



# Advanced Hydrologic Prediction Service Quarterly Report 4<sup>th</sup> Quarter FY 2014



November 1, 2014

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## **Quantify Uncertainty (Ensembles)**

## Hydrological Ensemble Forecast Service (HEFS) Rollout

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

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

**Objectives:** Provide the HEFS to all RFCs

### Milestones

Task	Due Date	Status
Complete operational testing of the HEFS Version 1 to provide routine real-time HEFS for the New York City water supply.	FY14, Q2	Completed. The operational test was successfully completed in Dec. 2013 showing that daily HEFS forecasts are being provided to the NYC Department of Environmental Protection by MARFC and NERFC for the area covering the NYC water supply.
Complete concept of operations document for the use of HEFS at RFCs.	FY14, Q3	Completed.
Operational integration of HEFS Version 1 into the CHPS software baseline and release to all RFCs.	FY14, Q4	Completed incorporation of HEFS into CHPS in Jan. 2014. The combined CHPS-HEFS was delivered to all RFCs on a CHPS hardware refresh which was completed September 2014.
Provide training to thirteen (13) RFCs on the use of HEFS within CHPS.	FY14, Q4	Completed. In January 2014, training was completed for representatives of five HEFS test RFCs, and, in August 2014, training was provided to the remaining eight RFCs.

### Accomplishments/Actions

This project is the next phase in the HEFS project after the HEFS Phase 1 Implementation (AHPS project). To provide a smoother transition in the AHPS reporting, the status from the last quarter of the prior project is included here.

#### 4<sup>th</sup> Quarter FY13

- The five (5) HEFS Test RFCs expanded their use of HEFS Development Release 3, Phase 2 (HEFS-0.3.2) to varying degrees to produce real-time daily HEFS forecasts.
  - NERFC and MARFC are creating HEFS forecasts for 22 forecasts locations within the NYC water supply. MARFC is also creating HEFS forecasts for internal use at all points on the Delaware River.
  - CNRFC is producing HEFS forecasts on their operational CHPS for approximately 150 locations
  - ABRFC is producing HEFS forecasts with the latest build for approximately 20 forecast points (or 50 segments).
  - CBRFC is producing HEFS forecasts on their operational CHPS for all points above L. Powell which is approximately 240 points.
- OHD also conducted a training workshop on the release in September for members of the HEFS Test RFCs and NWS hydrology support staff.
- OHD continues a multi-phase science evaluation of HEFS performance for a variety of forcings and locations.
  - During the quarter, OHD completed an evaluation and draft report of the Phase 2 of the HEFS science evaluation. In that phase, OHD evaluated long-range HEFS forecasts v. climatology-based performance for locations within the NYC water supply. As part of this effort, the resulting hindcasts were provided to NYC Department of Environmental Protection for their use in managing the NYC water supply.
  - OHD also continued work on Phase 3, in which HEFS skill will be compared using the Global Ensemble Forecast System (GEFS) v. Global Forecast System (GFS) over a 14-day forecast horizon. This phase is due to complete by the end of Dec. 2013.

- Representatives from the five RFCs and key HEFS team members continue to meet regularly to provide feedback to OHD.

### **1<sup>st</sup> Quarter FY14**

- In December 2013, an operational test was successfully completed. The test validated that HEFS and ESP climate-based stream-flow forecasts are being provided daily to the New York City Department of Environmental Protection (NYCDEP) by MARFC and NERFC for the locations covering the city's water supply.
- OHD started a rough draft of the HEFS Concept of Operations (ConOps) document.
- The five (5) HEFS Test RFCs continue to expand their use of HEFS to varying degrees to create real-time daily ensemble stream-flow forecasts.
  - NERFC and MARFC are creating HEFS forecasts for 22 forecasts locations within the NYC water supply.
  - MARFC also creates HEFS forecasts for internal use at all (53) locations on the Delaware River.
  - CNRFC creates HEFS forecasts for approximately 150 locations
  - ABRFC creates HEFS forecasts for approximately 200 stream-flow locations.
  - CBRFC creates HEFS forecasts for all (~240) locations above L. Powell.
- As part of the integration of HEFS into the CHPS baseline, OHD completed a version of HEFS (1.0.2) which combined HEFSV1 (released in Sep. 2013) with the latest CHPS. This version was provided a) to the five HEFS test RFCs for their beta use and b) for integration with the CHPS baseline.
- OHD hosted a training workshop on HEFS hindcasting and verification. The workshop was attended by representatives of the five HEFS test RFCs and NWS hydrology support staff. This workshop is the final training workshop for the representatives of the five RFCs.
- OHD completed the third (and final) science evaluation of HEFS performance for a variety of forcings and locations. This evaluation compared HEFS skill using the GEFS v. GFS over a 14-day forecast horizon. The report is available at [HEFS phase III science validation final report](#)
- Representatives from the five RFCs and key HEFS team members continue to meet regularly to provide feedback to OHD.

### **2<sup>nd</sup> Quarter FY14**

- In March 2014, a draft HEFS ConOps document was provided for review by the five HEFS test RFCs.
- The five (5) HEFS Test RFCs continue to expand their use of HEFS to varying degrees to create real-time daily ensemble stream-flow forecasts. NERFC and MARFC continue to provide HEFS forecasts for 22 forecasts locations within the NYC water supply. Besides those locations, the five RFCs also create the following:
  - MARFC also creates HEFS forecasts for 53 stream-flow locations.
  - NERFC also creates HEFS forecasts for 6 stream-flow locations.
  - CNRFC creates HEFS forecasts for 199 stream-flow locations.
  - ABRFC creates HEFS forecasts for 239 stream-flow locations.
  - CBRFC creates HEFS forecasts for 331 stream-flow locations.
- In January 2014, HEFS was incorporated into the CHPS baseline. The combined HEFS-CHPS baseline will be delivered to the field along with refresh of CHPS hardware due to complete by September 2014. The CHPS hardware refresh is being done via a refresh of the Advanced Weather Interactive Processing System (AWIPS).
- OHD hosted a training workshop on HEFS hindcasting and verification. The workshop was attended by representatives of the five HEFS test RFCs and NWS hydrology support staff. This workshop is the final training workshop for the representatives of the five RFCs.
- OHD is investigating a bias in the HEFS Meteorological Ensemble Forecast Processor.
- Representatives from the five RFCs and key HEFS team members continue to meet regularly to provide feedback to OHD.

### **3<sup>rd</sup> Quarter FY14**

- The HEFS ConOps document was finalized, although the ConOps will continue to evolve as we learn more. In particular, there are a couple of on-going issues which need substantial consideration, such as dealing with ensemble v. deterministic forecasts and how best to display

ensemble information. However, these are also issues for the world-wide hydrology ensemble community. All RFCs and NWS Regions were given an opportunity to review the document.

- In April 2014, maintenance release HEFS 1.1.1 was made available.
- OHD began preparation of the HEFS Training Workshop in August 2014 which will be hosted at the NWS Training Center in Kansas City, MO. The Workshop will be attended by two staff from each of the eight RFCs new to HEFS plus one staff from the NWS Hydrologic Support Branch.
- The five (5) HEFS Test RFCs continue to expand their use of HEFS to varying degrees to create real-time daily ensemble stream-flow forecasts. NERFC and MARFC continue to provide HEFS forecasts for 22 forecast locations within the NYC water supply.
- OHD continues to investigate a bias (probability of precipitation) in the HEFS Meteorological Ensemble Forecast Processor.
- OHD co-hosted the 10<sup>th</sup> Annual Hydrologic Ensemble Prediction Experiment (HEPEX) Workshop held in College Park, MD. The workshop was attended by several folks from OHD and RFCs and key HEFS partners and the international community. A few international groups and countries have also begun hydrologic ensemble prediction services.
- HEFS Meetings have started to include representatives from the all RFCs, in addition to HEFS team members. So far, the meetings were every few weeks in order to a) discuss the ConOps, b) share information on the up-coming plans, especially the HEFS Training Workshop in August 2014, and c) to share feedback on HEFS. After the training, the meetings will meet about every two weeks.

#### **4<sup>th</sup> Quarter FY14**

- In August 2014, the HEFS Training Workshop was attended by two representatives from eight RFCs and one representative from HSD. As a result, all RFCs have had staff trained on HEFS. The training was provided by OHD at the National Weather Service Training Center.
- Eight RFCs (that just attended the HEFS training) started the process of installing, calibrating, and running HEFS at their RFC. The plan is for these RFCs to run HEFS at a limited number of forecast locations through 2014 and then expand coverage in 2015.
- OHD completed its investigation of the bias in probability of precipitation in the HEFS MEFP. A fix to MEFP will be in the up-coming HEFS (1.2.1) build.
- OHD continues to work on the up-coming HEFS (1.2.1) build, and at the end quarter was in the final phases of testing. This build is on track for release in late October 2014.
- OHD continued to develop plans with NCEP for their numerical weather model upgrades, especially the up-coming GEFS upgrade (scheduled for middle FY15) and the number of reforecasts.
  - To support those plans, OHD started a reforecast sensitivity study, an evaluation comparing the sensitivity of HEFS performance to the number of reforecasts. The results of the study will be used to support decisions with NCEP on how many reforecasts are needed for weather model updates (by NCEP).
  - NCEP has committed to running the current version of the GEFS in parallel with the up-coming upgraded version for a year beyond the start of the upgraded version.
  - OHD also advanced plans with NCEP to have the CFS and, eventually, the GEFS data used by HEFS distributed over the Satellite Broadcast Network (SBN), an extremely reliable means of distributing large operational datasets. The CFS data is now planned for distribution over the SBN around the beginning of CY15.

### **Problems Encountered/Issues**

#### **4<sup>th</sup> Quarter FY13**

- During the quarter, OHD resolved the issue where the GEFS skill was not always being preserved in HEFS-MEFP.
- EnsPost skill at long-range is low and needs systematic investigation.
- EnsPost adjustments across different seasons can cause an unrealistic change in the magnitude of the forecast.
- HEFS skill at regulated (e.g. reservoirs) locations needs evaluation.

#### **1<sup>st</sup> Quarter FY14**

- The source of the raw forcings, an ftp site at the National Center of Environmental Prediction (NCEP), was unreliable. OHD has started the process of having the raw forcings from NCEP distributed via more reliable means, the NWS Satellite Broadcast Network (SBN).
- NCEP is planning to change the GEFS. OHD is working with other NOAA groups to develop requirements for a static version of the GEFS and reforecasts of any updated versions which are needed for HEFS.
- The HEFS ConOps was delayed to Q3 (from Q2) due to staffing constraints (e.g. US Gov't furlough).
- It was reported that MEFP has a low bias in the probability of precipitation forecast.

#### **2<sup>nd</sup> Quarter FY14**

- Although HEFS training plans are on track, there are on-going contractor staffing issues which would delay the training if not resolved by the end of May 2014.

#### **3<sup>rd</sup> Quarter FY14**

- Due to the planned change of the GEFS by NCEP, OHD continued to work with other NOAA groups to develop requirements for a static version of the GEFS and reforecasts of any updated versions which are needed for HEFS. In April, the requirements were collectively made into a white paper led by Tom Hamill of NOAA's Earth System Research Laboratory and provided to NCEP.
- RFCs are moving their HEFS applications onto new CHPS processors as they're being renewed.

#### **4<sup>th</sup> Quarter FY14**

- Preparation (data acquisition and configuring) for the reforecast sensitivity study has taken much longer than anticipated (2 months v. 2 weeks).

## **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. 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 FY13

- Continued assistance provided to HSEB and Deltares to develop a basic CHPS calibration tool similar to the Interactive Calibration Program (ICP).

#### 2nd Quarter FY13

- Continued assistance provided to HSEB and Deltares to develop a basic CHPS calibration tool similar to the Interactive Calibration Program (ICP). This exercise lays the groundwork for the more complex task of implementing automatic optimization in CHPS.

#### 3rd Quarter FY13

- Continued assistance provided to HSEB and Deltares to develop a basic CHPS calibration tool similar to the Interactive Calibration Program (ICP). This exercise lays the groundwork for the more complex task of implementing automatic optimization in CHPS.

#### 4th Quarter FY13

- Continued assistance provided to HSEB and Deltares to develop a basic CHPS calibration tool similar to the Interactive Calibration Program (ICP). This exercise lays the groundwork for the more complex task of implementing automatic optimization in CHPS.

#### 1<sup>st</sup> Quarter FY14

- None.

#### 2nd Quarter FY14

- Began development of plan to implement DHM-TF routines from legacy HL-RDHM into CHPS. This requires the implementation of the fast-running 'calibration' versions of the HL-RDHM operations into CHPS, which is a necessary step towards the use of auto-calibration approaches

#### 3<sup>rd</sup> Quarter FY14

- One of the 23 action items from the HPRC meeting in Tuscaloosa is to develop a project plan to fully implement HL-RDHM and SAC-HTET into CHPS and retire the stand alone HL-RDHM. A

team was assembled and a charter sent to NWSEO. The team's goal is to produce a comprehensive actionable project plan by November 1, 2014. The plan will cover a wide range of topics such as parameterization, calibration, mods and data assimilation, software engineering, science improvements, documentation, training, support, and others.

#### **4th Quarter FY14**

- Continued work on HPRC-identified task to implement HL-RDHM as a fully-supported CHPS baseline model. Automatic calibration was identified as a requirement to be examined in the future.
- Recommend that this AHPS project be closed out as it has been superseded by the HPRC-identified project to develop the CHPS implementation plan for HL-RDHM components.

### **Problems Encountered/Issues**

#### **1<sup>st</sup> Quarter FY13**

- No funding available to develop further CHPS calibration tools beyond ICP. As a result, the non-CHPS version of HL-RDHM will need to be maintained.

#### **2nd Quarter FY13**

- No funding available to develop further CHPS calibration tools beyond ICP. As a result, the non-CHPS version of HL-RDHM will need to be maintained

#### **3rd Quarter FY13**

- No funding available to develop further CHPS calibration tools beyond ICP. As a result, the non-CHPS version of HL-RDHM will need to be maintained

#### **4th Quarter FY13**

- CHPS cannot replicate the ICP percolation analysis function. A crude work-around was designed that calls for the use of paper copies of the percolation curve.

#### **1<sup>st</sup> Quarter FY14**

- None

#### **2nd Quarter FY14**

- No funding available to develop further CHPS calibration tools beyond ICP. As a result, the non-CHPS version of HL-RDHM will need to be maintained

#### **3<sup>rd</sup> Quarter FY14**

- None

#### **4th Quarter FY14**

- None

## Support Distributed Model Implementation

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

**Management Lead:** Mike Smith

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

### Milestones

Task	Due Date	Status
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 FY13

- Continued support of LMRFC in the development of DHM-TF over their entire domain
- Continued support of Hawaii WFO and APRFC in the runs of DHM-TF
- Began assisting NCRFC with implementation of HL-RDHM.

#### 2<sup>nd</sup> Quarter FY13

- Continued support of LMRFC in the development of DHM-TF over their entire domain. Good results seen in several cases, verified by on-the-ground observers. LMRFC providing results to WFOs for review and comment.
- Continued support of Hawaii WFO and APRFC in the runs of DHM-TF. Model is running at 1-km spatial resolution.
- Continued to assist NCRFC with implementation of HL-RDHM and SAC-HTET for the Red River of the North flooding. Worked with RFC to discuss options. Provided model states for start-up, parameters, HL-RDHM input file, and scripts to generate max-min temperature data.

#### 3<sup>rd</sup> Quarter FY13

- Continued Support to LMRFC as they began implementation of DHM-TF over their domain.
- Provided support to MBRFC as they began implementation of DHM-TF
- Provided support to NCRFC with spinning-up HL-RDHM and SAC-HTET for frozen ground modeling. In retrospective tests, SAC-HTET simulated the thawing of frozen soil within ~1 day of the observed time.

#### 4<sup>th</sup> Quarter FY13

- Continued support to LMRFC as they implement DHM-TF over their domain, with good results seen in several cases.
- Provided review and recommendations to MBRFC as they began implementation of HL-RDHM.
- Provided updates of HL-RDHM to NCRFC etc.

#### 1<sup>st</sup> Quarter FY14

- Developed version of HL-RDHM for NCRFC that included gridded outputs of all SAC runoff components, especially interflow. This modification was requested for an agricultural runoff study.
- Assisted MARFC with implementation of HL-RDHM at 2-km scale for flashy basins. Also helped with SAC-HTET questions to support a USDA fertilizer runoff study.
- Assisted LMRFC with implementation of SAC-HTET over entire domain for DHM-TF applications.

#### 2<sup>nd</sup> Quarter FY14

- In response to request from SERFC, developed initial draft plan to complete the derivation of

SAC-SMA parameters in Puerto Rico and the U.S. Virgin Island to support distributed modeling.

### **3<sup>rd</sup> Quarter FY14**

- One of the 23 action items from the HPRC meeting in Tuscaloosa is to develop a project plan to fully implement HL-RDHM and SAC-HTET into CHPS and retire the stand alone HL-RDHM. A team was assembled and a charter sent to NWSEO. The team's goal is to produce a comprehensive actionable project plan by November 1, 2014. The plan will cover a wide range of topics such as parameterization, calibration, mods and data assimilation, software engineering, science improvements, documentation, training, support, and others.
- Assisted MBRFC with implementation of RDHM for DHM-TF.

### **4th Quarter FY14**

- Assisted MBRFC with set-up and running of DHM-TF over entire domain
- Assisted MARFC with questions about SAC-HTET

## **Problems Encountered/Issues**

### **1<sup>st</sup> Quarter FY13**

- None

### **2<sup>nd</sup> Quarter FY13**

- Discovered and corrected shift in sub-HRAP cells when running 4-km precipitation but ¼ HRAP resolution.
- Discovered and resolved flow direction issue in LMRFC domain where the Red River is joined to the Mississippi River via a canal. Discussed issue with Dave Welch.

### **3rd Quarter FY13**

- Lack of full time software engineering assistance hampers support efforts for the RFCs.

### **4th Quarter FY13**

- Lack of full time software engineering assistance hampers support efforts for the RFCs

### **1st Quarter FY14**

- Lack of full time software engineering assistance hampers support efforts for the RFCs

### **2<sup>nd</sup> Quarter FY14**

- Retirement of Victor Koren on Jan. 11, 2014 resulted in a large loss of scientific expertise.

### **3<sup>rd</sup> Quarter FY14**

- Retirement of Victor Koren on Jan. 11, 2014 resulted in a large loss of scientific expertise.
- Brian Cosgrove on detail to WPC for three months starting April 18.

### **4th Quarter FY14**

- Retirement of Victor Koren on Jan. 11, 2014 resulted in a large loss of scientific expertise

## 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. RFC testing of CHPS HL-RDHM	FY 14 Q2	On track

**Accomplishments/Actions**

**1<sup>st</sup> Quarter FY13**

- Continued merging (into CHPS) of HL-RDHM advances from the CONUS SAC-HTET activity.

**2<sup>nd</sup> Quarter FY13**

- CONUS SAC-HTET evaluation in OHRFC, SERFC, and NCRFC domains (~ 50 basins in each) showed good streamflow simulation results. Tests involved routing the SAC-HTET runoff to USGS gages. Precipitation from three sources was used: NLDAS, RUC/RRM, and RFC MPE. Results showed that the RUC/RRM precipitation has a high bias.

**3<sup>rd</sup> Quarter FY13**

- Revised SAC-HT paper according to comments from Journal of Hydrology. Submitted revised paper to the journal.

**4<sup>th</sup> Quarter FY13**

- HL-RDHM designated to become part of regular CHPS release package. Work begun to update adapters, write documentation, test plan etc.

**1<sup>st</sup> Quarter FY14**

- Work continued to update the HL-RDHM CHPS components into a regular CHPS release package. A package for RFC testing was being developed.

**2<sup>nd</sup> Quarter FY14**

- In response to OHRFC's requests for help in FogBugz 1010, OHD updated the HL-RDHM adapter for FEWS to be compatible with the latest version of CHPS. Using OHRFC as a test site, OHD updated the packaging of the HLRDHM\_IN\_FEWS software, which now includes a step-by-step configuration guide. Currently, all distributed runoff models (SAC-SMA, SAC-HT, and SAC-HTET), Snow-17, and the distributed routing models have been included in the release. However, the DHM-TF and the automatic calibration functionality are not included. The package contains two FEWS external modules, one for converting FEWS exported NetCDF grids, such as precipitation, into XMRG files. The other external module runs the HL-RDHM distributed models using the converted grids as input forcings. By proper configuration, FEWS users can run HL-RDHM distributed models using the gridded precipitation, temperature or any other gridded forcing data in FEWS' internal database.

- In response to requests from Central Region, developed initial draft plans to implement the lumped SAC-HTET into CHPS and to implement the DHM-TF approach into CHPS.

### **3<sup>rd</sup> Quarter FY14**

- One of the 23 action items from the HPRC meeting in Tuscaloosa is to develop a project plan to fully implement HL-RDHM and SAC-HTET into CHPS and retire the stand alone HL-RDHM. A team was assembled and a charter sent to NWSEO. The team's goal is to produce a comprehensive actionable project plan by November 1, 2014. The plan will cover a wide range of topics such as parameterization, calibration, mods and data assimilation, software engineering, science improvements, documentation, training, support, and others.

### **4<sup>th</sup> Quarter FY14**

- A new release was made of the non-baseline CHPS HL-RDHM.
- Progress continued on developing the implementation plan for formal CHPS implementation of HL-RDHM as a base-line component. Team meetings were held every two weeks. Requirements were developed and prioritized. Where possible, the costs to perform the tasks were estimated. The project to develop the implementation plan is on track.
- Recommend that this AHPS project be closed out as it has been replaced by the implementation project established by the HPRC.

## **Problems Encountered/Issues**

### **1<sup>st</sup> Quarter FY13**

- Journal review of SAC-HT and SAC-HTET papers took longer than 3 months.

### **2<sup>nd</sup> Quarter FY13**

- HL-RDHM CHPS adapter was not updated along with other CHPS and FEWS code changes; OHRFC unable to try implementation of CHPS HL-RDHM.
- J. Hydrology review of SAC-HT paper took six months.

### **3<sup>rd</sup> Quarter FY13**

- Very little work on HL-RDHM and CHPS integration due to limited OHD software engineering resources.

### **4<sup>th</sup> Quarter FY13**

- The SLS autocalibration routine for HL-RDHM is not available in CHPS. As a result, the legacy HL-RDHM needs to be retained.

### **1<sup>st</sup> Quarter FY14**

- The SLS autocalibration routine for HL-RDHM is not available in CHPS. As a result, the legacy HL-RDHM needs to be retained.

### **2<sup>nd</sup> Quarter FY14**

- The SLS autocalibration routine for HL-RDHM is not available in CHPS. As a result, the legacy HL-RDHM needs to be retained.
- Retirement of Victor Koren on Jan 11 resulted in a large loss of scientific expertise that impacts the migration.

### **3<sup>rd</sup> Quarter FY14**

- Retirement of Victor Koren on Jan. 11, 2014 resulted in a large loss of scientific expertise.

### **4<sup>th</sup> Quarter FY14**

- None

# 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 Flood Inundation Mapping (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 maintain viability.

**Team Members:**

- 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
- Wendy Pearson – Central Region
- Vacant – Southern Region<sup>1</sup>

This AHPS Core Goals team has been commissioned since Q4 of FY07. IN FY14, the sub-task areas have been retitled to closely represent the priorities of the FIM program and the coordination with OHD, OCWWS HSD, and regional HSD managers.

<sup>1</sup>*Ms. Katelyn Costanza departed the NWS on March 21 to take on new endeavors. She now serves as the Assistant Director of Natural Systems Modeling & Monitoring and a Research Associate III for Louisiana’s Water Institute of the Gulf in Baton Rouge. Katelyn has been a tremendous asset to the NWS FIM program by helping out with SR projects and providing advice to the national program. She will be missed and the team wishes her our best.*

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**I. Main Objectives and Task Areas**

- FY14 Objectives:**
- (1) Update AHPS Flood Mapping Web Portal and Display
  - (2) Implement, via the AHPS web portal, additional flood inundation mapping libraries and provide assistance to the regions for development/implementation of other AHPS flood inundation mapping.

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

## II. Milestones

Task Area #1 - AHPS Flood Mapping Web Portal and Display		
Subtask 13-1.1 AHPS Web Portal for Levees and Flood Risk Areas	Due Date	Status
NWS is to begin displaying flood risk behind federally certified and uncertified flood levees to Orion and demonstrate AHPS Web capability.	-	Completed in FY13 with additional implementation for FY14 libraries
Subtask 13-1.2 Provide more geospatial intelligence to NWS AHPS Products	Due Date	Status
Expand AHPS Flood Mapping Capabilities to include a broader availability of FEMA RiskMAP data through AHPS and gain better understanding of the extent of flooding upstream and downstream of the AHPS forecast point.	FY14Q2	Completed with National Rollout in Progress using FEMA NFHL

Task Area #2 Quality Assurance and Consistency of Regional Flood Maps		
Subtask 13-2.1 Quality Assurance and Phase 2 Quality Control Training Workshop	Due Date	Status
Work with CSC on Logistics for Webinar and Workshop	-	Completed, but workshop postponed.
Conduct Flood Mapping Webinars	FY13Q3	Postponed in FY13 due to funding
Conduct QAQC Hands-on Workshop	FY13Q3	Postponed in FY13 due to funding.

Task Area #3 - National Flood Inundation Mapping Guidelines and Program Standards		
Subtask 13-3.1 IWRSS FIM Requirements for National Flood Inundation Mapping Services	Due Date	Status
Develop <i>IWRSS Flood Inundation Mapping Requirements Document</i> per (a) Memorandum of Understanding (MOU) " <i>Collaborative Science Services and Tools to Support Integrated and Adaptive Water Resources Management</i> " with NWS, USACE, and USGS and (b) Charter for National Flood Inundation Mapping Requirements Team.	-	Completed.
Subtask 14-3.1 IWRSS FIM Design for National Flood Inundation Mapping Services	Due Date	Status
Develop charter for <i>IWRSS Flood Inundation Mapping Design Team</i> per (a) Memorandum of Understanding (MOU) " <i>Collaborative Science Services and Tools to Support Integrated and Adaptive Water Resources Management</i> " with NWS, USACE, and USGS	FY14Q3	Completed
Subtask 13-3.2 NOAA Partnered Guidelines and Statement of Work Templates	Due Date	Status
Update NOAA Partnered Guidelines V.3	-	See recommendations for FY15
Update SOW and QAQC Guidance	Ongoing-	Product Development Template is on the AHPS FIM FAQ webpage
Subtask 13-3.3 Partnered Program/Project Management Support Tool	Due Date	Status
AHPS Management System Tools including Scoping Data Sheets	Ongoing-	Tools are being developed ad-hoc and with in-kind resources,

QA Inundation/Depth Tools	Ongoing	Tools are being developed ad-hoc and with in-kind resources
QA Metadata Tools	-	Onhold, unfunded In-kind, important for FIM WMS

<b>Task Area #4 - Regional Flood Mapping Development</b>		
<b>Subtask 14-4.1 Eastern Region's Flood Inundation Map Libraries</b>	<b>Due Date</b>	<b>Status</b>
Implement Passaic River and Licking County Flood Inundation Map Libraries	FY14Q4	<b>Completed</b>
<b>Subtask 13-4.2 Eastern Region's Delaware River Flood Inundation Libraries</b>	<b>Due Date</b>	<b>Status</b>
Extend DRBC Flood Inundation Map Libraries	FY14Q2	<b>Completed</b>
<b>Subtask 13-4.3 Western Region's Flood Inundation Mapping</b>	<b>Due Date</b>	<b>Status</b>
Implement 2 <sup>nd</sup> Demonstration Flood Inundation Map Library in WR	Revised to FY15	Ongoing, delays due to revised modeling requirements and operational support activities.
<b>Subtask 14-4.2 Central Region's Flood Inundation Map Libraries</b>	<b>Due Date</b>	<b>Status</b>
Implement additional Flood Inundation Map Libraries in Central Region HAS	FY14Q4	<b>Completed</b>
<b>Subtask 14-4.3 Southern Region's Flood Inundation Map Libraries</b>	<b>Due Date</b>	<b>Status</b>
Implement additional Flood Inundation Map Libraries in Southern Region	FY14Q4	<b>Completed</b>
<b>Subtask 14-4.4 QAQC Technical Review and Oversight Support</b>	<b>Due Date</b>	<b>Status</b>
Provide assistance to the regions for development/implementation of AHPS flood inundation mapping.	FY14 and Continual basis	<b>Completed</b>

<b>Task Area #5 - Maintenance and Servicing Maps</b>		
<b>Subtask 13-5.1 Maintain AHPS Flood Maps</b>	<b>Due Date</b>	<b>Status</b>
Evaluate and Prioritize Updates to AHPS FIM Interface	FY14 and Continual basis	<b>Completed</b>
Work with Partners, WFO, and RFC to update maps	Ongoing and as provided-	Ongoing, but lack funding
Document required FIM revisions to accommodate various FIM changes from River Stage Forecast to River Elevation Forecast, changes in datum, or service relocations. (See examples: for HMMT2 and WFDT2 and Relocation of services for ACRT2. FIM Maps (HMMT2, WFDT2, and ACRT2) have been taken offline.	-	Unfunded, Work to be accomplished via in-kind.

### III. FY14 Accomplishments/Actions

The FY14Q4 AOP milestone was completed before the end of FY14Q1. The AOP goal was to work with regional leaders, RFCs, WFOs, NWS stakeholders, and partners to deliver 11 new map libraries by end of FY14. In FY14, the NWS Hydrology program implemented 28 new AHPS Flood Inundation Map libraries, with 15 in Q1, 1 in Q2, 8 in Q3, and 4 in Q4.

- Cedar River at Cedar Falls, IA - [CED14](#)
- Cedar River at Waterloo, IA - [ALO14](#)

- Cross Creek at Rossville, KS - [RSSK1](#)
- Indian Creek at Leawood, KS- [ICLK1](#)
- Indian Creek at Overland Park, KS- [OPDK1](#)
- Kentucky River at Frankfort Lock, KY - [FFTK2](#)
- Licking River near Newark, OH - [NEAO1](#)
- Mississippi River at St. Paul, MN - [STPM5](#)
- Missouri River at Leavenworth, KS - [LEVK1](#)
- North Fork Licking River at Newark, OH - [NMSO1](#)
- Ocmulgee River at Macon, GA - [MACG1](#)
- Passaic River at Chatham, NJ - [CAMN4](#)
- Passaic River at Clifton (Dundee Dam), NJ - [DDCN4](#)
- Passaic River at Little Falls, NJ - [LTFN4](#)
- Passaic River near Millington, NJ - [MILN4](#)
- Pecatonica River at Freeport, IL - [FEEI2](#)
- Pequannock River at Riverdale, NJ - [RDLN4](#)
- Pompton River at Pompton Plains, NJ - [PPPN4](#)
- Raccoon Creek at Newark below Wilson St., OH - [RCNO1](#)
- Raccoon Creek near Granville, OH - [GRNO1](#)
- Rio Grande at Columbia Bridge, TX - [CBBT2](#)
- Saluda River near Greenville, SC - [GSLS1](#)
- South Fork Licking River near Heath, OH - [SFHO1](#)
- South Fork Licking River near Hebron, OH - [BEEO1](#)
- Tomahawk Creek at Overland Park, KS - [TCRK1](#)
- Upper Saddle at Saddle, NJ - [SADN4](#)
- White River near Nora, IN - [NORI3](#)
- Winnebago River at Mason City, IA - [MCWI4](#)

Currently, there are 120 [active Flood Inundation Map libraries](#) spread across 18 states, with majority of them in Texas, North Carolina, New Jersey, and New York. Enhanced decision support services for these products in coordination with riverine flooding forecasts and warnings are provided by over 31 [WFOs](#) and 8 [RFCs](#).

In addition, the capability to consume and display FEMA National Flood Hazard Layers (NFHL) via Web Mapping Services (WMS) was officially made available in AHPS at the end of Q3FY14. Currently, there are over 3100 NWS AHPS sites implemented with this capability. This provides the NWS AHPS users a better understanding of the FEMA's regulatory floodways of the high velocity zones, the 1% and 0.2% Annual Chance Flood Hazard areas, and other FEMA flood risk information in relationship to NWS hydrologic services, for which NWS provides river flood forecast and/or warnings.

#### FY14 Q4

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

#### **Subtask 13-1.1 AHPS Web Portal for Levees and Flood Risk Areas**

During FY14, NWS provided enhanced flood inundation maps, which show the risk areas behind levees for the:

- Cedar River at Cedar Falls, IA - [CEDI4](#)
- Cedar River at Waterloo, IA - [ALOI4](#)
- Indian Creek at Leawood, KS- [ICLK1](#)
- Indian Creek at Overland Park, KS- [OPDK1](#)
- Kentucky River at Frankfort Lock, KY - [FFTK2](#)
- Mississippi River at St. Paul, MN - [STPM5](#)
- Missouri River at Leavenworth, KS - [LEVK1](#)
- Ocmulgee River at Macon, GA - [MACG1](#)
- Winnebago River at Mason City, IA - [MCWI4](#)

#### **Subtask 13-1.2 Provide more geospatial intelligence to NWS AHPS Products**

The National Weather Service (NWS) provided capacity to integrate the FEMA National Flood Hazard Layer (NFHL) and FEMA Flood Insurance Studies into the NWS's Advanced Hydrologic Prediction Services (AHPS) web pages as a new way to address the need of flood risk communication to the public. This service, officially launched in the summer of 2013, combines flood risk information, flood forecasts, warnings, and impacts on AHPS. For FY14Q4, this capability was added to over 3100 NWS AHPS sites.

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

#### **Subtask 14-3.1 IWRSS FIM Design for National Flood Inundation Mapping Services**

The charter for the IWRSS FIM Design team was completed and signed by the respective parties in September 2014. This charter called for a *National Flood Inundation Mapping Design Team*, hereinafter referred to as *FIM-Design Team*, to develop a design for sharing/consuming FIM maps with metadata that includes an understanding of the mapping methodologies for that product. Specifically, the FIM design is for the mutual sharing, exchanging, and consuming of current, existing, and future-delivered FIM (*Stream Reach, Historical Flood, Event-based Maps*) products, its associated metadata, and the documentation of the mapping methodologies for the respective products, all of which are to be made available and accessible by the Parties. It is to include the following deliverables: (1) *Design Document*, (2) *Final Specifications*, (3) *Design Schedule* and (4) *Cost estimates*. The design document is due 9 months after the formation and kick-off of the design team.

#### **Subtask 13-3.3 Partnered Program/Project Management Support Tool**

During FY14Q4, CRH developed and added tools to the Central Region Google-sites FIM Support pages. The following tools found under Map Review Tools folder: <https://sites.google.com/a/noaa.gov/flood-inundation-mapping-qc/r-d> capture many of the best practices which CRH has been employing to coordinate FIM projects from scoping, qc coordination, and preliminary/final review. In addition, CRH is working with ERH and OCWWS HSD to examine FEMA RiskMaps and evaluate the availability/utility to integrate these products into the AHPS FIM. Concepts of these ideas are on the FEMA2AHPS folder.

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

#### **Subtask 13-4.3 Western Region's Flood Inundation Mapping**

Western Region worked on the following projects:

- [GOSO3](#) - Coast Fork Willamette River at Goshen, OR - WFO Portland had worked on Phase 1 activities and provided first cut of the Product Development Template for review. The project boundary extent and the FIM extent onto the the feeder streams/tributaries need to be considered.
- [CENW1](#) - Chehalis River at Centralia, WA - WFO Seattle had worked on Phase 3 issues with the raster depth values, which were issues identified by Orion.

#### **Subtask 14-4.1 Eastern Region's Flood Inundation Map Libraries**

Eastern Region worked on the following projects:

- [MCCO1](#) - Muskingum River at McConnelsville, OH.- Eastern Region and USGS Ohio Water Science Center conducted a phase 2 review and identified a few minor actions with respect to bridges and map projections.
- [RWDN4](#) - Saddle Brook at Ridgewood, NJ.- Eastern Region conducted a phase 2 review of USGS NJ Water Science Center's work. Partner had provided maps showing inundated bridges and overpasses, when the river levels were below the lower chord of the bridges. ERH will fix by properly accounting for the water whether the bridges and overpasses are overtopped and clear for access.

#### **Subtask 14-4.2 Central Region's Flood Inundation Map Libraries**

In FY14Q4, Central Region implemented the following three FIM libraries onto AHPS.

- [LEVK1](#)- Missouri River at Leavenworth, KS
- [OPDK1](#)- Indian Creek at Overland Park, KS
- [TCRK1](#)- Tomahawk Creek at Roe Avenue, KS

In FY14, CRH delivered a total of 12 FIM projects to NWS AHPS.

#### **Subtask 14-4.3 Southern Region's Flood Inundation Map Libraries**

In FY14Q4, Southern Region implemented the following FIM libraries onto AHPS

- [MACG1](#)- Ocmulgee River at Macon, GA

Southern Region worked on the following projects:

- [VING1](#) - Chattahoochee River at Vinings, GA – USGS GA Water Science Center and NOAA NWS reviewed and commented on USACE Phase 2 modeling and mapping. USACE is now working to address Phase 2 comments.
- [PRST2](#)- Rio Grande at Presidio International Bridge – SRH is working on addressing mapping issues. SRH is working with contractors to address the proper units of measurements for the depth rasters from metric to english.
- [HATM6](#)- Leaf River at Hattiesburg, MS– HSD and LMRFC worked on Phase 2 review of the USGS MS Water Science Center to extend the mapping to include inundated areas on the Bouie Creek and Leaf River upstream of the Bouie Creek confluence.

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

### **Subtask 13-5.1 Maintain AHPS Flood Maps**

This subtask was separated into three major areas to document the ongoing progress in these respective areas. The proper maintenance of the AHPS FIM service requires updates to the following areas: a) the website, b) maps, and c) techniques to address minor revisions or changes such as datum, gage, or service change. The following is a FY14 status on activities related to this task area.

**Website Updates:** As part of AHPS Phase X, the FIM interface was improved to read the raw raster data and more quickly display the values via MapServer. In addition, the interface was updated to use the ESRI background maps.

**Map Updates:** When there is a new FIM study, NWS works with partners to update the webpages. Unfortunately, new updates require resources to reprocess maps onto AHPS, thus map updates are limited due to the current ways of reprocessing or updating flood maps.

**Techniques:** There are several map revisions which are worth tracking, such as datum, gage, or service change. **Datum Changes:** The techniques to update FIM as a result of datum changes need to be documented beyond 10-940 and captured into the workflow on how to revise FIM. Several locations in Texas and North Carolina have had datum changes at the gage locations. Some of them are a change in the gage offset or relative elevation at zero datum. Others require changing the datum as well as a service change from the reporting of stage to elevation. Unfortunately, there have been no funds available for updating these maps and implementing the revised maps onto AHPS. **Gage Changes.** The technique to update FIM when the gage is relocated in close proximity of an existing gage has not been updated, tested, and documented. **Service Changes.** The technique to update FIM when a stage-based gage is changed to an elevation-based gage has been tested, but the technique has not been documented. Some of these various changes have taken place in Southern region. HSD will work with Southern region after backlog of pre-moratorium projects are completed and some of reprioritized FIM goals are more established to document these techniques.

## **FY14 Q3**

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

#### **Subtask 13-1.2 Provide more geospatial intelligence to NWS AHPS Products**

NWS recently implemented the capability to provide FEMA's National Flood Hazard Layers on the AHPS gage map. Final revisions were implemented by Orion in FY14Q3. Regional training to implement this capability has been provided by various members of the AHPS Integrated Work team involved in this project. The training involved an overview of the NWS job sheets used to help the HPMs determine the availability of FEMA NFHL for a particular AHPS forecast point and their Hydrologic Service Area (HSA). These jobsheets also provide information to help the HPM enhance NWS flood impacts with the use of FEMA Flood Insurance Studies available from the FEMA's Map Service Center.

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

#### **Subtask 13-3.1 IWRSS FIM Requirements for National Flood Inundation Mapping Services**

The IWRSS POCs provided guidance to FIM-RT and wanted more clarity on how some of the IWRSS FIM activities were coordinated across agencies or whether they were mutually complementary. The FIM-RT reviewed the matrix of activities/requirements, linked them to the major recommendations of the IWRSS FIM Requirements Document, and provided them to POCs in May 2014.

The POCs worked to establish next steps for integrating National FIM Services. POCs agreed on moving forward on common FIM standards and integrating/sharing existing Flood inundation Maps. POCs agreed to draft an IWRSS FIM Design Charter for integrating/ sharing existing Flood inundation Maps, using the IWRSS Interoperability and Data Synchronization Design Team Charter as a guide.

### **Subtask 13-3.2 NOAA Partnered Guidelines and Statement of Work Templates**

The Statement of Work (SOW) Template, dated Rev. 5/16/2013 and used by Orion, is more up to date than the version contained in the NOAA Partnered Guidelines. Both the NOAA Partnered Guidelines and SOW Templates also should be updated for the following areas:

- Some of the references are Google specific and should be updated to cover the ESRI capabilities
- Need to address any missing references to custom shapefile layers.
- Flow location naming convention (raster: flow\_34000 and shapefile: flow\_34000.shp).
- Reference to the Product Development Template as best practice.

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

#### **Subtask 13-4.3 Western Region's Flood Inundation Mapping**

Western Region completed Phase 2 QAQC for the Flood Inundation Map library on the Chehalis River in Centralia, WA ([CENW1](#)) and provided the information to Orion for Phase 3 processing.

#### **Subtask 14-4.1 Eastern Region's Flood Inundation Map Libraries**

Eastern Region partnered with USGS to deliver the following FIM libraries onto AHPS. The USGS South Carolina Water Science Center conducted the hydrologic study and hydraulic modeling for this project.

- Saluda River near Greenville, SC - [GSL51](#)

#### **Subtask 14-4.2 Central Region's Flood Inundation Map Libraries**

In FY14Q3, Central Region implemented six FIM libraries onto AHPS. Many of these libraries have important overlays to help convey additional flood risk information. Stakeholders also provided additional information to help convey the residual risk behind levees and additional flooding due to backwater/ tributary flows, and historical flooding. This information is captured into the AHPS map overlay features. The local WFO service hydrologists serve a key role working with CRH to implement this information.

Three of these libraries were produced in collaboration with number of stakeholders who are involved in Silver Jackets, such as USACE, USGS, state, and regional agencies. Emergency managers also participated in the development and review of these projects.

- Mississippi River at St. Paul, MN - [STPM5](#)
- Missouri River at Leavenworth, KS - [LEVK1](#)
- Winnebago River at Mason City, IA - [MCWI4](#)

The following three projects were completed in collaboration with the Iowa Flood Center, who provided the hydrologic and hydraulic modeling expertise.

- Cedar River at Cedar Falls, IA - [CEDI4](#)
- Cedar River at Waterloo, IA - [ALOI4](#)
- Cross Creek at Rossville, KS - [RSSK1](#)

The implementation of the St Paul Minnesota FIM was very well timely, as the Mississippi River in this vicinity rose above major flood stage (17 feet) and crested slightly above 20 feet on June 26<sup>th</sup>. During this event, the NWS AHPS Google Analytics web tracking service showed that NWS AHPS FIM services received a total of 4,625 page views from June 18 to July 5, 2014. Peak traffic occurred on June 23rd, with over 1,300 page views in one day. The majority of users were from Minnesota, and most of this traffic originated from the AHPS hydrograph pages, social media campaigns, local media news articles and web page referrals by the City of St. Paul.

### **Subtask 14-4.3 Southern Region's Flood Inundation Map Libraries**

Due to Katelyn's departure, Southern Region has a moratorium on any new projects which have not been started. Any projects which are in the pipeline will be handled by Victor at the National level. Currently, there are approximately six more AHPS FIM projects under development, namely one in Texas on the Rio Grande, one in Georgia, one in Mississippi, and three in Florida. Of the six, the following libraries are in the later stage of Phase 2 or early stage of Phase 3, undergoing final QAQC or further processing:

- Chatoohoochee River at Vinings, GA – [VING1](#)
- Extension of Leaf River at Hattiesburg, MS – [HATM6](#)
- Rio Grande at Presidio International Bridge, TX - [PRST2](#)

Recently, two new libraries were implemented in SR. The Rio Grande at Columbia Bridge, TX is the fifth of six libraires to be completed in partnership with Mexico and IBWC through the NWS International Activities Office. The map for Macon, GA was produced in partnership with USACE, USGS, and Georgia EMA under the Silver Jackets Partnership.

- Rio Grande at Columbia Bridge, TX - [CBBT2](#)
- Ocmulgee River at Macon, GA - [MACG1](#)

FY14 Q2

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

#### **Subtask 13-1.2 Provide more geospatial intelligence to NWS AHPS Products**

AHPS now has the capability to provide FEMA's National Flood Hazard Layers onto the AHPS gage map. Tests of this capability and national guidance for implementation have been completed by AHPS IWT team, which included Mark Walton, Nicole Belk, Jonathan Brazzell, Mark Strudley, and Britt Westergard. National rollout of this capability is being planned, including training and the use of **Jobsheets** to capture essential data needed for implementing this capability. Laurie Hogan (the National Lead) for this project had the opportunity to unveil this feature and collect feedback from respective stakeholders in Eastern Region. Her presentation in conjunction with NWS "Building a Weather Ready Nation" campaign was very well received by FEMA and respective stakeholders.

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

#### **Subtask 13-3.1 IWRSS FIM Requirements for National Flood Inundation Mapping Services**

The IWRSS Governance Board requested the FIM Requirements Team (FIM-RT) to reconvene and produce an FY14 statement of work with the Near-Term Tasks. This single tri-agency document was to identify the coordinated "low hanging fruit" or high priority initial objectives/tasks, either recommended in the final requirements documents submitted in September 2013 or subsequently internally discussed by the agencies. The document, which enumerated specific tasks and associated costs by agency, was provided to the POC in February 2014.

The POCs later informed the FIM-RT that they had desired the identification of near-term products," such that the capabilities for further developments can be accomplished if funding becomes available."

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

#### **Subtask 13-4.3 Western Region's Flood Inundation Mapping**

Western Region has completed Phase 2 round 1 QAQC for Flood Inundation Map library on the Chehalis River in Centralia, WA ([CENW1](#)).

#### **Subtask 14-4.1 Eastern Region's Flood Inundation Map Libraries**

In FY14Q1, Eastern Region partnered with stakeholders in the Passaic River Watershed to deliver the following FIM libraries onto AHPS.

#### **Subtask 14-4.2 Central Region's Flood Inundation Map Libraries**

In FY14Q2, Central Region had worked closely with Illinois State Water Survey in partnership with the stakeholders of Stephenson County, Illinois Emergency Management, and City of Freeport to deliver the following FIM library onto AHPS.

- Pecatonica River at Freeport, IL - [FEEI2](#)

In addition, the following libraries are undergoing final Phase 3 QAQC:

- Cross Creek at Rossville, KS - [RSSK1](#)
- Mississippi River at St. Paul - [STPM5](#)
- Winnebago River at Mason City, IA - [MCWI4](#) (Note: MCWI4 was implemented onto AHPS in April 2014)

#### **Subtask 14-4.3 Southern Region's Flood Inundation Map Libraries**

Due to Katelyn's departure, Southern Region has expressed concerns with providing adequate support to the FIM program, especially from a project management standpoint. As such, SR is placing a moratorium on any new projects which have not been started. Any projects which are in the pipeline will be handled at the National level.

The NWS Southern Region stated that they are highly interested in furthering the Flood Inundation Mapping program in a streamlined and efficient manner and that they will work with National HQ during this temporary moratorium toward streamlining the project management and coordination aspects.

During the moratorium, there are seven AHPS FIM projects grandfathered, namely two in Texas on the Rio Grande, two in Georgia, and three in Florida. The AHPS FIM library for Greenville, SC is being handled by Eastern Region.

The following libraries are in Phase 3 undergoing final QAQC:

- Ocmulgee River at Macon, GA - [MACG1](#)
- Rio Grande at Presidio International Bridge, TX - [PRST2](#)
- Rio Grande at Columbia Bridge, TX - [CBBT2](#) (Note: CBBT2 was implemented onto AHPS in April 2014)

### **FY14 Q1**

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

##### **Subtask 13-1.2 Provide more geospatial intelligence to NWS AHPS Products**

Orion has demonstrated the inclusion of FEMA National Flood Hazard Layers on the gage map. This feature can be turned on and the service made available via CMS database. A demonstration of this feature is on the Orion test server for the Canoochee River near Claxton, GA ([CNOG1](#)). Testing is completed. Capability is now available. National implementation guidance has been completed by AHPS IWT team. National rollout is being planned.

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

##### **Subtask 13-4.2 Eastern Region's Delaware River Flood Inundation Libraries**

As part of the Northeast IWRSS demonstration, USGS Pennsylvania Water Science Center was asked to "Develop and Demonstrate a Common Framework to Generate Flood-Inundation Maps at National Weather Service Flood-Impact Stages Utilizing Existing Data". The intent of this study was to develop a methodology to produce less costly, more rudimentary, and rapidly reproducible risk-informed flood-inundation maps, referenced to USGS streamgages/NWS flood-forecast sites. The methodology and its associated technique were applied selected sites in the Delaware and Susquehanna River Basin where AHPS points exist. The study also evaluated whether you can extend the maps in between AHPS service locations. The study and pilot project were provided in FY14Q1 to NWS. NWS will provide review and provide comments to USGS in FY14Q2.

##### **Subtask 14-4.1 Eastern Region's Flood Inundation Map Libraries**

In FY14Q1, Eastern Region partnered with stakeholders in the Passaic River Watershed to deliver the following FIM libraries onto AHPS.

- Passaic River at Chatham, NJ - [CAMN4](#)
- Passaic River at Clifton, NJ - [DDCN4](#)
- Passaic River at Little Falls, NJ - [LTFN4](#)
- Passaic River near Millington, NJ - [MILN4](#)
- Pequannock River at Riverdale, NJ - [RDLN4](#)

- Pompton River at Pompton Plains, NJ - [PPPN4](#)
- Upper Saddle at Saddle, NJ - [SADN4](#)

In FY14Q1, Eastern Region partnered with stakeholders in the Licking River Watershed to deliver the following FIM libraries onto AHPS.

- Licking River near Newark , OH - [NEAO1](#)
- North Fork Licking River at Newark, OH - [NMSO1](#)
- Raccoon Creek at Newark, OH - [RCNO1](#)
- Raccoon Creek near Granville, OH - [GRNO1](#)
- South Fork Licking River near Heath, OH - [SFHO1](#)
- South Fork Licking River near Hebron, OH - [BEEO1](#)

#### **Subtask 14-4.2 Central Region’s Flood Inundation Map Libraries**

In FY14Q1, Central Region worked closely with USGS Indiana/Kentucky Water Science Center and partnered with the stakeholders in the Indiana/Kentucky to deliver the following FIM libraries onto AHPS.

- Wabash River at Terre Haute, IN - [HUF13](#)
- Kentucky River at Frankfort Lock, KY - [FFTK2](#)

#### **Subtask 14-4.4 QAQC Technical Review and Oversight Support**

In addition to final review of the maps which were posted to AHPS in FY14Q1, HSD also provided QAQC and review of maps for:

- Ocmulgee River at Macon, GA ([MACG1](#))
- Rio Grande at Presidio International Bridge ([PRST2](#)) -
- Rio Grande at Colombia ([CBBT2](#))
- Pecatonica River at Freeport, IL ([FEEI2](#))

### **IV. Problems Encountered/Remaining Issues**

#### **FY14**

Headquarter and regional representatives could scope and collect stakeholder requirements, however, the challenge will be finding sufficient resources to address new technological needs, incorporate newer capabilities, and improve ways to map the flood risks to meet stakeholder needs. As such, some of the prior year tasks, which have been impacted, are highlighted in RED or Yellow depending on the severity. Any scoping of requirements and strategic planning will need to be very flexible and adaptable.

#### **Continuing Issues Identified in previous Fiscal Years**

##### **General**

- The core goal team is having difficulties with setting mid-range project priorities to enhance the program due to the uncertainties of funding. Partnered funding/resources are only for developing AHPS FIM, but neither for maintenance nor to address additional requirements.
- HSD needs fiscal and labor resources to develop, collect, stand-up, and maintain a public FIM web services so that maps can more efficiently be shared and maintained. In addition, the services could also help in their implementation.
- As part of the path forward for FIM, guidance has been provided to the core goals team for FY15 to focus on the following:
  - Review the progress of IWRSS FIM Requirements Team
  - Review the progress of AHPS locations which now has FEMA NFHL added to the AHPS Gage Pages
  - Review the concept of incorporating FEMA Flood Risk Maps into AHPS FIM and propose how to transform the AHPS FIM using Web Mapping Services to consume and exchange flood maps.

## **Inputs and Forcings**

## 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. Prepare a 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; anticipate Q1 FY2013  Further slip to CY 2013  Not complete yet
3. Collaborate with NSSL hydrometeorology staff to implement real-time codes in MRMS system	FY15 – depends on NSSL	NSSL implementation delayed – FY14Q2

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY13

- Coauthors reviewed the draft journal article and suggested an additional form of product verification, namely Fractions Skill Score. These were calculated in December.
- The manuscript is being revised to include the Fractions Skill Score results
- Recovered the ability to run real-time forecasts within the OHD development system
- Revised code for the real-time package to be run in NSSL-MRMS was sent in December. Further coordination is needed to confirm it runs properly there.

#### 2<sup>nd</sup> Quarter FY13

- Delivery final journal article delayed (see above)
- No further word on possible MARFC DHM-TF work
- Recently completed remapping-reformatting code to put 0-6h QPF products into a format consistent with other MRMS products (April 2013)
- Continue working with NSSL staff on implementation in MRMS

#### 3<sup>rd</sup> Quarter FY13

- Delivery final journal article delayed
- A survey conducted in June indicated continuing interest in the product suite by RFC staff
- An MRMS QPE “summit” meeting was held June 13-14 to confirm priorities for development of new MRMS products, including this QPF package. Input from WFOs and RFCs was collected by OHD/HSD; NCEP and NSSL staff participated directly.
- Now anticipate real-time runs of the 0-6QPF starting in 2014, prior to implementation of the entire

- MRMS package within the NCEP Integrated Dissemination Program facility.
- Made ~50 real-time runs during the quarter, for current subjective evaluation and later statistical evaluation
- Completed remapping-reformatting code to put 0-6h QPF products into a format consistent with other MRMS products (April 2013 – per above)
- Continue working with NSSL staff on implementation in MRMS
- Prepared extrapolation forecasts and collected Rapid Refresh model output for the period October 2011-March 2013, for re-development of equations with 4 seasons' data

#### **4<sup>th</sup> Quarter FY13**

- Limited work this quarter – further delay in delivery of journal article
- Still targeting FY14 implementation in MRMS-Q3 system
- Continued to collect and examine real-time forecasts
- Reported on results to staff at NCEP Weather Prediction Center, who indicated interest in the products
- Collected remaining input and verification data for April-September 2013, for evaluation and re-derivation of probability equations

#### **1<sup>st</sup> Quarter FY14**

- Limited work this quarter – further delay in delivery of journal article
- Still targeting FY14 implementation in MRMS-Q3 system
- Evaluated CY2013 forecasts, found that they're statistically reliable and still add appreciable information beyond that available from the Rapid Refresh numerical forecasts
- Did some revision of journal article, prepared material for presentation at Weather Radar and Hydrology Symposium in 2014

#### **2<sup>nd</sup> Quarter FY14**

- Delivery of final journal article delayed (see above)
- Prepared and submitted extended abstract for Weather Radar and Hydrology Symposium; covered verification of 2013 real-time forecasts
- Ported codes and scripts to NCEP WCOSS – eventually the code could be run there
- Derived a new set of conditional probability equations based on 2009-2012 data. The equations for probability of exceeding any one threshold amount are derived from a sample in which the observed precipitation was at least as large as the next lower threshold amount (e.g. the 2.5mm probability was derived from a sample with at least 0.25mm observed precip). Absolute probabilities will be derived by successive multiplication of the conditional probabilities. This approach enables new physical insight into the factors that determine exceedance of higher thresholds.
- By end of the quarter, investigated the possibility of putting real-time PQPF and QPF fields into OHD open-to-public "hydrology" ftp server; this appears feasible and would answer queries from ABRFC and NCEP.

#### **3<sup>rd</sup> Quarter FY14**

- Delivery of final journal article delayed due to higher-priority tasks. We continue to archive input data and real-time forecasts
- Delivered a presentation on the algorithm principles and recent verification results at the Symposium on Weather Radar and Hydrology, in Reston VA, in April
- Learned that implementation in MRMS will be deferred from initial to final operating capability, due to priority of other implantation tasks that must be executed by NSSL staff
- Began real-time production of QPFs on a non-operational basis, by executing codes in OHD's NHDR system and making GRIB and graphical products available on the OHD public-access ftp server. The product suite now includes 1-h quantitative QPFs for each hour during the 6-h period, based on disaggregation of the forecasted 6-h total precipitation. Finally, an additional set of forecasts initiated at 0500, 1100, 1700, and 2300 UTC was established to provide an advance-look at the next 6-h period. The probability and amount forecasts are based on the corresponding equation sets for 0600, 1200, 1800, and 0000 UTC. Notice was given to RFC, NSSL, and NCEP-WPC staff of the availability of these products.

#### **4<sup>th</sup> Quarter FY14**

- Delivery of final journal article delayed due to higher-priority tasks. We continue to archive input data and real-time forecasts, and to generate retrospective forecasts for recent cases. A complete record of forecast data is now available for April 2009 to September 2014
- Real-time production and availability of the QPF products was maintained via NHDR production and OHD's public-facing FTP server
- Some contemporaneous High-Resolution Rapid Refresh (HRRR) precipitation forecasts have been archived for comparison with those from RAP and the 6-h QPF system
- We've maintained contact with NSSL staff regarding implementation in MRMS. As of early Q1 FY15, it appears that new codes for MRMS will be accepted through December 2014.

### **Problems Encountered/Issues**

#### **1<sup>st</sup> Quarter FY13**

- Other priority tasks continue to delay final completion with delivery of journal manuscript and MRMS codes

#### **2<sup>nd</sup> Quarter FY13**

- Other priority tasks continue to delay final completion with delivery of journal manuscript

#### **3<sup>rd</sup> Quarter FY13**

- Delivery of final journal article delayed due to higher-priority tasks. We continue to archive input data and real-time forecasts

#### **4<sup>th</sup> Quarter FY13**

Some loss of time due to shutdown preparation activity

#### **1<sup>st</sup> Quarter FY14**

- Some loss of time due to 2-week shutdown in October
- Work on MRMS implementation is mainly out of OHD control

#### **2<sup>nd</sup> Quarter FY14**

- Work on MRMS implementation is out of OHD control – however we might have an in-house method for using OHD resources to make nonoperational but real time forecasts available to users

#### **3<sup>rd</sup> Quarter FY14**

- Delivery of final journal article delayed due to higher-priority tasks.
- See note above on delay of operational implementation in MRMS
- Real-time production and general availability of the QPF products for testing purposes has begun

#### **4<sup>th</sup> Quarter FY14**

- Delivery of final journal article delayed due to higher-priority tasks and staffing shortages
- See notes above on delay of operational implementation of the QPF package in MRMS

## Gridded Hydrometeorological Forcings for use in Calibrating Hydrologic Models

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

**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 and elsewhere. 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 used in constructing calibration datasets.

### Proposed Milestones:

Task	Due Date	Status
4. Archive forcings data from CAT sites (ABRFC, NERFC, CNRFC, NWRFC)	Continuous	Ongoing – started FY09 Q4
5. Initiate real-time archive development from all remaining RFCs	Initiate FY10/Q2	Ongoing at most sites – FY10 Q2
6. 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
7. 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
8. 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>9. 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>10.(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>11.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 Stagell/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 September 2013</p>
<p><b>12.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>	
<p><b>13. Deliver hourly temperature and precipitation grids on 4-km HRAP projection, covering 1981-2010 period, for CONUS and surrounding contributing areas. Will include only gridded inputs.</b></p>	<p>FY13 Q4 – slip to FY15</p>	<p>Per directive of latest IWRSS forcings report,</p>

## Accomplishments/Actions

### 1<sup>st</sup> Quarter FY13

- We have a target set of products to be delivered by 1 Oct 2013, based on initial IWRSS/NWC planning. That is, a set of NLDAS forcings downscaled to the 4km HRAP grid and bias adjusted according to 1981-2010 climatology. The dataset will be hourly and will extend through at least the 1981-2010 period.
- Work on defining precipitation and temperature climatology to constrain the long-term record is ongoing, per the items below.
- New 4-km 1981-2010 precipitation and temperature climate grids for much of North America were supplied by NCDC staff. These are proving useful for regions not covered by the new PRISM datasets
- We are awaiting delivery of new station climate normals for 1981-2010 from Environment Canada. These will be used to estimate precipitation frequency, as an additional constraint to the mean monthly precipitation.
- Gridded mean hourly temperatures for 0000, 0300, ..., 2100 UTC have been developed from NCDC station data and PRISM and NCDC gridded monthly mean Tmin and Tmax. Mean hourly temperatures from 240 NCDC climate stations and other stations over Canada and Mexico were used to develop climatic diurnal temperature cycle information. These mean hourly temperature grids will be used to constrain the downscaled NLDAS hourly temperature fields.

## **2<sup>nd</sup> Quarter FY13**

- Formulated a comprehensive plan for precipitation and temperature processing based on adjustment of hourly NLDAS values to agree with monthly PRISM time series over CONUS, and a monthly time series dataset maintained by U. East Anglia Climate Research Unit over OCONUS areas. The approach was recently published in Intl. J. Climatology.
- Will bias adjust the monthly time series above to agree with 1981-2010 climatology grids previously collected
- Planning a review seminar on above method, and initial findings, by May 15
- Outlined a longer-term plan for other weather elements, to be carried out in 2014 and beyond
- Collected the 1979-2012 time series of hourly NLDAS2 "A" forcings data and stored on (non-backup) space on zeus

## **3<sup>rd</sup> Quarter FY13**

- Conducted some internal reviews of the comprehensive plan during the quarter
- Got initial results on long-term precip and temperature biases (and corresponding correction factors) for the NLDAS2 record 1981-2010; to be applied to monthly total precip and monthly mean max/min temperatures 1979-2011
- Confirmed basic reliability of surface air temperature diurnal cycle in the NLDAS2 hourly record, by comparing with NCDC climatology at some individual 1<sup>st</sup>-order sites
- Aim to generate monthly mean temperatures (Tmax/Tmin) and monthly total precipitation, though bias corrections to NLDAS2/CRU grids, by August
- Aim to produce simple bias adjustment of original NLDAS2 precip, temperature - October
- Aim to apply 4km radar inputs, re-derive precip records - December
- Succeeding in decoding historical 40-km grid hourly Manually Digitized Radar records for the CONUS, covering 1979-1994. Initial evaluation indicates these data might be helpful in getting a better spatial/temporal resolution for precip in the pre-NEXRAD era, by using them to disaggregate daily/monthly NLDAS2 totals. The original NLDAS used only NARR reanalyses to temporally distribute precipitation to hourly, resulting in too many hours of light precipitation.

## **4<sup>th</sup> Quarter FY13**

- Created 1979-2011 time series of monthly total precipitation and mean Tmax/Tmin for the NLDAS2 domain, merging PRISM data for CONUS with Climate Research Unit (CRU) for Canada and Mexico. Revision of the off-CONUS precipitation data will likely be needed
- We're carrying forward with checking of the monthly time series by verification with Global Historical Climate Network monthly station reports; results indicate the PRISM-CRU time series; after adjustment toward 30-year 1981-2010 climatology, has less bias and random error than corresponding NLDAS2 estimates
- We determined that historical 40-km grid hourly Manually Digitized Radar information has useful information on distribution of daily precipitation totals to hourly; we'll apply this information in future to pre-NEXRAD reanalysis

## **1<sup>st</sup> Quarter FY14**

- Procedures for spatial downscaling of hourly NLDAS2 precipitation and temperature grids were developed
- Generated a set of hourly gridded temperatures, with correction for monthly biases in Tmin and Tmax, for 1996-2011, to support use in an NCRFC runoff model, and to support further testing.
- Collected newly-released PRISM daily datasets of Tmax, Tmin, and precipitation, on a CONUS-scale 4-km grid, for later use
- Began preparation of material for presentation at AMS 2014 Hydrology Conference

## **2<sup>nd</sup> Quarter FY14**

- Presented validation results for bias-adjusted monthly temperature and precipitation time series at AMS 28<sup>th</sup> Hydrology Conference
- Submitted extended abstract on validation results for above conference.
- Initiated investigation into methods for specifying precipitation phase (liquid/frozen)
- Prepared adjustments to some of the NCDC gridded precipitation climatology estimates over Mexico

- Investigated using the NLDAS2 monthly time series for certain months over Mexico, to resolve instances where CRU precipitation appears inaccurate relative to Mexican weather service reports
- Began refining methodology to adjust NLDAS2 hourly temperatures, to insure reasonable agreement with NLDAS2 3-h time trends while still adjusting monthly mean daily maxima/minima toward PRISM-CRU mean monthly values

### **3<sup>rd</sup> Quarter FY14**

- Successfully tested a software update to the NWSRFS calibration preprocessor package, which enables creation of an hourly station temperature time series from corresponding daily time series of Tmax/Tmin. This will later be used in generating station inputs for hourly temperature grids.
- Continued work on developing a precipitation-typing algorithm (liquid-vs-frozen) based on observed surface temperature and humidity, and lower-atmosphere temperature. For development purposes, the surface estimates are obtained from airways and ASOS/AWOS observations. For production runs of the AOR, the surface variables will be obtained from the analyses themselves. Upper-air data is obtained from North American Regional Reanalysis gridded data. It appears that a combination of surface temperature, surface wetbulb, and near-surface temperature lapse rate will yield a suitable relationship with probability of frozen precipitation.
- A set of grids with the climatic mean of the number of precipitation hours on precipitation days is being prepared, based on COOP hourly rain gauge reports, surface weather reports, and some satellite precipitation data. The datasets will serve as a reference to judge the ability of radar to detect precipitation on an hourly basis; at points where radar-based QPE occurs on too few hours relative to climatology, radar quality will be judged as unreliable and other information will be used to disaggregate daily/monthly precipitation totals.
- In a related project, support was obtained from GOES-R Risk Reduction and USWRP sources by Yu Zhang as co-investigator; this project requires adaption and improvement of an offline version of the Multisensor Precipitation Estimator for merging gauge/radar/satellite QPE information into unified gridded fields
- Project plan was revised to include a set of work tasks for one or more scientific programmers working under the direction of OHD/NWC scientists. To be reviewed in early Q4 by HSEB staff.

### **4<sup>th</sup> Quarter FY14.**

- Developed a precipitation-typing algorithm (liquid-vs-frozen) based on observed surface temperature and humidity, and lower-atmosphere temperature. For development purposes, the surface estimates are obtained from airways and ASOS/AWOS observations. For production runs of the AOR, the surface variables will be obtained from the analyses themselves. Upper-air data is obtained from North American Regional Reanalysis gridded data. It appears that a combination of surface temperature, surface wetbulb, and near-surface temperature lapse rate yields a suitable relationship with probability of frozen precipitation.
- A set of grids with the climatic mean of the number of precipitation hours on precipitation days was prepared, based on COOP hourly rain gauge reports, surface weather reports, and climatic grids of precipitation amount and daily precipitation frequency. The datasets will serve as a reference to judge the ability of radar to detect precipitation on an hourly basis; at points where radar-based QPE occurs on too few hours relative to climatology, radar quality will be judged as unreliable and other information will be used to disaggregate daily/monthly precipitation totals.
- In a related project, financial support was obtained from GOES-R Risk Reduction and USWRP sources by Yu Zhang as co-investigator; this project requires adaption and improvement of an offline version of the Multisensor Precipitation Estimator for merging gauge/radar/satellite QPE information into unified gridded fields.
- Project plan was revised to include a set of work tasks for one or more scientific programmers working under the direction of OHD/NWC scientists. We got a review of the tasking levels by HSEB staff. At the end of the quarter we started another revision to add tasks related to real-time forcings and connecting historical/real-time data though bias adjustment to a common set of reference temperature and precipitation grids such as those from PRISM and the University of East Anglia Climate Research Unit.

## **Problems Encountered/Issues**

### **1<sup>st</sup> Quarter FY13**

- Possibility that work might be re-scoped yet again, since the IWRSS/NWC report is being revised.

### **2<sup>nd</sup> Quarter FY13**

- Previous problems resolved

### **3<sup>rd</sup> Quarter FY13**

- Previous problems resolved

### **4<sup>th</sup> Quarter FY13**

- Some time and momentum were lost due to shutdown preparations in September

### **1<sup>st</sup> Quarter FY14**

- Lost two weeks' time due to shutdown in October

### **2<sup>nd</sup> Quarter FY14**

- Work time reduced due to pressure to complete other tasks
- We're now hampered by lack of software engineering help – reported to HSMB chief

### **3<sup>rd</sup> Quarter FY14**

- As before, work time reduced due to pressure to complete other tasks
- We're now hampered by lack of software engineering help – a work plan for such help has been developed, for when it becomes available

### **4<sup>th</sup> Quarter FY14**

- As before, work time reduced due to pressure to complete other tasks
- We're now hampered by lack of software engineering help – a work plan for such help has been developed, for when it becomes available

## **Flash Flood Services**

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

**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	FY15 Q2	Ongoing
2. Create and/or modify data visualization tools as needed	FY15 Q2	Ongoing
3. Recommend high level requirements for operational development	FY15 Q2	Ongoing
4. Publish results	FY15 Q2	Ongoing

### Accomplishments/Actions

#### 1st Quarter FY13

- Completed first version of seamless CONUS connectivity file and associated routing parameters. Currently addressing connectivity problems discovered in the file.
- Continued to provide assistance to APRFC and LMRFC in their efforts to get DHM-TF up and running at their locations

#### 2<sup>nd</sup> Quarter FY13

- Worked on revised version of seamless CONUS connectivity file and associated routing parameters. Currently addressing flow accumulation problems discovered in the file.
- Continued to provide assistance to APRFC and LMRFC. Each location has now brought up DHM-TF and executes the model automatically each hour.

#### 3<sup>rd</sup> Quarter FY13

- Continued to work on revised version of seamless CONUS connectivity file and associated routing parameters. Generated continuous flow accumulation files for Mississippi and other large river basins that were not included in the NHDPlusV2 data set.
- Continued to provide assistance to APRFC and LMRFC in executing DHM-TF and diagnosing output.

#### 4<sup>th</sup> Quarter FY13

- Revised process used to generate seamless CONUS connectivity file and associated routing parameters to better account for cross-boundary flow issues.
- Continued to provide assistance to MBRFC, WR (CBRFC), APRFC and LMRFC in configuring and/or executing DHM-TF and diagnosing output.
- Ran DHM-TF for several Colorado Front Range test cases as part of NOAA-NCAR flash flood project.

#### 1st Quarter FY14

- Continued to provide assistance to LMRFC, MBRFC, WR (CBRFC) and APRFC in configuring

- and/or executing DHM-TF and diagnosing output.
- Worked with NASA/GSFC on new Matlab-based xmrq-format data viewer tool

#### **2nd Quarter FY14**

- Continued to provide assistance to LMRFC in configuring and executing DHM-TF and diagnosing output.
- Continued to work with NASA/GSFC on new Matlab-based xmrq-format data viewer tool
- Corrected NHDPlus Version 2 flow direction errors and used to re-derive CONUS flow direction and accumulation maps for routing purposes

#### **3rd Quarter FY14**

- Continued to correct NHDPlus Version 2 flow direction errors and use to re-derive CONUS flow direction and accumulation maps for routing purposes

#### **4<sup>th</sup> Quarter FY14**

- Assisted MBRFC in setting up and executing DHM-TF over full MBRFC domain
- Began discussions with ESRI about CONUS connectivity needs and links to NWC activities. This may replace effort to locally derive CONUS connectivity.

### **Problems Encountered/Issues**

#### **1st Quarter FY13**

- None

#### **2nd Quarter FY13**

- None

#### **3rd Quarter FY13**

- Extensive and lengthy problems installing local copy of ArcMAP on desktop computer greatly slowed derivation of CONUS connectivity file and routing parameters.

#### **4th Quarter FY13**

- Problems with license for local copy of ArcMAP on desktop computer slowed derivation of CONUS connectivity file and routing parameters, as did disk problems on GIS server.

#### **1st Quarter FY14**

- Error in data set supplied by NHDPlus Version 2 data team hindered progression of work. Solution is currently being discussed with NHDPlus team.

#### **2nd Quarter FY14**

- None

#### **3rd Quarter FY14**

- This quarter was spent at WPC for NRAP assignment, which severely limited work on this project.

#### **4th Quarter FY14**

- 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
5. Compare DHM-TF skill to operational FFG and GFFG skill	FY14 Q4	Pending funding
6. Evaluate FFG, GFFG and DHM-TF for flash flooding cases, with a focus on the predictability of specific impacts	FY14 Q4	Pending funding
7. Prototype products focused specifically on flash flooding impacts	FY14 Q4	Pending funding

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY13

- Description of flash flood database comprised of observations from NWS StormDat SHAVE, and USGS is now in press in *BAMS*.
- Graduate student, Race Clark, presented the CONUS-wide evaluation of FFG at the AMS annual conference.
- Paper describing CONUS-wide evaluation of FFG and intercomparison of FFG, FFPI, GFFG, and DFFG has been submitted to *Wea. Forecasting*.
- Prototype flash-flood prediction system, NMQ-FLASH, has been awarded funding by NASA. Initial demonstration with a single member running at 1km/5min is running in real-time over the CONUS.
- PI Gourley presented the FFG results as well as NMQ-FLASH in the NWS Research and Innovation Transition Team seminar series.
- Submitted a proposal in response to the Sandy Supplemental bill that will deploy NMQ-FLASH (along with other radar-based hydrologic applications) at the National Water Center.

#### 2<sup>nd</sup> Quarter FY13

- PI Gourley presented the CONUS-wide FFG results as well as NMQ-FLASH in a UCAR/COMET course on flash flooding.

#### 3<sup>rd</sup> Quarter FY13

- NMQ-FLASH system was run in demonstration mode during the Flash Flood and Intense Rainfall (FFaIR) testbed experiment at the Weather Prediction Center. Results were qualitatively compared to operational flash flood guidance values on a daily basis.

#### 4<sup>th</sup> Quarter FY13

- An article describing the NMQ-FLASH system and its performance during FFaIR was submitted for publication in *BAMS*.

#### 1<sup>st</sup> Quarter FY14

- Graduate student, Race Clark, presented CONUS-wide analysis of flash flood warnings, observations, and FFG at the NWA conference. He won 1<sup>st</sup> place in student poster competition.

**2<sup>nd</sup> Quarter FY14**

- Submitted a proposal for a Hazardous Weather Testbed Experiment to be conducted with a focus on experimental flash flood watches and warnings.

**3<sup>rd</sup> Quarter FY14**

- Hazardous Weather Testbed Experiment with a focus on experimental flash flood watches and warnings has been funded and is proceeding.

**4<sup>th</sup> Quarter FY14**

- Hazardous Weather Testbed Experiment with a focus on experimental flash flood watches and warnings was successfully completed.

**Problems Encountered/Issues**

**1<sup>st</sup> Quarter FY13**

- Lack of AHPS funding has caused us to redirect focus on the development of NMQ-FLASH rather than continued analyses of FFG, GFFG, comparisons to DHM-TF, etc.
- The lack of AHPS funding has also impacted the NWS National Precipitation Verification Unit. Apparently, they are no longer archiving CONUS FFG mosaics, thus preventing future studies to evaluate the methods

**2<sup>nd</sup> Quarter FY13**

- None

**3<sup>rd</sup> Quarter FY13**

- None

**4<sup>th</sup> Quarter FY13**

- None

**1<sup>st</sup> Quarter FY14**

- None

**2<sup>nd</sup> Quarter FY14**

- None

**3<sup>rd</sup> Quarter FY14**

- None

**4<sup>th</sup> Quarter FY14**

- None

# Software Projects

## Transition CHPS Code into AWIPS

**Management Lead:** Jon Roe

**Technical Lead:** Alan Harmon

**Objective:** Transition CHPS code into the AWIPS baseline

**Note:** With the completion of the deployment of CHPS-5.0.1 to the RFCs and the code residing in the AWIPS Configuration Management System, this project can be considered complete.

### Milestones

Task	Due Date	Status
<b>1. Refresh REP servers and CHPS software at RFCs</b>		
1.1 Deliver CHPS-4.1.1 to AWIPS	FY14 Q1	Image taken from NHOR
1.2 Mod-Note submitted to NWS	FY14 Q2	Draft mod-note submitted by RTS
1.3 Kit Proofing, OS, and Virtualization	FY14 Q3	Completed and Authorization to Proceed (ATP) approved
1.4 OTE Site Prep and Hardware Shipment	FY14 Q3	OTE completed and hardware shipped
1.5 Deployment of REP (with CHPS) Servers to RFCs	FY14 Q4	Completed
<b>2. Integrate and deliver CHPS-5.0.1 with FEWS update</b>		
2.1 Evaluate, integrate, and test FEWS 2014.01	FY14 Q4	Completed
2.2 Perform CHPS Alpha Test	FY14 Q4	Completed
2.3 Package CHPS components, documents, and release package	FY15 Q1	Completed
<b>3. Deliver CHPS-5.0.1 to AWIPS configuration management</b>	FY15 Q1	Delivered on Oct-03

### Accomplishments/Actions

#### 4<sup>th</sup> Quarter FY13

- The first draft of the OS configuration was enabled and a draft image was taken of CHPS software. TIM was conducted.

#### 1<sup>st</sup> Quarter FY14

- 1.1 - The tested release of CHPS-4.1.1 was imaged from NHOR for Raytheon testing.
- 1.2 - A draft Mod-Note was developed and circulated for review with updates by NWS.
- 1.3 – Kit Proofing being developed. Operating System and virtual machine testing conducted.
- 1.4 – OTE sites being selected and shipment schedule being developed.
- 1.5 – Schedule for delivery of hardware and installation at sites being drafted.

#### 2<sup>nd</sup> Quarter FY14

- 1.2 – The draft Mod-Note was finalized and submitted on 2/22/2014.
- 1.3 – Kit Proof activities initiated and being conducted.
- 1.4 – OTE sites identified and hardware shipped.
- 2.1 – OHD met with Deltares and agreed on target date of July 2014 for FEWS-2014.01 delivery by Deltares to NWS/OHD.
- 3.0 – Working with AWIPS Program Office and Raytheon, defined CHPS into AWIPS alpha test, configuration management activities, and reduced SwIT and Beta testing by Raytheon.

#### 3<sup>rd</sup> Quarter FY14

- 1.5 – Kit Proof activities completed. NWS OTE Authorization to Proceed (ATP) on 4/18/14.

- 1.4 – OTE completed on 6/13/14. Hardware shipped by Raytheon during week of 6/23/14.
- 1.5 – Required upgrade of RFCs to AWIPS2 OB14.1.1 scheduled for each RFC.
- 3.0 – Working with AWIPS Program Office and Raytheon on reduced testing by Raytheon and delivery of CHPS components into AWIPS2 configuration management system.

#### **4<sup>th</sup> Quarter FY14**

- 1.5 – RFCs upgraded to AWIPS2 OB14.1.1 and new REP hardware installed.
- 2.0 – OHD CHPS Development Team received newer FEWS and integrated with CHPS-Core component with fixes and small enhancements. CHPS-5.0.1 tested, beta tested, and deployed by Sep-26 and pushed on Oct-01.
- 3.0 – The VLab integration ticket #4765 created. CHPS-5.0.1 package (FEWS, code, release and installation instructions, and documentation) uploaded to VLab configuration management repository and received by the AWIPS CM Team on Oct-03.

### **Problems Encountered/Issues**

#### **1<sup>st</sup> Quarter FY14**

- Red Hat license add-ons need to be procured for virtual machines.

#### **2<sup>nd</sup> Quarter FY14**

- Task Order awarded to procure 54 Red Hat entitlements for REP servers on 2/25/2014. Need to update Remedy tracking data base.

#### **3<sup>rd</sup> Quarter FY14**

- Remedy tracking data base updated successfully to reflect Red Hat entitlements procured.

#### **4<sup>th</sup> Quarter FY14**

- No issues to report.

## **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. Finalize Phase VIII requirement	FY13 Q1	Complete
2. Phase VII+ deployment	FY13 Q2	Complete
3. Phase VIII development	New date FY14 Q1	In progress – some delay to refine requirements
4. Phase VIII deployment	FY13 Q4	Part 1 of 4 deployed
5. Phase IX deployment	FY14 Q2	Complete
6. Phase X requirements definition	FY14 Q3	Ongoing
7. Phase X development	FY14 Q4	On track
8. Inventory of Hydrology Program web sites	FY14 Q4	On track
9. Phase X deployment	FY15 Q1	On track

**Accomplishments/Actions**

**1st Quarter FY13**

- Updated and regenerated all precipitation images to use the new 1981-2010 normals
- Created and deployed instructional documentation for external websites to incorporate the AHPS national maps into their own websites
- Added the capability for AHPS CMS administrators to adjust the display order of the inundation image layers on the Google Maps interface
- Added NWS FIM YouTube video link to inundation national overview map page

- Update deprecated PHP4 code to PHP 5 standards
- Converted RSS feed generation scripts to use the NWSCMS database instead of flat files
- Converted KMZ file generation to use the NWSCMS database instead of flat files
- Updated all Numerical Models Links to point to new ncep.noaa.gov site
- Deployed Automated Flood Warning System (AFWS) to water.weather.gov/afws domain
- Corrected HRAPX and HRAPY typos on precipitation pages
- Updated “Hydrogen Days Ahead” values in the AHPS CMS to allow for 11 to 14 day forecasts
- Deployed updated AHPS CMS Documentation
- Responded to emergency and non-urgent support requests which are tracked by NWS TOC
- Performed normal O&M activities during the period

### **2nd Quarter FY13**

- Provided a National Analysis and Display of Long-range Flood Risk
- Added downloadable precipitation metadata
- Corrected inconsistencies between observed and forecast RSS feeds
- Unified AHPS and AHPS2 footers for consistency
- Decommissioned legacy Automated Flood Warning System (AFWS) and redirected all traffic to water.weather.gov/afws domain
- Allowed plotting of a negative low flow on hydrographs
- Added inundation columns to CMS report
- Deployed updated version of nctoasc to precipitation page
- Responded to emergency and non-urgent support requests which are tracked by NWS TOC
- Performed normal O&M activities during the period

### **3rd Quarter FY13**

- Addressed issue on hydrographs when using computed ratings and the low-flow threshold was set below the minimum rating curve value, the hydrograph was not drawn.
- Updated Orphan Gauge Report to better display mismatched river gauges.
- Added custom inundation layers to KML archives and repackaged all sites.
- Addressed issue where the AHPS River Menus were displaying duplicate rivers and updated the CMS “Dropdown Navigation” configuration page.
- Increased precipitation process threads from 2 to 6 for faster and more reliable processing.
- Updated XML, tabular, RSS and national forecast maps to match hydrograph days ahead configuration for display of consistent data.
- Deployed updated national forecast slider which added an “entire period” button and better readability.
- Corrected issue where daylight savings time was being calculated incorrectly for AHPS RSS feeds.
- Added additional error checking to AHPS shapefile generation script to skip

- gauge with observation values in scientific notation.
- Created report that will display the NWSLIs that have mismatched HSA configurations between the AHPS CMS and NRLDB database tables.
- Responded to emergency and non-urgent support requests which are tracked by NWS TOC
- Performed normal O&M activities during the period

#### **4th Quarter FY13**

- Implemented 10 Google Maps based inundation locations.
- Corrected CSS styling issue in the inundation footer.
- Updated NWSCMS text to better explain the hydrograph x and y labels.
- Updated AHPS CMS documentation to include Google inundation and various other page updates.
- Fixed bug on AHPS flood inundation mapping current/forecast display.
- Deployed updates to AHPS forecast page time slider bar.
- Addressed issue with RSS feeds for the precipitation gauges under AHPS not working.
- Updated all references from WFO to HAS in the NWSCMS and AHPS documentation.
- Addressed issue where the precipitation pages were not updating and processes were backing up.
- Changed hydroParse code logic to only skip singular invalid HML instead of all products issued by the WFO.
- Updated precipitation download page to check for requested file and present the user the actual download size.
- Responded to emergency and non-urgent support requests, which are tracked by NWS TOC.
- Performed normal O&M activities during the period.

#### **1st Quarter FY14**

- Implemented 15 Google Maps based inundation locations.
- Added “Flood Loss” link to water.weather.gov pages.
- Added “Turn Around Don't Drown” logo to water.weather.gov pages.
- Addressed issue where the AHPS Google maps would auto-pan when clicking on a gauge marker.
- Updated Flood Inundation Map processing code to include custom layers in downloadable packages.
- Updated gauge to river association configuration pages in AHPS CMS to be more user friendly and retooled the gauge sorting algorithm.
- Addressed daylight savings issue on hydrographs. Discovered that if the hydrograph plot data spanned the switchover from daylight to standard time, it kept the time in the first time zone it found. Applied a bug fix.
- Added “iNWS” link to water.weather.gov pages.
- Worked with Boulder, CO to address rating curve issues during times of extreme flooding.
- Responded to emergency and non-urgent support requests, which are tracked by NWS TOC.

- Performed normal O&M activities during the period.

### **2nd Quarter FY14**

- Implemented 2 Google Maps based inundation locations.
- Updated AHPSCMS documentation for Phase IX changes.
- Added a Mississippi Valley RFCs special region group to the observation, forecast and Long-Range River Flood Risk RFC menus.
- Updated HML processing code to better display the originator in XML and RSS feeds when WFOs are backing up neighboring WFOs.
- Added NOAA Google Map API key to all AHPS maps.
- Successfully passed NIDS security scans and audit.
- Added the ability for hydronotes to be turned on or off based on the date.
- Added Tabular date in local time zone.
- Added additional fields to both observed and forecast shapefiles.
- Created auto-update capability for AHPS and hydrograph pages so they refresh automatically.
- Created dockable toolbox for flood inundation map controls.
- Flood inundation map geo-location popup draggable.
- Added explanation about UTC to AHPS pages.
- Added separate AHPS and AFWS headline inputs.
- Separated controls which displayed gauges on AHPS and AFWS so they may be displayed independently.
- Moved the river stage state summary pages from AFWS to AHPS and displayed all gauges.
- Added county overlay to all Google maps.

### **3rd Quarter FY14**

- Implemented 5 Google Maps based inundation locations.
- Added the NOAA logo to all historical and future generated precipitation graphics.
- Deployed FEMA Flood Risk Mapping capabilities to all AHPS gauge marker maps, which dynamically pull FEMA flood layers from the FEMA Web Map Service.
- Updated gauge photo upload tool.
- Added NOAA Google Map channel ID to all AHPS maps.
- Increased text front size and spacing for better readability on AHPS pages.
- Updated and revised NWSCMS documentation, help text and status messages for better clarity.
- Replaced deprecated MDB2 database calls with PDO for compatibility with PHP 5.3.
- Added a special “Mississippi Valley RFCs” region group, which combines ABRFC, OHRFC, NCRFC, MBRFC and LMRFC on a singular Google map.
- Added a “scale” option to the AHPS developer iframes, which resize the content for display within the NIDS CMS system.
- Applied improvements to the River at a Glance feature to better illustrate up/downstream gauges and WFOs.
- Responded to emergency and non-urgent support requests, which are tracked by

NWS TOC.

- Performed normal O&M activities during the period.

#### **4th Quarter FY14**

- Implemented 4 Google Maps based Inundation locations.
- Address user reported issue where both Stage/Flow and Precipitation location were displaying on the Area Hydrographs page.
- Conducted a security scan of all AHPS code and address any discovered vulnerabilities.
- Audited all AHPS pages for HTML errors, missing HTML or malformed tags and corrected.
- Updated hydrograph generation code and AHPSCMS to allow the independent plotting of observed and forecast data. Previously, forecast data could only be plotted if current observed data was paired with it.
- Added county overlays with transparency slider control to all AHPS maps.
- Added gauges to the WFO area map in the AHPSCMS so WFO admins may reposition their WFO mapping boundaries in relation to the available gauges.
- Corrected issue with RSS feed generation where flow only location may not have displayed properly.
- Updated Puerto Rico normal files used in precipitation processing.
- Updated RSS display page to better organize data feeds by county, zone and wfo.
- Cleaned up and audited AHPSCMS user guide in preparation to add new feature for AHPS Phase X.
- Updated the Download KML process to only require mode and LID instead of the prior method of requiring mode, LID, lat/long and location name.
- Ongoing development for AHPS Phase X tasking.
- 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**

#### **1st Quarter FY13**

- None

#### **2nd Quarter FY13**

- None

#### **3rd Quarter FY13**

- None

#### **4th Quarter FY13**

- None

#### **1st Quarter FY14**

- None

**2nd Quarter FY14**

- None

**3rd Quarter FY14**

- None

**4th Quarter FY14**

- None

## **New Service Locations**

## FY2014 AHPS Activities for APRFC

**Management Lead:** Dave Streubel, Development and Operations Hydrologist

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

**Milestones:**

### FY14 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
				Q1	Q1	No AHPS points added Q1
<b>Matanuska River</b>	1	MATA2	Prob AHPS	Q2	Q2	Implemented April 1, 2014
<b>Yukon River</b>	9 (delayed)	KLNQ9 SRFQ9 SRMQ9 PRXQ9 YWRQ9 NIRQ9 WHRQ9 YDAQ9 YEAA2	Prob. AHPS	Q3-delayed		Currently no operational rain gauge analysis for Canada appears to be sufficient for proposed AHPS headwater tributaries. On-going work is being done by AK Region HQ to look at Canadian GEM analyses for potential use.
<b>Hawaii Oahu Hawaii Kauai Alaska Tidal Gages*</b>	2 <b>6</b> 2+	MNSH1 WKSH1 HLAH1 HLEH1 KWKH1 WIEH1 WNIH1 WSFH1	APRFC hourly RVF forecasts started for 6 Kauai forecast points and two Oahu forecast points. Currently being evaluated by HFO with option to put forecasts on AHPS for extreme events.  *APRFC is recommending to AK WFOs to put tidal gages with MDL derived forecasts on AHPS pages with exact # being available 1 <sup>st</sup> QTR FY15	Q4	Q4	Eight forecast points on Hawaii are deterministic and extend 18 hours into future.  Tidal gages and MDL forecasts are deterministic and extend 72 hours into future

\*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
FY14 Q1	-	-	-	-	-	-	-	-
FY14 Q2	1							
FY14 Q3	0							
FY14 Q4	0							
<b>Total FY14</b>	1	0	0	0	0	0	10	
<b>Overall Total (FY2000-2014)</b>	92	0	0	0	20	0	10	122

#### Accomplishments/Actions:

##### 1<sup>st</sup> Quarter FY14

- Calibration of Eyak River near Cordova Alaska started. Oahu RDHM implementation continuing to progress at 15 Oahu USGS gage locations. No additional AHPS points added during Q1 2014.

##### 2<sup>nd</sup> Quarter FY14

- Implemented Matanuska River at Palmer AHPS forecast point.

##### 3<sup>rd</sup> Quarter FY14

- No AHPS points added – Further delay in implementing AHPS points for basins originating in Canada due to poor observed precipitation forcing.

##### 4<sup>th</sup> Quarter FY14

- Operational 1HR forecasts being sent to HFO for 8 Hawaii forecast points for HFO evaluation and option to put RVF forecast on AHPS page for extreme events.
- Evaluating 12 additional Hawaii forecast points with RDHM model on Oahu for future AHPS forecasts. Canada precipitation options for additional AK AHPS points still being evaluated. Tidal gauge and NOS forecasts inclusion on AHPS pages being implemented along west Coast of AK.

#### Problems Encountered/Issues

##### 1<sup>st</sup> Quarter FY14

- None

##### 2<sup>nd</sup> Quarter FY14

- None

##### 3<sup>rd</sup> Quarter FY14

- Additional rain gauge data appears insufficient for reasonable accurate precipitation forcing for CHPS model simulations in Canada. A NWP model derived analysis originating from Canada GEM is a possible solution however AK Regional Office and APRFC are unable to get this data into our AWIPS2 system at this time.

##### 4<sup>th</sup> Quarter FY14

- None

## FY2014 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, and/or inundation mapping points. For FY14, these would include WFO requested forecast points per below.

**Milestones:**

### FY14 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
Sugar River	1	Albany, WI (ALBW3)	AHPS Prob	Q2	Q2	
Wisconsin River	3	Castle Rock, WI (CROW3) Wisconsin Dells, WI (WDEW3) Necedah, WI (NCAW3)	AHPS Prob	Q2,Q4	CROW3 WDEW3 Q2	CROW3, WDEW3 Q2 NCAW3 Q4
Muskegon River	1	Oak Grove, MI (OKGM4)	AHPS Prob	Q2	Q2	
Prairie River	1	Taconite (TACM5)	AHPS Prob	NA	Q4	Unplanned, gage was reinstated

\*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)

### 1<sup>st</sup> Quarter FY14 –

**Problems Encountered/Issues:**

Testing of MPE in AWIPS2 has identified several critical deficiencies, mostly related to the gage table functions used for HAS QC. NCRFC continues to use A1 MPE operationally. Trouble Ticket number 611938 has been opened for this issue.

Testing of Hydrobase in AWIPS has identified critical deficiencies when editing the ingestfilter. NCRFC continues to use A1 Hydrobase operationally.

**Accomplishments/Actions:**

Initiated a remote CHPS access project with the Illinois USGS and IL DNR on Fox River. USGS is working with the DNR to develop reservoir modeling system. NCRFC currently uses NWSChat to coordinate reservoir releases by the DNR. The goal is to provide CHPS access to enhance coordination and planning activities with the DNR.

NCRFC is participating in a NOAA JPSS project with City College of New York, George Mason University, and the University of Wisconsin to evaluate MODIS and VIIRS satellite enhanced imagery in Awips2 for river ice and overland flooding situational awareness. Imagery will be collected and processed by CCNY and GMU, then converted to an AWIPS compatible format at UW before being sent to the RFC via LDM. System implementation will be completed by March 1 for evaluation during the spring flood season.

NCRFC participation in the CR QPF Optimization project has been completed and presentations with team recommendations given to CRH and OCWS/HSD personnel.

NCRFC participated in a table top flood exercise with multiple Power Utilities and Emergency Managers on the Wisconsin R. Over the past few years, NCRFC has conducted conference calls during major floods with the various utility company representatives. Based on RFC inflow contingency forecasts, the companies cooperate on their own initiative to balance their respective operations in order to mitigate downstream flooding. Exercise participants remarked on how much better and more smoothly information flows since the dam operators have been working with the NWS and sponsoring conference calls.

## **2<sup>nd</sup> Quarter FY14 –**

### **Accomplishments/Actions:**

NOAA JPSS Project: NCRFC is now ingesting two experimental VIIRS products into Awips2, as well as MODIS and VIIRS visible imagery. Products have been monitored daily through the spring melt season and our operational testing phase is complete. The focus will now be on the APRFC for operational testing during their spring snow melt season. Although there are some limitations remaining, the results are promising and several product improvements were made based on NCRFC results. The CCNY River Ice product had limited utility due to the 380 meter resolution, which limits it to very wide channels, e.g. the Mississippi R. It also has difficulty filtering out light cirrus clouds, which obscure the product details. The River Flood product from GMU had better results indicating detailed areas of active snowmelt and overland flooding. It also was able to identify some minor levee breach areas in Illinois, which was unexpected.

RFC Backup: NCRFC has coordinated with MBRFC to establish hardware requirements for a common backup platform to be located at CR HQ, which will serve as the backup location for both RFCs. A hardware procurement request was sent to CR for approval. The goal is to have offsite backup capabilities in Awips2 for long term events, i.e. more than one day. The assumption is this capability will be needed for several years before the NWC becomes operational and can provide backup

capabilities.

### **3<sup>rd</sup> Quarter FY14 –**

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

Preliminary testing of data transfer to support the Illinois USGS/DNR CHPS project determined current bandwidth is insufficient to support remote users. Transfer of the RFC FEWS localstore (1.6 Gb) to the CR web server took in excess of 24 hours to complete. NCRFC needs a reliable and efficient method to provide external CHPS users with real time data sets. This is a show stopper for this project.

The WFO CHPS project at ARX and MPX has identified performance issues that remain unresolved. Remote execution of FEWS via VNC in Awips produces exceedingly slow response times. ARX has determined that the slowness is severe enough to render remote execution useless in an operational setting. NCRFC plan to establish a remote connection using NX to see if performance can be improved.

#### **Accomplishments/Actions:**

Note: Prolonged major snowmelt and rainfall flooding during this quarter limited development activities.

The USACE St. Paul district and NCRFC conducted a basin review of a proposed CWMMS modeling framework of the Red River of the North. Significant discrepancies were identified between CWMMS and FEWS basin boundaries. CWMMS basins were defined to support the corps' HEC-RAS modeling structure, while RFC basin boundaries are largely based on USGS gauge locations supporting NWS forecast points. Redefining RFC basins across the entire river system will be a substantial project that is not planned at this time. Consequently, interoperability between the USACE models and the NWS FEWS model will be limited until a common basin network is established.

A web based verification interface for all NCRFC forecast points was completed and presented to WFOs via two webinars. Verification statistics are now available on an annual, seasonal, and monthly basis for WFO and RFC forecaster analysis to aid in the collaborative forecast process.

The NCRFC WI Runoff Risk Advisory Forecast (RRAF) project was briefed to the MN Dept. of Agriculture at their kickoff meeting to develop a MN version called the "Application Risk Advisory System". The GLRI Priority Watershed working group has approved a grant to expand the RRAF into Ohio and Michigan. This now increases the number of participating states to four.

Support for the National Science and Engineering Research Council of Canada (NSERC). NCRFC provided support to NSERC as a member of a 5-person panel to evaluate a major flood forecasting proposal, known as FloodNet. There are 3 overarching objectives of the 5- year FloodNet research network: 1) advance

knowledge on flood regimes (past and future) and provide guidelines for infrastructure design, 2) advance knowledge on flood forecasting systems and enhance flood forecasting in Canada, and 3) assessing impacts of floods on people, society, and environment. These objectives will be addressed in 4 themes that are divided into 21 projects. There are 21 University researchers involved in the network from 12 Canadian Universities. Twenty-five PhDs and 26 MSc students will be trained with an additional 18 PDFs involved in the research. In addition, 30 scientist/engineers from the network partners will also be collaboratively involved with the research projects. The PI for the project is Prof. Paulin Coulibaly from MacMaster University in Hamilton, ON. The project was approved for funding.

Cooperative Research and Development Agreement (CRADA). NCRFC is the NWS office participating in a CRADA with Hydronia LLC. Hydronia is a Florida corporation that develops two-dimensional hydraulic models that take advantage of the computational power offered by the General-Purpose Graphical Processing Units (GP-GPUs). This CRADA will evaluate the performance of those models on the Red River of the North, and compare that performance, in terms of accuracy, ease of implementation and execution time with the existing USACE HEC-RAS model.

#### **4<sup>th</sup> Quarter FY14 –**

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

The Illinois USGS has approached us about resuming the remote USGS/DNR CHPS project. The project goal is to develop a collaborative forecast process with core partners optimizing operations of the Fox River Reservoirs in Illinois, as an example of IWRSS activities defined in the WRN Roadmap. Problems identified in the Q3 report still present a major obstacle to moving forward with this project. The NCRFC needs a reliable and efficient method to provide external CHPS users with real time data sets. This remains a show stopper for this project.

Bugs in the IDMA software were identified and were assigned to fogbugz case 1503, assigned to Raytheon. A work around was found that allows analysis to continue, but requires more time to complete the process.

We are still experiencing problems with truncated time series in CHPS (fogbugz 1443). This too, has a work around which will suffice under normal operations, but becomes more severe when we experience widespread river activity. The issue remains unresolved.

##### **Accomplishments/Actions:**

The NCRFC WFO CHPS project has resumed in cooperation with ARX and MPX. The VNC remote connection has been replaced with an NX server connection in AWIPS. NX is baseline software and remote CHPS performance appears much improved from the precious VNC connection. The previous surplus server has been replaced with an old CHPS server until we receive our new server from CR. Both offices attended CHPS refresher training on site at MPX during an ARX familiarization visit in September, and

are currently running operational tests. Pending feedback from ARX and MPX, we tentatively plan to establish a remote CHPS account at DMX next.

HEFS implementation is underway at NCRFC, with initial plans to implement HEFS in one forecast group and two headwaters by the end of the calendar year. Development activity is currently limited until delivery of the next release of HEFS.

Good progress is being made on the AOR project to update the entire NCRFC historical data set through 2012, with a project target date of mid-November.

NCRFC participated in the Healthy Soils Healthy Waters initial conference in Columbus OH. We presented on the use of RFC soil moisture forecast data used in agricultural runoff risk forecasting. This conference included many of the major research institutions in the Mississippi and Great Lakes watersheds. The conference will be an on-going forum in the search for solutions to the lake and ocean hypoxia problems resulting from terrestrial runoff.

Work continues on expanding the Risk Runoff Advisory Forecast service to the Great Lakes region. Performance testing on RDHM execution over an expanded domain is being conducted to determine an optimum operational configuration to support both NCRFC and OHRFC from the NCRFC server.

NCRFC was notified in August and September that three proposals to the NASA terrestrial hydrology program in which we had participated had been awarded. All proposals are focused on the Red River. The first proposal is led by Andy Wood at NCAR with participation from the U. of MD and the Goddard Space Flight Center and will develop techniques to estimate the volume of ponded water in the Red River Valley, thus helping estimate the total volume of water and timing of water flow into the river during spring flooding conditions.

The second proposal is led by Matt Rodell at Goddard and seeks to estimate the amount of water into the groundwater, also at the Red River Valley. This project will help estimate the partitioning of water between groundwater, root zone and surface water. This proposal is in collaboration with the USACE and a couple of universities.

The third proposal is led by Jennifer Jacobs at the University of New Hampshire and will focus on remote and in-situ soil moisture estimation, also on the Red River of the North. Collaborators in this proposal are from NDSU, CRREL and USDA.

NCRFC is the Technical Project Official for a Small Business Innovation Research Grant that is developing a submersible dropsonde that will be able to gather information on subsurface currents, temperature and salinity during hurricanes. All of those parameters are key factors in the development of hurricane intensity, and there are no current means to gather that information. During non-hurricane events, an optional dissolved oxygen sensor can be attached to the dropsonde for research and management of hypoxia

## FY2014 AHPS Activities for MBRFC

**Management Lead:** Scott Dummer

**Objective:** Implement AHPS for locations in the MB 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 FY14, this would include...

**Milestones:**

### FY14 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
Little Sioux Basin	1	Spencer, IA (LSSI4)	AHPS Prob	1 <sup>st</sup> Qtr	1 <sup>st</sup> Qtr	

### FY14 Planned Expanded Service Locations

Area of Service (River Basin)	# Expanded Locations	Location Names (LIDs)	Service Type Provided *see list below	Planned Completion Quarter	Completion Quarter	Notes
Kansas Basin Cross Creek	1	Rossville, KS (RSSK1)	Flood Inundation Mapping	3 <sup>rd</sup> Qtr	3 <sup>rd</sup> Qtr	
Missouri Mainstem Basin	1	Leavenworth, KS (LEVK1)	Flood Inundation Mapping	3 <sup>rd</sup> Qtr	3 <sup>rd</sup> Qtr	
North Platte Basin North Platte River	1	North Platte, NE (NPTN1)	Flood Inundation Mapping	3 <sup>rd</sup> Qtr		Delayed, reference note below
Missouri River Tributary Basins - Kansas City & Below	3	1) Leawood, KS (Roe) 2) Overland Park, KS (OPDK1) 3) Leawood, KS (State Line Rd)	Flood Inundation Mapping	4 <sup>th</sup> Qtr	4 <sup>th</sup> Qtr	
Upper Missouri Basin Gallatin River	1	Logan, MT (LOGM8)	AHPS Prob (in addition to water supply services)	2 <sup>nd</sup> Qtr	2 <sup>nd</sup> Qtr	

\*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 Supply	Probabilistic RFC Web Only	Other	Number Unique Locations
Q1	1							1
Q2	1				1			
Q3	2			3 2				1
Q4				3				3
Total FY14	4			6	1			5
Overall Total (FY2000-2014)								

**Problems Encountered/Issues**

**1st Quarter FY14** – AHPS Calibration and model development contract under protest. This delay will negatively impact FY15 AHPS Implementation Results.

**2<sup>nd</sup> Quarter FY14** – AHPS Calibration and model development contract protest has been resolved. MBRFC is again working with the contractor. Held a re-kick-off call 4/14. By the end of the week MBRFC was able to provide the necessary data to the contractor via google drive. Gave sample development progress reports to give the contractor an idea of what type of things to report each month to the NWS.

**3<sup>rd</sup> Quarter FY14** – The North Platte inundation mapping project on hold pending USACE and City of North Platte decision on hydraulic modeling. Project likely to be completed by 4<sup>th</sup> Quarter FY15.

**4<sup>th</sup> Quarter FY14** – None

**Accomplishments/Actions:**

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.

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

### **1st Quarter FY14 –**

Completed 1 AHPS Probabilistic Web Service Point for Rossville, KS on Cross Creek within the Kansas River Basin.

An archive stand-alone CHPS version is now working so that post-event analysis can be performed.

CR QPF Duration Study work has been completed. Results have presented to CRH and NWSH OHD/HSD. An operational decision memorandum will be issued by the Acting Regional Director announcing that QPF duration will likely be extended to 48 hours for fall and winter. 24 hours would continue to be used in the summer months.

Continual Silver Jackets engagement with respect to the flood inundation mapping projects within the MBRFCs area.

Successful Revamp of the MBRFC Precipitation Mapping and Quality Control process used in Water Supply services.

### **2<sup>nd</sup> Quarter FY14 –**

Completed 1 AHPS Probabilistic Web Service Point for Logan, MT on the Gallatin River within the Upper Missouri River Basin.

Added 1-Hr MAPX hyetographs to be viewable in CHPS. This will help MBRFC hydrologists to recognize storm durations, and make the appropriate changes to the model during times when river response is different from the Standard Unit Hydrograph designed storm.

Built experimental CHPS server (CHPS10) from retired Idad servers. This was built to test running the QPF ensembles to remove load from the operational servers. This sped up the ensemble up by 15 minutes.

Completed the Upper Missouri Tributary MAP/Ts out through Apr 2013 3/27/2014 for Contract Calibration Work

Developed Field Intranet River Forecast Verification Page that show basic statistics for forecast points to help partners set reasonable forecast accuracy expectations.

Completed Goose Creek CHPS configuration project to reduce basin areas to improve

forecast performance in Wyoming.

Migrated GFFG off NWSRFS and to CHPS and use PROGEN to generate FFG Products.

Developed estimate for NWSH on what it will take to become fully AHPS ready for the entire Missouri Basin by 2018.

Implemented processing of non-USGS ratings, and developed automatic procedure to get non-usgs ratings from Colorado Department of Water Resources.

Selected HEFS Focal Pt. Have begun learning the science and methodology of the system. Focal point also gaining familiarity with GraphGen and XML CHPS configuration work.

### **3<sup>rd</sup> Quarter FY14 –**

Implemented one unplanned AHPS probabilistic forecast location: Platte River at Overton, NE.

Inundation mapping published for two locations (Cross Creek at Rossville KS and Missouri River at Leavenworth KS).

### **4<sup>th</sup> Quarter FY14 –**

Developed and Fielded Intranet River Forecast Verification Page that shows basic statistics for all MBRFC Forecast Points. Provided information to WFOs

Implemented new SSHP Points Indian Creek at State Line and Tomahawk Creek at Roe in EAX HSA.

Updated MAP, MAT historical time series for the Upr Mo Tribs above Canyon Ferry Dam out through Apr 2013. Soon to complete Upr Mo Tribs below Canyon Ferry Dam.

Implemented non-exceedance (low water) ESG Probabilities throughout MBRFC area (effective with Oct 2014 ESG issuance)

Trained Staff on procedures to provide briefings during flood events via [join.me](http://join.me)

Migrated GFFG to CHPS and used PROGEN to generate FFG Products

Developed requirements and obtained equipment for both RFC Backup and WFO CHPS Projects.

Increased understanding of the science and methodologies of HEFS. Began preparation required to move to HEFS. Selected HEFS focal point and received HEFS focal point training.

Transitioned to a new method for MAT forcings in the Mountains and Plains.

Conducted WFO Customer Satisfaction Survey - AHPS Outreach

Conducted 7 WFO Outreach Trips for MBRFC. - AHPS Outreach

Conducted 2 RFC Familiarization Visits for WFOs - AHPS Outreach

Improved rating curve applications to allow processing of non-usgs ratings, developed procedure to get non-usgs ratings from CO, WY and NE. Investigated and adjusted rating curve update procedures.

Used CHPS to create and output various SHEF Products currently being done in NWSRFS (e.g.; MAPs/MATs/MAPXs)

## FY2014 AHPS Activities for MARFC

**Management Lead:** Peter Ahnert (HIC), Seann Reed (DOH), Patti Wnek (SCH)

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

**Milestones:**

### FY14 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided *	Planned Completion Quarter	Actual Completion Quarter	Notes #
Passaic	7	SADN4 PPPN4 RDLN4 CAMN4 MILN4 DDCN4 LTFN4	FIM - Static	FY14 Q1	FY14 Q1	Upper Saddle @ Saddle River, NJ Pompton River @ Pompton Plains, NJ Pequannock River @ Riverdale, NJ Passaic River @ Chatham, Millington, Clifton (Dundee Dam), and Little Falls, NJ

\*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	7	0	0	0	0
Q2	0	0	0	0	0	0	0	0
Q3	0	0	0	0	0	0	0	0
Q4	0	0	0	0	0	0	0	0
<b>Total FY14</b>	0	0	0	7	0	0	0	0
<b>Overall Total</b>	174	0	33	28	0	0	2	2

### Accomplishments/Actions:

#### 1<sup>st</sup> Quarter FY2014

#### CHPS Innovations

- CHPS
  - Operational Readiness Exercise completed by staff
  - Incorporated test pulse release by Gathright Dam into forecasts
  - CHPS Modifier behavior documented for staff information
  - Completed CHPS 4 beta test
  - Attended "What's New in CHPS 4.0.1" training webinar

- CHPS 4 was successfully installed on CHPS 1-6 and the BUS
- Prepared to implement daily forecasts at Bremono Bluff, VA when change of service process complete
- Provided information to NYCDEP to support their discussion with Delaware Basin Decree Parties regarding the use of snow pack data in the Flexible Flow Management Program (FFMP)
- Calibration
  - Attended “CHPS Calibration Features” training webinar
  - Successfully configured a basin using the new calibration tool.
- Distributed Hydrologic Modeling
  - USDA Project
    - Created 10 years of historical temperature grids to be used in the snow model and RDHM
    - Calibrated Mahantango Creek basin
    - Set sample data to USDA
    - Toured Mahantango Creek Watershed
  - NART
    - Provided student intern project proposals for NART
    - Coordinated with the Chesapeake Bay Office
    - Internship position announced through NOAA Chesapeake Bay Office
- Service Back-Up Operations
  - CHPS-based headwater flash flood guidance (FFH) now runs on BUS & Shoebox
  - SDM, Digital Forecast Manual, and Backup System Description are available on BUS & Shoebox
  - Updated hard-copy printouts added to On-site & Off-site notebooks
  - Information on how to manually initialize the BUS with data from AWIPS, as well as troubleshooting tips, added to “MARFC Backup System Description”
  - Stage and surge data flows at LWTV2 & WASD2 and forecast wind data needed to run HEC-RAS Potomac added
  - Shoebox has been updated to match the BUS
  - Nightly automatic data transfer of CHPS local data store to flash drive & BUS was fixed
- AWIPS2
  - Installed two software builds
  - Participated in national RFC call on RP replacement plans

### Ensemble/Uncertainty Initiatives

- HEFS
  - Beta testing continues
  - Discussed future HEFS-related collaborative project with ICPRB
  - Participating in 1 month trial of delivering daily products to NYC DEP

### Forcing innovations

- Tropical Cyclone Inland Graphics – continued participation on national team activities to improve graphic
- Met with Maryland Department of Environment’s Healthy Beaches Program to discuss use of MPE data in a new Healthy Beaches smartphone app. MPE data used to manage beach closures due to rainfall runoff.
- Provided Maryland Department of the Environment with gridded GIS overlay to aid in expansion of MDE’s use of MPE data for shellfish IDSS
- Added new Passaic Basin precipitation gages to operations
- Wrote letter of support for CSTAR project, “*Understanding and Improving the Full Hydrometeorological Forecasting Chain Using Multimodel Ensembles.*” Project study involves Mid-Atlantic watersheds. Active collaborator with PSU Civil and Environmental Engineering Department
- NOAA Climate Diagnostics and Prediction Workshop Webinar: Special Session on Climate Science Communication
- Abstract “*Retrospective Case Study of the Impact of Rain Gage Network Reductions on National Weather Service River Forecasts in the Susquehanna River Basin*” accepted for presentation 28th Conference on Hydrology, AMS 94th Annual Meeting
- Attended MRMS training webinar on new website
- ER Science Sharing Webinars – attended OHRFC Climate Change presentation

- Attended WFO CTP Winter Weather Workshop
- Attended WPC Winter Weather Desk Operations & Verification webinar

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

- WFIPP – 4 staff members participating in 3 WFIPP teams
- Flood Inundation Map Libraries
  - 7 new inundation map libraries completed in the Passaic Basin: Pompton Plains, Riverdale, Chatham, Millington, Clifton/Dundee Dam, Saddle River, and Little Falls
- Silver Jackets
  - PA - Participated in team conference calls. Provided update on Nurture Nature Social Science research project. Team completed work on new public flood risk management website <http://www.nab.usace.army.mil/Home/SilverJackets.aspx>. Nurture Nature Center reported to team on social science collaborative project with MARFC, PHI & BGM.
  - VA - attended webinar on government agency response to recent flooding in Colorado
  - Washington DC - became member of Washington DC Flood Risk Management Team. Provided MARFC familiarization at a team meeting.
  - NJ – participated in team meeting virtually. Attended NJAFM's Coastal Flood Risk webinar.
  - National Silver Jackets - attended *"Enhance Resilience of Coastal Ecosystems"* webinar

### **Significant external engagement**

- Partner briefings for flood impacts from TS Karen. Participated in MEMA coordination conference calls.
- Social Media Training in Winter Weather
- Socialized NOAA/Nature Conservancy Coastal Resilience website w/ coastal WFO(s) & external partners
- Nurture Nature Center (NNC) Collaborations
  - Social Science Project – made recommendations to proposed new graphics that will be used in December's focus groups and reviewed draft ideas of new MMEFS graphics created by NNC
  - Final 4 focus groups completed for Phase II of the project
  - Flood Safety Education Project – shared with NWSHQ links to flood safety materials from this project for newly renovated NWS National Flood Safety Awareness website. Socialized latest flood safety outreach materials on ER WCM/SCH call. Contributed article for AWARE Newsletter on availability of new children's Flood Coloring Workbooks that EMs can personalize with their logo and website address.
  - Provided letter of support for SeaGrant Collaboration Project proposal CSAPP-35, *"They had the facts: Why didn't they act? Understanding and improving public response to NWS coastal flooding forecasts"* submitted under NOAA Sea Grant's Coastal Storm Awareness Program Research Call. NNC was awarded the grant.
  - Coastal Flood Safety Project – reviewer on new coastal flood safety outreach materials
- Attended annual PA State Climatologist meeting
- Gathered & shared USGS WSC emergency contacts for gage outages prior to Government shutdown
- National SCH Group – led planning meeting for SCH role in National WCM/SCH Conference
- Attended update on SRBC's Cumulative Water Use and Availability Study
- Attended DRBC Flood Advisory Committee quarterly meeting
- VLAB – attended training webinar for new tool to collaborate with external users
- Conducted RFC Operations tour for Shippensburg University Students
- WRN
  - attended Virtual Lab training
  - attended WRN Ambassador address to WCM/SCH
  - attended *"Building the Future of the NWS"* address
  - attended WFO New Orleans IDSS Pilot Project Review
- Hosted office visit by Deputy Director General of the China Meteorological Administration, Professor Meiyuan Jiao who is in charge of weather forecast operations in China
- Water Resource Outlook updated several times.
- Hosted office visit by NWA President-Elect
- AMS Summer Meeting – began planning with PSU & WFO CTP.

- National WCM/SCH Conference – led summation of national survey results and presented to agenda planning team
- Attended national USGS webinar on stream gages
- Joined ER planning team for the Commemorate of the 60th anniversary of Hurricane Hazel

## 2nd Quarter FY2014

### CHPS Innovations

- River Ice
  - DRJTBC began sending river ice photos to operations
  - Participated in briefing calls with LWX, PHI & AKQ for MEMA
  - Began issuing river ice situational awareness briefings. Coordinated & shared river ice information & services from Mid-Atlantic WFOs and services.
  - Active use of Social Media to share river ice photos and news
- CHPS/FEWS
  - Attended Deltares presentation on new features
  - CHPS troubleshooting training exercise reviewed by staff
  - Continued testing of FFG PCRaster fix
  - Participated on team planning fall CHPS Workshop
- MARFC Flood Climatology – info used for a statistical predictive model for forecasting the likelihood of spring floods for towns along the Susquehanna River
- Training
  - Attended Red River of the North webinar from NCRFC.
  - Attended OHD Techniques to Compare Observations with Simulated Soil Moisture webinar.
- Calibration
  - Successfully configured stand-alone CHPS to view and make calibration runs
  - Currently configured for 3 models at 9 headwater locations
  - Plan to calibrate 1-hour lumped SAC-SMA & Snow-17 and use the parameters to help scale a priori parameter grids for the distributed model
- Along with NOAA NART, Chesapeake Research Consortium, and NOAA Chesapeake Bay Office (CBO), interviewed and selected a summer intern for a modeling project with application to shellfish bed restoration in the Chesapeake Bay
- HEC-RAS modeling – met University of MD professor and student to discuss their use of our Potomac HEC-RAS model in a Washington D.C. sewage treatment plant study

### Ensemble/Uncertainty Initiatives

- HEFS
  - Met all goals in the MOU for HEFS and passed the 30-day operational test
  - Beta testing completed
  - Installed latest software on the servers
  - Dr. Alfonso Mejia and Dr. Chris Duffy of the PSU Civil Engineering Department have been awarded a new CSTAR applied research grant for the coming 3 yrs. The project received the highest ranking of any of the proposals submitted. The project involves developing improvements to HEFS and MMEFS. Collaborators include: WPC, MARFC, NERFC, OHRFC, and SERFC.
  - 2 hydrologists attended the HEFS Hindcasting & Verification workshop at NWS HQ
  - Nearly finished adding Southern Operations area (Potomac, Rappahannock, James, & Appomattox) to HEFS system. Graphics developed to help investigate the observed undersimulation in HEFS forecasts during April. Fixed data flow issue following AWIPS 13.5.3 upgrade. HEFS concept of operations document reviewed.
- GraphGen
  - Testing scripts to produce MMEFS summary graphics in GraphGen
  - Modified the AHPS graphics being produced in GraphGen
  - Volunteered to test new AHPS GraphGen template for OHD
  - Assisted APRFC with their GraphGen configuration

### Forcing innovations (e.g. dual-pol, snow estimation, etc.)

- Continued to work to transition model forcings from OFS to CHPS

- Retrospective Case Study of the Impact of Rain Gage Network Reductions on National Weather Service River Forecasts in the Susquehanna River Basin paper was finalized. Authors: Peter Ahnert, Kevin Hlywiak, Cody Moser, and Seann Reed.
- Installed map backgrounds under CAVE. Added new map of flashy sub-basins.
- Systems Team met and discussed next steps for transitioning model forcings from OFS to CHPS
- Resolved AWIPS2 bug that resulted in MPE Q3 grid definition errors. Restored MPE data flow to CHPS following AWIPS 13.5.3 upgrade.

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

- WFIPP - National teams completed reports (staff on 3 of the teams). DOH had lead role in organizing and consolidating requirements for the Evaluation/Verification team.
- Silver Jackets
  - PA – Attended quarterly meeting in Harrisburg. Presented the latest Flood Safety outreach resource – a kid’s activity book, to the PA Silver Jackets. PEMA is now considering incorporating this into the PAReady.gov program.
  - PA, NJ, WV – participated in team calls
  - SCH is NWS representative on partners planning team for 2014 National Silver Jacket Flood Risk Management Conference

### **Significant external engagement**

- Staffed outreach exhibit booth at the PA Farm Show outreach event with WFO CTP in Harrisburg, PA
- Customer Advisory Board meeting. Group expressed need for more river ice situational awareness.
- Media
  - Interview for TV station in York, PA for use in future flood events.
  - Participated in WFO CTP Media Workshop. Gave a talk on new NWS Flood Safety outreach resources.
- Website – continued preparations for NIDS transition. Participated in meetings for the transition to NIDS.
- Social Media
  - Attended training on Social Media Dashboard Alternatives
  - Expanded social media engagement by encouraging the sharing of river ice photos on Twitter and Facebook. River ice photos were also used by operational staff to help assess ice conditions.
- National WCM/SCH Meeting Agenda Team Co-Lead - agenda finalized. Team transitioned into a planning team. SCH continued to advocate for some dedicated time for SCHs to meet separately from the WCMs during this meeting. Continued to plan portions of the meeting.
- Nurture Nature Center Social Science Project – provided feedback for AMS presentation on proposals for the FOP, QPF, MMEFS, AHPS Hydrographs, Flood Watches and Flood Warnings
- AMS Summer Community Meeting Planning – continued to provide input with WFO CTP
- Weather Ready Nation – attended FEMA/NWS Be a Force of Nature webinar
- DRBC Flood Advisory Committee – attended quarterly meeting in Trenton, NJ
- Participating on regional team to add inland flood impacts to ER commemoration of Hazel
- Capital Area Science & Engineering Fair – judged 8 high school physics projects and interviewed students
- First Lego League Global Innovation – evaluated 10 projects as part of a team of judges

### **3rd Quarter FY2014**

#### **CHPS Innovations**

- Converted Bremono Bluff, VA (BREV2) on the James River from a flood-only to a daily forecast point
- New patch installed on CHPS that fixes the rolling barrel issue. Replaced faulty disk drive in CHPS6.
- Participating on planning team for Fall CHPS Workshop
- Coordinated with WFO LWX SSH and USGS MD-DE-DC Water Science Center to confirm accuracy of ratings for 2 locations in the Potomac Basin

- Flood Operations: Ran FRMAs Geo-Dam Breach model and provided WFO LWX with information on depth of inundation over nearby roads as well as GIS graphics of the inundation
- AWIPS2: Completed pre-install activities and operational implementation of a major upgrade
- FFG:
  - Started comparisons between the OFS and CHPS FFG. Satisfied with the PCR methodology. Want to verify that the results between the 2 systems are similar for several weeks before making switch over.
  - With help from OHD, resolved last FFG bug and started validation. So far, CHPS FFG is very similar to OFS FFG.
- GraphGen: Completed testing of the new AHPS GraphGen templates on 7/8/9 system. Using GraphGen to issue all operational AHPS ESP graphics.
- Distributed Hydrologic Modeling:
  - Calibrated 9 additional basins (18 total) using the 1-hour lumped SAC-SMA model. These parameters will be used to help scale a priori parameter grids for the distributed hydrologic model.
  - Continuing to support USDA Fertilizer Forecaster Decision support tool using RDHM simulations
  - Ryan Jones, summer hydrologic modeling intern for the NART, MARFC & NOAA Chesapeake Bay Office came on board to work on a DHM modeling project to improve and sustain the ecological health of the Choptank watershed. The project kickoff meeting was attended by Ryan and MARFC DOH in Annapolis.
  - DHM seminar given to staff by MARFC departing hydrologist Dr. Cody Moser
  - Developed 4 synthetic, 1-hr unit hydrographs for OKX SSHP implementation using RDHM
- HEC-RAS Modeling:
  - Provided feedback to WFO LWX for best siting of new Fairfax County, VA lower Potomac tidal gage. Participated in NHC-RFC coordination call for upcoming hurricane season.
  - Staff attended a webinar by NWS HQ's Hassan Mashriqui's, *"Toward Modeling of River Estuary Ocean Interactions to Enhance Operational River Forecasting in the Tar-Pamlico River System."*

#### **Ensemble/Uncertainty Initiatives**

- HEFS:
  - Adding the Potomac, Rappahannock, & James River Basins to HEFS. Working with RTi and NERFC to resolve discrepancies between MARFC & NERFC forecasts for NYC (e.g. units).
  - Installed software version 1.1.1 on our operational system
  - DOH attended 10th Anniversary HEPEX Workshop in College Park, MD. Workshop brought together national and international experts to discuss research, development, and application of ensemble forecasting. MB, AB, AP, CN, & and OHRFCs also attended.
- MMEFS: Using GraphGen operationally for all MMEFS products. NERFC's scripts & templates made transition very easy

#### **Forcing Innovations (e.g. dual-pol, snow estimation, etc.)**

- MADIS Observations: Investigating possible operational use of some MADIS (Meteorological Assimilation Data Ingest System) Mesonet reports as a way to fill in known gaps in existing rain gauge networks. Developed a background process to collect and format the reports, and are monitoring them for performance and reliability.

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

- WFIPP: National teams completed reports (MARFC reps on 3 of the teams). DOH led organization and consolidation of requirements for the WFIPP Evaluation/Verification team.
- NWC: HIC & Senior HAS Forecaster attended NWS Hydrology Managers Meeting
- Silver Jackets:
  - SCH is NWS representative on the planning team for 2014 National Silver Jacket Flood Risk Management Conference
  - SCH attended in-person meetings of the NJ & MD Silver Jacket Teams presentation a talk on new products and services for hurricane season at the MD meeting
  - Attended PA Silver Jackets quarterly meeting at Nurture Nature Center, Easton, PA.
  - SCH participated in PA & VA Silver Jackets monthly team calls

#### **Significant External Engagement**

- HIC participated in and gave a talk at the ER MIC/HIC Meeting

- Gave flood model demonstrations at “Earth Day Along the Susquehanna” in Wilkes-Barre, PA
- Facilitated WFO BGM IWT meeting in Endicott, NY
- Hosted office visit of 29 Millersville University Students and professors
- Social Media: surpassed the 1,000 mark of followers on Twitter
- AMS Summer Community Meeting Planning: continued to provide input with WFO CTP
- Website: completed transition for NIDS
- National WCM SCH Meeting Agenda Team Co-lead: planned and carried out the meeting
- ER Hurricane Hazel Commemoration: participating on planning team
- Participated in WFO CTP Warm Weather and Spring Media Workshops
- Hosted 2-day ER DOH meeting with NE & OH RFCs and ER HSD
- HIC & summer intern attended the Chesapeake Modeling Symposium and the Choptank Habitat Focus Area Meeting in Annapolis, MD
- 2 Hydrologists & Senior HAS forecaster participated in *Hydromania* teaching hundreds of Lehigh Valley 3rd graders about flood safety and the water cycle through flood model demonstrations and water relay races
- SCH made a presentation about RFC Operations during tropical weather at the NHC’s Consistent Messaging course in Miami, FL
- SCH and WFO PHI MIC participated in Nurture Nature’s NOAA Grant briefing for NOAA officials. Provided examples to NOAA of how Nurture Nature’s findings can be used by the NWS to improve the communication of flood risk.
- SCH attended quarterly meeting of the DRBC Flood Advisory Committee
- AMS Summer Community Meeting Planning: continued to provide input with WFO CTP
- Participated in WFO BGM’s post-IWT meeting follow-up call providing feedback on kickoff meeting
- ER Hurricane Hazel Commemoration: Coordinated with SERFC on providing graphics of inland river flooding
- Hosted an office visit of 30 homeschool children with WFO CTP
- Attended FEMA RISK Map Forum for the Monocacy River Basin
- Attended National WCM/SCH Meeting in Silver Spring, MD. SCH presented poster entitled: *“Flood Risk and Uncertainty: Assessing the NWS’s Forecast and Warning Tools”*.
- Hosted 2 groups of 40 students from Penn State University’s Weather Camp with WFO CTP. Used river flood model to demonstrate flood safety and impacts of dams and levees.
- Participated in NART Delaware Roundtable Scoping activities helping to plan summer event
- Participated in annual meeting of Conowingo Pond Management Team. Team received a tour of the Abingdon Water Treatment Plant.
- Participated in Wilkes-Barre’s River Festival demonstrating flood safety and showing the impact of flood walls and dams
- SCH attended NERFC Hydro Program Managers Meeting presenting talks on hydrology-related social science and on Silver Jacket-related flood inundation maps
- Held SSH conference call to track action items from last Fall meeting and to plan rest of FY14 RFC familiarization training & travel

#### 4th Quarter FY2014

#### CHPS Innovations

- CHPS
  - Installed 3 new RP servers to replace existing RP1, RP2 and CHPS 1-9 servers
  - Beta testing CHPS 5.0.1 (FEWS 2014.01). Identified several bugs in Deltares FEWS software.
  - Participated on planning team for RFC CHPS Workshop
  - Continuing validation of CHPS FFG. The *“ffgffh”* process has been rewritten to transmit MARFC’s FFG text products (PITFFGDE, MD, NJ, NY2, PA2, VA, and WV2) generated by CHPS. Expended much effort over the last couple years working out the kinks with OHD & Deltares. Comparisons this summer vs. the corresponding OFS numbers have been satisfactory. Began issuing CHPS-based text products operationally (Sep 25).
  - Attended Brian Cosgrove’s Flash Flood Verification webinar
  - Added Potomac River at Washington DC, Wisconsin Ave flood history to MARFC flood climatology information

- Tested & implemented new CHPS rating curve tool
- Conducted extensive point and areal comparisons of new CHPS PCRaster-based station precipitation estimation and MAP. Biases vs. OFS are small enough to proceed with operational replacement of OFS methodology, tentatively in October in time for the MAP cold season default.
- Continued moving web content from legacy web server to NIDS
- Completed training in AJAX (dynamic website content generator that can be used in the NIDS environment). Working on “AJAX Applications and Server Communications” course.
- Forecast Modeling – new forecast relationship in Digital Forecast Manual for Berryville to Martinsburg on Opequon Creek
- Distributed Hydrologic Modeling
  - Developed four synthetic, 1-hour unit hydrographs for OKX Site Specific implementations using RDHM
  - Calibrating & testing 2-km distributed hydrologic model (RDHM) throughout service area to improve forecasting on fast-responding basins
  - Trained staff on distributed hydrologic modeling (RDHM) and implemented RDHMs in CHPS at 9 headwater basins
  - Supporting USDA Fertilizer Forecaster Decision support tool using RDHM simulations
  - NART-sponsored summer intern for MARFC-NOAA Chesapeake Bay Office continued to work on RDHM modeling project to improve and sustain the ecological health of the Choptank watershed
- LDAD – Worked with CTP & ERH to fix dissemination issue sending MPE data via email to external users
- New forecast service at Edwards Ferry, VA (EDFM2) on Potomac River (daily, 72-hour full-time series, no probabilistic)
- Flash Flood Guidance – implemented daily, routine, automated 06Z FFG
- AWIPS2 – build 14.2.2 was completed

#### **Ensemble/Uncertainty Initiatives**

- HEFS
  - Calibration & implementation of HEFS basins continues. Generating HEFS forecasts for the Delaware and Potomac basins. 75% of the work done for the Susquehanna Basin.
  - Completed MEFPE
  - Extracted MAP/MAT/MAPE data for the period 1999-2010 for WALN6 to support an ongoing HEFS study at OHD
  - 3-year CSTAR Project “*Understanding and Improving the Full Hydrometeorological Forecasting Chain Using Multimodel Ensembles*” – Hosted kickoff with PI Alfonso Mejia & Penn State students and 3 RFCs & WPC via webinar. One component of the project is to evaluate a new hydrometeorological preprocessing technique which combines the strengths of current MMEFS & HEFS approaches. Early results of verification of SREF and GEFS precipitation forcings were presented.

#### **Forcing innovations (e.g. dual-pol, snow estimation, etc.)**

- MRMS Hydro Experiment - Participate in MRMS Hydro Experiment (Norman) to assess emerging hydrometeorological concepts and products to improve the accuracy, timing and specificity of flash flood watches and warnings. Evaluated short-term predictive tools derived from MRMS QPE and Flooded Locations and Simulated Hydrographs (FLASH) hydrologic modeling framework.
- Mesonets
  - Provided Working Group with comments & suggested locations for 1<sup>st</sup> tier (35 sites) NYS Mesonet
  - Adding 40+ NJ Mesonet stations to operations
- ER Blender Project Regional Team Member
- Attended Global Flood Monitoring System using satellite estimated rainfall webinar
- Attended BGM Winter Weather webinar
- Added new F/P rain gauge (Danville, NY) to operations

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

- Participating in IWRSS/NWC Task Teams
  - An optimal structure of the NWS water program – HIC co-leads
  - Implement Distributed Model (SAC-HTET) in CHPS – DOH co-leads

- Reshape and customize the ERDC Portfolio Management process – HIC
- Organize WFIPP Design Teams – HIC
- Prepare for the FY16 AOP Process – HIC
- Training Team – DOH
- Collaborative Development of NWC Profile – HIC
- Communications Strategy Team – SCH
- Silver Jackets
  - National Meeting – Agenda planning team member
  - Washington DC – attended team meeting at Fort Belvoir. Presented on RFC products and services
  - Pennsylvania
    - Attended monthly webinar meeting and quarterly face-to-face meetings in Harrisburg
    - Contacted Bucknell visiting professor & extended invitation to visit MARFC to present his research on the impact of flood policies on PA towns. His visit is scheduled for November 2014.
    - Co-authored report on Harrisburg FIM Silver Jacket project (published by USGS)
    - Contacted USDA team member & provided information on NWS river forecasting to help their IDSS
  - Maryland – attended quarterly meetings in Baltimore
  - New Jersey – attended quarterly meetings in Trenton

### **Significant external engagement**

- Customer Advisory Board met bimonthly via webinar
- Participate in post-event review of Hurricane Arthur with NHC, WSHQ, Regions & coastal WFOs
- Hosted Chester County, PA EM office visit
- WFOs
  - PHI Familiarization Visits – hosted a total of 12 forecasters from WFO Mt Holly in a series of familiarization visits during the 3<sup>rd</sup> & 4<sup>th</sup> quarters
  - AKQ – DOH and hydrologist visited WFO Wakefield
  - LWX – 2 hydrologists attended WFO Sterling's Hydro Partners meeting
  - CTP – staff participated in flash flood meeting with MIC prior to her attendance at Flash Flood Summit
- Social Media
  - Surpassed 2,000 followers on Facebook
  - Commemorated anniversary of 1977 Johnstown Flood on Facebook & Twitter
- Hazel Commemoration – completed final deliverables to ER Team (Mid-Atlantic inland flooding will be included in the Hazel impacts)
- Water Quality/Public Health IDSS
  - With assistance from CTP & ERH, solved an LDAD email issue that was preventing MPE data to be sent to water quality interests
  - Began providing MPE data to U of Delaware, Delaware Environmental Observing System (DEOS).
  - MPE data now available to MDE Healthy Beaches Program data users via a new MDE smartphone app. Users are told to avoid swimming in natural waters within 48 hours of a heavy rain event because of the potential for increased concentrations of harmful bacteria due to polluted storm water runoff.
- USGS – attended USGS/NOAA seminar on Hurricane Sandy and the SWATH Network
- AMEC Environment & Infrastructure LLC – answered multiple inquiries re: MPE data for use in USACE Norfolk modeling project
- AMS – member of planning committee for AMS summer meeting; Dr. Louis Uccellini office visit
- USACE Baltimore District – staff traveled to Baltimore to meet with USACE Hydro Data Operations section to learn more of each other's operations and discuss data information sharing. One idea quickly implemented was to put USACE recreational release info into SHEF format for RFC ingest.
- Students
  - Penn State University – provided office tours to first year meteorology students
  - Taught operational hydrology at Bucknell University
  - Gave tours and forecasting demos to 2 prospective hydrology students

- Worked with PSU meteorology class to have students write weather summaries for events in MARFC flood climatology program
- NOS – to help answer an inquiry from NOS, surveyed RFCs re: different SHEF codes used in RVFs
- Nurture Nature Center
  - Arranged for NNC to submit article on Social Science Project for National Silver Jackets Newsletter
  - NNC Director presented project results to NOAA leadership at NOAA Science Days event and to several congressional staff in Washington DC
  - Participated in project wrap-up at NNC with WFO PHI and several social scientists
- Richmond, VA – met with Flood Wall Supervisor for City of Richmond, WFO AKQ, USACE Norfolk, and USGS to discuss possible new forecast point at the Richmond City Locks gage
- River Basin Commissions
  - Potomac
    - Visited ICPRB to discuss their current drought exercise and possible methods to improve low flow forecasts in the future
    - Participated in annual drought exercise
  - Delaware – attended DRBC Flood Advisory Committee quarterly meeting
  - Susquehanna – attended Cumulative Water Use Study webinar
- NART – participated in NART-sponsored Delaware congressional roundtable
- FEMA – participated in FEMA discovery meeting for Middle Potomac-Anacostia-Occoquan Watershed
- USACE Baltimore District – provided details on accessing inflow forecasts for Jennings Randolph and Savage River Dams via MARFC/AHPS web pages

## FY2014 AHPS Activities for NERFC

**Management Lead:** David Vallee (HIC), Rob Shedd (DOH), Ed Capone (SCH)  
**Objective:** Implement AHPS services in the Northeast River Forecast Center's area of responsibility  
**Milestones:**

### FY14 Planned New Service Locations

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided	Planned Completion Quarter	Actual Completion Quarter	Notes
Pawcatuck	2	WODR1, WSTR1	Prob. AHPS	FY13 Q4	FY14 Q1	Pawcatuck River @ Wood River Junction & Westerly, RI
Pawcatuck	1	HOPR1	Prob. AHPS	FY14 Q4	NC #1	Pawcatuck River @ Hope Valley, RI
Housatonic	1	BEAC3	Prob. AHPS	FY14 Q3	NC #1	Naugatuck River @ Beacon Falls, CT
Penobscot	1	BPRM1	Prob. AHPS	FY14 Q1	FY14 Q1	Penobscot River @ Bangor, ME
Merrimack	2	MFDN3, ANDM3	Prob. AHPS	FY15 Q2	NA	Souhegan River @ Milford, MA Shawsheen River @ Andover, MA (AHPS Contract calibration support in FY14)

\*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)

#1 Final implementation of HOPR1 and BEAC3 has been delayed pending some required data from the Service Hydrologist. Both are ready to go within the model.

### 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	3	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	0	0	0	0	0	0	0	0
Total FY14	3	0	0	0	0	0	0	0
Overall Total	179*	1	57	0	0	0	0	0

\* Connecticut River @ Middletown, CT (MDDC3) discontinued FY12Q2 was added back to point total

### Accomplishments/Actions:

#### 1st Quarter FY2014

- **Forecast Points**
  - Pawcatuck River at Wood River Junction, RI (WODR1)

- Pawcatuck River at Westerly, RI (WSTR1)
- Penobscot River at Bangor, ME – tidal location running in HEC-RAS. AHPS plots are being generated.
- **RISK:** Initial discussion on calibration activities with LynkerTech and AMEC in October regarding calibrations in the Souhegan River basin. However, the contract protest has put that work on hold. Although it should not affect FY14 implementations, it will delay when in FY15 things are implemented
- **CHPS Innovations**
  - Beginning work on implementation of CHPS4. At end of Q1 installed on standalone. Will be installed operationally early in Q2
  - Bringing in additional NOHRSC grids and have generated additional spatial displays and forecast point plots that incorporate this data
- **Ensemble / Uncertainty Initiatives**
  - Completed all requirements for HEFS implementation for NYC DEP
  - Beginning initial work to expand HEFS development to additional basins
- **Forcing Innovations**
  - Forecasters have been making more routine use of MRMS/Q2 grids in MPE. Recent changes in those grids have seemed to make significant improvement in their performance
- **Status of Ongoing IWRSS Innovations**
  - DOH is on the WFIPP Verification and Evaluation team
  - SCH is on the WFIPP Modeling Test-bed team
- **External Engagement**
  - HIC gave a series of talks on Flood Climatology and Forecasting to several groups including:
    - New England Sea Grant Biennial Conference
    - New England Erosion Control
    - Rhode Island Political Roundtable – participation was organized by the NART (NOAA North Atlantic Regional Team)
  - HIC attended WMO Expert Meeting on Flood Forecast Operations in Geneva in November

## 2<sup>nd</sup> Quarter FY2014

- **Forecast Points**
  - The Merrimack River at Haverhill MA was converted from a 6-hr time step stage-stage forecast to an hourly time step forecast using HEC-RAS with a downstream tidal boundary
  - **RISK:** We are continuing to wait for resolution of the AHPS calibration contract. This delay will likely result in a delay of forecast point implementation for FY15
- **CHPS Innovations**
  - Upgraded CHPS to CHPS4.0.1
  - Developed spatial display of percent normal SWE of current snow pack compared to historical snowpack on that particular day. The historical run was from 1961-2010
- **Ensemble / Uncertainty Initiatives**
  - MMEFS converted to generating graphics using GraphGen. This eliminated the need for using ESPADP and R for graphics generated
  - HEFS implementation is ongoing. Most work in the Hudson basin has been completed. Current development work in Connecticut River basin
- **Forcing Innovations**
- **IWRSS Innovations**
  - DOH and SCH served on Evaluation & Verification and Modeling Testbed WFIPP Teams respectively. Final reports for both requirements phases have been submitted

- **External Engagement**
  - Participated in conference planning calls for New York State's Statewide Weather Mesonet that will be implemented over the next several years

### 3<sup>rd</sup> Quarter FY 2014

- **Forecast Points**
  - Working with AHPS contractor on a couple of headwater calibrations. Implementation will likely be delayed due to the contract delays
  - The Sebasticook River at Pittsfield ME (PITM1) gage was discontinued last year by the USGS. Forecast services have now been discontinued as well
- **CHPS Innovations**
  - Created new mod to allow switching between tidal forcing data
  - Working on procedures to display river ice formation and breakup based on heating/cooling degree days
- **Ensemble / Uncertainty Initiatives**
  - HEFS implementation is ongoing. Most work in the Hudson basin has been completed. Current development work in Connecticut River basin
- **Forcing Innovations**
- **IWRSS Innovations**
  - DOH involved in HPRC/NWC Task Teams following the HPRC meeting in Tuscaloosa. Teams are on Distributed Modeling and Training
  - Participated in a call with GLERL on forecasting for the Great Lakes as a follow on from a project that NCRFC was involved in with Lake Michigan. Lake Ontario is much more complex since most of the lake inflow comes from Canada and is not modeled by NERFC.
- **External Engagement**
  - Participated in conference planning calls for New York State's Statewide Weather Mesonet that will be implemented over the next several years
  - Penn State has been awarded a CSTAR grant that will in part look at the biases in the MMEFS models and work to improve the performance of the bias of the model forcings. Hosted a meeting with principal investigator (Alfonso Mejia) to review his project plans and RFC role in the project

### 4<sup>th</sup> Quarter FY 2014

- **Forecast Points**
  - Received calibration package for 2 points (Merrimack Basin) contracted this year. Work on operational implementation will begin shortly.
  - Final implementation of HOPR1 and BEAC3 has been delayed pending some required data from the Service Hydrologist. Both are ready to go within the model.
- **CHPS Innovations**
  - Plans to begin testing river ice algorithms for ice thickness and breakup within CHPS this winter season that rely on Freezing Degree Day computations
  - Setting up specialized mods at a couple of reservoirs that will fit better the way the reservoir is operated and the data we receive to improve the modeling
- **Ensemble / Uncertainty Initiatives**
  - Working to have an initial HEFS setup available for all basins by the end of CY2014
- **Forcing Innovations**
  - Preliminary testing with the NHC PSURGE grids was successful
  - Beta test site to begin for the updated MRMS products and data feed
  - Web mining from the weatherlink.com page to bring in some hourly precipitation reports along the Canadian border

- **IWRSS Innovations**
  - DOH continues work on HPRC/NWC Task Teams (Distributed Modeling & Training)
- **External Engagements**
  - Working on project with a variety of schools and other agencies to ingest satellite imagery of ice and flooding extent into AWIPS and possibly CHPS
  - Coordinating with Buffalo District Corps of Engineers to provide some early forecasts of possible flows for Mt Morris Dam and downstream to assist them in gate setting at the dam
- **Challenges**
  - Recently lost 2 staff persons. This will have an impact on some development activities.

## FY2014 AHPS Activities for OHRFC

**Management Lead:** Trent Schade (HIC), Vacant (DOH), Jim Noel (SCH)  
**Objective:** Implement AHPS services in the Ohio River Forecast Center's area of responsibility  
**Milestones:** **FY14 Planned & Unplanned New Service Locations**

Area of Service (River Basin)	# New Locations	Location Names (LIDs)	Service Type Provided	Planned Completion Quarter	Actual Completion Quarter	Notes
Licking	6	GRNO1 (1) RCNO1 (2) NEAO1 (3) NMSO1 (4) SFHO1 (5) BEE01 (6)	FIM	FY14 Q1	FY14 Q1	Raccoon Creek nr Granville, OH and at Newark, OH (1 & 2) Licking River nr Newark, OH (3) North Fork Licking River nr Newark, OH (4) South Fork Licking River nr Heath and nr Hebron, OH (5 & 6)
White	1	FCFI3	SSHP-SAC	NP	FY14 Q1	Fall Creek nr Fortville, IN
Wabash	2	JRMI3 RLVI3	SSHP-SAC	NP	FY14 Q1 FY14 Q2	Wildcat Creek nr Jerome, IN Big Walnut Creek nr Reelsville, IN
Cumberland	1	DOVT1	Prob. AHPS	NP	FY14 Q2	Cumberland River at Dover, TN
Kentucky	1	LPTK2	Prob. AHPS	FY12 Q4	FY14 Q2	Kentucky River at Lockport, KY
Licking	1	NMSO1	Prob. AHPS	FY14 Q1	FY14 Q2	North Fork Licking River nr Newark, OH
Conemaugh	2	FDLP1 ECMP1	SSHP-SAC	NP	FY14 Q2	Stonycreek River at Ferndale, PA Little Conemaugh River at East Conemaugh, PA
White	1	FLCI3	SSHP-SAC	FY14 Q2	FY14 Q4	Flatrock River at US Highway 31 in Columbus, OH

\*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	2	0	6	0	0	0	0
Q2	3	3	0	0	0	0	0	0
Q3	0	0	0	0	0	0	0	0
Q4	0	1	0	0	0	0	0	0
<b>Total FY14</b>	3	6	0	6	0	0	0	0
<b>Overall Total</b>	284	99	40	14	0	0	0	0

### Accomplishments/Actions:

1<sup>st</sup> Quarter FY2014

- **CHPS Innovations**
  - CHPS Calibration Training webinar
- **Ensemble/Uncertainty Initiatives**
  - None
- **Forcing Innovations/Initiatives**
  - FFG coordination call with other RFC(s)
- **Status of ongoing and new IWRSS innovations:**
  - Coordinating with NOAA GLERL as lead RFC on experimental rainfall QC project in the Great Lakes
- **External engagement**
  - Routine flow forecast coordination calls continued with USACE LRD supporting the Olmstead Lock & Dam Project
  - Ohio State University climate/weather/water coordination call
  - Partner Flood Coordination
    - Partner DSS flood briefing coordination calls
    - WFO Cleveland flood coordination calls
    - FEMA V flood coordination call
  - Silver Jackets Activities
    - Coordination calls: Virginia, Indiana, Pennsylvania,
    - Meetings: Indiana, Ohio
  - Climate
    - CPC coordination call
    - Youngstown State climate change coordination call
    - Ohio River Basin Climate Change Pilot Project coordination calls & presentations
    - Climate presentation made at 2013 Kentuckiana Crop Production Seminar
    - Climate presentation made at 2013 Indiana Certified Crop Advisor Conference
  - Training and Outreach
    - Stiver School of Arts Career Day
    - Outreach presentation made at Wilmington High School
    - WFO Nashville program coordination call
    - WFO OHX coordination visit
    - WFO LMK coordination visit
    - Q3 Multi-Radar Multi-Sensor (MRMS) training
    - NOAA 14 Rainfall Atlas webinar
    - USGS Flow Network webinar
    - DHS Dam Safety Training

## 2<sup>nd</sup> Quarter FY2014

- **CHPS Innovations**
  - New Ohio River HEC-RAS Model implemented
  - USACE/LRD-LRL and OHRFC Community HEC-RAS meeting
  - Added lower Licking and Kentucky basins to Ohio River HEC-RAS model
  - Adding in new cross section and bathymetry data for lower Miami, lower Green, lower Wabash and Ohio River near Louisville for Ohio River HEC-RAS model
  - Began work in USGS FIM data to be pulled into the Ohio HEC-RAS model around Marietta, OH and for the lower Muskingum River basin from McConnellsville to Marietta, OH
  - Extended all of the historical traces used for AHPS long term out to 63 years and getting that data into the old ESPADP graphics package
  - Implemented the FEWS calibration package
  - Put data sets together for calibrations such as evapotranspiration grids from STATGO/SSURGO to generate more consistent ET curves and observed data sets from USGS for calibration

- Obtained a FEWS RDHM adapter from OHD and working with Lee Cajina, Zhengtao Cui and Xiaoshen Li as a beta site for testing purposes to work out some issues with it
- Working on calibration of RDHM for gridded FFG
- Working on calibration of RDHM for gridded runoff project
- Implemented Basin Care-taker project to look at headwater runoff within SAC-SMA of CHPS
- Implemented MBRFC Rating software for use in tracking and pushing ratings to CHPS & NWSRFS
- Developed ratings software to pull ratings from USGS Ratings Depot daily
- Developed software to pull USGS Ohio River flows at Sardis & Shawneetown to improve river forecasting along the main-stem Ohio
- Implemented ability to view USGS Ohio River flows at Sardis & Shawneetown in AWIPS 2 & CHPS
- Adding in new cross section and bathymetry data for lower Miami, lower Green, lower Wabash and Ohio River near Louisville for Ohio River HEC-RAS model
- Began GraphGen implementation for MMEFS
- **Ensemble/Uncertainty Initiatives**
  - Re-implemented VAR in SSHP for ensemble forecasts in SSHP to converge to correct solution
  - Implemented KML for MMEFS per request of FEMA 5, First Energy and other users
  - Began work to use GraphGen for MMEFS graphics from CHPS
  - Provided West Virginia Silver Jackets with MMEFS training
  - Improved ensemble traces add to GIFTS
  - Began work to use GraphGen for MMEFS graphics from CHPS
- **Forcing Innovations/Initiatives**
  - NWA Webinar presented by OHRFC on multiple FFG method and coming up with a Best Guess FFG based on multiple methods
  - Implemented new dataset from Ohio STORMS
  - Added new CoCoRaHS sites
  - Implemented new unit hydrographs for ANTT1 and WBNT1 for SSHP for WFO Nashville
  - Provided USACE Buffalo with Grand River rainfall for July 2006 data project
  - Began issuing 06Z FFG
  - Added new features to the AWARE programs for situational awareness
- **Status of ongoing and new IWRSS innovations:**
  - Implemented LDM with NOAA GLERL on an experimental rainfall QC project in the Great Lakes
  - Set up transfer process within LDM with NOAA GLERL as the lead RFC on an experimental rainfall QC project in the Great Lakes. Transfer of rainfall MPE grids is starting
  - Work continues on USGS FIM data to be pulled into the Ohio HEC-RAS model around Marietta, OH and for the lower Muskingum River basin from McConnellsville to Marietta, OH
- **External engagement**
  - Routine flow forecast coordination calls w/ USACE LRD supporting Olmstead Lock & Dam Project
  - Routine USGS Midwest Water Resources Flood Science Technical Team Meeting and coordination
  - Partner Flood Coordination
    - Partner DSS flood briefing coordination calls
    - WFO Pittsburgh, WFO Charleston, USACE Pittsburgh, USACE Huntington, Pittsburgh Waterways, Huntington Waterways Ice Coordination Calls.
  - Silver Jackets Activities
    - Tennessee, West Virginia, Kentucky, Virginia, Indiana, Pennsylvania
  - WFIPP
    - Meetings and Tasks completed for WFIPP Verification and Evaluation Team
    - Meetings and Tasks completed for WFIPP Data Interoperability
  - Climate
    - Water Resources Outlook issued
    - CPC coordination call and climate outlook
    - Ohio Seed Growers Association Meeting and presentation

- Ohio River Basin Climate Change Pilot Project coordination calls with USACE, Ohio EMA Flood Mitigation, and Ohio Department of Agriculture
- Ohio River Basin Climate Change Pilot Project coordination call and review of ODOT climate change plan for adaptation and planning – climate resiliency plan
- Provided USACE LRE Detroit with location & 6 month QPF climate outlooks for modeling
- Training and Outreach
  - Dayton STEM
  - Chemical spill WV; coordination & velocity forecasts w/ ORSANCO, EPA & USACE
  - Interview with TWC on chemical spill in WV impacting Ohio River
  - WFO Nashville hydrology program coordination call
  - EPA Green Initiative
  - FEWS training
  - Miami Conservancy District Coordination Meeting at MCD.
  - SAC-HTET training
- Lead office for the Mississippi Drainage Spring Flood Outlook for WFOs and Partners
- Ohio Valley Tri-Agency Meeting with USGS, USACE and NWS
- NWS-USACE-USGS River Forecasters Summit in New Orleans
- Presented Ohio River Basin Climate Change Project at Ohio River Sanitation Commission Meeting
- Dayton Tech Fest booth with 5000 people in attendance
- City of Columbus Flood Forecasting Improvement Coordination call
- Ohio University students and professors visited OHRFC

### 3<sup>rd</sup> Quarter FY2014

- **CHPS Innovations**
  - Began work on CFS mean for 45-day Ohio River runs for partners
  - Dumped large amount of data from CHPS for use in HEC-RAS calibrations
  - Began early work on preparing for HEFS in CHPS
  - Preparing to test calibration in CHPS for Daily, WV with goal of re-calibrating part/all OHRFC area
  - Switched to GraphGen to generate MMEFS graphics
  - Upgraded to the new RP boxes successfully
  - Upgraded to AWIPS 14.x
  - Did a successful test using CHPS for backup
- **Ensemble/Uncertainty Initiatives**
  - Completed Nashville OEM data ingest operationally into MPE
  - Switched to GraphGen to generate MMEFS graphics
- **Forcing Innovations/Initiatives**
  - Completed Nashville OEM data ingest operationally into MPE
  - Completed getting Environment Canada weather models into CAVE/D2D and GFE for AWIPS 2
  - Worked with WFO OHX on dataflow issues of rainfall from Nashville OEM
  - Added QPF graphics and FFG graphics to NWSChat
- **Status of ongoing and new IWRSS innovations:**
  - Participated in IWRRS Ohio River Basin Stakeholders Engagement meetings
  - Final calibration work ongoing for lower Muskingum basin in HEC-RAS with goal of new forecast point at Beverly, OH in 2014
  - Providing NOAA GLERL with QC rainfall data over Lake Erie and part of Great Lakes U.S./Canada project for rainfall over the Great Lakes
- **External engagement**
  - Attended Hydrology Committee meeting for United States and Canada Great Lakes Compact
  - Providing testing to do real-time rainfall QC for Lake Erie for GLERL and USACE

- Coordinating with USACE/EPA to setup logistics for providing daily cloud forecasting coordination calls for lakes in Kentucky and Ohio during June
- IWRSS stakeholder follow up meetings for the Ohio River basin
- Routine flow forecast coordination calls continued with USACE LRD supporting the Olmstead Lock & Dam Project
- Community HEC-RAS Ohio River Coordination Meetings
- Attended the National WCM/SCH Meeting
- Participated in USACE/EPA daily cloud forecasting coordination calls for lakes in KY & OH
- Presented at the West Virginia Flood Plain Managers Conference
- Meeting with Preston County, WV EMA on forecast services
- Flow forecast coordination calls continue with USACE LRD supporting Olmstead Lock & Dam Project
- Presented on Ohio River Community HEC-RAS Model to ORSANCO Water Resources Committee
- Partner Flood Coordination
  - Partner DSS flood briefing coordination calls for PA, OH, IN, IL
  - WFOs Pittsburgh, Cleveland, and Wilmington Coordination Calls
- Silver Jackets Activities
  - Tennessee, West Virginia, Kentucky, Virginia, Indiana, Pennsylvania, Ohio
- Climate
  - Water Resources Outlook issued
  - CPC coordination call and climate outlook
  - Ohio State spring climate outlook calls
  - Purdue spring climate outlooks
  - Ohio River Basin Climate Change Pilot Project USACE coordination calls
  - CR Drought and Climate Call
  - CPC coordination call and climate outlook
  - Ohio River Basin Climate Change Pilot Project USACE coordination calls & presentations
  - OHRFC Attended the HEPEX Conference and had a poster session on ensemble Flash Flood Guidance
  - Ohio Country Journal spring and summer climate outlooks article
- WFO Coordination Visits
  - PBZ to OHRFC
  - OHRFC to JKL, LMK, PAH, RLX (Via WV Flood Plain Managers Conference)
- Training and Outreach
  - OHRFC River Forecast Process Training for Partners
  - OHRFC NWSChat LIVE training for Partners
  - National SCH Conference
  - West Virginia Flood Plain Managers Conference

#### **4<sup>th</sup> Quarter FY2014**

- **CHPS Innovations**
  - Began developing workflows to handle 1937 event for USACE flow line study
  - HEC-RAS Community Model meetings with LRD
  - Working to add lower Muskingum into operational model on CHPS
  - Added Lower Muskingum and Beverly into the HEC-RAS model
  - Added news points of Franklin and Piqua in Great Miami basin into model preliminarily
  - Add 16 member and mean CFS 44-day ensemble into CHPS
  - Updated the Graphical Interactive Forecast Time Series (GIFTS) with new features pulling from CHPS
  - Updated LaunchPad which allows interaction to run CHPS workflows etc outside CHPS
- **Ensemble/Uncertainty Initiatives**
  - Added Ohio EMA to our software to send out flood alerts
  - Added Hoover Dam inflows for the City of Columbus on MMEFS

- Upgraded from a 4 member to 16 member CFS 44-day Smithland inflow forecast, includes a mean
- **Forcing Innovations/Initiatives**
  - Added Ohio EMA to our software to send out flood alerts
  - Updated CoCoRaHS dataset
  - Gage improvement project begun to gaging in the Nimishillen basin with the USGS and State of Ohio
- **Status of ongoing and new IWRSS innovations:**
  - Experimental rainfall estimate project over Great Lakes ongoing. Successfully providing GLERL with rainfall estimates daily over Lake Erie
- **External engagement**
  - USGS Indiana Water Science Center Meeting
  - USGS/WV meeting on new river gage at Buckanon
  - Routine flow forecast coordination calls with USACE LRD supporting Olmstead Lock & Dam Project
  - Ohio Flood Plain Managers Conference
  - Farm and Dairy interview on climate, hydro and frost outlooks into autumn
  - Coordination meeting with Columbus, OH on Hoover Dam MMEFS forecasts for the City of Columbus
  - GLERL coordination calls for Lake Erie rainfall estimates project
  - USACE Flow Line Meeting at OHRFC
  - Participated in the CR Hydrology Program Managers Conference in Kansas City
  - Participated in the USACE/NWS/USGS Fusion Team Meeting in Kansas City
  - Participated in the USACE/NWS/USGS Products and Communication Team meeting
  - Participated in Ohio and Ohio State University Healthy Soils for Healthy Waters Conference
  - Partner Flood/Drought Coordination
    - CRH Climate and Drought Outlooks
  - Silver Jackets Activities
    - Tennessee, West Virginia, Kentucky, Virginia, Indiana, Pennsylvania, Ohio
  - Climate
    - Water Resources Outlook issued
    - GLERL calls with OHRFC on coordination on climate outlooks with CPC
    - Presented at Ohio State on Climate Change in Hydrology for the Ohio River Basin through 2099
      - ODOT meeting on hydrology climate change impacts on Ohio
      - CPC coordination call and climate outlook
      - Ohio State summer climate outlook calls
      - Purdue spring/summer climate outlooks article
      - Ohio River Basin Climate Change Pilot Project USACE coordination calls
      - CR Drought and Climate Call
      - Purdue summer climate outlooks
  - WFO/RFC Coordination Visits
    - WFOs Jackson, KY; Charleston, WV; Pittsburgh, PA; Louisville, KY; Indianapolis, IN
    - NCRFC
  - OHRFC visited Columbus, IN Haw Creek project
  - Training and Outreach
    - OHRFC River Forecast Process Training for Partners
    - Global Flood Monitoring System
    - WTDB MRMS Rainfall
    - Hurricane Sandy Post training
    - HWT Webinars
    - Flash Flood Webinar
    - Flash Flood Verification Webinar
    - Unmanned Space Craft webinar training for floods

## FY2014 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:**

### FY14 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	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	3	0	0	0	0	0	0	0
Total FY14	3	0	0	0	0	0	0	0
Overall Total (FY2000-2014)								

**Accomplishments/Actions:**

**4th Quarter FY2014**

- **CHPS Innovations**
  - Added historical events for 64 locations into CHPS.
  - Configured and calibrated RDHM for the St Charles River near Vineland CO (SCVC2). Operational in CHPS.
  - Added new forecast points AMCO2, RIPO2, WDGO2
- **Ensemble/Uncertainty Initiatives**
  - Ran HEFS MEFP hindcasts for 55 locations for 2005-2013.
  - Began EVS verification of the 55 runs.
  - Added AMCO2, RIPO2, and WDGO2 as ESP points.

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

## **July**

- Bill Lawrence and Lee Crowley participated in the SR HAS Workshop in Fort Worth, TX.
- James Paul, Jeff McMurphy and Angelo Dalessandro attended Sanford Dam (TX) tabletop exercise held by USBR at Lake Meredith (TX).
- James Paul, Jeff McMurphy and Angelo Dalessandro met with WFO AMA HFP and SOO and visited several forecast points.
- James Paul and Matt Bryant visited WFOs SGF, ICT and TOP and gave RFC operations presentations.
- James Paul and Matt Bryant visited several forecast points in Kansas.
- James Paul gave an RFC operations presentation to a multi-regional FEMA hydrology class at University of Oklahoma.
- Eric Jones, Matt Bryant and Bekki Harjo visited WGRFC to discuss current Site Specific Model and CHPS Calibration techniques.
- Tony Anderson visited the National Weather Center at University of Oklahoma to observe their Hazardous Weather Testbed Flash Flood tools.
- Bekki Harjo served as SR ROC Duty Officer.

## **August**

- James Paul visited Southern Region for his BLAST follow-up.
- Bekki Harjo, Matt Bryant, and Manuel Vilar attended HEC-RAS training in Fort Worth, TX.
- Bill Lawrence attended LMRFC Hydro Program Manager's Workshop.
- Tony Anderson gave a Flash Flood Webinar for RFCs using GFFG.
- Bekki Harjo attended a USACE Tulsa District Verdigris Basin tabletop exercise.
- Bill Lawrence attended SR MIC-HIC meeting.
- James Paul and Lee Crowley attended Drought Workshop at National Weather Center in Norman, OK.
- Eric Jones and several RFC personnel traveled to WFO OUN for RFC backup test.
- Jeff McMurphy attended USACE Tulsa District tabletop exercise for Elk City, Big Hill, Fall River and Toronto Dams.

## **September**

- ABRFC and WFO Tulsa held joint Open House with Tulsa USGS.
  - James Paul did a TV interview during the event.
- ABRFC hosted a visiting student from University of Oklahoma.
- James Paul attended CR HPM workshop in Kansas City, MO.
- Bill Lawrence visited WFO SHV and gave RFC operations presentation.
- James Paul, Bekki Harjo and Larry Lowe visited WFO LZK and gave RFC operations

presentation.

- James Paul, Bekki Harjo and Larry Lowe visited USACE Little Rock District and gave RFC operations presentation.
- Bill Lawrence gave a tour of operations and software to visiting college student Tony Jackson from the University of Oklahoma.

## FY2014 AHPS Activities for LMRFC

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

**Objective:** Implement AHPS services in the Tennessee River, Black, and Pascagoula Basins of the Lower Mississippi River Forecast Center's area of responsibility.

**Milestones:**

### FY14 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
Spring	1	HDYA4	Prob. AHPS	Q1	Q1	
Watauga	1	WTGT1	Prob. AHPS	Q2	Q1	
Hiawassee	1	CHAN7	Prob. AHPS	Q3		**
Duck	1	NRMT1	Prob. AHPS	Q4	Q2	
Bayou Des Cannes	1	BDCL1	Prob. AHPS	Q4		**
Okatibee	1	MRDM6	Prob. AHPS	Unplanned	Q1	
Ocoee	1	CPHT1	Prob. AHPS	Unplanned	Q2	
Vermilion	1	BVCL1	Prob. AHPS	Unplanned	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)

\*\*Implementations may be modified due to FY14 staffing and work load constraints.

### 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
FY14 Q1	3							
FY14 Q2	2							
FY14 Q3	1							
FY14 Q4	0							
Total FY14	6	0	0	0	0	0	0	
Overall Total (FY2000-2014)	248	24	4	7	0	0	0	263

**Accomplishments/Actions:**

#### 4<sup>th</sup> Quarter FY2014

- **CHPS Innovations** (e.g. any extensions, configurations, displays, adaptors, collaborations, community models, etc.)
  - On-going discussions with the Tennessee Valley Authority (TVA) on their transition to CHPS and future collaborations with modeling, calibration and development. Extensive effort to coordinate hydrologic data collaboration efforts between TVA and LMRFC.
  - LMRFC continues participation in national HEFS implementation.
  - David Welch and Kai Roth participated in HEFS training at NWSTC.
  - David Schlotzhauer collaborated with WFO LCH's Jonathan Brazzell on ground truth/data acquisition to expand Vermillion Basin meta-data to improve CHPS forecasting.
  - Coordinated with Lynker Tech for upcoming FY15 calibrations and uploaded hydrologic datasets.
  
- **Forcing innovations** (e.g. dual-pol, snow estimation, etc.)
  - Scott Lincoln participated in the July Flash Flood and Intense Rainfall (FFaIR) Experiment Workshop to evaluate new ways for WPC to forecast excessive rainfall high resolution meteorological models and produce short ranged QPF.
  - Continue discussion with other Southern Region RFCs on numerous HAS functions, including QPF, QPE (Stage IV) consistencies, and regional boundary consistency and grid policy.
  - WPC gridded products changed to 2.5 km resolution for day 4-7
  
- **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.
  - Continue discussions with NASA Stennis, NGI, and affiliated groups for coastal total water level prediction collaboration with LMRFC.
  - Continue on-going decision support service development for excessive rainfall events, including partnership with NSSL and LMRFC WFOs.
  - Continue collaboration with OHD on Distributed Hydrologic Model Threshold Frequency project for the LMRFC area. DHMTF running in real-time with an evaluation phase with WFOs LCH, JAN, SGF, MEG and RNK. Journal article published by Scott Lincoln illustrated preliminary DHMTF results for WFO SGF area.
  - Continue discussions with New Orleans Corps on water monitoring and hardening of gages (HSDRRS).

- Jeff Grascchel, Jessica Smith, and Katie Landry participated in the HAS Meeting at SRH. Also, Jessica presented LMRFC's daily HAS operations. Workshop action items included formation of the Southern Region RFC Social Media Focal Point collaborations.
- Numerous LMRFC conference calls with Lynker Tech concerning calibrations, datasets, and expectations.
- Scott Lincoln participated in the evaluation of NSSL's Multi-Radar/Multi-Sensor Warning Experiment in Norman, OK.
- Suzanne Van Cooten with Ken Graham, MIC WFO New Orleans, served as local NWS hosts for the New Orleans segment of the 3 state NWS, National Ocean Service, USACE, USGS, and USCG Interagency Integration tour of facilities. The goal of the New Orleans segment of the tour was to see first-hand the challenges of hydro modeling and the total water concept and how relationships between NOAA and these three agencies can be strengthened to address this challenge. Attendees included the NWS Chief of Staff, NWS Acting Director of OHD, NOS Deputy Director, USGS Associate Director for Water, Commander of USACE Mississippi Valley Division, Director of Science and Technology for USACE Mississippi Valley Division, and Director of the Watershed Division for the USACE Mississippi Valley Division
- Suzanne Van Cooten delivered a presentation remotely for the 2<sup>nd</sup> NOAA Unmanned Aerial Systems (UAS) Arctic and River Forecast Workshop held in mid-September in Anchorage, Alaska. The presentation detailed the ongoing collaboration between NOAA's Northern Gulf Institute, LMRFC, NWS WFO New Orleans, and St. Tammany Parish to explore the applications of high-resolution imagery collected from three UAS missions in the lower Pearl river basin of southeast Louisiana for development of hydrodynamic models, flood inundation, and damage assessments
- **Significant external engagement** (e.g., Silver Jackets, Fusion Team, Congressional activities, Impact-based Decision Support Services (IDSS), etc.)
  - Suzanne Van Cooten continues collaboration and coordination with Northern Gulf Institute partners including LSU and Mississippi State University to leverage expertise in hydrologic and hydrodynamic modeling.
  - Tabitha Clark and other WFO LZK forecasters toured LMRFC operations, trained on CHPS, and discussed items to improve the LZK hydro program.
  - Significant coordination with USACE's Great Lakes and Ohio River Division for Olmsted construction and L&D operations.
  - David Welch and Gina Tillis-Nash toured WFO MRX and TVA Forecasting operations and visited numerous LMRFC forecast and reservoir sites.

- Suzanne Van Cooten and Jeff Grascchel of LMRFC in collaboration with Marty Pope, Senior Service Hydrologist WFO JAN, and Patricia Brown, Senior Service Hydrologist WFO LIX, hosted a Pearl River collaboration meeting at LMRFC attended by officials of the Pearl River Water Supply District and St. Tammany Parish, Louisiana
- Ongoing work with TVA and RTi on precipitation datasets, including discussions with MetStat.
- LMRFC organized and facilitated a Service Hydrologist/Hydro Focal Point Training Meeting to better understand HPM needs and how to improve LMRFC services. Outcomes include a Hydro Outreach Team to support the WFOs and RFCs with consistent outreach material and increase support at state levels for dam breaks.
- Katie Landry served as a conference organizer and co-chair of the NWS Gulf South social media conference
- Suzanne Van Cooten participated in Central Region's HPM Meeting.
- Bouie Creek/Hattiesburg AHPS flood inundation mapping revision to extend the boundaries up beyond Bouie Creek has been completed and submitted to Orion for updating the AHPS mapping page.
- David Schlotzhauer attended LIX's Gulf South Decision Support Service Workshop 7/22-23.
- St. Tammany Mosquito Abatement visit to explore utilizing LMRFC products for mosquito population bloom modeling.
- David Schlotzhauer presented "Storm Surge Forecasting Tools and Implementation" for the NWA/AMS's Southeast TX/Southwest LA Chapter on 9/6.
- Calcasieu Parish Government meeting to acquire DCP for OTBL1.
- David Welch participated in the SOO/DOH Facilitator Workshop at NWSTC.
- David Welch participated in the national CHPS meeting in Kansas City, MO.
- NWRFC's Steve King (DOH) and Joe Intermill (SCH) toured LMRFC operations.
- David Welch met with ESRI's Jeff Donz to discuss software and services to help meet RFC needs.
- David Schlotzhauer conducted a familiarization trip to WFO's LZK, PAH, and SGF, including tour of each office's operations and forecast site visits with the service hydrologists (9/8-9/12).
- Attended meetings/conference calls with Mississippi and Tennessee Silver Jackets and Camo Jackets programs.
- Continued collaboration with representatives from the St. Tammany Parish Engineering Department along with the Navy Research Laboratory's Lead ADCIRC/Hydraulic Modeler about a united,

collaborative effort to develop a hydraulic model for the lower Pearl River, Northshore of Lake Pontchartrain, and coastal communities impacted by storm surge. Discussions include augmenting real-time data gaging network to improve WFO and RFC situational awareness.

- Continued collaboration with USACE New Orleans District, NOS, and Levee Boards to develop a prioritized list of locations for hardened gauge locations to collect meteorological and water level observations in the New Orleans and Lake Pontchartrain/Rigolets area.
- Continued collaboration with USACE and USGS to develop and implement New Orleans Tri-Agency meeting agenda and associated table top exercise to better analyze data availability and sharing needs during high impact events, such as significant tropical.

## FY2014 AHPS Activities for SERFC

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

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

**Milestones:**

### FY14 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	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	0	0	0	0	0	0	0	0
Total FY14	0	0	0	0	0	0	0	0
Overall Total (FY2000-2014)	269							

**Accomplishments/Actions:**

**4<sup>th</sup> Quarter FY2014**

- **CHPS Innovations**
- **Ensemble/Uncertainty Initiatives**
  - Jeff Dobur continues maintenance of MMEFS and ESP to facilitate our need for contingency forecast for partners and customers.
- **Forcing innovations**

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

- Tentative agreement to work on consolidated web page with Corps Mobile and USGS Georgia.

**Significant external engagement**

- Reggina Cabrera attended NOAA Crest meeting for Eastern Region in New York.
- Visit to USGS and WFO Columbia, SC.
- Gulf Coast Social Media workshop.
- Familiarization visit to WFO's AKQ, MHX, and ILM. In addition, visited Bertice County and Windsor, NC emergency management.
- Alabama water partners meeting that included Alabama Power Company, the Corps of Engineers – Mobile and BMX service hydrologist.
- Tri Agency meeting at the National Water Center that included USGS from MS, AL, GA, and FL. It also included Corps of Engineers - Mobile and Alabama Power.
- Familiarization visit to ABRFC.
- HAS meeting in Fort Worth.
- Continued monthly South Atlantic Division Corps of Engineers calls that include Corps districts Mobile, Savannah, Jacksonville, and Wilmington.
- Visit from Georgia DNR, contractor, and Corps of Engineers Mobile to discuss operations at West Point Lake.
- Gave presentation via Go To Meeting to Corp of Engineers about HAS operations and MPE production at the SERFC.

## FY2014 AHPS Activities for WGRFC

**Management Lead:** Robert Corby

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

**Milestones:**

### FY14 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
Nueces River	21	BTVT2 BKST2 FRRT2 CNCT2 RWDT2 SABT2 SCRT2 KWHT2 ULRT2 TNLT2 MYAT2 UVAT2 UVLT2 ASRT2 COTT2 TILT2 UDET2 DBYT2 TIDT2 WTTT2 THET2	Prob. AHPS	Q4 (see note below)		
Rio Grande	2	CBBT2 PRST2	FIMapping	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)

**NOTE: Due to delays with the calibration contract, we will not have calibrations for the 21 sites in the NUECES, and therefore will be unable to implement this FY.**

### 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
FY14 Q1	0	0	0	0	0	0	0	0
FY14 Q2	0	0	0	0	0	0	0	0
FY14 Q3	0	0	0	1	0	0	0	
FY14 Q4	0	0	0	0	0	0	0	
Total FY14	0	0	0	1	0	0	0	
Overall Total (FY2000-2014)								

**Accomplishments/Actions:**

**4th Quarter FY2014**

**CHPS Innovations**

- Continued work with CHPS calibration system.

**Ensemble/Uncertainty Initiatives**

- Began configuration of 9 HEFS basins.

**Forcing innovations**

- Refined configuration to compute real-time gridded QPE/QPF comparisons.
- Began import of HRRR forecast precipitation.

**Status of ongoing and new IWRSS innovations**

- WGRFC worked with WFOs MAF and SJT, IBWC, and contractors to revise FIM library for PRST2. Jason Johnson is coordinating.

**Significant external engagement**

- Paul McKee attended AWRA Conference in Reno.
- Greg Waller attended Flash Flood Intense Rainfal Experiment at WPC.
- Alana McCants and Greg Story visited WPC.
- Frank Bell and Bob Corby attended IBWC annual meeting and workshop in El Paso, TX.
- WGRFC hosted Hydro Program Manager (HPM) workshop for WFO's in our service area.
- Bob Corby attended LMRFC HPM conference.

- Greg Waller attended Central Region HPM conference.
  - Derek Giardino attended TFMA Fall conference in San Antonio.
- Bob Corby met with meteorology professors at Texas A&M University. Also in attendance were FWD, EWX, and HGX staff.

## FY2014 AHPS Activities for CBRFC

**Management Lead:** Michelle Stokes, HIC; John Lhotak, DOH; Vacant SCH

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

**Milestones:**

**FY14 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								
<b>Total FY14</b>								
<b>Overall Total (FY2000-2014)</b>	84	0	0	0	149	7		

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

**1st Quarter FY2014**

- **CHPS Innovations**

- Continue testing of HEFS in CHPS.
- Began collaboration with Utah State University to investigate using the Utah Energy Balance snow model in CHPS.
- **Ensemble/Uncertainty Initiatives**
  - HEFS is now set up throughout the Upper Colorado and Great Basins, for a total of 331 locations. We still need to set up HEFS in the lower Colorado Basin (128 locations). We are producing evaluation statistics that we need to analyze before we start using HEFS.
  - Continue developing verification statistics for Schaake post adjustment and enspost techniques.
  - Continue work with University of Massachusetts (SARP funded) to develop a decision making tool for Public Utilities using ESP and HEFS. Partners in this project include Pacificorps and Salt Lake Public Utility.
- **Forcing innovations**
  - Continue work with NASA JPL to ingest MODIS snow cover grids to use in making operational decisions (inform hydrologist when making adjustments to snow states in the model). Year 1 of the project has been completed. We are now entering the next phase of the project, which includes more analysis of the snow grids, further integration and testing with operational forecast, and model development.
- **Status of ongoing and new IWRSS innovations:**
  - Continue work with USBR which uses ESP output as input to their reservoir model. This new reservoir model is the MTOM (mid term operations model) and is being run in parallel with their legacy model, the 24 months study.
- **Significant external engagement**
  - Participated in the AGU (3 presentations and 1 poster by 3 staff members of the CBRFC).
  - Webinars to brief stakeholders on water supply forecasts, and performance of last year's forecasts.
  - Developing a drought workshop in February in collaboration with NIDIS and Metropolitan Water.

#### 2nd Quarter FY2014

- **CHPS Innovations**
  - Continue testing of HEFS in CHPS.
  - Continue collaboration with Utah State University to investigate using the Utah Energy Balance snow model within CHPS.

- **Ensemble/Uncertainty Initiatives**
  - Implemented EnsPost.
  - Wrapped up work with University of Massachusetts (SARP funded) to develop a decision making tool for Public Utilities using ESP and HEFS.
- **Forcing innovations**
- **Status of ongoing and new IWRSS innovations:**
- **Significant external engagement**
  - [CBRFC 4<sup>th</sup> annual stakeholder meeting.](#)
  - [CBRFC Drought meeting in collaboration with NIDIS and USBR.](#)
  - Monthly webinars to brief stakeholders on water supply and peak flow forecasts.

#### 3rd Quarter FY2014

- **CHPS Innovations**
  - Continue testing of HEFS in CHPS.
  - Continue collaboration with Utah State University to investigate using the Utah Energy Balance snow model within CHPS.
- **Ensemble/Uncertainty Initiatives**
  - Working on verification of probabilistic water supply forecasts (ESP with and without post adjustment), for various time periods.
- **Forcing innovations**
- **Status of ongoing and new IWRSS innovations:**
- **Significant external engagement**

#### 4<sup>th</sup> Quarter FY2014

- **CHPS Innovations**
  - Continue testing of HEFS in CHPS.
  - Continue collaboration with Utah State University to investigate using the Utah Energy Balance snow model within CHPS.
- **Ensemble/Uncertainty Initiatives**

- Working on verification of probabilistic water supply forecasts (ESP with and without post adjustment, and HEFS), for various time periods, for all points in the CBRFC area.
- **Forcing innovations**
- **Status of ongoing and new IWRSS innovations:**
- **Significant external engagement**

## FY2014 AHPS Activities for CNRFC

**Management Lead:** Alan Haynes (acting), HIC; Art Henkel, DOH; Alan Haynes SCH

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

**Milestones:**

### FY14 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	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	0	0	0	0	0	0	0	0
Total FY14	0	0	0	0	0	0	0	0
Overall Total (FY2000-2014)	46	0	0	0	33	94	10	183

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

**1<sup>st</sup> Quarter FY2014**

- **CHPS Innovations**
- **Ensemble/Uncertainty Initiatives**
- **Forcing innovations**
- **Status of ongoing and new IWRSS innovations**
- **Significant external engagement**

**2<sup>nd</sup> Quarter FY2014**

- **CHPS Innovations**

- **Ensemble/Uncertainty Initiatives**
- **Forcing innovations**
- **Status of ongoing and new IWRSS innovations**
- **Significant external engagement**

**3<sup>rd</sup> Quarter FY2014**

- **CHPS Innovations**
- **Ensemble/Uncertainty Initiatives**
- **Basin recalibration**

**4<sup>nd</sup> Quarter FY2014**

- **CHPS Innovations**
- **Ensemble/Uncertainty Initiatives**
- **HEFS V1.0 implementation**
- **Basin recalibration / implementation**

## FY2014 AHPS Activities for NWRFC

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

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

**Milestones:**

### FY14 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	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	0	0	0	0	0	0	0	0
Total FY14	0	0	0	0	0	0	0	0
Overall Total (FY2000-2014)	142	0	0	1	105	20	0	0

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

**1<sup>st</sup> Quarter FY2014**

- **CHPS Innovations**
- **Ensemble/Uncertainty Initiatives**
- **Forcing innovations**
- **Status of ongoing and new IWRSS innovations**
- **Significant external engagement**

**2<sup>nd</sup> Quarter FY2014**

- **CHPS Innovations**

- **Ensemble/Uncertainty Initiatives**
- **Forcing innovations**
- **Status of ongoing and new IWRSS innovations**
- **Significant external engagement**

**3<sup>rd</sup> Quarter FY2014**

- **CHPS Innovations**
- **Ensemble/Uncertainty Initiatives**
- **Forcing innovations**
- **Status of ongoing and new IWRSS innovations**
- **Significant external engagement**

**4<sup>th</sup> Quarter FY2014**

- **CHPS Innovations**
- **Ensemble/Uncertainty Initiatives**
- **Forcing innovations**
- **Status of ongoing and new IWRSS innovations**
- **Significant external engagement**

## **Outreach and Training**

## AHPS FY14 Hydrology Program Outreach & Training Work Plan

**Theme:** Hydrologic Services Outreach

**Management Lead:** Mary Mullusky, Katie Garrett, 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
Outreach Planned for Regional and National Levels (see breakdown below)	HQ/ER/SR/WR/AR /CR	100	Q4	Completed
<b>Outreach Subtotal</b>		<b>100</b>		
Training Officer for the National Water Center	OCWWS/OHD	0	Q4	Delayed to FY15
<b>Training Subtotal</b>		<b>0</b>		
<b>AHPS Total</b>		<b>100</b>		
<b>Headquarters (HSD)</b>				
ASFPM Booth and Travel	HQ	4.1	Q3	Complete
Fusion Team Meeting	HQ	0	Q4	Travel cancelled
CR HSD Team Member Travel to HQs	HQ	0	Q3	Travel cancelled
Additional Travel in support of AHPS Outreach	HQ	8	Q4	Complete
Bookmarks	HQ	2.0	Q4	Complete
TADD labels	HQ	0.7	Q4	Complete
TADD signs	HQ	3.0	Q3	Complete
TADD sign shipping materials	HQ	1.0	Q3	Complete
iPad Screen Protectors	HQ	0.02	Q3	Complete
Flooding Animations for PSAs	HQ	3.0	Q4	Complete
<b>Outreach Sub Total</b>	HQ	<b>22</b>		
Training Officer for the National Water Center				
<b>Training Sub Total</b>	HQ	<b>0</b>		
<b>HQ Total</b>		<b>22</b>		
<b>Eastern Region</b>				
NJ EM Conference (ER HSD); Atlantic City, NJ	ER	0.399	Q3	Complete
ASFPM Annual National Conference (BTV); Location: Seattle WA	ER	2.675	Q3	Complete
RFC/HPM Workshop (NERFC & WFOs); Location: Taunton, MA	ER	4.448	Q3	Complete
HEPEX Conference (MARFC); Location: College Park, MD	ER	0.742	Q3	Complete

RFC/HPM Workshop (WFO GSP); Location: Slidell, LA	ER	1.353	Q4	Complete
2014 Flood Risk Management Workshop (ER HSD); Location: Southbridge, MA	ER	0.804	Q4	Complete
Fusion Team Meeting (ER HSD); Location: Kansas City, MO	ER	0.0	Q4	Travel cancelled
NOAA/Centre d'expertise hydrique du Quebec (CEHQ) Collaboration Meeting (ER HSD); Location: Quebec, Canada	ER	1.36	Q4	Complete
<b>Outreach Sub Total</b>	ER	<b>11.781</b>		
2014 FFaIR Experiment (HMT – WPC) College Park, MD	WFO GYX	1.614	Q4	Complete
HEC-RAS Training Hydrologic Engineering Center Davis, CA	OHRFC	1.598	Q3	Complete
Technical Writing Training	OHRFC	0.0	Q4	Not completed
<b>Training Sub Total</b>	ER	<b>3.212</b>		
<b>ER Total</b>		<b>14.993</b>		
<b>Southern Region</b>				
ABRFC – Outreach Trip to WFOs Location: Springfield, MO, Topeka, KS, and Wichita, KS	SR	.950	Q4	Completed
ABRFC – Outreach Trip to WFO/COE Location: Little Rock, AR	SR	.600	Q4	Completed
ABRFC – Outreach Trip to WFOs Location: Lubbock, TX, Amarillo, TX, and Albuquerque, NM	SR	.700	Q4	Completed
LMRFC – Outreach Trip to TVA/Eastern Tennessee River Basins Location: Knoxville, TN	SR	1.900	Q4	Completed
SERFC – Interagency Meeting for Southeast US Location: TBD	SR	.500	Q4	Completed
SERFC – Outreach Trip to WFO/University of Alabama – Huntsville Location: Huntsville, AL	SR	.300	Q4	Completed
SERFC – Outreach Trip to WFO/COE Location: Melbourne, FL	SR	.700	Q4	Completed
WGRFC – Rio Grande Spring Snowmelt Meeting Location: Albuquerque, NM	SR	.750	Q3	Completed
WGRFC – IBWC Annual Meeting Location: El Paso, TX	SR	.650	Q4	Completed
WGRFC – IBWC Annual Flood Workshops Location: Cities throughout Rio Grande Basin	SR	.585	Q3	Meetings Cancelled
WGRFC – AHPS Outreach/Training to WFO/Partners Location: New Braunfels, TX, Corpus Christi, TX, and Brownsville, TX	SR	.650	Q4	Cancelled
HSB – ASFPM Conference Participation (Paul McKee – WGRFC) Location: Seattle, WA	SR	2.500	Q3	Completed
HSB – WFO AHPS Program Support	SR	.215	Q4	Completed
HSB – Southern Region HAS Workshop	SR	5.000	Q4	Completed
<b>Outreach Sub Total</b>	SR	<b>16</b>		
No Localized Training Activities Planned Using AHPS Funds				
<b>Training Sub Total</b>	SR	<b>0</b>		
<b>SR Total</b>		<b>16</b>		
<b>Western Region</b>				
WFO Glasgow - SOO travel to MBRFC. The WFO plans to send their SOO for a familiarization trip, during which the plan is to learn about the forecast challenges at the RFC for the Milk River. The visit will allow the WFO to better understand the RFC forecast process and limitations and improve communication of the	WR	.650	Q3	Completed

forecast uncertainty to their partners and general public. The WFO is also interested in running CHPS at the WFO at some point in the future (FY15 possible) and this should also assist with that activity. This item will be cost shared with the WFO.				
WFO Oxnard - hydrology outreach magnets. The magnets will include the LOX web page and social media contacts and will feature an image of flooding that has taken place in the LOX Hydrologic Service Area. The magnets will be used to promote the NWS hydrologic products and services for LOX. ~2000 magnets will be produced.	WR	.650	Q4	Completed
WFO Tucson – TADD magnets. The WFO will purchase a large quantity of 2500 magnets. The magnets will be used at outreach events and will be shared with the other 2 WFOs in Arizona.	WR	.599	Q4	Completed
WFO Great Falls – Project WET Kids Activity Booklets. These are 16-page high quality booklets created by a WMO team. The booklets will be used for school aged children outreach and education about hydrology and flooding.	WR	1.265	Q4	Completed
WFO Great Falls – Staff Hydrologic Service Area familiarization trip. The trip would include the SSH and two forecasters.	WR	0	Q4	Canceled. WFO did not have the ability to free up staff for a familiarization trip. Funds reallocated to Project WET Kids Activity Booklets at the request of the WFO.
WFO Flagstaff – Floodplain Simulation Model. Will allow the WFO to bring the model to outreach events and educational talks. This item will be cost shared with the WFO.	WR	1	Q4	Completed
WFO Reno – Floodplain Simulation Model. Will allow the WFO to bring the model to outreach events and educational talks. This item will be cost shared with the WFO.	WR	1	Q4	Completed
WFO San Diego – TADD signs (fixed locations). WFO San Diego has been the most active WFO in WR engaging their partners on TADD signs. The WFO has installed several signs during FY13 and have a large backlog of TADD needed sign locations spanning several future years. The interest in TADD signs from their counties has been enormous.	WR	5.45	Q4	Completed
WFO Portland - TADD signs (fixed locations and mobile signs). Recent flooding has allowed the WFO to gather interest in TADD for the first time.	WR	4.84	Q4	Completed
WFO Las Vegas – ALERT radios and handar. This will allow the WFO to improve their reception of Clark County Flood Control Data. In addition to receiving data for the WFO and RFC to use, better radios will help the WFO potentially serve as a backup for ALERT data collection for the county. The WFO and the county flood control have a very good working relationship.	WR	0	Q4	Canceled. WRH SFD paid the full amount without requiring to use AHPS funds. The funds originally allocated for this purchase were reallocated elsewhere.
WFO Seattle – SSH is attending ASFPM Conference. The SSH is assisting Mark Walton with the demonstration of the floodplain model. The SSH will also help staff the One NOAA Booth.	WR	7.61	Q3	Completed
WFO Spokane – SH is attending ASFPM Conference. The SH is active with the local chapter and can benefit from attending the national conference.	WR	1.863	Q3	Completed
WFO Pendleton – TADD signs. Recent flooding has allowed the WFO to gather increased interest in TADD.	WR	.285	Q4	Completed
WFO Monterey – Survey and field equipment (purchased from a GSA vendor). This equipment will help the SH set flood stages and impacts at AHPS locations, improve the quality of WFO E-19 reports, and assist with field work related to spinning up local modeling locations. This item will be cost shared with the WFO.	WR	.986	Q4	Completed
NWRFC – CHPS Calibration Workshop for RFC WFOs. WFOs will learn how to calibrate model locations in CHPS. This item will be a cost share with the WFOs that decide to attend the workshop.	WR	1.94	Q4	Completed
WFO Pocatello - Supported SH in attending the national Department of Interior	WR	.583	Q3	Completed

(DOI) BAER team meeting and training.				
WFO San Diego sent assistant hydrology focal point on a trip to the CNRFC to become familiar with the RFC and its operations.	WR	1	Q4	Completed
USDA Automated Geospatial Watershed Assessment Tool (AGWA) training - Send two SHs to AGWA training conducted by the USDA-ARS. AGWA is the modeling package the Department of Interior (DOI) BAER teams have selected to conduct post-wildfire watershed assessments. DOI BAER has requested that NWS SHs whom would like to participate with and on BAER teams be trained on AGWA. This item will be a cost share with the WFOs that decide to attend the training.	WR	2	Q4	Completed
<b>Outreach Sub Total</b>	WR	<b>15.611</b>		
No Localized Training Activities Planned Using AHPS Funds				
<b>Training Sub Total</b>	WR	<b>0</b>		
<b>WR Total</b>		<b>15.611</b>		
<b>Alaska/Pacific Regions</b>				
Send additional staff to CHPS Development Workshop	AR	1.3	4	Completed
Outreach trip to Fairbanks by SCH	AR	1.3	4	Completed
ADCP Fieldwork Training trip(s) (Flow measurement and igage installation)	AR	3.0	4	Completed
ASFPM Travel to Seattle (Celine)	AR	2.4	3	Completed
Bring Hydrologist from NWRFC to Anchorage for CHPS Training	AR	0.0	3	Cancelled - used in-house resources
Senior Hydrologist to Juneau to train staff and SSH Aaron Jacobs on Automated Wire Weight gages and to install gage on Indian River in Sitka	AR	0.0	3	Cancelled - a cheaper alternative used
Software and posters for outreach	AR	0.65	3/4	Completed
Outreach trip to Soldotna for Kenai Flood Aware Fair	AR	0.1	3	Completed
<b>Sub Total</b>	AR	<b>8.75</b>		
No Localized Training Activities Planned Using AHPS Funds				
<b>Training Sub Total</b>	AR	<b>0</b>		
<b>AR/PR Total</b>		<b>8.75</b>		
<b>Central Region</b>				
MBRFC WFO visits to BIS/ABR/UNR	CR	1.64	Q4	Completed
MBRFC WFO visits to LSX/SGF	CR	0.95	Q4	Completed
MBRFC WFO visits to BYZ/TFX/GCW	CR	1.9	Q4	Completed
MBRFC attend USACE Coop Stream gauge meeting	CR	0.41	Q4	Completed
NCRFC WFO visits to LSX/PAH and USACE in St. Louis	CR	1.3	Q4	Completed
NCRFC WFO visit to MKX/IWX/GRR	CR	0.75	Q4	Completed
NCRFC WFO visit to FGF	CR	0.75	Q4	Completed
NCRFC WFO visit to GRB and Univ. of Wisconsin Green Bay Earth Science Dept	CR	1.0	Q4	Completed
CRH – Kris Lander to ASFPM	CR	2.3	Q3	Completed
WFO staff visit MBRFC and NCRFC for RFC Familiarization Workshops	CR	5.0	Q4	Completed
<b>Outreach Sub Total</b>	CR	<b>16</b>		
No Localized Training Activities Planned Using AHPS Funds				
<b>Training Sub Total</b>	CR	<b>0</b>		
<b>CR Total</b>		<b>16</b>		

# **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 FY14 Milestones	Responsible	FY14 Completion Date
Annual Operation Plans <ul style="list-style-type: none"> <li>• AOP Development</li> <li>• Finalize OHD AOP items</li> <li>• OHD Portfolio Definition</li> </ul>	OHD OHD OHD OHD	Feb. 21, 2014 Q3
OHD Reporting <ul style="list-style-type: none"> <li>• Monthly OHD Management Reports and Top 5 Issues</li> <li>• Monthly AOP Milestone Status Updates</li> <li>• Monthly AOP Status Update of Top 10 (NWC item)</li> <li>• Quarterly Program Reviews (AHPS and NWC)</li> </ul>	OHD OHD OHD OHD	2 <sup>nd</sup> Monday of the Month 2 <sup>nd</sup> Monday of the Month 2 <sup>nd</sup> Monday of the Month Feb. 12-13, April 22-23, July 22-23, Oct. 21-22
AHPS Planning/ Execution/ Reporting <ul style="list-style-type: none"> <li>• E-CPIC Updates</li> <li>• Quarterly Status Report</li> </ul>	OHD OHD/Regions	Quarterly Quarterly
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> </ul>	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>
NWS Requirements and Development Processes <ul style="list-style-type: none"> <li>• NWS requirements process meetings</li> <li>• AWIPS SREC</li> </ul>	OHD OHD	TBD Biweekly

### Accomplishments/Actions

#### 1<sup>st</sup> Quarter FY13

- All milestones are on schedule – all scheduled reports completed
- Congress passed a Continuing Resolution (CR) to last until March 27, 2013. Funding severely limited through the CR period.
- OHD consolidated most of their operations to the 8<sup>th</sup> floor of SSMC2. Only maintain small part of AWIPS testbed area on 7<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.

#### 2<sup>nd</sup> Quarter FY13

- All milestones are on schedule – all scheduled reports completed

- The FY13 Continuing Resolution (CR) was in place until final CR was passed for remaining of FY13 (March 26). Funding severely limited through the CR period.
- OHD worked on reconciling property inventory (completed) and excessing property from the remaining 7<sup>th</sup> floor store room.
- 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.
- OHD starting to work with teams focused on restructuring of NWS budget into 5 main activities (Observations; Central Processing; Analyze, Forecast, Support; Dissemination; Science and Technology Integration)

### **3<sup>rd</sup> Quarter FY13**

- First installment of AHPS funding was received in Q3. Spend plan was developed for “regular” AHPS funding. Plan for the “plus up” funds will be finalized in Q4 when funds are available.
- Reduced projected number of AHPS locations from 379 to 85 for FY13. That was all the RFCs committed to for FY13.
- Gathered feedback on Water Resources Forecast Improvement Preparatory Project report. Began working on team charters and soliciting interest in the teams from Region, HIC and HQ management staff.
- National Water Center staffing and operations plan (report to Congress) drafted and sent to NWS
- All other scheduled reports completed.

### **4<sup>th</sup> Quarter FY13**

- All AHPS funding was received. Plans were put in place and executed for “regular” and “plus up” AHPS funding.
- Completed target number of 85 AHPS locations for FY13. End of FY13 total is 3343 AHPS locations.
- Coordinated with CFO on plans for remaining 668 locations. Committed to complete 167/year for next 4 years (FY14-FY17).
- Chartered 5 WFIPP teams (RFC Archive, Evaluation and Verification, Modeling Testbed, Integrated Information, and RFC Service Backup). Teams started work in September and will report out in January 2014.
- National Water Center staffing and operations plan (report to Congress) cleared NWS, NOAA, DOC, OMB.
- All other scheduled reports completed.

### **1<sup>st</sup> Quarter FY14**

- Most of OHD was furloughed for the duration of the 17-day partial government shutdown.
- New Acting OHD Director, Rob Hartman (HIC CNRFC) started on Oct. 21

### **2<sup>nd</sup> Quarter FY14**

- National Water Center (NWC) was accepted by NOAA for beneficial occupancy on Feb. 14. All required service contracts were put in place.
- Provided Quarterly Program Review of 1<sup>st</sup> quarter for AHPS and NWC on Feb. 19.
- OHD and HSD representatives worked with the PPA teams to provide input for the April FY15 Annual Operating Plan meetings
- The 5 WFIPP Requirements Teams completed their reports by the March 31.

### **3<sup>rd</sup> Quarter FY14**

- Provided Quarterly Program Review of 2<sup>nd</sup> quarter for AHPS and NWC on May 6.
- HydroScience IDIQ contract was released with 2 awardees on April 14. Stop work order was lifted and work resumed on the first tasks.
- Hydrology program representatives worked with the 5 PPA teams to develop FY15 Annual Operating Plan (AOP) milestones for late April AOP meeting.
- OHD representatives began work with the 5 PPA teams to develop FY15 spend plans to address the FY15 AOP milestones
- On May 13-16, the Hydrology Program Review Committee held the inaugural meeting at the National Water Center in Tuscaloosa AL to plan for the future of the NWS Hydrology Program.

#### **4<sup>th</sup> Quarter FY14**

- Provided Quarterly Program Review of 3<sup>rd</sup> quarter for AHPS and NWC on July 23.
- Completed the following AOP items:
  - Initiate Initial Operating Capability staffing and operations at the National Water Center
    - Transferred 3 positions to the NWC, Tuscaloosa, AL (Sam Contorno, Jim Rawls, Andy Rost)
    - Advertised 5 positions for the NWC, Tuscaloosa, AL
  - Completed IWRSS Stakeholder Engagement Forum reports.
  - Provided operational, web-based, National Snow Analysis and Forecast Products
  - Implemented AHPS services at an additional 150 new forecast locations (actual – 168)
  - Implemented AHPS web page enhancements and 11 Flood Inundation Maps (FIM) (actual- 28)
  - Completed transition of CHPS Operations into AWIPS hardware and CHPS software executables into the AWIPS baseline.
  - Operational integration of HEFS v.1 into the CHPS software baseline and release to all RFCs
  - Inventory of existing OHD hydrologic web and data services
  - Completed charters for 2 IWWRS interagency teams – FIM Design Team and System Interoperability/Data Synchronization Design Team (3<sup>rd</sup> charter for National Water Modeling System Requirements Team is on hold until the OSTP effort by the Federal Geographic Data Committee - Open Water Data Initiative can inform the team)
  - Completed the interim updated precipitation frequency estimates for the northeast (out for peer review)
  - Held the Flash flood summit (September 9-11) to produce a vision and high-level requirements for nationally consistent end-to-end flash flood services

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

##### **1<sup>st</sup> Quarter FY13**

- NOAA dealing with effects of operating under a CR and the threat of sequestration. Funding allocation to OHD has been greatly reduced to a little more than labor. There are no AHPS funds allotted in Q1.

##### **2<sup>nd</sup> Quarter FY13**

- NOAA still dealing with effects of operating under a CR and the threat of sequestration. Funding allocation to OHD has been greatly reduced to a little more than labor. There were no AHPS funds allotted in Q1 or Q2.

##### **3<sup>rd</sup> Quarter FY13**

- Some contracting delays.

##### **4<sup>th</sup> Quarter FY13**

- Planning for potential shutdown.

##### **1<sup>st</sup> Quarter FY14**

- Government shutdown delayed work
- Work stopped on new Hydro Science IDIQ contract due to protest

##### **2<sup>nd</sup> Quarter FY14**

- Work remains stopped on Hydro Science IDIQ

##### **3<sup>rd</sup> Quarter FY14**

- None

##### **4<sup>th</sup> Quarter FY14**

- None