USACE Non-Stationarity "Activities"

Presentation to Annual Progress Meeting on Reclamation Climate and Hydrology Research

October 3, 2012

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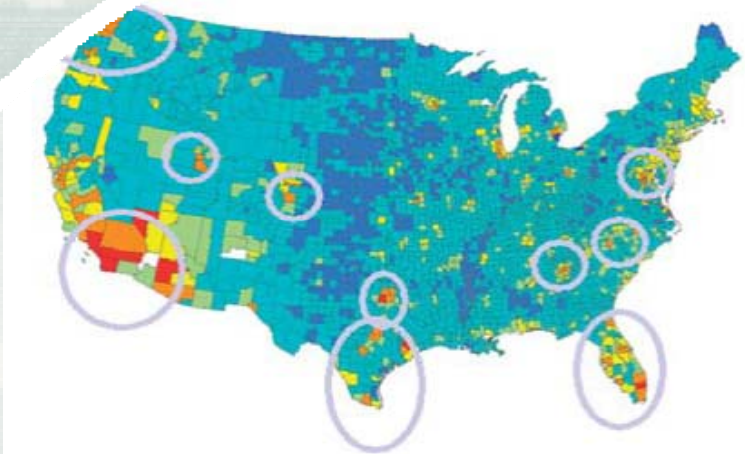
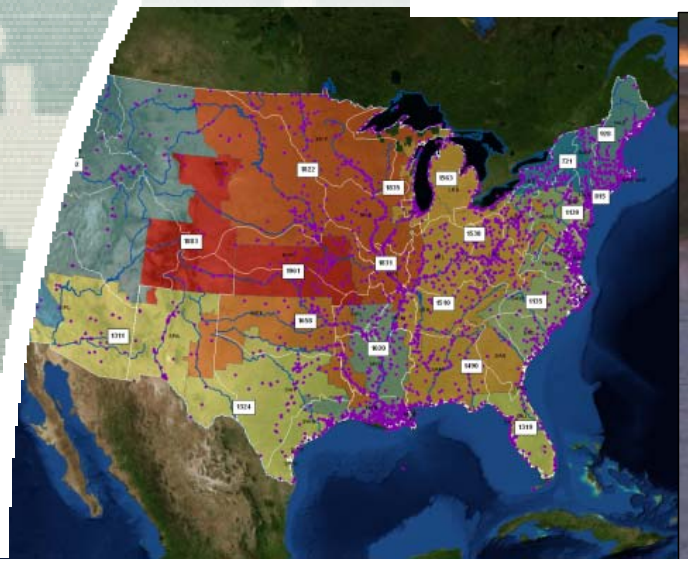
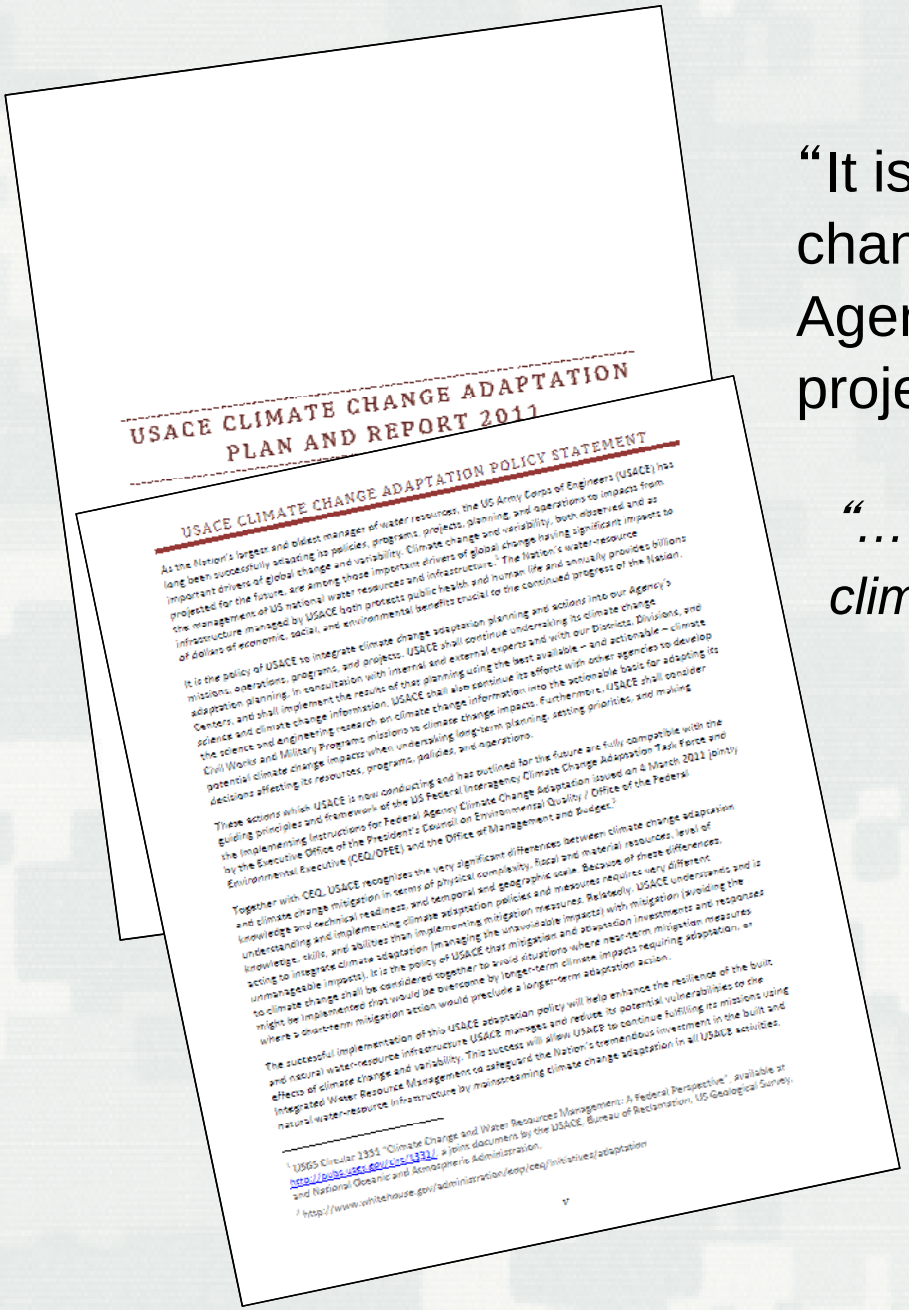




US Army Corps of Engineers
BUILDING STRONG®

USACE Climate Change Adaptation Policy

June 2011


USACE CLIMATE CHANGE ADAPTATION PLAN AND REPORT 2011

USACE CLIMATE CHANGE ADAPTATION POLICY STATEMENT

As the Nation's largest and oldest manager of water resources, the US Army Corps of Engineers (USACE) has long been successfully adapting its policies, programs, projects, planning, and operations to impacts from important drivers of global change and variability. Climate change and variability, both observed and as projected for the future, are among those important drivers of global change having significant impact to the management of US national water resources and infrastructure.[1] The Nation's water-resource infrastructure managed by USACE both protects public health and human life and annually provides billions of dollars of economic, social, and environmental benefits crucial to the continued progress of the Nation.

It is the policy of USACE to integrate climate change adaptation planning and actions into our Agency's missions, operations, programs, and projects. USACE shall continue undertaking its climate change adaptation planning. In consultation with internal and external experts and with our Districts, Divisions, and Centers, and shall implement the results of that planning using the best available – and actionable – climate science and climate change information. USACE shall also continue its efforts with other agencies to develop the science and engineering research on climate change information into the actionable basis for adapting its Civil Works and Military Programs missions to climate change impacts. Furthermore, USACE shall consider potential climate change impacts when undertaking long-term planning, setting priorities, and making decisions affecting its resources, programs, policies, and operations.

These actions which USACE is now conducting and has outlined for the future are fully compatible with the guiding principles and framework of the US Federal Interagency Climate Change Adaptation Task Force and the implementing instructions for Federal Agency Climate Change Adaptation issued on 4 March 2011 jointly by the Executive Office of the President's Council on Environmental Quality / Office of the Federal Environmental Executive (CEQ/OFEE) and the Office of Management and Budget.[2]

Together with CEQ, USACE recognizes the very significant differences between climate change adaptation and climate change mitigation in terms of physical complexity, fiscal and material resources, level of knowledge and technical readiness, and temporal and geographic scale. Because of these differences, understanding and implementing climate adaptation policies and measures requires very different knowledge, skills, and abilities than implementing mitigation measures. Relatively, USACE understands and is acting to integrate climate adaptation (managing the unavoidable impacts) with mitigation (avoiding the unmanageable impacts). It is the policy of USACE that mitigation and adaptation investments and responses to climate change shall be considered together to avoid situations where near-term mitigation measures might be implemented that would be overcome by longer-term climate impacts requiring adaptation, or where a short-term mitigation action would preclude a longer-term adaptation action.

The successful implementation of this USACE adaptation policy will help enhance the resilience of the built and natural water-resource infrastructure USACE manages and reduce its potential vulnerabilities to the effects of climate change and variability. This success will allow USACE to continue fulfilling its missions using Integrated Water Resource Management to safeguard the Nation's tremendous investment in the built and natural water-resource infrastructure by mainstreaming climate change adaptation in all USACE activities.

[1] USGS Circular 1331 "Climate Change and Water Resources Management: A Federal Perspective," available at http://pubs.usgs.gov/circ/1331/, a joint document by the USACE, Bureau of Reclamation, US Geological Survey, and National Oceanic and Atmospheric Administration.

[2] http://www.whitehouse.gov/administration/eop/ceq/initiatives/adaptation

17

"It is the policy of USACE to integrate climate change adaptation planning and actions into our Agency's missions, operations, programs, and projects."

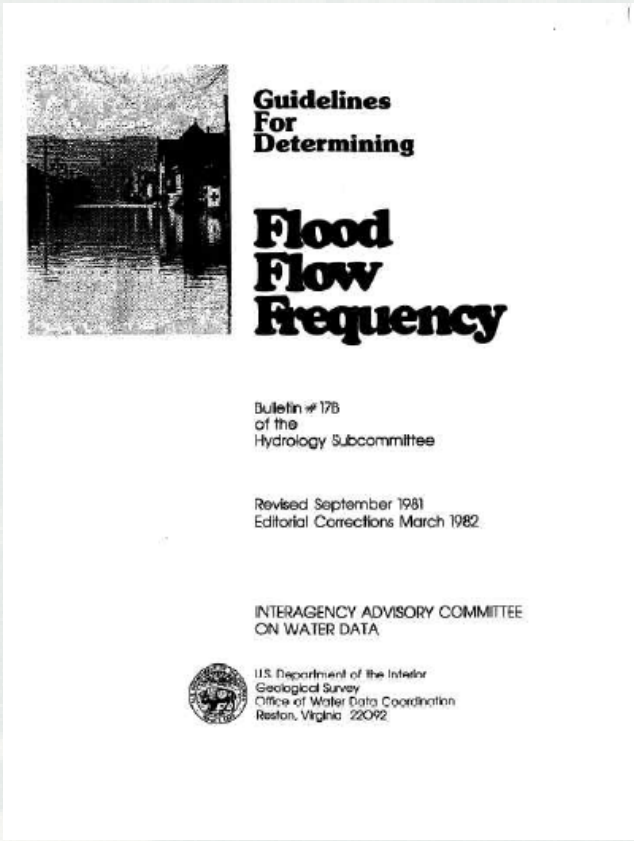
"… using the best available – and actionable – climate science and climate change information …"

"… it shall be considered at every step in the project life cycle for all USACE projects, both existing and planned, … to *reduce vulnerabilities and enhance the resilience of our water-resource infrastructure.*"

Bulletin 17B Revision

Previous Wording for "Climatic Trends:"

"There is much speculation about climatic changes. Available evidence indicates that ***major changes occur in time scales involving thousands of years***. In hydrologic analysis it is conventional to assume flood flows are not affected by climatic trends or cycles. Climatic time invariance was assumed when developing this guide."



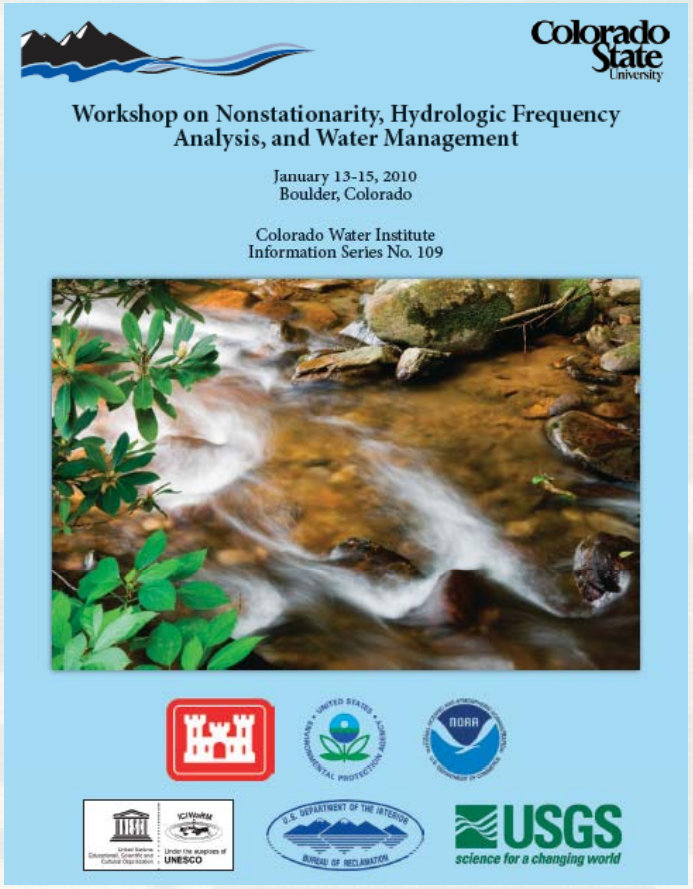
Bulletin 17B Revision

Revised Wording for Climate Paragraph:

"There is much speculation about changes in flood risk over time. Available evidence indicates that ***major changes may be occurring over decades or centuries***. While time invariance was assumed when developing this guide, where ***changes in climate and flood risk over time can be accurately quantified, the impacts of such changes should be incorporated in frequency analysis by employing time-varying LP3 parameters or using other appropriate and statistically justified techniques***. All such methods need to be thoroughly documented and justified."

Non-Stationarity Workshop January 2010

One objective of the January 2010 "Workshop on Nonstationarity, Hydrologic Frequency Analysis, and Water Management" was to facilitate Federal interagency efforts to account for nonstationarity in hydrologic frequency analysis.

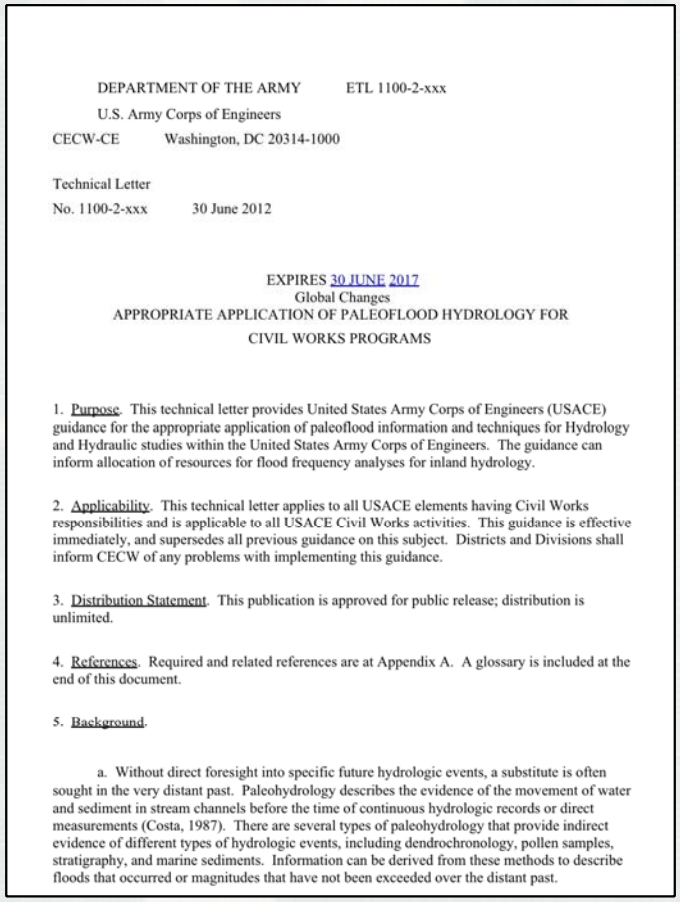


Non-Stationarity and Floods Work Plan

- Communication
  - ACWI and Interagency Activities
- Guidance Development
  - Risk Management
  - Detection and Attribution
  - Climate Signals
- Additional Science Needs
  - Distributions
  - Projection Based Methods

Appropriate Applications of Paleoflood Information for USACE H&H Decisions

- Addresses use of Paleoflood information by H&H decision type
- Document complete Internal Peer Review
- Document complete External Expert Peer Review
- Issuance of Engineering Technical Letter expected FY 2013



DEPARTMENT OF THE ARMY ETL 1100-2-xxx
U.S. Army Corps of Engineers
CECW-CE Washington, DC 20314-1000

Technical Letter
No. 1100-2-xxx 30 June 2012

EXPIRES 30 JUNE 2017
Global Changes
APPROPRIATE APPLICATION OF PALEOFLOOD HYDROLOGY FOR CIVIL WORKS PROGRAMS

1. Purpose. This technical letter provides United States Army Corps of Engineers (USACE) guidance for the appropriate application of paleoflood information and techniques for Hydrology and Hydraulic studies within the United States Army Corps of Engineers. The guidance can inform allocation of resources for flood frequency analyses for inland hydrology.

2. Applicability. This technical letter applies to all USACE elements having Civil Works responsibilities and is applicable to all USACE Civil Works activities. This guidance is effective immediately, and supersedes all previous guidance on this subject. Districts and Divisions shall inform CECW of any problems with implementing this guidance.

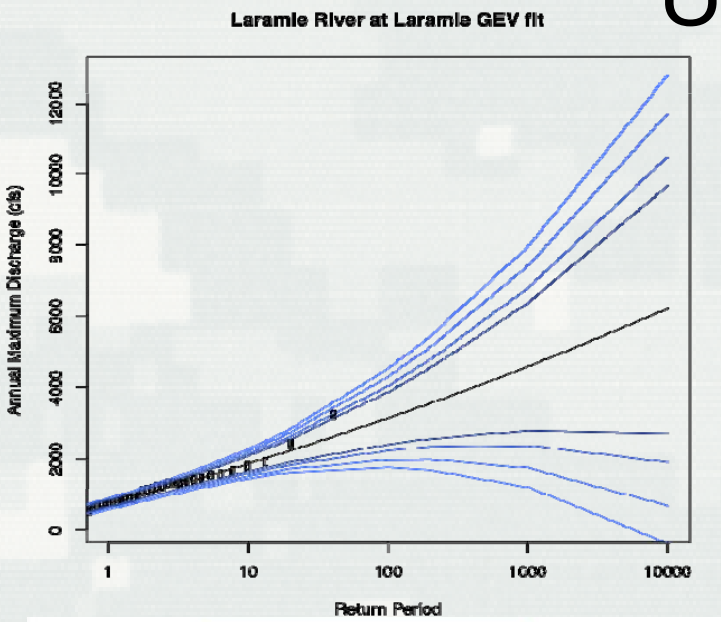
3. Distribution Statement. This publication is approved for public release; distribution is unlimited.

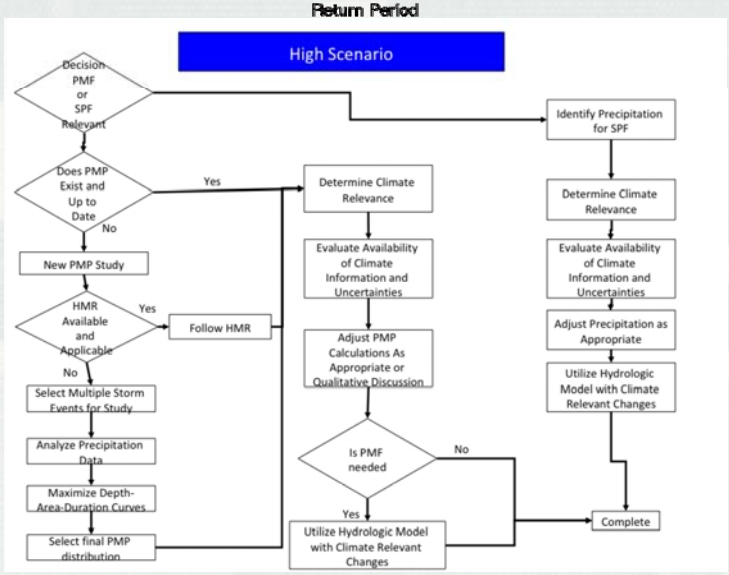
4. References. Required and related references are at Appendix A. A glossary is included at the end of this document.

5. Background.

a. Without direct foresight into specific future hydrologic events, a substitute is often sought in the very distant past. Paleohydrology describes the evidence of the movement of water and sediment in stream channels before the time of continuous hydrologic records or direct measurements (Costa, 1987). There are several types of paleohydrology that provide indirect evidence of different types of hydrologic events, including dendrochronology, pollen samples, stratigraphy, and marine sediments. Information can be derived from these methods to describe floods that occurred or magnitudes that have not been exceeded over the distant past.

General Inland Hydrology Guidance for USACE Projects





- Physically based guidance.
- Build in uncertainties associated with Global Changes
- Cover both extremes of hydrologic cycle
- Considerations of scenarios associated with global changes.
- First Draft Calendar Year 2012

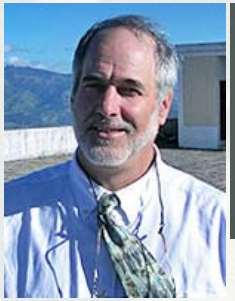
Non-Stationarity and Floods Work Team

Internal Work Team

Inter-Agency Work Team

RECLAMATION USGS FEMA

External Guidance Team



Internal Work Team
H&H Focus

Working Through USACE Headquarters Hydrology and Hydraulics Community of Practice

Inter-Agency Work Team

Workgroup on Interagency Hydrologic Nonstationarity

- USACE, USGS, FEMA, Reclamation, and the Federal Highways Administration (FHWA) are working together to evaluate approaches to and issues regarding nonstationarity, climate change, and flood risk.
- First product will be an annotated bibliography of statistical methods to describe nonstationarity. *

Coordination and Guidance Teams – Key Guidance

Professor Richard Vogel
Tufts University

Hydrologic, hydraulic and statistical methods for analyzing water resource systems

Professor Upmanu Lall
Columbia University

Hydroclimatology, climate change adaptation, risk analysis and mitigation.

Professor Gabriele Villarini
University of Iowa

Flood hydrology, extreme events, remote sensing of rainfall, seasonal forecast, and statistical modeling.

Expert External Project Delivery Team

Vogel, Lall, Villiarini

- Focus on 3 goals over 2 year Intergovernmental Personnel Agreements
  1. Specific practical guidance for non-stationarity considerations within flood frequency analysis.
  2. Potential broader risk based approaches that are fully decision based.
  3. Science road map to accomplish needs to have a broad risk based approach to flood risk management.
- First product will be an annotated bibliography of statistical methods to describe non-stationarity. *
  - Expected December 2012

Thank You

- Questions?
- Discussion