

Meeting the Challenge of Change....*A Report
from the Gilbert F. White Flood Policy Forum*

INNAUGURAL PUBLIC RELEASE

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ASFPM Annual Conference – June 21, 2016 Grand Rapids Michigan



- Results from September, 2015 Gilbert F. White Flood Policy Forum
- Why we met... FFRMS
- Focused on the Climate Informed Science Approach (CISA)



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ASSOCIATION OF STATE FLOODPLAIN MANAGERS FOUNDATION

The mission of the ASFP Foundation is to support the ASFP's efforts to advance floodplain management and serve as a national and international resource for floodplain management professionals, scholars, and students. Contributions from the ASFP Foundation are used to support the ASFP's efforts to advance floodplain management and serve as a national and international resource for floodplain management professionals, scholars, and students. The Foundation's hallmark event, Gilbert F. White National Flood Policy Forum, brings together national and international experts to evaluate and provide recommendations on pressing policy issues.



A Summary Report based on the 5th Assembly of the
Gilbert F. White National Flood Policy Forum
Washington, D.C.
2015

May 2016



The Challenge Ahead: Managing Future Flood Risk

Changes in flooding that affect our natural and human-made flood defenses are posing major challenges for floodplain management.

Natural flood-water storage in floodplains is being overwhelmed by higher flood volumes, often reclaiming for the floodplain areas we have encroached. Natural coastal barriers are experiencing frequent battering and are under threat of being decimated. And the changes are taking place in ways that cannot be fully predicted, presenting a challenge of increasing uncertainty for the scientists, economists, engineers and government officials who estimate and manage risk.

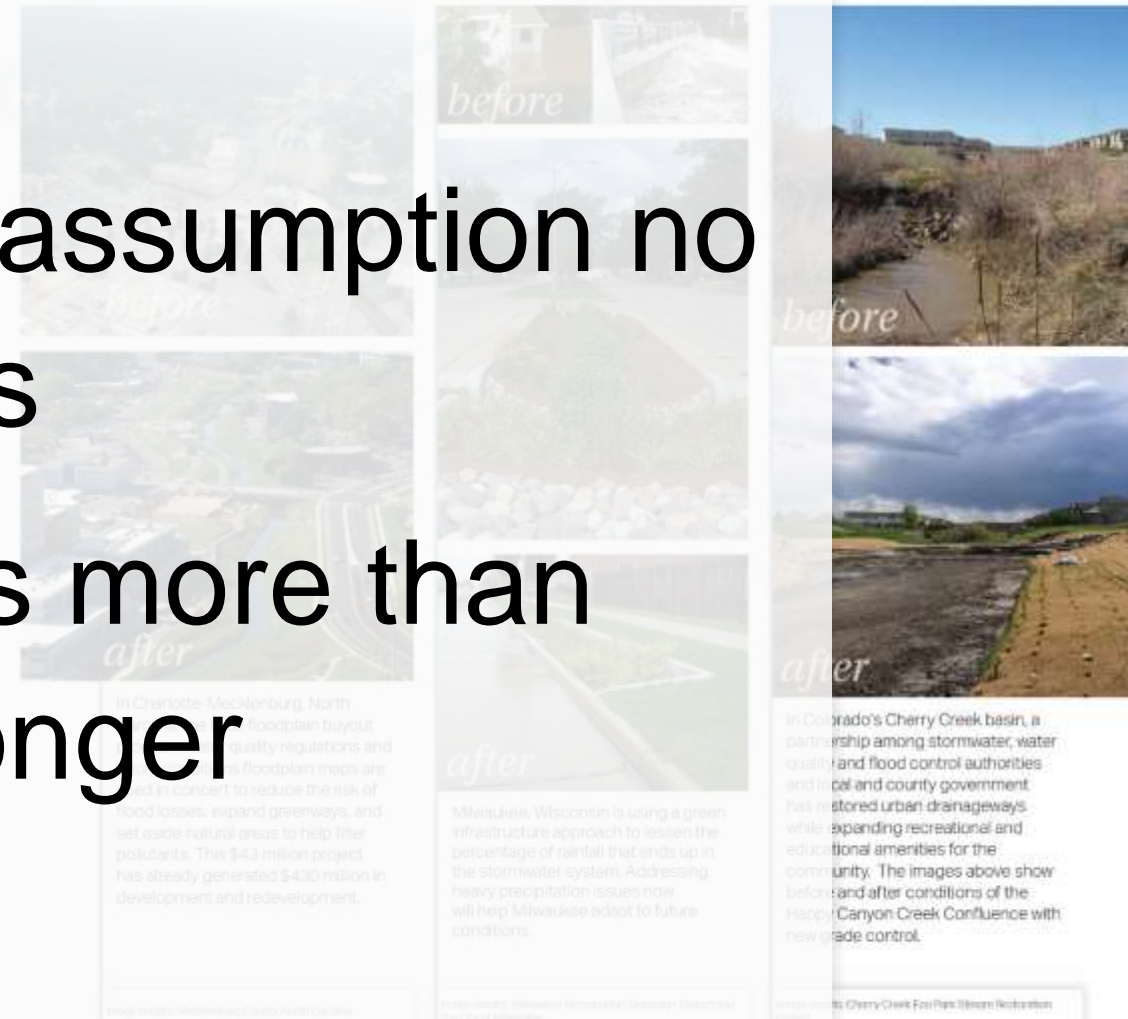
The challenge of uncertainty also affects the government and private sector decision makers who must plan, locate, fund, design and build our nation's infrastructure. Their choices must be based on an analysis of risk that considers the nature, likelihood and impacts of a variety of scenarios—a set of tomorrows that could look markedly different from today.

Floodplain Management

For nearly 40 years, floodplain management has been defined as having a dual purpose: to manage flood risk and the natural functions of floodplains. Climate change is altering flood risk and putting additional stress on the natural functions that affect our risk, our economy and the resources on which we rely. To manage future flood risk, floodplain management must maintain its duality in approach, inclusive of future development and redevelopment throughout the watershed.

- Changing Flooding Conditions
- Stationarity assumption no longer works
- Resilience is more than building stronger

The good news is that growing numbers of communities, as well as federal agencies and states, are increasing resilience by coupling proactive mitigation actions with sound planning. The best examples employ mitigation actions that "buy down" risk while integrating the natural functions of the floodplain.



AN UPDATED FLOODPLAIN MANAGEMENT STANDARD FOR FEDERAL INVESTMENTS

A New Emphasis: Flood Risk Management Using Climate-Informed Science

On January 30, 2015, President Obama issued Executive Order 13690. It modified an earlier Executive Order in place since 1977 (EO11988, *Floodplain Management*) to establish a new *Federal Flood Risk Management Standard (FFRMS)* for federal taxpayer funded projects and actions. The new standard requires a climate-informed forward look to ensure that federal investments in or near floodplains are protected in the future.

Aimed at increasing resilience against flooding and helping to preserve the natural values of floodplains, the FFRMS directs approaches that will take into account both current and future flood risk to ensure that projects last as long as intended. The standard offers options for determining the vertical and horizontal extent of a floodplain in planning. The preferred option is an approach that incorporates the use of climate-informed science when providing estimates of future flooding.

The FFRMS introduces a resilience directive for federal investments in flood-prone areas incorporate measures to combat the impacts of climate change. It rightly suggests using "method[s] that integrate current and future changes in flooding, based on climate science."

- Federal investments and actions must be resilient to climate change
- FFRMS calls for:
 - Use of a Climate Informed Science Approach (CISA)
 - Consideration of nature based approaches

FFRMS options to define the floodplain for federally funded actions:

1. The area that results from the intersection of the 1 percent annual chance flood elevation and the base flood elevation for non-critical actions and by adding an additional 3 feet to the base flood elevation for critical actions, or
 2. The area subject to flooding by the 0.2 percent annual chance flood.*
- The standard also allows for future use of any other method identified in an update of FFRMS.

Climate-Informed Science Approach

Freeboard Value Approach

0.2 Percent Annual Chance Approach

"The CISA is preferred. Agencies should use this approach when data to support such an analysis are available."

Guidelines for implementing EO11988 and EO13690, October 2015, p. 3/5

"Where possible, an agency shall use natural systems, processes, and nature based approaches when developing alternatives for consideration."

EO13690, Section 7(d)(2)

FFRMS IMPLEMENTATION

A Standard with Broad Implications Across All Levels of Government

FFRMS applies to programs traditionally involved in managing flood risk and to all federal taxpayer investments in the floodplain. Agencies as diverse as FEMA, USACE, HUD, EPA, US Department of Transportation (DoT) and the Economic Development Administration (EDA) will have major programs affected.

Post-disaster federal assistance programs

- HUD Community Development Block Grant (CDBG)
- FEMA Hazard Mitigation Grant and Public Assistance Grant Programs
- Small Business Administration Disaster Loan
- USDA NRCS Emergency Watershed Protection Program



Agencies must take this implementation on with a unified process, working together to resolve policy and technical issues. We can't afford not to ensure that investment for the future be efficient and effective and begin now.

Federal Agency Impact

Examples of program issues

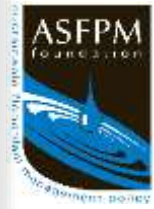
- *What is emergency?*
- *How to apply BC analysis to future change?*
- *CISA in Riverine systems*

Resolving Policy Issues

The FFRMS provides a framework to all agencies to resolve policy issues. It is a criticality and regional and local conditions—an explicit acknowledgment that “one size does not fit all.”

However, this flexibility can pose challenges as multiple agencies work to set forth rules and implement the standard. The adjacent table lists some issues surfaced by ASFPF and Forum.

Issue	ASFPF Suggests
Exempting emergency construction or mitigation projects	The EO exempts “emergency work essential to save lives and protect property and public health and safety” from the provisions of the FFRMS, but “emergency” should be limited to “emergency response” activities and not programs of recovery or mitigation. Recovery programs implemented under “emergency authorities” include the USACE PLB4-99 program and the National Resource Conservation Service Emergency Watershed program.
Addressing long-term benefit in benefit cost analyses	The resilience we buy today may not be realized until years into the future. Traditional benefit cost analysis shows a much lower investment return when spending money today for deferred benefits. This suggests the need to find a better way to incorporate FFRMS resilience requirements in planning and to determine cost effectiveness across a project’s full life-cycle.
Recognizing higher local standards	Many state and local governments have adopted standards that exceed federal minimums. For example, 62 percent of NFIP communities require buildings to be built higher than the NFIP base flood elevation. For federal investment, higher local standards should be treated as the starting point to apply FFRMS, rather than the lower federal standard.
Setting minimum risk for critical facilities	Earlier Water Resources Council guidelines recommended protection to the level of the 500-year event or flood of record, whichever is greater. For critical facilities the highest methods available should be most appropriate.
Applying a CISA for riverine areas	Tools for applying a CISA to riverine areas need to be developed. In some cases, land use and drainage may pose more significant risks than climate change. These risks should be fully understood at the watershed level through local and state government collaboration.
Incentivizing a move to higher standards in design codes	Most construction decisions are made locally. Incentivizing mitigation and safer construction can pay major dividends.
Providing further guidance on “actionable” data and climate-informed decision making	More detailed guidance is needed to aid agencies in adopting the new standard, including protocols for adopting a CISA into decision support processes.
Using from the making process.	Scenario-based planning would be aided by detailing a range of scenarios and attendant risks. Sea level rise (SLR), storms with SLR, riverine flooding, drought, subsidence, erosion and changes in vegetation and drainage can all provide multiple scenarios for consideration.



Building Cooperation and Collaboration

For both initial FFRMS implementation and the long-term effort to manage flood risk, cooperation among federal, state, local and private sector institutions is not an option. **It is a necessity.**

What If?

40' SBA Established FFRMS

38' City Established Floodboard

37' FEMA Established FFRMS

35' HUD Established FFRMS

Problem:

In city X, HUD establishes a FFRMS at 35 feet, FEMA at 37 feet and SBA at 40 feet. The city already set its own at floodboard at 38 feet. What value should guide community actions?

Solution:

Interagency coordination in FFRMS implementation will ensure that the conundrum remains hypothetical.

Washington D.C., September 2010 – The Total Basin recovery following Hurricane Isabel, which hit the Chesapeake Bay area, was a challenge for the region. The FEMA Flood Risk Assessment (FRA) was a key tool in the recovery process.

- Fed-State cooperation & collaboration a must
- Challenge: Implementation by multiple agencies
- Need Unified National Program and Fed Leads

Collaboration at Work

Lower Onion Creek Flood Buyout: Working with USACE in the Lower Onion Creek watershed, the City of Austin determined that acquiring flood-prone buildings was the best solution to growing flood risk. Additional HMA funding allowed 300 homes to be removed from the floodplain. Subsequent flooding proved this was an effective way to reduce damage and improve resiliency. The photo below shows flooding from October 2013, and a map of resulting buyout areas.



Image credit: City of Austin, Department Engineering Division

The Klein Creek Flood Mitigation Project began early June 2014. The project along Klein Creek in Armstrong Park, IL, located in Carol Stream, is a joint effort between DuPage County Stormwater Management, the Village of Carol Stream and the Carol Stream Park District to alleviate flooding in the area.



Image credit: DuPage County Stormwater Management

INVESTING FOR THE FUTURE

Incorporating Climate-Informed Science

Uncertainty is a given. Tomorrow's climate and built environment will be different from today's, and in many places the changes will be significant, requiring changes in how we manage flood risk.

Hydrologists and engineers will need to provide flood estimates with an incomplete understanding of the location, timing, and extent of impact, particularly in the riverine environment. The good news, however, is that professional floodplain managers have provided reasonable estimates in the past with less than certain data and knowledge, and we can do it again.

"One size fits all" estimates of future hydrology will not fit all

The FFRMS suggests, as alternatives to CISA in making estimates of future hydrology, a 2-foot freeboard, 3-foot freeboard for critical actions, or the 500-year flood in making estimates of future hydrology. Use of one-size-fits-all freeboard or the use of a one-size-fits-all safety factor, while simple in application, does not adequately address variation of uncertainty over time or from site to site. Use of the 500-year flood poses further concerns if used in coastal areas because maps apply it as a stillwater boundary estimate, not taking into account the effects of future sea level rise or flooding due to wave action.

■ We can prepare CISA estimates....*right now*

■ Estimates will improve with time, data and reevaluation

■ Freeboard is method of last resort

■ We must embrace uncertainty analysis

We must embrace a multi-prong approach to estimating future conditions

Relying on one fits-all estimate can result in poor investment choices. A multi-prong approach to estimating future conditions is warranted:

- For larger investments, current statistical analysis can be adjusted using data transformation to account for climate change. For smaller investments, current statistical analysis can be adjusted using data transformation to account for climate change.
- For the many areas with limited availability of stream data, current regional regression equations of the US Geologic Survey (USGS) can be adjusted similarly with the adjustments being regionally-specific.
- For local areas that estimate peaks and the changing flood stage over time, the use of a 2-foot freeboard, 3-foot freeboard for critical actions, or the 500-year flood in making estimates of future hydrology.
- As the method of last resort, freeboard can be applied to all future times.

The issue of applying CISA also cross walks with how we view risk. It is essential to understand that risk is not a static value. Risk is a function of the probability of a loss occurring and the magnitude of that loss. The uncertainty we may be seeing is one that says that we are 90 percent confident a design or regulatory elevation will not be exceeded today, 60 percent confident for the year 2050, and 25 percent confident for the year 2100. The more we look into the future the more uncertainty we can accept because much of the uncertainty has to do with lack of availability of data and not necessarily a pending failure of a system.

Our estimates can change with time. But this requires a renewed commitment to data collection, and a willingness to accept that the private sector to some extent has been declining for years. We must reverse this mindset, while becoming more innovative and accepting of data from non-federal sources.

Success in using CISA is dependent on several factors. Moving forward, we need data, we need information, and we need to keep improving both. The need for data collection and monitoring of the nation's streams and watersheds has never been more crucial.

We also need policy and consensus regarding tolerable levels of risk and uncertainty. And we need to re-evaluate where we are, periodically, over time.

Multi-prong Approach



Identifying and Communicating Future Risk

Among the challenges in managing future flood risk is that of presenting risk—or rather, the range of probabilities and possibilities that comprise the risk—in a useful and actionable way.

Meeting this challenge is vitally important. Planners, developers, regulators, residents and business owners everywhere need to understand the direction and magnitude of change that may come, including impacts of future development, land use change, erosion, sea/lake level risk and climate change.



8 foot SLR estimating for Charleston, SC using NOAA's Digital Coast Sea Level Rise and Coastal Flooding Impacts Viewer <https://coast.noaa.gov/digitalcoast/> (Image credit: NOAA)



- Must effectively communicate risk
- Regulatory products alone won't do
- Need to exploit future-facing communication tools

To achieve resilience, agencies must fund communication strategies and tools that will help people visualize and act on future risks—risks that we are just beginning to understand.

Moving from regulatory products to tools that visualize future conditions

Although a number of agencies have been successful in communicating flood risk, there has been that of FEMA's National Flood Insurance Program (NFIP). NFIP flood maps help determine flood insurance rates and set minimum requirements for construction in floodplains.

The maps present information about future conditions are not always clear, but with the NFIP's new provisions in 2012, FEMA's National Flood Insurance Program (NFIP) in its December 2012 report has urged FEMA, in cooperation with its mapping partners, to move toward showing future conditions as required by the 2012 law, and incorporating actionable science.

A key question for future-facing communication is how best to indicate uncertainty and to choose among possible scenarios of change and sector effects. NOAA has done with its U.S. Climate Resilience Toolkit. In this toolkit, NOAA provides user-selectable sea level rise and coastal flood tools as well as a comparison matrix to help coastal communities choose web-based tools available for their state.

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Moving to a productive conversation about managing risk

Developing a new way of thinking about flood risk is not well understood and either be ignored or fought against, particularly when there are multiple and conflicting points of view to resolve, and when it is easier to simply delay tough choices. Ongoing, coordinated risk communication backed by appropriate decision tools can help. Risk messages, tools and resources must be coordinated across agencies and down to the state and local level so that messages are aligned and people will listen, hear, remember, and act. But none of this will happen without commitment and funding.

NOAA, in partnership with FEMA and USACE, created a set of map services to help communities, residents, and other stakeholders consider risks from future sea level rise in planning construction following Hurricane Sandy. These map services, which New York City and the states of New York and New Jersey integrate the best available FEMA flood hazard data for each location with information on future sea level rise from two different peer-reviewed sources (Global Sea Level Risk Scenarios for the United States Climate Assessment and Climate Risk Information 2013: Observations, Climate Change Projections and Maps).



Mitigating Future Risk

Too often, investments in the floodplain are short-sighted. One reason is that planners and designers underestimate the length of time a given project will continue to function—in many cases a life span of 100 years or more. Another is that planners continue to assume stationarity, although we now know that risk will change and in many cases will accelerate rapidly.

Mitigation, either in original design or in efforts to rebuild or retrofit, will be essential to control loss and reduce the nation's risk. This is true not only for federal FFRMS investments but for non-federal investments as well.

Mitigation Works.

A 2005 study of post-disaster rebuilding efforts by the National Institute of Building Sciences found that a dollar spent for mitigation yields four dollars in costs avoided. Even greater savings can apply for initial construction.

The right questions

■ Current Investments will be impacted by a changed climate

■ The dialog on how we adapt can no longer be delayed

■ *“We have enough information to act, so let’s act”* Gilbert F. White



The Harris County Flood Control District in Texas is working with federal and other partners to mitigate flooding along the area's bayous. The Bays Bayou project is creating detention areas with welcome green space, and an ongoing effort to buy out flooded homes has restored more than 1,000 acres to the floodplain.

View from the north, Mexican Park, part of the Bays Bayou project. Photo credit: Harris County Flood Control District.

We must ensure that emergency funding is used to build higher and stronger, not to repeat earlier mistakes. And, we must actively support protective investment at the local level, where most infrastructure building decisions are made.

- FFRMS and CISA "Version 1" better than a "Version None"
- Agencies must move with high seriousness
- Policy issues must be addressed as they arise
- Need Fed- State cooperation and collaboration in implementation

Definition Team

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Thank You