



Department of
**Environment &
Conservation**

It's About Dam Removal Time Potential for mitigation credit

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Dam Removal

What do you mean by “dam”

Removal in review

What should we do in the future

- baseline data and performance standards

Compensatory Mitigation and Dam Removal

- Using established TDEC guidance

Regulated vs Non-regulated Dams

“Dam” means any artificial barrier, together with appurtenant works, which does or may impound or divert water, and which either (1) is or will be **twenty (20)** feet or more in height from the natural bed of the stream or watercourse at the downstream toe of the barrier, as determined by the Commissioner, or (2) has or will have an impounding capacity at maximum water storage elevation of **thirty (30) acre-feet** or more. Provided, however, that any such barrier which is or will be less than six (6) feet in height, regardless of storage capacity, or which has or will have a maximum storage capacity not in excess of fifteen (15) acre-feet, regardless of height, shall not be considered a dam, nor shall any barrier, regardless of size, be considered a dam, if, in the judgment of the Commissioner, such barrier creates an impoundment used only as a farm pond. Diversion weirs, roadbeds, water tanks, and wastewater impoundment barriers as defined in this section are not dams.

“Diversion Weir” means a structure substantially within the bed of a stream, designed to impound water only during low flow conditions, that would not cause substantial overflow of water onto the downstream floodplain in the event of failure, and meets the definition of a Category 3 dam in part (2)(b)3 of Rule 0400-45-07-.05.

Regulated Dams

- In the past 10 years there have been 2 regulated dam breaches
- Kirby Smith dam
 - 29 feet high
 - Upstream of larger lake
 - No permit & No credits
- Green Valley Farm Dam
 - 15-17 feet high
 - >30 acre feet of storage
 - Permit required
 - Received credits

We'll focus on small structures

- Diversion Weir” means a structure substantially within the bed of a stream, designed to impound water only during low flow conditions, that would not cause substantial overflow of water onto the downstream floodplain in the event of failure.
- Run-of-the-river dams
- Farm ponds
- Headwater dams

Farm Ponds



Harpeth River Dam Removal





Richland Creek



Sevenmile



Citico Creek



Roaring River

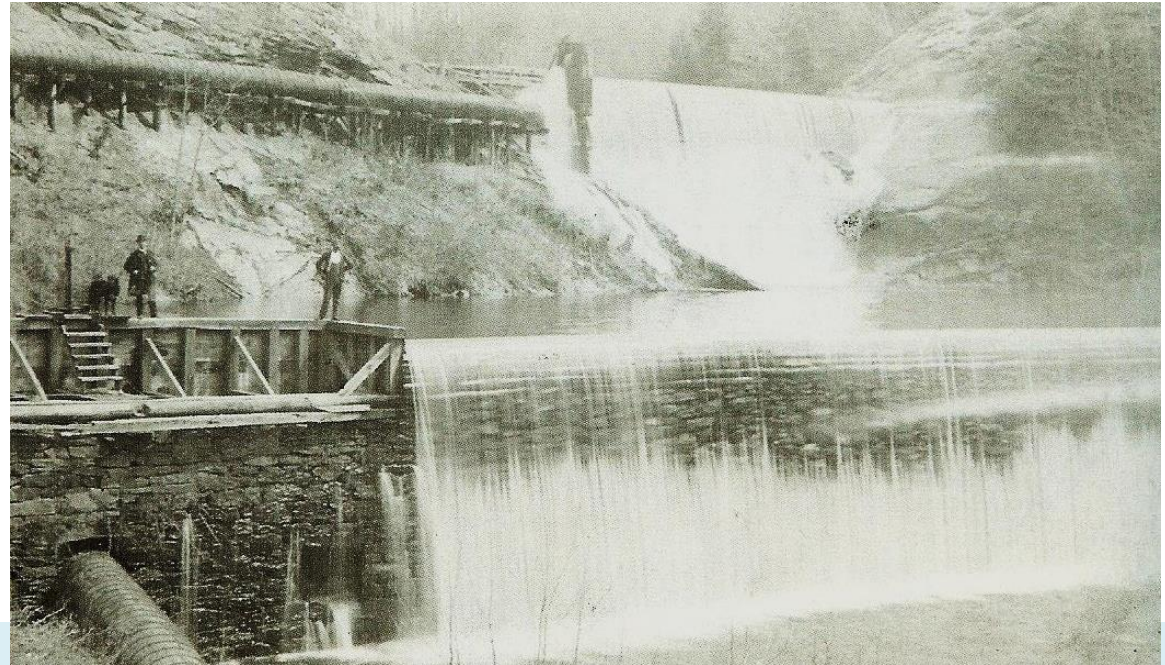


How much credit does it generate?



2004 Mitigation Guidelines

- **Impoundments**
 - **Alteration II**
 - Impact ratio 0.75:1
 - Credits for dam removal
 - 1.33:1



How much credit does it generate?

- Focus on
 - Benefits to the stream
 - Amount of functional uplift
 - Not type of mitigation activity
- Look closely at less intensive mitigation strategies than construction of a completely new channel, floodplain, and riparian zone.
- Develop monitoring methods that may give better insight into whether the mitigation activities conducted have actually improved stream function.

Analysis Needs

ANALYSES LEVEL

Big Dam - High Impact - High Controversy



Elwha, Glines Canyon and Snake River Dams

Big Analyses

Small Dam - High Impact - No Controversy



Cuddebackville Dam

Big Analyses

Big Dam - Low Impact - Some Controversy



Edwards Dam

Moderate Analyses

Small Dam - Low Impact - No Controversy



Small Analyses

Small Dam - No Impact - No Controversy



Minimal Analyses

Establishing baseline conditions

- Sediment
- Sediment
- Sediment
- Groundwater
- Typical channel morphology characteristics; what was lost & what can be gained?

Add some dam requirements

- Sediment analysis
 - Amount and distribution
 - Contaminated?
 - Potential for headcuts?
 - Sediment transport analysis
- Specific requirements for demolition, construction, EPSC plans

Sediment management

- Determine accumulation amount, characterization and potential for mobilization, management of during construction
 - Grab methods vs. methods to depth of refusal
 - Mechanical removal and disposal (what limits should be?)
 - In-stream management
 - Bank stabilization and grade control
 - **Natural redistribution of accumulated material**
 - Capping or in situ remediation of contaminated sediments
 - Not a preferred method

Additions

- Potential impacts to groundwater
 - Adverse impacts to domestic water wells within the vicinity of drawdown
 - Mortality of existing riparian vegetation from modified groundwater gradient
 - Impacts to existing fringe wetlands

Tributary impacts

- Evaluation of potential impacts to tributaries upstream and downstream
- Can we require monitoring and potential corrective action on a feature outside of the project boundaries?



How much credit does it generate?



| Dam Removal Compensatory Mitigation Potential | | | | | |
|---|-------------------------|-------------------------------------|----------------------|-----------------------|------|
| | Stream Functional Group | Assessment Parameter | Current Stream State | Proposed Stream State | |
| Dam Removal with a restored channel 1.1:1 | Hydrology | Flow Regime/Hydrologic Connectivity | NF-FAR | F | |
| | Hydraulics | Floodplain | NF-FAR | F | |
| | Geomorphology | Riparian | | NF-FAR | F |
| | | Bedform Diversity | | NF-FAR | F |
| | | Lateral Stability | | NF-FAR | F |
| | Biology | Biology | NF | Lift | |
| | Physiochemical | Water Quality | | NF-FAR | Lift |
| Watershed Assessment | | | F-G | | |
| Dam Removal with stream rehabilitation 1.33:1 | Hydrology | Flow Regime/Hydrologic Connectivity | NF-FAR | F | |
| | Hydraulics | Floodplain | NF-FAR | FAR-F | |
| | Geomorphology | Riparian | | NF-FAR | F |
| | | Bedform Diversity | | NF-FAR | F |
| | | Lateral Stability | | NF-FAR | F |
| | Biology | Biology | NF | Lift | |
| | Physiochemical | Water Quality | | NF-FAR | Lift |
| Watershed Assessment | | | F-G | | |
| Dam Removal with in-stream enhancement 1.5:1 Riparian vegetation already established | Hydrology | Flow Regime/Hydrologic Connectivity | NF-FAR | F | |
| | Hydraulics | Floodplain | NF-FAR | NF-F | |
| | Geomorphology | Riparian | | F | F |
| | | Bedform Diversity | | NF-FAR | F |
| | | Lateral Stability | | NF-FAR | F |
| | Biology | Biology | NF | Lift | |
| | Physiochemical | Water Quality | | NF-F | Lift |
| Watershed Assessment | | | F-G | | |

