

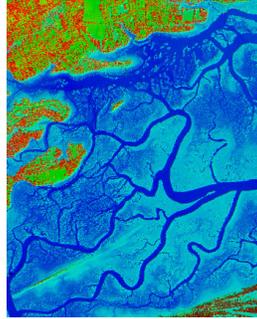


URS | Simplified Dam Break Analysis and GIS Toolbox

52nd Floodplain Management Association Conference
21-24 February 2012
Batemans Bay, NSW

Bel Marquez, PE, CFM

Presentation Agenda



- FEMA's role promoting dam safety
- Need for automated tools to produce dam breach mapping for emergency and floodplain management
- Overview of FEMA toolbox
- Toolbox functionality
- Demonstration of GIS-based mapping tools
- Benefits of the tools

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FEMA's role promoting dam safety

- FEMA is congressionally mandated to coordinate the National Dam Safety Program with States, Federal Agencies, and Stakeholders
- FEMA provides funding to State Dam Safety Programs and sponsors research, technical support, and training
- FEMA's National Flood Insurance Program (NFIP), Risk MAP, promotes proactive floodplain management and includes dam breach inundation zones for local risk communication



2006 Dam overtopping, Gwinnett County, Georgia



1976 Teton dam failure, Rexburg, Idaho

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URS Corporation

Since 1976, URS has provided services covering a wide range of disaster support

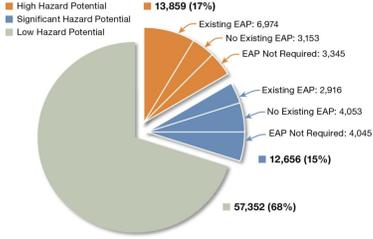
- Flood studies and floodplain mapping
- Program support for NFIP
- Response and recovery for Presidentially declared disasters
- Support to FEMA's Dam Safety Program Office
 - EAP Training for Association of State Dam Safety Officials (ASDSO)



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Dam breach mapping for emergency management

A tool to reduce the high cost of dam breach inundation studies and Emergency Action Plans (EAPs)



Hazard Potential	EAP Status	Count	Percentage
High Hazard Potential	Existing EAP	6,974	17%
Significant Hazard Potential	No Existing EAP	3,153	
	EAP Not Required	3,345	
Low Hazard Potential	Existing EAP	2,916	15%
	No Existing EAP	4,053	
	EAP Not Required	4,045	
Total Low Hazard Potential		57,352	68%

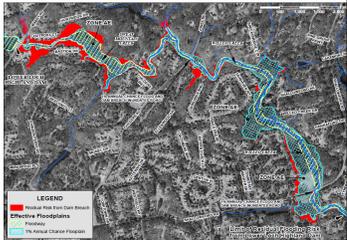
Increase EAPs for dams where a dam breach would result in loss of life and economic damage

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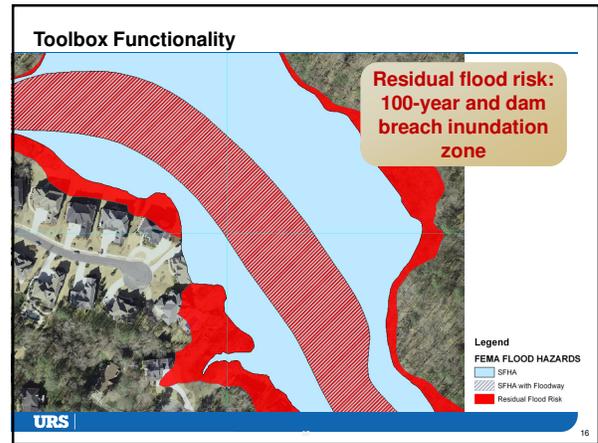
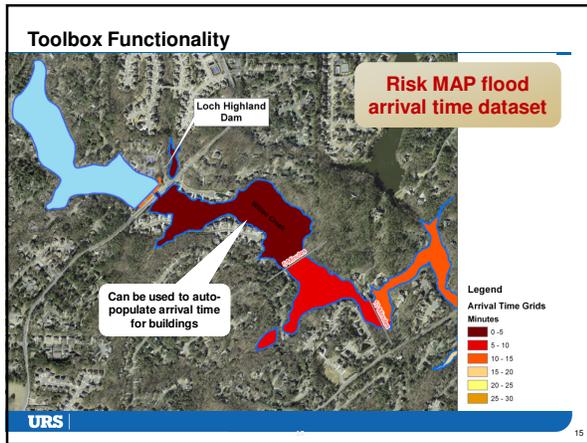
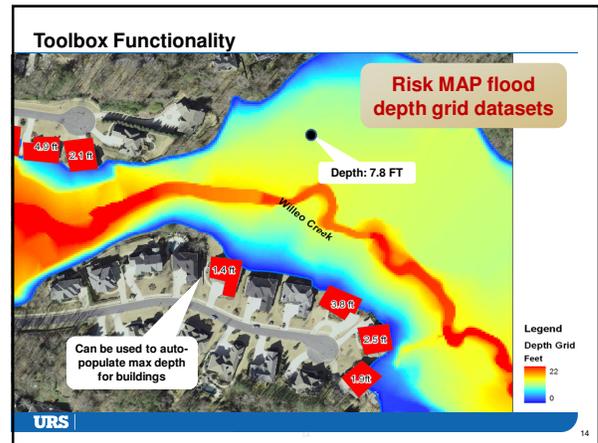
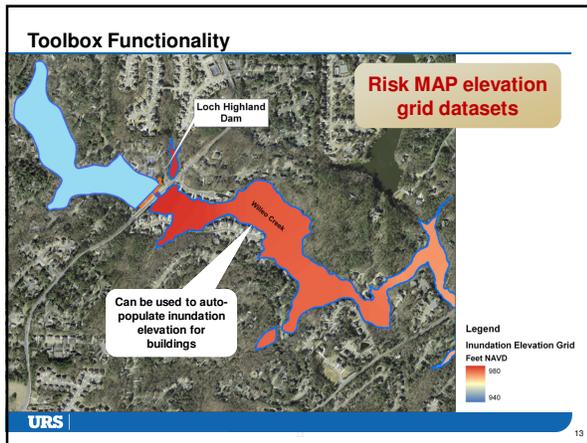
Dam breach mapping for floodplain management

A tool for communities to produce Risk MAP maps to help reduce future consequences of a dam failure

- Maps for outreach, education and risk communication for living downstream of dams
- Breach inundation maps for low hazard dams to avoid hazard creep
- Maps and datasets that are for dam breach consequence studies and hazard mitigation planning



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Toolbox Functionality

Loss of life calculation

Based on Graham's Method in DHS Dam Sector Guidance Document

ID	RIS_CODE_ID	NAME	REG_ID	ACR_ID	OWNER	CD
1	WPCS-01	LOCHLOD				
2	WPCS-02	LOCHLOD				
3	CCB-Band Dam	LOCHLOD				

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Toolbox Functionality

Loss of life calculation

- Based on Graham's Method in DHS Dam Sector Guidance Document
- User can determine population at risk
- Allows the user to specify pre-breach warning time scenarios

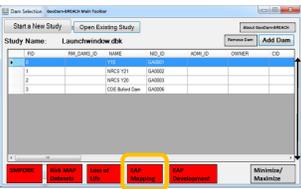
	Total Population	PAR Weekday	PAR Weekend	Loss of Life Factor	Loss of Life Weekday	Loss of Life Weekend
12am - 7am	118	106	106	.5	53	53
7am - 5pm	118 / 171	18	112	.5	9	56
5pm - 12am	118	89	71	.5	45	36

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Toolbox Functionality

EAP mapping

- Standardized map
- Toolset to assist user with paneling scheme
- Automated transfer of flood elevations, flood depths, and flood arrival
- Annotation tools allow specialized text for the EAP map

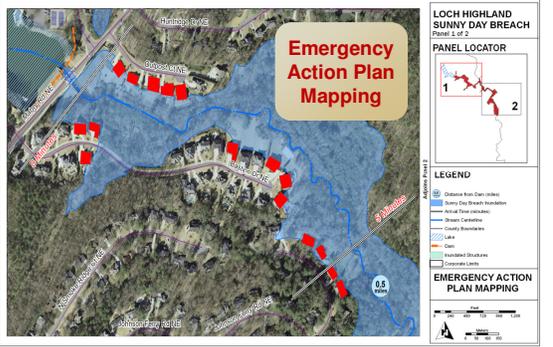


Toolset allows the user to import dam breach inundation zone mapping from other dam breach models

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Toolbox Functionality

Emergency Action Plan Mapping



LOCH HIGHLAND SUNNY DAY BREACH
Panel 2 of 2

PANEL LOCATOR

LEGEND

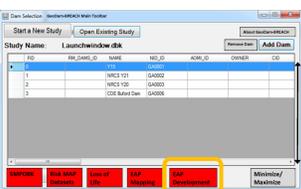
EMERGENCY ACTION PLAN MAPPING

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Toolbox Functionality

EAP report

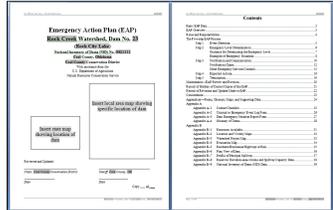
- Interactive user interface to create a EAP report
 - Based on NRCS EAP template
 - Data entry screens query user to input information for database
- Links to retrieve data from the dam breach modeling
 - depth of flooding and time to flood at structures
- Remains semi-automated to develop a EAP specific to the dam being studied.



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Toolbox Functionality

EAP Report



NRCS sample EAP report template

- Title Page
- Table of Contents
- Basic EAP Data
- Roles and responsibilities
- The Five-step EAP Process
- Event Detection
- Emergency Level Determination
 - Guidance for Determining the Emergency Level
 - Examples of Emergency Situations
- Notification and Communication
 - Notification Charts
 - Other Emergency Services Contacts
- Expected Actions
- Termination

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Demonstration of the Toolset



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Benefits of the Toolset

- Reduces the effort of producing dam breach inundation zone maps
 - Increasing the number of dams with breach mapping and EAPs
 - Standardizing the look and content of the EAP report and the breach evacuation maps
- Provides local governments tools to evaluate the consequences of potential dam failures and implement hazard mitigation measures
- Helps the Floodplain Manager implement sound floodplain management practices
- Informs the public of the risk of living downstream of dams to avoid low hazard dams becoming significant or high hazard dams

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The image is a promotional graphic for URS. It features a collage of three photographs at the top: a waterfall on the left, a cornfield in the middle, and an aerial view of a residential neighborhood on the right. Below the collage is a white banner with the URS logo, the text 'Questions?', and a small blue map of Australia. The bottom half of the graphic is a solid blue rectangle.