

# The Benefits and Challenges of Beavers in our watersheds

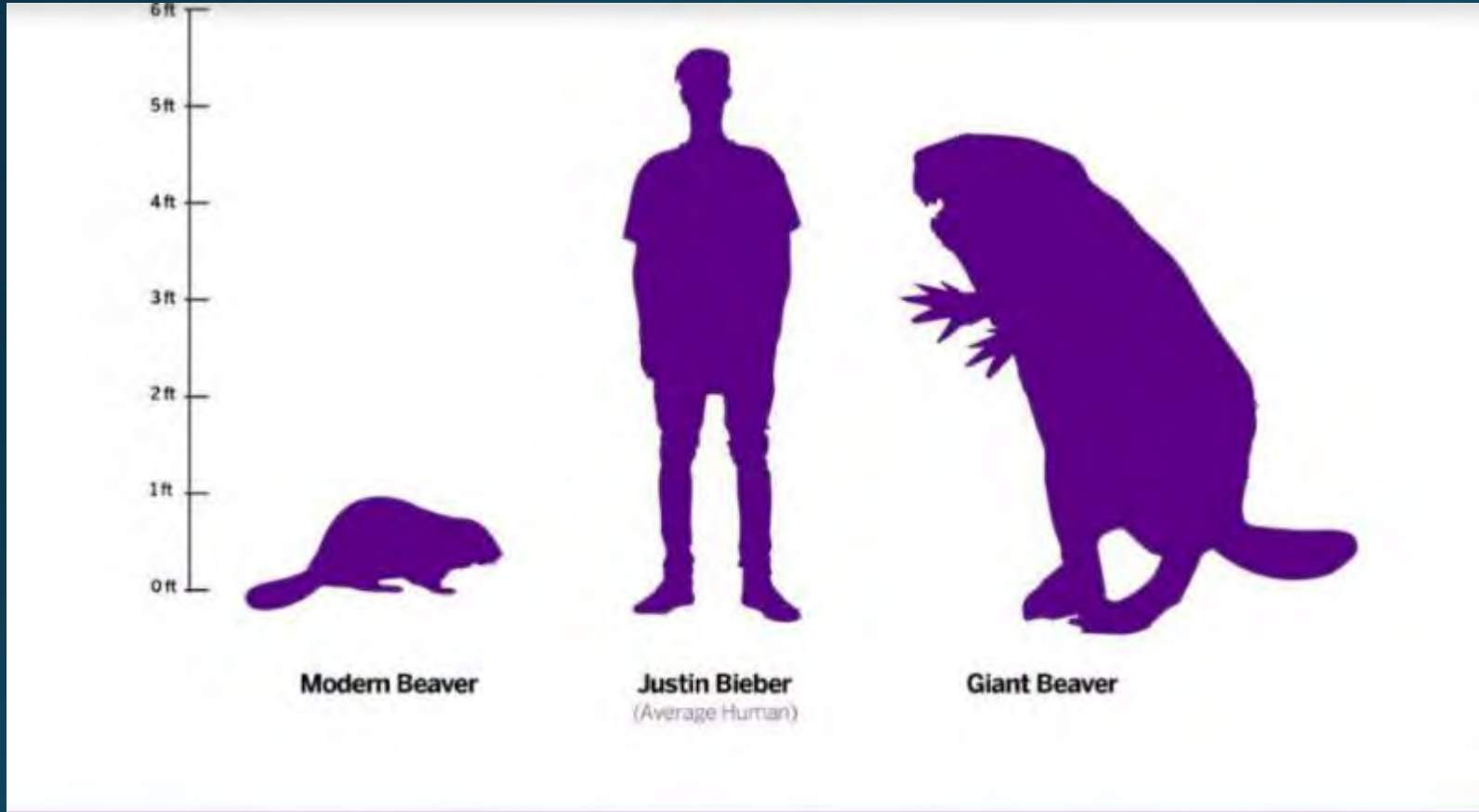
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LAKE  
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**LSPA**



# Giant Beaver once roamed our landscape



...but went extinct in the last ice age





# Historic populations of North American Beaver

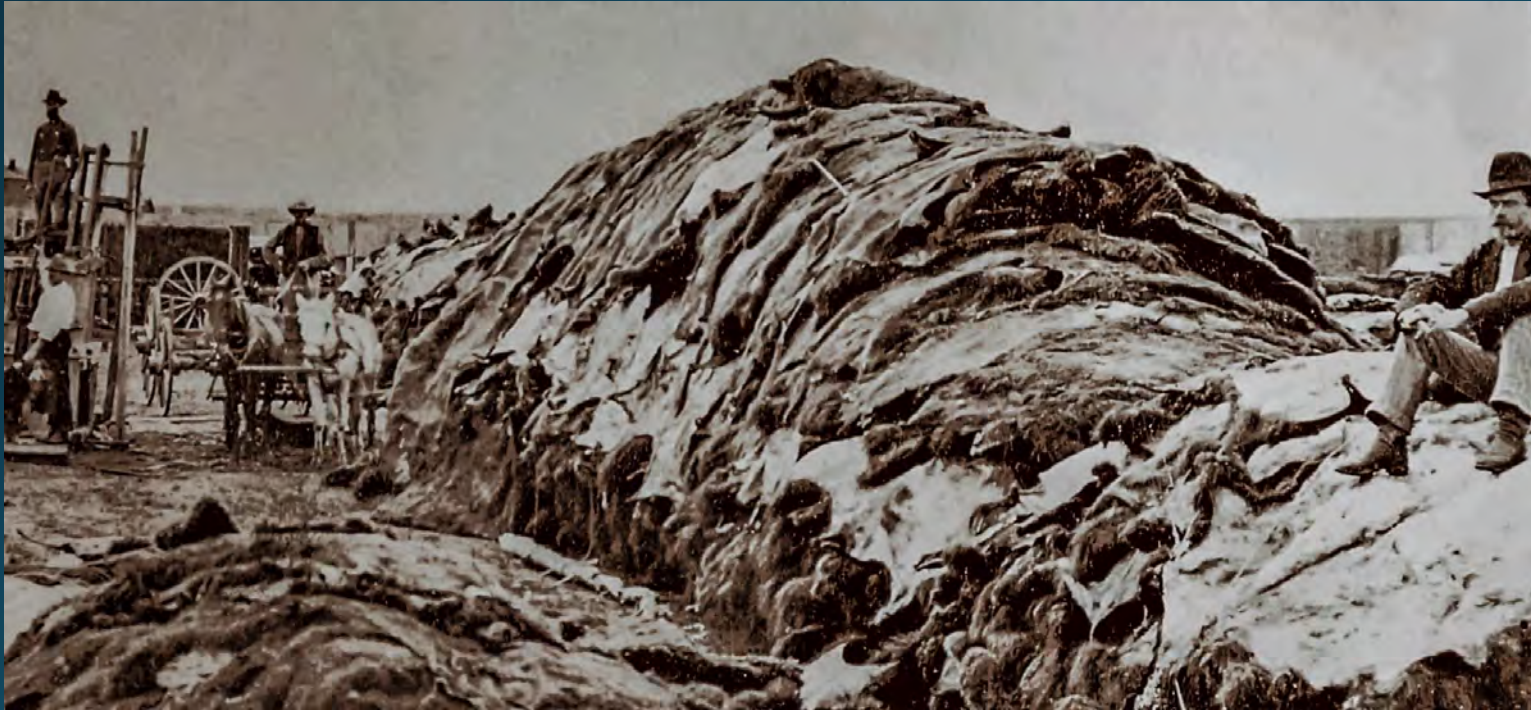
- Estimates of pre-colonization beaver population range from 60–400 million beavers
- This would have made beavers about 1.5 times as common as the current human population of the United States
- Beavers were found in nearly every North American watershed, from the boreal forests to temperate regions.





# Fur Trapping Declines

Intense trapping decimated beaver populations across their historic range, leaving them nearly extinct in many areas.







# Beavers were extirpated in most parts of New Hampshire

Dave Anderson of the Forest Society:

“In 1922, the Forest Society actually imported two pairs of breeding beavers from Minnesota to Kinsman Notch, adjacent to the Lost River Reservation, after they had been extirpated by fur trapping in the rest of the state,”

“One hundred years ago there were almost no beavers in New Hampshire. A century later they’re found statewide and are maxed out of available habitat.”





# Beaver recover across North America

- By the late 20th century, the population of beaver in North America had rebounded to an estimated 6–12 million
- While still not fully recovered to their pre-European settlement numbers (600 – 400 million), beaver populations are increasing in many regions



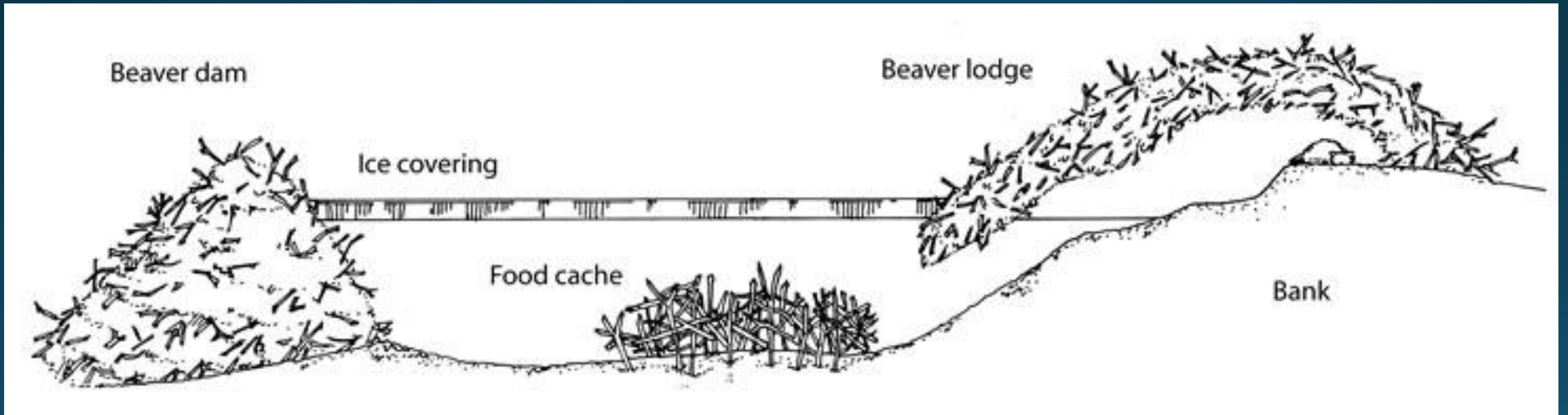


# North American Beaver *Castor canadensis*

- Largest rodent in North America
- Herbivores – eat leaves, inner bark and twigs

# North American Beaver *Castor canadensis*

- Build and live in lodges with underwater access
- Cache food under water in winter





# North American Beaver *Castor canadensis*

Create dams and  
impound water to  
protect lodges from  
predators and  
increase access to  
food resources



# Beavers are ecosystem engineers that shape the landscape

## ENGINEERS

'Beavers are keystone species and ecosystem engineers who can profoundly shape environments to suit their ecological needs'



<https://doi.org/10.1002/hyp.14017>



# Ecosystem Engineers and Keystone Species

Beavers significantly alter their environment by building dams, which creates new wetland habitats and benefits a wide range of other plant and animal species in the ecosystem

They engineer their environment AND have a huge impact on other species in the ecosystem

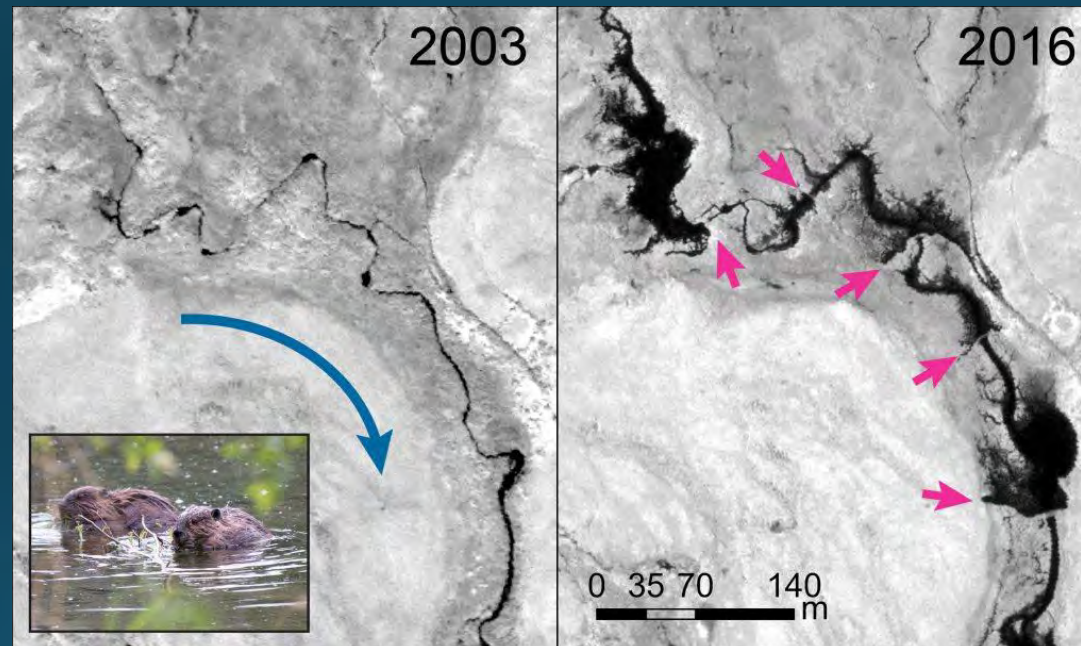




## Beaver Engineering: Tracking a New Disturbance in the Arctic

<https://doi.org/10.25923/0jtd-vv85>

K. D. Tape<sup>1</sup>, J. A. Clark<sup>1</sup>, B. M. Jones<sup>2</sup>, H. C. Wheeler<sup>3</sup>, P. Marsh<sup>4</sup>, and F. Rosell<sup>5</sup>



**Fig. 1.** Beaver engineering dramatically altered a tundra stream on the Seward Peninsula in western Alaska between 2003 and 2016. The enlarged black areas are new beaver ponds, the blue arrow shows flow direction, and magenta arrows denote dams. Ikonos satellite image: 6 Aug 2003, Worldview satellite image: 10 June 2016, 64° 33.52'N, 165° 50.12'W (Imagery © 2021 Maxar).



2003

2016



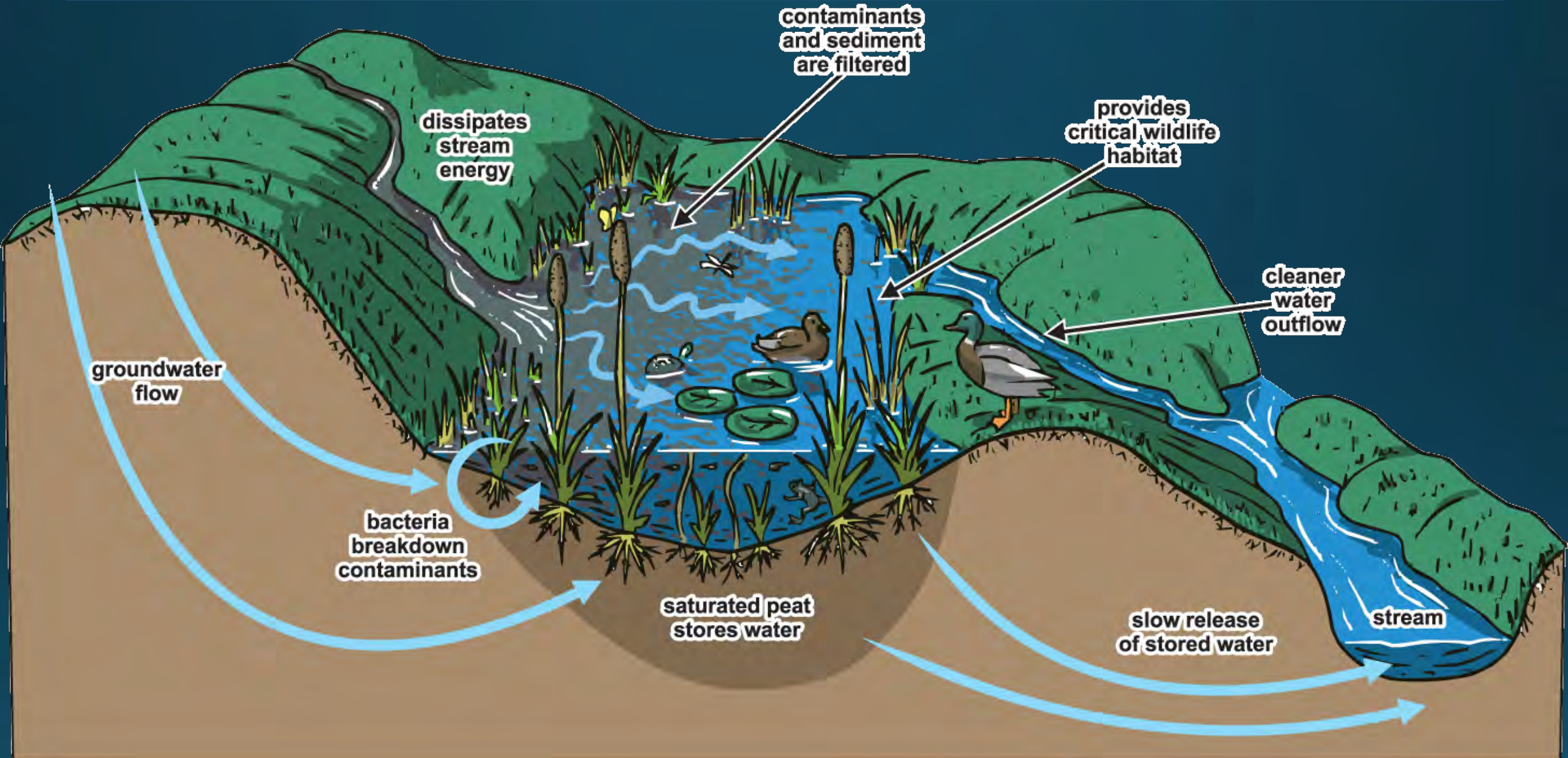
0 35 70 140 m

# Beavers Increase Biodiversity





# Beaver Wetlands Provide Valuable Ecosystem Services





# Status and Trends of Wetlands in the Conterminous United States 2009 to 2019

*Report to Congress*

## Accelerating Wetland Loss

- The lower 48 states have lost 50% of their wetlands since the 1780s.
- The rate of wetland loss has accelerated by 50% since 2009, amounting to a net loss of 670,000 acres — an area about the size of Rhode Island.
- 221K acres of wetlands were lost, primarily to uplands through drainage and fill.
- Wetland loss disproportionately affected vegetated wetlands, resulting in the loss of 670K acres of these wetlands.



# Beavers affect phosphorous levels

- Beaver ponds slow water flow allowing sediments to settle out
- Phosphorous accumulates in the sediment and becomes available for plant growth
- This reduces the amount of phosphorous carried downstream

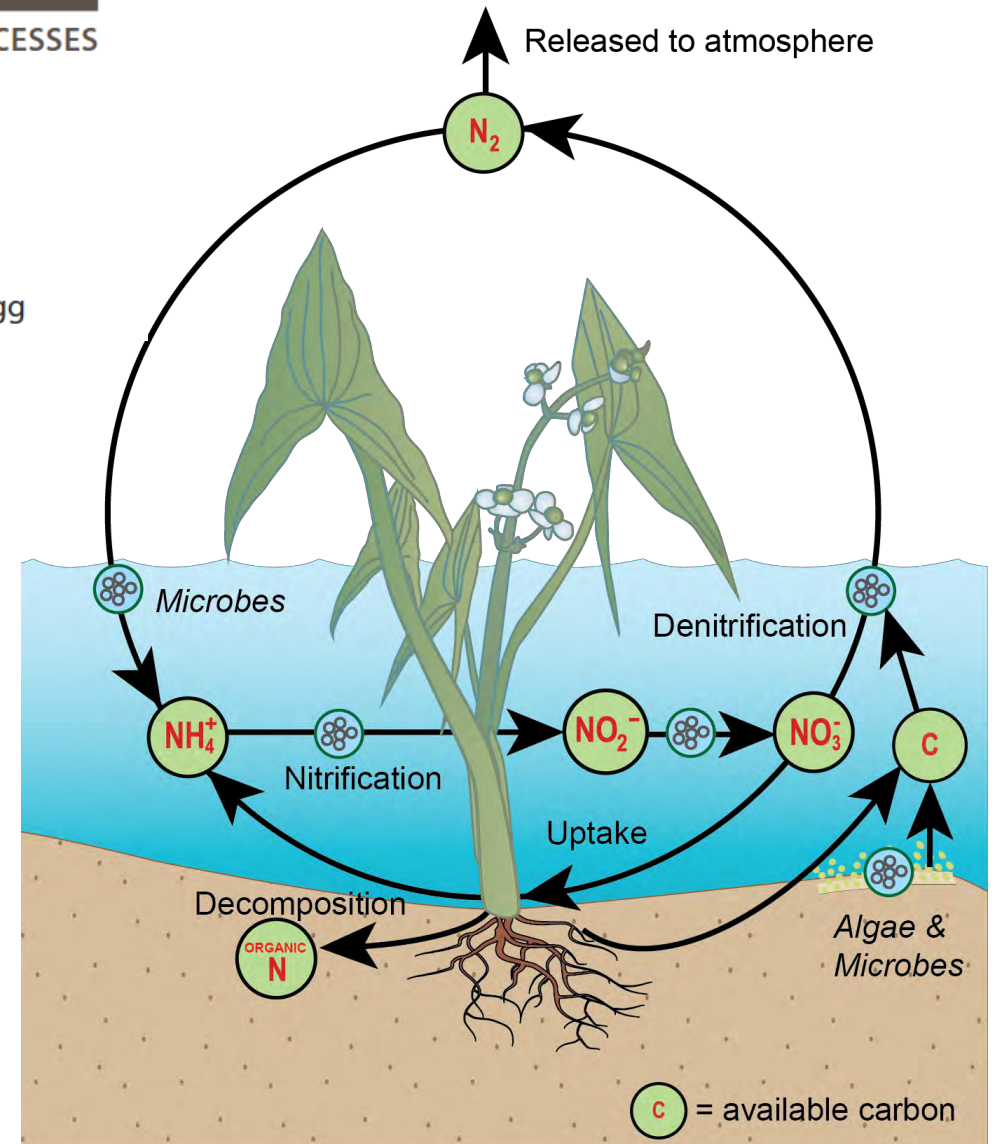




## Beaver Ponds: Resurgent Nitrogen Sinks for Rural Watersheds in the Northeastern United States

Julia G. Lazar, Kelly Addy, Arthur J. Gold,\* Peter M. Groffman, Richard A. McKinney, and Dorothy Q. Kellogg

“In rural watersheds of southern New England with high N loading, denitrification from beaver ponds may remove 5–45% of watershed nitrate-N loading.”





# Problems caused by beavers

- Damage to trees – often resulting in streambank erosion
- Dams blocking culverts – causing roads to flood
- Beaver dams bursting and flooding areas downstream





# Changing our Perception of Beaver

Can we see beaver as a net benefit instead of a nuisance?

- Wetland restoration
- Climate adaptation and resilience
- Increased biodiversity
- Improved water quality
- Tourism and Recreation





# Strategic Co-existence

- Biological vs. Social Carrying Capacity
- Biological: How many beaver can the landscape support?
- Social: How many beaver will people tolerate in a landscape?



# Strategies for reducing conflicts between beaver and humans

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Proactive land protection and  
management

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Public outreach and education

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Flow device installation (Beaver  
deceivers)

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Protecting trees with wraps and

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Removal by trapping (sometimes  
necessary)



# HOW TO LIVE WITH BEAVERS

## CONTROLLING DAM HEIGHT

CASTOR MASTER: Double Walled Pipe & Round Fence Filter - Skip Lisle



FLEXIBLE LEVELER: Single walled pipe & domed filter - Mike Callahan

Worth A Dam Photos

## CULVERT PROTECTION



BEAVER DECEIVER : Trapezoidal Fencing in front of culvert - Skip Lisle



DOUBLE FILTER SYSTEM or PIPE & FENCE

Worth A Dam Photos

## ABRASIVE PAINTING

### Ingredients:

- Paint: Exterior Latex (choose a color to match the bark)
- Mason Sand: 30 mil - 70 mil

### Formula

- Mix 5 oz sand per quart of paint
- Mix in small batches, or press sand on by hand after painting.

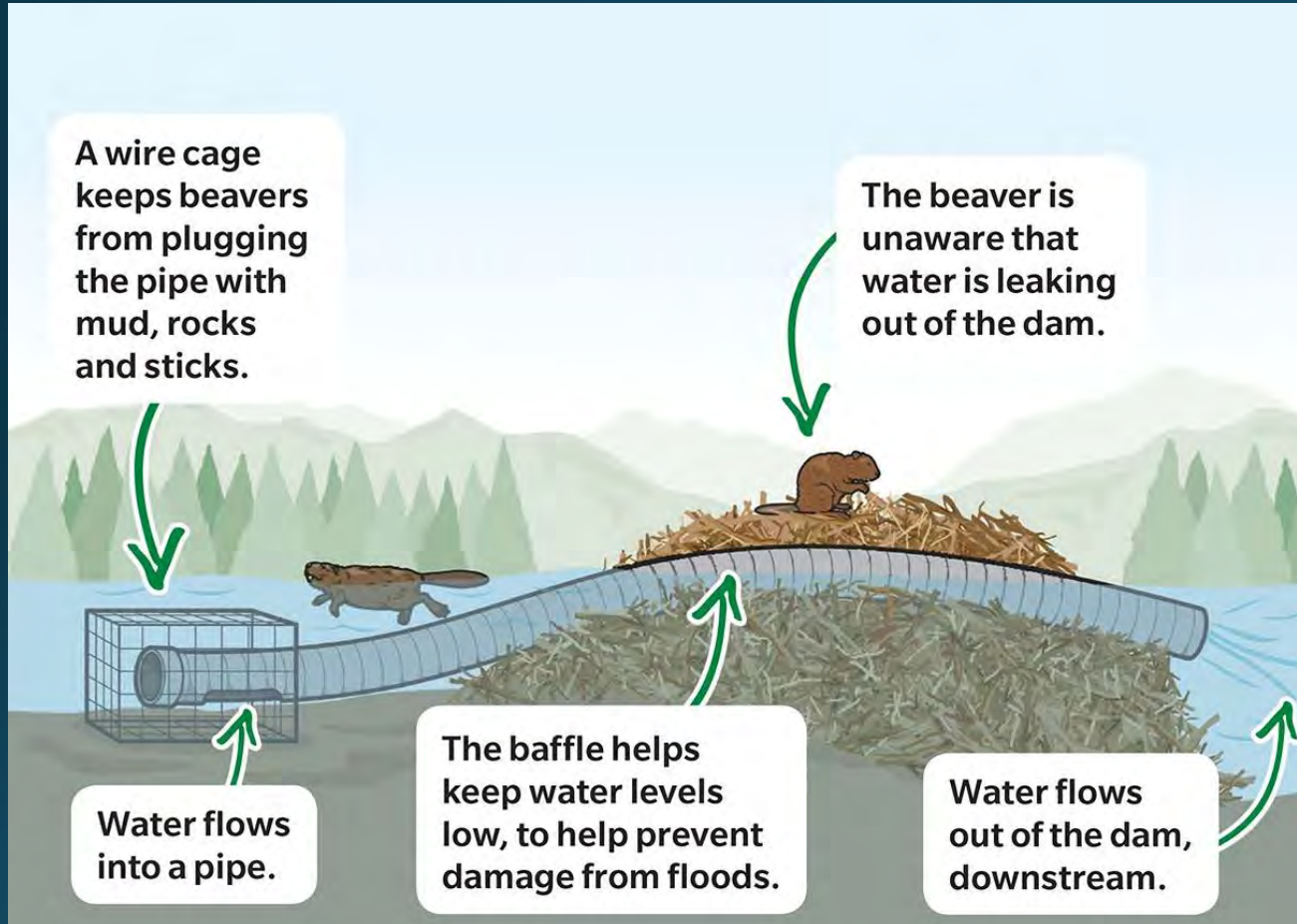


# Beaver Deceivers can allow beaver to remain in the landscape while reducing negative impacts

- Flow devices allow the flow of water through beaver dams in a way that deceives the beavers
- They moderate the flow of water to keep levels high enough to preserve the functions of the wetlands, but low enough to prevent damage to roads and culverts
- They can be more cost effective than removing beaver: Callahan et al. 2019 studied 55 conflict sites, 43 with flow devices. Non-lethal control cost \$229/site/year and lethal control cost \$409 per site per year



# Flow Devices









# Questions and Discussion



















