



Land Conservation Conference

2020 Vision & Beyond:
Climate, Conservation & Collaboration

Restoring Ecological Function and Diversity to our Preserved Lands

presented by Scott McGill, Ecotone, Inc.

Wednesday, May 27th, 2020

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Merritt Pridgeon

Restoring Ecological Function and Diversity to our Preserved Lands



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Takeaways

- Conservation easements are the first step
- Vibrant agriculture and ecological function are NOT mutually exclusive
- Be a Beaver Believer
- Facts about our Maryland landscape you didn't learn in history class



Conservation easements are where we start



Habitat – low

Diversity – low

Forage for deer – high





Ecological restoration can add to farm bottom line!

- **2 acre marginally wet hayfield**
- **150 bales/acre/year**
 - **\$1500/acre/year**
- **2 acre wildlife wetland lease: \$5,000/year (cost shared thru Soil Conservation District)**



Ecological Restoration Easements

- **Forest Retention**
- **Reforestation**
- **Stream Restoration**
- **Wetland Restoration**
- **Nutrient Credits**
- **TMDL – usually stream restoration**

Non-easement Options

- **State/Federal Grants – Chesapeake Bay Restoration**
- **Soil Conservation – MACS Cost Share**
- **Farm Bill Programs – CREP, Equip**

The Objective

To improve the ecological function of properties that are subject to a conservation easement.



How do we make improvements?

Create and/or Conserve Forests

Restore Streams and Improve Stream Function

Create and/or Improve Wetlands

Create and/or Improve Habitat

A Combination of These Activities

Conservation Easement Implications

Purpose

- Agricultural Land
- Scenic Views
- Historic Structures

Restrictive Covenants

- Limits on Construction
- Limits on Commercial Activities (sales of mitigation credits)
- Covenant against further encumbrances

Options

Take the position that the project is permitted by the terms of the easement.

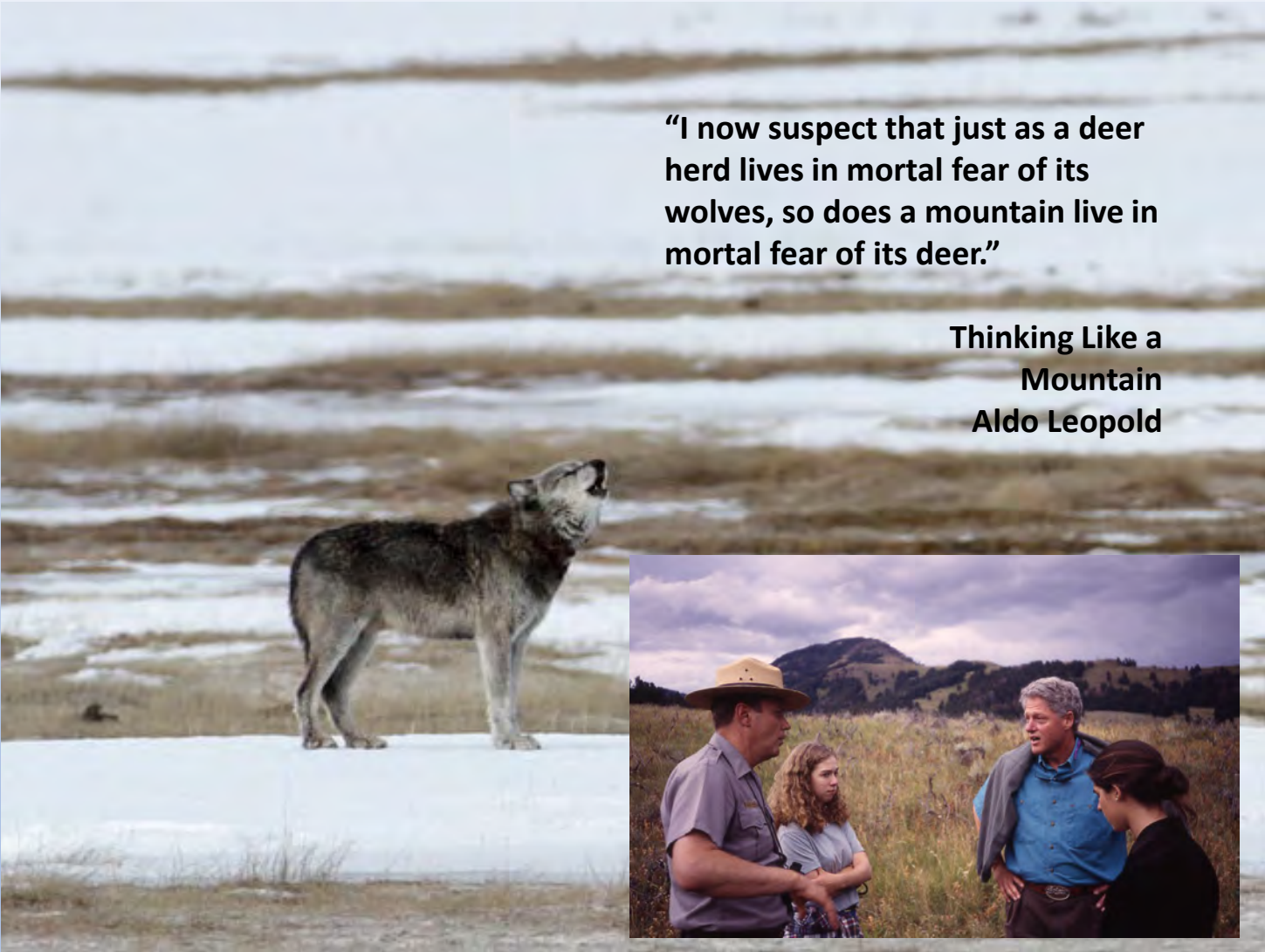
Ask Approval Pursuant to Express Authority

- **MALPF Forest Conservation Overlays**
- **MALPF General Overlay**
- **MET Allows Sales of Credits**
- **General Request**
- **County Easement Overlays**

Terminate the Easement

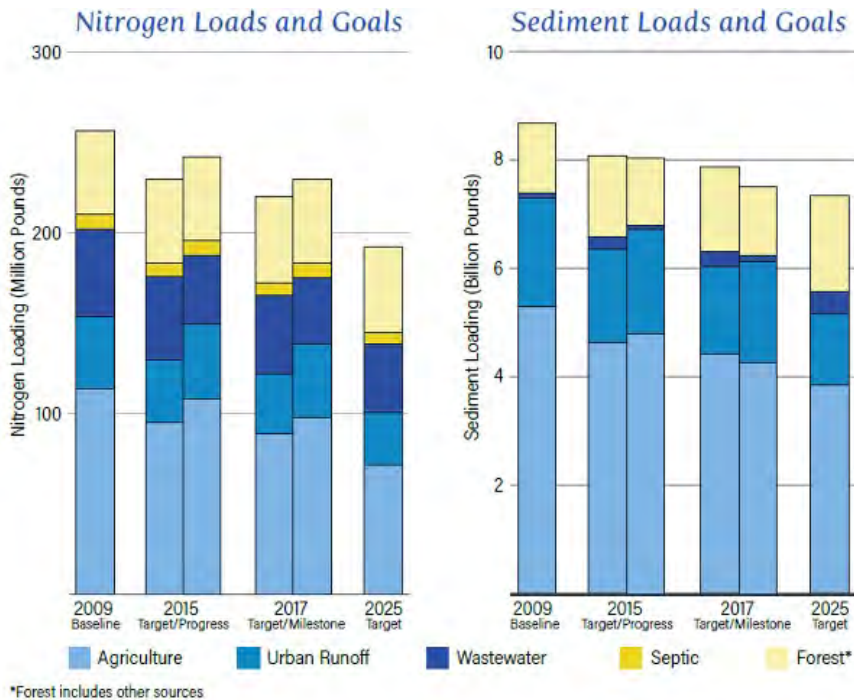
“I now suspect that just as a deer herd lives in mortal fear of its wolves, so does a mountain live in mortal fear of its deer.”

**Thinking Like a
Mountain
Aldo Leopold**



Chesapeake Bay TMDL Goals

Maryland



	2025 Goal million lbs	2009 Baseline million lbs	% Reduction
Nitrogen	39	49.8	21%
Sediment	1,219	1,394	13%

Difference from 2009 to
2025:

- 10.8 million lbs. nitrogen
- 175 million lbs. sediment















“The beaver has a major image problem. A chubby rodent with goofy buckteeth and a tail that looks like it was run over by a tractor tire - its no wonder beavers prefer to work under the cover of darkness.”

Frances Backhouse, *Once They Were Hats*

Bridge Creek, Oregon

- NOAA Funding
- Objective is to improve salmonid habitat
- 10 year study
- Beaver dam analogs
- Several meters of aggradation in 5 years





Beaver Dam Analogs – BDA's



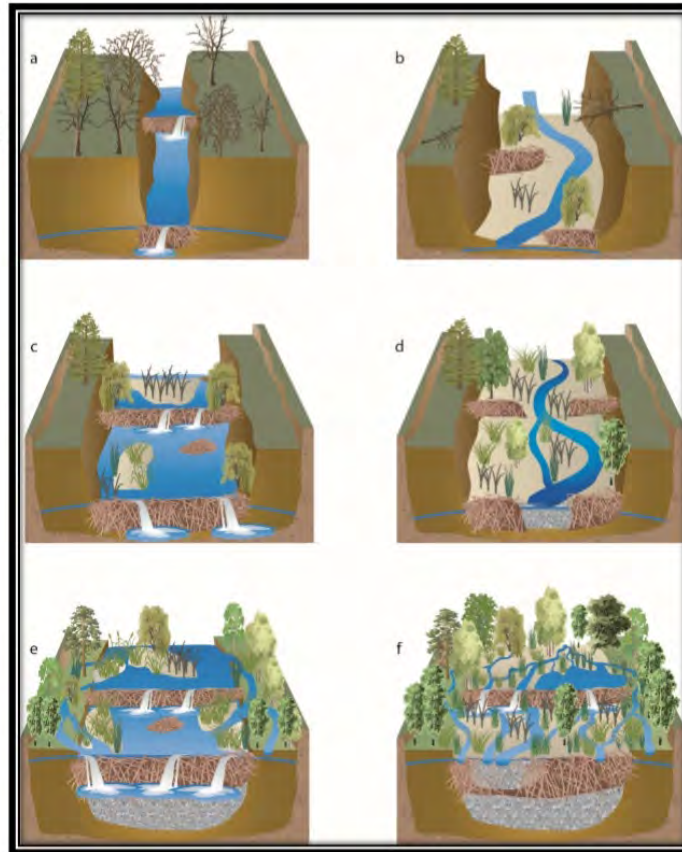


Outside the Box Thinking

- Direct flows into the hillside.
- Widens the floodplain and spreads out energy.
- Beaver dams trap sediment, increase floodplain connectivity, and establish wetlands.
- “Fight fire with fire.”

Beaver in incised streams

“Recovery possible in years to decades instead of decades to centuries”



Pollock et al., 2014. using beaver dams to restore incised stream ecosystems. *Bioscience*, 64(4).

STATE OF THE BEAVER CONFERENCE

FEB 22-24,
2017

BRINGING
BACK BEAVERS
TO BRING BACK
LIFE.



AGENTS OF REGENERATION



Beavers in Devon

Enclosed Beaver Project

In 2011 a male and female beaver were introduced into a three hectare fenced enclosure in the Tamar headwaters, where their impacts are being studied in detail. Most of the results presented in this document are from this research site.

The Enclosed Beaver Project is situated on private land in the headwaters of the River Tamar and upstream of Roadford Lake.

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The 900 m perimeter fence has electric strands to prevent beavers climbing and a weldmesh apron on the inside to prevent them burrowing underneath. This fencing cost approximately £35/m to construct.



The beavers live in a large lodge situated on the banks of a pond. The lodge has increased in size every winter as more sticks and silt are built on top by the beavers, and willow sticks and branches are placed in the water to create a nearby winter food cache.



Since 2011, 13 ponds of varying sizes have been constructed by the beavers. The dramatic engineering of the watercourse in this site has provided a perfect opportunity to study the impacts of beaver dams on a wide range of different subjects.



Partners and funders



The Enclosed Beaver Project site is owned by John and Elaine Morgan who have kindly allowed this wetland area within their farm to be managed by the beavers. Additional funding has come from Natural England through Higher Level Stewardship (HLS).



The beavers are owned and managed by the Derek Gow Consultancy. The initial fencing and other infrastructure was funded by Viridor Credits Environmental Company and the Truell Charitable Foundation.

In 2012, Westland Countryside Stewards began funding the project allowing the University of Exeter to carry out detailed research work on the hydrological and water quality implications of the beaver dams.

Funding is currently being sought to continue this project.

River Otter Beaver Trial

In March 2015 two families of wild-living beavers of unknown origin were captured from the River Otter and proven to be healthy before being released back into the river as part of a five year licensed trial.

The River Otter Beaver Trial area covers the entire 250 km² of the Otter catchment containing 594 km of watercourse. The river rises in the predominately pastoral landscape of the Blackdown Hills, before flowing through highly productive agricultural land in its middle and lower reaches. The River Otter enters the sea at Budleigh Salterton.



In February 2015 five beavers were captured by the Animal and Plant Health Agency (APHA). They were given detailed health examinations by beaver experts from the Royal Zoological Society of Scotland (RZSS), who confirmed they were healthy Eurasian beavers and fit for re-release.

Photo:
Nick Upton / Naturapl.com



The beavers were released back into their territories in March 2015. At the start of the trial approximately nine beavers were identified, living in two family groups.

Photo:
Nick Upton / Naturapl.com



In the early stages, beaver activity was concentrated in the lower reaches of the river where there is sufficient deep water, and so they have not needed to build dams. As their numbers have increased and they have moved into sub-optimal areas, they are beginning to build dams in the ditches and headwater streams. These are now the subject of detailed research work.

Partners and funders

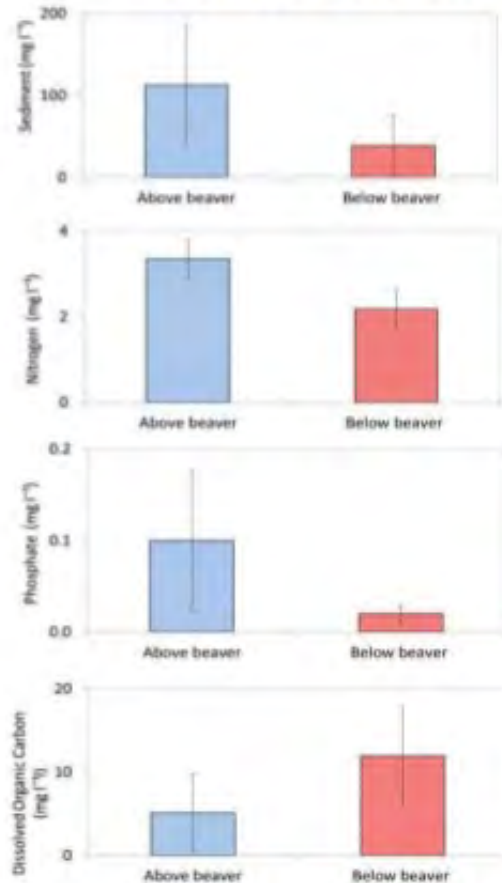
The River Otter Beaver Trial is led by Devon Wildlife Trust working in partnership with The University of Exeter, the Derek Gow Consultancy, and Clinton Devon Estates. Expert independent advice is also provided by the Royal Zoological Society of Scotland, Roisin Campbell-Palmer, Professor Alastair Driver, Professor John Gurnell, and Gerhard Schwab, an international beaver expert based in Bavaria.

Funding for the ROBT comes from Devon Wildlife Trust (DWT), the Royal Society for Wildlife Trusts (RSWT), Peter de Haan Charitable Trust, Garfield Weston Foundation, University of Exeter and from the generous donations from the public.

In 2016, Devon Wildlife Trust launched a crowdfunding campaign to encourage the public to donate to the project in return for a series of unusual things such as beaver chips, guided walks or the appearance of Nora the beaver mascot at your event. www.supportdevonbeavers.org/



Devon Beaver Project Results – water quality

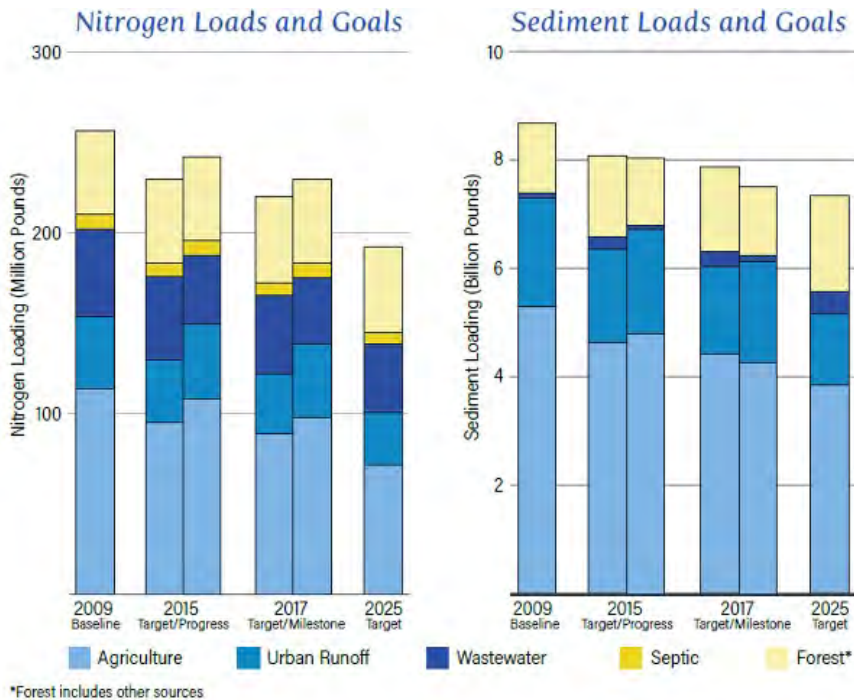


Storm monitoring (17 events, 178 samples above, 119 below), suggests site may act as a sink or filter for diffuse water pollutants from agriculture (suspended sediment, nitrogen and phosphate).

However, more organic matter in the site, so potentially results in a greater loss of dissolved organic carbon than comparative agricultural land.

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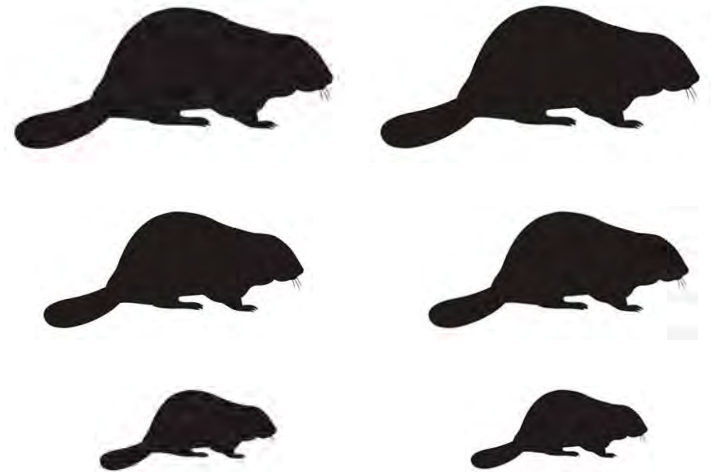
- 10.8 million lbs. nitrogen
- 175 million lbs. sediment

Beaver Colonies

- Average of 6 beavers
- Up to 12 beavers



1 colony creates and maintains a 5 acre pond

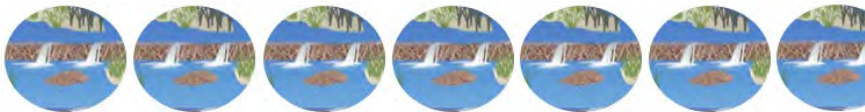



Nitrogen

- 3,906 beaver can meet the nitrogen TMDL goals for Maryland in 16 years



- 3,255 acres of pond



 = 500 beaver


Sediment

- 1,626 beaver can meet the sediment TMDL goals for Maryland in 16 years



- 1,355 acres of pond



 = 500 acres of pond

*Sediment reduction from Correll and Weller, 2000

Sources

Nitrogen

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4. Lazar JG, Addy K, Gold AJ, Groffman PM, McKinney RA, Kellogg DQ. 2015. Beaver ponds: resurgent nitrogen sinks for rural watersheds in the northeastern United States. *Journal of Environmental Quality* 44:1684–1693. <https://doi.org/10.2134/jeq2014.12.0540>.
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Sediment

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11. Lazar JG, Addy K, Gold AJ, Groffman PM, McKinney RA, Kellogg DQ. 2015. Beaver ponds: resurgent nitrogen sinks for rural watersheds in the northeastern United States. *Journal of Environmental Quality* 44:1684–1693. <https://doi.org/10.2134/jeq2014.12.0540>.
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"Claiborne's elaborate preparations and largescale operation brought in 7488 pounds of beaver pelts (worth £4493 at 12 s./lb.)...in the six years before Kent Island's takeover by Maryland in 1638" – Fredrick J. Fausz, "Present at the Creation"

"Claiborne's timing was perfect, for in 1629 the English had captured Quebec in a war with France, and beaver fever spread throughout the London merchant community after the Canada Company brought home some three hundred thousand pounds of pelts in 1630." Fredrick J. Fausz, "Present at the Creation"

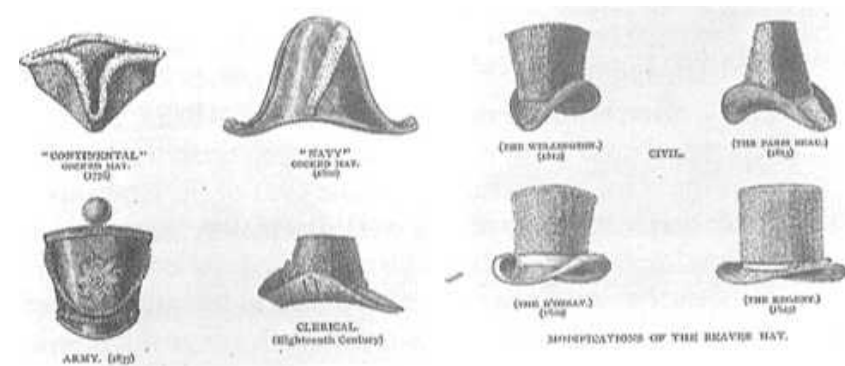


Photo Credit: Portland State University



Photo Credits: Canadian Museum of History



"In 1643-44 also, over 5700 pounds of beaver pelts were mentioned in debt cases, at a time when one pound was worth between 12s. and 24s., or from 36 to 144 pounds of tobacco." – Fredrick J. Fausz, "Present at the Creation"

"On more than one occasion, colonists found themselves so deeply in debt for beaver pelts that they mortgaged, or had to put up as security, a large portion of their property" – Fredrick J. Fausz, "Present at the Creation"















Beaver Management in Maryland

- Approximately 1,000-3,000 beaver trapped and killed annually. Population is growing.
- Recreational and management trapping by landowners, County and State agencies.
- Live trapping and relocation infeasible/not permitted.
- Minimal use of low flow management devices.
- Most management involves trapping.



Furbearer Seasons, Bag Limits, Locations and Resident Requirements, 2018-2019

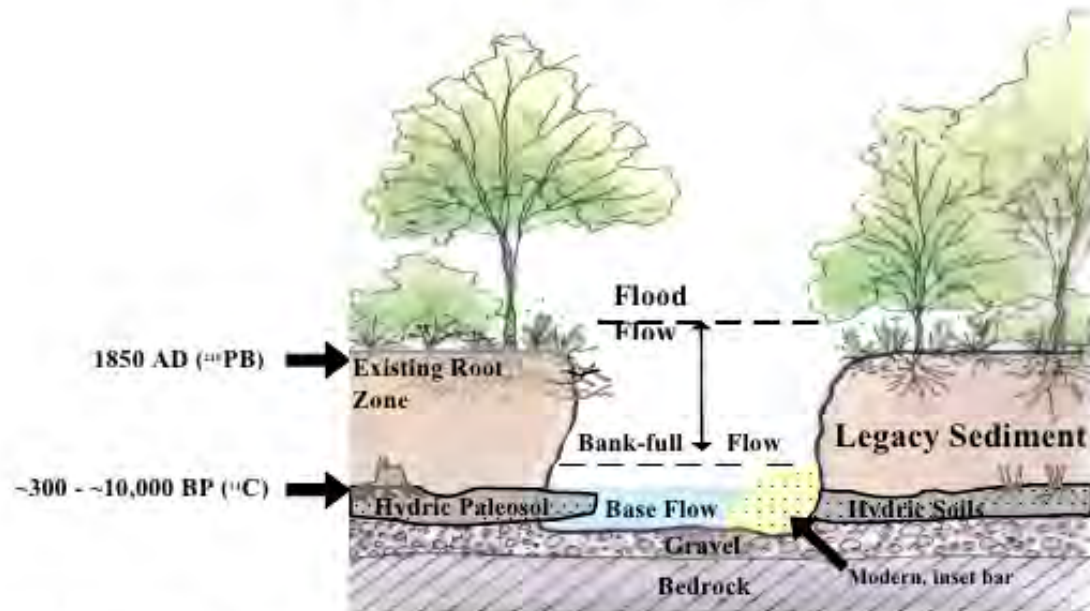
Species	Open Season	Location	Bag Limit	Possession Limit
Beaver – Trapping Only	Dec 15- March 15	All counties except Allegany and Garrett	No limit	No limit
Beaver – Trapping Only	Dec 1- March 15	Allegany and Garrett counties	No limit	No limit





Soft rush	<i>Juncus effusus</i>	20%	FACW
Straw Colored Flat Sedge	<i>Carex straminea</i>	12%	OBL
Canada rush	<i>Juncus canadensis</i>	7%	OBL
Barnyard grass	<i>Echinochloa crusgalli</i>	7%	FACU
Cattail	<i>Typha latifolia</i>	5%	OBL
Tussock sedge	<i>Carex stricta</i>	5%	OBL
Lurid Sedge	<i>Carex lurida</i>	3%	OBL
Square stem Money flower	<i>Mimulus ringus</i>	<2%	FACW
Walter Millet	<i>Echinochloa walteri</i>	<2%	FACW
Pennsylvania smartweed	<i>Polygonum pennsylvanicum</i>	<2%	FACW
Rice Cutgrass	<i>Leersia oryzoides</i>	<2%	OBL
Slender St. Johns Wort	<i>Hypericum mutilum</i>	<2%	FACW
Eastern burreed	<i>Sparganium americanum</i>	<2%	OBL
Jewelweed	<i>Impatiens capensis</i>	<2%	FACW
Blunt Spike rush	<i>Eleocharis obtusa</i>	<2%	OBL
American Water horehound	<i>Lycopus americanus</i>	<2%	OBL
American Water Wort	<i>Elatine americana</i>	<2%	OBL
Seedbox	<i>Ludwigia palustris</i>	<2%	OBL
Beaked spike rush	<i>Eleocharis rostellata</i>	<2%	OBL
False Nettle	<i>Bohemaria cylindrica</i>	<2%	OBL
Boneset	<i>Eupatorium perfoliatum</i>	<2%	FACW
Soft Stem Bulrush	<i>Scirpus validus</i>	<2%	OBL
Woolgrass	<i>Scirpus cyperinus</i>	<2%	FACW
White Clover	<i>Trifolium repens</i>	<2%	FACU
Duck Potato	<i>Sagittaria latifolia</i>	<2%	OBL
Swamp milk weed	<i>Asclepias incarnata</i>	<2%	OBL
Littleleaf Goldenrod	<i>Solidago graminacea</i>	<2%	FAC
White Aster	<i>Aster viminifolius</i>	<2%	FAC
Arrow arum	<i>Peltandra virginica</i>	<2%	OBL
Black Eyed Susan	<i>Rudbeckia hirta</i>	<2%	FACU
Arthraxon	<i>Arthraxon hispidus</i>	<2%	NI
Morning Glory	<i>Ipomoea eriocarpa</i>	<2%	FACU
Goldenrod	<i>Solidago spp</i>	<2%	FACU
Speedwell	<i>Veronica anagallis-aquatica</i>	<2%	OBL

Typical Existing Condition



- Legacy sediment stored in valley bottoms predominantly was established by the combined effect of increased sediment supply from uplands and sediment trapping behind ubiquitous dams in many watersheds of the mid-Atlantic Region. (Walter and Merritts, 2008)
- Conceptual models linking channel condition and sediment yield exclusively with modern upland landuses are incomplete for valleys impacted by mill dams (Merritts, et al. 2011)
- Streambanks represent a significant sediment and nutrient source in watersheds where channels have incised through legacy sediment. (Walter, Merritts, Rahnis, 2007; 2010)

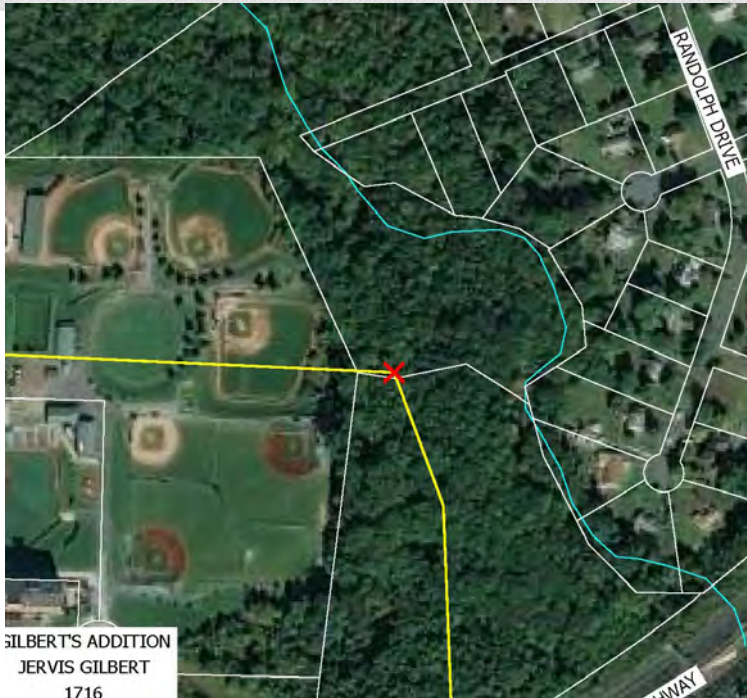


Historical Streams

- Property surveys reference swamps, pocosins, marshes, moors
 - Pocosin- of Algonquin origin meaning “swamp on a hill”
- Multithreaded wetland complexes



7. Gilbert's Addition - Surveyed 8 Mar. 1716 for Jarvis Gilbert, and
from "T. W." No. 306a
granted to for
50 acres. Beginning at Three... W.O... at the
head of a little swamp on the N. side of
the N.W. Branch of Swan Creek "and eight halves a mile to
1/2 Eastward of the said Jarvis's plantation"; and







Bear Cabin Branch

- Legacy sediment from mill dam
- 20% impervious watershed
- County property











































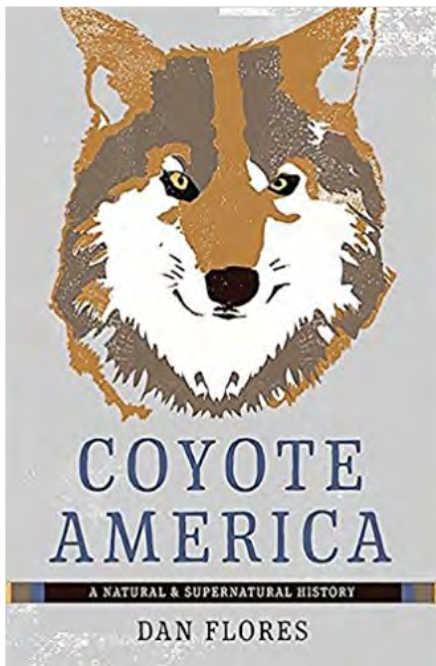


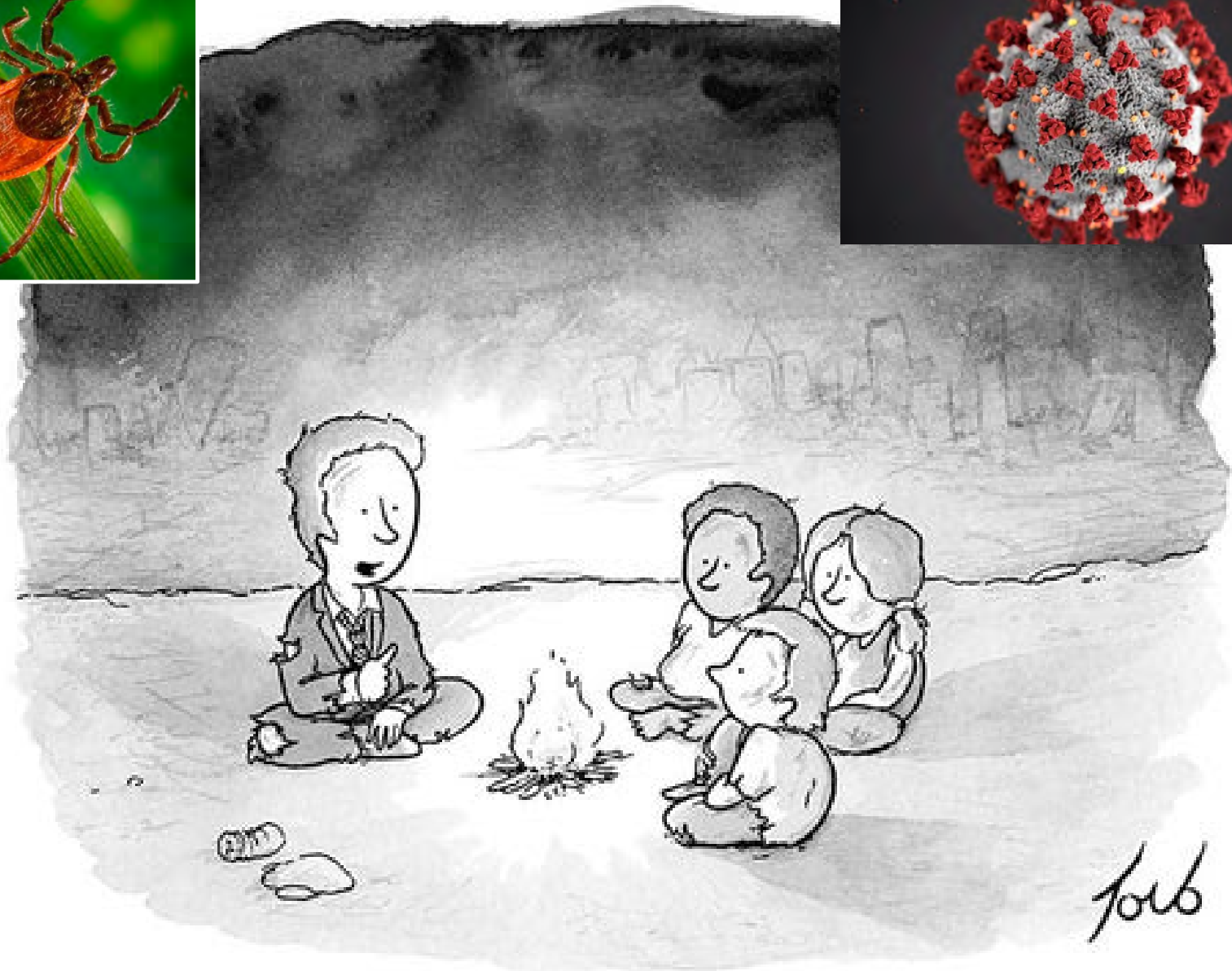
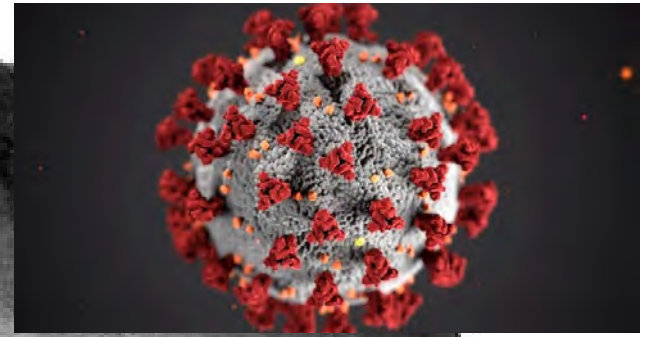
I now suspect that just as a deer herd lives in mortal fear of its wolves, so does a mountain live in mortal fear of its deer.

Aldo Leopold. A Sand County Almanac, 1949









"Yes, the planet got destroyed. But for a beautiful moment in time we created a lot of value for shareholders."

Questions?



Scott McGill

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