthly
NOAA PPBES Hydrology Program Support <ul style="list-style-type: none"> • Program Operating Plan • Quarterly Program Review 	OHD OHD	3 rd Quarterly
Agency/ Department/ Legislative Interfaces <ul style="list-style-type: none"> • Budget Fact Sheet • Prepare and submit Budget Request • Prepare Briefings and Support OMB/Congressional Meetings • Prepare Response to Pass Back • Prepare Response to Budget Hearing Questions • Program Assessment Rating Tool Progress 	OHD OHD OHD OHD OHD OHD	1 st 2 nd 3 rd 3 rd 4 th Quarterly
HOSIP Process Improvement and Document Development <ul style="list-style-type: none"> • Instructions • Guidance & Standards • Performance Statistics • Quality Control Reports • Validation & Recommendation Reports • HOSIP Documents • Gate Status, Branch Chief Status Reports 	OHD OHD OHD OHD OHD OHD OHD	Quarterly Quarterly Quarterly Quarterly Quarterly Quarterly Weekly

Accomplishments/Actions

1st Quarter FY10

- All milestones are on schedule – all scheduled reports completed
- As a reminder, for FY10, there are no project management funds for this task. All AHPS project management is being handled by government FTE - Quarterly AHPS reports are being compiled by Dennis Miller. Other reporting handled by other government FTE (John Ingram, Ken Pavelle).

Problems Encountered/Issues

1st Quarter FY10 - None