Development of a Fluvial Erosion Hazard Mitigation Program for Indiana

Indiana Watersheds Webinar Series
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Stable Channel Equilibrium

Image: USFWS; after Lane, 1955
The Fluvial System (after Schumm, 1977)
North Getty’s Creek, Brown County, IN
Pecatonica River, WI

Image: Maher

Dates: Knox, 2000
Tippecano River, Kosciusko County, IN
Stream channel evolution in response to increased runoff

1. Stable Condition
2. Incision
3. Widening (Bank Failure)
4. Stabilizing (Soil Erosion)
5. Stable

Image: Fairfax County, Virginia (after Simon)
Woodford, VT Aug 28 2011 (AP Photo)
Whitewater River near Brookville, IN

Distance in 2006 = 1846 feet
Distance in 2008 = 1812 feet
34 foot change/ 2 years
Levee Road, Franklin County, IN

May, 2011
Eagle Creek, near Zionsville, IN

CEES, 2009
White River above Centerton, Ind.

March, 2005

May, 2010

Moved 290 ft in 5 years  (58 ft/yr)
In June 2008, flooding damaged or destroyed more than 650 sections of road, 60 bridges, and 100 culverts in Indiana.
Silver Jackets

**Federal:** USGS, USACE, NRCS,
**State:** IDNR, INDOT, IDHS, OCRA,
**Academia:** CEES, Polis,
**Private Sector:** National Flood Risk Policy Liaison (ASFPM)

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**OCRA**  
Funding FEH Program  
82 counties impacted by 2008 floods

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**USGS**  
FEH Tech. Tools

**CEES (IUPUI)**  
(Center for Earth and Environmental Science) Outreach / Education

**Polis (IUPUI)**  
(The Polis Center)  
GIS and Web Support
Regional Hydraulic Geometry Curves

Bankfull Channel Dimensions for Non-urban Wadeable Streams in Indiana, SIR 2014-xxxx (Robinson and Barr)

Drainage Area vs:
• Bankfull Width
• Bankfull Depth
• Cross-sectional Area

Regional curves showing bankfull dimensions vs drainage areas for various hydro-physiographic provinces (Dunn and Leopold, 1978).
Photographic Guide to Bankfull Indicators
Patterned after USDA / USFS DVD-ROM
FEH Mapping

Patterned after Vermont DEC; GIS application

Rivers naturally meander...

...require space to establish equilibrium
Vermont River Management Program
Little Calumet River near Burns Drive and Nealon Drive, Portage, IN.
(yellow lines indicate meander belt width)
Outer meander belt lines of a low gradient, meandering channel
Meander belt width approx 6X Bkf channel width

Exceptions to the 6X channel width occur in steep, narrow valleys with
In resistant materials or in more sensitive areas that require >6X
Bridge-Screening Tool

Based on USGS Level 1 bridge-scour methods (1990s)

- Bank material
- Bank stability
- Bed material
- Flow alignment
- Piers in water
- Woody debris
- Observed scour
Bank-Stability Assessment Tool

Based on OFR 03-186, Robinson, White River...

Field Criteria
- Bank height
- Bank material
- Bank angle
- Vegetation condition
- Meander position
Presentations and Workshops

• 8 introductory presentations to introduce project and opportunities to regional audiences
• 3 introductory workshops (up to 35 participants at each workshop)
• 5 regional workshops (up to 35 participants at each workshop)
• 2 two-day workshops for 20 participants
• INAFSM workshop (to present results and applications)
• 5 presentations to state and local mitigation planners and community officials to explain the program results, available information, and how to update local mitigation plans.
Proposed Introductory Presentations

1. Indiana Association for Floodplain and Stormwater Management Annual Conference (Sept 2011)
2. Indiana Association of Cities and Towns Annual Conference (Oct 2011)
3. UWRWA Storm Water Workshop
4. Indiana Society of Professional Land Surveyors Annual Meeting (Jan 2012)
5. Soil and Water Conservation Districts Annual Meeting
6. Purdue Road School – INDOT? (?)
7. Purdue Watershed Academy
8.