

COMPLETED AND ONGOING FLOOD STUDIES AND PROJECTS IN THE DELAWARE RIVER BASIN (Working draft - Last updated September 2015)

| Project   | Lead Agency/ Partners  | Purpose/ Deliverables   | Time Frame  | Cost   |
|---|--|---|---|--|
| <b>RESERVOIR OPERATIONS</b>   |  |   |   |  |
| Delaware River Basin Flood Analysis Model   | <p><b>Lead:</b> U.S. Geological Survey (USGS), Pennsylvania &amp; New Jersey Water Science Centers and National Research Program</p> <p><b>Partners:</b><br/>           U.S. Army Corps of Engineers (USACE), Hydrologic Engineering Center and Philadelphia District;<br/>           National Weather Service (NWS), Mid-Atlantic River Forecast Center;<br/>           Delaware River Basin Commission (DRBC), Water Resources Management Branch, Operations Section</p> | <p>For the September 2004, April 2005 and June 2006 storm events, the model evaluated the effects of pre-event reservoir voids and release operations on downstream flood crests.</p> <p>Model results are among the many considerations that inform reservoir management and policy decisions.</p>   | <p>Model and results presented at December 2009 Flood Interstate Task Force meeting.</p> <p>Model results can be found at <a href="http://www.nj.gov/drbc/programs/flood/model.html">http://www.nj.gov/drbc/programs/flood/model.html</a></p> | <p>Four basin states committed a combined total of \$500,000.</p> <p>Additional funds and in-kind services from USGS, NWS and USACE totaling \$285,000.</p> <p>Total Project Cost = \$785,000.</p> |
| Flexible Flow Management Program (FFMP) for the New York City Delaware Basin Reservoirs | <p><b>Lead:</b> Parties to the 1954 U.S. Supreme Court decree (the states of Delaware, New Jersey, and New York, the Commonwealth of Pennsylvania and the City of New York)</p>  | <p>The FFMP provides a comprehensive framework for addressing multiple flow management objectives, including water supply, drought mitigation, spill mitigation, protection of the tailwaters fishery, a diverse array of habitat needs in the main stem Delaware River, Delaware Estuary and Delaware Bay, recreational uses, and salinity repulsion.</p>  | <p>FFMP agreement continues to be implemented on temporary basis by decree parties.</p> <p>The current FFMP agreement can be found at <a href="http://water.usgs.gov/osw/odrm/">http://water.usgs.gov/osw/odrm/</a></p>                       |  |
| Spill Mitigation Program at Lake Wallenpaupack  | <p><b>Lead:</b> PPL Generation</p>   | <p>The PPL spill mitigation program for Lake Wallenpaupack is based on snowpack and the 48-hour precipitation forecast.</p>   | <p>Implemented in 2007</p>  |  |
| Snowpack Monitors in Neversink and Pepacton Watersheds                                  | <p><b>Lead:</b> New York City Department of Environmental Protection (NYCDEP)</p> <p><b>Partners:</b><br/>           National Weather Service<br/>           Delaware River Basin Commission</p>   | <p>In 2006, DRBC received a grant to buy two automatic snowpack monitors for installation in Delaware Basin watersheds draining to NYCDEP reservoirs. In 2008, NYCDEP installed electronic load type sensors; the first in the Neversink River Watershed and the second in the East Branch Delaware River (Pepacton Reservoir) Watershed. NYCDEP is responsible for maintenance and telemetry.</p> <p>Snowpack based storage management is a type of discharge mitigation that has previously been implemented in the Delaware River Basin. Such programs are based on the concept that a percentage of the water equivalent in the snowpack in the watershed above a reservoir will eventually flow into the reservoir and can be counted as storage. Automatic monitors will be used to supplement manual snow surveys working towards easier, quicker, and more accurate snowpack data collection.</p> | <p>Installed in 2008</p>  | <p>\$22,000 grant to DRBC through the National Oceanic and Atmospheric Administration's (NOAA) automated flood warning system grant program</p>  |

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| STRUCTURAL AND NON-STRUCTURAL  |  |  |  |  |
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| South Jersey Levee Inventory   | <p><b>Lead:</b> US Department of Agriculture - Natural Resources Conservation Service</p> <p><b>Partners:</b><br/>           NJ Department of Environmental Protection</p> <p>US Army Corps of Engineers</p> <p>Delaware River Basin Commission</p> <p>Delaware Estuary Levee Organization</p> | <p>Purpose: To identify and characterize the location, extent and condition of existing levees/dikes in South Jersey and the amount, type and extent of vulnerability of people and property protected by these levees, including agricultural acreages and businesses.</p> <p>The inventory identified 70 levees in the four county vicinity of Cape May, Cumberland, Gloucester and Salem counties. The Inventory was divided into two parts, the Field Inventory and the Light Detection and Ranging (LiDAR) Analysis. Approximately 86 percent of all levees were in Cumberland and Salem Counties.</p>  | <p>Report published November 2010.</p> <p>Report available online at:<br/> <a href="http://www.nrcs.usda.gov/wps/portal/nrcs/detail/nj/water/watersheds/?cid=nrcs141p2_018968">http://www.nrcs.usda.gov/wps/portal/nrcs/detail/nj/water/watersheds/?cid=nrcs141p2_018968</a></p>   | <p>Funding was provided by the Bureau of Dam Safety of the New Jersey Department of Environmental Protection.</p>          |
| Multi-jurisdictional Use and Management of Water Resources for the Delaware River Basin, NY, PA, NJ and DE                             | <p><b>Lead:</b> U.S. Army Corps of Engineers Philadelphia District</p> <p><b>Partner:</b> Delaware River Basin Commission</p>  | <p>Identified flood prone areas within the Delaware Basin using Federal Emergency Management Agency (FEMA) claims data. Developed a Potential Solution Matrix, including all structural and non-structural solutions. Applied the Potential Solution Matrix to identified damage centers (New Hope, Yardley, Easton and Upper Makefield, PA; Lambertville, Stockton, Harmony and Belvidere, NJ; and Rockland and Colchester, NY). Updated stage-frequency relationships for main stem Delaware gages plus selected tributaries so they reflect recent floods. Coordinated with other agencies (i.e. USGS, FEMA Region II and III, DRBC) to ensure protocol consistency. Applied available historic USACE reports and analyses to assemble stage-damage data for major damage centers for the Delaware River main stem and selected tributaries, applied available damage and stage estimates from recent storm events in the Delaware River Basin and express damage data at a current price level. Conducted Structure Inventory at the identified damage centers with ground/first floor and zero damage elevations for all commercial/residential and industrial structures within the 100-year floodplain.</p> | <p>Report published December 2008.</p> <p>Report available online at:<br/> <a href="http://www.nj.gov/drbc/ArmyCorps/index.htm">http://www.nj.gov/drbc/ArmyCorps/index.htm</a></p>   | <p>Federally funded, Total Project Cost = \$1 million</p> <p>Task 2 = \$490,000 (\$475,000 to USACE; \$15,000 to DRBC)</p> |
| Delaware River Basin Comprehensive New York, New Jersey, Pennsylvania, Maryland and Delaware: Interim Feasibility Study for New Jersey | <p><b>Lead:</b> U.S. Army Corps of Engineers Philadelphia District</p> <p><b>Partner:</b><br/>           New Jersey Department of Environmental Protection (NJDEP)</p>   | <p>The Interim Feasibility Study for New Jersey will evaluate possible flood mitigation options for New Jersey communities within the Delaware River Basin.</p> <p>The Feasibility Cost Share Agreement between NJDEP and the USACE was signed on July 27, 2006. The NJDEP and USACE have met with Delaware River town residents and local officials to perform visual inspections and gather information on the 2004, 2005 and 2006 flooding. NJ continues to provide cost-share funding and the USACE continues to move forward on the study.</p>  | <p>Draft Feasibility Report -June 2015<br/> <a href="http://www.nap.usace.army.mil/Portals/39/docs/Civil/DelComp/DraftDel_Comp%20Draft_Feasibility_ReportEA.pdf">http://www.nap.usace.army.mil/Portals/39/docs/Civil/DelComp/DraftDel_Comp%20Draft_Feasibility_ReportEA.pdf</a></p> <p>Project factsheet:<br/> <a href="http://www.nap.usace.army.mil/Missions/Factsheets/FactSheetArticleView/tabid/4694/Article/490810/delaware-river-basin-comprehensive-interim-feasibility-study-for-new-jersey.aspx">http://www.nap.usace.army.mil/Missions/Factsheets/FactSheetArticleView/tabid/4694/Article/490810/delaware-river-basin-comprehensive-interim-feasibility-study-for-new-jersey.aspx</a></p> | <p>Total Project Cost: \$3.9 million (Cost shared 50/50 by USACE and NJDEP)</p>  |

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| <p>A Multi-Jurisdictional Flood Mitigation Plan for Municipalities in the Non-tidal, New Jersey portion of the Delaware River Basin</p> | <p><b>Lead:</b> Delaware River Basin Commission</p> <p><b>Partners:</b><br/>         New Jersey Department of Environmental Protection,<br/><br/>         New Jersey Office of Emergency Management (NJOEM),<br/><br/>         Mercer, Hunterdon, Warren and Sussex Counties in New Jersey</p> | <p>A multi-agency and local planning effort that resulted in the development and local adoption of a Multi-jurisdictional Flood Mitigation Plan for the New Jersey, non-tidal portion of the Delaware River Basin.</p> <p>The plan details regional, county-wide, and municipal mitigation actions that, when implemented, could reduce future flood losses. Over 160 flood mitigation actions developed by four counties and 43 municipalities are presented in this plan. For participating municipalities, this Flood Mitigation Plan was an important and significant step towards completion of the required All Hazards Mitigation Plan.</p> <p>The plan includes basin-scale mitigation strategies and priorities, a compendium of local mitigation strategies, an analysis of flood insurance claims and repetitive loss properties, and a flood hazard identification and vulnerability assessment.</p> | <p>Plan approved by FEMA/NJOEM November 2008</p> <p>Report available online at: <a href="http://www.state.nj.us/drbc/programs/flood/mitigationmeasures.html">http://www.state.nj.us/drbc/programs/flood/mitigationmeasures.html</a></p> | <p>FEMA Flood Mitigation Assistance Grant, Total Project Cost = \$130,550</p> <p>Federal Share: \$97,695.07<br/>         Non-Federal Share (NJDEP, DRBC): \$32,854.93</p> |
| <p>New York State Acquisition Funding</p>   | <p><b>Lead:</b> New York State Department of Communities and Development</p> <p><b>Partners:</b><br/>         New York State Department of Environmental Conservation</p>  | <p>New York State is provided acquisition funding through its Department of Communities and Development to buy out homes in flood-prone areas. Sullivan County received \$4 million; Ulster, Orange and Delaware counties, \$2 million each. Other counties that received money included: Broome, \$750,000; Chenango, \$750,000; Herkimer, \$750,000; Montgomery, \$750,000; Otsego, \$750,000; Schoharie, \$750,000; and Tioga, \$750,000. To qualify for the program, homes must have been primary residences appraised at under \$250,000. Preference was given to homes that have been flooded twice since April 1, 2004, and were appraised at under \$100,000. The county's emergency management director and a town building official certified qualifying homes.</p>  | <p>2008-2009</p>  | <p>\$15.25 million</p>  |
| <p>New Jersey Blue Acres Program (Acquisition Funding)</p>  | <p><b>Lead:</b> NJDEP Blue Acres Program</p>   | <p>The Green Acres, Farmland, Blue Acres, and Historic Preservation Bond Act of 2007 authorized \$12 million for acquisition of lands in the floodways of the Delaware River, Passaic River or Raritan River, and their respective tributaries, for recreation and conservation purposes. An additional \$24 million was approved by the voters in the Green Acres, Water Supply and Floodplain Protection, and Farmland and Historic Preservation Bond Act of 2009.</p>   | <p>2008-ongoing</p>   | <p>\$36 million</p>   |

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| <p>Pennsylvania Senate Bill 2- SB2</p>                                      | <p><b>Lead:</b> Pennsylvania Commonwealth Financing Authority</p>  | <p>Act 63 of 2008 provided \$800 million over the next 10 years for critical water, sewer, flood control projects and repairs to unsafe, high-hazard dams in areas outside of Philadelphia and Pittsburgh. The law provided at least \$100 million for flood control projects and a minimum of \$35 million to address state and municipally owned unsafe, high-hazard dams in need of repair.</p> <p>Governor Rendell signed legislation that provided \$800 million in funding for water and sewer projects, storm water projects, flood control projects, and high hazard unsafe dam projects. Of that, SB-2 provided at least \$100 million in funding for flood-control projects. The money was awarded as grants to municipalities and agencies. Of that \$100 million, approximately \$91 million was used for capital flood protection projects.</p>     | <p>2008-2018</p>   | <p>\$100 million</p> |
| <p>Flood Mitigation in Northampton and Lehigh Counties</p>                  | <p><b>Lead:</b> Lehigh Valley Planning Commission</p> <p><b>Partners:</b><br/>         Pennsylvania Emergency Management Agency (PEMA)<br/><br/>         Federal Emergency Management Agency (FEMA) Region III</p> | <p>Northampton and Lehigh counties received a \$1 million in pre-disaster mitigation (PDM) earmark funding (through FEMA's PDM program, FY-08) for flood mitigation in these two counties.</p>   | <p>2008</p>  | <p>\$1 million</p>   |
| <p><b>FLOODPLAIN REGULATIONS</b></p>  |  |  |  |                      |
| <p>Updated Flood Hazard Area Control Act Rules (N.J.A.C. 7:13)</p>          | <p><b>Lead:</b> New Jersey Department of Environmental Protection</p>  | <p>NJDEP adopted amendments to its Flood Hazard Area Control Act rules (N.J.A.C. 7:13), which incorporate more stringent standards for development in flood hazard areas and riparian zones adjacent to surface waters throughout the state.</p> <p>Some of the provisions of the rule include:</p> <ul style="list-style-type: none"> <li>- requiring floor elevations and roadway surfaces to be set at least one foot above the state's flood hazard area design flood elevation (125% of the 100-year flow rate reported by FEMA) in order to provide increased flood protection for buildings and public roadways;</li> <li>- a 0% net-fill requirement that now applies to all non-tidal flood hazard areas of the state; and</li> <li>- expansion of riparian zones to 50, 150 or 300 feet in width along surface waters throughout the state.</li> </ul> | <p>Adopted: November 5, 2007<br/><br/> <a href="http://www.nj.gov/dep/landuse/fha_main.html">http://www.nj.gov/dep/landuse/fha_main.html</a></p> |                      |
| <p>New York State Residential Building Code (Chapter III, Section R323)</p> | <p><b>Lead:</b> New York State</p>   | <p>As of January 2008, the NYS Residential Building Code incorporated a 2' freeboard standard in studied flood zones.</p>  | <p>January 2008</p>  |                      |

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| State of Delaware Floodplain and Drainage Advisory Committee (FDAC)    | <b>Lead:</b> State of Delaware  | <p>In 2011, Senate Bill 64 established a Floodplain and Drainage Advisory Committee for Delaware. This committee prepared a report with recommendations for higher floodplain and drainage standards. The committee plans to evaluate the capacity of local governments to enforce higher standards, identify communities which may already have adequate local standards, and those with local standards that do not meet the committee's recommendations.</p> <p>The report recommends specific standards that go beyond FEMA's NFIP minimums.</p>  | <p>Final recommendation report: July 2012</p> <p>Report available online at: <a href="http://www.dnrec.delaware.gov">http://www.dnrec.delaware.gov</a></p>   |  |
| Floodplain Regulations Evaluation Subcommittee                         | <b>Lead:</b> Delaware River Basin Commission Flood Advisory Committee (FAC)   | <p>In May 2008, New Jersey and Pennsylvania Commissioners requested that a subcommittee of the FAC be formed to address Task Force Recommendation FR-1: "Catalog, Evaluate and Update Existing Floodplain Regulations in the Basin."</p> <p>As such, a subcommittee was formed to review and evaluate the similarities and differences in floodplain regulations throughout the Basin and develop recommendations for consideration by the FAC. In May 2009, the subcommittee presented its findings to the FAC.</p> <p>The FAC presented its report, "Recommendations For More Effective Floodplain Regulations In The Delaware River Basin", to the Commissioners in October 2009.</p>  | <p>FAC presented report to Commissioners in October 2009</p> <p>Report available online at: <a href="http://www.state.nj.us/drbc/programs/flood/floodplainregs.html">http://www.state.nj.us/drbc/programs/flood/floodplainregs.html</a></p>  |  |
| <b>FLOODPLAIN MAPPING</b>  |   |   |  |  |
| Updated Hydrologic Information for the Main Stem of the Delaware River | <p><b>Leads:</b> U.S. Geological Survey, New Jersey &amp; New York Water Science Centers &amp; U.S. Army Corps of Engineers Philadelphia District</p> <p><b>Partners:</b><br/>         U.S. Geological Survey, Pennsylvania Science Center<br/>         Federal Emergency Management Agency Region II and III<br/>         New Jersey Department of Environmental Protection<br/>         Delaware River Basin Commission</p> | <p>The flood magnitude and frequency for the eight active streamflow-gaging stations along the main stem Delaware River in New Jersey, New York, and Pennsylvania were updated to include the three recent floods. The updated discharges were developed by Bob Schopp, USGS NJ Water Science Center, and Gary Firda, USGS NY Water Science Center, in consultation with the USACE Philadelphia District, FEMA Regions II and III, NJDEP-State NFIP Coordinator's Office, and DRBC. These discharges will be used in future flood mapping updates.</p> <p>The updated flood-frequency values indicate that the recurrence interval of the September 2004 flood ranged from 20 to 35 years, the recurrence interval of the April 2005 flood ranged from 40 to 70 years, and the recurrence interval of the June 2006 flood ranged from 70 to greater than 100 years. Examination of trends in flood discharges indicate no statistically significant trends in peak flows during the period of record for any of the eight streamflow-gaging stations.</p> | <p>The Delaware River flood frequency report, "Flood magnitude and frequency of the Delaware River in New Jersey, New York, and Pennsylvania: U.S. Geological Survey Open-File Report 2008-1203" was published in 2008 and is available online at: <a href="http://pubs.er.usgs.gov/usgspubs/ofr/ofr20081203">http://pubs.er.usgs.gov/usgspubs/ofr/ofr20081203</a></p> |  |
| Updated Floodplain Study & Mapping Delineation for New Jersey          | <p><b>Lead:</b> Federal Emergency Management Agency Region II</p> <p><b>Partners:</b><br/>         New Jersey Department of Environmental Protection<br/>         Medina Consultants (mapping contractor)</p>   | <p>Digital Flood Insurance Rate Maps (DFIRMS) for Mercer, Hunterdon, Warren, and Sussex counties.</p> <p>Preparation of new floodplain delineations and associated mapping for 126 miles along the main stem of the Delaware River on the NJ side. Over 500 surveyed river cross-sections, LiDAR information and updated hydrology have been incorporated into updated hydraulic modeling that has been used to prepare new floodplain mapping.</p>   | <p>Final Effective Maps for Sussex and Warren - 2011, Hunterdon - 2012<br/>         Mercer - 2015</p>  | <p>The NJDEP - \$1 million. FEMA - \$2.5 million</p> |

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| Updated Floodplain Study & Mapping Delineation for New York   | <b>Lead:</b> Federal Emergency Management Agency Region II  | In response to the June 2006 flood, FEMA Region II conducted a flood hazard analysis of certain streams prone to flooding in the Delaware River Basin in New York State. This includes, but is not limited to, 10 miles of the Beaverkill, 13 miles of Willowemoc Creek, 62 miles of the West Branch, 12 miles of the East Branch and 85 miles of the Delaware River from Hancock to Port Jervis. The scope of the effort includes: LIDAR acquisition, field survey of structure and wet sections, hydrologic and hydraulic modeling, and the development of flood recovery maps.   | Preliminary Maps - 2013/2014 |  |
| Updated Floodplain Study & Mapping Delineation for Pennsylvania   | <b>Lead:</b> Federal Emergency Management Agency Region III   | Evaluation of existing hydraulic modeling of higher frequency flood elevations (10- & 50-year) using revised hydrology on the Delaware River.<br><br>Revisions to hydraulic modeling in Lower Mt Bethel Township, Northampton County  |                              |  |
| Collection of High Water Mark Elevations  | <b>Lead:</b> U.S. Geological Survey   | The appendix of the report, "Flood of April 2-4, 2005, Delaware River Main Stem from Port Jervis, New York, to Cinnaminson, New Jersey," contains detailed information for 156 high-water mark elevations obtained on the main stem of the Delaware River from Port Jervis, New York, to Cinnaminson, New Jersey, for the April 2-4, 2005 flood. The report can be accessed at <a href="http://pubs.er.usgs.gov/usgspubs/sir/sir20075067">http://pubs.er.usgs.gov/usgspubs/sir/sir20075067</a> . These high water marks were compared to existing flood insurance study flood profiles by the USACE - Philadelphia District at the request of FEMA. | Published in 2007            |  |
| Analysis of Flood-Magnitude and Flood-Frequency Data for Streamflow-Gaging Stations in the Delaware and North Branch Susquehanna River Basins in Pennsylvania | <b>Lead:</b> U.S. Geological Survey   | Updated flood-magnitude and flood-frequency data for streamflow-gaging stations on tributaries in the Delaware and North Branch Susquehanna river basins were analyzed using data through the 2006 water year to determine if there were any major differences in the flood-discharge data. The report can be accessed at <a href="http://pubs.usgs.gov/of/2007/1235/">http://pubs.usgs.gov/of/2007/1235/</a> .   | Published in 2007            |  |
| Regression Equations for Estimating Flood Flows at Selected Recurrence Intervals for Ungaged Streams in Pennsylvania  | <b>Lead:</b> U.S. Geological Survey   | Regression equations were developed for estimating flood flows at selected recurrence intervals for ungaged streams in Pennsylvania with drainage areas less than 2,000 square miles. The report can be accessed at <a href="http://pubs.usgs.gov/sir/2008/5102/">http://pubs.usgs.gov/sir/2008/5102/</a> .   | Published in 2008            |  |
| <b>FLOOD WARNING</b>  |   |   |                              |  |
| High Hazard Dam Emergency Action Plan (EAP) Documents   | <b>Lead:</b> NJ Office of Homeland Security & Preparedness (NJOHSP)<br><br><b>Partner:</b> New Jersey Department of Environmental Protection (NJDEP)<br><br>New York City Department of Environmental Protection (NYCDEP) | Formation of a regional Task Force to examine inundation mapping practices for high hazard dams along the Delaware River, emergency notification and risk communication, assessment of threat at high hazard dams along the Delaware River, and regional emergency response collaboration and coordination.   | Not yet initiated            |  |

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| Ice Jam Monitoring using Security Cameras on Delaware Bridges | <p><b>Lead:</b> Delaware River Joint Toll Bridge Commission (DRJTBC)</p> <p><b>Partners:</b> National Weather Service<br/>Delaware River Basin Commission</p>   | <p>DRJTBC owns, maintains, and operates 20 bridges from the Trenton-Morrisville Bridge to the Milford- Montague Bridge. The system is comprised of approximately 300 surveillance cameras.</p> <p>DRJTBC sends daily camera screenshots of river ice conditions to the National Weather Service Middle Atlantic Forecast Center. This cooperation helps to monitor ice jam potential with the early detection of ice conditions along the river.</p>   | <p>Camera installation completed in 2009</p> <p>Protocol to transmit screenshots of river ice conditions: 2011</p>  | \$23 million  |
| Digital Flood Inundation Maps for the Main Stem Delaware      | <p><b>Lead:</b> U.S. Army Corps of Engineers Philadelphia District</p> <p><b>Partners:</b><br/>National Weather Service<br/>Delaware River Basin Commission</p> | <p>Effective September 15, 2010, the NWS added Flood Inundation Maps to AHPS for the following five flood forecast points: Trenton, N.J., Lambertville, N.J./New Hope, Pa., Stockton, N.J., Frenchtown, N.J., and Riegelsville, N.J.</p> <p>Effective July 12, 2011, the NWS added Flood Inundation Maps to AHPS for the remaining four flood forecast points: Belvidere, N.J., Easton, Pa., Montague, N.J. and Port Jervis, N.Y.</p>  | <p>2010-2011</p> <p><a href="http://www.state.nj.us/drbc/hydrological/river/ahps/index.html">http://www.state.nj.us/drbc/hydrological/river/ahps/index.html</a></p> | <p>Funding for creation of the inundation mapping was made possible by using the \$500,000 provided by the basin states for the flood analysis model as a local cost share to leverage federal funding.</p> <p>Funding to put this mapping online via AHPS was acquired through portions of FY-08 and FY-09 funding for the Delaware River Enhanced Flood Warning System.</p> |
| FY-09 Flood Warning Improvements                              | <p><b>Lead:</b> Delaware River Basin Commission</p> <p><b>Partners:</b> National Weather Service<br/>U.S. Geological Survey</p>                                 | <p>With promotion by members of Congress (Sponsors: U.S. Reps. Hinchey, Gerlach, Dent, Holt, and Castle), \$235,000 in federal funds were directed to DRBC for the Delaware River Enhanced Flood Warning System. Priorities for FY-09 work include:</p> <ul style="list-style-type: none"> <li>●Inventory and evaluation of non-NWS precipitation gages; improved flash flood forecasts and ice monitoring information; establish flood stages and impact statements for new forecast sites (NWS)</li> <li>●Flood hardening of select gages (USGS)</li> <li>●Implementation of flood inundation mapping into AHPS at flood forecast points (NWS &amp; ACOE)</li> <li>●Education and outreach component (see below); flood coordination; catalog Emergency Action Plan documents in the basin (DRBC)</li> </ul> | October 2009 - September 2010   | \$235,000   |
| FY-08 Flood Warning Improvements                              | <p><b>Lead:</b> National Weather Service</p> <p><b>Partners:</b><br/>Delaware River Basin Commission<br/>U.S. Geological Survey</p>                             | <p>With DRBC assistance and promotion by members of Congress (Sponsors: U.S. Reps. Dent &amp; Holt; Senators Lautenberg &amp; Menendez), \$235,000 in federal funds were directed to NOAA-NWS for work on improved flood warning in the Delaware River Basin. This work included:</p> <ul style="list-style-type: none"> <li>●Inventory and evaluation of existing precipitation and stream gage networks (NWS)</li> <li>●Flood hardening of select gages (USGS)</li> <li>●Implementation of flood inundation mapping into AHPS at flood forecast points (NWS &amp; USACE)</li> </ul>  | <p>Inventory and Evaluation Report - November 2009.</p> <p>USGS Flood Hardening - 2009</p> <p>Flood Inundation Mapping - Spring 2010</p>                            | \$235,000   |

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| Updates to the Streamgaging Network                | <p><b>Lead:</b> Delaware River Joint Toll Bridge Commission (DRJTBC)</p> <p><b>Partners:</b> U.S. Geological Survey<br/>New Jersey Department of Environmental Protection</p> | <p>Radar-operated river gages are being installed on DRJTBC bridges. USGS operates and maintains the gages while the DRJTBC is responsible for covering the costs for installation, electricity and telecommunications. The gages record the river readings every 15 minutes and transmit the data hourly via satellite or modem to the USGS. These bridges include Easton, Riegelsville, Frenchtown, Stockton, Lambertville and Washington Crossing.</p>   | 2005-2011  |  |
| Updates to the Stream gaging Network               | <p><b>Lead:</b> U.S. Geological Survey</p> <p><b>Partners:</b> New Jersey Department of Environmental Protection<br/>Pennsylvania Department of Transportation</p>            | <p>To date, major gage repairs and upgrades have been accomplished to the existing gages located on the Delaware River at Montague, Riegelsville, and Trenton, as well as on the Lehigh River at Glendon. The Beaver Kill at Cooks Falls and Delaware River at Barryville gages were relocated.</p> <p>Real-time data are now available online at these USGS stations: West Branch Delaware River at Stilesville (01425000) and East Branch Delaware River at Downsville (0141700).</p>   |  |  |
| <b>EDUCATION AND OUTREACH</b>                      |   |   |  |  |
| The Flood Project of the Nature Nurture Foundation | <p><b>Lead:</b> Nurture Nature Foundation</p>   | <p>Focus on Floods is a project of Nurture Nature Foundation, a nonprofit organization developing a science center, the Nurture Nature Center, about flooding and related issues in Easton, Pennsylvania.</p> <p>Focus On Floods is a flood education campaign being developed by Nurture Nature Foundation through a cooperative partnership with National Oceanic and Atmospheric Administration and the National Weather Service. Focus on Floods is designed to help residents and individuals in the Delaware River Basin and beyond improve their flood readiness. The project will share information with individuals, via radio, television, Internet and other venues, about how to use National Weather Service flood forecasting and warning tools, and other critical flood preparedness information.</p> | <p><a href="http://www.focusonfloods.org">www.focusonfloods.org</a></p>  |  |
| Flood Resources Portal                             | <p><b>Lead:</b> Delaware River Basin Commission</p>   | <p>A collection of flood resources; containing links to important information from AHPS, NWS, USGS, FEMA and educational resources. Designed to share accessible resources with the public.</p>   | <p>2015</p> <p><a href="http://www.state.nj.us/drbc/hydrological/river/flood-portal/index.html">http://www.state.nj.us/drbc/hydrological/river/flood-portal/index.html</a></p> |  |



**COMPLETED AND ONGOING FLOOD STUDIES AND PROJECTS IN THE DELAWARE RIVER BASIN** (Working draft - Last updated September 2015)

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| <p>Flood Warning User Forums</p>                        | <p><b>Lead:</b> Delaware River Basin Commission</p> <p><b>Partner:</b><br/>National Weather Service</p>  | <p>Three full-day meetings were held in September 2010 for county/local emergency managers. Over 130 county and local officials attended the Forums. Forums were held in Easton, PA on 9/21, Lambertville, NJ on 9/22, Narrowsburg, NY on 9/28. Partners for these forums included USGS, USACE, The Nurture Nature Foundation, and NOAA-NWS.</p> <p>Agendas highlighted the flood inundation mapping tool on the main stem and presentations about the latest flood warning improvements, current and future NWS forecast products, USGS WaterAlert, how river forecasting works, uncertainty in forecasting, flash flooding tools and Nurture Nature's flood awareness and safety campaign.</p> | <p>September 2010</p> <p><a href="http://www.state.nj.us/drbc/programs/flood/improvements/user-forums.html">http://www.state.nj.us/drbc/programs/flood/improvements/user-forums.html</a></p>  |  |
| <p>Association of State Floodplain Managers (ASFPM)</p> | <p><b>Leads:</b> New Jersey Association of Floodplain Management (NJAFM)</p> <p>New York State Floodplain and Stormwater Managers Association (NYSFSMA)</p> <p>Pennsylvania Association of State Floodplain Managers (PAFPM)</p> | <p>Both NJAFM and NYSFSMA are State Chapters of the Association of State Floodplain Management (ASFPM) and PAFPM is an affiliate of ASFPM. The associations support and promote the Certified Floodplain Manager (CFM) certification for local officials and others involved in floodplain management. All are active in promoting sound floodplain management.</p>  | <p>The Associations hold Annual Conferences.</p> <p><a href="http://www.njafm.org/">http://www.njafm.org/</a></p> <p><a href="http://nyfloods.org/">http://nyfloods.org/</a></p> <p><a href="http://www.pafpm.org/">http://www.pafpm.org/</a></p> |  |