Fluvial Hazard Mapping and Re-Wetlanding™ Colorado

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Introduction and Demonstrated Need

Nationally, nearly 25% of flood insurance claims come from areas outside of the 100-year floodplain
Introduction and Demonstrated Need

“Planning for erosion hazards is an essential component of effective river corridor management and the prevention of future flood damages.”

Jamestown, 1969
Fluvial Hazard Zone Delineation
A Framework for Mapping Channel Migration and Erosion Hazard Areas in Colorado

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For: Colorado Water Conservation Board, Department of Natural Resources
Introduction and Demonstrated Need

What does this have to do with wetlands!?

"Dahl (1990) estimated that in the 1780s Colorado contained 2 million acres of wetlands, down to 1 million acres in the 1980s… Because Colorado's climate is quite dry… wetlands are most commonly associated with riparian areas. As areas adjacent to rivers became settled, riparian wetlands were lost due to the development of the land adjacent to rivers..."

Source: http://www.cnhp.colostate.edu/cwic/cons/history.asp
Colorado Senate Bill 15-254  
“Natural hazard mapping fund”

SENATE BILL 15-245

BY SENATOR(S) Grantham, Steadman, Lambert, Cooke, Garcia, Heath, Jones, Kefalas, Kerr, Martinez Humenik, Merrifield, Newell, Roberts, Todd, Cadman; also REPRESENTATIVE(S) Young, Hamner, Rankin, Becker K., DelGrosso, Fields, Foote, Garnett, Ginal, Kraft-Tharp, Lontine, Melton, Mitsch Bush, Pettersen, Rosenthal, Ryden, Singer, Williams, Hullinghorst.

CONCERNING THE PROVISION OF STATE FUNDING FOR NATURAL HAZARD MAPPING.

Be it enacted by the General Assembly of the State of Colorado:

SECTION 1. In Colorado Revised Statutes, add 37-60-131 as follows:

(1)(a) There is hereby created in the State Treasury the Natural Hazard Mapping Fund, referred to in this section as the "Mapping Fund", which consists of the following revenues:

(I) Gifts, grants, and donations from private or public sources for the purposes of this section; except that the board shall not accept a gift, grant, or donation that is subject to a
Objectives

- reduce property loss and damage
- promote river planning and management on a watershed scale
- increase channel stability by improving floodplain connection and sediment transport
- reduce public expenditures for disaster response and recovery (avoidance is cost-effective in the long run)
- protect riparian habitat and ecological services of a connected floodplain
Technical Standards—Goals and Objectives

- Scientifically supported and reviewed
- Ability to scale in size, implement cost-effectively on a large scale
- Applicable to any stream, perennial or ephemeral, in the state of Colorado
- Ability to refine in detailed study based on presence of debris flow potential, burn scars, hazardous/critical infrastructure, and/or delineation disputes.
Four primary types of fluvial processes:
1) Lateral Migration
2) Downstream Meander Migration
3) Avulsion (local, reach, and regional)
4) Slope failures due to toe erosion

Colorado standard built on identifying the locations where each can occur; the combination of the areas defines the *fluvial hazard zone*.

Broadly defined, the Fluvial Hazard Zone (FHZ) is the area a stream has occupied in recent history, could occupy, or could physically influence as it stores and transports sediment and debris during flood events.”
Determining a “Best Fit” Method for Colorado

Diverse topography, geology, and hydrology
Desire to provide a method that is both cost and time efficient while not being too coarse in the delineation
Acknowledge opportunity for further refinement of the maps based on further detailed studies, observations, and local knowledge.
FHZ Delineation Decision Tree
1) The **active river valley**, where the river has occupied in the past and is likely to occupy again in the future.

2) The **erosion hazard buffer** that generalizes the slope areas prone to erosion as a result of river lateral migration or toe erosion.

3) **Channel avulsion zones** are those where the channel can dramatically change its position on the valley floor.

4) **Alluvial fans** are depositional features that generally form at the transition from confined to unconfined reaches. An alluvial fan is highly susceptible to avulsion and bank erosion during all peak flow events.
Level 1 FHZ—most alluvial rivers
FHZ Delineation Decision Tree
Level 1
Meander Beltwidth
Key Factors in our decision making process

Level 1 for planning and if necessary Level 2 for refined analysis

Adopt highly revised version of all three types of methods used in the United States ➔ could be considered a new method

No relative (or absolute) probabilities of hazard
Key Factors in our decision making process—HUMAN INFLUENCE

- Undersized Bridges and Culverts
- Fire-affected watersheds
- Road Infrastructure
- Diversion Infrastructure and Off-Channel Storage Facilities
- Fill and Development
- Altered Hydrologic Regime
- Climate Change
- Channelization, Armoring, and Floodplain Disconnections
Protection of a river corridor for *wetlands*, open space, habitat, flood control, water quality, and recreation.
Multiple Channels, Channel Movement and the Single Thread
Channel Evolution Model (CEM)

Schumm and Parker 1973
Post Flood Recovery
Stream Evolution Model (SEM)

Cluer and Thorne 2013
Post Flood
Restoration
CPW Fish Survey Data
The Pitch:

Recharge
Disturbance
Creation
Thank You!

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