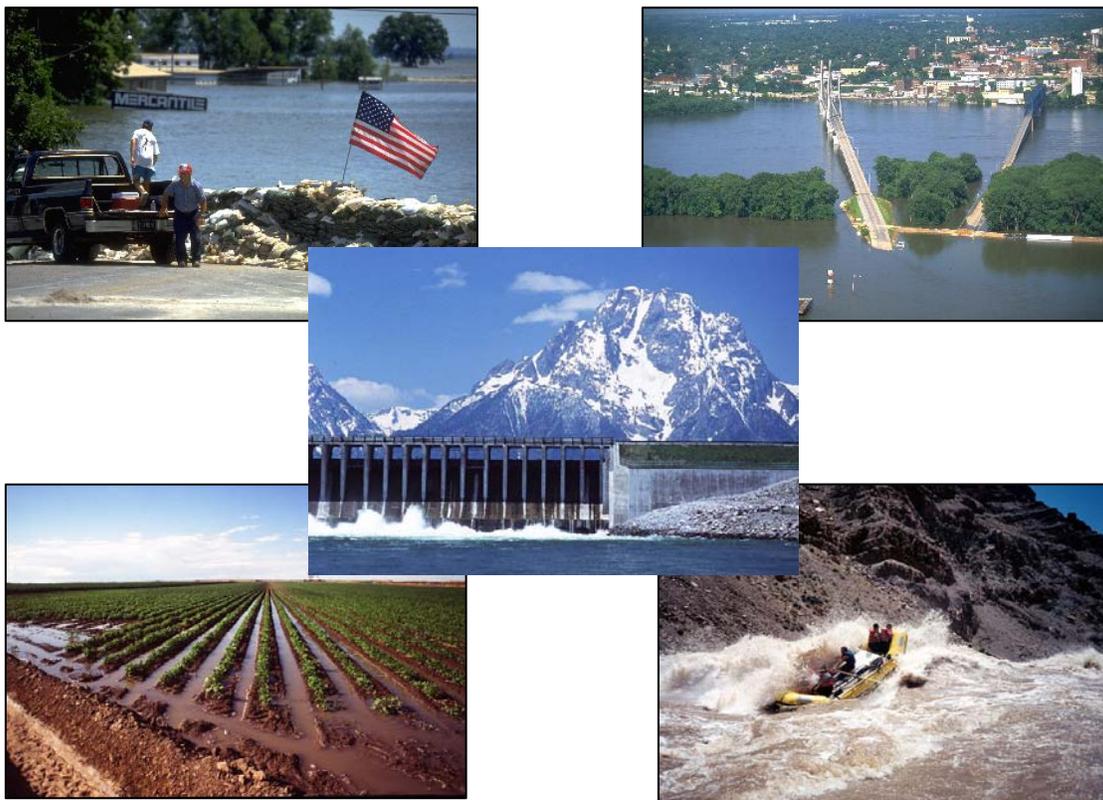




Advanced Hydrologic Prediction Service Quarterly Report 4th Quarter FY 2010



November 01, 2010

CONTENTS

Collaborative Research

On-going Competitive and Collaborative Research	2
Snow Science Plan.....	4

Quantify Uncertainty (Ensembles)

Hydrologic Routing Data Assimilation (DA)	7
Snow & Streamflow DA	9
DA for RDHM	11
eXperimental Ensemble Forecast System (XEFS)	13
XEFS Operational Support	17
XEFS Implementation	19
XEFS Evaluation and Improvement	21
HEFS Phase I Implementation	23
NCEP Collaboration (THORPEX)	26
Compare Post Processors	28
Hydrologic Uncertainty in Extreme Events	32
Evaluate Climate Forecasts	34

Gridded Water Resources

Distributed Model – SAC-SMA Parameters	37
Distributed Model – Evaluate New Parameter Approaches	40
Snow Model – Plans for using SNODAS Output	46
Auto Calibration for Distributed Model	49
Distributed Modeling Spatial Display and Analysis Tool	53
Distributed Model Intercomparison Project (DMIP 2)	56
OHD – NCEP Coordination	62
Support Distributed Model Implementation.....	64
Migration of HL-RDHM Components to CHPS.....	67

Hydrologic Verification

Improve Hydrologic Hindcasting	70
Improve Hydrologic Forecast Verification Strategies	73
Improve Ensemble Forecast Verification	77

Inundation Mapping

Static Flood Inundation Map Web-page Development and Deployment	83
---	----

Inputs and Forcings

Prototyping NMQ for FFMP	100
Quantitative Precipitation Estimate Evaluation for CI-FLOW	105
Gauge-Radar Analyses in High-Resolution Precipitation Estimator (HPE)	109
Satellite Based Analysis for Potential Evaporation.....	111
Short-range Radar-based Precipitation Forecasts.....	113
Evaluation of Radar-based QPE from NMQ and PPS over CONUS	115
CHPS-gridded-forcings	117
Test ARSR-ASR QPE products	120

Flash Flood Services

Distributed Hydrologic Model with Threshold Frequencies	122
Evaluate Gridded Flash Flood Guidance (GFFG) Approaches	126
Improve Guidance for DamBreak Forecasting.....	129
FFMP Small Basin Support.....	132

Routing (Hydraulics)

Transition to HEC-RAS: Model Development and Implementation.....	136
River-Estuary-Ocean Modeling – Chesapeake Bay Study.....	138
Incorporate Wind Information into HEC-RAS.....	140
Dynamic Inundation Mapping.....	142

Hydrologic Models

Physically-based Modifications to the Sacramento Model	146
Calibration – Complete IDMA Study.....	150
Modified SAC-HT for NCRFC.....	153

Software Refresh

Community Hydrologic Prediction System (CHPS)	155
---	-----

Dissemination (Web Pages)

AHPS Web Page Activities	169
Western Water Supply Forecast Service Improvements	173

New Service Locations

Alaska Region	
AHPS Implementation APRFC.....	177
Central Region	
AHPS Implementation NCRFC.....	179
AHPS Implementation MBRFC.....	181
Eastern Region	
AHPS Implementation MARFC	183
AHPS Implementation NERFC	192
AHPS Implementation OHRFC	195
Southern Region	
AHPS Implementation ABRFC	202
AHPS Implementation LMRFC	203
AHPS Implementation SERFC	211
AHPS Implementation WGRFC	213
Western Region	
AHPS Implementation CBRFC	217
AHPS Implementation CNRFC	218
AHPS Implementation NWRFC	219

Training

Hydrologic Science Training – COMET.....	221
--	-----

Outreach

Outreach Work Plan	224
--------------------------	-----

Program Management

Program Management Activities	229
-------------------------------------	-----

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.

2nd Quarter FY10

- Forwarded the continuing funding request to the two on-going collaborative projects, and to the NOAA-CREST projects as well

3rd Quarter FY10

- All projects are funded now. Received the draft final report from HRC, and are expecting the one from Aptima any day now.

4th Quarter FY10

Reviewed and accepted all progress report. Final reports from HRC and Aptima. Progress report from UC-Irvine, U. Arizona and Boise State.

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

2nd Quarter FY10 – None

3rd Quarter FY10 – None

4th 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
1. Review existing plans and projects; determine snow plan updates	Q3	Work to start in Q3
2.		
3.		
4.		

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.

2nd Quarter FY10

- No work this period.

3rd quarter FY10

- Project is now closed

4th Quarter FY10

- Project closed

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.

2nd Quarter FY10

- None

3rd quarter FY10

- Project is now closed

4th Quarter FY10

- Project closed

Quantify Uncertainty (Ensembles)

Hydrologic Routing DA

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Julie Demargne (previously 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	Delayed to FY11
Interface the prototype 1DVAR with OpenDA	Q4	Completed
Run the prototype 1DVAR in hindcasting mode in the CHPS environment at OHD	Q4	Delayed to FY11

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.

2nd Quarter FY10

- Received datasets of inflow/outflow observations and Lag/K parameters for 15 test locations in ABRFC. Processed the datasets for quality control, time interval adjustment, interpolation to fill missing values under simple flow conditions etc.
- Performed parameter estimation for the 3 Muskingum routing parameters for selected ABRFC locations and started to apply 1DVAR to these locations. The comparison between 1DVAR and Lag/K for selected locations will be carried out in Q3.
- Continued discussions with Deltares on how to integrated 1DVAR into OpenDA. Successfully compiled and ran the example provided by Deltares on Linux workstations and started to develop the OpenDA wrapper for 1DVAR.

3rd Quarter FY10

- Met with Albrecht (Deltares) at the EGU meeting to discuss the specific steps/requirements involved in integrating a native fortran DA algorithm (such as 1DVAR) into the OpenDA system.
- Reviewed additional materials from Deltares regarding the OpenDA system
- Started working on dividing the 1DVAR fortran code into proper model and algorithm parts as required for integrating 1DVAR into OpenDA.
- Worked on applying 1DVAR to selected ABRFC test basins and conducted sensitivity analysis of window size and error covariances.

4th Quarter FY10

- Enhanced 1DVAR code for better clarity and reformatted it into Fortran 90 modules to be

- more compatible with the OpenDA system.
- Completed initial integration of the 1DVAR prototype into the OpenDA system; tested 1DVAR within OpenDA and confirmed that the same DA results were obtained for the test locations.
 - Worked with Deltares on developing 1DVAR-OpenDA compatibility with FEWS and CHPS. So far 1DVAR-OpenDA runs successfully with inputs in the format of CHPS PI time series and generates the correct outputs in CHPS PI time series. Work is ongoing to enhance the OpenDA-FEWS model adaptor so it has the capability to transfer parameter XML files into the native parameter files needed by 1DVAR. Other enhancements include modifying the 1DVAR prototype to work with actual forecast creation times instead of time steps to better support forecast/hindcast applications in CHPS.
 - Obtained and tested the latest CHPS configurations from ABRFC and WGRFC, in preparation for testing 1DVAR in CHPS for test locations in these two RFCs.
 - Continued working on applying the 1DVAR prototype to selected ABRFC test locations.

Problems Encountered/Issues

1st Quarter FY10

- None

2nd Quarter FY10

- None

3rd Quarter FY10

- The delivery of the FEWS model adaptor for OpenDA by Deltares was delayed, which could lead to potential delay in integrating 1DVAR into CHPS.

4th Quarter FY10

- The full integration of 1DVAR into CHPS (by Q4 FY10) has been delayed to FY11 due to a delay in the delivery of the OpenDA-FEWS model adapter by Deltares, which is required to run 1DVAR in CHPS, as well as unforeseen work loads on the project lead due to DJ Seo's departure. We expect to be able to run 1DVAR in CHPS in a more fully integrated fashion by Q1 FY11.

Snow and Streamflow DA

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Julie Demargne (previously 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	Completed
Design the prototype data assimilator and develop a prototype code	Q4	Delayed to FY11
Generate/obtain the regression-based snow updating results for comparison	Q4	Delayed to FY11

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.

2nd Quarter FY10

- Discussed the plans and goals for snow and streamflow DA with NWRFC. Four new headwater basins were identified as test basins for the study; required datasets and model parameters were collected and processed for the test basins.
- Started to develop a variational framework for snow/streamflow data assimilation using the snow-17 and SACSMA models.
- Prepared a package including the snow-17 and SACSMA models and accompanying datasets for the researchers from University of Connecticut for their streamflow data assimilation work.

3rd Quarter FY10

- Designed a variational framework for snow/streamflow data assimilation for the snow-17 and SACSMA models.
- Discussed the plans for the comparison between snow DA results with the results from the Snow Updating System (SUS)
- Continued to provide support to the researchers from University of Connecticut for their streamflow data assimilation work.

4th Quarter FY10

- Submitted an AGU abstract on the comparison between snow DA results and those from the Snow Updating System (SUS)
- Downloaded SNOTEL SWE datasets from NRCS for the identified test basins in NWRFC and started to process the data
- Discussed within the group the potential strategies for converting point SNOTEL SWE observations into basin averages for use in data assimilation for the SNOW-17 model.

- Carried out the exploratory sensitivity analysis of the 2D-MLEF performance on streamflow analysis and prediction as a function of streamflow observational error variance and additive noise to total channel inflow.

Problems Encountered/Issues

1st Quarter FY10

- None

2nd Quarter FY10

- None

3rd Quarter FY10

- Depending on how soon OpenDA becomes available in CHPS, it may be more efficient to configure snow/streamflow DA directly in CHPS for implementation at the RFCs, as apposed to developing the data assimilators offline first then integrating it into CHPS as originally planned.

4th Quarter FY10

- The tasks on developing the DA prototype code and generating regression-based results using SUS were delayed due to the departure of DJ Seo and appointment of the new group leader, Julie Demargne, which has resulted in shifted responsibilities and interruptions in developing the prototype code.

DA for RDHM

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Julie Demargne (previously 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	Completed
Design DA for RDHM interface with OpenDA. Enhance the research prototype DA for RDHM code for OpenDA compliance	Q4	Delayed to FY11 Q4
Literature review on timing errors. Develop an on-line timing error estimation procedure for the research prototype DA for RDHM	Q4	Delayed to FY11 Q4
Test and evaluate the performance of the research prototype DA for RDHM with and without the procedure	Q4	Delayed to FY11 Q4

Accomplishments/Actions

1st Quarter FY10

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

2nd Quarter FY10

- Deltares made the OpenDA code compilable on linux
- Studied the OpenDA example code from Deltares.

3rd Quarter FY10

- Improved and tested the minimization routine with capability of adjusting routing parameters in order to improve the performance of DA for RDHM in the presence of timing errors in base flow simulation.
- Presented the DA activities and results with HL-RDHM at the Joint Federal Interagency Conference 2010 (Las Vegas, June 28-July 1).

4th Quarter FY10

- Continued generating and testing adjoint codes that adjust one or more routing parameters on the HRAP grid in a spatially lumped manner. Synthetic experiments were carried out to assess the performance of the 4DVAR using the new adjoint code in terms of streamflow analysis and prediction in the presence of timing errors.
- Efforts were made to develop an ensemble data assimilator for the gridded-SAC and kinematic wave routing models, which produce uncertainty-quantified streamflow analysis and prediction.

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.

2nd Quarter FY10

- To develop OpenDA compliance of the prototype DA for RDHM, two model wrappers need to be developed. One is for the gridded SAC and kinematic-wave routing models and the other is for the adjoint model. In addition, the assimilation algorithm is separately dealt with within the OpenDA code. This may require additional work to divide the research prototype DA for RDHM into three parts: the model, the adjoint code and the minimization routine. It may be necessary to improve the OpenDA code that may work directly with the current version of the research prototype DA for RDHM as it is with the aid of model wrappers only.

3rd Quarter FY10

- Developing OpenDA-compatible DA for RDHM requires Java programming and also, has to be coordinated with Deltares and the other DA activities. Therefore this activity has been delayed to FY10-Q4 and FY11.

4th Quarter FY10

- Developing OpenDA-compatible DA for RDHM has been delayed to FY11 Q4, due to its reliance on progress on other DA activities being carried out under CRADA, with support from Deltares.
- Developing a procedure to directly estimate timing errors within the 4DVAR may be necessary, to explicitly quantify timing errors in the objective function so that they may be minimized.

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	Completed FY10, Q1
Integrate prototype Ensemble Post Processor (EnsPost) into CHPS	FY09, Q4	Completed FY10, Q1
Integrate prototype HMOS into CHPS	FY09, Q4	Completed FY10, Q1

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.

2nd Quarter FY10

- We set up beta testing at CNRFC, and continue to provide minor updates to the XEFS components.

3rd Quarter FY10

- We have started CHPS configuration reviews of the different XEFS components, which will make XEFS installation and configuration easier. In addition, we started reviewing and improving the installation procedures and user's manuals and continued to work on the XEFS support web-page.
- HSMB continued testing the XEFS components on test basins at CNRFC and ABRFC as described in the other ensemble projects.

4th Quarter FY10

- OHD updated the model adapters based on the configuration reviews. The next XEFS delivery with these changes is scheduled for November 2010.
- HSMB continued testing the XEFS components on test basins at AB-, CN-, and NW-RFCs as described in the other ensemble projects.

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

- The CHPS integrated versions of EPP3, HMOS, and EnsPost await beta-testing by CNRFC.

2nd Quarter FY10

- Beta-testing feedback has been limited.

3rd Quarter FY10 – None

4th Quarter FY10 – None

XEFS Operational Support

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Julie Demargne (previously Dong-Jun Seo)

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

Milestones

Task	Due Date	Status
5. Identify test basins and obtain necessary data	Q1	Completed
6. Calibrate test basins	Q2	Completed for HMOS and ongoing for EnsPost and EPP3
7. Develop data description documents, user's guides and scientific training materials	Q3	Completed for HMOS and ongoing for EnsPost and EPP3
8. Support RFCs	Q1-Q4	Ongoing

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.

2nd Quarter FY10

- Completed parameter estimation for the 4 new ABRFC test basins.

3rd Quarter FY10

- Revised the document for EPP3 RFC historical data formats.
- Discussed with ABRFC and NWRFC the datasets needed for XEFS calibration.

4th Quarter FY10

- Helped Andy Wood of CBRFC setup EPP3 for hindcast runs.
- Reviewed "XEFS Configuration Review EPP3 Initial Change Proposals" prepared by Hank Herr.
- Generated parameter files for the following XEFS test locations. For these locations, the number of calibration days for the RFC-, GFS-, CFS-, and climatology (CLM)-based ensembles are given in the tables below.
 - ABRFC: BLUO2, GLOO2, MORA4, and TALO2.

	RFC	GFS	CFS	CLM
PRCP	2	14	240	365
TEMP	0	14	240	365

- CNRFC: NFDC1HLF and NFDC1HUF.

	RFC	GFS	CFS	CLM
PRCP	5	14	240	365
TEMP	7	14	240	365

- NWRFC: AUBW1XL, AUBW1XU, HHDW1IL, and HHDW1IU.

	RFC	GFS	CFS	CLM
PRCP	0	14	240	365
TEMP	0	14	240	365

- Calibrated EnPost for 8 CNRFC test basins and 2 CBRFC test basins.
- Calibrated HMOS for 6 ABRFC test basins and 5 CNRFC test basins.
- Completed a first version of the HMOS users' manual; the user's manual will be reviewed and finalized for the next XEFS prototype release in early November.
- Supported HSEB to fix a bug in the CHPS model adapter of EnsPost.
- Presented HMOS results to ABRFC and OHD personnel to get feedback on HMOS performance.

Problems Encountered/Issues

1st Quarter FY10

- None

2nd Quarter FY10

- Need to get RFC historical data sets from NWRFC to calibrate its test basins.

3rd Quarter FY10

- The calibration with the RFC historical data sets for NWRFC test basins has been postponed to FY11. The calibration will be done using GFS and CFS data sets in FY10.
- Revision of EPP3 User's Guide is expected to be completed by the end of July.
- The work may be delayed due to the departure of DJ Seo from OHD.

4th Quarter FY10

- The project tasks have been delayed due to the departure of the old HEP group leader, DJ Seo, and appointment of the new group leader, Julie Demargne, which resulted in a shift in responsibilities, and a reduction in time available to work on the deliverables of this project.
- EPP3 and EnsPost will be calibrated on additional test basins at AB-, CN-, and NW-RFCs.
- Completion of Revision of EPP3 User's Guide is delayed to Feb. 2011.
- The HMOS scientific manuscript will be completed by mid-November.
- The EnsPost user's manual will be finalized using the existing EnsPost notes document for the next XEFS prototype release in early November.

XEFS Implementation

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Julie Demargne (previously Dong-Jun Seo)

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

Milestones

Task	Due Date	Status
9. Support integration of EPP, EnsPost and HMOS calibration processors in CHPS	Q1-Q4	Ongoing – will continue in FY11
10. Integration-ready calibration processors for EPP, EnsPost and HMOS	Q4	Completed
11. Test data sets and results for EPP, EnsPost and HMOS calibration processors	Q4	Completed

Accomplishments/Actions

1st Quarter FY10

- Developed regression test plans and procedures for EPP3
- Conducted integration and regression tests for the updated EPP3 precipitation and temperature programs.

2nd Quarter FY10

- Conducted integration and regression tests for the updated EPP3 precipitation and temperature programs.

3rd Quarter FY10

- Conducted integration and regression tests for the updated EPP3 precipitation and temperature programs.
- Calculated HMOS parameter and error statistics for location NFDC1 of the CNRFC's service area for XEFS testing purpose
- Enhanced HMOS script for all processors, i.e., calibration processor, hindcast processor and real-time processor, of prototype version.
- Prepared a HMOS user's manual to run all the different HMOS processors.

4th Quarter FY10

- Continued to run the EPP3 calibration programs to generate parameter files for multiple XEFS test locations at AB-, CN-, NW-RFCs. Calibration is generated using different forecast sources, HPC/RFC single-valued forecasts, GFS ensemble means, CFS ensemble means, and climatology time series.
- Continued to enhance HMOS script for all processors of prototype version; the HMOS calibration processor will be updated with the new algorithm for the XEFS prototype release in mid-November.
- Continued to enhance HMOS user's manual to run all the different HMOS processors.

Problems Encountered/Issues

1st Quarter FY10

- Found an error in EPP3 time stamping for the hindcast files.

2nd Quarter FY10

- In testing the updated EPP3 precipitation and temperature programs, caught a number of bugs and reported them to John Schaaque to have them fixed.

3rd Quarter FY10

- The work may be delayed due to the departure of DJ Seo from OHD.

4th Quarter FY10

- The work to interface the different calibration programs with CHPS is pending development of a new Graphical User Interface in CHPS and new project plan for hydrologic ensemble forecasting development and implementation.

XEFS Evaluation and Improvement

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Julie Demargne (previously 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	Q3	In progress
Carry out hindcasting experiments	Q4	Completed
Generate verification results	Q4	Ongoing – will continue in FY11
Analyze and summarize the results	Q4	Ongoing – will continue in FY11
		Ongoing – will continue in FY11

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.

2nd Quarter FY10

- Obtained data for 4 ABRFC test basins and completed parameter estimation for these basins.
- Conducted scientific evaluation of EPP3 precipitation and temperature hindcasts using RFC and GFS forcing data for a number of scenarios.
- Worked on including the EnsPost component in the hindcasting scenarios to account for the hydrologic uncertainty in the flow ensembles. Verification results for forcing input ensembles from EPP and for flow ensembles from EPP-ESP-EnsPost based on the GFS datasets will be presented at the General Assembly 2010 (Vienna, Austria, May 02-07, 2010). The presentation is entitled “Hydrologic ensemble hindcasting and verification in the U.S. National Weather Service” and is part of the session called: “*Towards practical applications in ensemble hydro-meteorological forecasting*”.

3rd Quarter FY10

- Continued to conduct scientific evaluation of EPP3 precipitation and temperature hindcasts using RFC and GFS forcing data. Evaluation of precipitation ensemble hindcasting using NFDC1 datasets is completed.
- Prepared a poster entitled “Short-term Ensemble Streamflow Forecasting Using Operationally-Produced Single-valued Streamflow Forecasts” for the European Geophysical Union Fall 2010 conference.
- Continued to enhance the HMOS algorithm, and then conducted scientific evaluation in dependent, quasi- and cross-validation models for six locations of the ABRFC area.

- Worked on a manuscript to describe the strategy to develop the Hydrologic Ensemble Prediction Services and the end-to-end XEFS, including initial verification results of XEFS ensembles.
- Presented the end-to-end XEFS and verification results for the different components at the ASCE/EWRI conference (Providence, May 16-20, 2010) and at the Joint Federal Interagency Conference 2010 (Las Vegas, June 28-July 1).

4th Quarter FY10

- Produced and analyzed EPP3 hindcasts and EVS results for ABRFC test basins BLUO2 and GLOO2, CNRFC test basin NFDC1, and NWRFC test basin HHDW1. Prepared a report on EPP3 scientific evaluation for precipitation and temperature ensembles for 14 forecast lead days, using the GFS ensemble means and the HPC/RFC single-valued forecasts. These results are part of the XEFS evaluation report described in the AHPS project titled "Improve Hydrologic Hindcasting". The preliminary report on XEFS evaluation will be finalized in October 2010.
- Worked on developing techniques for enhancing robustness of the precipitation EPP3 models for daily and larger time scales.
- Continued to enhance the HMOS algorithm (i.e., varying error model parameters, flow threshold and QPF threshold; application of different calibration schemes) and then conducted detailed scientific evaluation in dependent-validation mode a few locations in the ABRFC's service area.
- Prepared a draft report describing performance results from the revised HMOS algorithm using different classification criterion; this includes both conditional and unconditional single-valued forecast verification metrics of HMOS ensembles for the BLUO2 test basin and hydrographs of selected events. The HMOS evaluation results for 2 locations at ABRFC and 2 locations at CNRFC are part of the XEFS evaluation report to be finalized in October 2010.

Problems Encountered/Issues

1st Quarter FY10

- None

2nd Quarter FY10

- The hindcasting experiments based on different forcing input datasets and forecasting scenarios will be carried out on different time frames for the different RFCs, depending on the availability of the datasets for calibration and the enhancements of the EPP, EnsPost and HMOS enhancements.

3rd Quarter FY10

- Identified a bug (corresponds to error propagation) in the HMOS script and fixed it
- The work may be delayed due to the departure of DJ Seo from OHD.

4th Quarter FY10

- The Reliability Diagrams of the EPP3 precipitation ensembles of the test basins show that they are less reliable at the 0 precipitation amount threshold (i.e., intermittency threshold), a behavior not seen in EPP2 evaluation, which will be investigated in FY11.
- This project has been delayed due to the departure of the old HEP group leader, DJ Seo, and appointment of the new group leader, Julie Demargne, which resulted in a shift in responsibilities, and a reduction in time available to work on the deliverables of this project. The hindcast experiments and ensemble verification with the different XEFS components will continue in FY11 for the test basins at AB-, CN-, and NW-RFCs.

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	Completed March 2010
Complete the Phase 2 Graphics Generator Implementation	FY10, Q4	Postponed until a FEWS graphics API is implemented

Accomplishments/Actions

3rd Quarter FY09

- 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

- 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

- 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.

2nd Quarter FY10

- The Graphics Generator Phase 1 was made available to CAT RFCs at the end of March to provide basic ESPADP functionality. During the next few months, we plan to incorporate minor functionality improvements, bug fixes and improved user documentation based on feedback from RFCs. We will continue to provide monthly updates to incorporate those changes and keep up with FEWS and CHPS releases.

3rd Quarter FY10

- Over the past few months, we've continued to make changes to the Graphics Generator based on feedback from the RFCs, although our release frequency of the Graphics Generator has gone down from once per month to once per quarter. We also tested the Graphics Generator within an operational setting. We started making changes to make the Graphics Generator easier to use, including improving the User's Manual. For the next few months, we'll create plot templates which very closely match ESPADP products and can be automatically applied to all segments. Over the next few months, we will work with Forecast Decision Training Branch to develop Graphics Generator training. In addition, we're working with AHPS Web-Team to compare Graphics Generator and ESPADP output.

4th Quarter FY10

- During the last quarter, OHD has tested and improved the Graphics Generator functionality as an operational replacement to ESPADP with some additional displays for probabilistic information. Recently, we've gotten good feedback from CNRFC and NWRFC and from the NWS Regions through the AHPS web-team. The next delivery of the Graphics Generator (and XEFS) is scheduled for November 2010. Following this delivery, there will be a one-month period to develop must-have changes with a follow-up delivery with those changes in January 2011.
- At the beginning of October, OHD kicked-off the Hydrologic Ensemble Forecast Service (HEFS) project. This project is OHD's first effort to improve the way we plan, develop, and deliver new functionality to the field. It involves the creation of end-to-end packages where everything needed for successful implementation in the field office has been integrated in the package, including scientifically sound, well engineered software, information for dissemination, training, and support.
- The HEFS project has become one of OHD's top priorities and has a firm end date just 3 years away. By late 2013, the project is to be completely operational at NE and MA RFCs and providing data to NYC. A beta version will be provided to NE and MA RFCs by early fall 2013. OHD management, led by Don Cline (HL Lab Chief), is currently having weekly meetings to complete more detailed planning.

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

- 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.

2nd Quarter FY10

- The feedback from the CAT RFCs continues to be limited due to the high priority nature of CHPS development and migration.
- The CAT directed that before the Graphics Generator goes into Phase 2, FEWS should be

enhanced with an Application Program Interface (API) for common graphics functionality and information which the Graphics Generator and other planned GUIs should use.

3rd Quarter FY10

- The feedback from the CAT RFCs continues to be limited due to the high priority nature of CHPS development and migration.

4th Quarter FY10

- None

NCEP Collaboration (THORPEX)

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Julie Demargne (previously Dong-Jun Seo)

Objective:

- 1) Accelerate development of reliable and skillful hydrometeorological (precipitation, temperature and potential evaporation) ensemble forecast products for hydrology and water resources applications
- 2) 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 & dew point 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.	Q3	Ongoing – will continue in FY11
Implement operational generation of combined (RFC & CPC) precipitation and pseudo-precipitation dataset for bias correction and downscaling of NAEFS ensembles.	Q3	Completed
Test climatological downscaling of NAEFS precipitation forecasts over CONUS.	Q3	Ongoing – will continue in FY11

Accomplishments/Actions

1st Quarter FY10

2nd Quarter FY10

3rd Quarter FY10

- The climatology-calibrated precipitation analysis (CPPA) has been implemented. NCEP produces CCPA products 4 times per day (every 6 hours) around CONUS with various spatial resolutions based on HRAP and NDGD resolutions: 0.125, 0.5 and 1.0 (lat/lon) degree. NCEP has produced CCPA products for these resolutions for at least 8 years.
- Discussed the current activities at NCEP and OHD and future planned activities on 05/25.
- Started to work with NCEP on providing the RFC specific areas for NCEP ensemble verification. This activity has been delayed due to differences in data format between OHD and NCEP and due to the departure of DJ Seo from OHD.

4th Quarter FY10

- Provided NCEP with 3 grids of RFC-specific areas for their calibration and verification purposes. This activity will be completed in FY11 Q1 by providing 2 additional grids.

- Held a NCEP-OHD meeting to discuss recent progress made at NCEP EMC on recent implementation, post-processing, and CPPA datasets.

Problems Encountered/Issues

1st Quarter FY10

- None

2nd Quarter FY10

- None

3rd Quarter FY10

- The work done at OHD has been delayed due to the departure of DJ Seo from OHD.

4th Quarter FY10

- The OHD activities have been delayed due to the departure of the old HEP group leader, DJ Seo, and appointment of the new group leader, Julie Demargne, which resulted in a shift in responsibilities, and a reduction in time available to work on the deliverables of this project. The collaborative activities between OHD and NCEP EMC will continue in FY11.

Compare Post Processors

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Julie Demargne (previously 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	Complete
Implement logistic regression (LGR) within the PIT framework.	Q2	Complete
Prepare the precipitation forecast and observed data sets for Phase I.	Q2	Complete
Carry out the comparison experiments for post-processor Phase I.	Q3	Delayed to FY11
Analyze and summarize the results.	Q4	Delayed to FY11
Write a draft paper for an international journal on the results of the Phase I intercomparison.	Q4	Delayed to FY11

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).

2nd Quarter FY10

- Obtained and pre-processed a range of NWS model outputs and observations for use in Phase I of the post-processor intercomparison project. These include a four-year archive of operational precipitation and temperature forecasts for CONUS from NCEP’s Short Range Ensemble Forecasting (SREF) system, an eight-year archive of operational forecasts precipitation and temperature from the Global Ensemble Forecasting System (GEFS) and a thirty-year precipitation and temperature reforecast dataset from the frozen version of GEFS. The data have been pre-processed for the MARFC Juniata region for input to the post-processor inter-comparison tool and will be pre-processed for the other regions considered (in AB, CN- NW- RFCs) once the post-processing work begins for those regions. A new 10-year gridded observed dataset will shortly be available from NCEP and will provide the basis for bias-correction in all regions. Currently, observed MAP values are being used. The climate regions used in the Meteorological Development Laboratory HR-MOS scheme were obtained from Jess Charba of MDL and may be used for spatial pooling (to increase sample size), depending on the computer resources required to pool over such large regions.
- Performed extensive evaluation and verification of the SREF precipitation forecasts for the Juniata basins, conditional upon forecast lead-time, physics-model, event-size, ensemble member and location.
- Implemented indicator co-kriging and Bayesian Model Averaging for the SREF forecasts within a dependent-validation framework and verified the resulting bias-corrected forecasts.
- Implemented an initial version of logistic regression within the post-processor intercomparison tool. Initial results for the SREF precipitation forecasts under dependent validation appear very favorable and bear further scrutiny.

3rd Quarter FY10

- Evaluated the BMA post-processing technique for the MARFC study basins and made some enhancements after noting the poor performance compared to the other techniques (logistic regression and ICK). The performance enhancements involved simplifying the dependence of the mean of the bias-corrected distribution centered on the forecast member on the forecast amount. Originally this dependence was described with the linear model $\mu = b_0 + b_1x$ with forecast amount x and parameters b_0 and b_1 to be determined through least-squares regression. The new structure is $\mu = b_1x$, with parameter b_1 to be determined.
- Obtained vector files containing MAP basin outlines for each of four RFCs, namely MA-, AB-, CN, and NW-RFCs. Extracted the basin boundaries for 10-15 basins in each RFC and used these polygons to compute the MAP from the SREF gridded data. This was implemented in a Java program that is part of the post-processor inter-comparison tool (PIT). The tool extracts the gridded information from the SREF forecasts, interpolates the grid to a finer grid (to avoid edge effects when aggregating over the basin polygons) and then averages over all points on the refined grid that fall within the polygon boundary for a given basin.
- Coordinate with Jun Du of NCEP and Joe O. of MARFC to augment OHD’s archive of SREF forecasts. Joe O. has agreed to download the SREF gridded forecasts and archive them at MARFC. He will also provide the last six months of data, coordinating with Pen State. The NCEP archive is available on tape, which is accessible online, but each file archived stores

- the output from all modeled variables. The data proved too unwieldy to transfer at 75GB per file and with limited options to reduce this prior to transfer from the tape deck.
- Started identifying potential enhancements to the Indicator Cokriging (ICK) technique. These enhancements include modeling the covariance structure and maintaining temporal statistical dependencies for ensemble generation. The covariance structure was explored as a function of threshold separation distance. This may provide an avenue for modeling the covariances, but it is not yet clear, since a simple relationship between covariance and threshold separation distance is clouded by conditional biases in the forecast at different absolute threshold amounts.
 - Developed a SON document for a new HOSIP project on the post-processor inter-comparison work and started writing the project plan.

4th Quarter FY10

- Completed downloading of all missing SREF forecasts. The partial dataset obtained from Brian Colle of SUNY was ~33GB. The augmented dataset, downloaded from the NCEP HPSS to include all 4 x daily model runs, is ~110GB in size.
- Completed processing of all precipitation data for the post-processor inter-comparison, including the GEFS and SREF datasets and the NCEP gridded QPE.
- Compared the NCEP QPE-derived MAP to the RFC-derived MAP (gauge only) and MAPX (radar) and found some significant differences for high-valued precipitation amounts. Some further work will be necessary to establish whether the NCEP QPE data will meet the needs of this project. This work will be coordinated with Haksu Lee and Yu Zhang who are investigating similar issues.
- Identified a new task to be completed in FY11, namely to conduct comprehensive verification of the GEFS and SREF datasets as the basis for providing more rapid input to the Eastern Region RFCs on how to blend ensembles from GEFS and SREF (as part of the Meteorological Model Ensemble Forecast System, MMEFS). This work will lead to a draft manuscript for publication in an international journal and associated guidance to the MMEFS project on the nature and degrees of bias in the GEFS and SREF precipitation forecasts. This task will feed into the comparison of post-processors by establishing the pre-existing biases in the GEFS and SREF forecasts; it will also be completed while waiting for new computer resources to conduct the post-processing work (a workstation with GP-GPU purchased in June 2010 and due for delivery in October 2010).
- Started initial verification of the GEFS and SREF forecasts using the Ensemble Verification System (EVS).

Problems Encountered/Issues

1st Quarter FY10

- None.

2nd Quarter FY10

- None.

3rd Quarter FY10

- Due to insufficient computing resources to implement the post-processing techniques within a cross-validation framework, three activities will be delayed, namely: 1) "Carry out the comparison experiments for post-processor Phase I"; 2) "Analyze and summarize the results"; and 3) "Write a draft paper for an international journal on the results of the Phase I intercomparison". However, actions have been taken to remedy this problem. A new workstation with a GP-GPU card has been purchased and will be used to conduct the cross-validation work. These activities are ongoing in FY10 Q4 and will be further delayed to FY11.

4th Quarter FY10

- A new computer was ordered in June 2010 and is still awaiting delivery (as of 6th October 2010). While this has delayed the post-processor inter-comparison, a new task and

associated milestone will be added to the FY11 workplan on comprehensive verification of the GEFS and SREF ensembles. This task will provide a baseline for comparing the statistical post-processors for precipitation (by establishing existing biases in these forecasts) and should provide valuable guidance to the MMEFS project earlier than anticipated (i.e. before the post-processor inter-comparison has been conducted), offsetting the impacts of the delay in acquiring computing resources.

Hydrologic Uncertainty in Extreme Events

Core Goal: Quantify uncertainty of our forecast information

Management Lead: James Brown (previously 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	Complete
Develop a modeling framework for accounting of hydrologic uncertainty in extreme floods	Q2	Complete
Design & carry out simulation experiments for proof-of-concept demonstration and analysis	Q3	Delayed to FY11
Analyze and summarize the results	Q4	Delayed to FY11

Accomplishments/Actions

1st Quarter FY10

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

2nd Quarter FY10

- A dynamical-statistical framework is under development.

3rd Quarter FY10

- Completed initial work on a dynamical-statistical framework. This work will be communicated to James B. who will take over the project on the project leader's departure.
- Start planning the activities in FY11.

4th Quarter FY10

- None. Project delayed to FY11, following a re-evaluation of resources (in light of the HEP Group Leader's departure).

Problems Encountered/Issues

1st Quarter FY10

- None

2nd Quarter FY10

- None

3rd Quarter FY10

- All milestones and deliverables will be delayed to FY11 or later. As part of the FY11 activities, the new project lead (James B.) will develop a proposal for reformulating the project as necessary.

4th Quarter FY10

- None. Project delayed to FY11.

Evaluate Climate Forecasts

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Julie Demargne (previously 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	Ongoing
Carry out the evaluation experiment	Q3	Ongoing
Analyze and summarize the results	Q4	Ongoing

Accomplishments/Actions

1st Quarter FY10

- Nothing to report

2nd Quarter FY10

- The evaluation experiment is designed, i.e., both precipitation and temperature variables will be evaluated on monthly and seasonal time scales via estimating both single-valued and ensemble forecast verification metrics.
- Started evaluating CFS and consolidation forecast skill via estimating various skill measures on monthly and seasonal scales specific to Colorado region.

3rd Quarter FY10

- Calculated various verification metrics for CFS and consolidation precipitation forecasts specific to the Colorado region, and delivered a presentation to OHD scientists, CBRFC and NCEP personnel.

4th Quarter FY10

- Calculated both single-valued and ensemble forecast verification metrics for CFS and consolidation precipitation forecasts for the SERFC's region, and presented the evaluation results to OHD scientists, Dr. Kingtse Mo (CPC) Mo and Jeff Dobur (SERFC).
- Discussed with Kingtse Mo (CPC), Mike Ek (EMC), and Eric Wood (Princeton) the new CFS system (CFSv2) to become operational in January 2011 and the FY11 activities to get the new CFSv2 hindcast and forecast datasets and evaluate the forecast skill.

Problems Encountered/Issues

1st Quarter FY10

- None

2nd Quarter FY10

- None

3rd Quarter FY10

- The work may be delayed due to the departure of DJ Seo from OHD.

4th Quarter FY10

- The summary report on CFS evaluation results has been delayed due to the departure of the old HEP group leader, DJ Seo, and appointment of the new group leader, Julie Demargne, which resulted in a shift in responsibilities, and a reduction in time available to work on the deliverables of this project.
- The evaluation of CFS and CFSv2 forecasts will continue in FY11 in collaboration with NCEP CPC and EMC, selected RFCs, and Princeton University.

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 of CONUS	FY09 Q3	CONUS Complete

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.

2nd Quarter FY10

- None for this period. Concentrated on DMIP2 related project. Started to revise the paper based on comments from some of co-authors.

3rd Quarter FY10

- None for this period. Concentrated on DMIP2 related project and preparation for the HOSIP meeting. Revised the paper based on comments from some of co-authors.

4th Quarter FY10

- Finalized journal article comparing STATSGO and SSURGO based SAC-SMA parameters and submitted paper to OHD review process
- July 26: Conducted OHD seminar on results of comparing streamflow and soil moisture from the STATSGO and SSURGO derived parameters
- Submitted HOSIP documents in preparation for Gate 3 review.

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

2nd Quarter FY10 – None

3rd Quarter FY10 – None

4th 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
1. Derive relationships between lumped calibrated SNOW-17 parameters and watershed properties	Mar. 31, 2005	On schedule
2. Generate SNOW-17 parameter grids over Susquehanna River basin	Apr. 30, 2005	On schedule
3. Evaluate and calibrate derived SNOW-17 parameter grids using snow observations and streamflow	Dec. 30, 2005	On schedule
4. 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
5. Initial evaluation of possibility of using soil moisture data to calibrate <i>a priori</i> SAC-SMA parameters	Sep. 30, 2005	completed
6. 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.
7. 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
8. 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
9. Test PE adjustment approach on a large region, e.g., Oklahoma Mesonet using soil moisture data.	FY08 Q4	completed
10. Perform calibration of SAC parameters, and analyze their relationships to <i>a priori</i> and climatologic indexes	FY08 Q4	completed
11. 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.
12. Evaluate soil moisture simulations over DMIP2 basins from lumped and distributed models.	FY07 Q3	Completed in Q4 for DMIP 2
13. Extend analysis and tests of a climate adjustment to <i>a priori</i> parameters (increase time period and basins)	FY09 Q1	complete
14. 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
15. 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.
16. Investigate other sources of Snow-17 <i>a priori</i> parameter ranges: use energy budget model results	FY08 Q4	Complete for MFMAX and MFMIN

17. 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
18. 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.
19. Finish journal paper on derivation of Snow-17 parameters. Co-author and non-co-author review	FY10 Q1	On track.
20. Journal paper on derivation of Snow-17 parameters. OHD management review	FY10 Q3	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

- Obtained DEM and forest grid to start investigation on a snow-17 parameterization for Alaska
- 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

- 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.
- 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

- 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.
- Victor presented his lumped model results with newly derived climate adjusted parameters in dry areas. Presentations made to RFCs and OHD.
- 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

- 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

- 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

- 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.
- 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.

- Climate adjustment also applied to the CONUS SSURGO parameters and delivered to RFCs via FTP site.

1st Quarter FY10

- Finished a journal paper draft on a priori melt factor parameterization method and put it in the OHD internal review process.
- 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.

2nd Quarter FY10

- Revised of the journal paper based on Mike's comments.
- For an evaluation of a priori MFMAX and MFMIN parameters, 1) compared basin average a priori parameters with lumped calibrated parameter for 388 CNRFC segments, 250 NERFC segments and 242 Alaska segment (generated a few plots - scatter-plots and CDF). 2) Examined a priori parameter range compared to Eric's recommended range (created a map showing the pixels out side Eric's range). Summarizing the results and will attempt to close this project during the next Quarter.

3rd Quarter FY10

- Submitted the journal paper to OHD review on 6/23/2010.
- Prepared for HOSIP Gate III meeting (originally scheduled on July 7th and postponed to August).
- Working on presentation for OHD seminar in July.

4th Quarter FY09

- July 26: Conducted OHD seminar on the derivation of CONUS Snow-17 melt factor parameters
- Prepared for HOSIP Gate 3 meeting in Q1 FY11
- Journal paper in final OHD review by Gary Carter
- Melt factors successfully used for DMIP 2 simulations in the North Fork American River. Streamflow simulations based on these *a priori* parameters compared very well to the other distributed model simulations.

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

2nd Quarter FY10 – SNOW-17 melt factor uncertainty analysis was postponed based on the discussion with Geoff, Mike and Naoki. Plan to prepare for new HOSIP project as a separate project and resume the analysis.

3rd Quarter FY10 – None

4th 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
1. Review existing Snow-17 modifications	May 2006	completed
2. Familiarization with SNODAS processes and products	July 2006	Complete
3. Devise approach	Aug 2006	Draft plan delivered 9/06
4. Acquire data & write draft code	Sept 2006	On hold
5. Test approach.	Nov 2006	On hold
6. Allocate funding for 4 months (\$50K) for a contractor to support the SSST. Locate contractor	FY08 Q3	On hold
7. 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

2nd Quarter FY10

- None

3rd quarter FY10

- Project is now closed

4th Quarter FY10

- Project is now closed

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.

2nd Quarter FY10

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

3rd Quarter FY10

- Project is now closed

4th Quarter FY10

- Project is now closed

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. 1

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; parameter limits, and routing model parameters	TBD	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.

2nd Quarter FY10

- Hydro group met with JJ Gourley to discuss his results of using the global optimization approach Differential Evolution Adaptive Metropolis (DREAM) autocalibration approach with HL-RDHM on the Tar River basin. JJ also ran SLS and manual calibration. His results show that parameter limits are important. DREAM has promise but takes a very long time. Hydro group provided guidance on the proper order of parameters for SLS. JJ will follow the guidance as the Tar Basin is re-calibrated on a sub-basin basis. Hydro group also provided guidance on how to use the 'calb' versions of the SAC and routing models to reduce the autocalibration run times with DREAM.
- Portions of the FY-10 AHPS/WR proposed projects were approved for incorporation even though not specifically funded: parameter limits will be examined in the FEW/CHPS version of HL-RDHM and autocalibration. Also, an approach for manually adjusting the routing parameters (similar to the ICP Percolation Analysis) will be investigated in FEWS.

3rd Quarter FY10

- Analysis of DMIP 2 results shows that several of the uncalibrated HL-RDHM simulations have better statistics (correlation, bias) than simulations from other calibrated distributed models from DMIP 2 participants. This highlights the importance of *a priori* parameters in the implementation of the distributed model.

4th Quarter FY10

- Basic HL-RDHM components migrated to CHPS/FEWS. A data flow path was developed to facilitate efficient multi-year calibration runs in the CHPS/FEWS framework.

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.

2nd Quarter FY10

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

3rd Quarter FY10

- 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 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
3. Refine existing data display tools as needed	FY10 Q4	Ongoing

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

2nd Quarter FY10

- Further refined Google Earth conversion tool to enable use in visualizing DMIP2 related data
- Modified color schemes used to display Pittsburgh WFO return period data per user feedback

3rd Quarter FY10

- Modified color schemes and title wording used to display Pittsburgh WFO return period data per user feedback
- Provided support to Hydromet group in use of xmrgtokml conversion program

4th Quarter FY10

- Provided support to IT staff at BGM WFO in the installation and alteration of DHM-TF visualization tools
- Modified color schemes and title wording used to display Binghamton WFO return period data per user feedback

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

2nd Quarter FY10

- None

3rd Quarter FY10

- None

4th Quarter FY10

- While GRASS was installed on the operational dx machine at the PBZ WFO, this proved not to be possible at the BGM WFO. The solution implemented by the BGM WFO IT staff was to install it on a separate machine, shuttling the data back and forth between the dx machine and the visualization machine.

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
1. Complete analysis of simulations from the Oklahoma experiments	Q4	Completed
2. Submit papers for DMIP 2 Special Issue	FY10 Q3	Submitted to OHD review August, 2010
3. Design OK forecast mode experiment (this experiment postponed)	FY09 Q1	withdrawn
4. DMIP 2 Western Basin Experiments: generate and analyze basic (w/o HMT data) distributed and lumped simulations	FY10 Q4	Complete
5. Finalize the 'basic' (non-HMT) gridded QPE and QTE data and make available to DMIP 2 participants.	FY10 Q2	Complete
6. Complete analyses of participants' western basin 'basic' simulations.	FY10 Q4	Interim analysis of submitted simulations completed
7. (Jointly with Hydrometeorology Group) Support ESRL and NSSL in the derivation and evaluation of the HMT products for DMIP 2.	FY10 Q4	On track
8. Deliver to DMIP 2 the HMT advanced data for 2005-2006 with new modeling instructions.	FY10 Q4	Delayed to FY11
9. 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 Hydro groups 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 xmrq 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.

2nd Quarter FY10

- Hydro and Hydromet groups finalized the revised QPE for the DMIP 2 western basins. They followed CNRFC guidance and re-generated the QPE using the 1971-2000 high resolution PRISM climatology to generate the grids. Mike announced the restart of DMIP 2 western basin experiments and the new data and documentation were placed on the DMIP 2 web pages. To date, the following institutions will participate in the western basin experiments: 1) Hydrologic Research Center with K. Georgakakos, 2) CEMAGREF, France with Vazken Andreassian, 3) NCEP/EMC with Jairui Dong, and 4) U. Washington with Jessica Lundquist. CEMAGREF and U. Washington are new participants.
- Hydro group analyzed the QPEs derived using the 1961-1990 and 1971-2000 PRISM data: the later period seems to result in different precipitation patterns. Results were sent to CNRFC.
- NWRFC tested the DMIP 2 gridded QPE approach (Calb MAP and MPE) for their CHPS forcings evaluation. They developed 50 year gridded 6hour and daily QPEs with the method.
- Hydro and Hydromet groups coordinated with HMT on the processing of the 2005-2006 'gap-filling' radar data.
- As a by-product of the derivation of using the Calibration MAP preprocessor and MPE, Mike looked at the Calibration MAT code to see if the station time series of 6-hour temperatures could be written out and used as input to a gridded interpolation algorithm.
- Mike processed remaining non-OHD papers for the Journal of Hydrology Special Issue on the Oklahoma Experiments. Only one non-OHD paper remains.
- Mike, with help from the Hydro group, resumed work on the DMIP 2 Oklahoma overview and results papers.

3rd Quarter FY10

- Mike, with help from the Hydro group, analyzed the results of the routing experiment and experiment for calibration with biased data. Mike finished a draft version of the DMIP 2 Oklahoma overview results paper and sent it to ABRFC and all participants for review June 23.

Comments received from received from several participants. Mike revised the results paper for submission to OHD review by Aug 2.

- Hydro group provided support to CEMAGREF, U. Washington, and others for data processing for the western basin experiments.
- Victor began recalibrating HL-RDHM for the East Fork of the Carson River basin using the revised QPE data.
- Ziya set up Eric Anderson's lumped models for the Carson Basin to generate final lumped simulations for analysis.
- Mike and Naoki made several runs of HL-RDHM to compare to lumped simulations.
- As Guest Editor, Mike completed all the non-OHD paper reviews for the DMIP 2 Special Issue of the Journal of Hydrology.
- The Hydromet group developed three QPE cases for two events from the 2005-2006 HMT West season: radar only (88D), gauge only, and radar-gauge mosaic. Naoki successfully generated HL-RDHM simulations with the three cases and compared to the HL-RDHM simulation with the QPE from the dense DMIP 2 data set. The preliminary results indicate that the radar-gauge mosaic QPE led to the best simulation of the flood event. This was a milestone for a HMT-West: to evaluate the QPE methodology for two events before processing the entire 2005-2006 data period.
- Mike presented a paper at the ASCE EWRI conference in Rhode Island on the derivation of historical gridded QPE fields for mountainous areas. Presentation was later given to RFCs via GoToMeeting.
- Mike and Zhengtao worked on modifying the MAT calibration preprocessor to write out station 6-hour temperature time series for input to a grid interpolation program for historical gridded QTE generation.

4th Quarter FY10

- Mike and Zhengtao worked on modifying the MAT calibration preprocessor to write out station 6-hour temperature time series for input to a grid interpolation program for historical gridded QTE generation.
- Mike conducted OHD seminar on derivation of historical gridded QPE July 26
- Hydrology Group received and analyzed simulations from six institutions (U. Bologna Italy, CEMAGREF France, U. Valencia Spain, U. Ca. Irvine, U. Washington, and OHD). The Hydrologic Research Center and NCEP/EMC are finalizing their simulations. NCEP/EMC is generating gridded runoff volumes to be routed using HL-RDHM.
- Hydrology group performed an interim analysis of the results and submitted the report to OHD management and later to CNRFC.
- Mike presented an overview of the western basin results at the HMT-West meeting October 6 and 7.
- Mike, Julie Demargne, Naoki Mizukami, and Andy Wood (DOH, CBRFC) finalized plans for a session on Advances in Hydrologic Forecasting at the Fall Meeting of the AGU in December, 2010.
- Hydrology Group submitted the overview and results papers for the Oklahoma Experiments to OHD management for review.

Problems Encountered/Issues

1st Quarter FY08

- 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 NCD 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.

2nd Quarter FY10

- None

3rd Quarter FY10

- Delays in delivery of HMT West QPE data
- Delays requested by DMIP 2 participants to submit simulations. Deadline was Aug 15. Late submission of simulations will allow for only a preliminary analysis of results by Q4. Full analysis of results will occur in FY11.

4th Quarter FY10

- Delays in delivery of HMT West QPE data
- Delays by HRC and NCEP/EMC in submitting simulations for the western basin experiments.

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

- N/A

2nd Quarter FY08

- NCEP hired Jiarui Dong to provide point of contact for coordination with OHD on NCEP hydrologic modeling activities

3rd Quarter FY08

- Work plan in progress

4th Quarter FY08

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

1st Quarter FY09

- Work in progress

2nd Quarter FY09

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

3rd Quarter FY09

- Work in progress

4th Quarter FY09

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

1st Quarter FY10

- Work in progress.

2nd Quarter FY10

- OHD and NCEP held their regular coordination meetings. Results of the research by Jiarui Dong are now being used by the USGS as well

3rd Quarter FY10

- OHD and NCEP are in the process of preparing the Core project report. No changes on the status of Jiarui Dong's work.

4th Quarter FY10

- Work in progress. New proposals were submitted to OAR to fund the continuation of the Core project, which will include Jiarui's work during FY11 due to the new budget allocation

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

2nd Quarter FY10 – None

3rd Quarter FY10 – None

4th Quarter FY10 – If no funding is forthcoming from OAR to fund Jiarui's work, this task will have to be terminated

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
12. Provide training and support to RFCs as necessary to support implementation for river, flash flood, and new product forecasting.	Ongoing	
13.		
14.		
15.		

Accomplishments/Actions

1st Quarter FY09

- 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.

2nd Quarter FY10

- Incorporated surface water freezing option into HL-RDHM and provided to NCRFC for a potential use for the Red River flood prediction scenarios
- Brian provided RFCs with updated scripts to process the USGS flow measurements for deriving *a priori* routing parameter estimates.
- Victor and Zhengtao provided assistance to John Halquist on CONUS executions of the SAC-HT.

3rd Quarter FY10

- Victor and Zhengtao resolved problems with RFC wide runs of HL-RDHM at NCRFC. Scott Stockhaus is implementing GFFG and needed to run HL-RDHM over a long period to get states correct. Scott reported that the issue were resolved
- Hydro group provided guidance to John Halquist for CONUS runs of HL-RDHM.
- Zhengtao and Mike worked on MAT preprocessor to write out 6-hour temperatures per request of NWRFC.

4th Quarter FY10

- Zhengtao and Mike finalized the modified MAT code and sent it to NWRFC for testing. They provided several bug fixes and guidance to NWRFC.
- Zhengtao developed and delivered the configuration files for two basins in ABRFC for the CHPS/FEWS version of the basic HL-RDHM components. Zhengtao worked with Eric Jones to select the basins and derive the configuration files.

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

1st Quarter FY10

- None

2nd Quarter FY10

- None

3rd Quarter FY10

- None

4th Quarter FY10

- None

Migration of HL-RDHM Components to CHPS

Core Goal: Innovation

Management Lead: Mike Smith

Objective: This proposal covers work to implement the basic HL-RDHM components into the CHPS/FEWS architecture. Work began in FY-09 but funding did not begin until FY-10

Milestones:

Major Task	Due Date	Status
16. Develop project plan	FY-09 Q2	Completed
17. Design review	FY-09 Q3	Completed
18. Develop utilities, break HL-RDHM into components	FY-09 Q4	Completed
19. Develop distributed model adaptors	FY-10 Q2	Completed
20. Develop workflows, configuration files, and test documents	FY-10 Q3	
21. Conduct Gate 3 meeting	FY-10 Q4	Completed
22. Performance testing, prepare for and conduct Gate 4	FY-11 Q1	

Accomplishments/Actions

3rd Quarter FY09

- Design review by Joe Gofus and Peter Gijsbers. They suggested looking at PC-Raster for gridded computations. After investigation, OHD management decided to forego PC-Raster until the HSEB has an opportunity to fully analyze it.

4th Quarter FY09

- Developed distributed model adaptors.

1st Quarter FY10

- Developed JNI codes
- Added HL-RDHM basic components

2nd Quarter FY10

- Design review with Geoff Bonnin, Jon Roe, Peter Gijsbers, Zhengtao Cui, Lee Cajina, and Mike Smith. The group approved the use of a separate data flow path for multi-year calibration runs.
- Developed general adaptor to convert NetCDF files to XMRG' files.

3rd Quarter FY10

- Design workflow schemes and configuration files for various distributed model simulation scenarios

4th Quarter FY10

- Successfully completed Gate 3 meeting September 22, 2010
- Zhengtao Cui developed FEWS configuration files for two basins in ABRFC to help Eric Jones implement and test the FEWS version. Delivered the configuration files and provided updates and assistance to Eric Jones.
- Zhengtao began performance testing of the real-time data flow option involving converting xmrgr input grids to the native FEWS gridded format.
- CBRFC offered to test the FEWS version starting in the November 2010 time frame.

Problems Encountered/Issues

1st Quarter FY 10

- None

2nd Quarter FY10

- None

3rd quarter FY10

- Discovered the need to modify HL-RDHM codes so that error messages were passed to FEWS. Zhengtao performed the necessary coding to facilitate this.

4th Quarter FY10

- 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 – Q4	Delayed to FY11
Develop user’s manual for installation and operation of CHPS hindcast workflows	FY10 – Q4	Delayed to FY11
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	Ongoing – will continue in FY11
Enhance CHPS hindcast workflows to include new XEFS processes and analyze sources of uncertainty and error	FY11 – Q4	

Support hindcasting done by RFCs, HSMB and collaborators	As necessary	Ongoing
--	--------------	---------

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).

2nd Quarter FY10

- Set up hindcasting workflows for CNRFC using the latest CHPS-FEWS release and the CNRFC configuration files. The hindcasting workflows were successfully tested for a few hindcast dates using the climatology forcing input ensembles. Started to include the EnsPost latest release and to use forcing input ensembles generated by the EPP3 component.
- Discussed the timing set up for ensemble forecasting in CHPS to deal with historical observations that are relative to local time system and operational forecasts that are produced in UTC. Following discussions with Deltares, HSEB and CNRFC, it was agreed that the ensemble forecasts would be produced in UTC by shifting the historical observations in time by a number of hours (2 hours in the case of CNRFC).
- Submitted an abstract entitled "Hydrologic ensemble hindcasting and verification in the U.S. National Weather Service" for the EGU General Assembly 2010 (Vienna, Austria, May 02-07, 2010). It was accepted for an oral presentation for the session called: "*Towards practical applications in ensemble hydro-meteorological forecasting*".

3rd Quarter FY10

- Participated in the CHPS Advanced Configuration Class and discussed the CHPS hindcasting workflows with the 4 CAT RFCs.
- Continued to work on setting up the hindcasting workflows for CNRFC using the latest CHPS-FEWS release. Produced verification results on EPP3-ESP-EnsPost ensembles compared to traditional ensemble forecasts. The results showed an improved skill and reliability for all 14 lead days using the GFS ensemble means for the EPP3 component.
- Presented the XEFS activities and system, including hindcasting results at the EGU General Assembly 2010 (Vienna, Austria, May 02-07, 2010) and at the ASCE/EWRI conference (Providence, May 16-20, 2010).

4th Quarter FY10

- Continued to work on producing streamflow ensemble hindcast from the Hydrologic Processor and EnsPost of XEFS. Verified the ensemble hindcasts with the EVS version 3.0 using climatology-based streamflow ensembles as a reference. Described verification results for the NFDC1 test basin at CNRFC using the GFS ensemble means for the EPP3 component.
- Started to develop a preliminary evaluation report of XEFS with verification results for EPP3, Hydrologic Processor, EnsPost, and HMOS. The preliminary evaluation report will be finalized in October 2010.
- For the Fall AGU 2010, submitted an abstract entitled "Verification of experimental short-term streamflow ensemble forecasts produced by the U.S. National Weather Service" to present initial performance results from EPP3-ESP-EnsPost and HMOS; it was accepted as a poster presentation.
- Supported hindcasting at CBRFC using the prototype version of EPP3 and the ESP Hydrologic Processor to produce streamflow ensembles using GFS and CFS ensemble mean forecasts.

Problems Encountered/Issues

1st Quarter FY10 - None

2nd Quarter FY10

- The CHPS hindcast workflows for the CAT RFCs will be provided in FY10-Q4 due to unexpected issues to run hindcasting experiments in CHPS for multiple hindcast years. The issues are currently being worked on by HSMB, Deltares and ITSG.

3rd Quarter FY10

- The work may be delayed due to loss of resources in the Hydrologic Ensemble Prediction group.

4th Quarter FY10

- Several items have been delayed due to the departure of the old HEP group leader, DJ Seo, and appointment of the new group leader, Julie Demargne, which resulted in a shift in responsibilities, and a reduction in time available to work on the deliverables of this project. The hindcast experiments with the different XEFS components in CHPS for multiple test basins will continue for the 4 CAT RFCs in FY11.

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.
 - 2) 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.
 - 3) 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).
 - 4) 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	Delayed to FY11
Enhance display prototype capabilities to produce verification standards	FY11 – Q2	Delayed to FY11
Propose improved verification standards in the second NWS Hydrologic Forecast Verification Team report with case studies	FY11 – Q4	Delayed to FY12
Solicit feedback on proposed standard verification products	FY10 – Q3	Delayed to FY11
Develop report on forecasters' and users' feedback on standard verification products and list products for dissemination	FY10 – Q4	Delayed to FY11
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	Delayed to FY11 Q4
Provide NCEP with RFC specific areas to report verification statistics	FY10 – Q4	Ongoing – will continue in FY11
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.

2nd Quarter FY10

- Finalized the verification work plan for FY10-11 with the OHD management. The work of the NWS verification team for FY10-11 and the selection of RFC verification case studies were discussed at the HIC meeting on 02/25/10.
- The NWS Hydrologic Forecast Verification Team met on 02/25/10 to discuss the results of the survey on the real-time verification functionality, which concerns 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. The survey results were also used to provide more detailed requirements on the new archiving capability to store and access all the necessary datasets for real-time verification.
- Developed a first draft for the survey on the standard verification products, including the examples from the September 09 team report, as well as extra plots for single-valued and ensemble verification. The survey will be sent to the Service Coordination Hydrologists (SCH) to work with a few key external users on determining the most meaningful verification products. The survey will also be filled out by the NWS verification team members.
- Discussed the second COMET training module on hydrologic verification with Matt Kelsch, Tom Adams from OHRFC, and Andrew Philpott from MARFC. Provided comments on the results and plots for the case studies with EVS and IVP.
- 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, including the EVS software and the Network-Enabled Verification Service project for aviation services.

3rd Quarter FY10

- Started to develop the verification work plan for FY11.
- The NWS Hydrologic Forecast Verification Team met on 04/15/10 to discuss verification results for the operational single-valued flow forecasts for different flow and precipitation conditions; these findings were relative to the HMOS ensemble project.
- Continued to support COMET, MARFC and OHRFC to prepare the second COMET training module on hydrologic verification. Provided comments on the results and plots for the case studies with EVS and IVP.
- 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.
- Worked with NCEP on providing the RFC-specific areas for NCEP verification computation.

4th Quarter FY10

- Prepared the verification work plan for FY11 for the discussion between the OHD management and the RFCs at the HIC meeting in August 2010.
- Continued to support COMET, MARFC and OHRFC to prepare the second COMET training module on hydrologic verification. Provided COMET with comments on the case studies with EVS and IVP. COMET will finalize the module in FY11-Q1.
- 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.
- Provided NCEP with 3 gridded masks of the RFC-specific areas for NCEP calibration and verification purposes.

Problems Encountered/Issues

1st Quarter FY10 - None

2nd Quarter FY10

- The survey on the standard verification products is expected to be completed in FY10-Q3 and the report on the survey results will be developed in FY10-Q4. The schedule change is due to

unexpected issues to run hindcasting experiments in CHPS for the AHPS project entitled "Improve Hydrologic Hindcasting".

3rd Quarter FY10

- The survey on the standard verification products is expected to be completed in FY10-Q4 and the report on the survey results will be developed in FY11. The schedule change is due to loss of resources in the Hydrologic Ensemble Prediction group.

4th Quarter FY10

- Several items have been delayed due to the departure of the old HEP group leader, DJ Seo, and appointment of the new group leader, Julie Demargne, which resulted in a shift in responsibilities, and a reduction in time available to work on these tasks.
- The charter of the NWS Hydrologic Forecast Verification Team will be revised to reflect these changes.

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.
 - 4) 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.
 - 5) 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.

6) 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.

7) 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.

8) 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 – Will continue in FY11
Evaluate sampling uncertainties of verification metrics	FY10 Q4	Delayed to FY11
Prepare a draft manuscript on the quality of XEFS ensembles	FY10 Q4	Delayed to FY11
Develop improved prototype for computing confidence intervals for the EVS verification metrics	FY10 Q3	Completed
Develop prototype displays for the sampling uncertainties surrounding the EVS metrics	FY10 Q4	Ongoing – Will continue in FY11
Develop an Algorithm Description Document (ADD) for the confidence interval prototype	FY10 Q4	Delayed to FY11
Implement additional diagnostic measures in the EVS for experimental testing at the RFCs	FY10 Q4	Completed
Develop an enhanced version of the Cross Wavelet Transform (XWT) prototype for timing error decomposition in Matlab	FY10 Q3	Completed

Evaluate the performance of XWT for several test basins	FY10 Q3	Completed
Prepare a draft manuscript on the XWT	FY10 Q4	Completed
Solicit feedback from RFC forecasters on real-time verification for analog selection and summary verification products	FY10 Q1	Completed
Develop a software prototype to select historic analogs from hindcast datasets using predefined queries	FY10 Q3	Completed
Enhance the real-time verification display prototypes of mapped statistics	FY10 Q3	Delayed to FY11
Develop real-time verification display prototypes for the analog forecasts	FY10 Q3	Delayed to FY11
Report on the results of the real-time verification work, together with future steps necessary	FY10 Q4	Delayed to FY11
Enhance the GUI/software operation of the EVS	FY10 Q3	Completed
Enhance the documentation of the EVS	FY10 Q3	Completed
Release an enhanced version of the EVS (3.0) and associated documentation	FY10 Q4	Completed
Conduct extended testing of the EVS Model Adapter within a workflow context	FY10 Q2	Completed
Release an enhanced version of the EVS to CHPS Model Adapter and associated documentation	FY10 Q2	Completed

Accomplishments/Actions

1st Quarter FY10

- Defined a new HOSIP project entitled “Improve Ensemble Forecast Verification” for FY10/FY11.
- 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.
- Completed minor revisions to the EVS manuscript, which has now been accepted for publication in the international journal *Environmental Modeling and Software*.
- 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.
- Prepared the EVS Version 2.0 and associated documentation for public release (including completion of required security checks and disclaimer).
- 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>).
- 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.
- 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”).

2nd Quarter FY10

- Summarized the RFC results of the survey on the real-time verification functionality and discussed it with the NWS Hydrologic Forecast Verification team. This will help guide the development of prototype real-time verification functionality.

- Completed a draft version of the manuscript on timing error analysis (Liu et al.) The timing error analysis uses the Cross Wavelet Transform (XWT) approach. The draft manuscript has been submitted for internal review and, subject to review, will then be submitted to the *Journal of Hydrology*.
- Assisted MARFC with evaluating the sampling uncertainties surrounding the EVS verification metrics (for their NWS Verification Team case study) using the prototype confidence interval tool, evsCI. Updated the prototype Matlab code as part of this.
- Updated the CHPS-EVS model adapter to improve the diagnostic information.
- Worked on enhancements to the EVS in preparation for the release of EVS 3.0 by Q4. These enhancements include computation of metrics as a continuous function of threshold amount; improvements in memory use and writing of paired files, improvements in the performance of the routine for temporally aggregating data across several forecast lead times; and many other enhancements.

3rd Quarter FY10

- Completed all predefined enhancements to the EVS in preparation for release of Version 3.0 in Q4 FY10. The enhancements are currently being evaluated. All enhancements over the previous version have been documented in the release notes for inclusion in the software release. However, the decision was made to implement existing functionality to sub-select verification pairs within the EVS. This will form the real-time verification prototype. Originally, several scripts were developed in R for this purpose, but it was decided that there were several benefits of moving this to the EVS, including having a common interface for sub-selecting historical forecasts and verifying them, as well as enhancing the functionality of the EVS.
- Started work on updating the documentation for the next release of the EVS.
- Submitted a draft version of the manuscript on timing error analysis (Liu et al.) to the *Journal of Hydrology* on 24th May.
- Assisted MARFC with evaluating the sampling uncertainties surrounding the EVS verification metrics (for their NWS Verification Team case study) using the prototype confidence interval tool, evsCI.
- Evaluated the CHPS-EVS model adapter within a CHPS workflow for NWRFC. The adapter worked properly. Some documentation needs to be prepared to accompany the adapter, which will then be placed on the XEFS website.
- As an illustration case study for the HEFS paper, worked on verifying the ensemble precipitation and streamflow forecasts produced from EPP and EnsPost, as compared to the climatology-based ensembles. evsCI was used to compute the confidence intervals for the verification results.

4th Quarter FY10

- Completed evaluation, bug-fixing, and additional enhancements to the EVS Version 3.0 beta in light of testing by HEP.
- Revised and enhanced all documentation associated with the EVS, including the user's manual, developer's documentation, and release notes.
- Completed coding and testing of the additional functionality within the EVS for sub-selecting historical pairs of forecasts and observations, which constitutes the "software prototype for selecting historic analogs from hindcast datasets using predefined queries."
- Tested and ran EVS 3.0 to verify XEFS ensemble forecasts of precipitation, temperature, and streamflow that are produced by multiple XEFS components (EPP3 Ensemble Pre-Processor, Hydrologic Processor, EnsPost Hydrologic Post-Processor, and HMOS Ensemble Processor). The results are described in the preliminary evaluation report of XEFS, which will be finalized by October 2010. The evaluation of XEFS ensembles will continue in FY11.
- Prepared the final version of EVS 3.0 for release from the public website.
- Assisted MARFC with evaluating the sampling uncertainties surrounding the EVS verification metrics (for their NWS Verification Team case study) using the prototype confidence interval tool, evsCI.
- Assisted COMET with their preparation of a second module on forecast verification.
- Completed final testing of the EVS-CHPS model adapter.
- Prepared some documentation for the EVS-CHPS model adapter.

- Prepared the final version of the EVS-CHPS model adapter for release from the XEFS “One-Stop” website (i.e. with restricted download access).
- Tested the evsCI prototype with EVS 3.0 to evaluate necessary modifications to evsCI in order to be compatible with the new version of EVS.

Problems Encountered/Issues

1st Quarter FY10 - None

2nd Quarter FY10

- The Q2 milestones to test the CHPS-EVS model adapter and release a new version of the tested CHPS-EVS model adapter have been delayed due to problems in running the ensemble hindcaster within CHPS. The EVS-CHPS model adapter requires testing within a hindcast workflow, and this cannot be accomplished until the ensemble hindcaster is working within CHPS. Towards the end of Q2, progress had been made on this problem. We anticipate the successful completion of these deliverables by Q3. This does not (and will not) impact the RFC’s experimental use of the EVS.

3rd Quarter FY10

- The delayed Q2 milestone to test the CHPS-EVS model adapter has now been completed, but the documentation needs to be prepared prior to its release. This will be completed by Q4.
- There are three Q4 milestones that culminate in the preparation of a draft manuscript on the quality of the XEFS ensembles, namely: 1) “Evaluate quality of XEFS ensembles”; 2) “Evaluate sampling uncertainties of verification metrics”; and 3) “Prepare a draft manuscript on the quality of XEFS ensembles”. These milestones will not be met by Q4 due to delays in the testing and calibration of EPP3 for the experimental basins across several RFCs. These milestones have been added to the FY11 workplan.
- The Q3 deliverable on preparing a prototype for selecting historical analogue forecasts has been delayed to Q4 and will be incorporated in an enhanced interface within the EVS for sub-selecting historical forecasts and observations and writing them to a paired file.

4th Quarter FY10

- Several items have been delayed due to the departure of the old HEP group leader, DJ Seo, and appointment of the new group leader, Julie Demargne, which resulted in a shift in responsibilities, and a reduction in time available to work on the deliverables of this project.
- The two remaining deliverables associated with the confidence interval prototype, evsCI, namely the production of an Algorithm Description Document (ADD) and the development of prototype displays for showing sampling uncertainty have been delayed to FY11. The HOSIP Project Plan for project “Improve Ensemble Forecast Verification” will be updated with a revised timeline to reflect this.
- The three remaining deliverables associated with the real-time verification work, namely the enhancement of real-time verification display prototypes for mapped statistics, the development of prototype displays for analog forecasts, and the report on future steps necessary, have all been delayed to FY11. Again, the HOSIP Project Plan will be updated with a revised timeline.

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:

- Frank Bell – Southern Region
- Jay Breidenbach – 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	Completed
	Contractor Delivers FY10 AHPS Web Changes	FY10Q3	Completed
	Evaluate and Prioritize Changes to AHPS Portal for extended mapping for bridges and roadway infrastructure at risk.	FY10Q4	Completed
	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	FY10Q4	Completed
	Contractor Delivers FY10 AHPS Web Changes	FY11Q2	Revised from FY10Q2 to FY11Q2
	Evaluate and Prioritize Changes to AHPS Portal for extended mapping of E-19 impacts	FY10Q4	Completed
	Work with Contractor on Project Scope	FY11Q1	Completed in FY10Q4
	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.	FY10Q2	Completed
	Conduct Webinars and QAQC Hands-on Workshop	FY10Q2	Completed

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	FY11Q1	Ongoing, Revised to FY11Q1
	Evaluate Changes to SOW V.2	FY11Q2	Ongoing, Revised to FY11Q2
	Meet with FEMA Stakeholders and NFIP Coordinators	FY10Q3	Completed, Ongoing
	Update Federal Guidelines and SOW Templates	FY10Q4	Completed in FY10Q2
	Update Federal Guidelines to V.3	FY11Q4	
	Update SOW to V.3	FY11Q4	

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

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/ F11Q4	Completed/with additional planned
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	On-hold
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/ FY11Q4	Completed with additional planned
Subtask 4-4 Central Region's Indiana Inundation Libraries (FIM08-4P)	Due Date	Status
Implement up to 2 Flood Inundation Map Libraries	FY10Q4	On-hold
Subtask 4-5 Eastern Region's Killbuck Creek, OH (FIM09-3P)	Due Date	Status
Implement 1 Demonstration Flood Inundation Map Library	FY10Q4	Completed
Subtask 4-6 Central Region's Iowa Inundation Libraries (FIM10-1P)	Due Date	Status
Implement 1 Flood Inundation Map Libraries	FY11Q2	Ongoing, Revised from FY10Q4 to FY11Q2
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	Completed
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	FY11Q4	Ongoing, delayed from FY10 to FY11

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	Completed in FY10Q4 with Additional
Work with Contractor on 1 st Priority	FY10Q4	Completed
Supply Revisions on Test Platform for NWS Evaluation	FY11Q3	Delayed from FY11Q2 to FY11Q3
Implement Updates on Regional Servers	FY11Q3	Delayed from FY11Q3 to FY11Q4
Evaluate and Prioritize 2 nd set of Map Updates	FY11Q2	On hold, unfunded
Work with Contractor on 2 nd Priority	FY11Q3	On hold, unfunded

Supply Revisions on Test Platform for NWS Evaluation	FY11Q4	On hold, unfunded
Implement Updates on Regional Servers	FY12Q2	On hold, unfunded

III. FY10 Accomplishments/Actions

FY10 Q4

Task Area #1 - AHPS Flood Mapping Web Portal and Display

AHPS Web Portal for Bridges (FIM09-8P)

- Part 1 of two year subtask 1 **Completed in FY10Q3.**

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

- Part 1 of two year subtask 1-2 was in progress and put on hold because of the inter-relationship with the SRBC project, as reported in FY10Q3. NWS had worked with SRBC to field the concepts showing the flood risks behind levees when river levels are forecast to exceed the height of levee. NWS is now working with SRBC contractor to enhance guidelines pertaining the display of levee information.
- Part 2 of two year subtask 1-2 was discussed with AHPS contractor to provide geo-referencing for listed AHPS Flood Impacts (E-19). The geo-referenced impacts will follow the color schema of the flood category. AHPS contractor will provide demonstrate prototype in FY11.

AHPS Web Enhancements (FIM08-5P)

- AHPS Core Goals team worked with AHPS Contractor to prioritize work (FY10 AHPS Flood Mapping deliverables and AHPS Web Interface Enhancements). With the deliverables and firm handle on the FY10 AOP goals, AHPS contractor began work on AHPS Web Interface Enhancements. AHPS Web contractor will be demonstrating these new features in FY11.
- AHPS contractor began to document current technique for the creation of the Depth Raster display (inundated pixel approach).
- AHPS contractor is enhancing the capability to process inundation raster directly from flood studies and investigate how to display the raster data with the mouse-over feature.
- AHPS contractor is working on the capability to use Google Mapping capabilities to AHPS Flood Inundation Mapping Interface.

Task Area #2 Quality Assurance and Consistency of Regional Flood Maps

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

- Intro to AHPS FIM and QA/QC Webinar** **Completed in FY10Q2**
- 2010 AHPS FIM QA/QC Workshop** **Completed in FY10Q2**

Task Area #3 - National Flood Inundation Mapping Guidelines and Program Standards

Federal Guidelines and Statement of Work Templates (FIM08-2P)

- NWS and CSC continued work on updating existing documents to assist in NWS AHPS Flood Mapping. OCWWS HSD has contracted with Dewberry to complete version 3.0 of the National Flood Inundation Mapping Guidelines and amend the QAQC Document by end of FY11Q4. Much of the requests for additions to revision 3.0 include the addition of the newer procedures for bridges/levees, expansion of the checklists, and more descriptions of the deliverables.
- CSC worked with NWS to secure technical resources with FEMA FMC (Flood Mapping Coordinator) expertise to expand version 3 of the National Flood Inundation Mapping Guidelines.
- In addition, NWS is collaborating with USGS, USACE, and FEMA 'to enhance national guidance for the creation of National Inundation Mapping Services.
- OCWWS HSD offered the QAQC Document, Guidelines, and SOW templates to local partners so that they better understand the standards fro AHPS FIM, the checklists of common issues which

NWS QAQC identifies and flags for corrections, and templates for partners to use, when services are needed locally to implement AHPS Flood Maps. During this quarter, NWS HSD and SR worked with NWS IAO on the creation of SOO for Flood Mapping Projects along the Rio Grande, which led to reward of contract.

- OCWWS HSD participates in regular conference calls with USGS Flood Mapping Technical Steering Committee to enhance cooperation in Flood Mapping activities being undertaken by both agencies. During this period, USGS and NWS completed a common checklist to streamline USGS and NWS Flood Mapping processes and ensure quality assurance (QA) throughout the entire Flood Mapping process. In addition to developing checklist, OCWWS HSD also worked with USGS to establish mapping standards with USGS National Mapping Division and SIM template for the USGS Enterprise Publishing Network (EPN) <http://www.usgs.gov/publishing/policies.html>.
- Version 2 of the Federal Guidelines was modified with appendices and added to the QAQC Documentation in FY10Q2 and made available to NWS from OCWWS FTP Server: http://apps.weather.gov/tempdocuments_ext/NWS_FIM_QAQC_Plan_FY09Q4_FINAL_NWS.pdf

Task Area #4 - Regional Flood Mapping Development

Gulf Coast Libraries (FIM08-1P)

- Following AHPS Flood Inundation Map Libraries were implemented in FY10Q4:

CART2	Elm Fork Trinity River near Carrollton, TX	(FWD)
TODA1	Black Warrior River at Oliver Dam nr Tuscaloosa, AL	(BMX)
BLTN7	Swannanoa River at Biltmore , NC	(GSP)
ABGN1	Flint River at Albany GA	(TAE)

These 5 libraries have been delivered with the assistance from Hurricane Katrina Supplemental Funds. Currently, there have been 26 AHPS Flood Inundation Map Libraries made possible with these supplemental funds.

- Plans for additional implementations in FY11 includes:

SEGT2	Guadalupe River - Seguin, TX	(EWX)	
DUPT2	Guadalupe River - Bloomington, TX	(CRP)	
VICT2	Guadalupe River- Victoria, TX	(CRP)	
SHEA1	Aldridge Creek at Sherwood Dr - Huntsville, AL	(HUN)	
TKSN7	Tuckasegee River at Bryson City , NC	(GSP)	

Southern Region’s Flint River at Albany GA and Peachtree Creek at Atlanta GA Flood Inundation Library

- USGS Georgia Water Science Center and OCWWS HSD provided an overview of the AHPS FIM Library for Flint River at Albany to Congressman Sanford Bishop and his staff. A local roll-out and outreach media event are being planned for October 22, 2010.
- Phase 1 activities are being planned and assessments will be conducted for Peachtree Creek in Atlanta, GA during FY11. In the project, which would potentially led to flood mapping at [AANG1](#), advanced hydraulics are also being considered that would help the nation move towards dynamic mapping.

Southern Region’s Rio Grande/Rio Bravo Projects

- In partnership with the International Boundary and Water Commission (IBWC), NOAA NWS agreed to develop up to 7 web-based flood inundation maps for FY2011, which will provide information on the spatial extent and depth of flood waters in the vicinity of NWS river forecast locations on the Rio Grande/Rio Bravo along the Texas/Mexico border. HSD provided consultation to NWS International Activities Office and Southern Region HSD to assist in the development of Statement of Objectives necessary to procure technical services to build the AHPS Flood Inundation Map Libraries. Southern Region helped secure the engineering/scientific services needed to proper model the hydraulics component of the flood mapping through local

BPA. In addition to flood mapping, this project will deliver Data Collection equipment to monitor local flooding.

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

- The following libraries were implemented in FY10Q4:

TREN4	Delaware River at Trenton, NJ	(PHI)
NHPP1	Delaware River at New Hope, PA	(PHI)
STKN4	Delaware River at Stockton, NJ	(PHI)
FREN4	Delaware River at Frenchtown, NJ	(PHI)
RGLN4	Delaware River at Riegelsville, NJ	(PHI)

ERH and WFO Mount Holly led the NWS collaboration efforts with USACE and DRBC to create these five libraries.
- ERH plans to work with the partners and local stakeholders to deliver up to 4 DRBC libraries for FY11. Work is progressing for the following locations:

BVDN4	Delaware River at Belvidere, NJ	(PHI)
ESTN4	Delaware River at Easton, PA	(PHI)
MTGN4	Delaware River at Matamoras, NJ	(BGM)
MTMP1	Delaware River at Montague, PA	(BGM)

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

- Flood Map libraries for KILO1 was delivered to AHPS and implemented on October 1st [KILO1](#).

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

- University of Iowa is working with NWS on AHPS Flood Maps for the Iowa River in the vicinity of Iowa City, IA ([LOW14](#))
- The project is currently in Phase 3 QAQC review.
- NWS identified and suggested some revisions and enhancements to the mapped shapefiles and depth grids, which the partners are adjusting.
- Project is dependent on AHPS Contractor to improve the depth raster process

Western Region’s Flood Inundation Libraries (FIM10-1P)

- WR Staff members have been consulting with OCWWS HSD in performing site selection of a suitable demonstration AHPS Flood map library for Western Region: During this period, reviews of the Truckee River near Vista, NV ([VISN2](#)) were conducted. Meetings with the Washoe County are being planned.

Task Area #5 - Maintenance and Servicing Maps

Update Existing Flood Inundation Libraries (FIM09-10P)

- Plans were made to work with ER HSD, SERFC, and respective WFOs to update North Carolina Libraries. The priorities will be for libraries which have road networks crossing above the flood inundated areas and local Service Hydrologists had previously provided comments.

FY10 Q3

Task Area #1 - AHPS Flood Mapping Web Portal and Display

AHPS Web Portal for Bridges (FIM09-8P)

- Part 1 of two year subtask 1-1 has been completed and new AHPS Flood Mapping Products now include proper mapping for bridges, roadways, and overpass structures. Guidance has been provided to tackle flood maps currently in queue for the Gulf Coast Libraries. New partnered libraries are required to comply with the standard requiring the proper display of flood risks near, above, or below bridges, roadways, and overpass structures.
- Part 2 of two year subtask 1-1 will look at reprocessing existing locations.

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

- Part 1 of two year subtask 1-2 is in progress. NWS has worked with local partners to field the concepts showing the flood risks behind levees when river levels are forecast to exceed the height of levee. AHPS Demonstration library is scheduled to be available in the late fall, upon local partner's agreement to release.

Task Area #2 Quality Assurance and Consistency of Regional Flood Maps

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

- **Intro to AHPS FIM and QA/QC Webinar** **Completed in FY10Q2**
- **2010 AHPS FIM QA/QC Workshop** **Completed in FY10Q2**

Task Area #3 - National Flood Inundation Mapping Guidelines and Program Standards

Federal Guidelines and Statement of Work Templates (FIM08-2P)

- NWS and CSC continue to work on updating existing documents to assist in NWS AHPS Flood Mapping. OCWWS HSD will deliver version 3.0 of the National Flood Inundation Mapping Guidelines and amend the QAQC Document by end of FY10Q4. Much of the requests for additions to revision 3.0 include the addition of the newer procedures for bridges/levees, expansion of the checklists, and more descriptions of the deliverables.
- Version 2 of the Federal Guidelines is an appendix of the QAQC Documentation available at: http://apps.weather.gov/tempdocuments_ext/NWS_FIM_QAQC_Plan_FY09Q4_FINAL_NWS.pdf
- CSC is working with NWS to secure technical resources with FEMA FMC (Flood Mapping Coordinator) expertise to expand version 3 of the National Flood Inundation Mapping Guidelines in FY11, incorporate USGS, USACE, and FEMA's inundation mapping best practices, and work to address any major concerns about NOAA NWS Guidelines, as expressed by the Real-time Inundation Flood Mapping Team which is being chartered per recommendations from the USGS National Coordination Meeting June 2010 in Atlanta, GA. The basis of this work will result in version 3.1 of the National Flood Mapping Guidelines to be delivered before end of FY11. This is part 2 of subtask 3-1 from AHPS FIM FY10 Core Goal plans.
- OCWWS HSD has offered the QAQC Document, Guidelines, and SOW templates to local partners so that they better understand the standards fro AHPS FIM, the checklists of common issues which NWS QAQC identifies and flags for corrections, and templates for partners to use, when services are needed locally to implement AHPS Flood Maps. For example, during this quarter, NWS HSD and SR worked with NWS IAO to develop SOW for Flood Mapping Projects on the international boundaries between US and Mexico along the Rio Grande.

Task Area #4 - Regional Flood Mapping Development

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

- SR Staff members from the WGRFC, LMRFC, and SERFC assisted in completing Phase 2 refinements by addressing the inundation of floodwaters near bridges, overpasses, and rampways to properly communicate the flood risks across these structures:
[SEGT2](#) Guadalupe River - Seguin , TX (EWX)
[DUPT2](#) Guadalupe River - Bloomington , TX (CRP)
[VICT2](#) Guadalupe River- Victoria , TX (CRP)
[SHEA1](#) Aldridge Creek at Sherwood Dr - Huntsville , AL (HUN)
- AHPS contractor processed and implemented the following sites onto the development test server. Maps are undergoing NWS Phase 3 review. OCWWS HSD will review the comments in late July and direct any needed reprocessing:
[CART2](#) Elm Fork Trinity River near Carrollton, TX (FWD)

[TODA1](#)
[BLTN7](#)
[TKSN7](#)
[BIRN7](#)

Black Warrior River at Oliver Dam nr Tuscaloosa, AL - (BMX)
Swannanoa River at Biltmore , NC (GSP)
Tuckasegee River at Bryson City , NC (GSP)
Oconaluftee River at Birdtown , NC (GSP)

Southern Region's Flint River Albany GA Flood Inundation Library

- USGS Georgia Water Science Center provided shapefiles for WFO and City of Albany to review. The review identified that additional inundation maps are needed for the lower flood levels, subject to a review of the local flood impacts and any changes to the flood categories.
- WFO Tallahassee and City of Albany reviewed the flood categories for the AHPS Forecast Location ([ABNG1](#)). Officials also performed reconnaissance surveys to assess the potential impacts near this gage. Based on these actions, WFO Tallahassee and City of Albany are working to refine the minor flood stage category.

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

- In March 2010, SRBC decided to withdraw from this project. SRBC cited the need for AHPS FIM to adopt a Google background for flood mapping and that display of the spatial extent of flooding on Google was higher priority than the display for a range of flood depths which AHPS additionally provides via customized interface. As a result, in Q3 SRBC delivered the following product: <http://maps.srbc.net/> .
- Eastern Region and OCWWS HSD worked with SRBC and made presentations on Flood Inundation Mapping at the Eastern Region Flashflood Workshop, hosted by NWS and sponsored by SRBC. The presentations are posted at: <http://www.erh.noaa.gov/bgm/research/ERFFW/>.

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

- ERH has been leading the collaboration with USACE and DRBC. The following libraries had undergone Phase 3 review and USACE have addressed majority of the review comments:
 - Trenton, NJ
<http://beta.enable-us.com/ahps2/inundation/inundation.php?wfo=phi&gage=tren4>
 - New Hope, PA
<http://beta.enable-us.com/ahps2/inundation/inundation.php?wfo=phi&gage=nhpp1>
 - Stockton, NJ
<http://beta.enable-us.com/ahps2/inundation/inundation.php?wfo=phi&gage=stkn4>
 - Frenchtown, NJ
<http://beta.enable-us.com/ahps2/inundation/inundation.php?wfo=phi&gage=fren4>
 - Reigelsville, NJ
<http://beta.enable-us.com/ahps2/inundation/inundation.php?wfo=phi&gage=rgln4>
- The above five (5) Delaware River Basin Libraries will be reprocessed and then made ready for AHPS deployment. NWS OCWWS HSD projects delivery up to 5 DRBC libraries by end of FY10 or FY11Q1.

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

- Flood Map libraries for KIL01 was delivered to the test server for AHPS Phase 3 Review.
- NWS is conducting Phase 3 QC review of AHPS Flood Map Libraries for [KIL01](#).

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

- University of Iowa is working with NWS on AHPS Flood Maps for the Iowa River in the vicinity of Iowa City, IA ([LOW14](#))
- The university has provided funds for Phase III AHPS implementation and thus the project is now in Phase 3 implementation.
- NWS and our partners are looking forward to the files on the test server to begin the AHPS Phase 3 Review.

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

- In FY10Q3, Indiana DOT assumed local funding for seven (7) Indiana libraries. Project was stalled because anticipated funding from Indiana DHS thru FEMA did not materialize. Project is resuming with revised schedule for delivery of AHPS Flood Map Libraries to 2 in FY11, 3 in FY12, and 2 in FY13. USGS is providing phase 2 technical services to help develop the Flood Map

libraries.

FY10 Q2

Task Area #1 - AHPS Flood Mapping Web Portal and Display

AHPS Web Portal for Bridges (FIM09-8P)

- NOAA CSC, NWS HSD, and WGRFC worked with LMRFC and SERFC so they can better understand the required task for clipping areas where the bridge structures are not inundated by flood waters. The technique is being used to handle the remainder of the Gulf Coast Libraries, which were not delivered to account for non-inundated overpasses and bridges.

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

- Risk areas behind levees will be mapped in accordance to white paper guidance developed in coordination with SRBC/Dewberry/NWS and reviewed in FY10 Q2. The guidance will provide information on the shapefile formats and specifications for delivery to NWS at the end of phase 2. The guidance will be folded into version 3 of the AHPS FIM Guidelines, which is scheduled for revision with target release prior to the end of FY10 (see reference to Task Area #3).

Task Area #2 Quality Assurance and Consistency of Regional Flood Maps

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

Intro to AHPS FIM and QA/QC Webinar

- NOAA Coastal Services Center (CSC) and NWS conducted webinars to explain NOAA's Advanced Hydrologic Prediction Service (AHPS) Flood Mapping Process. The webinar has two purposes: (1) serve as pre-requisite for the prospects of the AHPS Flood Inundation Mapping QC Training and (2) provide information for those offices interested in working with local partners to develop AHPS flood maps. The first webinar took place on Monday February 22nd, repeated on Wednesday March 3rd, and a third time on Friday March 12th. There were 80+ registered attendees for the three webinars. A copy of the webinar is available at:
https://ocwws.weather.gov/tempdocuments_ext/PreWorkshopWebinar_AHPS_FloodMapProgram_GTW_3.ppt

2010 AHPS FIM QA/QC Workshop

- NOAA CSC and NWS conducted a 2.5 day hands-on GIS workshop in Charleston SC at NOAA CSC facilities from March 23 to March 26, 2010. The purpose of the workshop was to:
 1. *Provide NWS Regions assistance in ensuring QA during the development of AHPS Flood Maps.*
 2. *Provide participant hands-on experience in performing QC of Flood Mapping Shapefiles.*
 3. *Enhance QA/QC procedures by learning various techniques, procedures, and control measures used in reviewing flood map deliverables from NWS partners/cooperators*There were 18 attendees and a special guest from the USGS. The response was favorable and attendees think the webinars and workshop should be continued as more NWS staff participates in flood mapping. The materials are available for download at:
ftp://ftp.csc.noaa.gov/temp/jtowers/final_NWS_QC_training/ .

Task Area #3 - National Flood Inundation Mapping Guidelines and Program Standards

Federal Guidelines and Statement of Work Templates (FIM08-2P)

- NWS contains to share version 2.0 AHPS FIM Federal Guidelines with many of partners such as USGS, USACE, academia, local river authorities, and emergency officials and solicit feedback for improvements. Much of the requests for additions to revision 3.0 include the addition of the newer procedures for bridges/levees, expansion of the checklists, and more descriptions of the deliverables.
- Version 2 of the Federal Guidelines is inserted into the QAQC Documentation which is being

shared with our partners. This document is available at the OCWWS intranet server http://apps.weather.gov/tempdocuments_ext/NWS_FIM_QAQC_Plan_FY09Q4_FINAL_NWS.pdf

Task Area #4 - Regional Flood Mapping Development

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

- SERFC and LMRFC are processing phase 2 shapefiles to proper display the inundation near bridges/overpasses. In particular, the efforts are focus on removing water pixels from the main channel underneath bridges and overpasses that are not subjected to inundation. Some of the libraries are now ready for phase 3 implementation.

Southern Region's Flint River Albany GA Flood Inundation Library

- NWS, USGS, and city officials from Albany GA have been working in Phase 2 to develop shapefiles and depth grids for flood maps
- NWS Southern Region staff and OCWWS HSD continue to work with USGS Georgia Water Science Center and city officials on the development of flood inundation maps for the Flint River at Albany GA ([ABNG1](#)). The project is undergoing Phase 2 Hydraulic Modeling Review through a community approach. The USGS have addressed many of the Phase 1 and Phase 2 modeling checklist items. The mapping has identified opportunities to re-examine some of the NWS flood categories.
- WFO Tallahassee is working with city officials to geocode the flood impacted locations so that a prototype KML layer could be developed and beta-tested for use in communication of flood risk/prone areas.

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.
- Flood mapping deliverables from Phase 2 were processed by the AHPS contractor and underwent Phase 3 review by WFO Binghamton, MARFC, Eastern Region, and OCWWS HSD. The phase 3 review was completed in less than 2 weeks or 50% faster than normal to meet SRBC requests.
- NWS review identified flood mapping concerns and comments that needed to be addressed before many of the maps could be implemented on AHPS. Some of the main NWS concerns involved flood depths and its representation within the main channel. Many of the issues were addressed by SRBC contractors. Those which were addressed were returned for further reprocessing. NWS approved three SRBC libraries for AHPS implementation provided that reprocessing would be completed. These included:
 - Susquehanna River at Conklin, NY (CKLN6)
<http://dev.enable-us.com/ahps2/inundation/inundation.php?wfo=bgm&gage=ckln6>
 - Chenango River at Greene, NY (GNEN6)
<http://dev.enable-us.com/ahps2/inundation/inundation.php?wfo=bgm&gage=gnen6>
 - Susquehanna River at Windsor, NY (WSRN6)
<http://dev.enable-us.com/ahps2/inundation/inundation.php?wfo=bgm&gage=wsrn6>
- In March 2010, SRBC decided to withdraw from this project. SRBC cited the need for AHPS FIM to adopt a Google background or online ArcIMS interface.

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

- ERH has been leading the collaboration with USACE and DRBC. The following libraries are in Phase 3 and are being reviewed by ER staff:
 - Trenton, NJ
<http://beta.enable-us.com/ahps2/inundation/inundation.php?wfo=phi&gage=tren4>
 - New Hope, PA
<http://beta.enable-us.com/ahps2/inundation/inundation.php?wfo=phi&gage=nhpp1>
 - Stockton, NJ

<http://beta.enable-us.com/ahps2/inundation/inundation.php?wfo=phi&gage=stkn4>
Frenchtown, NJ
<http://beta.enable-us.com/ahps2/inundation/inundation.php?wfo=phi&gage=fren4>
Reigelsville, NJ
<http://beta.enable-us.com/ahps2/inundation/inundation.php?wfo=phi&gage=rgln4>

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

- The demonstration project for flood mapping on the White River near Nora, Indiana ([NORI3](#)) is in the late stages of Phase 2. USGS Indiana Water Science Center is providing support on the H&H/Geospatial Analysis and water surface outputs for CR to review. CRH has been leading the efforts on behalf of NWS on coordination, technical review, follow-up, and resolution to key issues involving structures and levees. USGS has worked with the Indiana Department of Transportation to secure support and funding for the implementation of 7 flood map libraries in Central Indiana. A SOW for Phase III AHPS Implementation will now be worked on.

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

- Phase 2 QC of AHPS Flood Map Libraries for KILO1 is complete. Contractor is awaiting funds for Phase 3 AHPS Implementation.

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

- Phase II QC GIS Layer review on the Iowa City flood mapping was completed this quarter. Central Region worked with University of Iowa to address the flood mapping at the pedestrian foot bridge crossing, island in the shapefiles, and the extent of the DFIRM. With these adjustments, the deliverables are now available for Phase III AHPS implementation. The goal is to have AHPS Flood Maps for the Iowa River in the vicinity of Iowa City, IA ([IOWI4](#)).

Western Region's Demonstration Libraries (FIM10-1P)

- WFO BOI continues to work together with Silver Jackets, USACE, and Idaho officials on the development of AHPS Flood mapping for Boise River near Eagle Bridge in Boise, Idaho. FEMA Mitigation activities, USACE efforts, DHI studies, and other mapping resources were discussed. Project is in Phase 1 but will require improvements to the AHPS Web Interface to display larger mapping extent without losing mapping resolution when project reaches Phase 3.
- CNRFC and WFO LOX have had regional meetings to discuss flood mapping with USACE LA District, FEMA, CA DWR, and Ventura County. There are interest to work with NOAA on collecting and developing products that could lead to AHPS Flood Map Libraries, such as detailed topographic, bathymetric data, and calibration of the hydraulics models in accordance to NOAA guidelines. This project is in phase 1.

FY10 Q1

Task Area #1 - AHPS Flood Mapping Web Portal and Display

AHPS Web Portal for Bridges (FIM09-8P)

- Evaluate and Prioritize Changes to AHPS Portal for bridges and roadway infrastructure. Water surface profiles will need to be clipped to show non-flooded bridges and roadways as phase 2 deliverable submissions so phase 3 implementation could be properly performed.

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

- Evaluate and Prioritize Changes to AHPS Portal for Levees/Risk Areas. Levee risk areas will be mapped in accordance to white paper guidance developed in coordination with SRBC/Dewberry/NWS and delivered to NWS as part of phase 2.

Task Area #2 Quality Assurance and Consistency of Regional Flood Maps

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.

Task Area #4 - Regional Flood Mapping Development

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.

Task Area #5 - Maintenance and Servicing Maps

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.
- NOAA NWS is working with Silver Jackets for the development of flood mapping for Boise River near Eagle Bridge in Boise, Idaho. The challenge pertains to the need for extended flood reach beyond current AHPS flood mapping display extents and the hydraulic models to be used.

IV. Problems Encountered/Remaining Issues

FY10

4th Quarter FY10

General

- Moratorium on new web implementation has resulted in delay implementation of AHPS Flood Map Libraries in particular for [SEGT2](#), [IOWI4](#), and [TKSN7](#).
- Prioritizations and AHPS Phase VI resulted in backlog of projects for AHPS contractor. AHPS contractor is closing many of the gaps of the Flood Inundation Mapping Projects, in particular, for enhancements to AHPS Flood Inundation Mapping Interface.

3rd Quarter FY10

General

- Personnel changes are inevitable and the personnel changes in the identified resources to assist in conducting QAQC review, especially in Central Region, will result in lesser resources to carry-out Phase 2 activities. This is normally a bottleneck, so this has raised the need to provide additional QAQC training.

Southern Region's Flint River Albany GA Flood Inundation Library.

- USGS Georgia Water Science Center would like to complete this project as soon as possible due to fiscal constraints and annual goals, so the city of Albany Georgia needs to provide documentation supporting the changes to the minor flood categories. .

2nd Quarter FY10

Eastern Region's Susquehanna River Flood Inundation Libraries (FIM08-4P) is on-hold and was withdrawn.

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. In FY10 Q2, Indiana DOT has promised to provide funding for the development of 7 flood map libraries.

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 portions of this activity and maintenance will be made available through FY10 Task Area #5.

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 no 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. Deliverable requirements will be further spelled out in Federal Guidelines and reference SOW templates, under FY10 Task Area # 3.

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. FY10Task Area #1 has been funded to address this issue.

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

Task	Due Date	Status
Dissemination of NMQ Q2 products in 'real time'	Q2/Continuous	Completed
Assessment of Cool Season Q2 performance for RFC and selected FO operations	Q1/FY11	Ongoing
Assessment of Warm Season Q2 performance for RFC and FO operations	Q1/FY11	Ongoing
Compilation of RFC and FO feedback and recommendations	Final Report Q4	Conducting quarterly conference calls.
Conducting testing of wdss-ii build within the NCEP Dell server	Q3	Completed with report

environment		submitted to NCEP, OHD, and FAA
-------------	--	------------------------------------

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_31gkwgqj54

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 qtrs 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.

2nd Quarter FY10

- Real time Q2 feeds continue to RFCs as outlined in 4th quarter FY09.
- Final coding and testing completed for VPR corrected Q2 QPE product suite. VPR corrected QPE product will be implemented in real time during Q3 with products available to RFCs beginning May 1.
- Q2 performance input from RFCs was obtained through conference call held on February 17th. Minutes from the conference call have been compiled and provided to OHD as well as the Q2 development team.
- Four NCEP hardware test trials completed, however, additional testing is underway to assess issues with running VMware for system management.
- After initial FY10 RFC conference call NSSL undertook a major effort to assess the degree in

which light precipitation was being removed from Q2 products. After a nearly a daily review of Q2 performance during Q1 it was found the wdssii reflectivity quality control was removing valid reflectivity echo especially during cool season events. Refinements were made to the quality control logic and a reduction of light precipitation has been realized but assessments will continue.

3rd Quarter FY10

- Real time Q2 feeds continue to RFCs as outlined in 4th quarter FY09.
- During Q3 NSSL implemented within the real time Q2 MRMS system ten new products related to quantitative precipitation estimation. The products include:
 - Radar Quality Index
 - Tilt Based Vertical Profile Reflectivity
 - Seamless Hybrid Scan Reflectivity (SHSR)
 - Seamless Hybrid Scan Reflectivity with power adjustment
 - Seamless Hybrid Scan with Vertical Profile Reflectivity correction
 - Height (MSL) of the Seamless Hybrid Scan Reflectivity
 - Q2 QPE using the SHSR with power adjustment
 - Q2 QPE using the SHSR with Tilt based Vertical Profile Reflectivity correction
- The new products are being generated in real time CONUS at 1-km horizontal resolution with a 5-minute update rate.
- NSSL is currently assessing the performance and limitations of the new products. Initial evaluations show
 - SHSR was able to mitigating blockage artifacts, but also introduced BB contamination and thus needs refinements.
 - The VPR correction is successful in mitigating the BB-lead QPE overestimation. The VPR correction is limited by the assumption of horizontal uniformity.
 - The VPR correction reduced underestimation in areas where the radar sampled ice regions.
- Further evaluations and refinements are ongoing.
- The new QPE products are available to OHD, RFCs and FOs in AWIPS NetCDF format in real time. All new products are viewable within the QVS webpage (nmq.ou.edu)

4th Quarter FY10

- Real time Q2 feeds continue to RFCs.
- Established feed of CONUS Mountain Mapper QPE to ARBRFC for CONUS analysis.
- A new verification tool set was created for conducting long-term verification statistics for individual RFCs, CWAs, and custom regions per the FY10 milestones. The url for the new verification tools is <http://nmq.ou.edu/beta/q2-tools.html>.
- The appearance of wind farm contamination in QPEs has been increasing and a issue for RFCs and FOs. A comprehensive effort was undertaken at NSSL to indentify the wind farm locations impacting QPEs. After a 4-month effort all wind farms impacting radar visibility were identified with GIS shape files developed along with the Meta data for wind farm locations. The shape files and metadata have been provided to the Radar Operations Center for distribution to individual offices and RFCs.
- Comprehensive verification of all products in the NMQ system is ongoing within the HMRG group. Results from the verification efforts have and will continue to be sent to OHD in the form of PowerPoint's and performance statistics. Additionally OHD and other NOAA individuals can easily obtain performance statistics in real time for all Q2 products in addition to Stage 2,3, and 4.
- New gauge QC tools were implemented in the system for real time automated quality control for HADS and mesonet gauges.
- Q2 products were provided as part of the NextGen NWS demo.

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

2nd Quarter FY10 – None

3rd Quarter FY10 – None

4th Quarter FY10 – A position error was found in the radar polar to Cartesian gridding. The references files within the wsddii system were incorrect. New references files were created and implemented on the NMQ system on October 10th.

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 to 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	Completed journal article and submitted for management review June 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 rain gauge 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

2nd Quarter FY10

- Lead coauthors (Kitzmilller, Van Cooten) agreed on final revisions to journal article (April). Will give other coauthors until April 30 to review, then submit to OHD management for final review

3rd Quarter FY10

- Journal manuscript submitted to OHD management for final review (June)

4th Quarter FY10

- Journal manuscript approved by OHD management and coauthors, now ready for submission to Journal of Hydrometeorology

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

2nd Quarter FY10

- None this quarter

3rd Quarter FY10

- None this quarter

4th 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

2nd Quarter FY10

- Task on hiatus

3rd Quarter FY10

- Task on hiatus

4th Quarter FY10

- Task on hiatus

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

2nd Quarter FY10

- Task on hiatus

3rd Quarter FY10

- Task on hiatus

4th Quarter FY10

- Task on hiatus

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	Done
2. System for infusing temperature, humidity, wind data	FY10/Q3	Note schedule slips
3. Preprocessors of GOES-based solar radiation	FY10/Q3	Note changes in the project plan
4. PET computation and corroboration	FY10/Q4	Delayed
5. Research paper on evaluating estimated PET*	FY11/Q2	
6. Preprocessor for NDFD gridded forecasts	FY11/Q3	
7. PET forecast framework	FY11/Q3	
8. Research paper on evaluating PET and soil moisture forecast*	FY11/Q4	

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

2nd Quarter FY10

- Some FY10 AHPS funding was approved
- Carried out an examination of MDL archives of GOES-sounder effective cloud amount products, described above. While there are some issues with data quality, they appear usable for daily cloud fraction estimates

3rd Quarter FY10

- Held meeting with Mike Hobbins and John Schaake and made the decision to use GOES Insolation products in lieu of the cloud cover data; revised SON and project plan accordingly
- Acquired GOES insolation products from U of Maryland and performed preliminary processing and examination

4th Quarter FY10

- Attended meetings on MODIS PET product evaluation results
- Worked on revising the project plan to provide a more realistic time frame of the project

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.

2nd Quarter FY10

- Initial examination of imagery from the GOES product archived by MDL indicates the products might still be suitable for daily average cloud cover; some data processing artifacts are evident.
- 2nd Qtr FY10 We also found considerable number of hours with missing data. For May 2005, 30% of the data were missing. This is a potential long-term problem.

3rd Quarter FY10

- After encountering multiple problems with the archive of operational Effective Cloud Amount (ECA) products, and on advice from OHD and WR staff, will shift the study to evaluation of a real-time but non-operational GOES-based surface radiation product suite.

4th Quarter FY10

- The project plan is still under revision to account for data constraints (RTMA has relatively short archive which makes it difficult to perform hydrologic evaluations). The scope of the timeline of the project needs to be re-planned. Implementation of the algorithm is delayed accordingly.

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 – Completed HOSIP Gate2 review as a research project, to be followed on by an implementation task	FY10/Q3	HOSIP Gate2 review passed in FY10/Q2
14. Assemble statistical dataset and develop regionalized probability equations based on CY2009-2010 input data	FY10/Q4	Initial results using 2009 data presented in OFC and European Radar Conference
15. Prepare and journal article on initial results from CY2009 data	FY11/Q1	Likely slip to Q2

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

2nd Quarter FY10

- Passed HOSIP gate2 review, for research project, March
- Revised milestones above per approved HOSIP research project research plan and FY10 AHPS submission
- Completed and submitted preprint article for EWRI Congress scheduled May 2010
- Presented seminars on initial results at Norman National Weather Center, ABRFC

3rd Quarter FY10

- Presented results, demonstrating probability and QPF amount fields, at EWRI congress May 2010
- Obtained verification statistics demonstrating approximate parity with skill of HPC 0-6h update forecasts, for 2009 data
- New results presented in preprint for European Radar Conference, submitted July 2010
- Continuing data collection, refinement of probability and amount equations, methodology for probability matching to insure a realistic distribution of forecasts

4th Quarter FY10

- Presented results for comment by HPC staff, including Forecast Branch chief and SOO. They confirmed that verification statistics appeared correct.
- Presented results, demonstrating probability and QPF amount fields, at European Radar Conference (September)
- Continued collecting-collocating data for 2010
- Expanded initial predictor dataset to include stability and humidity indices from RUC model

Problems Encountered/Issues

2nd Quarter FY09

- Funding not committed until FY09 Q3

3rd Quarter FY09

- None

4th Quarter FY09

- None

1st Quarter FY10

- None

2nd Quarter FY10

- Have revised initial milestones (above) to reflect approved HOSIP research plan, latest FY10 AHPS funding plan

3rd Quarter FY10

- None

4th 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	Complete
Analysis and evaluation (spatial characteristics of radar/gauge errors, regions of effective radar coverage, radar QPE errors in cold weather situations)	FY10/Q3	Complete
Review of research results	FY10/Q4	Complete; OFC seminar delivered in July
Prepare journal article	FY10/Q4	On track

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 StageII radar-only data without any gauge bias correction; there was only minor influence on StageII (DPA) verification statistics, generally positive
- Processed and applied rmosaic 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.

2nd Quarter FY10

- Continued data collection in real time
- Derived evaluation statistics for 1-h, 6-h, 24-h point data (ASOS rain gauge verification)
- Began evaluation of statistics in cold-rain situations (surface temperature 34-40°F)
- Began evaluation of spatial correlation statistics of DPA-based and NMQ-based radar-only gridded fields, relative to StageIV multisensor and gauge-only precipitation

3rd Quarter FY10

- Completed statistical analyses
- Began preparation of tech report and OFC seminar material (seminar delivered in July)
- HOSIP Gate3 scheduled 1 September

4th Quarter FY10

- HOSIP Gate3 review presented on September 1
- Awaiting final approval of technical report from gatekeeper

Problems Encountered/Issues**3rd Quarter FY09**

- Funding not committed until FY09 Q3

4th Quarter FY09

- Discovered error in NCEP Stagell 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 this quarter

2nd Quarter FY10

- None this quarter

3rd Quarter FY10

- None this quarter

4th Quarter FY10

- Awaiting gatekeeper's final review of technical report

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
16. Archive forcings data from CAT sites (ABRFC, NERFC, CNRFC, NWRFC)	Continuous	Ongoing – started FY09 Q4
17. Initiate real-time archive development from all remaining RFCs)	Initiate FY10/Q2	Ongoing at most sites – FY10 Q2
18. Document statistical differences between point-based and gridded forcings from MPE, Mountain Mapper/Daily QC, GFE, and report on findings.	FY10/Q3	Results reported from all CAT RFCs
19. 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	Results reported from ABRFC, CNRFC, NERFC
20. 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>21. 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>Not met – now conferring with NWS Analysis of Record Integrated Work Team Members on upcoming advisory meetings</p>
<p>22. Report on potential and preferred methods of deriving gridded precipitation calibration dataset, 50-year duration, including reanalysis with archive of RFC rain gauge and radar data; available satellite products, and disaggregation of climatic datasets with daily-to-monthly total precipitation</p>	<p>FY10/Q4</p>	<p>Delivered an OFC seminar on CAT RFC forcings results, ongoing precipitation analysis activities in NWS, and possibilities for expanding data records (July 19)</p>
<p>23. 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>Target not met; now conferring with management on new schedule</p>
<p>24. 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>25. 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>26. 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>27. 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

2nd Quarter FY10

- Final review of project plan during January HIC meetings, ARC meetings
- Reviewed results of comparison of gridded temperature forcings with legacy point-based forcings at ABRFC, during site visit in March (Kitzmilller)
- Results of gridded forcings comparisons at CNRFC, NWRFC, ABRFC, NERFC reviewed during DOH conference call, April (lead Don Laurine)
- Collected information on multiple NWS operations and projects creating real-time and retrospective precipitation grids; also reviewed availability and characteristics of datasets created by PRISM group and U. Washington (Hamlet and Letternmaier, *J. Hydrometeorology*, 2005)

3rd Quarter FY10

- Ongoing work to hire a contractor to assist with remainder of study
- Determined approximate schedule for upcoming meetings associated with defining requirements for the 2nd phase Analysis of Record (AOR), an effort headed by OST staff. Meetings to be lead by NCEP-EMC and WR staff
- Delivered an OFC seminar on CAT RFC forcings results, ongoing precipitation analysis activities in NWS, and possibilities for expanding data records (July 19)

4th Quarter FY10

- Limited work – contractor still not hired
- Prepared abstract for CLIVAR program conference on reanalysis and user needs for reanalyses, November 2010
- Joined CPC-led effort to gather user input on general needs for Analysis of Record data

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

2nd Quarter FY10

- Working to hire new contractor to collect reports and carry out literature and operations searches to develop plan for long-term forcings calibration datasets

3rd Quarter FY10

- Contractor hire still pending as of the end of the quarter – expect some delays in milestones for items 6, 7, 8

4th Quarter FY10

- Limited work – contractor still not hired

ARSR/ASR radar QPE evaluation

Core Goal: Improve the quality of physical inputs and forcings

Management Lead: David Kitzmiller

Objective: To verify the reliability of single-polarization radar quantitative precipitation estimates (QPEs) derived from Air Route Surveillance Radar (ARSR-4) and Airport Surveillance (ASR-11) units. Staff in HSEB have updated a local radar Supplemental Product Generator (SPG) to generate precipitation fields from ASR data, in the format of regular Precipitation Processing System products. Data from radar sites at Erie PA and Makah WA are being ingested and tested.

Milestones

Task	Due Date	Status
28. Collect ARSR- and ASR- based 1-h QPE product files for multiple precipitation events	FY10/Q4	Started FY10 Q3
29. Validate FAA radar QPEs via comparison with RFC precipitation and available rain gauge reports; report on results at HOSIP gate meeting	FY09/Q4	HOSIP or other review delayed, will try FY11-Q1

Accomplishments/Actions

2nd Quarter FY10

- Initial HSMB subjective assessment of products generated by HSEB during software development
- Began collection of data product files, from ASR-11 at Erie PA and ARSR-4 in Makah WA (April 2010). Aim to collect data for at least three months.

3rd Quarter FY10

- Continued collection of data products – initial analysis started
- Discovered that while the QPE products appear accurate in terms of placement and timing of precipitation, the Erie unit has a significant low bias

4th Quarter FY10

- Evaluated multiple hours of product data from each of the Makah WA, Watford ND, and Erie PA sites, in terms of correlation with StageIV gauge-radar gridded precipitation analyses and Stagell radar-only precipitation
- Erie data has best correlation with WSR-88D and gauge-radar data overall
- Makah WA output difficult to interpret because of lack of gauge or radar ground truth on the west side of the Olympic Peninsula, and over Pacific Ocean
- Results were forwarded to HSEB staff for comment (October)

Problems Encountered/Issues

2nd Quarter FY10

- Funding not committed until FY10 Q2

3rd Quarter FY10

- Initial indications are that data quality is poor – investigation is continuing
- Limited number of sites means that few cases are being collected

4th Quarter FY10

- Requested HSEB review of results; some data artifacts might have gotten into the precipitation products.

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 Pittsburgh set up prototype model	FY10 Q3	Complete
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 Q4	Ongoing
8. Publish results	FY10 Q4	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)

2nd Quarter FY10

- With Pittsburgh, began investigation of May 2010 flash flood event—planned visit to PBZ WFO to discuss this event, broader DHM-TF issues, as well as to give a talk at PBZ flash flood workshop.
- Delivered DHM-TF lecture to WFO/RFC forecaster audience at COMET workshop in Boulder, CO.
- Continued to monitor operation of model on Pittsburgh's and OHD's servers. Altered scripts as necessary to account for minor bug fixes and for server reconfiguration.
- Worked with Eastern Region and BGM WFO personnel to plan DHM-TF prototype implementation at BGM WFO.
- Coordinated DHM-TF and DHM-FSR research with CBRFC, coming up with joint plan to implement FSR-style surface runoff post-processing into DHM-TF.
- With Seann Reed, continued 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)

3rd Quarter FY10

- Visited PBZ WFO to talk with staff about current and future DHM-TF operations
- With Seann Reed, continued 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)
- Delivered DHM-TF talk to WFO/RFC/Academic audience at Eastern Region flash flood conference
- Worked with staff at BGM WFO in a continuing effort to set up DHM-TF on BGM server. Work included derivation of routing parameters, bias correction of forcing data, and establishment of necessary HPN, HPE, and MPE data feeds. Process is nearing completion pending a change in BGM's MPE domain size.
- Continued to monitor operation of model on Pittsburgh's and OHD's servers. Altered scripts as necessary to account for minor bug fixes and for disk space limitations.

4th Quarter FY10

- Completed setup of DHM-TF at BGM WFO. System is now running (and producing visualizations) in a real-time automated mode.
- Began to analyze October 1st flood event in conjunction with BGM WFO staff
- Worked with Ed Clark to create a questionnaire which will be used by WFO/RFC staff to record their usage of DHM-TF and to provide feedback concerning the system.
- With input from Seann Reed, completed set of CONUS *a priori* routing parameters and produced initial parameter report per OHD AOP item.
- Responding to initial contact by LWX WFO, planned visit to LWX to discuss installation of DHM-TF at their location. Sent DHM-TF output to them during DC/Balt-area flood event.

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.

2nd Quarter FY10

- Instability of OHD computer system has hampered the continuity of real-time Sterling-domain runs at OHD.
- System upgrade (OB) at Pittsburgh WFO led to a changed scripting environment and an interruption in prototype operations.

3rd Quarter FY10

- Instability of OHD computer system has hampered the continuity of real-time Sterling-domain runs at OHD as well as the ability to run baseline simulations to support prototype operations at PBZ and BGM.

4th Quarter FY10

- MPE product used as forcing for DHM-TF operations at BGM WFO was found not to cover the entire BGM CWA (NERFC precipitation data is missing). NERFC will coordinate with BGM WFO to fix the data supply issue. DHM-TF baseline run will be re-run once precipitation data is fixed.

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	Complete
16. Continue assessment of flash flood events and utility of SHAVE data	FY10 Q4	Ongoing

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.

2nd 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 undergone two revisions and is conditionally accepted to the Journal of Hydrology's special issue on flash flooding.
- We have included the polygons from the StormDat FF event database into our analysis of FFG and GFFG. A complete analysis of the results is pending.

3rd Quarter FY10

- Evaluated skill of FFG and ABRFC-GFFG methods using NSSL flash flood verification database.
- Submitted article to Weather and Forecasting describing ABRFC-GFFG and FFG results, emphasizing thresholds used to maximize skill.
- Created CONUS-wide flash flood database using NWS Storm Data reports.
- Collected dense flash flood observations for a number of cases throughout the summer, including an OKC flash flooding event.
- Software has been developed to automatically classify SHAVE flooding reports as detailed in Gourley et al. (2010). The 2010 SHAVE reports will be added to the existing database of SHAVE observations from summers 2008-2009.

4th Quarter FY10

- Hosted Ernie Wells and Ed Clark from the Office of Climate, Water, and Weather Services at the National Weather Center in Norman, OK. We met over the course of 2 days to discuss last year's progress and ideas for future work. We invited Dr. Eve Grunfest and her students to participate in the meetings regarding the inclusion of social science in flash flooding research. We were joined by Scott Watson from the Kansas City Forecast Office who presented results from his MS thesis work on evaluating the MBRFC's high-resolution experimental FFG products.

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.

2nd Quarter FY10

- We had initially conducted our analysis of GFFG and FFG by comparing the rainfall exceedance associated to the FFG and GFFG values precisely coincident with the StormDat polygon location. The results were rather unsatisfactory due to either uncertainties in the spatial assignments of the FF polygons, displacement of intense rainfall from the location where FF impacts were recorded, or both. Revisions were made to the analysis software to search for the most intense rainfall; i.e., that which was most likely associated with the recorded FF event, in pixels surrounding each polygon.

3rd Quarter FY10

- None

4th Quarter FY10

- One challenge that was identified in current CONUS-wide FFG and GFFG evaluation methodologies is the need for recent years' 15-min streamflow observations from the USGS. There is a website that enables users to request data site-by-site (<http://ida.water.usgs.gov/ida/>), but a much greater offline request for data will be required. Once details of the requested data are identified (i.e., station IDs, time period) Ed Clark has agreed to put us in touch with a contact at the USGS who can assist with the request.

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	Will be completed at the same time as task 9
6. Write guidance document for existing procedures (first draft)	FY10 Q3	Delayed to Q4 due to personnel changes
7. Develop and document tool to quickly derive cross-sections for SMPDBK and HEC-RAS applications.	FY10 Q3	Delayed to Q4 due to personnel changes
8. Add ability to quickly map SMPDBK results to ArcGIS Toolkit	FY10 Q4	Replaced by higher priority Tasks 9 and 10 for FY10; could be re-proposed for FY11
9. Revisit Rules of Thumb and include findings in final report	FY10 Q4	On track
10. Examine deficiencies in DamCrest data; recommend short-term workarounds and medium term functional requirements for software enhancements	FY10 Q4	Delayed due to personnel changes (expected completion in FY11 Q1)
11. Finalize documentation	FY10 Q4	Delayed due to personnel changes (expected completion in FY11 Q2)
12. Develop training materials and deliver webinars; work with training folks on future plans	FY11 Q1	Delayed due to personnel changes (expected completion in FY11 Q2)

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".
- The paper for the ASCE-EWRI conference was not approved by Geoff and Pedro because they believed the content was useful to an NWS audience but not necessarily to the larger ASCE audience; however, we discussed revised content and still plan to put together a presentation for ASCE. Written information from the paper will contribute to Task 6.
- Fekadu, Seann, and Cecile prepared a draft Quick Reference document for SMPDK runs to provide NCRFC short-term assistance in preparation for potential dam break scenarios this Spring. Fekadu provided informal training on this topic via GoToMeeting to NCRFC hydrologists (Andrea, Laura and Bill). This information will be used for Task 6.
- Seann investigated a concern Steve Predmore (MBRFC) raised about DamCrest during the HIC meeting. He identified the cause of the problem and met with Steve to explain and discuss solutions. Steve provided useful input that we can include in our "Best Practices" material we are preparing.
- We also gathered more information from David Welch on DamCrest and how DamCrest data can be updated (Task 5). Next quarter we will gather additional feedback on DamCrest from Service Hydrologists in Eastern Region and document our findings.
- Fekadu helped Ed Capone (NERFC) modify the Gilboa Dam HEC-RAS model to include a spillway.
- Fekadu and Seann worked on writing the Guidance Document for Task 6.
- Cecile has worked on Task 7 -- Develop and document tool to quickly derive cross-sections for SMPDBK and HEC-RAS applications. Seann reviewed software alternatives and concluded that our ArcGIS-based approach makes sense..
- We acquired disk storage space necessary to complete this project but it is still being configured by NWS IT staff.

3rd Quarter FY10

- Completed analysis of FLDWAV, HEC-RAS, and SMPDBK simulations for three dams.
- Prepared a presentation for an ASCE-EWRI conference: "Towards Improved Guidance and Tools For NWS Dam Break Forecasting". Delivered an expanded presentation at an NWS Webinar.
- A document "Rapid Preparation of a SMPDBK Model Using HEC-GeoRAS to Cut Cross Sections" is 95% complete. The procedures include a new Spreadsheet program to make it easy to create a SMPDBK input deck. A very limited and early version of these procedures was provided to NCRFC in February.
- Collected questions on DamCrest (primarily from WFOs) and began compiling answers.
- 80% of final project document is complete.

4th Quarter FY10

- Collected data from the literature on historical failures to review and potentially improve Rules of Thumb.
- Identified a revised set of tasks required to complete the project. Critical among these are experiments to determine if very approximate default DamCrest assumptions have any value.
- Determined that "Rapid Preparation of a SMPDBK Model Using HEC-GeoRAS to Cut Cross Sections" is too complicated in the form from Q3 work. Began creating new scripts to simplify further.
- Cecile will return for 1 month in October. New time estimates for project completion are provided in the table above.

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

- Task 5 is delayed and will be completed at the same time as Task 6.
- Some schedule delays are due to extended sick leave for a team member.
- It has taken more time than anticipated to acquire the necessary disk storage to complete Tasks 7 and 8.

3rd Quarter FY10

- Both contractors working on this project have left OHD causing delays as indicated in the Table.

4th Quarter FY10

- Both contractors working on this project have left OHD causing delays indicated above. We anticipate getting time from Cecile and a new RTi employee (James Halgren) to complete this project during FY11 Q1 and Q2.

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, to coordinate and facilitate the sharing of customized files to prevent duplication of effort among WFOs, and to establish a repository for base and derived datasets and other information relevant to Gridded Flash Flood Guidance.

Milestones

Task	Due Date	Status
23. FFMPA Dataset Tier II/ III Customization Webinars	Jan 2010	Completed
24. Coordination of dataset sharing via the Basin Customization Repository	Ongoing	Ongoing
25. Provide technical assistance and additional training as needed for dataset customization	Ongoing	Ongoing
4. Develop a repository for base and derived datasets and other information relevant to Gridded Flash Flood Guidance (GFFG)	Sept. 30, 2010	Completed (The GFFG repository is now online and populated with data. Additional data will be added to the site as it is received from and based on ongoing discussions with the RFCs.)

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.

2nd Quarter FY10

- The fourth webinar was given during this quarter, and the Basin Customization Repository was updated with relevant training materials and data for the topics covered.
- Technical assistance on basin customization was provided to several FFMPA dataset users.
- Based on discussions with several RFCs, a prototype repository was established for Gridded Flash Flood Guidance base and derived datasets and other files. A plan for organization of the larger datasets in a hydrologically meaningful way that will allow easy download for GFFG and other projects has been developed and is being tested.

3rd Quarter FY10

- We continued to work with the RFCs to finalize the type and format of datasets to be included in the GFFG repository. Progress was made on gathering and formatting the gridded datasets including the National Elevation Dataset, Land Use/Land Cover dataset, and STATSGO soils data. These gridded datasets are being organized into hydrologic units roughly corresponding to the 4-digit USGS cataloging units. This will allow easy access for many hydrologic projects.
- We also continued to provide technical assistance to FFMPA dataset users.

4th Quarter FY10

- During this quarter, the Hydrologic and GFFG Data Repository was brought online. The following datasets and files are available for download from the repository:
 - National Elevation Dataset organized into hydrologic download units
 - National Land Cover Dataset organized into hydrologic download units
 - GFFG derived grids submitted by LMRFC (Curve Number, Threshold Runoff, Peak Flow, Critical Flow)--additional GFFG derived grids will be added as they are submitted by RFCs
 - GFFG scripts and documentation
- Several programs and GIS scripts were developed to extract soil parameters from the very complex high-resolution Soil Survey Geographic Database (SSURGO). The result of this work is a national Hydrologic Soil Group layer (the Hydrologic Soil Group is used in the derivation of GFFG). This layer was originally made available on the repository, but was taken offline after the most recent conference call with the RFCs when a request was made that this parameter be

expressed in a slightly different way. This update is in progress.

- ArcGIS delineation instructions were written and contributed to the GFFG ThreshR procedure being developed at the ABRFC.
- Several FFMP basin/stream datasets were assembled and delivered for testing the version of FFMPA ported to AWIPS II.
- 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

2nd Quarter FY10

- none

3rd Quarter FY10

- none

4th 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 (will continue into FY11)
Assist with HEC-RAS configuration in CHPS as needed and HEC-RAS troubleshooting during parallel operations.	Q4	Ongoing (will continue into FY11)
Assist in the transitioning of Red River flood mapping service to CHPS.	Q4	Delayed due to personnel changes
Recommend how to segment HEC-RAS models operationally.	Q4	Delayed due to personnel changes
Lead a NWS HEC-RAS Workshop on advanced topics.	FY11 Q1	LMRFC is now the lead with OHD assistance (scheduled for FY11 Q2)

Accomplishments/Actions

1st Quarter FY10

- Seann converted the NCRFC M19 model to HEC-RAS with assistance from Angelica 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 and Fekadu visited NCRFC during January to provide hands-on training and discuss what needs to be done to transition their DWOPER and FLDWAV models to HEC-RAS.
- Seann presented the status of HEC-RAS transition to the CAT.
- Seann assisted Deltares in troubleshooting a HEC-RAS adapter problem identified by NERFC and responded to a HEC-RAS Adapter question from NWRFC.
- Fekadu attended the CHPS migration training, and began bi-weekly training sessions for the Hydraulics Group.
- Seann completed Gate 2 documents for the “Transition to HEC-RAS: Model Development and Implementation” and the Gate 2 meeting has been scheduled.
- Fekadu and Seann held several GoToMeetings to assist NCRFC in converting their MISILO (Mississippi-Illinois) DWOPER model to HEC-RAS.
- Fekadu visited SERFC and discussed their needs with respect to HEC-RAS model development

and implementation.

3rd Quarter FY10

- OHD has finished work on the NWRFC M1022DW Mississippi model and made substantial progress on the ABVSTPFW and M10FW models. Fekadu was the lead on the ABVSTPFW and M10FW models and is now gone, so there will be a delay in completing that task.
- Seann and Fekadu helped with a few 'chps_ops' questions.
- Seann prepared a presentation discussion HEC-RAS Transition issues for the ASCE-EWRI conference and then presented similar information to an NWS audience during a June 28 Webinar.
- Fekadu visited SERFC to help assess their needs with respect to HEC-RAS model development.

4th Quarter FY10

- Seann created a new model for LMRFC's "Upper Mississippi" domain which incorporates data from the OHRFC community model and provided the model to LMRFC.
- Tested HEC-RAS 4.1 CHPS Adapter on Linux. Learned enough CHPS to answer several RFC support questions. Revised Deltares document: "How to Add HEC-RAS Models to CHPS".
- A new RTi contractor, Alfonso Mejia, began work on this project. He will complete the conversion of the ABVSTPFW and M10FW models during FY11 Q1.
- Planned and advanced HEC-RAS training class with LMRFC.

Problems Encountered/Issues

1st Quarter FY10

- None

2nd Quarter FY10

- None

3rd Quarter FY10

- Both contractors working on this project have left OHD. We have initiated the process of finding replacements. The resulting delays for certain tasks are reflected in Table 1.

4th Quarter FY10

- Both contractors working on this project left OHD in June. A new RTi contractor, Alfonso Mejia, began work on Sept. 20, 2010.

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
26. Develop plans (identify models to use, connect with collaborators, identify resources)	FY09 Q2	Complete
27. Acquire software and initial models from collaborators (HEC-RAS and ADCIRC)	FY09 Q2	Complete
28. Build and test HEC-RAS (Potomac) and ADCIRC (Chesapeake) models	FY09 Q4	Complete
29. Calibrate HEC-RAS	FY10 Q2	Complete
30. Calibrate ADCIRC (task revised to focus on comparisons with CIPS ELCIRC and CBOFS2)	FY10 Q3	N/A
31. Compare HEC-RAS and ADCIRC scenarios (now CIPS ELCIRC and CBOFS instead of ADCIRC)	FY10 Q4	Complete
32. Publish results – journal article	FY11 Q2	On track
33. Coordinate with NOAA Storm Surge Team	Ongoing	Ongoing

*See below for information after FY10 Q2

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

- Mashriqui and Cecile calibrated the Potomac HEC-RAS (Task 4)
- Seann and Mashriqui prepared 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. The final decision on this proposal is not in but it does not look promising.
- Mashriqui presented the Gate 2 presentation for "Modeling River-Estuary-Ocean Interactions". Geoff and Pedro wanted some follow up discussion on how to document the broader effort in addition to the specifics of the one-year Project Plan provided. Seann and Mashriqui met with Pedro to discuss this. Additional discussion is needed.
- Seann and Mashriqui attended several presentations at the DHS Science and Technology for Intelligent Resilience workshop in D.C. Specifically, "Hazards Resilience: A New Approach for Forecasting the Coastal Impacts of Hurricanes". There were 3 presentations from Jackson State University in Mississippi and one from NASA.
- Mashriqui attended the NOAA-CMOP exchange meeting. CMOP is the Center for Coastal

Margin Observation and Prediction, an NSF Science and Technology Center in the Pacific Northwest. This meeting was organized by Don Laurine.

- Mashriqui met with NOS/CSDL ADCIRC modeler Jiantao Xu and made progress on ADCIRC model runs on the NCEP computer. Specifically, they discussed ADCIRC capabilities to incorporate freshwater inflows (Task 5).
- Mashriqui and Seann worked with Ken Pavelle on CERIS and NOAA Storm Surge Team planning activities.

3rd Quarter FY10

- This project received no AHPS funding after FY10 Quarter 2. Work continues with FTE resources. For further updates, please see the HOSIP Projects web page: https://bestpractices.nws.noaa.gov/contents/hosip/Pages/HOSIP_Projects/index.php, Project ID is **P-2008-009**.

4th Quarter FY10

- Mashriqui delivered a seminar on August 25 discussing hydraulic modeling of the Potomac River with particular emphasis on the relative importance of tides and freshwater inflows in the transition zone and comparisons among HEC-RAS, CIPS - ELCIRC, and CBOFS2 models.
- Mashriqui drafted two documents outlining how we have met two AOP items related to this project: "Identify downstream river stage boundary conditions to use for initial, real-time testing of new hydraulic modeling techniques for the Potomac River." and "Document the comparison of hydraulic and ocean model simulations for the southern extent of the Potomac River."
- Seann Reed and Mashriqui participated in several CERIS planning meetings with Ken Pavelle, NOS/CSDL, and NSSL. In coordination with Mashriqui, Seann drafted three new mini-Project Plans for FY11 CERIS.

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.
- There will no longer be AHPS/WR funds supporting this work after FY10 Q2. All subsequent work will be funded through other resources.

3rd Quarter FY10

- See above

4th Quarter FY10

- No AHPS/WR funding.

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
34. Collect data	FY09 Q2	Ongoing
35. Build models (HEC-RAS and Sobek)	FY09 Q3	Complete
36. Calibrate models during low wind period	FY10 Q2	Complete
37. Compare models and document recommendations	FY10 Q2	Delayed, see Problems Encountered
38. Provide requirements to HEC	FY10 Q3	On hold until funding to work with HEC is identified
39. Publish Results documentation: presentation and paper	FY10 Q3	Journal article will be submitted FY11 Q2

*See below for information after FY10 Q2

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

- Mashriqui and Cecile calibrated the Potomac HEC-RAS model (serves both this project and REO project). Sobek model still needs calibration for high wind period.
- Mashriqui updated some cross sections in the HEC-RAS model based on MARFC's feedback and worked with Deltares to convert this new HEC-RAS model to SOBEK for wind modeling experiments. Roughness factors must be checked in Sobek for each section.

3rd Quarter FY10

- This project received no AHPS funding after FY10 Quarter 2. Work continues with FTE resources. For further updates, please see the HOSIP Projects web page: https://bestpractices.nws.noaa.gov/contents/hosip/Pages/HOSIP_Projects/index.php, Project ID is **P-2008-007**.

4th Quarter FY10

- Plans made to revisit SOBEK work and analysis of 1D winds in FY11 Q1.

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

- Some delays due to higher priority and unexpected tasks related to the REO project. It makes more sense to allow deadline delays in this Wind project because we don't have funding for the next step in FY10. The next step is to contract with HEC to add wind capabilities to HEC-RAS.
- Converting HEC-RAS models to Sobek is not as easy as expected.
- No FY10 AHPS/WR funds are supporting this project.

3rd Quarter FY10

- See above

4th Quarter FY10

- No AHPS/WR funds are supporting this project.

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 (will be complete in FY11 Q1)
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 finalize her thesis by Dec. 3, 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.

2nd Quarter FY10

- None this quarter.

3^r Quarter FY10

- None this quarter. Project no longer receiving AHPS funding. This report will not be updated until funding is obtained.

4th Quarter FY10

- No funded work.
- Unfunded work continued by Keren Cepero, Master's student at NCSU. Keren will defend her Master's Thesis on Oct. 28th. The title is: "Inundation Mapping Employing One Dimensional Hydraulic Modeling and Geographic Information System: Study Cases on Neuse River and Tar River". Seann is an external member of her thesis committee.
- Seann continued to participate in inundation mapping related meetings on the following topics: Static Inundation Mapping Theme Team activities, USGS PeachTree City implementation, LMRFC-Mississippi State Flood Visualization tools, LMRFC simplified mapping techniques.

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

-

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.

2nd Quarter FY10

- No AHPS funding for documentation portion of this project.

3rd Quarter FY10

- No AHPS funding for documentation portion of this project.

4th Quarter FY10

- No AHPS funding.

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	Delivered capability to specify channel losses in HL-RDHM routing algorithm to CBRFC
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	Complete
6. Investigate linkage of sub-surface flows in gridded Sac model	FY09 Q4	Complete
7. Modify SAC-HT for better evapotranspiration treatment	FY10 Q4	Complete

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 hill slope 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 grid 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 Khakbaz 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 Khakbaz at U. California Irvine is summarizing research results on the subsurface water exchange in her PhD Thesis.

2nd Quarter FY10

- Extended tests of modified SAC-HT with the vegetation effects over few Oklahoma Mesonet river basins. Improved formulation of root distribution.

3rd Quarter FY10

- Victor completed major testing, began writing final report for HOSIP gate meeting on the modification of the SAC-HT for enhanced evapotranspiration
- Behnaz Khakbaz submitted paper on her results to Water Resources Research

4th Quarter FY10

- Victor completed final project report for the modification of the SAC-HT for enhanced treatment of evapotranspiration
- Victor conducted Gate 3 project review and OHD seminars in September
- Victor's project report selected by OHD as a model report for future HOSIP projects
- Hydrology Group completed analysis of NASA-derived gridded PE time series and submitted report to OHD.

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/hsmb5 file system was damaged and needed to be fixed.

2nd Quarter FY10

- None

3rd Quarter FY10

- Victor determined that he needs extensive medical leave and will take sick leave for the majority of September, 2010.

4th Quarter FY10

- NASA Marshall could not deliver in time the final version of the PE grids using the correct B3 parameters.

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 Q4	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 RFC's

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 QC'ed 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.

2nd Quarter FY10

- Mike and Hydrogroup completed the data QC for the DMIP 2 Western Basins. Analyses show that the correct time distribution of daily station precipitation totals is very important when deriving gridded historical hourly QPE fields. Such non-distributed daily values cause anomalous hydrograph rises which calibration can't correct. NCDC station data erroneously flagged as missing (-999) when the values are missing accumulations (-998) should also be corrected.
- Naoki revised his paper on identifying and diagnosing non-stationarities in gridded precipitation forcings. This paper is the result of analyzing the flawed initial QPE data for DMIP 2.

3rd Quarter FY10

- Mike analyzed the HL-RDHM simulations in DMIP 2 that used biased QPE data from 1993-1996 in ABRFC. Results indicate that the HL-RDHM model calibrated using this data with known biases generates biased simulations compared to the model calibrated with the 1996-2002 ABRFC QPE data. This was one of the DMIP 2 Oklahoma basin experiments.
- Naoki completed all reviews of his western basin QPE paper and submitted to OHD for review. Favorable comments were received from Pedro. This paper deals with the impact of biased and non-stationary data in mountainous areas.

4th Quarter FY10

- Naoki completed all reviews of his western basin QPE paper and submitted to the Journal of Hydrometeorology.
- DMIP 2 Oklahoma results paper submitted to OHD management for review. The paper contains the results of the experiment to calibrated distributed models with inconsistent data.

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.

2nd Quarter FY10

- None

3rd Quarter FY10

- None

4th Quarter FY10

- None

Modified SAC-HT for NCRFC

Core Goal: Improve the forecasts by improving hydrologic models

Management Lead: Mike Smith

Objective: The objective of this project is to provide NCRFC with tools to predict the impact of ponded meltwater on the infiltration/runoff processes in the Red River of the North for the Spring 2010 season.

Milestones

Task	Due Date	Status
5.	FY08 Q3	On track
6. Calibrate basin with uncorrected/corrected data	FY08 Q3	On track
7. Analyze calibration results	FY08 Q4	On track
8. Deliver code and instructions to NCRFC	FY10 Q3	Completed

Accomplishments/Actions

1st Quarter FY10

- On October 7, Victor conducted an OHD and RFC seminar on his analysis of the Spring 2009 Red River floods showing the impact of ponded water on the infiltration process.
- Victor Koren developed, tested, and delivered (on Dec 30) a stand-alone version of the SAC-HT that allowed user-defined depths of ponded water over a specific geographic area.

2nd Quarter FY10

- Hydrology group worked with NCRFC staff to develop requirements for a modification of HL-RDHM to help in the spring 2010 melt season.

3rd Quarter FY10

- Victor and Zhengtao developed a version of HL-RDHM that uses the modified SAC-HT for ponded water. On April 1, Zhengtao put this version on the AWIPS LAD for access by the RFCs. NCRFC began using the version.

4th Quarter FY10

- Fortunately, there were no unusual melt and flooding events this spring.

Problems Encountered/Issues

1st Quarter FY10

2nd Quarter FY10

- None

3rd Quarter FY10

- Problems getting initial states for the modified SAC-HT in HL-RDHM for the spring season. There was a mix of model versions, input files, and parameters over the 2-year run period up to the current date. The problems were resolved.

4th Quarter FY10

- None

Software Refresh

Community Hydrologic Prediction System (CHPS)

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

Management Lead: Jon Roe

Project Manager: Chris Dietz

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 (Deltas)		
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	Completed
1.4 Deliver BOC-II to CAT-II RFCs	Q2	Completed
1.5 Conduct System Manager Training for CAT-II RFCs	Q3	Completed
1.6 Conduct Advanced FEWS Configuration Training for CAT RFCs	Q3	Completed
1.7 Lead quarterly CHPS workshops	Q1, Q2, Q3, Q4	Q1: Completed Q2: Completed Q3: Completed Q4: Canceled
1.8 Conduct Software Acceptance Testing at OHD for all routine releases of CHPS	Q1, Q2, Q3, Q4	Q1: Completed Q2: Completed Q3: Completed Q4: Ongoing (see Activities below)
1.9 Provide support to CAT RFCs for delivered software releases, Migration, and other CHPS issues	Q1-Q4	Q1: Completed Q2: Completed Q3: Completed Q4: Completed
1.10 Deliver all system documentation to CAT RFCs	Q3, Q4	Q4: Completed
2 FEWS for CHPS Implementation supplement (Deltas)		
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	Completed

2.3 Deliver additional functionality for the IFD as part of CHPS BOC	Q2	Completed
2.4 Deliver additional FEWS software to support the FFG/FFH emulation work by OHD	Q3 (formerly Q2)	Completed
2.5 Deliver system and configuration training to OHD (software developers, scientists) and OCWWS HSD	Q2-Q3	Q2: Completed Q3: Completed
2.6 Deliver support to CAT-II RFCs to during their Migration activities	Q2 – Q4	Q2: Completed Q3: Completed Q4: Completed
2.7 Deliver a 4 th CAT workshop in FY10	Q4	Canceled
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, Q3, extended into Q4 and into FY11	Q2: Started; Q3: ongoing Q4: ongoing
3.2 Provide software maintenance support for Task 3.1	Q3; extended into Q4 and into FY11	Q3: Started; Q4: ongoing
3.3 Deliver all OHD software documentation to CAT RFCs	Q3, Q4; extended into FY11	Q3: Started Q4: Ongoing
3.4 Establish a CHPS software CM environment	Q3	Completed
3.5 Establish a CHPS software distribution mechanism	Q4; extended into FY11	Not started
3.6 Support quarterly SAT meetings at OHD	Q1, Q2, Q3, Q4	Q1: Completed Q2: Completed Q3: Completed Q4: Ongoing (see Activities below)
3.7 Develop a Calibration service for CHPS	FY11 (formerly Q3)	On Hold (See Q2 Issues)
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	Completed
4.2 Provide software maintenance support for nc2grib	Q1 – Q4	Q1: Completed Q2: Not required Q3: Completed Q4: Completed
4.3 Develop improved MAT algorithm	Q3	Canceled

4.4 Implement operational software based on an improved MAT algorithm	Q4	Canceled
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	Completed
5.6 Travel to CAT-II RFCs to install CHPS software January-February 2010	Q2	Completed
5.7 Attend Migration & Configuration Training at the NWSTC in February 2010	Q2	Completed
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	Completed
5.9 Attend Software Acceptance Testing (SAT) in Silver Spring in March 2010	Q2	Completed
5.10 Attend CAT-II workshop [at central location TBD] in March/April 2010	Q2	Canceled (See Q2 Issues)
5.11 Attend System Manager's Training in April 2010 [central location TBD]	Q3	Completed
5.12 Attend Advanced FEWS Configuration Training in June 2010	Q3	Completed
5.13 Attend CAT-II workshop [at central location TBD] in June 2010	Q3	Completed
5.14 Attend Software Acceptance Testing (SAT) in Silver Spring in June 2010	Q3	Canceled (see Activities below)
5.15 Attend Software Acceptance Testing (SAT) in Silver Spring in September 2010	Q4	Canceled
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	Delayed to Q4 or FY11 (see Activities below)
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 Q2 : Delayed (See

		Q2 Issues) Q3: Completed Q4: Completed
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.	Q1-Q4	Q1 : Not Applicable Q2 : Delayed (See Q2 Issues) Q3: Not Applicable Q4: Complete
9 RFC Archive prototype		
9.1 Deliver additional hardware to support RFC archive prototyping activities	Q4	Completed in Q3 (early)

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.
- o 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.
- o On October 19 HSEB submitted a "High Level Analysis and Design" document to the XEFS Implementation Team for review.
- o 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

- o 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.
- o 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.
- o 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 Glaudemans)
- 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.

2nd Quarter FY10

- Deltares led a CHPS workshop for the CAT during the week of January 5. The CAT traveled to Silver Spring for the workshop. Numerous OHD and OCWWS HSD people attended.
- OCWWS HSD traveled to CAT-II RFCs to install FEWS infrastructure software during January-February 2010, prior to the Migration & Configuration Training (see next bullet).
- In February Deltares conducted Migration & Configuration Training for CAT-II RFCs at the NWSTC in Kansas City, MO. CAT representatives, OHD, OCWWS HSD, and others also attended the training. Immediately following Migration training, Deltares conducted on-site visits for all CAT-II RFCs. The CAT "buddies" participated in these visits. Deltares installed the first release of CHPS at the CAT-II RFCs during these support visits.
- Deltares conducted a routine quarterly Software Acceptance Testing (SAT) at OHD in March. Wyle (OHD) contractor staff provided necessary support. CAT representatives traveled to Silver Spring to participate.
- Deltares continued to provide support to the CAT RFCs for delivered software releases, Migration scripts, and other CHPS issues.
- As part of the December and March releases, Deltares delivered additional functionality for the IFD for CHPS BOC.
- System and configuration training for OHD (software developers, scientists) and OCWWS HSD has begun and will be ongoing throughout the rest of the year. In January Deltares began holding weekly coaching sessions for small groups of developers using real RFC problems as exercise examples.
- OHD developed and delivered software for CHPS BOC/BOC-II. There is still more work to do, so this task will extend into Q3 and possibly Q4.
- An updated version of MPE/DQC was sent to the RFCs in March.
- No software changes were required for nc2grib during Q2.

3rd Quarter FY10

- 1.5 & 5.11 Deltares provided System Manager Training for all 9 CAT-II RFCs in May (Q3 – on schedule). Training was held at CNRFC in Sacramento, CA.
- 1.6 & 5.12 Deltares provided Advanced FEWS Configuration Training for the CAT RFCs in June

- (Q3 – on schedule). Training was held at NWRFC in Portland, OR
- 1.7 & 5.13 Deltares led a CHPS workshop for the CAT in May (Q3 – on schedule). It was held at CNRFC in Sacramento, CA. In June Deltares also led a CAT & CAT-II (i.e. national RFC) workshop in Boulder, CO.
- 1.8, 3.6, & 5.14 Deltares conducted Software Acceptance Testing (SAT) in Silver Spring in June (Q3 – on schedule). OHD provided support and additionally used it as an opportunity to train developers in CHPS. However the CAT RFCs decided not to attend the June SAT as they felt there was no further need now that the IFD is largely complete. Deltares introduced a different SAT process for the June release, and will revisit this process for the September (Q4) release. On-site (Beta) testing currently has precedence over lab testing. Deltares and OHD developers will continue to conduct an internal SAT prior to releasing the software to the RFCs.
- 1.9 Deltares provided support to the CAT RFCs for delivered software releases, Migration, and other CHPS issues. They are currently in the process of transitioning support to the NWS (OCWWS HSD) in preparation for the end of the CHPS implementation contract (next year).
- 1.10 Deltares has delivered almost all system documentation to the CAT RFCs, but some documents are still in development (e.g. functional descriptions of transformations) and some documents require minor updates. This isn't considered a major issue by the CAT, which considers most documentation to be adequate.
- 2.4 Deltares delivered the necessary FEWS software to support the FFG/FFH functionality in CHPS. This permitted OHD to complete its part of the software in time for BOC delivery.
- 2.5 Deltares provided one Migration & Configuration Training class at their Silver Spring offices for NWS partners in May. OHD HSEB and HSMB sent a few people to this class. OHD HSEB and HSMB also sent several people to the Advanced FEWS Configuration Training class (1.6 above) in June. In addition Deltares continued to lead weekly training sessions for HSEB, HSMB, and OCWWS HSD during this quarter.
- 2.6 Deltares provided support to the CAT-II RFCs during their Migration activities
- 3.1 OHD in-house contractors continued working on BOC and BOC-II software. Fixing bugs in BOC software (task 3.2 – software maintenance) has been the highest priority and is ongoing.
- 3.3 OHD began uploading documentation for its software (models, adapters, utilities) to the Deltares CHPS wiki site. It is a fairly extensive task involving conversion of some legacy NWSRFS documents, and is taking longer than expected. This presents a very low priority risk. We expect the task to be complete by the end of FY10 (Q4).
- 3.4 OHD completed creation of a software CM environment for CHPS. The environment is within the CasaNOSA system, which makes use of Subversion.
- 4.2 OHD provided support to WGRFC to facilitate their use of GFE with nc2grib – this optimizes the RFC's operational processing time.
- 4.3 & 4.4 These tasks were re-targeted early in FY10 to focus on collecting and documenting results from CAT RFC analyses on their legacy (point based) versus gridded forcings (precip and temp). In July HSMB plans to conduct a seminar to summarize the results and to consider methods for developing a long-term precip calibration data set.
- 6.2 The final 3 servers for the CAT-II RFCs and OCWWS HSD were placed on order. However procurement is backed up and we don't expect to see the hardware arrive until Q4. As an aside, the NWSTC decided they also needed CHPS migration hardware so OHD added an extra 6 servers to the procurement at NWSTC's cost.
- 7.1 The Support & Maintenance contract task was activated on May 1. 124 hours were billed to the contract in Q3.
- 8.1 The contract was activated on June 1. We are waiting for HEC/RMA to provide final versions of HEC-RAS and ResSim software, and also for RMA and Deltares to exchange final versions of the two HEC-FEWS adapters. Once these tasks are completed, any necessary work can be billed against the contract. No hours have been billed as of Q3.
- 9.1 NOHRSC procured and received shipment of hardware to be used as a prototype for an RFC archive solution (Q3 – ahead of schedule).
- ISSUE: the CAT raised their issue regarding operational support for CHPS to "show stopper" status. See Issues below.

4th Quarter FY10

- 1.7 OHD, Deltares, and the CAT determined that there was too much on everyone's plate for a workshop in Q4; it was deferred until Q1 FY11 (October).

- 1.8, 3.6, & 5.15 Deltares finished testing of the “September” release in Silver Spring on September 8 (Q4 – on schedule). However given the importance of this release (CHPS-1.0, or “BOC Release”) the NWS test process was changed this time as follows:
 - Once again the CAT did not attend Software Acceptance Testing (SAT) in Silver Spring; Beta testing at CAT RFCs began on Sept 9 before the OHD SAT, and continued through Oct 15 (Q1 FY11);
 - Deltares conducted daily conference calls with the RFCs to swiftly address problems; OHD SAT was conducted on a much more stable version of the release, beginning on Oct 4 and ending on Oct 12.
- In summary, numerous errors were found and fixed, resulting in the issuance of several FEWS and OHD patches. The CAT-II RFCs will thus receive a much more stable and capable release in Q1 FY11. RFCs and Deltares developers both derived benefit from the direct contact. OHD and Deltares are considering using this improved process for future releases.
- 1.9 Deltares provided support to the CAT RFCs for delivered software releases, Migration, and other CHPS issues. They continued to transition support to the NWS (OCWWS HSD) in preparation for the end of the CHPS implementation contract (next year).
- 1.10 Deltares delivered two key documents: the “Transformations” documentation (as Wiki pages linked to the FEWSDOC Wiki page), and the “Interactive Forecaster’s Display Manual” (as PDF, posted on the FEWSDOC Wiki page). The CAT RFCs were given one month to review the Transformations document; one comment was provided.
- 2.6 Deltares continued to provide support to the CAT-II RFCs during their Migration activities.
- 2.7 See 1.7 – the Q4 CAT workshop was deferred until FY11.
- 3.1 OHD HSEB ported existing FFG/FFH and PRODGEN algorithms to CHPS; although originally declared unnecessary for BOC, NERFC concluded that no other solution would meet their operational requirements. OHD HSEB also implemented some software enhancements to support the multi-threaded execution option in FEWS. OHD HSEB also worked on the SSHP functionality for BOC-II.
- 3.2 OHD HSEB continued to address bugs in BOC software distributed to the RFCs, with a particular focus on the September Beta release at the CAT RFCs.
- 3.3 OHD continued uploading documentation for its software (models, adapters, utilities) to the Deltares CHPS wiki site. Due to other higher priority tasks, this has now been extended into FY11.
- 3.5 Lack of resources/other higher priority tasks have pushed the creation of a new software distribution mechanism into FY11. OHD hopes to outsource this task.
- 4.2 Some minor changes were made to nc2grib tool. No further changes are expected.
- 7.1 A total of 310 hours were billed to the Support & Maintenance contract task in Q4 (July, August only – September invoice not yet received.) The high number of hours reflects some other work on the task which were not directly associated with operational support.
- 8.1 During Q4 RMA helped Deltares conduct testing of the ResSim for CHPS and made some corrections to the HEC-ResSim FEWS/CHPS adapter. RMA billed 28 hours.
- Other: In response to the CAT’s concern, OCWWS HSD and OHD HSEB have made operational support their top priority. HSD has moved one person from WFO support over to RFC support. HSD and HSEB personnel are undergoing weekly training from Deltares in Silver Spring. Procedures have been developed for RFCs, Deltares, HSD, and HSEB to follow when support issues arise. HSD has purchased and is configuring a tool called FogBugz. Responsiveness and timeliness have improved during this quarter.

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

2nd Quarter FY10

- Additional FEWS software to support OHD's FFG/FFH emulation work was not included in the March release as expected. We anticipate Deltares will include the changes in a June (Q3) release.
- During a meeting in March the CAT agreed to suspend work on the CHPS-based calibration until Deltares has developed enough of an Application Programming Interface (API) that will permit OHD to develop user interfaces on top of FEWS without impacting FEWS itself. Deltares took an action to form a small API team, create a plan, and do some development. FEWS already addresses the vast majority of the calibration requirements; OHD is in the process of learning FEWS and identifying the relevant capabilities before identifying remaining requirements.
- The CAT concluded this quarter that a full CAT-II workshop in March 2010 was too early, and

- o opted to wait until June instead.
- o The CHPS Support and Maintenance task was delayed by approximately 4 months. As of the end of Q2 a new task through the RTi contract is being processed by OHD and NOAA procurement.
- o The Support and Maintenance for HEC software (RMA) task was delayed by approximately 4 months. As of the end of Q2 a new task through the RTi contract is being processed by OHD and NOAA procurement.

3rd Quarter FY10

- o CHPS operational support (amount of staff and level of expertise) has been identified as a “show stopper” for the CAT RFCs and NWSEO in going operational with CHPS. The CAT’s September 2009 request to the Director of OCWWS and Chief of HSD for 6 more FTEs went unheeded. The CAT has now said that no RFC can go operational with CHPS until the support issues are resolved. In response to this, OCWWS HSD added one full-time person to the team (3 people are now dedicated to CHPS), and HSEB dedicated 12 CHPS software developers to assist OCWWS HSD with support when needed. There is an approximately 6-month learning curve; so in Q2 HSEB began an accelerated training effort. As of Q3 training is proceeding well and HSEB developers are now becoming effective. OCWWS HSD is also in the process of coming up to speed. NWRFC plans to go operational on July 14 (this has since slipped to 7/21); ABRFC expects to go operational in August; CNRFC is considering going operational in October; and NERFC won’t go operational until after the September release has stabilized. The potential impact of applying all HSEB CHPS software developers to operational support is that all non-BOC software development tasks could be delayed; this will depend upon the level of operational support required.

4th Quarter FY10

- o Of concern to OHD is the need to declare BOC complete, get the CAT RFCs to operational readiness, and to focus on finishing up BOC-II for the remaining CAT-II RFCs. This topic will be addressed at the upcoming CAT workshop in October. The project end date was originally scheduled for April 2011; however some CAT-II RFCs elected to receive user (Forecaster) training in March 2011 instead of October/November 2010; those RFCs will need a 3-6 month period of parallel execution to become familiar with the system and to transition all operational procedures to the new environment, thus pushing the project end date out to September 2011.

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	Delayed to Q3 FY10 (April 19)
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

2nd Quarter FY10

- Phase VI web page implementation activities began in earnest this quarter.
- All Phase VI processes were installed and running on the CR and HQ webfarms
- Orion developed and provided training to the TOC and WHFS Support groups.
- Began parallel testing with field and regions looking at test site and providing feedback through support structure.
- Successfully tested the re-hosting AHPS web pages on Consolidated Internet Farm's (CIF) outside vendor's farm
- Successfully tested the failover from CR to HQ and from HQ to CR webfarms serving all AHPS content
- Made numerous modifications to address performance.
- Provided numerous briefings and email status reports.
- Deployment date scheduled for April 19.

3rd Quarter FY10

- Implemented AHPS Phase VI at two NWS Consolidated Internet Farm(s) in April
- Implemented webpage redirects at regional web-farms to transition users to the new water.weather.gov domain
- Implemented national AHPS monitoring webpage and RSS feeds for NWS TOC support activities
- Update AHPS observation and forecast RSS feeds to include GeoRSS (geographically tagged), which supports plotting of AHPS locations in third party mapping applications

4th Quarter FY10

- Implemented nine AHPS flood inundation locations
- Three additional beta AHPS flood inundation locations were worked on during this period
- Decommissioned pre-phase VI regional AHPS backend systems
- Worked with OCWS HSD and Regions on AHPS Phase VI requirements and priority rankings

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

2nd Quarter FY10

- Reworked the national map and rss processes to address performance issues
- Moved all AHPS processes off the central filer to local processors to address filer issues.
- Rehosted the hydrogen data databases from the CIF cluster database to the AHPS CMS servers in CR and HQ to address issues with the stability of the CIF cluster database. Procurement of new server for SR in the works.
- Changed the HQ data feed from and LDM feed from SR to a direct gateway feed to address problems with dropped products

3rd Quarter FY10

- Resolved post AHPS Phase VI deployment issues at CIFs with NRLDB updates, hydrograph scaling, and ERH Intranet photo upload process

4th Quarter FY10

- Addressed AHPS support tickets submitted via NWS TOC. CIF operations performed as expected during this period with no major outages.

Western Water Supply Forecast Service Improvement

Core Goal: Dissemination

Management Lead: Kevin Werner, Jeff Zimmerman, Don Laurine

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

FY10 Milestones

Task	Due Date	Status
1a. Roll Out "Version 4"	Q2	Complete
1b. Maintain "Version 4"	Q4	Ongoing
2a. Develop social science methodologies to apply to WS/WRO services	Q3	In Progress
2b. Test social science methods in CO and UT with user groups	Q4	CO user group done UT user group postponed
3. Hardware upgrades for NWRFC web farm	Q4	Complete
4. OSIP gate 2 passage	Q3	Delayed – Expected FY11Q2

Accomplishments/Actions

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

2nd Quarter FY10

- Task 1: Website development:
 - Version 4 released (Jan 2010)
 - Enhancement and bug tracking software (stormtrac) collecting new requirements and tracking work
- Task 2: User engagement:
 - Draft toolkit for user engagement developed in collaboration with NOAA RISAs (WWA and CLIMAS) includes decision gaming, usability surveys, and general discussion to identify decision making processes involving forecasts
 - Draft toolkit field tested at CBRFC (March 2010)
 - First application of toolkit planned for Grand Junction, CO (April 2010)
- Task 3: Hardware:
 - Specific new hardware for NWRFC webserver dependent on NOAA HPCC proposal funding. TBD
- Task 4: OSIP:
 - WRH/HCS (Zimmerman) leading team to draft OSIP gate 2 materials. Materials nearing completion; expect gate 2 passage in Q3 or early Q4.
 - NWSH/HSD has agreed to lead gate 3 effort once gate 2 is passed
- Discussions on collaborations with NIDIS to integrate capabilities with drought portal and

- develop drought specific products are promising and ongoing.
- Presented project at CPASW meeting in San Diego (March 2010)

3rd Quarter FY10

- Task 1: Website development:
 - Minor bug fixes and modifications made.
- Task 2: User engagement:
 - First user engagement workshop held in Grand Junction, CO (April 2010)
 - CLIMAS/WWA/CBRFC are compiling an initial report. Organizing committee met in Boulder, CO to assess Grand Junction results and plan next workshop (June 2010)
 - Second workshop planned for Salt Lake City, UT (August 2010)
- Task 3: Hardware:
 - Hardware upgrade at NWRFC funded with remainder of AHPS project funds. The new system will have 2 quad processors, 24GB Ram and 1.5 TB of disk space. The design of this system addresses future scalability. Additional drives can be added more easily based on added requirements for storage.
- Task 4: OSIP:
 - WRH/HCSO (Zimmerman) leading team to draft OSIP gate 2 materials. Materials nearing completion; expect gate 2 passage in Q3 or early Q4.
 - NWSH/HSD has agreed to lead gate 3 effort once gate 2 is passed
- NIDIS funded integration work with NIDIS portal (~\$25k) and organizational workshop (~\$15k)
- Organizational workshop planned for August 4-5, 2010. Major goal is to identify drought related products, services, plots, and/or datasets based on RFC forecasts that could be included on webpage. Participants include representatives from all three NIDIS pilot areas, relevant RFCs, and WRH and NWSH.

4th Quarter FY10

- Task 1: Website development:
 - Minor bug fixes and modifications made.
- Task 2: User engagement:
 - CLIMAS developed initial report for August 2010 Grand Junction meeting
 - Utah user engagement workshop postponed pending new WWA hire
- Task 3: Hardware:
 - Hardware upgrade at NWRFC complete
- Task 4: OSIP:
 - WRH/HCSO (Zimmerman) leading team to draft OSIP gate 2 materials. Materials nearing completion; expect gate 2 passage FY11Q2.
 - NWSH/HSD has agreed to lead gate 3 effort once gate 2 is passed
- Contract for integration with drought portal in place using NIDIS funding
- Organizational workshop held in August 2010 with key stakeholders from three NIDIS pilot areas and NWS staff. White paper developed documenting key recommendations from group. White paper also offers a consensus definition for water resources outlook addressing 3rd quarter issue. Will be submitted along with this report. Concise recommendations
 - Water demand forecast tools
 - Sophisticated low flow forecasts
 - Ensemble forecast services
 - Credible, high resolution precipitation analysis
 - Reservoir data
 - Partnership development and maintenance
 - Two way education to support decisions
 - Periodic independent review panels on all parts, as well as particular parts, of RFC efforts and products
- Key achievements to date:
 - Consolidation of NWS water supply forecast program
 - Verification tools for water supply forecasts enabled first systematic verification of forecasts
 - User engagement workshops have provided an iterative development process

- Clearinghouse for reforecasts, archived forecasts, real time forecasts, and observed streamflow datasets
- First step toward an objective national water resources outlook based on RFC ensemble forecasts

Problems Encountered/Issues

1st Quarter FY10

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

2nd Quarter FY10

- ESP forecast inconsistencies between RFCs are a problem (e.g. forecast frequency, forecast duration, forecast type (regulated vs unregulated), etc).
- Web development capacity has been reduced with recent personnel changes; Have contacted Orion to scope out possible contract work via NOAA HPCC and NIDIS.

3rd Quarter FY10

- Web development / maintenance capabilities – Our lead developer, Andrew Murray, has left the NWS for a position in Boulder. Our lack of development and maintenance capabilities going forward will likely present a major obstacle to both new development as well as maintenance of existing capabilities. This lack of NWS capacity is especially acute given the recent evolution of the NIDIS collaboration with this project. Recommend identifying a combination of FTE and contract personnel to support project.
- ESP forecast inconsistencies between RFCs are a problem (e.g. forecast frequency, forecast duration, forecast type (regulated vs unregulated), etc). Preliminary discussions with OCWWS/HSD and informally among RFCs have raised awareness to the problem.
- “Water resources outlook” is not well defined. Some RFCs view this as a flood risk product while others view it as a water availability outlook. This needs to be better defined.

4th Quarter FY10

- Web development / maintenance capabilities – Our lead developer, Andrew Murray, has left the NWS for a position in Boulder. Our lack of development and maintenance capabilities going forward will present a major obstacle to both new development as well as maintenance of existing capabilities. This lack of NWS capacity is especially acute given the recent evolution of the NIDIS collaboration with this project. Recommend identifying a combination of FTE and contract personnel to support project.
- ESP forecast inconsistencies between RFCs are a problem (e.g. forecast frequency, forecast duration, forecast type (regulated vs unregulated), etc). Preliminary discussions with OCWWS/HSD and informally among RFCs have raised awareness to the problem.

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 3rd 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	4	0
Implement 4 new forecast points (non-AHPS)	4	4 th Qtr	4	0
Identify 8 locations for AHPS implementation for FY10		1 st Qtr	Complete	
Implement 8 new AHPS points	8	4 th Qtr	8	0
Total	8		8	0

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.

2nd Quarter FY10

- Completed calibration of 3 new basins, but have not implemented new forecast points.
- Started calibration of the 4th basin.
- Started data collection to recalibrate a small forecast group containing 4 basins. Recalibration planned for FY11.
- Implemented 8 new AHPS points.

3rd Quarter FY10

- Completed calibration of the 4th basin, and have implemented 4 new non-AHPS forecast points.
- Continued data collection to recalibrate a small forecast group containing 4 basins. Recalibration planned for FY11.

4th Quarter FY10

- Continued 4 calibrations to support FY11 implementations.

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.

2nd Quarter FY10 – None

3rd Quarter FY10 – None

4th Quarter FY10 – None

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 ten 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, and the Calumet River Basin in northwest Indiana and far northeast Illinois.

Milestones:

Implementation Area	Forecast Points Planned	Due Date	Actual to Date (4 th Qtr FY10)	Variance
Eastern Wisconsin Streams	1	2 nd Qtr	1	0
Rock River Basin	1	2 nd Qtr	0	-1
Illinois River Basin	1	2 nd Qtr	0	-1
Kankakee, Des Plaines and Fox River Basins	6	3 rd Qtr	6	0
Calumet River Basin	1	3 rd Qtr	1	0
New, unplanned forecast points	0		3	3
Total	10		11	+1

Accomplishments/Actions

1st Quarter FY10

- none

2nd Quarter FY10

- Rowan, IA
- Dardenne, MO
- Holliday, MO

3rd Quarter FY10

- Appleton, WI
- Lincolnshire, IL
- Bolington, IL
- Shorewood, IL
- Coal City, IL
- Milford, IL
- Romeoville, IL
- Dyer, IN

4th Quarter FY10

- none

Problems Encountered/Issues

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

2nd Quarter FY10 - Operational demand was higher than anticipated; delayed points planned in 1st Quarter to 3rd Quarter.

3rd Quarter FY10 – Operational demand was high.

4th Quarter FY10 –Two points not yet implemented will be added to FY11 implementation plan. The delay for the point in the Rock River basin was due to waiting on a new gage from the USGS. The delay for the point in the Illinois/Fox River basin was due to establishment of flood impacts at the new site.

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 (4 th Qtr FY10)	Variance
Marais Des Cygnes River Basin	4	4 th Qtr	4	0
North Platte River Basin	22	2 nd Qtr	22	0
Upper Republican River Basin	10	4 th Qtr	10	0
Milk River Basin	1	4 th Qtr	1	0
New, unplanned forecast points	0		5	5
Total	37		42	5

Accomplishments/Actions

1st Quarter FY10

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

2nd Quarter FY10

- Implemented 22 points in North Platte basin: 11 sites with probabilistic forecasts, 11 sites with observed hydrographs on AHPS page only (probabilistic graphics for these water supply sites will be shipped directly to the USBR).
- Implemented 4 unplanned points in WFO Rapid City's area, on the White and Belle Fourche Rivers; and one in WFO Bismarck's area, Linton on Beaver Creek.

3rd Quarter FY10

- No new points

4th Quarter FY10

- Implemented 14 points: 4 in the Marais Des Cygnes River Basin and 10 in the Upper Republican River Basin

Problems Encountered/Issues

1st Quarter FY10 – none

2nd Quarter FY10 – none

3rd Quarter FY10 – none

4th 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 (4 th Qtr FY10)	Variance
(WALN6) - West Branch Delaware	1	Q1	1	0
Total	1		1	0

Accomplishments/Actions

1st Quarter FY10

New Forecast Service:

- A new AHPS point was added at Walton, NY (WALN6) on the west Branch of the Delaware River.

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.
- Redesigned 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.

2nd Quarter FY10

Outreach:

- Participated with collocated WFO CTP in the Pennsylvania Farm Show.
- Prototype DSS provided to Maryland Dept of Environment's Beaches section. MARFC MPE information will be used by county managers to decide which public beaches need to be sampled to protect human health.
- Penn State University Career Fairs
 - School of Forest Resources - had a booth and gave a talk at their career fair to encourage interest in a hydrology career. 4 resumes received from students interested in a student volunteer position this summer at MARFC.
 - Dept of Meteorology – gave a short talk and attended networking event with students to encourage interest in a hydrology career. 4 resumes received from students interested.
 - College of Information Science & Technology “Future Forum” career event – had an exhibit booth to encourage interest in a hydrology career.
- Delaware River Basin Commission – gave a talk on how the NWS forecasts river stages at the quarterly Flood Advisory Committee meeting.
- Nurture Nature - Reviewed prototype animation and assisted with application for NOAA Environmental Literacy grant. Reviewed student software called, “Flood Advisor” that facilitates subscription to AHPS RSS feeds. Provided examples of flood warning text.
- *Hydrologists in the National Weather Service* outreach brochure created and printed.
- Customer Advisory Board – 3rd meeting of MARFC Customer Advisory Board held. Feedback on January flood was shared. Provided MMEFS training in 3 separate sessions, provided pre-flood briefing, held 4th routine meeting to gather feedback on NWS Hydro products and services and on MMEFS during the Spring Flood.

- Attended Susquehanna River Basin Commission quarterly meeting and learned of mining activities and other anticipated water diversions.

Hydrologic Modeling:

- Improved the service on the Delaware River at Easton from a crest-only forecast to a full time series forecast.
- Continued to monitor SAC-SMA real-time performance at 6 test segments.
- Post-flood events service reviews completed for two December moderate floods, and January moderate floods. Service review underway for major spring 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.
- Investigating feasibility and needed efficiencies to issue forecasts for all points daily. 3 hydrologists participated in residence training for the migration phase of the implementation.
- Coordinated with the USGS to improve routing to Wilkes-Barre, PA, Meshoppen, PA and Cartersville, VA through updating the rating curves.
- The project proposal “A New Statistical Model of Streamflow Forecast Error” was recommended for funding by the CSTAR panel.
- Thorough QC, coordinated with WFOs, NYC DEP and NOHRSC to ensure accuracy of modeled SWE going into the Spring Floods.
- Provided hydrologic briefings with MEMA, PEMA, and WFO BGM through the spring floods. NWS offices took the flooding opportunity to highlight AHPS products and services.
- Supplemental Spring Flood Outlook issued.
- Based on performance during the spring floods, routings were improved at:
 - Pine Brook, NJ
 - Sunbury, PA
 - Springfield, PA
 - Fredericksburg, VA
 - Richmond, VA
 - Mattoax, VA

CHPS:

- CHPS software installed.
- 2nd CHPS Buddy Visit completed.
- Continued to participate in CHPS CAT II calls & preparation and migration activities.
- Working to streamline the segment ids to new 8-letter ids.
- Migrated 3 segments with the new ids since February.
- Established a live data feed into the system.
- Overall, we have 1.5 forecast groups (James & Rappahannock) migrated into the live system.

Inundation Mapping:

- Completed a QC review of draft inundation map libraries for 3 points in the Susquehanna basin.
- MARFC, WFO PHI and WFO BGM QC review underway of draft inundation map libraries for 5 points on the Delaware River.

Gages/Observations/Data:

- Continue to add new CoCoRaHS precip stations and delete inactive ones.
- GFE implementation continuing. HAS forecasters trained.
- Completed 2009 precip gage to MPE comparison.
- Coordinated with WFOs to assure accuracy of modeled SWE.

Training:

- Training provided to staff on MMEFS and MARFC Wiki page.
- Climate Variability and Change virtual course completed by forecasters at MARFC and WFOs OKX, LWX & BGM.

- Attended OHD seminar on *A Comparison Study of Calibration Strategies for the NWS Research Distributed Hydrological Model (HL-RDHM)*.
- AHPS Phase VI training completed.
- Intro to AHPS Flood Inundation Mapping training completed.
- “Flood Safety: When you live were flooding happens” webinar attended.

Ensemble River Forecasts (MMEFS):

- Prototype watermarks designed to show experimental nature of products.
- Completed migration from ftp site to website.
- Addressed necessary changes, updated code and installed at MARFC, NERFC & OHRFC.
- Training and access given to members of our Customer Advisory Board (CAB)
- CAB used the information during the Spring Flood and provided feedback on format and content that will be used in future enhancements.
- Several refresher training sessions held for our WFOs.

Service Backup:

- Nearing completion of in-house backup system

3rd Quarter FY10

Outreach and Customer Service:

- Communicated expected changes from AHPS upgrade to customers.
- Shippensburg Univ – participated in joint CTP-MARFC exhibit booth at outreach event.
- Nurture Nature
 - Flood Education Website created. Survey being conducted that measures flood safety knowledge in the Delaware River Basin.
 - MARFC assisted Lafayette College in their project for Nurture Nature that provides an easier public interface to receive RSS feeds.
 - Joined application for a NOAA Grant for a Science on a Sphere as co-principal investigators.
- Penn State Univ
 - Tour of the MARFC provided to class studying the ecosystem of the Chesapeake Bay and to 2 sessions of Penn State’s Weather Camp.
 - Met with professor from the College of Information Sciences and Technology (IST) to plan semester-long class project with the MARFC.
 - Interviewed 2 students of the College of IST for volunteer position at the MARFC.
- Provided water supply information to the ICPRB.
- Gave a talk on “Climate Change in the New Jersey Region” at the New Jersey Water Environment Association’s (NJWEA) Annual Meeting in Atlantic City.
- Created 2 new MARFC Fact Sheets, “Uncertainty in River Forecasts” and “Understanding the River Forecast Process” for use in MARFC & WFO outreach events. SRBC provided the design and printing work.
- Held 5th meeting of the MARFC Customer Advisory Board. Provided training on inundation maps & Nurture Nature gave a presentation on their flood education accomplishments. WFOs joined in. Welcomed an additional board member from Somerset Co., NJ.
- MARFC is a member of the national AWIPS II Collaboration CONOPS team. We have contributed a description of the current state of RFC collaboration and 2 RFC-centric coordination scenarios to the team.
- Gave a talk on MPE at the Chesapeake Modeling Symposium in Annapolis, MD.
- Participated in quarterly meetings of the DRBC Flood Advisory Committee.
- Provided tours of the MARFC to visitors from PEMA and Clinton Co., PA EMS.
- Participated in Northeast/North Atlantic Tri-Agency meeting at West Point with NERFC, ERH HSD, WFO BTV & WFO ALY. MARFC gave a presentation on MMEFS.
- MARFC began providing rainfall information for posting on Maryland Dept of the Environment’s www.MarylandHealthyBeaches.com website. This will inform beachgoers of conditions in which bacteria concentrations may be elevated at the beach due to storm water runoff.

- Participated in ER's Flash Flood Conference, with 2 posters, a talk and a RFC exhibit.
- Participated in USACE Baltimore District meeting on gage funding.
- Creating inventory of NWS hydrologic services in the Susquehanna Basin to support the update of SRBC's strategic plan.

Hydrologic Modeling:

- Upgraded Cooks Falls, NY from a flood-only forecast point to a daily 48hr forecast point.
- Extended forecasts for the Potomac River at Fredericksburg, VA from 48 hours to 72 hours.
- Improved modeling at Bloomsburg, PA on the Susquehanna River by creating a nested basin with its own basin-specific QPE and QPF.
- Began providing Baltimore USACE with daily raw forecast model output of flows at Mapleton Depot, Lewistown, and Newport.
- MARFC & WFO BGM participated in biannual NYC DEP/USGS/NWS Coordination meeting in Albany.
- Participated in NYC DEP reservoir operations model meeting at ERH.
- Participated in quarterly meeting of the Passaic Flood Warning Service group.
- Completed survey of our 7 WFOs to understand their use of the Site Specific Model and their confidence in its' accuracy.
- LARC phone dial-up restored on the Rivanna River at Palmyra, VA, after lengthy outage due to bridge construction.
- Implementing new methodology to create our Flood Outlook Product using Arc-GIS.
- Continued to monitor SAC-SMA real-time performance at 6 test segments.
- Participated in ER HSD call to review Spring Flood services.
- Implemented new methodology to create our Flood Outlook Product using Arc-GIS.
- Continued to monitor SAC-SMA real-time performance at 6 test segments.

CHPS:

- Completed first software upgrade.
- Completed work to develop optimum OFS definitions for each of our forecast segments.
- 2 MARFC hydrologists attended the System Administrators course.
- MARFC Sr Hydrologist and the DOH attended the CHPS CAT II Workshop 2 in Boulder, CO.
- 25% of segments migrated.

Inundation Mapping:

- MARFC and WFO PHI completed QC review of 5 draft inundation map libraries in the Delaware River Basin and documented 86 QC issues.
- Collaborated with WFO PHI SSH & DRBC to create and deliver 3 training webinars. We reached 18 officials in 6 counties. Goal was to include them in the QC process.
- Staff trained on AHPS inundation mapping in preparation for Delaware release this summer.

Gages/Observations/HydroMet Data:

- GFE implementation work continues. Training provided to staff.
- Provided historical MPE information to Dewberry for their use in development of models for FEMA.
- Assisted NJ DEP with their evaluation of our MPE data as a possible tool for monitoring water quality and managing public beaches.
- Rewrote and improved our IFLOWS extraction script to take advantage of a different data format that should increase the number of precip gages reports available to MPE for more accurate bias calculations.

Training:

- OHD HEC-RAS Dam Break webinar
- National Hurricane Center webinar.

Ensemble River Forecasts (MMEFS):

- Added NAEFS ensemble information to a test version.

- Presented MMEFS poster at national MIC/HIC meeting.
- Continued to gather MMEFS feedback from CAB and WFOs.
- Provided MMEFS training webinars for 2 WFO Severe Weather Workshops (PHI & OKX).
- Reformatted MMEFS data for NYC DEP in their evaluation of its potential use in the management of water supply reservoirs.
- SERFC now functioning with MMEFS, producing GEFS & SREF information and placing on web page.
- Revised code for handling OFS flexibility for OHRFC, NERFC & SERFC.

4th Quarter FY10

Hydrometeorological Information:

- GFE Implementation Completed: Operational QPF input now being created through GFE.
- Hosted weeklong familiarization visit by HPC QPF Forecaster.
- Edit area implemented for elevations above 1000 feet along the Blue Ridge in VA. This will make it easier to incorporate orographic effects into QPF. Additional areas are being investigated.
- Implemented two QPF improvements into HAS Operations:
 - A GFE edit area for the Virginia Blue Ridge to enhance rainfall when orographic lift is expected
 - A new local GFE element to allow the forecaster to see the previously issued QPF, to assure consistency.

DSS – Ecosystems:

- Began routine provision of MPE info to NJ DEP for their use in analysis of ground water contamination as part of the NJ Private Well Testing Act. The data allows a more detailed analysis of the actual impact of precipitation on coliform detection frequencies within the various geological strata in the state.
- Added current drought information links to water resources web pages.

River Forecasts, Hydrologic Modeling:

- Continued to monitor SAC-SMA real-time performance at 6 test segments.
- Participated in USACE gage funding meetings. Provided NWS priority list of gages.
- All AWIPS basin map overlays were updated based on the latest basin delineations.
- Used updated USGS readings to correct lower end of rating and improve low flow forecasts along the James River at Cartersville, VA.
- Assisted WFO AKQ in providing input to the National Drought Monitor.
- Participated in several state and regional coordination conf calls for Hurricane Earl.
- Provided contingency river forecast info to WFO(s)
- Became co-PI on a proposal for the Climate Program Office to implement HEFS as an operational CHPS application at MARFC & NERFC.
- Met all seven GPRA+ goals for FY10, reflecting ongoing efforts to improve data, modeling, products and services. For Day 1 QPF over an inch, improved on HPC in 11 out of 12 months. Day 1 river forecast errors for Wilkes-Barre and Harrisburg were best in past 5 years
- SAC-SMA model verification procedures developed to enable comparisons of raw and modified SAC-SMA and Cont-API runs.
- Procedures to generate persistence forecasts for use in verification documented.
- Scripts developed to generate input files needed to run HEC-RAS on the Potomac.
- Calibration of the HL-RDHM distributed model continued for one test basin.
- Updated 183 rating curves over the past 2 months.

Inundation Mapping:

- Staff participated in SRBC Flood Inundation Map Viewer training.
- Completed final reviews of 5 Delaware River basin flood inundation map libraries
- Assisted in the planning of 3 DRBC User Forums to introduce AHPS FIM services.

CHPS:

- Migration activities continue. Installed and debugged several software builds.
- Completed migration for the Potomac, Rappahannock, James, Juniata, Chemung, West Branch Susquehanna and North Branch Susquehanna segments.
- Average migration: 3 segments per day.
- Continue set-up and testing of the DailyQC program for generating gridded fields from gage observations.
- Working with NERFC to resolve installation issues with new FFH CHPS utility.

Ensemble River Forecasts (MMEFS):

- Led discussion with ER SCHs to prioritize needs and make recommendations for MMEFS rollout based on customer feedback.
- Gave a briefing on MMEFS at the National HIC meeting in Peachtree City, GA.
- Coordinated feedback from all ER SCHs, submitted recommendations to ER HSD for improvements needed before implementation.
- Began projects with Penn State College of Information Sciences and Technology to improve MMEFS information and help meet ER implementation goal.

National Water Center/IWRSS:

- IWRSS / WSC Team (2 MARFC members): continued work on the formation of a National Water Support Center by drafting ideas of how the RFCS will evolve in the Context of Services and the NWS Strategic plan.
- Participated in discussions about plans for the new National Water Center and related IWRSS programs at the National HIC meeting.

AWIPS II:

- Completed software development to enable the AWIPS Testbed (NMTR) at headquarters to be set-up and re-configured to perform as any RFC in the country, including appropriate live data feeds and baseline software configuration. The system was reconfigured and tested as both MARFC and NCRFC. Next step is work with Raytheon to reconfigure an AWIPS II system to allow for this same capability prior to FIT testing in December. This is a major project supporting the effort to test RFC baseline capabilities prior to fielding AWIPS II.

Climate:

- Began integrating newly identified on-line sources of historical tropical storm/hurricane flood information from the HPC and NHC into our river climatology database and website.

Outreach/Customer Service:

- Provided rainfall observations and forecasts to SRBC and PA DEP in their evaluation of drought potential for the state of PA.
- Hosted open house for visiting Penn State alumni as part of the recognition of the Dept of Meteorology's 75th anniversary.
- Began working with Penn State College of IST for fall class project.
- Toured AccuWeather with ER Director.
- Led collocated office's participation in annual Penn State's Ag Progress Days outreach event. Staffed the NWS exhibit booth over 3 days.
- Created inventory of precipitation, stream, water temperature and soil moisture stations/gages to support the Interagency Committee project to update the Susquehanna Flood Forecast and Warning System's strategic plan
- Attended Virginia Silver Jackets kickoff meeting. Accepted invitation to be a core team member along with WFO AKQ for the NWS.
- Participated in New Jersey Silver Jackets kickoff meeting.
- Participated in several Susquehanna Drought Advisory Committee meetings with SRBC and state officials.
- Participated in quarterly meeting of the DRBC's Flood Advisory Committee in Trenton, NJ.

- Participated in AMS Summer Community meeting at Penn State.
- Gave office tours to:
 - incoming Penn State Univ freshmen meteorology students
 - AMS meeting attendees
- Hosted RFC familiarization visit from two new OHD employees: Kevin He & Ian Yue.
- Hosted visits and provided in-briefs to the NWS' Director and Deputy Director.
- Participated in a large-scale flood preparedness exercise with WFO BGM at Corning, NY. Provided contingency river forecast information
- MARFC Website Enhancements:
 - Added a KML GIS data link to our website with an archive of monthly precipitation departure information.
 - Added drought status maps our website.
 - Added a "What's New" section to the flood climatology page to keep users informed on recent updates, changes and future work.
- Presented how the NWS forecasts rivers at 3 DRBC Users Forums.
- Held 7th MARFC Customer Advisory Board meeting.
- Supported WFO CTP in responding to inquiry from SRBC re: possible new streamgage.

Training:

- Complete series of 3 ER webinars on determining flood stage and impacts.
- HPC Experimental Probabilistic QPF (HPC CLC training).
- Moving Towards Gridded Precipitation Forcings in the CHPS Era (OHD webinar)
- Development of Gridded QPE Datasets for Mountainous Area Distributed Hydrologic Modeling (OHD webinar)
- Derivation of Gridded SAC-SMA A Priori Parameters from STATSGO & SSURGO Soils Data (OHD Webinar)
- Derivation of Gridded A Priori Parameters for the Snow-17 Model (OHD webinar)
- QPF – COMET virtual classroom instruction (1 week course)
- GFE for RFC Workshop (3.5 days)
- Ensemble Nowcasts of Rainfall – OH webinar
- Hurrevac 2010 – webinar by Sea Island Software
- CPC ENSO & NOAA Atlantic Basin Tropical Cyclone Outlook – NHC & CPC webinar
- Hosted NART Climate Literacy Training course.
- GFE focal point completed GFE for RFCs residence course at NWSTC.

Problems Encountered/Issues

1st Quarter FY10

None

2nd Quarter FY10

None

3rd Quarter FY10

None

4th 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 2011.

Milestones:

Implementation Area	Forecast Points Planned	Due Date	Actual to Date (3 rd Qtr FY10)	Variance
Thames River	4	FY11Q3	0	-4
Naugatuck River	1	FY11Q3	0	-1
(TMCV3) - Connecticut River	0		1	+1
Total	5		1	-4

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

2nd Quarter FY10

- Attended CAT meeting to review progress and planning for the next several months
- Continuing work with Deltares to identify issues with the current software release. Deltares focus is on performance enhancements and bug fixes. Patch released in late January has shown some significant improvements

- Hosted meeting with CUAHSI Executive Director Rick Hooper. Provided information on CHPS status and overall operations and services from the RFC. Rick explained how CUAHSI is working to improve data exchange
- Hosted meeting with Dr. Jim Porter from NYC DEP. Provided information on CHPS. Dr. Porter shadowed forecasters during the morning operations to see how the Hudson River forecasts are prepared. He provided a presentation on the overall New York City Water Supply System including Reservoir Operations
- Work progressing on cleaning up precipitation database in order to identify obsolete gages, gages that do not function well in the winter, and other issues that have impacted the amount of time spent QC'ing MPE and DailyQC
- Hosted Regional ER DOH Workshop focused on CHPS planning and MMEFS
- Identified a couple problems with configuration of MMEFS that have been a major cause of a very low bias that has been occurring in precipitation and temperature. Problems were corrected and subsequent runs showed significant improvement
- CHPS - patch was installed at beginning of month which resulted in some significant performance improvements. Continue to identify some issues that will be fixed in an early March patch
- CHPS Buddy Support - attended CHPS migration training at NWSTC
- Buddy visits to MARFC and OHRFC to begin their CHPS development activities
- Hosted meeting with Dr. Marouane Temimi from NOAA-CREST/CCNY. Discussed project for using satellite remote sensing for observing river ice cover. Primary study area is on the Susquehanna but prototype on the Mohawk is feasible
- MMEFS - latest version installed in late February. Good timing roll out as it was followed immediately by some moderate flooding in southern New England
- NYCDEP - discussion with John Schaake on the development activities he is involved with for NYC and how MMEFS can fit into this program
- Major flooding throughout the month necessitated an escalation of 24x7 operations which in turn provided less resources for development activities
- Developed several scripts to provide quick status assessments of flooding as well as post flood reviews
- Continued work on parallel operations. Attempted to maintain running throughout the month but it was a challenge due to flood concerns
- Successfully began running GEFS ensembles in CHPS
- Participated in Software Acceptance Test for next release of software. This release will be installed during April
- Identified with Deltares assistance a major bug in configuration that was preventing States from incorporating the effects of certain Mods
- Meeting was held with Customer Advisory Board. Focus was on introduction of MMEFS and NWSChat
- Meeting with Aptima on their river regulation project. Will be providing Aptima with some test data for the Housatonic River Basin so that they can begin some quantitative analysis of their development
- Attended FIM QA/QC workshop at NOAA Coastal Services Center in Charleston, SC

3rd Quarter FY10

- CHPS March and June software releases were installed
- Participated in Software Acceptance Test procedures associated with software builds
- Attended CAT-I workshop in Sacramento in May
- Attended CAT-II workshop in Boulder in June
- Participated in CHPS System Managers training in Sacramento in May
- Participated in CHPS Advanced Configuration training in Portland in June
- Ran a number of data forcings scenarios through CHPS for the period Jan-Mar 2010 and then Oct 2009-May 2010. This was to assess the different performance of MAPX, DailyQC, and OFS MAP preprocessor data on the hydrologic simulation in CHPS
- Began generating test RVFs from CHPS for comparison and validation of CHPS forecasts to NWSRFS based forecasts
- Work on calibrating HEC-RAS segments for use in CHPS. Found this was necessary after the initial port of FLDWAV definitions to HEC-RAS failed to yield adequate results
- Expanded MMEFS to incorporate some forecast locations that had not previously been running correctly

- Participated in collaboration meeting in April to discuss NYC DEP Operations Support Tool (OST) reservoir project
- Attended the 2010 Water Environmental and Water Resources Congress in Providence, RI which was hosted by the American Society of Civil Engineers' Environmental & Water Resources Institute
- Met with officials from Providence Water (State of Rhode Island's largest water utility) to discuss forecasting services with the Pawtucket River watershed
- Hosted coordination meeting with FEMA Region I to discuss collaboration opportunities
- Participated in ER Flash Flood Conference in Wilkes-Barre, PA
- Participated in Tri-Agency coordination meeting in West Point, NY
- Hosted Saint John River Hydrologic Committee annual meeting
- New daily forecast point: Taunton River at Bridgewater MA. This had been previously implemented but has been upgraded to a daily product at the request of the WFO

4th Quarter FY10

- CHPS – currently running on patched September release. This release should have all necessary functionality to support NERFC operations.
- Entered next phase of parallel operations with major intent on testing all functionality and generating internal products on a daily basis from CHPS
- Attended extra CHPS system managers training in Silver Spring in August
- Met with New England Corps of Engineers to review plans on providing an early forecast of reservoir inflows to them on a daily basis and their provision based on that forecast of a reservoir release schedule
- Working to set up FFG using the legacy procedures in CHPS
- Began routine export of forecasts from CHPS to New Brunswick for import into their FEWS implementation
- Working with Stevens Institute of Technology on receiving and displaying their Hudson River forecasts in CHPS

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.

2nd Quarter FY10

- Encountered some significant problems with both RES-J and RES-SNGL during the midst of flooding this month. We figured out workarounds to get around the problem that required frequent redefinitions of forecast points in NWSRFS. We never got a clear resolution on these issues and cannot guarantee they will not re-occur during future flood episodes.

3rd Quarter FY10

- Continue to identify a number of critical issues with the CHPS software. This has prevented us from identifying a timeline for completing a transition of our operations to CHPS.

4th Quarter FY10

- Senior Hydrologist Tom Econopouly left the NWS to take a position with the US Fish and Wildlife in Colorado effective. Tom has been an integral part of CHPS migration and has served as NWSRFS focal point.

4th Quarter FY2010 AHPS Implementation for OHRFC

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

Objective: Implement AHPS and probabilistic hydrologic forecasts for new basins in the Ohio River Forecast Center's (OHRFC) area of responsibility.

Milestones:

Implementation Area	Forecast Points Planned	Date	Actual to Date (4 th Qtr FY2010)	Variance
(FRDI3) – Louisville	0	Q1	1	+1
(BELT1) – Lower Cumberland	0	Q1	1	+1
(RFDO1) – Maumee	0	Q2	1	+1
(OPLP1) - Monongahela	0	Q3	1	+1
(DLPI3) – Upper Wabash	0	Q4	1	+1
(ALVK2) – Green	0	Q4	1	+1
Total	0		+6	+6

Accomplishments/Actions:

1st Quarter FY2010

Forecast Points and Hydrologic Modeling:

- Implemented 2 additional forecast points
 - FRDI3 – Ohio River (Louisville segment) at Fredericksburg, IN for WFO LMK
 - BELT1 – Harpeth River (Lower Cumberland segment) at Bellevue, TN for WFO OHX
- AHPS Point Total: 274
- 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

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 & 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 presenting on what NOAA/NWS can provide with regards to water resource products. Panel member for the breakout session on water quantity. Fostering relationships with 43 partners in the Ohio Valley.
- 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 Southeast Flooding (Sep 2009)
- Hosted Ohio River Basin & Great Lakes Tri-Agency Partner Meeting in Wilmington, OH
- 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 NWS Water Resources Outlook services
- Participating member of the National Water Resources Outlook through the OSIP Gate 2 process
- Participated in Regional Flood Risk Management meeting with CR for FEMA
- Member of the AHPS Flash Flood Services Team
- Provided webinar on national SCH call for the National WRO

Training:

- Reviewed OHRFC March 2009 Case Study with forecast staff

2nd Quarter FY2010**Forecast Points and Hydrologic/Hydraulic Modeling:**

- Added RFDO1 – Rockford, OH on Maumee River as a flood only point for WFO ILN
- Total AHPS Points: 275
- Added GRNO1 – Granville, OH on Raccoon Creek to SSHP
- Total SSHP Points: 79

Accomplishments:

HEC-RAS Community work with USACE LRD

- HEC-RAS Ohio River almost completely calibrated for main-stem Ohio River
- HEC-RAS tributaries include lower Monongahela & parts of the Kanawha calibrated

CHPS Transition:

- Initial setup of 15 of 31 forecast groups
- Live data feeds setup for RTMA, MPE, QPF

Service Backup:

- Progress continues toward onsite and offsite service backup upgrades

Ensemble River Forecasts (MMEFS):

- Providing MMEFS Summary graphics to USACE Huntington and LRD for dam safety coordination
- New MMEFS installed. Login/Passwords approved for RFC Customer Advisory Boards. Training scheduled and passwords provided to USACE and USGS only
- Training and passwords provided to Customer Advisory Board (CAB) for use of MMEFS
- MMEFS used to brief OHRFC and CR WFO(s) during March flooding

Gages/Observations/Data:

- On-going appraisal of gage inventory; QC of database
- Gage quality work with the USACE Huntington District
- Provided USACE Huntington with optimal placements for gages in their area to help with MPE
- Added 1000 CoCoRaHS observations to operational data to assist in quality control of precipitation

Gridded Flash Flood Guidance:

- Working on a process to ingest both observed and forecast temperature grids
- Developing plan using GIS to update threshold runoffs for FFG in CHPS world using GFFG

Climate:

- Winter/Spring Flood Potential Outlook issued via monthly OHRFC Water Resources Outlook and Winter/Spring Flood Potential Outlook products (ESG)
- Expanded dissemination of Outlook to the NWS Headquarters and Central Region WFOs
- ESG being updated weekly due to risk of flood potential
- Provided flood outlooks for NWS Headquarters and Central Region WFOs
- Created flood potential graphics merging MBRFC/NCRFC/OHRFC into one outlook via ESP 90-day graphics from AHPS per CR request
- Participated in the CPC monthly and seasonal outlooks conference calls. Notified CPC of issues getting 6-10 day outlooks for OHRFC ESP runs
- Provided flood outlooks for NWS Headquarters, CR WFO(s), FEMA V and Congressional staffers
- Provided national briefings on flood potential to Accu-Weather and The Weather Channel
- Provided briefings to water resources partners including Pittsburgh Waterway, Pittsburgh Coast Guard, Pennsylvania and Ohio State Emergency Management Agencies
- Notified CPC of issues getting 6-10 day outlooks for OHRFC ESP runs
- Provided training and briefings to FEMA on MMEFS and flood potential
- Provided training and flood potential outlook to City of New Richmond

Outreach:

- Follow-up meeting with USACE Huntington District / NWS OHRFC re: coordination of services in support of dam operations at USACE High Risk Projects including Dover and Bluestone
- NWS Service Assessment Team – Southeast Floods (Sep 2009)
- Presented paper at the AMS Annual Meeting 2^{4th} Conference of Hydrology. Topic: National Water Resources Outlook
- Chair/co-chair for sessions at the AMS Annual Meeting 24th Conference of Hydrology
- Presented paper at the 2010 AMS Town Hall Meeting. Topic: NOAA Precipitation Analysis from an RFC perspective
- Meeting with FEMA IV in Atlanta to discuss coordination products
- Attended precipitation analysis meeting with SERFC, NSSL, NCDC and OHD. Precipitation software used at LMRFC/SERFC/MARFC being investigated for use in MPE QC operations
- Attended Regional DOH Workshop. Investigating using NERFC GRASS QC for MPE currently in use at NERFC
- Continue as participating member of the National WRO through the OSIP Gate 2 process. Submitted Gate 2 operational functional documents
- Provided USACE Huntington with MMEFS. Ongoing coordinate with them due to dam safety risk.
- Presented at the Climate Variability and Change Virtual Course for COMET
- Participated in the CR Winter/Spring Flood Potential Briefings to NWS Headquarters and WFOs.
- Participated in the USACE Ohio River Basin Water Resources Summit
- Participated in the Huntington Waterways Association with a briefing on flood potential in March
- Corporate Board briefing of the September 2009 SE Flooding Service Assessment
- Met with WFO ILN & USGS to discuss forecast services to address Ohio DOT's I-70 flood issues
- Participated in the Ohio Silver Jackets meeting

3rd Quarter FY2010

Forecast Points:

- Added OPLP1 – Ohiopyle, PA (OPLP1) on the Monongahela River.
- AHPS Points Total: 276
- SSHP Points Total: 79

HEC-RAS Community Work with USACE LRD:

- HEC-RAS Ohio River calibrated for main-stem Ohio River
- Working through data issues

CHPS-FEWS Transition:

- Initial setup of 31 of 31 forecast groups complete
- Configuration of displays ongoing
- Data feeds working
- Added CHPS-FEWS menu items to AWIPS

Service Backup:

- Limited additional progress for onsite and offsite service backups made
- Testing needs to be completed to see if NOAA Net issue to push data out has truly been resolved

Ensemble River Forecasts (MMEFS):

- Provided MMEFS training to WFOs and Customer Advisory Board
- Provided voice-over MMEFS PowerPoint training module for WFOs and CAB
- Improved email alerts for inflow forecasts for 4 high risk dams (Bluestone, Dover, Wolf Creek & Center Hill) daily to USACE partners in Huntington & Nashville Districts and Cincinnati Division
- Continue gathering MMEFS feedback. Primary feedback – MMEFS is well liked and USACE would like to expand its use. Primary enhancements sought are a Google interface and improved labeling of graphics
- MMEFS was widely used during late April-early May flood event by OHRFC, WFOs and CAB
- Completed request from USACE to provide MMEFS inflow forecast for 4 high risk dams (Bluestone, Dover, Wolf Creek & Center Hill)
- Email sent daily for forecasts for 4 high risk dams (Bluestone, Dover, Wolf Creek & Center Hill)
- Attended Pittsburgh Waterways meeting to discuss March flood event and MMEFS

Gages/Observations/Data:

- Implemented a naming change for the Kentucky mesonet data

Gridded Flash Flood Guidance:

- Reviewed threshold runoff values from GFFG and AVThresR version to see if a change to one of these would improve FFG values
- Will continue this process of reviewing AVThreshR about possible implementation to replace legacy threshold runoff values currently used

Climate/Flood Potential:

- Extensive partner/user coordination activities in late April highlighting flood threat for early May in Kentucky and Tennessee.
- Coordinated with USACE Huntington District via calls for early June flood event in Muskingum basin
- Issued July Water Resources Outlook
- Requested high water readings from USGS Indiana

Outreach:

- Participated Ohio State University NWS College Road Show
- Presented at the Ohio State University Severe Weather Symposium. Heavy Rainfall techniques including precipitation potential placement was given for the presentation.

- Attended SCH meeting at WFO RLX to discuss AHPS forecasts and potential collaborative projects
- Interview with NBC 4 Columbus, OH on early May flood threat
- Interview with CBS National on Nashville Floods
- Participated in USACE/NWS Nashville Press Conference
- Attended and presented at the ER Flash Flood Conference on Precipitation Potential Placement, SSHP and Q2
- Participated in USGS TN/NWS Nashville conference call with WFO Nashville on possible additional new forecast points along Mill Creek in Nashville
- Follow-up meetings and interviews with NWS TN/KY Service Assessment team
- Visit with WFO CLE and local emergency managers for possible Loudenville forecast point. EMA(s) expressed concern that the Mohecanville Recreation Area has similar potential to the Arkansas flash flood event of June 2010. Review will continue on funding gage support with Muskingum Conservancy District.
- Provided WFO Louisville and St. Louis with Hydrologic Forecast Process presentation for use in Coast Guard training
- Participated in the ER March Flood Review with HSD and other RFC(s) and WFO(s)
- Visited WFO Louisville, Dix Dam and local emergency managers to discuss post May flood event from Dix Dam through High Bridge to Frankfort
- Provided SR with possible members to form a national team to standardize FEMA briefings
- Provided two MMEFS training session to WFO(s) and OHRFC's Customer Advisory Board

Visits to OHRFC:

- Hosted WFO Louisville visit (SSH, HMT and ITO)

Training:

- Participated in planning meeting for COMET PQPF virtual training course. OHRFC will serve as a presenter for this August training
- Provided WFO Louisville & St. Louis with Hydrologic Forecast Process presentation for use in Coast Guard training
- Provided WFOs, HSDs and CAB with recorded training modules on MMEFS and Precipitation Potential Placement for those who could not attend live webinars
- Participated in OHD Hydraulics Group Webinar

Award:

- The Federal Executive Association of Columbus and Central Ohio - Cooperative Interagency Recognition Award. It was presented to NOAA/NWS on May 6, 2010 for the Silver Jackets Disaster Mitigation Project to recognize NWS's leadership, dedication and lasting accomplishments to government service.

4th Quarter FY2010

Forecast Points:

- Added ALVK2 – Drakes Creek (Green segment) near Alvaton, KY
- Added DLPI3 – Tippecanoe River (Upper Wabash segment) at State Highway 18 Bridge
- AHPS Point Total: 278
- Added FECO1 – Eagle Creek at Findlay, OH to SSHP
- SSHP Point Total: 80

NWSRFS Modeling

- Coordinated with State of Kentucky officials and the Kentucky River Authority to add locks to forecast model (Kentucky segment)

HEC-RAS Ohio River Community Project with USACE LRD

- HEC-RAS Ohio River is now running as needed

CHPS-FEWS Transition

- Configuration of displays and setup mainly at a holding pattern waiting for patches and upgrades as most of the focus is now with CAT 1 offices and OHRFC is a CAT 2. OHRFC is ready to move forward but will need to wait for support.
- Much progress has been made at loading in ESP data to CHPS

Ensemble River Forecasts (MMEFS) / ESP

- Work is beginning on moving away from GEFSA and toward NAEFS with 42 members instead of 12 members.
- Script was provided by OHRFC to ERH (Josh) on being able to retrieve NAEFS data from NOMADS.

Gages/Observations/Data

- Coordinated with WFO Nashville, USGS Tennessee and USACE Nashville to ensure latest network of gages in TN is available
- Alerted WFO Nashville, USACE LRN and USGS TN to weaknesses in current rainfall observing network in Tennessee, Nashville and Old Hickory drainage areas
- Coordinating with WFO Nashville to gain access to Nashville Emergency Management rainfall network

Gridded Flash Flood Guidance

- Held Flash Flood Guidance meeting on possible transition to AVThreshR as new basis for FFG in CHPS-FEWS

Climate/Flood Potential

- Issued October Water Resources Outlook.

Outreach

- Participated with Ohio State University on climate, weather & water outlooks for Ohio and impacts to the agricultural community
- City of Columbus visit to discuss RFC and WFO hydrologic forecast operations
- Met with USGS Water Science Center Indiana
- Met with WFO Indianapolis
- Attended Indiana Silver Jackets Meeting
- CPC Drought Briefing
- Visited WFO Nashville
- Met with USGS Tennessee, USACE Nashville, Tennessee EMA, USACE Old Hickory and USACE J. Percy Priest
- SCH call on Silver Jackets
- Participated with Ohio State University on climate, water and weather outlooks for Ohio and impacts to the agricultural community.
- Participated in Pennsylvania Silver Jackets kickoff meeting
- Participated in the COMET COMAP QPF Virtual Course preparation meeting
- Station visit to WFO Cleveland
- Participated in the ER WCM-SCH meeting
- Station visit to WFO Wilmington to discuss future changes at OHRFC
- Participated in the Olmstead project on the lower Ohio by providing weather and hydrology outlooks for the next month

Visits to OHRFC

- City of Columbus
- WFO Cleveland MIC and SSH.
- USACE LRD – Cumberland River System
- USACE LRD – Data flow from USACE to NWS

Training

- USACE LRD training on Cumberland River System

Problems Encountered/Issues:

1st Quarter FY2010

None

2nd Quarter FY2010

Snowmelt and flood potential were the concerns of OHRFC going into March. Working hard to ensure coordination is there and graphics and data needed are provided to customers.

The AHPS webpage mismatch between WFO/national pages and RFCs pages was an ongoing issue as national and WFO pages show peak stage only out to 48-hours while OHRFC page goes out length of RVF which ranges from 5-10 days

3rd Quarter FY2010

AHPS Phase 6 service remains unreliable with numerous instances of NRLDB not updating noted

4th Quarter FY2010

Configuration of displays and setup mainly at a holding pattern waiting for patches and upgrades as most of the focus is now with CAT 1 offices

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 4 th Qtr FY10	Variance
Total	0		0	0

Accomplishments/Actions

1st Quarter FY10

- N/A – Implementation of probabilistic forecasts were completed in FY09. No new forecast services added.

2nd Quarter FY10

- N/A – Implementation of probabilistic forecasts were completed in FY09. No new forecast services added.

3rd Quarter FY10

- N/A – Implementation of probabilistic forecasts were completed in FY09. No new forecast services added.

4th Quarter FY10

- N/A – Implementation of probabilistic forecasts were completed in FY09. No new forecast services added.

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 4 th Qtr FY10	Variance
Black River Basin, AR/MO	4	Q1	4	0
White River Basin, AR/MO	2	Q1	2	0
Black River Basin, AR/MO	2	Q2	2	0
White River Basin, AR/MO	7	Q2	7	0
White River Basin, AR/MO	7	Q3	7	0
Lower Arkansas River Basin, AR	1	Q4	0	-1
Ouachita River Basin, AR	4	Q4	4	0
FY11 Ouachita River Basin, AR	0	FY11-Q1	1	+1
Total	27		27	0

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 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 Grascel and Dave Reed attended TVA meeting in Huntsville, AL.
 - November 12, OB9.1 Build.
 - November 16 – 18, Jeff Grascel, 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 Grascel, Dave Reed, and Angelo Dalessandro visited the Little Rock Army Corps of Engineers in Little Rock, AR.
 - November 30 – December 2, Jeff Grascel attended the FEMA RISC meeting.
 - December 1-2, David Welch participated in the USACE-STL, LMRFC, and NCRFC Forecast Operations GoToMeetings.
 - December 1 – 3, Glenn Carrin attended the NWSTC’s Climate Variability Course in Kansas City, MO.
 - December 3, Dave Reed, David Welch, Jeff Grascel, 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 10 new AHPS sites (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.

2nd Quarter FY10

- AHPS outreach activities this month.
 - January 12 – 13, David Welch, Dave Rameriz, and Katelyn Costanza attended the Corps of Engineers’ Engineering Research and Development Center’s (ERDC) Adaptive Hydraulics Modeling Workshop in Baton Rouge, LA.
 - January 14, the St. Tammany Parish Engineers Office visited the office.
 - January 19, David Schlotzhauer, Governor’s Office of Homeland Security and Emergency Preparedness and Thomas Long, DynMcDermott Petroleum Operations Company visited the LMRFC and toured operations.
 - January 20, Dave Reed, Jeff Grascel, David Welch, Ken Kleeschulte, and WFO LIX’s Pat Brown 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.
 - January 21, David Welch and WFO LIX’s Pat Brown and Francida Moore visited the Atchafalaya Co-Op sites and Bayou Sorrel Lock Master.
 - January 19 and 22, local chapters of the Cub Scouts toured the LMRFC.
 - January 27, Jeff Grascel, Dave Reed, and David Welch attended the Plaquemines Parish flood meeting in Plaquemines, LA sponsored by the U.S. Coast Guard.
 - January 28, OB9.2 build completed.

- January 29, Jeff Grascchel participated in the “Flood Potential Briefing for NWS Partners”.
- February 2, Jeff Grascchel presented LMRFC operations at WFO LIX’s Weather/Hydro Workshop in Slidell, LA.
- February 4, Jeff Grascchel, Dave Reed, and David Welch participated in the Silver Jackets meeting with the Mississippi USGS and USACE’s Vicksburg District via conference call.
- February 4, LMRFC successfully performed an NWSChat test with the USGS and USACE.
- February 7, New Orleans Saints won Superbowl (XLIV) in Miami, FL. **Who DAT!**
- February 8 – 12, Glenn Carrin attended COMET’s Climate Variability and Change tele-training.
- February 8 - 10, Jeff Grascchel attended the Fusion Team meeting with USACE in Kansas City, MO.
- February 9, Dave Reed and Dave Ramirez attended the LSU Career Fair in Baton Rouge, LA.
- February 10, Katelyn Costanza participated in a recruitment trip to Mississippi State University (MSU) and presented LMRFC operations to the ASCE’s MSU student chapter in Starkville, MS.
- February 16 - 19, LMRFC staff attended the ARC presentation series.
- February 18 and 20, Dave Reed attended the University of Southern Alabama Road Show in Mobile, AL for recruitment purposes.
- February 22 – 26, David Welch, Katelyn Costanza, and Kai Roth attended the CHPS Migration Training in Kansas City, MO.
- February 22, Dave Reed and Jeff Grascchel attended the Governor’s Office of Homeland Security and Emergency Preparedness Flood Potential Meeting in Baton Rouge, LA. Jeff presented the 2010 flood potential for the local area.
- February 23 – 26, Dave Reed attended HIC meeting in Silver Spring, MD.
- February 23 - 25, Jason Caldwell, of NOAA’s National Geophysical Data Center, Marine Geology and Geophysics Division, visited the LMRFC and toured operations.
- February 24, the, Navy Research Laboratory, NGDC (Jason Caldwell), and Dave Ramirez presented work on DEMs, ADCIRC, and SMS to the LMRFC staff.
- February 24, Jeff Grascchel presented the spring flood potential outlook to St. Tammany Parish Council.
- February 25, Jeff Grascchel participated in planning meeting for the upcoming FEMA Training Conference.
- March 2, 5 LMRFC staff members attended rating curve training by the Louisiana USGS District in Baton Rouge, LA.
- March 2, WWL-TV interviewed Dave Reed on Pearl River flooding issues.
- March 2, Jeff Grascchel presented Pearl River Spring Flood Potential to St. Tammany Councilman Gene Bellisario’s public meeting in Slidell, LA.
- March 3, provided tour of LMRFC operations to LA National Guard.
- March 3-4, ABRFC’s Eric Jones, OHD’s Xiaobiao Fan, and Deltares’ Willhem van Verseveld conducted a CHPS site support visit to LMRFC.
- March 8-12, Jessica Smith attended COMET’s Flash Flood/QPE course in Boulder, CO.
- March 7-10, Dave Reed and David Welch attended the NASA/UCF for NOAA grant meeting in Orlando, FL on “Establishing the Application of High Resolution Satellite Imagery to Improve Coastal and Estuarine Models”.
- March 9, provided tour of LMRFC operations to Louisiana Highway Patrol.
- March 11, Jeff Grascchel, Glenn Carrin, and Ken Kleeschulte and LIX’s SH Pat Brown provided training at the FEMA Inland Flooding Course in Hattiesburg, MS.
- March 15, Jamie Rhome from NHC visited WFO LIX/LMRFC.
- March 16-17, Jeff Grascchel, Dave Reed, and David Welch attended the Louisiana Hurricane Conference in Baton Rouge, LA.
- March 17, Jeff Grascchel presented the Spring Flood potential to the Coastal Protection and Restoration Authority, Baton Rouge, LA.
- March 18, Jeff Grascchel gave a radio interview to WBRZ on spring flood potential on Mississippi River to the Baton Rouge radio market.
- March 20, tour provided to Cub Scout Pack 221, with 17 scouts and 7 adult chaperons.

- March 23, WVUE-TV interviewed Jeff Grascel on southeast LA Spring Flood Potential.
 - March 24, Jeff Grascel provided hydrology training at the New Orleans FEB's Weather 101 Workshop at the National Finance Center, New Orleans East, LA.
 - March 24-26, Katelyn Costanza attended the OHD's AHPS Flood Inundation Mapping Training in Charleston, SC.
- Received guidance on AHPS allocations. Awaiting FY10 Task# assignment by NWS COTR. Submitted supporting documentation for FY10 market research.
 - Implemented 5 new AHPS sites (SJOA4, GLBA4, CLRA4, BAGA4, and TNZM7) for WFOs SGF and LZK in the White Basin, completing Q2 implementation requirements.
 - Added the Elk River near Pelham (PELT1), Garrison Fork at Wartrace (WTTT1) and Wartrace Creek at Wartrace (WRTT1) into the operational Forecast model to help support SSHP.
 - Added Bayou Bartholomew at Wilmot (BBWA4) in the Lower Ouachita Basin and Jacks Fork at Alley Spring (ALYM7) in the Black Basin to the operational forecast model for future river forecasting support.
 - Completed generation of MAP calibrations for Upper Ouachita Forecast group, 4 basins (PBFA4, PLBA4, MTRA4, and BMGA4) in the Lower Arkansas Forecast group, and BSRL1.
 - Flood stage changes implemented for Savannah, TN (SAVT1) and Ashville, NC (AVLN7).
 - Set up Bundick Lake (BUNL1) for the Site Specific Model to begin testing and development for WFO LCH.
 - Developed historical relationships to forecast water elevations at Bayou Boeuf at Amelia based on stages on the Atchafalaya River at Morgan City to assist WFOs LIX/LCH in warnings for Stephenville, LA.
 - Working with SERFC to setup their ESP scripts.
 - Received and reviewed RTi's FY09 calibration decks and incorporating into operations.
 - RTi conference call (3/24).
 - LMRFC continues support of AHPS activities with in-house calibrations for remaining basins east of the Mississippi River.

3rd Quarter FY10

- AHPS outreach activities this month.
 - April 6, Jeff Grascel, Dave Reed, and Katelyn Costanza attended the Silver Jackets Meeting in Jackson, MS on potential flood inundation mapping. Presented TADD signs to MS Floodplain manager.
 - April 6, David Welch attended the Atchafalaya Basin Project Flood Meeting in Morgan City, LA.
 - April 7, Steve Dumovich, the FEMA Region VI Hurricane Program Manager toured LMRFC operations.
 - April 27, David Welch accepted the Department of Commerce's Bronze Medal on behalf of the LMRFC for superior federal service during Hurricanes Gustav and Ike.
 - April 28, Glenn Carrin, Jeff Grascel, and Dave Reed participated in the P3 Hurricane Hunter tour and Hurricane Preparedness Coordination meeting.
 - April 28, David Welch, Katelyn Costanza, and David Ramirez attended the Transitioned to HEC-RAS Model Development and Implementation webinar.
 - April 29, Ken Kleeschulte presented at the AFMM Spring Conference in Gulfport, MS on Inland Flooding.
 - May 5, Jessica Smith and Gina Tillis-Nash setup NWS display at Lakeside Mall for Public Service Recognition Week
 - May 6, Dave Ramirez and David Welch provided Stephenville and Bayou Sorrel Training.
 - May 10-14, Ken Kleeschulte participated in the HPC/RFC Visiting Forecaster Exchange Program in Silver Spring, MD.
 - May 10, Dave Reed, Jeff Grascel, Amanda Roberts, and Katelyn Costanza attended the Pearl River Mapping meeting in Jackson, MS on potential flood inundation mapping.
 - May 11, LMRFC participated in conference call with Jack Hayes on the significant Tennessee/Cumberland flood event.
 - May 11, Dave Reed, Jeff Grascel, David Welch and Katelyn Costanza attended the Leaf River Inundation Mapping meeting in Hattiesburg, MS.

- May 12, Jack Hayes toured LMRFC operations and gave an all-hands meeting.
 - May 13, LMRFC and LIX celebrated receipt of the Department of Commerce's Bronze Medal for superior federal service during Hurricanes Gustav and Ike, as well as service during the recent floods and on-going Deepwater Horizon events.
 - May 17-21, Jessica Smith attended the Advanced Hydro Applications course at NWSTC in Kansas City, MO.
 - May 18-20, Dave Reed and Jeff Grascchel participated and presented presentation at the NGI Annual Meeting in Mobile, AL.
 - May 24-28, David Welch and Kai Roth attended the Cat II System Management Training session in Sacramento, CA.
 - May 25, Jeff Grascchel provided QPF Ensemble Training for WFOs via webinar.
 - May 25, Amanda Roberts provided training on flooding concerns at Walkiah Bluff on Pearl River.
 - May 26, LMRFC participated in the TN Flooding Service Assessment briefing.
 - May 26-27, Katelyn Costanza participated as one of the facilitators at the Regional Gridded FFG training held at WFO JAN in Jackson, MS.
 - June 1, David Welch and Jessica Smith attended the 2010 LA Hurricane GIS Data Mining Workshop in Lafayette, LA
 - June 2 – 4, Jeff Grascchel participated in the ER FF Conf – Wilkes Barre PA
 - June 3, David Welch participated in NWS/TVA Conference Call
 - June 3, Dave Ramirez provided Stephenville and Bayou Sorrel training
 - June 8, Jeff Grascchel and Dave Reed participated in the Camo Jacket conference call on flood inundation
 - June 9, Amanda Roberts provided Walkiah Bluff training
 - June 10, David Welch provided Stephenville and Bayou Sorrel training
 - June 11, Conference call with Gulf Coast RFCs, OHD and the NOS on providing Gulf river inflow forecasts to the NOS for Ocean oil trajectory modeling.
 - June 11, Jeff Grascchel participated on a SCIPP conference call.
 - June 11, Participated on a pilot projects conference call with SR RFCs and SRH,
 - June 11, David Welch and Dave Ramirez gave a HEC-RAS demo to Mississippi State University staff for FloodViz project.
 - June 14, Gina Tillis-Nash presented EEO/Diversity milestones achieved by LMRFC, LIX, and MOB to the Southern Region EEODIAC
 - June 14 – 25, Jeff Grascchel attended ELS training in Kansas City, MO
 - June 14 – 18, WFO LZK's Service Hydrologist, Tabitha Clarke toured LMRFC operations and worked with numerous forecasters familiarizing herself with LMRFC products and services as well as in-depth discussion on AHPS/ESP graphics, HADS, Site Specific, Dambreak, GIS activities and flash flood guidance.
 - June 15 – 16, Little Rock Army Corps of Engineers' Steve Bays and Mike Biggs toured LMRFC operations
 - June 16, Jessica Smith provided training to LMRFC staff on Storm Surge and changes in NHC issuance time line
 - June 18, MSU met with David Welch and Katelyn Coastanza to discuss the NGI project to develop a HEC-RAS flood mapping application for use on AWIPS.
 - June 22 – 24, David Welch attended the CAT II Workshop in Boulder, CO
 - June 24, LMRFC and LIX hosted the New Orleans FEB's EAOC meeting to continue planning and implementing the New Orleans EEO/Diversity Workshop this coming August
 - June 28 – July 1, David Welch and Glenn Carrin participated in the CE SMART BLAST workshop in at WFO Huntsville, AL
 - June 29 – 30, Katelyn Costanza, Kai Roth, and Scott Lincoln participated in the Inundation Mapping Training in Gautier, MS
- Received FY10 Task # assignment (T10-0011) by NWS COTR. Worked with RTi on reducing to SOW within budgetary constraints and submitted revised SOW
 - Implemented 7 new AHPS sites (NPTA4, AUGA4, JUDA4, GEOA4, DSCA4, PTTA4, and CLDA4) for WFO LZK in the Lower White Basins.

- LMRFC continues support of AHPS activities with in-house calibrations for remaining basins east of the Mississippi River.
- Finalized review of RTi draft report and calibration decks.
- Began issuing daily forecasts for ALYM7.
- Provided feedback to the USGS's Real Time Hydrologic Notification System.
- Collaboration with WFO LIX on Department of Homeland Security Briefing presentation on inflows to the Gulf of Mexico for mitigation effort on Deepwater Horizon oil spill and provided GIS support for graphics used in briefings. Continued support for mitigation effort on Deepwater Horizon oil spill, including lead on collaborative work with Gulf Coast RFCs to provide inflow data and products and GIS support for graphics used in briefings and issuance of weekly LMRFC flows product to the Gulf of Mexico as input for the National Ocean Service's Gulf Circulation model.
- Katelyn Costanza has been working on QC'ing the AHPS static inundation maps for BLTN7 and TKS7.
- Completed generation of MAP calibrations for Lower Arkansas Forecast group and BGBA4, BBPA4, BBWA4, and JONL1 basins.
- Three in-house basin calibrations were completed this quarter: JKFM7, ALYM7, and BGBA4
- LMRFC continued CHPS migration activities.
- LMRFC participated in numerous conference calls, including Gridded FFG workshop planning, LOMRC, Texas DEM, and Hurricane Katrina Supplemental Flood Mapping Project Calls.
- NOAA Net communications test and ORN Xyplex replacements were successful
- LMRFC began participation in weekly Olmstead Dam Construction Hydrologic Support conference calls

4th Quarter FY10

- AHPS outreach activities this month.
 - July 6, David Welch and Kai Roth participated in a conference call with Gulf Coast RFCs to discuss verification of Gulf inflows provided to the NOS for Ocean oil trajectory model.
 - July 13– 16, WFO SGF's Service Hydrologist, Megan Terry toured LMRFC operations and worked with numerous forecasters familiarizing herself with LMRFC products and services.
 - July 14, Glenn Carrin participated in the NMQ and Nexrad Evaluation conference call
 - July 15, David Welch and Gina Tillis-Nash participated in RTi conference call concerning RES-J implementation from FY08
 - July 16, Dave Reed, David Welch, and Scott Lincoln participated in a meeting with the USGS and local officials in Hattiesburg, MS to discuss implementation of two new AHPS static inundation mapping sites.
 - July 19 – 23, Jeff Graschel participated in the Fusion/IRWSS Meeting in St. Louis, MO
 - July 20 – 21, Eric Jones (ABRFC) visited the LMRFC for a CHPS Buddy visit
 - July 20 – 22, Jessica Smith, Glenn Carrin, and Scott Lincoln visited the Old River Control Structure, ERDC, Vicksburg COE, WFO JAN, and USGS-MS for LMRFC Orientation trip
 - July 26 – 30, Katelyn Costanza visited WFOs MRX and GSP for LMRFC AHPS Customer Familiarization Meetings
 - July 27, Dave Reed, David Welch, Amanda Roberts, and Pat Brown (WFO LIX SH) visited with the director of the Pearl River County, MS EOC to discuss flooding concerns at Walkiah Bluff and visited several sites on the Lower Pearl River.
 - July 29, OB9.2.8 successfully installed with patches for NWSRFS.
 - July 30, NGI Intern Reggie Powell completed internship with LMRFC
 - August 2 – 6, Ken Kleeschulte attended GFE training in Kansas City, MO.
 - August 4-5, Jeff Graschel visited WFO MRX and attended TVA meeting in Knoxville, TN.
 - August 7, Jessica Smith and Jeff Graschel participated in the 57th Annual Foodservice Expo Outreach event in New Orleans, LA.
 - August 9 – 11, Dave Reed attended the HIC meeting in Atlanta, GA.
 - August 10, Amanda Roberts participated in Mississippi Camo Jackets conference call.
 - August 10, Dave Rameriz and Nancy Powell of the New Orleans Corps visited the LMRFC to review the Hurricane Surge Atlas.
 - August 11, Jeff Graschel attended the Virginia Silver Jackets conference call.

- August 11 -12, David Welch and Gina Tillis-Nash participated in the Mobile Army Corps' Tri-Agency meeting in Mobile, AL.
 - August 17 – 20, Royce Fontenot and Scott Lincoln attended COMET QPF Virtual course.
 - August 18, the New Orleans Corps Hydro & Hydraulics group toured LMRFC operations.
 - August 19, Jeff Grascel and Angelo Dalessandro visited the Vicksburg Corps to for Wayland Hill's retirement luncheon.
 - August 26, Gina Tillis-Nash, Jessica Smith, and Ken Kleeschulte participated in the New Orleans FEB's EEO/Diversity Leadership workshop in New Orleans, LA.
 - August 26, David Welch, Katelyn Costanza and Jeff Grascel visited the New Orleans Corps for NDFD setup and Gerry Grogreve's retirement luncheon.
 - August 30 – September 1, Scott Lincoln visited WFO LCH to work with Service Hydrologist Jonathan Brazzel on flood inundation mapping project and conducted river gage site visits.
 - August 31 – September 2, Angelo Dalessandro, Jessica Smith, and Glenn Carrin attended ArcGIS Spatial Analyst Course in Waveland, MS.
 - September 1, the Mobile and New Orleans Corps Hydrology and Hydraulics groups toured LMRFC operations and with LMRFC and WFO LIX team members, toured the USGS's Hydrologic Instrumentation Facility at Stennis Space Center, MS.
 - September 2, Dave Reed visited the Harrison County, MS Emergency Managers.
 - September 9 – 10, WFO JAN forecasters Jared Allen and Brian Koeneke toured LMRFC operations and participated in hands-on training of HAS function and river forecasting.
 - September 29, Dr. Lubchenco toured LMRFC operations and gave an all-hands briefing.
 - September 29, LMRFC staff participated in CHPS Introduction training session.
- Implemented 5 new AHPS sites (BHTA4, AKDA4, CAMA4, BTNA4 and CALA4) for WFO LZK in the Upper Ouachita Basins.
 - LMRFC continued CHPS migration activities.
 - LMRFC participated in numerous conference calls, including Gridded FFG workshop planning, LOMRC, and Olmstead Construction Project.
 - Continued support for mitigation effort on Deepwater Horizon oil spill, including issuance of weekly LMRFC flows product to the Gulf of Mexico as input for the National Ocean Service's Gulf Circulation model.
 - Prepared and submitted LMRFC FY11 AHPS work plan information for budget planning and the FY11 NWSRFS calibration worksheet for ARC.
 - Finished delivering datasets and supporting documentation to RTi for FY10 calibration effort. RTi currently reviewing datasets and performing water balance analysis.
 - Completed one in-house basin calibration (BLWM6).
 - Created five historical MAPs time-series for the Upper Mississippi River (PAHK2, CIRI2, CPGM7, and WKLK2) and East Tennessee (ENGG1) forecast groups.
 - LMRFC continues support of AHPS activities with in-house calibrations for remaining basins east of the Mississippi River.
 - Held a conference call with OHD to review Ohio/Upper Miss DWOPER to HEC-RAS conversion and calibration.
 - Scott Lincoln completed raster/shapefile clipping for the Guadalupe River at Seguin (SEGT2) AHPS static map library for WGRFC.
 - Katelyn Costanza and Scott Lincoln completed raster/shapefile clippings for BLTN7 and TKS7 AHPS static map libraries.
 - Scott Lincoln facilitated a presentation on a simplified inundation mapping methodology with the AHPS Core Goals Team.
 - BLTN7 flood lowered to 10.0 ft on September 7.
 - Continued working with Eric Jones to implement ESP for PFAA4, which is dependent upon PBFA4 ESP output from ABRFC.

Problems Encountered/Issues

1st Quarter FY10 –

- None

2nd Quarter FY10 –

- Issues with OB9.2 release in January resulting in DR 21050: Hydro: Invalid forecast from RES-J in ESP and DR 21051: Hydro: Trouble running ESPADP in batch mode. Special release patch of OB9.2.8 expected in July-August to resolve these issues.

3rd Quarter FY10 –

- None

4th Quarter FY10 –

- Computer issues implementing PFAA4 for ESP, a hand-off point from ABRFC. Continue working on implementation.

AHPS Implementation for SERFC

Management Lead: John Feldt, HIC

2. Objective: Implement probabilistic forecasts for basins in the Suwannee and Alabama River Forecast Center's area of responsibility. For FY10, this would include ...

3. FY 2010 calibration funding (\$K):

4. AHPS Implementation

Milestones

Implementation Area	Forecast Points Planned	Due Date	Actual to Date (4 th Qtr FY10)	Variance
Suwannee	7	1 st Qtr	7	0
Santee	1	Past due	1	0
Alabama	6	2 nd Qtr	6	0
	6	3 rd Qtr	6	0
	6	4 th Qtr	6	0
Total	25	FY10	26	0

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

- Todd Hamill presented L310 Inland flooding course at the National Hurricane Conference
- John Feldt gave presentation about Atlanta Flooding to Georgia Flood Plain Managers conference

3rd Quarter FY10

- CI-Flow – Participated in calls in preparation for hurricane season .
- Continued CHPS migration
- Corps Water management briefing call
- Coordinated with Duke Energy on an information/data exchange
- SERFC tropical briefing: 1 for WFO's and 1 for constituents
- Began forecasts for oil Spill – an extended model run

4th Quarter FY10

- Finished implementing ESP for the Alabama basin

- Continued CHPS migration
- Did specific Corps call for drought for Savannah Corps
- Continued forecasts for Deep Horizon oil spill
- Participated in Western Water Resource meeting contributed information for the web page
- Participated in 2 NIDIS meetings and are part of steering committee for final one for 2010

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- None

3rd Quarter FY10 - None

4th Quarter FY10 - None

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 4th Qtr FY10	Variance
Guadalupe	32	30 Sep. 2010	33	+1
Upper Rio Grande	2	31 Mar. 2010	2	0
Total	34		35	

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 WFO's (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 SAC SMA model.
- Initial installation of daily QC software.

2nd Quarter FY10

- Held monthly project call with RTi for contract RTi T9-0009 on 02/01.
- Defined four new segments in upper Rio Grande using calibrations delivered under Phase I of contract T9-0009.
- Installed and began running snow updating software to support upper Rio Grande forecast system.
- Completed computations of historical natural flow timeseries required under contract T9-0009.
- Provided natural flow timeseries to RTi.
- Received historical quality controlled station temperature and precipitation timeseries from RTi for MAP and MAT development.
- Coordinated reservoir modeling effort for Canyon Dam with Corps of Engineers. Completed

RES-J model for Canyon.

- Held monthly project call with RTi for contract RTi T9-0009 on 03/04.
- Performed GIS processing of gridded PRISM precipitation data sets and elevation zones to support MAT and MAP time series development
- Implemented necessary OFS changes from updated DWR and Phase I model calibration work; RTi discovered some issues with station temperature time stamps that affected MAT development which slightly affected results
- Continue preparing responses to questions concerning RTi review of historical natural flow timeseries required under contract T9-0009.
- Began setting up calibration decks using the current operational modeling parameters for Guadalupe.
- Held monthly project call with RTi for contract RTi T9-0009 on 03/31.
- Continued coordination and revisions with RTi for Pecos River market research analysis for FY 2010 AHPS calibration contract.
- Completed MAP and MAT time series development from historical quality controlled station temperature and precipitation time series provided by RTi. Delivered on 3/12/10.
- Reworked GIS processing and analysis to compute PRISM means for elevation zones which required reanalysis to determine station weighting for MAP time series development. Redelivery 3/24/10.
- Reviewed RTi technical memorandum and resource/reference document reviewing historical natural flows provided by WGRFC.
- Held meeting to discuss questions concerning RTi review of historical natural flow time series required under contract T9-0009.
- Continue to run forecast model for seven sites in the upper Rio Grande, evaluating results in support of our water supply forecast service.
- Continue running snow updating software to support upper Rio Grande forecast system.
- Began writing and debugging a program to auto generate mcp3 decks using the current operational modeling parameters.
- Began evaluating 1 hour Guadalupe model using ICP to determine usefulness for AHPS implementation.
- Began QIN, QME, and peak flow time series for San Antonio River.
- Continued market research for FY 2010 AHPS calibration contract.

3rd Quarter FY10

- Held monthly project call with RTi for contract RTi T9-0009 on 04/28.
- Reviewed questionable reservoir data as requested by RTi during evaluation and quality control of natural time series
- Held conference call with CDWR and RTi to discuss questions concerning diversions and regulation from RTi review of historical natural flow time series required under contract T9-0009.
- Updated model segments to correct input time series error and reran ESP for Apr 1 forecasts.
- Troubleshooting model to determine cause of data flow problems that have been recently identified within OFS... unresolved at present.
- Continue to run forecast model for seven sites in the upper Rio Grande, evaluating results in support of our water supply forecast service.
- Continue running snow updating software to support upper Rio Grande forecast system.
- Generated new basin definitions and historical MAPX files for new SANA sites and the affected old basins.
- Extended historical MAPX time series for all SANA basins through 12/2009.
- Completed QIN, QME, and peak flow time series for San Antonio River.
- Continued training and developing additional training materials for new employees on SAC/SMA calibration techniques.
- Held monthly project call with RTi for contract RTi T9-0009 on 06/03. Discussed status of calibration and preliminary results of initial calibrations for most of the headwater basins.
- Continue discussions with CDWR and RTi concerning diversions and regulation affecting natural flows as calibration efforts expose some areas where additional consumptive use modeling will be needed to account for regulation/diversions/return flows either unknown or too numerous to

individually track as required under contract T9-0009. Discussed preferred approaches and methods for resolution.

- Troubleshooting model to determine cause of snotel precipitation data flow problems that have been recently identified within OFS... unresolved at present.
- Began planning outreach travel for FY10 to support AHPS implementation for the Upper Rio Grande.
- Generated new basin definitions and historical MAPX files for new GUAD sites.
- Extended historical MAPX time series for all GUAD basins through 12/2009.
- Completed QIN, QME, and peak flow time series for Guadalupe River.
- Collected data for water balance technique for both Guadalupe and San Antonio Rivers.
- Held monthly project call with RTi for contract RTi T9-0009 on 06/03. Discussed status of calibration and preliminary results of initial calibrations for most of the headwater basins.
- Continued planning outreach travel for FY10 to support AHPS implementation for the Upper Rio Grande in Colorado. Coordinating outreach meetings for stakeholders and NWS forecasters at Pueblo WFO and Colorado Department of Water Resources office in Alamosa during week of August 16-20, 2010.
- Received and began initial review of Phase II headwater calibrations; working towards operational implementation.
- Received remaining Phase II calibrations ready for review.
- Completed 1 hour model calibration for the Guadalupe River above Canyon Dam.
- Completed calibration for new Comal River forecast point and tested implementation segments.
- Completed new MAPX time series data for new sites on Guadalupe and San Antonio Rivers.
- Completed all calibration decks for San Antonio River and adjusted routings/unit hydrographs in preparation for calibration.
- Completed water balance analysis for both Guadalupe and San Antonio Rivers with satisfactory results.

4th Quarter FY10

- Held monthly project call with RTi for contract RTi T9-0009 on 07/27. Discussed status of calibration and preliminary draft report reviews.
- Continued calibration deck review of Phase II headwater and local basin calibrations; working towards operational implementation.
- Received project report draft for review; continuing draft report review to provide RTi with questions and feedback in preparation for final report.
- Held initial Pecos River project call with RTi for contract RTi T10-XXXX on 07/27 jointly with URG-CO project call. Discussed internal work and QA/QC plans, basin delineation, and station data collection efforts to date. RTi requested support to verify real-time stations within data networks.
- Troubleshooting model to determine cause of snotel precipitation data flow problems that have been recently identified within OFS... unresolved at present.
- Completed outreach travel for Guadalupe/San Antonio River with WFOs and customers.
- Installed 1 hour model for the Guadalupe River above Canyon Dam.
- Upgraded forecast points below Canyon Dam to Seguin to the one hour time step and prepared them for installation.
- Downloaded additional information from the USGS that was discovered missing/inaccurate.
- Began calibration for San Antonio River above Elmendorf.
- Held monthly project call with RTi for contract RTi T9-0009 on 08/24. Discussed final report, wrap-up and requested feedback. Calibration project complete with final report to be delivered.
- Prepared AHPS outreach presentation for Upper Rio Grande in Colorado suited for both WFO forecasters and water supply stakeholders.
- Completed calibration deck review of Phase II headwater and local basin calibrations. Received additional explanation and corrections from RTi for some decks.
- Completed review of Phase II draft report. Provided RTi with review comments and questions; received RTi responses.
- Received Phase II final report and deliverables.
- Held monthly Pecos River project call with RTi for contract RTi T10-14 on 08/24 jointly with final

URG-CO project call ending the Phase II work. Discussed basin and elevation zone delineations along with issues related to temp/precip station data inventory. Updated progress on inventory and QA/QC process to date. RTi continued request for support to verify real-time stations within data networks.

- Complete review of basin and elevation zone delineations.
- Continued field support of temp/precip station data inventory to verify station IDs and data availability in real-time. This has required significant in-house effort along with requested support from WFO service hydrologists and hydro focal points.
- Completed outreach travel to support FY10 AHPS implementation for the Upper Rio Grande in Colorado. **Two sites (Del Norte and Alamosa) will be officially available beginning in November as requested and coordinated with WFO Pueblo.** About eight NWS forecasters participated in presentation at Pueblo WFO and around 15 staff and district commissioners participated during two separate presentations for the Rio Grande Division office of the Colorado Department of Water.
- Continuing work towards operational implementation of Phase II calibrations. Two sites (Del Norte and Alamosa) will be officially available beginning in November as requested and coordinated with WFO Pueblo.
- Held monthly Pecos River project call with RTi for contract RTi T10-XXXX on 09/29. Discussed station data inventory questions and status, unit hydrograph analysis, and other planned deliverables. RTi continued request for support to verify real-time stations within data networks.
- Coordination and planning for contracted RTi training scheduled for November 18th, 2010.
- Began initial discussions with NM State Engineer's office and Interstate Stream Commission to compile information about the Pecos Riverware model.
- Troubleshooting model to determine cause of snotel precipitation data flow problems that have been recently identified within OFS... unresolved at present.
- Finalized all routings, especially for new simulation/forecast points.
- Finalized all graphics to be generated for AHPS locations.
- Created new GUADRESJ forecast group to support RES-J operations/segments below Canyon Dam and Coletto Creek Reservoirs.
- Configured the doAHPS program to generate the GUAD and SANA text products for AWIPS and email messages for weather service and outside users.
- Discovered and corrected a problem with MAPE and discharges that was causing Canyon Lake to drain during ESP runs.
- Set up ESP decks that run for one year to look for strange behavior in ESP forecasts.
- Completed full implementation for all sites on Guadalupe and San Antonio Rivers including 3 sites expected to be new forecast points by the end of the year.
- Prepared ESPADP and user interface program doAHPS for soon to be implemented San Jacinto River system.

Problems Encountered/Issues

1st Quarter FY10 – None

2nd Quarter FY10 – Because of challenges with continuing effort on developing natural flows in upper Rio Grande, the implementation of the AHPS services on those two sites will be delayed until the end of June. This will not impact the completion of the contract by RTi on time, just the implementation dates of the AHPS sites.

3rd Quarter FY10 – Due to major flooding along the Rio Grande, work was not accomplished towards the end of June on any of the AHPS projects. Therefore the two sites in Colorado that were scheduled for the 3rd quarter will now be implemented in the 4th quarter.

4th Quarter FY10 – At the request of the Pueblo WFO, the two sites in the Upper Rio Grande, although being completed, will not be posted on the AHPS pages until November 2010. The WFO wants the implementation to coincide with the beginning of the snow season.

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

2nd Quarter FY10

- N/A

3rd Quarter FY10

- N/A

4th Quarter FY10

- N/A

Problems Encountered/Issues

1st Quarter FY10

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

2nd Quarter FY10

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

3rd Quarter FY10

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

4th 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

2nd Quarter FY10

- N/A

3rd Quarter FY10

- N/A

4th Quarter FY10

- N/A

Problems Encountered/Issues

1st Quarter FY10

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

2nd Quarter FY10

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

3rd Quarter FY10

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

4th 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

2nd Quarter FY10

- N/A

3rd Quarter FY10

- N/A

4th Quarter FY10

- N/A

Problems Encountered/Issues

1st Quarter FY10

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

2nd Quarter FY10

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

3rd Quarter FY10

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

4th 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

<i>Task (COMET-led unless noted)</i>	<i>Due Date</i>	<i>Status</i>
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	Completed Q2 FY10
Communicating and Understanding Hydrologic Ensemble Information – Distance Learning Module (FDTB) [HY20]	Q3 FY10	Suspended indefinitely in Q3 FY10 in lieu of higher priority work for XEFS training development
Quantitative Precipitation Forecasting Virtual Course [HY19]	Q4 2010	Course completed August 2010. Similar to June 2009 offering.
Techniques in Hydrologic Forecast Verification Distance Learning Module [HY21]	Q4 FY 2010	Expected in November 2010.
QPF Verification I Distance Learning Module [HY29]	Q3 FY 2010	Completed in Q3 FY2010.
QPF Verification II Distance Learning Module [HY29]	Q1 FY 2011	Suspended due to lack of AHPS funding to complete work
Distributed Modeling for Flow Forecast Distance Learning Module	Q3 FY 2010	(Part I completed in Q4 FY09.) Part II completed Q4 FY2010
NCEP-HPC Visits	Q4 FY10	4 Visits Completed

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

- Completed the Flash Flood/QPE Residence Workshop [HY11] from 3/9-11/2010. COMET reported that the "...Workshop was successfully delivered ... with 12 subtopics, two FFMP-Advanced laboratory exercises, and a floodway field study. The students' evaluation of the workshop's ability to provide important and useful information was 4.7 where 5 is outstanding."
- Discussions between FDTB, OCWWS/HSD, and field staff on Communicating and Understanding Hydrologic Ensemble Information – Distance Learning Module [HY20]. See notes on this in problems section.
- Discussions continue with COMET and selected instructors on the focus for the Quantitative Precipitation Forecasting Virtual Course [HY19]. The course will be held in August 2010, but it may be more focused on the hydrologists (e.g. RFC river forecasters, WFO SH/HPM), rather than meteorologists (e.g. RFC HAS).
- For the Techniques in Hydrologic Forecast Verification Distance Learning Module [HY21], content and graphics development continued in April.
- For the QPF Verification modules [HY29], module 1 script and graphics are complete and the script is through management review. Multimedia production began in April. It is expected that work for the module 2 may not be complete until Q1 FY11.
- For part 2 of the module on Distributed Modeling for Flow Forecasts, the module containing presentations from Dr. Dennis Johnson continues to be revised and updated. An interactive exercise is being designed.

3rd Quarter FY10

- Activities proceed and on track for the Quantitative Precipitation Forecasting Virtual Course [HY19]. The course will be held in August 2010; it will be shifted somewhat to be more focused on the hydrologists (e.g. RFC river forecasters, WFO SH/HPM).
- For the Techniques in Hydrologic Forecast Verification Distance Learning Module [HY21], script development continued for and the necessary graphics have been received from the two collaborating RFCs (MARFC and OHRFC). Refinement and preparation of graphics continues.
- For the QPF Verification module [HY29], module 1 (QPF Verification: Challenges and Tools) this module was completed and made available June 3. It is accessible through the COMET METED site (<http://www.meted.ucar.edu/hydro/verification/QPFverif1/index.htm>) or via the Learn Center.
- For part 2 of the module on Distributed Modeling for Flow Forecasts, development continues. Narration has been recorded by Dr. Dennis Johnson and the module is about to go into final production.
- NCEP-HPC Coordination Visits: Greg Waller (WGRFC) visited HPC May 4-6, Ken Kleeschulte (LMRFC) visited HPC May 11-13. The remaining visits scheduled are: HPC (Rich Bann) will visit MARFC July 13-14, and HPC (Chris Hedge) will visit CNRFC August 2-5.

4th Quarter FY10

- The Quantitative Precipitation Forecasting Virtual Course [HY19] course was held the week of August 16, 2010. The agenda shifted somewhat to be more tailored to the hydrologists with less meteorological experience (e.g. RFC river forecasters, WFO SH/HPM).
- The following RFC staff visited HPC during the course of FY10: Greg Waller (WGRFC) May 4-6, Ken Kleeschulte (LMRFC) HPC May 11-13. The following HPC staff will visit RFC in FY10: Rich Bann to MARFC July 13-14, Chris Hedge to CNRFC August 2-5.
- The Distributed Modeling for Flow Forecast module was completed and placed on the LMS.
- Work continued on Techniques in Hydrologic Forecast Verification Distance Learning Module [HY21]. Most of module will be completed for a November publication. The issues encountered are discussed below.

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

- For the ensemble modules, this was scheduled for May 2010, but this module will not be completed by then. Furthermore, it does not seem that Communicating and Understanding Hydrologic Ensemble Information [part of PNS HY20] is the ensemble topic which needs a training module. There is not a consensus on how this topic should be presented in a way which will be useful to field training. Discussions are ongoing on possibly shifting the training to focus on operational, or prototype, implementations of current functionality, including XEFS/HEFS, MMEFS, and HMOS.
- For the Techniques in Hydrologic Forecast Verification Distance Learning Module [HY21], this was scheduled for Q2 FY2010, but was not completed. It is expected to be completed in FY10, but it may not be complete until Q4.
- For the QPF Verification modules [HY29], module 1 has slipped from Q2 to Q3, module 2 has slipped from Q3 FY2010 to Q1 FY2011.
- For part 2 of the module on Distributed Modeling for Flow Forecasts, this module has slipped from Q2 FY2010 to Q3 FY2010.

3rd Quarter FY10

- The work for the module Communicating and Understanding Hydrologic Ensemble Information was suspended. FDTB estimated that work was about 25% complete. Given the more urgent demands for training support on the XEFS ensemble prototype system, FDTB was instructed to support the training needs for the XEFS project. Rick Koehler from FDTB has joined the XEFS project team and is reviewing user documents and developing training documents.
- For the Techniques in Hydrologic Forecast Verification Distance Learning Module [HY21], this was scheduled for Q2 FY2010, slipped to Q3, and will not be complete until Q4.
- For the QPF Verification module [HY29], module 2 (QPF Verification: Working with Discontinuous Files), work has been suspended indefinitely due to lack of funds. Because AHPS funds for COMET in FY11 are being reduced and used for CHPS training, the continuity of funding has been reduced and COMET is not able to complete this module.
- For part 2 of the module on Distributed Modeling for Flow Forecasts, this module has slipped from Q3 FY2010 to Q4 FY2010.

4th Quarter FY10

- COMET needs to wrap up HY21, but does not yet have adequate graphics to demonstrate conditional forecast verification for IVP. Therefore, the portion of the IVP section that describes conditional forecast verification (forecast reliability and forecast discrimination) will not be provided.

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	Completed
Flood Safety Awareness Week	OCWWS	0	Q2	Completed
Annual FEMA Flood Conference, San Diego, CA	OCWWS	8.0	Q3	Completed
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	Completed
Update and reprint Floods the Awesome Power brochure	OCWWS	3.0	Q3	Completed
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	Completed
Update and reprint "Guide to Hydrologic Information on the Web" brochure	OCWWS	6.0	Q3	Completed
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	Completed
Produce and distribute TADD Warning Road Signs	OCWWS	4.0	Q4	Completed
Develop new AFWS brochure in coordination with the NHWC	OCWWS	5.0	Q4	Completed
Sub Total		48.0		
AHPS ESP presentation & training at the Ohio River Basin Water Summit (OHRFC); Location: Cincinnati, OH	ER	.1	Q1	Complete
Customer Outreach Visit in Champlain Basin to promote AHPS services and solicit customer hydrologic service requirements (NERFC); Location: Champlain Basin, VT	ER	1.2	Q1	Complete
AHPS ESP presentation & training at the Mississippi Water Control Meeting (OHRFC); Location: Memphis, TN	ER	3.0	Q1	Complete
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	Cancelled
Participate in NOAA in the Carolinas and visit Duke Power to promote AHPS services in the Carolinas (SERFC); Location: North & South Carolina	ER	.8	Q3	Complete
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	Complete
Enhanced AHPS services presentations at the ASCE Environmental & Water Resources Congress (OHRFC, NERFC); Location: Providence, RI	ER	2.1	Q3	Complete
Customer Outreach Visits in New England & New York to promote AHPS services & solicit customer hydrologic service requirements (NERFC); Locations: Mt. Morris Dam	ER	1.0	Q3	Completed
Coordination visit to Dominion Power & SC Gas & Electric, WFO(s) CHS & CAE to review AHPS product suites and review hydrologic services (SERFC); Location: SC	ER	.6	Q4	Completed
Enhanced Care Taker Program Basin Review Visits to 2 ER WFO(s) to review and	ER	1.0	Q4	Completed

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	Completed
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	Q1	Completed
AHPS presentation at Red River Basin Commission River Forecast Summit (NCRFC) Location: Grand Forks, ND	CR	.9	Q2	Completed
RTI AHPS Contract Meeting (MBRFC) Location: Fort Collins, CO	CR	1.5	Q3	Completed
Participate in Red River Basin Commission Ex-Officio Meeting (NCRFC) Location: Grand Forks, ND	CR	.5	Q4	Completed
Participate in Mississippi Valley Annual River Forecasters Meeting (MBRFC) Location : St. Paul, MN	CR	2.6	Q4	Completed
High Water Mark Signs (CRH)	CR	1.0	Q4	Completed
Stormwater Floodplain Simulation System (CRH)	CR	1.0	Q4	Completed
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
TVA Coordination Meeting (LMRFC) Location: Huntsville, AL	SR	1.15	Q1	Completed
Red River Valley Association Meeting (ABRFC) Location: Shreveport, LA	SR	.3	Q2	Completed
Louisiana Hurricane Conference (LMRFC) Location: Baton Rouge, LA	SR	.5	Q2	Completed
WFO LCH/Southeast Texas Water Managers Workshop (WGRFC) Location: Beaumont, TX	SR	.5	Q2	Completed
Lake Texoma Advisory Committee Meeting (ABRFC) Location: Lake Texoma	SR	.2	Q3	Completed
National Association of State Flood Plain Managers (ASFPM) Conference (ABRFC) Location: Oklahoma City, OK	SR	1.15	Q3	Completed
AHPS Customer Familiarization Meetings (ABRFC) Location: Springfield, MO and Topeka, KS	SR	.3	Q3	Completed
National Hurricane Conference (SERFC) Location: Orlando, FL	SR	1.25	Q3	Completed

Florida Governor's Hurricane Conference (SERFC) Location: Fort Lauderdale, FL	SR	1.25	Q3	Completed
International Boundary Water Commission Flood Workshops (WGRFC) Location: Various locations along the Texas portion of Rio Grande	SR	.5	Q3	Completed
AHPS Customer Familiarization Meetings (LMRFC) Location: WFOs OHX, MRX, and GSP	SR	2	Q4	Completed
AHPS Customer Familiarization Meetings with Emergency Management Agency (SERFC) Location: Tallahassee, FL	SR	.8	Q4	See Below
AHPS Customer Familiarization Meetings - 2 (SERFC)	SR	.8	Q4	Completed
AHPS Customer Outreach Visits (WGRFC) Location: Upper Rio Grande Valley – CO/NM	SR	1	Q4	Completed
Customer Outreach for FY 2010 AHPS Probabilistic Forecast Implementation for the Guadalupe and San Antonio River Basins (WGRFC) Location: Throughout South Texas	SR	.8	Q4	Completed
Customer Outreach for FY 2010 AHPS Probabilistic Forecast Implementation for the Upper Rio Grande River Basin (WGRFC) Location: Rio Grande Valley throughout CO and NM	SR	1.5	Q4	Completed
High Water Mark Signs (SRH)	SR	1.25	Q4	Completed
Stormwater Floodplain Simulation System (SRH)	SR	1	Q1	Completed
Sub Total		19.0		
Purchase Turn Around Don't Drown Signs (WFO PSR)	WR	\$1.0	Q4	Completed
Purchase High Water Mark Signs (WFO LKN)	WR	\$0.2	Q4	Completed
Conduct Montana Hydrology Conference (WFO TFX)	WR	\$3.0	Q4	Completed
Purchase Outreach Materials (WFO SEW)	WR	\$2.0	Q4	Completed
Purchase Materials for Office Outreach Exhibit (WFO LOX)	WR	\$3.0	Q4	Completed
Purchase Watershed Model (WFO MFR)	WR	\$1.1	Q4	Completed
Purchase Watershed Model (WFO VEF)	WR	\$1.1	Q4	Completed
Purchase Watershed Model (WFO EKA)	WR	\$1.1	Q4	Completed
Purchase Turn Around Don't Drown Signs (WFO PQR)	WR	\$1.5	Q4	Completed
Sub Total		\$14.0		
Preparation of material for user conferences	AK	\$.7	Q2	Complete
Participation in Anchorage NWS User Conference	AK	\$.3	Q3	Complete
Participation in Fairbanks User Conference	AK	\$2.0	Q4	Complete
Participation in Juneau Users Conference	AK	\$2.0	Q3	Complete
Sub Total		\$5.0		
Grand Total		\$114		

Accomplishments/Actions

1st Quarter FY10

2nd Quarter FY10

3rd Quarter FY10

4th Quarter FY10

SR - AHPS Customer Familiarization Meetings with Emergency Management Agency (SERFC)
Location: Tallahassee, FL. This funding was reprogrammed into other SERFC AHPS activities.

Problems Encountered/Issues

1st Quarter

2nd Quarter

3rd Quarter

4th Quarter

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 the AHPS, NOAA or Agency parts of 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).

2nd Quarter FY10

- All milestones are on schedule – all scheduled reports completed

3rd Quarter FY10

- All milestones are on schedule – all scheduled reports completed

4th Quarter FY10

- All milestones are on schedule – all scheduled reports completed
- Have begun to consider impact of upcoming Strategic Execution and Evaluation process on planning

Problems Encountered/Issues

1st Quarter FY10 – None

2nd Quarter FY10 – None

3rd Quarter FY10 – None

4th Quarter FY10 – None