*The Beaver Institute and MHOA Present:*

# Better Beaver Management Builds Climate Resilience

*Michael Callahan, President*

Beaver INSTITUTE™

# My Beaver Background

**1986 – Certified Physician Assistant**

**1996 – Question 1 Referendum**

**1998 - Pioneer Valley Wetland Volunteers**

**2000 – Started Beaver Solutions LLC**

**2001 - New BOH Beaver Permits**

**2017 - The Beaver Institute, Inc.**
**a 501(c)3 nonprofit**

Beaver INSTITUTE™

# Preview

- Beaver Basics
- How Beavers Build Climate Resilience
- Beaver Problems and Solutions
- Permits
- Q & A

Beaver INSTITUTE™

# Beaver Basics

Beaver INSTITUTE™

# Beaver Basics

- *Castor Canadensis*
- North America's Largest Rodent
- Adults weigh 40 to 60+ lbs.
- Aquatic mammal

Beaver INSTITUTE™

# Many Aquatic Adaptations

Fur
Lips
Eyes
Feet
Tail
Ears
Nose
Heart

# Beaver Biology

- Vegetarian diet. (No fish!)
- Self-sharpening teeth

Beaver INSTITUTE™

# Beaver Basics

- Mate for life
- Only one breeding pair
- 1 to 6 kits per year

Beaver INSTITUTE™

# Beaver Basics

- 2 yr. olds move out to find a mate
- Territorial
- No hibernation

Beaver INSTITUTE™

# Why Do Beavers Dam?

To create ponds for:

- Protection from predators
- Flood trees
- Store winter food cache

Beaver INSTITUTE™

# Beaver Dams

## Create Valuable Wetlands

Beaver INSTITUTE™

# Wetlands Clean Water
## (*The Earth's Kidneys*)

- Decrease Nitrogen and Phosphorus
- Trap heavy metals
- Reduce runoff pesticides, pollutants
- Deposit suspended solids

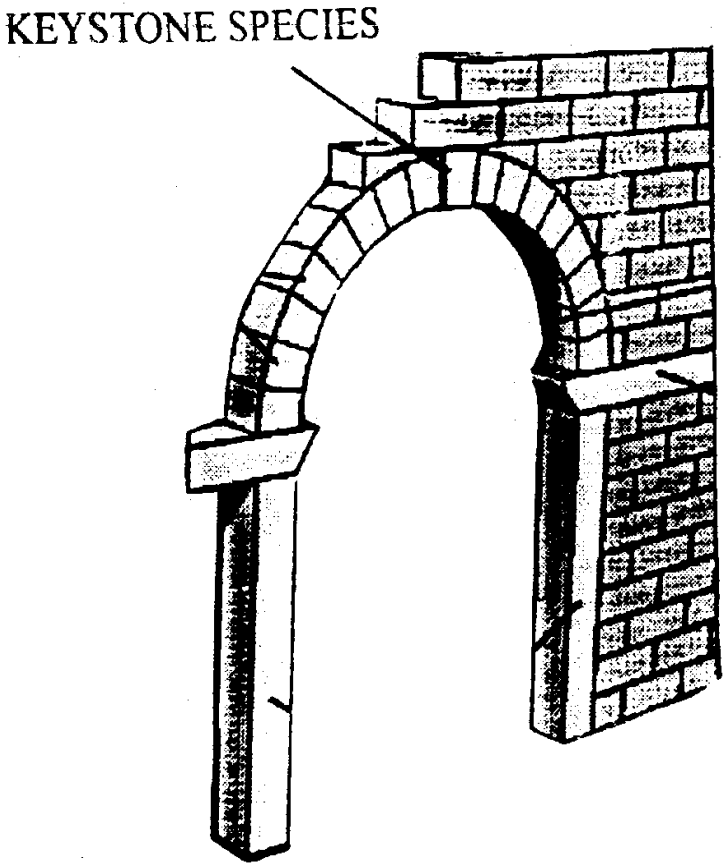
Beaver INSTITUTE™

# More Beaver Pond Benefits

- Recharge aquifers
- Maintain water table
- Less stream erosion
- Restore eroded streams
- Endangered species / Biodiversity

Beaver INSTITUTE™

# Beaver = Keystone Species




## Biodiversity: A Major Dam Benefit

Beaver INSTITUTE™

# Beaver Wetlands

## Biodiversity equal to:
## Coral Reefs and Rain Forests!

*Source: U. S. EPA*

*https://www.epa.gov/wetlands/why-are-wetlands-important*

Beaver INSTITUTE™

# Climate Change Issues

Large Storm Flooding Damage

Water Storages

Wildfires

Species on Decline

and More

Beaver INSTITUTE™

# Can Beavers Stop Climate Change?

## No.

Beaver INSTITUTE™

# Can Beavers Decrease Climate Damage?

Absolutely!

Beaver INSTITUTE™

# Climate Resilience Benefit

✓Large Storm Flooding Damage

Beaver INSTITUTE™

# Climate Resilience Benefits

✓Large Storm Flooding Damage
✓Water Storage

Beaver INSTITUTE™

# Climate Resilience Benefits

✓Large Storm Flooding Damage
✓Water Storage
✓Wildfires

Beaver INSTITUTE™

# Climate Resilience Benefits

- ✓Large Storm Flooding Damage
- ✓Water Storages
- ✓Wildfires
- ✓Species on Decline

Beaver INSTITUTE™


Beaver dams “bank”
water and biological riches
reducing climate change damage.

# Climate Resilience Benefits

- ✓Large Storm Flooding Damage
- ✓Water Storages
- ✓Wildfires
- ✓Species on Decline
- ✓Carbon Storage

Beaver INSTITUTE™


Beaver Wetlands are Safe Repositories
for valuable water and species under stress.

# Beavers Building Climate Resilience

**Water** – Save and store

**Floods** – Decrease damage from large storms

**Wildfires** – Wet the land: decrease burns, refuge for species, decrease damage downstream, and speed recovery after fires

**Biodiversity** – Save genetic biodiversity and endangered species, e.g. salmon

Beaver INSTITUTE™

# BUT……..

Beaver INSTITUTE™

# Beavers Can Cause Problems

Beaver INSTITUTE™

# Types of Beaver Problems

- Road Flooding
- Structural Flooding
- Tree Damage
- Septic System or Well Flooding
- Agricultural Land Flooding
- Drainage Structure Blockage

Beaver INSTITUTE™

# Beaver Control Options

- **Short-Term Solutions**:

  Dam Removal, Culvert Clearing

- **Moderate-Term Solution**:

  Trapping

- **Long-Term Solutions**:

  Water Control (Flow) Devices

Beaver INSTITUTE™

# Trapping

Beaver INSTITUTE™

# Floodplain Development = “No Tolerance Zone”

# Beaver Trapping

Beaver INSTITUTE™


Beaver
INSTITUTE™


Beaver
INSTITUTE™

# Conibear Trap - Lethal

Beaver INSTITUTE™

# Trapping

**Pros**: Traditional approach

- Utilize fur in-season
- Inexpensive if DIY

**Cons**: Often short term

- Often more expensive if not DIY
- Loss of wetland benefits
- Public relations

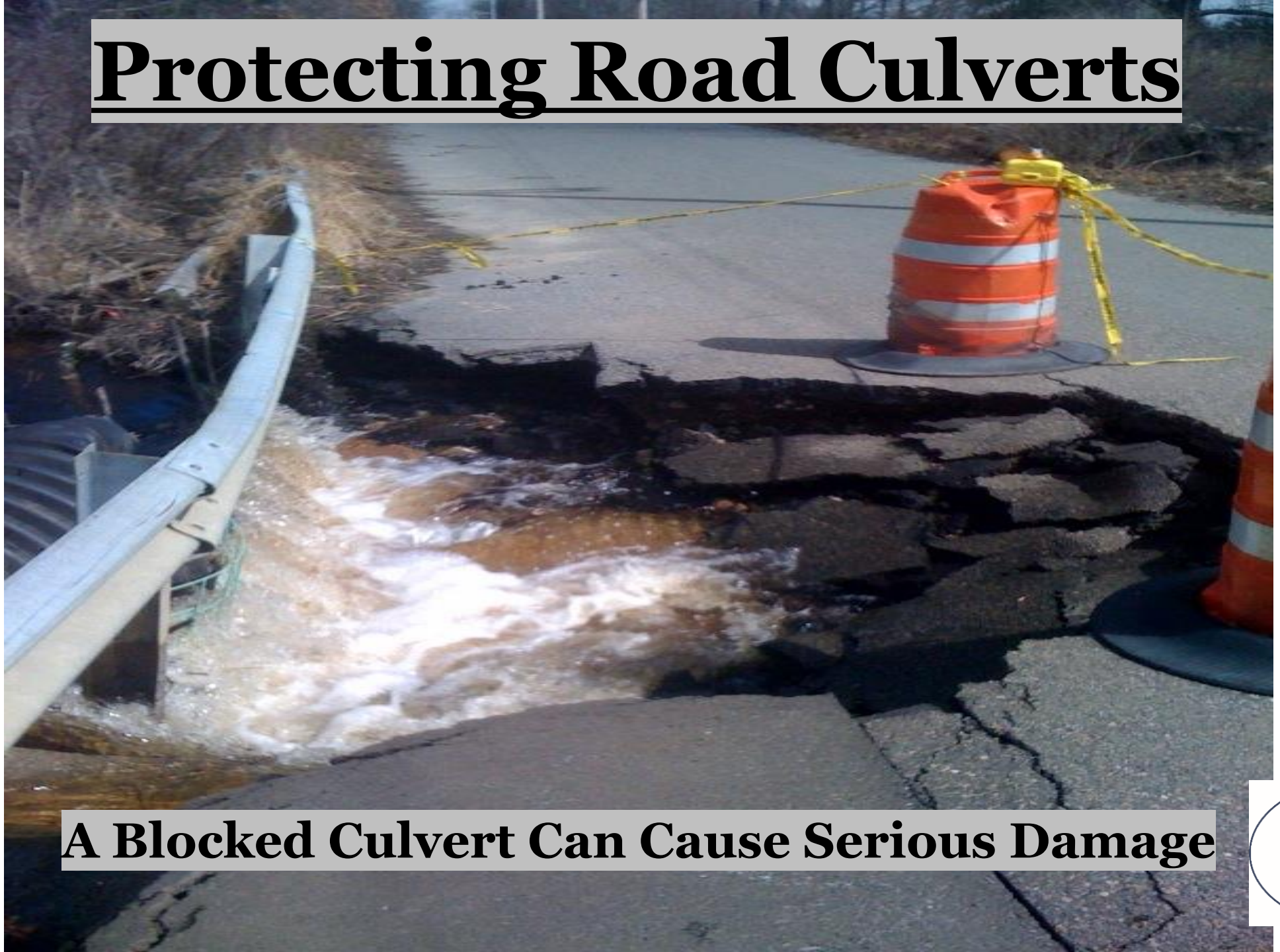
Beaver INSTITUTE™

# Road Culverts

A blocked road culvert can quickly become a serious problem.

Beaver INSTITUTE™

# Protecting Road Culverts



**A Blocked Culvert Can Cause Serious Damage**

Beaver INSTITUTE™

# Preventing Beaver Flooding Damage

A blocked road culvert can quickly become a serious problem.

# Road Culverts

**Nearly every culvert can be protected from beavers with a flow device.**

Beaver INSTITUTE™

# Flow Device Types

1. Flexible Pond Leveler
2. Culvert Fence
3. Fence and Pipe System
4. Diversion Dam

Beaver INSTITUTE™


Blocked culverts are our most common beaver problem and each one can cost thousands of dollars in labor and repair costs.

Beaver INSTITUTE™

# Flow Devices

- Save Labor and Time
- Protect Infrastructure 24/7
- Minimal Maintenance
- Cost-Effective
- Long-Term
- Environmentally Friendly

Beaver INSTITUTE™


Testimonials
courtesy of Beaver
Solutions LLC

# Flow Device Types

1. **Pond Leveler Pipes**
2. Culvert Fences
3. Fence and Pipe Systems
4. Decoy Dams

Beaver INSTITUTE™


Beaver
INSTITUTE™

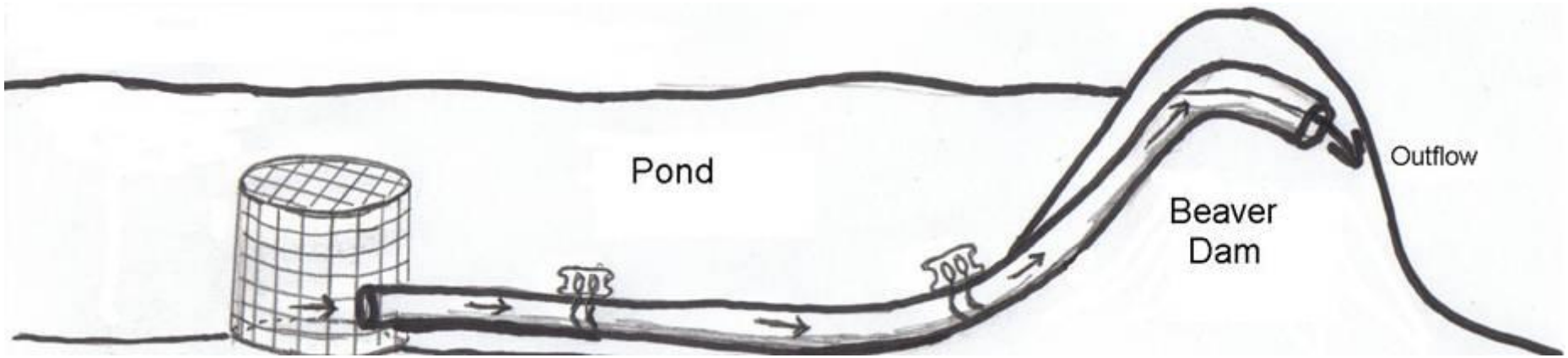
# Flexible Pond Leveler

# Flexible Pond Leveler

Beaver INSTITUTE™

# The height of the pipe in the dam determines the final pond level.

# Flexible Pond Leveler Diagram




*Note: Beavers are unable to detect the flow of water into the pipe.*

Beaver INSTITUTE™


Beaver
INSTITUTE™


Beaver
INSTITUTE™


Beaver
INSTITUTE™


3 Months Later
Beaver
INSTITUTE™


3 Years Later
Beaver
INSTITUTE™


3 Years Later
Beaver
INSTITUTE™

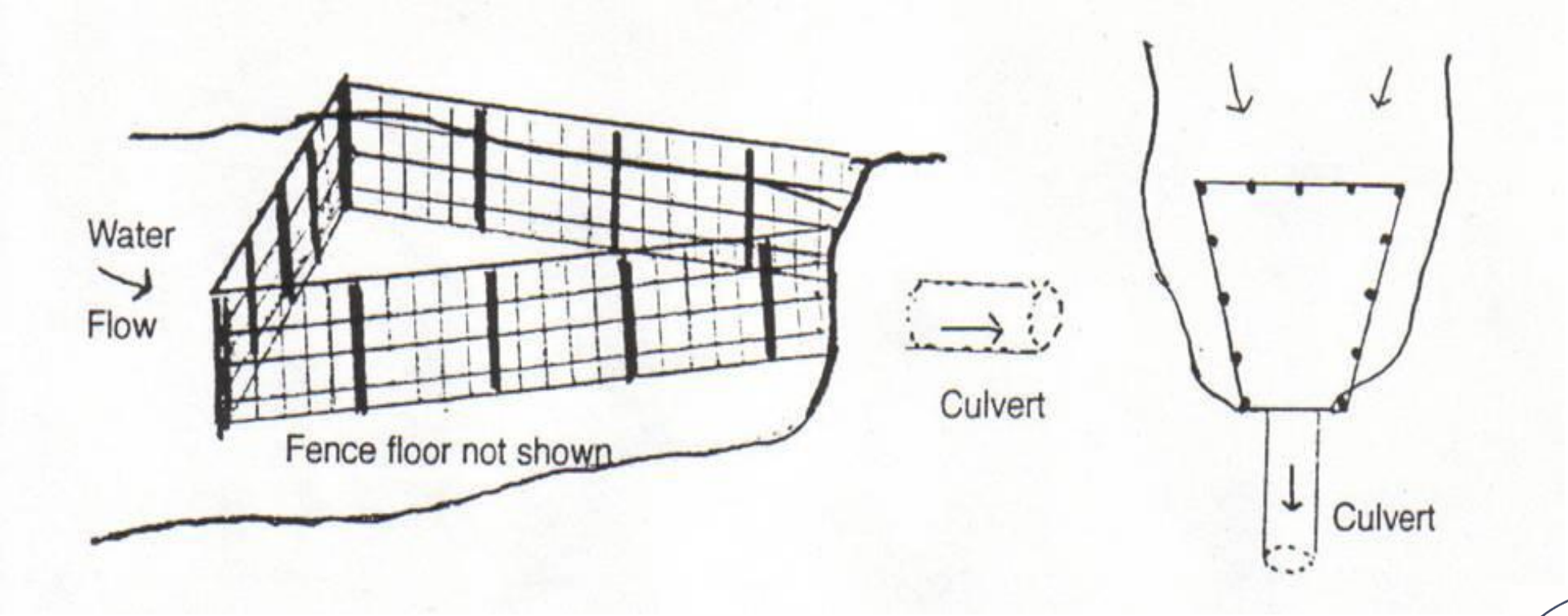

8 Years Later
Beaver
INSTITUTE™

# Flow Device Types

1. Pond Leveler Pipes
2. **Culvert Fences**
3. Fence and Pipe Systems
4. Decoy Dams

Beaver INSTITUTE™

# Keystone Culvert Fence




**Make the culvert undesirable to dam**

Beaver INSTITUTE™

# Keystone Culvert Fence

Reason 1:

Large perimeter to dam

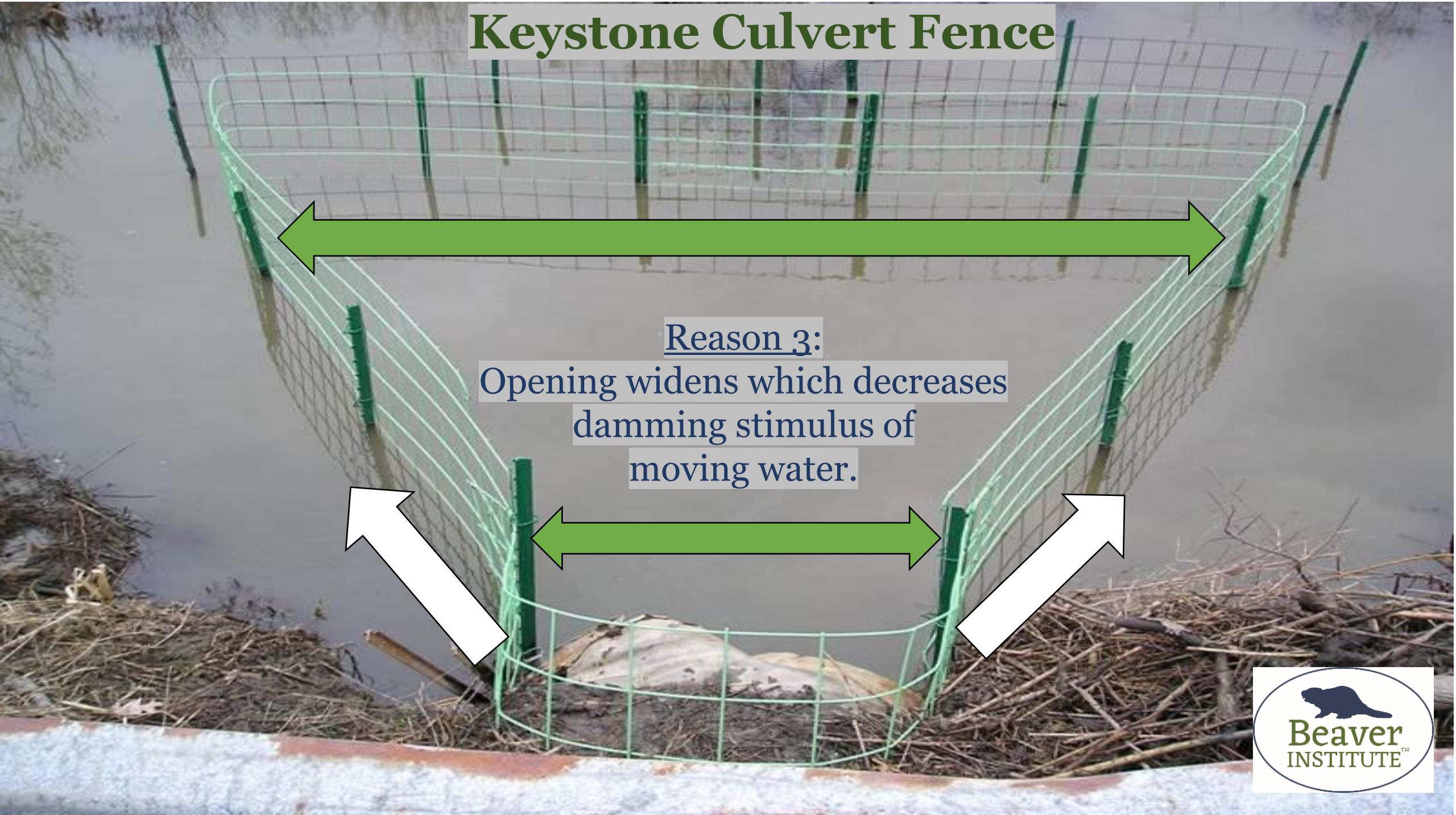
Beaver INSTITUTE™

# Keystone Culvert Fence

Reason 2:
Damming
forced away
from culvert

Beaver INSTITUTE™

# Keystone Culvert Fence




Beaver
INSTITUTE™


Beaver
INSTITUTE™


On a Dam Mission
Beaver
INSTITUTE™


Beaver
INSTITUTE™


Customize shape to fit stream
Wildlife Passage
Beaver INSTITUTE™


Beaver
INSTITUTE™


Beaver
INSTITUTE™


Beaver
INSTITUTE™

# Flow Device Types

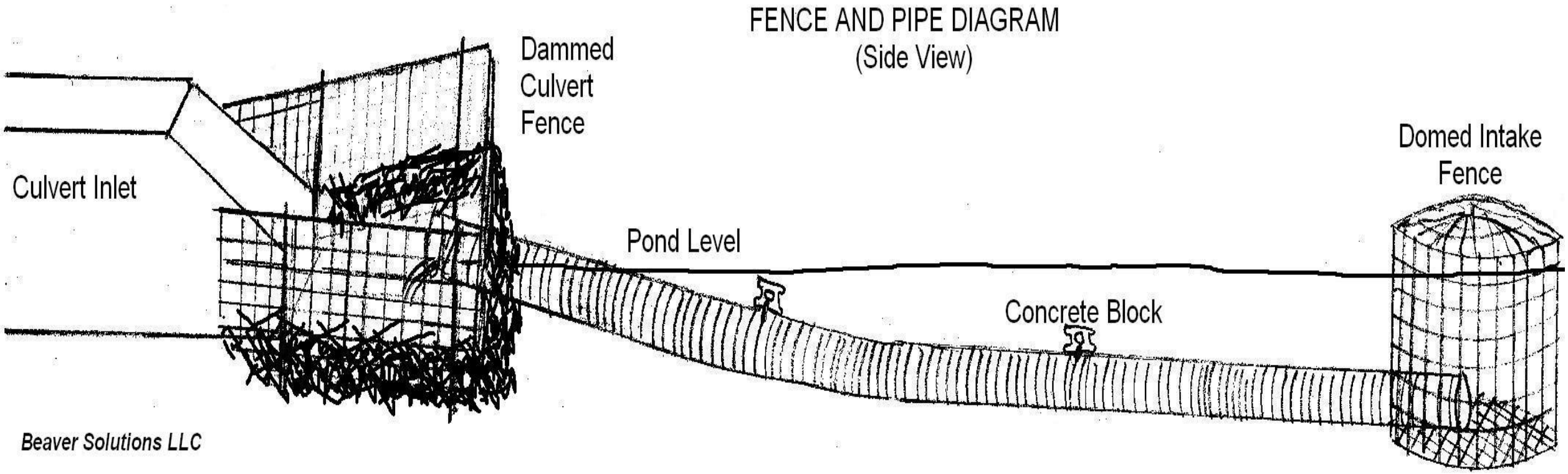
1. Pond Leveler Pipes
2. Culvert Fences
3. **Fence and Pipe Systems**
4. Decoy Dams

Beaver INSTITUTE™

Large storm runoff goes up and over the dam on the fence into an open culvert

Beaver INSTITUTE™

# Fence and Pipe Diagram




Beaver
INSTITUTE™


Beaver
INSTITUTE™

# Sometimes 2 or 3 Pond Leveler pipes are needed to handle large watersheds

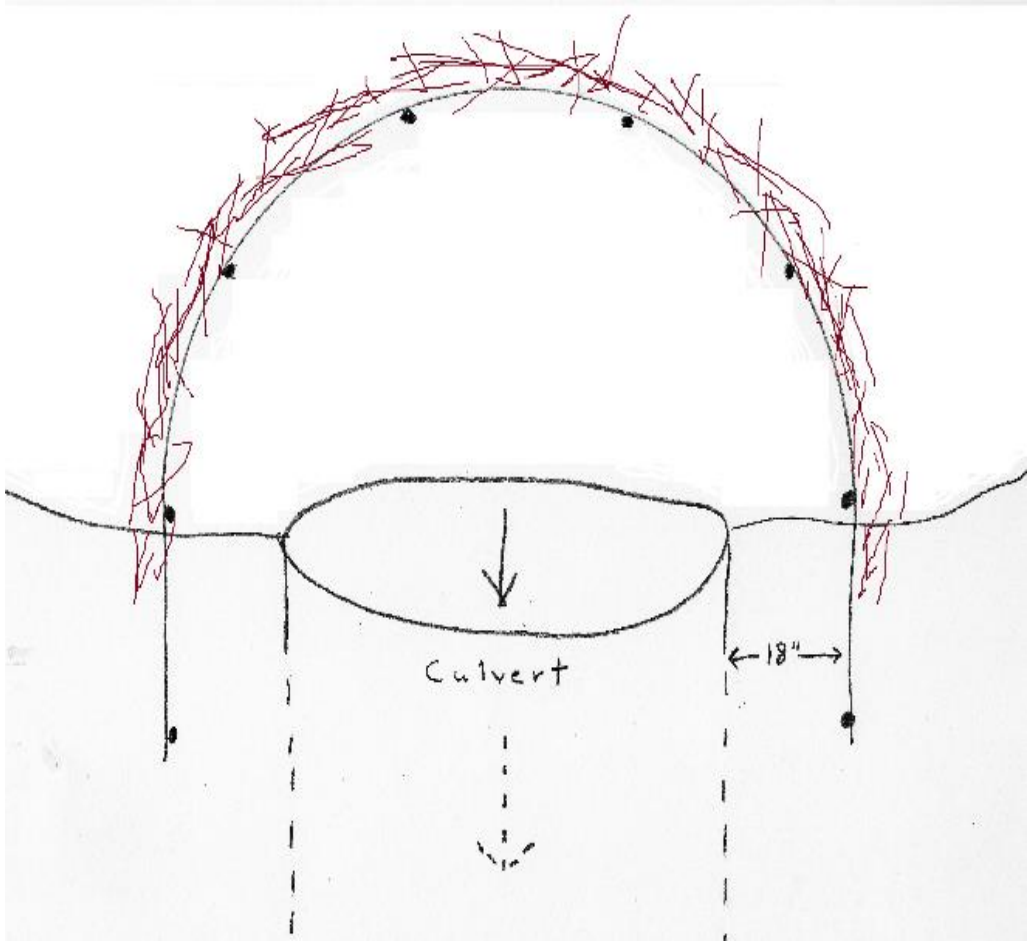
Beaver INSTITUTE™

# Flow Device Types

1. Pond Leveler Pipes
2. Culvert Fences
3. Fence and Pipe Systems
4. **Decoy Dams**

Beaver INSTITUTE™

# Decoy Dam




Beaver INSTITUTE™

# Decoy Dam

Protects culvert
Allows upstream beaver pond

Beaver INSTITUTE™

Beaver INSTITUTE™

Beaver INSTITUTE™

# Site Assessments

A site assessment determines if
a flow device is feasible
or if trapping is needed.

3 of 4 conflicts are best managed
with flow devices,
1 of 4 with trapping.

Beaver INSTITUTE™

# Flow Device Feasibility Issues

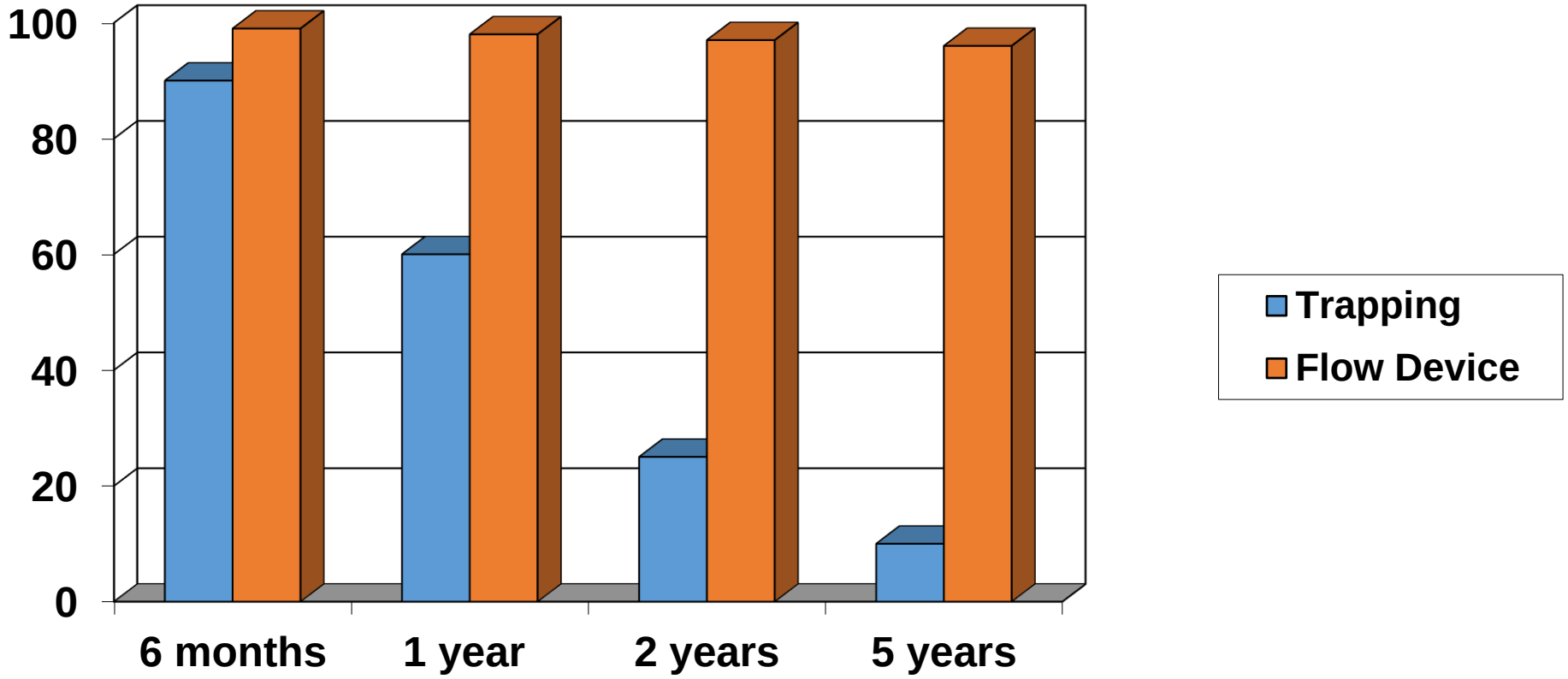
Very high flow streams
Development in a floodplain
Drainage ditches or canals
Public water supplies

Beaver INSTITUTE™

# Success Rates

Beaver INSTITUTE™

# Trapping v. Flow Device Comparison




*Sample Size – Over 1,000 total sites*

Beaver INSTITUTE™

# Billerica, MA
# Beaver Management Study

## 19 Year Study

## 55 Beaver Conflict Sites

*Published by the Association of MA Wetland Scientists, 2019*

Beaver INSTITUTE™

# Billerica Beaver Study

## 55 Conflict Sites

43 - Flow device sites = $229/year
12 - Trapping sites = $409/year

## Flow devices saved $180 (44%) per site every year

Beaver INSTITUTE™

# Professional Options

Beaver Deceivers International - Grafton, VT

***www.beaverdeceivers.com***

Beaver Solutions LLC - Southampton, MA

***www.beaversolutions.com***

*(shameless plug!)*

Beaver INSTITUTE™

# Average Costs

- Culvert Protective Fence - $1,500
- Flexible Pond Leveler - $1,900
- Fence and Pipe Device - $2,400
- Diversion Dam - $500
- Trapping - $1,300

Beaver INSTITUTE™

# Flow Device Maintenance

Maintenance checks 1x – 4x annually

Average total labor = 1 hour/year/site

*Beaver Solutions Maintenance Plan ≤ $300 per year with a Money-back Guarantee*

Beaver INSTITUTE™

# Permits

Health Director: 10 Day Emergency Beaver Permit

**Allows**:

Trapping

Dam Breaching

Flow Device Installation

# • MA DPH Guidelines

Guidance for Boards of Health Implementing M.G.L. c.131, s.80A

Threats from Beaver and Muskrat-Related Activities

Issued 2/14/01

Page 2 -

Beaver INSTITUTE™

# MA DPH Guidelines

Threats to human health and safety identified:

See examples a-i,

Pages 2 - 3

www.mass.gov/files/documents/2016/12/op/beaver-guidance.pdf

Beaver INSTITUTE™

A threat to human health and safety may include:

(a) beaver or muskrat occupancy of a public water supply;

(b) beaver or muskrat-caused flooding of drinking water wells, well fields or water pumping stations;

(c) beaver or muskrat-caused flooding of sewage beds, septic systems or sewage pumping stations;

(d) beaver or muskrat-caused flooding of a public or private way, driveway, railway or airport runway or taxi-way;

(e) beaver or muskrat-caused flooding of electrical or gas generation plants or transmission or distribution structures or facilities, telephone or other communications facilities or other public utilities;

(f) beaver or muskrat-caused flooding affecting the public use of hospitals, emergency clinics, nursing homes, homes for the elderly or fire stations;

(g) beaver or muskrat-caused flooding affecting hazardous waste sites or facilities, incineration or resource recovery plants or other structures or facilities whereby flooding may result in the release or escape of hazardous or noxious materials or substances;

(h) the gnawing, chewing, entering, or damage to electrical or gas generation, transmission or distribution equipment, cables, alarm systems or facilities by any beaver or muskrat;

# Permits

If, Dam breaching or a Flow Device is planned:

Conservation 30 Day Emergency Permit is needed
(after BOH Permit is issued)

Beaver INSTITUTE™

# Summary

- Beaver Basics
- How Beavers Build Climate Resilience
- Beaver Problems and Solutions
- Permits
- Q & A

Beaver INSTITUTE™

# Thanks for your attention and to the MHOA!

Beaver INSTITUTE™

***www.BeaverInstitute.org***

# Thanks for your attention and to The MHOA!

Beaver INSTITUTE™