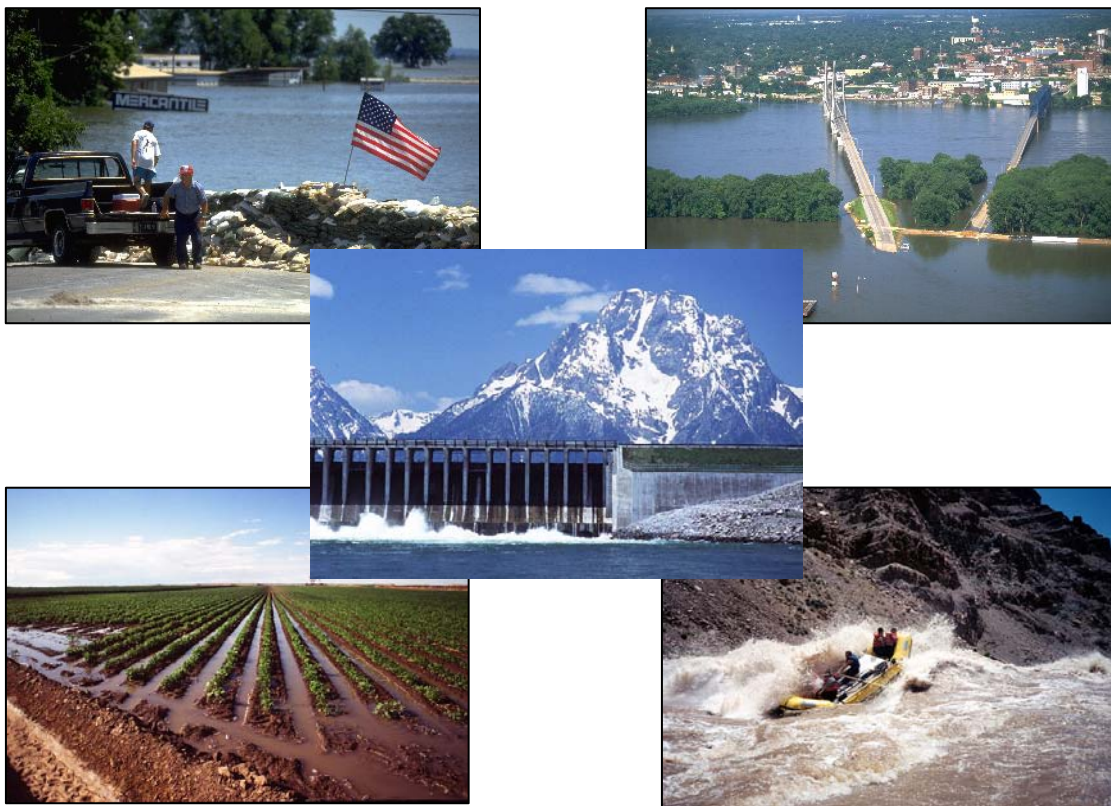




# Advanced Hydrologic Prediction Service Quarterly Report 3<sup>rd</sup> Quarter FY 2012



August 1, 2012

# CONTENTS

## **Innovation/ Collaborative Research**

On-going Competitive and Collaborative Research .....	2
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## **Quantify Uncertainty (Ensembles)**

HEFS Phase I Implementation .....	5
-----------------------------------	---

## **Gridded Water Resources**

Auto Calibration for Distributed Model .....	11
Distributed Model Intercomparison Project (DMIP 2) .....	13
Support Distributed Model Implementation.....	16
Migration of HL-RDHM Components to CHPS.....	18

## **Inundation Mapping**

Static Flood Inundation Map Web-page Development and Deployment .....	22
---	----

## **Inputs and Forcings**

Prototyping NMQ for FFMP.....	32
Short-range Radar-based Precipitation Forecasts.....	35
Gridded Forcings for CHPS .....	38

## **Flash Flood Services**

Distributed Hydrologic Model with Threshold Frequencies .....	44
Evaluate Gridded Flash Flood Guidance (GFFG) Approaches .....	47
Improve Guidance for DamBreak Forecasting.....	50
FFMP Small Basin Support.....	53

## **Routing (Hydraulics)**

Transition to HEC-RAS: Model Development and Implementation.....	56
River-Estuary-Ocean Modeling – Chesapeake Bay Study.....	59

## **Software Refresh**

Community Hydrologic Prediction System (CHPS) .....	63
---	----

## **Dissemination (Web Pages)**

AHPS Web Page Activities .....	68
--------------------------------	----

## **New Service Locations**

	Alaska Region	
AHPS Implementation APRFC.....		72
	Central Region	
AHPS Implementation NCRFC.....		74
AHPS Implementation MBRFC.....		77
	Eastern Region	
AHPS Implementation MARFC .....		82
AHPS Implementation NERFC .....		88
AHPS Implementation OHRFC .....		91
	Southern Region	
AHPS Implementation ABRFC .....		95
AHPS Implementation LMRFC .....		98
AHPS Implementation SERFC .....		102
AHPS Implementation WGRFC .....		105
	Western Region	
AHPS Implementation CBRFC .....		108
AHPS Implementation CNRFC .....		110
AHPS Implementation NWRFC .....		112
<b>Outreach &amp; Training</b>		
Outreach & Training Work Plan .....		116
<b>Program Management</b>		
Program Management Activities .....		122

# **Innovation/Collaborative Research**

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

**Theme:** Innovation

**Management Lead:** Pedro J. Restrepo

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

### Milestones

Task	Due Date	Status
- None presently defined -		

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY11

- Received and reviewed progress reports from UCLA, UC Irvine, U. Arizona, and Arizona State University. Returned all reports with comments. Held a project meeting via teleconference with Boise State University. Their progress report is due shortly.

#### 2<sup>nd</sup> Quarter FY11

- Received progress report from Boise State and approved it. Interacted with the UC Irvine team to clarify our priorities.

#### 3<sup>rd</sup> Quarter FY11

- Received the final reports from UCI and U. of Arizona. Approved the report from UCI, and we are in the process of reviewing the reports.

#### 4<sup>th</sup> Quarter FY11

- Reviewed and approved report from City of Hayden, AR (earmark). Reviewed and send back with comments progress report from Arizona State, UC-Irvine and U. Arizona

#### 1<sup>st</sup> Quarter FY12

- In addition to Arizona State's grant (PI: Vivoni, "Improved Hydrometeorological Forecasting through Physically-based Distributed Models"), two on-going grants requested a no-cost extension: Terri Hogue's project ("Data Assimilation in Operational Watershed Models for Short and Long-term Hydrologic Forecasting") and Juan Valdés ("Estimating the Impact of Soil Moisture Profiles and its Impact in River Flow Forecasting"). During this quarter, reports from Irvine and Arizona were reviewed and approved. The revised report from Arizona State is being reviewed. U. of California, Irvine submitted a final report on its project "Understanding and improving California's river and water resource predictions using in situ and remote sensing data". It was returned with a request for substantial revisions.

#### 2<sup>nd</sup> Quarter FY12

- Received progress report from Boise State and is being revised.
- UC Irvine having problems submitting the final report through GrantsOnline..
- Received and approved final report from UCLA.

#### 3<sup>rd</sup> Quarter FY12

- Received Progress Reports from Arizona State and U. of California, Irvine.

### Problems Encountered/Issues

**1<sup>st</sup> Quarter FY11 – None**

**2<sup>nd</sup> Quarter FY11 – None**

**3<sup>rd</sup> Quarter FY11 – None**

**4<sup>th</sup> Quarter FY11 – None**

**1<sup>st</sup> Quarter FY12 – None**

**2<sup>nd</sup> Quarter FY12 – None**

**3<sup>rd</sup> Quarter FY12 – None**

## **Quantify Uncertainty (Ensembles)**

## HEFS Phase I Implementation

**Core Goal:** Quantify uncertainty of our forecast information

**Management Lead:** Jon Roe, Mark Fresch

**Objective:** Implement Phase 1 Hydrological Ensemble Forecast Service (HEFS) into the operational baseline. The operational ensemble functionality will be based on prototypes developed and tested in the eXperimental Ensemble Forecast System. The capabilities included in this first operational HEFS will be decided based on high-level requirements and concept of operations created by a team of scientists, software engineers, and RFC forecasters.

### Milestones

Task	Due Date	Status
HEFS Graphics Generator: Pass HOSIP Gate 2	FY10, Q2	Graphics Generator is being taken out of this project.
HEFS Graphics Generator: Pass OSIP combined Gate 1/2	FY10, Q2	Graphics Generator is being taken out of this project.
Complete the Phase 1 Graphics Generator Implementation	FY10, Q1	Completed March 2010
Complete the Phase 2 Graphics Generator Implementation	FY10, Q4	Graphics Generator is being taken out of this project.
Complete the HEFS high-level requirements and concept of operations	FY 11, Q2	Draft completed in FY11 Q2. A final version was sent to the NWS River Forecast Centers for comment.
Complete software development project plan for EPP3 and EnsPost	FY11, Q3	The project plan was completed in Q4.
Release HEFS Development Release 1 for Beta Testing	FY12, Q3	HEFS Development Release 1 started Beta Testing during FY12, Q3.
Release HEFS Development Release 2 for Beta Testing	FY12, Q4	
Release HEFS Development Release 3 for Beta Testing	FY13, Q2	
Release HEFS Version 1 release 1 for Beta Testing	FY14, Q1	

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY11

- OHD provided an updated Graphics Generator which included some added functionality requested by RFCs and bug fixes. In addition, OHD and the Forecast Decision Training Branch developed video training for the Graphics Generator and held a ½ day workshop for users at CAT RFCs. Next quarter, OHD will solicit a 'must-have' list of changes from RFCs on using the Graphics Generator as a replacement to ESPADP.
- An HEFS Assessment Team (A-Team) was formed to determine the high level requirements (such as major components) and concept of operations for the HEFS. The team met with the OHD scientists and software engineers to discuss the strengths and weaknesses of the existing prototypes for the different XEFS components and the planned enhancements. A report is expected in Q2-FY11.
- OHD started analyzing computer resources used by the end-to-end XEFS using the existing ensemble pre-processor prototype (EPP3), the existing hydrologic processor (i.e., the suite of hydrologic and routing models that generate hydrologic forecast outputs), the existing hydrologic post-processor prototype (EnsPost). The goal is to estimate computer resource needs for HEFS. OHD also completed an analysis of FEWS components which could be used in HEFS; this was



passed to Deltares for review.

## **2<sup>nd</sup> Quarter FY11**

- The HEFS Assessment Team (A-Team) completed a draft report on the HEFS high level requirements (such as major components) and concept of operations. Among the high level requirements are the required components of HEFS, including EPP3. The final report is expected within weeks.
- OHD completed their analysis of computer resources used by the end-to-end XEFS using the existing ensemble pre-processor prototype (EPP3), the existing hydrologic processor (i.e., the suite of hydrologic and routing models that generate hydrologic forecast outputs), the existing hydrologic post-processor prototype (EnsPost). The goal is to estimate computer resource needs for HEFS. The analysis showed that run-times for EPP3 and EnsPost added ~29% to ESP runs. In addition, the analysis showed that EPP storage requirements increased by 18.5 GB for operational execution and by 12 Tb for archive (non-operational) execution.
- OHD provided an updated Graphics Generator which included changes from a 'must-have' list of functionality from RFCs. This Graphics Generator can be used as a replacement to ESPADP created products.
- OHD completed evaluating and documenting the XEFS prototype code and design. In addition, OHD created a list of potential HEFS tasks to increase software maintainability and usability. Next quarter, OHD will provide a preliminary HEFS design.

## **3<sup>rd</sup> Quarter FY11**

- The HEFS A-Team final report was reviewed by OHD Management and sent to the NWS RFCs for comment. The final report contains the HEFS high-level requirements and concept of operations. The high-level requirements include the required HEFS components for the first version of HEFS (HEFSv1), including Meteorological Ensemble Forecasting Processor (MEFP, formerly called EPP), EnsPost, Ensemble Verification Service (EVS), Graphics Generator, and Product Dissemination.
- A project plan strategy was approved, and a project plan has been drafted. The project plan will be presented to the Hydrologist In-Charge (HIC) meeting in August 2011.
- OHD completed further analysis of EPP and EnsPost software.
  - OHD started changing software MEFP to ingest version 2 of NCEP's Climate Forecast System (CFSv2).
  - New designs for MEFP and EnsPost were approved for HEFS. The new designs will improve usability and maintainability, and these changes will begin after the CFSv2 changes are completed. In addition, both components will come with GUI to facilitate parameter estimation.
  - The HEFS configuration management environment was created. The environment will provide a separate (from other OHD projects) repository for HEFS software and associated data and documentation and a location to run daily automated builds and tests.
- The New York City Department of Environmental Protection (NYCDEP) is entering into an MOA with OHD to accelerate HEFS.
  - We've been working with MARFC and NERFC to create climate-based Ensemble Streamflow Prediction (ESP) hind-casts covering their ~ 50 years of historical data. These hind-casts will be used by NYCDEP for post-processing.

## **4<sup>th</sup> Quarter FY11**

- The HEFS project plan was reviewed by HEFS Mgmt and a summary was presented to the Hydrologist In-Charge (HIC) meeting in August 2011. Briefly, the plan is to have three development releases approximately 6 months apart starting in late March 2012 followed by the final HEFS Version 1 in Sep. 2013. These releases will be to a limited number (5) of RFCs, and, in 2014, HEFS will be provided to all RFCs. The RFCs will install and Beta test all these releases. Starting in early Nov. 2011, Representatives of the RFCs will meet as a team regularly with the HEFS Project Manager to help plan testing and provide feedback.
- There has been one major change in the project plan. One of the HEFS components, the Graphics Generator, will become part of the CHPS baseline in mid-2012. Prior to this, a

preliminary version of the Graphics Generator will be provided with the first development release of HEFS, but otherwise Graphics Generator is no longer part of the HEFS project.

- Software Development for the first development release (HEFS Dev. Rel. 1) is mostly on track.
  - Meteorological Ensemble Forecasting Processor (MEFP): Changes are being made to ingest CFSv2 (scheduled for Dev. Rel. 1), and this task is approximately 1 month behind schedule, and as a result, another task, (the capability to invoke MEFP hindcasting in CHPS) has been moved to a future release. To support the CFSv2, decades of past forecasts were converted from their native gridded format to a more usable and smaller form. A GUI is being created to make parameter estimation more user friendly, and this task is on track.
  - Ensemble Post-processor (EnsPost): Prototype code is being recoded in Java to improve maintainability, and the task is on track.
  - EVS: The tasks will be to review and improve testing and documentation and provide support. Staff will be available to work on this component starting in Nov. 2011.
- Training planning has started with National Hydrologic and Geospatial Sciences Training Center. The goal is to adapt existing ensemble hydrological training for HEFS and add new training for new software functionality. The training will be provided prior to each release and be recorded and made available via NWS Learning Management System (LMS).
- A Test Plan is being drafted.
- A small set of preliminary climate-based ESP hind-casts for NYCDEP (mentioned in the prior quarter) were completed. More of these hind-casts are planned for the up-coming quarter.

#### **1<sup>st</sup> Quarter FY12**

- HEFS Development Release 1 software development and unit testing are on track for integration testing to start after January 2012. Here are some details on the HEFS components
  - Meteorological Ensemble Forecasting Processor (MEFP): Changes were made to ingest the CFSv2 as an option to the CFSv1, both long range numerical weather prediction models. In addition, a GUI, called the MEFP Parameter Estimator, was created to make parameter estimation (or calibration) easier and less time consuming.
  - Ensemble Post-processor (EnsPost): The prototype code was recoded in Java to improve maintainability. In addition, a GUI, called the EnsPost Parameter Estimator, was created to make parameter estimation (or calibration) more user-friendly
  - Ensemble Verification System (EVS): EVS was incorporated into the HEFS software package.
  - Graphics Generator: Some minor changes are being made to FEWS and Graphics Generator in order for Graphics Generator to work with the latest FEWS.
- Training – A 3-day workshop is being planned for the end of March. Similar training workshops will be provided prior to each release and be recorded and made available via NWS Learning Management System (LMS). A Basic Hydrologic Ensemble Theory model is being developed by OHD and the National Hydrologic and Geospatial Sciences Training Center.
- In order to prepare for the HEFS ensemble stream-flow forecasts, (non-HEFS) operational deterministic and climate-based ensemble stream-flow forecasts are being provided to NYCDEP. Some of the preliminary climate-based ESP hind-casts for NYCDEP (mentioned in the prior quarter) are being redone due to errors.

#### **2<sup>nd</sup> Quarter FY12**

- HEFS Development Release 1 (software and documentation) is on track for release in early Q3 FY12 to the HEFS Test RFCs for Beta Testing. Support tracking tool (Fogbugz) has been adapted to include HEFS areas. During the Beta Test, the Test RFCs will be given a) several test procedures to run over the next several weeks and b) HEFS end-to-end configurations for real-time forecasts at two points. Subsequently, the Test RFCs will be expected to configure two more forecast points for end-to-end HEFS real-time forecasts.
- A 3-day HEFS Training Workshop was held at the end of March 2012 for representatives of the HEFS RFC Test Team. The workshop provided reviews of background information, including the Basic Hydrological Ensemble Theory model, demonstrations of the HEFS components, and exercises for the students to use the components.
- The climate-based ESP hindcasts for NYCDEP are about 70% complete.

### **3<sup>rd</sup> Quarter FY12**

- HEFS Development Release 1 (software and documentation) was completed for beta testing on May 1<sup>st</sup>.
  - Off-line, non-operational testing has uncovered only minor issues.
  - Development Release 1 provides new graphical user interfaces for calibrating MEFP and EnsPost. Also, MEFP can now make use of the latest version of the Climate Forecast System (CFSv2). The HEFS software reliability and usability has also been improved.
  - HEFS software testing now follows a thorough, structured process with detailed procedures.
  - HEFS is being beta tested at five RFCs until the end of calendar year 2013.
  - In April 2012, representatives from the five RFCs and key HEFS team members, collectively called the HEFS RFC Test Team, began meeting weekly to provide feedback on HEFS testing to OHD.
  - In addition to software, OHD provided the HEFS RFC Test Team with supporting documentation, including user's manuals for all HEFS components.
  - The NWS hydrology support group started supporting HEFS, including adding dedicated staff and tracking HEFS issues.
- Climate-based ensemble hindcasts are on-track to complete by the end of July 2012. MARFC and NERFC created the hindcasts, and, during the quarter, OHD has been checking these hindcasts against historical simulations. In late 2011, historical simulations were created by MARFC and NERFC and delivered to Riverside Technology, inc., which is part of the OST development team. However, the historical simulations were recently redone by the RFCs when OHD's checks uncovered errors and these simulations will be redelivered with the climate-based hindcasts.
- OHD began work to make use of the Global Ensemble Forecast System (GEFS) output within MEFP. MEFP design changes were started which will enable MEFP to use GEFS in operations (due in Spring 2013). In addition, OHD has created hindcasting configurations, which will eventually be used to produce GEFS-based hindcasts (due Sep. 2013). In May 2012, NOAA's Earth System Research Laboratory provided an archive of GEFS reforecasts needed for MEFP calibration. OHD is converting those GEFS reforecasts to a more usable format, and have converted the data for approximately 50% of the area covering the five HEFS test RFCs.
- OHD continues to evaluate MEFP and EnsPost performance for a variety of forcings and locations. Eventually, the GEFS-based hindcasts for OST will be created as a by-product of this effort. During the quarter, OHD started the evaluation of GFS-based and climatology-based performance at two locations within each of the five HEFS Test RFCs.
- In May, a project update briefing was provided to NWS hydrologists, and, in June, seminars of HEFS components were briefed to the RFC Development and Operations Hydrologists.

### **Problems Encountered/Issues**

#### **1<sup>st</sup> Quarter FY11**

- None

#### **2<sup>nd</sup> Quarter FY11**

- None

#### **3<sup>rd</sup> Quarter FY11**

- Converting CFSv2 re-forecasts grids from native (NCEP) GRIB format to ASCII (for use by MEFP) is taking much longer than anticipated. The slowness of the conversion is due to a) the large volume of data and b) the slowness of the IT systems.
- Hind-casting at MARFC and NERFC is going very slowly due primarily to the large amount of data being processed (50 years of daily forecasts with a 1-year forecast horizon). OHD is investigating ways to improve performance.

#### **4<sup>th</sup> Quarter FY11**

- There were temporary staffing shortages for work on MEFP and EVS.

- More staff was temporarily shifted to the EnsPost re-coding task due to the complexity of the prototype code.
- Converting the CFSv2 re-forecasts continued to be slow (see 3<sup>rd</sup> quarter). Next quarter, the conversion programs will be optimized, and the disk storage restriction is being addressed.

#### **1<sup>st</sup> Quarter FY12**

- Re-forecasts of the new GEFS have been delayed. This will cause a delay (amount TBD) in the MEFP recoding and inclusion of GEFS as an input to MEFP currently targeted for HEFS Development Release 2. When GEFS is added as an input to the MEFP, the re-forecasts are needed by the MEFP Parameter Estimator and for hind-casting.
- Creation of hind-casts within CHPS is taking much longer than anticipated. As a result, some future HEFS tasks may need to be delayed or re-thought in order to accomplish the hind-casting for NYCDEP.

#### **2<sup>nd</sup> Quarter FY12**

- The system being used for HEFS testing is also being used for AWIPS 2 testing
- Due to budget constraints, some tasks have been cut or deferred.

#### **3<sup>rd</sup> Quarter FY12**

- The test systems at two RFCs have been unstable causing disruptions to HEFS field testing and using up support staff and spare equipment. In response, OHD will procure new test systems at those RFCs.
- Hindcasts and historical simulations were difficult and time-consuming to produce. Because of the extended processing times, the large amount (50 yrs.) of data used needed to be broken up into manageable time periods; this made the process prone to errors. Forecast staff at NERFC and MARFC created these data, although this task was a secondary to their forecast duties. In addition, when the task to create these data was started (Fall 2011), they had little experience creating long hindcasts or historical simulations on a newly deployed hydrologic forecasting system. To alleviate these issues, GEFS-based hindcasts will be created by OHD staff dedicated to the task and have lots of hindcasting experience on a faster processor with additional storage. In addition, at OHD's request, Deltares provided a faster CHPS workflow which reduced run times by 67-80%.
- Delivery of the GEFS reforecasts to OHD was delayed by 6 months. As a result, modifying MEFP to use GEFS had to be delayed from Development Release 2 to Development Release 3 (due Spring 2013). OHD will modify the MEFP hindcast version to use GEFS in time to generate the GEFS-based hindcasts by September 2013.

## **Gridded Water Resources**

## Auto Calibration for Distributed Model

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

**Management Lead:** Mike Smith

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

### Milestones

Task	Due Date	Status
1. Investigated separate procedures for elevation zones for mountainous areas.	TBD	On hold
2. Develop outline for overall strategy for distributed model calibration	TBD	On hold
3. Develop approach for auto calibration of elevation zone parameters; parameter limits, and routing model parameters	TBD	Delayed to put HL-RDHM components into FEWS

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY11

- None this quarter

#### 2<sup>nd</sup> Quarter FY11

- Deltares interested in adding auto-calibration schemes to FEWS, including HL-RDHM approach. This would be done via the Open DA approach.

#### 3<sup>rd</sup> Quarter FY11

- No work this period; focusing migrating SAC-HTET into CHPS/FEWS.

#### 4<sup>th</sup> Quarter FY110

- Mike assisted HSEB to implement OPT 3 lumped auto calibration tools in CHPS/FEWS. Experience gained in this step will help ultimate implementation of distributed model auto calibration tools in HL-RDHM.

#### 1<sup>st</sup> Quarter FY12

- Continued assistance provided to HSEB on implementing OPT 3.

#### 2<sup>nd</sup> Quarter FY12

- Assisted CHPS Calibration Team with developing requirements for basic calibration capability.
- Penn. State U. beginning large experiments with calibrating HL-RDHM on supercomputer (no cost to OHD). Such tests could help inform the development of automatic calibration strategies for HL-RDHM in CHPS

#### 3<sup>rd</sup> Quarter FY12

- No work this period

### Problems Encountered/Issues

**1<sup>st</sup> Quarter FY11**

- None this quarter

**2<sup>nd</sup> Quarter FY11**

- None this quarter

**3<sup>rd</sup> Quarter FY11**

- No work this quarter

**4<sup>th</sup> Quarter FY11**

- CHPS/FEWS does not currently have a convenient way to loop through auto-calibration runs.

**1<sup>st</sup> Quarter FY12**

- Some delays noted due to other CHPS priorities.

**2<sup>nd</sup> Quarter FY12**

- None this quarter

**3<sup>rd</sup> Quarter FY12**

- None this quarter

## Distributed Model Intercomparison Project (DMIP II)

[Note: Reporting on project “Calibration - Complete IDMA Study” was merged into this project as of FY11 Q1]

**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	FY-10 Q4	Completed
2. Submit Oklahoma basin papers for DMIP 2 Special Issue	FY10 Q3	Submitted to OHD review August, 2010
3. Design OK forecast mode experiment (this experiment postponed)	FY09 Q1	withdrawn
4. DMIP 2 Western Basin Experiments: generate and analyze basic (w/o HMT data) distributed and lumped simulations	FY10 Q4	Complete
5. Finalize the 'basic' (non-HMT) gridded QPE and QTE data and make available to DMIP 2 participants.	FY10 Q2	Complete
6. Complete analyses of participants' western basin 'basic' simulations.	FY10 Q4	Interim analysis of submitted simulations completed
7. (Jointly with Hydrometeorology Group) Support ESRL and NSSL in the derivation and evaluation of the HMT products for DMIP 2.	FY10 Q4	On track
8. Deliver to DMIP 2 the HMT advanced data for 2005-2006 with new modeling instructions.	FY10 Q4	Withdrawn as DMIP 2 is officially over
9. OHD support for DMIP 2 participants	FY10 Q4	Complete
10. Submit overview and results papers for DMIP 2 Western Basin experiments	FY-11 Q4	<del>On track</del> Delayed to FY-12 Q1
11. Develop and deliver recommendations on the use of biased and inconsistent precipitation data	FY10 Q4	Completed

### Accomplishments/Actions

#### 1st Quarter FY11

- Mike presented an overview of the Western Basin results at the HMT-West meeting October 6 and 7.
- Mike presented the Western Basin DMIP 2 results in a poster at the Fall AGU in San Francisco. The poster was sent to all DMIP 2 Western Basin participants for comments.
- Naoki presented his poster on the analysis of gridded, historical gridded QPE for consistency
- Mike received comments from Geoff Bonnin on the DMIP 2 Oklahoma results paper. The overview paper for the Oklahoma experiments was approved by OHD.
- Mike Julie Demargne, Naoki Mizukami, and Andy Wood (DOH, CBRFC) chaired a session at the AGU meeting on Advances in Operational River Forecasting. Rob Hartman gave an invited oral presentation on hydrologic forecasting in mountainous areas.
- Analyses continued of the OHD distributed model simulation improvements compared to the lumped model in the North Fork American. The analyses for three events show that the OHD distributed model improvement is from the generation of more runoff due to better modeling of the rain/snow line. The Hydrology Group began the analysis of the HMT 'precipitation type on



the surface' grids for 2005-2006.

- The DMIP 2 methodology for generating hourly 4km gridded QPE data sets was considered for inclusion into the AOR project.

#### **2<sup>nd</sup> Quarter FY11**

- Introduction and results papers for the Oklahoma experiments were approved by OHD and officially submitted to the Journal of Hydrology in March. Mike Smith sent out the papers to the RFCs and Regions.
- Hydrology Group completed 90% of the analyses of the 2005-2006 HMT radar-derived rain-snow data. Naoki Mizukami began writing summary report. The HMT data were tested with lumped and distributed models.
- Along with other OHD AGU attendees, Mike Smith presented his DMIP 2 AGU poster to the RFCs on Jan 19.
- Hydrology and Hydromet groups evaluated the gap-filling radar QPE data for 2005-2006. The Hydromet group developed several QPE data sets
- Hydrology group began writing the introduction and results papers for the DMIP 2 Western Basins experiments.

#### **3rd Quarter FY11**

- Journal of Hydrology provided comments provided for Introduction and Results papers for the Oklahoma experiments. Reviewers called for only moderate revision, mostly to paper structure. Mike and co-authors began review process.
- Hydrology and Hydromet groups presented HMT QPE results analysis on June 30 via OHD seminar.
- Naoki nearly finished with draft report on use of HMT BBH-derived precipitation type data.

#### **4<sup>th</sup> Quarter FY11**

- Collaborated with DMIP 2 participants to revise the Oklahoma Results paper. DMIP 2 Oklahoma introduction paper, results paper, and Special Issue Preface accepted for publication. The Editor's proofs of these three documents were revised and submitted.
- Mike began writing the journal papers for the DMIP 2 western basin experiments.

#### **1st Quarter FY12**

- Paper by Hydrology Group on the analysis of gridded historical QPE was accepted for publication in the Journal of Hydrology
- DMIP 2 Special Issue of the Journal of Hydrology finalized; Editorial staff announced that it would be published in Feb, 2012.
- Draft paper by ESRL and OHD on the use of HMT West radar derived snow level height completed and approved by CNRFC.

#### **2<sup>nd</sup> Quarter FY12**

- DMIP 2 Special issue of the Journal of Hydrology (Oklahoma experiments) published in February.
- Paper by ESRL and OHD on the use of HMT West radar-derived snow level height submitted to the Journal of Hydrometeorology
- DMIP 2 western basin results paper sent out to participants for review.

#### **3rd Quarter FY12**

- Final revisions made to western basin results paper

### **Problems Encountered/Issues**

#### **1st Quarter FY11**

- Delays in the OHD review of the DMIP 2 Oklahoma experiment results paper (5 months).
- Delays in the delivery to OHD of the HMT-West advanced QPE from the 'gap-filling' radars.

#### **2nd Quarter FY11**

- OHD Review of DMIP 2 Oklahoma experiment results paper completed after 7 months.

### **3rd Quarter FY11**

- Journal of Hydrology reviews on DMIP 2 papers took 3 months

### **4<sup>th</sup> Quarter FY11**

- Initial Editor's proof of DMIP 2 Results paper was unacceptable to the authors due to many errors. It took 3 weeks for the Journal Editors to generate a new proof that could be reviewed by all authors (OHD and DMIP 2 participants).
- Delays in writing the papers for the western basin experiments due to new IWRSS SAC-HTET project spin up.

### **1st Quarter FY12**

- Naoki Mizukami left OHD to take a Post Doctoral position at NCAR in Boulder, CO.

### **2nd Quarter FY12**

- None

### **3rd Quarter FY12**

- Work on results paper delayed to focus on IWRSS prototype CONUS runs of SAC-HTET

## Support Distributed Model Implementation

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

**Management Lead:** Mike Smith

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

**Milestones**

Task	Due Date	Status
1. Provide training and support to RFCs as necessary to support implementation for river, flash flood, and new product forecasting.	Ongoing	

**Accomplishments/Actions**

**1<sup>st</sup> Quarter FY11**

- The Hydrologic Modeling Group provided support to CBRFC to move to 1km grid modeling for better modeling with Snow-17 in steep terrain.
- Zhengtao Cui provided support to ABRFC in the CHPS handling of static gridded parameters.

**2<sup>nd</sup> Quarter FY11**

- Hydrology group provided guidance to NWRFC as they started a project with the co-located WFO. The goal is to implement the CHPS HL-RDHM components on a few fast responding basins.

**3rd Quarter FY11**

- Hydrology group developed plan for NWRFC and Portland WFO to implement the CHPS HL-RDHM components on a few fast responding basins. Working details of historical and real time gridded forcings and relation to AOR.

**4<sup>th</sup> Quarter FY11**

- Zhengtao provided CHPS code and documentation to NWRFC to get started.
- Naoki generated ¼ HRAP connectivity for NWRFC basin.
- NWRFC will begin project in earnest on October 1 so that they can finish their CHPS implementation first.

**1<sup>st</sup> Quarter FY12**

- Provided guidance to APRFC and HAWAII WFO on QPE derivation and modeling scale issues for DHM-TF issues in Hawaii.
- Developed historical gridded temperature preprocessor (Hydrometeorology Group).

**2<sup>nd</sup> Quarter FY12**

- Hydrology Group provided guidance to LMRFC as they began implementation of DHM-TF over their domain.
- Hydrology Group supported APRFC efforts to implement DHM-TF in Hawaii.

**3rd Quarter FY12**

- APRFC and Hawaii WFO successfully generated historical 1-km QPE and 1-km HL-RDHM connectivity for DHM-TF in Hawaii. Resolved HRAP projection issues.
- Continued Support to LMRFC as they began implementation of DHM-TF over their domain.
- Provided gridded air temperature data to ABRFC for tests of Snow-17 in their western mountainous basins.

## **Problems Encountered/Issues**

### **1<sup>st</sup> Quarter FY11**

- None

### **2<sup>nd</sup> Quarter FY11**

- None

### **3<sup>rd</sup> Quarter FY11**

- None

### **4th Quarter FY11**

- None

### **1<sup>st</sup> Quarter FY12**

- Don Laurine (NWRFC DOH) retired. NWRFC project efforts put on hold until new DOH is hired.
- Suitability of HRAP projection for Hawaii is unclear.

### **2<sup>nd</sup> Quarter FY12**

- Suitability of HRAP projection for Hawaii is unclear.

### **3rd Quarter FY12**

- None

## Migration of HL-RDHM Components to CHPS

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

**Management Lead:** Mike Smith

**Objective:** This proposal covers work to implement the basic HL-RDHM components into the CHPS/FEWS architecture. Work began in FY-09 but funding did not begin until FY-10. It includes the science development, implementation, and testing of the SAC-HTET into CHPS. This project includes elements previously listed under the AHPS Project “Physically-based Modifications to the SAC-SMA”.

**Milestones:**

Major Task	Due Date	Status
2. Performance testing, prepare for and conduct Gate 4: Basic HL-RDHM components in CHPS.	FY11 Q1	Complete except for Gate 4
3. Implement SAC-HTET into CHPS HL-RDHM: including derivation of soil texture parameters; analysis/evaluation of Noah parametric data extension of SAC-HTET during and specifically after HL-RDHM software modification	FY11 Q4	Completed
4. RFC testing of CHPS HL-RDHM	FY11 Q3	On track Delayed due to RFCs' focus on BOC CHPS implementation
5. Submit a journal article describing the change in the evapotranspiration processes of SAC-HT	FY11 Q4	<del>On track</del> <del>Delayed to FY 12 Q2</del> <del>Delayed to April, 2012</del> Delayed to Q4

**Accomplishments/Actions**

**1<sup>st</sup> Quarter FY11**

- Zhengtao Cui and Victor Koren began work to implement SAC-HTET into CHPS as a component for gridded distributed modeling.
- Zhengtao provided ESRL with CHPS version of HL-RDHM to work on HMT-West follow-on project using WARF QPF.
- Victor and Mike began writing journal papers on the SAC-HT and the SAC-HTET. These will be written as companion journal articles.

**2<sup>nd</sup> Quarter FY11**

- Implementing SAC-HTET into CHPS progressed according to schedule with some slight delays. Significant coding was accomplished to read in and process many gridded data and parameter fields, and for evaporation options using precipitation and temperature or the full suite of meteorologic forcings. Victor Koren generated a number of required CONUS parametric grids and developed a utility to generate HRAP grids of max/min air temperature from hourly grids of temperature
- SAC-HT paper completed and ready for OHD review

**3rd Quarter FY11**

- SAC-HT paper passed OHD review
- Mike and Victor wrote 90% of SAC-HTET paper.
- Zhengtao on track for implementing gridded SAC-HTET in CHPS.
- Hydrology Group to work with NOHRSC to test SAC-HTET over CONUS in quasi-operational

mode. Don Cline approved plan.

#### **4<sup>th</sup> Quarter FY11**

- SAC-HTET code successfully implemented into CHPS as a distributed modeling component. Documentation also completed.
- Victor completed the analysis of the gridded SAC-HTET for the Oklahoma region. Results show improvement in soil moisture simulation, especially in the lower zones.
- Victor and Mike wrote two NOAA Technical Reports: “Physically-Based Modifications to the Sacramento Soil Moisture Accounting Model: Modeling the Effects of Frozen Ground on the Rainfall-Runoff Process” Modification of the Sacramento Soil Moisture Accounting Heat Transfer Component (SAC-HT) for Enhanced Evapotranspiration.
- Zhengtao and Victor provided HL-RDHM SAC-HTET code and parameters to NOHRSC for CONUS runs as a prototype IWRSS project.

#### **1<sup>st</sup> Quarter FY12**

- Experimental CONUS runs of SAC-HTET begun at NOHRSC. Resolved issues that arose as part of ‘operationalizing’ the SAC-HTET. Examples include identifying and correcting erroneous temperature and parametric data.
- Worked with EMC to extend the NLDAS 30-year re-analysis over CONUS to generate initial conditions for Jan 1, 2012 start of ‘live’ runs at NOHRSC of SAC-HTET

#### **2<sup>nd</sup> Quarter FY12**

- Successfully executed SAC-HTET over CONUS for period spanning 9/2009-6/2010 at 4-km hourly scale. SAC-HTET was run at NOHRSC and saved states and restarted every 6 hours
- Gained ability in HSMB to run CONUS 4-km hourly executions of HL-RDHM and SAC-HTET on Imac machines, greatly enhancing the diagnosis of any issues.

#### **3<sup>rd</sup> Quarter FY12**

- Began ‘live’ runs of SAC-HTET over CONUS, running on NOHRSC machines and generating prototype products for the IWRSS National Water Center. Data files and CONUS images posted on NOHRSC web page and FTP sites.
- SAC-HTET and SAC-HT companion journal papers revised and near completion.
- Began developing strategy to have SAC-HTET supported as a CHPS component
- Finalized Technical Readiness Level assessment of CONUS implementations of SAC-HTET

### **Problems Encountered/Issues**

#### **1<sup>st</sup> Quarter FY11**

- Testing at ABRFC of CHPS HL-RDHM components delayed until the RFC gets to a good point in its CHPS operational transition. This will delay the HOSIP Gate 4 meeting covering the migration of the basic HL-RDHM components.

#### **2<sup>nd</sup> Quarter FY11**

- Some delays due to Linux disk problems. The disk problems caused very long program run times or prevented programs from completing.

#### **3<sup>rd</sup> Quarter FY11**

- Very long Linux run times for testing SAC-HTET delaying the development and testing of the gridded SAC-HTET.

#### **4<sup>th</sup> Quarter FY11**

- Continued very long Linux run times delaying the development and testing of the gridded SAC-HTET

#### **1<sup>st</sup> Quarter FY12**

- Continued very long Linux run times delaying the development and testing of the gridded SAC-

## HTET

### **2<sup>nd</sup> Quarter FY12**

- SAC-HTET paper being finalized but delayed due to NASA proposal review
- Some issues with CONUS initial states from EMC on Jan 2012 needed to be resolved such as large snow water equivalent values.

### **3rd Quarter FY12**

- For CONUS SAC-HTET runs, resolved issues with parameters along coasts, generation of daily max min temperatures, mismatch of modeling domains, etc.

# Inundation Mapping



## Static Flood Inundation Maps Web-Page Development and Deployment

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

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**Management Lead:** Victor Hom

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

**Team Members:**

Jay Breidenbach – Western Region<sup>1</sup>  
 Laurie Hogan – Eastern Region  
 Victor Hom – Office of Climate Water and Weather Services / HSD  
 Kris Lander – Central Region  
 Doug Marcy – National Ocean Service / Coastal Services Center  
 Mike Schaffner - Western Region  
 Seann Reed – Office of Hydrologic Development / HSMB<sup>2</sup>  
 Wendy Pearson – Central Region  
 Katelyn Costanza – Southern Region

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

<sup>1</sup>In April 2012, Mike Schaffner assumed Jay Breidenbach’s role for Western Region. Jay was instrumental in guiding the AHPS FIM program to implement flood maps displaying a range of flood flows.

<sup>2</sup>In June 2012, Seann Reed moved to a new position and now serves as the Development Operational Hydrologist at MARFC.

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### **I. FY12 Main Objectives and Task Areas**

- Main FY12 Objectives:**
- (1) Update AHPS Flood Mapping Web Portal and Display
  - (2) Provide webinar sessions on AHPS FIM to field offices.
  - (3) Implement, via the AHPS web portal, additional flood inundation mapping libraries and provide assistance to the regions for development/implementation of other AHPS flood inundation mapping.

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

## II. FY12 Milestones

<b>Task Area #1 - AHPS Flood Mapping Web Portal and Display</b>			
<b>Subtask 1-1</b>	<b>AHPS Web Portal for Bridges</b>	<b>Due Date</b>	<b>Status</b>
	NWS performs post processing prior to providing to AHPS contractor; NWS will assist in the reprocessing of prior libraries.	-	Completed
<b>Subtask 1-2</b>	<b>AHPS Web Portal for Levees and Flood Risk Areas</b>	<b>Due Date</b>	<b>Status</b>
	NWS coordinated with FEMA's Levee Analysis and Mapping Approach for Accredited and Non-Accredited Levee, FIM Guidelines will need to be revised as Phase 2 will need to consider the approach to flood risk areas behind levees	-	Completed
<b>Subtask 1-3</b>	<b>Provide more geospatial intelligence to NWS AHPS Products</b>	<b>Due Date</b>	<b>Status</b>
	Demonstrate existing AHPS Flood Mapping Capabilities on Google Interface and enhanced current interface to meet AHPS FIM Partner Needs	FY12Q1	Completed
	Contractor provides beta version of Google interface for review	FY12Q1	Completed

<b>Task Area #2 Quality Assurance and Consistency of Regional Flood Maps</b>			
<b>Subtask 2-1</b>	<b>Quality Assurance and Phase 2 Quality Control Training Workshop</b>	<b>Due Date</b>	<b>Status</b>
	Work with CSC on Logistics for Webinar and Workshop	-	Completed
	Conduct Flood Mapping Webinars	FY12Q4	Moved to FY12Q4
	Conduct QAQC Hands-on Workshop	FY12Q4	Remaining FY12 and FY13 monies were identified for travel costs for this webinar.

<b>Task Area #3 - National Flood Inundation Mapping Guidelines and Program Standards</b>			
<b>Subtask 3-1</b>	<b>Federal Guidelines and Statement of Work Templates (FIM08-2P)</b>	<b>Due Date</b>	<b>Status</b>
	Update Federal Guidelines to V.3	-	Completed
	Update SOW and QAQC	FY12Q1	Completed
<b>Subtask 3-2</b>	<b>Partnered Program/Project Management Support Tool (FIM09-7P)</b>	<b>Due Date</b>	<b>Status</b>
	AHPS Management System Tools	-	Onhold, unfunded
	QA Inundation/Depth Tools	-	Onhold, unfunded In-kind
	QA Metadata Tools	-	Onhold, unfunded In-kind

<b>Task Area #4 - Regional Flood Mapping Development</b>			
<b>Subtask 4-1</b>	<b>Southern Region's Gulf Coast Libraries</b>	<b>Due Date</b>	<b>Status</b>
	Implement remaining Flood Inundation Map Libraries	FY12Q2	Completed.
<b>Subtask 4-2</b>	<b>Eastern Region's Susquehanna River Flood Inundation Libraries (FIM08-4P)</b>	<b>Due Date</b>	<b>Status</b>

Implement up to 3 Flood Inundation Map Libraries	FY13Q3	Maps for West Branch of Susquehanna River Jersey Shore, PA were delivered in FY12Q1; New FY13 activities have been recommended and funded for implementing SRBC libraries.
<b>Subtask 4-3 Eastern Region's Delaware River Flood Inundation Libraries (FIM08-4P)</b>	<b>Due Date</b>	<b>Status</b>
Implement remaining DRBC Flood Inundation Map Libraries	-	Completed
<b>Subtask 4-4 Central Region's Indiana Inundation Libraries (FIM08-4P)</b>	<b>Due Date</b>	<b>Status</b>
Implement up to 2 Flood Inundation Map Libraries (1 library was delivered in FY11)	FY12Q2	In Progress; Delayed due to Partnered Funding
<b>Subtask 4-5 Western Region's Flood Mapping for Boise River</b>	<b>Due Date</b>	<b>Status</b>
Implement 1 Demonstration Flood Inundation Map Library	FY12Q2	Completed.
<b>Subtask 4-6 Central Region's Iowa Inundation Libraries (FIM10-1P)</b>	<b>Due Date</b>	<b>Status</b>
Implement 1 Flood Inundation Map Libraries	-	Completed. In addition, CR delivered a second library (CID14) in coordination with partners from Iowa
<b>Subtask 4-7 QAQC Technical Review and Oversight Support (FIM10-2P)</b>	<b>Due Date</b>	<b>Status</b>
Provide assistance to the regions for development/implementation of AHPS flood inundation mapping.	-	Completed and on a continual basis
<b>Subtask 4-8 Demonstration AHPS Flood Map Libraries (FIM10-3P)</b>	<b>Due Date</b>	<b>Status</b>
Implement 2 AHPS Flood Map Libraries, namely one in Central and one in Western Region	FY13Q3	FY13 Funding was identified and will assist WR implement second AHPS FIM

<b>Task Area #5 - Maintenance and Servicing Maps</b>		
<b>Subtask 5-1 Maintain AHPS Flood Maps (FIM09-10P)</b>	<b>Due Date</b>	<b>Status</b>
Evaluate and Prioritize Map Updates	-	Completed in FY10Q4
Work with WFO and RFC to update NC and Gulf Coast Libraries	FY12Q2	Completed in as much as possible with limited resources for remapping.
Supply Revisions on Test Platform for NWS Evaluation	FY12Q2	Completed
Implement Updates on Regional Servers	FY12Q3	Completed in as much as possible with limited resources for remapping

### III. FY12 Accomplishments/Actions

FY12 Q3

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

- *As of FY12Q3, related actions to subtasks have been completed.*
- *New related actions are being developed for FY13.*

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

**Quality Assurance and Phase 2 Quality Control Training**

- In late June and early July, there were several meetings including OHD, HSD, and CSC to discuss the newly identified funds to cover travel and per-diem costs to CSC in Charleston, SC. CSC has the IT resources to host QAQC class on Flood Inundation Mapping. Hands-on QAQC training is more effective to distance learning for QAQC maps. CSC will work to retransition the training to this type of delivery.

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

- *As of FY12Q2, related actions to subtasks that has been funding through FY12 have been completed.*
- *HSD will be collecting notes for considerations in future updates to the Guidelines, SOW, and QAQC documents.*

**Task Area #4 - Regional Flood Mapping Development**

**Southern Region’s Gulf Coast Libraries**

- *As of FY12Q3, related actions to this subtask have been completed. The initial set of libraries funded as a part of the Katrina Supplemental has been implemented.*

**Eastern Region’s Delaware River Flood Inundation Libraries**

- *As of FY12Q3, related actions to this subtask have been completed. The initial set of seven libraries has been implemented.*

**Central Region’s Iowa Inundation Libraries**

- *As of FY12, related actions to this subtask have been completed. NWS has exceeded its goal and one additional FIM library for Iowa was delivered onto AHPS.*

**Central Region’s Indiana Inundation Libraries**

- CR approved the following Flood Inundation Maps developed with the USGS Indiana Science Center for Phase 3 development. Orion has processed the libraries and posted them for review.
 

<a href="#">DREI3</a>	Driftwood River in Edinburgh, IN	(IND)	
<a href="#">NORI3</a>	White River near Nora IN		(IND)
<a href="#">SASI3</a>	St. Marys River in Fort Wayne, IN	(IND)	

**Western Region’s Flood Inundation Libraries**

- As of FY12Q3, related actions to this subtask have been completed. Flood Inundation Maps for the Boise River at Boise, ID ([BIGI1](#)) were implemented in FY12Q3. This was the culmination of several years of work involving coordination with numerous external partners, who are all very excited about the end result and high quality of the display within AHPS. Jay Bredienbach provided interviews with the local [ABC and FOX news](#) affiliates and spoke with several other news reporters. The Statesman ran a front page story with color images in this morning's print edition ([online version](#)).

**Eastern Region’s Susquehanna River Flood Inundation Libraries**

- In June and early July, there were several meetings including OHD, HSD, and ER to discuss the newly identified funds to cover AHPS FIM implementation of SRBC [SIMV](#) libraries. As a result of the discussion and the new resources, the current plan is for the NWS to coordinate with the Susquehanna River Basin Commission (SRBC) and implement at least six more flood inundation

maps for the Susquehanna River onto NWS AHPS.

- SRBC has initially provided data for ER HSD to review. A cursory review of the files look adequate for NWS to produce AHPS FIM libraries, but work will be needed to map the areas behind levees.

#### **Demonstration AHPS Flood Map Libraries**

- FY11 resources were provided to fund the AHPS FIM implementation for the Blanchard River at Ottawa, OH ([OTTO1](#)) in Northern Indiana WFO's Service Area.. FY12 resource was identified to fund implementation of Western Region's 2<sup>nd</sup> AHPS FIM Library. The FY12 resource will help in implementing a map library for the Truckee River near Vista, NV.

#### **Task Area #5 – Maintenance and Servicing Maps**

##### **Maintain AHPS Flood Maps**

- *As of FY12Q3, related actions to this subtask have been completed. The updates to select North Carolina and Gulf Coast libraries were performed for bridge clippings. An inventory for those AHPS FIM libraries which have not been clipped for overpasses and bridges will need to be tallied. In addition, maps were transitioned to Google Maps background, as previously reported in FY12Q2 and FY12Q1.*

#### **FY12 Q2**

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

##### **Google Display**

- Orion implemented the Google Maps code for inundation on live NIDS webfarms.
- Orion converted legacy AHPS FIM products to Google based Maps on the test server: <http://ahpsdev.enable-us.com/ahps/inundation.php> . Orion is providing opportunities for NWS to revised the maps and consider areas which may need to be addressed for bridges and overpasses.
- AHPS FIM products which have been updated with Google based Maps can be found at: <http://water.weather.gov/ahps/inundation.php>
- The new enhancement 1) improves the background map by incorporating Google maps and features, 2) provides easily added data layers/overlays, 3) revises and adds new configurable features on the map and to the CMS database, 4) recognizes the inclusion of inundation maps.

##### **Related Webpages**

- Orion updated the Inundation Mapping User Guide to include the new Google update: [http://water.weather.gov/ahps/inundation\\_mapping\\_user\\_guide.pdf](http://water.weather.gov/ahps/inundation_mapping_user_guide.pdf)
- Orion also provided a Flood Inundation Mapping video to highlight some of these new features.

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

##### **Quality Assurance and Phase 2 Quality Control Training**

- CSC met with NWS to revisit the training modules and expressed concerns on the effectiveness of delivering hands-on training modules which are normally provided in-person. In addition, NWS have added new QAQC processes based on NWS lessons learned from partner projects after the development of the North Carolina and Gulf Coast Libraries, which NWS HSD and NOS CSC had partnered to produce.
- Kris Landers provided training materials which he had used in one-on-one training at Central Region. The new requirement for the training is to provide pre-requisite materials and self-study modules which a user can accomplished prior to the one-on-one training.

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

## Federal Guidelines and Statement of Work Templates

- The 2011 Federal Guidelines for AHPS FIM which is posted on the NWS AHPS website: <http://water.weather.gov/ahps/inundation.php> which includes the Statement of Work and QAQC Document need to be slightly modified to address the new Google Maps. Since the Google Maps are the background for FIM, some of the prior requirements could be reduced and deliverables could be made more simple.

## Task Area #4 - Regional Flood Mapping Development

### Gulf Coast Libraries

- Flood Maps for Tuckasegee River at Bryson City, NC ([TKSN7](#)) in the WFO Greenville-Spartanburg SC (GSP) service area have been posted onto AHPS webpages.

### Southern Region's Flood Inundation Mapping Projects

- The USGS Mississippi Water Science Center, in collaboration with MEMA, the city of Hattiesburg, MS, and others, completed Phase 2 H&H/GIS work on the Leaf River at Hattiesburg, MS and developed shapefiles/depth rasters for flood inundation map libraries at ([HATM6](#)). USGS has helped arranged for resources to implement the FIM deliverables onto AHPS.
- Partners would like to include flood maps which incorporates recent record flooding and new LIDAR data, as such the projects are being delayed for:  

<a href="#">LDOT2</a>	Rio Grande @ Laredo/Nuevo Laredo	(CRP)	
<a href="#">EPPT2</a>	Rio Grande @ Eagle Pass		(EWX)
<a href="#">DLRT2</a>	Rio Grande @ Del Rio/Ciudad Acuna	(EWX)	
<a href="#">RGDT2</a>	Rio Grande @ Rio Grande City	(BRO)	

### Eastern Region's Flood Inundation Mapping Projects

- The following location is to be implemented on AHPS in FY12Q3:  

<a href="#">LODN4</a>	Saddle River- Lodi, NJ	(OKX)
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### Central Region's Flood Inundation Mapping Projects

- Flood Maps for the Blanchard River at Ottawa, OH ([OTTO1](#)) in the WFO Northern Indiana service area (IWX) have been posted onto AHPS webpages.
- Flood Maps for the Cedar River at Cedar Rapids, IA ([CIDI4](#)) in the WFO Quad Cities, IA service area (DVN) have been posted onto AHPS webpages.
- CR has approved the Flood Inundation Maps developed with the USGS Indiana Science Center on the White River near Nora Indiana ([NORI3](#)) to Phase 3 posting, but Orion is awaiting the AHPS funds to proceed.
- In coordination with USGS, CR conducted phase 1 scoping review for:  
PYMI3 (05516500): Yellow River at Plymouth, IN  
EKMI3 (04101000): St. Joseph River at Elkhart, IN  
GSHI3 (04100500): Elkhart River at Goshen, IN  
WMCI3 (03331753): Tippecanoe River at Winamac, IN  
ORAI3 (03331500): Tippecanoe River near Ora, IN
- USACE Kansas City worked with CR and NWS HSD on task deliverables and funding for Silver Jackets projects. As a result, USACE identified the need to separate the resources for Phase 3 into two deliverables, namely one for posting onto the test server and the second for posting onto AHPS. If the Phase 3A review indicated additional work is required, there might be insufficient funds to complete the phase 3B of the project. USACE wanted assurances to be able to postpone Phase 3B and withhold funds. USACE suggested separate costs and quotes.
- Other locations which CR offices are working or collaborating with others in Phase 2 to produce FIM libraries include:  

<a href="#">RZLI3</a>	Iroquois River- Rennselaer, IN	(LOT)	Phase 2A
<a href="#">DREI3</a>	Driftwood River- Edinburg, IN	(IND)	Phase 2B

### Western Region's Flood Inundation Mapping Projects

- The following are locations which WR offices are working or collaborating with others to produce FIM libraries:

<a href="#">TRRN2</a> 2B	Truckee River - Reno,NV	(REV) Phase
<a href="#">VISN2</a> 2B	Truckee River - Sparks, NV	(REV) Phase
<a href="#">BIGI1</a>	Boise River near Eagle Island	(BOI) Phase 3A

- WR Staff members have been coordinating with Federal, State, and local partners on the Boise River near Eagle Island ([BIGI1](#)) and approved the shapefiles/depth raster deliverables for Phase 3 implementation. Orion is working with NWS to address Western Region requirements of showing FIM based on flood flows.

## FY12 Q1

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

#### **Google Display**

- Orion enhanced the technique to display and update the water depth processes. New processes were required for the Google version of the AHPS FIM.
- Orion completed the Google Map code for the AHPS website and demonstrated the new AHPS Google based FIM
- Orion is in the process of converting sites to Google Maps. Progress updates are available at: <http://ahpsdev.enable-us.com/ahps/inundation.php>
- On December 14<sup>th</sup>, HSD made a presentation on the new AHPS Google capability at a Quad Agency meeting at USGS headquarters in Reston VA. A copy of the presentation is provided at: ([https://ocwws.weather.gov/tempdocuments\\_ext/FIM\\_20110825\\_Hom\\_Final.ppt](https://ocwws.weather.gov/tempdocuments_ext/FIM_20110825_Hom_Final.ppt))
- The official posting of the AHPS Google-based FIM onto NWS website is scheduled for March 2012.

#### **Related Webpages**

An updated draft of the FIM FAQs was circulated and has received preliminary approval by several FIM members.

A draft of the Inundation Mapping User's guide is being circulated and request for comments in FY12Q2

#### **Web Mapping Services**

In November, HSD made a [presentation](#) at the NOAA GIS day and agreed in principle with NOAA NWS GIS coordinator to have the downloads be hosted as a web mapping services. An example is as follows for Iowa River at Iowa City:

<http://gis.srh.noaa.gov/ArcGIS/rest/services/Inund/MapServer>

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

#### **Quality Assurance and Phase 2 Quality Control Training Workshop**

- CSC met with HSD to review the course content and new strategies to disseminate the training. Because of budget constraints, the hands-on portion of the workshop will be online and thus it will be more prudent that trainees do their due diligence, complete the homework, and use the webinar as a review of the homework. The course content is in good shape. CSC is to investigate how to make the modules be more equivalent to take-home assignments and the webinar for review/discussions.

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

#### **Federal Guidelines and Statement of Work Templates**

- The 2011 Federal Guidelines for AHPS FIM was posted on the NWS AHPS website and can be downloaded via: <http://water.weather.gov/ahps/inundation.php>
- The related Statement of Work template and QAQC document are being revised in FY12Q2 to reflect the new Guidelines.

### **Task Area #4 - Regional Flood Mapping Development**

### Gulf Coast Libraries

- Flood Maps for Tuckasegee River at Bryson City, NC [TKSN7](#) in GSP HSA has been approved for posting onto AHPS webpages.
- Additional post processing in the vicinity of RT.77 Bridge is being performed for [VICT2](#) Guadalupe River near Victoria, TX in the CRP service area.

### Southern Region's Flood Inundation Mapping Projects

- The USGS Mississippi Water Science Center, in collaboration with MEMA, the city of Hattiesburg, MS, and others, completed Phase 2 H&H/GIS work on the Leaf River at Hattiesburg, MS and developed shapefiles/depth rasters for flood inundation map libraries at ([HATM6](#)). NWS conducted a conference call to discuss the remaining tasks that have to be completed prior to posting these libraries on the NWS' Advanced Hydrologic Prediction Services web page, in particular QAQC.
- IBWC is providing resources to correct the base data for:

<a href="#">LDOT2</a>	Rio Grande @ Laredo/Nuevo Laredo	(CRP)	
<a href="#">EPPT2</a>	Rio Grande @ Eagle Pass		(EWX)
<a href="#">DLRT2</a>	Rio Grande @ Del Rio/Ciudad Acuna	(EWX)	
<a href="#">RGDT2</a>	Rio Grande @ Rio Grande City	(BRO)	
- 

### Eastern Region's Flood Inundation Mapping Projects

- The following are locations which ER offices are working or collaborating with others to produce FIM libraries:

<a href="#">LODN4</a>	Saddle River- Lodi, NJ	(OKX)
<a href="#">DELN6</a>	West Branch Delaware River at Delhi, NY	(BGM)
- OHD HSMB is working with MARFC on setting HECRAS and CHPS. The goal is to be able to model the Susquehanna River in real-time and investigate capabilities to provide dynamic mapping.

### Central Region's Flood Inundation Mapping Projects

- CR has approved the Flood Inundation Maps developed with the USGS Indiana Science Center on the White River near Nora Indiana ([NORI3](#)) to Phase 3 posting onto Orion's test server:
- CR worked with USGS, NWSH, and University of Iowa to provide information and discuss in detail HAZUS-MH Level 2+ Flood Analyses for Iowa River at Iowa City IA ([IOWI4](#))
- Other locations which CR offices are working or collaborating with others to produce FIM libraries include:

<a href="#">OTTO1</a>	Blanchard River in the Village of Ottawa, OH	(IWX)	
<a href="#">RZLI3</a>	Iroquois River- Rennselaer, IN	(LOT)	
<a href="#">SASI3</a>	St. Marys River - Fort Wayne, IN	(IWX)	
<a href="#">SERI3</a>	White River- Seymore, IN	(IND)	
<a href="#">BEDI3</a>	East Fork White River- Riverdale, IN		(IND)
<a href="#">DLPI3</a>	Tippecanoe River- Delphi, IN	(IND)	
<a href="#">FREI3</a>	White River- Edwardsport, IN	(IND)	
<a href="#">HUFI3</a>	Wabash River- Terre Haute, IN	(IND)	
<a href="#">BAKI3</a>	East Fork White River- Columbus-White, IN		(IND)
<a href="#">FLCI3</a>	Flatrock River- Columbus-Flat Rock, IN	(IND)	
<a href="#">DREI3</a>	Driftwood River- Edinburgh, IN	(IND)	
<a href="#">STPM5</a>	Mississippi River- St Paul, MN	(IND)	
<a href="#">CIDI4</a>	Cedar River- Cedar Rapids, IA	(IND)	
<a href="#">FFTK2</a>	Kentucky River- Frankfort, KY	(LMK)	
<a href="#">MWCK1</a>	Wildcat Creek- Manhattan, KS	(TOP)	
- CR is also working on the development of FIM libraries along many parts of the Blue River.

### Western Region's Flood Inundation Mapping Projects

- The following are locations which WR offices are working or collaborating with others to produce FIM libraries:



<a href="#">TRRN2</a>	Truckee River - Reno,NV	(REV)
<a href="#">VISN2</a>	Truckee River - Sparks, NV	(REV)
<a href="#">BIGI1</a>	Boise River near Eagle Island	(BOI)

- Western Region, WFO Reno, Washoe County, and OCWWS HSD have been meeting to discuss Truckee River modeling and the geospatial mapping of the floodwaters/flood depths. The project has slowed down because the partner needs assistance in geoprocessing of the hydraulic analyses.
- WR Staff members have been coordinating with Federal, State, and local partners on the Boise River near Eagle Island ([BIGI1](#)) and the necessary deliverables to NWS for implementation onto AHPS. Currently, six flow levels have already been mapped and 7 more have been proposed. Ada County emergency management has budgetary approval from the Mayors and Commissioners to move forward and complete the map library. NWS will need to enhance AHPS Flood Inundation Mapping Interface and allow for the display of flows.

#### IV. Problems Encountered/Remaining Issues

##### FY12

There could be lack of resources to support partnered FIM activities and continued AHPS development/enhancement for FY12 and FY13.

Headquarter and regional representatives could scope and collect stakeholder requirements, however, the challenge will be finding resources to address and incorporate the latest technology with newer capabilities and improved ways to map the flood risks for the stakeholders needs. Any scoping of requirements and strategic planning will need to be very flexible and adaptable.

##### Remaining Issues from FY11

#### 4th Quarter FY11

##### General.

- The core goal team is having difficulties with setting mid-range project priorities to enhance the program due to the uncertainties of funding. A system to allow partnered funding/resources to be rolled back into the AHPS FIM program for project charges has been identified.
- HSD needs more resources to stand-up and maintain a public FIM webpage where best practices and webinars could be posted. HSD is to explore working with OCWWS Staff to address the webpages.

#### 3rd Quarter FY11

##### General

- Due to NIDS sustainment system changes, AHPS Flood Inundation Mapping code had to be revised by AHPS contractor. AHPS contractor also had to rebuild several missing libraries and data downloads. There could be missing items in the FIM downloads.

#### 2nd Quarter FY11

##### Federal Guidelines and Statement of Work Templates

- The core goals team evaluated the list of proposed Federal Guideline revisions, Dewberry suggestions, and task work order costs. From this evaluation, the team put together a prioritization schema to tackle the largest number of revisions with the given fiscal resources. As a result, 42 of the 50 high priority revisions were made to the FY2011 Federal Guideline. Of the 42 revisions, three of the revisions were addressed directly by NOAA. These include areas which NOAA has developed expertise: (1) DEM resolution, (2) medium of delivery and the associated file deliverables, and (3) bridge clipping requirements and procedures.

## **Inputs and Forcings**

## Prototyping NMQ for FFMP

**Core Goal:** Improve the quality of physical inputs and forcings

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

[**Note:** AHPS funding no longer available for this project; this may be the last report on it.]

**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 FY11-12

Task	Due Date	Status
Enable real-time ingest of NMQ products at WFO's: Obtain and review results of regional survey on communications capabilities for staging of NMQ products to WFOs for flash flood monitoring:	Q4/FY11	Completed
Based on results, enable communications between National Weather Center MRMS prototype system and regional or field offices	Q1/FY12	Completed – Q2
Coordinate with regional headquarters and MDL staff regarding instructions on enabling NMQ ingest to FFMP-A: FY12Q3	Q3/FY12	Completed – Q2

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY11

- NSSL staff contributed substantial time to preparation for NWS/OAR senior managers' review of MRMS-NMQ project on December 10, which resulted in NMQ being identified as a line office transition project.
- There is presently no AHPS funding for this project. We continue to maintain the distribution feeds and address RFC questions.

#### 2<sup>nd</sup> Quarter FY11

- Project temporarily on hold due to lack of funding.

#### 3<sup>rd</sup> Quarter FY11

- Allocation and receipt of FY11 funding was confirmed
- Real time Q2 feeds continue to RFCs
- Based on requests from several WFOs and an initiative suggested by Eastern Region Headquarters, a survey of potential methods for forwarding a subset of the NMQ precipitation products to WFOs in real time will be undertaken
- Task list above has been updated to include this initiative

#### 4<sup>th</sup> Quarter FY11

- Basic capabilities for supplying real-time NMQ precip rates to WFOs were established
- A regional survey on field needs was carried out
- Grid clipping conventions were established to insure adequate overlap coverage among all neighboring CWAs

### 1<sup>st</sup> Quarter FY12

- NSSL, ER, and MDL staff agreed that the Q2 5-minute precip rates would be cropped to fit WFO domains and would be provided in two formats. The AWIPS netCDF format is needed for those offices using AWIPS, and the GRIB2 format is needed for offices who have switched to AWIPS II.
- Laurie Hogan (ER) worked with various WFOs to create a list of lat/lon boxes for each of their watch areas and provided a spreadsheet. These bounds were later adjusted to better align with the Q2 domain (bumped out slightly).
- ER and NCEP staff determined proper GRIB2 headers for data transmitted in that format
- NSSL provided Laurie with example data for both file types in late December. The test WFOs for this were BTV, LWX, OKX, PBZ. Laurie requested that Tom Filiaggi review the AWIPS netCDF example files. The initial feedback is that the AWIPS netCDF files will work
- Some real-time transmission tests for the above sites were carried out early in Q2.

### 2<sup>nd</sup> Quarter FY12

- National Weather Center (NWS) - MRMS prototype is complete, with systems at NSSL, ER, and several WFOs in ER and CR
- Real-time transmission to several ER [and CR] WFO's is being carried out
- Initial feedback from WFO's is positive, indicating the Q2 inputs contribute to flash flood monitoring operations
- Instructions on enabling NMQ ingest to FFMP-A complete for AWIPS 1
- NSSL is establishing a server for the dissemination of the following products, in GRIB2 format, for access by all RFCs and FOs:

CREF  
 CREF\_1HR\_MAX  
 GaugeCorr\_QPE\_01H  
 GaugeCorr\_QPE\_03H  
 GaugeCorr\_QPE\_06H  
 GaugeCorr\_QPE\_12H  
 GaugeCorr\_QPE\_24H  
 GaugeCorr\_QPE\_48H  
 GaugeCorr\_QPE\_72H  
 GaugeOnly\_QPE\_01H  
 GaugeOnly\_QPE\_03H  
 GaugeOnly\_QPE\_06H  
 GaugeOnly\_QPE\_12H  
 GaugeOnly\_QPE\_24H  
 GaugeOnly\_QPE\_48H  
 GaugeOnly\_QPE\_72H  
 HSR\_PrecipRate  
 HSR\_QPE\_01H  
 HSR\_QPE\_03H  
 HSR\_QPE\_12H  
 HSR\_QPE\_24H  
 HSR\_QPE\_48H  
 HSR\_QPE\_72H  
 HybridScanRefl  
 MaxExpectedHailSize  
 Model\_0degC\_Height  
 MtnMapper\_QPE\_01H  
 MtnMapper\_QPE\_03H

MtnMapper\_QPE\_06H  
MtnMapper\_QPE\_12H  
MtnMapper\_QPE\_24H  
MtnMapper\_QPE\_48H  
MtnMapper\_QPE\_72H  
PrecipFlag  
PrecipPhase  
ProbSevereHail  
SevereHailIndex  
VIL  
VIL\_Density

- No further AHPS funding is available for the project; will likely terminate reports this quarter

### **3<sup>rd</sup> Quarter FY11**

- Completed new on-line tutorial for NMQ QPE products - nmq.ou.edu
- Completed and implemented 'wide screen' verification real time webpage for NMQ Q2, ORPG dual pole QPEs -nmq.ou.edu/QVS-AppSuite-QPEGaugeCompare.html
- Conducted webinar on NMQ and Q2 QPE products for Eastern and Central Region forecast offices.
- Completed purchase of new server to expand the creation and dissemination of Q2 QPE Grip2 formatted files for ALL FOs. Server will be put into service in Q4.

### **Problems Encountered/Issues**

#### **1<sup>st</sup> Quarter FY11**

- There is presently no AHPS funding for this project. Some work continues on a limited basis.

#### **2<sup>nd</sup> Quarter FY11**

- There is presently no AHPS funding for this project. Some work continues on a limited basis.

#### **3<sup>rd</sup> Quarter FY11**

- Funding restored; no problems presently.

#### **4<sup>th</sup> Quarter FY11**

- NSSL lead on extended leave in FY12 Q1

#### **1<sup>st</sup> Quarter FY12**

- Staff are working to reduce latency times between NSSL generating platform and the ERH hub

#### **2<sup>nd</sup> Quarter FY12**

- It appears no FY12 funding is available; reports may be terminated after this quarter.
- Instructions for using NMQ data in AWIPS II are not complete.

#### **3<sup>rd</sup> Quarter FY12**

- – None this quarter –

## Short-range radar-based quantitative precipitation forecasts

**Core Goal:** Improve the quality of physical inputs and forcings

**Management Lead:** David Kitzmiller

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

### Milestones

Task	Due Date	Status
1. Archive necessary radar, lightning, and RUC2 numerical model output	Continuous	Ongoing – started FY09 Q2
2. Develop 6-h extrapolation prediction algorithm and codes based on operational High-Resolution Precipitation Nowcaster (HPN)	FY09/Q4	Done
3. Construct dataset with collocated radar extrapolation forecasts, satellite precipitation extrapolation forecasts, RUC2 precipitation forecasts, and Stage4 verifying precipitation, for available CY2009 data	FY10/Q1	Done
4. Deliver interim report on data evaluation, including CONUS-wide statistics on RUC2 and radar forecast correlations with observed precipitation	FY10/Q2	Done – EWRI conference preprint
5. Prepare and submit OSIP documents for implementation process – Completed HOSIP Gate2 review as a research project, to be followed on by an implementation task	FY10/Q3	HOSIP Gate2 review passed in FY10/Q2
6. Assemble statistical dataset and develop regionalized probability equations based on CY2009-2010 input data	FY10/Q4	Completed
7. Prepare and journal article on initial results from CY2009-CY2011 data	FY11/Q1	HOSIP gate3 conditionally passed in December; follow-up work on HOSIP documentation completed Q2  Slipped to July 2012

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY11

- Continued data collection for CY 2010
- Developed local-regional probability and QPF equations from warm (2009-2010 data) and cool (2009-2010) season input data. Developed codes for spatial interpolation of regression equation coefficients to obtain spatially-continuous equation output on the 4-km HRAP grid
- Developed scripts for real-time operation of the forecast system

#### 2<sup>nd</sup> Quarter FY11

- Continued data collection for CY 2011
- Have capability to generate real-time forecasts from NMQ radar, Hydroestimator satellite, and RUC2 numerical model input. Running sequence on NHDR takes ~7-8 minutes, but could be accelerated by obtaining RUC2 input earlier than radar and satellite
- Found some artifacts in the real-time output, unrealistic spatial patterns in some of the probability fields. We determined a new approach to spatially interpolating the regression

coefficients which will be tested in Q3.

### **3<sup>rd</sup> Quarter FY11**

- Began regular examination of real-time forecast products. These showed some unrealistic results among the probability products, which are being corrected in Q4
- Introductory and methodology explanation sections of a journal article manuscript have been drafted
- Acceptance of a presentation at upcoming AMS radar conference (September)

### **4<sup>th</sup> Quarter FY11**

- Collected and analyzed 3 months of warm-season forecasts from 2011, which data were not included in the original 2009-2010 development sample. Confirmed earlier results that extrapolative-statistical forecasts clearly improve on basic RUC input in terms of correlation and RMS error. HPC manual forecasts yield some better correlation statistics, but are skewed toward unrealistically low values at the 4-km grid mesh scale, a problem largely corrected in the extrapolative-statistical system.
- Prepared 13-page extended abstract (preprint) for 35<sup>th</sup> AMS radar conference, September
- Poster presentation on the work by Dennis Miller at AMS radar conference.
- Journal paper being drafted

### **1<sup>st</sup> Quarter FY12**

- Conditional pass of HOSIP Gate3 in December
- Gave general seminar on results in December
- Got OHD management review of journal manuscript
- Initial planning to test real-time output in MARFC prototype flash flood prediction system using a version of the Distributed Hydrologic Model – Threshold Frequency approach – if accepted, to be started in CY 2012

### **2<sup>nd</sup> Quarter FY12**

- Completed corrections to science technical document following HOSIP review
- Continue to archive NMQ (radar) and RUC inputs to expand statistical database for future re-derivation of probability and amount equations
- Delays in correcting the journal manuscript due to other task priorities – plan to complete in May 2012
- Run the forecast model in real time during events of interest
- MARFC prototype flash flood prediction system testing/development is on indefinite hold due to budget issues
- Had initial discussions with NSSL staff, leading to a tentative plan to implement the forecast package within the MultiRadar-Multisensor (MRMS) system that supplies the radar input

### **3<sup>rd</sup> Quarter FY12**

- Had to modify scripts and codes in real-time prototype package to accommodate change of RUC model to new Rapid Refresh model in May.
- Initial work with NSSL staff to port the QPF package into MRMS
- Worked on journal article - delivery of final journal article delayed to incorporate suggestions from coauthors

## **Problems Encountered/Issues**

### **1<sup>st</sup> Quarter FY11**

- Delivery of final development report slipped to Q2

### **2<sup>nd</sup> Quarter FY11**

- Delivery of final development report further slipped to Q3 – some problems appeared in the output when tested on real-time data

**3<sup>rd</sup> Quarter FY11**

- Imminent departure of a contract support staffer necessitated delays in finalizing the products, in order to concentrate on code and data documentation

**4<sup>th</sup> Quarter FY11**

- Some residual delay in completing documentation for the project

**1<sup>st</sup> Quarter FY12**

- None

**2<sup>nd</sup> Quarter FY12**

- Delivery final journal article delayed (see above)
- MARFC prototype flash flood prediction system testing/development is on indefinite hold due to budget issues

**3<sup>rd</sup> Quarter FY12**

- Delivery of final journal article delayed to incorporate suggestions from coauthors



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

**Core Goal:** Improve the quality of physical inputs and forcings

**Management Lead:** David Kitzmiller

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

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

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

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

### Proposed Milestones:

Task	Due Date	Status
8. Archive forcings data from CAT sites (ABRFC, NERFC, CNRFC, NWRFC)	Continuous	Ongoing – started FY09 Q4
9. Initiate real-time archive development from all remaining RFCs	Initiate FY10/Q2	Ongoing at most sites – FY10 Q2
10. Document statistical differences between point-based and gridded forcings from MPE, Mountain Mapper/Daily QC, GFE, and report on findings.	FY10/Q3	Results reported from all CAT RFCs
11. Execute parallel streamflow simulations driven by point-based and grid-based basin average precipitation, temperature; report on magnitude of differences in simulations and differences in quality relative to gauge observations	FY10/Q3	Results reported from ABRFC, CNRFC, NERFC
12. Coordinate with RFC staff to locate historical point or gridded inputs (precipitation, temperature, cloud cover, winds, relative humidity) used to construct hydrologic calibration datasets – needed for either development of new datasets or verification of calibration datasets from an outside source such as AOR.	FY11/Q4	Revised later when OHD management requested time to review this plan

<p><b>13. Report on potential and preferred methods of deriving gridded calibration datasets</b> (other than precipitation and PET) of at least 50 year duration – possibly a re-analysis of historical data, or an external source such as the Analysis of Record (AOR) now under development, possibly other methods of reanalysis. Calibration datasets will be ~4-km mesh length, 1-h time series.</p>	<p>FY11/Q4</p>	<p>RTi scheduled report delivery FY12/Q2 Complete</p>
<p><b>14. Report on potential and preferred methods of deriving gridded precipitation calibration dataset</b>, 50-year duration, including reanalysis with archive of RFC raingauge and radar data; available satellite products, and disaggregation of climatic datasets with daily-to-monthly total precipitation</p>	<p>FY11/Q4</p>	<p>RTi scheduled report delivery FY12/Q2 Complete</p>
<p><b>15. Report on potential and methods of deriving gridded potential evapotranspiration (PET) calibration dataset</b>, focusing on geostationary satellite estimates of cloud cover and/or surface radiation balance, and reanalysis estimates of radiation balance, wind, temperature, and humidity.</p>	<p>FY11/Q4</p>	<p>Now includes tasks from original CHPS PET task from FY09</p>
<p><b>16. (Tentative as of FY11 Q1): report on potential impact of PET forcings in calibration, to assess any impact of use of real-time estimates vs. application of local climatic values on hydrologic simulations</b></p>	<p>FY12/Q1</p>	
<p><b>17. Evaluate methods of improving MPE/DQC disaggregation of multi-hour precip accumulations to 1-h</b>, including spatial interpolation of 1-h radar QPE when necessary, use of reanalysis precipitation forecasts</p>	<p>FY12/Q1</p>	<p>Done – see Q3 FY12 item below</p>
<p><b>18. Re-analysis for precipitation from point (gauge) observations:</b> develop offline capability for gridded record of precipitation for ≥ 10 years. Report on methods for further disaggregating to hourly time series.</p>	<p>FY12/Q2</p>	<p>Done – see Q3 FY12 item below</p>
<p><b>19. Re-analysis for precipitation from radar/remote sensor observations:</b> Determine if CPC and/or NCDC efforts to produce long-term high-resolution gridded precipitation are moving forward. Depending on schedules, either prepare to utilize one of these sources or re-analyze existing StageIII/StageIV grids using external high-reliability sources such as PRISM monthly totals.</p>	<p>FY12/Q2 Now FY12/Q4</p>	<p>In progress as of June</p>
<p><b>20. Reanalysis for sky cover and remote-sensor PET:</b> Determine availability/reliability of RTMA or research sky cover datasets; create PET grids from these data and temperature, wind and relative humidity information from NARR</p>	<p>Deferred for work on other elements</p>	

## Accomplishments/Actions

### 1<sup>st</sup> Quarter FY11

- Presented a poster at CLIVAR program conference on reanalysis and user needs for reanalyses, Baltimore, in November 2010. Presentation entitled “Requirements for Long-term Retrospective Analyses of Hydrometeorological Data to Support Hydrologic Operations and Development” by Kitzmiller, Wu, Zhang, and Adams
- Obtained some valuable information about the availability, limitations, and potential uses of various reanalyses in our effort, particularly for higher latitudes and North America as a whole
- Gathered a basic outline plan for creating calibration datasets from quality-controlled point precip and temperature input, radar QPE and reflectivity input, and existing reanalysis datasets – presented the outline to HICs (January)
- Drafted HOSIP Statement of Need and project plan
- In early January, received some new direction involving real-time gridded data forcings needed at National Water Center, from OHD management
- Got commitment of initial contract support starting in January

### 2<sup>nd</sup> Quarter FY11

- Assembled a summary report on the CAT RFC forcings studies – sent out for comment with final version to be ready in May
- Worked on adapting existing temperature (MAT) calibration preprocessor code to producing point 1-h temperature values for application in distributed modeling and possibly lumped modeling.
- Drafted a development plan for historic gridded forcings datasets applicable to both the CHPS project and subsequent IWRSS applications such as USGS water census – sent to OHD management for comment in early March
- Began meeting with gridded forcings team for IWRSS/Water Center (Schneider, Kitzmiller, Fall) to plan initial steps for demonstrating a new centralized capability for very high resolution (500-m grid mesh, hourly) meteorological datasets
- Now working on coordinating the QPE part of these efforts with ESRL/PSD (Rob Cifelli) who has produced a general QPE improvement plan involving in situ and remote sensor inputs

### 3<sup>rd</sup> Quarter FY11

- Staff of the IWRSS forcings team (Schneider, Fall, Kitzmiller) met at NOHRSC in April to plan for forcings part of National Water Center IOC. This has implications for supplying data for a historical water census, hydrologic model calibration, and real-time operations
- A HOSIP plan for the calibration analysis of record, including precipitation, temperature, solar radiation, is under revision. The plan includes a tie-in to real-time operations
- Work is ongoing to modify an existing OHD preprocessor for Mean Areal Temperature estimates to generate time series and grids of 1-h temperature. The logic is designed to match that of the Mountain Mapper/DailyQC application presently in operational use for 6-h temperature grids.
- Work is ongoing to develop and demonstrate a method of objectively identifying zones of adequate and poor radar coverage based on multi-year precipitation climatology, and for long-term bias correction of radar-only StagII precipitation. This approach has applications to both historical and real-time analysis of radar precipitation estimates.
- An effort to create a multidecade record of 1-km, 1-h interval temperature and precipitation grids for a portion of the NWRFC area has been started; this complements a demonstration project for distributed hydrologic modeling of fast-reacting basins in the area
- Initial discussion of statement of work with RTi staff; they will work on literature survey for the calibration effort and provide recommendations on preferred methods of developing gridded analyses of meteorological data for calibration. Work on their literature survey began Q4

### 4<sup>th</sup> Quarter FY11

- RTi staff initiated work on their data source and methodology report. One face-to-face meeting held in July; routine teleconferences continue
- Staff of the IWRSS forcings team (Schneider, Fall, Kitzmiller), the OHD calibration AOR team

(Wu, Z. Zhang), and RTi staff continue to meet to review potential data sources, synthesis methods, and downscaling methods

- A summary report on the results of the items above, produced by the IWRSS team, is near completion
- Work continues to develop and demonstrate a method of objectively identifying zones of adequate and poor radar coverage based on multi-year precipitation climatology, and for long-term bias correction of radar-only StageII precipitation. A remapping and merging of 1990's StageIII estimates from multiple RFCs was completed, for use in quality control
- An adaptation to enable the current MAT preprocessor to produce high-resolution grids of hourly temperature has been completed
- Work is ongoing to ingest hourly temperature as well as daily max/min values in the MAT preprocessor, and to locally adjust hourly estimates that were originally based on an assumed diurnal cycle, using the hourly temperatures.

### **1<sup>st</sup> Quarter FY12**

- IWRSS forcings team (Schneider, Fall, Kitzmiller) completed a report on possibilities for generating high-resolution grids of real-time hydrometeorological forcings, with implications for retrospective forcings (November)
- RTi staff continued work on their report on data sources and reanalysis methods for precipitation and temperature
- For the RTi report, RTi and OHD staff conducted phone interviews with staff at two RFCs, NCEP-CPC, and NESDIS-CIRA
- Filed a draft project plan late in the quarter – HOSIP gate2 time yet TBD
- Necessary background work on determining areas of effective radar coverage continues
- Background work on methods of merging information from sites reporting only daily max/min and sites reporting hourly temperatures continues

### **2<sup>nd</sup> Quarter FY12**

- Riverside Technology (RTI) staff delivered two drafts of their report on potential inputs, analysis, and assessment methods for temperature and precipitation calibration analyses of record (AORs). OHD, HSD, and field staff are now reviewing and providing comments. RTI has reserved some time to make final revisions.
- Have made some revisions to the draft calibration AOR project plan, based on feedback on the RTI report thus far.
- The temperature (MAT) calibration preprocessor has been revised to generate point 1-h temperature values from daily maximum/minimum values. After some experimentation, a curve fit between a prescribed daily maximum and minimum time, based on cosine functions, will be used. Little or no benefit was obtained by trying to apply available hourly observations to the curve fit.
- Derived 10-year (2002-2011) daily precipitation amount and occurrence climatologies, on the national 4-km HRAP grid, based on StageIV (gauge-radar), StageII (radar-only), and Climate Prediction Center (gauge-only) analyses. Radar coverage artifacts are clearly apparent. A method for objectively specifying zones of radar coverage and gauge/radar bias corrections is being tested.
- Work is ongoing for an offline Multisensor Precipitation Estimator (MPE), functionally equivalent to the AWIPS MPE, that will be used to merge gauge-radar-satellite precipitation inputs. It's being tested on data in the San Francisco/Sacramento region.
- Group participated in a multi-office 1-day workshop on needs for real-time and retrospective precipitation analyses (Feb 8). Reviewed resulting recommendations.

### **3<sup>rd</sup> Quarter FY12**

- RTI staff delivered final report on inputs and methods for forming calibration AOR for temperature and precipitation
- Based on this report and other research, we've outlined a plan to use reanalysis, remote sensor (radar, satellite), and gridded climatic inputs to form a multidecade background hourly record of temperature and precipitation – to be augmented in a final step with point surface observations to be selected by end users at RFCs and within USGS (see items 10, 11 above)

- Plan presented to RFC staff at DOH Virtual Workshop in June, and to USGS partners later in July. There's general concurrence with the plan.
- Targeting Sep 2012 for delivery of initial reanalysis/remote-sensor grids.
- An MAT preprocessor option to generate high-resolution hourly temperature grids from time series is being added to the software – documentation forthcoming in 4<sup>th</sup> quarter

## **Problems Encountered/Issues**

### **1<sup>st</sup> Quarter FY11**

- Work still limited by lack of a full-time contractor for support

### **2<sup>nd</sup> Quarter FY11**

- Partial resolution of contractor support issue – Ziya Zhang started on the project in January. We began an effort to identify tasks for performance by another, offsite contractor.

### **3<sup>rd</sup> Quarter FY11**

- Contract staffing issues are resolved; onsite UCAR staff and offsite Riverside Technology Inc. staff are now at work on the project

### **4<sup>th</sup> Quarter FY11**

- Due to shifting scope of the work, HOSIP gate2 dates for the original calibration AOR effort continue to be delayed. Gate2 will be set soon after completion of the IWRSS forcing report, likely in FY12/Q1

### **1<sup>st</sup> Quarter FY12**

- Due to shifting scope of the work, HOSIP gate2 dates for the original calibration AOR effort continue to be delayed. Gate2 will be set after review of the IWRSS team and RTi calibration reports, likely in FY12/Q3

### **2<sup>nd</sup> Quarter FY12**

- Due to shifting scope of the work, HOSIP gate2 dates for the original calibration AOR effort continue to be delayed. Gate2 will be set after review of the IWRSS team and RTi calibration reports, likely in FY12/Q3

### **3<sup>rd</sup> Quarter FY12**

- Some time lost due to confusion over status of the one non-FTE employee on the project – the individual was eventually retained on the project
- HOSIP gate2 continues to be delayed while we get buy-in from RFC and USGS partners – current plan appears acceptable based on feedback from RFC staff at DOH virtual workshop, and through meetings with USGS staff

# **Flash Flood Services**

## Distributed Hydrologic Model with Threshold Frequencies (DHM-TF)

[Note: Reporting on project “**Distributed Modeling Spatial Display and Analysis Tool**” was merged into this project as of FY11 Q1]

**Core Goal:** Improve forecasts of fast response hydrologic events and improve relevant distributed hydrologic model spatial display and analysis tools (DHM-SDAT)

**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 Baltimore/Washington, Binghamton, and Pittsburgh WFOs to evaluate real-time and retrospective DHM-TF simulations. Create and modify DHM output visualization tools guided by input from OHD and field offices.

### Milestones

Task	Due Date	Status
1. Implement Snow17 within BGM WFO DHM-TF operations	FY12 Q3	Ongoing
2. Implement DHM-TF at Baltimore/Washington WFO	FY10 Q3	Complete
3. Create and/or modify data visualization tools as needed	FY12 Q3	Ongoing
4. Recommend high level requirements for operational development	FY12 Q3	Ongoing
5. Publish results	FY12 Q3	Ongoing

### Accomplishments/Actions

#### 1st Quarter FY11

- With Ed Clark, met with staff at LWX (Baltimore/Washington WFO) to plan DHM-TF deployment at their WFO.
- Delivered DHM-TF presentation at NOAA/CREST institute in New York City
- Worked with NERFC and BGM WFO staff to enable transfer of MPE precipitation data from the RFC to the WFO. Efforts are still ongoing.
- Created DHM-TF presentation for use by Mike Schaffner at BGM WFO
- Worked with EMC to create 30 years dataset of 2m temperature for use in Snow17 simulations at BGM WFO. Processing work is ongoing, as is work on obtaining real-time 2m temperature data

#### 2nd Quarter FY11

- Continued to work with staff at WFO LWX to install DHM-TF
- Worked with EMC to debug code used to re-project and interpolate RTMA data for use with DHM-TF
- Continued to work with staff at WFO BGM to resolve problems related to transmission of MPE data to the WFO from the surrounding RFCs.
- Finished processing EMC 30-year temperature data set which will be used to support Snow17 simulations
- Began calibration of DHM-TF for WFO BGM and installation of Snow17 at WFO BGM

#### 3rd Quarter FY11

- Finished initial installation of DHM-TF at WFO LWX
- Continued to work with staff at WFO BGM and WFO LWX to resolve problems related to transmission of MPE data to the WFO from the surrounding RFCs
- Ran several DHM-TF test cases over the BGM domain using the version of DHM-TF which

- includes Snow17 (and which ingests temperature data)
- Presented BGM case studies at BGM hydrology workshop
- Gathered test case validation information from WFOs BGM and LWX
- Presented DHM-TF overview to FFG conference call participants
- Finished auto-calibrating BGM basins. Will install calibrated version of DHM-TF at BGM when BGM is able to receive feed of temperature data

#### **4th Quarter FY11**

- Presented DHM-TF overview to OCWWS staff
- In conjunction with WFO LWX staff, began evaluation of real-time DHM-TF runs at LWX
- Continued to work with staff at WFO BGM resolve problems related to transmission of MPE data to the WFO from the surrounding RFCs, and to resolve problems in obtaining RTMA data
- Ran several DHM-TF test cases over the BGM domain on OHD servers using the version of DHM-TF which includes Snow17 (and which ingests temperature data)
- Gathered test case validation information for events over WFOs BGM, LWX, and PBZ
- Continued to work on DHM-TF evaluation report
- In support of NWS flood assessment effort, began analysis of Irene/Lee test cases

#### **1st Quarter FY12**

- Completed evaluation of DHM-TF for several test cases over PBZ, BGM, and LWX domains, and completed draft of DHM-TF evaluation report.
- Continued to work with staff at WFO BGM resolve problems related to transmission of MPE data to the WFO from the surrounding RFCs, and to resolve problems in obtaining RTMA data
- Began discussions with APRFC and Hawaii WFO centering on use of DHM-TF at WFO Hawaii.

#### **2nd Quarter FY12**

- Completed DHM-TF evaluation report and distributed to RFC, WFO, and HQ audience
- Provided assistance to APRFC and Hawaii WFO centering on use of DHM-TF at WFO Hawaii.
- Provided assistance to LMRFC centering on use of DHM-TF at WFO Lake Charles.
- Modified xmrktokml visualization program to allow for increased number of contour levels, plotting options, and color schemes

#### **3rd Quarter FY12**

- Worked on deriving a seamless CONUS connectivity file and associated routing parameters which will support large-domain DHM-TF simulations.
- Continued to provide assistance to APRFC and Hawaii WFO centering on use of DHM-TF at WFO Hawaii.
- Continued to provide assistance to LMRFC centering on use of DHM-TF at WFO Lake Charles.
- Created automated set of software to download and visualize NOHRSC CONUS SAC-HTET/Snow17 simulations

### **Problems Encountered/Issues**

#### **1st Quarter FY11**

- Problems continue to be experienced with the transfer of MPE data from NERFC to BGM. In addition, the production of real-time and retrospective 2m temperature data (needed for Snow17 simulations at BGM) has proven to be extremely time consuming and challenging.

#### **2<sup>nd</sup> Quarter FY11**

- Severe disk instability problems at OHD continued to hamper DHM-TF baseline and calibration runs at OHD. This prevented the implementation of a calibrated version of DHM-TF at WFO BGM and has greatly delayed the installation of DHM-TF at WFO BGM.
- A bug in the NCEP code used to interpolate and re-project the RTMA data for use with Snow17 has delayed the activation of Snow17 (in support of DHM-TF) at WFO BGM
- Problems in the transmission of MPE data from MARFC/NERFC to WFO BGM continued to



- delay operations of DHM-TF at the WFO
- The need to enlarge the MPE domain covering WFO LWX delayed the installation of DHM-TF at the WFO

### **3<sup>rd</sup> Quarter FY11**

- Severe disk instability problems at OHD are now fixed, although they continued to hamper DHM-TF baseline and calibration runs at OHD through the beginning of this quarter.
- It has proven to be extremely difficult to establish transfers of MPE data from the RFCs to the WFOs
- It has also proven to be very difficult (due to network capacity issues) to establish a stream of RTMA 2m temperature data that is necessary (at BGM) to run the Snow17-enabled version of DHM-TF.

### **4<sup>th</sup> Quarter FY11**

- It continues to be difficult to establish transfers of MPE data from the RFCs to the WFOs
- It continues to be very difficult (due to network capacity issues) to establish a stream of RTMA 2m temperature data that is necessary (at BGM) to run the Snow17-enabled version of DHM-TF. As a solution, processing may occur at OHD, with the RTMA data then transferred to the WFO.

### **1st Quarter FY12**

- None

### **2nd Quarter FY12**

- None

### **3rd Quarter FY12**

- None

## Evaluate Gridded Flash Flood Guidance (GFFG) Approaches

**Core Goal:** Improve forecasts of fast response hydrologic events

**Management Lead:** Michael Smith (Project Lead: J.J. Gourley)

**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
6. Finalize and check TF-GFFG codes	FY10 Q3	Complete for 1 hr GFFG
7. Complete initial assessment of impervious surface area data for small basins	FY10 Q3	This should be re-scoped as a separate project.
8. Continue assessment of flash flood events and utility of SHAVE data	FY10 Q4	Complete
9. Assemble flash flood guidance values from 2006-present for all RFCs	FY11 Q2	Complete
10. Create CONUS-wide flash flood database using USGS streamflow observations	FY12 Q2	Complete
11. Produce DHM-TF values for RFCs with sufficient StageIV archive	FY12 Q3	Ongoing
12. Establish benchmark skill of operational FFG and GFFG methods over CONUS	FY12 Q4	Complete
13. Compare DHM-TF skill to operational FFG and GFFG skill	FY13 Q1	Pending funding
14. Evaluate FFG, GFFG and DHM-TF for flash flooding cases, with a focus on the predictability of specific impacts	FY13 Q2	Pending funding
15. Prototype products focused specifically on flash flooding impacts	FY13 Q3	Pending funding

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY11

- Completed quality control of 2010 SHAVE flash flood observations and made all data available from 2008-2010 in comma-delimited files and shapefile format here: [http://ftp.nssl.noaa.gov/users/gourley/ffg/ff\\_conus\\_databases/shave/](http://ftp.nssl.noaa.gov/users/gourley/ffg/ff_conus_databases/shave/)
- Requested and obtained 10-yr archive of StageIV hourly rainfall estimates over the CONUS
- Requested and obtained archive of operational, hourly FFG values from 9/2006 to 09/2010. These CONUS mosaics contain whichever version of FFG or GFFG was running operationally at each RFC.

#### 2<sup>nd</sup> Quarter FY11

- Identified ABRFC as having unbiased, complete StageIV rainfall archive from 1996-present.
- Produced simulated flow frequencies over ABRFC for period of record, and then compared skill of exceeding 2-yr return period from DHM-TF to FFG and GFFG using flash flood observations.
- Presented results from FFG, GFFG, and DHM-TF methods to forecasters at ABRFC and at Weather Radar and Hydrology Symposium in Exeter, UK.
- Ed Clark put us in contact with USGS personnel and we now have a strategy in place for obtaining instantaneous data archive for all stations in US.
- Assisted in an HPCC proposal to potentially demonstrate and evaluate DHM-TF method in

NWS Western Region.

### **3<sup>rd</sup> Quarter FY11**

- Purchased 2 Tb hard drives and sent it to USGS contact in Illinois.
- Received entire archive of USGS 15-min discharge over the US.
- Downloaded all NWS Stormdat reports of flash flooding and river flooding from 2006-2010.
- Article describing the past, present, and future skill of flash flood prediction tools in the US has been accepted for publication in IAHS redbook series. Invitation for developing article into a full-length manuscript has been granted.
- Developed procedure to convert text file containing recorded flood polygons and points to GIS shapefile format. Quality controlled SHAVE reports from 2008-2010 and NWS point and polygon shapefiles from 2006-2010 have been put on an ftp site for community use.

### **4<sup>th</sup> Quarter FY11**

- An attribute table has been included with all SHAVE reports in GIS format that gives the specific impact of the flash flooding. The impact was determined from survey comments along with the assistance of GIS layers of land cover and population density.
- Installed MySQL database on local server to host USGS discharge database.
- Proposal written to *Bull. Amer. Meteor. Soc.* to describe US flash flood database, comprised of SHAVE, NWS StormDat, and USGS discharge observations, has been accepted.
- Pseudo-code has been written to objectively evaluate FFG and GFFG using flash flood observation database.

### **1<sup>st</sup> Quarter FY12**

- Initial code has been written to objectively evaluate CONUS-wide FFG and GFFG using flash flood observation database.
- PI Gourley supervised the research of a visiting graduate student from the Universite Joseph Fourier, Grenoble, France. The graduate student completed his project on including specific impact classes to the SHAVE and NWS Storm Data observation datasets. He then used these reports to assess the spatial behavior of flash flood impacts during events.
- Server to host a variant of the DHM-TF method, forced with real-time Q2 observed rainfall, has been purchased and configured.

### **2<sup>nd</sup> Quarter FY12**

- Flash flood database comprised of observations from NWS StormDat, SHAVE, and USGS has been completed.
- Variant of DHM-TF method is now running in real-time over the ABRFC region with rainfall forcing from the Q2 rainfall at 1-km/5-min resolution.
- Graduate student from Universite Joseph Fourier (Martin Calliano) has presented the impact classification of SHAVE reports at the European Geophysical Union's session on flash flooding.

### **3<sup>rd</sup> Quarter FY12**

- Description of flash flood database comprised of observations from NWS StormDat, SHAVE, and USGS has been submitted to BAMS.
- Description of impact classification of SHAVE and NWS StormDat data has been submitted to Journal of Hydrology.
- Evaluation of CONUS-wide FFG, FFPI, and GFFG has been completed.

## **Problems Encountered/Issues**

### **1<sup>st</sup> Quarter FY11**

- We will need to get some documentation about which versions of FFG or GFFG were running in real time for each RFC. This must be known because our CONUS FFG dataset is comprised of each RFC's FFG or GFFG values, all stitched together.
- Similarly, before attempting to derive DHM-TF values using StageIV data, we will need to get

some information about the details of the rainfall algorithms that were running in real-time at each RFC to yield the mosaicked rainfall fields.

#### **2<sup>nd</sup> Quarter FY11**

- Details about FFG, GFFG, and StageIV generation are still lacking. We discovered with some RFCs that the hourly StageIV products do not sum to the daily rainfall product. It is likely additional/different procedures go into the daily products.
- The USGS streamflow data archive will need to be obtained by purchasing a 2 Tb hard drive and shipping to USGS. They are presently processing all stations in 2010 and will be finished in June. At this time, we will send them the hard drive and obtain the archive.

#### **3<sup>rd</sup> Quarter FY11**

- Details about FFG, GFFG, and StageIV generation are still lacking. Need to coordinate details with RFCs. Perhaps a survey or questionnaire will need to be developed and disseminated.
- In tests over the ABRFC, for which we have a StageIV rainfall archive going back to 1996, we discovered the HL-RDHM simulated flows and derived threshold frequencies are sensitive to the 4-km/hourly scale of the forcing data (and model resolution). Thus, when we shift our forcing data and model to utilize the 5-min/1-km Q2 data, the frequencies will need to be adjusted to account for the resolution differences.

#### **4<sup>th</sup> Quarter FY11**

- There were some IT-related delays to upgrade operating system to support latest version of MySQL, set up user accounts, and activate the software. MySQL must be used in order to access the USGS streamflow data archive.
- Development of code to evaluate FFG, GFFG, and DHM-TF using NWS StormDat and USGS observations is more complex than original project scope. This effort will need to carry over into next FY tasks.
- Decisions need to be finalized regarding the specifics of the DHM-TF method to be considered. Sensitivity studies have been performed for a USGS dataset in the ABRFC and have indicated sensitivity to model resolution.

#### **1<sup>st</sup> Quarter FY12**

- There are still some IT-related delays in accessing the USGS database of streamflow over the US. Some of the data can now be read, and we have dedicated an entire computer to this ongoing task.

#### **2<sup>nd</sup> Quarter FY12**

- Uncertainties in graduate student funding means we may have to move Mr. Clark to another project once his thesis project on CONUS-wide evaluation of operational flash flood guidance approaches is completed (most likely by the end of summer).

#### **3<sup>rd</sup> Quarter FY12**

- There is no funding to support Mr. Clark's research on the CONUS-wide evaluation of operational flash flood guidance. Thus, it is unlikely additional reporting on this project will be made, once Mr. Clark is moved to another project.

## Improve Guidance for DamBreak Forecasting

**Core Goal:** Improve forecasts of fast response hydrologic events

**Management Lead:** Seann Reed/Hassan Mashriqui

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

### Milestones\*

\* FY10 milestones in this project were substantially delayed. See “Problems Encountered” for explanation. Revised due dates are provided below.

Task	Due Date (original)	Status
1. Coordinate with Army Corps of Engineers to get updates on the NID database and identify how these updates are used at RFCs and WFOs.	FY09 Q4	Complete
2. Write guidance document for existing procedures (first draft)	FY11 Q2 (FY10 Q3)	Complete.
3. Deliver prototype GIS-based SMPDBK tool (GeoSMPDBK)	FY11 Q2 (FY10 Q3)	Complete
4. Add ability to quickly map SMPDBK results to ArcGIS Toolkit	----	FEMA contractor is using our code and will develop a new tool that has this capability.
5. Revisit Rules of Thumb and include findings in final report	FY11 Q2 (FY10 Q4)	Complete
6. Examine deficiencies in DamCrest data; recommend short-term workarounds and medium term functional requirements for software enhancements	FY11 Q3 (FY10 Q4)	Complete
7. Peer review of guidance and GeoSMPDBK.	FY11 Q3 (FY10 Q3)	Complete.
8. Revisions to guidance document and GeoSMPDBK	FY11 Q3 (FY10 Q4)	Complete
9. HOSIP Gate 3	FY11 Q4 (FY10 Q4)	Complete
10. Conference presentation (ASDSO)	FY11 Q4	Complete
11. Evaluate Dewberry/URS enhanced version of GeoSMPDK	FY12 Q2	In progress

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY11

- Building on scripts developed by Fekadu and Seann, James developed a much improved tool to rapidly develop a SMPBK model within ArcGIS.
- With assistance from James, Seann used the tool to compare results from GIS derived cross-sections with DamCrest default cross section assumptions for historical dam failures. Initial analysis suggests the approach has benefits. The approach is much more viable than full HEC-RAS modeling in an emergency. This is critical information to provide guidance on appropriate assumptions and whether further development of the tool would improve RFC response in the event of a flood.

## **2<sup>nd</sup> Quarter FY11**

- James delivered and supported testing of GeoSMPDBK beta to three RFCs. He made substantial improvements based on feedback received.
- James wrote documentation for GeoSMPDBK.
- Seann completed analysis of seven historical failures and identified the need for an enhancement to GeoSMPDBK to allow easier estimation of storage areas.
- Seann and James worked on “Recommended Procedures for Providing Quantitative Forecast Information for Dam Break Floods”.
- Seann and James prepared and submitted an abstract for ASDSO.

## **3<sup>rd</sup> Quarter FY11**

- James enhanced GeoSMPDBK to include a mechanism to easily account for inactive storage.
- James worked on an improvement to the aesthetics of the symmetric cross-section shapes derived from the DEM.
- Seann and James delivered a Webinar.
- Seann and James provided GeoSMPDBK default data DVDs to RFCs.
- Seann revisited validation analysis using elevation high water marks.
- Seann and James prepared a paper for ASDSO.

## **4<sup>th</sup> Quarter FY11**

- Attended ASDSO Dam Safety Conference and presented poster.
- Supported GeoSMPDBK Users.
- Finalized all project documents for HOSIP Gate 3.
- Passed HOSIP Gate 3.

## **1<sup>st</sup> Quarter FY12**

- Continued support to RFC SMPDBK users.
- Provided initial feedback on a preview of URS/Dewberry enhanced GeoSMPDBK tool (Jan. 20, 2012). Expect to get a chance to beta test later in FY12 Q2.

## **2<sup>nd</sup> Quarter FY12**

- Provided additional feedback to Dewberry. Still planning to test their software when the beta version becomes available. Will likely occur in Q3.

## **3<sup>rd</sup> Quarter FY12**

- Provided feedback on first beta version of Dewberry software. We are expecting a second beta version. Seann is willing to test at MARFC and provide feedback.

## **Problems Encountered/Issues**

### **1<sup>st</sup> Quarter FY11**

- Original milestones are delayed primarily due to personnel changes and unanticipated complications (e.g. discovering there has been no quantitative assessment of DamCrest default cross-sections assumptions and there is very limited documentation on NWS Rules of Thumb). Also, other activities with more critical deadlines have taken precedence (e.g. support for HEC-RAS transitions).

### **2<sup>nd</sup> Quarter FY11**

- Finishing first version of “Recommended Procedures Document” is delayed approximately one month due to unexpected higher priority tasks – Seann’s involvement in extra help to NCRFC on CHPS transition tasks and addressing computer resource problems (e.g. GIS server confiscation by N-CIRT and purchasing a replacement machine).

### **3<sup>rd</sup> Quarter FY11**

- None

**4<sup>th</sup> Quarter FY11**

- None

**1<sup>st</sup> Quarter FY12**

- None

**2<sup>nd</sup> Quarter FY12**

- None

**3<sup>rd</sup> Quarter FY12**

- None

## FFMP Small Basin Support

**Core Goal:** Improve forecasts of fast response hydrologic events

**Management Lead:** Ami Arthur, NSSL

**Objective:** To provide training and assistance to all WFOs for customization of the FFMPA small-basin shapefile datasets, to coordinate and facilitate the sharing of customized files to prevent duplication of effort among WFOs, and to establish a repository for base and derived datasets and other information relevant to Gridded Flash Flood Guidance.

### Milestones

Task	Due Date	Status
6. FFMPA Dataset Tier II/ III Customization Webinars	Jan 2010	Completed
7. Develop a repository for base and derived datasets and other information relevant to Gridded Flash Flood Guidance (GFFG).	Sept. 30, 2010	Completed
8. Host, maintain, and update the National FFMP Basin Repository and the FFMP Basin Customization Repository, and continue to provide instructions, training, and technical assistance to FFMP dataset users.	Sept. 30, 2011	Ongoing

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY11

- During this quarter, the SSURGO shapefiles with extracted Hydrologic Soil Group parameters were updated to include components and percentages as requested in Q4 FY10 by the RFCs. This update is near completion, and the shapefiles will soon be uploaded to the Hydrologic and GFFG Repository.
- Provided technical assistance to some of the first users of the Hydrologic and GFFG Repository.

#### 2<sup>nd</sup> Quarter FY11

- The SSURGO update that began during the last quarter has been completed and is now available on the GFFG Repository.
- Additional data updates for the GFFG Repository are underway in numerous areas where the National Elevation Dataset has been updated in recent months.
- The previous CONUS land use/cover dataset is being replaced with the newly released NLCD 2006. This is the “latest and greatest” version of the high-resolution seamless land use/cover data. This task will be completed during the next quarter.

#### 3<sup>rd</sup> Quarter FY11

- Completed the new NLCD 2006 dataset processing. In addition to the land use/cover data, an additional layer with “percent impervious” values has been included. These files are now being transferred to the GFFG Repository.
- Continued to provide customization assistance to FFMPA dataset users.
- Continued to provide test datasets to the AWIPS II FFMPA programmers and assist with related issues.

#### 4<sup>th</sup> Quarter FY11



- The GFFG Repository and dataset updates have been completed.
- Customization assistance continues to be provided to FFMPA dataset users, including assistance via phone calls, e-mails, and direct assistance by ftp exchange of datasets.
- We are still working with the AWIPS II FFMPA programmers and assisting with related dataset issues. Currently, there is an issue with the topology of the basin shapefiles for which we are trying to find a solution.

#### **1<sup>st</sup> Quarter FY12**

- A possible solution to the AWIPS-II shapefile topology issue has been found. A script has been developed for ArcGIS that will eliminate the “dangling” polygons that appear to be causing the problem. Using the script, these areas are separated from their main basin polygon and then merged with a different adjacent basin polygon so that they are no longer “dangling”. Most of the dangling polygons are very small in area (generally less than 0.01 km<sup>2</sup>), so the effect of merging them with a different adjacent basin polygon is insignificant in most cases.

We are awaiting the response from the AWIPS-II FFMPA team regarding whether or not this is indeed the solution to the issue.

- We continue to receive and respond to various FFMPA dataset user requests and needs.

#### **2<sup>nd</sup> Quarter FY12**

- We continue to receive and respond to various FFMPA dataset and customization requests and needs. During this quarter, we defined additional land areas between the coastal basins in MTR’s current FFMPA shapefile, and provided help with the FFMPA shapefiles in AWIPS-II when needed.

#### **3<sup>rd</sup> Quarter FY12**

- During this quarter, considerable time was spent implementing the solution to the AWIPS-II shapefile topology issue.

### **Problems Encountered/Issues**

#### **1<sup>st</sup> Quarter FY11**

- none

#### **2<sup>nd</sup> Quarter FY11**

- none

#### **3<sup>rd</sup> Quarter FY11**

- none

#### **4<sup>th</sup> Quarter FY11**

- none

#### **1<sup>st</sup> Quarter FY12**

- none

#### **2<sup>nd</sup> Quarter FY12**

- none

#### **3<sup>rd</sup> Quarter FY12**

- In April, the machine that houses and serves all of the spatial data repositories (the National FFMP Basin Repository, the FFMP Basin Customization Repository, and the Hydrologic and GFFG Repository) failed. This machine served its NWS and other users well for six years, but

unfortunately we do not have the necessary resources to replace it at this time. The data from these repositories is still available upon request and will be delivered via ftp.

## **Routing (Hydraulics)**

## Transition to HEC-RAS: Model Development and Implementation

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

**Management Lead:** Seann Reed

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

**Milestones\***

Task	Due Date (original due date)	Status
Support FLDWAV/DWOPER conversions for non-CAT RFCs.	FY11 Q4 (FY10 Q4)	Complete
Assist with HEC-RAS configuration in CHPS as needed and HEC-RAS troubleshooting during parallel operations.	FY11 Q4 (FY10 Q4)	Complete
Assist in the transitioning of Red River flood mapping service to CHPS.	FY11 Q3 (FY10 Q4)	Complete.
Recommend to LMRFC how to segment Mississippi HEC-RAS models operationally.	FY11 Q2 (FY10 Q4)	Complete.
Help coordinate a NWS HEC-RAS Workshop on advanced topics.	FY11 Q2 (FY11 Q1)	Complete.
HOSIP Gate 3	FY11 Q4	Complete.

**Accomplishments/Actions**

**1<sup>st</sup> Quarter FY11**

- Seann and Alfonso led several modeling coordination calls with NCRFC.
- Alfonso refined the HEC-RAS model for the upper Mississippi River, from Anoka, MN, to Lock and Dam 10 (including major tributaries). He computed statistics, refined the calibration, and checked cross-section data.
- Seann and Alfonso reviewed and discussed three other Mississippi River models with NCRFC.
- Alfonso learned CHPS and worked with Varalakshmi Rajaram (HSEB) to create an example configuration for a small portion of the Mississippi river. They created a supplemental instructional document that will assist RFCs with configurations.
- Alfonso completed the ice jam exercise from Pedro.
- Seann coordinated with LMRFC, West Consultants, Dennis Johnson, and Mark Glaudemans on HEC-RAS training plans. The agenda is finalized.
- Seann and Alfonso assisted NWRFC with some HEC-RAS modeling instability problems.
- James assisted LMRFC with a HEC-RAS modeling boundary condition problem.
- James began learning CHPS.

**2<sup>nd</sup> Quarter FY11**

- Alfonso and Seann worked closely with NCRFC, Varalakshmi (HSEB), and Kuang (HSEB) to develop working standalone CHPS configurations for the ABVM10 and M1022RAS NCRFC models.
- Alfonso and Seann worked with RMA to explain problems with the HEC-RAS CHPS Adapter and test new Adapter versions.

- Alfonso began examining boundary condition and model segmentation issues for the Mississippi River models.
- Alfonso, Seann, and James answered HEC-RAS and CHPS questions from NCRFC, LMRFC, OHRFC, and MBRFC.
- Seann helped coordinate Unsteady Hydraulic Modeling HEC-RAS and GeoRAS Workshop. Four OHD Hydraulics Group traveled to the workshop, took the course, and interacted with RFCs and instructors on a number of key issues. One group member attended portions of the course remotely.
- The OHD Hydraulics Group participated in an HEC webinar on a new lower Columbia River model presented to NWRFC.

### **3<sup>rd</sup> Quarter FY11**

- Alfonso continued to support NCRFC on testing HEC-RAS models in CHPS, refining their last Mississippi River model to be converted: MISILO, and completing statistical evaluations of model calibration performance.
- Seann and Alfonso worked with RMA to get bug fixes and test them – one related to reading DSS files, one related to passing time series directly to storage areas, one related to missing data at internal boundary locations. Alfonso and Seann wrote test procedures for HSEB. Seann also began coordinating a fix to the longitudinal profile output needed for Red River Inundation Mapping.
- Alfonso continued examining boundary condition and model segmentation issues for the Mississippi River models.
- LMRFC requested more assistance in preparing their lower Mississippi models for CHPS. Alfonso began working on this task.

### **4<sup>th</sup> Quarter FY11**

- Alfonso worked on three hydraulic models for the lower Mississippi River (“Upper,” “Middle,” and “Lower”) to help LMRFC complete their HEC-RAS transition. The boundaries of the Upper model are Smithland on the Ohio R. and Chester, Illinois. Each model required a different type of work. The Upper model only required some limited testing with different inflows. The Middle model required some cross-section replacement and calibration. The Lower model required some conversion from FLDWAV, cross-section editing and replacement, and calibration. Alfonso provided our results to LMRFC for inclusion in CHPS. We will correspond with LMRFC to see if additional assistance is needed.
- Alfonso and Seann completed work testing bug fixes from RMA for Adapter version 1.0.4 and provided documentation to HSEB.
- Seann tested longitudinal profile export capability for HEC-RAS Adapter. This will be useful for migrating the Red River Mapping Tool.
- Miscellaneous support for SERFC and NWRFC.

### **1<sup>st</sup> Quarter FY12**

- Examined impacts of boundary conditions in three LMRFC Mississippi models and recommended merging their three models into one.
- Worked with HSEB to provide scripts to NCRFC that will enable them to continue using their Red River of the North mapping system with CHPS for the 2012 flood season.
- Miscellaneous HEC-RAS related support for LMRFC, WGRFC, and MARFC.

### **2<sup>nd</sup> Quarter FY12**

- Completed work to enable NCRFC to continue using their Red River of the North mapping system with CHPS.
- Held Gate 3 meeting.

### **3<sup>rd</sup> Quarter FY12**

- (Nothing this quarter)

## **Problems Encountered/Issues**

**1<sup>st</sup> Quarter FY11**

- Found a problem with the HEC-RAS Adapter. The adapter will not allow users to specify time series as internal boundary conditions. We have provided a description of the problem and example data to RMA and they are working on a fix.
- Resolving some configuration and Adapter issues took longer than expected due to lack of complete documentation and/or lack of training among collaborators. Still, no show stoppers and all problems were eventually solved.

**2<sup>nd</sup> Quarter FY11**

- None

**3<sup>rd</sup> Quarter FY11**

- None

**4<sup>th</sup> Quarter FY11**

- Getting longitudinal profile data exported from CHPS to the format needed by NCRFC is not as simple as we expected due to limitations in FEWS Export Module. See FogBugz 367.

**1<sup>st</sup> Quarter FY12**

- None.

**2<sup>nd</sup> Quarter FY12**

- None.

**3<sup>rd</sup> Quarter FY12**

- None.

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

**Core Goal:** Improve the routing techniques used to connect forecast locations. Improve the quality of physical inputs and forcings (e.g. wind data into hydraulic models).

**Management Lead:** Seann Reed/Hassan Mashriqui

**Objective:** Provide an accurate hydraulics model that extends from river mouths upstream to at least existing forecast points and beyond if necessary to achieve accuracy. Provide accurate river flow forecasts to NOS operational estuary models. Evaluate 2D/3D models or a combination of HEC-RAS and 2D/3D models to meet the goals. Evaluate and document appropriate boundary conditions, including water level and flux boundary conditions at the downstream boundary and wind forcings on the water surface.

### Milestones.

#### FY11 Milestones for Merged Project

Task	Due Date (original)	Comments
1. Compare HEC-RAS, CBOFS2, SLOSH/ET-Surge, Sobek 1D, and ADCIRC with wind	FY11 Q1	Complete
2. Submit drafts of two journal articles	FY11 Q2 (FY11 Q1)	Complete. Two articles were merged into one.
3. Finalize journal articles	FY11 Q3 (FY11 Q2)	Submitted one article to Journal of Hydraulic Engineering - Received reviewer comments and working on the revision.
3.1 Present at ECM12 (Twelfth International Conference on Estuarine and Coastal Modeling)	FY 12 Q1	Complete.
HOSIP Gate 3	FY11 Q3 (FY11 Q2)	Complete.
4. Participate in broader CERIS planning efforts	Ongoing	CERIS is officially on hold but we continue to interact with NOS and MDL on relevant topics. This task can continue after this project is closed.
5. Provide documentation to RFCs on how to access gridded extra-tropical surge data to use as HEC-RAS model boundary conditions	FY11 Q2	Complete
6. Prepare and deliver lecture on "Downstream Boundary Conditions for Coastal Hydraulic Situations" at Advanced HEC-RAS course.	Feb. 14, 2011	Complete
7. Prepare and deliver lecture for COMET Advanced Hydro Sciences Training on this topic.	August, 2011	Complete

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY11

- Using Sobek, Mashriqui made progress towards understanding the benefits of a wind force in modeling surge on the Potomac River.
- Mashriqui received and analyzed more CBOFS data to better understand the implications of 1D vs. 2D modeling on the Potomac River.
- James and Mashriqui learn more about ETSurge by collaborating with MDL. James collected and developed some initial pieces of code to help manage the ETSurge data.
- Mashriqui and James prepared lecture slides on "Downstream Boundary Conditions for Coastal Hydraulic Situations" in the Advanced HEC-RAS course.
- Mashriqui continued to write papers describing the HEC-RAS modeling, HEC-RAS vs. 2d model comparisons, and boundary condition data implications.

- James, Seann, and Mashriqui defined specifications for a new server computer with Windows to facilitate research.

## **2<sup>nd</sup> Quarter FY11**

- Mashriqui and James delivered a lecture at the LMRFC-hosted HEC-RAS/Hydraulic Modeling Workshop Feb. 14 – 18, 2011.
- With assistance from James and Seann, Mashriqui prepared a draft paper for submission to the Journal of Hydraulic Engineering titled: “A HEC-RAS Model for Operational River Forecasting in the Tidal Potomac River”. The paper has been sent to MARFC for peer review.
- James learned much about CHPS and prepared a standalone MARFC CHPS configuration containing the Potomac HEC-RAS model and flexible enough to access multiple downstream boundary conditions. He worked closely with Edwin Welles of Deltares on this task.
- Mashriqui and James continued interactions with partners at NOS/CSDL and MDL. Mashriqui made test runs with an ADCIRC model on the Chesapeake Bay area and acquired a more extensive ADCIRC grid covering North Carolina that may be useful for future intercomparisons.

## **3<sup>rd</sup> Quarter FY11**

- Mashriqui completed ADCIRC runs for Hurricane Isabel. This allows him to make more in depth comparisons with HEC-RAS and Sobek results.
- Mashriqui continued to analyze and document results using wind in several models.
- Mashriqui, James, and Seann attended SURA meeting to learn about latest research in coastal models (inundation and hypoxia).
- James helped MARFC implement the Potomac HEC-RAS model in their operational configuration.
- Mashriqui and James began collecting data and building models for next phases of REO R&D – dynamic coupling (e.g. using Mike Flood) and inundation mapping.
- Mashriqui (with assistance from James and Seann) prepared and submitted an abstract for the Estuarine and Coastal Modeling Conference, Nov. 7 – 9, 2011.
- Seann pushed through new hardware purchase for future REO work.

## **4<sup>th</sup> Quarter FY11**

- Mashriqui finalized simulation runs in Sobek 1D and ADCIRC and subsequent analysis for the journal paper.
- Mashriqui, James, and Seann prepared 95% of journal paper. Full completion expected by the end of October 2011.
- James continued to support MARFC and refine the operational CHPS configuration. James provided direct support during Hurricane Irene.
- James and Mashriqui interacted numerous times with NOS CSDL and MDL staff on key issues related to linking operational river and estuary-ocean models.

## **1<sup>st</sup> Quarter FY12**

- Submitted a journal manuscript to OHD review: “A 1D River Hydraulic Model for Operational Flood Forecasting in the Tidal Potomac: Evaluation for Freshwater, Tidal, and Wind Driven Events.” Gary and Ken Pavelle provided comments. The manuscript was revised, and finally submitted to the Journal of Hydraulic Engineering on January 18, 2012.
- Worked with MARFC to iron out final concerns with their Potomac HEC-RAS model implementation in CHPS. MARFC reported full satisfaction (1/3/2012).
- Prepared an inventory of coastal HEC-RAS models being used or in development at RFCs to emphasize (1) the strengths of existing capabilities and (2) the need for a wind term in HEC-RAS.

## **2<sup>nd</sup> Quarter FY12**

- Waiting for reviewer comments on paper. All other activities are complete.



### **3<sup>rd</sup> Quarter FY12**

- Developed multiple wind files in SOBEK on a reach by reach basis.

### **Problems Encountered/Issues**

#### **1<sup>st</sup> Quarter FY11**

- Waiting for IT Summit to get approval for hardware to more efficiently examine 1D vs. 2D modeling questions and the impacts of wind forcings on 2D models.

#### **2<sup>nd</sup> Quarter FY11**

- Underestimated time required to complete journal articles; however, stronger conclusions will result from the delayed papers.

#### **3<sup>rd</sup> Quarter FY11**

- None

#### **4<sup>th</sup> Quarter FY11**

- None

#### **1<sup>st</sup> Quarter FY12**

- None

#### **2<sup>nd</sup> Quarter FY12**

- None

#### **3<sup>rd</sup> Quarter FY12**

- Two co-authors, Seann and James, moved to new job and that may impact on the time to revise the manuscript.

# Software Refresh

## Community Hydrologic Prediction System (CHPS)

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

**Management Lead:** Jon Roe

**Project Manager:** Chris Brunner

**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.

**FY12 Milestones:**

Task/Subtask FY12 Milestones	FY12 Due Date	Current Status
<b>1 Finish BOC-II</b>		
1.1 Complete BOC-II software functionality (Deltares, OHD/CyberData, OHD/RMA)	Q2	Complete
1.2 Complete BOC-II training for OHRFC (Deltares, CAT buddy)	Q1	Complete
1.3 Complete BOC-II documentation (Deltares, OHD/CyberData, OHD/RMA)	Q2	Complete
1.4 Provide support (including travel) for BOC-II implementation assistance for CAT-II RFCs (Deltares, OHD)	Q1	Complete
<b>2 CHPS Software Development</b>		
2.1 Deliver 2011.02 (Deltares)	Q2	Complete
2.2 Deliver 2012.01 (Deltares)	Q4	Cancelled
2.3 Develop and deliver CHPS Calibration (Deltares, formerly OHD)	FY 13 Q2 (Formerly Q2)	Ongoing
2.4 Integrate Graphics Generator into CHPS Software Baseline (OHD)	FY13 Q2	Not started; refer to HEFS project
2.5 Provide FEWS API to support future CHPS enhancements (e.g., Calibration, HEFS, Archive DB) (Deltares)	Q4	Ongoing
2.6 Provide software development/maintenance for USACE Models and FEWS Adapters (HEC-RAS and ResSim) (OHD/RMA)	Q1-Q4	Ongoing
<b>3 CHPS Web Portal</b>		
3.1 CHPS Web Portal Development (OHD/Parts&Labor)	Q3	Ongoing
3.2 CHPS Web Portal Hardware	N/A	Canceled
<b>4 CHPS Archive DB Development</b>		
4.1 Deliver a working Archive database for CHPS	TBD	Ongoing

which replaces the RAX and the FEWS zip archive (NOHRSC/UCAR).		
<b>5 CHPS S/W Release Management</b>		
5.1 Transition CHPS software release management from Deltares to OHD and manage all subsequent software releases (OHD/CyberData)	Q1-Q4	Ongoing
<b>6 NWS HQ FEWS Training</b>		
6.1 TBD (no training identified)	TBD	TBD
<b>7 H/W Refresh/Warranty Extensions</b>		
7.1 First group from FY11	FY11 Q4	Complete
7.2 Second & third groups	Q4	Not started
<b>8 RFC Field Support</b>		
8.1 Provide operational troubleshooting support for all RFCs (HSD/Think Tank)	Q1-Q4	Ongoing
8.2 Provide software patches for Emergency, Critical, or High priority tickets when required for RFC operations (Deltares, OHD/CyberData, RMA)	Q1-Q4	Ongoing
8.3 Provide support to HSD as needed (OHD/CyberData)	Q1-Q4	Ongoing
8.4 Provide supplemental System Manager refresher training for all RFCs, in the form of "GoTo meetings" (Deltares)	Q2	Complete

#### Accomplishments/Actions:

##### 1<sup>st</sup> Quarter FY12

- **As of December 31, 2011 (end of Q1) all 13 RFCs had started using CHPS for forecasting operations.** Some non-critical software tasks are scheduled to be completed in Q2 before the end of the main CHPS Implementation contract with Deltares.
- Deltares delivered numerous FEWS "show stopper" changes and fixes, which facilitated operational use of CHPS at the CAT-II RFCs. The remaining items are now deferred to FEWS stable release 2011.02.
- Deltares delivered the final Advanced Configuration training class to OHRFC in November.
- Deltares and OHD traveled to NCRFC in November to provide supplemental training and site support help to prepare the RFC for using CHPS in operations.
- Deltares began work on the 2011.02 stable release of FEWS. It is expected to be delivered and deployed nationally in Q2.
- FEWS stable release 2011.02 has been a higher priority than the API work because of its BOC-II content. Consequently Deltares has done little work on the API this quarter.
- USACE HEC announced their intention to release the official (Windows) 3.1 version of ResSim at the end of Q1. As soon as it is available, RMA has agreed to create and deliver a Linux version for CHPS.
- Parts&Labor led an evaluation of 2 sample social business software technologies (Jive, IBM Connections) as the basis for a CHPS web portal. Survey results yielded no particular preference. Next step is to consider whether a solution will be determined by the platform hosting the final solution. This phase of the project ends in Q2 (April).
- In Q2 OHD will evaluate a potential host for the CHPS web portal (NIDS).
- NOHRSC completed archiving of CHPS and IHFS station metadata.
- OHD hired a software Release Manager. During Q1 the contractor helped refine and document the release management process, and oversaw the release of several operational software

components to the RFCs.

- At the end of Q4 FY11, warranties on the first set of CHPS hardware (for CAT RFCs) expired. In Q1 FY12 those warranties were renewed.
- One of the two HSD support contractors resigned during Q1; a replacement is expected by the start of Q2.
- Deltares delivered several BOC-II FEWS patches so the NWS could meet its CHPS implementation schedule. OHD delivered one unscheduled release. A HEC-RAS adapter patch was also delivered to the RFCs.
- OHD HSEB and HSMB contractors continued to provide operational support to HSD when needed.
- In November Deltares provided one System Management “GoTo meeting” for the RFCs. The final event in this series is expected during Q2.

## **2<sup>nd</sup> Quarter FY12**

- Remaining BOC-II software functionality was delivered to the RFCs via CHPS-2.0.1, which contained FEWS 2011.02, OHD-CORE-CHPS-2.1.a, and HEC-RAS\_4.1.0\_1.0.4. These components included numerous bug fixes identified during Q1 but deferred to Q2. Deltares and OHD also delivered the gridded FFG solution to MARFC (API-CONT/SNOW17). Documentation and the necessary configuration files were distributed.
- Due to the RFCs’ experiences with FEWS 2011.02 beta testing and fielding, OHD has decided to skip FEWS 2012.01 until Deltares can improve software versioning and testing. The next FEWS release for the RFCs will be 2012.02. Meanwhile, development builds based on 2012.01 will be used for prototyping other software development activities (Calibration, Data API, etc).
- CHPS Calibration: this project was originally led by OHD until it became clear that Deltares was still debating the nature of an Application Programming Interface (API). Calibration project leadership is now with Deltares. Accordingly, Deltares presented a design approach to the Calibration team (ABRFC, APRFC, CNRFC, CBRFC, NWRFC) which was approved and accepted. Next step is to deliver the first software prototype with sample configurations to the group for evaluation (early Q4).
- The Graphics Generator will not be included in the next CHPS software baseline release (July); instead it will be evaluated via the HEFS development releases to gain better insight into its operational usage and its computer resource needs.
- Deltares will resume the Data API work (related to the RFC Archive project at NOHRSC) in Q3. NOHRSC continues to design/code a new Archive database schema, but the developer requires a database “de-blobber” from Deltares before the end of Q3.
- Resource Management Associates (RMA) is working on delivering a Linux-based version of the USACE HEC’s ResSim version 3.1 for the NWS. Delivery is expected in Q3.
- Development of a fully functioning CHPS community web portal was canceled as a result of the FY12 budget cuts. These cuts applied to the web page development work by Parts&Labor (P&L) as well as the server to host/support the community site. Instead, P&L is designing a web package which will demonstrate the desired look and feel but without working functionality behind it. Some components of the design may end up on OHD’s web page or on an existing public facing server. With or without the budget cuts, the primary goal is to replace the current FTP location which barely/minimally serves the CHPS community.
- OHD’s software Release Manager has now assumed full responsibility for CHPS software delivery from OHD to the support group in HSD. The release process is described within a draft document which is awaiting review.
- OHD and Deltares continued to provide operational support to HSD. As of Q2 OHD nominated a single HSEB focal point to support HSD.

## **3<sup>rd</sup> Quarter FY12**

- CHPS Calibration: The first demo version of software and configurations showing the use of calibration tools in a sample RFC basin was expected from Deltares at the end of Q3; but it was delayed by one week, pushing delivery into Q4.
- FEWS Data API for Archive: a software development build with sample application of the data API was delivered by Deltares to NOHRSC for evaluation.
  - Related: CHPS-based archive database for RFCs: NOHRSC has designed and developed a database schema for the RFC data archive.

- Software development/maintenance for USACE Models and FEWS Adapters: HEC's contractor RMA delivered to OHD the official Linux-based ResSim version 3.1. OHD has encountered problems running it within CHPS on our development system. We will continue with CHPS-2.1.1 without ResSim, and deliver ResSim separately.
- CHPS community web portal: Parts&Labor finished the demo web site. OHD is looking for a place to host it. Meanwhile Deltares recently announced a new FEWS community web portal: [www.delft-fews.com](http://www.delft-fews.com)
- CHPS software release management: procedures are in place, and are now being extended to the HEFS project for its development releases. Draft document is updated as time permits. A CHPS-2.1.1 software release is planned for FY12 Q4.
- Operational troubleshooting support (HSD): one new contractor was added (Alfred Kwentua; replacement for Derryle Gogel).
- Software patches: FEWS patch 35025 was released. OHD-CORE-2.1.b was released. Upon leaving HSMB, Seann Reed trained HSEB and HSD in HEC-RAS troubleshooting techniques.
- Supplemental support to HSD: HSEB now uses a single point of contact for HSD for help with OHD-CORE software troubleshooting and resolution, or for general load-shed assistance. This means HSEB contractors spend less time providing support to HSD and more time working on software development tasks.

#### **Problems Encountered/Issues:**

##### **1<sup>st</sup> Quarter FY12**

- Deltares has still not delivered the gridded FFG for MARFC; OHD has provided the SNOW-17 portions to Deltares for integration with the PCRaster method used for API-CONT. This is becoming a critical item. Deltares assures OHD it will be delivered in Q2.
- The Calibration project continued to languish due to the need to assign resources to CAT-II implementation and support. The project will not meet its deadline of January 2012. A new plan will be developed in Q2.
- Integration of the Graphics Generator into the CHPS software baseline has been delayed due to the same resources issue as Calibration.

##### **2<sup>nd</sup> Quarter FY12**

- None

##### **3<sup>rd</sup> Quarter FY12**

- None

## **Dissemination (Web Pages)**

## AHPS Web Page Activities

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

**Management Lead:** Donna Page

**Objective:** Provide a standard look and feel for the presentation of AHPS hydrologic and forecast information on the World Wide Web by all NWS weather offices.

### Milestones

Task	Due Date	Status
1. Support AHPS web aspects of NIDS sustainment project	FY11 Q4?	Complete
2. Initial Phase VII definition	FY12 Q1	Complete
3. Finalize Phase VII requirements	FY12 Q1	Complete
4. Phase VII development	FY12 Q1/Q2	Complete
5. Phase VII deployment	FY12 Q2	Complete
6. Initial Phase VIII definition	FY12 Q3	Complete
7. Finalize Phase VIII requirement	FY12 Q4	In progress
8. Phase VIII development	FY12 Q4 / FY13 Q1/Q2	In progress
9. Phase VIII deployment	FY13 Q2	Not started

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY11

- Delivered five flood inundation locations for NWS review
- Attended Consolidated Internet Farms (CIF) meeting at CRH
  - Note: CIF was recently renamed the NWS Internet Dissemination System (NIDS)
- Worked to implement NIDS changes for AHPS systems and code
- Performed normal O&M activities during the period

#### 2<sup>nd</sup> Quarter FY11

- Worked to implement NIDS web-farm sustainment code and systems modifications
- Delivered four inundation locations to NWS Eastern Region for review which will be implemented on AHPS pages in Q3
- Responded to emergency and non-urgent support requests which are tracked by NWS TOC
- Performed normal O&M activities during the period

#### 3<sup>rd</sup> Quarter FY11

- Finished implementation NWS Web Sustainment version of all AHPS code and processes along with updated AHPS CMS module for sustainment at Central Region NIDS
- Implemented NWS Sustainment version of AHPS CMS and transferred hosting of master NWSCMS from HQ NIDS to CR NIDS
- Implemented IOWI4 inundation site which uses a new raster based water depth process
- Responded to emergency and non-urgent support requests which are tracked by NWS TOC
- Performed normal O&M activities during the period

#### 4<sup>th</sup> Quarter FY11

- Provided AHPS implementation support to NIDS group during web-farm sustainment activities at NIDS MD.



- Transitioned AHPS CMS to NIDS Sustainment level code base and moved AHPS CMS to NIDS MO.
- Implemented seven AHPS inundation locations
- Responded to emergency and non-urgent support requests which are tracked by NWS TOC
- Performed normal O&M activities during the period

#### **1<sup>st</sup> Quarter FY12**

- Finalized the development of an Inundation Google Maps interface
- Converted nine inundation gauge locations to Google Maps in development environment
- Worked with OCWWS HSD and NWS Regions to document requirements for Phase VII definitions
- Started development of AHPS Phase VII requirements
- Provided NIDS initial documentation on AHPS monitoring requirements
- Responded to emergency and non-urgent support requests which are tracked by NWS TOC
- Performed normal O&M activities during the period

#### **2<sup>nd</sup> Quarter FY12**

- Implemented 13 Google Maps based inundation locations
- Finished development of AHPS Phase VII and implemented phase on NWS NIDS web-farms
- Update NIDS documentation on AHPS monitoring requirements
- Responded to emergency and non-urgent support requests which are tracked by NWS TOC
- Performed normal O&M activities during the period

#### **3<sup>rd</sup> Quarter FY12**

- Implemented five Google Maps based inundation locations
- Worked with NWS Regions on AHPS 7 Plus requirements / planning
- Updated AHPS Precipitation Download page content
- Updated Low Water Impact controls within AHPS CMS
- Converted remaining AHPS backend scripts to use AHPS Phase 7 snapshot database table
- Responded to emergency and non-urgent support requests which are tracked by NWS TOC
- Performed normal O&M activities during the period

### **Problems Encountered/Issues**

#### **1<sup>st</sup> Quarter FY11**

- Lack of NIDS documented plan for sustainment activities which affected AHPS workload
- NIDS Database and filer outages during the period

#### **2<sup>nd</sup> Quarter FY11**

- Worked to glean requirement from NIDS for sustainment activity work

#### **3<sup>rd</sup> Quarter FY11**

- Unexpected changes to NIDS environment required modification to AHPS code before NWS Web Sustainment could be implemented at CR NIDS
- NIDS System and network delays at HQ NIDS kept new Sustainment version from going online at HQ NIDS
- NIDS advised AHPS that IRIS database would not be available in until sometime after November 2011

#### **4<sup>th</sup> Quarter FY11**

- IRIS database implementation shifted to FY12 Q2 by NIDS

#### **1<sup>st</sup> Quarter FY12**

- NIDS network experiencing connection issues with NOAA LDAP services for AHPS CMS.

AHPS is documenting these connection issues and provide results to NIDS.

**2<sup>nd</sup> Quarter FY12**

- NIDS network experiencing connection issues with NOAA LDAP services for AHPS CMS. AHPS is documenting these connection issues and provide results to NIDS.

**3<sup>rd</sup> Quarter FY12**

- NIDS network experiencing connection issues with NOAA LDAP services for AHPS CMS. AHPS is documenting these connection issues and provide results to NIDS.

## **New Service Locations**

## FY2012 AHPS Activities for APRFC

**Management Lead:** Ben Balk, Senior Hydrologist

**Objective:** Implement AHPS services in the Alaska-Pacific River Forecast Center's area of responsibility.

**Milestones:**

### FY12 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided *see list below	Planned Completion Quarter	Actual Completion Quarter	Notes
Koyukuk	5	SLAA2 MFKA2 BTTA2 ALLA2 KRHA2	Prob. AHPS	Q4	Q2	Completed at end of Q2...beginning of Q3
Bradley	4	BRUA2 BRMA2 BRIA2 BRTA2	Prob. AHPS ; Probabilistic delivered directly to partner	Q4	Q2	Completed at end of Q2...beginning of Q3

\*Service Types available: Probabilistic on AHPS web (Prob. AHPS), SSHP-SAC, SSHP-API, Flood Inundation Mapping (FIM), Water Resources on Western Water web page (WR/WW), Probabilistic displayed only on RFC web page(Prob. RFC), Probabilistic delivered directly to partner (not on any web page)

### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Flood Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
FY12 Q1	0							
FY12 Q2	9							
FY12 Q3								
FY12 Q4								
<b>Total FY12</b>	9	0	0	0	0	0	0	
<b>Overall Total (FY2000-2012)</b>	79	0	0	0	20	0	0	79

#### Accomplishments/Actions:

##### 1<sup>st</sup> Quarter FY12

- Early in Q1 Identified 9 additional AHPS points that will be implemented this fiscal year (see problems encountered below).

##### 2<sup>nd</sup> Quarter FY2012

- **CHPS Innovations** (e.g. any extensions, configurations, displays, adaptors, collaborations, community models, etc.)

- Developed retrospective QTE ensemble for 2011 in a stand-alone for temperature forcings evaluation; comparisons of RTMA, MPE-DQC and OFS forcings
- **Ensemble/Uncertainty Initiatives** (e.g. HEFS testing and implementation, MMEFS developments, enhanced communication of uncertainty, etc)
  - Have local QPF and QTF ensembles for additional hydro forecasting guidance; use official HAS forecasts and raw model QPF and QTF from NAM12, GFS40 and ECMWF as ensemble members
- **Forcing innovations** (e.g. dual-pol, snow estimation, etc)
- **Status of ongoing and new IWRSS innovations:** Novel collaborations and initiatives in science, technology and stakeholder engagement demonstrating federal partners working together, leveraging resources and providing efficient and effective government (e.g., seamless data exchange, system interoperability and data synchronization, summit to sea modeling, flood inundation mapping, geo-intelligence improvements, common operating picture, etc.). Examples of innovations include the WGRFC web portal, OHRFC HEC-RAS inundation mapping, CNRFCs adaption of RES-SIM.
- **Significant external engagement** (e.g., Silver Jackets, Fusion Team, Congressional activities, Impact-based Decision Support Services (IDSS), etc.)
  - Congressional breakup roundtable with Senator Lisa Murkowski (early April...officially early 3<sup>rd</sup> Quarter, but included in 2<sup>nd</sup> Quarter report.)

### 3<sup>rd</sup> Quarter FY2012

- No additional AHPS work performed in 3<sup>rd</sup> Quarter. We have met our obligations for this fiscal year.

### Problems Encountered/Issues

#### 1<sup>st</sup> Quarter FY12

- Late in Q1...After an assessment of the performance of the 9 points this past summer, we found significant errors in the generation of historical MATs. The poor calibration MATs led to a skewed parameterization of the hydro model. These 9 basins will need to be overhauled and recalibrated before implementing as AHPS points.
- As a result, we will probably not calibrate any new basins this fiscal year

#### 2<sup>nd</sup> Quarter FY12

- None

#### 3<sup>rd</sup> Quarter FY12

- None

## FY2012 AHPS Activities for NCRFC

**Management Lead:** Mike DeWeese

**Objective:** Implement AHPS for locations in the North Central River Forecast Center's area of responsibility. AHPS locations include those with probabilistic forecast products, Site Specific Hydrologic Prediction, statistical (Western) water supply, and/or inundation mapping points. For FY12, these would include WFO requested forecast points per below.

**Milestones:**

### FY12 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided *see list below	Planned Completion Quarter	Completion Quarter	Notes
Chicago River	1	Albany Avenue, Chicago, IL	Prob AHPS, WR	Q4	Q3	
DuPage River	1	Warrenville, IL	Prob AHPS, WR	Q4		
Cedar River	1	Cedar Rapids, IA (CIDI4)	FIM	Q4	Q3	

\*Service Types available: Probabilistic on AHPS web, SSHP-SAC, SSHP-API, Flood Inundation Mapping, Water Resources on Western Water web page, Probabilistic displayed only on RFC web page, Probabilistic delivered directly to partner (not on any web page)

### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Forecast Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
Q1								
Q2								
Q3				1				1
Q4								
Total FY12								
Overall Total (FY2000-2012)								

**Problems Encountered/Issues**

- 1<sup>st</sup> Quarter FY12 – none
- 2<sup>nd</sup> Quarter FY12 – none
- 3<sup>rd</sup> Quarter FY12 – none

## Accomplishments/Actions:

### 2<sup>ND</sup> Quarter FY2012

1. CHPS Innovations (e.g. any extensions, configurations, displays, adaptors, collaborations, community models)
2. Ensemble/Uncertainty Initiatives (e.g. HEFS testing and implementation, MMEFS developments, enhanced communication of uncertainty, etc)
3. Forcing innovations (e.g. dual-pol, snow estimation, etc)
4. Status of ongoing and new IWRSS innovations: Novel collaborations and initiatives in science, technology and stakeholder engagement demonstrating federal partners working together, leveraging resources and providing efficient and effective government (e.g., seamless data exchange, system interoperability and data synchronization, summit to sea modeling, flood inundation mapping, geo-intelligence improvements, common operating picture, etc.). Examples of innovations include the WGRFC web portal, OHRFC HEC-RAS inundation mapping, CNRFCs adaption of RES-SIM.
  1. Fusion Team river gage metadata action team completed a web portal and demonstrated it to senior management in NWS, USACE and USGS. Initial thoughts are to include it with the Federal Toolbox if USACE leadership concurs, and possibly incorporate with the U.S. Water Monitor at <http://watermonitor.gov/?a=streamflow>
  2. CRH and NCRFC are collaborating with USGS to implement static inundation maps at 6 locations.
    - CIDI4: This is an active partnership between the NWS and the Iowa Flood Center. The CIDI4 is in the final stages of AHPS publication and will be live on AHPS before May 5. The project was funded by in-kind labor from the Iowa Flood Center. AHPS publication was paid for by the NWS.
    - STMP5: This is a partnership between the NWS, USACE, USGS, MN DNR, and City of Saint Paul, MN. This project was funded as a Silver Jacket's project. The project is beginning the development of an unsteady flow hydraulic model. The project is planned to be completed in FY13.
    - RZLI3, PYMI3, EKMI3, GSHI3: These projects are under development in a partnership between the NWS and IN USGS. The projects have been funded by the Indiana Office of Community and Rural Affairs. The projects have been scoped and are planned to be completed in 2013 to 2014.

5. Significant external engagement (e.g., Silver Jackets, Fusion Team, Congressional activities, Impact-based Decision Support Services (IDSS), etc.)
  3. Mississippi basin RFCs are collaborating to produce a long-range, NAEFS-based 16-day QPF contingency stage forecast for the Mississippi River and tributaries.
  4. CRH and NCRFC continue to be highly involved in Fusion Team and Silver Jacket activities.

### **3<sup>rd</sup> Quarter FY12**

6. RFC Backup: NCRFC and MBRFC are collaborating on developing an offsite operational backup capability using surplus hardware. MBRFC backup capability requirements currently are in place, NCRFC backup capabilities are scheduled to be completed mid-Aug.
7. NCRFC is scheduled for AWIPS2 installation August 23, as the third RFC scheduled for implementation. Significant pre-Awips2 activities are underway testing baseline and local applications in preparation for the Aug deadline.
8. NCRFC has collaborated with GLERL and successfully helped them establish their own CHPS forecast system. Future efforts will investigate data transfer and interoperability between the two systems in an effort to support the Great Lakes Runoff Inter-comparison Project (GRIP). The project will compare various methods of calculating terrestrial runoff into Lake Michigan and Lake Ontario.
9. NCRFC developed special low flow version of a HEC-RAS model to support contingency water supply forecasts at the request of the Greater St. Louis metro area water utility. They are concerned about water levels dropping below intakes at two pumping stations between the Valley Park and Arnold, MO forecast points. These stations are a primary source of water for the greater St. Louis metro area.
10. NCRFC has initiated a partnership with the Illinois State Water Survey and WFO LOT with the goal of developing a flood inundation mapping site in the greater Chicago metro area. NCRFC and CRH presented the AHPS flood inundation mapping program to the Illinois State Water Survey on June 26. The Survey is interested in developing a flood inundation map for one or more locations in the Chicago area in FY 13. Project start date and location is yet to be determined.
11. NCRFC is developing an enhanced forecast system to provide water supply outlooks for the U.S. Forest Service and Upper Peninsula Power Company. The goal is to provide water supply outlooks for optimized reservoir operations and decision support services during a dam reconstruction project on the Ontonagon River.



## FY2012 AHPS Activities for MBRFC

**Management Lead: Gregg Schalk**

**Objective:** Implement AHPS for locations in the Missouri Basin River Forecast Center's area of responsibility. AHPS locations include those with probabilistic forecast products, Site Specific Hydrologic Prediction, statistical (Western) water supply, and/or inundation mapping points. For FY12, this would include portions of the Upper Republican, Lower Republican, Upper and Lower Smoky, Kansas, Big Blue, Upper Missouri, and Marais Des Cygnes basins.

**Milestones:**

### FY12 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided *see list below	Planned Completion Quarter	Completion Quarter	Notes
Upper Republican and Reservoirs	15			4 <sup>th</sup> Qtr		
Lower Republican and Reservoirs	9			4 <sup>th</sup> Qtr		
Lower Smoky headwaters and Reservoir	6			4 <sup>th</sup> Qtr		
Other Reservoir inflows in Smoky, Marais Des Cygnes, and Big Blue	8	KRWK1, STCK1, WLSK1, KANK1, HILK1, PLKK1, MLVK1, MTTK1	AHPS Prob	2 <sup>nd</sup> Qtr	2 <sup>nd</sup> Qtr	
Kansas headwaters and Reservoir inflows	13			4 <sup>th</sup> Qtr		
SSHP or FIM not included above (ref. following table)	1	MWCK1	SS(API), FIM	4 <sup>th</sup> Qtr		
New, unplanned forecast points	8	BCMM8, BSMM8, LGEM8, CCMM8, DMRM8, BCHM8, EDGM8,	AHPS Prob	2 <sup>nd</sup> Qtr	2 <sup>nd</sup> Qtr	

		<b>PMKM8</b>				
<b>New, unplanned forecast points</b>	<b>1</b>	<b>ELLK1</b>	<b>AHPS Prob, SS (API)</b>		<b>3<sup>rd</sup> Qtr</b>	
<b>New, unplanned forecast points</b>	<b>1</b>	<b>WRWK1</b>	<b>SS(API)</b>		<b>3<sup>rd</sup> Qtr</b>	

\*Service Types available: Probabilistic on AHPS web, SSHP-SAC, SSHP-API, Flood Inundation Mapping, Water Resources on Western Water web page, Probabilistic displayed only on RFC web page, Probabilistic delivered directly to partner (not on any web page)

**AHPS Service Location Summary**

<b>Time Frame</b>	<b>Probabilistic AHPS Web</b>	<b>Site Specific (SAC)</b>	<b>Site Specific (API)</b>	<b>Forecast Inundation Map</b>	<b>Water Resources Sites on W. Water Web Page</b>	<b>Probabilistic RFC Web Only</b>	<b>Other</b>	<b>Number Unique Locations</b>
Q1								<b>0</b>
Q2	<b>16</b>							<b>16</b>
Q3	<b>1</b>		<b>2</b>					<b>2</b>
Q4								
<b>Total FY12</b>								
<b>Overall Total (FY2000-2012)</b>								

**Problems Encountered/Issues**

**1st Quarter FY12 – none**

**2nd Quarter FY12 –** Due to ongoing CHPS activities, have delayed implementation of Upper Republican and Reservoirs to the 4th quarter. Have also delayed implementation of two points, the Ulm and Twin Bridges in Upper Missouri, as the original FY12 plan to produce natural flow probabilistic forecasts is no longer needed; will delay implementation until the basin area above is modeled for regulation.

**3<sup>rd</sup> Quarter FY12 – none**

**Accomplishments/Actions:**

**1<sup>st</sup> Quarter FY2012 – none**

**2<sup>nd</sup> Quarter FY12**

- Added 8 unplanned AHPS probabilistic forecast points per requests from MT WFOs
- CRH and MBRFC, and WFOs with responsibility in KS are working with the USGS in Kansas regarding the discontinuation of numerous gages in the precipitation network. NWS/CRH and USGS have collaborated on a plan for

maintenance of a subset of the gages with maximum resource efficiency of both agencies.

- CRH and MBRFC are collaborating with USGS to implement static inundation maps at 14 locations.
- The MWCK1 FIM map is scheduled to be completed in 2012. The project is currently wrapping up the hydraulic modeling phase and starting the GIS production phase. We are pushing for Q4 deployment on AHPS. This is a USACE and NWS team working to produce the maps. This project is funded by the USACE Silver Jackets. NWCK1 will be a new site specific forecast point, and the USACE funded the purchase of two stream gages as a part of this project.
- The Blue River Project includes 13 points on the Blue River, Indiana Creek and Tomahawk creek. This project is scheduled to be completed in 2014. This project has completed the scoping phase and hydraulic modeling is under development. This is a USGS, NWS and City of Kansas City, MO team working to produce the maps. This project is funded by the City of Kansas City, MO and the City of Overland Park, KS.

There are a number of proposed "innovative" projects that have not yet been funded. These efforts include:

- NWS discussions with the Omaha USACE and NE DNR on development of AHPS FIM mapping for the NPTN1 forecast point. This project is in the proposal phase for funding as a USACE Silver Jackets project. Funding has not yet been approved.
- NWS discussions with the KC USACE on scoping a project on the Kansas River to develop FIM maps using a "decision matrix" approach. The project would incorporate the effects of releases from the Tuttle Creek Reservoir and Milford Reservoir on one or more KS river forecast points. This project has been discussed and is not yet formally in the scoping phase. I plan to get the RFC and HPM involved in this project, as well as Victor Hom and Orion. A project proposal will be developed and submitted to the USACE Planning Assistance to States or Silver Jackets program for funding. We are planning to develop this project for AHPS, but a final viewer for the data has not been selected.
- NWS discussions with the Kansas City USACE to develop a Silver Jackets proposal to fund a stream gage on the Missouri River at 435 (near Wolcott). Inundation maps will also be developed for a 20 mile reach of river from Leavenworth to Parkville, but the USACE has proposed to host the maps on the SimSuite viewer instead of AHPS. NWS may be involved in the development of the maps to continue to foster our interagency partnership.

12. Significant external engagement (e.g., Silver Jackets, Fusion Team, Congressional activities, Impact-based Decision Support Services(IDSS), etc.)

1. Mississippi basin RFCs are collaborating to produce a long-range, NAEFS-based 16-day QPF contingency stage forecast for the Mississippi River and tributaries.
2. MBRFC is providing daily 72-hour QPF contingency stage forecasts for the confluence of the Platte and Missouri Rivers to USACE in DSS support of levee repair.
3. MBRFC is providing daily official river stage forecast in DSS support of local levee repair in the Leavenworth KS reach of the Missouri River.
4. CRH and MBRFC continue to be highly involved in Fusion Team and Silver Jacket activities.

### **3<sup>rd</sup> Quarter FY12**

13. Implemented two unplanned forecast points: Ellis, KS (ELLK1) and Wakarusa, KS (WRWK1)
14. UPDATE: CRH, MBRFC and EAX have participated with the USACE Kansas City District and the Missouri Silver Jackets in writing a proposal for a flood risk reduction project on the Missouri River. The project would involve installing a new stream gage near Parkville, MO and the creation of a set of static flood inundation maps. In addition, the team will work toward developing a unified process for developing flood inundation maps and determine how to best present the Missouri River inundation maps to the public, local and state users. The proposal was submitted for funding on July 16, 2012 and funding should be decided by the end of August 2012.
15. UPDATE: CRH and MBRFC have participated with the USACE Kansas City District and the Kansas Silver Jackets in writing a proposal for a flood risk reduction project on the Kansas and Big Blue Rivers, near Manhattan, KS. The project would involve installing a new gage on the Big Blue River and developing a set of static flood inundation maps and conduct feasibility scoping for a dynamic flood inundation mapping. In addition, the team will establish a process for interoperability among the agencies that improves flood inundation mapping capabilities that may enhance the work associated IWRSS. The proposal was submitted for funding on July 16, 2012 and funding should be decided by the end of August 2012.
16. UPDATE: CRH, OAX, GID, LBF and MBRFC have participated with the USACE Omaha District and the Nebraska Silver Jackets in writing a proposal for a flood risk reduction project on the Platte River. The project would involve modeling the hydraulics of the entire North Platte River and creating flood inundation maps for the North Platte at North Platte, NE. This Silver Jacket proposal also includes developing a RES-SIM model for the North Platte system to replace the current RES-J model. MBRFC will collaborate on that piece of the project and will provide the precipitation and temperature climatology to calibrate the model. This model will be used for the AHPS probabilistic products and hopefully as

a community model for the USACE, USBR, and NWS. The proposal has not yet been submitted for funding and will be submitted in FY13.

17. NEW: CRH and OAX have discussed a potential project opportunity for developing flood inundation maps on the Missouri River above Rulo, NE. This project is in the very early discussion phase and would be submitted to the Silver Jackets for funding in FY13.
  18. UPDATE: The MWCK1 FIM map is under final review by the project team and local stakeholders. The map is set to be published on AHPS in August 2012. New site-specific forecast services were operational at this forecast point on July 9, 2012. Progress on the project will be presented at the National Silver Jackets meeting in Harrisburg, PA in August, 2012.
- Forcing Innovations: MBRFC developed a gridded method in the 3rd quarter using FEWS software to use the maximum gridded value between the QPF grid and the QPE grid on six-hour time steps. This was to overcome a deficiency in the CHPS configuration for forecasts made between the synoptic times. If the current rainfall exceeds the QPF, the forecast will use the accumulated precipitation.
  - New Collaborations: MBRFC is in the beginning stages of collaboration with the USBR Eastern Colorado Area Office to enhance their current forecast. USBR is looking to going with a CHPS/FEWS in-house modeling effort on an hourly time step for three locations. USBR may have contractor support to develop the model. MBRFC has agreed to participate in the model development as co-collaborators. MBRFC may take over and implement that model and provide 5-day week forecast on a one hour time step. The forecasts are to enhance decision support in power production activities.
  - HEFS: MBRFC forecaster was involved as the NWSEO representative in the graphics generator testing of HEFS.
  - RFC Backup: NCRFC and MBRFC are collaborating on developing an offsite operational backup capability using surplus hardware. MBRFC has kept the legacy backup capabilities active using the OFS system. This is a temporary backup capability.
  - CRH and MBRFC continue to be highly involved in Fusion Team and Silver Jacket activities.

## FY2012 AHPS Activities for MARFC

**Management Lead:** Peter Ahnert (HIC/MARFC), Seann Reed (DOH), Patti Wnek (SCH)  
**Objective:** Implement AHPS services in the Middle Atlantic River Forecast Center's area of responsibility  
**Milestones:**

### FY12 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided	Planned Completion Quarter	Actual Completion Quarter	Notes
Susquehanna	1	BNGN6	Prob. AHPS	FY12 Q1	FY12 Q1	Susquehanna River @ Binghamton, NY
Susquehanna	1	JRSP1	FIM-Static	FY12 Q1	FY12 Q1	Susquehanna River @ Jersey Shores, PA
Delaware	1	WASN4	Prob. AHPS	FY12 Q1	FY12 Q1	Delaware River @ Washington Crossing, NJ
Potomac	1	SFSV2	API-CONT	FY12 Q2	FY12 Q2	South Fork Shenandoah River @ Luray, VA Unique - Prob. AHPS not available at this time

\*Service Types available: Probabilistic on AHPS web, SSHP-SAC, SSHP-API, Flood Inundation Mapping, Water Resources on Western Water web page, Probabilistic displayed only on RFC web page, Probabilistic delivered directly to partner (not on any web page)

### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Forecast Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
Q1	2	0	0	1	0	0	0	0
Q2	0	0	0	0	0	0	0	1
Q3	0	0	0	0	0	0	0	0
Q4								
<b>Total FY12</b>	2	0	0	1	0	0	0	1
<b>Overall Total</b>	172	0	33	10	0	0	0	1

### Accomplishments/Actions:

*[Full transition to CHPS operations completed October 20, 2011]  
 [After more than 35 years of government service, Joe Ostrowski/DOH retired on December 31, 2011]*

### 1<sup>st</sup> Quarter FY2012

#### River Forecasts and Hydrologic Modeling:

- RFC AHPS points: 172
- SSHP (SAC SMA) points: 0
- SSHP (API) points: 33
- Added probabilistic forecast service to Washington Crossing, NJ (WASN4) on the Delaware River and Binghamton, NY (BNGN6) on the North Branch of the Susquehanna River
- Participated in Regional Service Assessment for TS Lee
- Adjusted FFG computations based on WFO feedback
- Expanded forecast service at Binghamton, NY (BNGN6) on the North Branch of the Susquehanna River from a crest-only to a daily full-time series 72-hour forecast point

- Converted flood-only forecast service at Fredericksburg, VA (FDBV2) on the Rappahannock River to a daily full-time 72-hour forecast point. Forecast service was moved upstream to be collocated with the USGS stream gage
- The Delaware Joint Toll Bridge Commission put into action their agreement to send MARFC daily photos of river ice from toll bridge cameras to aid in Delaware River forecasting. This agreement was begun through the DRBC.
- Several critical flood stages were improved in WFO LWX's area through extensive fieldwork done by LWX's SSH

#### *AHPS Outreach/Customer Service/IDSS:*

- MARFC is on Facebook
- PA Association of State Floodplain Managers Conference in Johnstown, PA
  - NWS flood safety booth & ensemble river forecast presentation
- Silver Jackets:
  - MD: Team kick-off meeting in Baltimore
  - PA: Team meeting in Harrisburg; monthly conference calls
  - NJ: Participated in Trenton meeting; presented reviews of flooding from Irene & Lee
- MARFC-WFO HPM coordination conference call
- "Hotwash" - post-flood service review (Conowingo Dam) with MEMA, Cecil & Harford County EMs
- Flood Safety Outreach article written for NWS Aware Newsletter
- Website: improved Precipitation Departure information on site
- Customer Advisory Board: Bimonthly meeting – briefings from 4 Silver Jacket teams provided
- Office tour and flood model demo provided for 27 homeschool students from the Commonwealth Connection Academy
- Penn State University: provided precipitation gage info to Meteorology Department to support work with National Park Service's Eastern Rivers and Mountains Network
- Preserve America Grant: MARFC partnered with WFO CTP on grant proposal for historical marker for the Susquehanna River at Harrisburg, PA
- Supported Nurture Nature (NN) Foundation's application for a grant to Crayola (Easton, PA-based Company) for the creation of *Creative Classroom Weather Kits* that teachers can use after their students visit Nurture Nature's Science on a Sphere "Rising Waters" Show. PHI & MARFC will act as science advisors if the project is funded.
- Participated in kickoff meeting of the WFO LWX Hydrology Partners Board, in Sterling, VA
- Participated in WFO CTP media workshop
- Jointly hosted office visit by Boy Scouts and Home School Students from Chambersburg, PA

#### *AWIPS 2:*

- Participated in AWIPS2 system testing at NWSHQ
- Member of AWIPS 2 Technical Infusion – Collaboration IWT, (OSIP Project 050-042), working to identify national requirements for RFC collaboration with external partners

#### *Ensemble River Forecasts (MMEFS):*

- Collecting feedback on new [MMEFS](#) web page design

#### *Flood Climatology:*

- WFO, counties, states, stream, categorical individual/year ranking, every flood per year/decade/summary flood frequency and return period tables were updated for 2011
- Completed new flood climatology website: [Middle Atlantic River Forecast Center Flood Frequency](#)

#### *Flood Inundation Mapping (FIM):*

- Member of Mapping Technical Advisory Team
- FIM maps are now available in AHPS for Jersey Shore, PA on the West Branch Susquehanna
- FIM project funded through PA Silver Jackets for Harrisburg, PA

- FIM projects funded through NJ Silver Jackets for 4 points (Clifton, NJ, Little Falls, NJ, Pine Brook, NJ and Riverdale, NJ)

*Hydrometeorological Information:*

- Improvements made to locally created MPE bias script that automatically pulls 30-day MPE Bias information for each WSR-88D
- Assisted MBRFC with archive database problem
- Improving functionality of MPE/DailyQC software. Completed 1 year archive of MAP values created by DQP, MPE and historical MAP calculation method to create some longer term comparison of MAP data from these sources.
- CoCoRaHS status update: monitoring 950 observations. 425 are of high enough quality to be used in our river forecasts.

*Training:*

- NOAA Hurricane Conference webinar
- *Weather Ready Nation*: HIC & SCH completed training sessions

**Problems Encountered/Issues**

- a) The Development Operations Hydrologist position is currently vacant.
- b) Identified a problem with Ensemble Verification Software (EVS); OHD developed a fix that will be included in the next release EVS 4.0 in the near future.

**2<sup>nd</sup> Quarter FY2012**

- **CHPS Innovations**
  - Configured module that creates interactive crest-stage relationship plots called correlation plots. In addition to showing the correlation plot, RFC forecasters can view information for an individual event, or create a simulated stage using the regression equation and travel time.
  - MMEFS now running on CHPS
  - Gridded FFG now running on stand-alone system
  - AWIPS2 OT&E
    - Configuring ADAM box to prepare for conversion to AWIPS2
    - Drafted plan to move hardware from Silver Spring to State College
    - ET prep for hardware delivery
    - AWIPS2 Variance training seminar created & presented to staff
    - Completed national collection of NWS hydrologic external collaboration scenarios for AWIPS 2 Technical Infusion – Collaboration IWT, (OSIP Project 050-042)
- **Ensemble / Uncertainty Initiatives**
  - Hydrologic Ensemble Forecasting System (HEFS)
    - Attended training workshop (NWS HQ) to learn how to setup & run HEFS for Beta test
    - Continue to generate ESP hindcasts in support of HEFS project
  - Led regional team completing revision of training modules for Ensemble River Forecast (MMEFS) Training Course
- **Forcing Innovations**
  - Dual Pol
    - Training completed by 3 staff members
    - Additional training completed includes: ER Brown Bag Webinars, WDTB Storm-of-the-Month webinars, Precipitation Estimate webinar, Solution to QPE in partial-beam blockage webinar
  - QPF
    - Routine HAS QPF extended to 72 hours
    - Wrote script to create a 72 hour total QPF field in GFE
  - Precipitation Gages
    - Ingesting new ALERT rain gages at Lake Fairfax & Lake Accotink, VA



- Prioritization of Susquehanna Flood Forecast and Warning System (SFFWS) precipitation gages completed
  - Attended OHD seminar on Objective Reduction of SFFWS Rain Gage Network
- **Status of Ongoing IWRSS Innovations**
  - Flood Inundation Maps (FIM)
    - Jersey Shore, PA FIM now in GoogleMaps format on AHPS
    - Harrisburg, PA FIM being created through a joint collaboration between NOAA, USGS and USACE through the Pennsylvania Silver Jackets
    - MARFC and WFO BGM assisted the USGS NY Water Science Center writing requirements for stream gages in danger of losing funding
    - MARFC SCH & WFO PHI SSH assisting ER HSD in testing a methodology for implementing AHPS QuickLinks at individual river points
    - Training webinar *“Towards Dynamic Flood Forecast Mapping”* by James Halgren, OHD, summarized results of recent work completed in the Susquehanna and Potomac basins
    - River Ice & Ice Jam Monitoring: Delaware Joint Tollbridge Commission sent bridge cam images for use in river forecasts through the winter. Created a map of the bridge locations to assist forecasters.
    - Completed analysis of NJDEP proposed 30 new flood inundation mapping points in the Passaic River Basin for the potential to provide NWS river forecast services
- **External Engagement**
  - Leveraged Customer Advisory Board feedback to add Self-Briefing page to web
  - Assisted Harford County, MD emergency managers with study of Conowingo Dam floods by providing flood climatology data
  - Flood climatology data was used by SERFC HIC in presentation given at the National Flood Conference
  - As National RFC representative on the AWIPS External Collaboration Team – documented four hydrology scenarios
  - Hosted Customer Advisory Board meeting – Dr. Jim Porter, NYC DEP gave an overview and history of the NYC water supply program
  - Participated as a judge at the 55<sup>th</sup> Annual Capital Area Science & Engineering Fair sponsored by the Whitaker Center and at the North Museum Science & Engineering Fair sponsored by the North Natural History & Science Museum
  - Hosted HAS and Hydrologist shift shadows for a PSU Geosciences Senior interested in hydrological career
  - Junior Meteorology student office visit for assistance with river forecast modeling project.
  - Presented lecture on Hurricane Irene & T.S. Lee to Penn State Water Science & Society class
  - Participated remotely in 2-day national workshop for Optimal Unmanned Aircraft Systems River Observing Strategy.
  - Participated in the VA, NJ and PA Silver Jackets Team monthly conference calls
  - Participated in the winter quarterly meeting of the Delaware River Basin Commission (DRBC) Flood Advisory Committee
  - Attended 2-day PEMA Central quarterly training workshop in State College. Presentations on Hurricane Irene and T.S. Lee were made at the workshop
  - Hosted NWS Flood Safety Awareness exhibit booth promoting the availability of the exhibit for use by external partners at County outreach events
  - Participated in the quarterly meeting of the Passaic Flood Warning Users Group
  - Staffed an interactive NWS exhibit booth at the PA Farm Show
  - Three posters were presented at the Annual AMS Meeting in New Orleans: 1) *“Verification of Ensemble River Forecasts at the MARFC”*; 2) *“NWS and the Nurture Nature Center: A Partnership for Flood Outreach, Floods Happen, Lessen the Loss”*; and 3) *“Middle Atlantic River Forecast Center Flood Climatology Analysis”*. Posters were created in collaboration with OCCWS, OHD, UCAR, WFO(s) RNK & PHI & the Nurture Nature Center.

- HIC presented on “NWS Flash Flood Warning Services” at the AMS Meeting

### 3rd Quarter FY2012

- **CHPS Innovations**

- Flood Levels
  - Lowered major FS at Chenango Forks, NY
  - Established action stages at Front Royal, Strasburg & Lynnwood, VA
  - New stream gage installed on Wills Creek at Eilerslie, MD in Potomac River basin
- Hydrologic Modeling
  - Completed comparison study of API-Continuous with SAC-SMA at several forecast locations
    - Attended Virtual DOH Workshop
    - Attended Part1 Rating Curve training webinar
- CHPS
  - Installation and set-up of CHPS 7 8 9 nearly complete
  - Problem identified with SNOW-17 impacting FFG running on CHPS. Coordinated with OHD to resolve issues.
  - Installed new disk drive on CHPS8
- AWIPS2
  - Hardware delivered and installed
  - Ran daily operations on NMTR hardware
  - AWIPS2 installed on local RHA hardware
  - Configured ADAM to AWIPS2
  - 2<sup>nd</sup> session of AWIPS2 Variance training held for staff by MARFC Sr Hydrologist
  - Baseline software (GFE, MPE, D2D, etc.) and local apps converted
  - 1-on-1 staff training completed
  - Several trouble tickets remain open with NCF
  - Installed new builds
  - Completed comms test and live test

- **Ensemble/Uncertainty Initiatives**

- Hydrologic Ensemble Forecasting System (HEFS):
  - Beta tested HEFS Releases 1 & 1.2
  - Replaced disk on CHPS 8
  - Generated ESP hind casts and sent to OHD for review
  - Participated in several conference calls
  - With help from HSD, CHPS 7, 8, 9 now running HEFS
- Attended OHD seminar on stakeholder use of riverine probabilistic forecasts
- Ensemble River Forecasts (MMEFS) - completed draft case study for online training course
- **Forcing innovations (e.g. dual-pol, snow estimation, etc)**
  - Dual Pol training course completed by majority of staff
  - Attended WDTB Dual Pol training and “storm of the month” webinars
  - Attended WFO CTP Warm Season Workshop
  - Virtually attended day-long WFO CHS Tropical Weather Workshop
  - Attended UMass lecture, “*Climate Change and Water Resources: Characterizing Uncertainties for Decision Makers.*”
  - Attended HSD AFWS Migration Plan webinar
  - GFE (QPF) conversion to AWIPS2 complete
  - Staff received training on High Impact Hydrologic Events from CTP SOO
- **Status of ongoing and new IWRSS innovations:**
  - Flood Inundation Maps: Harrisburg, PA and 9 Passaic Basin FIMs are being created through a joint collaboration of NWS, USGS and USACE through the Silver Jackets (PA & NJ state teams)
  - Attended USACE HEC Overview webinar
- **Significant external engagement**
  - Congressional:
    - U.S. Congressman Glenn Thompson (PA) toured the MARFC

- Provided input to WFO OKX to answer congressional letter
- Passaic Flood Warning Users Group: participated in quarterly meeting in Wayne, NJ
- Media:
  - Provided training on how rivers are forecast at the WFO CTP Media Workshop
  - Interviewed by the Altoona Mirror (newspaper) on flood safety
  - WTAJ (Johnstown, PA TV) filmed MARFC participation at safety conference in Altoona, PA
  - TV stations in the Lehigh Valley region spotlighted MARFC's participation at HydroMania
- MPE Data Users: coordinated & assisted external users to receive precipitation data after ERH ftp server replacement
- Drought: participated in coordination calls with federal & state agencies
- Students:
  - Outreach booth at Millersville University Public Awareness Day
  - 30 meteorology students from Millersville University toured RFC Operations
  - Presentation: NWS Hydrology Careers at PSU Meteorology Career Day.
  - HydroMania: participated in Lehigh Valley Water Suppliers' HydroMania Event with interactive booth and new Water Relay Race for 1200 students
  - High School student shadowed HAS and Hydrologist forecast shifts
  - Thirteen 6<sup>th</sup> grade York County, PA students toured RFC Operations
  - PSU Weather Camp: RFC Operations tour and floodplain model demo
  - Floodplain model demo and RFC Operations tour to homeschoolers from Harrisburg & State College, PA
- Silver Jackets:
  - Participated in VA, MD & PA team monthly calls and quarterly NJ call
  - Participated in PA meeting to create Silver Jacket flood risk resources website
  - Planned & participated in FIM stakeholder outreach workshops for Harrisburg, PA
  - PA SJ Mapping sub-team meeting monthly
  - Participated in 2 day VA team meeting
  - Received training in FEMA's Community Rating System
  - MD & PA team meetings – participated in brainstorming and prioritizing FY13 projects.
- 2012 Blair County, PA SARA Summit: participated in *"Superfund Amendment Reauthorization Act"* Summit; meeting of 175 uniting government, communities and industries for the purpose of safety. Participated in presentations, panel discussion and flood safety outreach booth.
- Customer Advisory Board
  - Bimonthly meetings. USGS Ithaca gave presentation on new acoustic stream gage measurement techniques. Provided information on alerts via cell phones.
- Passaic Basin Flood Workshop: provided flood safety brochures, RFC fact sheets and *"Know Your Number"* magnets for participant packets
- WFO(s): led SSH/WCM call to plan MARFC-WFO familiarization activity for FY12, in-lieu of in-person workshop. Identified & prioritized training needs.
- Social Science Weather Research Grant: assisted with and sponsored Nurture Nature Center application for Social Science Weather Research Grant.
- Training: WEA/CMAS Webinar (NWS), Twitter
- River Basin Commissions:
  - Received training in SRBC new low flow protection policy
  - Attended DRBC quarterly meeting. Coordinated presentation on new coastal flood inundation services by NWS Marine & Coastal Services Branch.
- AHPS Quicklinks provided for Atlantic City, Pine Brook & Trenton, NJ – first in the nation.
- Commemorated the 40<sup>th</sup> anniversary of Agnes through daily website and Facebook posts
- Participated in 2<sup>nd</sup> meeting of the WFO LWX Partners group
- Participated in annual meeting of the Conowingo Pond Management Workgroup. Gave presentation on NWS products relating to water resources.
- Participated in Dominion Bath County Power Station functional exercise of the Emergency Action Plan

## FY2012 AHPS Activities for NERFC

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

**Objective:** Implement AHPS services in the Northeast River Forecast Center's area of responsibility

**Milestones:**

### FY12 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided	Planned Completion Quarter	Actual Completion Quarter	Notes
Thames	4		Prob. AHPS	FY12 Q3		
Naugatuck	1		Prob. AHPS	FY12 Q3		
Hudson	2					NYCDEP - HEFS

\*Service Types available: Probabilistic on AHPS web, SSHP-SAC, SSHP-API, Flood Inundation Mapping, Water Resources on Western Water web page, Probabilistic displayed only on RFC web page, Probabilistic delivered directly to partner (not on any web page)

### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Forecast Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
Q1	0	0	0	0	0	0	0	0
Q2	0	0	0	0	0	0	0	0
Q3	0	0	0	0	0	0	0	0
Q4								
<b>Total FY12</b>	0	0	0	0	0	0	0	0
<b>Overall Total</b>	173	1	57	0	0	0	0	0

### Accomplishments/Actions:

*[Full transition to CHPS operations completed February 8, 2011]*

#### 1<sup>st</sup> Quarter FY2012

##### *River Forecasts and Hydrologic Modeling:*

- RFC AHPS points: 174
- SSHP (SAC SMA) points: 1
- SSHP (API) points: 57
- Croton River System:
  - RTi delivered preliminary report on calibration
  - Work funded by NYCDEP
  - Received calibration decks
  - Began process of incorporating into forecast procedures
- Thames River System:
  - Initial conference call held regarding RTi calibration
  - RTi anticipates calibration activity will be complete around February 2012
  - Reviewed MAP computations for a couple of locations
- Met with USGS Connecticut Water Science Center to discuss the use of the Precipitation Runoff Modeling System (PRMS) for climate change analysis as well as the use of LANDSAT for flood monitoring

- Coordinating with Western Region to get NERFC points added into the National Water Resources Outlook web page

#### *AHPS Outreach/Customer Service/IDSS*

- Coordination meeting with Emergency Managers from WFO Albany's County Warning Area
- A customer advisory board conference call was held to discuss changes to MMEFS, implementation of NWSchat, and the use of Facebook
- Provided LDM feed of QPF grids to Buffalo Corps per their request
- Coordinating with NH Department Environmental Services to improve forecast services at Rumney, NH on the Baker River (Merrimack Basin) by modeling the releases on a series of small flood control reservoirs in the headwaters of the Baker River

#### *CHPS:*

- Major activity was installation of a patch which seems to have resolved ongoing mods synchronization issues
- Work continues to configure CHPS to drive MMEFS
- Buddy Visit and Advanced Configuration Training at OHRFC

#### *MMEFS:*

- System converted to using GEFS and NAEFS instead of GEFSa meteorological ensembles
- Member of regional team developing a training module for field forecasters
- MMEFS converted to run off CHPS instead of NWSRFS

#### **Problems Encountered/Issues**

None

#### **2<sup>nd</sup> Quarter FY2012**

- **Forecast Points**
  - The gage at the Connecticut River at Middletown, CT (MDDC3) has been discontinued. All AHPS services at this location have been discontinued. A new gage nearby at Middle Haddam, CT (MHDC3) is set up in CHPS HEC-RAS. Awaiting guidance on flood criteria prior to making this an official forecast point.
  - Final Report from RTi on the calibration in the Thames/Naugatuck basin has been completed and is under review by NERFC
- **CHPS Innovations**
  - Developed Annotations mod that allows forecaster to add text annotation that can be applied to forecast products. This functionality currently exists in external local application but it has been cumbersome to have forecaster find what annotations are active
  - Working on technique to ingest basin average winds and using that to compute an estimated UADJ mod value. The data would be available as a display to the forecaster but the mod would not be automatically generated
- **Ensemble / Uncertainty Initiatives**
  - Developed ensemble summary map that compares 30% exceedance conditional flow compared to historical. These maps were used as part of biweekly outlook calls and were generally well received
  - HEFS hindcasts for NYCDEP were completed using historical forcings and provided to RTi
  - Extended weekly AHPS outlooks from 30 days to 90 days.
  - Attempting to transfer weekly AHPS products to Western Water page but have not been routinely successful due to network timeouts
- **Forcing Innovations**

- Working on technique to compute MAP(s) within CHPS using point observations and using MPE grids to time distribute data. This technique will be assessed over the next several months to see if it represents improvement of DailyQC
- Investigating concerns with RTMA grids over snow cover. Seeing some biases of 30+ degF during periods of snowmelt. RTMA is going to be incorporating Rapid Refresh model into initialization which should improve performance.
- **Status of Ongoing IWRSS Innovations**
  - Working on transfer of QPF and QPE grids to New England, Buffalo, and Cincinnati Corps of Engineers on a routine basis
  - Developing a plan with Buffalo Corps of Engineers/Mt Morris Dam to provide afternoon forecast updates and in exchange have more routine process for receiving release plans
- **External Engagement**
  - Biweekly spring snowmelt calls with the WFO(s) and a number of other partners to review flood potential for the next several weeks
  - Attended Silver Jackets meeting in Waterbury, VT

### 3<sup>rd</sup> Quarter – FY2012

- **Forecast Points**
  - No new forecast points implemented
  - Delivery of the Croton-Kensico calibrations from RTi (supported by NYCDEP) have been received and implemented locally within CHPS
  - Delivery of the Thames River calibrations have been received from RTi and are in progress towards being implemented within CHPS
- **CHPS Innovations**
  - Set up procedures to allow users to establish spillway gates up or down at a couple of forecast locations. This has been troublesome at times as flow simulations were greatly impacted by the spillway gate settings
- **Ensemble / Uncertainty Initiatives**
  - Continuing work on HEFS beta project. Installed beta HEFS software on a CHPS standalone as well as test system and have performed a sequence of test procedures per OHD
- **Forcings Innovations**
  - Continuing to evaluate the CHPS computed MAP(s) from gage observations over the past several months. Will be performing statistical assessment comparing these MAP(s) with DailyQC MAP and MAPX and the impacts on the hydrographs
  - Attempting to force HEC-RAS with ESTOFS ocean data. However, this failed as the quality of the data seemed poor and did not always reach to lower boundary conditions in HEC-RAS
- **IWRSS Innovations**
- **External Engagement**
  - Conducting monthly water resources calls to review current river & soil conditions and outlooks for the next several weeks
  - Attended an international meeting in Vermont to discuss forecasting and flood mitigation on Lake Champlain and the Richilieu River

## FY2012 AHPS Activities for OHRFC

**Management Lead:** Trent Schade (HIC/OHRFC), Tom Adams (DOH), Jim Noel (SCH)  
**Objective:** Implement AHPS services in the Ohio River Forecast Center's area of responsibility  
**Milestones:**

### FY12 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided	Planned Completion Quarter	Actual Completion Quarter	Notes
Cumberland	2	HLHK2	SSHP-API	FY12 Q1	FY12 Q1	
		HLBK2	SSHP-API	FY12 Q1	FY12 Q1	
Cumberland	2	ANTT1	Prob. AHPS	FY12 Q2	FY12 Q2	Mill Creek @ Antioch, TN
		WBNT1	Prob. AHPS	FY12 Q2	FY12 Q2	Mill Creek @ Woodbine, TN
White	1	DREI3	Prob. AHPS	FY12 Q4		Proposed USGS FIMI project
Muskingum	1	LDVO1	SSHP-SAC	FY12 Q4		
Kentucky	1	LPTK2	Prob. AHPS	FY12 Q4		

\*Service Types available: Probabilistic on AHPS web, SSHP-SAC, SSHP-API, Flood Inundation Mapping, Water Resources on Western Water web page, Probabilistic displayed only on RFC web page, Probabilistic delivered directly to partner (not on any web page)

### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Forecast Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
Q1	0	0	2	0	0	0	0	0
Q2	2	0	0	0	0	0	0	0
Q3	0	0	0	0	0	0	0	0
Q4								
<b>Total FY12</b>	2	0	2	0	0	0	0	0
<b>Overall Total</b>	280	83	2	3	0	0	0	0

#### Accomplishments/Actions:

[Full transition to CHPS operations completed October 31, 2011]  
 [Suspended routine operations with CHPS-FEWS December 21, 2011]  
 [After more than 40 years of government service, Craig Hunter/HIC retired on December 31, 2011]

#### 1<sup>st</sup> Quarter FY2012

##### Forecast Points and Hydrologic Modeling:

- No new forecast points. RFC point total = 278
- SSHP (SAC SMA) points: 83
  - SSHP only: 49
  - RFC AHPS + SSHP: 34
- SSHP (API) points: 2
- Assisted WFO PAH with adding Hopkinsville, KY (HLHK2 & HLBK2) to their SSHP (API-MKC)

##### HEC-RAS Ohio River Community Project with USACE Great Lakes and Ohio River Division (LRD):

- Webinar with OHD and OWWS HSD to demonstrate dynamic flood capabilities

- Presentation and strategy discussion amongst partners at Ohio/Great Lakes Tri- Agency Meeting
- Work continues on extending modeling efforts for up the tributaries on the Green, Kentucky and Licking Rivers

*HEC-RAS Cumberland River Project:*

- Gathering data from USACE Nashville District (LRN)
- Working with LRN through TN Silver Jackets to find sources for help in development process
- Data received from USACE Nashville District (LRN); beginning development of preliminary model
- Working with LRN through TN Silver Jackets to find sources for help in development process

*AHPS Outreach/Customer Service/IDSS:*

- Coordinating with USACE Louisville District (LRL) in support of Olmsted Locks and Dam construction with low flow coordination calls for 5 & 30 day weather and hydrology outlooks
- Presented at Mid-Ohio Planning Commission on Climate Variability & Change in the Ohio Valley
- OHRFC is on Facebook
- Coordination office visit to Southeast RFC and WFO Peachtree City
- Coordination visit to FEMA Region IV in Chicago
- Coordination visit to First Energy Akron, OH Headquarters
- Coordinated CPC Winter Outlook with partners
- Taught Hydrology Section of COMET Climate Variability and Change Course
- Hosted Ohio River Valley/Great Lakes Tri-agency Conference
- Silver Jackets Initiative
  - Ohio - Marietta Flood Warning System discussion
  - Indiana - Coordination call
  - Pennsylvania - Meeting
- Judge for the Miamisburg Elementary School Science Fair
- USCG and Navigation coordination call for the Cumberland and Tennessee River Valley
- Coordinating with USACE Louisville District (LRL) in support of Olmsted Locks and Dam construction with low flow coordination calls for 5 & 30 day weather and hydrology outlooks
- Maumee River Basin Commission Meeting to discuss winter outlook
- Partner flood coordination calls with users including USACE, USGS, FEMA, USCG, TEMA, NWS WFOs, navigation etc.
- Ohio State University Flood Potential and Climate Outlook including agricultural outlook
- Partner training on NWS River Forecast Process including City of Columbus, USACE, FEMA, NWS WFOs, USGS etc

*CHPS-FEWS Transition:*

- CHPS Buddy visit from Deltares and NERFC
- FFG issues have forced forecast operations to transition back to NWSRFS operations.
- Model states are being updated once a day in CHPS

*Ensemble River Forecasts (MMEFS) / ESP:*

- Provided MMEFS training to COE, USGS, FEMA and Customer Advisory Board
- Provided MMEFS training to Tri-Agency partners at Ohio/Great Lakes Tri-Agency Meeting

*Flood Inundation Mapping:*

- Coordinated with WFO IWX on potential static flood inundation mapping project in Ottawa, OH
- Metropolitan Sewer District of Greater Cincinnati Meeting and presentation on winter outlook and flood inundation mapping

*Gages/Observations/Data:*

- New heated weighing gages added in USACE Pittsburgh District (LRP) area
- USGS now providing streamflow observations for Shawneetown, IL (SHNI2) on the Ohio River



*Gridded Flash Flood Guidance:*

- CHPS-FEWS FFG operations only allows updates based on the 12Z SAC-SMA model states
- CHPS-FEWS operations suspended until OHD can provide a patch to the FFG model adapter

*Training:*

- Deltares
- MMEFS
- COMET Climate Variability and Change Course
- USACE Levee Database Webinar

**Problems Encountered/Issues**

FFG issues in CHPS-FEWS have forced forecast operations to transition back to NWSRFS operations.

**2<sup>nd</sup> Quarter FY2012**

- **Forecast Points**
  - Two additional AHPs points were added this quarter in the Cumberland River Basin
    - Antioch, TN – ANTT1 – WFO Nashville (OHX) added
    - Woodbine, TN – WNBT1 - WFO Nashville (OHX) added
- **CHPS Innovations**
  - Implemented ESP for 90-day products
  - Implemented Water Resources Outlook products
  - Final work being done to convert MMEFS from NWSRFS to CHPS
  - Demonstration of dynamic flood inundation capabilities in CHPS to OHD & OCWWS HSD
- **Ensemble / Uncertainty Initiatives**
  - Implemented ESP for 90-day products
  - Implemented Water Resources Outlook products
  - Final work being done to convert MMEFS from NWSRFS to CHPS
- **Forcing Innovations**
  - None
- **Status of Ongoing IWRSS Innovations**
  - *HEC-RAS Ohio River Community Project with USACE Great Lakes and Ohio River Division (LRD)*
    - Extending further upstream on the tributaries (Green, Kentucky & Licking River)
    - Working with USGS and ODOT to develop I-70/Newark project
    - Collaborating with State of Kentucky on the to add new forecast point at Lockport, KY
    - Received data from USACE LRN District to develop preliminary model in CHPS for dynamic flood inundation mapping
    - Collaborating with USACE LRN District through the Tennessee Silver Jackets to find resources for developing static flood mapping projects in Indiana & Ohio
    - Met with OCWWS HSD to develop a demonstration project at Pittsburgh for dynamic flood inundation mapping
    - Met with NWSHQ & ERH to discuss developing experimental flood mapping in CHPS-FEWS and HEC-RAS for Pittsburgh. Requested workflow from Deltares for accomplishing this within CHPS-FEWS.
- **External Engagement**
  - Ohio River & Sanitation Commission (ORSANCO) office visit and presentation
  - Centerville, OH Cub Scouts office tour
  - University of Pittsburgh office visit to discuss NASA project (soil moisture & evapotranspiration estimation)
  - City of Columbus office visit for Scioto River Meeting
  - NWS-USGS-USACE Forecasters Cross Training Meeting in New Orleans
  - Ohio Silver Jackets conference call
  - Winter Flood Potential Partners briefing – Mississippi drainage
  - NOAA UAS workshop
  - NWS-USGS-USACE Fusion Team conference call

- Dayton, OH Technology Festival
- USACE LRD. LRP, LRL Districts office visit
- Presentations at Ohio State Severe Weather Symposium
- Attended Kentucky Silver Jackets Meeting
- **Issues**
  - Could not travel to the Ohio River Basin Alliance in Nashville, TN due to travel restrictions. Impact: miss opportunity to interact with important water resources partners & stakeholders.

### 3<sup>rd</sup> Quarter FY2012

- **CHPS Innovations**
  - Converted MMEFS for SREF, NAEFS and GEFS from NWSRFS to CHPS
- **Ensemble/Uncertainty Initiatives**
  - Converted MMEFS for SREF, NAEFS and GEFS from NWSRFS to CHPS
- **Forcing Innovations/Initiatives**
  - None
- **Status of ongoing and new IWRSS innovations:**
  - *HEC-RAS Ohio River Community Project with USACE Great Lakes and Ohio River Division (LRD)*
    - Extending tributaries further up Green, Kentucky and Licking Rivers
    - Working with USGS and ODOT for developing the I-70/Newark project
    - Work focused on Kentucky River expansion for new forecast point at Lockport, KY for State of KY
- **Significant external engagement**
  - Ohio State University Hydrologic Outlook for agriculture - 30,000 people receive outlook
  - Blanchard River Coalition Meeting - NWS River Forecast Process
  - COE LRD Olmstead coordination call
  - Hosted Cincinnati Church Group office tour (40)
  - Indiana Silver Jackets meeting
  - Hosted Ohio EMA visit (8)
  - Kentucky Silver Jackets meeting
  - Hosted First Energy visit; provided MMEFS training
  - Participated in the Dayton Water Fest (300)
  - Developed an OHRFC Outreach Pamphlet
  - Participated in career day at Eastmont School in Dayton (400)
  - Pennsylvania Silver Jackets meeting
  - Indiana Silver Jackets meeting
  - Ohio River Sanitation Commission (ORSANCO) Water Resources Committee meeting
  - GLERL meeting
  - Kentucky USGS WSC meeting
  - Ottawa Flood Mapping Project Media Press Conference
- **Issues**
  - GFS model low level issue especially below 5000 feet noted. Impacting operations. Notified ERH and NCEP with examples. Recommend using GFS with caution until fixed especially during significant heat wave and drought.

## FY2012 AHPS Activities for ABRFC

**Management Lead:** HIC, DOH, SCH

**Objective:** Implement AHPS services in the Arkansas-Red River Forecast Center's area of responsibility.

**Milestones:**

### FY12 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided *see list below	Planned Completion Quarter	Completion Quarter	Notes
	0					

\*Service Types available: Probabilistic on AHPS web, SSHP-SAC, SSHP-API, Flood Inundation Mapping, Water Resources on Western Water web page, Probabilistic displayed only on RFC web page, Probabilistic delivered directly to partner (not on any web page)

### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Forecast Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
Q1								
Q2	0	0	0	0	0	0	0	0
Q3	0	0	0	0	0	0	0	0
Q4								
Total FY12	0	0	0	0	0	0	0	0
Overall Total (FY2000-2012)								

**Accomplishments/Actions:**

2<sup>nd</sup> Quarter FY2012

#### CHPS Innovations

- Soil moisture maps comparing both upper and lower current soil moisture from the RDHM model showing graphics of percent full, monthly normals for the past 16 years, and percent of normal.
- Implemented the VERD RESJ forecast group from a calibration done by RTI in 2008. It allows the forecast group to be run using reservoir simulations from all 4 reservoirs in the group working in tandem. This forecast group could not be defined in NWSRFS due to carryover array restrictions. However it works fine in CHPS. It is also a candidate basin for HEFS implementation.

## **Ensemble/Uncertainty Initiatives**

### **Forcing innovations**

#### **Status of ongoing and new IWRSS innovations**

- Worked with John Halquist of NORSC as well as USACE in Tulsa to prove a concept of implementing HEC-RAS model of Arkansas River below Keystone Dam to Tulsa after receiving input from USACE Tulsa.

#### **Significant external engagement**

- Silver Jackets initiative with Tulsa Corps and OK USGS - Utilization of Multi-Organization Resources in Developing Static and Real-Time Flood Inundation Mapping for Miami Oklahoma
- CoCoRaHS Precipitation Give-Away with NWS Tulsa via Facebook. Found 11 new observers in data sparse counties.
- Provided data to U.S. Department of Justice Environment and Natural Resources Division: Re: United States v. Coffeyville Resources Refining & Marketing, LLC, No. 11-1291 (D. Kan.)
- Working with Aris Georgakakos on studying effects of human regulation on streamflow.

### **3<sup>rd</sup> Quarter FY2012**

## **CHPS Innovations**

### **Ensemble/Uncertainty Initiatives**

- Started HEFS testing of OHD test modules. Setup ingesting from GFS/CFSv2 precip/temp grids on CHPS7,8,9. Configured CHPS7,8,9 to also preprocess these grids into a HEFS readable format.

### **Forcing innovations**

- In the process of working with OHD on running RDHM Snow17 for years 1995-2011 using gridded temps created by OHD. Have plans to incorporate these runs into our soil moisture climatology.

#### **Status of ongoing and new IWRSS innovations**

- Worked with NOHRSC on dambreak initiative with Keystone dam. ABRFC and Tulsa COE have plans to work together in testing dambreak scenarios using CHPS/HECRAS.

#### **Significant external engagement**

- CoCoRAHS Precipitation Give-Away with NWS OUN and LZK via Facebook. Found 40+ new observers in data sparse counties.
- Worked with NCDC to derive acceptable NETCDF format to start sending QPE data in realtime. Set up scripts/crons to send this data daily.

Working on scripts to populate long term archive. Spent many hours working with NCDC on MOA type agreement.

- Created new North American high resolution zoomable daily QPEmaps that include AK and PR for various time periods (up to last 180 days, YTD, WYTD). Also created normals, % of normal maps for corresponding periods. Will be used with new SR RFC status map program being developed by Corey Pieper/Brian W.
- Attended Partners Meeting for the South Central Climate Science Center at Tulsa Office of the US Fish and Wildlife Service
- Attended Tulsa District of the US Army Corps of Engineers Continuity of Operations test at Lake Oologah
- Visited WFO Little Rock, Little Rock District Corps of Engineers and Little Rock USGS
- Ongoing visits for ABRFC personnel to Southwestern Power Administration office to learn what they do

## FY2012 AHPS Activities for LMRFC

**Management Lead:** Suzanne Van Cooten, HIC

**Objective:** Implement AHPS services in the Red, Calcasieu and Atchafalaya River Basins of the Lower Mississippi River Forecast Center's area of responsibility.

**Milestones:**

### FY12 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided *see list below	Planned Completion Quarter	Actual Completion Quarter	Notes
Red	6	MNEL1 LBUL1 LBBL1 CSHL1 GREL1 AEXL1	Prob. AHPS	Q1	Q1	
Calcasieu	11	GLML1 OKDL1 OBCL1 MTTL1 BKDL1 KDRL1 OTBL1 LCRL1 LCHL1 BSLL1 MRML1	Prob. AHPS	Q2	Q2	BKDL1 was additionally implemented as a new service location.
Atchafalaya	7	SMML1 MLVL1 KRZL1 BLRL1 BSRL1 GNDL1 MCGL1	Prob. AHPS	Q3		
Pascagoula	1	HATM6	FIM-Static	Q4		This is in collaboration with the USGS through a Silver Jackets program.

\*Service Types available: Probabilistic on AHPS web (Prob. AHPS), SSHP-SAC, SSHP-API, Flood Inundation Mapping (FIM), Water Resources on Western Water web page (WR/WW), Probabilistic displayed only on RFC web page(Prob. RFC), Probabilistic delivered directly to partner (not on any web page)

### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Flood Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
FY12 Q1	6							
FY12 Q2	11							
FY12 Q3	7							
FY12 Q4	0			1				
Total FY12	24	0	0	0	0	0	0	
Overall Total (FY2000-2012)	234	23	4	6	0	0	0	251

#### Accomplishments/Actions:

#### 2<sup>nd</sup> Quarter FY2012

#### CHPS Innovations

- January 2012, met with the Tennessee River Valley Authority (TVA) to discuss their transition to CHPS and future collaborations with modeling, calibration and development. Have moved forward in working with them on sharing data and LMRFC CHPS configurations.
- April 5, participated via GoToMeeting with WGRFC, TVA, USACE and contractors to discuss development of a RiverWare CHPS Adapter.

#### Ensemble/Uncertainty Initiatives

#### Forcing innovations

#### Status of ongoing and new IWRSS innovations

- Continued on-going work with Mississippi State University on the development of *FloodViz* for dynamic inundation mapping of HEC-RAS output on AWIPS. This included coordination with James Halgren with the hydraulics group at OHD who has been evaluating this and other dynamic mapping techniques.
- Provided historical data to the USACE Memphis/Vicksburg and New Orleans Districts to assist in the development of a community model for the Mississippi River and tributaries that would extend the Ohio Community Model to the Gulf of Mexico. Plans are to implement this in CHPS when available for operations.

#### Significant external engagement

- On January 21<sup>st</sup>, the LMRFC co-hosted a National Weather Ready Open House with WFO LIX attended by NOAA/NWS leadership and the public.
- On 2/27 hosted a visit to the LMRFC with Mississippi Valley Division General Peabody.
- Attended meetings/conference calls with Mississippi Silver Jackets program. One of the actions from this coordination is the future implementation of a new Flood Inundation Mapping location for the Leaf River at Hattiesburg (HATM6) being developed by the USGS.

### 3<sup>rd</sup> Quarter FY2012

- **CHPS Innovations** (e.g. any extensions, configurations, displays, adaptors, collaborations, community models, etc.)
  - On-going discussions with the Tennessee River Valley Authority (TVA) on their transition to CHPS and future collaborations with modeling, calibration and development. Have moved forward in working with them on sharing data and LMRFC CHPS configurations.
  - April 5, participated via GoToMeeting with WGRFC, TVA, USACE and contractors to discuss development of a RiverWare CHPS Adapter.
  - April 16, Katelyn Costanza and David Sutley met with Vicksburg COE to acquire HEC-RAS geometries to improve LMRFC modeling of the Mississippi, Yazoo, Red, and Ouachita Rivers.
  - May 10, LMRFC and RTi discussed and closed out FY11 Ouachita and Red River basin calibrations.
  - May 15, LMRFC commenced issuing daily WKCG1 forecasts.
- **Forcing innovations** (e.g. dual-pol, snow estimation, etc)
- **Status of ongoing and new IWRSS innovations:** Novel collaborations and initiatives in science, technology and stakeholder engagement demonstrating federal partners working together, leveraging resources and providing efficient and effective government (e.g., seamless data exchange, system interoperability and data synchronization, summit to sea modeling, flood inundation mapping, geo-intelligence improvements, common operating picture, etc.). Examples of innovations include the WGRFC web portal, OHRFC HEC-RAS inundation mapping, CNRFCs adaption of RES-SIM.
  - Continued on-going work with Mississippi State University on the development of *FloodViz* for dynamic inundation mapping of HEC-RAS output on AWIPS. This included coordination with OHD's hydraulics group, the evaluation team for this and other dynamic mapping techniques.
  - Provided historical data to the USACE Memphis/Vicksburg and New Orleans Districts to assist in the development of a community model for the Mississippi River and tributaries that would extend the Ohio Community Model to the Gulf of Mexico. Plans are to implement this in CHPS when available for operations.



- Preliminary discussions with Stennis, NGI, and affiliated groups for CIFLOW collaboration with LMRFC.
- **Significant external engagement** (e.g., Silver Jackets, Fusion Team, Congressional activities, Impact-based Decision Support Services (IDSS), etc.)
  - April 19, LMRFC hosted 10 Singapore Government Water Resource Division visitors and showcased operations as an example of how to improve Singapore's flood forecasting operations.
  - May 14, LMRFC staff toured COE Hurricane/Storm Surge protection structures in the New Orleans metro area.
  - May 16, Heath Jones, MVN COE, presented current status of New Orleans flood protection structures and projects in regards to emergency preparedness for this year's hurricane season to LMRFC and LIX staff.
  - May 21, LMRFC and LIX met with Harrison County Emergency Manager to assess data collection needs and to discuss venues of acquiring grant money to replace real-time data network along coastal Mississippi lost during Hurricane Katrina.
  - May 22, Kristen Laursen, NOAA's Gulf of Mexico Regional Coordinator toured LMRFC operations and discussed potential synergies with other NOAA sub-agencies.
  - On-going participation with the Northern Gulf Institute, including hosting a NGI intern, discussing upcoming year funding, and fostering partnerships.
  - June 7, LMRFC staff attended the USGS's National Spatial Data Infrastructure Partnership's Data Mining Workshop in Lafayette, LA and David Welch presented on GIS Data and Data Mining Tools for National Weather Service Hydrologic, Hurricane and Storm Surge Products.
  - LMRFC's Suzanne Van Cooten and David Scholtzhaur served as advisory board members to the Southern Climates Impacts Planning Program (SCIPP) directing NOAA grant funding for university researchers.
  - Attended meetings/conference calls with Mississippi Silver Jackets program. One of the actions from this coordination is the future implementation of a new Flood Inundation Mapping location for the Leaf River at Hattiesburg (HATM6) being developed by the USGS.

## FY2012 AHPS Activities for SERFC

**Management Lead:** HIC, DOH, SCH

**Objective:** Implement AHPS services in the Southeast River Forecast Center's area of responsibility.

**Milestones:**

### FY12 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided *see list below	Planned Completion Quarter	Completion Quarter	Notes
Tombigbee	2	BCKA1 SARA1	Probabilistic	3 <sup>rd</sup>	late	Will finish in 4th
St Johns	5	MDLF1 ASTF1 DLAF1 SNFF1 GENF1	Probabilistic	4 <sup>th</sup>		
Lake Okeechobee	2	LKOKF1 PLMF1	Probabilistic	4 <sup>th</sup>		
Suwanee	1	MACF1	Probabilistic	3 <sup>rd</sup>	late	Will finish in 4th
Altamaha	1	EVRG1	Probabilistic	3 <sup>rd</sup>	late	Will finish in 4th
Choctowatchee	1	BRUF1	Probabilistic	4 <sup>th</sup>		
Central Florida	2	TWWF1 TMTF1	Probabilistic	4 <sup>th</sup>		
Altamaha	1	MACG1	Flood Inundation Mapping	4 <sup>th</sup>		

\*Service Types available: Probabilistic on AHPS web, SSHP-SAC, SSHP-API, Flood Inundation Mapping, Water Resources on Western Water web page, Probabilistic displayed only on RFC web page, Probabilistic delivered directly to partner (not on any web page)

### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Forecast Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
Q1								
Q2								
Q3	4							
Q4	10			1				
Total FY12	14	0	0	1	0	0	0	0
Overall Total (FY2000-2012)	257							

**Accomplishments/Actions:**

**2<sup>nd</sup> Quarter FY2012**

19. **CHPS Innovations**

20. **Ensemble/Uncertainty Initiatives**

- Continued work on MMEFS being output from CHPS instead of NWSRFS

21. **Forcing innovations**

- Have implemented the snow model in portion of the SERFC area. Have not had the opportunity to test them well with such a warm winter but have it in place for next year. All of the implementations so far are in Eastern Region: Virginia and North Carolina
- Dual-pol training has begun with the HAS forecasters in the office and will continue through the rest of the staff and be completed by the end of FY2012.

22. **Status of ongoing and new IWRSS innovations**

23. **Significant external engagement**

- Have had significant work done with Silver Jackets and USGS in Georgia. Working on implementations of inundation maps at Macon, GA. Currently in early stages of development.
- Working with Alabama, Florida, and South Carolina Silver jackets groups on inundation mapping. We are in the very early stages of deciding which points we might implement.

**3<sup>rd</sup> Quarter**

1. **CHPS Innovations**

2. **Ensemble/Uncertainty Initiatives**

- Continued work on MMEFS being output from CHPS instead of NWSRFS

3. **Forcing innovations**

- Have implemented the snow model in portion of the SERFC area. They have been tested and are working in most of eastern Regions WFO's
- Dual-pol training has begun with the HAS forecasters in the office and will continue through the rest of the staff and be completed by August 31<sup>st</sup> of FY2012.

4. **Status of ongoing and new IWRSS innovations**

5. **Significant external engagement**

- Have had significant work done with Silver Jackets and USGS in Georgia. Working on implementations of inundation maps at Macon, GA. Currently in early stages of development.

- Working with Alabama, Florida, and South Carolina Silver jackets groups on inundation mapping. We are in the very early stages of deciding which points we might implement. We will be attending meetings during the 4<sup>th</sup> quarter of this year in talks to add inundation maps in numerous places.
- Continue to stay involved in NIDIS ACF outreach conference calls and outreach efforts.

## FY2012 AHPS Activities for WGRFC

**Management Lead:** Tom Donaldson

**Objective:** Implement AHPS services in the West Gulf River Forecast Center's area of responsibility.

**Milestones:**

### FY12 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided *see list below	Planned Completion Quarter	Completion Quarter	Notes
Pecos River	6	DAYN5 DACN5 LKWN5 CRBN5 MLAN5 RDBN5	Prob. AHPS	Q4		

\*Service Types available: Probabilistic on AHPS web, SSHP-SAC, SSHP-API, Flood Inundation Mapping, Water Resources on Western Water web page, Probabilistic displayed only on RFC web page, Probabilistic delivered directly to partner (not on any web page)

### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Forecast Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
FY12 Q1								
FY12 Q2								
FY12 Q3								
FY12 Q4								
<b>Total FY12</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Overall Total (FY2000-2012)</b>								

**Accomplishments/Actions:**

**2<sup>nd</sup> Quarter FY2012**

#### **CHPS Innovations**

- Began collaboration with Corps of Engineers (COE) and Tennessee Valley Authority (TVA) to develop adaptor for the model Riverware. Fort Worth District COE is funding CADSWES to determine what and how much it will take to develop the adaptor. Once that is established, the Fort Worth District, Albuquerque District and possibly TVA will combine to fund the development of that adaptor in FY 13.

### **Ensemble/Uncertainty Initiatives**

- Began discussions with the University of Texas at Austin for the possibility of providing long range ensemble forecasts out through the end of the summer, beyond our normal 90 day forecasts. They intend to use those forecasts in a model they have developed to help the state of Texas make decisions about water use through the forecast hot dry summer this year.

### **Forcing innovations**

#### **Status of ongoing and new IWRSS innovations**

- Continue collaborations with the University of Texas at Austin and the University of Texas at Arlington to develop regional data and service portals that bring together federal, state, regional and local water resources information in a common data platform. Also continuing conversations with State of Texas to build a statewide portal for that data from the regional pilots mentioned.
- Continue collaborations with the International Boundary and Water Commission and CONAGUA (National Water Commission of Mexico) in building a bi-national, data warehouse containing water resources data and information on the Rio Grande/Rio Bravo basin. Continue development of Inundation Mapping at several locations along the Rio Grande/Rio Bravo incorporating data from bin-national partners in the region.

#### **Significant external engagement**

- Began issuing briefing emails to primary partners (NWS, USACE, USGS, IBWC, various river authorities) prior to and during significant rain/flood events that focus on areas of concern, current conditions, potential threats, and promotion of existing products and services.
- Continuing to work with SR-ROC WRN Pilot Project to develop new IDSS policies and products for the State of Texas during flood events.

### **3<sup>rd</sup> Quarter FY2012**

#### **CHPS Innovations**

24. CADSWES has provided a proposal to the Corps of Engineers to develop a CHPS adaptor for Riverware. The Fort Worth and Albuquerque Districts of the Corps of Engineers and TVA are working together to fund the development of that adaptor in FY 13. WGRFC provided information for the proposal, and will be working with CADSWES on the development of the adaptor.

### **Ensemble/Uncertainty Initiatives**

- Began providing the University of Texas at Austin long range ensemble forecasts for the drought stricken Colorado River basin out through the end of the summer, beyond our normal 90 day forecasts. They intend to use those ensembles in a model they have developed to help the state of Texas make decisions about water use through the forecast hot dry summer this year.

## **Forcing innovations**

### **Status of ongoing and new IWRSS innovations**

- Continue collaborations with the University of Texas at Austin and the University of Texas at Arlington to develop regional data and service portals that bring together federal, state, regional and local water resources information in a common data platform. Also continuing conversations with State of Texas to build a statewide portal for that data from the regional pilots mentioned.
- Continue collaborations with the International Boundary and Water Commission and CONAGUA (National Water Commission of Mexico) in building a bi-national, data warehouse containing water resources data and forecast information on the Rio Grande/Bravo basin.
- Participating in the development phase of the North American Climate Services Partnership Rio Grande/Bravo Pilot Project. The RBG Pilot Project seeks to build bilateral collaboration in enhance climate and drought-related data and services in order to improve water management decisions in the Rio Grande/Bravo Basin. Technical planning meeting scheduled for August 15-16 at the International Boundary and Water Commission Headquarters in El Paso
- Rio Grande Inundation Mapping libraries published on AHPS pages July 1 for Del Rio/Acuna, Eagle Pass/Piedras Negras, Laredo/Nuevo Laredo, and Rio Grande City/ Camargo. This is a culmination of 2.5 years of collaboration with federal partners in the U.S. and Mexico. Began bilateral coordination on development of a second round of Inundation Mapping libraries.

### **Significant external engagement**

- Providing monthly video webinars for the USACE Fort Worth District that focus on midrange climate outlooks and potential impacts on water management decision and reservoir operations. Investigating need to record webinars, making them available to all WGRFC partners and customers through our web page.

## FY2012 AHPS Activities for CBRFC

**Management Lead:** Michelle Stokes, HIC; Andy Wood, DOH; Kevin Werner SCH

**Objective:** Implement AHPS services in the Colorado Basin River Forecast Center's area of responsibility.

**Milestones:**

### FY12 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided *see list below	Planned Completion Quarter	Completion Quarter	Notes

\*Service Types available: Probabilistic on AHPS web, SSHP-SAC, SSHP-API, Flood Inundation Mapping, Water Resources on Western Water web page, Probabilistic displayed only on RFC web page, Probabilistic delivered directly to partner (not on any web page)

### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Forecast Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
Q1								
Q2								
Q3								
Q4								
Total FY12								
Overall Total (FY2000-2012)	84	0	0	0	149	7		

**Accomplishments/Actions** (on each of the following topics that apply):

#### 2<sup>nd</sup> Quarter FY2012

##### 25. CHPS Innovations

- CBRFC has completed the recalibration of its entire area for the new period of record of 1981-2010. The new calibrations were directly incorporated into CHPS via locally developed scripts.

##### 26. Ensemble/Uncertainty Initiatives

##### 27. Forcing innovations

- CBRFC is now ingesting SNODAS and MODSCAG snow grids into CHPS for qualitative uses. We also built tools to look at differences between



those grids and the SWE and areal snow cover in SNOW 17 to highlight areas of potential discrepancies.

**28. Status of ongoing and new IWRSS innovations:**

- The USBR is developing a mid-term operations model (MTOM) to provide probabilistic outlooks of its major reservoirs on the Colorado River system to stakeholders. The MTOM will be used in parallel to the existing model (24 month study) which is run monthly and extends 24 months into the future. Unlike the existing model, the MTOM is based on CBRFC ESP forecasts. USBR and CBRFC have worked together to develop the connectivity between the two modeling system. In the near future, CBRFC intends to develop HEFS based 24 month ensemble forecasts to support the MTOM.

**29. Significant external engagement**

**3<sup>rd</sup> Quarter FY2012**

(No report submitted)

## FY2012 AHPS Activities for CNRFC

**Management Lead:** Rob Hartman, HIC; Art Henkel, DOH; Alan Haynes SCH

**Objective:** Implement AHPS services in the California-Nevada River Forecast Center's area of responsibility.

**Milestones:**

### FY12 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided *see list below	Planned Completion Quarter	Completion Quarter	Notes
Bear Creek	1	McKee Road (MEEC1)	Probabilistic on AHPS Web Page	3 <sup>rd</sup>	2 <sup>nd</sup>	
Feather River	1	Portola (MFTC1)	Probabilistic on AHPS Web Page	2 <sup>nd</sup>	1 <sup>st</sup>	

\*Service Types available: Probabilistic on AHPS web, SSHP-SAC, SSHP-API, Flood Inundation Mapping, Water Resources on Western Water web page, Probabilistic displayed only on RFC web page, Probabilistic delivered directly to partner (not on any web page)

### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Forecast Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
Q1	1							
Q2	1							
Q3								
Q4								
Total FY12	2							
Overall Total (FY2000-2012)	30	0	0	0	58	0		

**Accomplishments/Actions** (on each of the following topics that apply):

**2<sup>nd</sup> Quarter FY2012**

- **CHPS Innovations**
  - Implemented Snow Updating functionality developed by Deltares for Bonneville Power Administration. Solid results.
- **Ensemble/Uncertainty Initiatives**
  - Operationally supporting daily ESP runs with 14-days of XEFS forcings for ~150 locations. Suite of standard products available plus a “build your own” interface.

- **Forcing innovations**
  - Making solid progress on replacement forcings for OFS. Key breakthrough was the system-wide update of calibration MAPs and MATs for the 1949-2010 period. This created an approximate 10-year overlap period with our real-time analysis that permits scaling and offset adjustments. Full implementation planned in the next few months.
  
- **Status of ongoing and new IWRSS innovations**
  - Expanding use of ResSim in the FCO process to consider ensembles. Took delivery of ensemble-ready ResSim from HEC in March. Testing underway. Likely implementation in FY13.
  
- **Significant external engagement**
  - Nevada Silver Jackets. Working on flood inundation demonstrations.
  - Forecast Coordinated Operations (USACE, CADWR, NOAA, operating agencies). Feeding single value forecasts into FCO decision support interface supported by CDEC. System uses CNRFC forecasts and a joint ResSim model to help operators make release decisions that are coordinated with other projects. System provides agency specified releases back to CNRFC for inclusion in operations (downstream forecasts).
  - USBR / Truckee River Operations Agreement – feeding single value forecasts into a spreadsheet-based decision support model. Feeding ensembles into River Ware.
  - NIDIS demonstrations in California. 4 projects are Southern California, Central Valley, North Bay, Klamath.
  - Assisting USACE with development of new rule curves for Folsom Reservoir. Integrating information and forecasts from CNRFC. USACE, NOAA, CADWR, USBR, SAFCA, and others.
  - Co-Pi in SARP grant to understand user requirements and engineer improved water supply products and information in the Klamath Basin. NOAA, NRCS, USBR, Houston Engineering.

**3<sup>rd</sup> Quarter FY2012**

(No report submitted)

## FY2012 AHPS Activities for NWRFC

**Management Lead:** Harold Opitz, HIC; Joe Intermill SCH

**Objective:** Implement AHPS services in the Northwest River Forecast Center's area of responsibility.

**Milestones:**

### FY12 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided *see list below	Planned Completion Quarter	Completion Quarter	Notes
Boise	1	Boise Below Diversion Dam (BDDI1)	Probabilistic only on RFC Web Page	1 <sup>st</sup>	1 <sup>st</sup>	
Pend Orielle	1	Hope (HOPI1)	Probabilistic only on RFC Web Page	1 <sup>st</sup>	1 <sup>st</sup>	
Henrys Fork	1	Island Park Dam (IPDI1)	Probabilistic only on RFC Web Page	1 <sup>st</sup>	1 <sup>st</sup>	
Willow Creek	1	Ririe Dam (RIDI1)	Probabilistic only on RFC Web Page	1 <sup>st</sup>	1 <sup>st</sup>	
Snake	1	Nyssa (SNY11)	Probabilistic only on RFC Web Page	1 <sup>st</sup>	1 <sup>st</sup>	
Clarks Fork	1	Noxon Rapids Dam	Probabilistic only on RFC Web Page	1 <sup>st</sup>	1 <sup>st</sup>	
Rogue	1	Agnes (AGNO3)	Probabilistic only on RFC Web Page	1 <sup>st</sup>	1 <sup>st</sup>	
Willamette	1	Albany (ALBO3)	Probabilistic only on RFC Web Page	1 <sup>st</sup>	1 <sup>st</sup>	
Applegate	1	Applegate	Probabilistic only on RFC Web Page	1 <sup>st</sup>	1 <sup>st</sup>	
Blue	1	Blue Reservoir (BLUO3)	Probabilistic only on RFC Web Page	1 <sup>st</sup>	1 <sup>st</sup>	
Rogue	1	Eagle Point (EGLO3)	Probabilistic only on RFC Web Page	2 <sup>nd</sup>	2 <sup>nd</sup>	
South Santiam	1	Foster Dam	Probabilistic only on RFC Web Page	2 <sup>nd</sup>	2 <sup>nd</sup>	
Middle Santiam	1	Green Peter Dam	Probabilistic only on RFC Web Page	2 <sup>nd</sup>	2 <sup>nd</sup>	
Cow Creek	1	Galesville Reservoir (CSVO3)	Probabilistic only on RFC Web Page	2 <sup>nd</sup>	2 <sup>nd</sup>	

Willamette	1	Harrisburg (HARO3)	Probabilistic only on RFC Web Page	2 <sup>nd</sup>	2 <sup>nd</sup>	
Columbia	1	John Day Dam (JDAO3)	Probabilistic only on RFC Web Page	2 <sup>nd</sup>	2 <sup>nd</sup>	
Snoqualmie	1	Carnation (CRNW1)	Probabilistic only on RFC Web Page	2 <sup>nd</sup>	2 <sup>nd</sup>	
South Umpqua	1	Roseburg (RSBO3)	Probabilistic only on RFC Web Page	2 <sup>nd</sup>	2 <sup>nd</sup>	
Long Tom	1	Monroe (MNRO3)	Probabilistic only on RFC Web Page	2 <sup>nd</sup>	2 <sup>nd</sup>	
Snohomish	1	Monroe (MROW1)	Probabilistic only on RFC Web Page	2 <sup>nd</sup>	2 <sup>nd</sup>	
Boise	1	Boise (BIGI1)	Flood Inundation Mapping	3 <sup>rd</sup>		Inundation mapping information has been delivered to Orion and is undergoing final QC

\*Service Types available: Probabilistic on AHPS web, SSHP-SAC, SSHP-API, Flood Inundation Mapping, Water Resources on Western Water web page, Probabilistic displayed only on RFC web page, Probabilistic delivered directly to partner (not on any web page)

#### AHPS Service Location Summary

Time Frame	Probabilistic AHPS Web	Site Specific (SAC)	Site Specific (API)	Forecast Inundation Map	Water Resources Sites on W. Water Web Page	Probabilistic RFC Web Only	Other	Number Unique Locations
Q1						10		
Q2						10		
Q3				1				
Q4								
Total FY12				1		20		
Overall Total (FY2000-2012)	142	0	0	1	105	20		

**Accomplishments/Actions** (on each of the following topics that apply):

2<sup>nd</sup> Quarter FY2012

- CHPS Innovations
- Ensemble/Uncertainty Initiatives
- Forcing innovations

- **Status of ongoing and new IWRSS innovations:**
- **Significant external engagement**

**3<sup>rd</sup> Quarter FY2012**  
(No report submitted)

## **Outreach and Training**

## FY12 Hydrology Program Outreach & Training Work Plan

**Theme:** Hydrologic Services Outreach

**Management Lead:** Tom Graziano, Lora Mueller, Regional Hydrologic Services Program Representatives

**Objectives:** Accomplish outreach and training efforts 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 and training materials for use by national, regional, and local personnel.

### Milestones

Tasks	Org	Cost (\$1000)	Quarter Due Date	Status
Go-To-Meeting License for HSD	OCWWS	0	1	Deferred
Annual IAEM Conference	OCWWS	2.5	1	Complete
Annual FEMA Flood Conference (OCWWS Outreach funds)	OCWWS	0	3	Complete
Annual ASFPM Conference (OCWWS Outreach funds)	OCWWS	0	3	Complete
2012 National Flood Workshop	OCWWS	2.7	3	Cancelled
8 <sup>th</sup> Annual Flood Safety Awareness Week (Mar 11-17, 2012)	OCWWS	0	3	Complete
NHWC 2013 Annual Conference Title Sponsorship		25.0	3	Complete
NHWC Membership Renewal (3 years at \$650)	OCWWS	19.5	4	Pending
Tadd Signs x 3	OCWWS	9.0	4	Cancelled
AHPS Product Simplification and Improvement	OCWWS	18.0	4	Cancelled
<b>Outreach Subtotal</b>		<b>76.7</b>		
DOH Workshop (Virtual)	OCWWS	0	3	Complete
HPM Course (\$43k provided through NSTEP/AWIPS) (will be covered by \$30k from CIMMS Contract)	OCWWS	0	3	Complete
FF Operations Course (20k+40k COMET/FDTB)	OCWWS	60.0	3	Complete
CHPS (To TC)	OCWWS	54.0	4	
RFC Simulations (\$56k prepay and add'l \$14k provided through NSTEP/base for NWSTC staff and SME)	OCWWS	56.0	4	
WFO Simulations (\$44k provided through NSTEP/base)	OCWWS	0	4	
Hydro PDS (COMET \$54k/FDTB \$10k field travel)	OCWWS	64.0	FY13/14	On Schedule
<b>Training Subtotal</b>		<b>170.</b>		
<b>HSD Total</b>		<b>246.7</b>		
<b>Eastern Region</b>				
Mississippi Basin Tri-Agency Meeting (OHRFC); Location: St. Louis, MO	ER	1.0	1	Complete
Virginia Silver Jackets Initiative (MARFC); Location: Richmond, VA	ER	0.4	1	Complete
Maumee River Basin Commission Coordination Meeting, WFO North Webster Office Visit (OHRFC); Location: North Webster, IN	ER	0.1	1	Complete
Kentucky Silver Jackets Initiative (OHRFC); Location: Frankfort, KY	ER	0.3	2	Complete
Hudson River Estuary Development Workshop (NERFC); [Participated remotely]	ER	0.8	2	Complete
NOAA in the Carolinas (SERFC); Location: Charleston, SC	ER	0.8	2	Complete
SCH North Carolina Trip - Water Resources Conference, Emergency Management Meeting, WFO Raleigh Office Visit (SERFC); Location: North Carolina	ER	0.8	2	Not Completed
Coordination Meeting with New York City Department of Environmental Protection (NERFC); Location: Grahamsville, NY	ER	0.5	2	Not Completed
Ohio River Basin Alliance Meeting, USACE Nashville District Coordination Meeting, WFO Nashville Office Visit (OHRFC); Location: Nashville, TN	ER	1.0	2	Not Completed



NJ Emergency Preparedness Association Conference (MARFC); Location: Atlantic City, NJ	ER	0.8	3	Complete
Kentucky Silver Jackets Initiative, USACE Louisville District Coordination Meeting, WFO Louisville Office Visit (OHRFC); Location: Louisville & Lexington, KY	ER	0.5	3	Not Complete
Focal Point Familiarization Visit – Finger Lakes and Buffalo Creeks, USACE Mt Morris Reservoir Operations, USGS Coordination Meeting (NERFC); Location: Western New York	ER	1.5	3	Not Complete
WFO Paducah Office Visit (OHRFC); Paducah, KY	ER	0.4	3	Not Complete
USACE Baltimore District Coordination Meeting (MARFC); Location: Baltimore, MD	ER	0.4	3	Not Complete
WFO Central Illinois Office Visit (OHRFC); Location: Lincoln, IL	ER	0.4	3	Not Complete
Saint John River International Coordination Meeting (NERFC); Location: Canada	ER	1.4	3	Not Complete
Coordination Meeting with the US Army Corps of Engineers Wilmington District (SERFC); Location: Wilmington, NC	ER	1.0	3	Not Complete
FEMA Region III Coordination Meeting (OHRFC); Location: Philadelphia, PA	ER	0.8	4	
Pennsylvania Association of Flood Plain Managers Conference (MARFC); Location: Pittsburgh, PA	ER	1.0	4	
WFO Jackson Office Visit (OHRFC); Location: Jackson, KY	ER	0.1	4	
<b>Outreach Sub Total</b>		<b>14.0</b>		
Ohio Valley Tri-Agency Meeting	OHRFC	2.5	1	Complete
PEMA Quarterly Training	MARFC	1.0	1-4	Q1 Completed
Northeast HPM/RFC Workshop	NERFC	3.0	2	Not Completed
NE Federal Water Agencies Meeting	HSD	1.4	2	Not Completed
Mid-Atlantic HPM/RFC Workshop	MARFC	4.0	3	Not Complete
Virtual GIS Training	NERFC	1.0	4	
<b>Training Sub Total</b>		<b>12.9</b>		
<b>ER Total</b>		<b>26.9</b>		
<b>Central Region</b>				
NCRFC Spring Flood Outreach	CR	0.5	2	Cancelled
NCRFC Souris River Basin Meeting (Regina, SK): <b>Completed using local RFC travel budget</b>	CR	0	2	Completed
NCRFC WFO visit to FGF: <b>Completed in Q2 using local RFC travel budget</b>	CR	0	2	Completed
NCRFC WFO visit to LOT: <b>Completed in Q2 using local RFC travel budget</b>	CR	0	2	Completed
NCRFC Red River Basin Commission Ex-Officio Meeting: <b>Plan to use local RFC travel budget</b>	CR	0	4	
RTI AHPS Contract Meeting (MBRFC): <b>Plan to use local RFC travel budget</b>	CR	0	4	
MBRFC WFO visit to BOU/CYS/RIW: <b>Plan to use local RFC travel budget</b>	CR	0	4	
MBRFC WFO visit to OAX/FSD/DMX: <b>Plan to use local RFC travel budget</b>	CR	0	4	
High Water Mark Signs	CR	0.7	4	Cancelled
Stormwater Floodplain Simulation System	CR	2.7	4	Cancelled
NCRFC WFO visit to FSD	CR	0.4	4	Cancelled
NCRFC WFO visit to GRB meet with Detroit USACE	CR	0.4	4	Cancelled
NCRFC WFO visit to MKX	CR	0.5	4	Cancelled
NCRFC WFO visit to DLH and MQT for customer meetings	CR	1.0	4	Cancelled
<b>Outreach Sub Total</b>		<b>6.2</b>		
MBRFC Workshops: <b>Plan to use regional funds – No AHPS funds</b>	CR	0	4	
NCRFC Workshops: <b>Plan to use regional funds – No AHPS funds</b>	CR	0	4	
<b>Training Subtotal</b>		<b>0</b>		
<b>CR Total</b>		<b>6.2</b>		
<b>Southern Region</b>				
ABRFC – High Water Mark Sign Ceremony/WFO Visit Location: Amarillo, TX	SR	0.2	1	Completed

ABRFC - Mississippi River Tri-Agency Meeting Location: St. Louis, MO	SR	0.6	1	Completed
ABRFC – OK Governor’s Water Conference Location: Norman, OK	SR	0.4	1	Completed
LMRFC – Mississippi River Tri-Agency Meeting Location: St. Louis, MO	SR	0.7	1	Completed
ABRFC – USACE/WFO Visit Location: Wichita, KS	SR	0.8	1	Completed
LMRFC – TVA/NWS Meeting Location: TBD	SR	0.8	2	Completed
SERFC – Forecaster Visits to WFOs/Partners Location: TBD	SR	1.2	1-4	Cancelled
SR HSB – High Water Mark Sign Program	SR	0.5	1-4	Cancelled
SR HSB – WFO AHPS Outreach Support	SR	1.5	1-4	Cancelled
ABRFC – Oklahoma Emergency Management Meeting Location: Oklahoma City, OK	SR	0.3	2-4	Cancelled
ABRFC – Arkansas Emergency Management Operations Center Location: Little Rock, AR	SR	0.2	2-4	Cancelled
LMRFC – Visit to USACE LRD Location: Cincinnati, OH	SR	1.5	3	Cancelled
SERFC – SCH Visit Location: Florida	SR	0.5	3	Cancelled
SERFC – SCH Visit Location: Alabama	SR	0.3	3	Cancelled
SERFC – DOH on the Road Location: TBD	SR	1.0	3	Cancelled
WGRFC - IBWC Annual Meeting Location: TBD	SR	0.75	3	Cancelled
WGRFC - Southeast Texas Water Managers Meeting Location: TBD	SR	0.75	3	Cancelled
WGRFC - IBWC Flood Workshops Location: Rio Grande Valley	SR	0.5	3	Cancelled
ABRFC – Red River Valley Authority Meeting Location: TBD	SR	0.25	4	Cancelled
ABRFC – Outreach Materials	SR	0.25	4	Cancelled
WGRFC - AHPS Outreach for Carlsbad Irrigation District/Pecos River Basin Customers and WFO MAF visit Location: Carlsbad, NM and Midland, TX	SR	1.0	4	Cancelled
<b>Outreach Sub Total</b>		<b>14.0</b>		
SERFC – NOAA Hurricane Conference (MMEFS Training)	SR	1.0	1	Completed
ABRFC – USACE/USGS/WFO Visit Location: Little Rock, AR	SR	0.8	1	Cancelled
ABRFC – WFO Visit Location: Springfield, MO	SR	0.2	2	Cancelled
SERFC – HPM Visits to RFC	SR	0.8	2-4	Cancelled
WGRFC - Forecaster Familiarization Trips	SR	1.5	2-4	Cancelled
WGRFC – WFO Visitations to ELP, SJT, SHV	SR	1.5	2-4	Cancelled
ABRFC – WFO Visits Locations: Dodge City, KS and Pueblo, CO	SR	1.2	3	Cancelled
SERFC – National Hurricane Conference (FEMA Training)	SR	1.2	3	Cancelled
ABRFC – Kansas USGS/Kansas Emergency Operations Center/WFO Locations: Topeka and Lawrence, KS	SR	0.8	3-4	Cancelled
LMRFC – WFO Training Visits	SR	2.3	4	Cancelled
LMRFC – HPM Visit to RFC	SR	0.7	4	Cancelled
<b>Training Sub Total</b>		<b>12.0</b>		
<b>SR Total</b>		<b>26.0</b>		
<b>Western Region-</b>				
Travel and Registration for 1 WRH person to attend Alert Users Group Conference in Reno in May, 2012 (WRH)	WR	2.0	3	Cancelled
Travel and Registration for SGX HPM to attend Alert Users Group Conference in Reno in May, 2012 (WFO SGX)	WR	1.6	3	Cancelled
Travel and Registration for LOX SSH to attend Alert Users Group Conference in Reno in May, 2012 (WFO LOX)	WR	1.5	3	Cancelled
Purchase surveying equipment to support forecast point development/evaluation and Post-flood damage surveying (WFO PSR)	WR	1.4	4	
TADD Outreach Materials (WFO LOX)	WR	1.1	4	
TADD signs (WFO TWC) – used signs from PSR	WR	0	4	Complete
Wards Stormwater Floodplain Model (WFO GGW)	WR	1.4	4	
High Water Mark signs (WFO GGW)	WR	0.3	4	
TADD Signs (WFO GGW)	WR	0.5	4	

TADD Signs (WFO SEW)	WR	0.6	4	
High Water Mark Signs (WFO SEW)	WR	0.2	4	
Outreach Materials (WFO SEW)	WR	0.8	4	
TADD Signs (WRH)	WR	0.4	4	
High Water Mark Signs (WFO MFR)	WR	0.3	4	
TADD Signs (WFO STO)	WR	1.4	4	
<b>Outreach Sub Total</b>		<b>13.5</b>		
Travel for LOX SSH to attend Southwest Wildfire Hydrology Workshop in Tucson, AZ (WFO LOX) – Local Funds	WR	0	3	Complete
Conduct a Montana Hydrology Conference (WFO TFX)	WR	4	4	
Travel to support WFO TWC SH visit to another WFO for training (TWC)	WR	1.4	4	
Travel to attend Montana Hydrology Conference (WFO GGW)	WR	0.7	4	
Support for Southwest Wildfire Hydrology Workshop in Tucson, AZ (WRH)	WR	2.5	4	
Travel to support CBRFC/SH meeting	WR	2.5	4	
<b>Training Sub Total</b>		<b>11.1</b>		
<b>WR Total</b>		<b>24.6</b>		
<b>Alaska/Pacific Regions</b>				
Attend State AWRA meeting in Juneau (visit WFO) (Outreach)	AR	1.5	2	Cancelled – budget
Attend Bethel Search and Rescue meeting in Bethel – make presentation on Riverwatch (Outreach)	AR	.7	2	Cancelled – budget
Attend Interagency Hydrology Committee of Alaska Meeting in Fairbanks Juneau (visit WFO) (Outreach)—Attended by Juneau MIC and SH	AR	0	3	Complete
Flow Measurement Training Koyukuk (Training)	AR	2.5	3	Cancelled – budget
Meteorology Correspondence course for hydrologist (Training)	AR	0.5	3	Cancelled – budget
Flow Measurement Training Upper Yukon (Training)	AR	2.5	4	Cancelled – budget
Flow Measurement Training Lower Yukon and Outreach to villages (Training & Outreach)	AR	2.0	4	Cancelled – budget
Visit Pacific Region in Honolulu – Outreach and training on RDHM (Outreach and training)	AR	3.8	4	Cancelled – budget
<b>A/PR Total</b>		<b>13.5</b>		

### Accomplishments/Actions

1<sup>st</sup> Quarter FY12

2<sup>nd</sup> Quarter FY12

3<sup>rd</sup> Quarter FY12

- DOH Workshop completed virtually
- HPM course funded through CIMMS contract \$'s due to differences in FY payment dates between fed gov't and OU
- NHWC Sponsorship secured for 2013 conference

4<sup>th</sup> Quarter FY11

### Problems Encountered/Issues

1<sup>st</sup> Quarter FY12

- OCWWS HSD: Lack of funding thus far has not allowed us to complete two of the 3 first quarter items. Plans are to complete them if \$\$ allow.

2<sup>nd</sup> Quarter FY12

- SR: Due to budget cuts in the AHPS Program, SR HSB cancelled all remaining AHPS Outreach/Training Activities early in Q2. These activities will not be conducted unless SR HSB receives funding from the AHPS Program.

3<sup>rd</sup> Quarter FY12

- SR: Due to budget cuts in the AHPS Program, SR HSB cancelled all remaining AHPS Outreach/Training Activities early in Q2. These activities will not be conducted unless SR HSB receives funding from the AHPS Program.

4<sup>th</sup> Quarter FY12

# **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 FY12 Milestones	Responsible	FY12 Quarter Completion Date
OHD Portfolio Definition	OHD	Q4
AHPS Planning/ Execution/ Reporting <ul style="list-style-type: none"> <li>• E-CPIC Updates</li> <li>• Monthly Status for NWS Monthly Report</li> </ul>	OHD OHD/Regions	Quarterly Monthly
NOAA SEE Hydrology Program Support <ul style="list-style-type: none"> <li>• Program Operating Plan</li> <li>• Quarterly Program Review</li> </ul>	OHD OHD	3 <sup>rd</sup> Quarterly
Agency/ Department/ Legislative Interfaces <ul style="list-style-type: none"> <li>• Budget Fact Sheet</li> <li>• Prepare and submit Budget Request</li> <li>• Prepare Briefings and Support OMB/Congressional Meetings</li> <li>• Prepare Response to Pass Back</li> <li>• Prepare Response to Budget Hearing Questions</li> <li>• Program Assessment Rating Tool Progress</li> </ul>	OHD OHD OHD  OHD OHD OHD	1 <sup>st</sup> 2 <sup>nd</sup> 3 <sup>rd</sup>  3 <sup>rd</sup> 4 <sup>th</sup> Quarterly
HOSIP Process Improvement and Document Development <ul style="list-style-type: none"> <li>• Instructions</li> <li>• Guidance &amp; Standards</li> <li>• Performance Statistics</li> <li>• Quality Control Reports</li> <li>• Validation &amp; Recommendation Reports</li> <li>• HOSIP Documents</li> <li>• Gate Status, Branch Chief Status Reports</li> </ul>	OHD OHD OHD OHD OHD OHD OHD	Quarterly Quarterly Quarterly Quarterly Quarterly Quarterly Weekly

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY12

- All milestones are on schedule – all scheduled reports completed
- Congress passed the “mini-bus” bill with Dept. of Commerce appropriation on Dec. 16.
- Don Cline has developed a proposed 5-year plan and associated budget. Waiting for budget to be finalized by 18<sup>th</sup> floor.
- All AHPS project management is being handled by government FTE - Quarterly AHPS reports are being compiled by Dennis Miller. Other reporting handled by other government FTE (John Ingram, Ken Pavelle).

#### 2<sup>nd</sup> Quarter FY12

- All milestones are on schedule – all scheduled reports completed
- Proposed 5-year plan and associated budget (see Q1 item) require extensive rework due to extensive budget cuts.
- HOSIP/OSIP efforts have been scaled back with loss of funding for contract support and transfer of responsibilities to FTE (Donna Page and Dennis Miller)

#### 3<sup>rd</sup> Quarter FY12

- All milestones are on schedule – all scheduled reports completed
- Exhibit 300 updated with plan to realign OHD 3 FISMA systems (NOHRSC, HADS, DEIT) into one.
- Budget uncertainty remains. Reprogramming efforts by NWS/NOAA still evolving.
  - Will need to act quickly to push procurements through when budget is finalized.
- OHD/HSD developed plans for the AHPS Conference Mark Increase (\$2M)

#### **4<sup>th</sup> Quarter FY12**

### **Problems Encountered/Issues**

#### **1<sup>st</sup> Quarter FY12**

- NWS dealing with major budget deficit. OHD is being assessed for additional costs. OHD has proposed some initial budget cuts which will be finalized in the coming months.

#### **2<sup>nd</sup> Quarter FY12**

- NWS budget not yet finalized so more cuts are possible.

#### **3<sup>rd</sup> Quarter FY12**

- NWS budget not yet finalized – uncertainty remains.

#### **4<sup>th</sup> Quarter FY12**