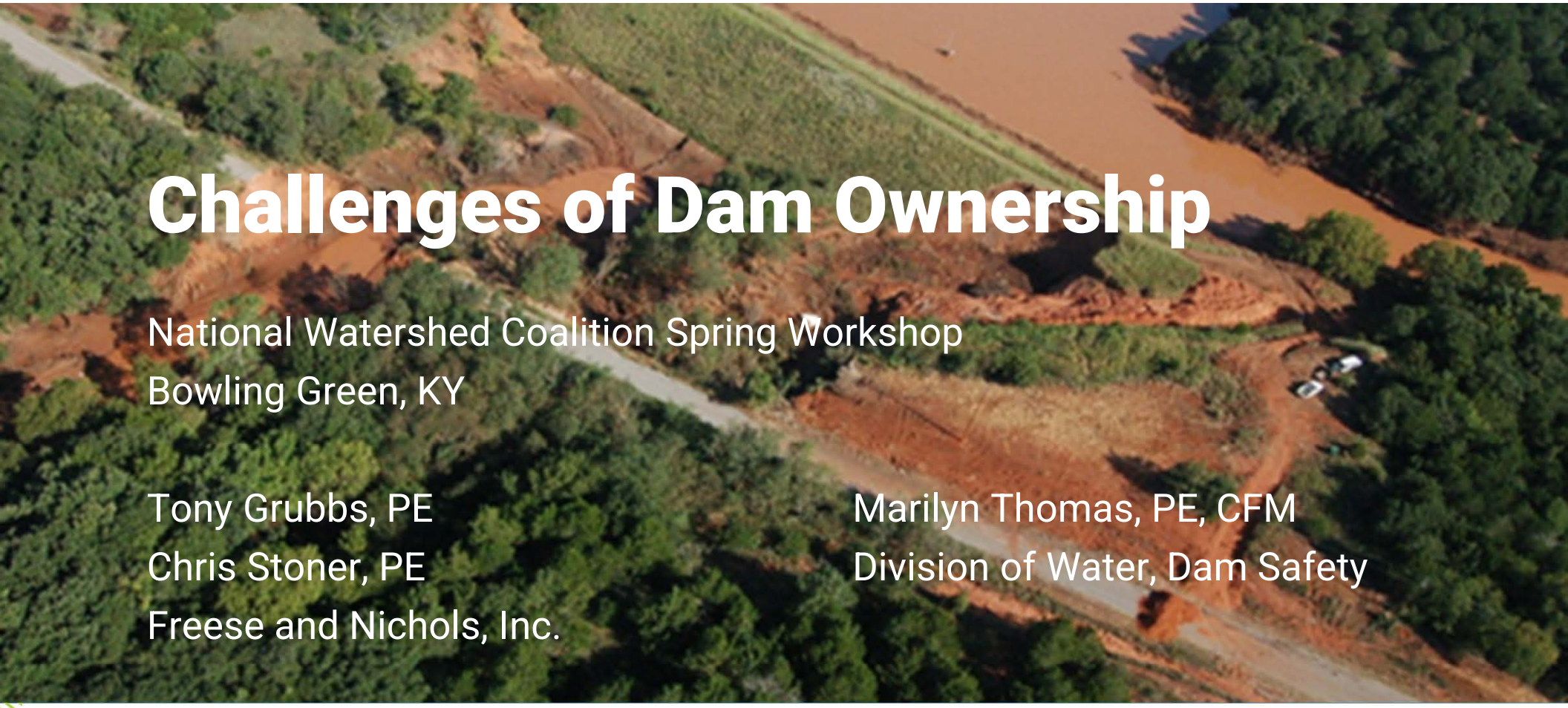


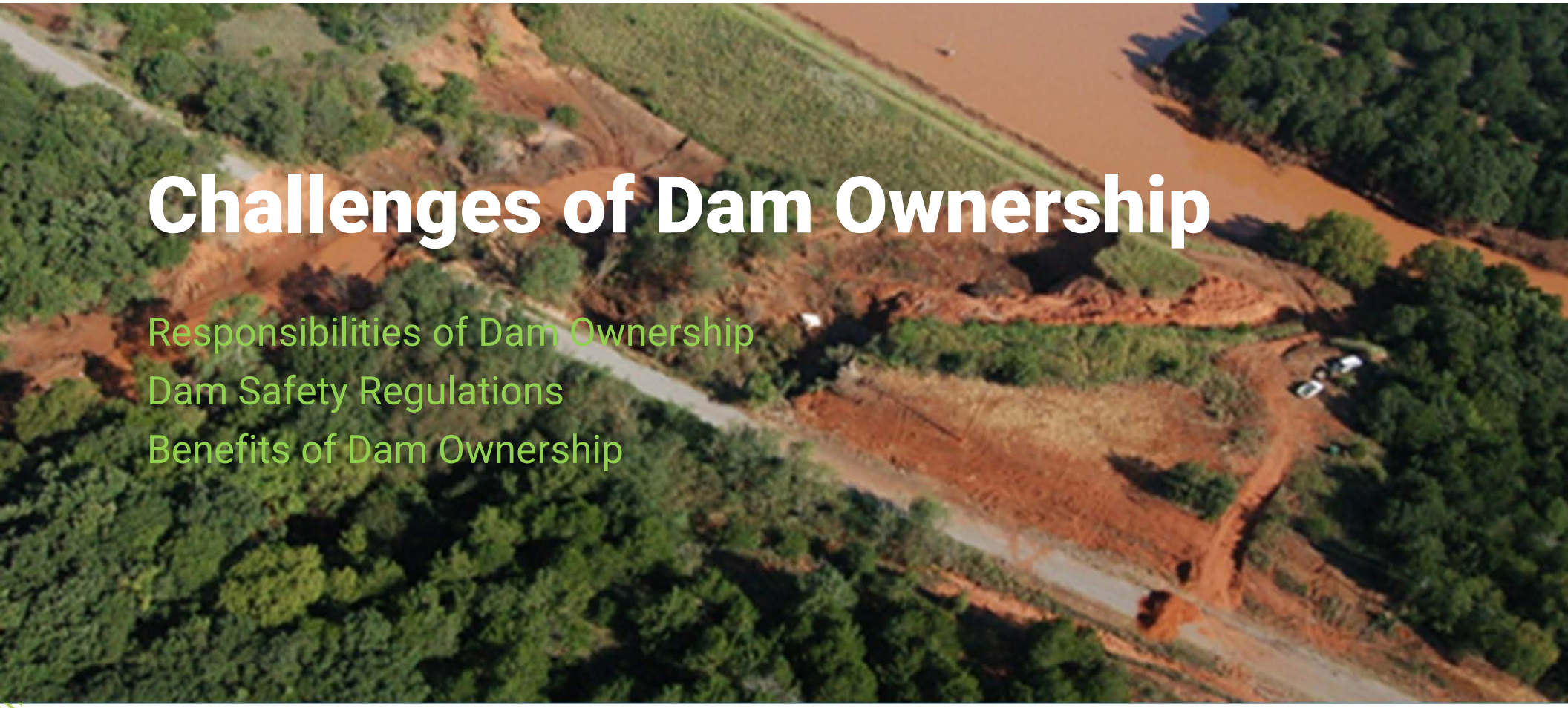
Challenges of Dam Ownership

National Watershed Coalition Spring Workshop
Bowling Green, KY

Tony Grubbs, PE
Chris Stoner, PE
Freese and Nichols, Inc.

Marilyn Thomas, PE, CFM
Division of Water, Dam Safety

www.watershed coalition.org



Challenges of Dam Ownership

Responsibilities of Dam Ownership
Dam Safety Regulations
Benefits of Dam Ownership

www.watershedcoalition.org

TEAM KENTUCKY
ENERGY AND ENVIRONMENT CABINET

FREESE AND NICHOLS

Risks Associated with Dams

Structural

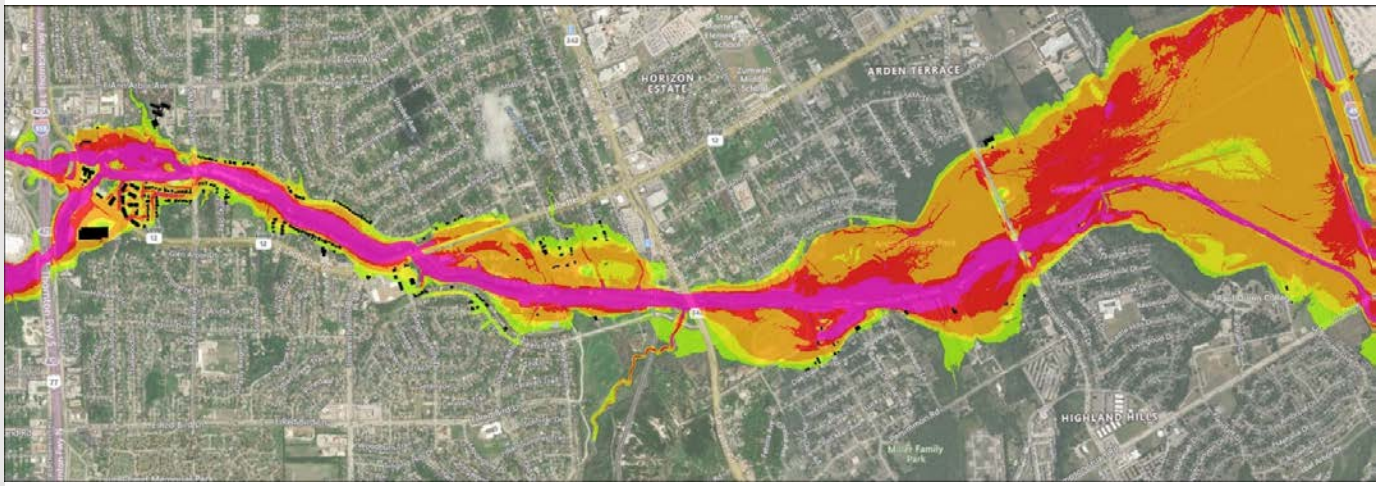
- Aging Infrastructure
- Poor Maintenance
- Design Flaws

Environmental

- Extreme Weather
  - Droughts
  - Hurricanes

Human

- Population Growth
- Sabotage



Example of dam breach inundation map

Challenges for Dam Safety

Downstream development below dams	Aging and deficient infrastructure
Lack of public awareness	Limited staff
Lack of funding	Heavily dependent on fluctuating federal funding

- ASCE Assessment (2011):
DOW has done well overseeing the state's dam safety and floodplain compliance programs given the current level of resources. Of the more than 1,000 dams in Kentucky that are inspected on a regular basis, none of them are currently declared unsafe. However, significant needs have been identified such as the need to hire personnel, train dam owners, and find additional sources of funding, and therefore a **D+ grade** has been given.

Downstream Development (Hazard Creep)

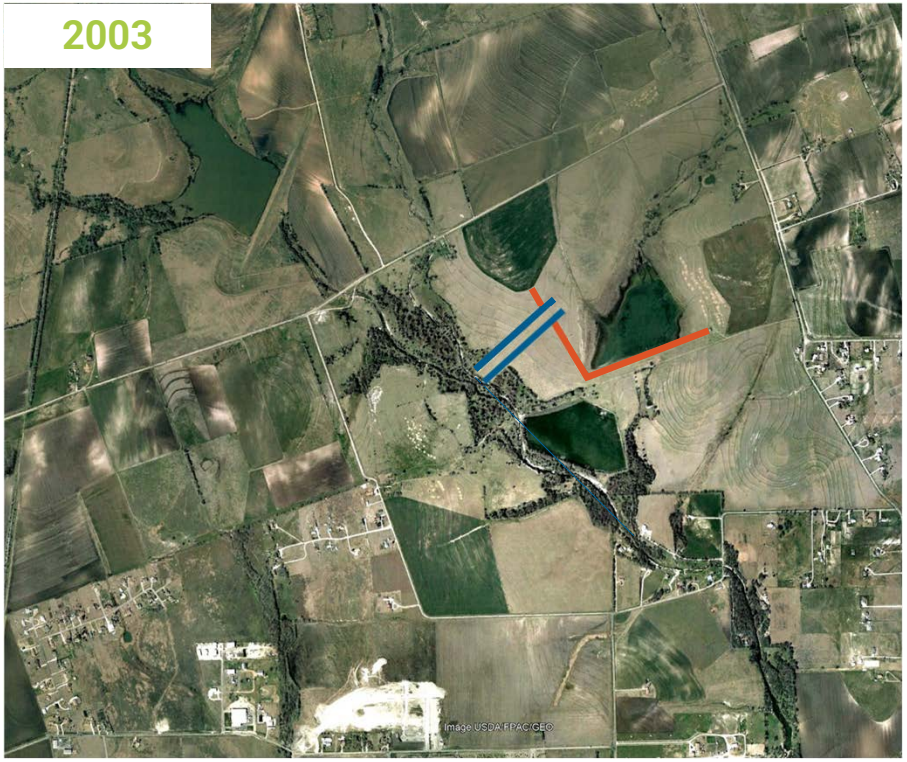
Downstream development can put people in harms way.

Hazard Creep

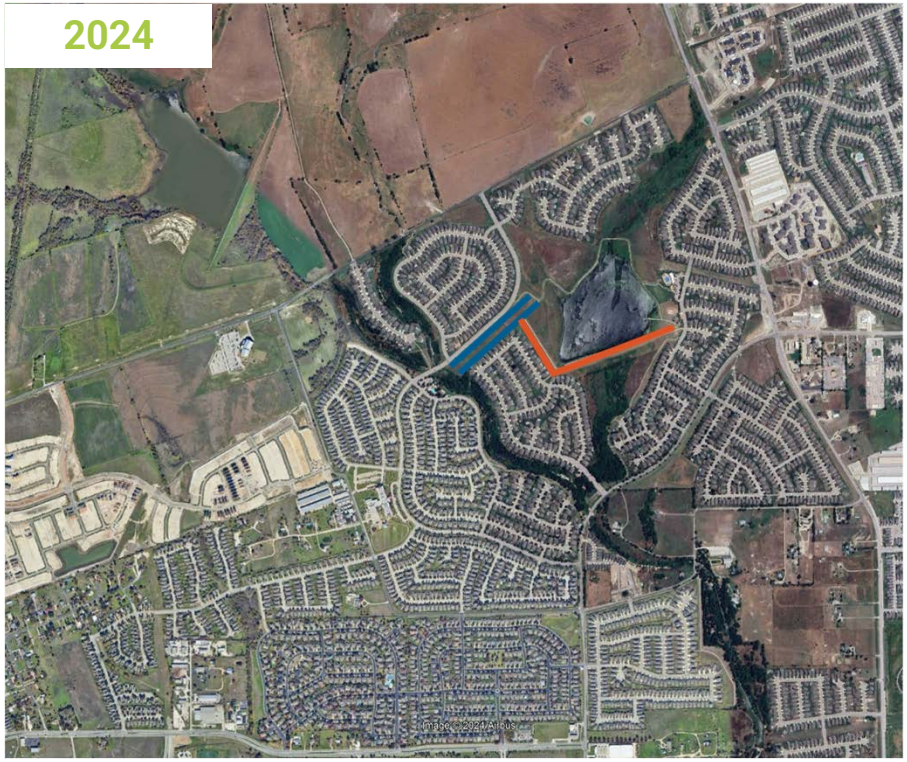
Hazard Creep

Williamson County, TX

2003



2024



Aging Dams

Sedimentation

Deterioration

Public Awareness

Science and Technology

Research & Development | Expertise | Partnerships | Work with S&T | News | About S&T

Science and Technology Directorate » News Room » Feature Article: Reducing Fatalities at Low-head Dams

Feature Article: Reducing Fatalities at Low-head Dams

Release Date: November 20, 2025

When the hydraulic jumps used to power dams become submerged, this can result in a reverse current, creating a life-threatening hazard. LHD continue to needlessly take lives, garnering the moniker "drowning machines," as victims are lured into seemingly calm waters above these dams. Unfortunately, more than 1,000 LHD-related deaths have been documented in the United States over the last several decades, a death toll nearly 14 times higher than that of dam failures over a longer time-period. Drowning fatalities have been documented at more than 400.

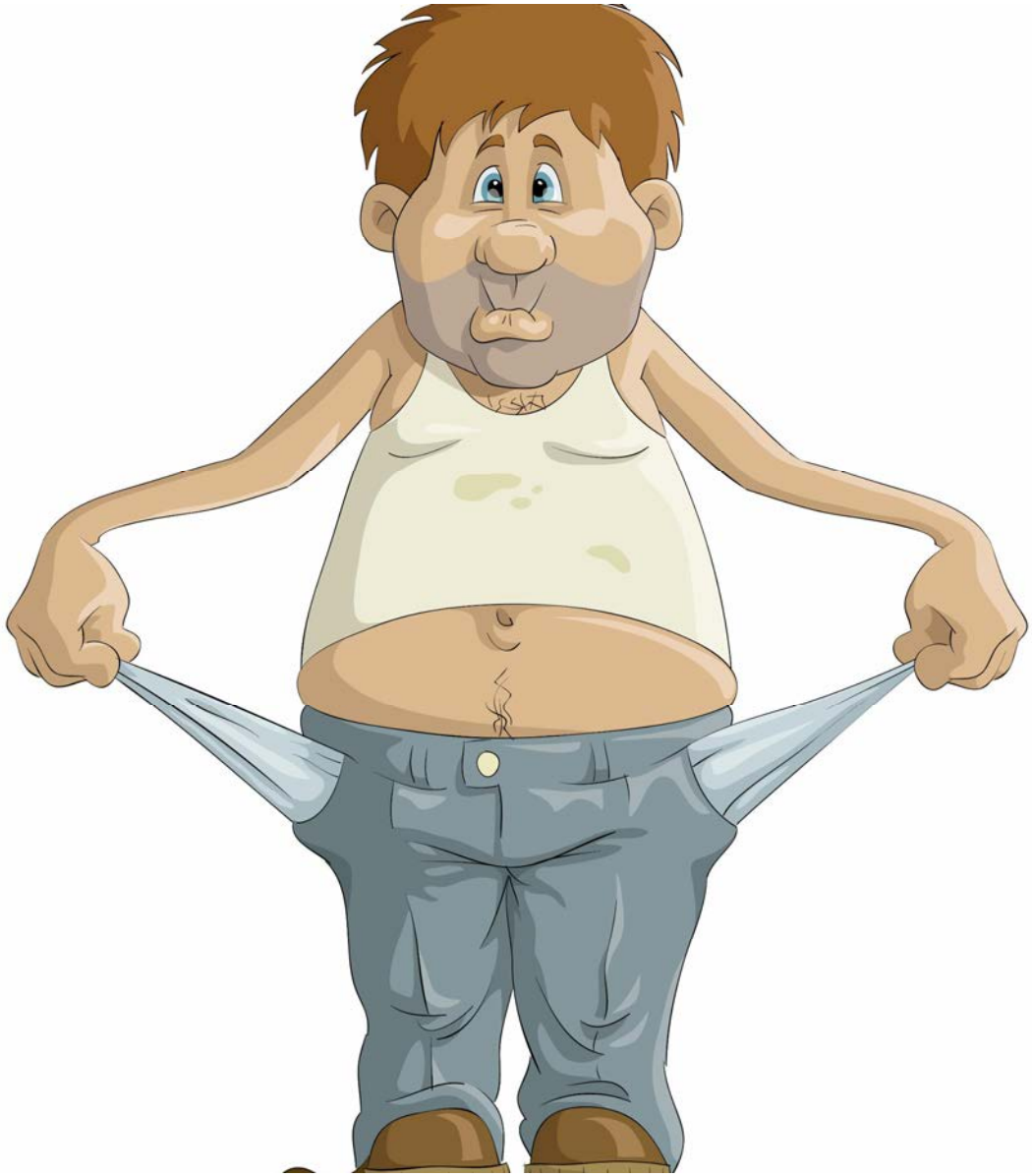
- No understanding of how dams work
- Recreational attraction
- Likely don't know they live downstream of a dam

Limited Resources

- Personnel
  - Number of staff
  - Experience
  - Training*
- Equipment and Supplies
  - Readily available
  - Breath of what may be needed

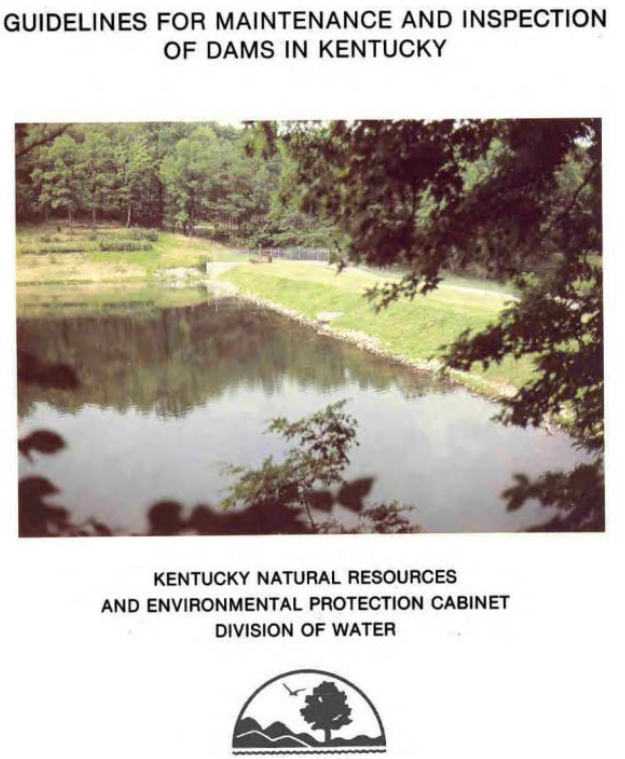
Funding

- Repair?
- Rehab?
- O&M?



Dam Owner Responsibilities

- O&M:
  - Operate and maintain the dam in a safe manner
  - Perform inspections (technical, maintenance, and after flood events)
  - Address maintenance and safety concerns at the dam in a timely manner
- Ensure that necessary modifications are approved by KDOW and completed in a timely manner
- EAP: Review (and update as needed) EAP annually.
  - Periodic Tabletop Exercises recommended



GUIDELINES FOR MAINTENANCE AND INSPECTION
OF DAMS IN KENTUCKY

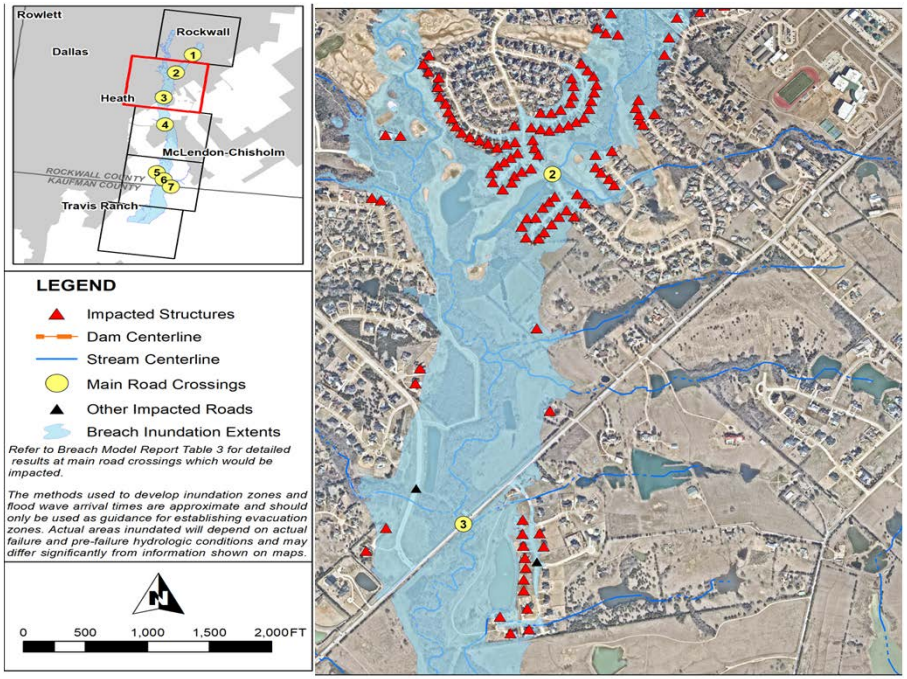
KENTUCKY NATURAL RESOURCES
AND ENVIRONMENTAL PROTECTION CABINET
DIVISION OF WATER

COMMONWEALTH OF KENTUCKY
ENERGY AND ENVIRONMENT CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
DIVISION OF WATER

APPLICATION FOR PERMIT TO CONSTRUCT ACROSS OR ALONG A STREAM
AND / OR WATER QUALITY CERTIFICATION

Chapter 151 of the Kentucky Revised Statutes requires approval from the Division of Water prior to any construction or other activity in or along a stream that could in any way obstruct flood flows or adversely impact water quality. *If the project involves work in a stream, such as bank stabilization, dredging or relocation, a 401 Water Quality Certification (WQC) from the Division of Water will be required.* This completed form will be forwarded to the Water Quality Branch for WQC processing. The project may not start until all necessary approvals are received from the KDOW. For questions concerning the WQC process, contact the WQC section at 502/564-3410.

Emergency Action Plans



Dam Failures Do Occur!

Impacts can be devastating to people, the local economy and the environment.

Decommissioning

- Removal
- Sediment Control
- Stream Restoration

- $$$$$$$$

Kentucky Dam Safety Program

- Marilyn Thomas, P.E.
- Kentucky Division of Water

NWC Spring Workshop

2026

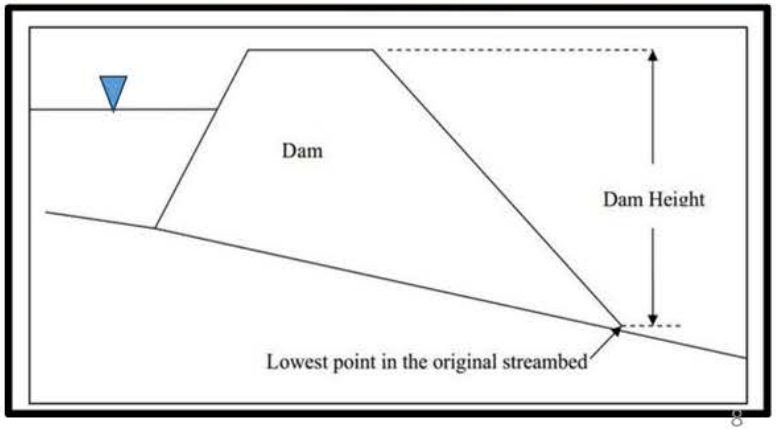
TEAM KENTUCKY

ENERGY AND ENVIRONMENT CABINET

What is a Dam?

KRS 151.100 - Dam Defined:

- *Any artificial barrier that can impound or divert water*
- 25 feet or more in height -OR-
- Impounds 50-acre feet or more



TEAM KENTUCKY
ENERGY AND ENVIRONMENT CABINET

Program Authority & Regulatory Requirements

Regulating Dams:

KRS 151.250: **Permits** (proposed Construction or Modification)

401 KAR 4:030: **Design Requirements** (Engineering Memo No. 5)

Hazard Classification (High, Significant, Low)

KRS 151.310: **No fill in the reservoir;** water impounded by the dam

KRS 151.295: **Dam Safety Inspection Program**

KRS 151.293: **Issue Inspections Reports with Conditions**

Floodplain Management Permit - 401 KAR 4:060

401 Water Quality Certification– KRS 224.16-050

TEAM KENTUCKY ENERGY AND ENVIRONMENT CABINET

Hazard Classification – Hazard Creep

Hazard Class Upgrades:

- Require services of a Professional Engineer
- Require increase the hydraulic capacity (11.2”/6-hour to 28.5’/6-hour)
- Compliance with embankment stability (geotechnical analysis)
- Very Costly - often multi-million-dollar projects

Hazard Classification – Hazard Creep

Hazard Class Upgrades:

- Require services of a Professional Engineer
- Require increase the hydraulic capacity (11.2”/6-hour to 28.5’/6-hour)
- Compliance with embankment stability (geotechnical analysis)
- Very Costly - often multi-million-dollar projects

Hazard Classification – Hazard Creep

Hazard Class can change as the result downstream impact changes (**hazard creep**)

2004: Significant Hazard

2016: High Hazard

Kentucky Dam Safety Program
Dams, Levees and Dikes
What's the Difference

Marilyn Thomas, P. E.
Kentucky Division of Water

Dams, Levees and Dikes What's the Difference

- Dam-A structure constructed perpendicular to, or across, a river or stream to retain water, creating a reservoir. Unlike levees and dikes, dams have water on both sides (high water on one side, lower on the other). Dams as defined by KRS 151.100 are regulated by Kentucky Dam Safety.

- Levee- Primarily an earthen embankment (sometimes a floodwall) constructed along the banks of a river or stream to contain flow within the channel, preventing it from flooding low-lying areas. They are typically dry unless the river is experiencing high water or flooding. There are 35 levee systems in Kentucky. Levees aren't regulated by Dam Safety but are required to obtain a construction permit from Floodplain Management before construction. (KRS 151.250)

Dams, Levees and Dikes What's the Difference

- Dike-Usually refers to a barrier intended to prevent the sea or a large lake from flooding adjacent land, often used to reclaim land. Similar to levees, they run parallel to the water and have water on only one side.

Benefits of Dam Ownership

FREESE AND NICHOLS

Benefits Associated with Dams & Lakes

Dam functionality

- Flood Attenuation
- Sediment Capture
- Water Supply
- Hydroelectric Generation

Recreation

- Open space
- Benefit is related to seeing or using the open space
- Increased opportunity for wildlife habitat

Economic Impact

- Increase property value
- Increase tax revenue
- Physical health benefits

Watershed Projects Benefit Kentucky Communities

Watershed projects provide over $15 million in benefits each year:

- Flood control
- Water Supply
- Erosion Control
- Recreation
- Wetland Restoration
- Wildlife Habitat

April 1-7, 2025
$8.3 Million

Benefits Associated with Dams & Lakes

- Greenspace
- Habitat Creation
- Sediment Storage
- Tax Value Creation
- Water Supply - Irrigation
- Groundwater Recharge
- Lake Recreation
- Flood Risk Reduction
- Water Quality
- Trail System

Immeasurable

Peace & Serenity

Our Lady of Grace Retreat Center
Stillwater, Oklahoma

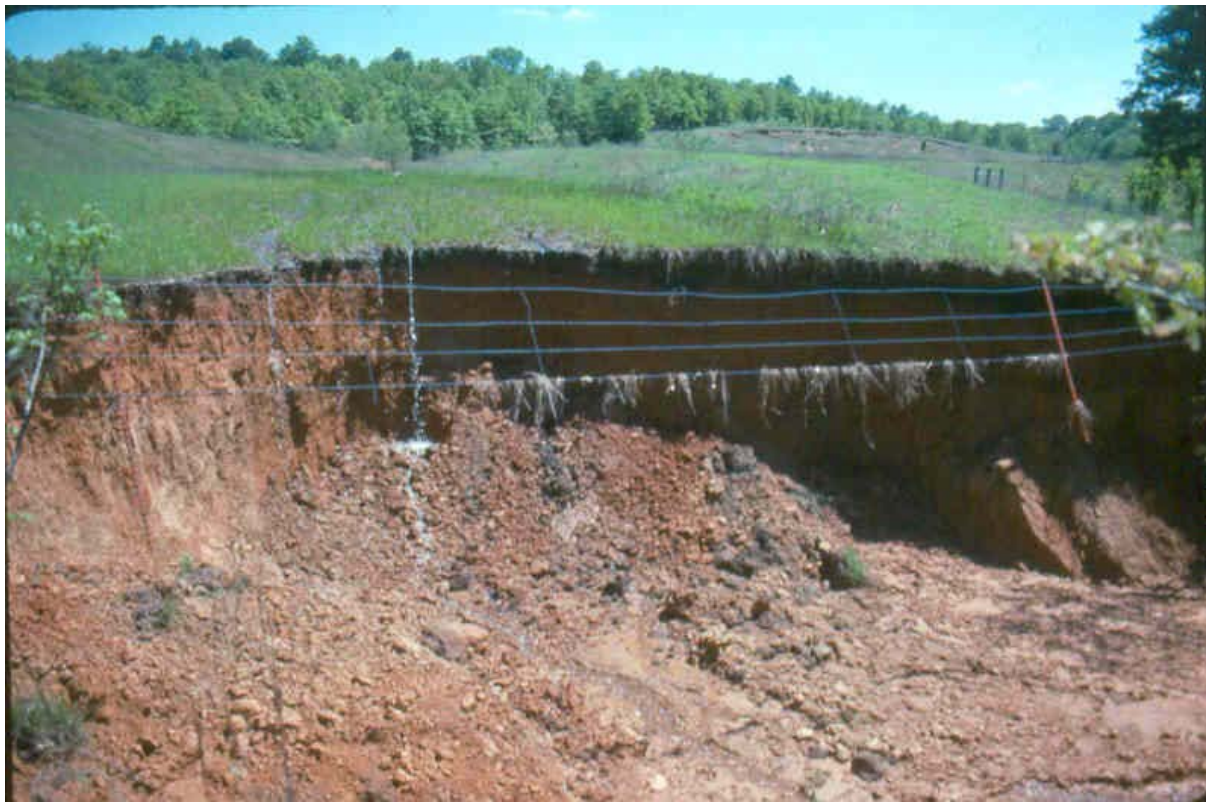
Stillwater Creek Site 54
Floodwater Retarding Structure

Immeasurable

People are drawn to water.

Negatives of development.
Positives as well.

FREESE AND NICHOLS



Be diligent.

If you see something, say something.

Ask for Help

Talking Points

1. Communicate and educate.
2. Is your community benefiting from a dam or dams?
3. Is your community benefiting from dams owned by other entities?
4. Talk about the “lake”, not just the “dam”.
5. Be creative in identifying and valuing dam and lake benefits.
6. When talking to stakeholders, discuss benefits and not only risks.
7. Understanding a value is critical to justifying O&M investment.
8. Low hazard dams provide value too and deserve investment.
9. Share lessons learned and best practices with industry.
10. Continue the conversation and raise awareness.

Other Benefits

Working with a great community of experts and professionals.

Engineering Firms

Private Sponsors

Your Dam is a Valuable Asset!
Let’s keep them safe!

Thank You!

Any Questions?

Tony.Grubbs@freese.com

Chris.Stoner@freese.com

FREESE AND NICHOLS