Association of State Floodplain Managers

Critical Facilities and Flood Risk

March 23, 2011

Chad Berginnis, CFM
Associate Director, ASFPM

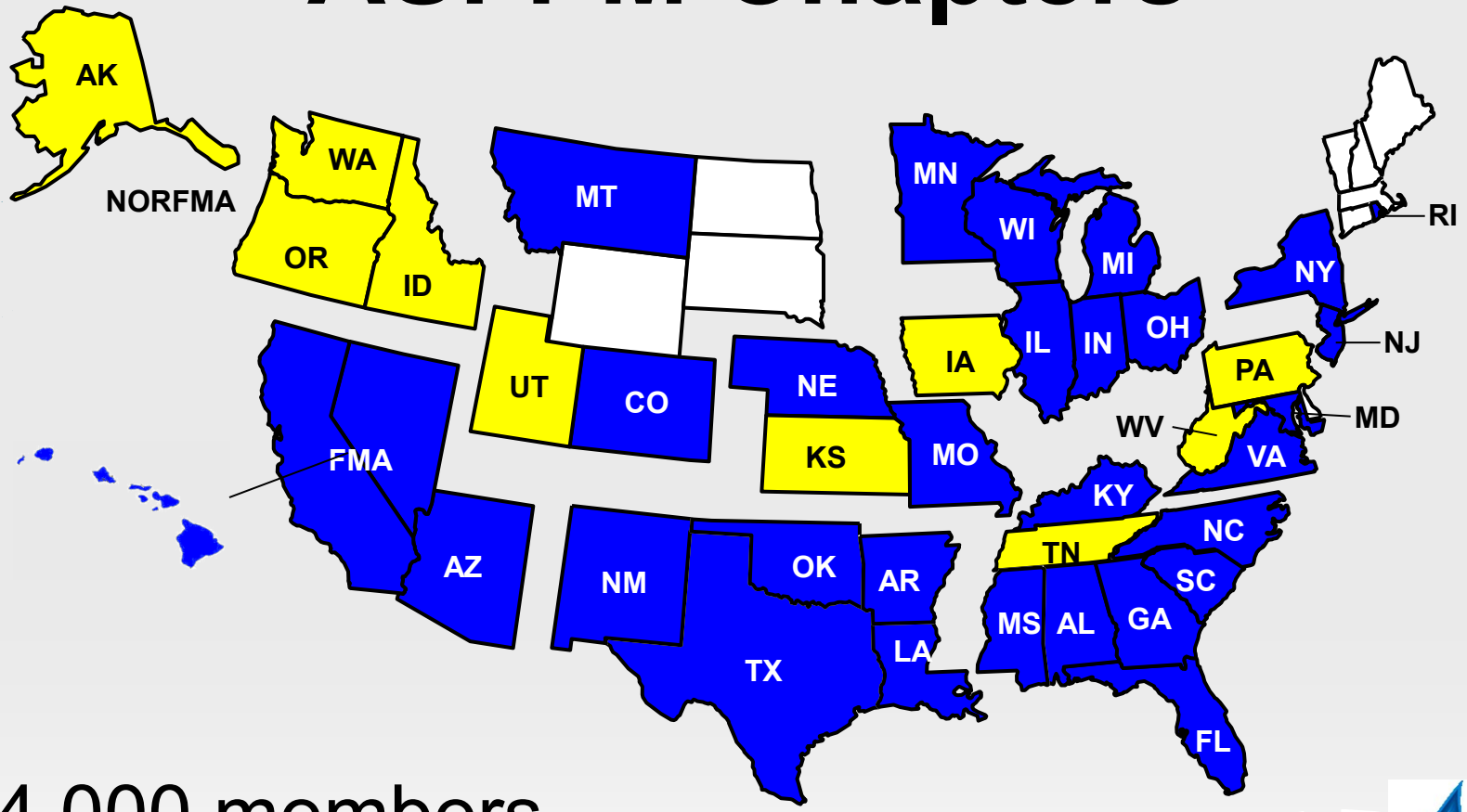
www.floods.org

ASFPM's Mission

To promote education, policies, and activities that mitigate current and future losses, costs, and human suffering caused by flooding,

and to protect the natural and beneficial functions of floodplains – all without causing adverse impacts.

ASFPM Chapters



14,000 members

- 29 ASFPM Chapters
- State Assoc. & Pending Chapters

ASFPM

- Organization of professionals involved in all aspects of floodplain management
- Policy is developed primarily from members through Committees to the ASFPM Board for adoption
- Executive Office in Madison, Wisconsin

ASFPM 13 Policy Committees

- Arid Regions
- Coastal Issues
- Flood Insurance
- Flood Mitigation
- Mapping & Engineering Standards
- Professional Development
- Stormwater Management
- Floodplain Regulations
- No Adverse Impact
- Floodproofing / Retrofitting
- Natural & Beneficial Functions
- Training & Outreach
- International

What does ASFPM do?

- ✓ National CFM® Certification
- ✓ State Chapter Services & Support
- ✓ Legislative Activities
- ✓ Review National Flood Programs & Policies
- ✓ Represent all members on national policy
- ✓ No Adverse Impact (NAI) tools/training
- ✓ White Papers on policy issues
- ✓ Coordination with FEMA & the NFIP
- ✓ Conferences & Events & Training
- ✓ Continuing Education Development

Critical Facilities

- What are they?
- How to determine flood risk?
- What are the standards?
- Best practices?
- ASFPM Recommendations

Defining Critical Facilities

- Water Resource Council *Further Advice on Executive Order 11988* (1987)
- Emergency Managers may have other definitions
- Critical Facilities = Critical Infrastructure?

Cranston WWTP (Rhode Island)
March 2010
Damage: $10 million
Photo: Providence Examiner

Definition of Critical Facilities

(Adapted from WRC definition of Critical Action)

- Any activity for which even the slight chance of flooding is too great
- Determining critical facilities:
  - If flooded would facility create an added dimension to the disaster?
    - Facilities storing toxic or volatile materials
    - Hazardous waste facilities
    - Nuclear plants
    - Certain manufacturing facilities

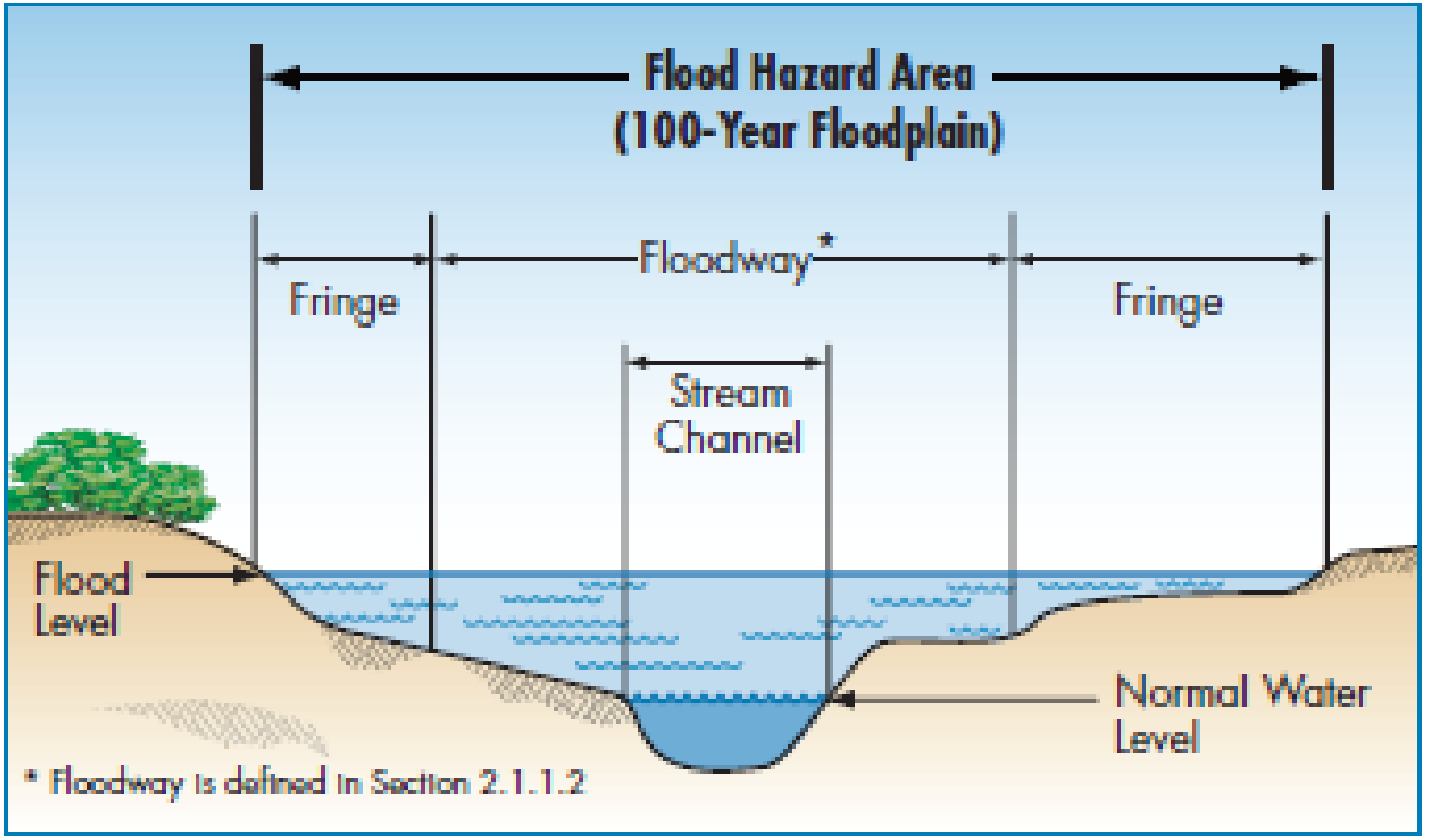
Definition of Critical Facilities

- Determining critical facilities:
  - Given flood warning lead times, would occupants of buildings be sufficiently mobile to avoid loss of life or injury?
    - Schools
    - Nursing homes
  - Would essential and irreplaceable records, utilities and/or emergency services be lost or inoperable due to flood?
    - Police and fire stations
    - EOCs and Emergency Shelters
    - Hospitals
    - Water plants, wastewater treatment plants (WWTP), pump stations

Determining Flood Risk for Critical Facilities

- Any activity for which even the slight chance of flooding is too great. What does this mean?
  - Start with site analysis, examine existing data including FEMA flood maps, historical flooding records, ask neighboring property owners
  - Protect to at least 500-year flood elevation
  - If mapping data is old, generate new information or add freeboard
  - Are there other flood related hazards (tsunami's, lahars)?

Determining Flood Risk for Critical Facilities



Determining Flood Risk for Critical Facilities

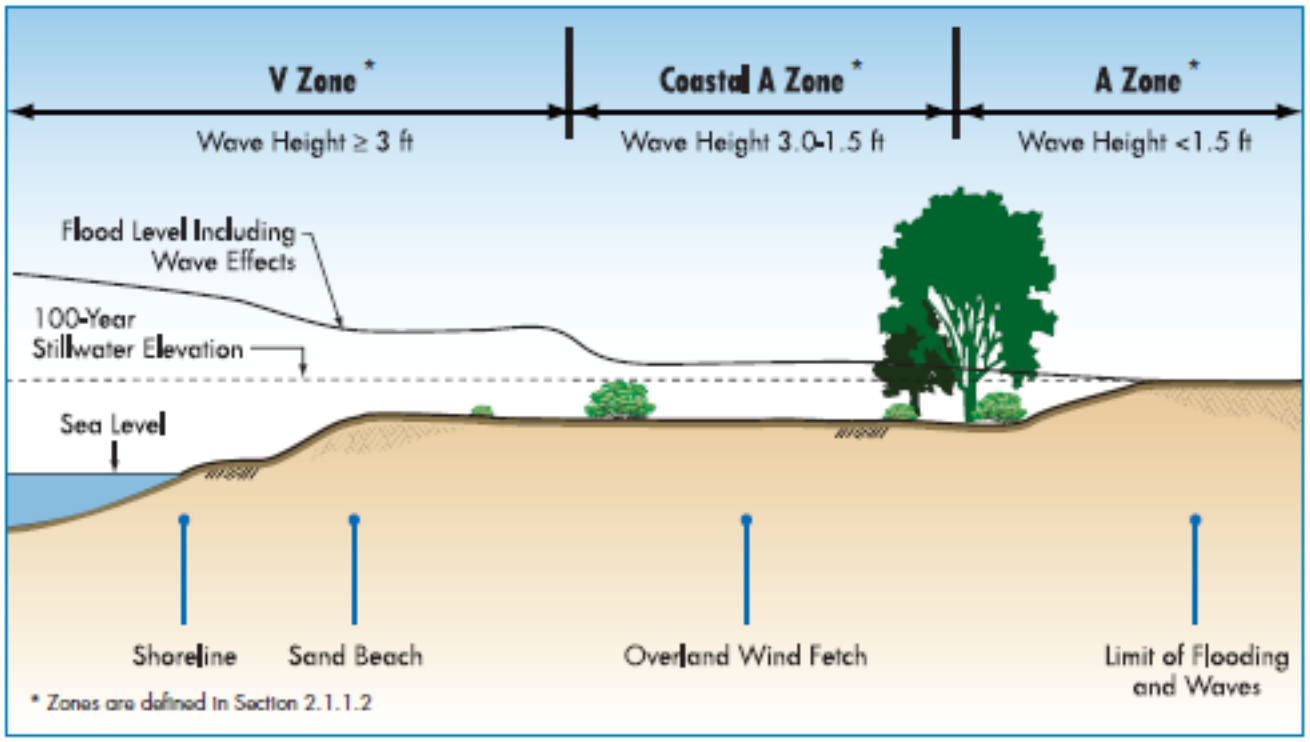
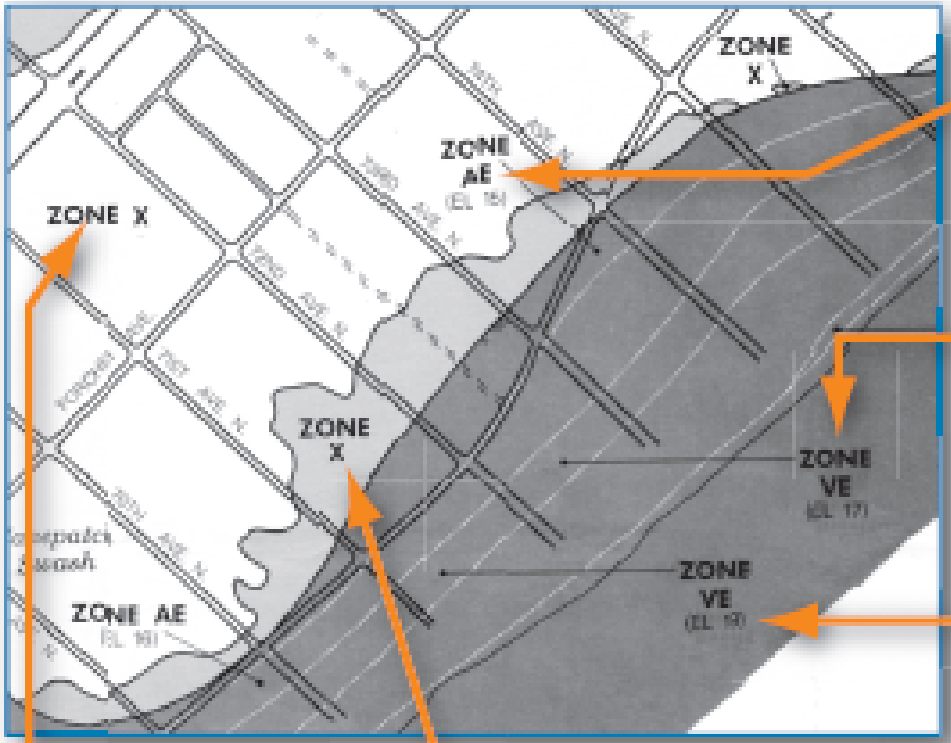


Figure 2-2: The floodplain along an open coast

Determining Flood Risk for Critical Facilities



Zone A, A Zones A1-A30, and **Zone AE** are subject to flooding by the base or 100-year flood (1 percent annual chance), and waves less than 3 feet.

Zone V, V Zones V1-V30, and **Zone VE** are where waves are expected to be 3 feet or more.

Base Flood Elevation (BFE) is the predicted water surface elevation (in feet above datum).

Zone X is all other areas.

Shaded Zone X (or Zone B) is subject to flooding by the 500-year flood (0.2 percent annual chance).

Standards for Critical Facilities

- New facilities
  - Avoidance of any area that has even a remote chance of flooding
  - Is it really a functionally dependent use – question your assumptions!
- Existing facilities
  - Component protection to at least 500-year
  - Dryland access to at least 500-year
  - Adequate emergency plans
  - Analysis of interdependencies and cascading effects

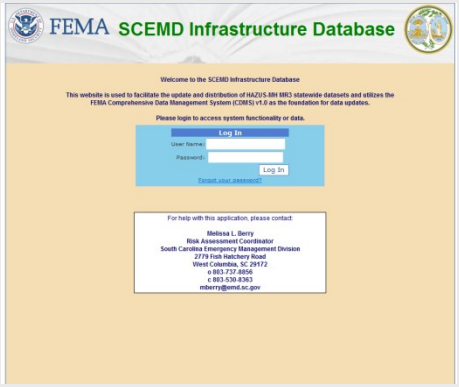
Texas Medical Center, Houston
June 2001 (Tropical Storm Allison)
Damage: $2 billion

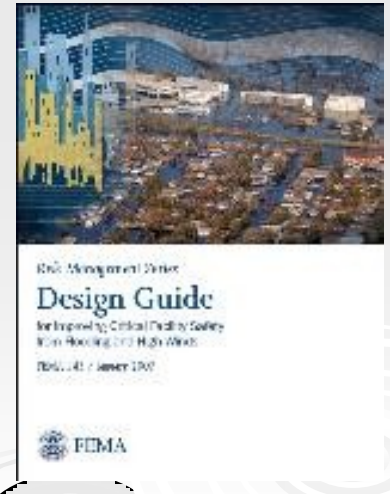
Best Practices for Critical Facilities

- Boulder, Colorado
  - Draft critical facilities ordinance
    - New critical facilities protected to 500-year flood elevation plus 1 foot of freeboard
    - Existing critical facilities grandfathered until substantially changed
- Ohio EPA, DEFA
  - As a condition of loan/grant funding, WWTPs new WWTPs must be cited outside of 500-year floodplain
  - Existing facilities upgrades must have component protection to 500-year floodplain

Best Practices for Critical Facilities

- State of South Carolina
  - Infrastructure web portal tied to FEMA HAZUS program
    - Statewide inventory, can input critical facilities
    - Florida piloting similar portal
- FEMA
  - Design Guide for Critical Facilities (FEMA-543)
  - ICC based matrix
  - Design standard recommendations





MAGNITUDE OF DESIGN EVENT (Increasing Magnitude of Event)	INCREASING LEVEL OF PERFORMANCE (Performance Groups)			
	Performance Group I	Performance Group II	Performance Group III	Performance Group IV
Very Large (Very rare)	Severe	Severe	High	Moderate
Large (Rare)	Severe	High	Moderate	Mild
Medium (Less Frequent)	High	Moderate	Mild	Mild
Small (Frequent)	Moderate	Mild	Mild	Mild

MAGNITUDE OF DESIGN EVENT	DESIGN EVENT		
	Seismic	Flood	Wind
Very Large (Very rare)	2,475 Years	Determined on Site-Specific Basis	125 Years
Large (Rare)	475 Years (Not to Exceed Two-Thirds of the Intensity of Very Large	Determined on Site-Specific Basis	100 Years
Medium (Less Frequent)	72 Years	500 years	75 Years
Small (Frequent)	25 Years	100 Years	50 Years

ASFPM Recommendations

- Reconnect land use decisions and flood risk responsibility and cost
- Ensure that communities are aware of their critical facilities
- Shift flood risk management thinking from short term to long term
- Better enforce Executive Order 11988
- Provide accurate floodplain mapping for communities

ASFPM Recommendations

- Adopt or update state executive orders on floodplain management dealing with critical facilities
- Shift the understanding of who pays for at-risk development in order to support good community decision-making
- Incorporate higher minimum standards for critical facilities

ASFPM's Critical Facilities White Paper can be found on the ASFPM website at:

http://www.floods.org/index.asp?menuID=290&firstlevelmenuID=187&siteID=1

Conclusion

- Costs for physical damages to critical facilities can be enormous, resulting in tax dollars and other resources being taken from existing important programs
- Other effects of critical facilities being impacted can be more costly. Functional downtime, environmental damage, community impacts are just a few