



Department of  
**Environment &  
Conservation**

# Tennessee Stream Mitigation Guidelines

Mitigation Outreach Event  
June 1, 2016

Division of Water Resources

Vena Jones– Natural Resources Section

# Mitigation -In the Beginning...

- Early TN mitigation history
  - Permittee responsible mitigation
  - Poorly tracked
  - Compliance challenges
  - Varying degrees of success
- Development of Guidelines
  - Early 2000's
  - Contribution from agencies and stakeholders
  - Aimed at improving the replacement of lost resource value



# 2004 TN Stream Mitigation Guidelines

- Regulatory Tool
  - Focuses on projects that re-establish maximum **biological, chemical, and physical** integrity to resource
  - Greater ecological benefits receive greater mitigation credit
- Informs TDEC and USACE
  - mitigation credits
  - Ratio based
  - Narrative criteria
  - TDEC uses to also inform on ratios for debits



# Framework

- Establishes regulatory authority
- **Classifies alterations that require mitigation based on impact type**
- Establishes mitigation site baseline requirements
- Classifies stream mitigation projects and associated ratios
- Monitoring requirements
  - Permittee responsible

## STREAM MITIGATION GUIDELINES FOR THE STATE OF TENNESSEE



TENNESSEE DEPARTMENT OF ENVIRONMENT AND CONSERVATION  
DIVISION OF WATER POLLUTION CONTROL  
NATURAL RESOURCES SECTION

July 1, 2004

# Stream Alterations Requiring Mitigation: Assessing Debits

- loss of stream length or wetland area
- loss of in-stream or wetlands habitat
- impairment of stream channel stability
- diminishment in species composition in any stream, wetland, or state waters
- loss of stream canopy
- activity is reasonably likely to have cumulative or secondary impacts to the water resource

# Classification of Stream Alterations: Determining Debits

- **Alteration III**
  - Elimination/Encapsulation
  - Impact Ratio is 1:1
  - Activities that result in complete or near-complete loss of stream functions
    - Culverts
    - Loss of stream length from relocations and fillings
    - Concrete lined channels
  - Lengths that trigger mitigation are dependent on impacts



# Determining Debits

- **Alteration II**
  - Impact ratio 0.75:1
  - Activities that result in a moderate loss of stream function
    - Riprap lined channels
    - Impoundments
    - Channel modifications that increase the existing cross section to convey flood flows
  - Lengths that trigger mitigation are dependent on impacts



# Determining Debits

- **Alteration I**
  - Impact ratio 0.5:1
  - Activities that result in lesser impacts to stream function
    - Removal of tree canopy
    - Synthetic channel liners
    - Modifications that deviate from or degrade the proper pattern, profile, dimension
    - Degrade in-stream habitat
      - Riffles, pools, etc...
  - Lengths that trigger mitigation are dependent on impacts



# Framework

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# Stream Mitigation - Generating Credits

- **Site Selection**

- Foundation for quality mitigation
- Focuses on significantly degraded streams near impact site
- Stream segments must be impaired – habitat focus
- Priority given to streams on 303(d) list
- Impaired but not listed
  - Document/demonstrate impairment



# Stream Mitigation - Generating Credits

- **Other Relevant Factors**
  - Perpetual protection
    - All stream mitigation projects shall be protected in perpetuity
    - Mitigation credit will only be given to projects that are protected in perpetuity
  - Level III ecoregion or HUC 8
  - w/in one Strahler stream order
  - Watershed consistency
    - Urban vs rural



# Framework

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# Classification of Stream Mitigation

- **Replacement**
  - Credit Ratio 1:1
  - Daylighting streams or removing concrete lined channels
  - Based on reference conditions
  - Typically includes rebuilding pattern, profile, dimension
  - Riparian zone



# Classification of Stream Mitigation

- **Restoration**
  - Credit Ratio 1.5:1
  - Returns a significantly degraded stream, including riparian zone and flood prone area to a natural stable condition
  - Based on reference conditions
  - Typically includes rebuilding pattern, profile, dimension
  - If project increases the channel length then 1:1 credit ratio will be given for additional linear feet



# Classification of Stream Mitigation

- **Enhancement II**
  - Credit Ratio 3:1
  - Significant bank stabilization
  - Introduction of in-stream habitat
  - Re-establishment of native vegetation
  - Along both banks of the stream channel



# Classification of Stream Mitigation

- **Enhancement I**
  - Credit Ratio 4-6:1
  - Involves any partial combination
    - Bank stabilization
    - Livestock exclusion
    - Intro of in-stream habitat
- **Preservation**
  - Credit Ratio 10-60:1
  - A component of a restoration project
  - Threatened, unique, or ecologically significant resources



# 2012 Draft Stream Mitigation Guidelines?

Realized deficiencies in the 2004 mitigation guidelines;  
qualitative/subjective

- Wanted to be consistent with USACE requirements
- Wanted to align state guidelines with the 2008 Final Rule to the extent practical for TN
- Wanted to establish **functional lift**
- Move away from linear footage/ratio based system

## Shortcomings

- Received significant comment on efficacy of functional assessment parameters and methods
- Division lacked capacity to create a robust functional assessment

# The Future of TN Mitigation Guidelines

- 2013 EPA Wetland Program Development Grant
- Establish ecoregion based reference sites
- Regional curves
- Ecological success criteria
- Development of Functional Assessment Tool



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## 8 Level III Ecoregions in Tennessee (East to West):

66: Blue Ridge

**67: Ridge and Valley**

**69: Central Appalachians**

**68: Southwestern Appalachians**

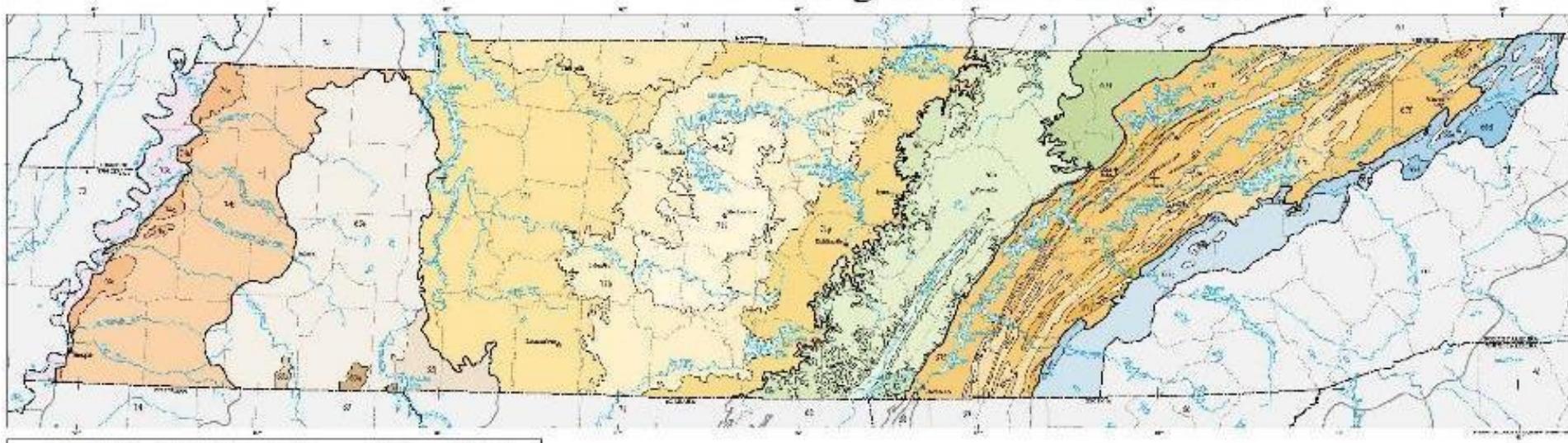
**71: Interior Plateau**

65: Southeastern Plains

74: Mississippi Valley Loess Plains

73: Mississippi Alluvial Plain

Ecoregions of Tennessee



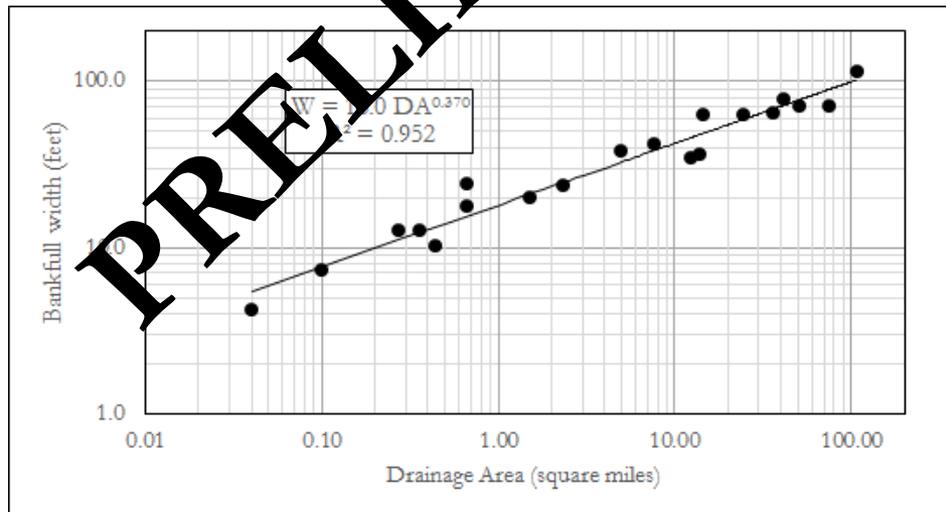
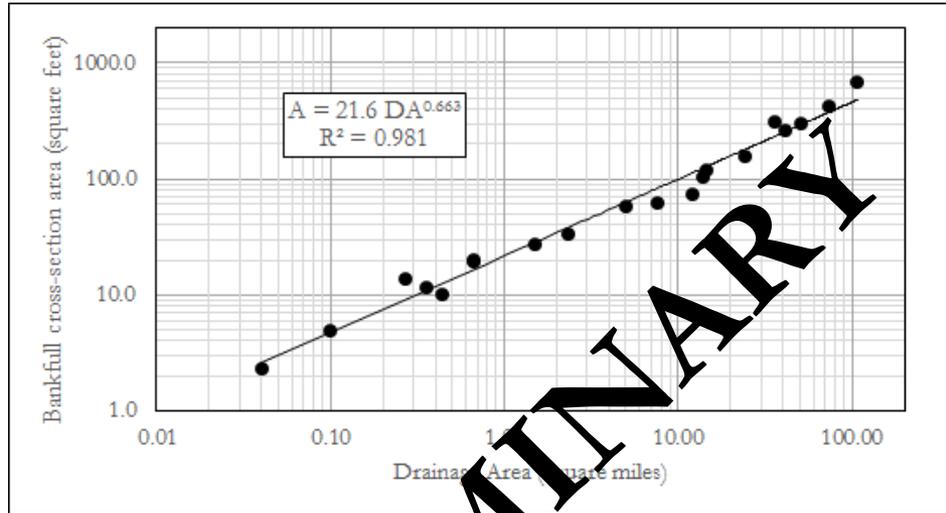
High-quality  
“reference”  
streams serve as  
design templates



## Morphology Summary for Completed Streams in Ecoregion 71

Temp. ID	Drainage area (sq miles)	Channel slope (ft/ft)	Cross-section area (sq feet)	Width (feet)	Mean depth (feet)	Width/depth ratio	Entrenchment ratio	Stream classification
71-MB3	0.04	0.0108	2.3	4.2	0.5	7.8	13.1	E4
71-MB2	0.10	0.0310	4.9	7.3	0.7	11.3	4.2	E4b
71-MB1	0.27	0.0117	13.9	12.8	1.1	11.8	2.6	E4
71-12	0.36	0.0147	11.6	12.7	0.9	13.8	3.5	C4
71-MB4	0.44	0.0070	10.0	10.3	1.0	10.7	3.1	E4
71-11	0.66	0.0084	19.6	24.5	0.8	30.7	1.5	B4c
71-MB6	0.66	0.0086	20.3	17.7	1.1	15.9	5.0	C4
71-23	1.51	0.0177	27.2	20.0	1.4	14.8	1.7	B3c
71-MB5	2.34	0.0079	33.2	23.8	1.4	17.0	4.0	C4
71-28	4.97	0.0056	58.9	38.0	1.5	24.6	1.2	F1
71-29	7.64	0.0073	63.0	41.7	1.5	27.6	1.6	B1c
71-33	12.2	0.0039	72.9	34.7	2.1	16.5	2.9	C1
71-34	13.8	0.0031	102.4	36.9	2.8	12.6	1.2	F1
71-35	14.5	0.0024	118.7	62.3	1.9	32.7	2.4	C1
71-36	24.3	0.0074	153.9	62.9	2.4	25.7	2.5	C4
71-37	35.7	0.0030	111.4	65.0	4.8	13.6	3.7	C1
71-39	41.3	0.0017	260.0	78.6	3.3	23.8	2.4	C4
71-40	51.3	0.0021	305.1	70.4	4.3	16.3	1.5	B1c
71-43	74.0	0.0022	424.7	70.7	6.0	11.8	1.6	B3c
71-46	101.0	0.0014	675.1	114.2	5.9	19.3	5.6	C3

PRELIMINARY Regional Curves  
Ecoregion 71, Tennessee  
December 2015



# TN Mitigation Guidelines in Transition

- Partner with USACE and IRT to adopt functional assessment guidance tools
- Parameters are measurable
- Based on known stream functions
- Inherent stream metric relationships
- Incorporate TDEC biological and water quality data
- Regionalize as information as it becomes available



# Guidelines In Transition: Cross-Walking

Mitigation Potential	Stream Functional Group	Assessment Parameter	Current Stream State* (Measured)	Proposed Stream State (At a minimum)
<b>Restoration</b> 1.5:1	Hydrology	Runoff		
	Hydraulics	Floodplain	NF-FAR	F
	Geomorphology	Riparian	NF-FAR	F
		Bedform Diversity	NF-FAR	F
		Lateral Stability	NF-FAR	F
		Biology	Biology	NF-FAR
	Physiochemical	Water Quality	FAR-F	optional
		Watershed Assessment	Fair-Good	not affected
Channel Evolution Model		NF, or justify trend to NF	F	
* Provide evidence of trend to NF for any parameter that is measured as FAR				
<b>Rehabilitation/Enhancement</b> 3:1	Hydrology	Runoff		
	Hydraulics	Floodplain*	NF-FAR	FAR-F
	Geomorphology	Riparian*	NF-FAR	F
		Bedform Diversity*	NF-FAR	FAR-F
		Lateral Stability*	NF	F
		Biology	Biology	NF-FAR
	Physiochemical	Water Quality	FAR-F	optional
		Watershed Assessment	Fair-Good	not affected
Channel Evolution Model		NF-FAR	F	
*All of these assessment parameters must be lifted at least one functional category				
<b>Enhancement I</b> 4:1-6:1	Hydrology	Runoff		
	Hydraulics	Floodplain	FAR-F	
	Geomorphology	Riparian*	NF-FAR	FAR-F
		Bedform Diversity*	NF-FAR	FAR-F
		Lateral Stability*	NF-FAR	FAR-F
		Biology	Biology	FAR-F
	Physiochemical	Water Quality	Any	
		Watershed Assessment	Any	not affected
Channel Evolution Model		Any	Any	
*If any of these parameters are NF in current state, proposed mitigation must address that parameter				
*At least one of these assessment parameters must be lifted one functional category. Multiple parameter lift may increase credit ratio.				

# The Future of TN Mitigation Guidelines

- EPA Wetland Program Development Grant
- **TDEC Goals**
- Finalize regional curves 2016-2017
- Gather LWD data 2016-2017
- Gather ecological success criteria 2017
- Build regionalized quantification tool 2017-2018
- Updated Stream Mitigation Guidelines 2018
- Until then....We utilize the tools we have to make the best regulator decisions we can with the information given.

# Questions ?



**Vena Jones**  
**DWR-Natural Resources Unit**  
**[Vena.L.Jones@tn.gov](mailto:Vena.L.Jones@tn.gov)**  
**615-253-5320**

**TN**

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