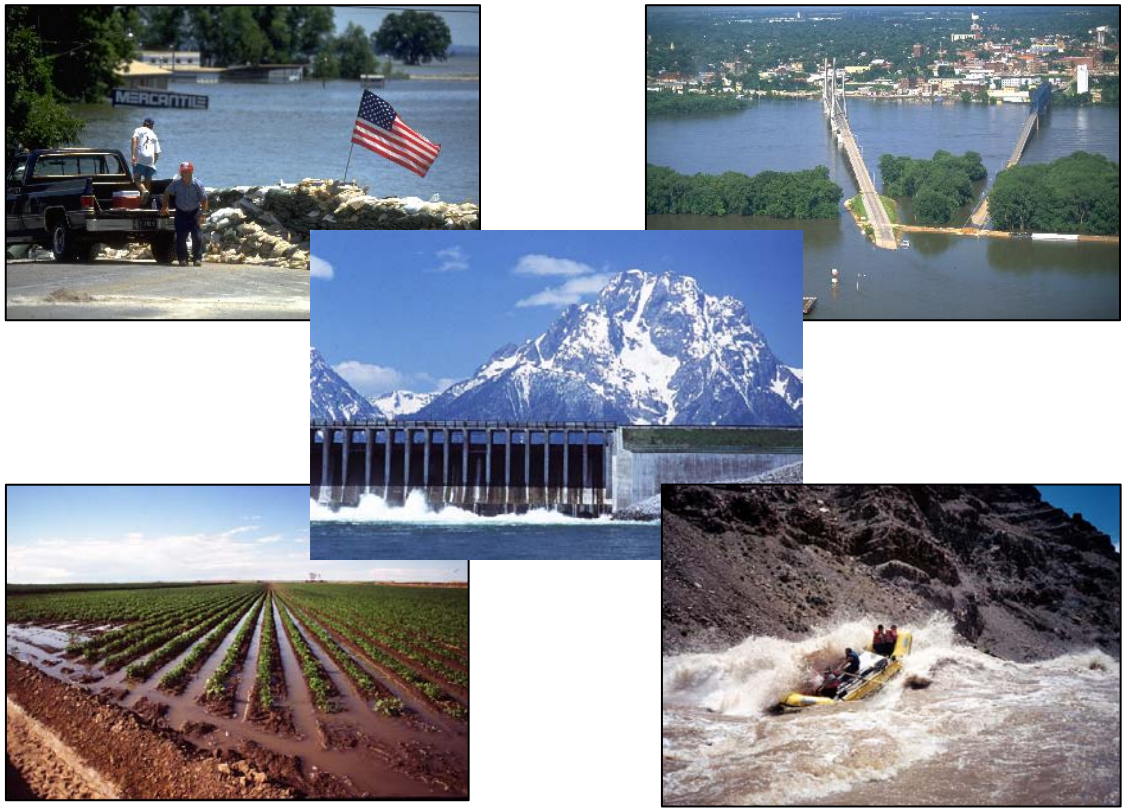
Advanced Hydrologic Prediction Service
Quarterly Report
3rd Quarter FY 2008



June 30, 2008

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On-going Competitive and Collaborative Research

Theme: Collaborative Research

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

Accomplishments/Actions

1st Quarter FY05

- We received 27 pre-proposals for new competitive grants. There was no money in the budget to award new grants. All proposers were notified and the process terminated.
- We received progress reports from 3 of the 4 on-going competitive grants. As of today, we also hosted a seminar on the research grant from the U. of Arizona. We will be hosting seminars from the U. of Colorado, U. of Iowa and Central Florida University on Monday, February 7.
- We received a proposal for continuation of a collaborative research from Shripad Deo at CIRA. We requested a re-scope of the proposal which was received and is being evaluated

2nd Quarter FY05

- All progress reports for the on-going competitive grants were received and the renewal process was complete and delivered to the Office of Grants.
- We received news of a Congressional earmark for the Read River Basin Institute. The RFA was published one week ago, and in a telephone conversation with the Institute Director (Chuck Fritz) he communicated that he was completing the proposal this afternoon (4/22)

3rd Quarter FY05

- All on-going competitive grants were submitted on-time to the Grants office.
- The non-competitive Red River earmark grant was received by the proponent on-time. OHD evaluated the grant with assistance of two outside reviewers, approved and forwarded the material to the grants office on time.

4th Quarter FY05

- All grants were awarded on time

1st Quarter FY06

- Scheduled presentations for the Grant Principal Investigators to present their annual progress reports

2nd Quarter FY06

- All four grantees gave presentations to OHD in January, and submitted progress reports.
- All grants were renewed on-time

3rd Quarter FY06

- We used Water Resources Initiative funding to increase each grant by $20 K. Additionally, we used $80K to grant the University of Central Florida a one-year extension to adapt the model to the Pascagoula, MS river, in order to extend the area of forecasting of the LMRFC.
- We dedicated $93K to fund 2 graduate fellowships. Both fellowships will be managed through

the NOAA-CREST program lead by the City College of New York. One of the fellowships will be hosted by a NOAA-CREST institution, and the other one will be available to any graduate program in Water Resources and Hydrology in the US.

4th Quarter FY06

- NOAA-CREST was notified of the award, which allows us to proceed to the announcement, evaluation and award of the two student fellowships.
- The four $20K extensions to all grantees, and the $80K extension to UCF were signed.

1st Quarter FY07

- We received 42 proposals for the June Omnibus announcement. The proposals were reviewed for compliance and found four were non-compliant. The remaining proposals are being evaluated by HSMB and external reviewers.
- The 4 on-going research projects are approaching their completion. Their third and final seminar presentation is scheduled for February 16. These projects are:
    - University of Colorado: "Improving Operational Streamflow Forecasts in the Colorado River Basin" PI Andrew Slater.
    - University of Arizona: "Parameterization and Parameter Estimation of Distributed Models for Flash Flood and River Prediction with Quantification of Uncertainty" PI Hoshin Gupta.
    - University of Iowa: "Diagnostic Verification of 6-90 Day Ensemble Streamflow Predictions for AHPS" PI Allen Bradley
    - University of Central Florida: "Tides and Waves for the National Service River Forecast System" PI Scott Hagen

2nd Quarter FY07

- Recommended one proposal for award in the Social Sciences category of the December 27 2006 Federal Register Omnibus announcement. No proposals were deemed suitable for funding in the River Regulation category.
- The 40+ proposals received in response to the June Omnibus announcement are in final review. The panel should meet on 4/20

3rd Quarter FY07

- OHD recommended 3 proposals for award under the June 2006 Omnibus announcement. We also received a proposal under the Broad Agency Announcement which we recommended for award.
- All proposals are now in the grants office. Two proposals are now finalized by the Grants office, and the remainder are in progress.

4th Quarter FY07

- All 3 grants received under the June 2006 and one grant received under the December 2006 Omnibus announcements and recommended for funding were awarded. The Grants office rejected the proposal received under the Broad Agency Announcement, by refusing to issue a waiver.

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.

Problems Encountered/Issues

1st Quarter FY05

- Apart from the reduced amount of funding, there have been no problems

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

- None on our side. The award to AZ and the $80K extension to UCF had some glitches that were resolved at the last minute.

1st Quarter FY07 - None

2nd Quarter FY07 – None

3rd Quarter FY07

- The Grants office has an issue with the indirect cost rate (ICR) of the social science proposal. The requested, and received, a clarification about the rate both from the grantee and from DoD, which reviewed and approved the ICR. The Grant specialist is now on leave, returning on 8/8. I'll pursue the question then.

- As of today, we are still waiting on a formal approval from the Grants office about the proposal received under the BAA. We had received verbal approval, but are waiting for a written approval to be attached to the file and finish up that grant.

4th Quarter FY 07

- The proposal received under the BAA was rejected by the Grants office. The Chief had the authority to issue a waiver, but declined to do so. We are studying whether to include it in the December 07 omnibus announcement, or whether to solicit bids for a contract.

1st Quarter FY08

- None

2nd Quarter FY08

- None

3rd Quarter FY08

- None

Quantify Uncertainty (Ensembles)

Update/develop XEFS R&D and RTO plan

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Dong-Jun Seo

Objective: Update the existing R&D and RTO plan for Phase 1 implementation of XEFS. Working with the RFCs, develop an R&D and RTO plan for Phase 2 of XEFS.

Milestones

Task	Due Date	Status
1. None planned	Q1	N/A
2. None planned	Q2	N/A
3. Form the planning team and lead discussions with the RFCs	Q3	Complete
4. update the Phase 1 plan and develop the Phase 2 plan	Q4	

Accomplishments/Actions

1st Quarter FY08
- N/A

2nd Quarter FY08
- N/A

3rd Quarter FY08
- Form the DSST planning team and held discussion sessions.

Problems Encountered/Issues

1st Quarter FY08
- N/A

2nd Quarter FY08
- N/A

3rd Quarter FY08
- None.

Integrate EPP2 Subsystems into EPP3

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Dong-Jun Seo

Objective: Improve performance of precipitation ensemble module in the EPP2-RFC Subsystem. Integrate the EPP2-RFC and EPP2-GFS Subsystems into a unified Ensemble Pre-Processor, EPP3.

Milestones

Task	Due Date	Status
1. Benchmark performance of the EPP2 subsystems	Q1	Complete (see Q1 Issues)
2. Improve precipitation ensemble modeling (including distribution modeling) for implementation in EPP3	Q2	Complete
3. Integrate the EPP2 subsystems (including calibration and real-time processors) into EPP3	Q3	In progress
4. Complete integration and produce Version 1 of EPP3	Q4	

Accomplishments/Actions

1st Quarter FY08
- Carried out hindcasting of the EPP2-RFC and EPP2-GFS Subsystems for test basins in AB-, CN- and MARFCs.
- Carried out evaluation and verification of the hindcast ensembles from the EPP2 Subsystems.

2nd Quarter FY08
- Carried out research and analysis for development of the new module for parametric and nonparametric modeling of probability distribution of precipitation.
- Carried out hindcasting of precipitation ensembles from the new module.
- Carried out evaluation and verification of the hindcast precipitation ensembles.

3rd Quarter FY08
- Completed hindcasting and validation of short- and medium-range ensemble hindcasts.

Problems Encountered/Issues

1st Quarter FY08
- For AB- and MARFC test basins for which the GFS Subsystem currently does not operate, it was not possible to verify the results obtained from the GFS Subsystem installed at OHD. As such, additional work is needed, and will be carried out by John Schaake in collaboration with HEP during the rest of the project period, to verify the results.

2nd Quarter FY08
- The Q1 issue has not been resolved and the work is continuing.

3rd Quarter FY08
- Integration of EPP3 requires information on the user interface, which has only begun.

Develop/Improve HMOS

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Dong-Jun Seo

Objective: Develop the prototype Hydrologic Model Output Statistics (HMOS) streamflow ensemble processor, and carry out research and development necessary to improve performance

Milestones

Task	Due Date	Status
1. Carry out enhancement to HMOS to account for uncertainty due to misidentification of flow level.	Q1	Complete
2. Carry out evaluation.	Q2	Complete
3. Support experimental operation and verification at ABRFC	Q3	Complete
4. Support experimental operation and verification at ABRFC	Q4	

Accomplishments/Actions

1st Quarter FY08
- Carried out and completed development of the enhanced version of the HMOS streamflow ensemble processor that reflects errors in identifying flow regime (between high and low).

2nd Quarter FY08
- Carried out and completed evaluation of the new version of the HMOS streamflow ensemble processor using an updated (and enlarged) data set from ABRFC.

3rd Quarter FY08
- Completed evaluation of the new version and released it to ABRFC.

Problems Encountered/Issues

1st Quarter FY08
- None

2nd Quarter FY08
- Due to the limited sample size, it was not possible to stratify the statistics finely (to account for, e.g., seasonality). This is expected to compromise the performance to a degree.

3rd Quarter FY08
- None.

Integrate EPP2 Subsystems into EPP3

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Dong-Jun Seo

Objective: Improve performance of precipitation ensemble module in the EPP2-RFC Subsystem. Integrate the EPP2-RFC and EPP2-GFS Subsystems into a unified Ensemble Pre-Processor, EPP3.

Milestones

Task	Due Date	Status
5. Benchmark performance of the EPP2 subsystems	Q1	Complete (see Q1 Issues)
6. Improve precipitation ensemble modeling (including distribution modeling) for implementation in EPP3	Q2	Complete
7. Integrate the EPP2 subsystems (including calibration and real-time processors) into EPP3	Q3	In progress
8. Complete integration and produce Version 1 of EPP3	Q4	

Accomplishments/Actions

1st Quarter FY08
- Carried out hindcasting of the EPP2-RFC and EPP2-GFS Subsystems for test basins in AB-, CN- and MARFCs.
- Carried out evaluation and verification of the hindcast ensembles from the EPP2 Subsystems.

2nd Quarter FY08
- Carried out research and analysis for development of the new module for parametric and nonparametric modeling of probability distribution of precipitation.
- Carried out hindcasting of precipitation ensembles from the new module.
- Carried out evaluation and verification of the hindcast precipitation ensembles.

3rd Quarter FY08
- Completed hindcasting and validation of short- and medium-range ensemble hindcasts.

Problems Encountered/Issues

1st Quarter FY08
- For AB- and MARFC test basins for which the GFS Subsystem currently does not operate, it was not possible to verify the results obtained from the GFS Subsystem installed at OHD. As such, additional work is needed, and will be carried out by John Schaake in collaboration with HEP during the rest of the project period, to verify the results.

2nd Quarter FY08
- The Q1 issue has not been resolved and the work is continuing.

3rd Quarter FY08
- Integration of EPP3 requires information on the user interface, which has only begun.

eXperimental Ensemble Forecast System (XEFS)

Core Goal: Quantify uncertainty of our forecast information

Management Lead: Jon Roe

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)	Project planning continued
XEFS Phase 1 Implementation: Pass OSIP Gate 2	FY09 Q3 (formerly FY08 Q3)	Not started
XEFS Phase 1 Implementation: Pass HOSIP Gates 1, 2 and 3	FY09 Q3 (formerly FY08 Q4)	HOSIP project P-2007-019 "Experimental Ensemble Forecast System (XEFS)" in Stage 1
XEFS Phase 1 Implementation: Reconcile differences between prototype and operational Ensemble Post Processor (pass HOSIP Gate 3)	Q2	HOSIP P-2005-005 "Ensemble Post Processor Evaluation" in Stage 3
XEFS Phase 1 Science Algorithm Development: Pass HOSIP Gate 3	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

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 (EPP, HMOS, etc.) to HSMB. Training provided. Intention is that HSMB will now continue XEFS prototyping activities in a CHPS environment instead of it 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.

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

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
1. Obtain high resolution SSURGO and Land Use Land Cover data for DMIP1 basins	Jan. 31, 2005	completed
2. Derive new a priori SAC-SMA parameters using high resolution data for some research basins	March 31, 2005	Completed
3. Review, understand theory of a priori parameter estimation procedure	April 30, 2005	completed
4. Streamline parameter updating (add newly derived data in current grid data sets)	Sept. 30, 2005	Completed
5. Test new parameters against those derived from STATSGO (both for lumped and distributed)	Dec. 31, 2005	In progress
6. Modify, extend theory of SAC-SMA parameter estimation (e.g. use of CN number explicitly)	Sept. 30, 2005	Completed
7. Extend areal coverage of SSURGO-based SAC parameters for more consistent evaluation	Sep. 30, 2006	Derived for DMIP 2 western basins. Derived for 25 states in SR and CBRFC
8. Evaluate performance of SSURGO-based and STATSGO based parameters on soil moisture simulation over DMIP 2 basins where data available.	FY07 Q3	In progress
9. Derive and test a priori parameters by using combination of STATSGO and Curve Number Grids	FY07 Q3	Derivation complete; testing in progress
10. Complete hydrograph analysis of STATSGO-SSURGO parameters and hydrologic simulations, journal paper and RFC recommendations.	FY08 Q4	Analysis completed; paper draft for comments
11. Derive SSURGO parameters for remaining states (including Hawaii, Alaska and Puerto Rico if possible)	FY08 Q4	Will start in the week of July 21, 2008

Accomplishments/Actions

1st Quarter FY05

- Task 1: Most of GIS data for DMIP1 basins are downloaded
- Task 2: Began processing of GIS data to generate SSURGO-based SAC-SMA parameters for IAHS conference

2nd Quarter FY05

- Tasks 2 & 3 have been completed. Fine scale parameters have been derived for some basins in Oklahoma.

3rd Quarter FY05

- Ziya Zhang, Seann Reed, and Victor Koren ran 2km x 2km scale distributed modeling tests with

new parameters. Results show improvement over STATSGO based parameters.

4th Quarter FY05

- New version of soil-based SAC-SMA parameters was developed that uses a high resolution CN grid in addition to soil texture. Testing of this new procedure will commence.

1st Quarter FY06

- Began to process data for North Fork American River in CNRFC domain
- Developed basic time estimate to process raw data into parameters.
- OFC Dec 14 on comparison of SSURGO and STATSGO parameters for distributed model simulations. Showed improvement in cases. Gary expressed great interest in the value of these fine scale data for soil moisture simulations.

2nd Quarter FY06

- Mike Smith presented paper on SSURGO and STATSGO data for distributed model simulations at the Joint Federal Interagency Modeling Conference in Reno, Nevada, April 2-6.
- Ziya Zhang's statistical analyses of the distributed modeling simulations shows that the gains by using SSURGO data for parameterization are statistically significant.
- Ziya Zhang investigated methods of automating some of the processing of the raw SSURGO data.

3rd Quarter FY06

- Reviewed an available program to derive STATSGO-based SAC parameters and defined needed changes to develop the program that accounted explicitly for CN grids.
- Provide HL-RMS with Muskingum-Cunge routing option to ABRFC for their testing.
- Continued evaluation of the performance of SSURGO-based and STATSGO-based SAC parameters.

4th Quarter FY06 - N/A

1st Quarter FY07

- This project now leverages the work funded via the Hurricane Supplemental. Significant progress made in streamlining the process of SSURGO data downloading and processing into SAC parameters. New processes use "R" language and GRASS GIS. Validation of new procedures versus initial manual procedures shows generally good agreement.

2nd Quarter FY07

- SSURGO based SAC parameters developed for 20 states in Southern Region and CBRFC domain at 1 and 4km resolutions. Initial comparisons (scatter plots and spatial variability) with STATSGO based parameters show reasonable agreement. HOSIP documents updated to agree with current status of work. Hydrologic modeling analysis of the SSURGO parameters to continue. Intermediate products such as soil porosity were also developed.
- Developed HOSIP documents for this work.

3rd Quarter FY07

- Tested HL-RDHM on 16 basins using different sets of SAC parameters. Began to analyze results. Victor, Seann, Ziya, and Yu discussed use of antecedent soil moisture condition I versus II, decided condition 1 more valid. SSURGO parameters using condition 1 generated for 25 states. Yu revised his journal manuscript on SSURGO-based parameter definition per Seann's and Mike's comments. Yu completed program for filling missing values in parameter grids. Yu regenerated SSURGO parameters for entire states of OR, ID, and WY.
- Continued comparisons of SSURGO and STATSGO parameters using graphs and hydrologic simulations.

4th Quarter FY07

- New parameter grids made available for DHM/RDHM users. The following five files are available from the NOAA1 server. Please see the attached Word document for instructions on

obtaining these grids. The SSURGO parameters have been derived as part of the Hurricane Supplemental tasks.

1) unfilled.tgz : SSURGO-NLCD based parameter grids at the 4 km resolution (25 states) and supplemental grids (see README)
2) filled.tgz : SSURGO-NLCD based parameter grids at the 4 km resolution with some gaps filled via interpolation (see the README)
3) statsgo.tgz: STATSGO-GLCC based parameter grids at the 4 km resolution
4) pe_filled.tgz: new monthly PE grids in which data at CONUS boundaries has been extended using interpolation
5) readme.tgz: contains documentation for all the new grids

- Ziya Zhang worked on preparing a journal paper on the analysis of these new parameter sets.
- Yu Zhang submitted paper to OHD review on the processing of SSURGO-data for the derivation of SAC model parameters.

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.

Problems Encountered/Issues

1st Quarter FY05 - None

2nd Quarter FY05 - None

3rd Quarter FY05 - None

4th Quarter FY05 - None

1st Quarter FY06

- Ziya noted that SAC parameters derived from SSURGO data can show discontinuities at county borders.

2nd Quarter FY06 - None

3rd Quarter FY06

- Trying to automate the processing of the SSURGO is challenging due to different formats among counties.

4th Quarter FY06

- Delays due to 1) difficulties in process automation and 2) efforts to launch DMIP 2 western basin

experiments. Also, advances in using soil moisture data for model calibration were explored; a new technique for comparing point-to-grid soil moisture estimates was developed in a related study for the economic benefits of water resources. These latter two developments will help the analysis of STATSGO (with variable CN) and SSURGO soil moisture estimates.

1st Quarter FY07

- Identified problem of disk storage of the SSURGO data: much space is required.

2nd Quarter FY07

- FY07 Q1 disk storage problem resolved by processing the SSURGO data state by state.

3rd Quarter FY07 - None

4th Quarter FY07 – Work delayed due to major personnel changes:

- Researcher Ziya Zhang suffering from major health problems; will go on extended leave in October.
- Researcher Yu Zhang left Hydrologic Modeling group to join Hydrometeorology Group. Replacement is being sought.

1st Quarter FY08 - None

2nd Quarter FY08 - None

3rd Quarter FY08 - 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 *a priori* 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 *a priori* SAC-SMA parameters	Sep. 30, 2005	completed
6. Develop a physically-based procedure to derive *a priori* values of the most critical SNOW-17 parameters over CONUS	Mar 30, 2006	Completed for MF-max, MF-min.
7. Evaluate *a priori* 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	In progress
9. Test PE adjustment approach on a large region, e.g., Oklahoma Mesonet using soil moisture data.	FYO8 Q4	In progress
10. Perform calibration of SAC parameters, and analyze their relationships to *a priori* and climatologic indexes	FYO8 Q4	In progress
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 *a priori* parameters (increase time period and basins)	FY09 Q1	In progress
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	In progress
15. Test PE adjustment approach to large region i.e., uncalibrated areas/basins from lumped and distributed simulation results.	FY09 Q2	In progress

16. Investigate other sources of Snow-17 *a priori* parameter ranges: use energy budget model results	FY08 Q4	Delayed until new contractor hired in FY08 Q1: FY08 Q2: derived
17. Derive and test first-cut *a priori* values of Snow-17 parameters SCF and UADJ	FY08 Q4	Monthly values derived for CONUS; move completion date
18. Evaluate new ZPERC algorithm, provide recommendations to RFCs. Deliver new ZPERC grid via CAP	FY08 Q4	In Progress

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.

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.

Distributed Hydrologic Model into Operations

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

Management Lead: Jon Roe

Objective: Incrementally develop and nationally deliver components of distributed hydrologic modeling software within the evolving CHPS architecture.

Milestones:

Task	Due Date	Status
Expose this project to the larger NWS OSI Process in order to eventually make use of existing AWIPS capabilities for grid display and manipulation.	Q1	Complete
Adjust HOSIP Stage 1 documents and submit to OSIP.	Q1	Complete
Pass OSIP Gate 1.	Q2	Complete
Identification of first increment high-priority requirements, including requirements related to model computations, data display and manipulation, and operational considerations.	Q2	Complete
Adjust HOSIP Stage 2 documents and submit to OSIP.	Q2	Complete
Perform due diligence of a selection of existing hydrologic modeling systems used to process, display and manipulate grid-based data.	Q2	Complete
Pass OSIP Gate 2.	Q2	Complete
Pass HOSIP Gate 2	Q3	Complete
Adjust HOSIP Stage 3 documents and submit to OSIP.	Q4	Complete
Pass OSIP Gate 3.	Q1, FY06	Complete
Perform architectural design development for first increment, including database, computational, display, calibration and operational considerations.	Q1, FY06	Complete
Develop first increment prototype architecture.	Q1, FY06	Complete
Evaluate architectural design and make updates to architectural scheme and implementation.	Q1, FY06	Complete
Perform HOSIP Stage 4 development for first increment targeted for AWIPS Release OB7.	Q1 – Q3, FY06	Complete
Pass HOSIP Gate 4 for first increment	Q2, FY07	Complete
Present status update to OSIP Gate committee	Q2 FY07	Complete
Prioritize second increment of requirements for next AWIPS release OB8.2	Q2 FY07	Complete
Develop architectural design for second increment of Build 1	Q1 – Q3, FY07	Complete
Perform development for second increment of Build 1 targeted for AWIPS Release OB8.2.	Q1 – Q3, FY07	Complete
Prioritize next increment of Build 1 requirements for AWIPS release OB8.3	Q4 FY07	Complete
Perform and complete development for next increment of Build 1 for AWIPS Release OB8.3.	Q1 FY08	Complete
Support AWIPS testing of software	Q2-3, FY08	Complete
Present status update (Gate 4) to OSIP Gate committee	Q3 FY08	Complete

Accomplishments/Actions:

1st Quarter FY05

- WGRFC, ABRFC, and OHD agreed on a subset of high-priority functional requirements for the first increment of software development.

2nd Quarter FY05

- We have reviewed several existing distributed modeling systems: the USGS/USDA Object Modeling System (OMS), the NASA Land Information System, the Danish Hydraulic Institute MIKE 11 model, and the NOHRSC SNODAS modeling system. We will be working through simple experiments with the OMS and the NOHRSC system to further our understanding and to select one as the platform for our distributed modeling development.
- We have initiated an OSIP project to look at the existing AWIPS grid editing and display tools to determine if we can take advantage of them for our grids. Using existing tools will speed our development considerably.

3rd Quarter FY05

- We collaborated with NOHRSC in the development of a prototype distributed Sacramento model with the goal of better understanding the pluses and minuses of using the NOHRSC framework at the RFCs.
- We worked with SEC and FSL to determine the feasibility and level of effort required to update D2D and/or GFE to meet DHM's grid and spatial data display related requirements.

4th Quarter FY05

- We completed the analysis of a prototype DHM architecture using NOHRSC's GISRS modeling environment. Due to AWIPS constraints and differences in how NOHRSC does modeling and how DHM would be used at RFCs, we have decided to not pursue using GISRS for DHM at the RFCs.
- We started in-house development of DHM for AWIPS OB7.
- We completed, sent for review, and updated the OSIP documents to enter OSIP Gate 3 Based on the review of the documents by OCWWS, ABRFC, WGRFC, OHD, and SEC, all indications are we will get approval to commence OSIP Stage 4 in early October 2005. In fact, the OSIP Gate 3 was passed on 11 October 2005.

1st Quarter FY06

- We presented the proposed DHM architecture to the AWIPS design review committee. The review generated some action items, which have been addressed. We are still on track for delivery of the first increment of DHM at RFCs for AWIPS OB7.
- We worked with RFC representatives and SEC/OST to finalize the requirements for displaying output from the distributed model in D2D. SEC/OST is now making the necessary edits to D2D.

2nd Quarter FY06

- The DHM architecture and DHM features planned for AWIPS OB7.2 were presented to the DOH Science Steering Team (DSST). A follow-up meeting with the DSST is scheduled for mid-May to go over some of their questions and concerns.
- SEC/OST development of D2D features for DHM is back on track after contractual issues affecting the developer were resolved.
- OSIP project 05-001 "Application of the Graphical Forecast Editor in AWIPS at NWS River Forecast Centers (RFCs)", currently in OSIP Stage 3, will recommend a phased implementation of GFE at RFCs, with Phase 1 being the OB8 release of DHM. OSIP Gate 3 for project 05-001 is expected on 5/23.

3rd Quarter FY06

- DHM Build 1 software was delivered on time on June 6, 2006 to the AWIPS contractor for OB7.2. Corresponding D-2D changes, developed by OS&T/SEC, were also delivered on time.
- The OSIP project 05-001 "Application of the Graphical Forecast Editor in AWIPS at NWS River

Forecast Centers (RFCs)" failed its IWT pre-Gate 3 Review. A new approach will temporarily merge OSIP project 05-001 with this project (OSIP ID 04-007) to permit 05-001 Phase 1 to pass OSIP Gate 3.
- Funds from OHD/AHPS to GSD for OB8 GFE software development have now been transferred.

4th Quarter FY06
- As of September, OS&T no longer maintains a development or test system supporting an RFC localization, which is required for the end-to-end D-2D DHM capability. During this quarter, OHD created a local AWIPS development and test environment.
- Minor enhancements to the original DHM Build 1 (OB7.2) functionality are underway; these will be targeted for AWIPS OB8.1.
- Identification and re-prioritization of the next set of requirements targeted for Build 2 has begun
- The next phase of the project (DHM Build 2) is expected to "spiral" back around to OSIP Gate 3 during Q1 of FY07.

1st Quarter FY07
- The project leader for DHM in AWIPS OB8 is now Ai Vo
- OB8.1 content was completed and delivered to Raytheon for testing. Due to a compressed AWIPS schedule, OB8.1 content for DHM was limited to infrastructure improvements and bug fixes; no additional DHM requirements were implemented.
- OHD hosted a 2-day evaluation session in November with forecasters from ABRFC and WGRFC. It is now clear that the OB7.2 functionality with D-2D display of grids is too weak to be successful on its own. A joint decision was made to capitalize on ABRFC's XDMS and HSMB's prototype in the OB7.2 timeframe (also for OB8). OHD agreed to prepare a workshop which will provide training for RFCs and explain the plans for getting distributed modeling into operations.
- GSD will prepare and give a demonstration of GFE running in an RFC environment on January 31 2007 for the HIC conference in Kansas City. OHD will begin the DHM Build 2 requirements definition process based on information gathered at the demo.
- HOSIP Gate 4 for OB7.2 work was originally scheduled for January, but has been delayed until February due to other higher priority projects. OS&T's OSIP analyst determined that the DHM project is only required to pass OSIP Gate 4 when all requirements for DHM Builds 1 and 2 have been met. At the present time, complete implementation is expected to occur in AWIPS OB8.3.

2nd Quarter FY07
- HOSIP Gate 4 for the OB7.2 phase of Build 1 was completed in March
- Status update presented to OSIP Gate 4 in March
- An AWIPS Requirements Review for OB8.2 content (second phase of DHM Build 1) was held at the end of February/early March
- Development is now underway for OB8.2. Several conference calls with ABRFC and WGRFC have been conducted to review design aspects for the software. Of particular concern in OB7.2 was system performance; performance has now been significantly improved for OB8.2.
- The workshop for DHM is scheduled for the week of June 4. HSMB is coordinating the effort with OCWWS.

3rd Quarter FY07
- A DHM workshop, led by HSMB, was held during Q3 FY07 as planned.
- Software development for AWIPS OB8.2 was completed on schedule and delivered to the AWIPS prime contractor, Raytheon. Raytheon will begin formal testing during Q4.
- Requirements planning for AWIPS OB8.3 began during Q3.

4th Quarter FY07
- Finalized requirements for AWIPS OB8.3 in August after several discussions with RFC personnel.
- Analysis and design for OB8.3 were completed in September.
- A Distributed Modeling Operations Concept Team was formed. Work on DHM Build 2 will be postponed pending the report of this team and subsequent teams to identify the gaps in the current capabilities in the CHPS/AWIPS II environment.

- Upcoming AWIPS Release OB9 marks the end of DHM Build 1. DHM Build 2 will be picked up when work is scheduled for CHPS/AWIPS II.

1st Quarter FY08

- AWIPS OB8.3 Pre-Integration Testing was conducted Dec. 11-13.
- AWIPS OB8.3 Integration Readiness Review was completed and all software and documentation were handed off to AWIPS in December.

2nd Quarter FY08

- AWIPS OB8.3 Software Integration Testing (SWIT) and System Integration Testing (SIT) were completed by the AWIPS Contractor during this period.

3rd Quarter FY08

- AWIPS testing of the software was successfully completed.
- AWIPS OB8.3 System Verification Review (SVR) was completed on June 5, 2008.
- General deployment began on June 18, 2008.
- OSIP Gate 4 was passed on July 1, 2008.

Problems Encountered/Issues:

1st Quarter FY05

- Because some of the identified operational functional requirements are closely related to issues being addressed through software development in other parts of the NWS (e.g., developing software to display and manipulate grids), the project was promoted into the NWS's, Operational Service Improvement Process (OSIP) during the first quarter. This required adjustments to already existing HOSIP documentation which was performed in the first quarter and continues into the second quarter.
- Since this AHPS project was lightly funded for FY05, progress will be slower than seen in FY04. OHD is adding some AWIPS funding support to keep the project moving. The weak funding profile could cause milestones above to slip over time.

2nd Quarter FY05

- One of our contractors found a new (and better) job, so we have been delayed in completing our review of the modeling systems. We expect to have found a replacement by the end of April.

3rd Quarter FY05

- A more thorough review of the ARS/USGS object modeling system (OMS) led us to classify it as not mature enough for operational distributed hydrologic modeling. We will reassess it in the future.

4th Quarter FY05

- After determining NOHRSC's modeling environment (GISRS) is not useful for our purposes, we have started DHM development using the remaining alternative, which is to internally develop DHM architecture/software. We plan to use the existing research prototype and focus our efforts for AWIPS OB7 on integrating it into NWSRFS using a Java-based control structure. As documented in the OSIP documents, choosing this approach may result in reducing the number of DHM features implemented in AWIPS OB7.
- A principal OHD representative in formulating the CHPS architecture is helping to lead DHM development. Our approach for integrating DHM into NWSRFS will take advantage of the ideas being considered in the CHPS project.

1st Quarter FY06

- There is the potential for an interruption in the work being done by SEC/OST because of the transition of the AWIPS contract to Raytheon/Keane.

2nd Quarter FY06

- None

3rd Quarter FY06
- None

4th Quarter FY06
- Raytheon's implementation of changes to D-2D for DHM grid display has not gone well due to the maintenance developer's limited understanding of OHD's requirements and the D-2D subsystem. After much discussion between OHD, Raytheon, and GSD, all parties agreed that one particular major D-2D problem concerning missing cells in a gridded basin will be addressed by Raytheon for OB7.2.
- It remains unclear what documentation is required by OSIP for DHM Build 1, if any. There is no intention to proceed to OSIP Gate 4 until all functionality has been implemented; this will take at least two DHM Builds.

1st Quarter FY07
- AHPS funding for DHM is now limited to efforts targeted towards CHPS not NWSRFS. This means resources have been reduced to one person (Ai Vo) using Base funds, with some part-time assistance from 2 other developers.

2nd Quarter FY07 - None

3rd Quarter FY07
- GSD announced to OHD that previously provided AHPS funds will only be used to develop/provide training for GFE at RFCs. It turned out that the funds were not enough for GSD to do any DHM-specific GFE software enhancements.

4th Quarter FY07
- There was insufficient developer time available to incorporate the SNOW-17 operation, the most requested enhancement, into DHM. Instead a workaround is planned for OB8.3 which will allow DHM to process input rainfall+snowmelt grids produced by the RDHM.
- Note there were no AHPS funds allocated to this project for all of FY07 and there will be none for FY08. All future work will be for AWIPS II within the context of CHPS.

1st Quarter FY08
- The decision was made in January 2008 to not include any more work on this project for AWIPS Release OB9. Resources are being diverted to the task of implementing CHPS and considering how DHM fits into that architecture.

2nd Quarter FY08
- None

3rd Quarter FY08
- 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

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.

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

Milestones

Task	Due Date	Status
1. Modify RDHM to be called by a generic 'wrapper'	FY07 Q2	complete
2. Test initial auto calibration with OK DMIP 2 basins.	FY07 Q2	complete
3. Explore performance issues in context of DMIP 2	Q4	complete
4. Evaluate multi-time scale objective function. Evaluate need for time series component analysis to identify dominant time scales	FY07 Q2	1st part complete; 2nd part delayed
5. Test Rosenbrock and/or Davidon-Fletcher-Powell search algorithms	FY07 Q3	Put on hold
6. Automatic calibration extended to lumped Snow-17	FY08 Q1	Complete
7. Investigated separate procedures for elevation zones for mountainous areas.	FY08 Q4	In progress
8. Evaluate combined automatic and manual calibration strategy	FY08 Q4	Complete for non-snow basins; in progress for basins including snow
9. Develop outline for overall strategy for distributed model calibration	FY08 Q3	In progress
10. Develop approach for auto calibration of elevation zone parameters	FY09 Q1	Not started yet.

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

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.

Enhance prototype DA for HL-RDHM and carry out multi-site evaluation

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

Management Lead: Dong-Jun Seo

Objective: Enhance the existing prototype DA for HL-RDHM for assimilation of in-situ soil moisture data.
Carry out evaluation of the enhanced prototype to identify research and development necessary toward operational implementation.

Milestones

Task	Due Date	Status
1. Complete the initial condition assimilation experiment.	Q1	Complete
2. Complete the precipitation assimilation experiment.	Q2	Complete
3. Carry out evaluation.	Q3	Complete
4. Identify enhancement and simplification toward operational implementation.	Q4	

Accomplishments/Actions

1st Quarter FY08
- Designed and carried out a series of numerical experiments for assimilation of streamflow and in-situ soil moisture data for analysis and prediction of streamflow and soil moisture.

2nd Quarter FY08
- Designed and carried out a series of numerical experiments for assimilation of streamflow, in-situ soil moisture and precipitation data for analysis and prediction of streamflow and soil moisture.

3rd Quarter FY08
- Completed the numerical experiments.

Problems Encountered/Issues

1st Quarter FY08
- None

2nd Quarter FY08
- Due to lack of readily available data in other areas, evaluation may have to be limited to the Illinois and Elk River (i.e. DMIP) basins in the OK-MO-AR border area.

3rd Quarter FY08
- It was found that the in-situ soil moisture data used is of limited quality, which reduces the potency of assimilating them.

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.	FY09 Q1	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 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 output. Although featuring a steeper learning curve than GrADS, the software can directly display DHM 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

Problems Encountered/Issues

1st Quarter FY08 - None

2nd Quarter FY08 - None

3rd Quarter FY08 - None

Distributed Model Intercomparison Project (DMIP II)

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

Management Lead: Mike Smith

Objective: Develop then Refine Gridded Water Resources Products.

Milestones

Task	Due Date	Status
1. Complete analysis of simulations from the Oklahoma experiments	Q4	On track
2. Submit papers for DMIP 2 Special Issue	Q4	On track
3. Design OK forecast mode experiment	FY09 Q1	On track
4. DMIP 2 Western Basin Experiments: generate and analyze basic (w/o HMT data0 distribute and lumped simulations	FY09 Q1	On track
5. DMIP 2 Western Basin Experiments: HMT QPE, temperature, and freezing level data analysis and use in distributed and lumped models	FY09 Q1	Most likely delayed due to OHD and HMT precipitation problems
6. 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 QPE's 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.

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 inderlying 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.

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 contract for coordination with OHD	Q2	Complete
Develop Detailed Work Plan	Q4	On going

Accomplishments/Actions

1st Quarter FY08
- N/A

2nd Quarter FY08
- NCEP hired Jairui Dong to provide point of contact for coordination with OHD on NCEP hydrologic modeling activities

3rd Quarter FY08
- Work plan in progress

Problems Encountered/Issues

1st Quarter FY08
- N/A

2nd Quarter FY08
- None

3rd Quarter FY08
- None

Verification

Improve Ensemble Hindcaster

Core Goal: Verify our forecast and uncertainty information

Management Lead: Pedro Restrepo

Objective: 1) Use the Hydrologic Ensemble Hindcaster to produce hydrologic ensemble hindcasts based on different ensemble pre-processor methodologies (including EPP2, GFS subsystem, and newly developed ensemble pre-processors)
2) Develop user's manual and training document for installation and operation of the prototype Hydrologic Ensemble Hindcaster
3) Develop additional capabilities to offer capabilities for deterministic hindcasting, basic raw model forecasting, and ensemble postprocessing and analyze the impact of input forecasts, run-time MODs, and postprocessing on flow forecasts
4) Support the integration of the Hydrologic Ensemble Hindcaster into the XEFS prototype.

Milestones

Task	Due Date	Status
Use the prototype Hydrologic Ensemble Hindcaster to produce streamflow hindcasts from various pre-processor methodologies	FY07 – Q1	Complete
Develop a user's manual for installation and operation	FY07 – Q3	Complete
Release and support the prototype Hydrologic Ensemble Hindcaster	As necessary	In progress
Develop hindcasting capabilities for deterministic hindcasting and basic raw model forecasting	Q4	
Develop hindcasting capabilities with ensemble postprocessing	Q4	
Support the integration of hindcasting capabilities into XEFS	As necessary	In progress
Coordinate verification activities		Moved to AHPS project "Develop Verification Strategies" in FY08

Accomplishments/Actions

1st Quarter FY07

- Produced ensemble forecast verification results for various forcing inputs (including GFS subsystem hindcasts of precipitation and temperature using GFS forecasts) for AB- and CNRFCs.
- Delivered the enhanced Hydrologic Ensemble Hindcaster scripts to CNRFC.
- Developed a scientific algorithm documentation and training material, which was presented during the RFC Short-Term Ensemble Workshop in November 2006.
- Developed a description of all the verification activities and the verification focal point duties for 2007 with an estimation of work up to 2011, in order to develop a National River Forecast Verification System.

2nd Quarter FY07

- Helped putting the OFS FCST NUMCOSAV enhancement request in the DR list; this enhancement is necessary for the Hydrologic Ensemble Hindcaster to produce retrospective initial conditions at the time step consistent with the forcing input fore-/hindcasts.
- Worked on developing datasets required for running the Ensemble Hindcaster with the forcing input ensembles from EPP II and for verifying the streamflow forecasts at MARFC test basins.
- Supported CNRFC for running the Ensemble Hindcaster with the hydrometeorological ensembles produced by the GFS Subsystem; helped correcting an error on date labels for the GFS Subsystem output ensembles.

- Worked on the Ensemble Hindcaster user's guide (to be completed in by April 07).
- Presented the verification of hydrologic forecasts in the NWS with results from the Ensemble Hindcaster at the International Verification Workshop at ECMWF in Reading, UK in January 2007.
- Produced a paper entitled "Experimental hydrometeorological and hydrologic ensemble forecasts and their verification in the U.S. National Weather Service" to be published in the IAHS red books and presented at the IUGG07 conference.
- Worked on the organization of the RFC Verification workshop to be held at CBRFC in mid-August 2007: developed an agenda, contacted the speakers, developed a description of RFC verification focal points who will attend the workshop, and helped developing a survey for forecasters.

3rd Quarter FY07

- Ran the EPP II hindcaster and the Hydrologic Ensemble Hindcaster using different forcing input datasets (climatology, resampled climatology, QPF-based short-term ensembles) and produced verification results for precipitation and streamflow ensembles for the 10 MARFC test basins.
- Finalized the Hydrologic Ensemble Hindcaster user's guide.
- Worked on the organization of the RFC Verification workshop to be held at CBRFC on August 14-16 2007: finalized the agenda, had meeting with the speakers to coordinate the presentations, developed a team charter for the NWS Hydrology Forecast Verification, developed a website for the team and the workshop, reviewed the questions and the survey from the workshop participants, and developed presentations and a glossary for verification metrics.

4th Quarter FY 07

- Continued to run the EPP II hindcaster using the latest EPP II methodology, the Hydrologic Ensemble Hindcaster, and the Ensemble Verification System prototype to produce verification results for precipitation and streamflow ensembles for the MARFC test basins.
- Enhanced the Ensemble Hindcaster scripts to support CNRFC hindcast work. Hydrologic hindcasts can be generated for a list of segments or forecast groups. The user's manual has been updated using examples at CN-, AB-, and MA- RFCs. The updated scripts and users manual have been delivered to CNRFC in September 2007.
- Supported the design analysis of a hindcasting capability for XEFS.
- Conducted the RFC Verification workshop at CBRFC on August 14-16 2007. The workshop was attended by representatives from all RFCs, COMET, Central Region Headquarters, Western Region Headquarters, and one WFO. The topics covered included verification concepts and methodologies, effective strategies to communicate verification information, logistical verification, deterministic river forecast verification including the Interactive Verification Program (IVP) software and capabilities, and probabilistic river forecast verification including the Ensemble Verification System (EVS) software and capabilities. The topics were presented as lectures, software demonstrations, and hands on lab exercises. Overall, the workshop was well received with the most common feedback indicating that the workshop and training sessions need to be conducted yearly. All the workshop materials, results of software surveys, and workshop evaluation are available on the workshop website.
- Participated in the monthly meetings of the WR Hydrology Verification team to work on verification case studies at CN-, CB-, and NW- RFCs.
- Worked on the verification section for the OHD Science Plan; a first draft was presented to OHD management at the end of September 2007.
- Participated in the DMIP2 workshop on September 10-12 2007 to discuss how to verify the hydrologic simulations produced by the different models to be inter-compared.
- Worked on planning the verification activities for FY08 with the Verification System Requirements and Planning team, in coordination with the XEFS team and the RFC Archive team.

1st Quarter FY08

- Supported the use of the Hydrologic Ensemble Hindcaster prototype at CNRFC for the American River basins.

2nd Quarter FY08

- Delivered the Hydrologic Ensemble Hindcaster prototype to OH- and NE-RFCs; helped OHRFC and Allen Bradley run the hindcaster prototype on several basins and discussed future hindcaster enhancements.
- Gave the hindcaster prototype and test data to Raytheon to work on the small enhancement DR 18809, to get ESP produce retrospective model states with the correct timing; discussed the ESP codes and timing issues.
- Supported the tests of the hindcaster scripts for future integration into the XEFS prototype.
- Discussed the hindcaster issues on reservoirs at CN- and OH-RFC; the ESP hindcasting capability does not handle correctly reservoir operations, which limits the utility of the current hindcaster prototype.

3rd Quarter FY08

- Supported Raytheon to work on the DR 18809, to get ESP produce retrospective model states with the correct timing; ran several testing procedures and started to produce new results with the modified ESP codes.
- Updated the HOSIP documentation for the Hydrologic Ensemble Hindcaster Research Project in preparation of the HOSIP Gate 3 meeting on 07/09/2008.
- Continued to participate in the discussion about the hindcasting capability to be integrated in the XEFS prototype using the FEWS ensemble capabilities.

Problems Encountered/Issues

1st Quarter FY07

- There has been a request for enhancing the OFS FCST NUMCOSAV function used in the Hydrologic Ensemble Hindcaster to generate retrospective initial conditions at the desired time step; no enhancement has been done so far.

2nd Quarter FY07

- The requested enhancement of the OFS FCST NUMCOSAV function in the DR list is not assigned yet.

3rd Quarter FY07

- The work on additional ensemble hindcasting capabilities have been delayed since a new ensemble forecasting approach based on the statistical analysis of operational deterministic forecasts, called HMOS, has been developed to support the XEFS project.
- The requested enhancement of the OFS FCST NUMCOSAV function has not been worked on yet.

4th Quarter FY07

- The work on additional ensemble hindcasting capabilities have been delayed to FY08 to coordinate with the XEFS project, which includes the HMOS and post-processor components.
- The requested enhancement of the OFS FCST NUMCOSAV function is now part of the SREC list for OB9 but no resources have been allocated to it. This issue needs to be addressed before delivering the hindcasting capability to the RFCs to produce hydrologic hindcasts with the correct model states information.

1st Quarter FY08

- Resources have been allocated to work on the DR18809 in 2008. The completion date for this DR needs to be determined.

2nd Quarter FY08

- The completion date for the DR 18809 still needs to be determined.
- The ESP hindcasting capability does not handle correctly reservoir operations, which limits the

utility of the current hindcaster prototype.

3rd Quarter FY08

- Raytheon had many difficulties to deliver the DR 18809; final codes were delivered on 07/11/2008 and will have to be fully tested for ob9. Because the delivery of the new codes was delayed, the work on the hindcaster prototype was also delayed.

Develop Verification Strategies

Core Goal: Verify our forecast and uncertainty information

Management Lead: Pedro Restrepo

Objective:

1) Support the NWS Hydrologic Forecast Verification team and the WR Hydrology Verification team with the RFC verification case studies to develop standardized verification strategies for an effective communication of results to end users. This activity will include:
   - surveying all the RFCs on their current archiving practices and issues;
   - supporting the existing software and prototypes (IVP, EVS, and Ensemble Hindcaster) to run verification case studies;
   - gathering a list of enhancements for the existing software and prototypes to meet all user needs;
   - developing additional training material for the team members;
   - proposing standardized metrics and graphics to present verification results to identified users;
   - proposing performance tracking measures to show the level of success in river forecasting
   - developing a plan to disseminate verification data and results.
2) Organize and conduct a second RFC verification workshop in Fall 08 with the NWS verification team to share verification experiences, present new science and software applications, and develop the final team report on verification strategies.
3) Support the National Verification Focal Point to coordinate the verification activities within NWS, advocate for verification activities (AHPS, HOSIP/OSIP), represent hydrologic verification with respect to National Performance Management Committee, contribute to verification policy decisions, and coordinate hydrology verification journal articles and training development.

Milestones

Task	Due Date	Status
Support the NWS and WR hydrologic verification teams	FY09 – Q2	In progress
Organize and conduct verification workshop	FY09 – Q1	In progress
Support the National Verification Focal Point activities	As necessary	In progress

Accomplishments/Actions

1st Quarter FY08

- Worked on planning the verification activities for FY08 with the Verification Core Goal team, in coordination with the XEFS and RFC Archive Core Goal teams. The AHPS verification plan for FY08 was sent to OHD management on 11/02/2007.
- Organized monthly meetings with the NWS verification team to review the team charter, deliverables and agenda, to determine the current archiving processes and issues at the 13 RFCs, and to select verification case studies for all RFCs. Participated in the meetings with the WR verification team to review CB- and CN-RFCs case studies.
- Participated in the NPMC monthly meetings, as well as the verification workshop in early November; OHD verification activities for both single-valued and ensemble forecast verification were presented.
- Discussed with Matt Kelsch the verification training modules that COMET is developing.

2nd Quarter FY08

- Finalized the AHPS verification plan for FY08 and gave a presentation to the HICs on 01/29/2008.All verification activities got funded at 100%.
- Continued to organize monthly meetings with the NWS verification team to determine the current archiving processes and requirements, to select verification case studies for all RFCs, and to gain expertise with IVP ob8.2 by working on an exercise. Started to organize the second RFC verification workshop for the week of November 18 or the week of December 09. Participated in the meetings with the WR verification team to review the NWRFC case study.
- Set up a new verification listserver called verify-hydro, to facilitate communication on verification with DOHs, OHD, verification teams, and Matt Kelsch at COMET.
- Worked on a BAMS paper entitled "Application of Forecast Verification Science to Operational River Forecasting in the U.S. National Weather Service"; the proposal for this paper has been accepted as an In Box paper; sent the paper to the OHD management for review.
- Reviewed and updated a paper entitled "Completing the forecast: assessing and communicating forecast uncertainty" to be published in the ECMWF proceedings.
- Participated in the NPMC monthly meetings; discussed high impact event verification, GIS-based verification applications, and dissemination of verification information to the general public.
- Reviewed the verification training module developed by Matt Kelsch at COMET and discussed the training modifications with Kevin Werner and Holly Hartman.
- Sent training requirements to OCWWS for ensemble forecasting and verification.

3rd Quarter FY08

- Continued to meet with the NWS verification team to discuss the archiving requirements, review verification case studies for CB-, CN-, WG-RFCs, give a demo of EVS, and review exercises with IVP and EVS. Continued to organize the second RFC verification workshop for November 18-20. Participated in the meetings with the WR verification team to review the WFO case study and discuss the final team report.
- Support the verification listserver called verify-hydro, to facilitate communication on verification with DOHs, OHD, verification teams, and Matt Kelsch at COMET.
- Finalized the BAMS paper entitled "Application of Forecast Verification Science to Operational River Forecasting in the U.S. National Weather Service", to be published as an In Box paper; the paper was submitted to AMS on 05/06/2008.
- Participated in the NPMC monthly meetings; continued to discuss GIS-based verification applications and best ways to disseminate verification information to the general public.
- Helped Matt Kelsch at COMET to finalize the verification training module with Kevin Werner and Holly Hartman; the module was made available on 06/01/2008 and was well received by members in the NWS verification team.
- Submitted a verification session proposal for the AGU Fall meeting; the session for which the co-conveners are Allen Bradley, Kristie Franz, Barbara Brown and Julie Demargne, was accepted.

Problems Encountered/Issues

1st Quarter FY08 - None

2nd Quarter FY08 – None

3rd Quarter FY08

- For the NWS verification team, we had to postpone two meetings due to the recent flooding in the Mid-West and the overload of work at several RFCs. We plan to review all the RFC case studies before the 2nd RFC verification workshop on Nov. 18-20.

Improve Forecast Verification

Core Goal: Verify our forecast and uncertainty information

Management Lead: Pedro Restrepo

Objective:

1) Improve ensemble verification capabilities by developing new verification techniques, and publishing the results in one or more scientific manuscripts. In particular:
   - ⇒ Identification of sampling uncertainties for the ensemble verification metrics (e.g. through confidence intervals).
   - ⇒ Development of additional diagnostic and real-time (prognostic) verification measures, including measures for amplitude, phase, and hydrograph shape errors, as well as simple verification metrics to describe those aspects of forecast quality not considered so far (such as discrimination).
   - ⇒ Examine the performance of these new techniques for a range of conditions, including extreme events.
2) Extend the Ensemble Verification System (EVS) to include the new verification techniques, together with known feature requirements and ongoing feature requests from OHD scientists and the RFCs. The feature requirements will be listed and prioritized as they become known. Key goals include:
   - ⇒ Extension of the single-valued verification capabilities to include new metrics for one or more single-valued properties of the ensemble forecasts (primarily the ensemble mean).
   - ⇒ Extension of the batch-processing options.
   - ⇒ Support for skill calculations within EVS (e.g. based on persistence and climatology).
   - ⇒ Publish a manuscript documenting the capabilities of EVS for Computers and Geosciences or a similar computer-oriented scientific journal.
3) Conduct a systematic evaluation of the existing experimental ensemble products at all RFCs that are currently using them and publish the results in a scientific manuscript.
4) Develop the archiving data requirements for single-valued and ensemble forecasting through interactions with the RFCs to support the RFC Archive Core Goal Team
5) Support the development of the National Baseline Verification System (NBVS) for XEFS to verify operational/experimental single-valued and ensemble forecasts, based on IVP and EVS functionalities; NBVS is developed in collaboration with the XEFS team as the hydrologic forecast verification system in the new CHPS/XEFS environment.
6) Develop a Real-Time Verification experimental prototype with capability to select forecast analogs and present meaningful real-time forecast verification information to correct forecast error in real-time; this prototype will be integrated in XEFS in collaboration with the XEFS team.
7) Coordinate the enhancements of the EVS and NBVS functionalities with the verification functionalities of the WR water supply forecast website.
8) Collaborate with COMET and other stakeholders to produce appropriate training material on verification science and software applications for both single-valued and ensemble forecasts.

Milestones

Task	Due Date	Status
Enhance the prototype Ensemble Verification System (EVS), develop documentation and release the prototype	FY07 - Q1	Complete
Develop diagnostic and prognostic verification measures, confidence intervals, and techniques for real-time application	FY07 - Q2	Complete
Implement the new capabilities in EVS	FY07 - Q3	Complete
Develop archiving data requirements report for current and future verification of single-valued and probabilistic forecasts	FY08 - Q2	Complete
Release enhanced EVS prototype along with documentation	FY08 - Q2	Complete
Conduct a systematic evaluation of the existing ensemble products	FY08 - Q4	In progress
Support the NWS verification team with their use of EVS for exercises and RFC verification case studies	FY08 - Q4	In progress
Enhance EVS to incorporate new features	FY08 - Q4	In progress
Develop an experimental prototype for Real-Time Verification	FY08 - Q4	In progress
Support the integration of EVS into the XEFS experimental prototype	FY08 - Q4	In progress
Collaborate with COMET and other stakeholders for training material development	FY08 - Q4	In progress

Accomplishments/Actions

1st Quarter FY07

- Developed a Java User Interface for the Ensemble Verification System (EVS) with enhanced Fortran codes (to pair observations and forecasts and compute verification metrics) and R scripts (for graphical display).
- Developed documentation for prototype EVS and training material presented during the RFC Short-Term Ensemble Workshop in November 2006.
- Released Version 1.0 of the prototype EVS to MARFC in November 2006.
- Started to develop new prognostic verification measures.

2nd Quarter FY07

- Developed new measures and graphics for exploring historical forecast performance (diagnostic verification) and for estimating the quality of a live forecast using historical information that is tailored to that forecast (prognostic verification).
- Implemented the experimental methods for diagnostic and prognostic verification in Java (will be integrated within EVS in Q3).
- Produced the first draft of journal manuscript on the new verification measures.

3rd Quarter FY07

- Developed a new (beta) version of the Ensemble Verification System to remove dependence on legacy FORTRAN and R code and to extend the verification functionality. The new software is programmed in Java and is entirely stand-alone (i.e. it conducts file reading, pairing, calculation of metrics and plotting, all through a Graphical User Interface).
- Integrated new diagnostic verification measures developed in Q2 into EVS. It has been decided that the prognostic verification is best implemented near to the source of forecasts rather than in EVS (i.e. the RFS for streamflow, as it currently stands). This will be scoped further as XEFS progresses.
- Worked further on prognostic verification and developed ideas for operational products (to be further developed in Q4).
- Prepared for the RFC Verification Workshop in August 07.
- Begun to coordinate EVS as a prototype XEFS product.

4th Quarter FY07

- Made extensive bug fixes and improvements to EVS, and the associated documentation, prior to its official release in FY08.
- Planned AHPS verification projects for FY08, including coordination with the RFCs, XEFS, and others.
- Supported internal testing of EVS by HEP and external testing by four field offices, namely MA- AB- CN- and NC- RFCs.
- Continued to coordinate EVS as a prototype XEFS product.
- Worked further on prognostic verification, including further work on a draft manuscript illustrating the technique.
- Delivered a three-day workshop on verification of single-valued and ensemble forecasts to the field offices (verification focal points and others) at CBRFC in August 07.

1st Quarter FY08

- Made bug fixes and improvements to EVS, and the associated documentation, prior to the release of EVS 1.0 in FY08 Q2.
- Begun working on revised HOSIP documents, in preparation for Gate 3 review in FY08 Q2.
- Supported internal testing of EVS by HEP and external testing by four field offices, namely MA- AB- CN- and NC- RFCs.
- Continued to coordinate EVS as a prototype XEFS product.
- Completed first draft of prognostic verification manuscript to be reviewed and submitted in FY08 Q2.
- Begun working on the archiving data requirements for ensemble verification. A survey of existing archiving practices and issues was completed by all RFCs. This will be used in the preparation of an archiving data requirements report, to be delivered in FY08 Q2.

2nd Quarter FY08

- Made bug fixes and improvements to EVS, and the associated documentation.
- Completed HOSIP Gate 3 review, closing the existing HOSIP Ensemble Verification and Validation project. A new HOSIP project will be written under the umbrella XEFS project to accommodate the outstanding and planned verification tasks.
- Supported application of EVS at four field offices, namely MA- AB- CN- and NC- RFCs, together with internal use of EVS.
- Continued to coordinate EVS as a prototype XEFS product.
- Assisted COMET with the development of training material on ensemble verification.
- Evaluated various techniques for estimating the real-time verification equations, including regression of the principal components of the indicator transformed forecasts and observations. This work will be included in a second revision of the prognostic verification paper.
- Completed the archiving data requirements for ensemble verification.
- Began working on confidence intervals for diagnostic verification metrics.

3rd Quarter FY08

- Released EVS 1.0, including source code, executable, and associated documentation.
- Created a CasaNosa project for storing/updating the EVS source code.
- Trained the NWS Verification Team on how to use EVS, which included practical exercises.
- Supported the Verification Team case studies on ensemble verification with EVS.
- Conducted split sample validation of real-time verification results for several streamflow, temperature and precipitation cases. Experimented with various Order Relation corrections for the conditional observed distribution. Updated the real-time verification paper with recent progress.
- Finalized the long-term data archiving requirements report for the RFC Archive Team and sent it to Julie Meyer on 05/23/2008; helped Julie Meyer develop the RFC archiving survey about non-hardware requirements for the future RFC archiving system.
- Discussed with Kevin Werner and WR the use of EVS for the water supply website in the future, to verify the ensemble forecasts.

- Continued to work on confidence intervals for diagnostic verification metrics. Allen Bradley came to OHD for several meetings with the HEP group to discuss his work on verification and sampling uncertainty, as well as future collaborations on verification. He gave the HEP group some codes for estimating standard errors, which can be potentially adapted to estimate confidence intervals.

Problems Encountered/Issues

1st Quarter FY07 – None

2nd Quarter FY07

- Development of confidence intervals has been postponed to Q3/4, in order to support a review of existing methods/codes developed by Allen Bradley.

3rd Quarter FY07 – None

4th Quarter FY07

- Work on archiving capabilities for ensemble forecasting has been postponed to the first and second quarters of FY08 to facilitate better coordination with XEFS and the RFC Archive team.

1st Quarter FY08 - None

2nd Quarter FY08

- Development of confidence intervals has begun, but attempts to leverage the work of Allen Bradley have been unsuccessful following a cancelled meeting with Allen in Q2. At the time of writing, it is unclear precisely when another meeting can be arranged.
- The Enhanced EVS prototype will be released with the exercises for the NWS Verification Team in late April/early May. The enhanced prototype is not required until then.

3rd Quarter FY08 - None

Logistical Verification

Core Goal: Verify our forecast and uncertainty information

Management Lead: Mary Mullusky

Objective: Compute, display, and disseminate forecast services logistical measures information. Develop a plan to compute remaining logistical measures

Milestones

Task	Due Date	Status
1. Support of RFC verification focal points to populate the database	Q4	ongoing
2. Report of common forecast services metric queries	Q2	delayed
3. Display prototype maps of point forecast services	Q4	On track
4. Experimental web pages of forecast services	Q4	On track
5. Develop a plan to compute remaining logistical measures	Q4	On track

Accomplishments/Actions

1st Quarter FY08

- Created a new policy, to require RFCs to populate and maintain the hydrologic forecast services tables in the IHFS database. The services information will be consolidated with the localized river location information required from the Weather Forecast Offices (see NWSI 10-924, Weather Forecast Office Hydrologic Reporting, http://www.weather.gov/directives/sym/pd01009024curr.pdf) in the National River Location Database. The new policy 10-914 *River Forecast Center Hydrologic Services Information,* was distributed to the regions in December with comments due Friday, January 11, 2008. Comments to be integrated in Q2.

2nd Quarter FY08

- No activity. Regional comments integration into Policy 10-914 delayed until April. This will impact our ability to require RFCs to populate the services database.

3rd Quarter FY08

- No activity. Regional comments integration into Policy 10-914 delayed until August. This will impact our ability to require RFCs to populate the services database.

Problems Encountered/Issues

1st Quarter FY08

- None

2nd Quarter FY08

- Regional comments integration into Policy 10-914 delayed until April. This will impact our ability to require RFCs to populate the services database.

3rd Quarter FY08

- Regional comments integration into Policy 10-914 delayed until August. This will impact our ability to require RFCs to populate the services database.

Inundation Mapping

Static Flood Inundation Maps Web-Page Development and Deployment

Core Goal: Graphical Dissemination of Hydrologic Information and Web Page Deployment

Management Lead: Victor Hom

Objective: Develop AHPS web page interface and Deploy available flood inundation maps

Milestones

Tasks	Due Date	Status
Develop North Carolina Libraries (FIM07-1P)	**-**	**-**
Develop and present initial look of maps for approval	Nov 2006	Completed
Produce prototype for review and approval	Jan 2007	Completed
Produce first operational location in North Carolina for test, review, and comments	Apr 2007	Completed
Field output for first operational location in North Carolina	Jun 2007	Completed
Implement 16 map libraries for sites in North Carolina	Sep 2007	Completed
Implement an additional library in North Carolina	Sep 2008	Moved from 7/31/08
Map Maintenance and improvements	Sep 2008	In-progress
Develop Gulf Coast Libraries (FIM08-1P)	**-**	**-**
Implemented 4 map libraries for locations in Texas, 5th library moved to 9/08	May 2008	Completed
Implement 16 map libraries for locations in Southern region	Sep 2008	In-progress
Complete additional map libraries with remainder of hurricane supplemental funds	Dec 2008	In-progress
Develop National Flood Inundation Library Guidelines (FIM08-2P)	**-**	**-**
Draft Guidelines for Field Review	Mar 2008	Completed
Draft Guidelines for USGS Review	Apr 2008	Completed
Draft Guidelines for FEMA Review	Jun 2008	On Hold
Draft Guidelines for ACWI Review	Sep 2008	Moved from 7/31/08
Approved National Guidelines	Dec 2008	Moved from 9/30/08
Develop Lower Colorado River Flood Libraries (FIM08-3P)	**-**	**-**
Evaluate Resources (Data/Funding)	Dec 2007	Completed
Scoping Meeting	Jan 2008	Completed
Technical Development	Sep 2008	In-progress
Complete installation of 3 libraries for Texas sites.	Sep 2008	In-progress
Complete installation of 4 libraries in Texas.	April 2009	In-progress
Develop Susquehanna River Flood Libraries (FIM08-4P)	**-**	**-**
Evaluate Resources (Data/Funding)	May 2008	In-progress
Scoping Meeting	Jul 2008	In-progress
Technical Development	Sep 2008	In-progress
Complete installation of 3 libraries in Susquehanna River Basin.	Dec 2008	
Complete installation of 6 libraries in Susquehanna River Basin.	Jul 2009	

Enhance NOAA Procedures for Inundation Mapping (FIM08-5P)	**-**	**-**
Draft SOW guidelines for H&H/GIS Work for internal review	Mar 2008	Completed
Draft SOW guidelines for AHPS Related Work for internal review	Mar 2008	Completed
Incorporate Legal Counsel Recommendations to SOW guidelines	Apr 2008	In-progress
Send SOW guidelines for field review	Jun 2008	Completed
Finalize SOW guidelines and post to Web	Sep 2008	
Enhance AHPS Inundation Zoom Features	Sep 2008	
Resource, Roadmap, and Recovery Plan (3 R's) - (FIM08-6P)	**-**	**-**
Establish Team Charter/Create Team	May 2008	Withdrawn
Team Conference Meeting	Jul 2008	Completed
AHPS Contractor's Report on QC/QA and Maintenance	Apr 2009	Moved from 8/30/08
Develop Draft Document for NWSH approval	Sep 2008	Moved from 9/30/08
NWSH finalize Plan and post to Web	Jun 2009	Moved from 12/30/08
Partnering and Customer Requirements - (FIM08-7P)	**-**	**-**
Establish Team Charter/Create Team	May 2008	Withdrawn
Team Conference Meeting	Jul 2008	Completed
Develop Draft for Study	Sep 2008	In-progress
NWSH finalize Plan and post to Web	Dec 2008	
Develop Training - (FIM08-8P)	**-**	**-**
Develop Course Outline for Review	Apr 2008	Completed
Develop Training Material	Jul 2008	Completed
Test Training Material	Sep 2008	Completed
Add Training Material on Depth Grid	Sep 2008	
Build Demonstration Inundation Libraries - (FIM08-9P)	**-**	**-**
Evaluate Resources (Data/Funding)	Oct 2008	In-progress
Scoping Meetings	Dec 2008	In-progress
Technical Development	Jul 2009	
Implement additional libraries	Sep 2009	
Develop linkage of Inundation Libraries to AHPS Probability Forecasts - (FIM08-10P)	**-**	**-**
Evaluate NOAA Products/Resources	Oct 2008	In-progress
Proof of Concept Meetings to IMTT	Dec 2008	In-progress
Establish Team Charter/Create Team	May 2008	Withdrawn
Team Conference Meeting	Jul 2008	
Develop Draft Document for NWSH approval	Sep 2008	
NWSH finalize Plan and post to Web	Dec 2008	

Accomplishments/Actions

1st Quarter FY07

Develop North Carolina Libraries (FIM07-1P)
- Completed initial look of web page interface and map capability
- Completed prototype, on CD, of initial flood inundation map location

2nd Quarter FY07

Develop North Carolina Libraries (FIM07-1P)
- With the departure of Tom Donaldson, Frank Richards will coordinate this task
- Orion developed a protocol to process information for the Web that will expedite production
- Watershed completed an inventory of 57 locations with available model and elevation information – 6 locations were selected for the first group of maps

3rd Quarter FY07

Develop North Carolina Libraries (FIM07-1P)
- Goldsboro, NC, demonstration site is available on AHPS Web pages

4th Quarter FY07

Develop North Carolina Libraries (FIM07-1P)
- Deployed 16 inundation map libraries on AHPS
- Improved web interface based on feedback from NWSH staff and field offices
- Orion produced DVD to describe AHPS flood inundation mapping interface
- Published article entitled "Genesis and Evolution of NOAA's Flood Inundation Mapping Service" for ASFPM Gilbert White Flood Forum

Develop Gulf Coast Libraries (FIM08-1P)
- Watershed Concepts submitted 5 deliverables for NOAA to review

1st Quarter FY08

Develop North Carolina Libraries (FIM07-1P)
- NOAA has worked out some of the inefficiencies and deficiencies, which have led to past delays. New plans and insights were gained at NWS Flood Inundation Map Meeting entitled "Lessons Learned and Process Improvements" amongst members from NOAA, USGS, Watershed Concepts, Orion, Berry Williams and Associates, and NWS offices.

Develop Gulf Coast Libraries (FIM08-1P)
- Watershed Concepts delivered ten (10) H&H map overlays for NOAA to review. NOAA now has total receipt of fifteen (15) deliverables and remains ahead of schedule to complete the year-end target goal of 20 inundation map libraries for FY08.

Develop Flood Libraries (FIM08-3P), (FIM08-4P), (FIM08-9P)
- NOAA continues prospecting to build future inundation map libraries across USA for FY09 and FY10. Prospects include the Lower Colorado, Tennessee, Cumberland, Susquehanna, Delaware, and Blackstone Rivers.
- During this quarter, NOAA's out-reach activities and participation in ASFPM 2007 Flood Forum, FEMA 2007 Risk Analysis, and other inter-agency meetings, have led to stronger partnerships among FEMA, USACE, USGS, EPA, NRC, NAS, and FEMA CTPs. Partnerships will led to better data sharing and collaborative efforts in building future map libraries.

2nd Quarter FY08

Develop Gulf Coast Libraries (FIM08-1P)

- Orion delivers five (5) flood inundation map library for NOAA NWS review.
- NOAA CSC approves Watershed Concepts 2nd set of deliverables and furnishes them to Orion for development. NOAA now has total receipt of fifteen (15) approved deliverables and remains on schedule to field at least 20 inundation map libraries by end of FY08.
- Watershed Concepts delivered nine (9) additional H&H map overlays for NOAA CSC to review. CSC is working with Watershed Concepts to address QA/QC of these H&H map overlays.

Develop National Flood Inundation Library Guidelines (FIM08-2P)

- Draft guidelines issued for NWS internal review.

Develop Lower Colorado River Flood Libraries (FIM08-3P)

- WGRFC, LCRA, and Halff Associates produced a technique to incorporate results from HECRAS unsteady models to produce inundation maps at various incremental intervals interleaved between NOAA/NWS flood categories.

Develop Susquehanna River Flood Libraries (FIM08-4P)

- Eastern Region met with cooperators concerning the development of flood inundation mapping libraries for locations within the Susquehanna River Basin. Eastern Region provided information on the process which NOAA NWS undertakes to produce these libraries. The Upper watershed was selected for evaluation.
- SRBC awarded study contract to conduct H&H/GIS for library development. Dewberry has completed the Chenago River study and working on getting local approval.

Enhance NOAA Procedures for Inundation Mapping (FIM08-5P)

- Completed Draft SOW guidelines for H&H/GIS Work for internal review
- Completed Draft SOW guidelines for AHPS Web Implementation and Related Work for internal review.

Resource, Roadmap, and Recovery Plan (3 R's) - (FIM08-6P)

- Developed presentation conceptualizing the roadmap and process.
- Developed Intranet Website: https://ocwws.weather.gov/intranet/floodmap/index.shtml to house this conceptual reference and other resources.

Develop Training - (FIM08-8P)

- Issued FY09 Training Needs Statement.
- Course synopsis outline issued to AHPS IMTT for review.

Build Demonstration Inundation Libraries - (FIM08-9P)

- Review USGS proposal and techniques for Killbuck Creek in Ohio (KILO1).

3rd Quarter FY08

Develop Gulf Coast Libraries (FIM08-1P)

- NWS implemented four (4) flood inundation map library.
- NWS completed review of eight (8) more flood inundation map libraries, delivered in the 2nd set.
- CSC and OCWWS approved Watershed Concepts 3rd set of deliverables in July and have furnished them to Orion for development. NWS now has total receipt of sixteen (16) approved deliverables for AHPS implementation and remains on schedule to field at least 20 inundation map libraries by end of FY08.
- Watershed Concepts delivered three (3) new H&H map overlays (portion of the 4th deliverable) and updated the mapping for GBHT2 for CSC and OCWWS to review. CSC is working with Watershed Concepts and OCWWS to address QA/QC of these H&H map overlays.

Develop National Flood Inundation Library Guidelines (FIM08-2P)

- Draft guidelines reviewed by participating NWS field offices.
- Draft guidelines reviewed by participating USGS field offices.
- OCWWS is in process of reviewing comments and ensuring guidelines addresses comments.

Develop Lower Colorado River Flood Libraries (FIM08-3P)

- WGRFC worked with LCRA to conduct H&H/GIS work and produced the shapefiles needed for the development of AHPS inundation maps for seven sites.
- One of the sites, the Colorado River at Bastrop TX, will be available for NWS review on AHPS contractor's testbed in July 2008. Two other will be available before end of FY08.
- Establish contract through CSC to capture LCRA techniques used in unsteady modeling and evaluate the ability to transfer the technologic concept.

Develop Susquehanna River Flood Libraries (FIM08-4P)

- SRBC, ER, BGM, and New York State are continuing to work with the contractor on the H&H/GIS.

Enhance NOAA Procedures for Inundation Mapping (FIM08-5P)

- Completed Draft SOW guidelines for H&H/GIS Work for internal review
- Completed Draft SOW guidelines for AHPS Web Implementation and Related Work for internal review.
- Draft guidelines reviewed by participating NWS field offices.
- Draft guidelines reviewed by participating USGS field offices.
- OCWWS is in process of reviewing comments and ensuring guidelines addresses comments.
- AHPS Contractor has been tasked to provide enhancement of AHPS Procedures to build overlapping zoomable layers.

Resource, Roadmap, and Recovery Plan (3 R's) - (FIM08-6P)

- Provided training to SR via GotoMeeting on the roadmap and process.
- Added new documents and presentations about the process and implementation of AHPS Flood Mapping onto Intranet: < https://ocwws.weather.gov/intranet/floodmap/index.shtml >. See < https://ocwws.weather.gov/intranet/floodmap/Outreach.shtml > for more resources.

Partnering and Customer Requirements - (FIM08-7P)

- Responsibilities of this task were transferred back to the AHPS Static Inundation Mapping Core Goal team.
- The Core Goal team entrusted the Hydrology Lab to conduct an evaluation on suitable locations where NWS should develop AHPS static inundation mapping and on the proper approach/technique, which would lead to better understanding of the allocation of resources to prospect for partnering with customers.
- OCWWS and OHD met with the Hydrology Lab to discuss and review the draft proposal entitled "Analyze Site Characteristic at NWS River Forecast Points to Identify Steady State and Unsteady Modeling Requirements (with Implications for Inundation Mapping)" .

Develop Training - (FIM08-8P)

- OCWWS provided GotoMeeting Training to SR on QA/QC of the Flood Mapping.

Build Demonstration Inundation Libraries - (FIM08-9P)

- USGS Indiana Science Center, Polis Center, and WFO Indianapolis demonstrated flood mapping capabilities on the White River at the ASFPM 2008 Annual Convention.
- Coordination amongst USGS Indiana Science Center, Polis Center Central Region, WFO Indianapolis, OHRFC, and OCWWS provided initial interest to pursue AHPS flood mapping services for Central Indiana for FY09.

Problems Encountered/Issues

1st Quarter FY07

Develop North Carolina Libraries (FIM07-1P)

- Schedule for North Carolina locations impacted by web farm consolidation process.

2nd Quarter FY07

Develop North Carolina Libraries (FIM07-1P)

- Delays in identifying locations resulted in later completion of the first group of locations, but final completion of the project may not be delayed

3rd Quarter FY07

Develop Gulf Coast Libraries (FIM08-1P)

- Delays in prioritizing sites as well as slow response by FEMA to request for engineering study information caused project to slip by ~ 90 days
- Since Engineering data were only available for 28 of the 55 candidate sites, alternative sites had to be identified.

4th Quarter FY07

Develop North Carolina Libraries (FIM07-1P)

- Original H&H (Hydraulics and Hydrology) studies in the Lumberton NC area was for the river reaches in the vicinity of USGS gage. To create the proper inundation map library for NWS forecast point on the Lumber River at Lumberton NC, a re-study may be required to cover the desired spatial extent. OCWWS has removed Lumberton from inundation library development.

1st Quarter FY08

Develop Gulf Coast Libraries (FIM08-1P)

- NOAA and Watershed Concepts worked on several iterations of the five deliverables which was first furnished to NOAA at the end of FY07. The deliverables included assumptions concerning ponding and ineffective areas, which manifest in dangled polygons that are unconnected to the main channel. Watershed Concepts will implement tighter controls and re-allocate resources to ensure better QC/QA. Tighter controls will also be enforced to reduce oversights on the depth grids as a result of the conversion process from TIN to raster. Consequently, map inundation libraries for the initial five Texas sites will not be available until February 2008.

Develop North Carolina Libraries (FIM07-1P)

- NOAA re-evaluation of the map library for Lumber River in Lumberton NC indicated a re-study would be required. To ensure forward momentum and progress toward FY08 goals, NOAA has discontinued the map library for the Lumber River in Lumberton NC but will add a map library for the Tar River in Rocky Mount, NC by April 2008.

2nd Quarter FY08

Develop Gulf Coast Libraries (FIM08-1P)

- The USGS has converted the reporting procedures for several gages to elevation NAVD88, which required local WFO to establish new flood categories.
- The schedule for the first five deliverables were affected by the methods used to produce Depth grids. The lowest inundated shapefile did not necessary produce the base layer needed for computation. Lack of DEM resolution could pose problems. H&H/GIS contractor will need to provide ASCII depth grids. Consequently, this required more hands-on QA/QC, thus, the 1st deliverables will likely be available on AHPS at end of May 2008.

Enhance NOAA Procedures for Inundation Mapping (FIM08-5P)

- NOAA/NWS discussed the goal of Flood Inundation Mapping and the document with Hugh Schratwieser, NOAA Office of General Counsel. NWS is awaiting OGC advice and suggestions.

OGC verbally did not see any major issues with concept and indicated their willingness to assist in our cause.

3rd Quarter FY08

Develop North Carolina Libraries (FIM07-1P)

- Flood Maps for the Tar River at Rocky Mount NC requires additional evaluation and QA/QC on the AHPS testbed prior to deployment.

Develop Gulf Coast Libraries (FIM08-1P)

- Mapping was not performed for enough flood inundation levels due to flood category changes for two mapping sites in Southeast Texas.
- During this quarter, NWS held one (1) flood inundation map library from AHPS deployment. Additional flood mapping is required for GBHT2 (Greens Bayou near Houston TX) because the flood stage was lowered by 6.0 feet. This library will be re-scheduled for deployment before end of FY08-Q4.
- Delays in the approval of the third deliverable due to H&H/GIS mapping deficiencies have resulted in a tighter available time-window to implement mapping for FY08. OCWWS, CSC, and OHD are working on additional techniques to ensure QA/QC is sufficiently conducted in the allotted time window.

Resource, Roadmap, and Recovery Plan (3 R's) - (FIM08-6P)

- The "Lessons Learned" and QA/QC report will include evaluation of flood mapping to be provided in the 4th deliverable which is slated for implementation at the end of CY08. To ensure a better report, since the 4th deliverable included more difficult analyses, the combined report will be moved to Apr 09.

Partnering and Customer Requirements - (FIM08-7P)

- The Hydrology Lab indicated that there were inadequate funding to complete an identified task requirement but was interested in partnering with OCWWS to carry-out the task. With pooled resources, contract labor, and in-kind efforts, the report to satisfy an evaluation on suitable locations for flood mapping is now projected for completion between FY09 Q2 and Q3.

Inputs and Forcings

Radar Based Probabilistic QPE (PQPE)

Core Goal: Improve the quality of physical inputs and forcings

Management Lead: David Kitzmiller

Objective: Improve flash flood detection through application of radar-based probabilistic quantitative precipitation estimation (PQPE) algorithms

Milestones

Task	Due Date	Status
Develop demonstration version of radar PQPE system	Jun 30, 2005	Complete
Demonstrate real-time prototype version of PQPE system	Sep 30, 2005	Complete
Present verification statistics showing advantages of PQPE over deterministic precipitation estimates	Sep 30, 2005	Complete
Complete HOSIP SON, Conops, operational requirements for radar-based PQPE to support flash-flood monitoring and prediction	April 30, 2006	Delay
Complete Project Plan for radar-based PQPE	May 31, 2006	Delay
Design for preparation, dissemination of radar rainfall error distribution parameters for operational use	July 30, 2006	Delay
HOSIP approval of operational design	Sep 30, 2006	Delay

Accomplishments/Actions

1st Quarter FY05
- Accepted proposal for final phase of development/demonstration project from University of Iowa contractors.

2nd Quarter FY05
- Initiated validation study of U. Iowa work, and derived demonstration probability products: probability of rainfall exceeding 0.1 and 0.5 inch per hour, and 50th and 75th percentile rainfall amounts derived from radar rainfall estimates.

3rd Quarter FY05
- Received and began evaluation of U. Iowa mid-term report, which contains documentation on the statistical properties of 1-hour WSR-88D rainfall estimate errors
- Major findings: 1-hour radar rainfall estimates have a consistent rainrate-dependent bias component, and random errors in the estimates can be modeled as a Gaussian distribution
- Determined that statistical correction of 1-hour rainfall estimates reduces RMS errors relative to rain gauge reports, particularly for radar estimates in excess of 10 mm h^{-1}

4th Quarter FY05
- Enhanced existing real-time offline version of Multisensor Precipitation Estimator (MPE) to calculate probability that one-hour flash flood guidance amount has been exceeded, based on radar-estimated rainfall. Probabilities are shown under: http://www.nws.noaa.gov/ohd/hrl/hag/ffp_marfc/mxprobo/mxprobo.htm
- Obtained statistics from 2004-2005 warm seasons showing effects of rainrate-dependent bias adjustment in improving RMS error in rainfall estimates.

1st Quarter FY06
- Received U. Iowa final contract report, and obtained internal and external reviews indicating the initial work is complete

- Drafted Concept of Operations and Operational Requirements

2nd Quarter FY06
- OSIP Stage I document approved (1/27/2006)

3rd Quarter FY06
- Collected conterminous U.S. data sample of radar Digital Precipitation Array and collocated 1-h rain gauge reports covering 2004-2006, for error model development
- Presented posted on error model development and applications at May AGU conference, Baltimore
- Work on HOSIP documents continuing

4th Quarter FY06
- Work on formulating an operational version of the Krajewski-Ciach model was started upon arrival of an NCEP/HPC employee on a rotational assignment (Pereira). Work involves examination of 1-h gauge/radar pairs from many WSR-88D sites.
- Results suggest the existing PQPE model is reliable for larger amounts (> 0.75 inch h-1) but it tends to underestimate probabilities of lower amounts – a modified model might be required in which an empirical table is used to estimate probabilities of smaller amounts
- Still expect completion of an operational model for 0-1h amounts by December
- Revised Concept of Operations to emphasize the development aspect of the PQPE project and how the PQPE model information will be stored and updated in AWIPS, rather than end-user applications such as FFMP

1st Quarter FY07
- Developed and presented alternatives for a radar precipitation error model at an OFC seminar in December (Pereira, Kitzmiller, Guan)

2nd Quarter FY07
- No work this quarter

3rd Quarter FY07
- Article on radar-based probabilistic QPE, “Product-Error-Driven Uncertainty Model for Probabilistic Quantitative Precipitation Estimation with NEXRAD Data” authored by Ciach, Krajewski, and Villarini, was accepted for publication in *Journal of Hydrometeorology*. The work was funded in part by OHD and AHPS, and is a peer-reviewed presentation of material in earlier contract reports.

4th Quarter FY07
- No work this quarter

1st Quarter FY08
- Article on radar-based probabilistic QPE (see 3rd quarter above)appeared. No further work this quarter.

2nd Quarter FY08
- The OHD Hydrometeorology Group Leader, David Kitzmiller has requested approval to close this project. OSIP project, 06-035 "Radar-based Probabilistic Quantitative Precipitation Estimates (PQPE)" has passed Gate 1 in March 2006 and is currently in <idle> status. With limited interest and support for the project we wish to suspend the project until further notice.

3rd Quarter FY08
- OSIP review committee has recommended project be dropper – Project has been dropped and resources reassigned to other priorities.

Problems Encountered/Issues

1st Quarter FY05 - None

2nd Quarter FY05 – None

3rd Quarter FY05 – None

4th Quarter FY05 – None

1st Quarter FY06
- Scope of work still to be determined, given funding uncertainty

2nd Quarter FY06
- Departure of Richard Fulton, initiator of the original project

3rd Quarter FY06
- Departure of Rich Fulton has affected overall progress. A rotational assignment staffer has been engaged to work on data analysis September-November 2006.

4th Quarter FY06
- HOSIP work limited this quarter, with only drafting work and limited internal review ongoing. Further slippage into FY07 is inevitable.

1st Quarter FY07
- Further work on hold pending new FTE hire in the hydrometeorology group

2nd Quarter FY07
- No work this quarter

3rd Quarter FY07 - None

4th Quarter FY07
- No work this quarter

1st Quarter FY08 – None

2nd Quarter FY08
- The OHD Hydrometeorology Group Leader, David Kitzmiller has requested approval to close this project. OSIP project, 06-035 "Radar-based Probabilistic Quantitative Precipitation Estimates (PQPE)" has passed Gate 1 in March 2006 and is currently in <idle> status. With limited interest and support for the project we wish to suspend the project until further notice.

3rd Quarter FY08
- Project has been dropped and resources reassigned to other priorities.

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 FY06

Task FY06	Due Date	Status
Creation of initial 'radar only' Q2 products on a Cartesian grid of 1-kilometer resolution with refreshing rate of five minutes CONUS.	March 15, 2006	Completed
Implementation of Q2 gage correction scheme using NCEP gage data feed.	May 15, 2006	Completed
Creation of and delayed preliminary real time multisensor Q2 products on a Cartesian grid of 1-kilometer resolution with refreshing rate of five minutes CONUS.	June 15, 2006	Completed
Dissemination of Q2 products on a Cartesian grid of 1-kilometer resolution updated every five minutes for CWA (Phoenix) regions for ingest into FFMP.	July 1, 2006	Q2 product creation Completed – Ingest into FFMP set for Q1 Fy07
Development and access to a web based interface for the real time verification of QPE estimates and associated uncertainties CONUS.	July 1, 2006	Completed
Performance evaluation of Q2 products in FFMP	December 1, 2007	Planned

Milestones FY07

Task	Due Date	Status
Data exploration and coordination for the performance evaluation of NMQ/Q2 radar only products in FFMP	December 1, 2007	Q2 product creation completed in fy06 – Ingest into FFMP moved to Q2 FY08
Initial NMQ Code transfer and implementation for the creation of 3-D reflectivity mosaic products and 2-D severe weather products (HAD, VIL, etc.).	May 1,2007	Completed
Creation of seamless 'radar only' QPE products on a Cartesian grid of 1-kilometer resolution refresh rate of five minutes CONUS at NCEP.	June1, 2007	Pending Computing resources and requirements
Develop operational strategies for inclusion and dissemination of NMQ QPE products to WFO's and RFC's	August 1, 2007	Pending Computing resources and requirements
Configure NMQ QPE as a prototype external data source for RFC and WFOs	September 30, 2007	Completed

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	Near completion – moved to Q4
National prototype 2.5 minute update cycle for NMQ and QPE products	July 1, 2008	Moved to Q4
Initial development and testing of a multi sensor 'best of the science' QPE product	August 30, 2008	Planned
Development strategies and testing protocols for Dual polarization data in Q2	September 20, 2008	Planned

Accomplishments/Actions

1st Quarter FY06

- Completed assessment and comparison of WDSS-II ingest, QC (NN) and 3D mosaic (merger) with NMQ application.
- Initial coding and testing of 'radar only' Q2 has been completed. CPU load tests for running initial CONUS Q2 product suite have been completed. Hardware configuration and system updates for running initial Q2 products CONUS to be complete by 2/28/06.
- Several case studies have been completed regarding the generation of VPR s and possible 'gap' corrections on 3D mosaic fields. Real time CONUS VPR correction coding is in progress.

2nd Quarter FY06

- The initial suite of NMQ Q2 QPE products is being generated in real time, nationally, with a five-minute update cycle at 1x1 km resolution. The initial Q2 products and national mosaic products are being disseminated using ftp and ldm protocols to collaborators and researchers at NCEP, NESDIS, RFCs, OHD, UCAR, ESL, GLERL, NCAR, Unidata and the FAA.
- A website has been established to provide 'quick looks' at the NMQ and Q2 product suites. The NMQ website forms the basis of NSSLs QPE Verification System (QVS) currently under development. The initial QVS webpage is located at nmq.ou.edu/~qpeverif/Experimental/. The QVS page is experimental and will continue to evolve as products and verifications tools are added.
- Hardware and software is currently being configured for the Arizona Q2 prototype system The Southwest Q2 system will be delivered to the Salt River Project/NWS facility in early June 2006. The system will serve as the basis for generating and testing high resolution Q2 QPEs into FFMP in the southwest encompassing several CWAs. Testing is anticipated to begin 1st QR 07. However, Q2 QPEs in the southwest will be generated beginning July 1 and will be made available for use in the Arizona Flood Warning System for evaluation and verification.
- The North American Scale Remote Sensor Precipitation Estimation OSIP SON was officially posted on 3/29/06.

3rd Quarter FY06

- The Southwest Q2 system has successfully been deployed at the joint SRP/PHX NWS facility. The system integrates Phoenix TDWR data along with 6 WSR-88Ds in the region. High resolution Q2 products are being generated for the state of Arizona. The Southwest Q2 data is ready for inclusion in the FFMP demonstration project, which is set to begin in FY07 Q1. Currently Q2 products for Arizona are being archived and analyzed for several significant precipitation events that occurred during July 2006.
- The NMQ Q2 products continue to be generated in real time nationally with an average latency of less than 110 second from product valid time. The initial Q2 products are continually under refinement and assessment through the NMQ QPE verification system (QVS). Additional QPE

products have been add to the QVS such as the NEDSIS hydro-estimator.

- Vertical Profiles of Reflectivity (VPRs) are currently being generated for each WSR-88D with real time VPR plots on the NMQ QVS system. A gap filling technique utilizing the VPRs is currently being evaluated over the eastern 1/3 of the CONUS. Once a gap filling assessment is completed, a VPR correction will be deployed CONUS within the NMQ. Additionally, several QPE related algorithms are being developed utilizing VPRs in determining bright band height and the presence of warm rain microphysics for dynamically adjusting the Z-R relationships.
- 31 radars from Canada are being received and ingested within the NMQ system. The individual Canadian radars are being compared with adjacent WSR-88Ds using the Radar Reflectivity Calibration Tool (RRCT) to determine offsets leading to techniques for correctly combining Canadian radar with the WSR-88Ds in the NMQ 3-D Radar Mosaics and Q2 products.
- A new gauge-biasing scheme has been deployed within NMQ Q2 product suite and has been under real time performance assessment via QVS.
- A NMQ blog has been implemented for notification of NMQ and Q2 updates and system status. The NMQ Blog is viewable at nmq.ou.edu/~qpeverif/blog/

4th Quarter FY06

- The NMQ Q2 system CPU cluster and communications servers were moved to a new National Weather Center computer room.
- The new URL for the NMQ system webpage is www.nmq.nssl.noaa.gov.
- The Stage 4 product suite has been added to the NMQ system QVS verification system. The Stage 4 products can be directly compared with Q2 products as well as HE products as well as with gauge observations.
- The NMQ Blog contains changes and enhancements to the NMQ system including documentation.
- The 31 Canadian radars have been added to the NMQ RRCT tool for evaluation leading to incorporation into the 3D mosaic snag d Q2 products during Fy07.

1st Quarter FY07

- Completed Fortran coding of new radar reflectivity quality control for single radar reflectivity field. The new radar QC was specifically developed for the NCEP implementation for computational efficiency and is based upon a linear heuristic rule set.
- Completed Fortran code set for NMQ radar ingest and polar to Cartesian transformation.
- Completed code set port for 3D single radar Cartesian reflectivity (SRC) product.
- Completed initial port and CPU resource testing of NMQ single radar Cartesian ingest and QC applications on NCEP mainframe.
- Completed Fortran/C++ coding of Q2 radar only QPI applications with ongoing testing currently.
- Completed and implemented additional statistical analysis tools on QPI verification system.
- Several logic changes were implemented in the polar processing SRC components towards improving the accuracy of QPI products currently being generated on the NMQ system. These changes are focused on mitigating the impacts of radar calibration offsets. For detailed info on the changes see the NMQ blog located on the NMQ hompage (www.nmq.nssl.noaa.gov).

2nd Quarter FY07

- Initial code port to NCEP of radar quality control, single radar Cartesian transformation and 3D mosaic has been completed.
- The Q2 BAMS manuscript has undergone final review and submission.
- Scripts for the required formatting and clipping of Q2 QPI fields as input to FFMP have been completed and tested.

3rd Quarter FY07

- Completed coding and testing of automated technique for the identification of warm rain microphysics (tropical precipitation rates). The technique will augment the current Q2 pixel by pixel segregation of precipitation regimes and differential z/r assignments to include a 'tropical'

classification. The technique builds upon our VPR based applications currently running and displayable within NMQ.

- A description of the warm rain identification technique along with case studies have been completed with a formal paper on the technique submitted to the Journal of Hydrology.
- The warm rain technique is currently being implemented on NMQ for real time CONUS evaluation.
- Q2 'radar only' and 'local gauge bias' products are being formatted in XMRG and are being made available to the Arkansas-Red Basin River Forecast Center for evaluation.
- A bright band top and bottom identification (BBID) technique along with freezing level height products have been full implemented on NMQ and are currently being utilized in Q2 products. The technique is based upon VPRs in combination with RUC model analysis. A formal paper describing the VPR based BBID has been submitted to the Journal of Hydrology.

4th Quarter FY07

- The automated technique for the identification of warm rain microphysics (tropical precipitation rates) was implemented on August 12, 2007 and is currently running in real time within the NMQ/Q2 system. Evaluations are on going as to the national performance of this component. The warm rain addition completes the warm season Q2 QPI application and a paper describing the Q2 warm season technique(s) is in preparation for submission to Journal of Hydrology.
- Twenty-two (22) new dual CPU servers were added to NMQ hardware configuration. The new servers were configured for radar data ingest, QC and SRC creation with the tested capacity to process HiRes level 2 data WSR-88D in addition to 31 Canadian radars and TDWR data streams.
- The Canadian radars are being compared with the WSR-88D network and assessed for calibration and attenuation limitations. A preliminary report has been prepared and submitted to the FAA (copied provided to OHD) on quality control deficiencies associated with the Canadian radar network. Testing of new Canadian radar specific QC techniques is currently underway. The real time Q2 QPE product generation using the Canadian radar blended with the WSR-88D is planed for completion by 2nd Q FY08.
- The real time Canadian radar data stream has been added to the Radar Reflectivity Comparison Tool.
- Q2 'radar only' and 'local gauge bias' products are being formatted in XMRG HRAP and are being made available to the West Gulf River Forecast Center for evaluation in real time. Preliminary feedback is favorable towards improvements in coverage and quality of Q2 QPE products.

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 continue 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 provide 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-munites at 1x1km resolution within the NMQ system. Product grids containing eth Canadian radar data will be made available in Q4.

Problems Encountered/Issues

1st Quarter FY06
- All previous NMQ hardware and facility issues have been corrected and/or resolved.
- During the process of standardizing code sets utilizing WDSS-II, it was determine that the creation of a single radar high-resolution 3-D reflectivity Cartesian grid (SRC) would improve the overall efficiency, timing and accuracy of Q2 products for infusion into FFMP. A high resolution 3-D SRC will be created in real time for each WSR-88Ds and then mosaic with subsequent product generation. The refresh rate for the SRC grids will initially be 5 minutes with a horizontal resolution of 1x1 km and 31 vertical levels.
- Transition to WDSS-II coding and operating environment for CONUS NMQ radar ingest, and radar quality control on NMQ system is on going and will be completed by March 1, 2006.

2nd Quarter FY06
- The WDSS-II Neural Net radar Quality Control (NNQC) application was found to be deficient in addressing radar QC issues associated with night 'blooms' and other artifacts. Additional cases are being assembled to facilitate further training of the NNQC application. Previously tested NMQ QC logic is being reimplementation on the NMQ system to augment the NNQC towards improving radar quality specially to address bloom occurrences.

3rd Quarter FY06 - None

4th Quarter FY06 - None

1st Quarter FY07
- Initial bench tests of radar ingest and SRC creation on the NCEP system identified potential CPU and memory allocation shortfalls. Additional testing will be conducted to ascertain memory and CPU requirements.

2nd Quarter FY07
- Testing of Q2 QPI fields into FFMP postponed until 3rd quarter due to a delay in the new FFMP.

3rd Quarter FY07
- Testing of Q2 QPI fields into FFMP postponed until 1st FY08 quarter due to a delay in the new FFMP.

4th Quarter FY07
- Offsets in Q2 HRAP grids for WGRFC have been resolved.
- Testing of Q2 QPI fields into FFMP postponed until possibly 2ndQ FY08 to allow time to resolve communication and ingest issues associated with FFMP advanced.
- CPU resource limitations and programmatic priorities have delayed implementation of Q2_CST modules at NCEP. The NMQ/Q2 system at NSSL continues to provide QPI fields to RFCs and GSD until such time resources are made available. PPBS for FY10-14 include Q2 transition to NCEP.

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.

High-Resolution Precipitation Estimator Nowcaster (HPN)

Core Goal: Improve the quality of physical inputs and forcings

Management Lead: David Kitzmiller

Objective: Increase flash flood warning lead time through short-range prediction of heavy rainfall; HOSIP approval of MPN project and prototype implementation within operational baseline

Milestones

Task	Due Date	Status
Create and maintain offline version of code suitable for integration with Statistical Distributed Model for flash flooding	March 31 2007	Complete
Project through HOSIP/OSIP Gate 3	Jun 30 2007	Completed Q2 FY08
Training material developed	Sep 30 2008	On track
Code check-in for OB9	Jun 30 2008	Completed in May 08

Accomplishments/Actions

1st Quarter FY05
- Demonstrated ability of nowcaster system to forecast time series of precipitation rate, such as can be used in advanced distributed hydrologic models.

2nd Quarter FY05
- Developed method to correct forecasted rainrate fields for artificial zero values in rainy areas, which arise due to spatially-varying motion vectors.
- Collecting verification statistics on forecast rainfall and rainrate amounts.

3rd Quarter FY05
- MARFC-area real-time 0-1h rainfall and rainrate forecasts and enhanced Multisensor Precipitation Estimator (MPE) fields are available at: http://www.nws.noaa.gov/ohd/hrl/hag/ffp_marfc/prodesc.htm
- Above web page is password protected
- Products include precipitation analyses, forecasts, and comparisons with real-time flash flood guidance
- Flash flood case studies were conducted to optimize adaptable parameters of forecast algorithm
- Statistics for forecast verification are being collected routinely

4th Quarter FY05
- Prepared conference preprint documenting improvements offered by Nowcaster relative to simple extrapolation and persistence forecasts of rainrate
- Some Nowcaster forecast fields were sent to Hydrology Group (Seann Reed) for input to hydrologic model HL-RMS. Tests indicate the forecasts yield a realistic response in surface runoff in the hydrologic model.

1st Quarter FY06
- Assisted in preparation of conference preprint documenting the utility of MPN forecasts in driving a distributed hydrologic model for small basins. Input of precipitation forecasts yielded consistently better streamflow forecasts than assuming no future precipitation or persistence of the previous hour's rainfall.
- Documentation of the verification characteristics for 0-1 hour rainfall was completed
- Concept of Operations and Operational Requirements were documented

2nd Quarter FY06
- Conditional approval of OSIP Stage 2 documents (SON, Conops)
- Creating AEL and C-code from original Fortran prototype

3rd Quarter FY06
- Work continues on re-coding extrapolation model from original Fortran prototype
- Routine coordination with MDL staff who maintain FFMP, to insure portability of precipitation products from MPN to FFMP

4th Quarter FY06
- Work continues on re-coding extrapolation model, forecast rainfall accumulation model, and real-time verification model from original Fortran prototype to C
- Work initiated to create algorithm enunciation language (AEL) for modules as needed (extrapolation model already had documentation)

1st Quarter FY07
- Draft CONOPS and ORD sent out for field review; positive comments received
- Inhouse version of MPN coded for later use in Statistical Distributed Model for flash flooding testbed
- AEL completed

2nd Quarter FY07
- Transferred codes to Linux machine
- Working to finalize interface with distributed model
- Drafted science algorithm document

3rd Quarter FY07
- Started regular project meetings and software developers began reviewing science documents.
- Created data interfaces to send output of offline prototype nowcaster to a distributed hydrologic model (flash flood project)
- Preparation of OSIP documents is ongoing.

4th Quarter FY07
- Held an internal requirements review
- Developers reviewing prototype code and AEL
- OSIP Gate 3 documents (CONOPS, operational requirements, science algorithm document) under final internal review preparatory to gate meeting
- Journal-quality manuscript under preparation

1st Quarter FY08
- Preliminary design completed for operational AWIPS software
- Continued preparing science documentation
- Started preparation of a conference preprint (for EWRI Water Resources Congress in 2008) including science documentation
- Ongoing HSMB-HSEB discussions on code transfer from prototype to operations

2nd Quarter FY08
- Code transfer HSMB to HSEB underway
- Project pass HOSIP Gate 3 (conditional) March 6
- Project passed OSIP Gate 3 and referred to SREC March 26

3rd Quarter FY08
- HPN code was checked in for AWIPS OB9 during May 2008.
- Now searching for ATAN sites
- Products are routinely examined for potential problems

Problems Encountered/Issues

1st Quarter FY05 - None

2nd Quarter FY05 – None

3rd Quarter FY05 - None

4th Quarter FY05 - None

1st Quarter FY06
- Scope of AHPS work still to be determined, given funding uncertainty

2nd Quarter FY06
- Departure of Richard Fulton, original project lead

3rd Quarter FY06
- Departure of Richard Fulton, original project lead, causing some delays.

4th Quarter FY06
- Departure of Richard Fulton, original project lead, causing delays in generating HOSIP documents

1st Quarter FY07 – None

2nd Quarter FY07 - None

3rd Quarter FY07
- Some delay in OSIP documentation

4th Quarter FY07
- Developers busy with OB8.3 delivery, but should be more available after early Nov.

1st Quarter FY08 - None

2nd Quarter FY08 – HSMB lead programmer is departing; took action to make sure his material is handed off properly

3rd Quarter FY08 - None

Western Region Daily QC Integrated with MPE

Core Goal: Improve the quality of physical inputs and forcings

Management Lead: Jon Roe

Objective: Integrate existing Western Region Mountain Mapper Daily QC (DQC) functionality and OHD Multi-Sensor Precipitation Estimator (MPE) application functionality into a single set of operational applications. A Western Region memo dated 11/18/2003 states the need for MPE to emulate Mountain Mapper in these areas:

- Provide a check based on PRISM, elevation, climate and spatial consistency.
- Estimate point precipitation based on PRISM climatology.
- Display thresholds of values like precipitation or elevation.
- Color code sites based on a statistical qualification using surrounding stations (i.e., computation of standard deviation to denote screened, bad, manual, questionable points).
- Allow user to control threshold for which questionable data is flagged.
- Filter for point data, i.e., use raw or processed data.
- Subdivide the RFC area allowing for multiple, simultaneous quality control processes.
- Add site identifier to error log.
- Generate Mean Areal Precipitation based on discontinuous basins.
- Aggregate six- and 24-hour data time steps.
- Provide the same functionality for temperature quality control.
- Provide the same functionality for freezing level quality control.

Milestones

Task	Due Date	Status
Write HOSIP Stage 1 documents.	Q1, FY05	Complete
Pass HOSIP Gate 1.	Q1, FY05	Complete
Visit CNRFC to observe operational use of DQC.	Q2, FY05	Complete
Inventory existing DQC components.	Q4, FY05	Complete
Conduct Validation and write HOSIP Stage 2 documents.	Q4, FY05	Complete
Pass HOSIP Gate 2.	Q1,FY06	Complete
Install DQC at NWSHQ/OHD (via on site visit of Craig Peterson from WR).	Q4, FY05	Complete
Conduct Research & Analysis and write HOSIP Stage 3 documents.	Q3,FY06	Complete
Complete reverse engineering analysis of DQC.	Q3,FY06	Complete
Pass HOSIP Gate 3.	Q3,FY06	Complete
Conduct Operational Development and write HOSIP Stage 4 documents.	Q1, FY08	Complete
Pass HOSIP Gate 4.	Q2, FY08	Complete

Accomplishments/Actions

1st Quarter FY05

- Work did not begin until December 2004. OHD is coordinating with Kevin Werner of Western Region Headquarters. First, there is a need to better understand the existing Mountain Mapper applications and data sets in order to understand the detailed requirements. Documentation, field consultation, and the installation of Mountain Mapper at NWS Headquarters will provide the information needed to identify requirements and complete the design. As much as possible, existing code will be re-used in the integrated operations.
- We completed the HOSIP Stage 1 NID and passed HOSIP Gate 1.

2nd Quarter FY05

- Minimal progress was made in the 2nd quarter. Some general design discussions were communicated between WR personnel and OHD. A visit to CNRFC by OHD staff was conducted, where we discussed and viewed demonstrations of DQC. Significant progress was made on porting the MPE FieldGeneration program from FORTRAN to C, which will help with the integration of the DQC field generation (i.e. gage-only objective analysis) methods with MPE. We have discussed the installation of DQC at OHD by CNRFC staff; it was decided to have CNRFC do this remotely, rather than via a visit from CNRFC.

- The delay is caused by the sequencing of efforts involving national QPE software; OHD is focused on completing most of the ABRFC P3 functional integration with MPE before doing serious design work on the DQC integration. We recently hired an additional contractor who is tasked with working solely on the P3-DQC-MPE applications.

3rd Quarter FY05

- Minimal progress was achieved this quarter. CNRFC was assigned a user ID and password for the purposes of installing the DQC application at OHD. Initial work on installing DQC was begun. OHD staff continued general design discussions. An outline of the DQC processing was prepared by CNRFC and sent to OHD.

- P3 integration into MPE was wrapping up during Q3 which will allow more work on DQC to move forward in Q4.

4th Quarter FY05

- Completed draft of the CONOPS and Project Plan for Stage 3.
- Craig Peterson visited OHD in July and installed the Daily QC software along with a canned data case.
- Daily QC code was moved to the WHFS OB7 development environment. This allowed the code to be compiled using the gcc 3.4.3 compiler and an executable to be created for testing.
- Replaced all directory references in code with .Apps_defaults tokens.
- Completed the review the functionality of Daily QC. Began compilation of specific requirements related to the integration of Daily QC functionality into the HydroView/MPE GUI.

1st Quarter FY06

- Conducted HOSIP Gate 2 Meeting. Revised CONOPS based on comments from meeting. Expect to convene a second Gate 2 Meeting and pass Gate.
- Conducted numerous internal design meetings and coordinated design issues with Craig Peterson of CBRFC
- Completed design of new MPE GUI with DailyQC options incorporated and HydroView options removed.
- Completed User Interface Document.
- Redesigned directory structure for incorporating DailyQC's 6 hour and 24 precipiation data, temperature data and freezing level data.
- Began coding to incorporate DailyQC functionality into MPE GUI.
- Continued discussions with Craig Peterson via email.

2nd Quarter FY06

- Significant software development activity was completed during this quarter. The OB7.1 OHD software was delivered in February 2006. It included the Hydroview and MPE_editor applications as separate applications; these two applications were previously integrated in one application. Numerous design meetings were conducted during this quarter, with major software development completed for the MPE application suite to be delivered in June 2006 for AWIPS OB7.2. The data setup, pre-processor, and other utility applications and data sets were prepared for formal implementation for OB7.2. The project passed into Gate 3 in February 2006. The HOSIP documents Gate 3 were written, but after a delayed review by the AWIPS SEC staff, the documents need to be updated to discuss certain performance attributes.

3rd Quarter FY06

- Major software development continued during this quarter. This culminated in the DailyQC functions delivered as part of the AWIPS OB7.2 delivery of June 6, 2006. This software was then tested on the AWIPS Pre-Integration Test platform. A few issues were identified and corrected. The software was delivered to CBRFC later in June, with installation performed in July. CBRFC will then evaluate the software operationally. Plans were made for a visit to CBRFC in August by two OHD/HSEB staff members to demonstrate and discuss the OB7.2 implementation.

4th Quarter FY06

- Visited CNRFC. Evaluation was reasonable successful, but additional items (some of which are enhancements) were identified. These changes were identified and are scheduled for OB8.x. Began work on installing software at NWRFC.

1st Quarter FY07

- Installed the software at NWRFC. Spent considerable time dealing with specific configuration issues related to the install. Discussed many issues with NWRFC about the different expectations they have of DailyQC as they have historically been using a different version than CBRFC used. Began defining requirements for the next pass of DailyQC feature for delivery in OB8.2. We plan to continue to work directly with the WR RFCs (CBRFC and NWRFC initially) to deliver beta versions to them for evaluation.

2nd Quarter FY07

- A spreadsheet of requested changes and additions was prepared by HSEB based on feedback from WR RFCs. This was shared with NWRFC and a set of prioritized requirements was baselined. These were then assigned to AWIPS OB8.2 or OB8.3, or designated for future consideration. In April 2007, this information was shared and discussed in a conference call for which the AWIPS and national representatives were invited. WR HQ and NWRFC participated in the call. Based on the agreement from this discussion, work is continuing on the OB8.2 version of MPE/DQC.

3rd Quarter FY07

- The OB82 implementation of MPE/DailyQC was delivered to Raytheon. This version included many new DailyQC features. These are summarized in a separate spreadsheet which needs to be incorporated into the HOSIP ConOps requirements tables. The spreadsheet-tracked tasks were the result of the previously mentioned conference calls and follow-up emails, which mapped out the requirements/tasks to be done for OB8.2 and OB8.3.
- The OB82 MPE was installed on the AWIPS OB82 PIT system (Pre-Integration Testing) system and was reviewed by Mark Fenbers and assorted WFO visiting forecasters.
- Preliminary work is ongoing for tasks slated for OB83.

4th Quarter FY07

- Continued to work on software changes to support Daily QC operations. Considerable changes are expected to be completed for OB83 delivery in early November. A separate HSEB managed spreadsheet is being used to track the status of all the requirements.

- Conducted requirements review conference call in late August.

1st Quarter FY08

- Delivered MPE with additional DailyQC features and a disaggregation feature to the AWIPS contractor for implementation in OB8.3. This delivery included associated test documents and integration handoff documents.
- Updated MPE Fieldgen and MPE Editor user's documents for OB8.2 and OB8.3.
- A full list of changes made for OB8.3 is available in a spreadsheet managed by HSEB and provided as part of the integration handoff.
- HSEB is seeking RFCs to evaluate the new features. Candidate offices include NWRFC and APRFC.

2nd Quarter FY08

- Slated to be delivered in OB8.3 in June 08

3rd Quarter FY08

- Awaiting delivery of OB83 at all RFCs as part of regular AWIPS deployments.
- Working with OB83 beta-site NWRFC to evaluate MPE/DQC performance.

Problems Encountered/Issues

1st Quarter FY05

- In order to effectively implement the integration of Mountain Mapper and MPE, detailed requirements must be identified, and the design must be formulated to address these requirements.

2nd Quarter FY05

- Significant design work must be completed to address the integration issues, and to account for the enhanced time resolution being proposed for the DQC functions. Currently DQC operates at a minimum of 6-hour durations. For this project, we will be supporting 1-hour durations.

3rd Quarter FY05

- Work on this project was very slow this period due to two main reasons.
    - First, key resources within OHD/HL needed to perform the DQC analysis and subsequent HydroView/MPE design were unexpectedly tied up most of the last several months with high priority AWIPS-directed activities including getting hydro VTEC ready for OB6 and performing the large conversion of all hydro software from using Informix to using PostgreSQL. The extent of the AWIPS activities were not only larger (in effort and on the calendar) than previously expected but the series of AWIPS releases between OB4 and OB6 were highly changeable in content from week to week.
    - Second, the labor effort expected to analyze the existing DQC functionality and to incorporate its design into HydroView/MPE was underestimated at the beginning of FY05.
- The stretch goal is still to try to get this work into AWIPS OB7.

4th Quarter FY05

- AWIPS OB6 activities related to the PostgreSQL upgrade continued to tie up personnel needed for this project.
- Work to update the Post Analysis application for OB6 diverted resources from this project.
- The goal remains getting Daily QC into OB7.

1st Quarter FY06

- Planning for staged AWIPS deployments in OB7.1 and OB7.2 required special considerations.

2nd Quarter FY06 – n/a

3rd Quarter FY06 None

- The CBRFC evaluation is a critical period for the DailyQC MPE implementation. Feedback from this evaluation will be integrated into updates of the MPE software suite.

4th Quarter FY06

- Feedback provided from CBRFC. These changes need to scheduled and worked for incorporation into OB8.x.
- Because this is in Stage 4, but has been delivered for OB7.2, we need to update the HOSIP requirements to account for which were considered for OB7.2 and which are scheduled for OB8.x. The build for which a requirement is scheduled is not tracked in the HOSIP requirements table.

1st Quarter FY07

- Still need to update requirements to account for multiple releases of the software, starting with OB7.2 and continuing through OB8.2 and OB8.3 The WR RFCs will be coordinating their individual needs into a prioritized, consensus set of requirements from which OHD development can proceed.

2nd Quarter FY07 - None

3rd Quarter FY07

- The OB82 tasks which were completed need to be inserted into an updated HOSIP document. This HOSIP project spans three AWIPS releases (OB8.1, OB8.2, OB8.3).
- The final list of tasks being worked on for OB83 must be resolved via discussions with RFC staff. The results of this information must then be used to update the HOSIP documents.

4th Quarter FY07

- While most of the OB83 DailyQC tasks will be completed, a few desirable components will not be completed, and it is not clear if the software will be accepted for operational use.
- The task assignments for AWIPS OB9 has been completed, as part of the SREC activities. There is no work scheduled for MPE activities, and this is a serious concern if there is a need for additional changes to support operational use of MPE/DailyQC.

1st Quarter FY08

- None

2nd Quarter FY08

- None

3rd Quarter FY08

- None

High-Resolution Precipitation Estimator (HPE)

Core Goal: Improve the quality of physical inputs and forcings

Management Lead: David Kitzmiller

Objective: Delivery of HPE in AWIPS OB8.3

Milestones

Task	Due Date	Status
Pass HOSIP Gate 4	FY08 Q3	On Schedule
Scheduled for deployment in AWIPS OB8.3	FY08 Q3	Underway

Accomplishments/Actions

1st Quarter FY06
- Updating enhanced MPE code to enable Nowcaster to use radar-gauge bias information in generating forecasts
- Journal article describing MPE and NEXRAD Precipitation Processing System being drafted
- Concept of Operations and Operational Requirements were drafted

2nd Quarter FY06
- Conditional OSIP Gate 2 approval of SON and Conops
- Began creation of AEL and C-code based on real-time prototype
- OS&T seminar presentation on enhanced MPE and MP Nowcaster, including field representatives by Visitview (April 5)

3rd Quarter FY06
- HSMB and HSEB staff now working together on code integration
- Began integration of Digital Hybrid Reflectivity product decoder in OB7.1 baseline
- HSEB and HSMB staff are refining project plan
- Routine coordination with MDL staff to insure portability of reflectivity mosaic products from EMPE into FFMP
- Planned detailed study of EMPE performance over Tar River basin, North Carolina, in collaboration with NSSL and NESDIS

4th Quarter FY06
- Radar reflectivity and precipitation decoding and mosaicking functions were converted to C code and successfully run in AWIPS OB7.1 baseline
- Work initiated to create algorithm enunciation language (AEL) for modules as needed
- CONOPS and Operational Requirements reviewed by OCCWS and HSEB staff
- Options for obtaining Digital Storm-Total Precipitation (DSP) and Digital Hybrid-Scan Reflectivity (DHR) products from nonassociated radars were explored with HSEB and OS&T-SEC. We expect a final resolution on the approach during FY07 Q2.

1st Quarter FY07
- Implementation into OB8.3 is on schedule
- HOSIP gate 3 meeting scheduled for February, OSIP gate 3 for March

2nd Quarter FY07
- Revised Gate 3 science documentation based on HOSIP administrator's comments
- SREC design reviews carried out

- Initial real-time operation of EMPE within AWIPS
- Submitted RC for general dissemination of DHR, DSP products

3rd Quarter FY07
- Demonstrated real-time operation of EMPE prototype within AWIPS, with D2D displays, for several heavy precipitation events. Data from up to 11 radars ingested and processed simultaneously.
- Passed OSIP Gate 3
- Started ATAN of operational EMPE at WFO in Salt Lake City, UT
- RC to permit routine communication of NEXRAD digital hyrbrid reflectivity (DHR) and digital storm-total precipitation (DSP) products was approved is under real-time testing.

4th Quarter FY07
- In October 2007, OHD staff decided to rename the project High-Resolution Precipitation Estimator (HPE) because of ongoing external confusion about its relationship to MPE
- Field Tests (ATANs) at SLC, HGX, and MLB
- RC approved to increase storage for HPE
- Coding nearly completed and code review held

1st Quarter FY08
- HPE operational software development was completed, and software was delivered for AWIPS OB8.3.
- Routine generation and SBN dissemination of DHR and DSP products, the necessary NEXRAD input products for HPE, was approved
- Discussed results of ATAN with WFO SLC staff; the package got a favorable reception and the staff said they'd use it in operations when available.
- Developed science documentation on ATAN results; primarily gauge/radar comparisons.
- Got results of HPE output for Tar Basin (North Carolina) precipitation intercomparison with NMQ package. The HPE performed as expected; results were consistent with MPE and Stage IV RFC-produced precipitation grids when input to hydrologic model HL-RDHM.

2nd Quarter FY08
- Work has been completed and handed off for planned implementation in OB8.3
- Documentation has been completed for presentations at HOSIP for passing Gate 4

3rd Quarter FY08
- HPE deployment began with AWIPS OB8.3.

Problems Encountered/Issues

1st Quarter FY06
- Scope of work still to be determined, given funding modifications

2nd Quarter FY06 - None

3rd Quarter FY06
- Departure of Rich Fulton, original project lead, causing some delays.

4th Quarter FY06
- Some delays in OSIP process since the group leader is still working as project lead as well

1st Quarter FY07 - None

2nd Quarter FY07
- We were advised by HOSIP administrators to beef up the science documentation, just prior to deadlines for gate meetings. This delayed our gate reviews into the 3rd quarter

3rd Quarter FY07 - None

4th Quarter FY07 – None

1st Quarter FY08 - None

2nd Quarter FY08 – None

3rd Quarter FY08 - None

Gridded Temperature Forecasts for OFS

Core Goal: Improve the quality of physical inputs and forcings

Management Lead: David Kitzmiller

Objective: Develop science background for input of gridded 3-hourly temperature forecasts to OFS/NWSRFS, supplanting current method of incorporating only maximum/minimum temperature forecasts

Milestones

Task	Due Date	Status
Estimate optimum weights for converting max/min temps to 6-h averages in current OFS method, for CBRFC, CNRFC, AKRFC areas; present results to OHD and RFC staff	Feb 28, 2007	Complete
Test alternative methods of estimating hourly temperature from max/min values (current operational values; Schaake method)	Jun 30, 2007	Deferred; possibly not necessary
Complete concept of operations and project plan for centralized production of MOS-based gridded temperature forecasts for RFC use	Sep 30, 2007	Deferred – new CONOPS
Prepare program for local generation of temperature forecast grids from point forecasts	June 30, 2008	Complete

Accomplishments/Actions

1st Quarter FY07

- Initial task was undertaken for benefit of RFC operations - estimate optimum weights for converting max/min temps to 6-h averages in current OFS method, for CBRFC, CNRFC, AKRFC areas
- Results will also be applied in 2nd step, since most climatic temperature information is only on maximum and minimum values, and a daily cycle estimate must be applied to get instantaneous hourly temperatures
- Determined that these RFC areas will generally benefit by using the conversion weights derived for NWRFC, though RFC-specific weights would be best
- Collected information on availability and utility of PRISM max/min temperature grids for western U.S., Alberta, British Columbia

2nd Quarter FY07

- Sent documentation on new max/min to 6-h average temperature coefficients to staff at AKRFC, CBRFC, CNRFC
- Based on positive feedback, HSEB staff implemented new coefficients as ATAN 876, on 3/22

3rd Quarter FY07

- Collected more information on RFC needs for gridded temperature forecasts over Canada, and current operational capabilities for their production. There appears to be consensus from the northernmost RFC's that gridded temperature forecasts covering parts of Canada are necessary. The current MDL method for production might be suitable.
- Discussed MDL capabilities with Kathryn Hughes. The operational algorithm involves creation of 5-km temperature grids from point temperature forecasts within the CONUS. Similar point temperature forecasts are created for a set of sites in Canada.

4th Quarter FY07

- In discussions with MDL staff, we identified a potential solution to the lack of gridded MOS temperature forecasts over Canada. It appears possible to cover almost all relevant RFC basins by expanding forecast coverage within the currently-operational product; by activating grid points

that are presently masked.
- Prepared a draft concept of operations for circulation
- Initiated study of the behavior of operational NDFD2RFS code; located some potential problems since part of the code logic that estimates 6-h average temperatures from instantaneous values and daily maximum/minimum appears to assume a diurnal temperature cycle fixed with respect to universal time. This is a problem similar to that encountered with the max/min to 6-h conversion algorithm that was adjusted for western RFCs in an earlier stage

1st Quarter FY08
- Discussed possible modifications to NDFD2RFS code with PAL Joe Gofus, to address potential biases in 6-h average temperature output. He is now studying the code to estimate the level of effort required to modify it. We presented the proposed set of weighting factors for averaging instantaneous temperatures and max/min values to produce unbiased 6-h average temperatures.
- Discussions with RFC staff to determine the current usage of temperature forecast guidance (MOS and WFO-produced), NDFD2RFS usage, and the needs for OCONUS and Canadian temperature forecasts. It appears the most critical need for Canadian data is at NWRFC, with some additional need at NCRFC.
- Began designing a local application to use currently-operational point MOS temperature forecasts to supply grids out to day 10, to serve NWRFC needs.

2nd Quarter FY08
- Worked on adapting existing Model Output Statistics code to locally create temperature forecast grids from point max/min forecasts – results near completion.

3rd Quarter FY08
- Completed a prototype code that derives gridded maximum or minimum temperature from operational Model Output Statistics text products
- Sent initial results to NWRFC for comment

Problems Encountered/Issues

1st Quarter FY07 - None

2nd Quarter FY07 - None

3rd Quarter FY07 - None

4th Quarter FY07
- Initial, limited RFC feedback (received in October) indicates other problems with the gridded MOS approach – lack of forecasts beyond 7 days. Point MOS temperature forecasts are available out to 10 days. Some alternatives will be investigated.

1st Quarter FY08 - None

2nd Quarter FY08 – None

3rd Quarter FY08
- Results achieved too late for application during 2008 melt season; will continue for next winter

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	Expected July 2008
Collect and quality control all necessary rain gauge data for Sep 2003 and Jun 2006 warm season cases	June 30, 2008	Complete July 2008
Create radar-gauge multisensor analyses for Sep 2003 and Jun 2006 warm season cases, run RDHM hydrologic simulations	Aug 31, 2008	On track
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	
Report on the evaluation and develop collaborative research strategy (draft preprint for AMS Hydrology Conference; draft journal article)	Dec 31, 2008	

Accomplishments/Actions

1st Quarter FY07

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

2nd Quarter FY07

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

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

3rd Quarter FY07

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

4th Quarter FY07

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

1st Quarter FY08

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

2nd Quarter FY08

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

3rd Quarter FY08

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

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

QPE (MPE) Enhancements

Core Goal: Improve the quality of physical inputs and forcings

Management Lead: Mark Glaudemans

Objective: To improve the hourly QPE estimates used in river models at RFCs and WFOs and to provide for a national integrated, baselined tool for QPE operations.

Milestones

Task	FY08 Due Date	Status
1. Complete OB83 MPE changes to integrate DailyQC into MPE	Q1	Complete
2. OB9 DR #19816 - Include All Grids in MPEeditor Gage Table	Q3	Complete
3. OB9 DR #19817 - Allow Grid Selection for the MPEeditor Multihour Accumulation Display	Q3	Complete
4. Support NWRFC OB83 beta evaluation of DailyQC changes	Q3	Ongoing
5. Continue active support of MPE operational evaluation at all RFCs and WFOs	Q3-Q4	Awaiting deployment

Accomplishments/Actions

1st Quarter FY08

- Delivered OB83 changes for MPE integrated with DailyQC features. Included updated documentation.

2nd Quarter FY08

- Completed OB9 DR work for MPE operations.
- Addressed assorted bugs in MPE operational suite.

3rd Quarter FY08

- Delivered changes to AWIPS CM system for OB9. This included the following changes:

a) Implemented a new version of the Gage Table, which for each of the precipitation gages, lists the gage value and their values for the gage location as estimated by the various gridded and multi-sensor fields. Previously, the table presented an incomplete set of grid values. Now it contains all the values except for the raw satellite estimate value, although the satellite-radar and satellite-radar-gage value are presented. The gage table initially displays the values in the same order as the items shown in the MPE Editor Precip Fields menu. Also, the columns of the Gage Table are initially sorted by descending value. Both the column order and the row value order can be interactively adjusted. (DR 19816)

b) Modified Multi-hour Accumulation Display Features to add an option to choose the field. Previously, the field accumulated was always the Best Estimate QPE field. (DR 19817)

c) Modified the Display7x7 window to contain an option button which allows the MPE product displayed in the 7x7 window to be selected.

d) Fixed problem where the application shut down upon request of display of freezing level when there were too few freezing level datasets available. This also occurred for display of some temperature data sets.

e) Fixed problem where the Edit Precipitation Stations, Edit Temperature Stations, and Edit Freezing Stations windows each would creep a few pixels to the south and east when a new station is selected for editing. Eventually, the windows reach the corner of the screen and the forecaster had to reposition them. Also added logic so these windows close after editing a station, and when another station is selected for editing, the edit window always reappears in the same place on the screen.

f) Modified behavior regarding estimated gage values. Previously, when a user set a station to bad using the Edit Precipitation Station window or the Edit Temperature Station window, an estimated gage value is shown. Then, when the precipitation grids were rendered, the station's value is estimated to something different. The station value was getting re-estimated once missing stations were assigned estimated values. This was changed to always use the estimated value shown in the Edit Precipitation or Edit Temperature window.
g) Changed behavior of application so that when displaying the topographic image, it will display the topographic image below all other data sets and overlays.
h) Adjusted how the analysis time period is interpreted based on the current time. Previously, the application would show data for the next DailyQC day, if it is started after 12z (12z being the value of the token dqc basetime
i) Improved the logic which allows the last 6 hour temperature and freezing level period of the DailyQC day to be set as either 6Z or 12Z. This does not affect the precipitation data Created the dqc_ending_6hour_obstime token to determine whether temperature and freezing level data are QC'd for 6 hour periods 12z, 18z, 00z, 06z or for 18z,00z,06z,12z.

Also provided support for beta testing of MPE/DailyQC at various RFCs.

Problems Encountered/Issues

1st Quarter FY08
- None

2nd Quarter FY08
- None

3rd Quarter FY08
- None

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	To be completed Q4
Develop software for inserting rain gauge information from Point Data Control application in radar-based rain estimate grids from HPE	FY08 Q4	

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

Problems Encountered/Issues

2nd Quarter FY08 - None

3rd Quarter FY08 - None

Assessment of QPF Produced By 2-4 km WRF-based Storm Scale Ensemble for NOAA's 2007 Hazardous Weather Test bed Spring Experiment

Core Goal: Improve the quality of physical inputs and forcings

Management Lead: Suzanne Van Cooten, NSSL/OAR

Objective: Evaluate QPF output produced by a high resolution, convection allowing 10 member WRF-based Storm Scale Ensemble Forecast (SSEF) run at 4 km grid spacing and other deterministic convection allowing WRF models run at 2-4 km gird spacing by the University of Oklahoma Center for the Analysis and Prediction of Storms (CAPS), NCAR, EMC, and NSSL for NOAA's Hazardous Weather Testbed (HWT) 2007 Spring Experiment. QPF output from the NSSL and EMC deterministic WRF models are also available throughout the year.

An assessment will be completed to determine the accuracy and usefulness of high resolution WRF model QPF output, including probabilistic information from the SSEF, to NOAA hydrologic services. This assessment will ascertain if the SSEF and other WRF models produced for the 2007 Spring Experiment created QPF fields which add value for both the very near term, in a WFO Flash Flood Monitoring and Prediction (FFMP) application, and a somewhat longer term of up to 12 hours for RFC usage in forecasting mainstem river stages

Milestones

Task	Due Date	Status
1. Selection of student for QPF ensemble assessment	Apr 2008	Complete
2. Create gridded fields of QPF produced by each member of the WRF-based ensemble	June 2008	Complete
3. Development assessment methods and criteria to determine accuracy and usefulness of WRF QPF output	July 2008	Underway
4. Report on QPF evaluation and develop implementation strategies to evaluate QPF value in FFMP applications	Oct/Nov 2008	

Accomplishments/Actions

2nd Quarter FY08

- University of Oklahoma School of Meteorology Graduate Student selected for research assignment (Craig Schwartz to be supervised by Jack Kain (NSSL))
- Initiate creation of gridded fields of QPF produced by each member of the WRF-based ensemble for the Spring 2007 HWT experiment

3rd Quarter FY08

3rd Quarter FY08

- Developed data manipulation and statistical analysis tools and began preliminary analysis of convection-allowing datasets, including benchmark measures of forecast skill and sensitivities to model physical parameterizations and horizontal resolution.
- Worked with NCEP/EMC scientists to import hourly precipitation forecasts from the operational NAM for detailed comparison with output from convection-allowing models.

Problems Encountered/Issues

2nd Quarter FY08

- AHPS Funding not released

3rd Quarter FY08

- None

Flash Flood Services

National Basin Repository

Theme: Flash Flood Services

Management Lead: Ami Arthur, CIMMS and Ken Howard, NSSL

Objective: To create a National Basin Repository for the FFMP GIS dataset and provide data access through a web interface, to develop a kick-off training seminar to inform the WFOs of new basin dataset processing required prior to OB8.3, to assist all WFOs with the acquisition and processing of expanded domain small-basin shapefile datasets for FFMPA, and to coordinate and facilitate the sharing of verified stream names and other customization among WFOs via a web-based customization repository.

Milestones

Task	Due Date	Status
Establishment of the National Basin Repository computer server hardware and communications infrastructure	May 1,2005	Completed
Implementation of software for web interface to FFMP GIS dataset	July 31, 2005	Completed
Creation of a seamless hydrologically-connected FFMP basin and stream dataset for the United States, including Alaska, Hawaii, Puerto Rico, and Guam.	August 30,2005	Completed
Creation of instructions for users to download data and prepare it for localization in AWIPS.	Changed to Sept. 30, 2007	Completed
Develop a kick-off training seminar to inform the regions and WFOs of the upcoming needs related to basin datasets for OB8.3, describe how to accomplish the necessary tasks, and offer continued technical support.	Feb. 5, 2008	Completed
Coordinate and facilitate the sharing of verified and additional stream names among WFOs through the establishment of a web service to host and serve verified stream name datasets.	Sept. 30, 2008	In progress
Serve as the point-of-contact to support the WFOs in their FFMP basin dataset preparation for FFMP Advanced and WarnGen in OB8.3 to ensure that there is no interruption of service.	Sept. 30, 2008	In progress

Accomplishments/Actions

1st Quarter FY05

- Notification of funding availability not received until after first QR. No activities performed during first QR.

2nd Quarter FY05

- Progress has been made toward establishing hardware and communications infrastructure for the repository. The ESRI ArcIMS and Data Delivery Extension software for the web interface have been procured.
- NSSL continues to provide FFMP dataset technical support in the form of basin customization assistance and data delivery to various users.

3rd Quarter FY05

- The ESRI ArcIMS and Data Delivery Extension software have been installed. A few issues with the Data Delivery Extension are being worked out with the help of ESRI Technical Support.
- Creation of a seamless hydrologically-connected basin and stream dataset for the U.S. is underway.
- NSSL continues to provide FFMP dataset technical support. This quarter, varying degrees of assistance were provided to fill 15 requests for additional data and basin customization support.

4th Quarter FY05

- The Data Delivery Extension installation has been completed. Creation of the National Basin Repository website is in progress.
- The national seamless hydrologically-connected basin and stream dataset has been completed with the exception of a few areas where re-delineation was required. Previous errors of significance in these areas are being corrected using the improved elevation data that is now available. This will further improve the accuracy of the small basin boundaries and delineated streams.

1st Quarter FY06

- The National Basin Repository website for browsing the seamless stream and basin datasets has been created. The Data Delivery Extension is being configured for these datasets to allow user downloads in addition to browsing.
- Basins in the re-delineated areas (please refer to 4th Quarter activities) have been completed and incorporated into the CONUS seamless dataset. Basins in Alaska that were outside the originally delivered radar coverage areas are near completion and will be incorporated into the Alaska seamless dataset.
- NSSL continues to provide FFMP dataset technical support. This quarter, varying degrees of assistance were provided to fill 7 requests for additional data and basin customization support.

2nd Quarter FY06

- After several unsuccessful months of attempting to work out numerous problems associated with the Linux versions of ArcIMS and DDE, the decision was made to install the Windows versions instead. A new computer was purchased, and the Windows versions of ArcIMS and DDE were installed. These are now being configured for the national basin dataset, which is planned to be online by 15 May 2006.
- The Alaska basins that were outside the originally delivered radar coverage areas have been delineated. The seamless dataset for Alaska will be completed by the end of Q3.
- NSSL continues to provide FFMP dataset technical support. This quarter, assistance was provided to 10 WFOs and the CBRFC.

3rd Quarter FY06

- The National Basin Repository website for serving FFMP GIS datasets has been completed. It is currently being reviewed by NWS Headquarters and FFMP designers. After their review and approval, the website will be opened for access by NOAA and other government agencies.
- User instructions for requesting and using data from the National Basin Repository are being drafted.
- Additional progress was made on the Alaska seamless basin and stream dataset, which will be completed and made available through the National Basin Repository by 15 August 2006.
- NSSL continues to provide FFMP dataset technical support. This quarter, assistance was provided to 12 WFOs and the ABRFC.

4th Quarter FY06

- The seamless FFMP basin and stream datasets for Alaska have been completed.
- NWS Headquarters and FFMP designers have provided feedback regarding the National Basin Repository and web interface. To the extent possible, modifications will be made to incorporate their suggestions. This will likely be an iterative process, and the draft user instructions will be updated accordingly as changes are made.
- NSSL continues to provide FFMP dataset technical support to numerous WFOs.

1st Quarter FY07

- Minor modifications were made to the web interface this quarter, and development of user instructions continued. Although improvements to the interface and instructions will be an ongoing process for some time into the future, a “final” version will be solidified during Q2 FY07.
- NSSL continues to provide FFMP dataset technical support to numerous WFOs.

2nd Quarter FY07

- To simplify the National Basin Repository data download and assimilation procedure as requested by FFMP developers, the ArcView Basin Customization Extension was updated to include new geoprocessing tools. The entire data download and assimilation procedure, including use of the newly included tools, will be tested by Bob Davis (Pittsburgh WFO) during the next quarter. Suggestions resulting from the testing will be incorporated into the final user instructions.
- NSSL continues to provide FFMP dataset technical support.

3rd Quarter FY07

- Due to other commitments, progress this quarter was limited. The data download/assimilation procedure is being tested locally and will be passed on shortly to several people outside NSSL who have volunteered to evaluate it.
- NSSL continues to supply data and provide FFMP dataset technical support upon request.

4th Quarter FY07

- User instructions for the download of new FFMP shapefiles from the repository and integration with any previously customized versions of the shapefiles have been completed and posted to the repository website. For system security, website access is currently allowed through submission of an IP address. Anyone interested in accessing the repository should send their IP address to Ami.Arthur@noaa.gov.
- The eight WFOs that are participating in the FFMP Advanced Alpha test have been using the repository data and instructions during the past two weeks to prepare new basin and stream shapefiles for FFMP Advanced. We have received a few minor comments and suggestions, which we have incorporated into the instructions. NSSL will continue to maintain the repository and incorporate suggestions on the instructions to try to ensure that the task of creating the new datasets for FFMP Advanced will be as straightforward as possible for all of the WFOs.

1st Quarter FY08

- During this quarter, data and support were provided to numerous WFOs who were proactive in getting started on the process of obtaining and preparing their datasets for FFMPA. This included continued assistance for the eight WFOs participating in the FFMPA Alpha Test.
- Work continued on conversion of necessary shapefile processing and customization tools for compatibility with ArcView 9.2.

2nd Quarter FY08

- Shapefile processing and customization tools for ArcGIS 9.2 were completed, and tool documentation was developed. Instructions for the required FFMPA shapefile processing were completed and posted on the National Basin Repository webpage and on the NSSL public webpage.
- A kick-off training webinar was given on 02/05/08 to inform the regions and WFOs of the upcoming needs related to FFMPA basin datasets for OB8.3. Demonstrations of the National Basin Repository and FFMPA Toolbox for ArcGIS 9.2 were provided to 127 attendees to illustrate how to accomplish the necessary tasks. After the webinar, updates and additional information have been sent to the WFOs via the AWIPS/FFMP discussion list.
- As of 03/31/08, 29 WFOs have completed the required download and processing of basin datasets for FFMPA. NSSL has provided assistance of varying degrees to many of those offices, including coordination with the OB8.3 Beta test sites to ensure their datasets were in order prior to testing.
- The process of collecting customized basin datasets for sharing via a customization repository is now underway.

3rd Quarter FY08

- A repeat of the training webinar was given on 04/23/08 for anyone who missed the kick-off webinar in February.
- As of 06/31/08, notification of Tier I completion (download and processing of shapefile datasets for FFMPA) has been received from all but seven WFOs. NSSL has provided assistance in

varying degrees to the majority of these offices.

- NSSL is providing additional instructions and assistance to WFOs that are beginning the process of basin customization (Tier II and Tier III processing). A webinar on the Tier II and Tier III processing is planned for 4th quarter FY08.

Problems Encountered/Issues

1st Quarter FY05 - None

2nd Quarter FY05 - None

3rd Quarter FY05 - None

- Data Delivery Extension configuration issues are still being worked out.

4th Quarter FY05

- Delays in completing the seamless dataset were encountered due to the need for re-delineation in some areas. The re-delineation is critical for ensuring a high-quality dataset.

1st Quarter FY06

- Data Delivery Extension configuration issues specific to the seamless dataset are being resolved. We will enlist help from ESRI to ensure the data download capability is available as soon as possible in FY06 Q2.

2nd Quarter FY06

- The decision was made to halt work with the Linux versions of ArcIMS and DDE and install the Windows versions instead.

3rd Quarter FY06 - None

4th Quarter FY06 - None

1st Quarter FY07- None

2nd Quarter FY07- None

3rd Quarter FY07 - None

4th Quarter FY07 - None

1st Quarter FY08 - None

2nd Quarter FY08 – None

3rd Quarter FY08 – None

Distributed Hydrologic Model with Threshold Frequencies (DHM-TF)

Core Goal: Improve forecasts of fast response hydrologic events including debris flow

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. 2007 Task: First cut Poor Person's reanalysis for MARFC	Q2	Complete
2. Finalize parameterizations for two model domains (2 km – Baltimore; 4-km – MD).	Q3	4km Ongoing 2km delayed until Q4
3. Prepare GIS scripts to aid Sterling in viewing outputs	Q3	Ongoing
4. Help Sterling setup prototype model	Q3	Delayed start until Q4
5. Run historical hydrologic simulations to generate gridded statistics.	Q3	Ongoing
6. Complete historical analysis begun in 2007 (events and overall statistics for selected basins)	Q4	
7. Monitor real-time HL-RDHM runs; archive and analyze case studies	FY09 Q1	
8. Maintain and monitor MPN runs within OHD	FY09 Q1	
9. Additional work to improve and understand the limitations of the Poor Person's re-analysis; develop data set for a second RFC	FY09 Q2	
10. Recommend high level requirements for operational development	FY09 Q2	
11. Publish results	FY09 Q2	

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.

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.

Flash Flood Potential Index

Core Goal: Improve forecasts of fast response hydrologic events including debris flow

Management Lead: Greg Smith (Colorado Basin RFC)

Objectives: FY06 – 3rd[t] qtr FY08:
- Deliver FFPI output to several NWS offices for evaluation / feedback
- Incorporate a dynamic soil moisture component into FFPI
- Evaluate best platform for FFPI should utilize (based on feedback)

FY07 – FY08 - Explore / Expand FFPI use in the generation of FFG.
FY08 - Potential for future expansion / improvements for FFPI beyond FY08.

Milestones:

Task	Due Date	Status
Acquire & Prepare finer resolution GIS datasets	4th qtr FY06	Completed
Update and incorporate methodology and application process	4th qtr FY06-FY07	Completed
Re-create FFPI on a national scale and document process	4th qtr FY06-FY07	Extended to 4th qtr FY08
Identify offices willing to evaluate product	3rd qtr FY06	Completed
Deliver-Test static product – obtain / incorporate feedback	4th FY06-1st qtr FY08	Extended to 4th qtr FY08
Incorporate a dynamic soil moisture component (ext to to FY08)	4th qtr FY06-FY07	Extended to FY08
Acquire FF Event Data / Verify FFPI Output (ongoing – ext to FY08)	4th qtr FY06-FY08	On Schedule-extended to FY08
Define a method to incorporate FFPI in FFG generation (ext to FY07)	4th qtr FY06-FY07	Completed
Peer Review of FFPI Methodology / Application	FY06-FY08	Completed (& Ongoing)
Re-define future CONOPS based on testing / evaluation	FY07 – 4th qtr FY08	On Schedule-extended to FY08
Implement re-defined CONOPS & Improvements/Updates	FY08 & beyond	On Schedule

Accomplishments/Actions

1st Quarter FY06
- Obtained MRLC 30 meter resolution land-use dataset for conterminous U.S.
- Obtained national forest density dataset.
- Converted and merged approximately 25-30% of MRLC data required for application
- Visited PHX WFO (CBRFC funded) to implement initial FFPI for testing/feedback.

2nd Quarter FY06
- Continued to merge MRLC datasets required for application
- Acquired national DEM dataset required for application
- Identified several offices willing to test/evaluate product

3rd Quarter FY06
- Identified scale & methodology issues and addressing these.
- Completed FFPI for LAX office (western region test office)
- Set list of alpha test stations for initial FFPI testing
- Continued to manipulate national datasets for use in FFPI procedure

4th Quarter FY06
- Converted all available MRLC datasets for use in FFPI procedure.

- Developed initial implementation plan for Alpha test sites.
- Continue to manipulate remaining datasets for utilization in FFPI process.
- Continued to manipulate national datasets for use in FFPI procedure.

1st Quarter FY07

- Re-sampled datasets to FFPI grid-cell resolution for alpha test site regions.
- Loaded alpha test site geographic boundaries and clipped datasets to match.
- Met with USFS remote sensing center to verify proper application of wildfire burn data.
- Developing a process with USFS for obtaining wildfire burn data for FFPI application.
- Obtained numerous wildfire burn area datasets for FFPI application.
- Continued to manipulate national datasets for use in FFPI procedure.

2nd Quarter FY07

- Completed creating FFPI for RNK test sites (working on delivery methods).
- All Data acquired for conterminous test sites, ABQ/SGF near completion
- Started review of GRASS GIS and GFS as working environments for FFPI
- Developed FFPI-FFG methods for the CNRFC

3rd Quarter FY07

- Completed FFPI for ABQ (have not yet delivered)
- Developed a checklist for evaluation FFPI performance at test sites
- Identified possible soil moisture components for application to FFPI
- Incorporated FFPI into FFG development at CNRFC
- Visited Las Vegas office and delivered FFPI

4th Quarter FY07

- Modified methodology for incorporating slope data layer into FFPI
- Tested Arc-IMS as an option for delivery of product to FFPI
- Continued to develop final FFPI for CONUS and SJU sites. These are nearly complete.

1st Quarter FY08

- Completed FFPI for SGF.
- Incorporated finer resolution DEM data for SGF, ABQ, and RNK sites.

2nd Quarter FY08

- Successfully moved FFPI to the GFE (Graphical Forecast Editor) platform
- Continued analysis and development focused on incorporating finer resolution DEM

3rd Quarter FY08

- FFPI completed for all sites except HFO, work is ongoing for that site (4th qtr completion)
- Scheduled visits to beta test sites to be completed in the 4th quarter.
- Significant progress was accomplished toward final delivery of FFPI to beta test sites.

Problems Encountered/Issues

1st Quarter FY06

- Some slowdown encountered do to lack of available software licenses
- Some slowdowns do to processing power required, storage requirements for finer resolution data sets.
- Timetable subject to RFC operational responsibilities (minimal impact to date)
- Acquiring timely wildfire burn severity data from the forest service is still challenging. WRH has conducted meetings aimed at accelerating this process and I've been involved in those. Unfortunately this process isn't under NOAA's control**.**

2nd Quarter FY06

- RFC workload / operational responsibilities have had a significant impact on 2nd (and 3rd) quarter development. Most of these tasks will slip at least 1 qtr. Still hopeful to accomplish many 4th qtr tasks on time.

3rd Quarter FY06
- RFC workload / operational responsibilities continued to impact development. Less impact is anticipated during the 4th qtr and early FY07. Some tasks and product delivery will slip into the first half of FY07.

4th Quarter FY06
- RFC operational responsibilities occasionally impact development, otherwise no major issues.

1st Quarter FY07
- RFC operational responsibilities occasionally impact development, otherwise no major issues.

2nd Quarter FY07
- RFC operational responsibilities occasionally impact development, otherwise no major issues.

3rd Quarter FY07
- No real problems but RFC responsibilities occasionally impact development and delivery schedule.

4th Quarter FY07
- No real issues, RFC operational responsibilities and associated travel for training have pushed delivery into early FY08.

1st Quarter FY08
- Minor problems encountered with some FFMP Basin Files. Currently trying to re-acquire some FFMP basins.
- No other real issues, RFC operational and basin focal point responsibilities occasionally impact development activities.

2nd Quarter FY08
- Moderate to significant impact to development during 2nd qtr due to RFC operational and focal point responsibilities.
- Problems were encountered with some DEM data acquired from NSSL. Re-acquired this data from the USGS.

3rd Quarter FY08
- No issues encountered during the 3rd quarter.

Dam Break Tools

Core Goal: Improve forecasts of fast response hydrologic events including debris flow

Management Lead: Seann Reed

Objective: Investigate the use of HEC-RAS to replace or augment the Simplified Dam Break (SMPDBK) and Rule of Thumb tools. With input from the Hydraulic Model R&D Advisory Team, develop a more comprehensive plan for improving NWS dam break modeling capabilities.

Milestones

Task	Due Date	Status
Experiment with HEC-RAS Dam Break capabilities and compare results to SMPDBK.	Q3	Ongoing
Identify highest priority needs for dam break R&D with input from Hydraulic Model R&D Advisory Team	Q3	Ongoing
Develop multi-year HOSIP Project Plan	Q4	

Accomplishments/Actions

1st Quarter FY08
- Began literature review literature.
- Began investigating the use of HEC-RAS as a dam break tool.

2nd Quarter FY08
- Continued literature review.
- Began collecting data and setting up HEC-RAS experiments.

3rd Quarter FY08
- Developed a HOSIP SON
- Summer student began work on comparisons with SMPDBK and HEC-RAS

Problems Encountered/Issues

1st Quarter FY08
- None

2nd Quarter FY 07
- None

3rd Quarter FY08
- We leveraged 'free' summer student labor for this project. No AHPS funds were allocated this year.

Evaluate Gridded Flash flood Guidance (GFFG) Approaches

Core Goal: Improve forecasts of fast response hydrologic events including debris flow

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
12. Develop joint Project Plan with NSSL for evaluating ABRFC and OHD GFFG approaches	Q2	Complete
13. Support NSSL led efforts to collect new verification data (advisory role only)	Q3	Complete
14. Finalize and check TF-GFFG codes	Q3	Complete for 1 hr GFFG
15. Complete initial assessment of impervious surface area data for small basins	Q3	This should be rescoped as a separate project.
16. Provide TF-GFFG programs and analysis scripts to NSSL	Q3	Postponed to Q4
17. Assist NSSL with running HL-RDHM and generating TF-GFFG	Q4	On schedule
18. Assist NSSL in documenting results	FY09 Q2	On schedule

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.

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.

Flash Flood Monitoring and Prediction (FFMP) Enhancements

Theme: Flash Flood Services

Management Lead: Tom Filiaggi, Stephan Smith

Objective: Implement critical enhancements to FFMP-A in AWIPS Build OB9:

a) Ability to ingest ESRI shapefiles
b) Revised Basin Trend Graph
c) Improvements to FFG ingest and updating

Milestones

Task	Due Date	Status
1. FFMP OB9 Requirements Review	April 2008	complete
2. FFMP OB9 Design Approach Review	May 2008	complete
3. FFMP OB9 User Interface Review	May 2008	complete
4. FFMP OB9 code check-in	May 2008	complete
5. AWIPS Testing support	4th qtr FY08	ongoing

Accomplishments/Actions

2nd Quarter FY08

- Worked with OCWWS/HSD to refine requirements definition for OB9 Requirements Review.

3rd Quarter FY08

- Met all pertinent milestones, including reviews, document creation, and Pre-Integration Testing (PIT).

Problems Encountered/Issues

2nd Quarter FY08

- Delayed definition of OB9 requirements presents some risk to development schedule

3rd Quarter FY08

- Some requirements may not have been complete enough for the 'Basin Trend Graph' task and may require redefining, based in PIT feedback. This is the responsibility of those that defined the requirements in the first place.

Routing (Hydraulics)

NWSRFS Reservoir Tools Enhancements

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

Management Lead: Jon Roe

Objective: To enhance existing NWSRFS models to aid with modeling reservoirs.

Milestones:

Task	Due Date	Status
Add *potential* requirements to the existing HOSIP Concept of Operations document.	Q2, FY06	Completed
Submit project to AWIPS SREC to be considered for inclusion in Release OB8.3.	Q2, FY06	Completed
HSD surveys RFC for potential requirements, validity and priorities.	Q2, FY06	Completed
AHPS FY 2006 SAE Theme Team confirms requirement priorities in from the RFCs.	Q3, FY06	Completed
Create Statement of Objectives (SOO) to contract the work.	Q3, FY06	Completed
Review Statement of Work (SOW) from contractor.	Q4, FY06	Completed
Update HOSIP documents for HOSIP Gate 2 as needed.	Q1, FY07	Completed
Update HOSIP documents for Gate 3 as needed.	Q2, FY07	Completed
Pass HOSIP Gates 2 and 3.	Q2, FY07	Completed
Pass HOSIP Gate 3.	Q3, FY07	Completed
Begin Operational Development.	Q3, FY07	Completed
Complete Operational Development.	Q1, FY08	Completed
Deliver software and documentation to AWIPS for release OB8.3	Q1, FY08	Completed
Support AWIPS Testing	Q2-3, FY08	Completed
AWIPS OB8.3 System Validation Review (Deployment decision)	Q3, FY08	Completed

Accomplishments/Actions:

2nd Quarter FY06

- HOSIP Gate 3 for Phase 1 identified the POWERGEN function as a potential Phase 2 requirement.
- Added potential Phase 2 requirements to the existing HOSIP Concept of Operations document.
- Submitted project through OSIP to the AWIPS SREC to be considered for inclusion in the OB8.3 release.
- OCWWS/HSD conducted a survey of the RFCs to consider the potential enhancements outlined by the AHPS FY 2006 Software Architecture Enhancements (SAE) Theme Team together with suggestions from a 2004 workshop on streamflow regulation accounting tools and methods.

3rd Quarter FY06

- We received responses from the SAE theme team concerning the priorities of the Phase 2 requirements.
- We issued a Statement of Objectives for Phase 2 identifying five functions to be implemented if funds permit.

4th Quarter FY06

- We revised the Phase 2 activities to concentrate on two enhancements: a multi-valued time series lookup operation and utilizing standard NWSRFS static rating curves in Res-J.

- We accepted a Statement of Work from the contractor for the revised Phase 2 activities.

1st Quarter FY07
- HOSIP Concept of Operations and Project Plan were finally ready for HOSIP Gate 2 on January 17, 2007.

2nd Quarter FY07
- Passed HOSIP Gate 2 on March 2.
- Saud Amer arrived as the new contractor on-site liaison.

3rd Quarter FY07
- Received conditional approval of HOSIP Gate 3 on April 18, 2007.
- Conducted a combined Kickoff and Requirements Review for AWIPS SREC representatives on June 19, 2007.
- Draft design document, test plan and test procedures were submitted by RTi and are under review.

4th Quarter FY07
- Testing of the prototype software was completed at MBRFC.
- Conducted a combined Design and Test Plan Review for AWIPS SREC representatives on Sept. 25, 2007.

1st Quarter FY08
- HOSIP Gate 4 was passed.
- AWIPS OB8.3 Pre-Integration Testing was conducted Dec. 11-13.
- AWIPS OB8.3 Integration Readiness Review was completed and all software and documentation were handed off to AWIPS in December.

2nd Quarter FY08
- AWIPS OB8.3 Software Integration Testing (SWIT) and System Integration Testing (SIT) were completed by the AWIPS Contractor during this period.

3rd Quarter FY08
- AWIPS testing of the software was successfully completed.
- AWIPS OB8.3 System Verification Review (SVR) was completed on June 5, 2008.
- General deployment began on June 18, 2008.

Problems Encountered/Issues:

2nd Quarter FY06
- Most attention has been focused on completing Phase 1.
- Jon Roe has been slow in convening the AHPS FY 2006 SAE Theme Team to get the final say on Phase 2 tool priorities – expected to occur in Q3 of FY 2006.

3rd Quarter FY06 - None

4th Quarter FY06
- The funds expected to be available forced a reduction in the number of enhancements planned for Phase 2.

1st Quarter FY07
- Personnel absences delayed completion of the HOSIP Gate 2 documents.
- Completing the HOSIP internal review of the Gate 2 Documents took longer than expected.

2nd Quarter FY07
- The completion of the Stage 3 activities took longer than the contractor expected.

- Continued changes to the format and expected content of the Gate 3 documents delayed the submission of the documents.

3rd Quarter FY07 - None

4th Quarter FY07
- The completion of the development activities was delayed pending the HOSIP Gate 4 Review. However, the development and testing are essentially complete and the application will be ready for the AWIPS OB8.3 release.

1st Quarter FY08
- None

2nd Quarter FY08
- None

3rd Quarter FY08
- None

Transition from FLDWAV to HEC-RAS

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

Management Lead: Seann Reed

Objective: Develop scientific guidance and prototype data conversion tools to assist FLDWAV users transitioning to HEC-RAS. Guidance developed will include information on reproducing existing FLDWAV model results within HEC-RAS, developing new computationally stable and accurate models in HEC-RAS, and model calibration using HEC-RAS. Support requirements development and prioritization for the HEC-RAS into CHPS project.

Milestones

Task	Due Date	Status
Draft HOSIP Project Plan	Q2	Complete
Develop and analyze Tar River models	Q3	In progress
Validate HOSIP Project Plan with field hydraulics experts and prioritize requests for HEC-RAS enhancements.	Q3	Complete
Develop and analyze Columbia River models	Q3	In progress
GoTo Meeting Status Report	Q4	Will by July 30
Identify and test conversion of FLDWAV modeling options not used in the Tar and Columbia R. test cases.	FY09 Q1	
Make data conversion programs available to RFCs	FY09 Q1	In progress
Write technical paper and guidance documents	FY09-Q1	

Accomplishments/Actions

1st Quarter FY08
- Project team began learning HEC-RAS.
- Project team began developing Tar R models.

2nd Quarter FY08
- Seann took over as project leader.
- Developed draft HOSIP Project Plan.
- Project team continued to learn HEC-RAS (and FLDWAV and DWOPER) and DSSVue.
- Developed and tested symmetric and actual HEC-RAS models for the Tar R.
- Developed FORTRAN program to convert cross-section and bridge geometry from FLDWAV to HEC-RAS format
- Adapted LMRFC Python scripts to convert calibration data into DSS format.
- Began collecting data to build Columbia River models
- Devised and carried out key experiments to understand differences in FLDWAV and HEC-RAS models

3rd Quarter FY08
- Assisted HSEB to define task orders for HEC-RAS into CHPS software requirements.
- Fekadu took formal unsteady flow training at HEC and begin transferring knowledge to the group.
- Angelica worked on calibrating the actual Tar R model.
- Angelica studied bridge representations in the actual Tar R. model.
- Fekadu made initial conversion of a DWOPER model for the Lower Columbia to HEC-RAS.
- Fekadu obtained an alternate Lower Columbia model from HEC and began configuring it with

the same boundary conditions as the Tar R model.

Problems Encountered/Issues

1st Quarter FY08

- None

2nd Quarter FY09

- None

3rd Quarter FY08

- None

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
2. Identify basins with clear evidence of channel re-infiltration. Coordinate with Dave Goodrich of ARS for this; set up RDHM runs for analysis 3. Modify RDHM to test approach if necessary.	FY07 Q4	Delayed
4. Evaluate need for treatment of Mean residence times and old/new water as per seminar by Jeff McDonnell.	FY07 Q4	Delayed
5. Evaluate new NASA PE time series to assess value for hydrologic simulations.	FY08 Q3	In progress
6. Investigate linkage of sub-surface flows in gridded Sac model	FY08 Q4	In progress

Accomplishments/Actions

1st Quarter FY07

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

2nd Quarter FY07

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

3rd Quarter FY07

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

4th Quarter FY07

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

1st Quarter FY08

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

2nd Quarter FY08

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

3rd Quarter FY08

- PhD student Behnaz Kahkbaz 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. Concept and initial results presented at DOH 2008 conference.

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

Calibration - Complete IDMA Study

Core Goal: Improve the forecasts by improving hydrologic models

Management Lead: Mike Smith

Objective: The objective of FY08 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.

Milestones

Task	Due Date	Status
1. Complete Eric Anderson's initial evaluation and put on HL web site	Jan. 27, 2005	Complete
2. Develop literature review to establish how NWS procedures fit into the published literature of accepted practices.	12/31/2004	Complete
3. Develop outline of journal paper.	12/31/2004	Complete
4. Obtain data for additional analyses	FY08 Q3	On track
5. Calibrate basin with uncorrected/corrected data	FY08 Q3	On track
6. Analyze calibration results	FY08 Q4	On track
7. Develop and deliver recommendations fo r the RFCs	FY09 Q1	On track

Accomplishments/Actions

1st Quarter FY05
- Determined that the NWS double mass analysis procedures fit well into the body of existing quality control procedures for historical data. Climate-change researchers regularly use such procedures and stress their importance.
- Eric Anderson's initial work shows that biases can result from not corrected data for man-made inconsistencies.

2nd Quarter FY05
- Given problem described in Q1 above, found study basin with hourly discharge data and a nearby station with a documented station move.
- Found more studies in the literature on the effects of calibration data on model calibration.
- Discussed with Seann Reed a strategy to test the effects of calibration data quality on model forecasts.

3rd Quarter FY05
- Found another peer-reviewed journal article to support the need for the analysis.
- Began hourly calibration of ELDO2 using MAP time series with and without the consistency correction.

4th Quarter FY05
- Used data from the current IDMA study to help evaluate the MPE-Reanalysis data to be used for DMIP 2.

1st Quarter FY06
- Will continue calibration of the basin in conjunction with calibration of basins for DMIP 2

2nd Quarter FY06
- Work resumed after the lumped calibrations for DMIP 2 begun.
- Found journal papers confirming the test approach and need for such investigations (Journal of

Hydrology, Vol. 320, pages 62-86).

3rd Quarter FY06
- Began to revisit this project with calibration of DMIP 2 basins.

4th Quarter FY06
- N/A

1st Quarter FY07
- Calibrated ELDO2 test basin for DMIP 2 with MAPX data and sent to Eric Anderson for review. These parameters will help evaluate the parameters derived via calibration with raingauge data. Studied paper on calibration with MAPX and raingauge data as a surrogate to this problem (Calibration of a rainfall-runoff model using radar and raingauge data, Adv. In Geosciences, 2005)

2nd Quarter FY07
- Updated the HOSIP documents to reflect the current status of this project.

3rd Quarter FY07
- N/A

4th Quarter FY07
- N/A

1st Quarter FY08
- N/A

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

Problems Encountered/Issues

1st Quarter FY05
- Discovered that it is difficult to calibrate a basin using mean daily flow given minor changes in the MAP time series (caused by lack of consistency corrections). Proposed solution is to use hourly computations and data.

2nd Quarter FY05 - None

3rd Quarter FY05 – None

4th Quarter FY05
- Work delayed as Mike was assigned to lead River Mechanics Group as well as Hydrology group. George Smith ok'd the delay.
- Work delayed to focus on 1) DMIP 2 cost estimates for funding from Water Resources Program (No AHPS funding for DMIP 2 granted), 2) DMIP 2 precipitation forcing problem: MPE Reanalysis data found to be lacking and needed more analysis.

1st Quarter FY06
- Will continue calibration of the basin in conjunction with calibration of basins for DMIP 2.

2nd Quarter FY06 - None

3rd Quarter FY06
- Task put on 'back burner' due to crush of other projects.

4th Quarter FY06
- Task delayed in order to launch DMIP 2 western basin experiments. Will continue this task when calibrating the DMIP 2 basins.

1st Quarter FY07
- Task delayed due to tasks with higher priority

2nd Quarter FY07
- Task delayed due to tasks with higher priority

3rd Quarter FY07
- Task delayed due to tasks with higher priority

4th Quarter FY07
- Task delayed due to tasks with higher priority

1st Quarter FY08
- Task delayed due to tasks with higher priority

2nd Quarter FY08
- Task on hold due to loss of 3 group members and other higher priority projects.

3rd Quarter FY08
- Task on hold

Calibration - Re-Implement the Interactive Calibration Program and Enhance

Core Goal: Improve the forecasts by improving hydrologic models

Management Lead: Jon Roe

Objective: Re-Implement the Interactive Calibration Program (ICP) from the new set of functional requirements generated from an FY04 contract task. Originally, a follow on task to improve the functionality by implementing enhancements identified by the Theme Team, was expected. However, any such enhancements will be done in the CHPS environment rather than NWSRFS.

Milestones:

Task	Due Date	Status
Write HOSIP Stage 1 documents.	Q3, FY05	Complete
Pass HOSIP Gate 1.	Q4, FY05	Complete
Write Statement Of Objectives (SOO) for contractor tasking.	Q3, FY05	Complete
Review Statement Of Work (SOW) from contractor.	Q4, FY05	Complete
Add requirements for enhanced functionality to the HOSIP Concept of Operations document.	Q2, FY06	Complete
Submit project through OSIP to AWIPS SREC to be included in AWIPS OB8.x release.	Q2, FY06	Complete
Contractor writes HOSIP Stage 2 and 3 documents.	Q3, FY06	Complete
Pass HOSIP Gates 2 & 3 for Re-implementation.	Q3, FY06	Complete
Contractor begins Operational Development for Re-implementation	Q4, FY06	Complete
Contractor completes Re-implementation of ICP software and all required documentation and testing	Q1, FY08	Complete (completed 10/12/07)
Software and documentation are delivered to AWIPS	Q1, FY08	Complete
Support AWIPS testing of software	Q2-3, FY08	Complete
AWIPS System Validation Review (OB8.3 deployment decision)	Q3, FY08	Complete
Write SOO for contractor tasking for enhancements.	N/A	Cancelled
Review contractor's SOW for enhancements.	N/A	Cancelled

Accomplishments/Actions:

1st Quarter FY05
- We completed project identification, budgeting, and planning.

2nd Quarter FY05
- We started writing the HOSIP Stage 1 documentation.

3rd Quarter FY05
- HOSIP Stage 1 NID and SON were completed.
- SOO was completed and forwarded to Contracts for final processing.

4th Quarter FY05
- HOSIP Gate 1 was passed
- Technical proposal submitted by Contractor was accepted by OHD
- The task for RTi was awarded very late in Q4

1st Quarter FY06
- We completed CONOPS and Project Plan
- HOSIP Gate 2 was passed

2nd Quarter FY06
- The contractor completed the Stage 3 research and submitted the Research Report.
- The contractor is creating the HOSIP material for Gate 3, now expected in Q3, FY06
- Both the Re-implementation project and the enhancements from the AHPS Theme Team were submitted through OSIP to the AWIPS SREC for potential inclusion in AWIPS OB8.x releases.

3rd Quarter FY06
- HOSIP Gate 3 was passed.
- OHD and RTi agreed to a contract for HOSIP Stage 4 (operational development).

4th Quarter FY06
- The contractor held a kickoff meeting for the operational development phase in early August.
- The contractor has delivered revised Concept of Operations and decomposed technical requirements documents.
- The contractor has delivered a draft design document.

1st Quarter FY07
- As planned, the contractor delivered several prototypes with increasing functionality, which were reviewed by OHD and RFC personnel.

2nd Quarter FY07
- The contractor delivered a release candidate with all the required functionality. HSEB, HSMB and three RFCs: NERFC, NWRFC and WGRFC are currently testing this software.

3rd Quarter FY07
- The contractor updated the release candidate based on reviewer comments, submitted a revised version which was being tested at the sites listed above. The major performance problems have been resolved and corrections are now mostly addressing usability concerns. The development is on target for inclusion in AWIPS OB8.3.

4th Quarter FY07
- At the end of the period, the Contractor was completing final changes to the software and documentation.
- A HOSIP Gate 4 review was scheduled for 10/10/08.

1st Quarter FY08
- HOSIP Gate 4 was passed.
- AWIPS OB8.3 Pre-Integration Testing was conducted Dec. 11-13.
- AWIPS OB8.3 Integration Readiness Review was completed and all software and documentation were handed off to AWIPS in December.

2nd Quarter FY08
- AWIPS OB8.3 Software Integration Testing (SWIT) and System Integration Testing (SIT) were completed by the AWIPS Contractor during this period.

3rd Quarter FY08
- AWIPS testing of the software was successfully completed.
- AWIPS OB8.3 System Verification Review (SVR) was completed on June 5, 2008.
- General deployment began on June 18, 2008.

Problems Encountered/Issues:

1st Quarter FY05

- We will be having an off-site contractor work on this project. The extent of the implementation to be completed with this work will depend upon the contractor's response to our Statement of Objectives (SOO). It is not clear at this point whether the allowed budget will cover complete re-implementation of the ICP by the contractor. This potential shortfall may be exacerbated by having to retrofit early HOSIP documents during this funded item.
- This project has essentially completed the technical work necessary to pass HOSIP Gates 1, 2, and 3 but the work was performed in FY04 (pre-HOSIP) by an outside contractor culminating in a complete functional requirements document. Now, the current task will have to fill in the required HOSIP deliverables and formally pass the Gates to get completed.

2nd Quarter FY05

- We have moved the expected date for passing HOSIP gate 1 to the third quarter.

3rd Quarter FY05

- Due to Edwin Welles' departure from OHD we have moved the expected date for passing HOSIP Gate 1 to the fourth quarter.

4th Quarter FY05

- We experienced a delay because the Contractor's first technical proposal was unacceptable to OHD and had to be re-written and re-submitted. The second proposal was acceptable, but Contracts was unable to award the task until the end of Q4.
- Due dates for HOSIP Stage 2 and 3 documents, and HOSIP Gates 2 and 3, have been moved to Q2, FY06 to match the Contractor's SOW schedule. Follow-on activities have been adjusted accordingly but are subject to negotiation under Phase 2 of the contract task.

1st Quarter FY06

- We completed HOSIP Gate 2 CONOPS and Project Plan documents. HOSIP Gate 2 (January 18th, 2006) review went well with minor changes in CONOPS and Project Plan.

2nd Quarter FY06

- Progress in Stage 3 has been slower than expected.
- The contractor has not yet submitted a separate SOW for the operational development phase (HOSIP Stage 4) for the re-implementation. All schedule milestones for the HOSIP Stage 4 work and implementation into AWIPS are TBD, pending the contract being established.
- The funds allocated in FY05 will not be sufficient to complete the operational development, so FY06 funds will be used.
- Separate SOOs and SOWs will eventually be created for the enhancements.

3rd Quarter FY06

- HOSIP Stage 3, Applied Research & Analysis, took quite a bit longer than originally intended.

4th Quarter FY06

- None

1st Quarter FY07

- Reports from several reviewers have raised concerns about slowness in the prototypes. The development contractor is investigating ways to improve performance.

2nd Quarter FY07

- The performance of the application is still a concern and the contractor is continuing to investigate and try to improve it.

3rd Quarter FY07

- None

4th Quarter FY07

- The contractor is resolving several additional problems which have been identified in the final rounds of testing.

1st Quarter FY08

- None

2nd Quarter FY08

- None

3rd Quarter FY08

- None

Software Refresh

Community Hydrologic Prediction System (CHPS)

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

Management Lead: Jon Roe

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

Milestones:

Task/Subtask FY08 Milestones	FY08 Due Date	Status
1 CHPS FEWS Pilot		
• Workshop held at NWRFC	Q1	Complete
• Final recommendation on Delft-FEWS for CHPS delivered to Hydrology Program Manager	Q3	Complete (Q1, ahead of schedule)
• Implementation Realization Plan for CHPS migration complete	Q3	Complete
• 'Webinar' developed	(Q1 FY09)	Not started
• National workshop held	Q4	Not started
2 CHPS IOC		
• Requirements documented for 4 Pilot sites	Q3	Complete
• Complete development for 4 Pilot sites	(Q1 FY09)	Ongoing
3 CHPS HydroXC		
• Integrated schema for HydroXC and WaterML	Q4	Canceled (no funding)
• Integrate hydroxc.org website into CUAHSI website	Q4	Canceled (no funding)
• Demonstrate execution of one of the proposed HydroXML-compliant software adapters	(Q2 FY09)	Canceled (no funding)

Accomplishments/Actions:

1st Quarter FY07

- Key minimum requirements for demo system were defined. RFCs/basins were selected for the pilot. Draft versions of the HOSIP Concept of Operations (CONOPS) and Plan documents, co-developed by RTi and Delft, were delivered. HOSIP Gate 2/Gate 3 (combined) is expected to be held in January.
- The original plan for the pilot was to demonstrate functionality at one RFC. The CAT members agreed that there would be greater value using 2 RFCs rather than one. This means that Task 3 (Implement the FEWS pilot at other RFCs) has effectively begun.
- For risk reduction purposes, OHD also fired up a small team of developers to implement the new Heat Transfer version of the SAC-SMA/Frozen Ground model as part of the pilot demonstration. Work on this sub-project has begun.
- OHD installed the first version (0.0) of ADE locally, and began investigation of its capabilities and features. Several OHD developers, including the CHPS SOA expert, will attend ADE training in January 2007.

2nd Quarter FY07

- The CHPS FEWS Pilot project successfully passed HOSIP Gates 1 and 2 in January.
- In February OHD delivered a re-engineered Java version of OHD's new SAC-SMA Heat Transfer (HT) model, with associated adapter source code, to Delft for inclusion in the pilot.

- Delft began the installation and set-up of FEWS at NCRFC and NWRFC in March. A demonstration of the pilot system running at NWRFC is planned for April.
- OHD initiated a new task in March with Apex Digital Systems to conduct an assessment of the FEWS pilot system. The task will begin with the demo at NWRFC in April and is expected to run for 6 months. Apex will work with the pilot RFCs to develop a set of success criteria, and to evaluate the pilot system against those criteria. The assessment will provide information required in order for the CAT and OHD management to make the final decision concerning FEWS for CHPS.
- Jon Roe and Chris Dietz began a series of discussions with Raytheon in March to address the nature of an interface between AWIPS II and CHPS (FEWS). Raytheon expects to begin analysis of the FEWS pilot system in July with a view to identifying future work for OHD and Delft.
- OHD's SOA expert, Sudha Rangan, attended AWIPS Development Environment (ADE) training in January. This places her in the key position of having familiarity with both FEWS and AWIPS II, and will provide OHD with a means to assess Raytheon's proposal.

3rd Quarter FY07

- Installation of the CHPS FEWS Pilot system at NWRFC and NCRFC occurred this quarter; Delft demonstrated the system in Portland, OR during the week of April 15.
- Beyond the success of the demonstration, CAT members recognized immediately that additional functionality is required for the Pilot system to be viable, and for the Pilot evaluation to be meaningful. In response to this, HSEB initiated a contract task with Delft through RTi to implement the following:
  - Installation of the Pilot at ABRFC
  - Develop a MODs-like capability (the "what-if scenarios" are inadequate for operations)
  - Configure all Pilot sites as client-servers, not standalone as now
  - Provide additional segment definitions for the Santiam River for NWRFC
  - Provide more in-depth training to all Pilot sites

  HSEB expects Delft to begin work on these additional tasks in Q4.
- OHD began implementation of the lumped SNOW-17 model for the FEWS Pilot. Completion is targeted for Q4.
- Apex distributed an early version of the Pilot evaluation criteria document to the CAT; however in the absence of the additional functionality described above, the CAT members suggested that the evaluation effort be postponed until all functionality is complete.
- HSEB completed negotiations with Raytheon to define the interface between AWIPS II and CHPS. Raytheon is expected to begin the task in Q4.
- After a series of discussions with HSMB and HEC, HSEB submitted the necessary paperwork to begin the task of incorporating the USACE HEC River Analysis System (HEC-RAS) into CHPS. Apex will conduct the analysis; OHD expects HEC to do most, if not all, of the software development.
- In May the Experimental Ensemble Forecast System (XEFS) Design and Gap Analysis Team, led by DJ Seo (HSMB) and Rob Hartman (CNRFC) presented to the Director of OHD, Gary Carter, a report entitled "The Experimental Ensemble Forecast System (XEFS) Design and Gap Analysis: Report of the XEFS Design and Gap Analysis Team", dated May 11, 2007. Following acceptance of the report's recommendations, Gary Carter assigned Execution Management responsibility to HSEB, and created an Oversight Group (Rob Hartman, DJ Seo, Mary Mullusky, Chris Dietz). The XEFS will be implemented using the CHPS software architecture. An implementation plan will be prepared during Q4.

4th Quarter FY07

- Conducted a kick-off meeting for the CHPS FEWS Pilot Enhancements project on August 15. Demonstration and workshop is now planned for the week of December 17 2007 at NCRFC.
- Conducted a design review for the proposed MODs-like capability in the Pilot system. Discussions resulted in some changes identified for the Sac-SMA Pilot implementation, to be completed by Q1 FY08.
- Delivered SNOW-17 software to Delft for inclusion in the Pilot system.
- Pilot configurations and set-up for ABRFC have begun.

- Began changes to Pilot version of Sac-SMA to accommodate PE time series needed for the Illinois River at ABRFC; completion scheduled for Q1 FY08.
- Delft met with Raytheon in Omaha, NE at the end of September to discuss the question of an interface between Delft-FEWS AWIPS II. OHD expects to receive a proposal for review in early November.
- During the week of July 9, Delft led an installation at CNRFC bringing all collaborative components for the Res-Sim project together in one place for the first time; i.e., Delft-FEWS configured for CNRFC, an early Linux version of the ResSim from HEC, and a modified version of NWSRFS from Apex. The installation revealed some missing functionality needed for NWSRFS, which HSEB provided at short notice, and which was delivered to CNRFC during August.
- Delft sent a hydrologist to CNRFC during the week of September 17 to troubleshoot an outstanding ResSim issue on-site. The cause of the problem turned out to be configuration and environment, not software.
- Acceptance testing at CNRFC for the ResSim project has been delayed until mid-November.
- OHD and HEC finalized the Memorandum Of Agreement (MOA) that will enable us to work jointly on the HEC-RAS project. Funds for Phase 1 (the analysis & design phase) were transferred to HEC at the very end of Q4 FY07.
- HSEB (RSIS) completed the Experimental Ensemble Forecast System (XEFS) High Level Analysis & Design document. The Analysis & Design document will be shared with the XEFS Oversight Group for review, followed by the XEFS Implementation team.
- HSEB has now begun an XEFS Implementation Plan associated with the draft Analysis & Design. The plan is required for FY08 funding proposals. The XEFS Implementation project will be addressed by the Core Goal Planning Team for Forecast Uncertainty (i.e., Ensembles).

1st Quarter FY08

- 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.
- 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.
- 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.
- 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.
- 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.
- Acceptance testing of the new ResSim at CNRFC occurred during November. An adequately functional version of ResSim was installed, along with OHD's/Apex's enhanced version of NWSRFS.
- Phase 1 of the HEC-RAS into CHPS project began with a kick-off conference call in December where a proposed project schedule was discussed.
- On October 19 HSEB submitted a "High Level Analysis and Design" document to the XEFS Implementation Team for review.
- In December HSEB held a meeting to address feedback received on the XEFS document. However the discussion prompted a re-think of the implementation strategy, which will now be based on Delft-FEWS in light of the CAT recommendation for CHPS.

2nd Quarter FY08

- On January 1 Delft joined forces with several other Dutch water-focused institutes to form Deltares. Visit http://www.deltares.nl/xmlpages/page/deltares_en for more information.
- The CAT delivered its recommendation report to Gary Carter on January 9; the recommendation

to proceed with FEWS as the infrastructure component for CHPS was approved. Chris Dietz was named as the CHPS Implementation project leader.

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

3rd Quarter FY08

- The CAT met in Portland (NWRFC) on May 1-2 to accelerate progress on planning activities. An implementation plan for CHPS migration was completed.
- In mid-June Rob Shedd, the Development and Operations Hydrologist (DOH) at Northeast RFC (NERFC), became a CAT member. NERFC is now a "CHPS forerunner" site. John Halquist remains a CAT member, but now represents NOHRSC.
- On March 24 Apex Digital Systems, Inc. (Apex) delivered the final version of their document entitled "FEWS Pilot Results".
- Deltares made significant progress on the migration mapping document during a visit between Deltares and OHD the week of April 14.
- The CAT identified requirements for a CHPS Baseline Operational Capability (BOC), defined to be the minimal set of functionality required at the CAT RFCs to migrate to CHPS. BOC document for the CAT RFCs is now complete.
- Joe Gofus was assigned leadership of the OHD CHPS software development team which will focus on converting NWSRFS models to CHPS.
- A CAT-OHD-Deltares workshop was held June 17-19 in Silver Spring, MD
- Karel Heynert from Deltares gave a Delft-FEWS presentation to the Integrated Water Resources Science and Services (IWRSS) workshop participants on June 16.
- Deltares delivered to the CAT a proposed set of hardware specifications.
- HSEB submitted to NOAA Procurement a request for quotes based on final specifications drawn up by OHD, OCWWS, and Deltares for a partial system (i.e., without a duty standby, and without an offline system). The goal is to install this partial CHPS system at CAT sites in October 2008.
- HSEB initiated a "chps_info" mailing list to broadcast information and attempt to familiarize subscribers with terminology; also a new rfc.chps@noaa.gov email account was created as a supplemental way of disseminating CHPS information.
- Deltares is waiting for authorization from NOAA Procurement to proceed with work on the HEC-RAS adapter. Funds for HEC were transferred to the USACE at the end of June; HSEB is

waiting for HEC to advise when they can begin work.

Problems Encountered/Issues:

1st Quarter FY07 - None

2nd Quarter FY07 - None

3rd Quarter FY07

- The Pilot Evaluation task has been postponed until after the next set of Pilot enhancements have been deployed. This delays the key decision concerning adoption of FEWS for CHPS until FY08 Q2.

4th Quarter FY07

- The extension of AWIPS OB8 and OB9 activities caused a 2 month delay to the start of the XEFS project. Originally expected to begin on September 1, the project will now begin on November 1.

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. GoTo meetings, 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.

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	Delayed to FY08 Q3	In progress
2. Phase VI deployment	FY08 Q4?	Depends on web consolidation
3. Phase VII definition	FY07 Q4	Delayed to FY08 Q3
4. Phase VII development	FY09 Q1	Not started

Accomplishments/Actions

1st Quarter FY07
- Delivered and supported implementation of core Phase IV deliverables on regional web-farms
- Modified AHPS CMS to resolve potential river database loops. Solution will be implemented with Phase V
- Developed inundation prototype for OCWWS/OHD

2nd Quarter FY07
- Finalized inundation prototype look and functionality
- Deployed inundation prototype for NOAA/NWS review
- Integrated AJAX into national precipitation development pages and AHPS HSA pages
- Developed KMZ output for river observation and forecast data

3rd Quarter FY07
- Delivered Phase V to Regions for review
- Implemented first flood inundation site in NC
- Phase VI development underway

4th Quarter FY07
- Several new inundation web interface features added to code set
- Implemented16 additional inundation locations in NC
- AHPS CMS modified to fully manage inundation configuration options
- NRLDB version 2.0 delivered to OCWWS for review/testing
- Phase VI development continues

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

Problems Encountered/Issues

1st Quarter FY07

- Continued issues with missing products in HQ product database. NWS OCIO is aware of the ongoing issue
- Found issue where WFO users could create a river database loop in the AHPS CMS
- Continued to have intermittent SQL update issues with the cluster database at CRH. Will establish a development cluster database to determine a long-term solution

2nd Quarter FY07

- Continued to have occasional issues with missing products in HQ product database. NWS OCIO is aware of the ongoing issue. Additionally OCIO implemented a new database population process, which did not meet hydrologic text product requirements. OHD worked with OCIO developer to resolve issues.

3rd Quarter FY07

- Continued issues with missing products in HQ product database. NWS OCIO is aware of the ongoing issue
- Unable to obtain required web consolidation documentation from OCIO for AHPS Phase VI development architecture planning

4th Quarter FY07

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

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

Western Water Supply Forecast Service Improvement

Core Goal: Dissemination

Management Lead: Kevin Werner

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

Milestones

Task	Due Date	Status
1. Planning meeting for development and steering team to design enhancements	Q3	Complete
2. Purchase and install dedicated hardware on NWRFC web farm	Q3	In progress
3. Contract support to support and harden existing code	Q4	In progress
4. Conduct outreach activities at water management meetings	Q4	Ongoing

Accomplishments/Actions

2nd Quarter FY08

- Outreach Activities (travel funded by this AHPS project):
    - Verification Workshop: In partnership with the Western Water Assessment RISA and the NRCS, NWS organized a verification workshop targeted at water managers in Colorado. The workshop was held in February 2008 and was very well attended. About 70 attendees participated in the day long workshop which featured a hands on lab exercise with the web site.
    - Climate Prediction Applications Workshop – The project was presented at the annual CPASW workshop in Chapel Hill, NC in March 2008.
    - Drought Monitor Workshop – The project was presented at the annual Drought Monitor Workshop in Portland, OR in October 2007.
- Planning Meeting: Planning meeting is scheduled for May 2008 in Boulder, CO. An agenda is available upon request.
- Hardware Support: NWRFC is current scoping hardware to support the project.
- Contract Support: NWRFC contractor is currently supporting project through WR FY07 funding. Expect to establish a contract under this project during Q3.

3rd Quarter FY08

- Outreach Activities (travel funded by this AHPS project):
- Western Snow Conference – Project presented at annual western snow conference in Hood River, OR on 4/16
- USBR/USACE/USBR Pacific Northwest Meeting in Portland, OR on 5/6
- Montana Hydrology Meeting in Great Falls, MT on 5/27
- Planning Meeting: Planning meeting was held in Boulder, CO with NOAA ESRL scientists, western water assessment, and USBR personnel. Major outcomes include the following enhancements planned for a fall 2008 release:
    - Enhanced map interface for ESP forecasts and observed streamflow
    - Improved look and feel for web presence
    - Capabilities for non water supply forecast points from any RFCs
    - Climate change sensitivity studies
- Hardware Support: Hardware is on order through Dell to support project
- Contract Support: NWRFC contractor (Heydt) under contract to maintain a portion of the existing code

- OSIP Status: Documentation has been submitted for OSIP gate 1. OCWWS (Mullusky) is working on gate 2 documentation.
- Budget: Expenditures to date:
    - Travel (outreach + planning meeting) = $10,023.08
    - Hardware = $20347.90
    - Contract support = $8,000 ($4k for training government employees; $4k for contractor)
    - Total spent to date: $38,370.98

Problems Encountered/Issues

1st Quarter FY08 - None

2nd Quarter FY08 - None

3rd Quarter FY08 - None

New Service Locations

Snow Water Equivalent Data

Management Lead: Larry Rundquist, APRFC

Objective: Acquire high quality, high resolution airborne gamma radiation snow water equivalent for flight lines in Alaska; this should improve accuracy and lead time of hydrologic forecasts by providing high quality input to forecast operations in data sparse areas

Milestones

Task	Due Date	Status
Ingest 07 flight line data into archive database	5/07	Done
Compare period of record for flight line data (2003-2007) with nearby snow course sites to see if data are consistent	8/07	Done
Attempt to use flight line data in Snow updating system if data are sufficiently consistent and correlated with long-term snow course sites	FY08	Done

Accomplishments/Actions

1st Quarter FY07
- Activities are on target

2nd Quarter FY07
- Activities are on target… coordinated timing and priorities of flight lines with NOHRSC.

3rd Quarter FY07
- Flight lines were slightly abbreviated due to conflict on use of aircraft. Data collected have been evaluated against the appropriate basins

4th Quarter FY07
- Initial evaluation of flight line data against snow course completed. More detailed study in FY08 should evaluate direct correlation. Conclusion of initial evaluation recommends that data continue to be collected to maintain utility of records and allow more rigorous application of data in model update.

1st Quarter FY08
- Activities are on target… coordinated timing of FY08 flight lines with NOHRSC.

2nd Quarter FY08
- Activities are on target… a winter set of flight lines was flown in February for the first time in the program. Schedule and priorities for the spring flights was coordinated.

3rd Quarter FY08
- Spring flight lines were completed and evaluated. Insufficient historical record exists to allow flight lines to be used directly in snow update routines, but data can be used for indirect analysis and comparison. Recommend that flight lines continue to allow development of adequate historical record.

Problems Encountered/Issues

1st Quarter FY07 - None

2nd Quarter FY07 - None

3rd Quarter FY07 – None

4th Quarter FY07 - None

1st Quarter FY08 - None

2nd Quarter FY08 - None

3rd Quarter FY08 - None

AHPS Implementation APRFC

Management Lead: Scott Lindsey, APRFC

Objective: Implement probabilistic hydrologic forecast 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 FY08	Variance
Identify 7 potential basins for new calibrations		1st Qtr	Complete	
Calibrate 7 new basins for non-AHPS implementation	7	3rd Qtr	7	
Implement 7 new forecast points (non-AHPS)	7	3rd Qtr	7	
Identify 8 locations for AHPS implementation for FY08		1st Qtr	Complete	
Recalibrate and prepare historical time series for 8 existing non-AHPS basins to utilize new data sources and improve forecast performance	8	4th Qtr	8	
Implement 8 new AHPS points	8	4th Qtr	8	+8
Total	**8**		**8**	**0**

Accomplishments/Actions

1st Quarter FY08
- Identified 8 new AHPS points that will be implemented this fiscal year.
- Performed recalibrations and extended historical times series for 5 of these basins.
- Identified 7 new basins to calibrate. Began data collection and analysis.
- Identified additional previously calibrated basins (non-AHPS points) that have not performed well. Began calibration process to add new data sources and improve model parameters.

2nd Quarter FY08
- 7 new basin calibrations have been completed and are being prepared for operational implementation with the onset of the open-water season.
- 8 non-AHPS basins have been recalibrated and historical time series have been prepared for AHPS implementation. Implementation will occur with the open-water season.

3rd Quarter FY08
- 7 newly calibrated basins have been implemented operationally and the new forecast points will be monitored throughout the open water season to assess the quality of the calibrations.
- 8 forecast points have been prepared as AHPS points and have been implemented in AWIPS. All milestones for this project for this fiscal year have been completed.

Problems Encountered/Issues

1st Quarter FY08 - None

2nd Quarter FY08 - None

3rd Quarter FY09 - None

AHPS Implementation for NCRFC

Management Lead: Dan Luna, HIC/NCRFC

Objective: Implement probabilistic hydrologic forecasts for basins in the North Central River Forecast Center's (NCRFC) area of responsibility. For FY08 there will not be any new service locations implemented.

Milestones

Implementation Area	Forecast Points Planned	Due Date	Actual to Date (3rd Qtr FY08)	Variance
Awaiting MO river flows.	0		0	
New, unplanned forecast points	n/a	n/a	7	+7
Total	**0**		**7**	+7

Accomplishments/Actions

1st Quarter FY08
- Added a new forecast point per WFO request
  - Rifle River near Sterling

2nd Quarter FY08
- Added three new forecast points per WFO request
  - Clinton, WI on Turtle Creek
  - Readstown, WI on Kickapoo River
  - Hillboro, WI on the South Fork Baraboo River (HILW3)

3rd Quarter FY08
- Added three new forecast points per WFO request
  - Rensselaer, IN on the Iroquois River
  - Foresman, IN on the Iroquois River
  - Shiocton, WI on the Wolf River (SHIW3)

Problems Encountered/Issues

1st Quarter FY08 – none

2nd Quarter FY08 – none

3rd Quarter FY08 – none

AHPS Implementation for MBRFC

Management Lead: Steve Predmore, HIC

Objective: Implement probabilistic forecasts for basins in the Missouri Basin River Forecast Center's (MBRFC) area of responsibility. For FY08 this includes the Elkhorn river Basin, the Marais Des Cygnes Basin, the South Platte down to Kersey, CO., and the Milk river Basin above Havre, MT.

Milestones

Implementation Area	Forecast Points Planned	Due Date	Actual to Date (3rd Qtr FY08)	Variance
Elkhorn	9	4th Qtr	0	0
Upper Smoky River	2	4th Qtr	0	0
Remaining Milk River	7	2nd Qtr	7	0
South Platte River down to Kersey	16	4th Qtr	0	
Carryover from FY07	25	n/a	25	0
New, unplanned forecast points	n/a	n/a	2	+2
Total	**59**		**34**	**+2**

Accomplishments/Actions

1st Quarter FY08
- Added a new forecast point per WFO request
  - Niobrara River at Sparks, NE (SPNK1)

2nd Quarter FY08
- Add 7 new forecast points for the mild River

3rd Quarter FY08
- Added a new forecast point per WFO request
  - Milk River at Bjornberg Bridge, Saco (SACM8)

Problems Encountered/Issues

1st Quarter FY08 - None

2nd Quarter FY08 – Reduced total by 10 (to 59) due to budget reduction

3rd Quarter FY08 – None

AHPS Implementation for MARFC

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

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 by the end of FY 2006.

Milestones

Implementation Area	Forecast Points Planned	Due Date	Actual to Date (3rd Qtr FY08)	Variance
MARFC Service Area	0		0	0
Total	**0**	**FY08**	**0**	**0**

Accomplishments/Actions

1st Quarter FY08

- MARFC has completed basic AHPS implementation for its entire service area.
- Per communication with the Norfolk Division of the US Army Corps of Engineers (USACOE), MARFC is now generating a companion table for the 30-day inflow exceedance probability chart for Gathright Dam in the headwaters of the James River Basin in Virginia. Due to the low flows in the James Basin, the USACOE is looking more closely at the range of expected inflows to Gathright Dam.
- MARFC has undertaken a project in cooperation with the New York City, Department of Environmental Protection (NYC DEP) to develop probabilistic forecast pool elevations using currently produced probabilistic inflow hydrographs. No results to report at this time as project just got underway.
- MARFC Gridded Flash Flood Guidance (FFG) Project Update:
  - Independently varying gridded FFG methodology expanded to approximately 65% of HSA LWX, with 100% completion in the metropolitan Washington/Baltimore corridor.
  - Implementation efforts have been temporarily directed to MARFC's southern border within the WFO RNK and AKQ service areas. SERFC plans to implement ABRFC's FFG methodology, and it was felt that RNK and AKQ would benefit from having both new methodologies in place for operational assessment. The gridded FFG information provided to RNK has been converted over to the prototype FFG system.
  - Made significant progress on the data collection phase of project to refine the precision of gridded threshold runoff across MARFC's service area. Approximately 80 basins in PA, MD, DE, NJ, and VA were visited and bankfull measurements made, primarily by contracted summer employees, accompanied in some cases by a MARFC staff member. All measurements have been documented with photographs and field notes, and analysis of the data is progressing.

2nd Quarter FY08

- MARFC is nearing completion on a project in cooperation with the New York City, Department of Environmental Protection (NYC DEP) to develop probabilistic forecast pool elevations using currently produced probabilistic inflow hydrographs. MARFC has expanded their list of probabilistic products to include pool elevation exceedance graphs for Cannonsville, Pepacton, and Neversink reservoirs in New York State. These graphs will be on the AHPS web page, pending review by the NYC DEP. (These are not new points, just an addition to the information

already being provided for those locations).

- The gridded FFG values for 3 additional counties in WFO Wakefields's area (AKQ) were converted to the independently varying grid approach. These represent 2% of MARFC's total gridded area and they now have 61% of the total using the new method.
  WFO Binghamton (BGM) has been pursuing some inundation mapping work. Additional information on the project will be sent as the project develops.

3rd Quarter FY08

- Patti Wnek was selected to fill the new Service Coordination Hydrologist position at MARFC. This position will play a key role in AHPS services evaluation, marketing and training for partners and customers.
- MARFC completed development and added low flow record information for their forecast points to the MARFC web page: http://www.erh.noaa.gov/marfc/Rivers/FloodClimo/ In addition, all flood frequency information on their web pages was updated to include 2007 data.
- To date, MARFC has completed development and is issuing gridded flash flood guidance for 9800 (81%) of their grids, including zones in all HSAs except OKX. Additionally, they worked to refine and correct their boundary with SERFC using highly detailed GIS data, thereby improving the accuracy of their flash flood guidance. Feedback continues to be positive.
- MARFC completed development and began issuing Enhanced Headwater Guidance for WFO CTP and WFO PHI. Headwater guidance has been expanded to include guidance values for moderate and major flooding in addition to the traditional single guidance value for flood stage (already implemented previously for the WFO BGM area). In addition, five new headwaters have been added: Penns Creek, Shirleysburg, Hogestown, Harper Tavern and Lancaster.
- The Susquehanna River Basin Commission has contracted with Dewberry to complete inundation mapping in WFO BGM's area.
- Utilizing AHPS funds, MARFC has a Penn State Univ student under contract to continue work on refining their gridded flash flood guidance by making field bankfull measurements this summer. Currently they are working on the Lehigh River Basin. In addition, MARFC developed a prototype gridded "slope" field, which they plan to correlate with their bank full project results in order to adjust TROs (threshold run-off) consistent with terrain variations..
- MARFC provided AHPS training at the New Jersey Emergency Management Preparedness Association (NJEPA) Conference.
- WFO LWX made AHPS presentations at their Spring Media Conference and at the Maryland Severe Storms Conference.
- MARFC continues collaborative work with the NERFC, OHRFC, NCEP, and SUNY Stonybrook to produce short-term ensemble river forecasts using GEFS forecasts (out 7 days), the Canadian version of the GEFS (out 7 days), SREF ensembles (out 84 hours), and SUNY WRF/MM5 data (out 48 hours). Additional work is necessary to correctly model reservoir operations in their area. MARFC provided WFO OKX with 1 hour Unit Hydrographs for 2 FFH locations in their service area to set up site specific in conjunction with this project.
- Work continues on the 1 hour lumped model (1st step to Distributed Hydrologic Modeling). Five headwater locations in the Juniata basin have been setup to work at a 1 hour time step using MARFC's 6 hr API parameters. Performance is being monitored. The next step will be calibration. The goal is to have output used by MARFC hydrologists to help fine tune crest forecasts.
- MARFC participated in the NYC DEP biannual meeting at WFO BGM. NYC DEP is MARFC's largest customer of probabilistic forecasts (used in monitoring NYC's reservoir system). Discussions centered on data exchange and product formats.
- MARFC is testing the OH-developed Ensemble Verification System (EVS) on several years of short-term ensemble streamflow prediction (ESP) forecasts generated from PQPF precipitation traces for the Juniata basin. As a result of their testing and learning the system they have uncovered some biases in the PQPF.
- MARFC assisted the DRBC with the preparation of an EPA Grant Application for a potential future DRBC project with Rutgers University and MARFC, entitled, "Assess the Impacts of Global Climate Change to the Delaware River and Bay."
- A summer Penn State student volunteer has begun work on a flood history project and also a GIS project that will improve the appearance of MPE data on our website.

- WFO BGM began an annual summer program on watershed hydrology / rainfall-runoff modeling. The 1st student was hired from SUNY Binghamton. This student will gather data and set up the model for three basins, and conduct manual calibration and sensitivity analysis.
- MARFC worked to adjust AHPS probabilistic graphs based on WFOs establishing new cautionary and/or flood stages.
- MARFC participated with WFO CTP, the USGS and the Susquehanna River Basin Commission in a stakeholder meeting for Clinton and Lycoming Counties in Pennsylvania concerning inundation mapping.
- MARFC contributed to NOAA's Integrated Water Resource Services in the North Atlantic through participation in a team that identified regional needs for an enhanced water information program.
- MARFC participated in a two day planning meeting to develop ideas for Integrated Water Resource Services demonstration projects with NWS, NOAA, and U.S. Army Corps of Eng. representatives.
- MARFC attended a program review meeting for the Pennsylvania Water Resources Research Center located at Penn State University.

Problems Encountered/Issues

1st Quarter FY08 – None

2nd Quarter FY08 – None

3rd Quarter FY08 – None

AHPS Implementation for NERFC

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

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 2009.

Milestones

Implementation Area	Forecast Points Planned	Due Date FY08	Actual to Date (3rd Qtr FY08)	Variance
Connecticut River	4	2nd Qtr.	10 (2nd Qtr. FY08)	+6
Maine	2	4th Qtr.	0	0
Southern New England	3	4th Qtr.	3 (1st Qtr FY08) 2 (3rd Qtr. FY08)	+2
Total	**9**	**FY08**	**15**	**+8**

Accomplishments/Actions

1st Quarter FY08

- NERFC has implemented three (3) new AHPS forecast locations on rivers in Southern New England.
- Implementation of four locations in the Connecticut River Basin (originally scheduled for implementation in FY 07) was delayed due to NWSRFS software problems. These problems have been fixed in OB8.1.1 which contains an updated version of the Reservoir Operation (RES-J). OB8.1.1 software is now installed at NERFC, and the forecasts are now running in test mode in NWSRFS with assistance from RTi. This should allow for implementation of these locations over the next few months.
- The contract from FY07 funds with RTi is now in place for continued work in the Connecticut/Housatonic River Basins. NERFC has begun work with RTi on the calibrations. RTi visited NERFC (per task order) in December to coordinate the calibration efforts.
- NERFC and RTi held a meeting with First Light Power who operates power plants on the Housatonic River. The meeting was positive, and an agreement was reached to enhance data exchange from First Light to the NWS. This will provide more real time access to a number of platforms that NERFC does not receive reliable data from, including both precipitation and stage data. This should enhance the AHPS calibration/implementation efforts on the Housatonic river.
- NERFC plans to start working on market research phase of the FY08 task in January, to ensure they are ready as soon as possible.
- In-house calibration continues for locations in Southern New England and Maine.

2nd Quarter FY08

- 10 new AHPS forecast points were implemented this quarter in the Connecticut River basin in VT, NH, and MA. These are the locations that RTi calibrated under the FY06 task order that got delayed by software issues:

BALV1 - West River at Ball Mountain Lake, VT
TOWV1 - West River at Townshend, VT
KENN3 - Ashuelot River at Surrey Mtn Dam
OTRN3 - Otter Brook at Keene, NH
SWAN3 - Ashuelot River at West Swanzey, NH
HDLN3 - Ashuelot River at Hinsdale, NH
SRLM3 - Millers River at South Royalston, MA
EROM3 - Millers River at Erving, MA
WHGV1 - Deerfield River at Harriman Reservoir
ROWM3 - Deerfield River at Rowe, MA

- NERFC is continuing to work with RTi on the FY07 funded development in the Connecticut and Housatonic basins. RTi is currently finishing up work on Connecticut/Housatonic calibrations, and expects completion on their activities in April or May. Two NERFC staff members are planning to travel to Ft Collins in April to review the work.
- Beginning in February, NERFC started providing the WFOs in the NERFC service area with daily 'contingency outlooks' based on the GFS ensembles. These are issued for internal use only, in both graphic and text format. The outlooks cover 5-day forecast periods.
    - The Short Range (1-5 days) Ensemble River came on-line for all Weather Forecast Offices in the NERFC service area during the first week of February 2008. This first of its kind system, in Eastern Region, processes both rainfall and 2-meter temperature forecasts from the Global Forecast System (GFS) Ensemble members and calculates basin average temperature and rainfall fields out to 120 hours. By utilizing 2-meter temperature, NERFC provides the ability to quantify potential snowmelt, as well as QPF-driven flood potential. The GFS-based generated basin average fields are then routed through the National Weather Service River Forecast System (NWSRFS) to produce individual hydrographs for each member of the GFS ensemble. The NERFC prototype then employs a variety of Extended Streamflow Prediction (ESP) techniques to generate graphical and text guidance for over 100 forecast points in the region.
    - NERFC's system has already met with great success, providing early notification of minor to moderate flood potential in just its first week of operation. This work has also provided a unique learning opportunity, noting the limitations associated with the course grid associated with the GFS Ensemble. In addition, through the collaborate efforts of all three Eastern Region DOHs, this system is being implemented in all ER RFCs and will soon expand to incorporate SREF guidance.
- NERFC will be drafting their FY08 Statement of Objectives shortly to begin market research with RTi for FY08 funds.
- NERFC is working on setting up a few demonstration sites with distributed modeling. They are making slow progress on this, but are moving forward and hope to have this in place later this FY.

3rd Quarter FY08

- 2 new AHPS forecast points were implemented this month in the Southern New England watersheds in NH and MA. NERFC has finally been able to generate ESP plots on the lower portion of the Merrimack River. This implementation had previously been held up due to problems in the Winnipesaukee River that prevented proper modeling at Franklin Falls Dam. The two new locations are:
  GOFN3 - Merrimack River at Goffs Falls, NH
  LOWM3 - Merrimack River at Lowell, MA
- NERFC has completed market research for FY08 calibration work in the Connecticut and Finger Lakes basins and have forwarded the SOO to OHD for implementation. . As a result of NERFC being recently added to the CHPS Acceleration Team (CAT), it was agreed upon that the API-HFD would not be ported to CHPS, and therefore calibration of the remaining API segments needed to be accelerated. Additional funding for RTi was added, and the NERFC SOO was

modified to include their final 5 calibrations.

- NERFC completed their FY07 task order with RTi on the Connecticut and Housatonic rivers. Two NERFC staff members visited RTi at Ft. Collins to review their calibrations. They received the final report from RTi, including the calibration decks, to complete their FY07 calibration work.
- During June, NERFC hosted a service hydrologist workshop and discussed a number of issues including CHPS, Inundation Mapping, ensemble modeling, snow modeling improvements, distributed modeling, and need for precipitation frequency updates in the Norteast.

Problems Encountered/Issues

1st Quarter FY08 – None

2nd Quarter FY08 – None

3rd Quarter FY08 – None

AHPS Implementation for OHRFC

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

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

Milestones

Implementation Area	Forecast Points Planned	Due Date	Actual to Date (3rd Qtr FY08)	Variance
Ohio River Basin	0	---	3	+3
Total	**0**	**FY08**	**3**	**+3**

Accomplishments/Actions

1st Quarter FY08

- OHRFC has completed basic AHPS implementation for its entire service area.
- OHRFC is continuing with re-calibration activity in selected basins in parts of the Kentucky and Muskingum basins. Re-calibration in the Little Wabash is complete. Additionally, OHRFC is working on re-calibration of the Great Lakes (Lake Erie) drainage basins using one-hour time steps.
- Work on the Community Ohio River HEC-RAS model continues as a cooperative project with the Ohio R. & Great Lakes Div. of the USACE and the USGS.
- Implementation of the Advanced Research (ARW) version of the Weather Research and Forecasting (WRF) model on the OHRFC Linux cluster is progressing.
- OHRFC is working cooperatively with the NERFC and NCEP to implement a Short Range Ensemble Forecasting (SREF)-based approach to short lead-time probabilistic hydrologic forecasting.

2nd Quarter FY08

- 3 new AHPS forecast points were added this quarter - 2 points in the Great Lakes Forecast Group and 1 in the Miami River Basin. Additionally, OHRFC has implemented 4 new river forecast points (non-AHPS). All 7 locations (above) were implemented as non-daily, high-water forecast points, at the request of WFOs in the OHRFC service area. The list of new forecast points includes:
  - *WFO CLE*
  - *Great Lakes Forecast Group*
  - Vermilion R. at Vermilion, OH - AHPS probability info.
  - Chagrin R. at Willoughby, OH - AHPS probability info.
  - *Muskingum Forecast Group)*
  - Tuscarawas R. at Massillon, OH
  - Nimishillen CK. at N. Industry, OH
  - *WFO ILN*
  - E. Fork Whitewater R. at Abington, IN - AHPS probability info.
  - *WFO IWX*
  - Eel R. at N. Manchester, IN
  - Salamonie R. Warren, IN
  - In addition, the Little Kanawha R. at Glenville was upgraded from a non-daily to a daily forecast point.

- Re-calibration activity in the Hocking River basin has been completed.
- Re-calibration of the Lower Muskingum R basin (MKL) has been completed and re-calibration of selected basins in the Great Lakes – Lake Erie drainage (GTL) has begun
- Implementation of the Advanced Research (ARW) version of the Weather Research and Forecasting (WRF) model on the OHRFC Linux cluster is nearly completed.
- OHRFC continues work with the NERFC and NCEP to implement a GFS ensemble and Short Range Ensemble Forecasting (SREF)-based approach to short lead-time probabilistic hydrologic forecasting. Initial model runs have been achieved.
- Work on the Community Ohio River HEC-RAS model continues as a cooperative project with the Ohio R. & Great Lakes Div. of the USACE and the USGS; significant progress has been achieved in downstream reaches of the Ohio and with Mississippi R reaches near the confluence with the Ohio R. The OHRFC is working with the Western Region to make AHPS/ESP model run data available in the western water supply forecast services webpage through the OHRFC WRO webpage (http://www.weather.gov/ohrfc/WRO.shtml). An example for an OHRFC forecast point is shown in http://www.nwrfc.noaa.gov/westernwater/espapp/index.php?id=DLYW2.

3rd Quarter FY08

- Re-calibration of the Beaver R basin is nearing completion. Re-calibration of the upper Ohio River (OHW) has begun.
- Implementation of the ARW version of the WRF model on the OHRFC Linux cluster is completed.
- OHRFC is working cooperatively with the NERFC, MARFC, and NCEP to implement a GFS ensemble and SREF-based approach to short lead-time probabilistic hydrologic forecasting; routine 00Z model runs have been achieved. Experimental products are being generated and are viewable at ftp://ftp.werh.noaa.gov/share/ohrfc/gens/gens.html. OHRFC is nearing completion of implementing MARFC's MMEFS system (a modification of NERFC's GENS system) that greatly accelerates processing on a non-AWIPS 64-bit Linux machine.
- OHRFC continues to work with the Western Region to make AHPS/ESP model run data available in the western water supply forecast services webpage through the OHRFC WRO webpage (http://www.weather.gov/ohrfc/WRO.shtml). The maps are 'clickable' for all AHPS points that are USGS gauge sites with historical flow summaries. ESP forecasts and historical observed streamflows are shown in www.nwrfc.noaa.gov/westernwater.

Problems Encountered/Issues

1st Quarter FY08 – None

2nd Quarter FY08 - None

3rd Quarter FY08 – None

AHPS Implementation for ABRFC

Management Lead: Billy Olsen, HIC

Objective: Implement probabilistic forecasts for basins in the Arkansas-Red Basin River Forecast Center's (ABRFC) area of responsibility. For FY08, this would include implementation of basic service for 51 AHPS forecast locations in the following ABRFC forecast groups: Washita Basin, Lower Arkansas River-Kerr to Pine Bluff, Denison Inflow and Lower Red – Arthur City to Fulton. No contract assistance is requested this year.

Milestones

Implementation Area	Forecast Points Planned	Due Date	Actual to Date (3rd Qtr FY08)	Variance
Washita Basin	11	1st Qtr	11	0
Lower Arkansas River - Kerr to Pine Bluff	1	1st Qtr	1	0
Denison Inflow	22	4th Qtr	0	0
Lower Red – Arthur City to Fulton	17	4th Qtr	0	0
Total	**51**		**12**	**0**

Accomplishments/Actions

1st Quarter FY08

- Local implementation work was started on the calibration and ESPADP scripts for DENINF forecast group for ESP. Fourteen basins have been set up in ICP and initially calibrated for long-tern probabilistic forecasting.
- ABRFC staff members Greg Stanley and Mike Pierce traveled to the RTi offices during the week of December 10 to review contract progress to date. ABRFC continues to coordinate AHPS RES-J calibration contract work let in FY-07 with RTi. The project is on schedule and all is in order.

2nd Quarter FY08

- Local implementation work was completed on the calibration and ESPADP scripts for DENINF forecast group for ESP.
- Contact was made with WFO-SHV concerning an outreach / training activity this summer.

3rd Quarter FY08

- Local implementation work has begun on the calibration and ESPADP scripts for LWRRED forecast group for ESP.
- Final plans were completed with WFO-SHV concerning an outreach / training activity this August.
- ABRFC completed coordination with RTi for AHPS RES-J calibration contract work let in FY-07. The project is now complete and data/reports as contracted have been delivered.

Problems Encountered/Issues

1st Quarter FY08 – None

2nd Quarter FY08 - None

3rd Quarter FY08 - 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 FY08 this includes the Pearl and Pascagoula basins

Milestones:

Implementation Area	Forecast Points Planned	Due Date	Actual to Date 3rd Qtr FY08	Variance
Upper Pearl, MS	6	Q1	6	0
Lower Pearl Basin, MS/LA	6	Q2	6	0
Lower Pearl Basin, LA	3	Q3	3	0
Pascagoula Basin, MS	4	Q3	4	0
Pascagoula Basin, MS/AL	9	Q4		
Total	**28**		**19**	**0**

Accomplishments/Actions

1st Quarter FY08

- November 13, coordination call held with RTi on FY07 calibration progress and activities. LMRFC provided an updated set of FY07 calibration shapefiles to RTi, at their request
- December 24, received all preliminary FY07 calibration decks from RTi for LMRFC review.
- Implemented 6 new AHPS sites for the Upper Pearl Basin during December at: GDHM6, KSCM6, OFAM6, RATM6, JSNM6, and JACM6.
- Provided a brief overview of AHPS activities for the USACE, USGS, and TVA during our annual meetings with these Agencies.
- Completed 7 historical MAPs for the Gulf basins in Mississippi. This completes all MAPS for basins east of the Mississippi River. A total of 10 historical MAPs were completed for the White Basin in AR.
- Two in-house basin calibrations were completed this Quarter:
  - Yazoo Basin: YZOM6
  - Wolf Basin: ROST1
- No AHPS outreach/training activities were scheduled during the Quarter.
- LMRFC continues support of AHPS activities with in-house calibration effort for the west Tennessee, Yazoo, and Pearl Basins.

2nd Quarter FY08

- FY07 Task T6-0011 completed by RTi and approved by HIC.
- Completed FY08 Market research with Contractor, submitted draft SOO to COTR, and awaiting FY08 Task approval.
- Implemented 6 new AHPS sites during March for WFOs JAN and LIX. Sites added in the lower Pearl Basin are DLAM6, ROCM6, MTCM6, CLMM6, BXAL1, and TYTM6.
- Plans during the 3rd Q are to implement 7 new AHPS sites in the Pearl and Pascagoula Basins.
- Continuing historical MAP developments for the Black and White Basins in AR/MO.
- March 27, conducted AHPS training for WFO LIX.
- Five SAC-SMA calibrations were completed: LPOL1, GERT1, PHTT1, BVRT1, and RLTT1.
- LMRFC continues support of AHPS activities with in-house calibration effort for the west Tennessee, Yazoo, and Pearl Basins.

3rd Quarter FY08

- May 15, HIC provided NWS COTR with Contractor Evaluation and approval of Task T8-0007.
- June 4, Task Order T8-0007 was received and signed by RTi. Contractor calibration work for FY08 is now in progress.
- June 5, all required NWS datasets as per Task T8-0007 have been provided to Contractor.
- Implemented 7 new AHPS sites during the 3rd Quarter for the lower Pearl (3 for WFO LIX) and Pascagoula (4 for WFO JAN) basins. Sites implemented are: FRNL1, BSHL1, PERL1, CLSM6, HBGM6, HATM6, and LURM6.
- Plans are to implement 7 new AHPS sites during the 4th Q for the Pascagoula Basin with 4 sites planned for WFO JAN and 5 for WFO MOB.
- AHPS outreach activities with presentations on NWS flood inundation mapping efforts:
    - April 2-3, at the Louisiana State Flood Plain Managers Meeting held in Lake Charles, LA.
    - April 15-16, at the Mississippi Water Resources Conference held in Jackson, MS.
    - May 27-28, at the Mississippi, Association of State Flood Plain Managers Meeting held in Natchez, MS.
    - June 19, at the Louisiana GIS Council Meeting held in Baton Rouge, LA.
- Continuing historical MAP developments for the Black and White Basins in AR/MO.
- Two in-house basin calibrations were completed during the 3rd Quarter: LPOL1 and BLWM6.
- LMRFC continues support of AHPS activities with in-house calibrations for basins east of the Mississippi River.

Problems Encountered/Issues

1st Quarter FY08

- None

2nd Quarter FY08

- None

3rd Quarter FY08

- Delays in the Task approval process seem to be excessive.

AHPS Implementation for SERFC

Management Lead: John Feldt, HIC

Objective Implement probabilistic hydrologic forecasts for basins in the Southeast River Forecast Center's (SERFC) area of responsibility. For FY08 this would complete AHPS sites in portions of Georgia, South Carolina, and north Florida.

Milestones

Implementation Area	Forecast Points Planned	Due Date	Actual to Date (2nd Qtr FY08)	Variance
Altamaha	7 1	1st Qtr 2nd Qtr	7 1	+1
Santee	1	2nd Qtr		
Apalachicola	5 6 6	2nd Qtr 3rd Qtr 4th Qtr	6 5	 -1
Total	**26**	**FY08**	19	0

Accomplishments/Actions

2nd Quarter FY08

- There has been a request to southern region to replace Maximum exceedance graphs with Mean exceedance graphs. It is believed that these will be more informative to the public and agencies using these products. The outcome of that request is still pending.
- **ESP** continues to be used in briefings to the corps of engineers. We also continue to send the raw traces to the corps for use in their models.

3rd Quarter FY08

- There has been a request to southern region to replace Maximum exceedance graphs with Mean exceedance graphs. It is believed that these will be more informative to the public and agencies using these products. The outcome of that request is still pending.
- **ESP** continues to be used in briefings to the corps of engineers. We also continue to send the raw traces to the corps for use in their models.

Problems Encountered/Issues

2nd Quarter FY08 – None

3rd Quarter FY08 – None

AHPS Implementation for WGRFC

Management Lead: Thomas Donaldson, WGRFC

Objective: Implementation of probabilistic hydrologic forecasts for basin in the West Gulf River Forecast Center's area of responsibility. For FY08 this includes the Brazos River Basin..

Milestones

Implementation Area	Forecast Points Planned	Due Date	Actual to Date (1st Qtr FY08)	Variance
Upper Brazos Forecast Group	29	4th Qtr		
Lower Brazos forecast Group	44	4th Qtr		
Total	**73**		**0**	**0**

Accomplishments/Actions

1st Quarter FY08

- Assimilated and provided to RTi the following datasets in support of RES-J and headwater calibration for the Brazos River system:
  - Current fs5files
  - ESRI shapefiles of forecast points and basins
  - Historical reservoir inflow, release, and elevation time series
  - Reservoir Regulation Documents
  - Historical mean daily and instantaneous flow time series
  - Historical mean areal precipitation time series
- Began process to compute historical MAPs for Brazos River system.
- Constructed historical reservoir timeseries for three Brazos River Authority Reservoirs, and built preliminary RES-J models for these BRA reservoirs.

2nd Quarter FY08

- Performed data collection and QC for computations of MAPs for Brazos River system.
- Computed MAPX time series for Brazos River basins.
- Continued work on reservoir calibrations on reservoirs within the Brazos River system.
- Worked with RTi on design strategy for Corps of Engineers reservoir modeling for the Brazos Basin.
- Received AHPS Training and Outreach budget for FY 2008. Began planning the most effective use of these funds.
- Began development of local flow time series required by RTi for use in reservoir calibrations.
- Began local planning for FY 2009 AHPS development in preparation for market research.

3rd Quarter FY08

- Conducted market research for FY 2009 AHPS calibration contract.
- Submitted draft SOO to AHPS program office for 2009 contract.
- Completed historical MAP development for Brazos system.

- Held Brazos River Reservoir System Design/Modeling teleconference with RTi. Gave approval for overall design concept.
- Implemented the ESP model into all of the segments in the UBRA/LBRA forecast groups.
- Created batchbuilder decks to create core products for the Brazos River System.
- Configured DOAHPS to run BRAZ forecast group (combination of UBRA and LBRA)
- Added locally developed RES-J model for four Brazos River Authority Reservoirs.
- Finalized plans for FY 2008 AHPS Training and Outreach activities.

Problems Encountered/Issues

1st Quarter FY08 - None

2nd Quarter FY08 – None

3rd Quarter FY08 – None

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 3rd Qtr FY08	Variance
Total	**0**		**0**	**0**

Accomplishments/Actions

1st Quarter FY08
- N/A

2nd Quarter FY08
- N/A

3rd Quarter FY08
- N/A

Problems Encountered/Issues

1st Quarter FY08
- Implementation for regulated points is delayed until delivery of new software.

2nd Quarter FY08
- Implementation for regulated points is delayed until delivery of new software.

3rd Quarter FY08
- 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 3rd Qtr FY08	Variance
Total	0		0	0

Accomplishments/Actions

1st Quarter FY08
- N/A

2nd Quarter FY08
- N/A

3rd Quarter FY08
- N/A

Problems Encountered/Issues

1st Quarter FY08
- Implementation for regulated points is delayed until delivery of new software.

2nd Quarter FY08
- Implementation for regulated points is delayed until delivery of new software.

3rd Quarter FY08
- 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 3rd Qtr FY08	Variance
Total	**0**		**0**	**0**

Accomplishments/Actions

1st Quarter FY08
- N/A

2nd Quarter FY08
- N/A

3rd Quarter FY08
- N/A

Problems Encountered/Issues

1st Quarter FY08
- Implementation for regulated points is delayed until delivery of new software.

2nd Quarter FY08
- Implementation for regulated points is delayed until delivery of new software.

3rd Quarter FY08
- Implementation for regulated points is delayed until delivery of new software.

Training

Hydrologic Science Training - COMET

Theme: Training

Management Lead: Jeff Zimmerman

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

Milestones

Task	Due Date	Status
Conduct Flash Flood Hydrology/QPE Workshop	2nd Q	Complete
Conduct Advanced Hydrologic Science Residence Course	4th Q	On-going
Deliver Dambreak Distance Learning Module	Changed from 4th Q to 1st Q FY 08	Complete – Delivered 2nd Q FY 2008
Deliver Verification Distance Learning Module	Changed from 4th Q to 2nd Q FY 08	To be delivered 4th Q FY 2008
Deliver Distributed Hydrologic Model Distance Learning Module	To be published in FY 2009	On-going
Deliver Precipitation Processing Inputs Distance Learning Module	To be published in FY 2009	On-going
Deliver Verification Distance Learning Module		

Accomplishments/Actions

1st Quarter FY07
- Continued development work on Dambreak, Verification, and Distributed Hydrologic Model training modules. These modules were funded as part of the FY 07 NSTEP process.
- Conducted initial conference calls on FY 08 funded modules
- Initiated preparation activities for Flash Flood Hydrology/QPE Workshop to be held in February 2008

2nd Quarter FY08
- Conducted Flash Flood Hydrology/QPE Workshop
- Delivered first part of the Dambreak Distance Learning module
- Development proceeded on Verification and Precipitation Processing modules

3rd Quarter FY08
- 1st Verification module in final publication mode
- Development work continues on Precipitation Processing module
- Introduction to Distributed Modeling webcast under development
- OHD and HSD worked with COMET to install Hydrologic Software on COMET systems

Problems Encountered/Issues

1st Quarter FY08
- None

2nd Quarter FY08
- None

3rd Quarter FY08

- Decision was made to postpone the development of the 2nd Verification module until FY 2009.

Outreach

FY08 Hydrology Program Outreach Work Plan

Core Goal: Inform customers of our information and services, assess their satisfaction, and incorporate comments and feedback into Hydrology Program planning

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
Flood Inundation Mapping Coordination Mtg (Tauton, MA)	OCWWS	4.5	Q1	Completed
COE Flood Plain Management Services and Planning Assistance to States Programs Workshop (Napa, CA, Dec 2007)	OCWWS	2.6	Q1	Completed
FEMA Risk Analysis Division Mtg (Philadelphia, PA)	OCWWS	0.0	Q1	Completed
Water Resources Demonstration Coordination Mtg (CRREL Hanover, NH)	OCWWS	4.5	Q3	Completed
ASFPM: (Reno, NV, May 2008) - 4 Regional attendees	OCWWS	12.5	Q3	Completed
FEMA National Flood Conference: 2 attendees (Chicago, IL, May 2008)	OCWWS	4.0	Q3	Completed
AHPS Users Guide: ~100,000 copies (July 2008)	OCWWS	7.9	Q4	In Progress
NSC Congress and Exposition (Anaheim, CA, Sept 22-24)	OCWWS	10.0	Q4	In Progress
Provide Yellow Metal TADD Warning Signs to RFCs and WFOs	OCWWS	8.0	Q4	In Progress
Sub Total		**54.0**		
Participate in the Tri-Agency USGS-NWS-USACE New England Science Strategy Meeting. (NERFC, WFOs); Location: Hanover, NH	ER	.5	Q1	Completed
Participate in RFC-WFO partnered workshop in the Oswego River Basin to review new AHPS deployment. (NERFC, BGM); Location: Onondaga County, NY	ER	1.0	Q1	Completed
Participate in semi-annual New York City Water Supply Meetings and review AHPS deployment and operations in the NYC water supply system. (NERFC, HSD, ALY, BGM); Location: Grahamsville, NY	ER	.6	Q3	Completed
Participate in the NOAA in the Carolinas / Coastal and Inland Flooding Observation and Warning Project Coordinate Meeting. (SERFC) Location: TBD	ER	.8	Q2	Completed
Participate in quarterly Delaware River Basin Flood Advisory Committee Meetings and review AHPS deployment and operations in the Delaware River Basin. (MARFC, HSD, PHI, BGM); Location: Trenton, NJ	ER	.5	Q2	Completed
Co-sponsor and participate in WMO Sponsored-Saint John River Hydrology Committee Meeting. Co-located with the Eastern Snow Conference. Share AHPS development and deployment activities in northern New England. (NERFC, HSD, CAR, BTV, GYX); Location: Hanover, NH	ER	3.0	Q3	Completed
State Hurricane Conference Support to review AHPS product suites and review inland flooding hydrologic services. (SERFC); Location: NC & SC	ER	1.8	Q3	Completed
Participate in Ohio River Drainage Tri-Agency Coordination Meeting (OHRFC); Location: Urbana, IL	ER	.7	Q3	Completed
Sub Total		**13.0**		
FEMA Flood Map modernization scoping meetings	SR	4.0	Q4	Partially

Audience – local/county/FEMA officials (or corporate technical partners)				Completed
LA State Flood Plain Managers Conference - Presentation on NWS Flood Inundation Mapping Efforts; Audience - Flood Plain Managers in LA	SR	.5	Q3	Completed
MS State Flood Plain Managers Conference - Presentation on NWS Flood Inundation Mapping Efforts Audience - Flood Plain Managers in MS	SR	.5	Q3	Completed
Mississippi Water Resources Conference (MWRC) - Paper/presentation on NWS Flood Inundation Mapping Efforts Audience - Water resources managers in MS	SR	.5	Q3	Completed
RFC/WFO AHPS Workshop for Mobile District COE - Brief on AHPS products and services	SR	.4	Q4	
RFC/WFO AHPS Workshop- Mississippi Valley Division/ Vicksburg District/Pearl River Valley Water Supply District - AHPS products and services Audience - Water Resources managers at the COE and PRVWSD	SR	1.2	Q4	
RFC/WFO AHPS Workshop; Audience - WFO SHV high-end users/customers of AHPS products	SR	1.2	Q4	
RFC/WFO Outreach on the use of AHPS Products and Services to Support Drought Management.	SR	1.7	Q4	
Support to Hurricane Program - The SERFC plays a lead role in the hurricane program. 70% or more of inland-moving tropical systems affect the SERFC's area. This request would fund attendance at key hurricane conferences to share information about AHPS products and services.	SR	3.0	Q3	Completed
Sub Total		**$13.0K**		
NWS Hydrology WAS* IS Societal Impacts Workshop (Location TBD)	CR	5.0	Q4	
RFC Outreach MBRFC	CR	4.0	Q4	
RFC Outreach NCRFC	CR	4.0	Q4	
Sub Total		**$13.0K**		
Development of a "Hands-on" Watershed Model – Phoenix,AZ WFO	WR	1.0	Q4	
Host Montana Hydrology Conference - Theme AHPS and Water Supply Services – Helena, MT WFO	WR	6.0	Q3	Completed
In coordination with the CNRFC Produce Southern California AHPS Hydrology, Drought and Water Resource Services Brochure – San Diego, CA	WR	2.0	Q2	Completed
In coordination with the NWRFC produce AHPS, Water Supply and Flash Flood Brochure for the state of OR and WA	WR	2.0	Q4	
In coordination with the CBRFC Produce an Arizona-wide Brochure detailing AHPS Hydrology and Flash Flood Services in the state	WR	2.0	Q3	Completed
Sub Total		**$13.0K**		
Total		**$106K***		
CFI Group Biennial Hydrologic Services CSI Survey	OCWWS & Regions	36.0	Q4	
Grand Total		**$142.0K**		

***Total combined FY08 OCWWS and Regions Outreach costs equivalent to FY07**

Accomplishments/Actions

1st Quarter FY08

- All planned activities have been completed for the quarter

3rd Quarter FY08

- OCWWS-HSD: Yellow Metal TADD Warning Signs have been delivered to all Regions
- AHPS Users Guide is finished. Printed copies will be made available at the NLSC. A PDF version is available in the web at www.weather.gov/os/water/ahps/Ahps-resources.shtml

Problems Encountered/Issues

1st Quarter FY08

- 1st Quarter activities were funded by local money and will make a cost adjustment once AHPS money is released.

2nd Quarter FY08

- OCWWS-HSD submitted National Press Release to PA. However, PA chose not to release it. Therefore, deleted item from Tasks listed above

3rd Quarter FY08

- None

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 FY07 Milestones	Responsible	FY07 Quarter Completion Date
AHPS Planning/ Execution/ Reporting		
• Quad Charts	OHD/Regions	Monthly
• E-CPIC Updates	OHD	Quarterly
• Quarterly Status Reports	OHD	Monthly
NOAA PPBES Hydrology Program Support		
• Program Operating Plan	OHD	3rd
• Quad Charts	OHD	Quarterly
• Quarterly Program Review	OHD	Quarterly
Agency/ Department/ Legislative Interfaces		
• Budget Fact Sheet	OHD	1st
• Prepare and submit Budget Request	OHD	2nd
• Prepare Briefings and Support OMB/Congressional Meetings	OHD	3rd
• Prepare Response to Pass Back	OHD	3rd
• Prepare Response to Budget Hearing Questions	OHD	4th
• Program Assessment Rating Tool Progress	OHD	Quarterly
HOSIP Process Improvement and Document Development		
• Instructions	OHD	Quarterly
• Guidance & Standards	OHD	Quarterly
• Performance Statistics	OHD	Quarterly
• Quality Control Reports	OHD	Quarterly
• Gate Status Reports	OHD	Quarterly
• Validation & Recommendation Reports	OHD	Quarterly
• HOSIP Documents	OHD	Quarterly

Accomplishments/Actions

1st Quarter FY08

- All milestones are on schedule – all scheduled reports completed

2nd Quarter FY08

- All milestones are on schedule – all scheduled reports completed

3rd Quarter FY08

- All milestones are on schedule – all scheduled reports completed
- The Scientific and Information Technology Support Services Blanket Purchase Agreement (BPA) was awarded July 9, 2008. The period of performance for the BPA is through June 30, 2013 with a ceiling of $4.9M. The contract is primarily intended for NWS but is available for use DOC wide.

Problems Encountered/Issues

1st Quarter FY08 - None

2nd Quarter FY08 - None

3rd Quarter FY08 - None