

Washington County Water Consortium

April 2, 2025

2 to 3:45 pm

Remote meeting - Zoom

(If you are not on the Consortium listserv, please email

Adriana.Atcheson@co.washington.mn.us for the Zoom link and access code)

Agenda

2:00 - 2:05

Welcome

Introductions, Announcements

2:05 - 2:40

Beavers in Minnesota: Balancing Environmental Benefits and Conflict Management

Topic: Beavers are powerful ecosystem engineers capable of radically transforming the landscapes they inhabit. From lakes, to rivers, to streams – beaver dam building, tree cutting, and canal digging influence a multitude of biological and physical processes. This, in turn, can improve things like water quality, fish and waterbird habitat, and even the ecosystem's resilience to drought, flood, and fire. It can also be a headache when it results in things like flooded roads or loss of ornamental trees. This talk will cover what the beavers here in the Great Lakes region do and do not do, how we currently manage them, and strategies for more sustainable management in the future.

Presenters:

- Dr. Emily Fairfax – Assistant Professor of Geography, University of Minnesota and Affiliate Faculty Member, St. Anthony Falls Laboratory
- Andy Riesgraf – Research Scientist, University of Minnesota/St. Anthony Falls Laboratory

2:40 - 2:50

Questions

2:50 - 3:30

Wetland Conservation Act, BWSR Rules and Program Updates

Topic: Updates from BWSR on pertinent Wetland Conservation Act (WCA) Rule changes.

Presenter: Ben Meyer – Wetland Specialist, BWSR

3:30 - 3:45

Questions/Adjourn

Minnesota's Beavers: balancing benefits and conflict management

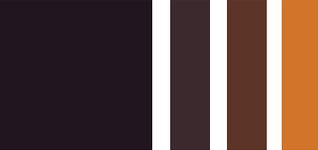
Emily Fairfax, Ph.D., University of Minnesota



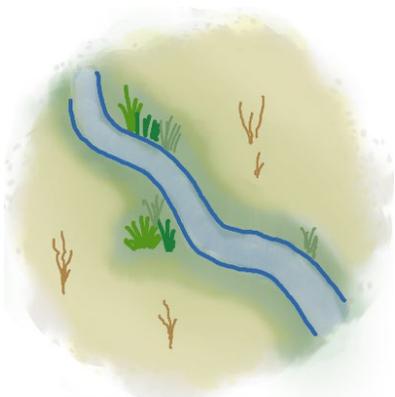


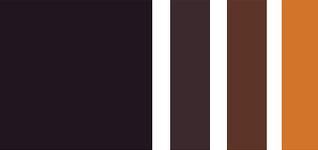
Beavers: Nature's Engineer





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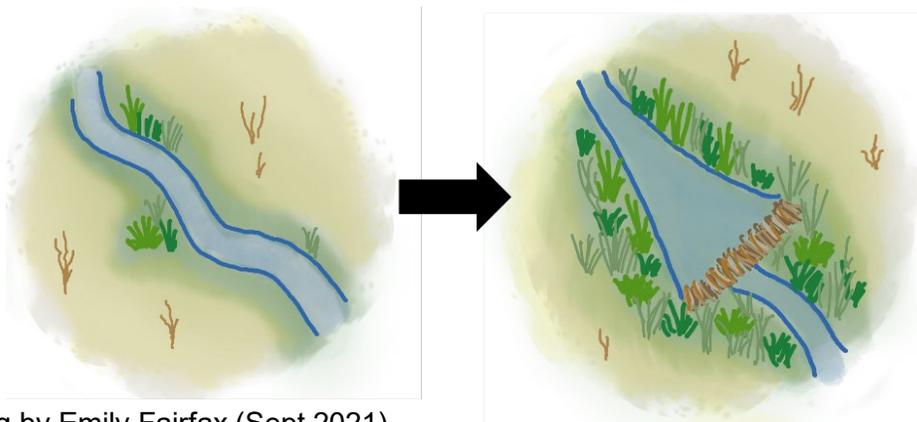


Photo and Drawing by Emily Fairfax (Sept 2021)

Beavers: Nature's Engineer

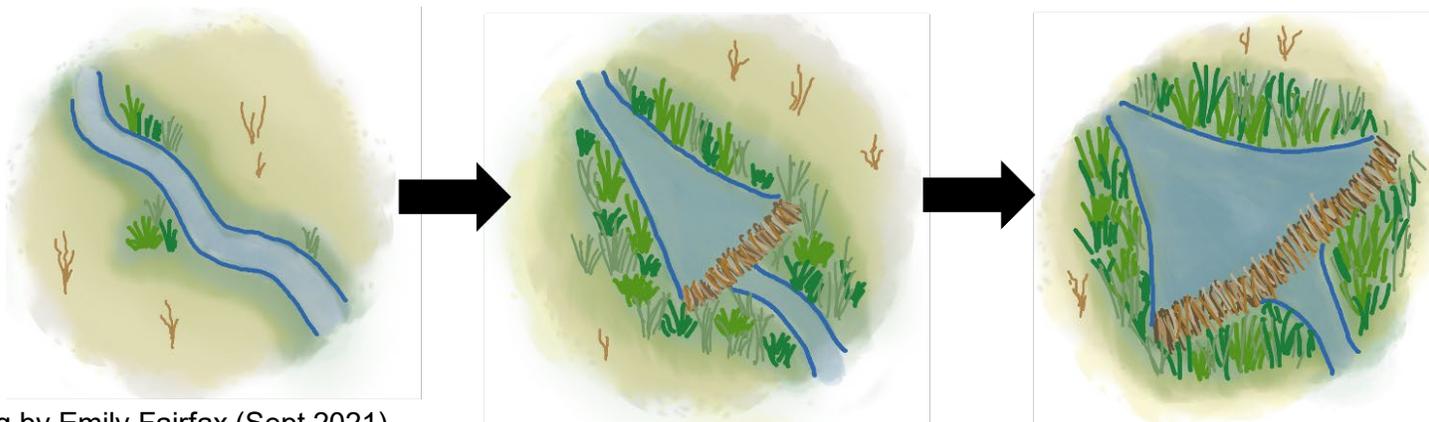


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Beavers: Nature's Engineer

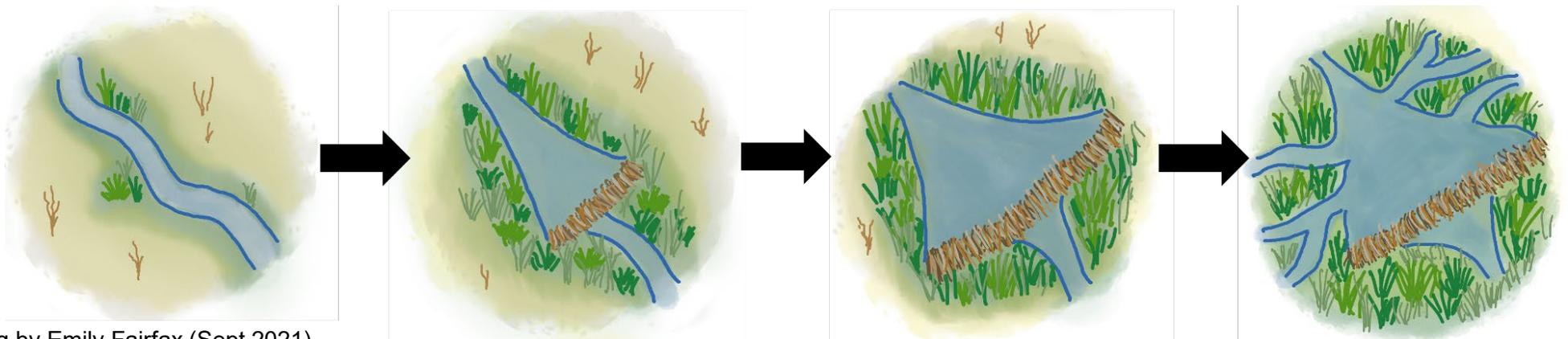
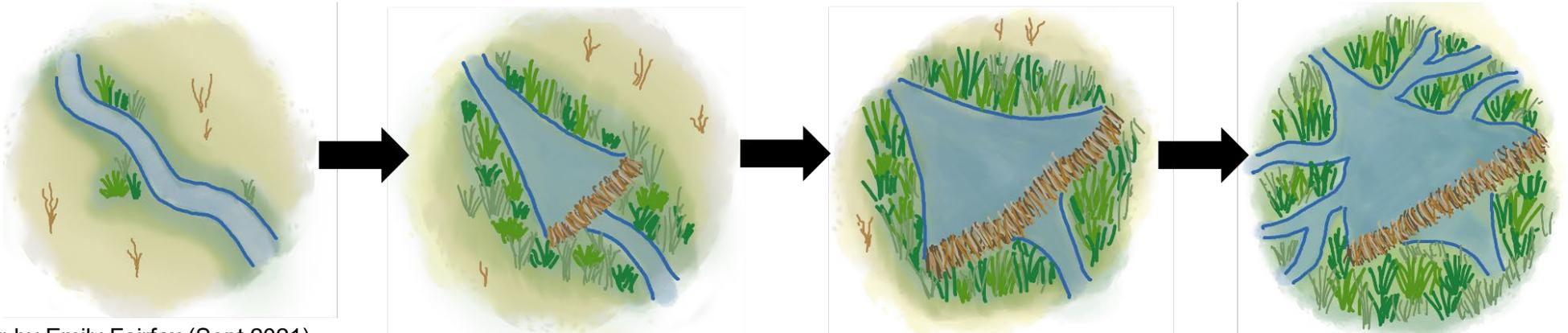
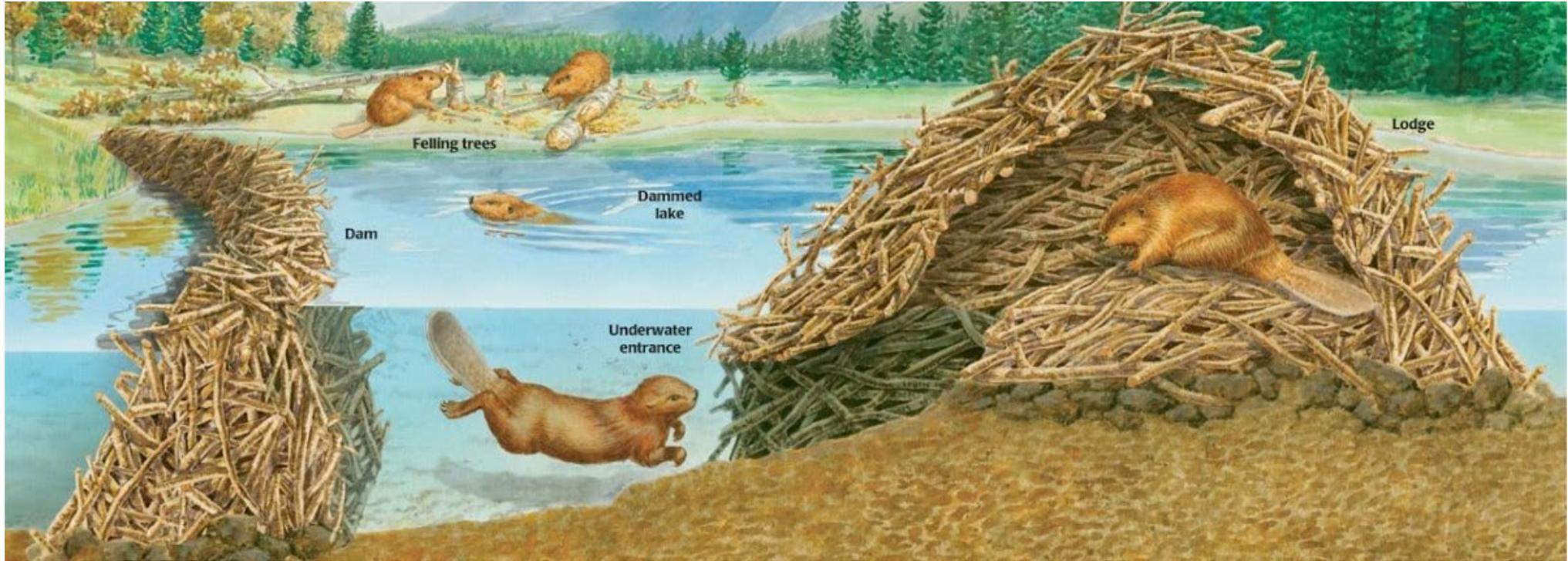
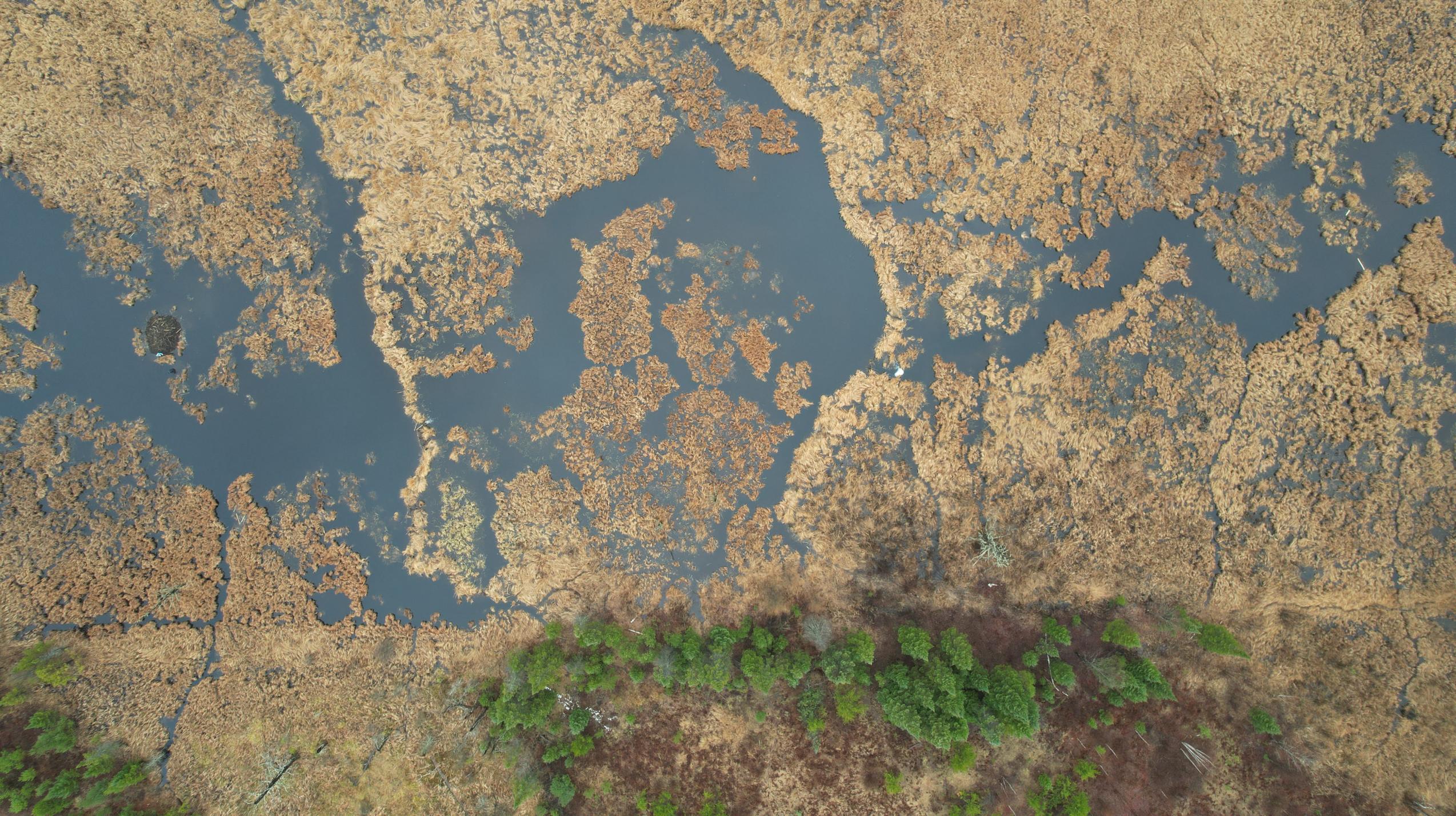


Photo and Drawing by Emily Fairfax (Sept 2021)

Beavers: Nature's Engineer







Beaver Conflict in Minnesota



Leave It To Beavers?

By **Joe Friedrichs**

Published June 9, 2023 at 5:37 AM EDT

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“In 2007, helicopters were circling over a few rivers and streams in Minnesota near Lake Superior. They were looking for beaver dams. The Minnesota Department of Natural Resources had just come up with a new plan: to **get rid of as many beavers and their dams as possible...**

‘I mean, ideally, if we could eliminate the majority of beaver in the entire watershed, we would have a lot less maintenance trapping to do.’ – Deserae Henrickson, MN DNR”

‘And then that was it. I stopped working for the feds and the DNR. It just didn't make any sense. ‘Kill them all,’ she says.’ – Dan Croke, MN Trappers Association Hall of Fame Trapper”

–Interlochen Public Radio

Enterprise

SPORTS NORTHLAND OUTDOORS

COLA: How much tree damage can a beaver's iron teeth inflict?

To help answer these questions, Hubbard County Coalition of Lake Associations checked with local Minnesota Department of Natural Resources (DNR) Wildlife and Forestry personnel and found fascinating facts about the beaver.



If you hear a sharp slap on the water, you've likely been spotted by a local beaver swimming along the shoreline. Contributed/Craig Bihire

FINAL ENVIRONMENTAL ASSESSMENT

Reducing Beaver Damage Through an
Integrated Wildlife Damage Management Program
in the
State of Minnesota

Prepared By:
UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
WILDLIFE SERVICES

January 2002

In Minnesota, beaver cause significant damage primarily as result of dam building and subsequent flooding, bank burrowing, tree cutting and obstructing overflow structures and spillways. The MDNR lists beaver as the wildlife species responsible for the second highest number of nuisance/damage calls in the state. Beaver are also listed as the second leading cause of economic damage by a wildlife species in the state. (MDNR 1993).

MDNR findings indicate Minnesota beaver damage issues in descending order of significance are:

1. Flooded roads (also including roadbed degradation, culvert washouts and resulting maintenance).
2. Flooded agricultural fields.
3. Flooded commercial timber.
4. Gnawing damage to commercial and ornamental trees.

Beaver Management in Minnesota



DEPARTMENT OF
NATURAL RESOURCES

Page Menu

Beavers

Although beavers provide many positive environmental values, they can also cause property damage. Presently, beavers are abundant in Minnesota. To help landowners and others manage beaver damage, the Minnesota DNR offers the following information and advice.

Methods for exclusion and damage prevention

- In some situations, water levels in the beaver pond may be controlled by special devices such as the [Clemson beaver pond leveler \(PDF\)](#). For information and technical assistance, contact your [local DNR area wildlife office \(PDF\)](#). The levelers are no longer available from Minncor, but can be built using a few basic tools and information in the brochure.
- Protect individual trees in your yard by placing hardware cloth cylinders at least 30" tall around the base of the tree. Energized fencing can protect larger areas.
- Plant native evergreens such as common juniper (*Juniperus communis*) that beaver do not like or other shrubs that regrow after some beaver damage (i.e. red osier dogwood, pussy or prairie willow).
- Create a buffer strip of native vegetation suited to your location. Visit the [Lakescaping](#) Web page for additional help with your shoreland management.



- **Outdated** information on pond levelers (Clemson no longer recommended, also not available anymore)
- **Incorrect** fence for tree protection shown

Beaver Management in Minnesota



Removal methods

In many cases, beaver damage cannot be effectively managed unless the offending beavers are removed (killed). Removing a dam without removing the resident beavers generally results in the dam being immediately rebuilt. To remove a beaver dam that is causing flooding, a permit is not needed if:

- Removal of the dam does not constitute work in Public Waters (contact your [local DNR area hydrologist](#) ([PDF](#)) for a determination).
- The dam is located on land owned or managed by the individual experiencing the flooding.
- If the dam is NOT on land owned or managed by the individual experiencing flooding and permission has been granted by the land owner or manager.
- Authorized by state statute (i.e. road authorities, drainage authorities).

The DNR encourages property owners to work with local trappers to take beaver causing damage during the open trapping season. No permit is needed for a licensed trapper during the regular beaver season. Your local Conservation Officer or Area Wildlife Office may have names of local experienced trappers who may be willing to assist in trapping beaver for you. Fees, if any, will vary with seasons and individuals.

No Permit is Required Minnesota Statute 97B.655 which allows a landowner or legal occupant (e.g., authorized renter), or their authorized agent, to shoot or trap beaver that are causing damage. No license or permit is required if all four of these conditions are met:

1. The landowner/occupant must have beaver damage to their property.
2. The landowner/occupant must authorize the removal.
3. The animal must be on that landowner's/occupant's property, where it is causing damage, at the time it is shot or trapped.
4. The person taking the beaver must notify the DNR within 24 hours, by following the Reporting Requirements listed below.

The reporting requirements for a person who takes beaver causing damage, without a permit, is they must contact the local DNR Conservation Officer or Area Wildlife staff within 24 hours of killing the beaver. It is sufficient to leave a message or e-mail the [Information Center](#) ☎ 1-888-MINNDNR stating your name, address, telephone number, the total number of beaver shot or trapped, along with a brief explanation of the damage and location the beaver was shot or trapped.

A permit is required if the above conditions are not met. This permit is issued by the local conservation officer or regional wildlife manager, is free, and authorizes beaver to be taken out of season and without a license. All federal, state, or local regulations apply. This permit does not allow trespassing, using poison, using artificial lights or the discharge of firearms or use of traps where prohibited. Live relocation of beavers is not allowed.

Federal, state, county, township or local governmental employees, while on duty as a representative of that government, do not need a permit while doing beaver removal on land under their jurisdiction.

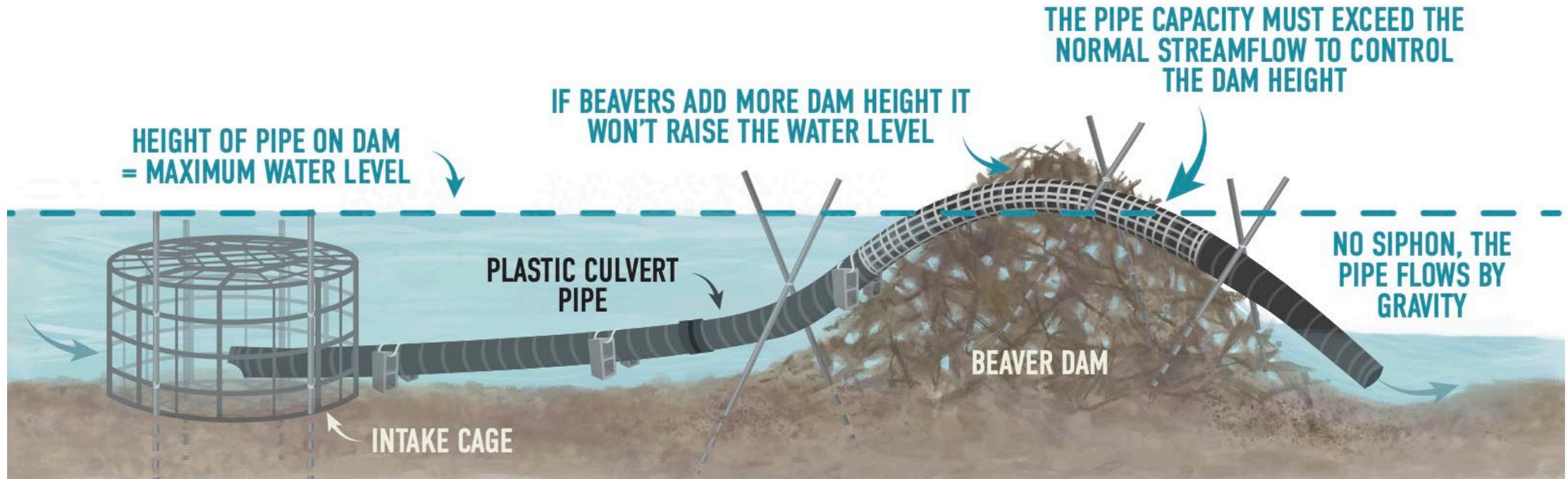
- **Statute 97B.667 Removal of beaver dams and lodges by road authorities.** When a drainage watercourse is impaired by a beaver dam and the water damages, or threatens to damage a public road, the road authority, as defined in section 160.02, subdivision 25, may remove the impairment and any associated beaver lodge within 300 feet of the road. Before killing or arranging to kill a beaver under Subd. 3. (a), the road authority or government unit must contact a conservation officer for a special beaver permit if the beaver will be killed within two weeks before or after the trapping season for beaver, and the conservation officer must issue the permit for any beaver subject to this section.

Affecting public waters

In some cases, lakeshore has been developed in conformance with water levels resulting from a beaver dam controlling the outlet for many years. Before removing a beaver dam in that situation, contact the DNR Area Hydrologist.

- **MN Beavers Trapped per Year: 25,000-30,000**
- **Relocation is currently illegal**
- **Minimal Formal Support for non-lethal or coexistence efforts**

Non-Lethal Beaver Management Options



- **Durable:** last 5-10 years with minimal maintenance
- **Inexpensive:** costs less than repeated trapping and dam removal
- **Ecologically Integrated:** does not remove wetland, but does mitigate flood damage

Non-Lethal Beaver Management Options

> [Environ Manage.](#) 2022 Jul;70(1):97-104. doi: 10.1007/s00267-022-01658-z. Epub 2022 May 9.

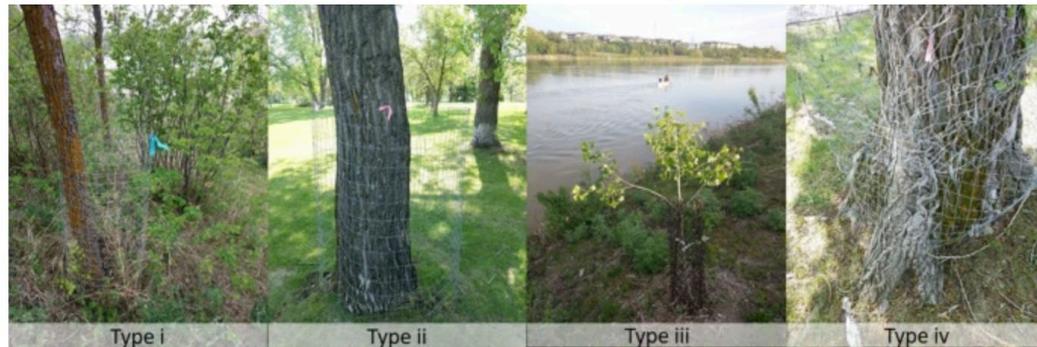
Relative Effectiveness of Four Different Guards In Preventing Beaver Cutting of Urban Trees

Cherie J Westbrook ¹, Kirby England ² ³

Affiliations + expand

PMID: 35532811 DOI: [10.1007/s00267-022-01658-z](#)

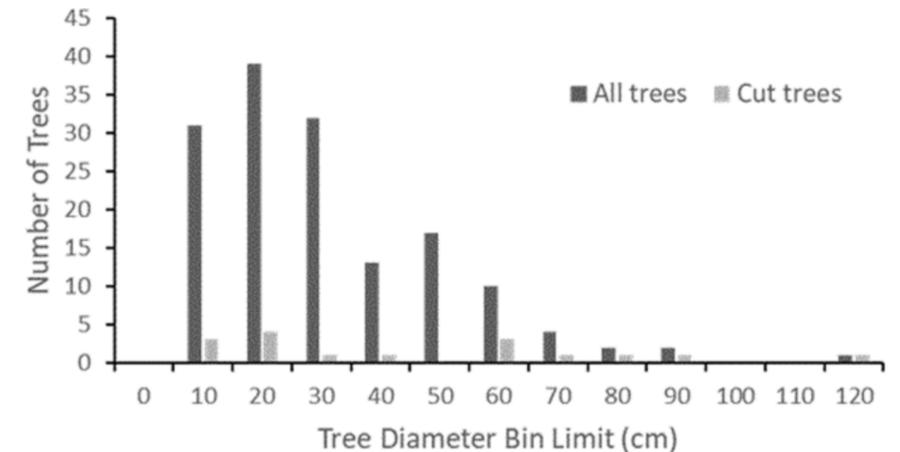
Fig. 2



Examples of the four materials used in wire mesh tree guard construction in the City of Saskatoon. Type i is wire fencing with a 2 × 2 inch (50 × 50 mm) square mesh size; type ii is wire fencing (elk fence) with a 2 × 6 inch (100 × 150 mm) rectangular mesh size; type iii is chain link fence with a 2 × 2 inch (50 × 50 mm) diamond mesh size; type iv wire poultry netting with a 1 inch (25 mm) hexagonal mesh size

Type ^a	n	No. beaver cut trees (no. severe cuts)	Mean guard height (SE), cm	Mean diameter difference ^b (SE), cm	No. trees with guards that meet recommended guidelines ^c for			No. trees meeting both guidelines that were beaver cut
					Height	Diameter	Both	
i	91	8 (4)	120 (1.5)	38 (2.3)	72	61	48	2
ii	19	1 (0)	148 (2.2)	39 (4.9)	19	10	10	0
iii	23	4 (1)	90 (1.7)	12 (2.4)	0	2	0	n/a
iv	18	3 (1)	67 (8.9)	1.0 (1.0)	0	0	0	n/a
Overall	151	16 (6)	113 (2.3)	56 (2.8)	91	73	58	2

Fig. 3



The distribution of diameters of trees outfitted with guards and trees with guards that were cut by beavers

Non-Lethal Beaver Management Next Door



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ENVIRONMENT

An ecosystem engineer's vision: mock beaver dams to restore Wisconsin wetlands

Beaver-inspired structures could limit flooding and benefit wildlife habitat, but state permitting is arduous.



Donate 

ENVIRONMENT

Opting for coexistence: Some Wisconsin landowners learn to live with beavers

Beavers can cause property damage, but research shows they positively impact the environment. Some landowners are ditching traps and dynamite to peacefully manage the nuisance.



Katie McCullough, 56, paddles across a pond on her property with her dog, Ky, on Oct. 18, 2024, near Rio, Wis. McCullough installed a pond leveler on her property after discovering an active beaver lodge and dam. (Joe Timmerman / Wisconsin Watch)

Non-Lethal Beaver Management Professionals



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Andy Riesgraf, Beaver Innovations

BeaverCorps Professional
Minneapolis MN

[More info](#)

[Directions](#) 2.4 mi

Clay Frazer, Native Range Ecological

BeaverCorps Professional
Deerfield WI

[More info](#)

[Directions](#) 245 mi

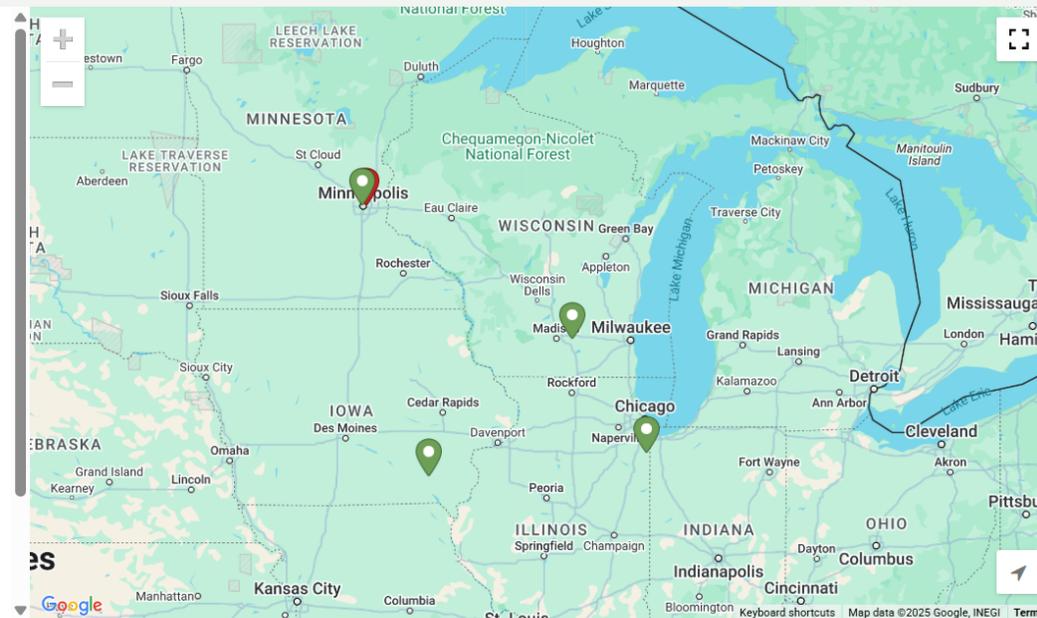
Chris Sorflaten, Leave it to Beavers Contracting, LLC

BeaverCorps Professional
Fairfield IA 52556

[More info](#)

[Directions](#) 281.1 mi

Jeff Boland-Prom, Midwest Beaver Mitigation



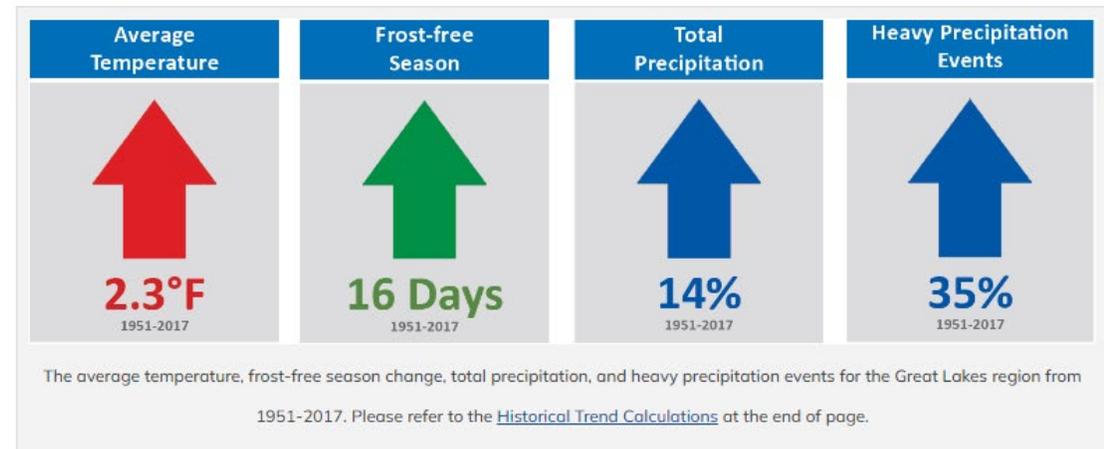
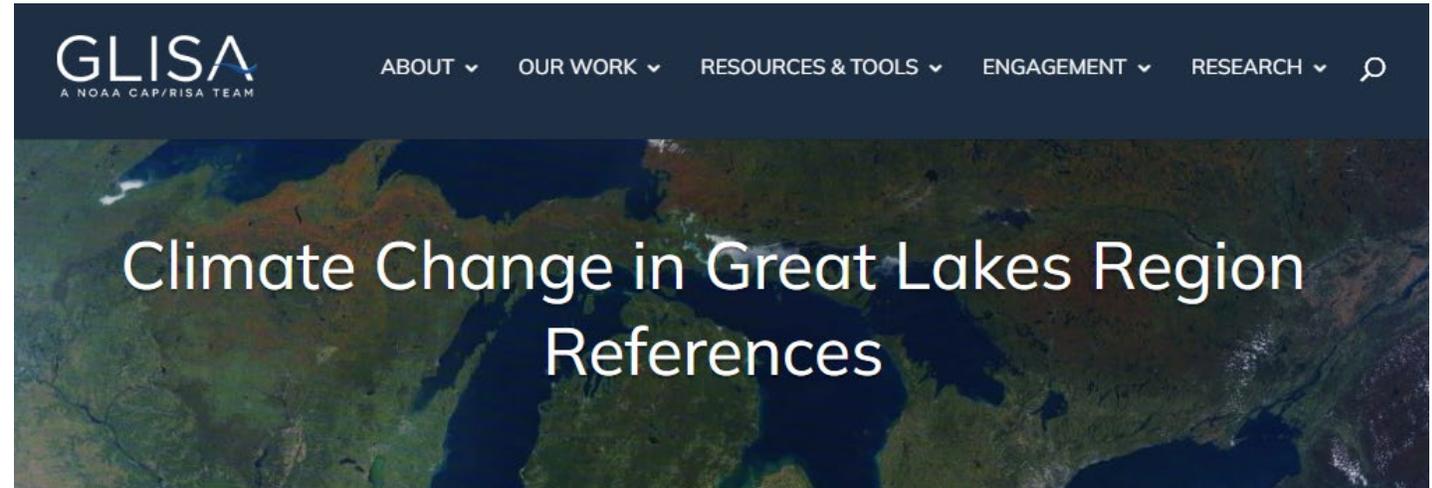
Why bother?



Temperature, Precip, Timing, Storms – all changing

Coming soon:

- **Wetter, shorter** winters (rain, not snow)
- **Drier** summers
- All around **hotter temps.**
- Flashier **storms.**



Climate-related threats that used to be just a western US problem are creeping eastwards.

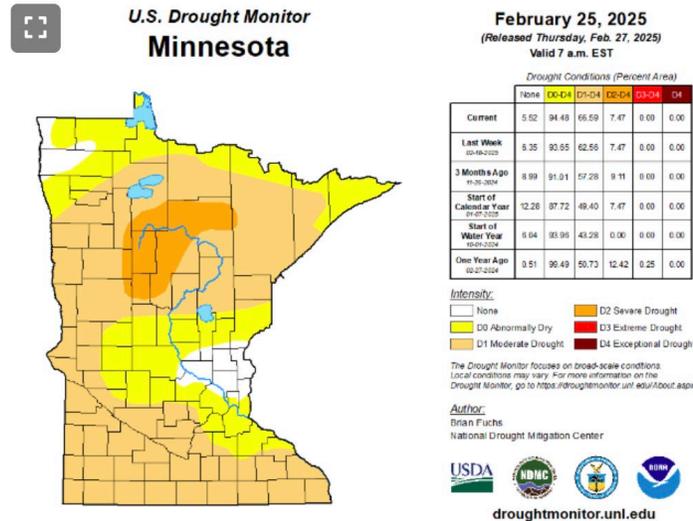
Study: Wildfire led to poorer water quality in northern Minnesota lakes

Kirsti Marohn Brainerd, Minn. September 4, 2023 8:00 AM



Severe drought affecting north central part of the state

by Erik Jacobson Mar 13, 2025 0



B105
The Northland's #1 For New Country

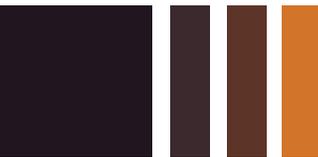
THE NORTHLAND'S #1 FOR NEW COUNTRY

RED FLAG WARNINGS NOW ISSUED IN 27 MINNESOTA COUNTIES

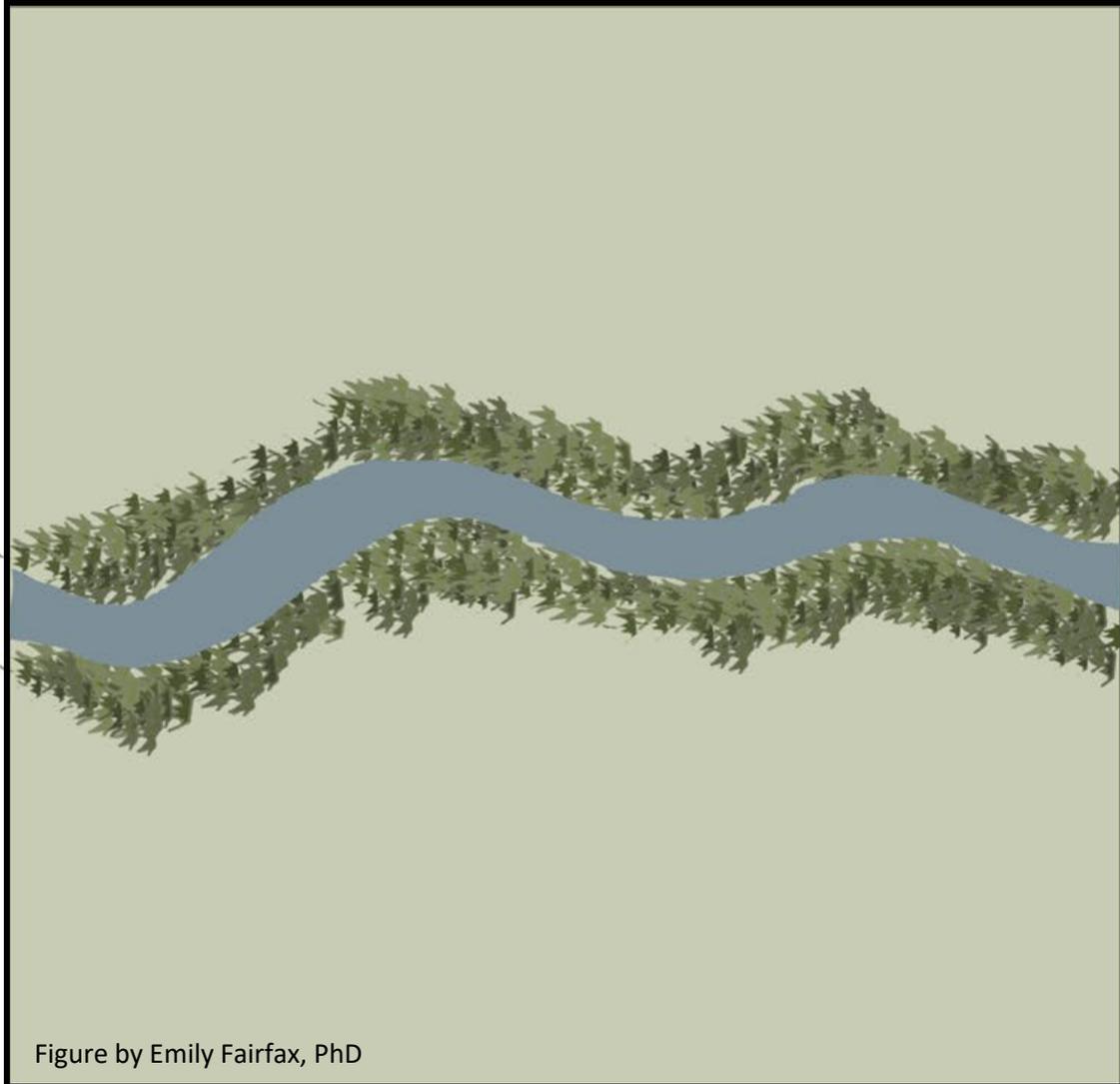
David Drew | Published: March 10, 2025

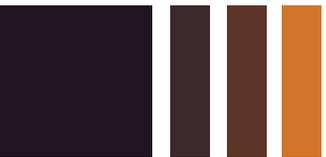
Why bother? Beaver dams, canals, and wetlands are climate-resilient natural infrastructure



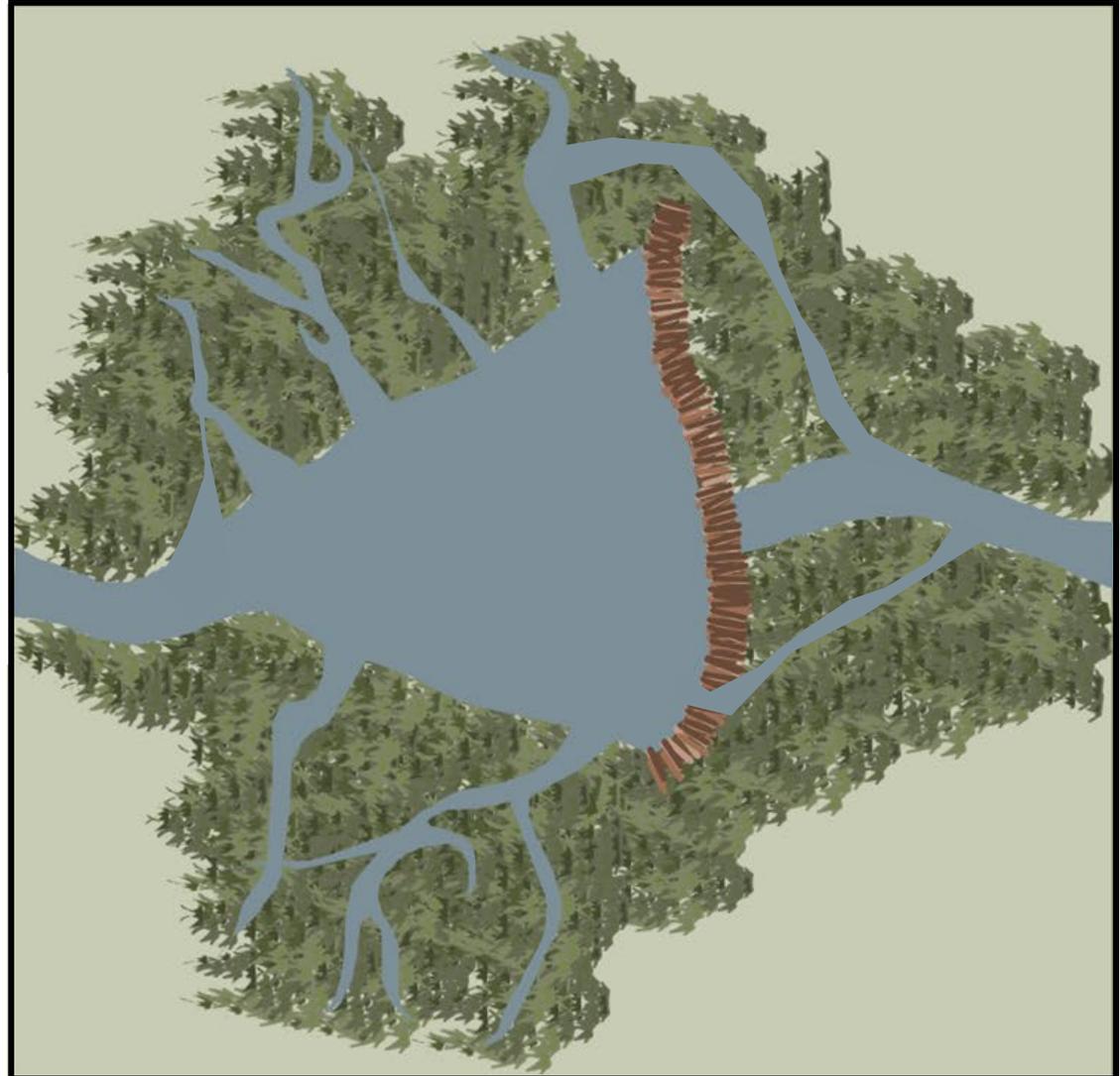
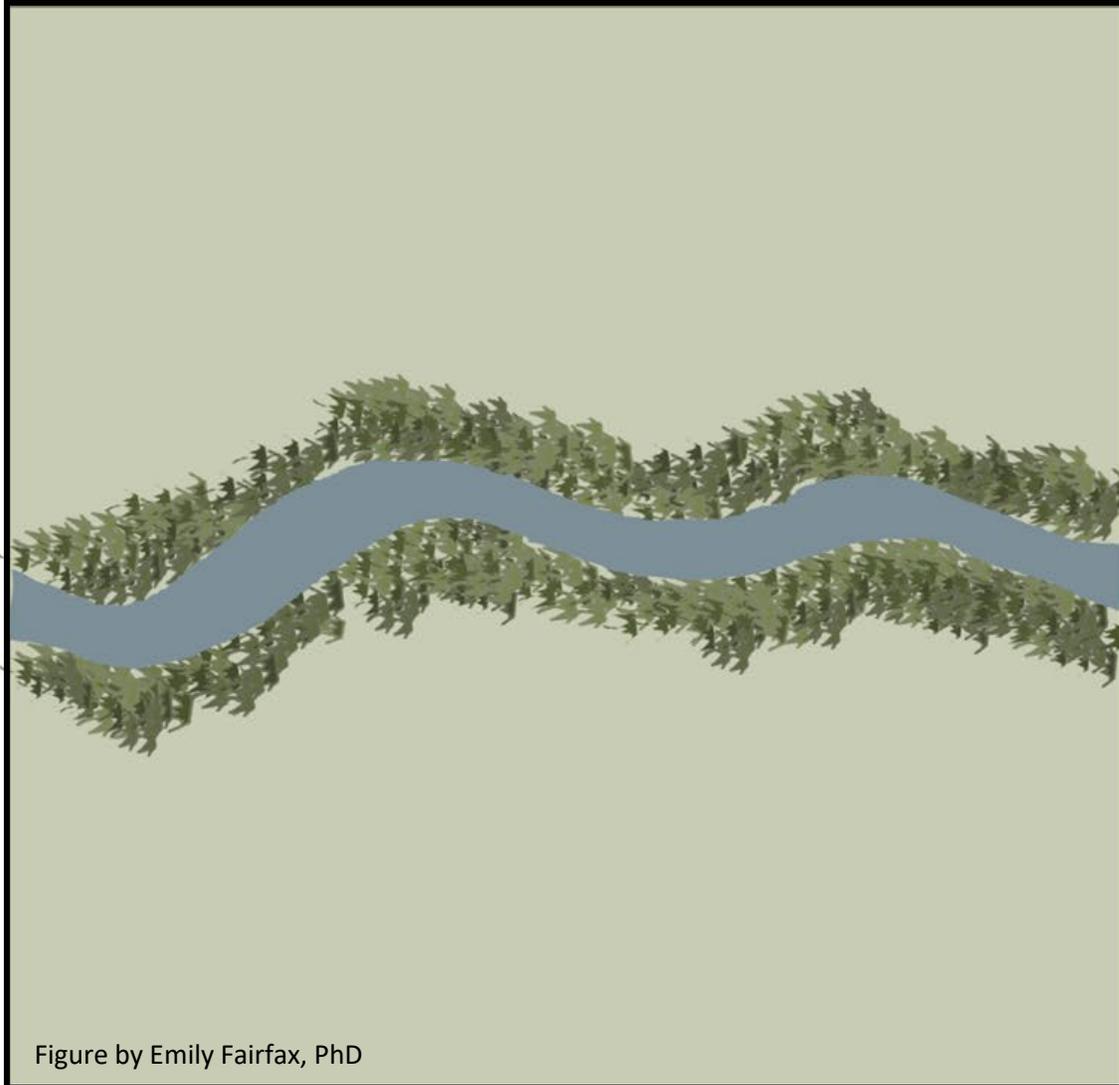


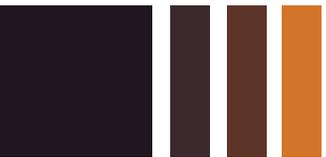
Complexity Builds Resilience: Starting with Floods



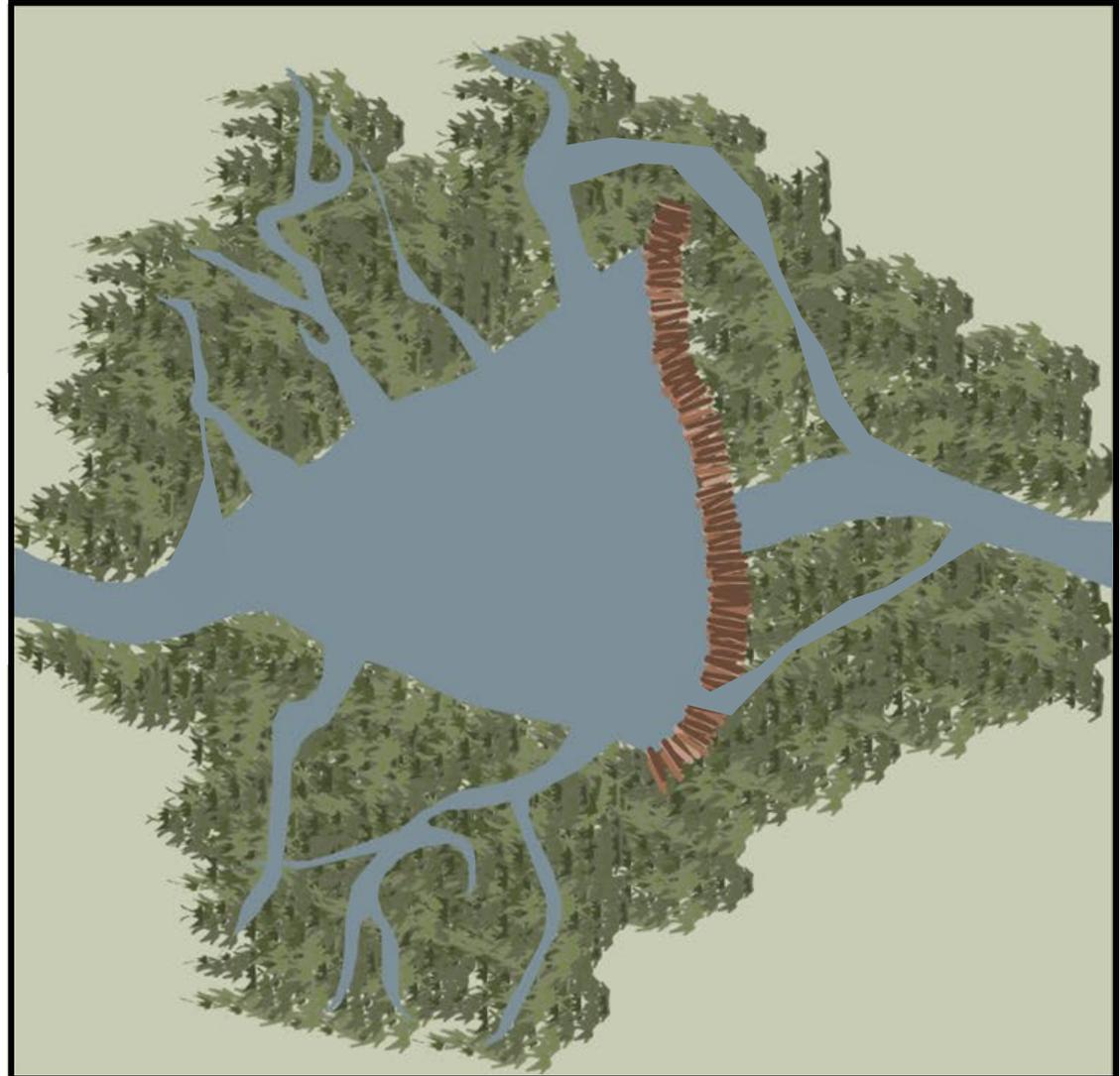
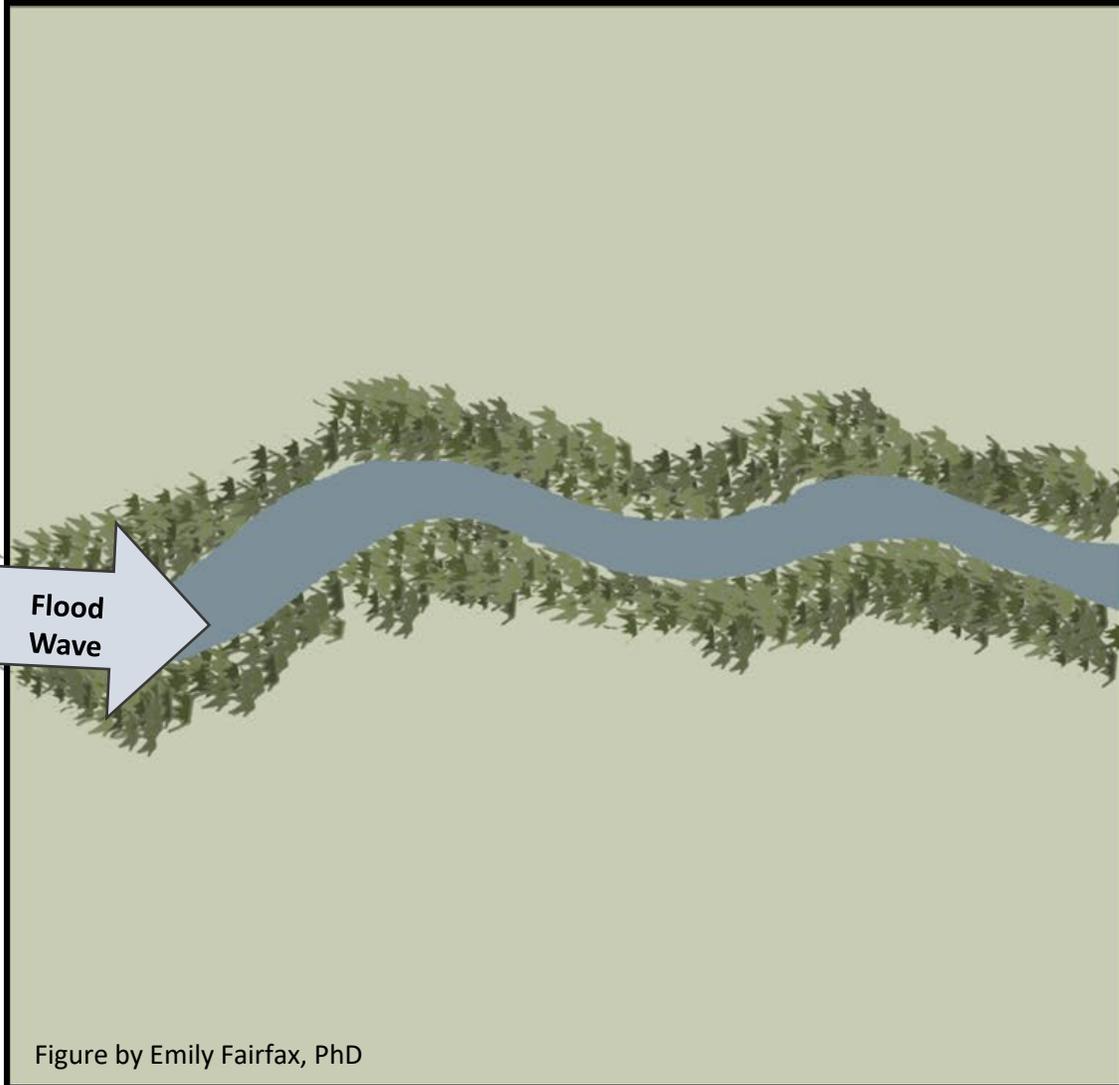


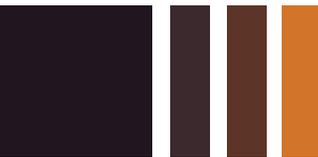
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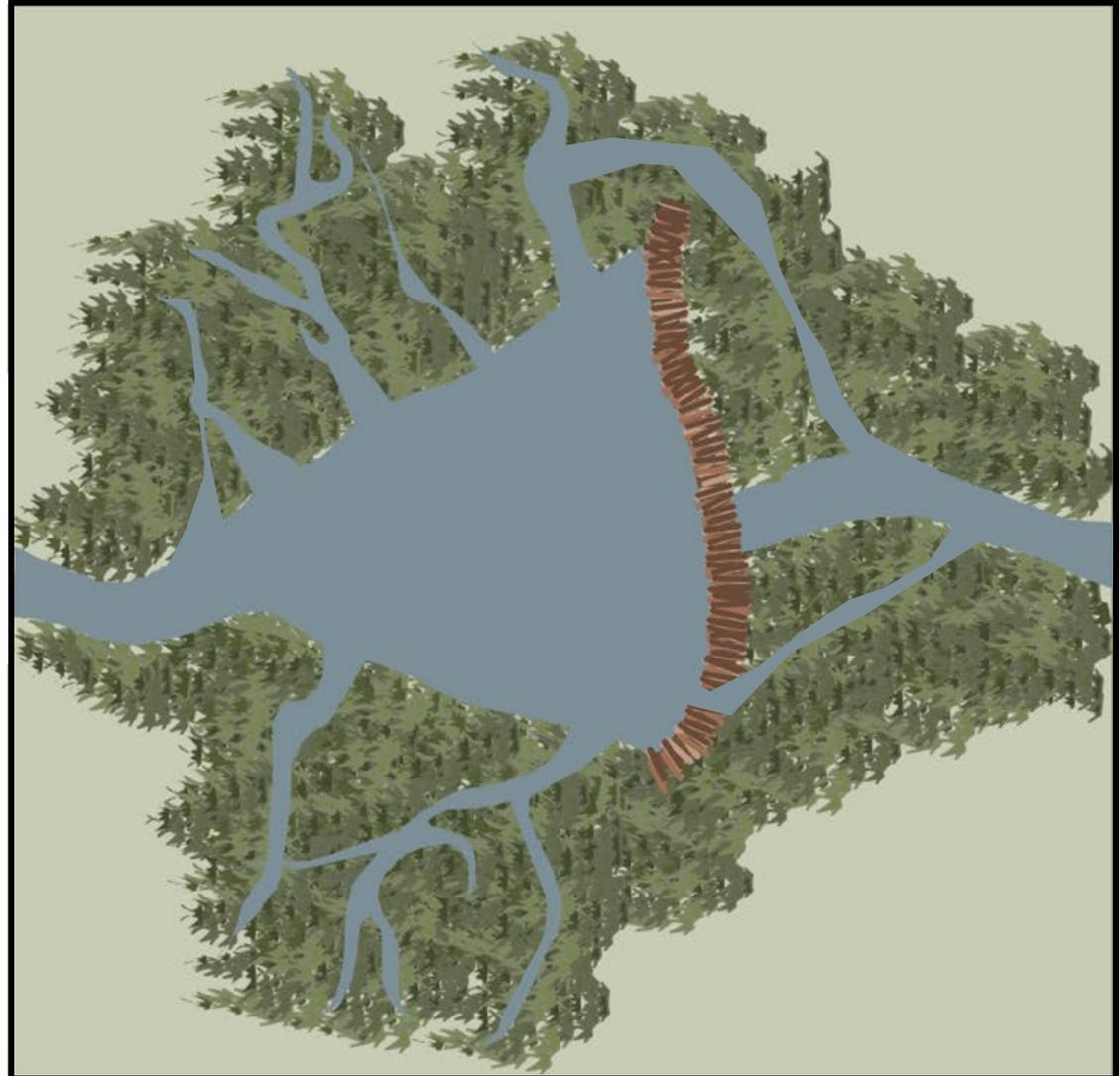
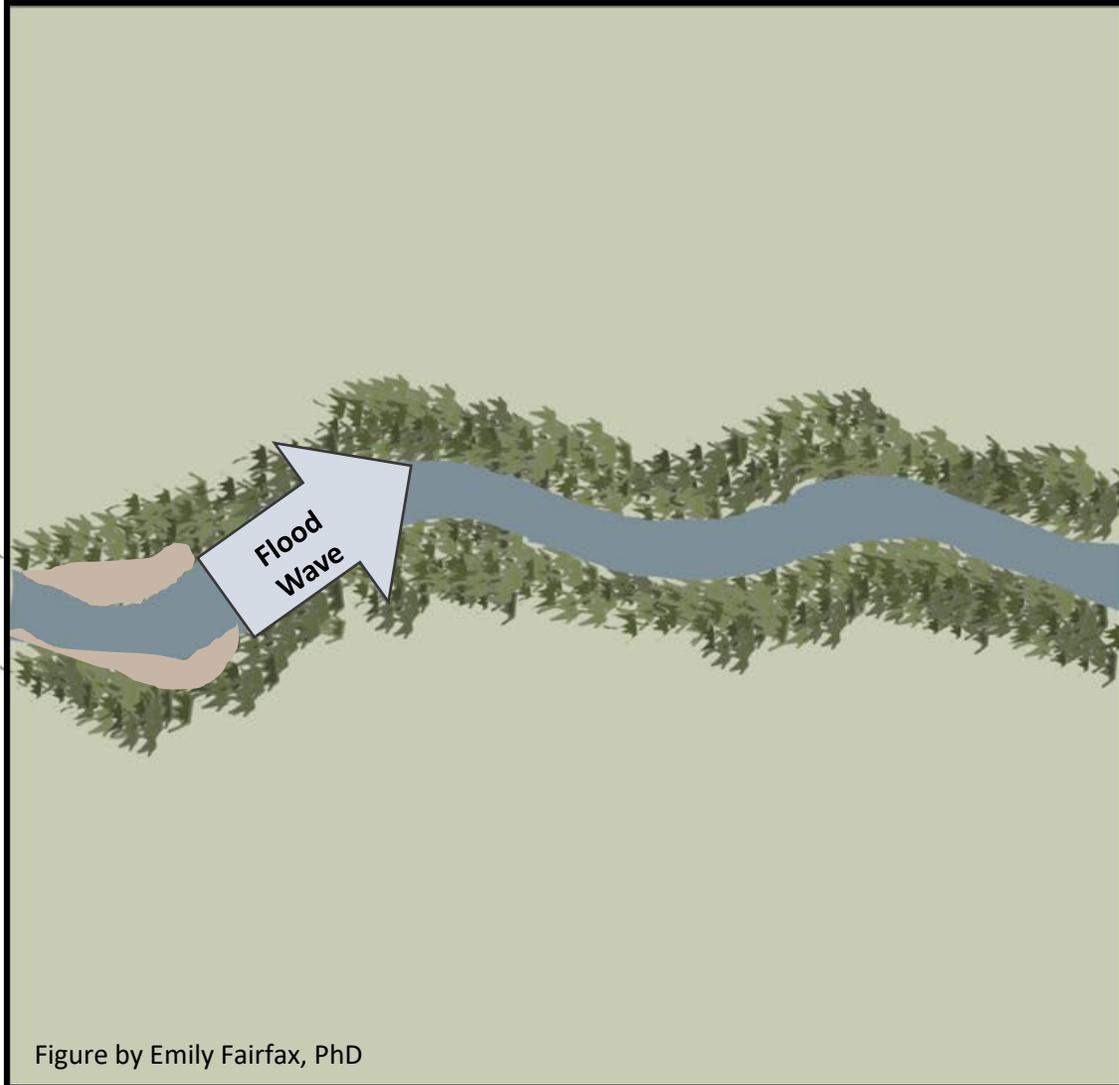


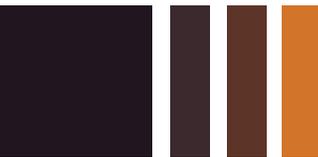
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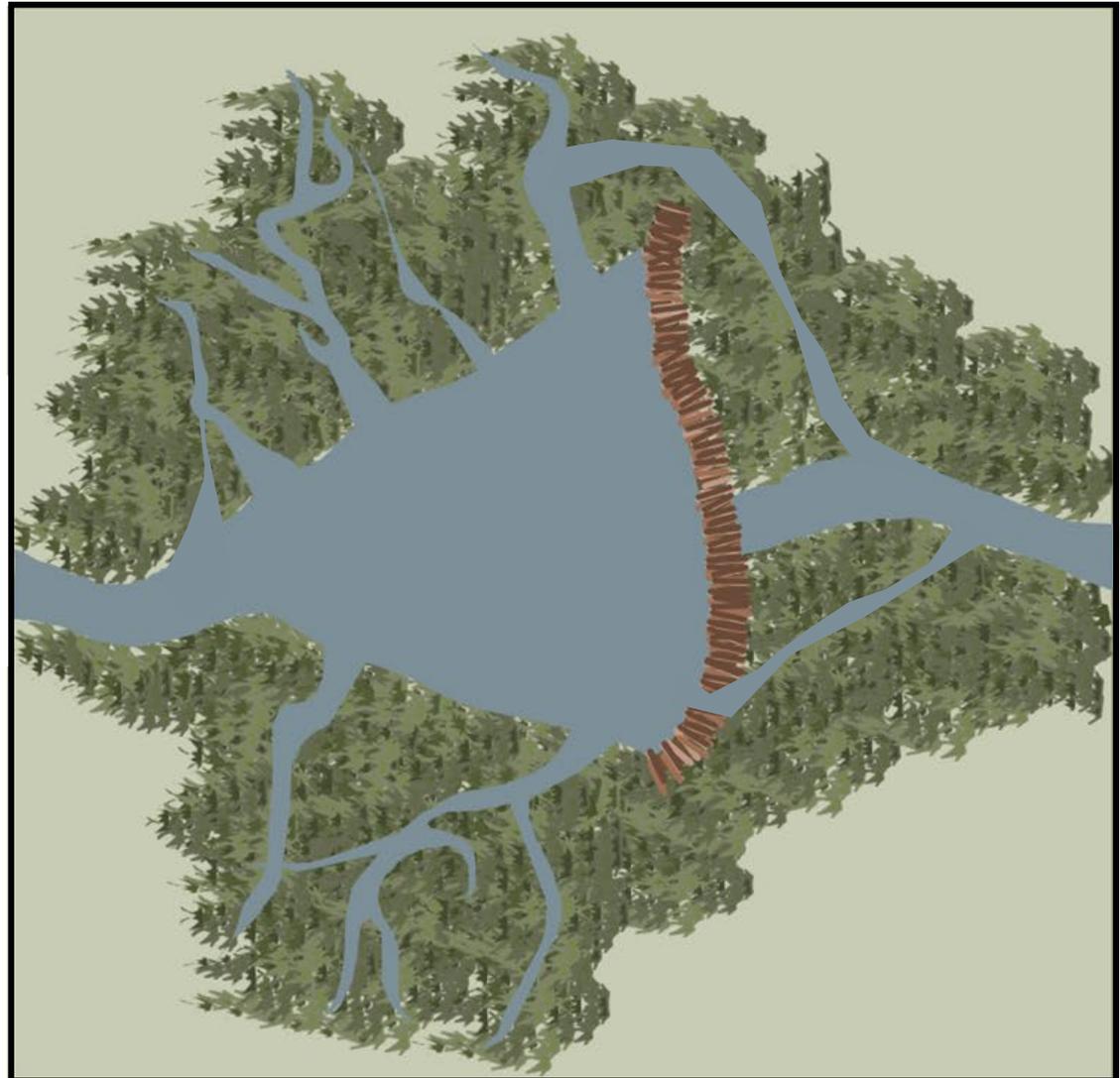
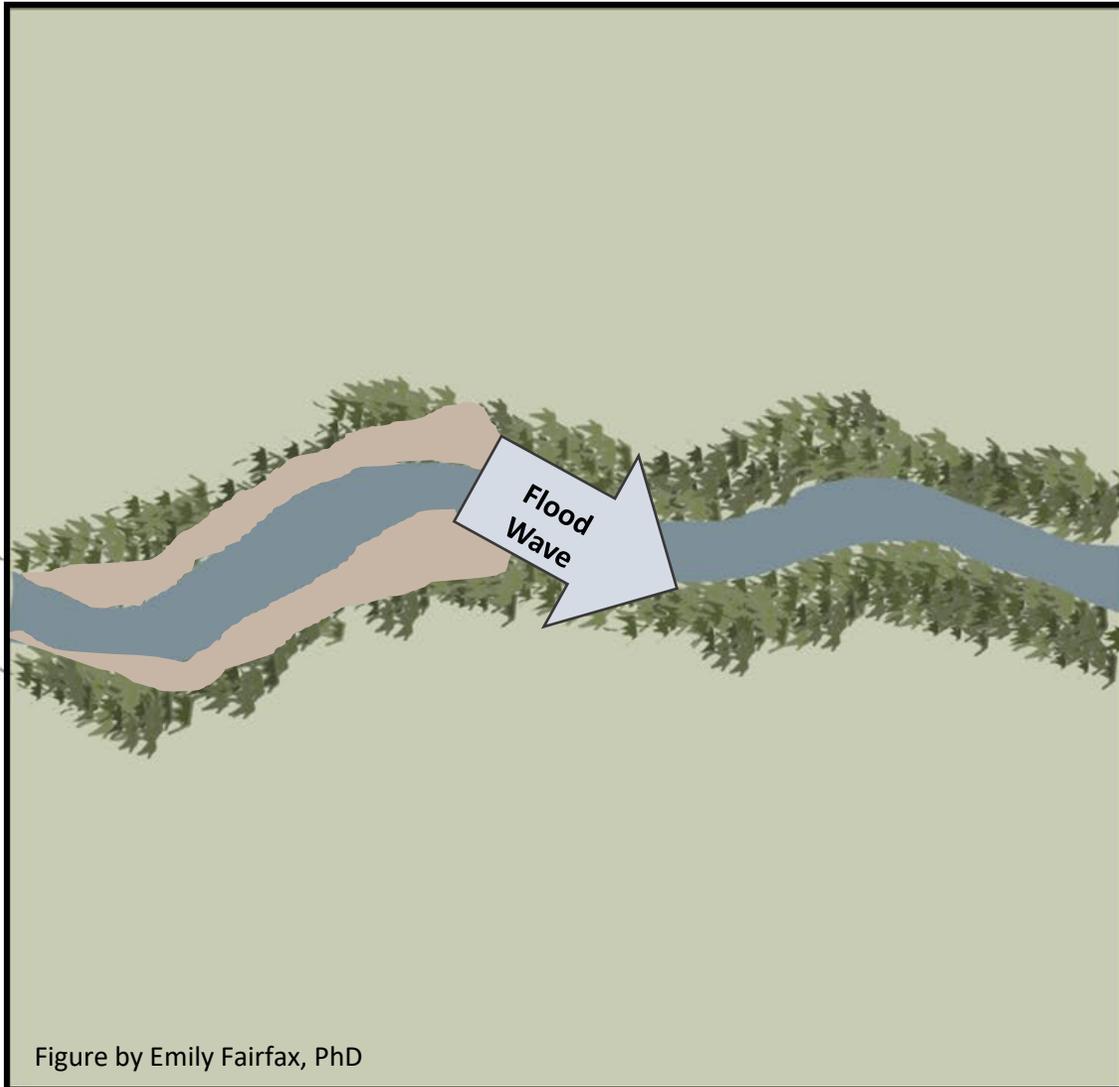


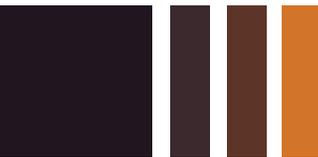
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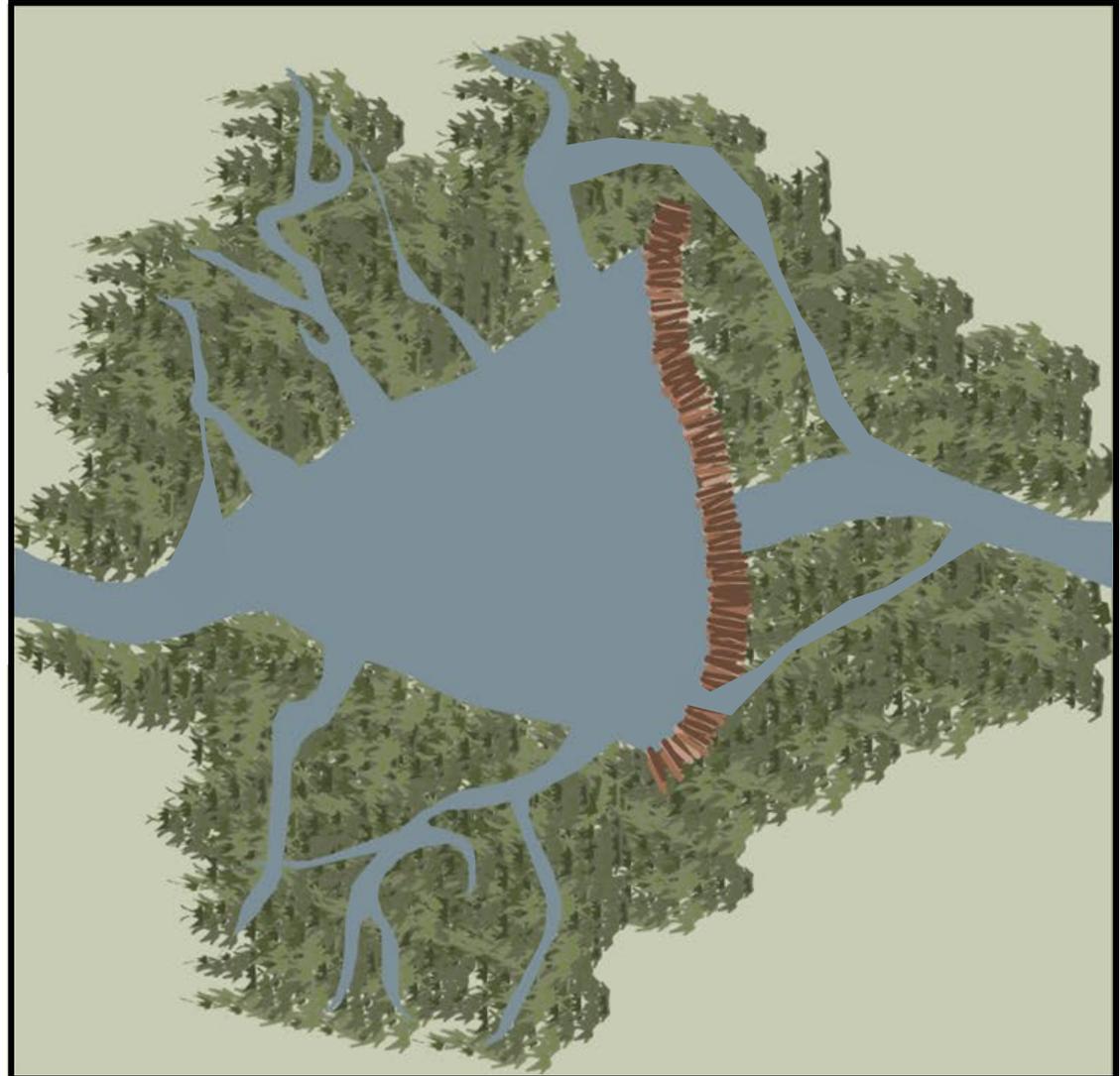
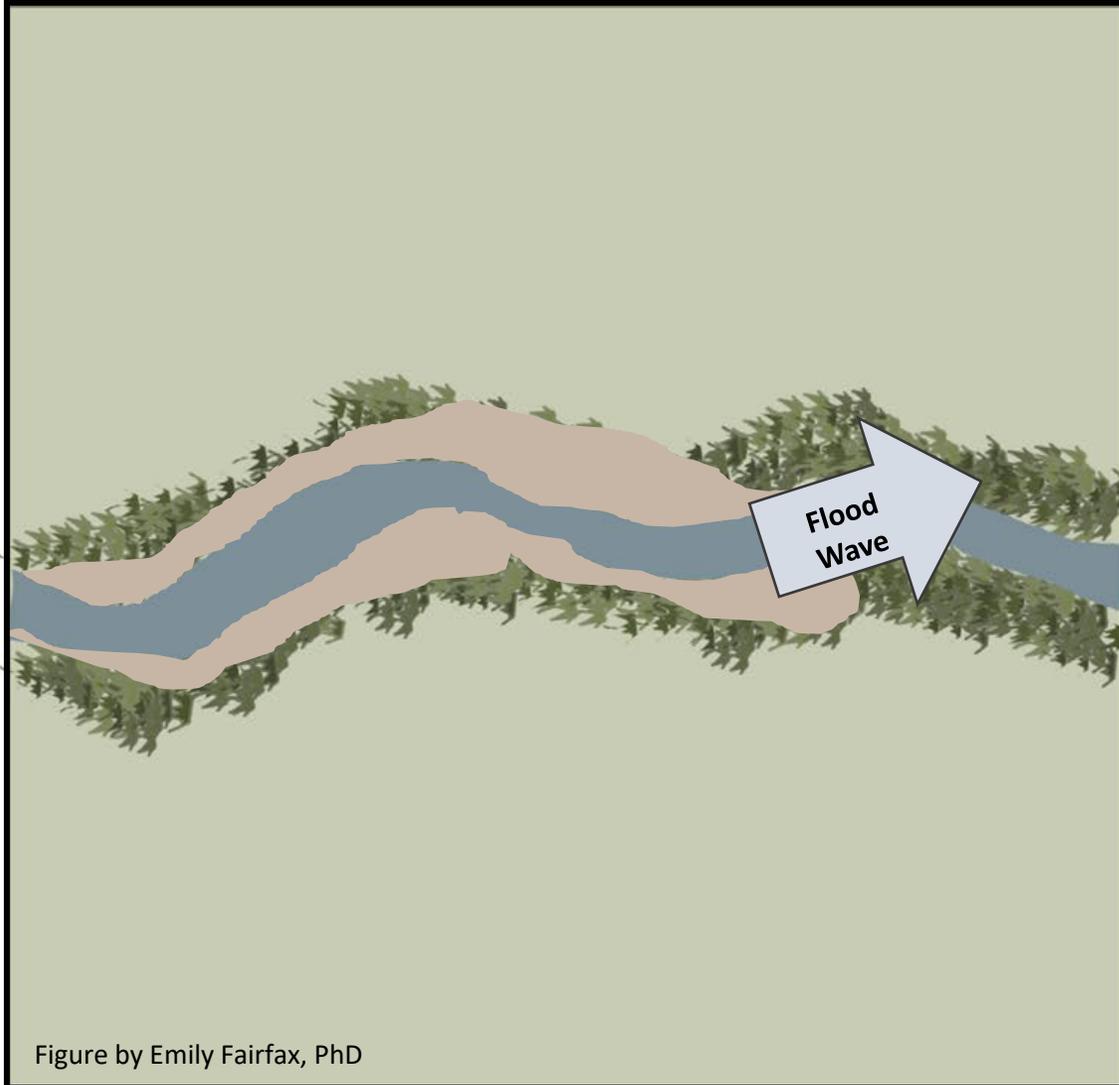


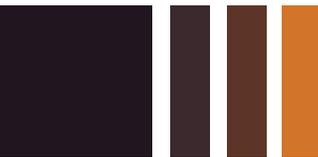
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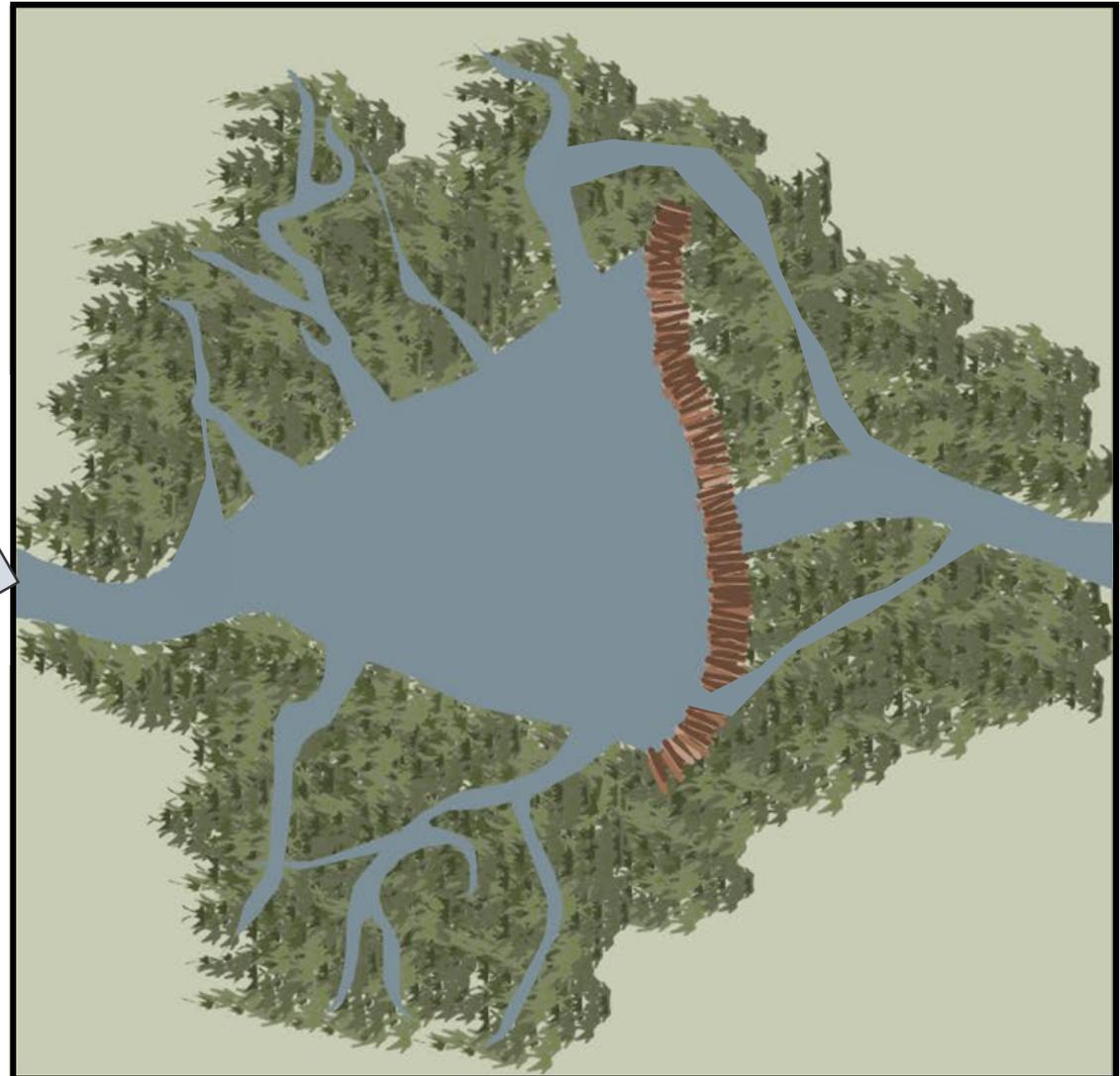
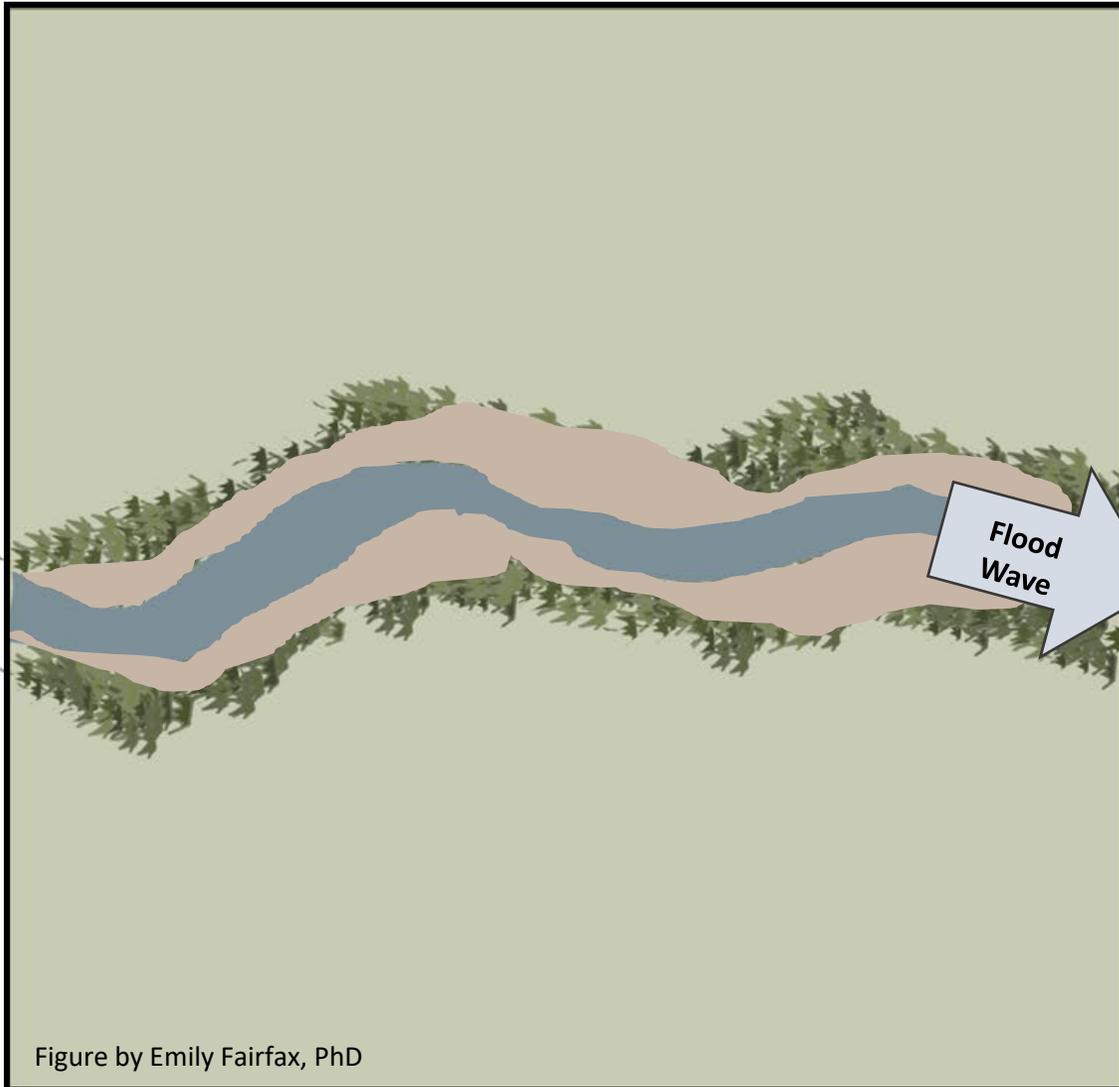
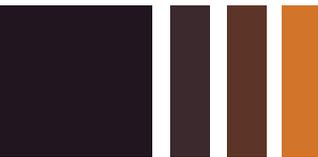


Figure by Emily Fairfax, PhD



Complexity Builds Resilience: Starting with Floods

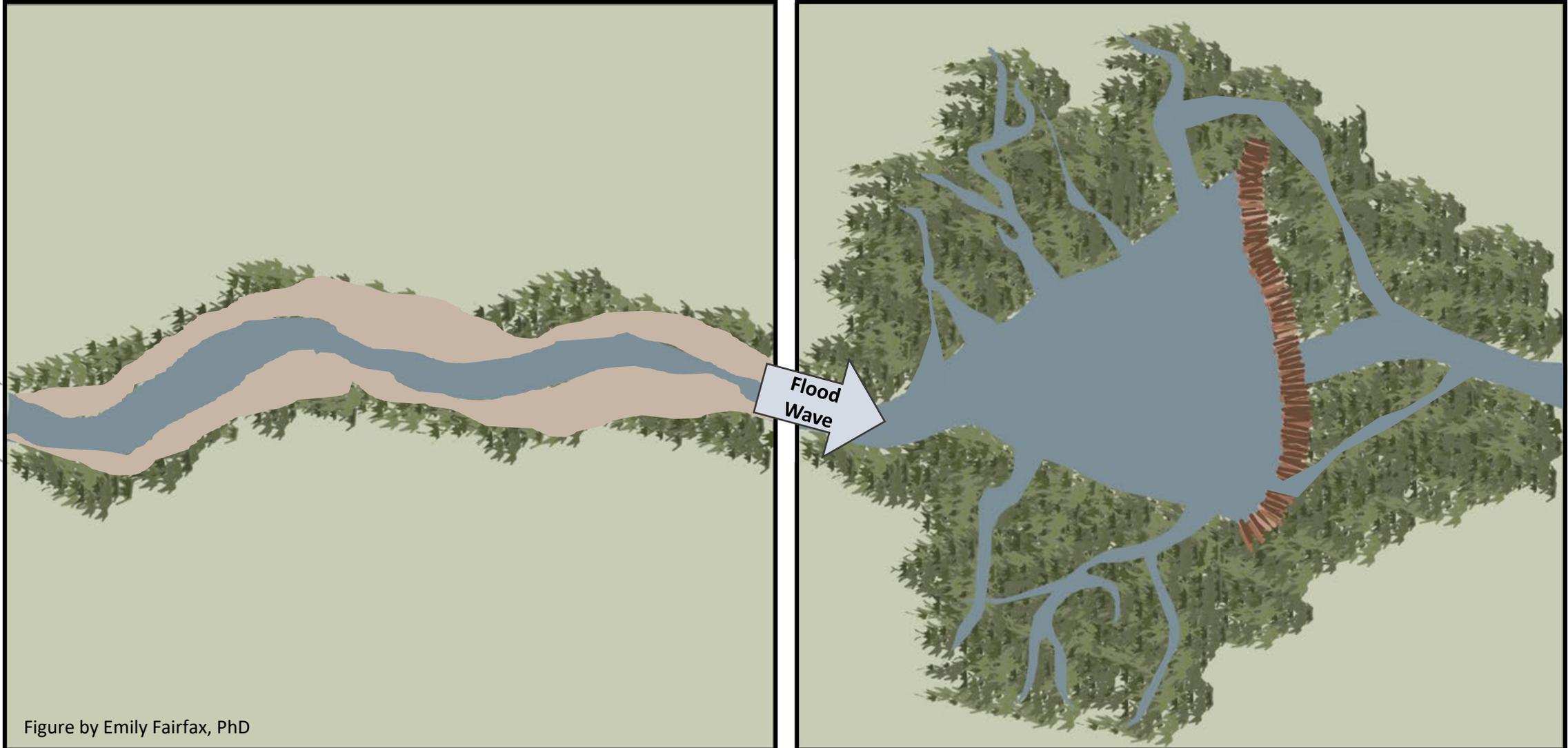
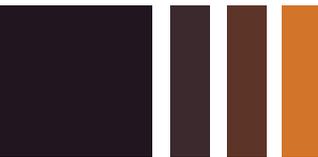
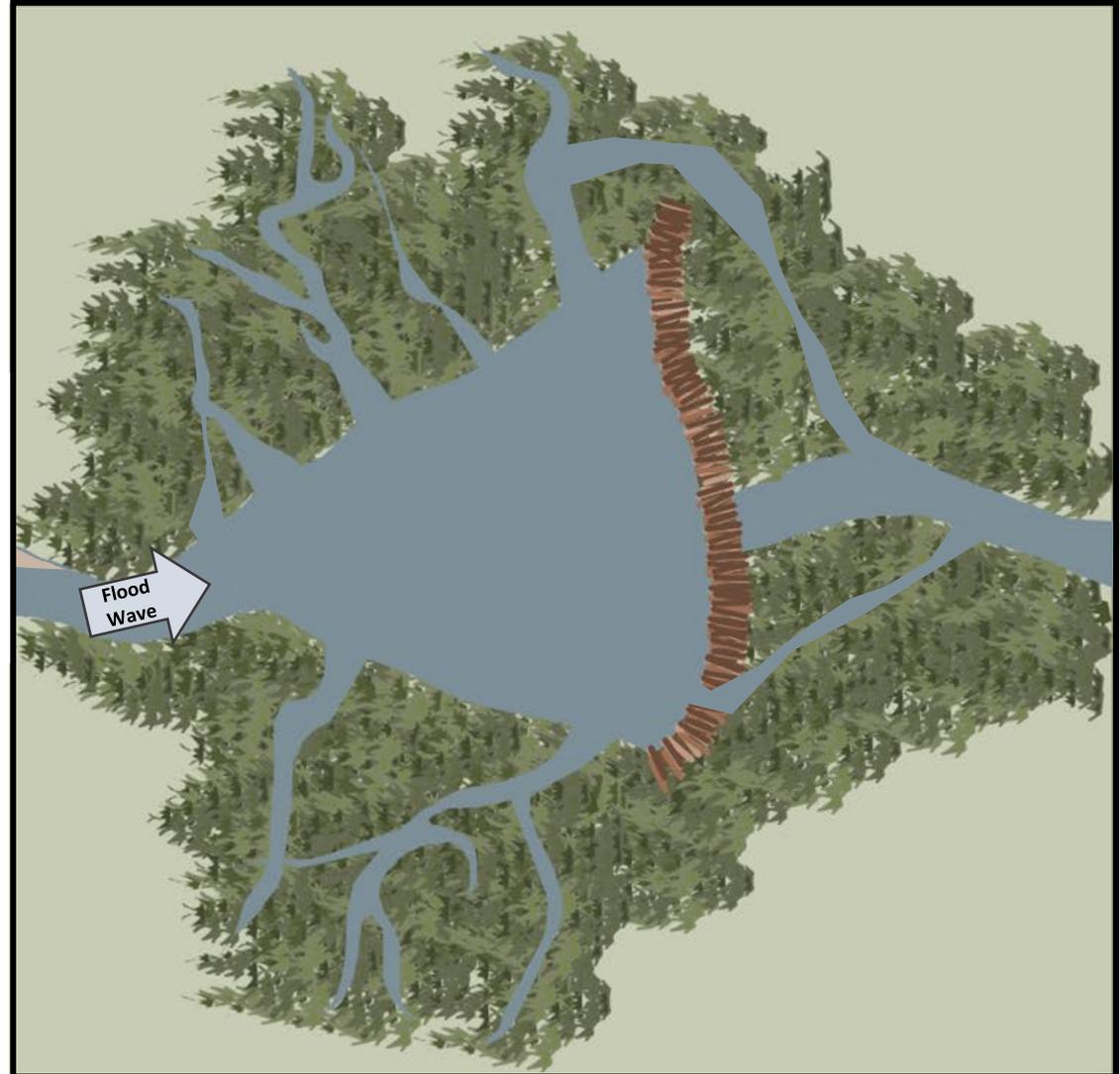
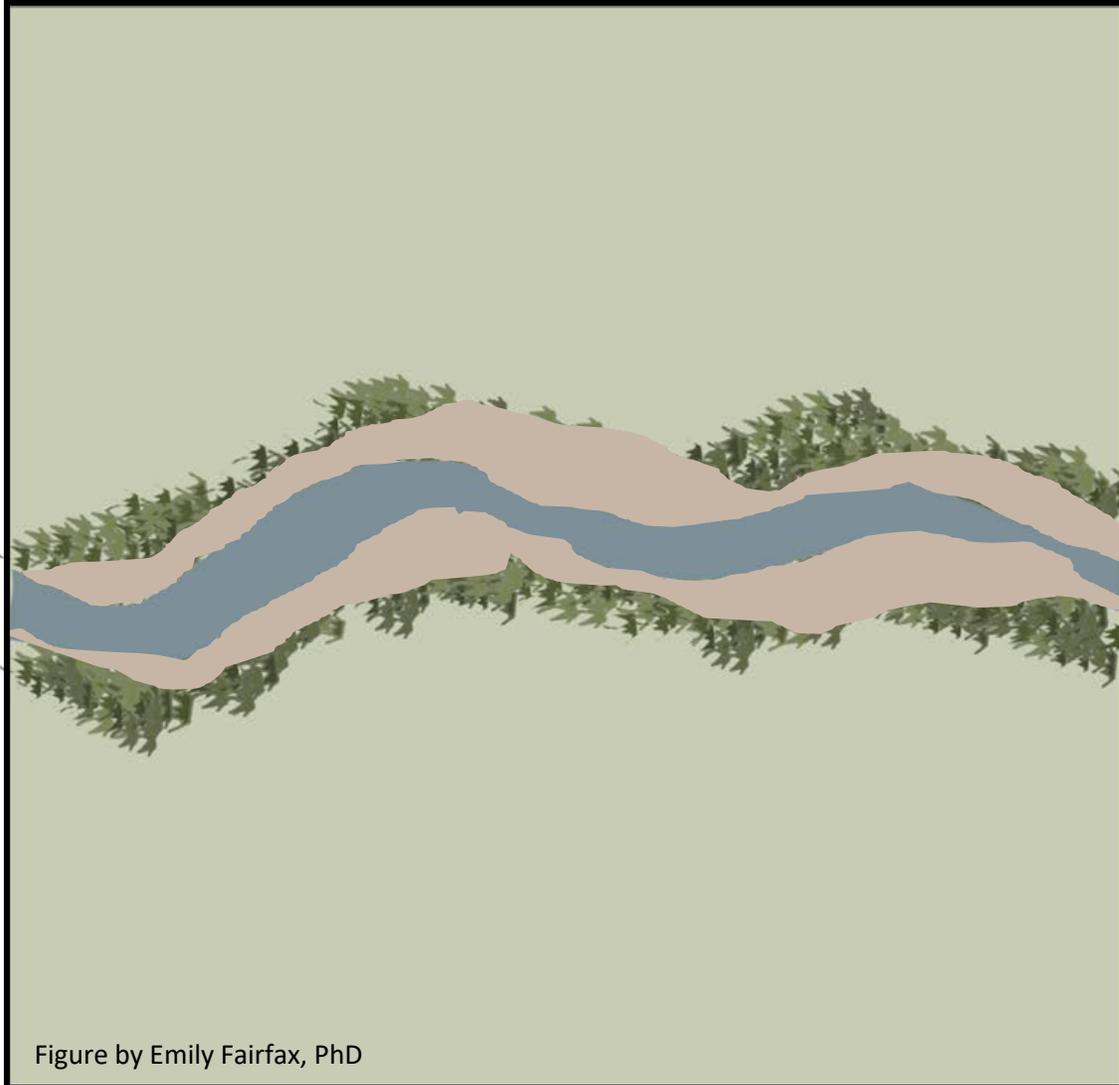


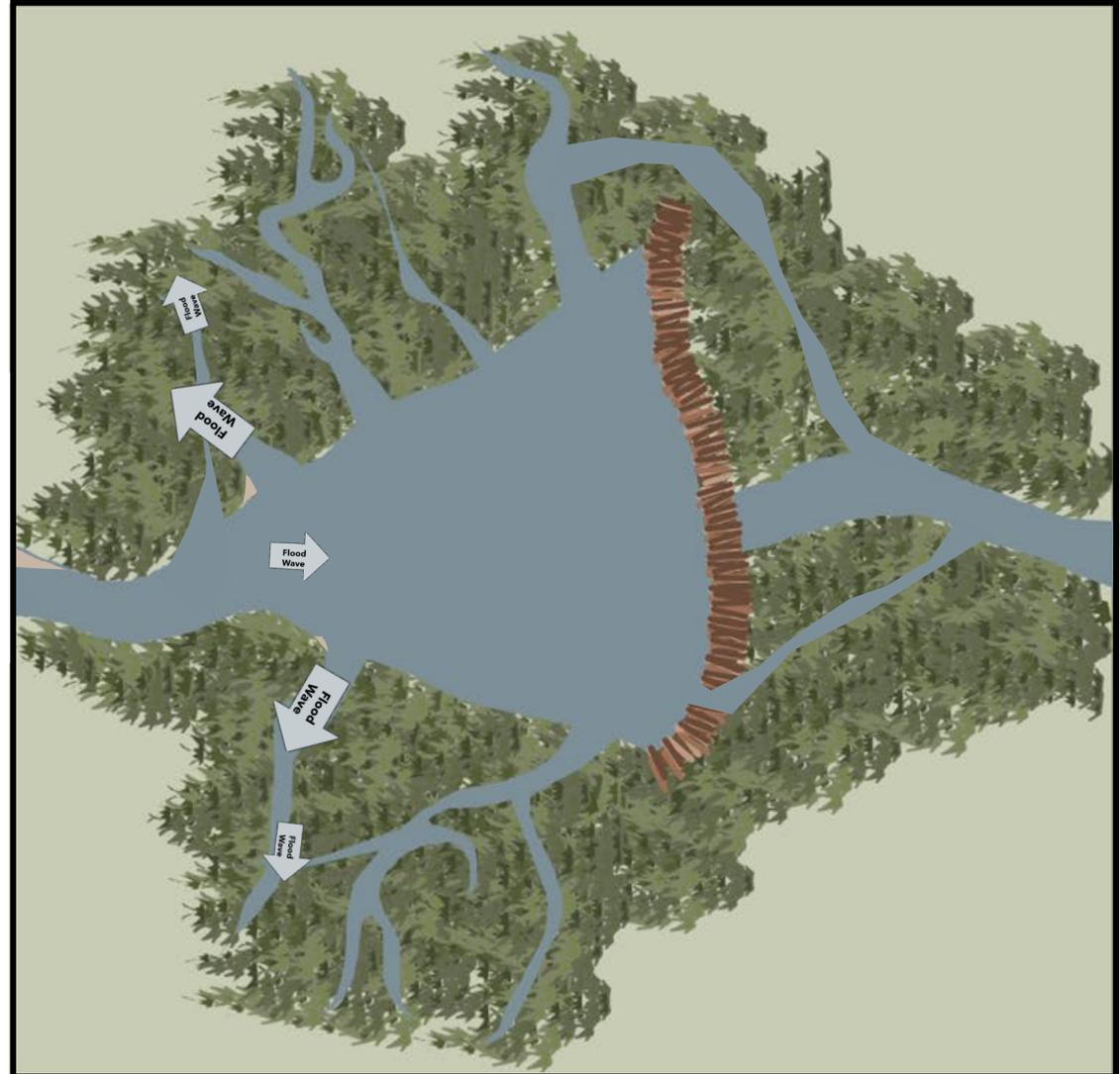
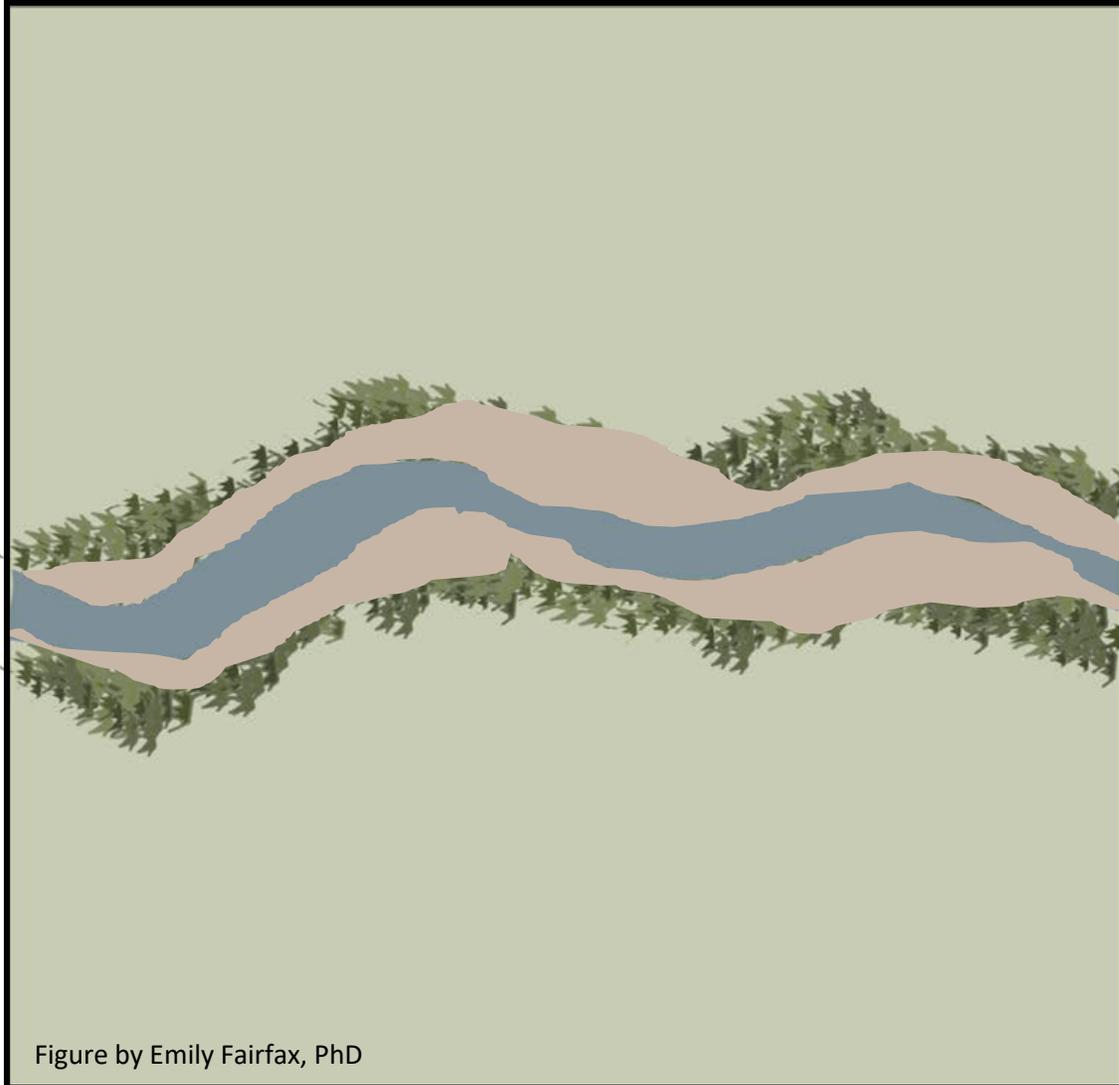
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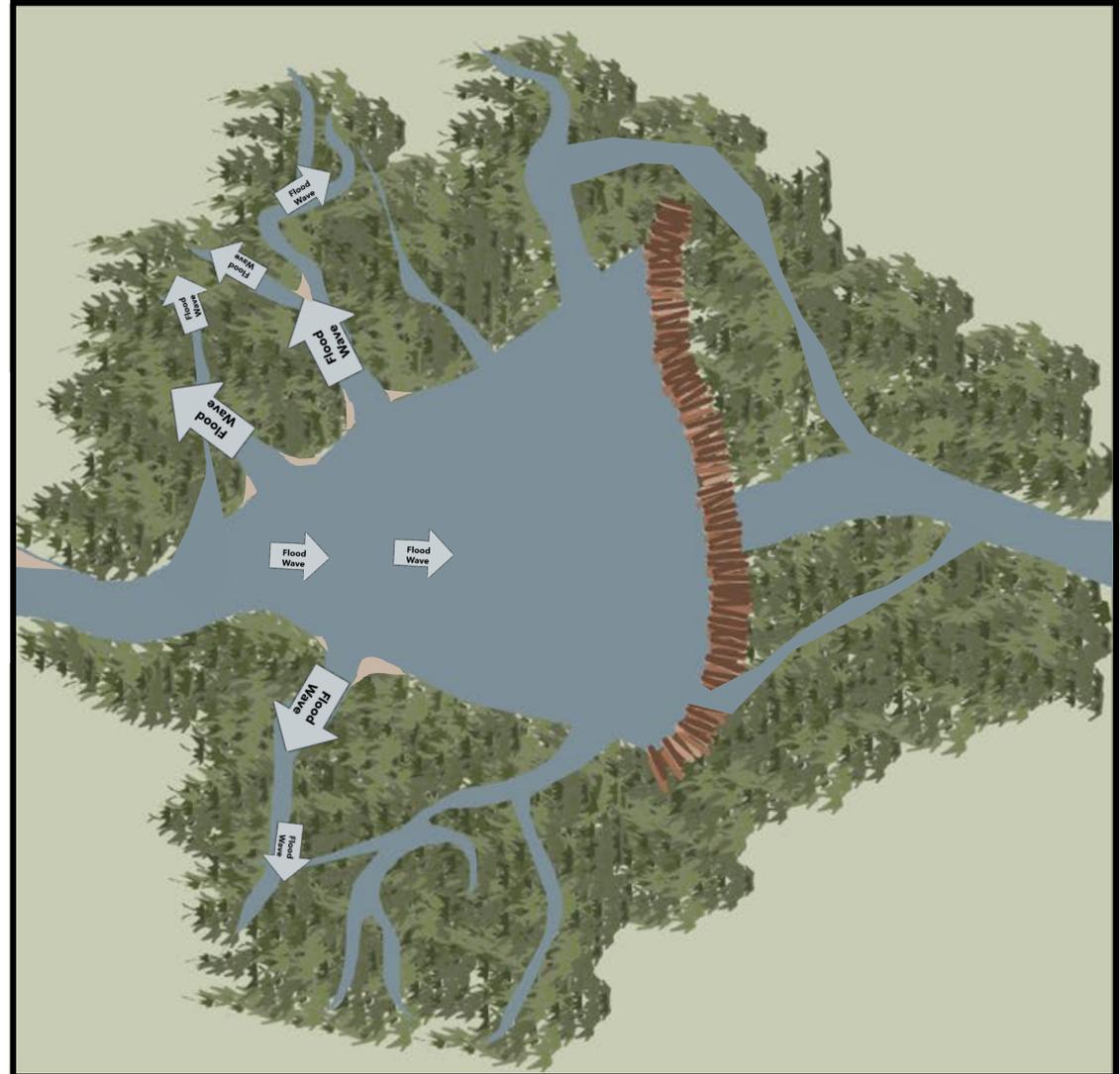
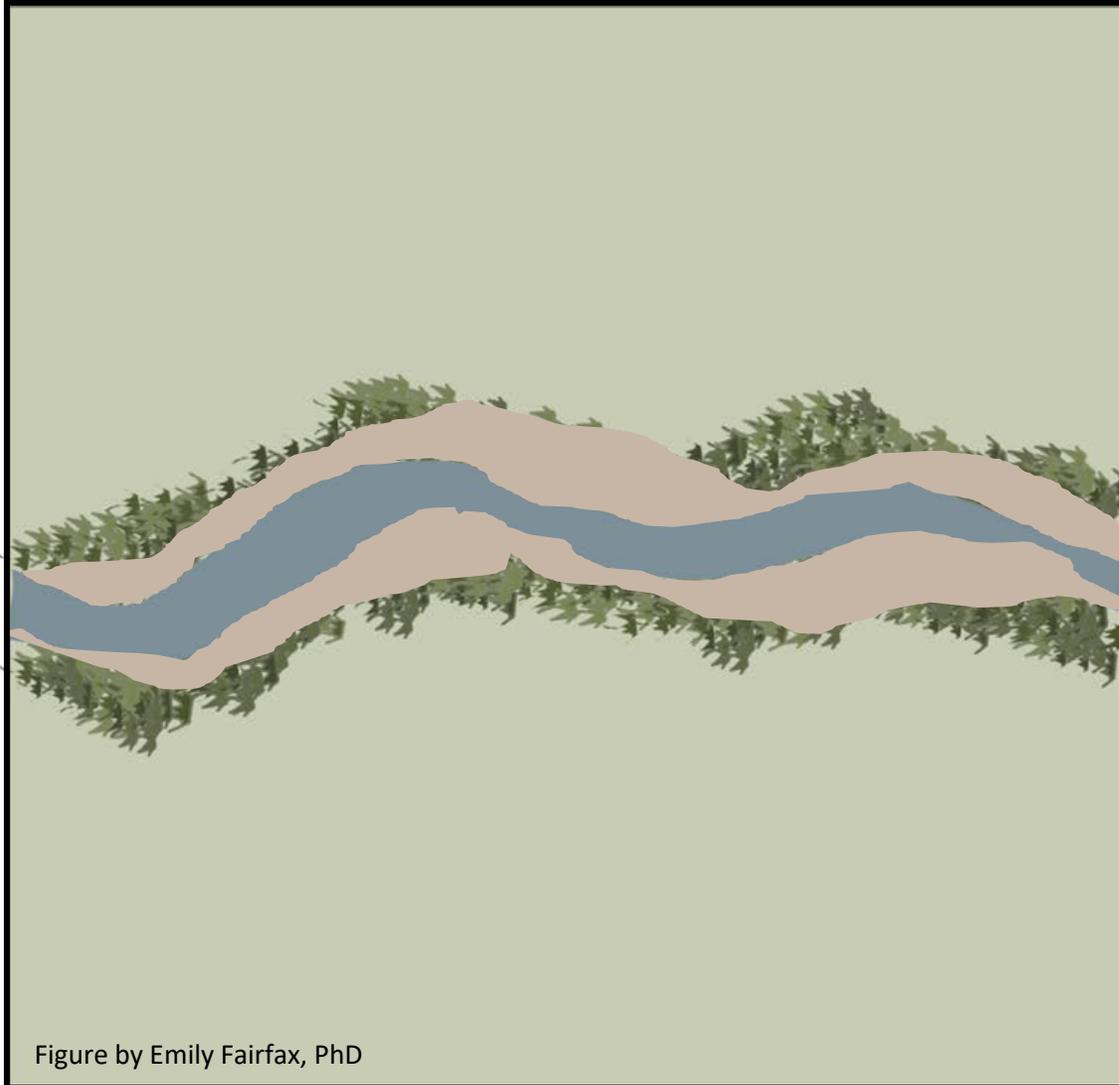
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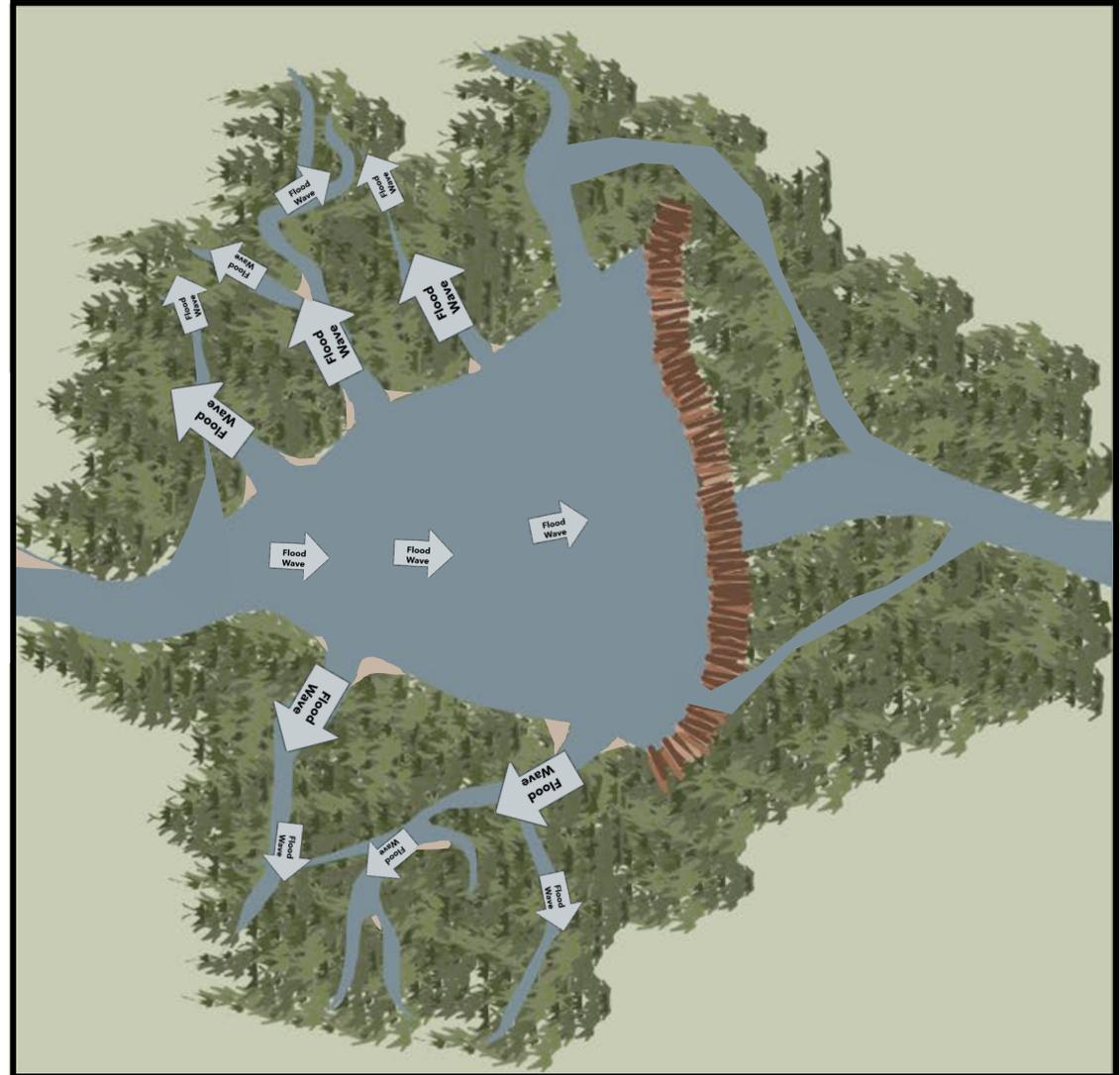
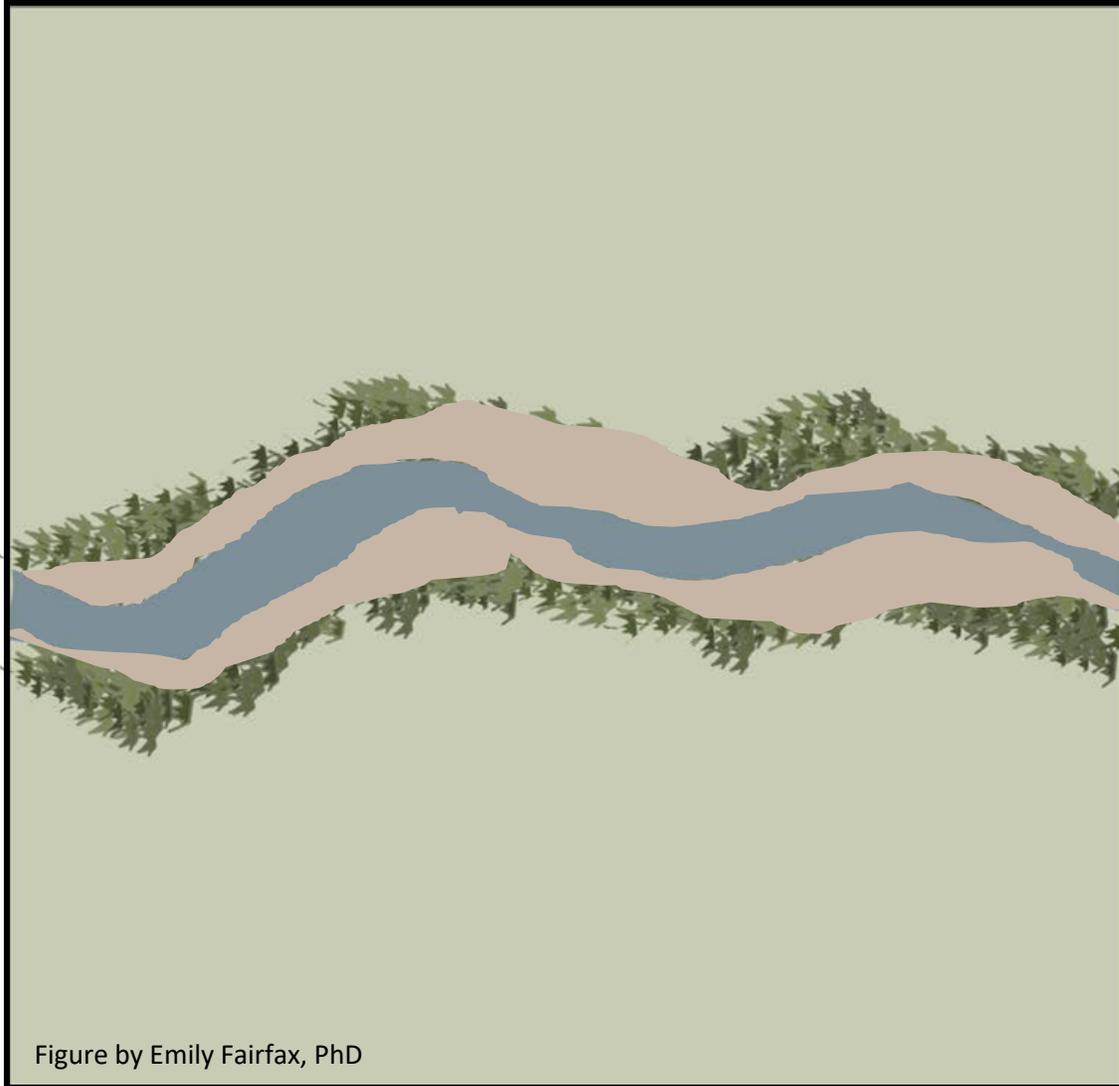


Figure by Emily Fairfax, PhD

Complexity Builds Resilience: Starting with Floods

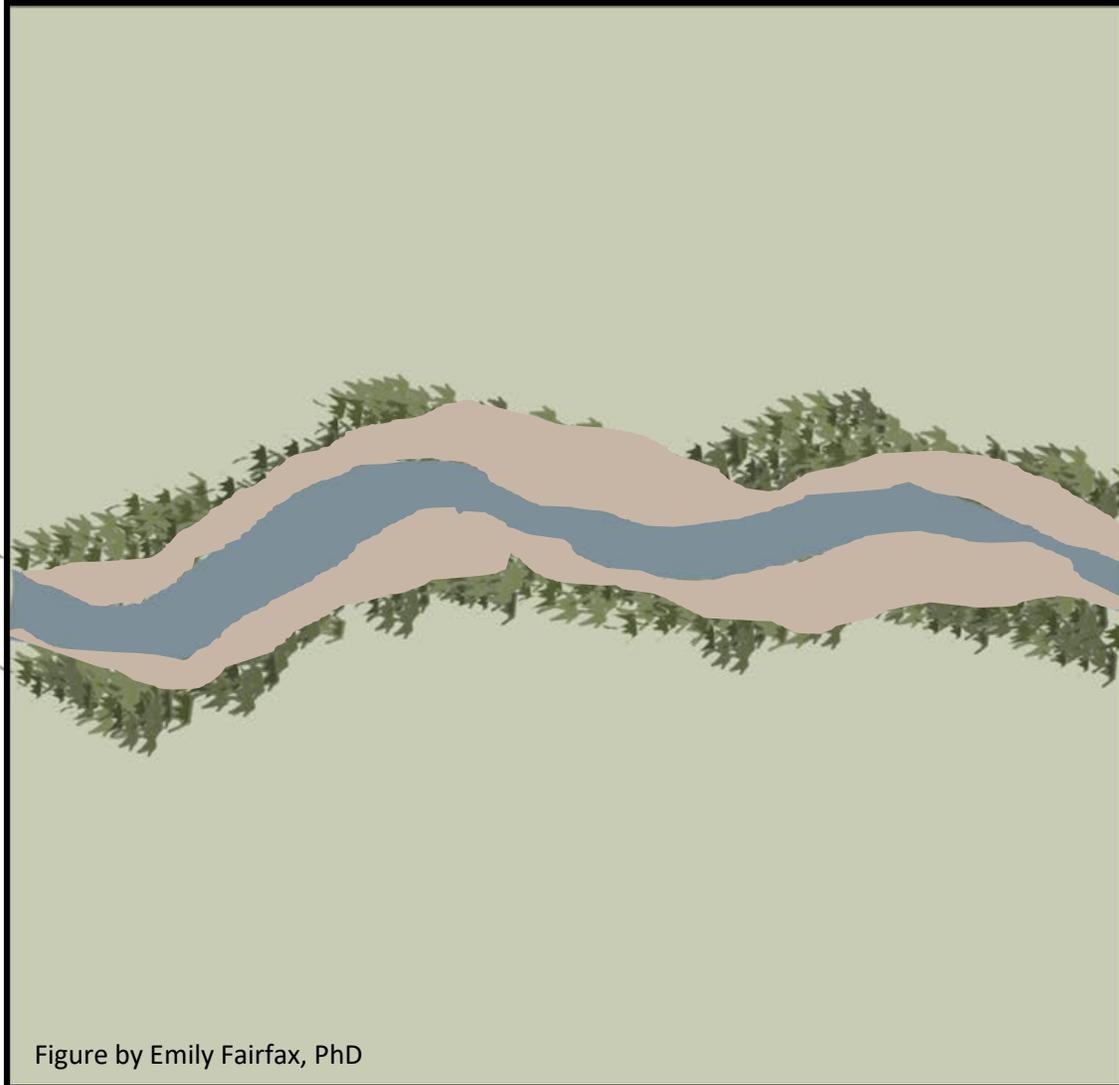
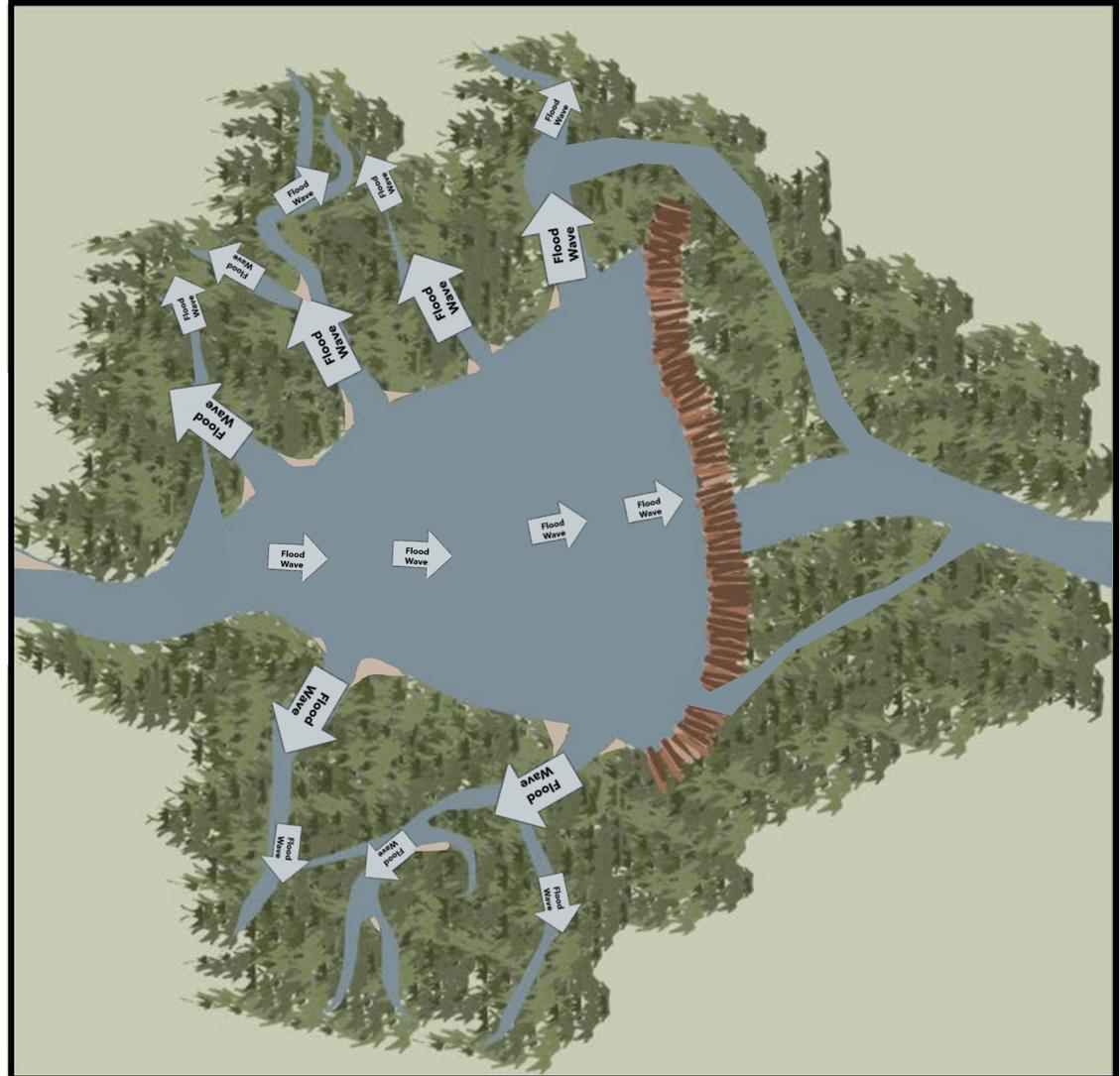


Figure by Emily Fairfax, PhD



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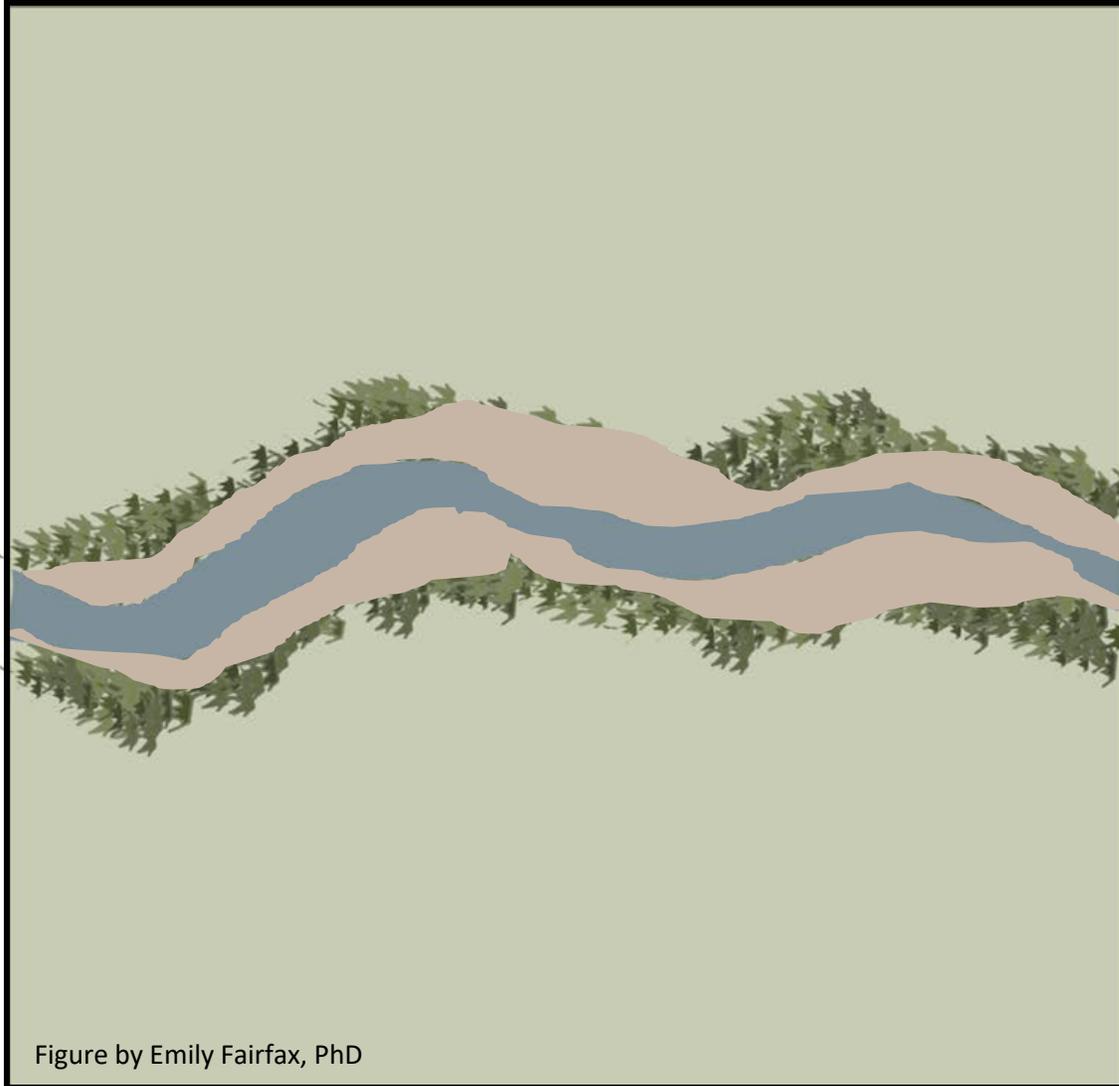
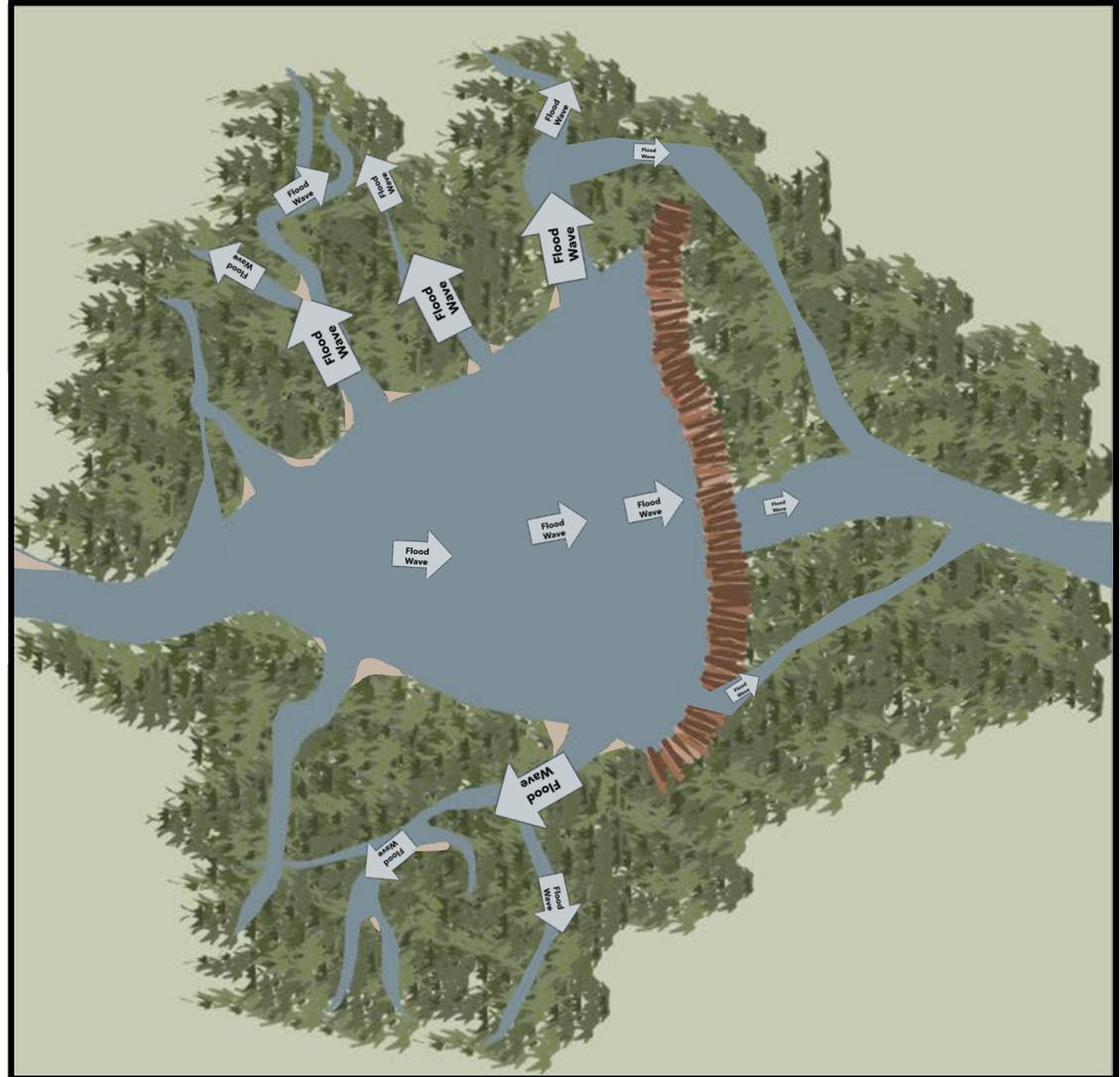
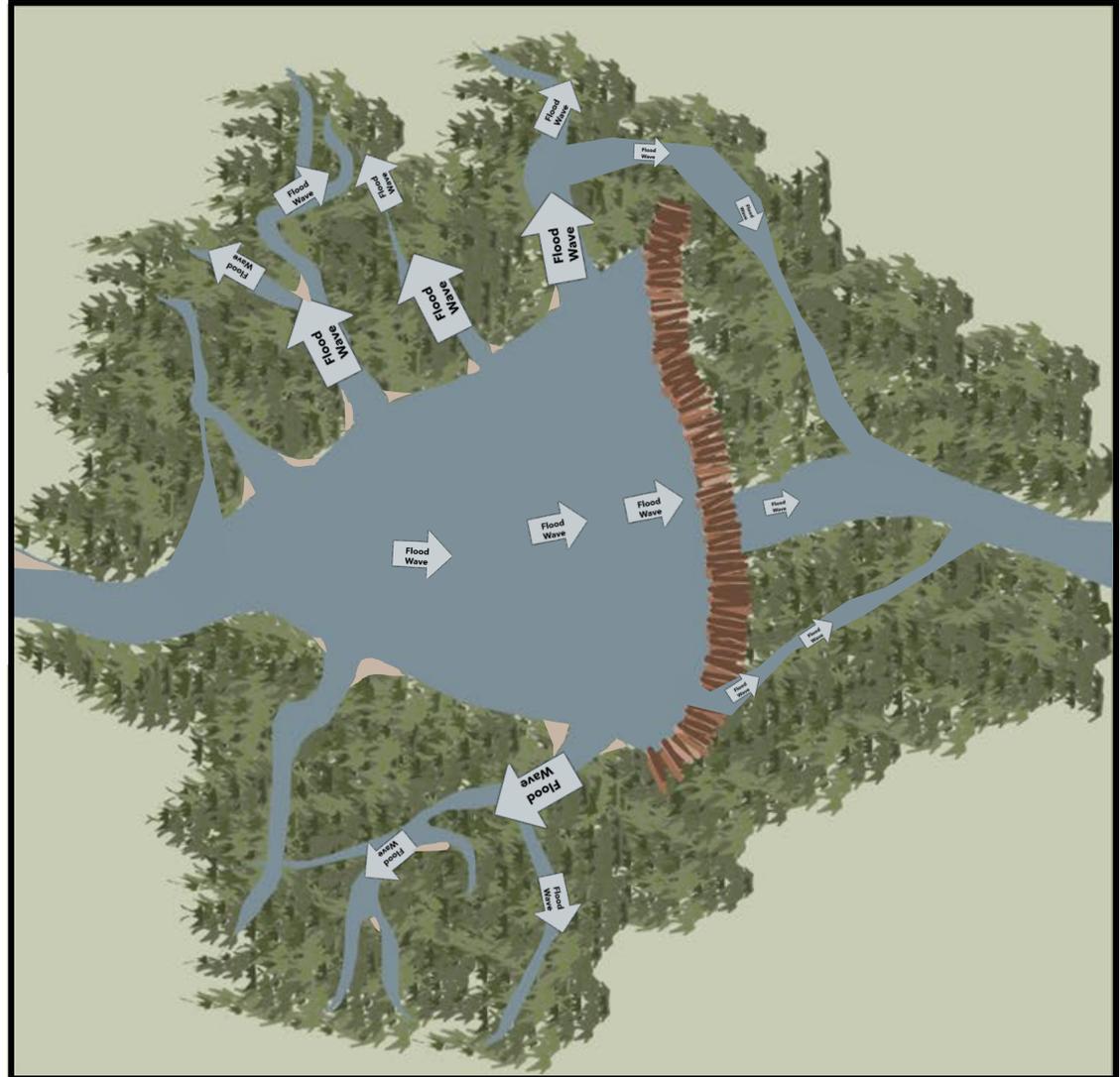
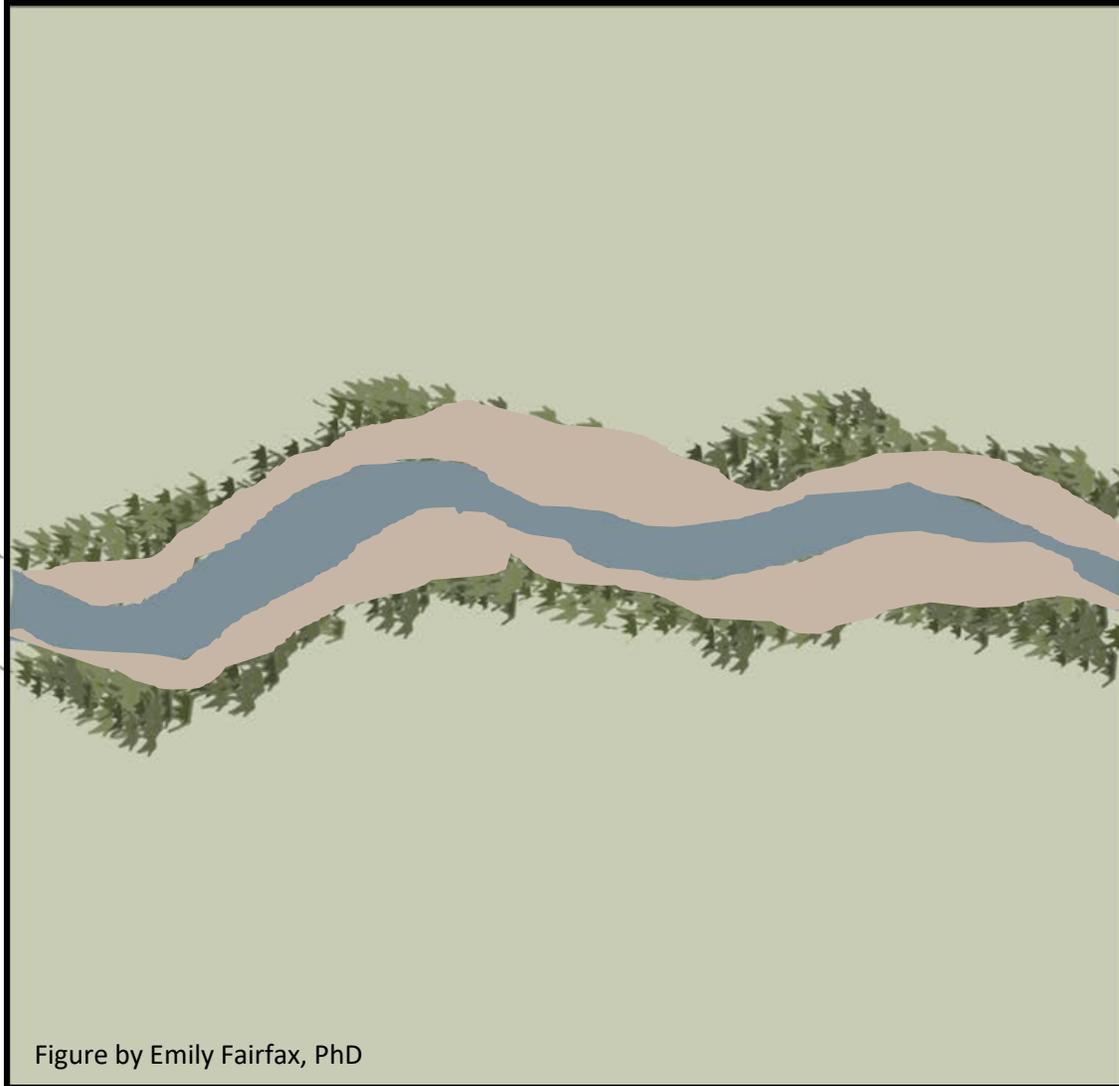


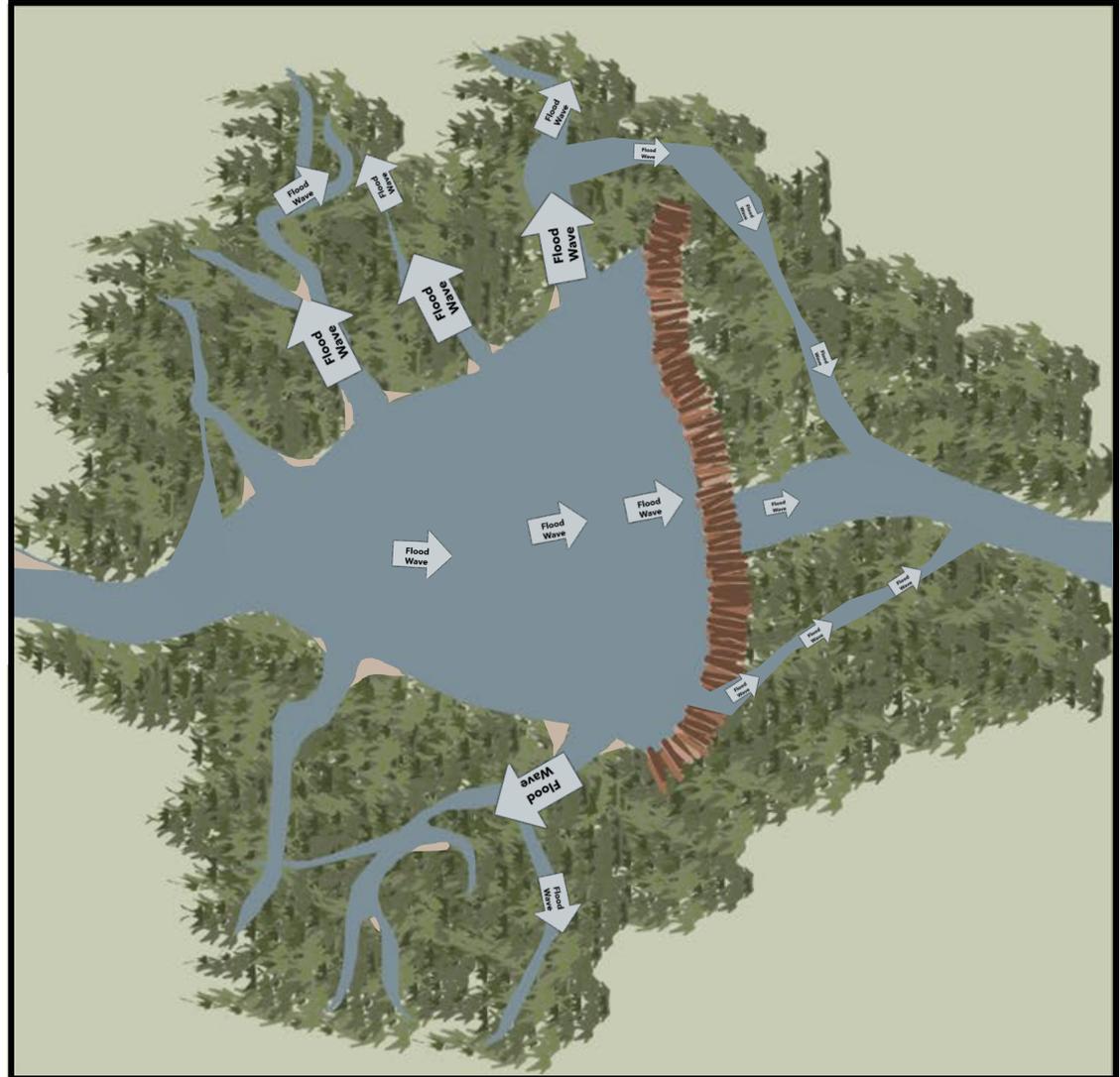
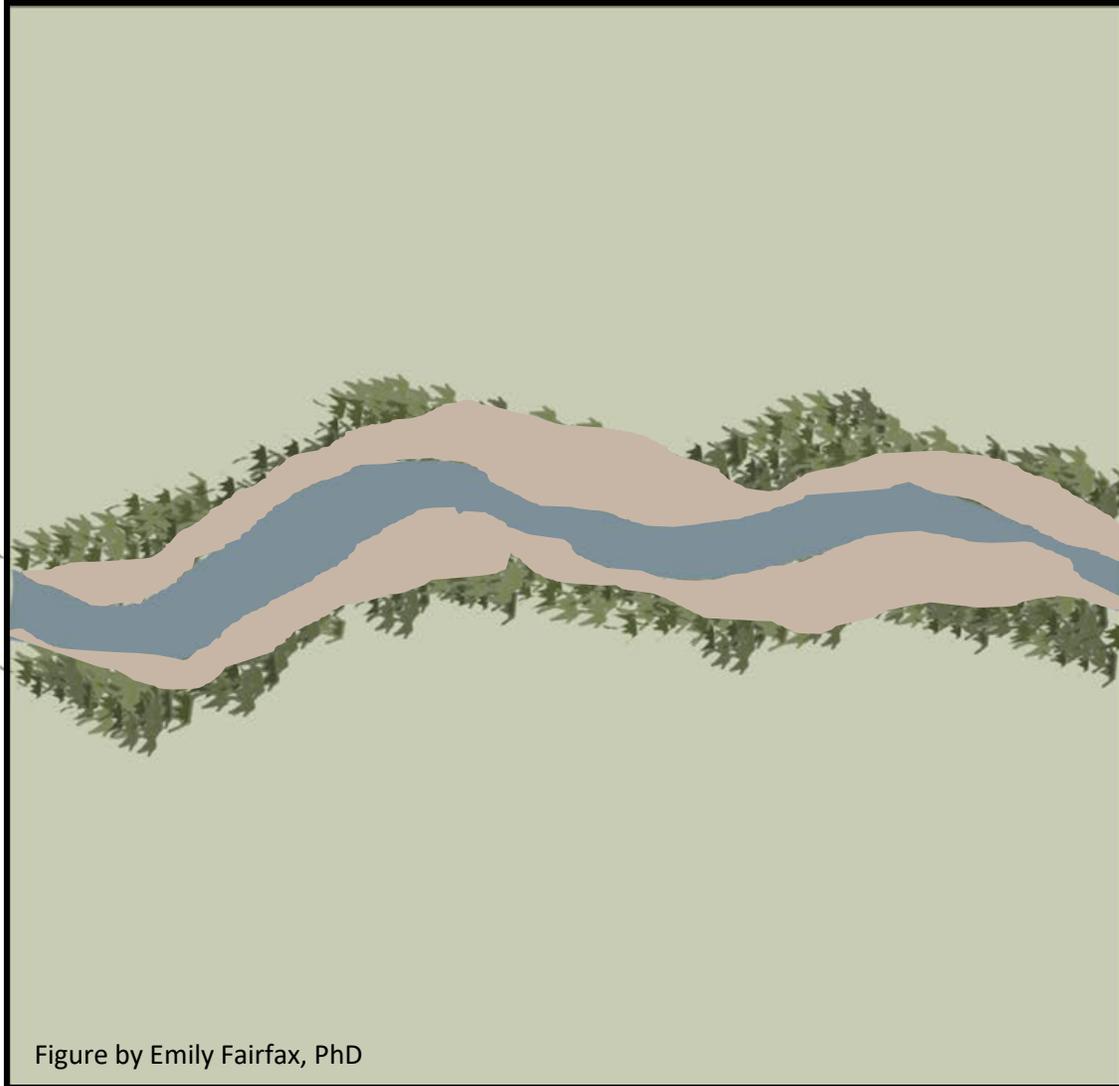
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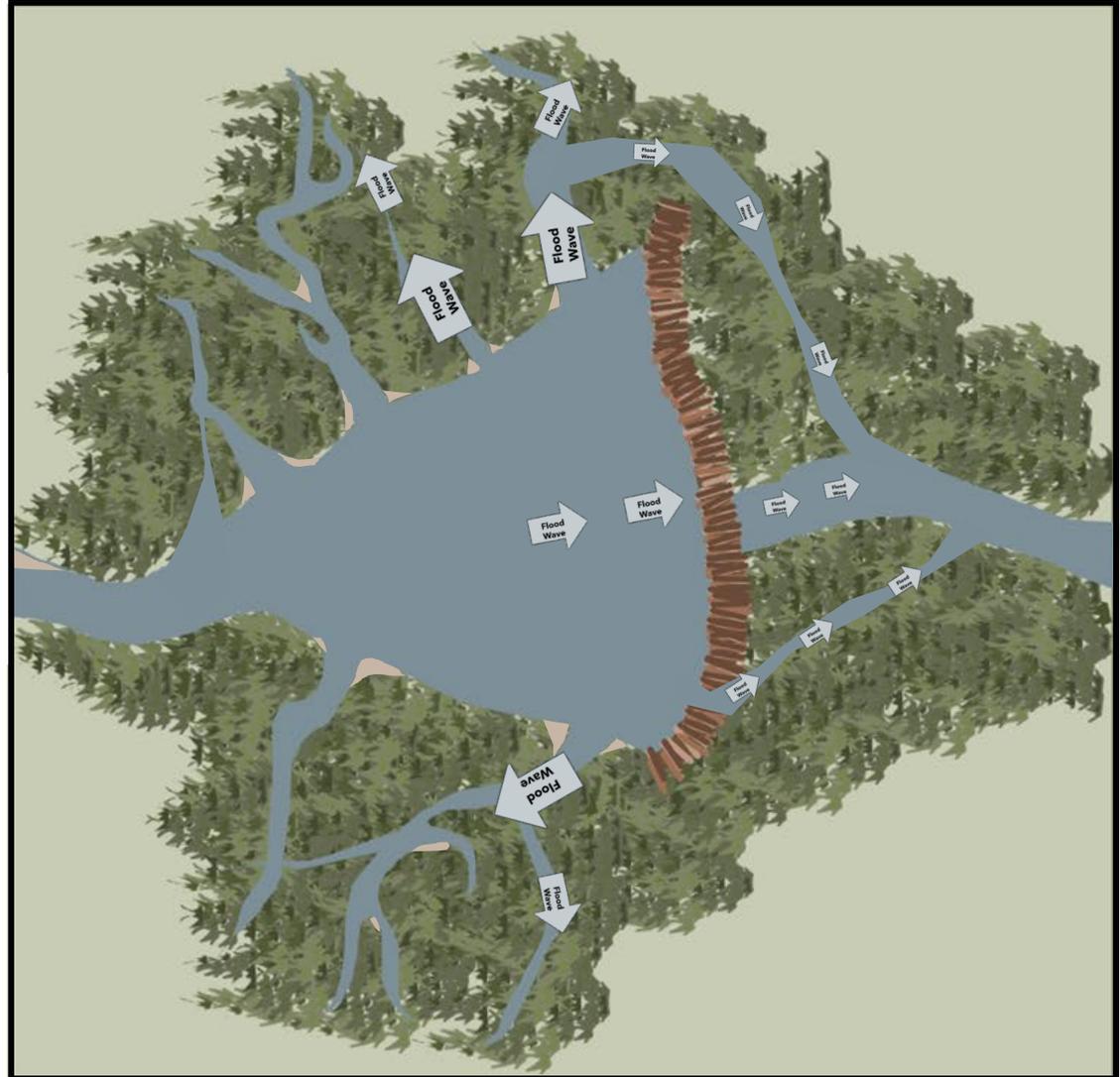
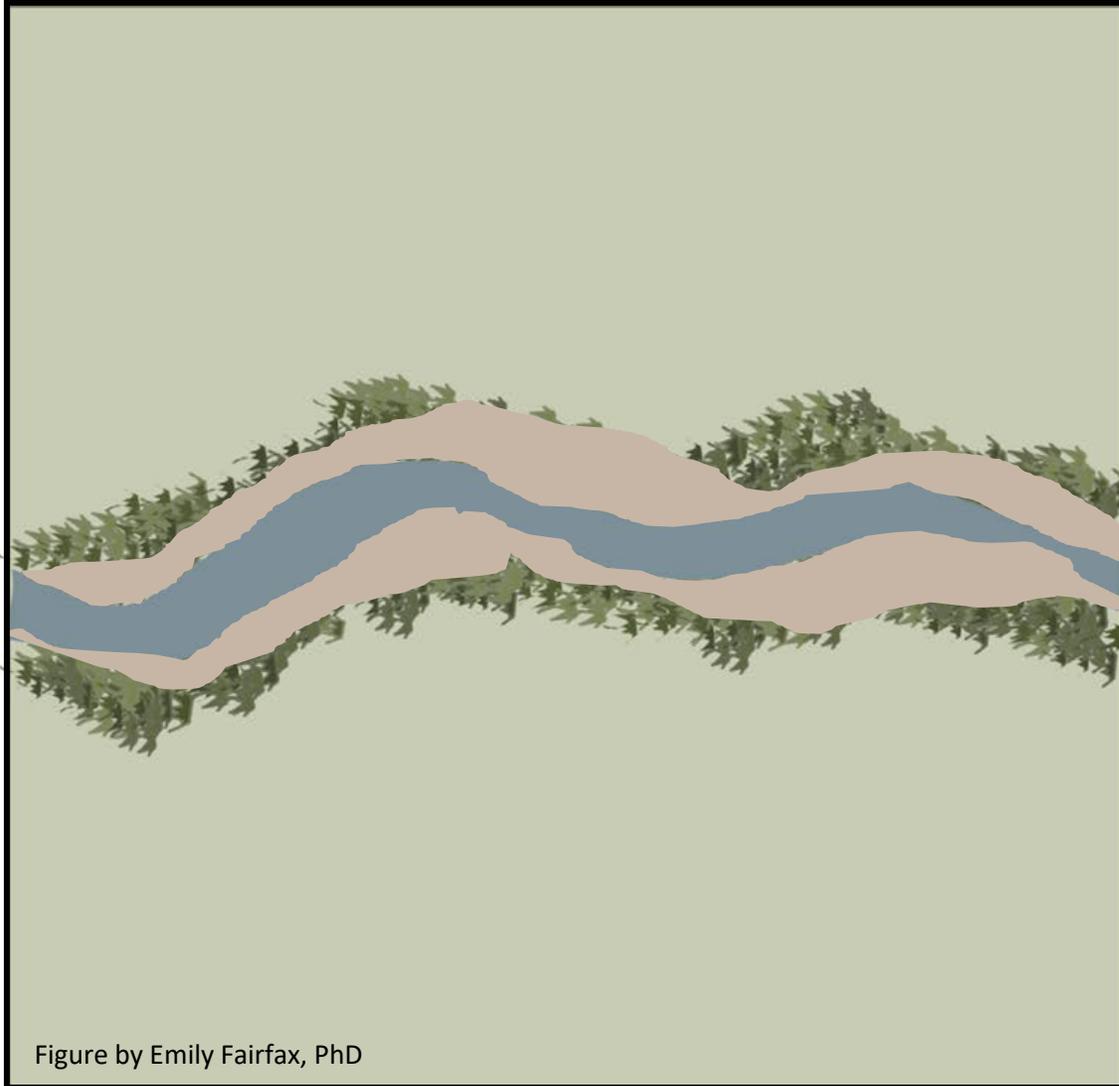
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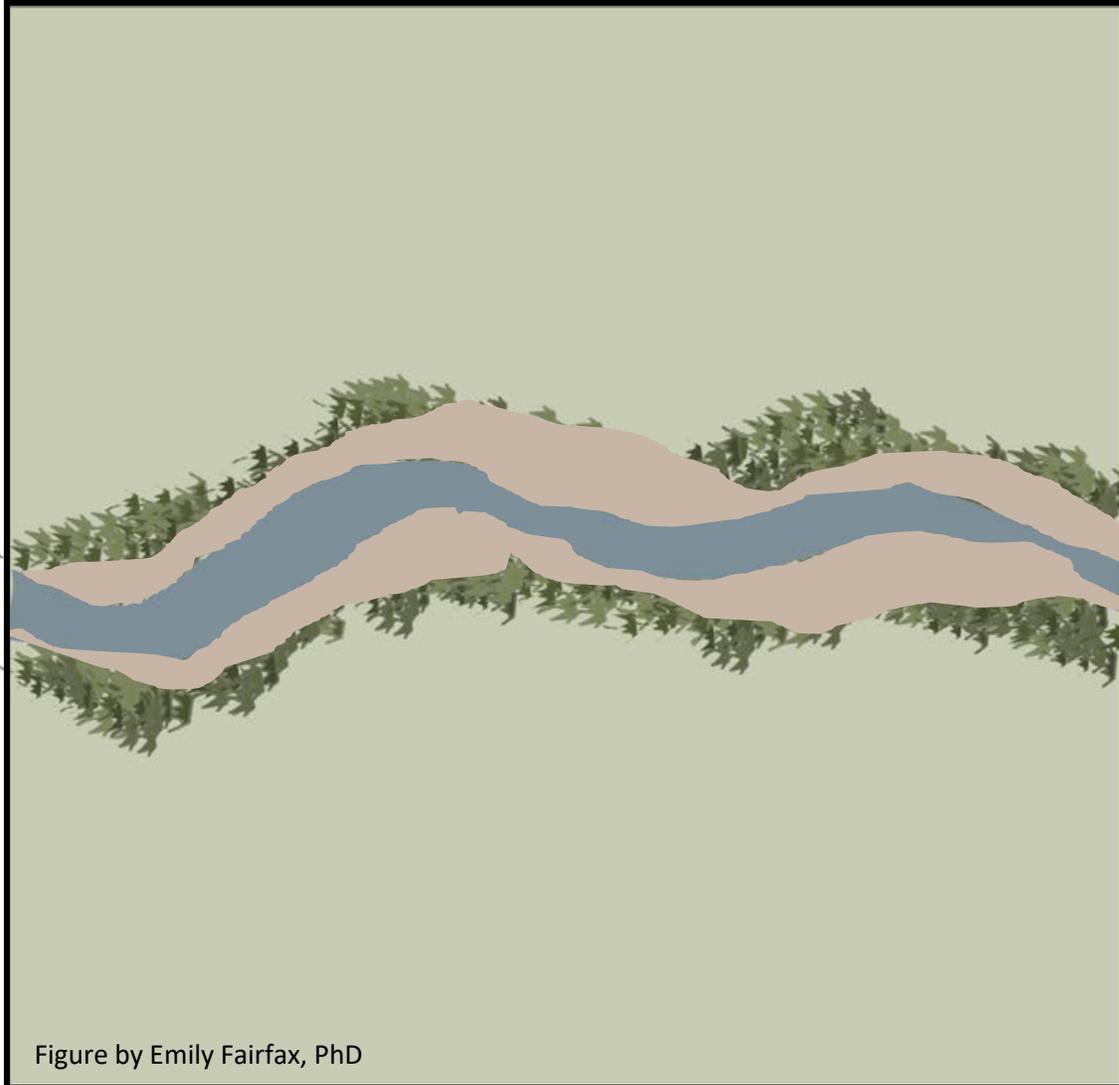
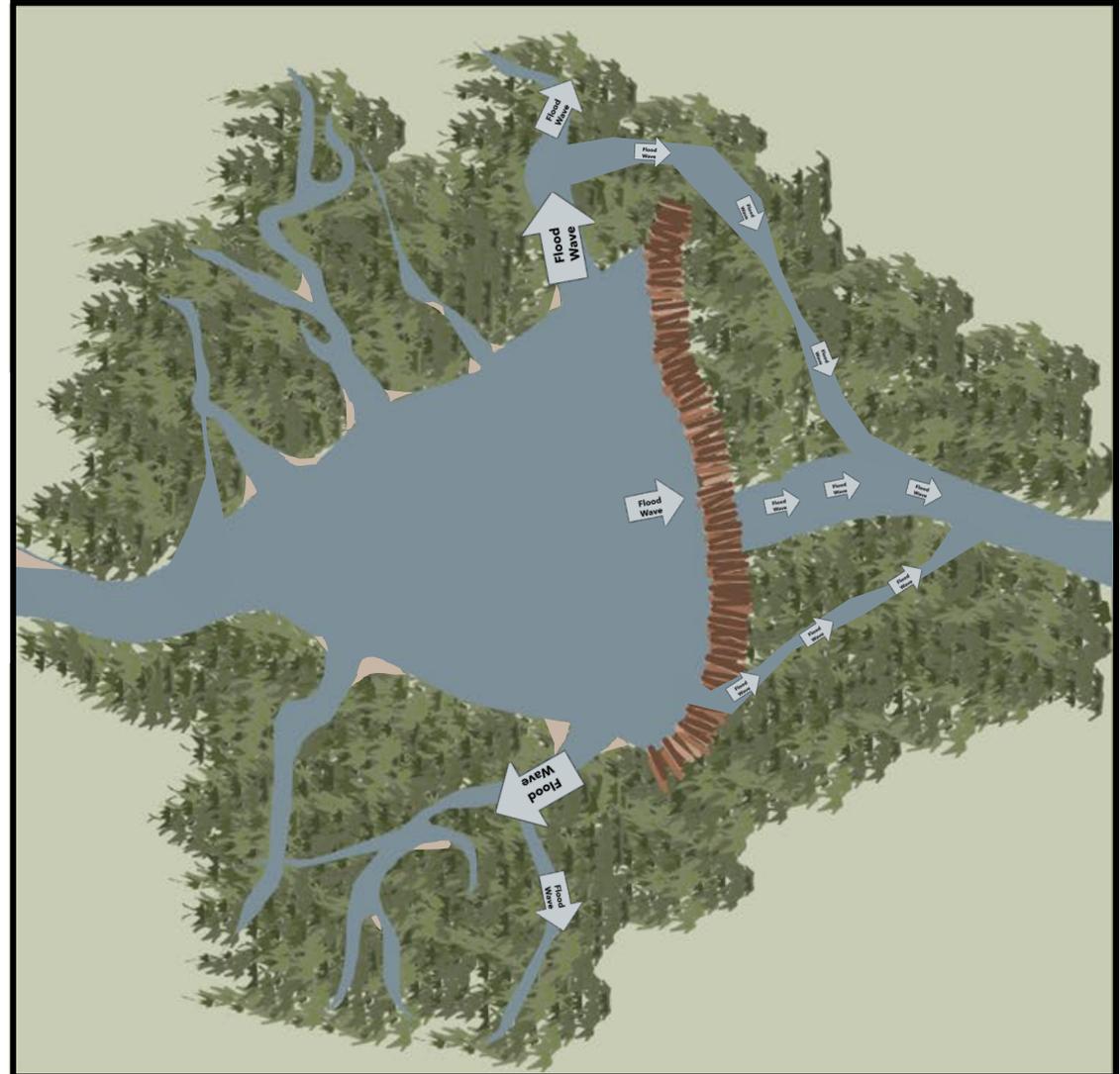


Figure by Emily Fairfax, PhD



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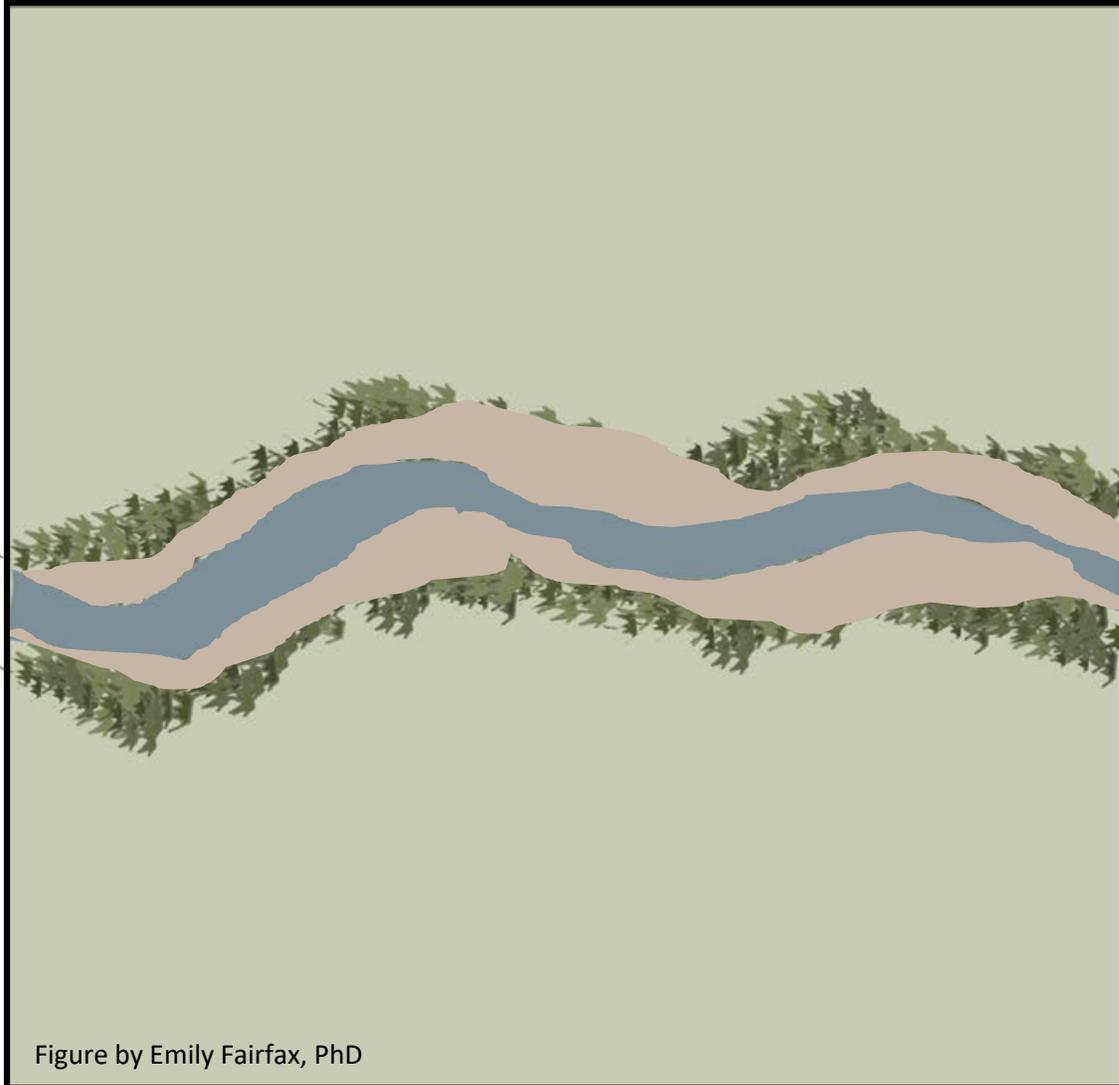
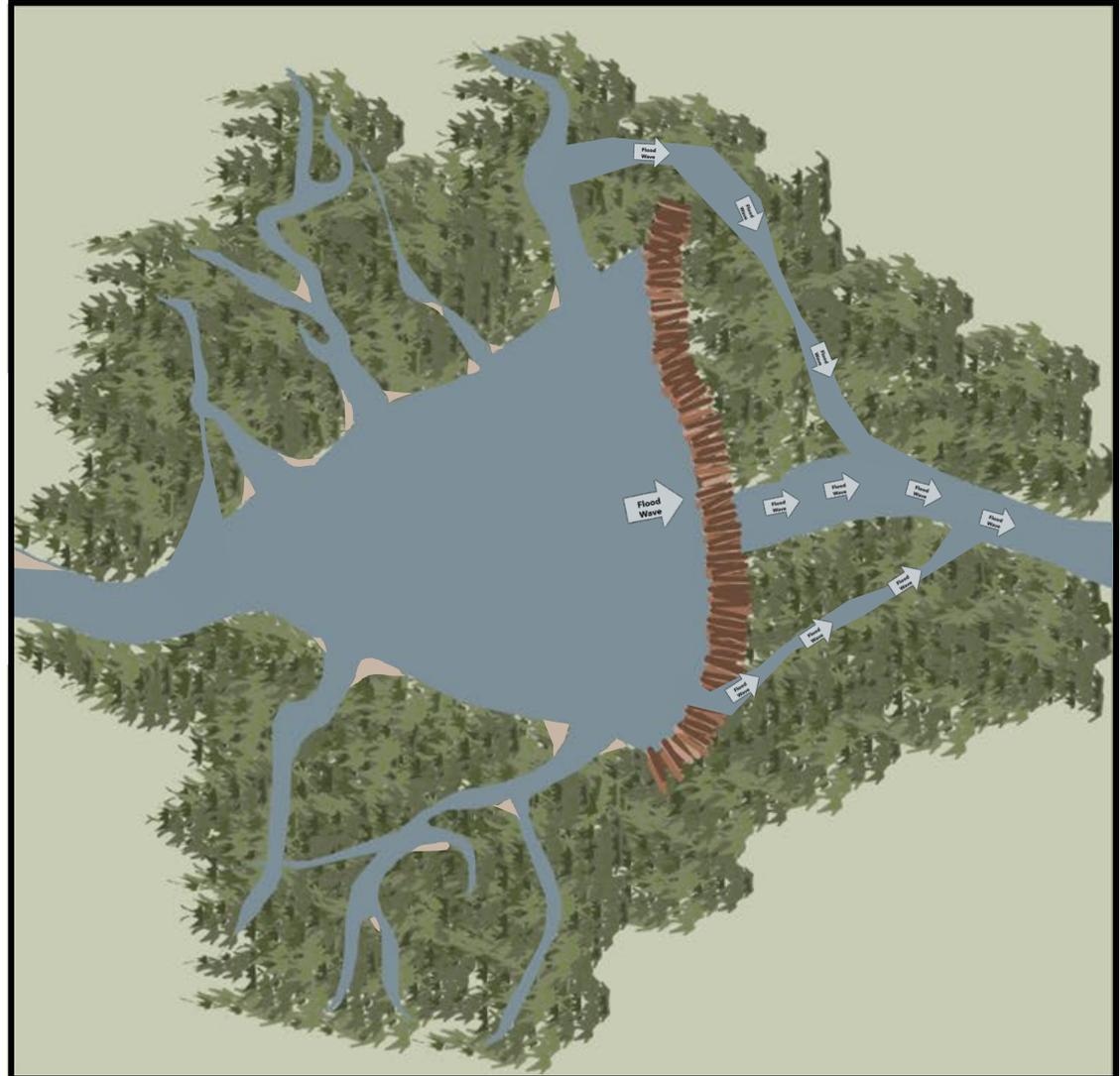
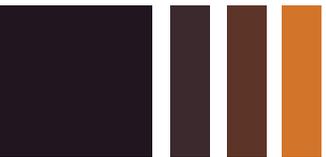
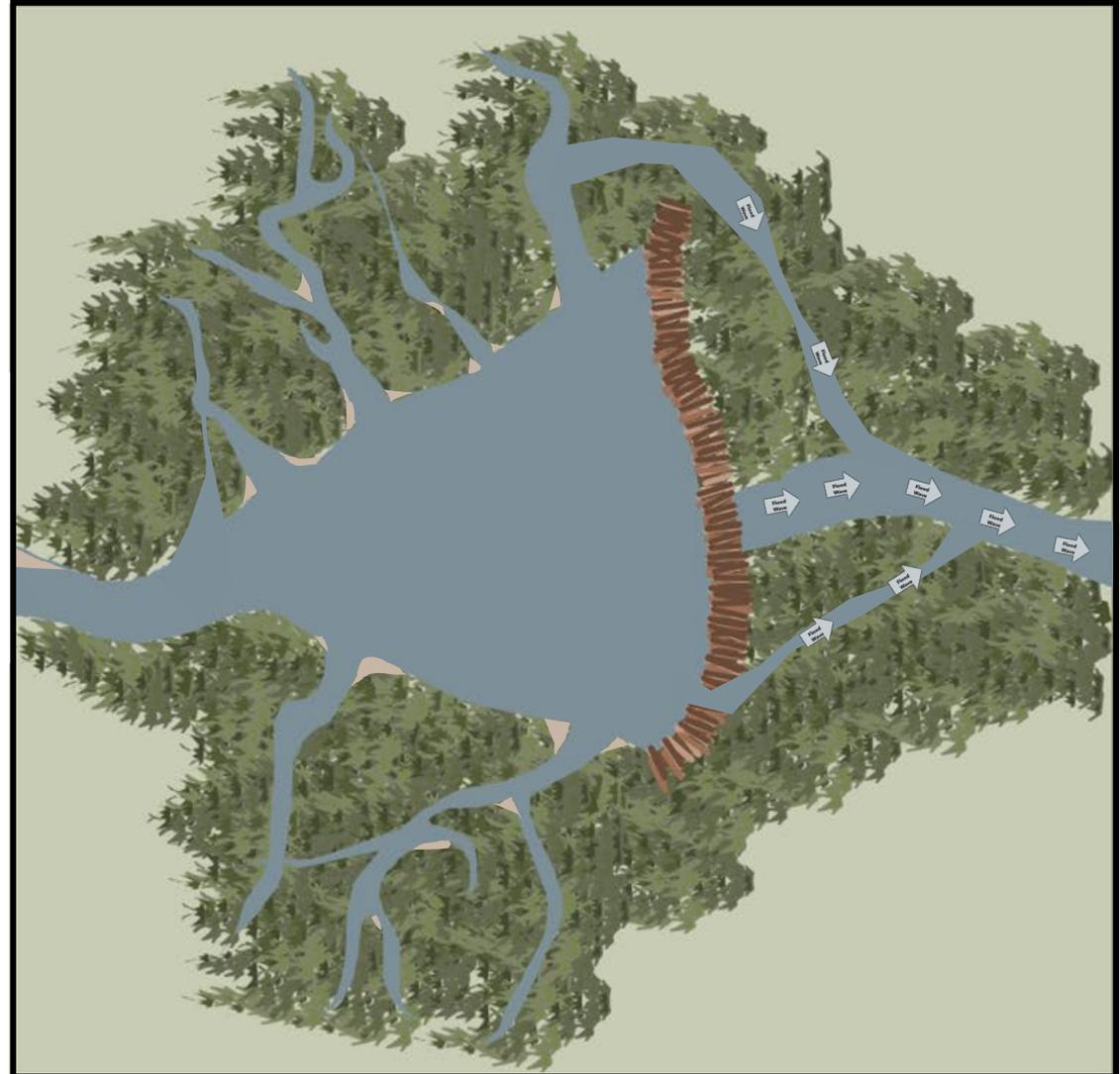
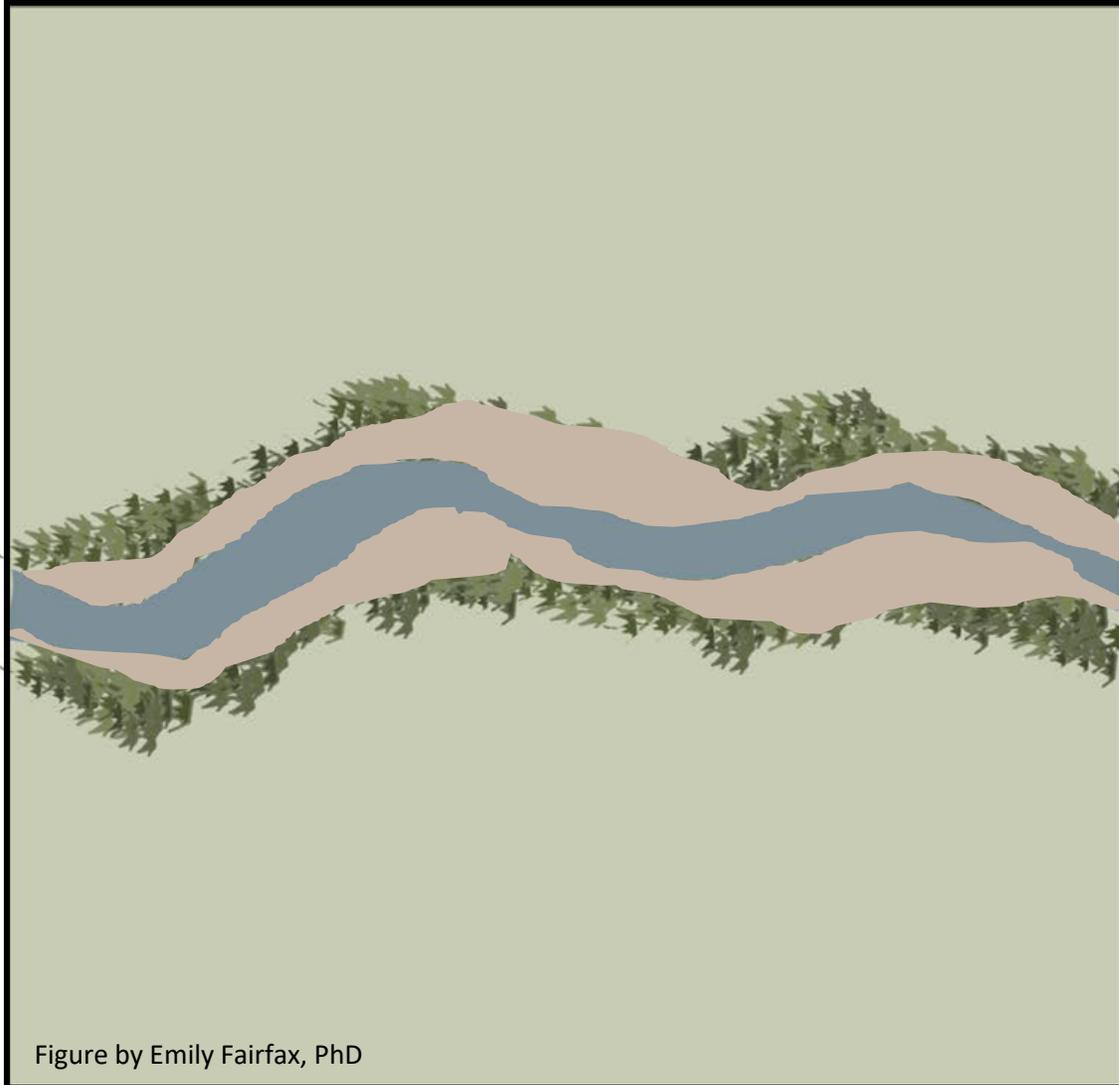


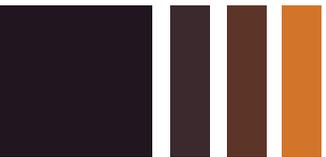
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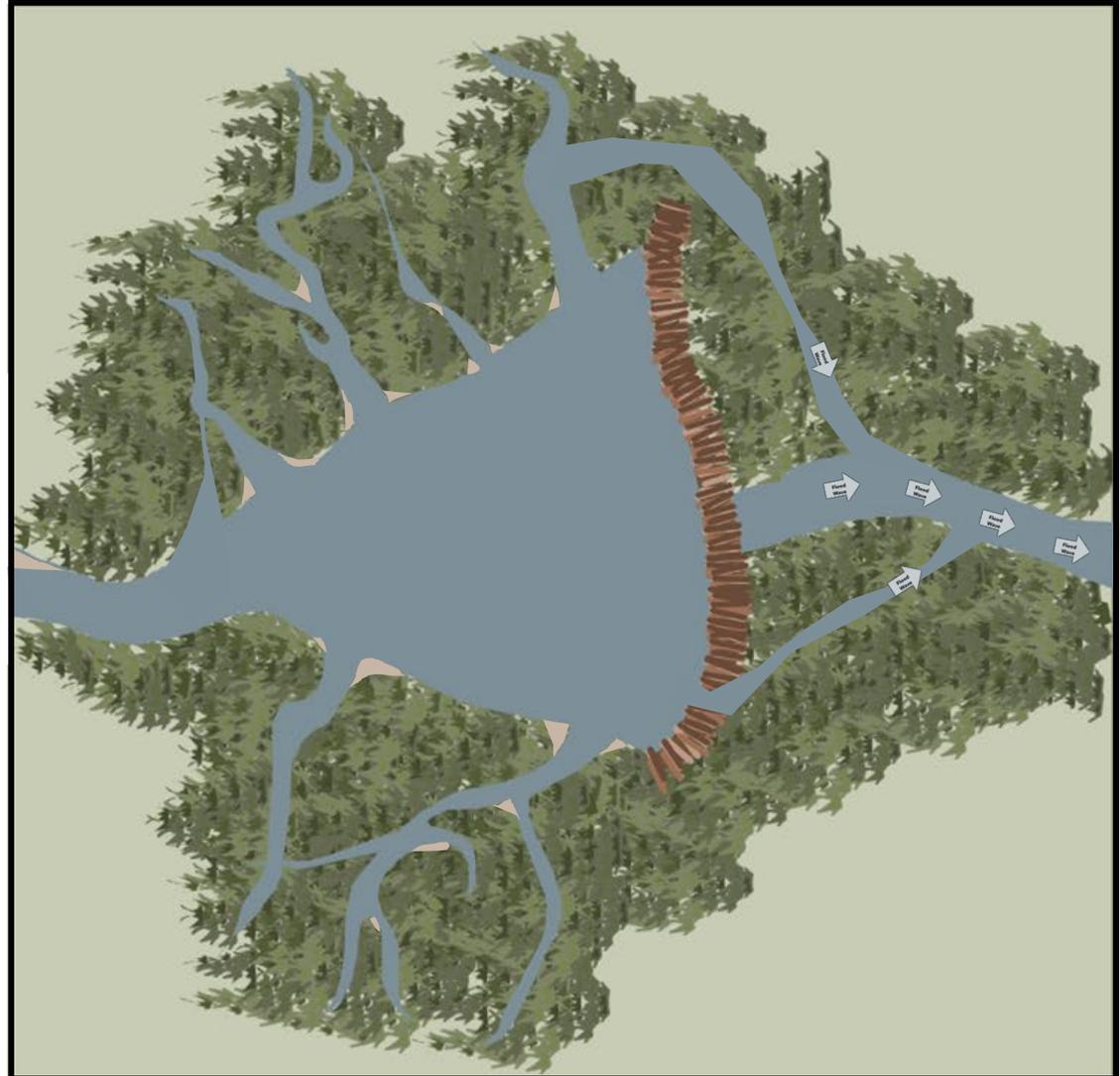
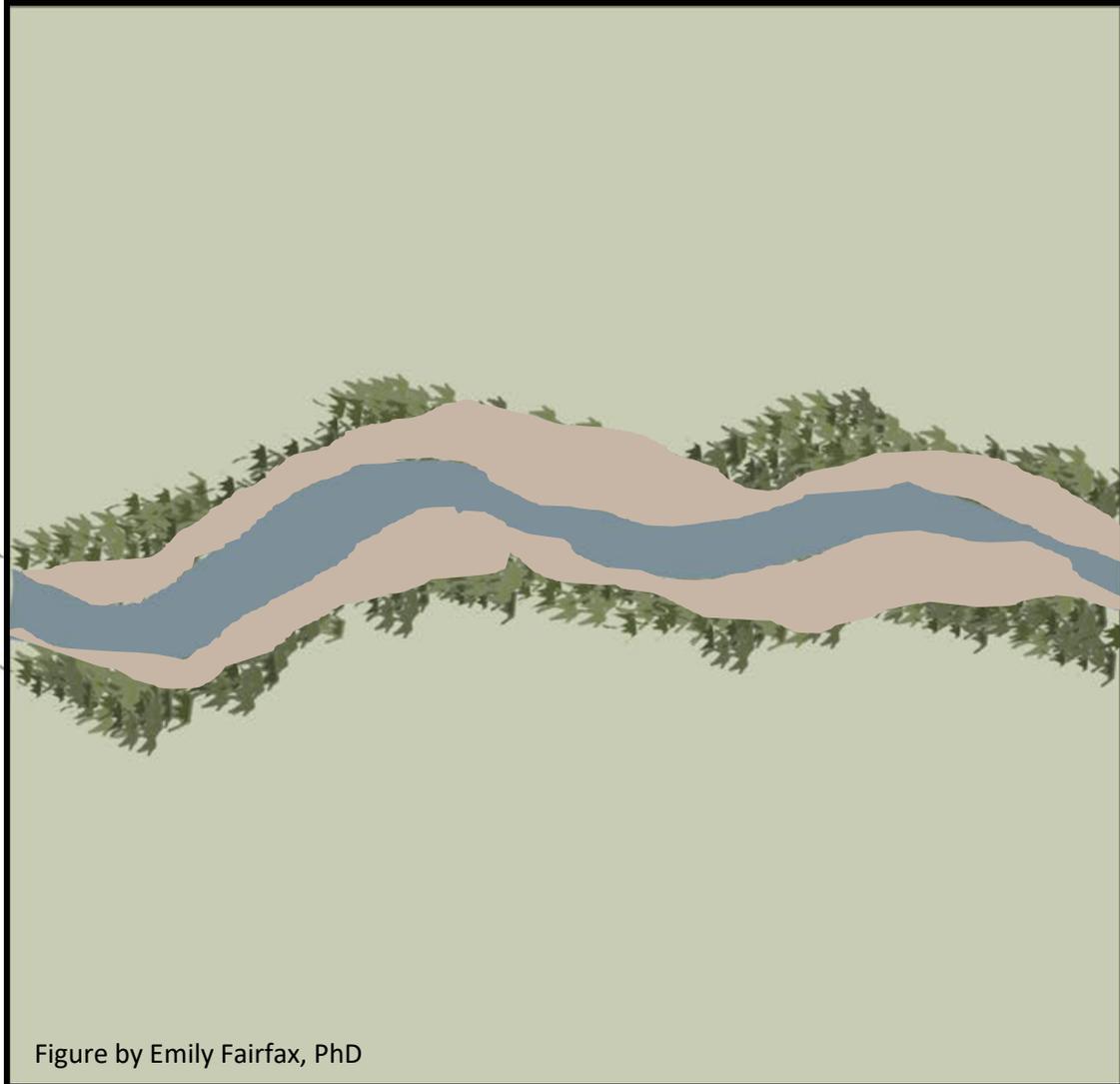


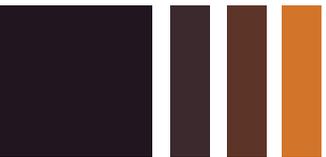
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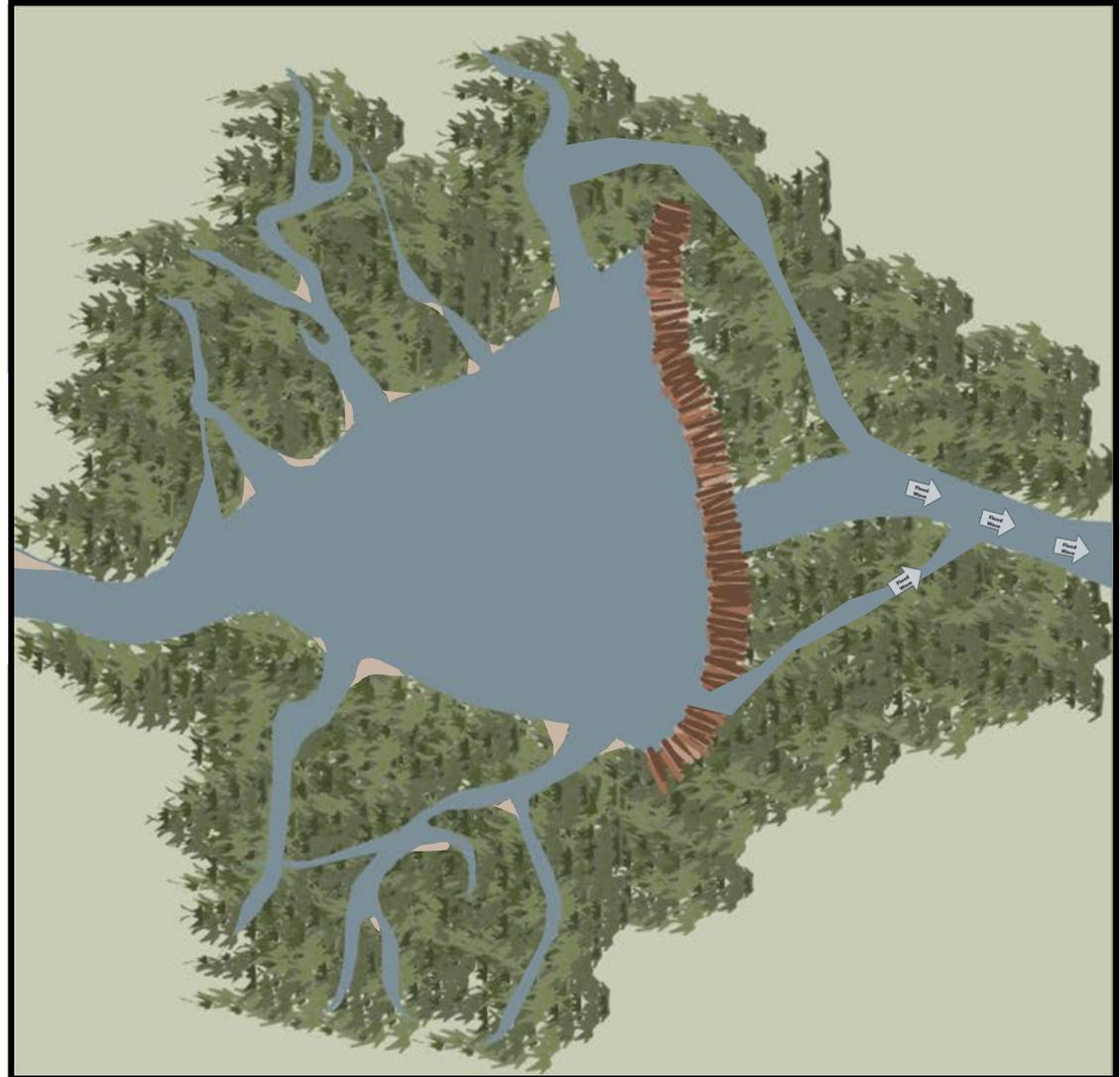
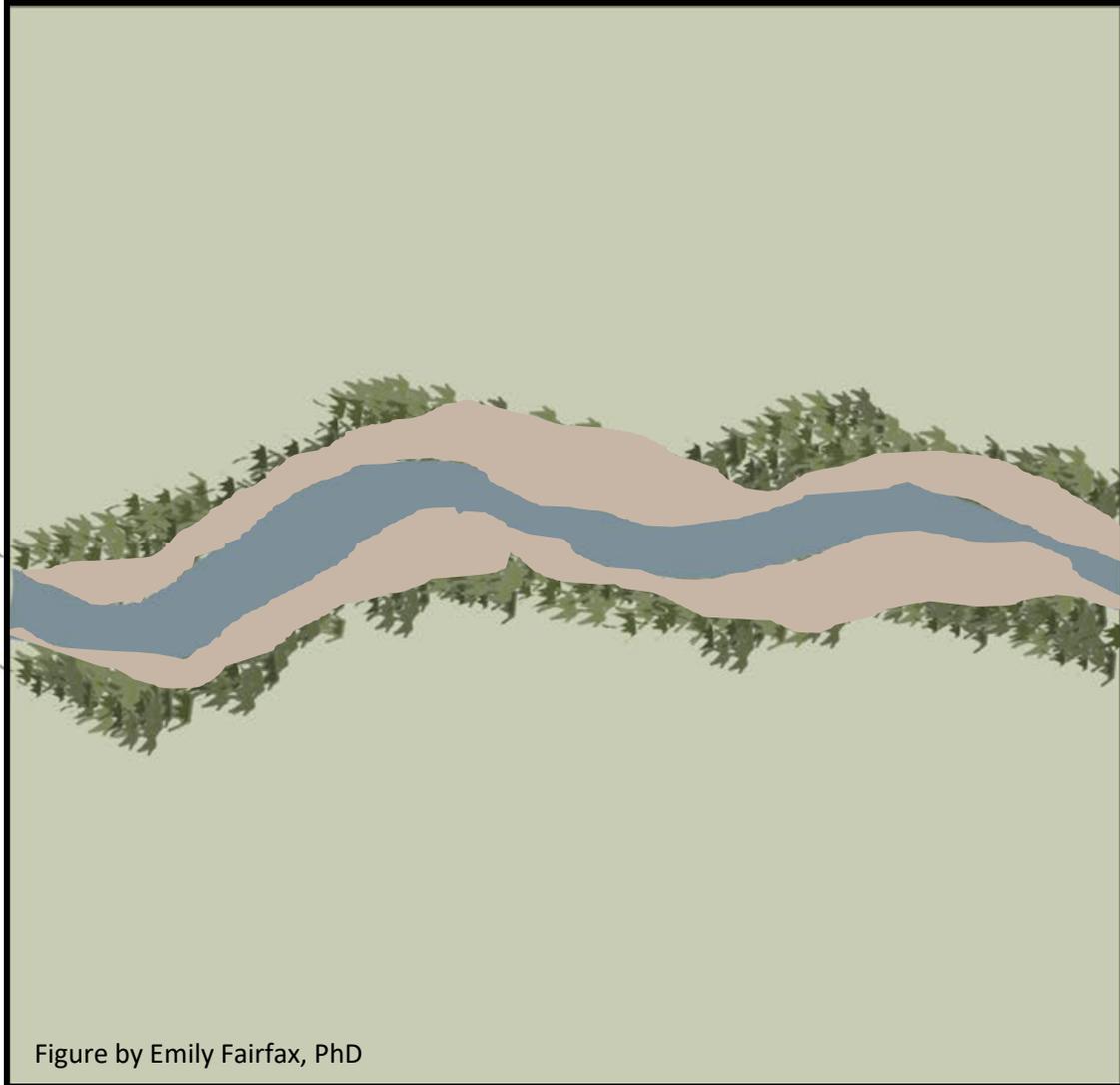


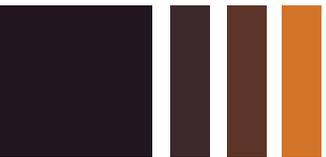
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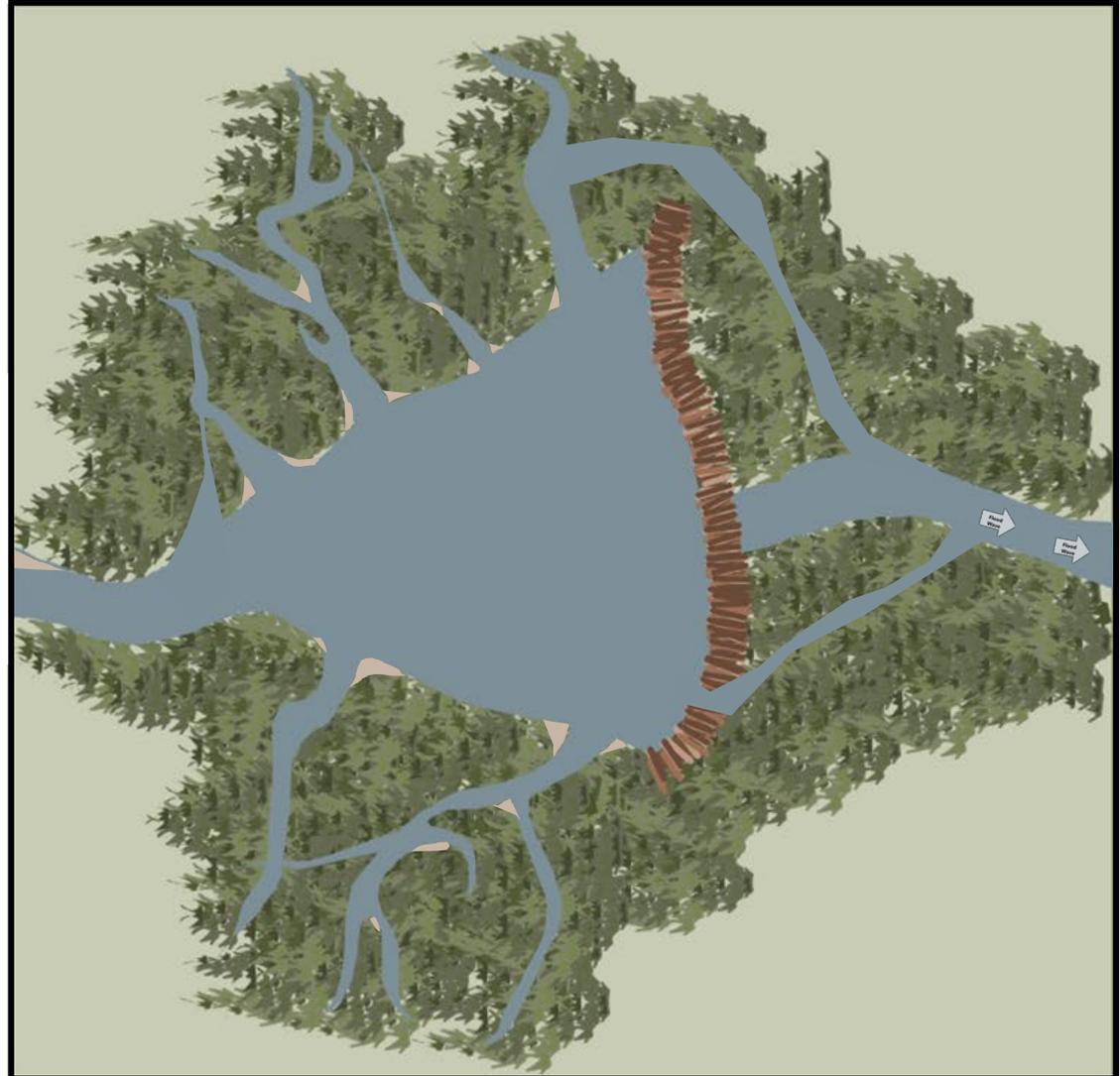
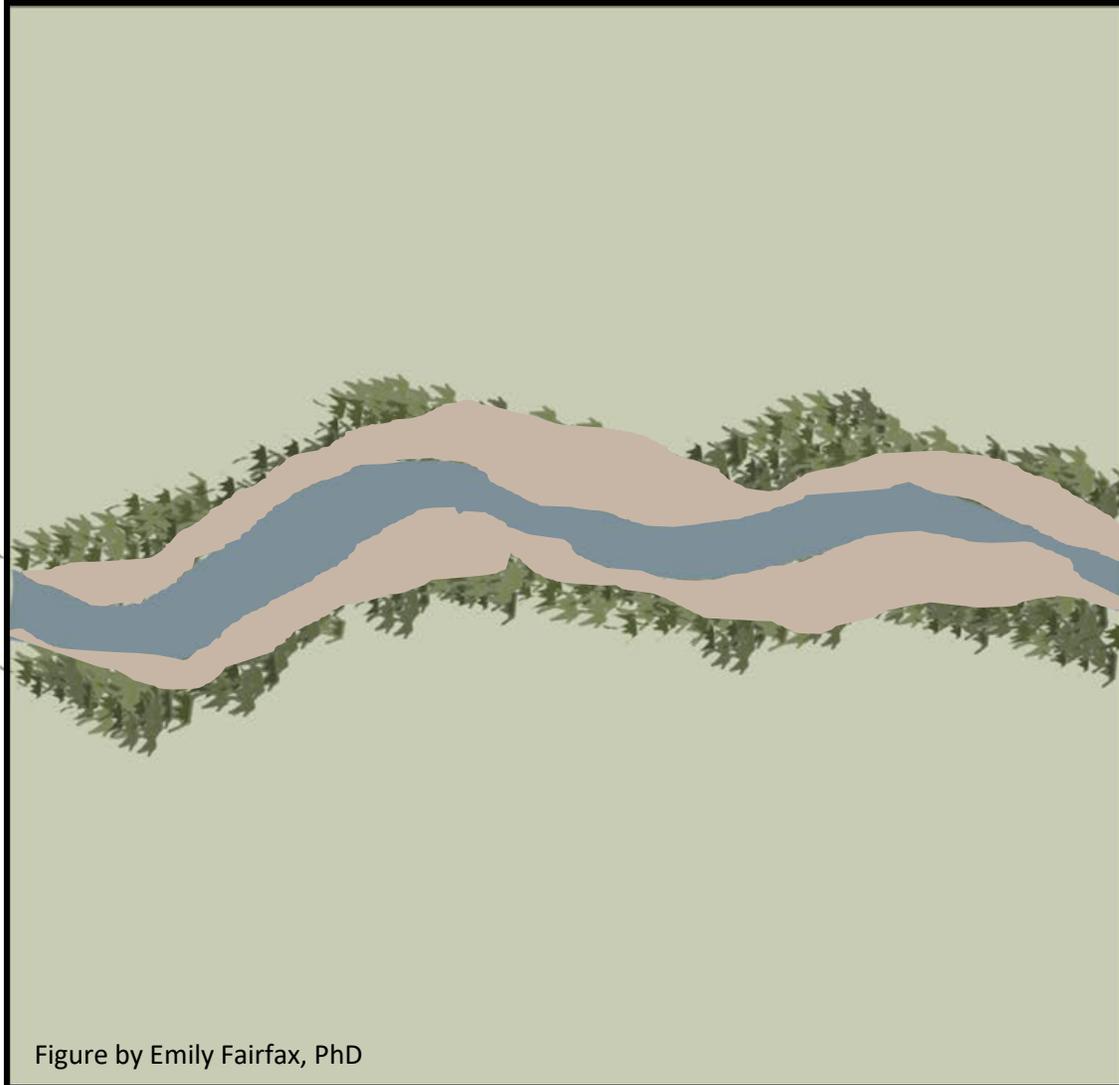


Complexity Builds Resilience: Starting with Floods



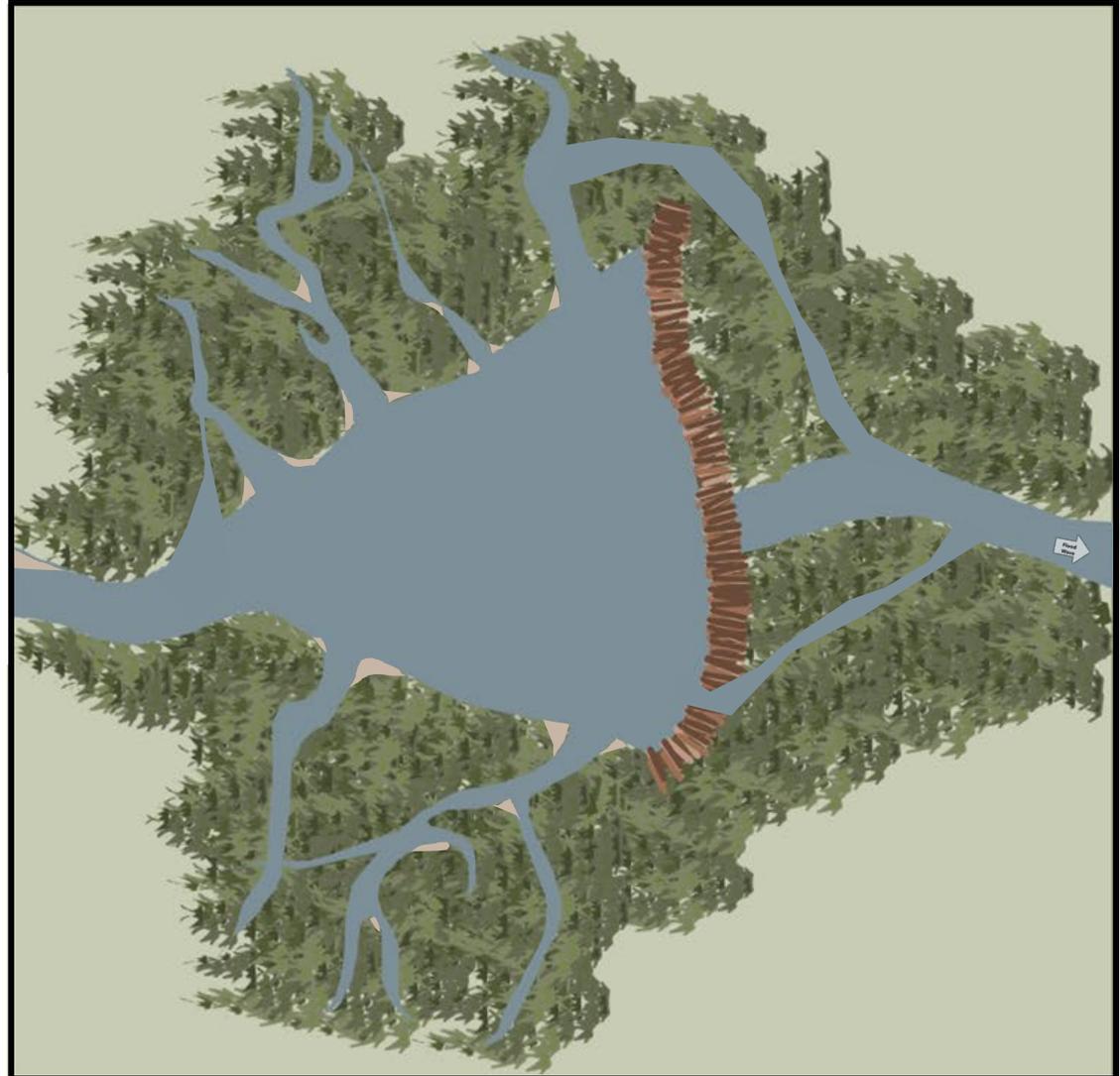
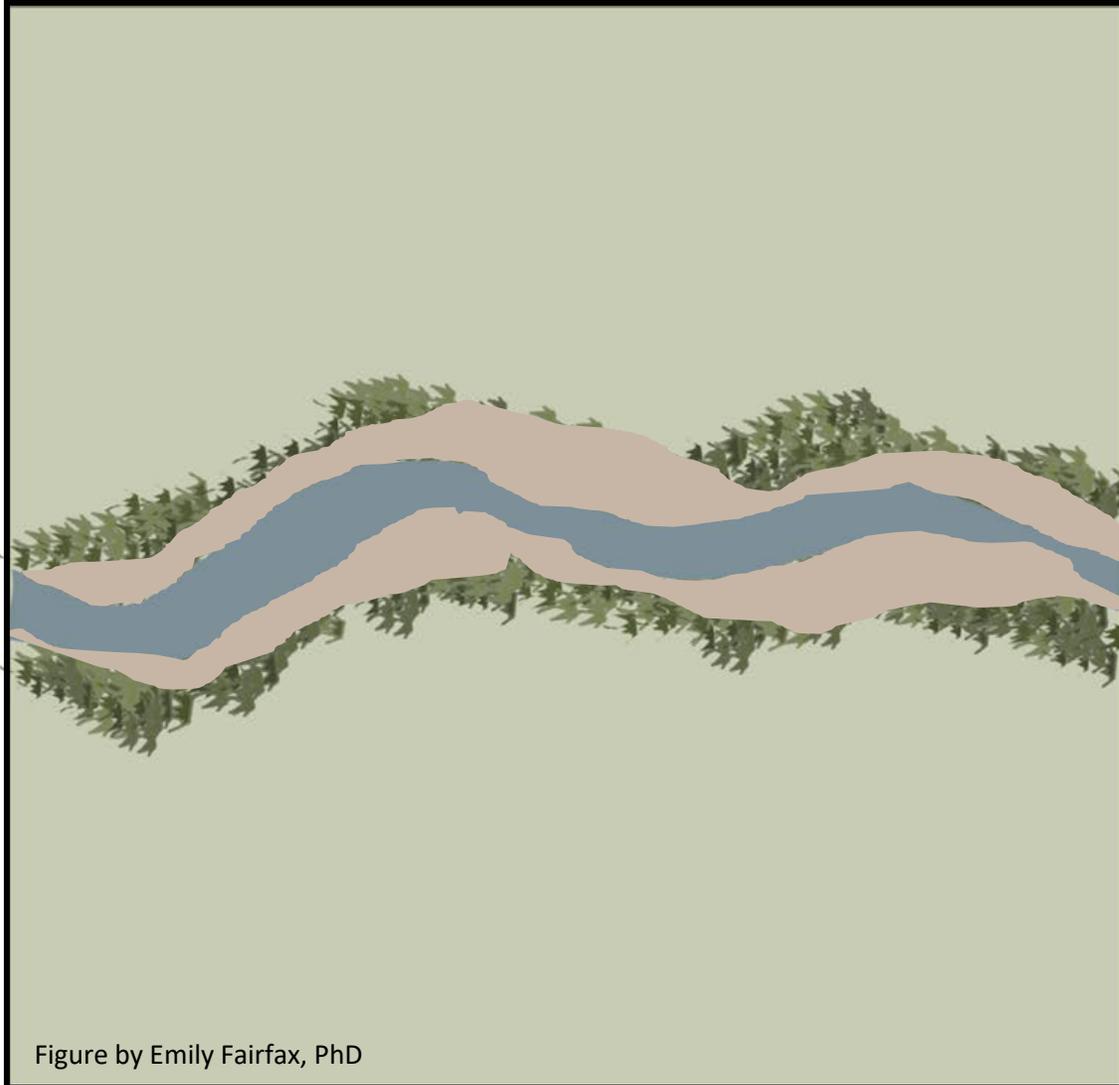


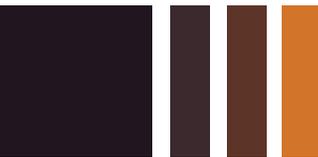
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Complexity Builds Resilience: Starting with Floods





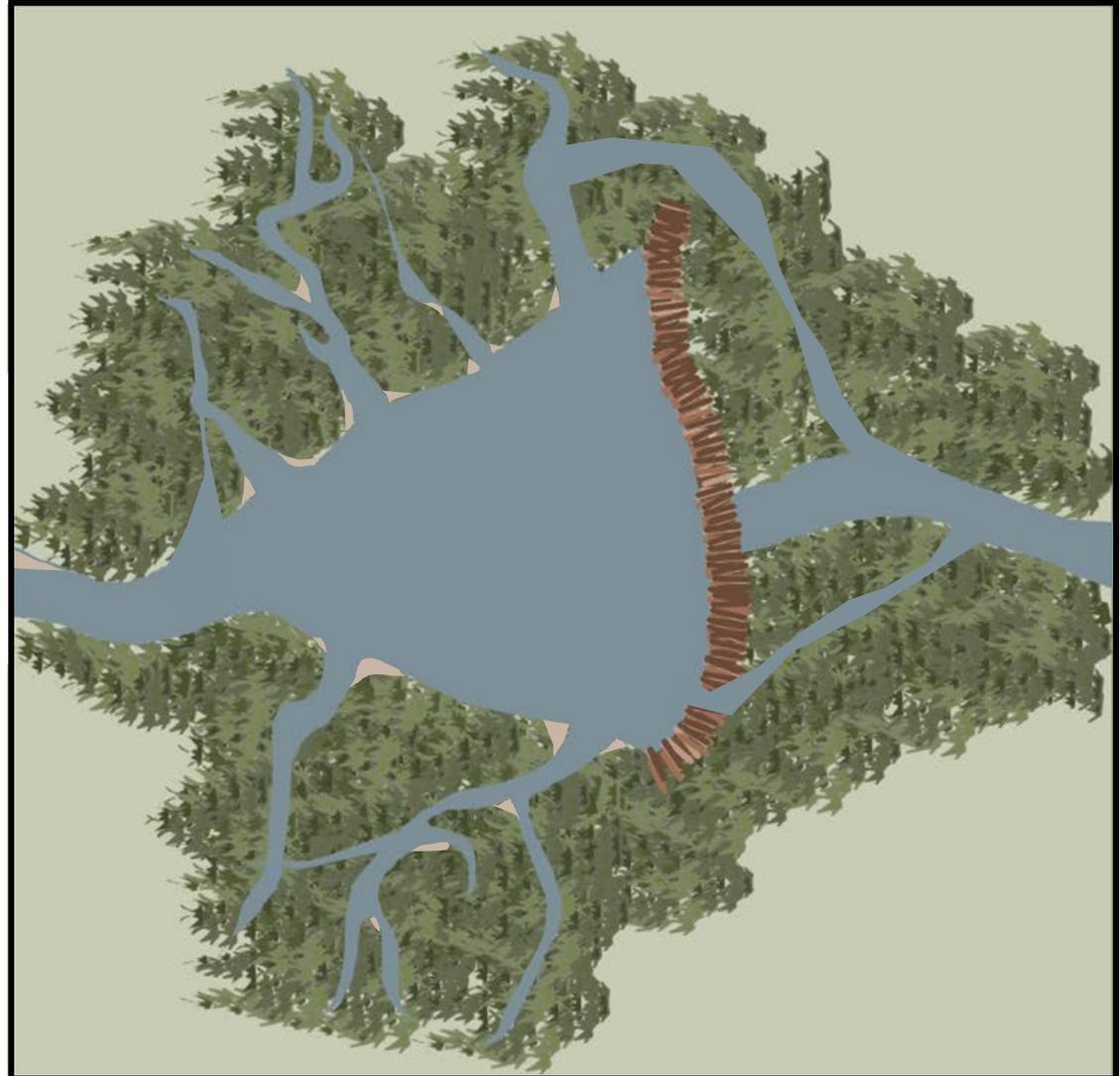
Complexity Builds Resilience: Starting with Floods

EROSION

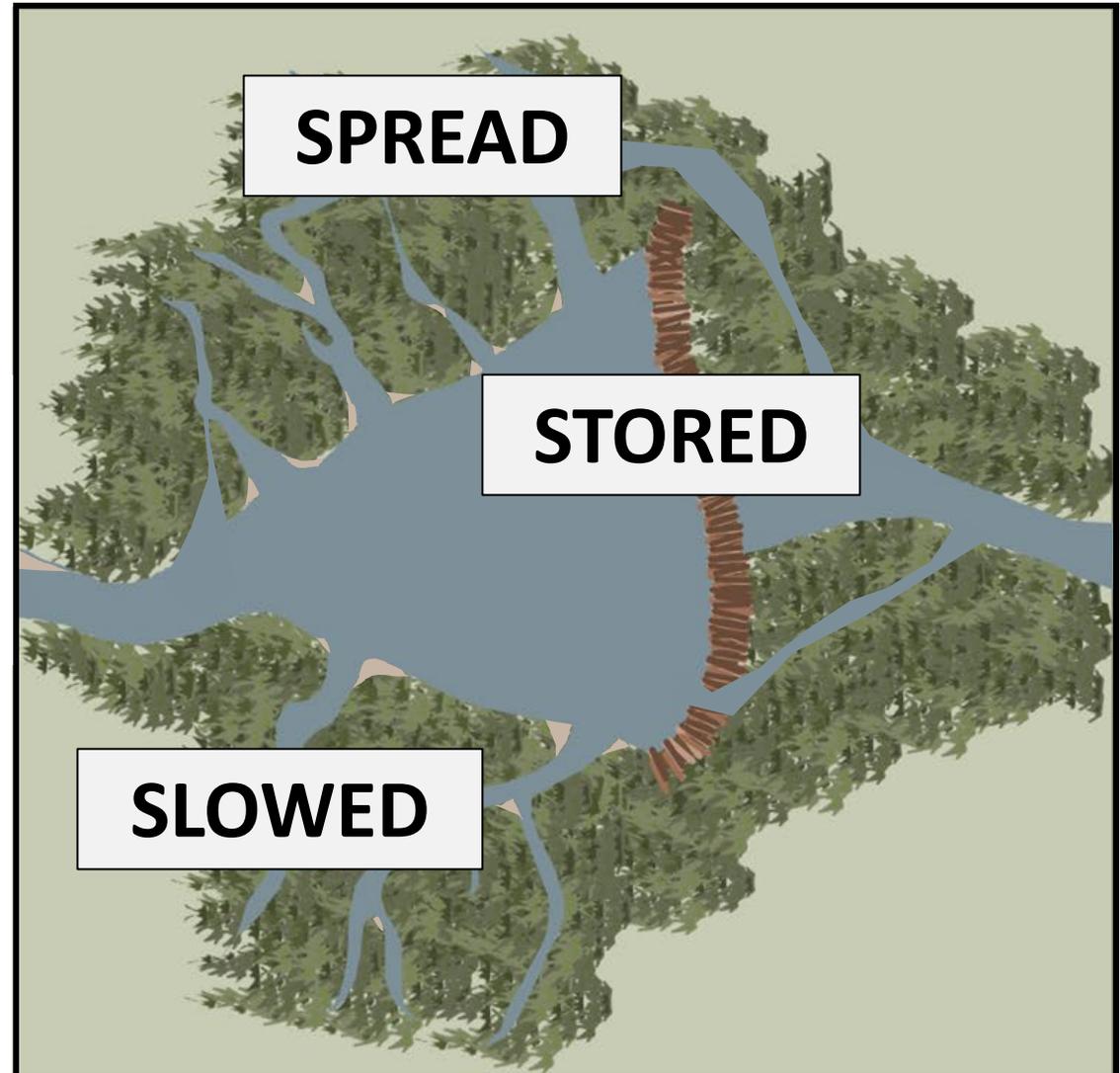
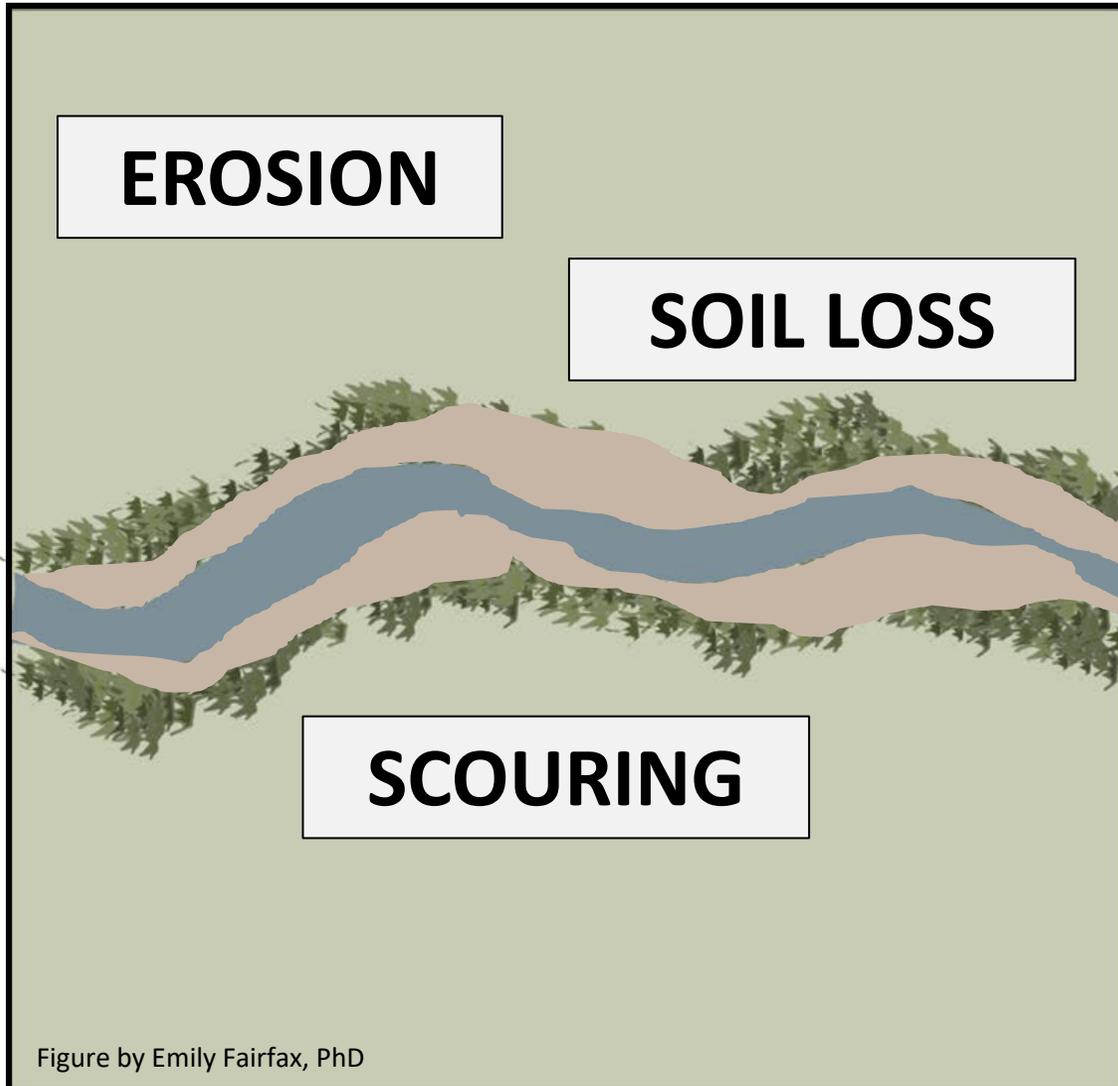
SOIL LOSS

SCOURING

Figure by Emily Fairfax, PhD

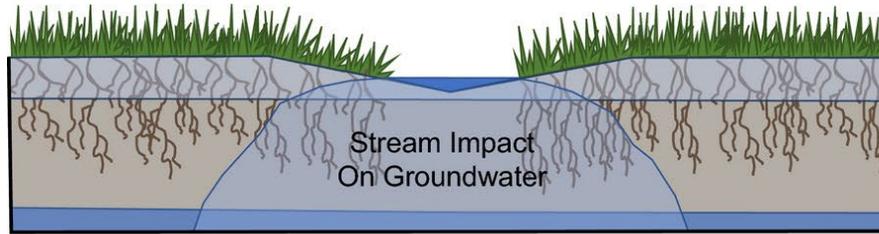


Complexity Builds Resilience: Starting with Floods



Beaver ponds provide reliable, consistent habitat.

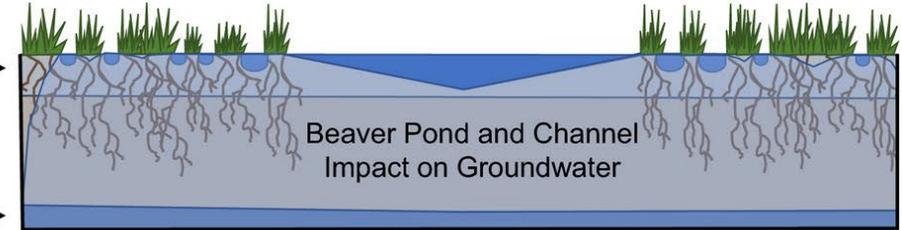
Stream without Beavers



← Infiltrating
Precipitation →

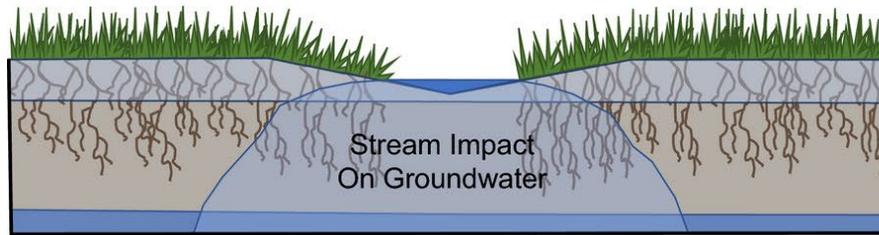
← Deep
Water Table →

Stream with Beavers



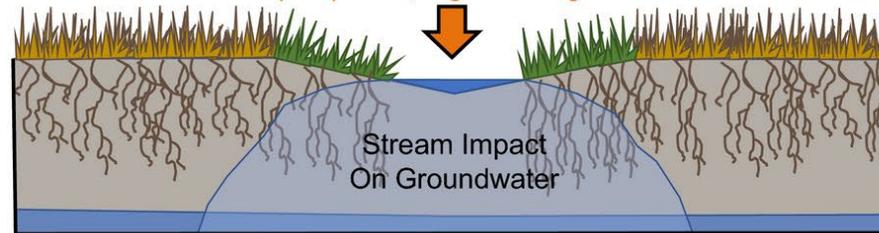
Beaver ponds provide reliable, consistent habitat.

Stream without Beavers

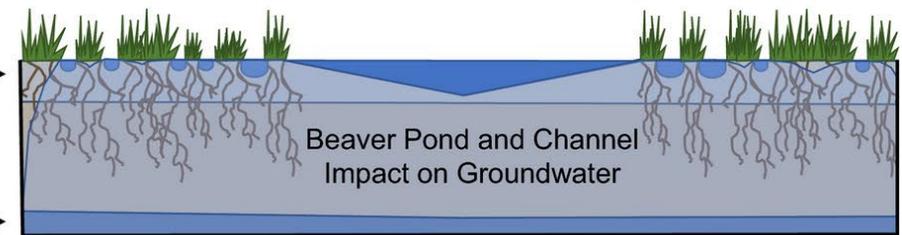


Drought Conditions

less precipitation, veg relies on groundwater



Stream with Beavers



Drought Conditions

less precipitation, veg relies on groundwater



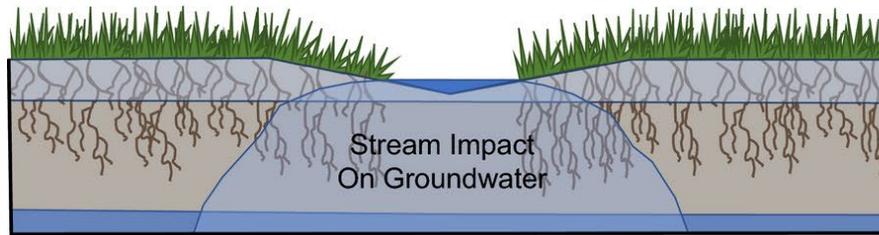
← Infiltrating Precipitation →

← Deep Water Table →

← Deep Water Table →

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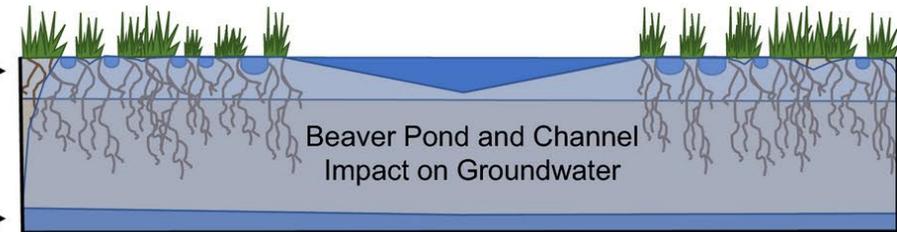
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← Infiltrating Precipitation →

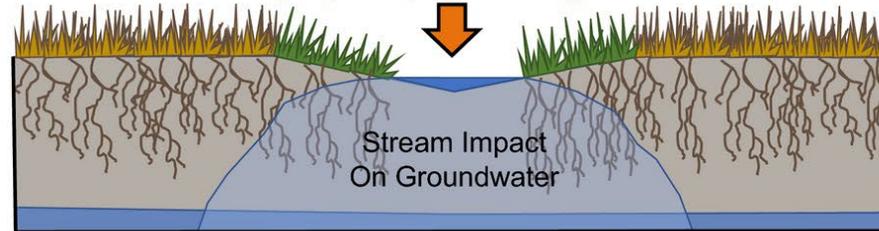
← Deep Water Table →

Stream with Beavers



Drought Conditions

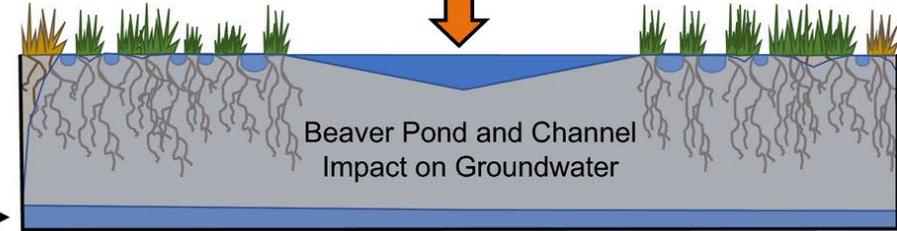
less precipitation, veg relies on groundwater



← Deep Water Table →

Drought Conditions

less precipitation, veg relies on groundwater



Ecohydrology

RESEARCH ARTICLE

Using remote sensing to assess the impact of beaver damming on riparian evapotranspiration in an arid landscape

Emily Fairfax  Eric E. Small



Biological Conservation

Volume 141, Issue 2, February 2008, Pages 556-567



Beaver (*Castor canadensis*) mitigate the effects of climate on the area of open water in boreal wetlands in western Canada

Glynnis A. Hood ^a  , Suzanne E. Bayley ^a 

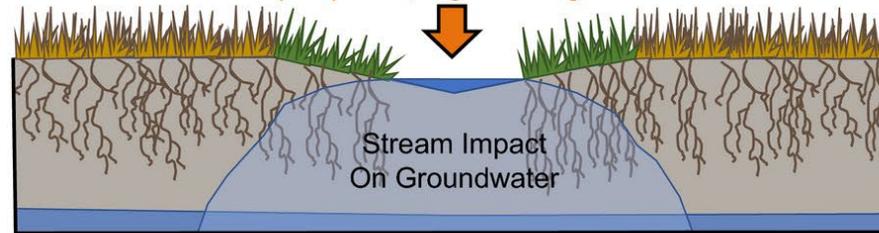
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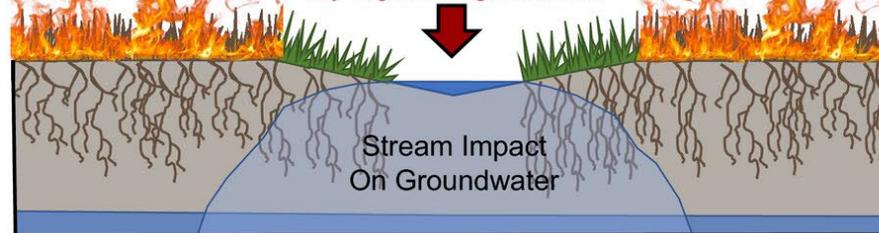
Drought Conditions

less precipitation, veg relies on groundwater

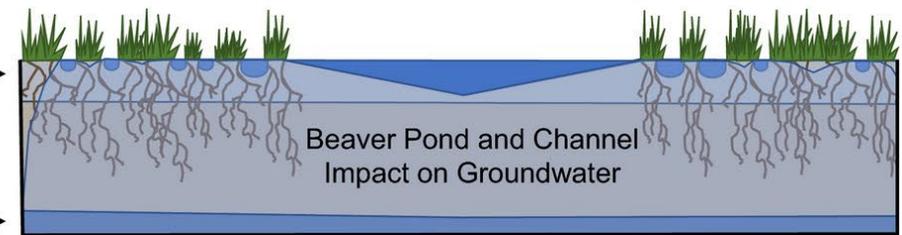


Fire Conditions

dry vegetation ignites/burns



Stream with Beavers



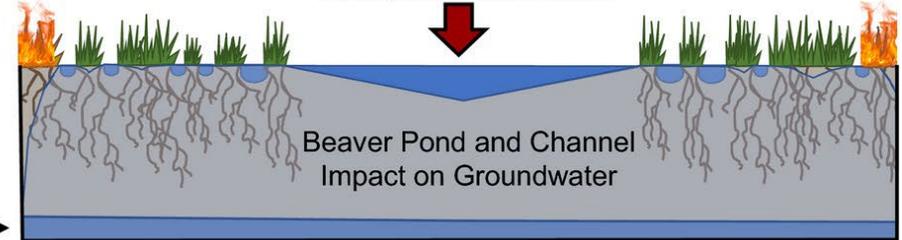
Drought Conditions

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Fire Conditions

dry vegetation ignites/burns





Emily Fairfax

And beaver-engineered landscapes are valuable, and beavers are a natural resource beyond fur.

Mammal Review



Review | [Full Access](#)

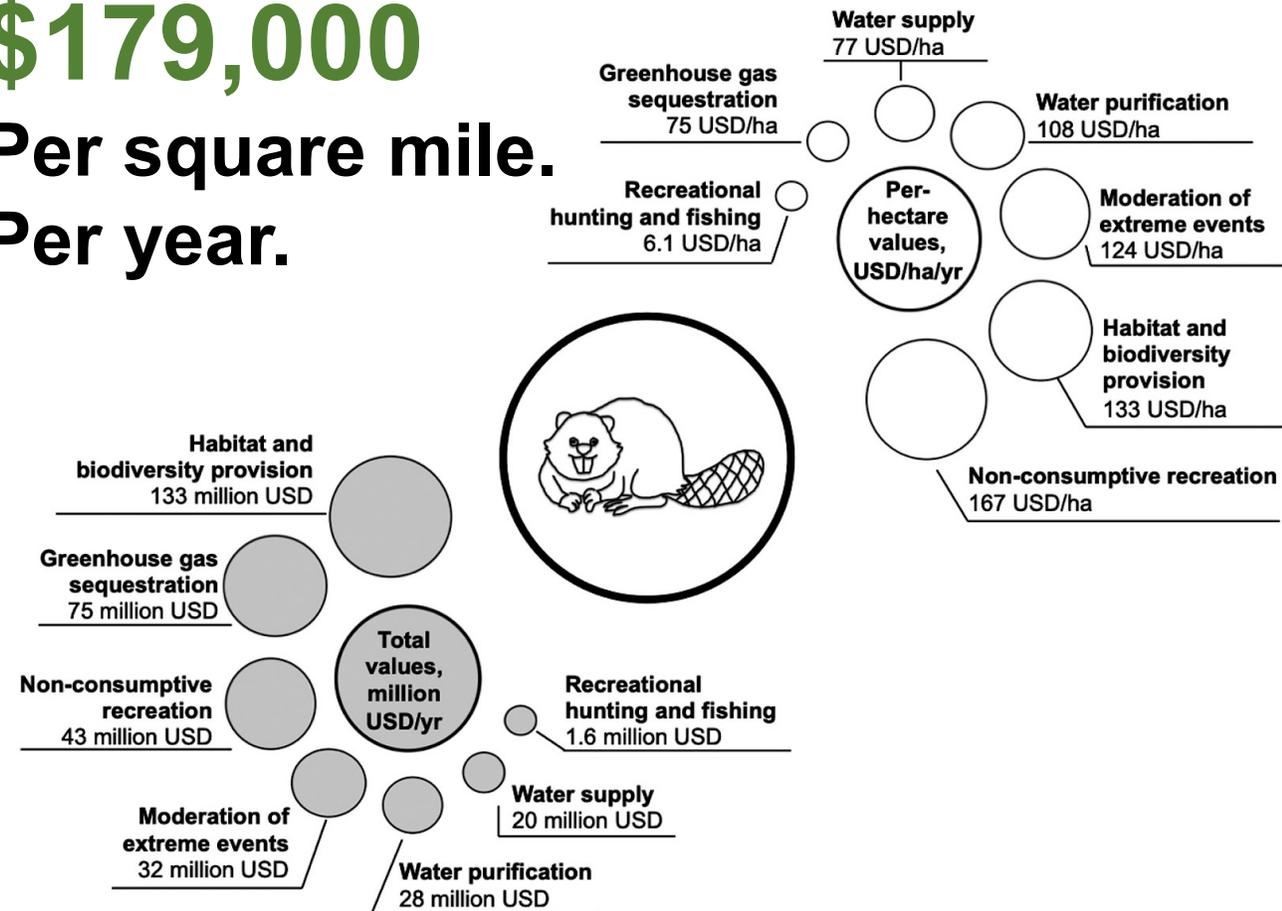
Ecosystem services provided by beavers *Castor* spp.

Stella Thompson , Mia Vehkaoja , Jani Pellikka , Petri Nummi 

First published: 01 October 2020 | <https://doi.org/10.1111/mam.12220>

Ecosystem service	Ecosystem service category	Number of value estimates
Moderation of extreme events (FloodDrought)	Regulating	11
Greenhouse gas sequestration (GHG)	Regulating	8
Water purification (Quality)	Regulating	26
Water supply (Supply)	Provisioning	6
Recreational hunting and fishing (HuntFish)	Provisioning	3
Habitat and biodiversity provision (HabBio)	Supporting	8
Nutrient cycling*	Supporting	0
Non-consumptive recreation (Recreation)	Cultural	17
Historical value*	Cultural	0

\$179,000
Per square mile.
Per year.



Water Quality is a Key Ecosystem Service



ELSEVIER

Science of The Total Environment

Volume 968, 10 March 2025, 178871



The impact of beaver dams on distribution of waterborne *Escherichia coli* and turbidity in an agricultural landscape

Hannah L. White ^a  , Rosie Fellows ^a, Luke Woodford ^a, Michael J. Ormsby ^a,
Ollie van Biervliet ^{b,c}, Alan Law ^a, Richard S. Quilliam ^a, Nigel J. Willby ^a

[Home](#) > [Wetlands Ecology and Management](#) > [Article](#)

Induced mobilization of stored metal precipitates from beaver (*Castor canadensis*) created wetlands on a mine drainage impacted stream

Original Paper | Published: 16 October 2021

Volume 30, pages 127–137, (2022) [Cite this article](#)

The impact of beaver impoundments on the water chemistry of two Appalachian streams

Authors: [Brian E Margolis](#), [Mark S Castro](#), and [Richard L Raesly](#) | [AUTHORS INFO & AFFILIATIONS](#)

Publication: Canadian Journal of Fisheries and Aquatic Sciences • November 2001 • <https://doi.org/10.1139/f01-166>

Biodiversity is a Key Ecosystem Service

Freshwater Biology / Volume 61, Issue 4 / p. 486-499

Original Article | [Full Access](#)

Habitat engineering by beaver benefits aquatic biodiversity and ecosystem processes in agricultural streams

Alan Law , Fiona McLean, Nigel J. Willby

First published: 11 February 2016

<https://doi.org/10.1111/fwb.12721>

Citations: 82

Freshwater Biology / Volume 58, Issue 7 / p. 1523-1538

Original Article | [Full Access](#)

Beaver dams maintain fish biodiversity by increasing habitat heterogeneity throughout a low-gradient stream network

Joseph M. Smith , Martha E. Mather

First published: 26 April 2013

<https://doi.org/10.1111/fwb.12153>

Citations: 55



Science of The Total Environment

Volume 950, 10 November 2024, 175166



Ecosystem engineers cause biodiversity spill-over: Beavers are associated with breeding bird assemblages on both wetlands and adjacent terrestrial habitats

Izabela Fedyń ^a, Wojciech Sobociński ^b, Sławomir Czyżowicz ^a,
Jakub Wyka ^a, Michał Ciach ^a  

North American Journal of Fisheries Management 40:427–445, 2020
© 2020 American Fisheries Society
ISSN: 0275-5947 print / 1548-8675 online
DOI: 10.1002/nafm.10422

ARTICLE

Effect of Beaver on Brook Trout Habitat in North Shore, Lake Superior, Streams

Kathryn M. Renik*  and Andrew W. Hafs

Aquatic Biology Program, Department of Biology, Bemidji State University, 1500 Birchmont Drive Northeast, Bemidji, Minnesota 56601, USA



efairfax@umn.edu



Minnesota's Beavers: balancing benefits and conflict management

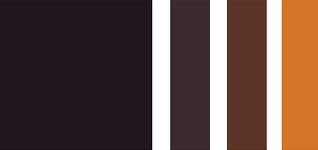
Emily Fairfax, Ph.D., University of Minnesota



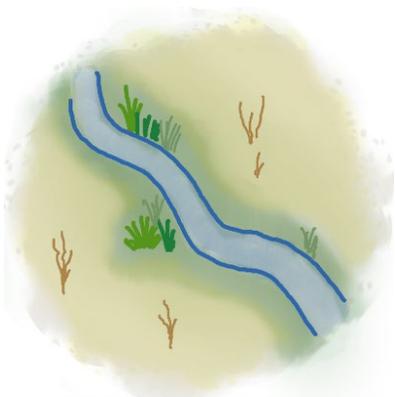


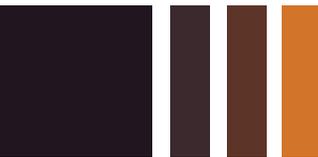
Beavers: Nature's Engineer





Beavers: Nature's Engineer





Beavers: Nature's Engineer

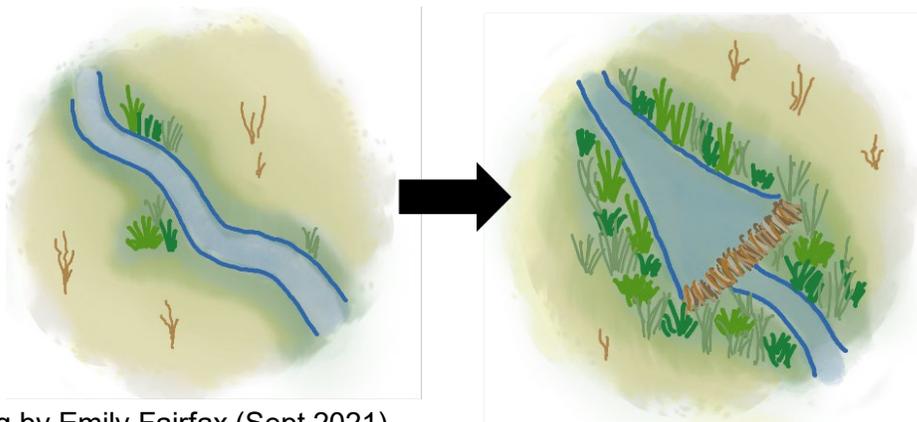


Photo and Drawing by Emily Fairfax (Sept 2021)

Beavers: Nature's Engineer

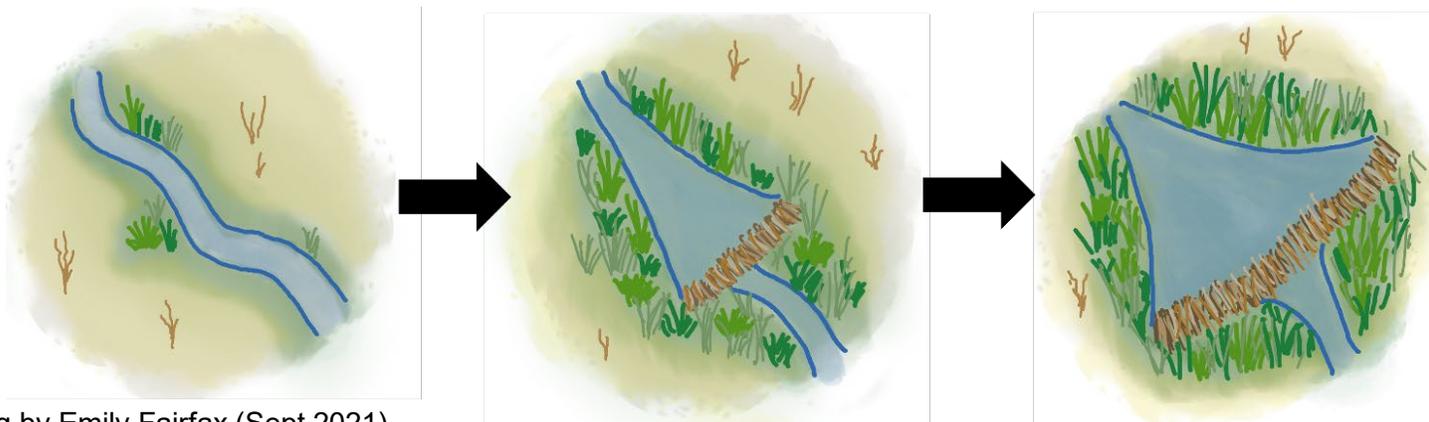


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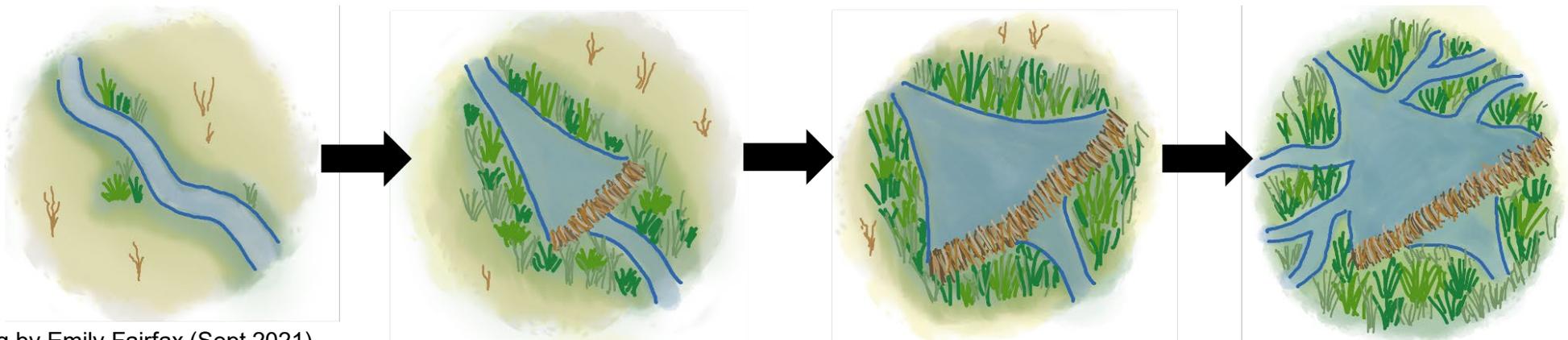
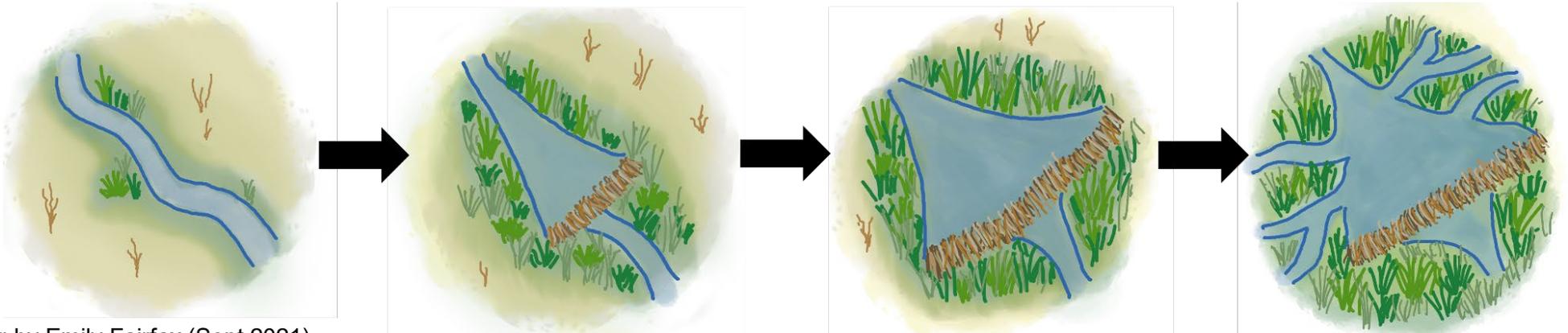
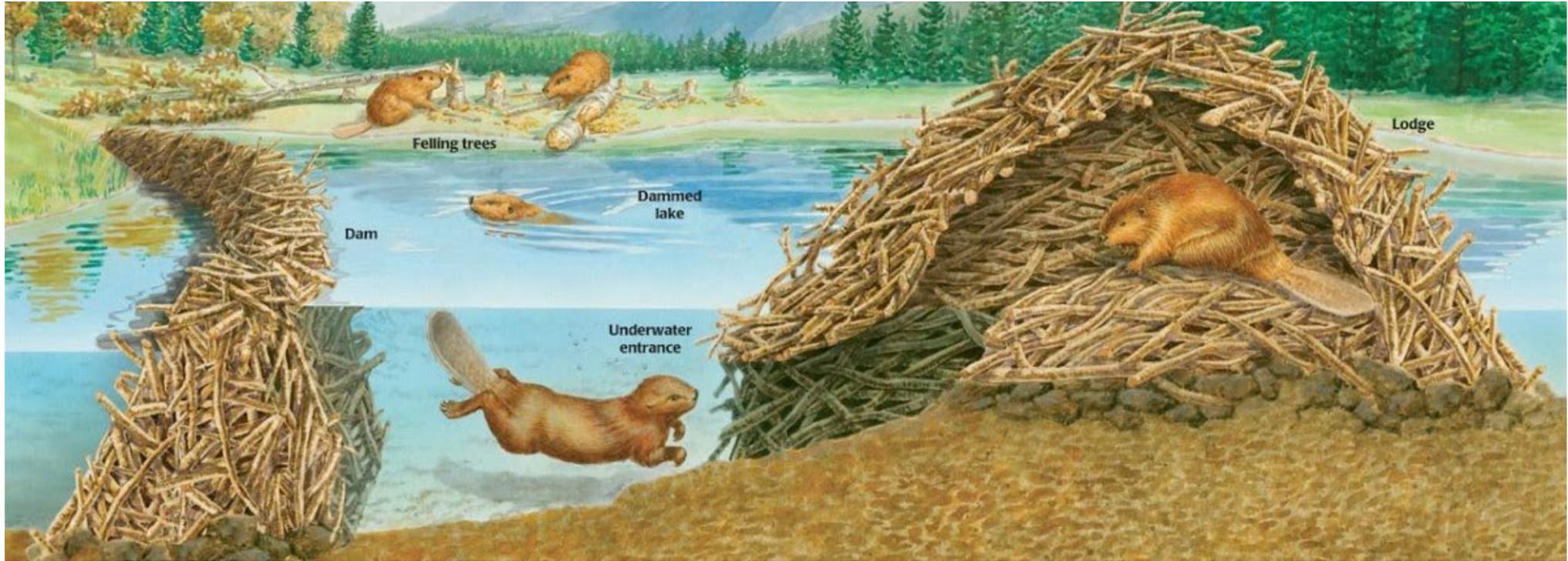
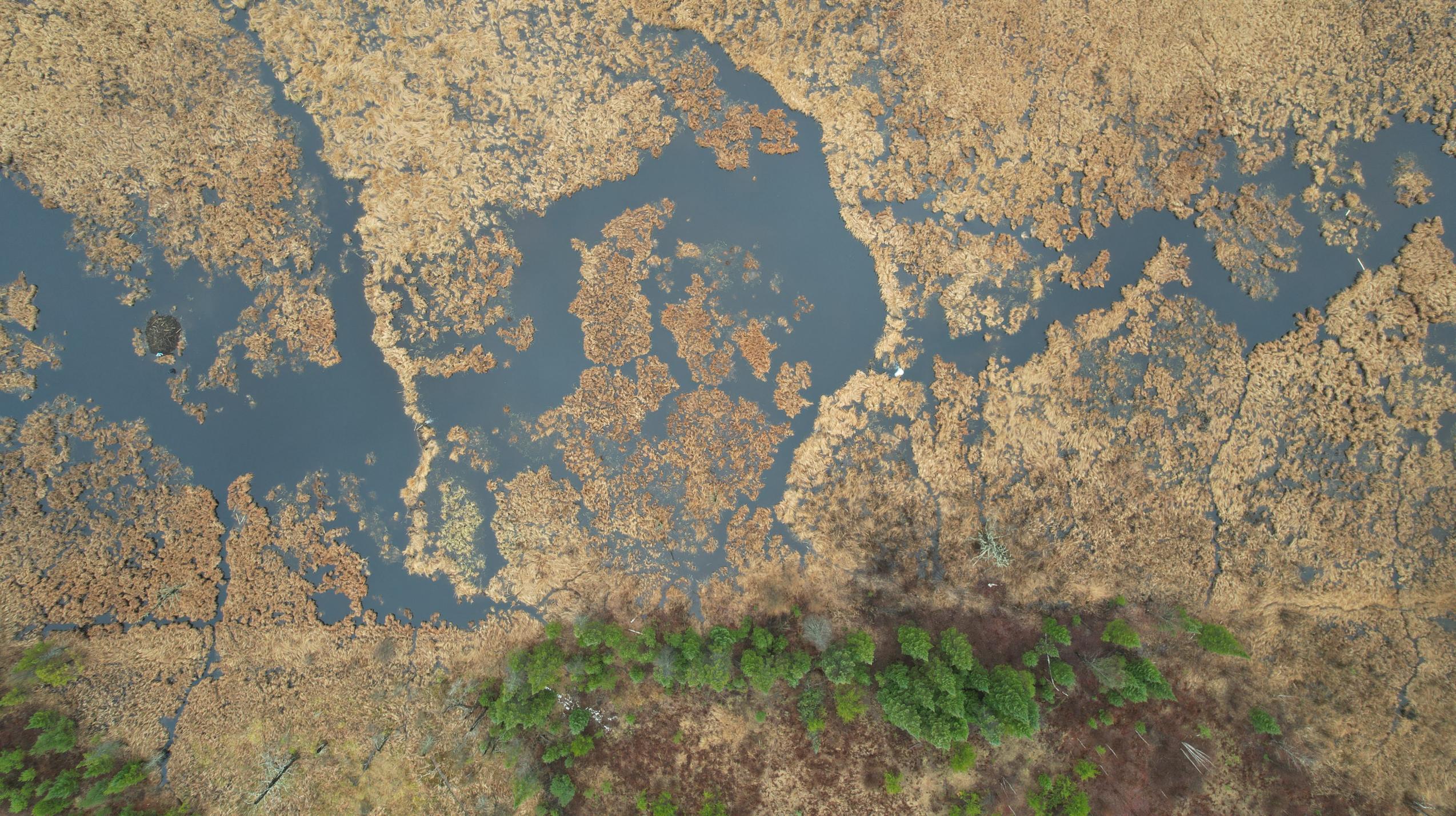


Photo and Drawing by Emily Fairfax (Sept 2021)

Beavers: Nature's Engineer







Beaver Conflict in Minnesota



Leave It To Beavers?

By **Joe Friedrichs**

Published June 9, 2023 at 5:37 AM EDT

♥ Donate

“In 2007, helicopters were circling over a few rivers and streams in Minnesota near Lake Superior. They were looking for beaver dams. The Minnesota Department of Natural Resources had just come up with a new plan: to **get rid of as many beavers and their dams as possible...**

‘I mean, ideally, if we could eliminate the majority of beaver in the entire watershed, we would have a lot less maintenance trapping to do.’ – Deserae Henrickson, MN DNR”

‘And then that was it. I stopped working for the feds and the DNR. It just didn't make any sense. ‘Kill them all,’ she says.’ – Dan Croke, MN Trappers Association Hall of Fame Trapper”

–*Interlochen Public Radio*

Enterprise

SPORTS NORTHLAND OUTDOORS

COLA: How much tree damage can a beaver's iron teeth inflict?

To help answer these questions, Hubbard County Coalition of Lake Associations checked with local Minnesota Department of Natural Resources (DNR) Wildlife and Forestry personnel and found fascinating facts about the beaver.



If you hear a sharp slap on the water, you've likely been spotted by a local beaver swimming along the shoreline. Contributed/Craig Bihire

FINAL ENVIRONMENTAL ASSESSMENT

Reducing Beaver Damage Through an
Integrated Wildlife Damage Management Program
in the
State of Minnesota

Prepared By:
UNITED STATES DEPARTMENT OF AGRICULTURE
ANIMAL AND PLANT HEALTH INSPECTION SERVICE
WILDLIFE SERVICES

January 2002

In Minnesota, beaver cause significant damage primarily as result of dam building and subsequent flooding, bank burrowing, tree cutting and obstructing overflow structures and spillways. The MDNR lists beaver as the wildlife species responsible for the second highest number of nuisance/damage calls in the state. Beaver are also listed as the second leading cause of economic damage by a wildlife species in the state. (MDNR 1993).

MDNR findings indicate Minnesota beaver damage issues in descending order of significance are:

1. Flooded roads (also including roadbed degradation, culvert washouts and resulting maintenance).
2. Flooded agricultural fields.
3. Flooded commercial timber.
4. Gnawing damage to commercial and ornamental trees.

Beaver Management in Minnesota



DEPARTMENT OF
NATURAL RESOURCES

Page Menu

Beavers

Although beavers provide many positive environmental values, they can also cause property damage. Presently, beavers are abundant in Minnesota. To help landowners and others manage beaver damage, the Minnesota DNR offers the following information and advice.

Methods for exclusion and damage prevention

- In some situations, water levels in the beaver pond may be controlled by special devices such as the [Clemson beaver pond leveler \(PDF\)](#). For information and technical assistance, contact your [local DNR area wildlife office \(PDF\)](#). The levelers are no longer available from Minncor, but can be built using a few basic tools and information in the brochure.
- Protect individual trees in your yard by placing hardware cloth cylinders at least 30" tall around the base of the tree. Energized fencing can protect larger areas.
- Plant native evergreens such as common juniper (*Juniperus communis*) that beaver do not like or other shrubs that regrow after some beaver damage (i.e. red osier dogwood, pussy or prairie willow).
- Create a buffer strip of native vegetation suited to your location. Visit the [Lakescaping](#) Web page for additional help with your shoreland management.



- **Outdated** information on pond levelers (Clemson no longer recommended, also not available anymore)
- **Incorrect** fence for tree protection shown

Beaver Management in Minnesota



Removal methods

In many cases, beaver damage cannot be effectively managed unless the offending beavers are removed (killed). Removing a dam without removing the resident beavers generally results in the dam being immediately rebuilt. To remove a beaver dam that is causing flooding, a permit is not needed if:

- Removal of the dam does not constitute work in Public Waters (contact your [local DNR area hydrologist](#) ([PDF](#)) for a determination).
- The dam is located on land owned or managed by the individual experiencing the flooding.
- If the dam is NOT on land owned or managed by the individual experiencing flooding and permission has been granted by the land owner or manager.
- Authorized by state statute (i.e. road authorities, drainage authorities).

The DNR encourages property owners to work with local trappers to take beaver causing damage during the open trapping season. No permit is needed for a licensed trapper during the regular beaver season. Your local Conservation Officer or Area Wildlife Office may have names of local experienced trappers who may be willing to assist in trapping beaver for you. Fees, if any, will vary with seasons and individuals.

No Permit is Required Minnesota Statute 97B.655 which allows a landowner or legal occupant (e.g., authorized renter), or their authorized agent, to shoot or trap beaver that are causing damage. No license or permit is required if all four of these conditions are met:

1. The landowner/occupant must have beaver damage to their property.
2. The landowner/occupant must authorize the removal.
3. The animal must be on that landowner's/occupant's property, where it is causing damage, at the time it is shot or trapped.
4. The person taking the beaver must notify the DNR within 24 hours, by following the Reporting Requirements listed below.

The reporting requirements for a person who takes beaver causing damage, without a permit, is they must contact the local DNR Conservation Officer or Area Wildlife staff within 24 hours of killing the beaver. It is sufficient to leave a message or e-mail the [Information Center](#) ☎ 1-888-MINNDNR stating your name, address, telephone number, the total number of beaver shot or trapped, along with a brief explanation of the damage and location the beaver was shot or trapped.

A permit is required if the above conditions are not met. This permit is issued by the local conservation officer or regional wildlife manager, is free, and authorizes beaver to be taken out of season and without a license. All federal, state, or local regulations apply. This permit does not allow trespassing, using poison, using artificial lights or the discharge of firearms or use of traps where prohibited. Live relocation of beavers is not allowed.

Federal, state, county, township or local governmental employees, while on duty as a representative of that government, do not need a permit while doing beaver removal on land under their jurisdiction.

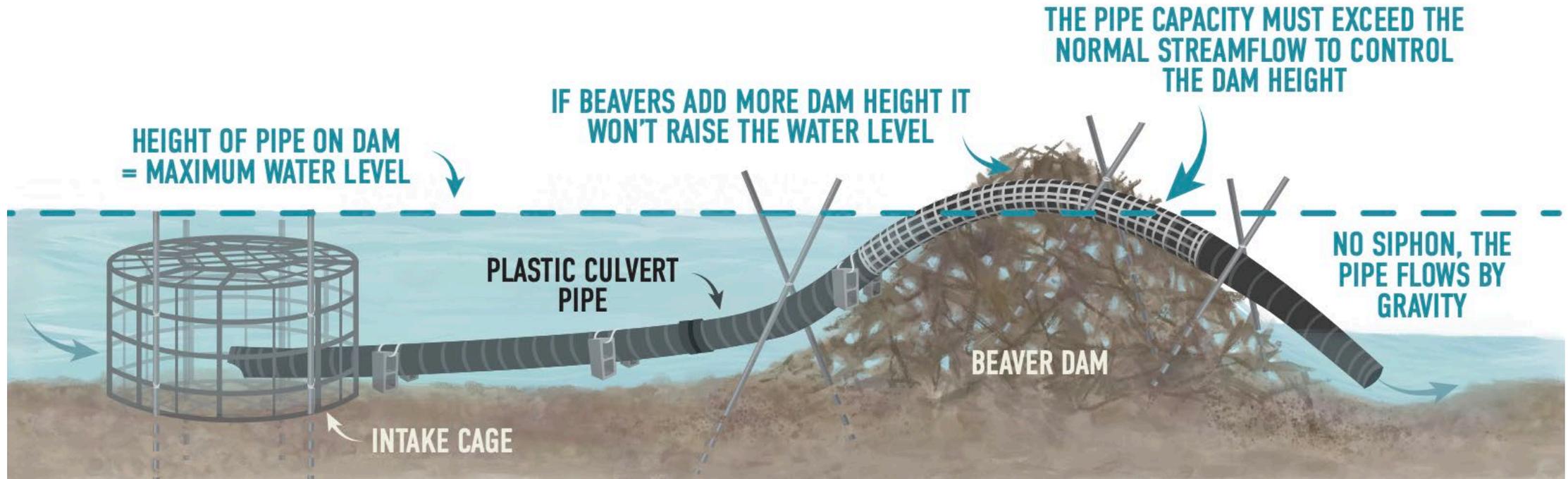
- **Statute 97B.667 Removal of beaver dams and lodges by road authorities.** When a drainage watercourse is impaired by a beaver dam and the water damages, or threatens to damage a public road, the road authority, as defined in section 160.02, subdivision 25, may remove the impairment and any associated beaver lodge within 300 feet of the road. Before killing or arranging to kill a beaver under Subd. 3. (a), the road authority or government unit must contact a conservation officer for a special beaver permit if the beaver will be killed within two weeks before or after the trapping season for beaver, and the conservation officer must issue the permit for any beaver subject to this section.

Affecting public waters

In some cases, lakeshore has been developed in conformance with water levels resulting from a beaver dam controlling the outlet for many years. Before removing a beaver dam in that situation, contact the DNR Area Hydrologist.

- **MN Beavers Trapped per Year: 25,000-30,000**
- **Relocation is currently illegal**
- **Minimal Formal Support for non-lethal or coexistence efforts**

Non-Lethal Beaver Management Options



- **Durable:** last 5-10 years with minimal maintenance
- **Inexpensive:** costs less than repeated trapping and dam removal
- **Ecologically Integrated:** does not remove wetland, but does mitigate flood damage

Non-Lethal Beaver Management Options

> [Environ Manage.](#) 2022 Jul;70(1):97-104. doi: 10.1007/s00267-022-01658-z. Epub 2022 May 9.

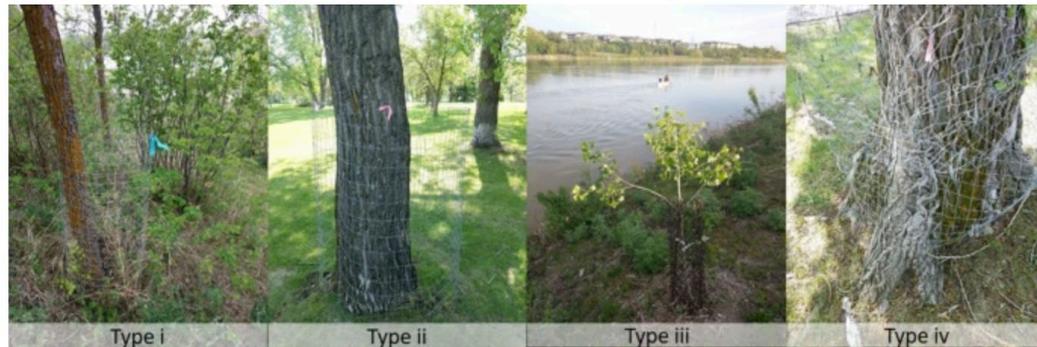
Relative Effectiveness of Four Different Guards In Preventing Beaver Cutting of Urban Trees

Cherie J Westbrook ¹, Kirby England ² ³

Affiliations + expand

PMID: 35532811 DOI: [10.1007/s00267-022-01658-z](#)

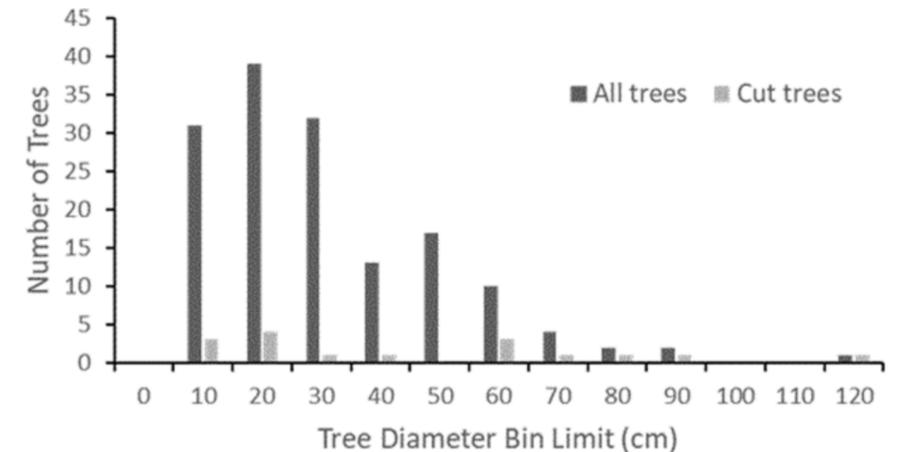
Fig. 2



Examples of the four materials used in wire mesh tree guard construction in the City of Saskatoon. Type i is wire fencing with a 2 × 2 inch (50 × 50 mm) square mesh size; type ii is wire fencing (elk fence) with a 2 × 6 inch (100 × 150 mm) rectangular mesh size; type iii is chain link fence with a 2 × 2 inch (50 × 50 mm) diamond mesh size; type iv wire poultry netting with a 1 inch (25 mm) hexagonal mesh size

Type ^a	n	No. beaver cut trees (no. severe cuts)	Mean guard height (SE), cm	Mean diameter difference ^b (SE), cm	No. trees with guards that meet recommended guidelines ^c for			No. trees meeting both guidelines that were beaver cut
					Height	Diameter	Both	
i	91	8 (4)	120 (1.5)	38 (2.3)	72	61	48	2
ii	19	1 (0)	148 (2.2)	39 (4.9)	19	10	10	0
iii	23	4 (1)	90 (1.7)	12 (2.4)	0	2	0	n/a
iv	18	3 (1)	67 (8.9)	1.0 (1.0)	0	0	0	n/a
Overall	151	16 (6)	113 (2.3)	56 (2.8)	91	73	58	2

Fig. 3



The distribution of diameters of trees outfitted with guards and trees with guards that were cut by beavers

Non-Lethal Beaver Management Next Door



Donate 

ENVIRONMENT

An ecosystem engineer's vision: mock beaver dams to restore Wisconsin wetlands

Beaver-inspired structures could limit flooding and benefit wildlife habitat, but state permitting is arduous.



Donate 

ENVIRONMENT

Opting for coexistence: Some Wisconsin landowners learn to live with beavers

Beavers can cause property damage, but research shows they positively impact the environment. Some landowners are ditching traps and dynamite to peacefully manage the nuisance.



Katie McCullough, 56, paddles across a pond on her property with her dog, Ky, on Oct. 18, 2024, near Rio, Wis. McCullough installed a pond leveler on her property after discovering an active beaver lodge and dam. (Joe Timmerman / Wisconsin Watch)

Non-Lethal Beaver Management Professionals



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Andy Riesgraf, Beaver Innovations

BeaverCorps Professional
Minneapolis MN

[More info](#)

[Directions](#) 2.4 mi

Clay Frazer, Native Range Ecological

BeaverCorps Professional
Deerfield WI

[More info](#)

[Directions](#) 245 mi

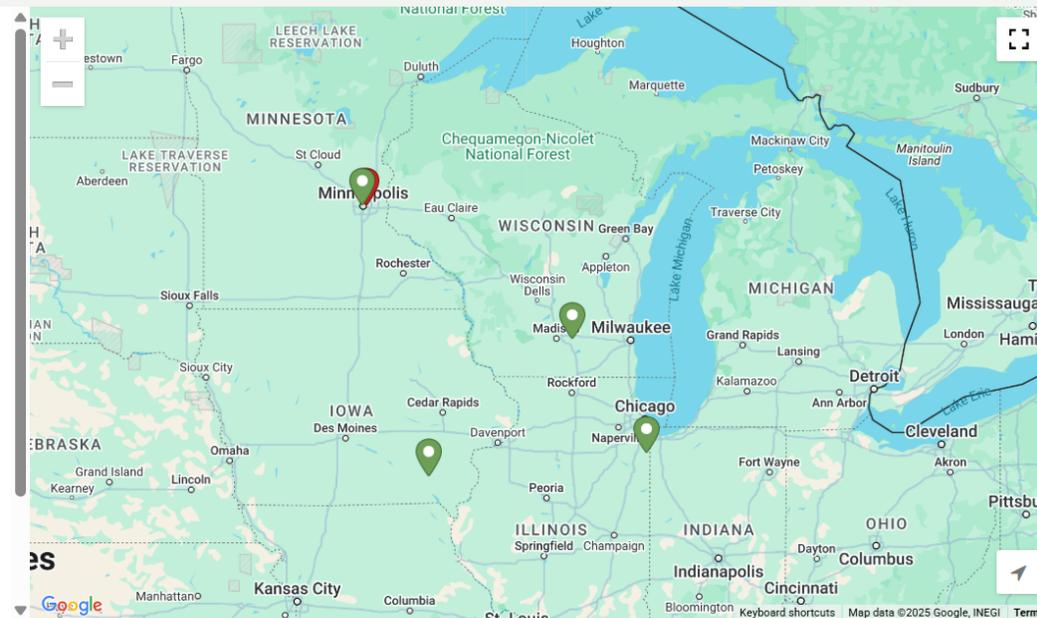
Chris Sorflaten, Leave it to Beavers Contracting, LLC

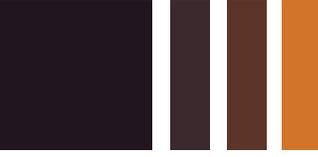
BeaverCorps Professional
Fairfield IA 52556

[More info](#)

[Directions](#) 281.1 mi

Jeff Boland-Prom, Midwest Beaver Mitigation





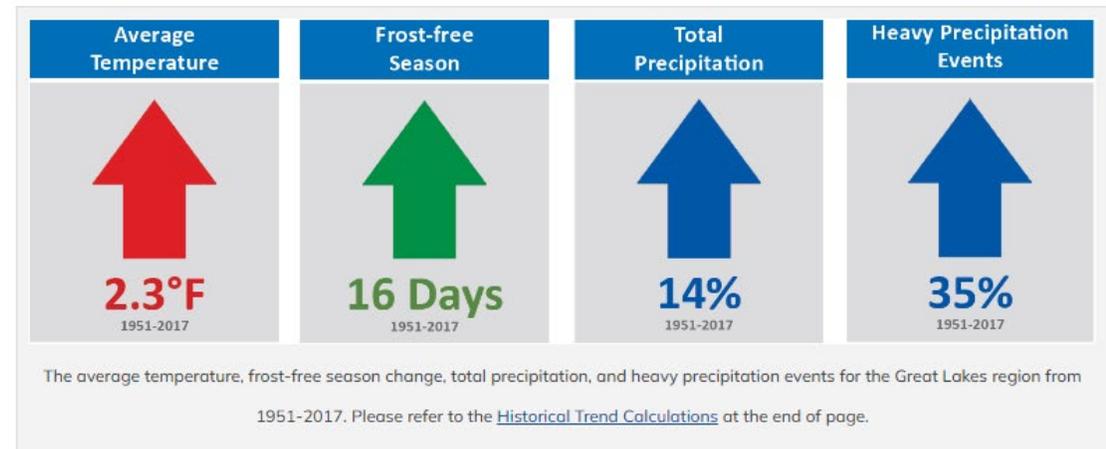
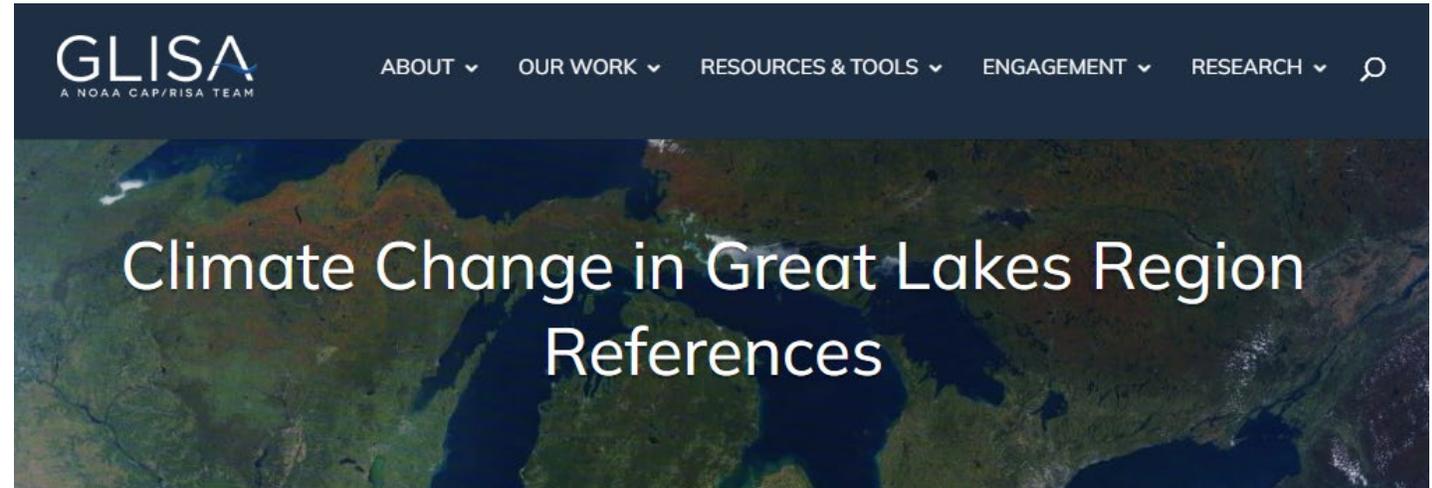
Why bother?



Temperature, Precip, Timing, Storms – all changing

Coming soon:

- **Wetter, shorter** winters (rain, not snow)
- **Drier** summers
- All around **hotter temps.**
- Flashier **storms.**



Climate-related threats that used to be just a western US problem are creeping eastwards.

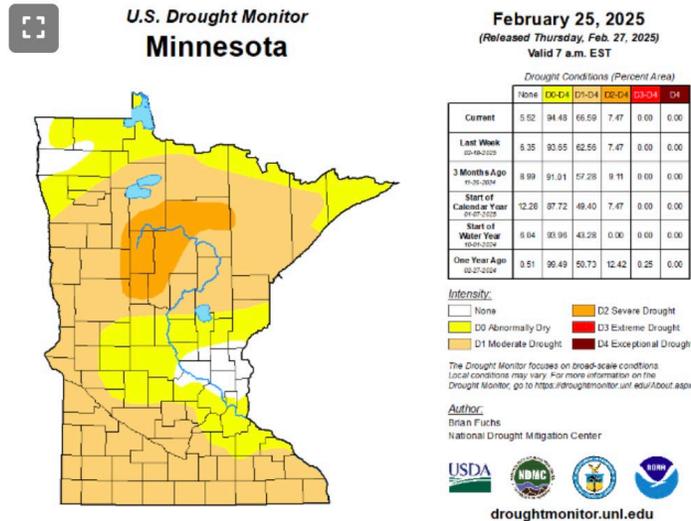
Study: Wildfire led to poorer water quality in northern Minnesota lakes

Kirsti Marohn Brainerd, Minn. September 4, 2023 8:00 AM



Severe drought affecting north central part of the state

by Erik Jacobson Mar 13, 2025 0



B105
The Northland's #1 For New Country

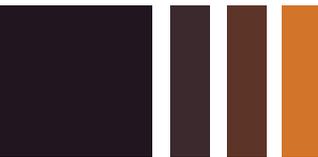
THE NORTHLAND'S #1 FOR NEW COUNTRY

RED FLAG WARNINGS NOW ISSUED IN 27 MINNESOTA COUNTIES

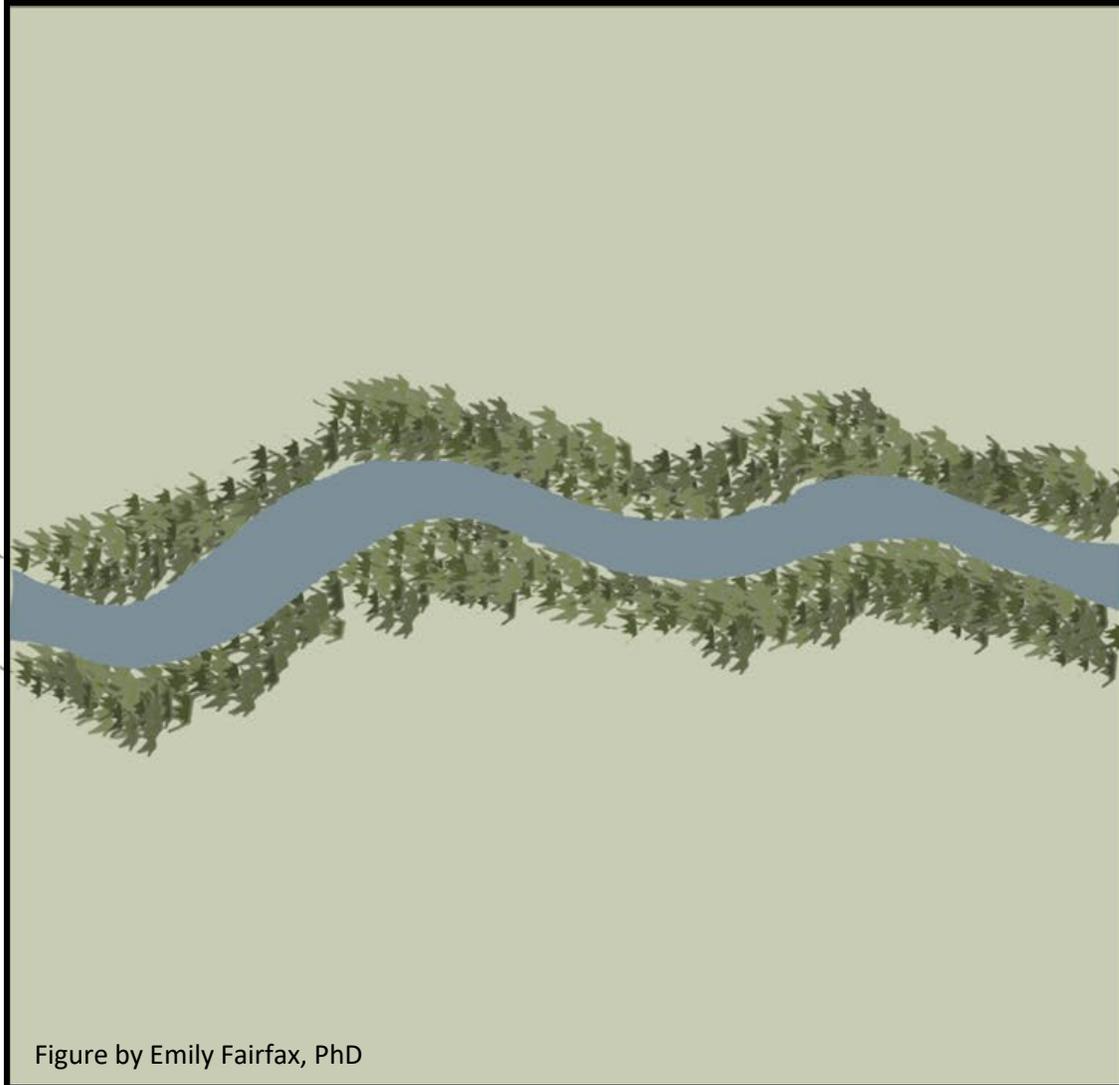
David Drew | Published: March 10, 2025

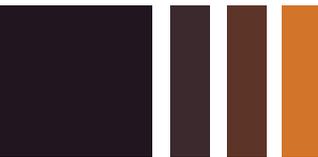
Why bother? Beaver dams, canals, and wetlands are climate-resilient natural infrastructure



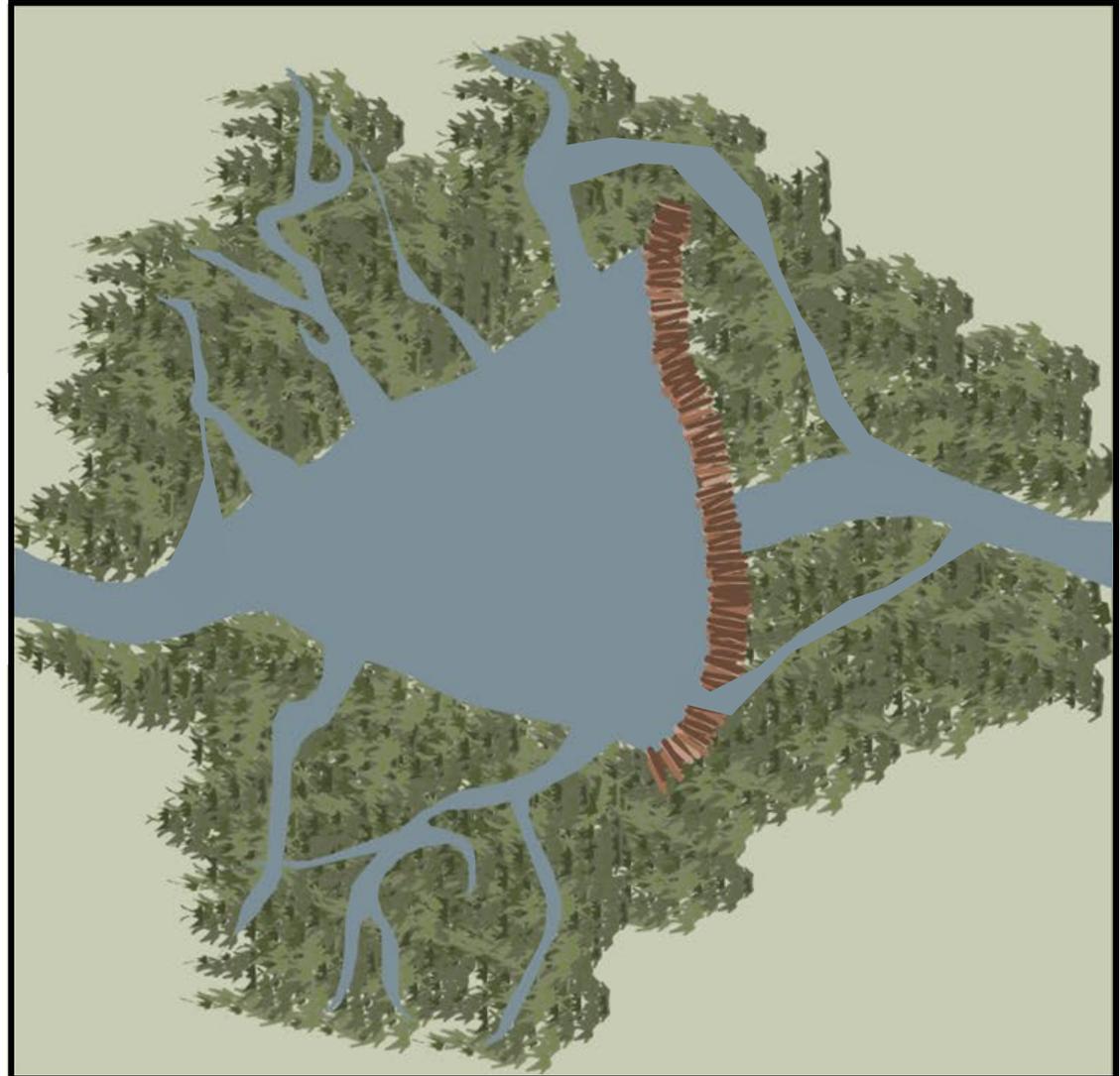
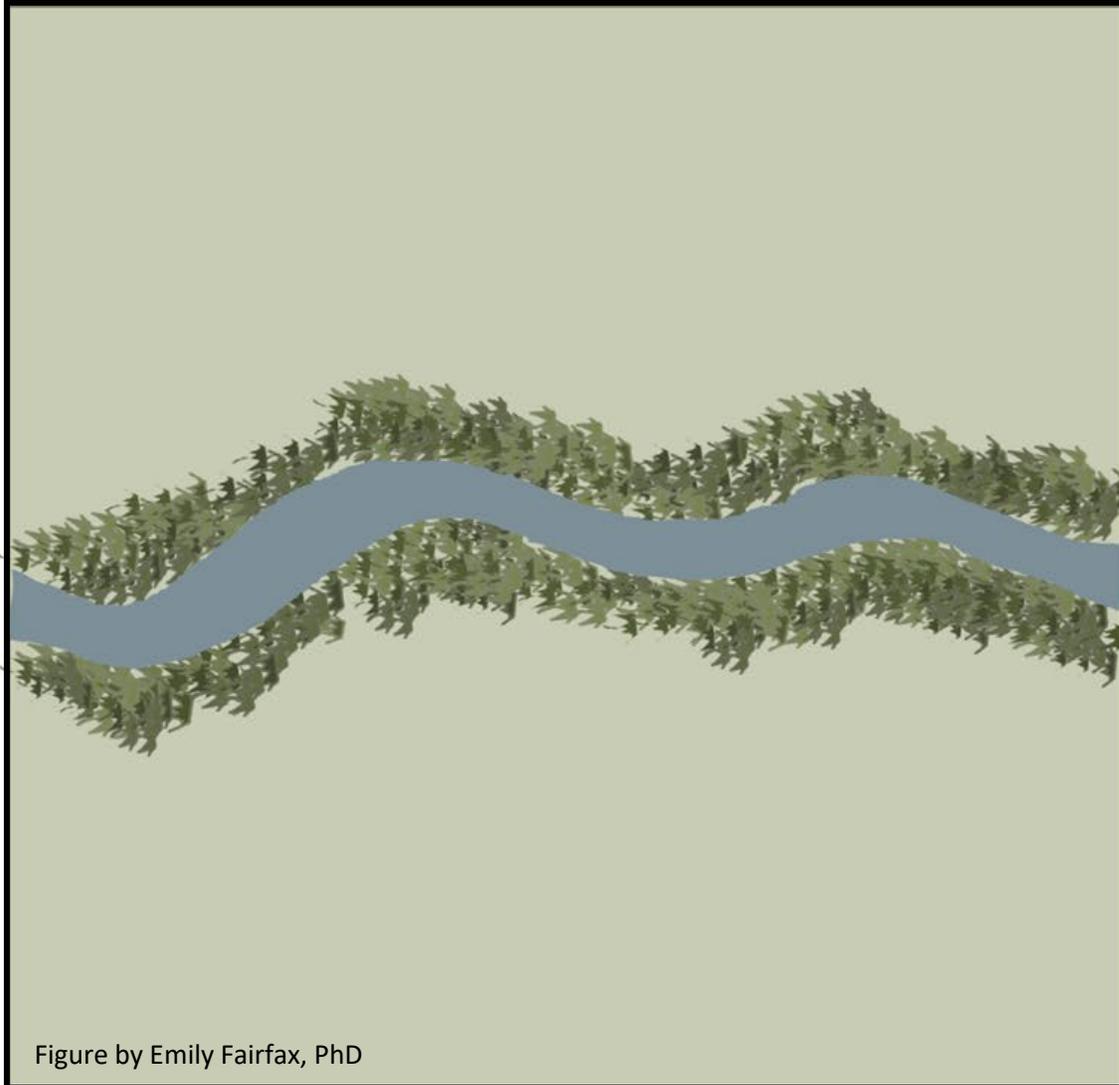


Complexity Builds Resilience: Starting with Floods

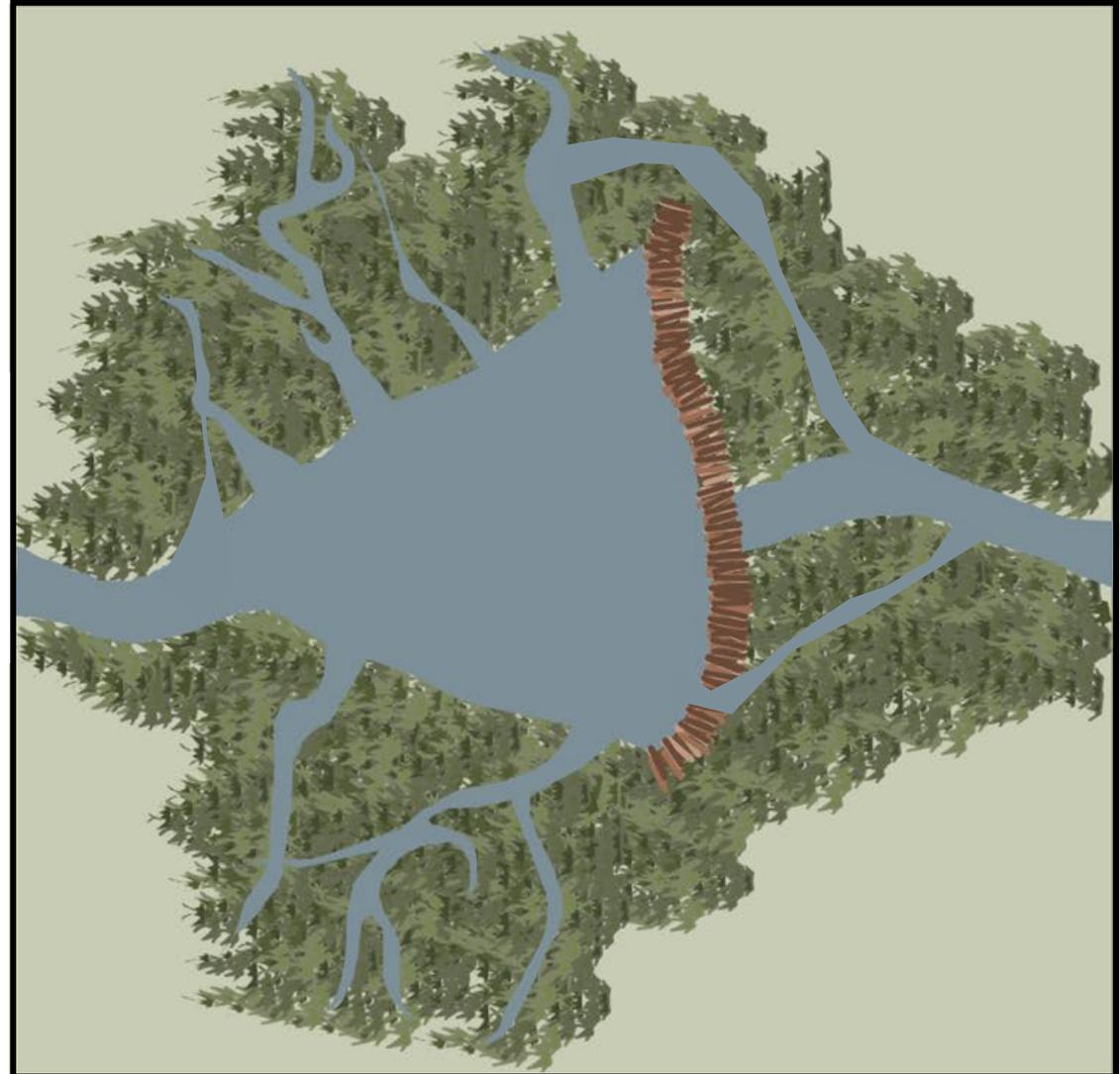
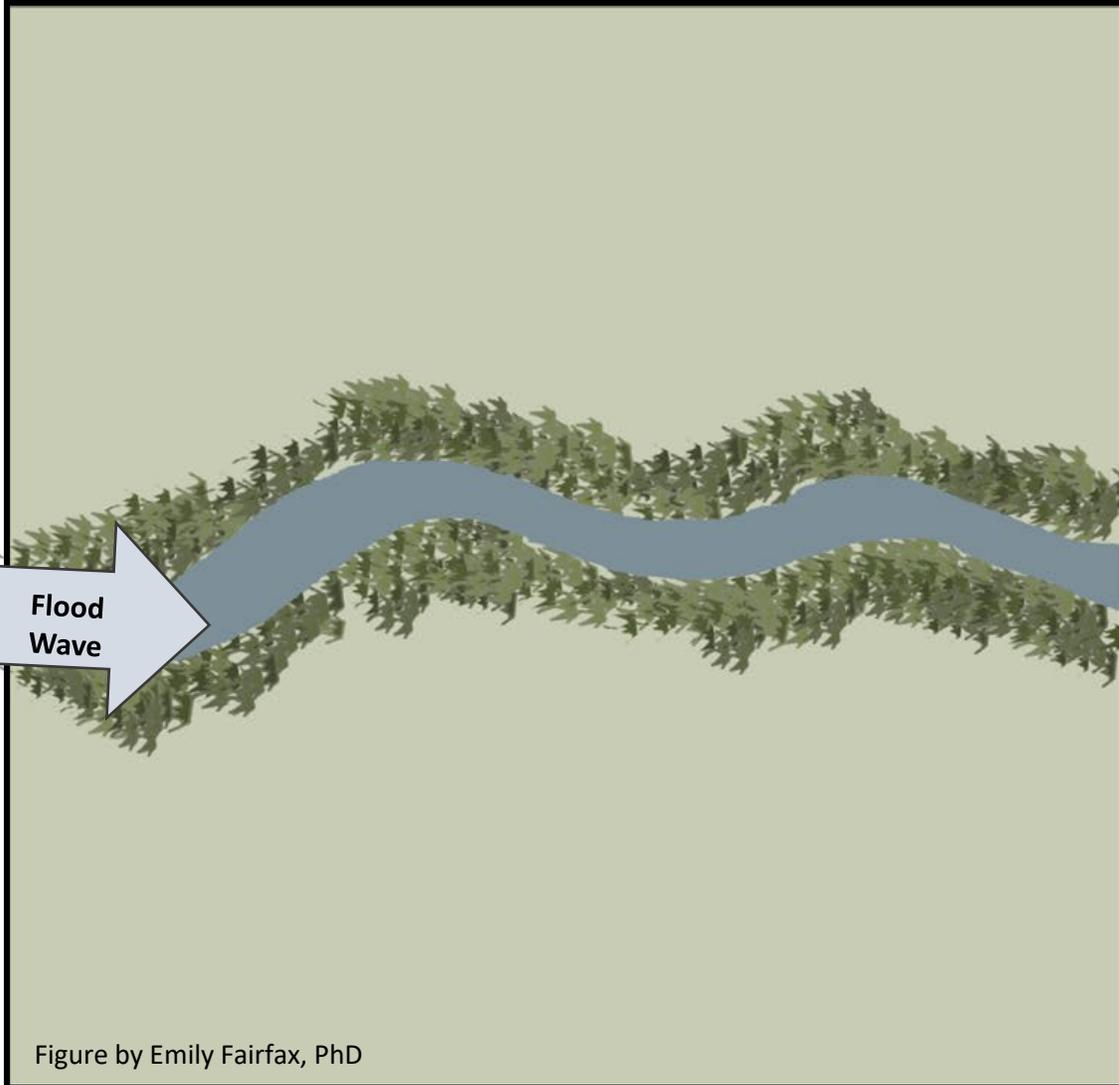


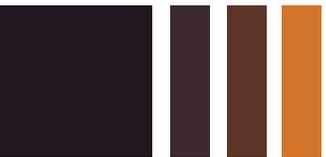


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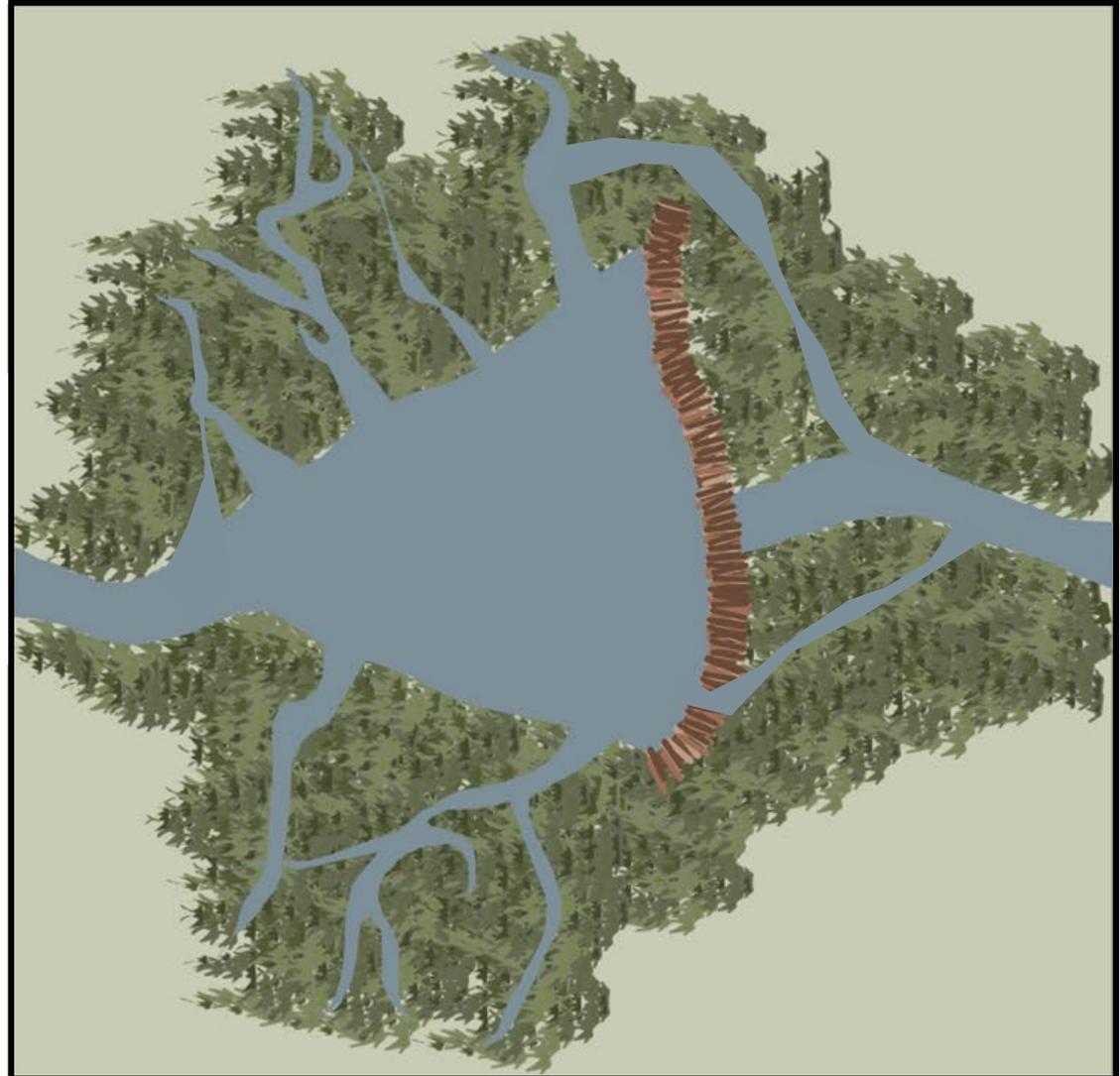
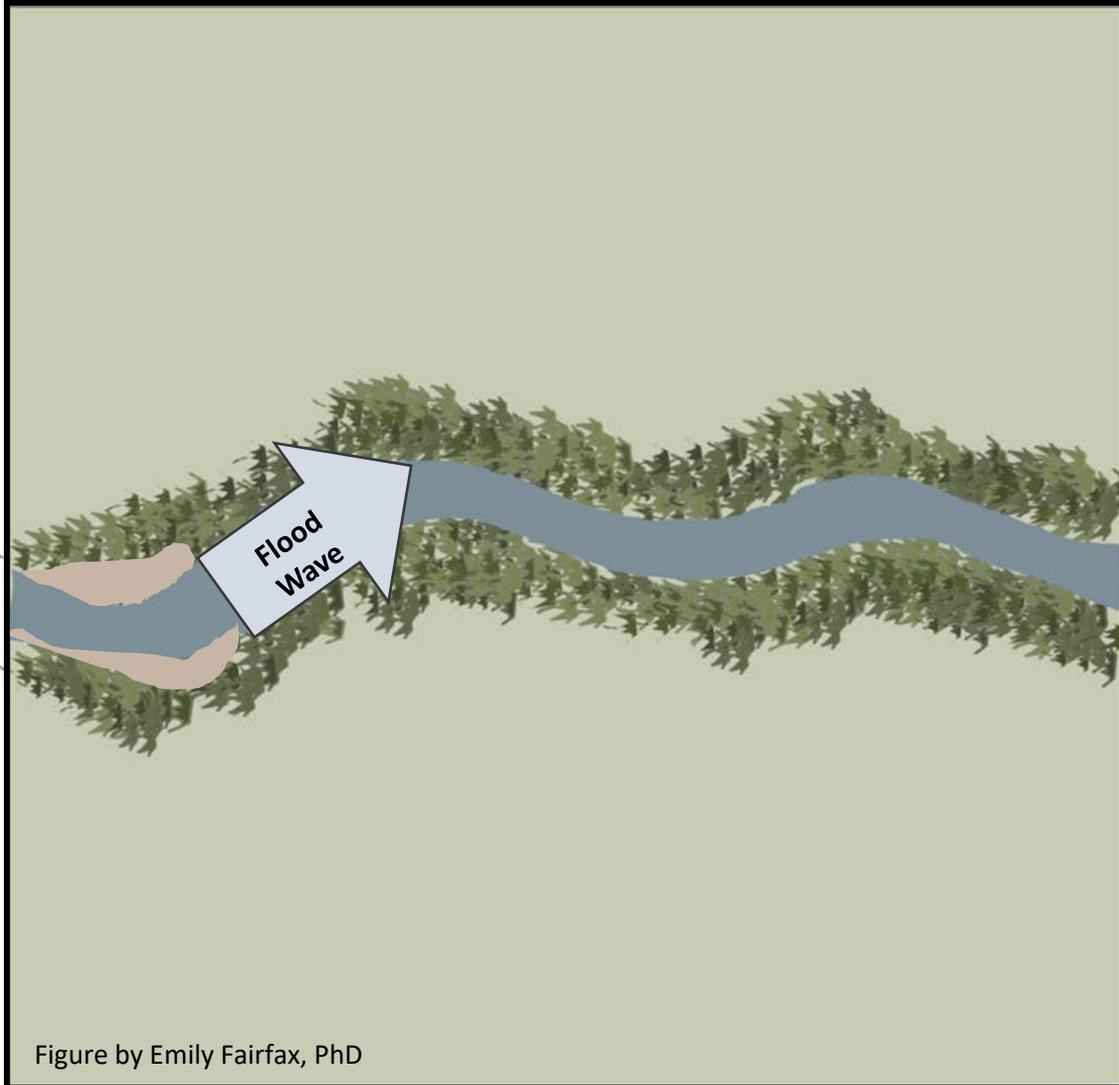


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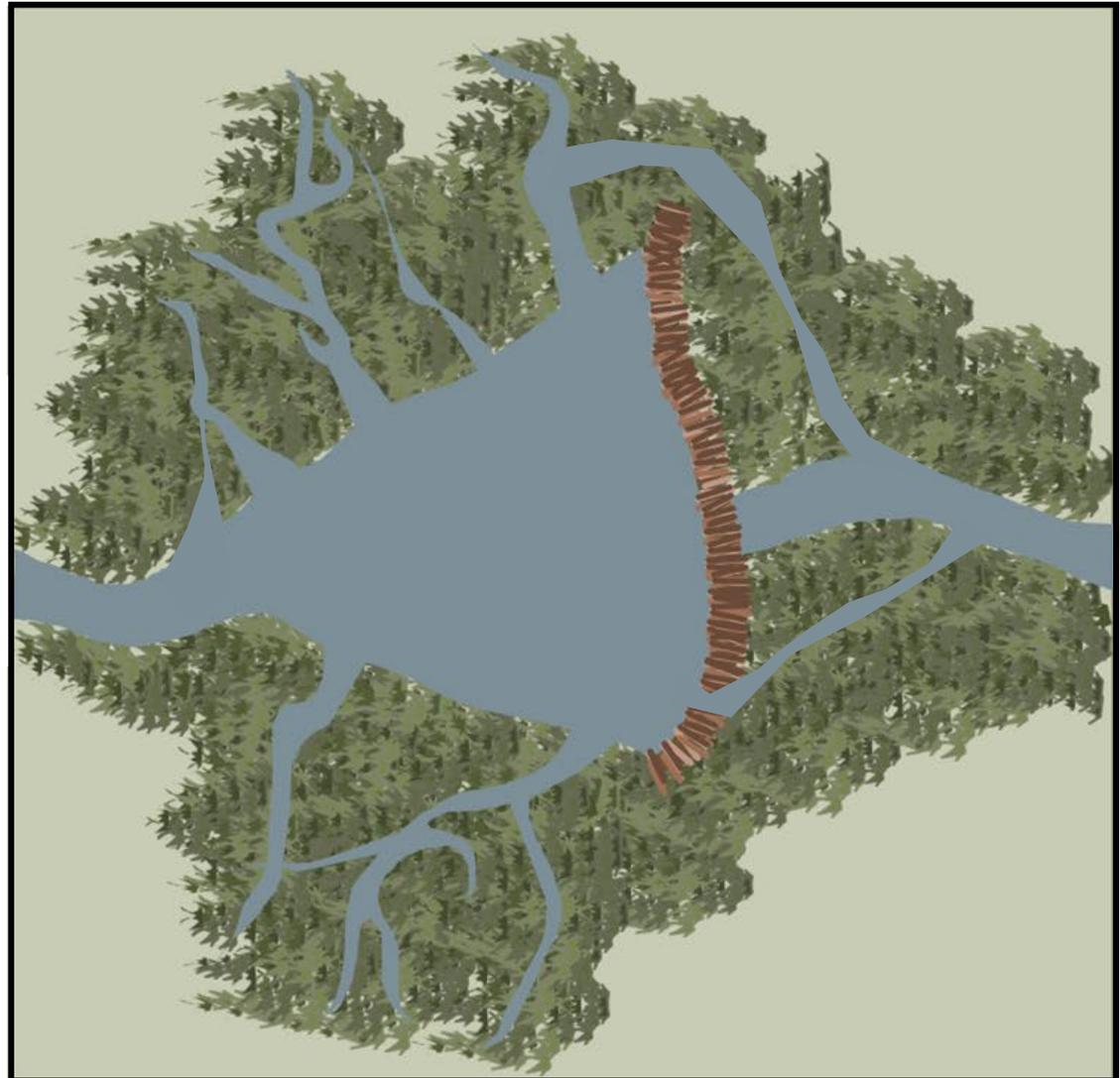
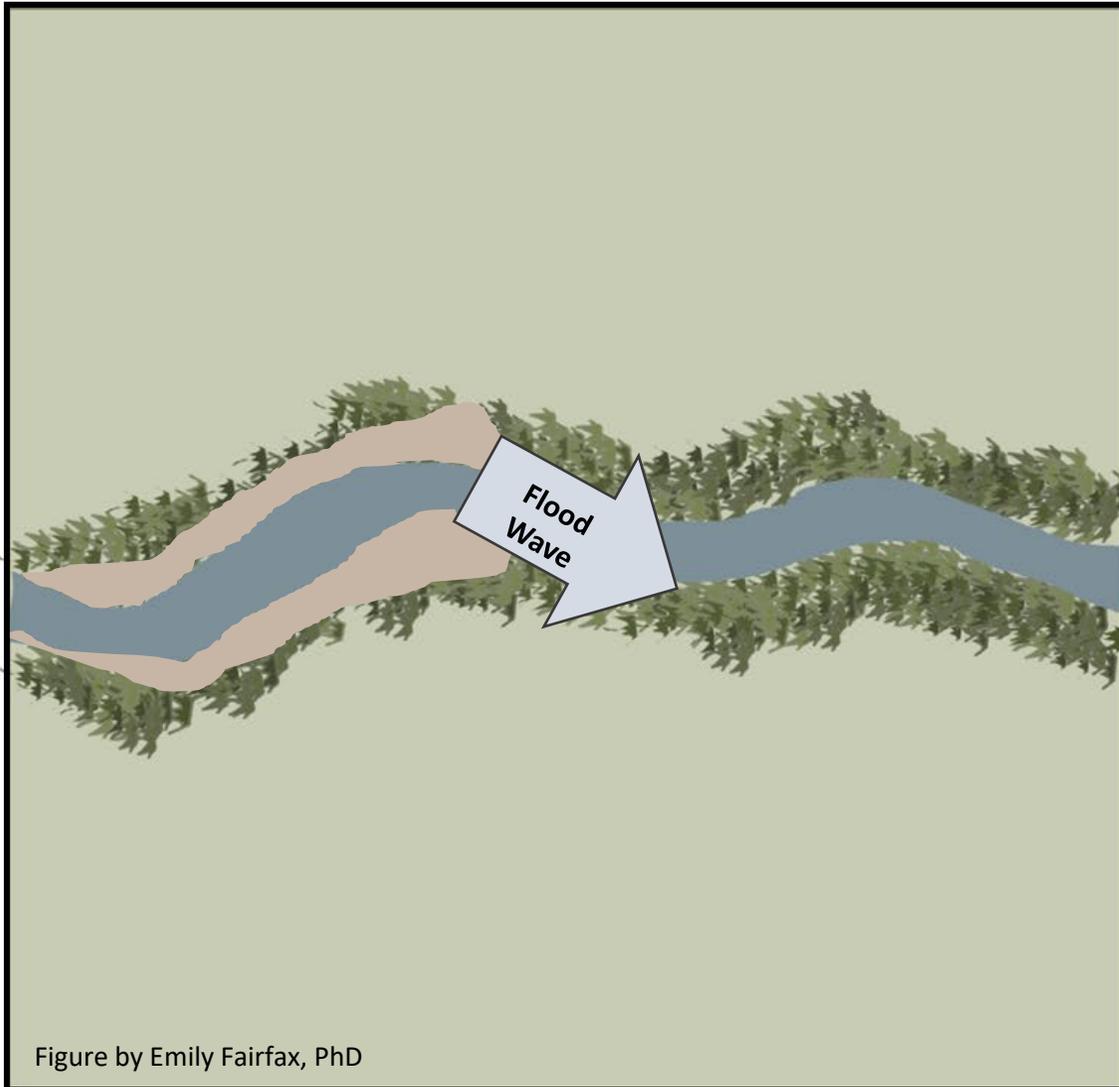


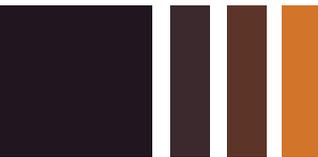


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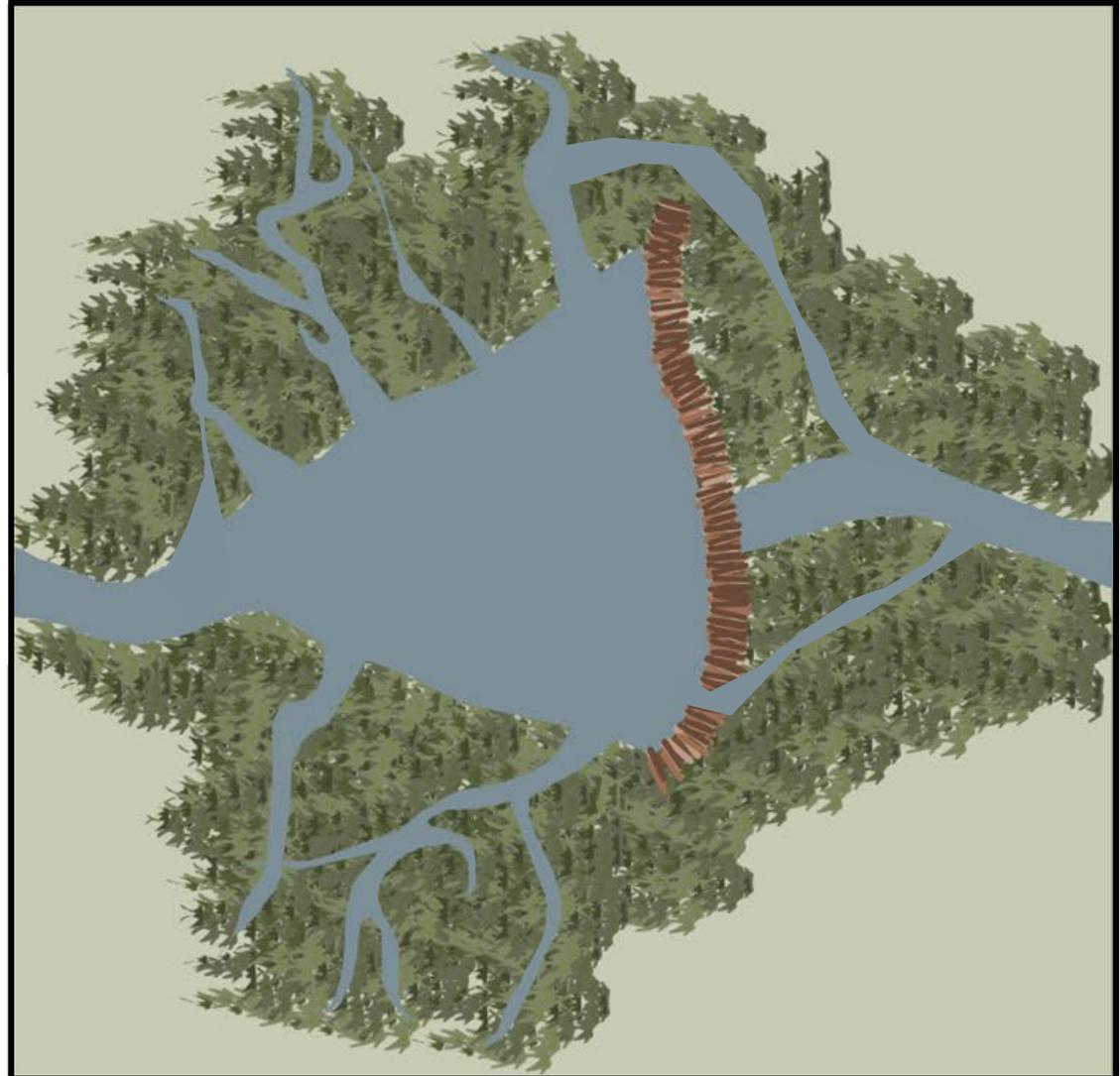
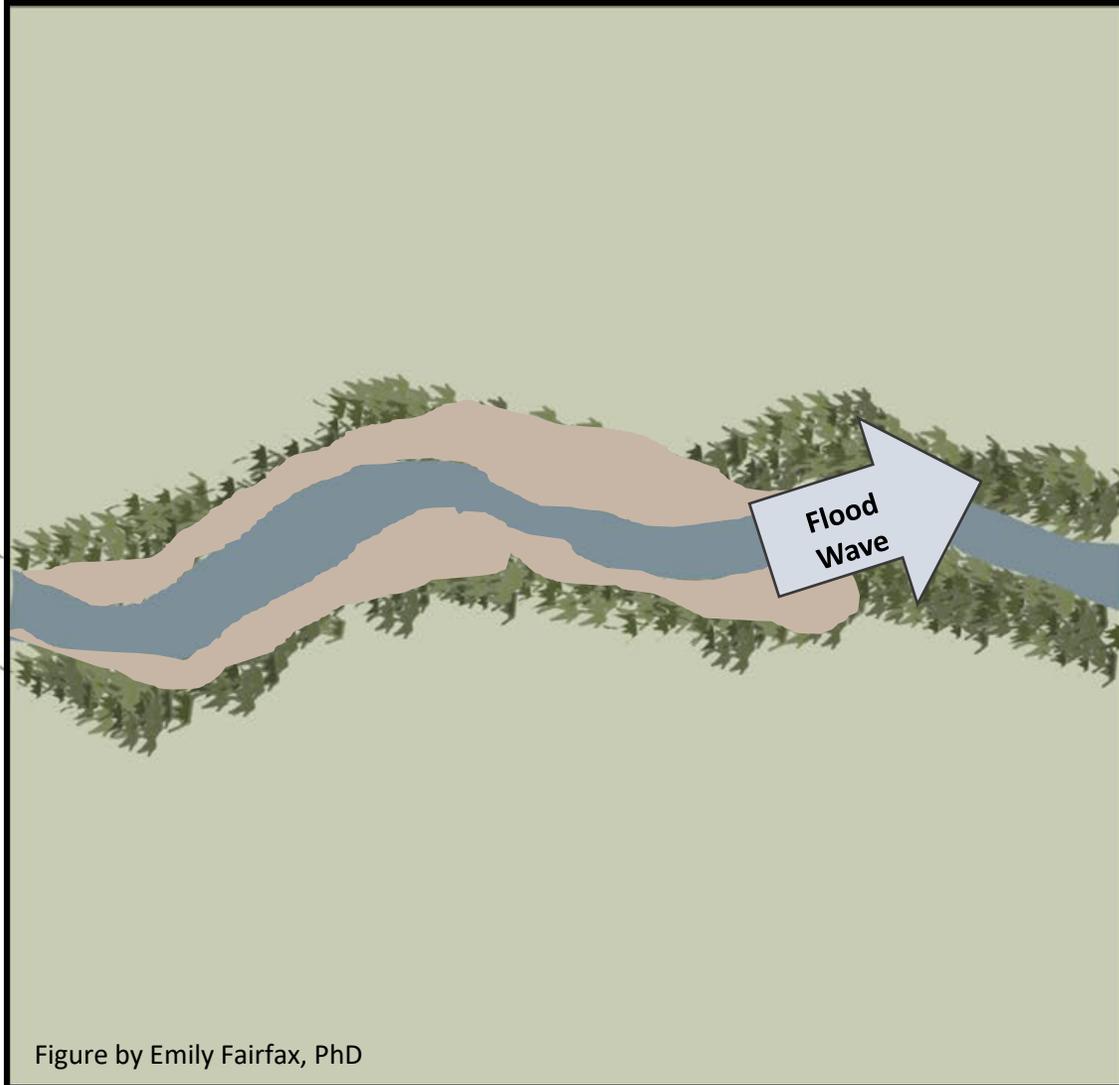


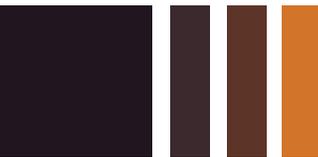
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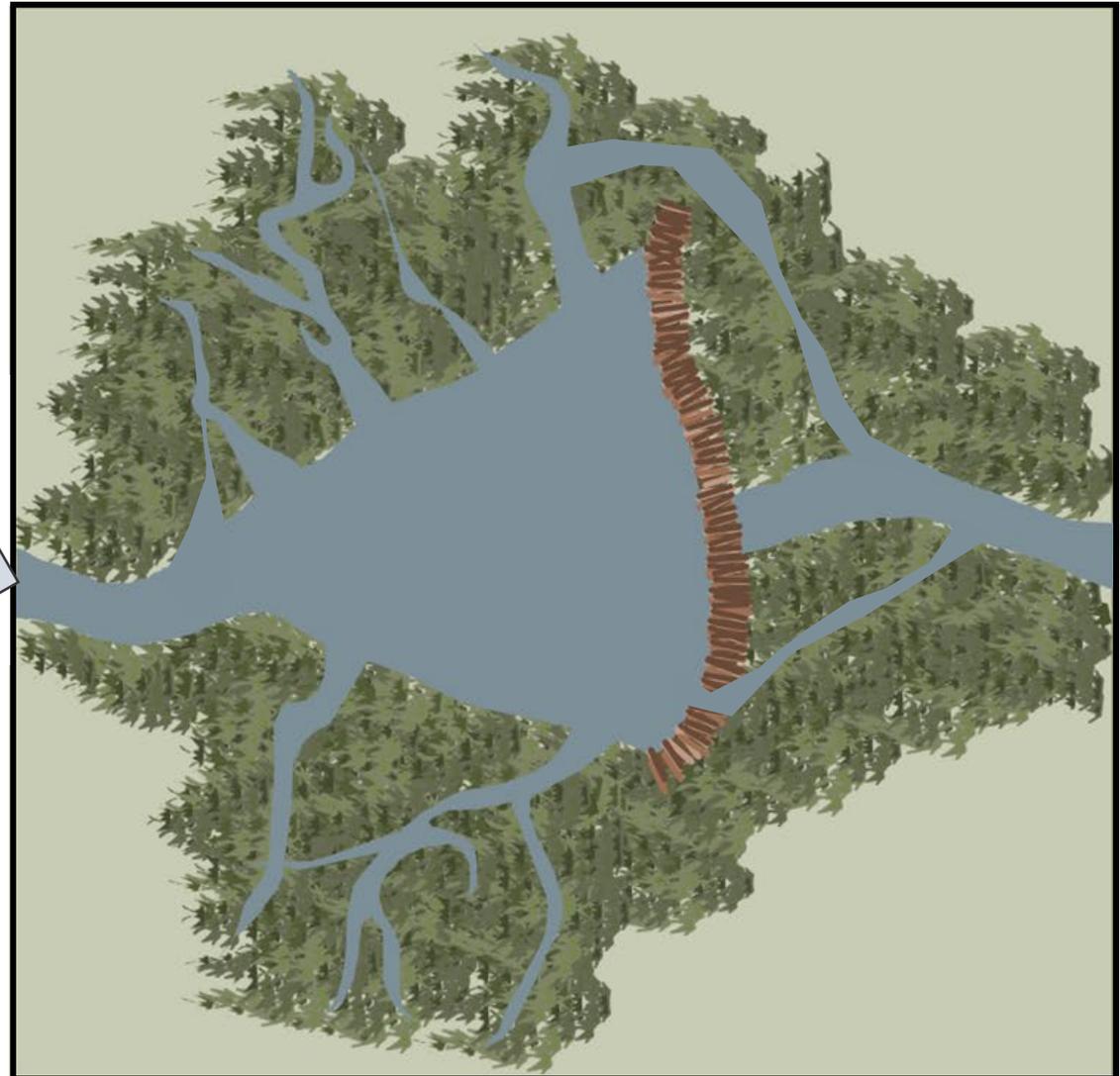
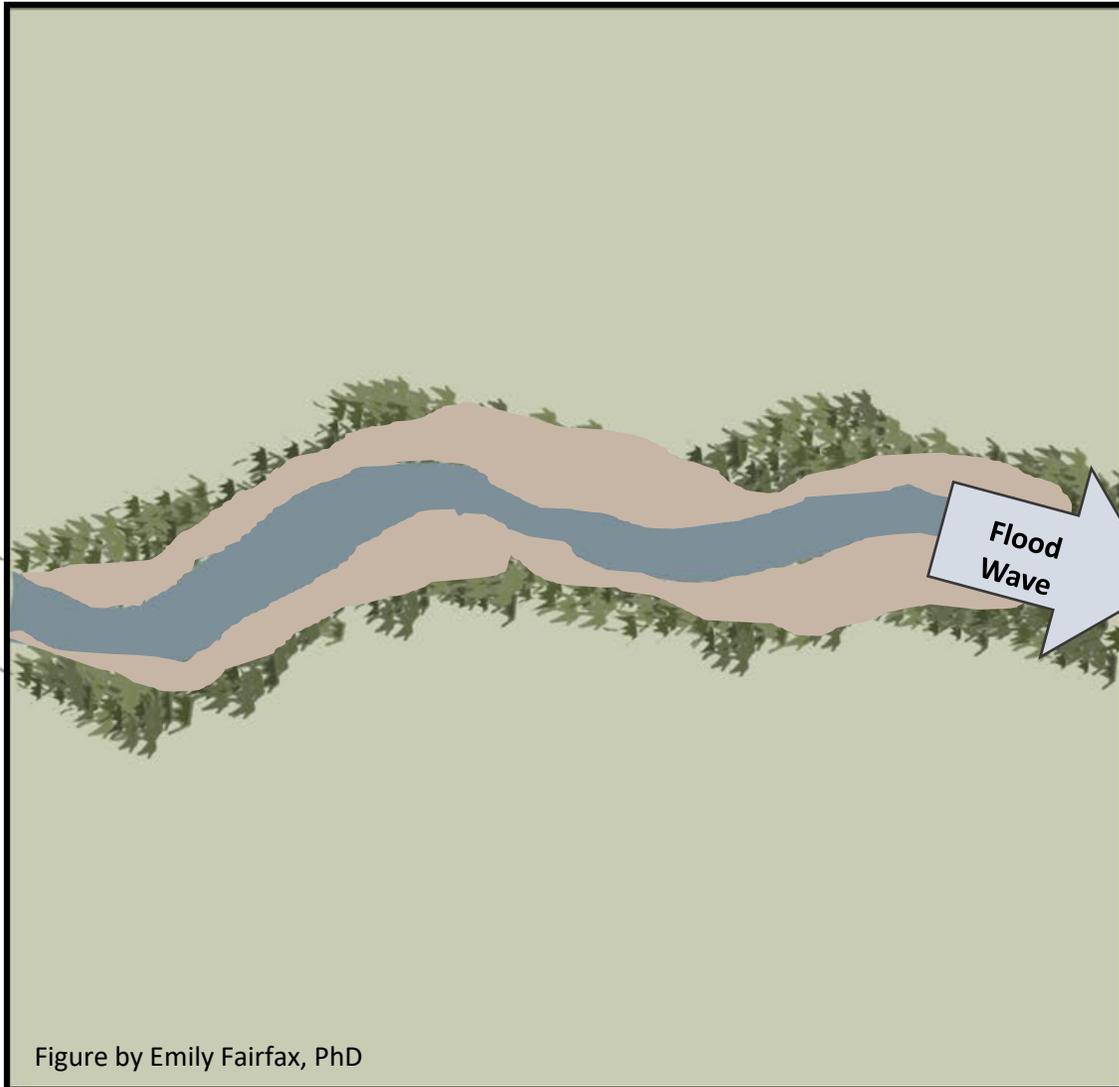
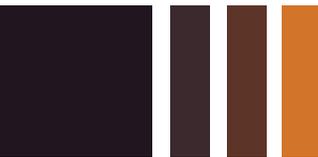


Figure by Emily Fairfax, PhD



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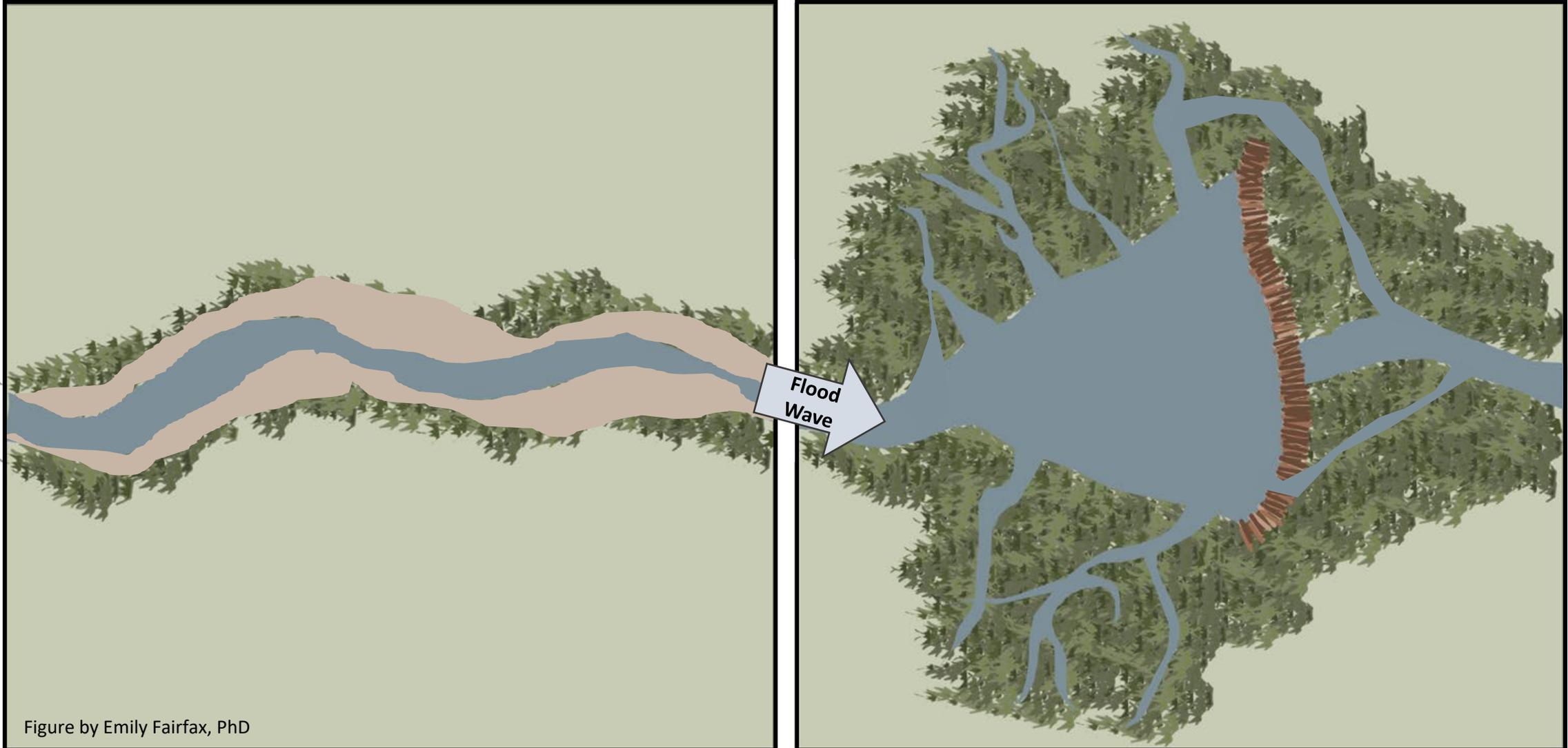
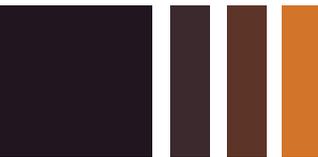
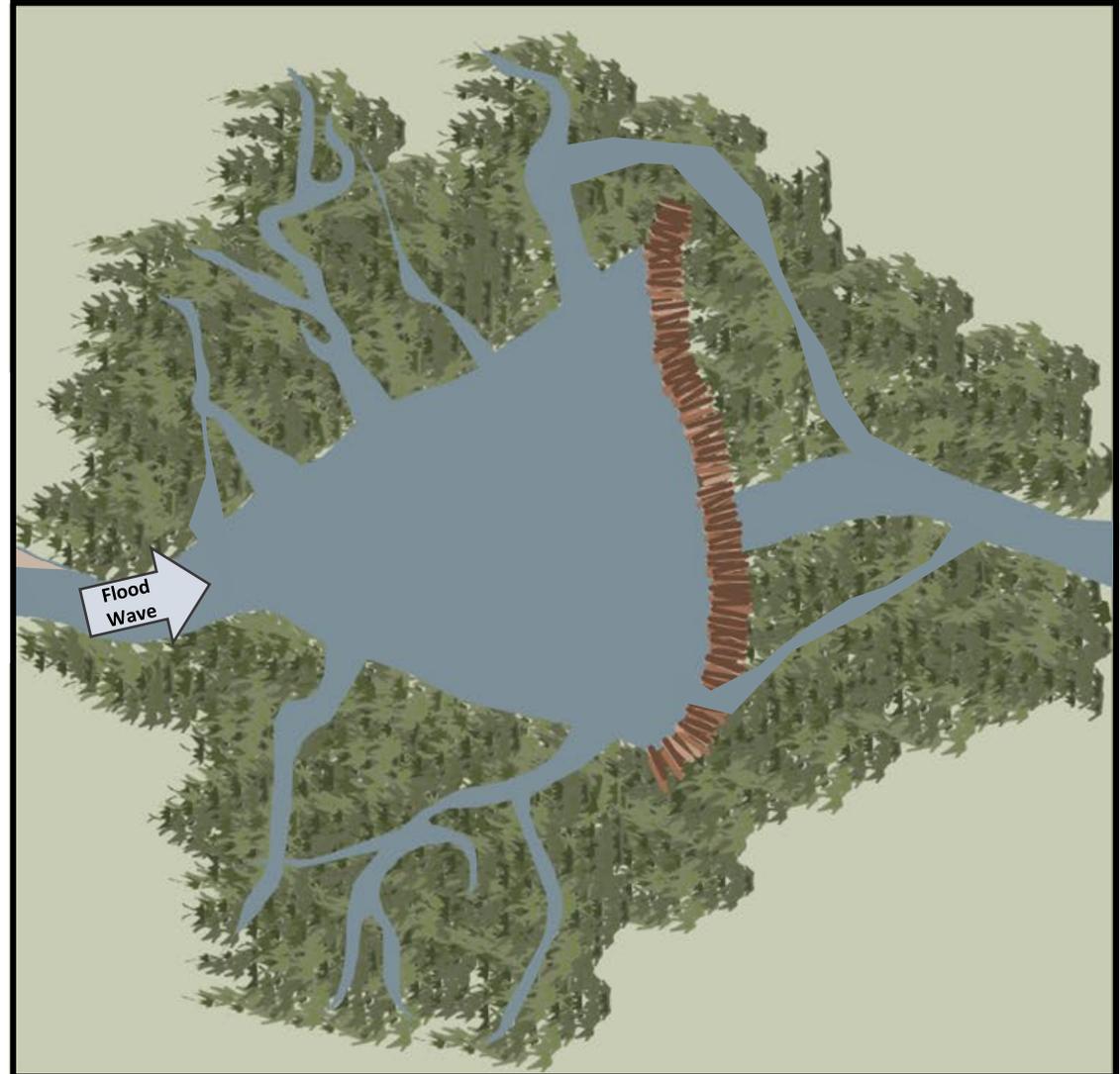
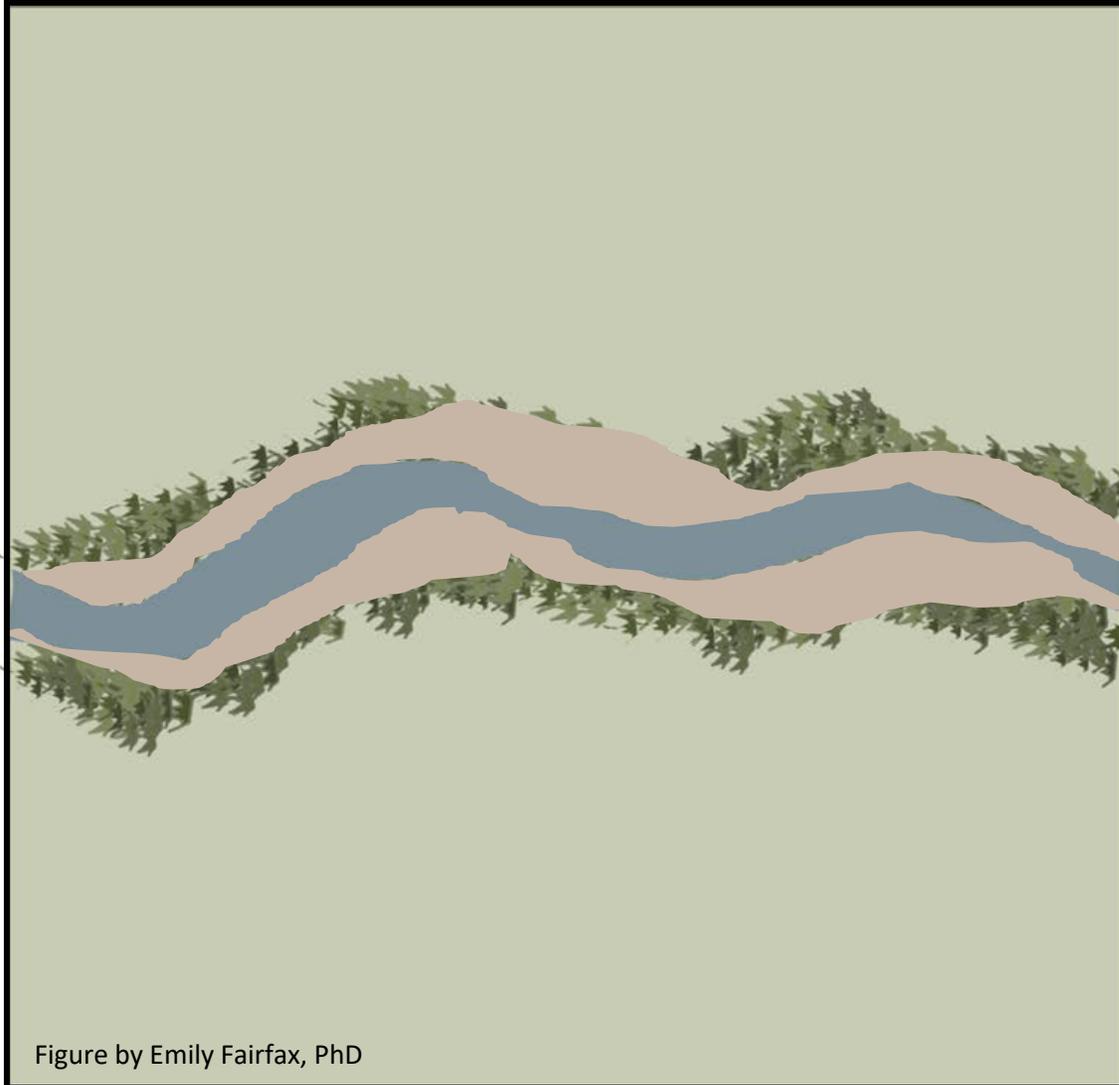


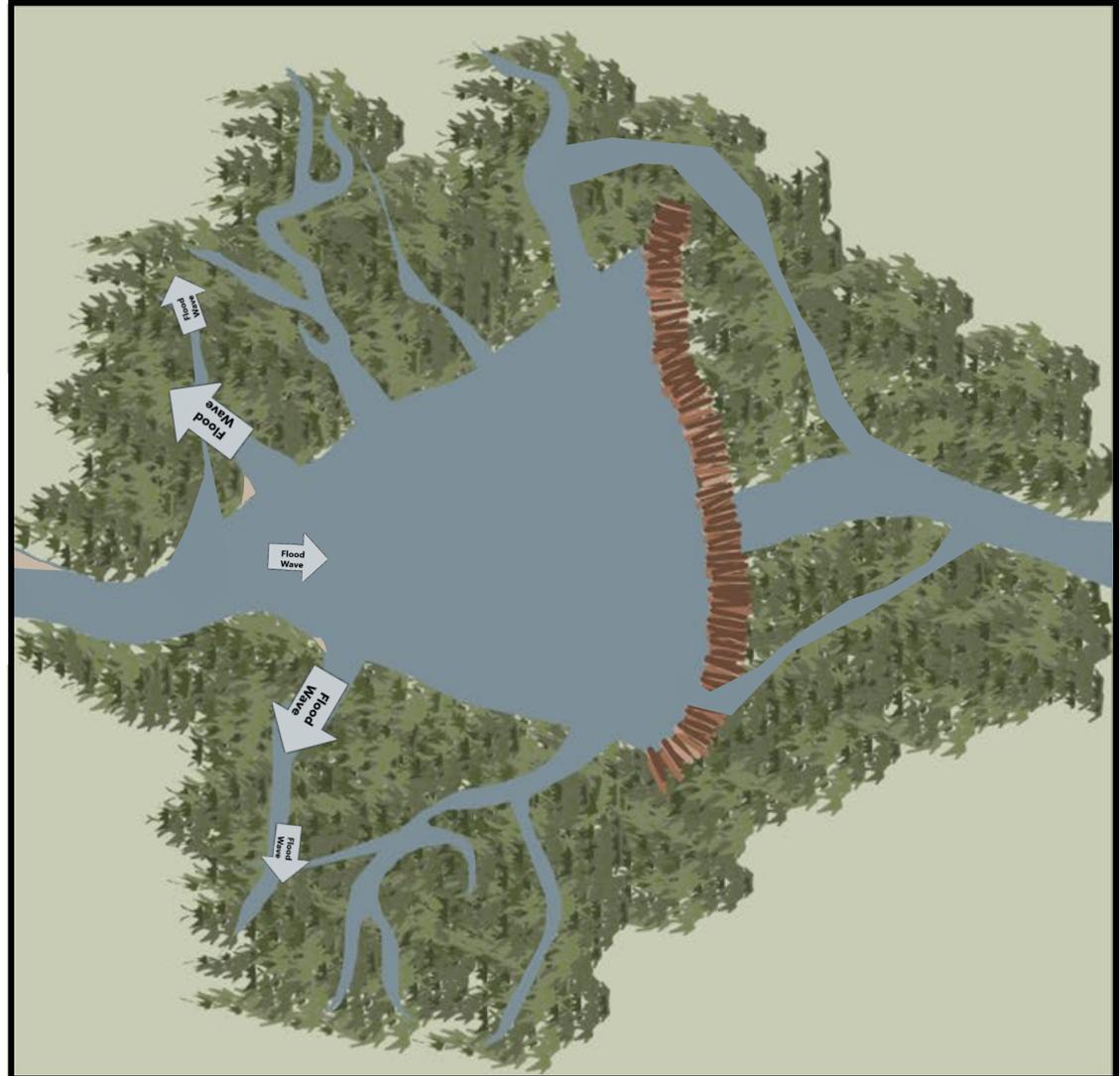
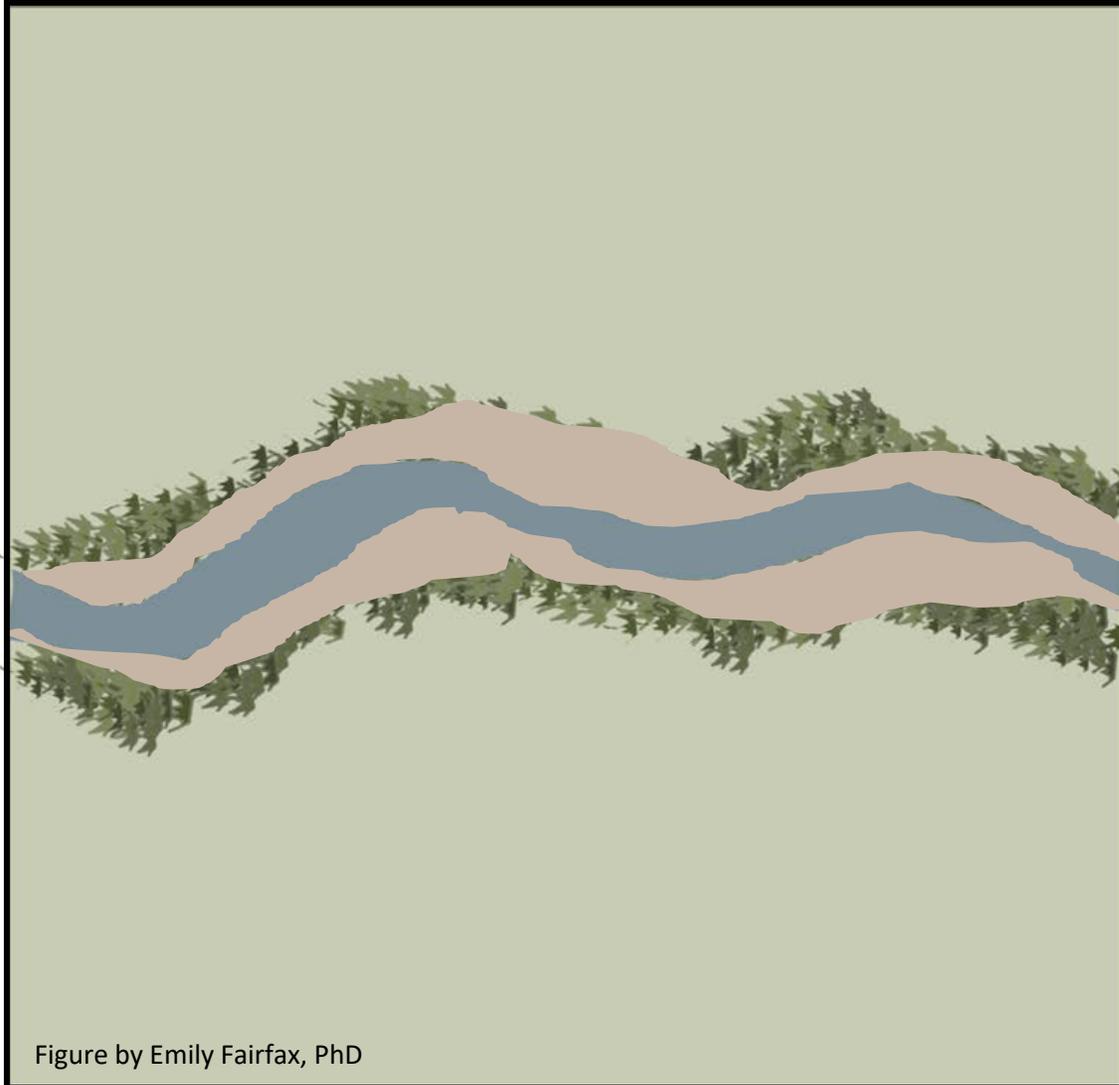
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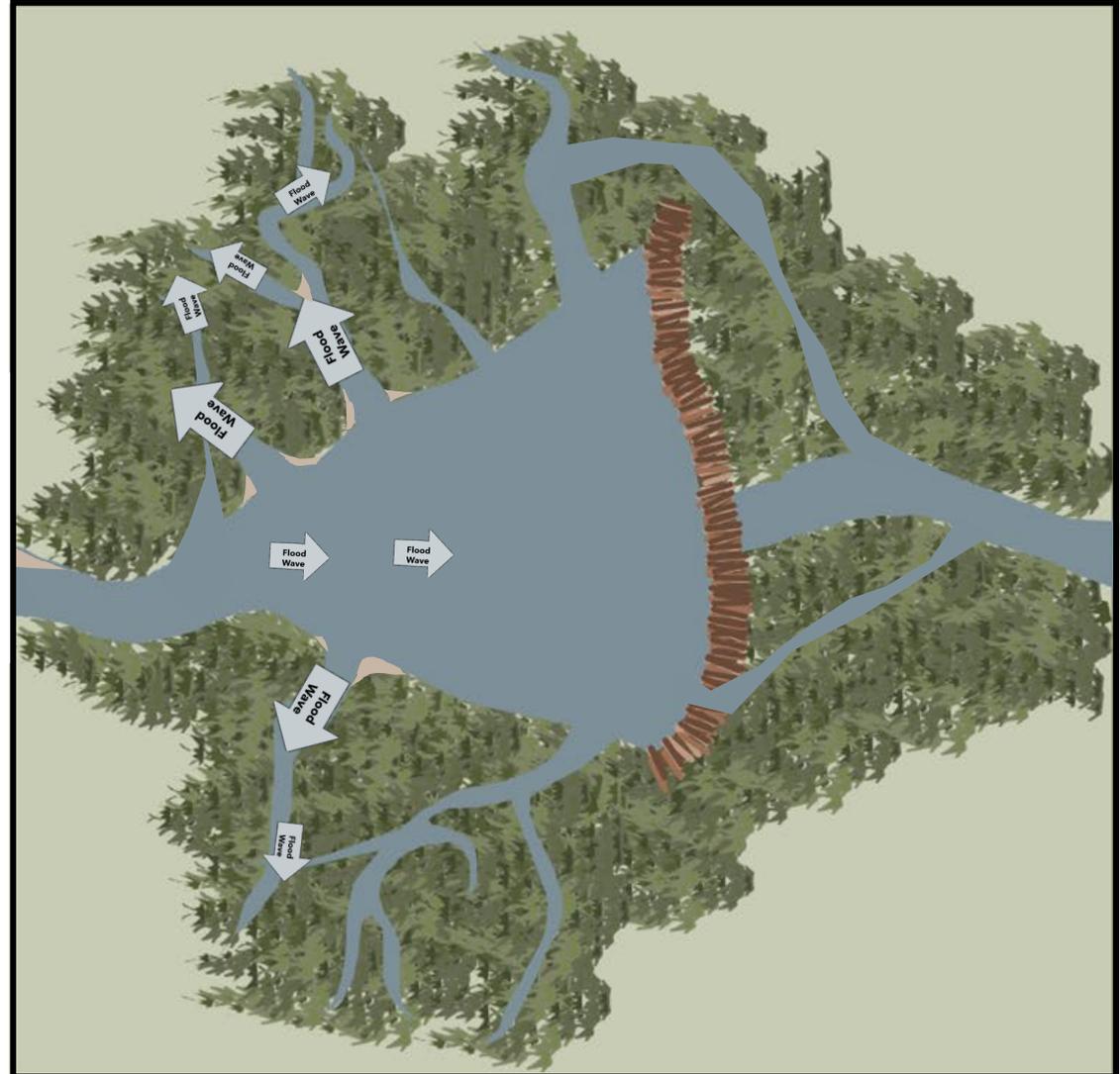
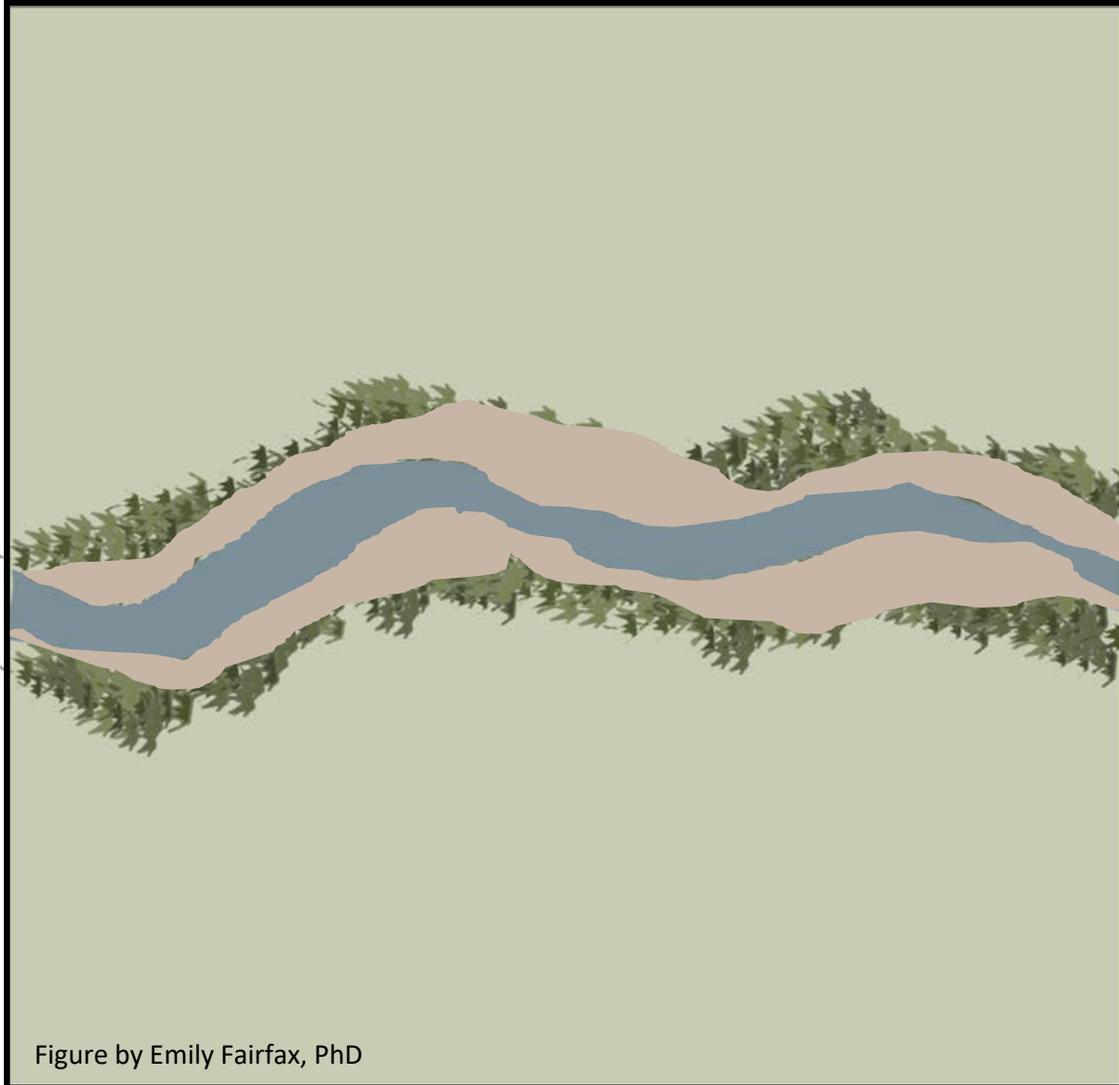
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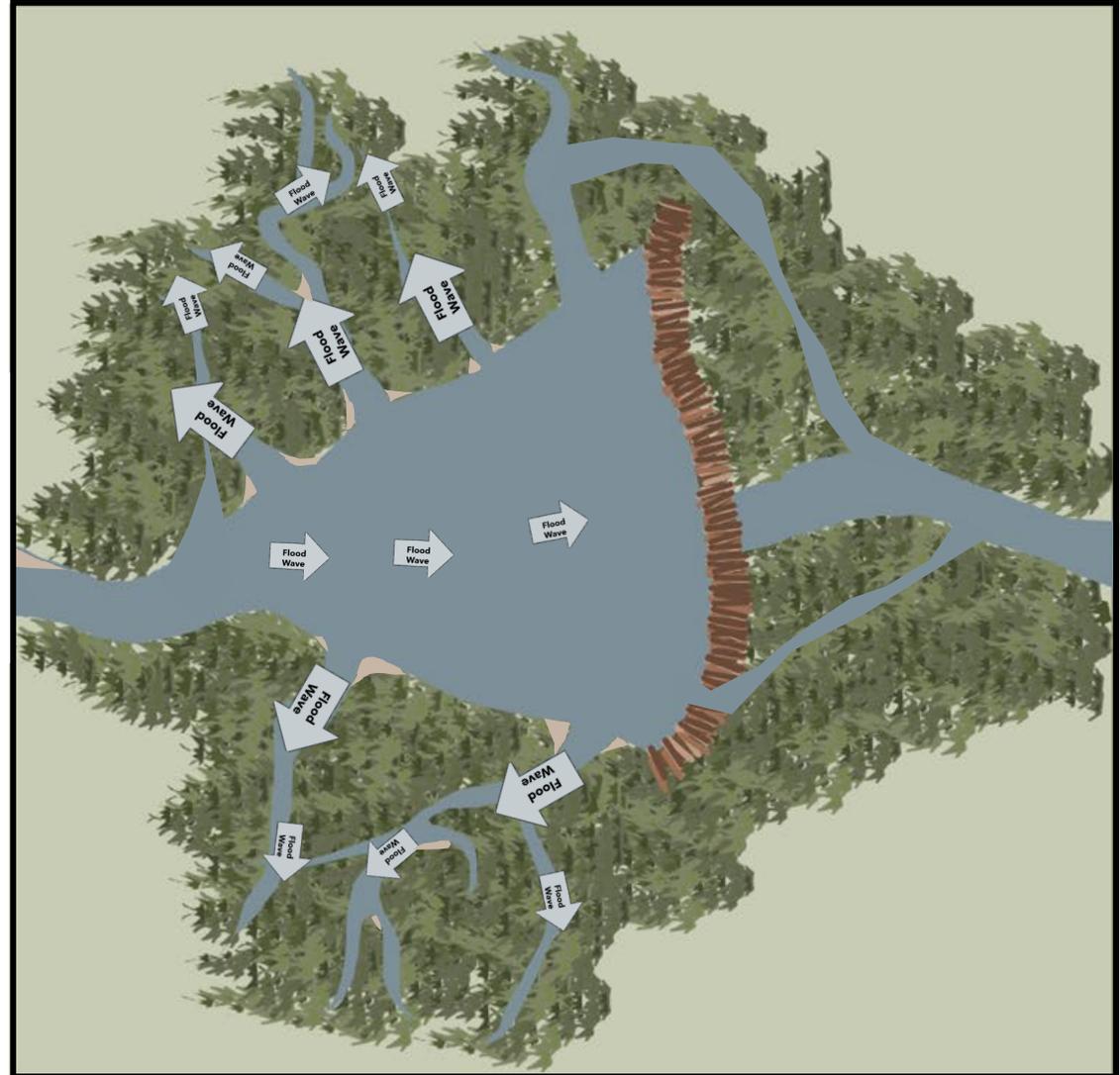
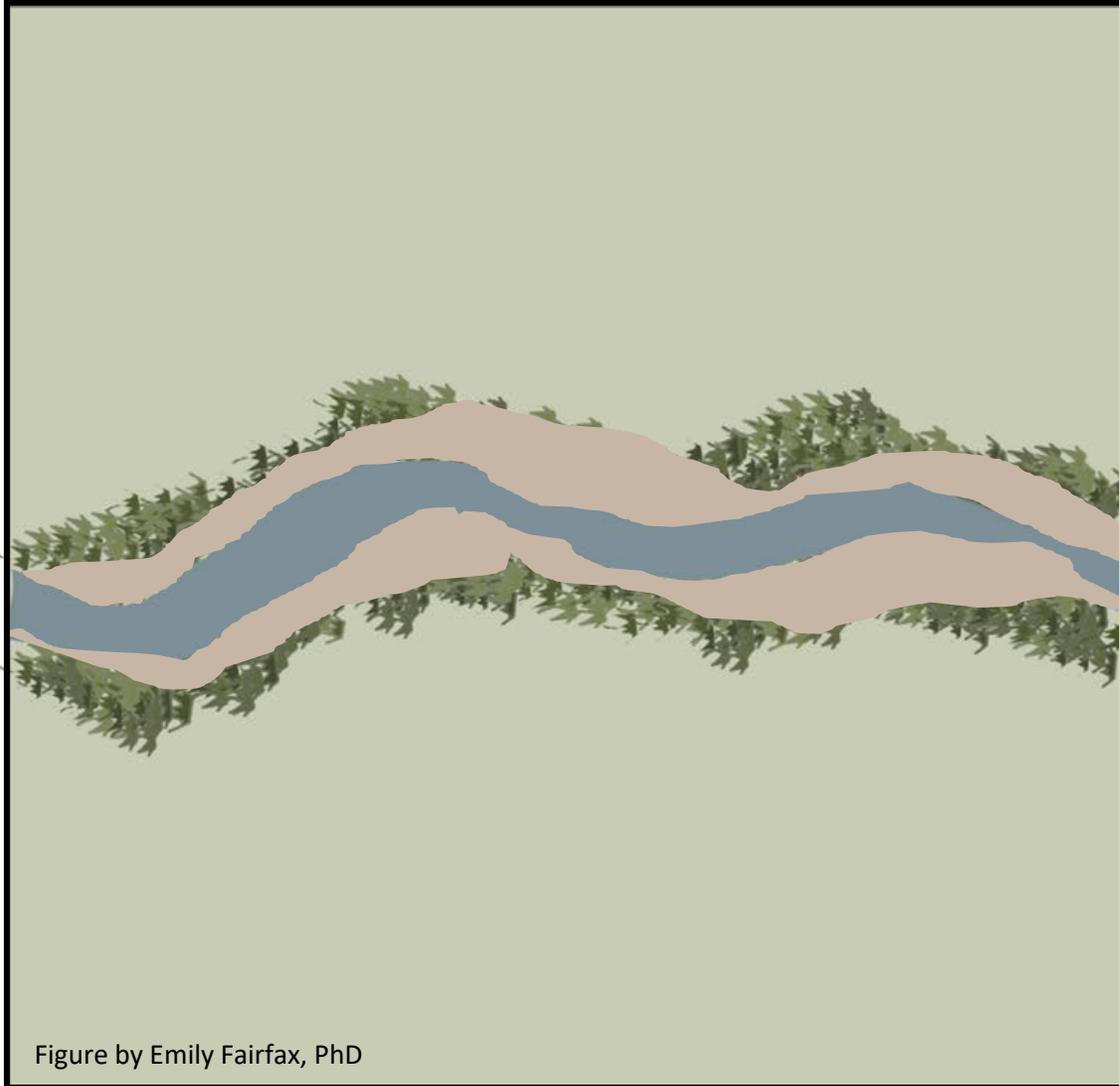


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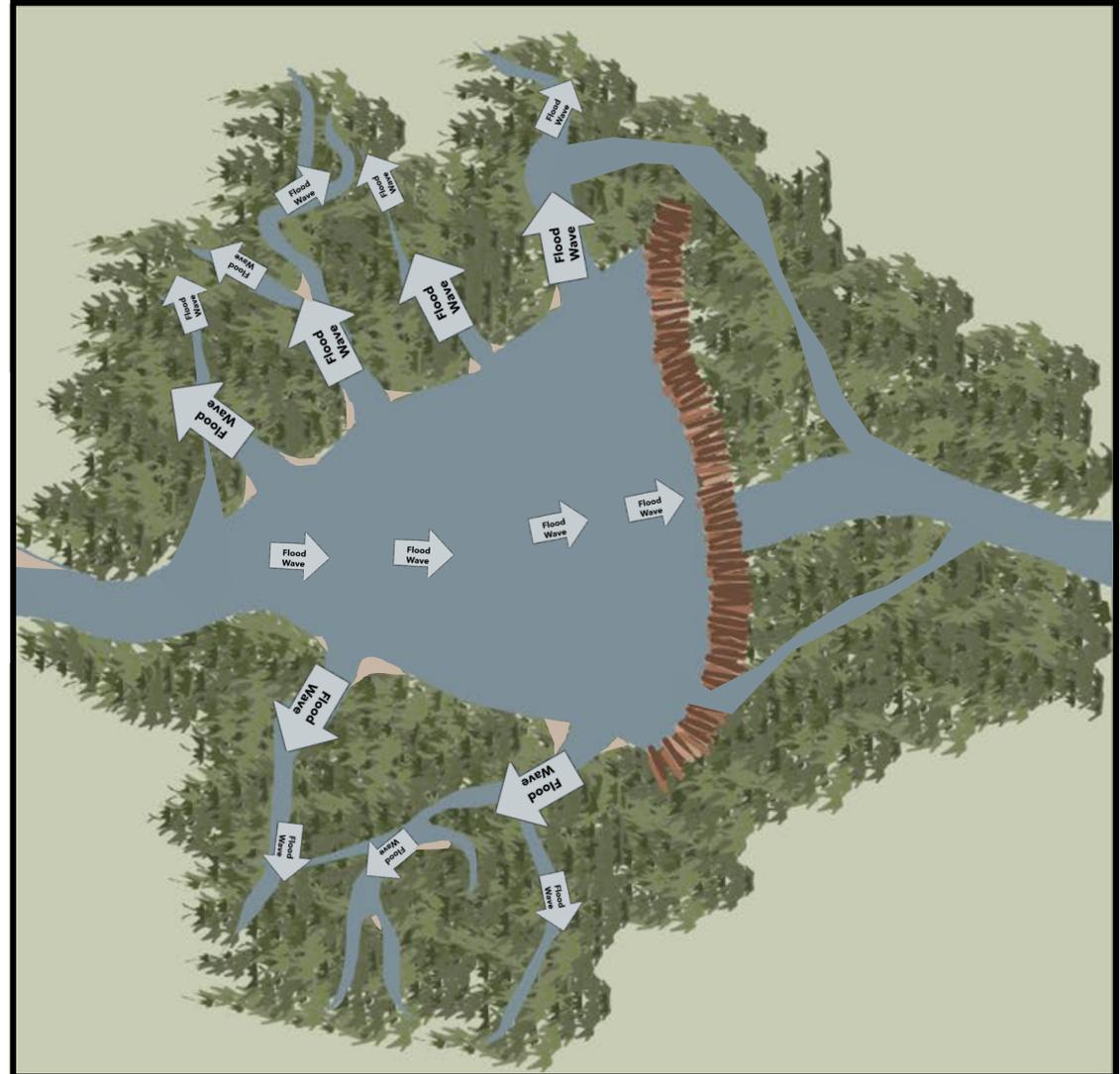
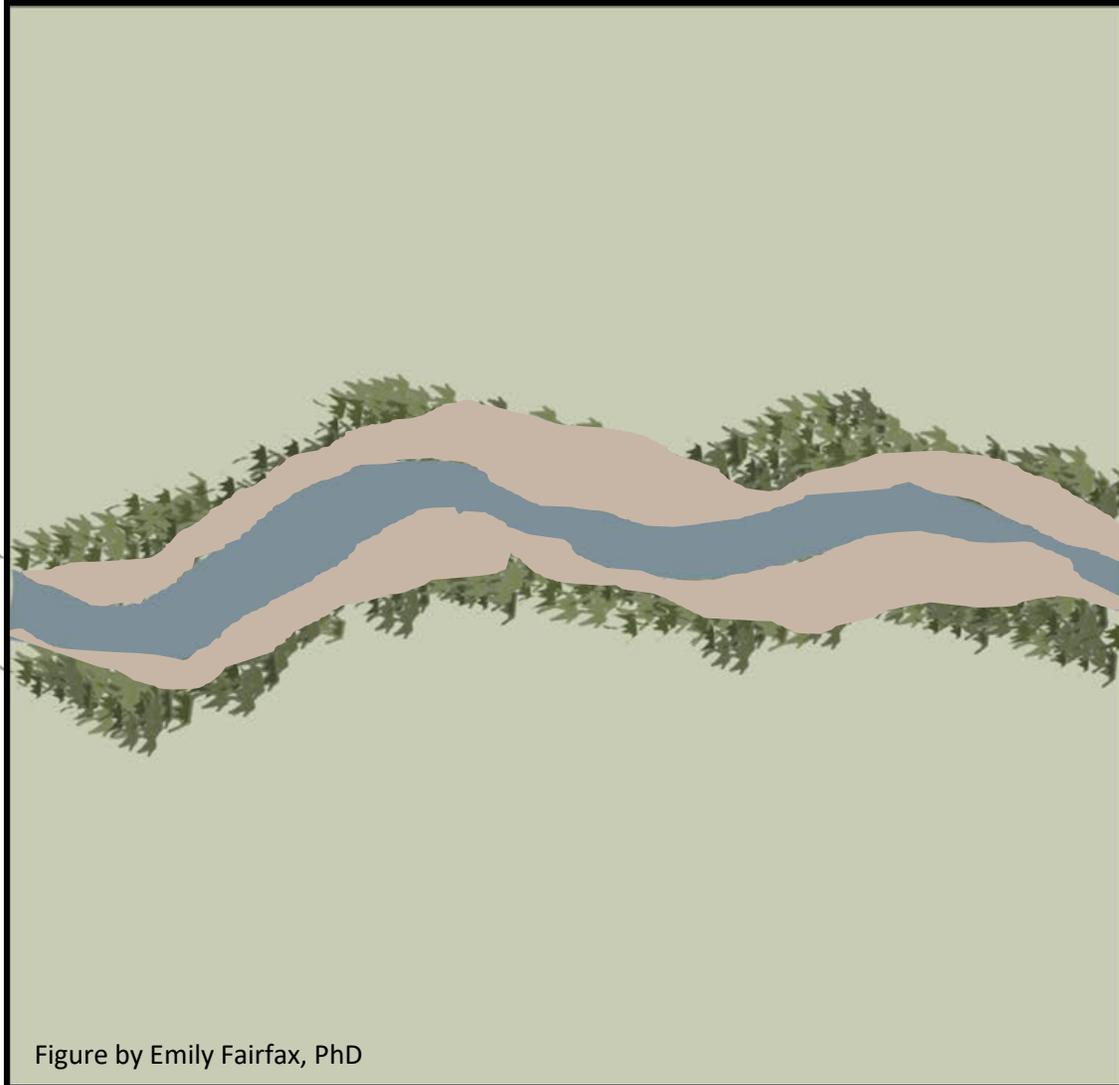


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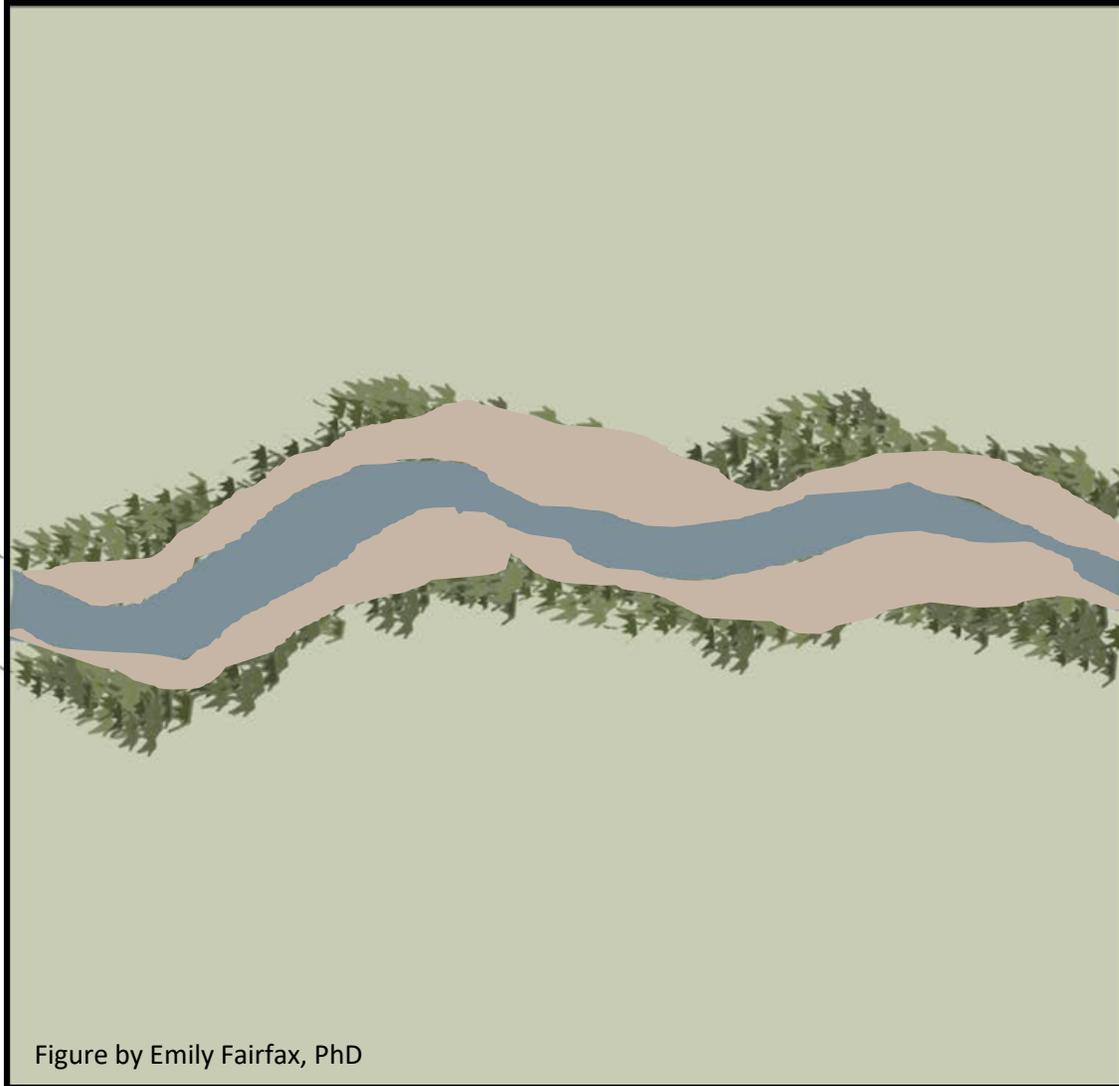
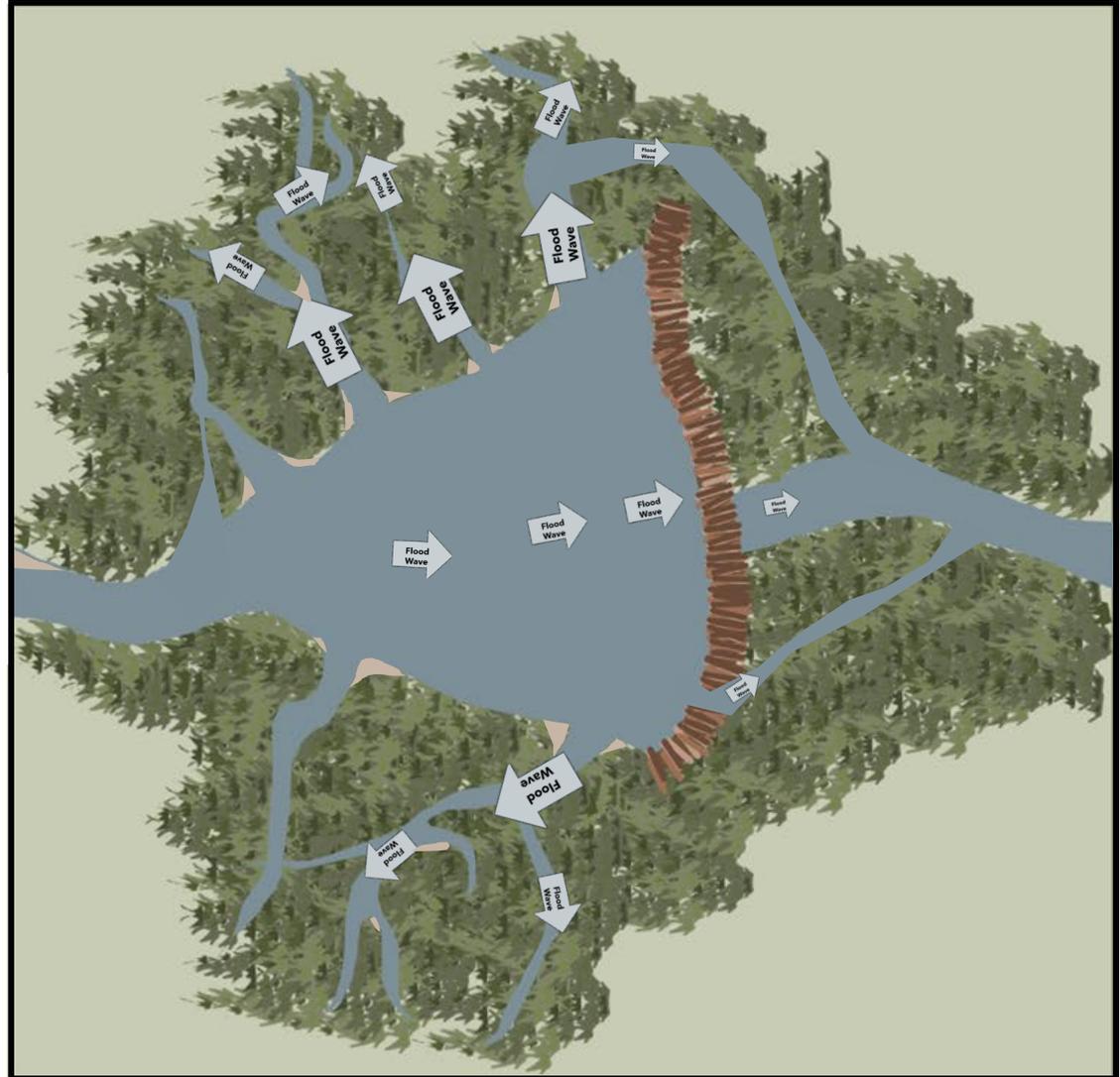
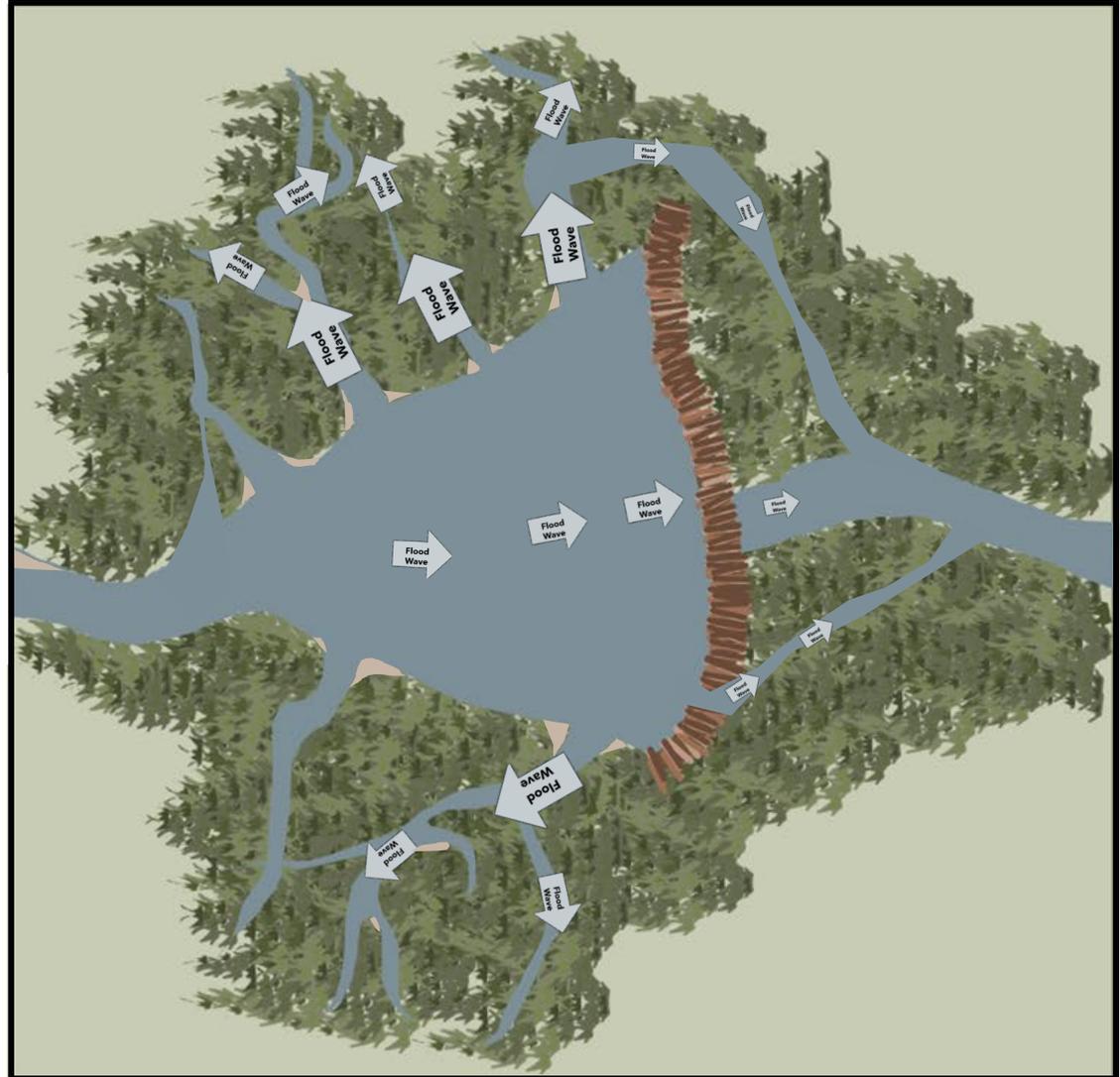
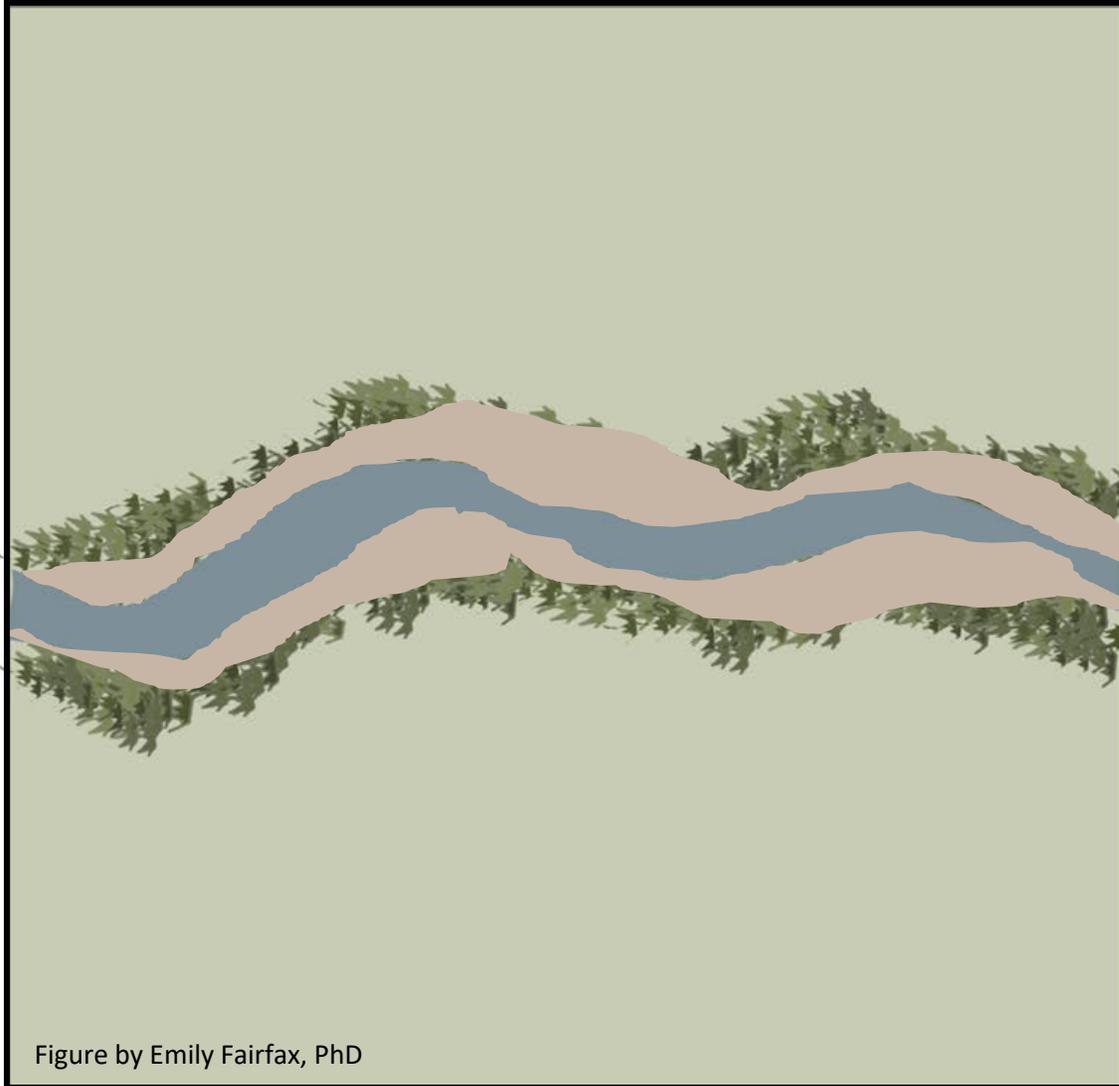


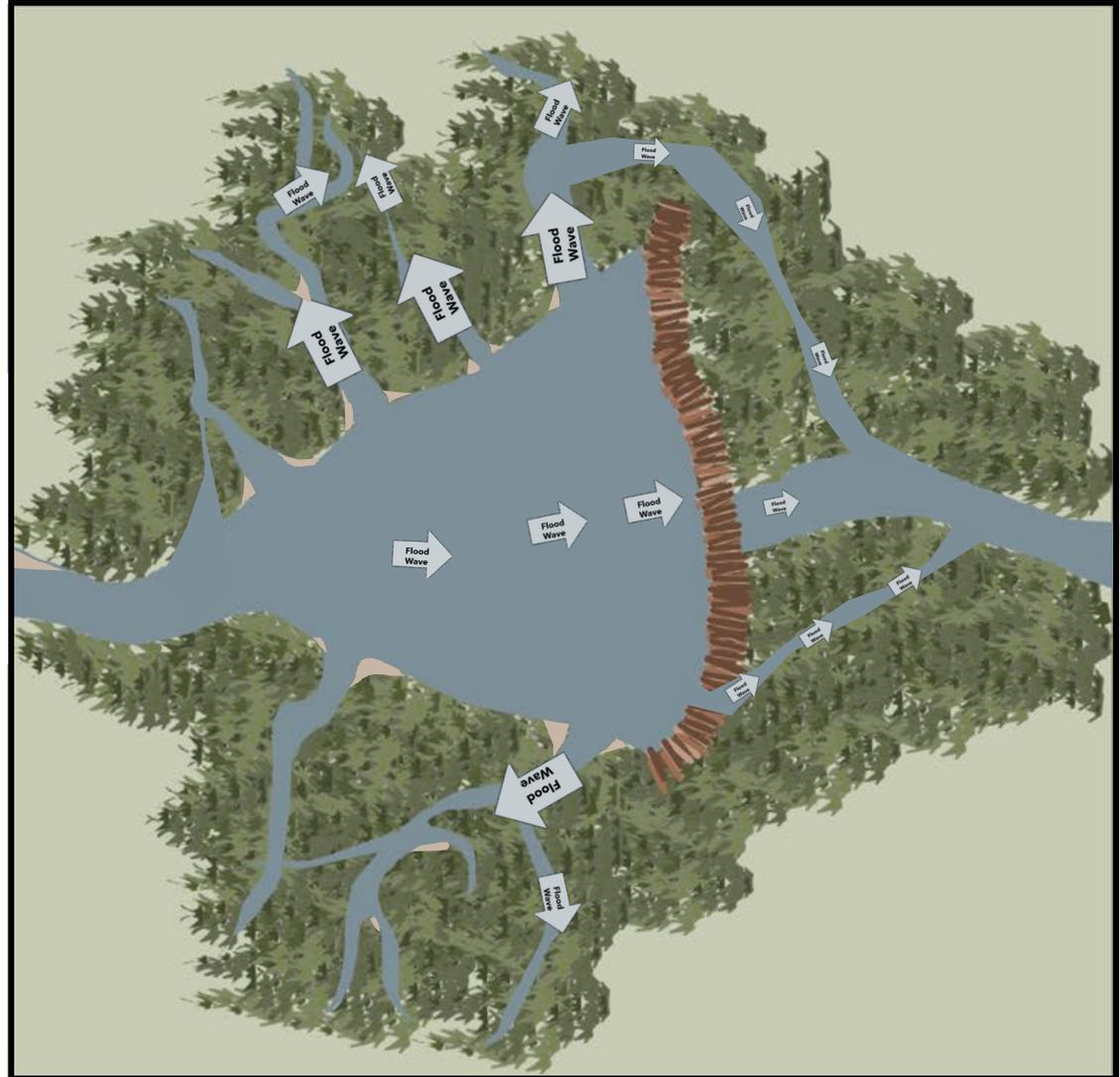
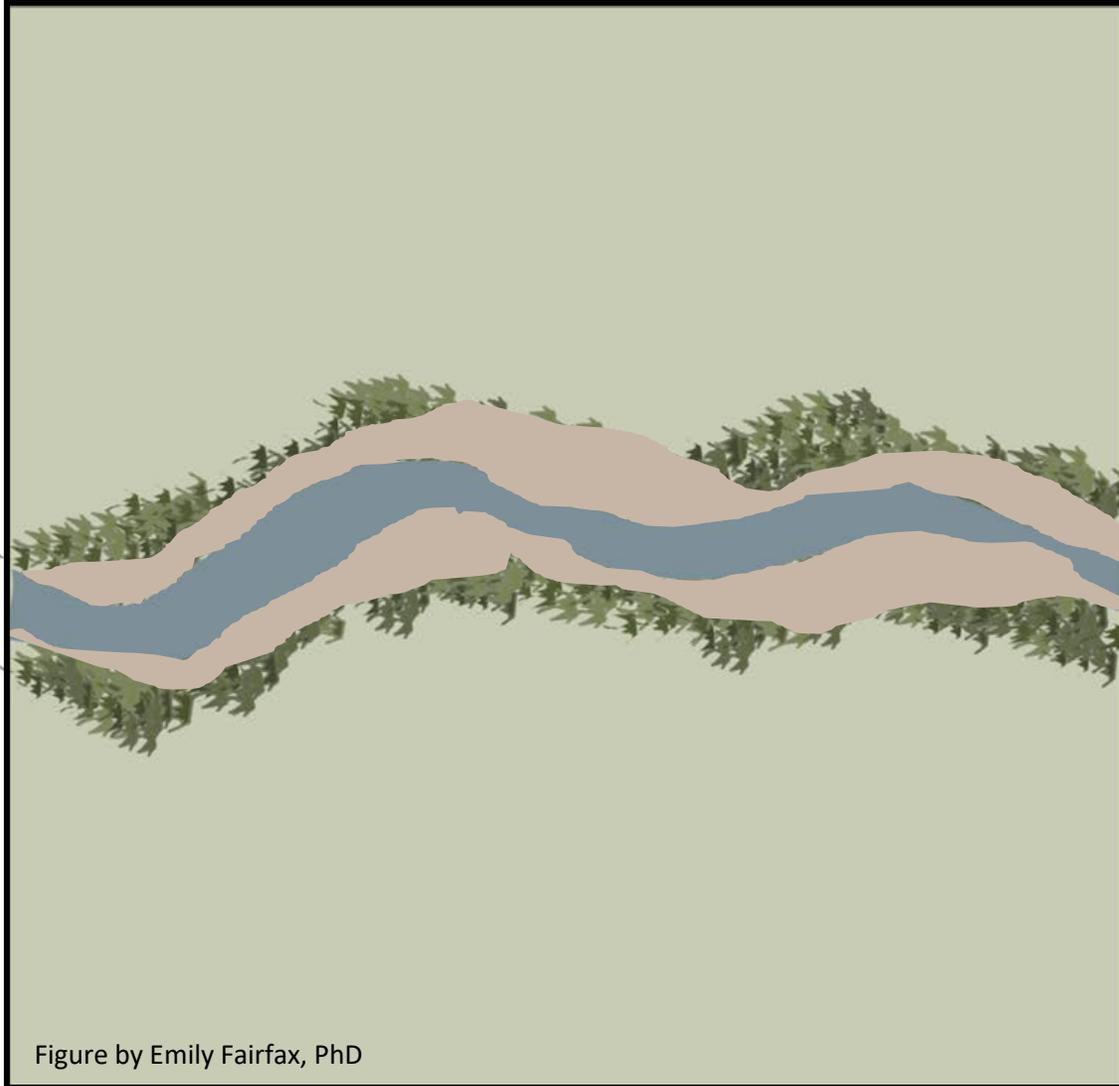
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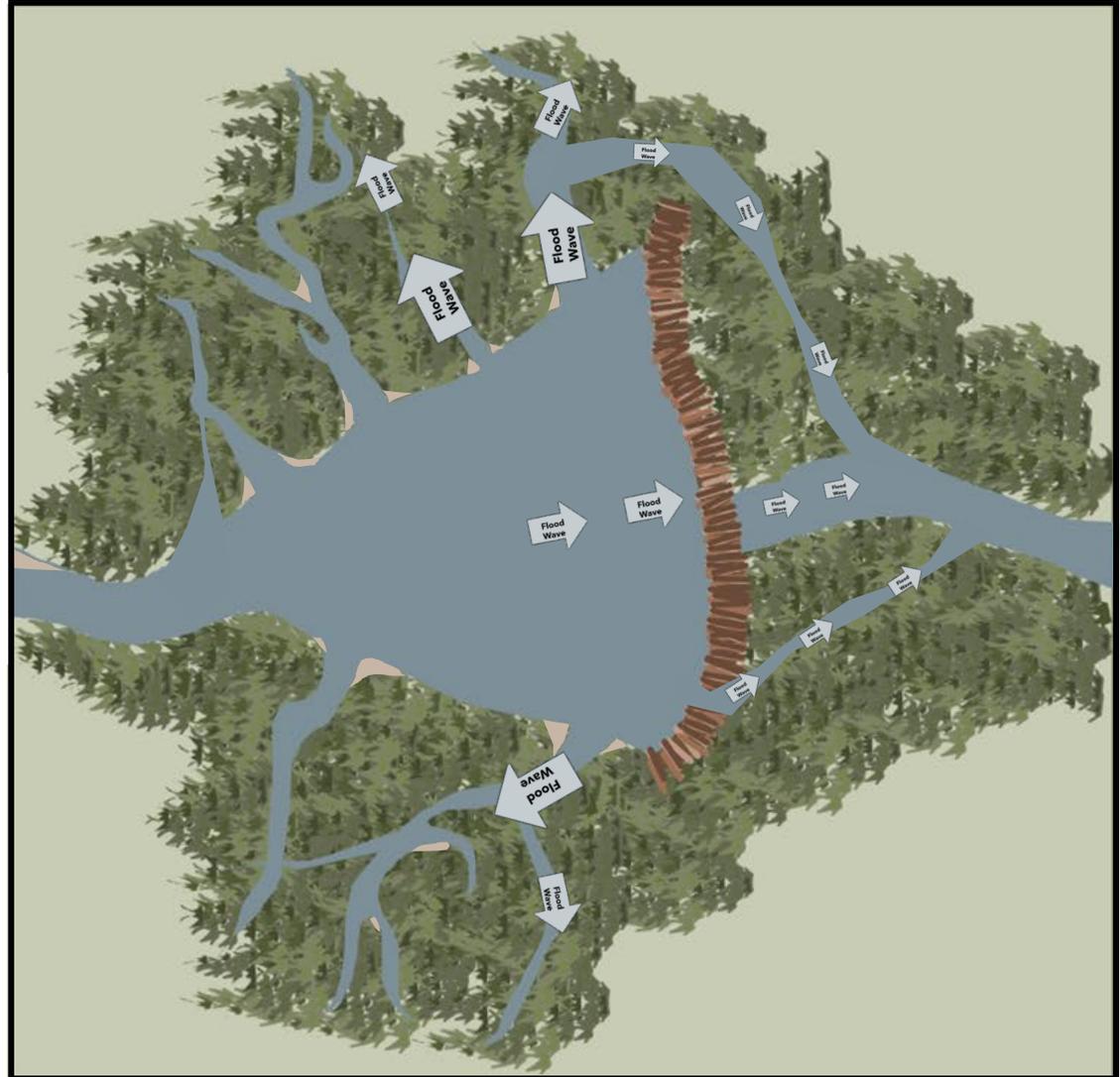
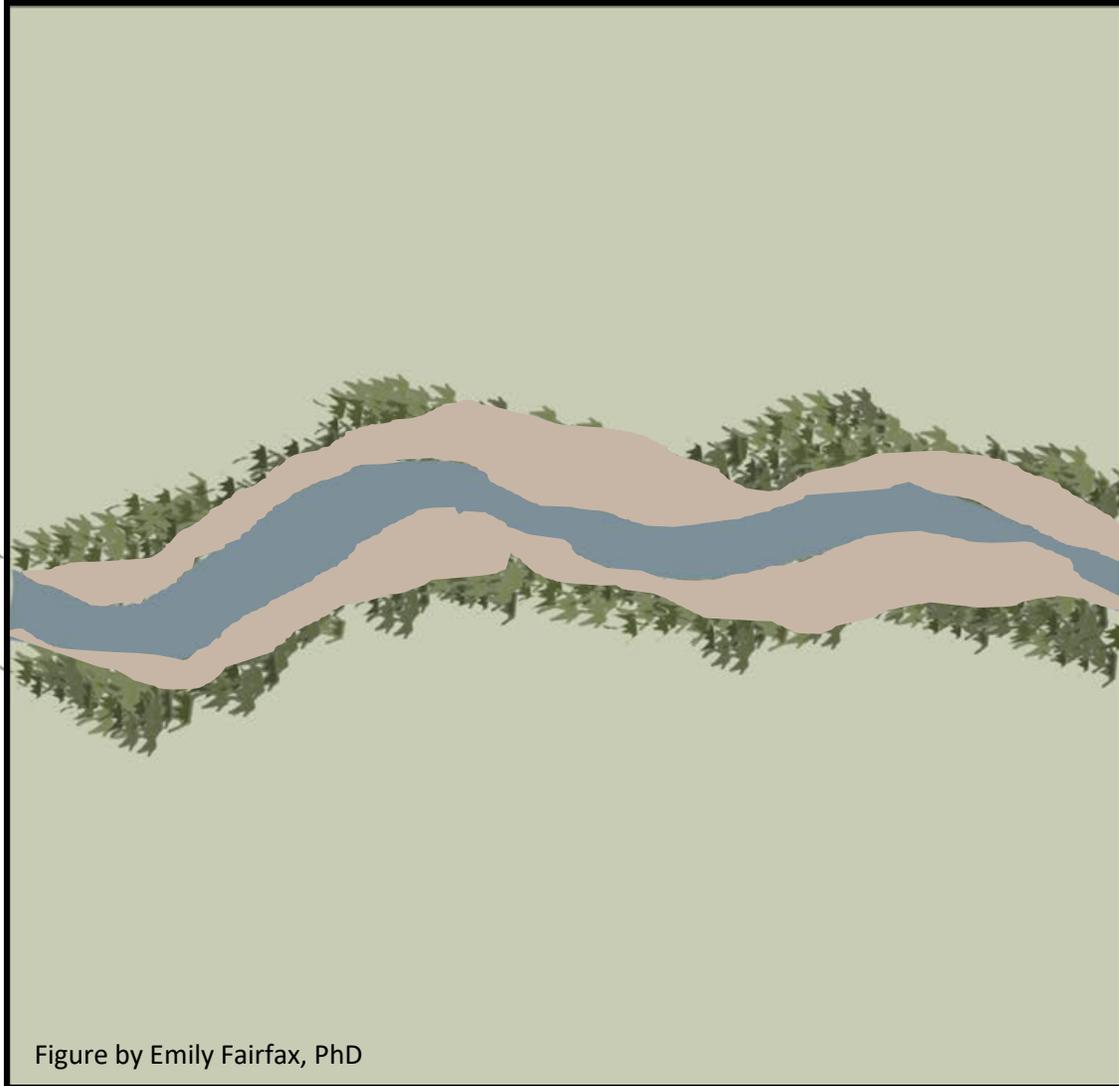
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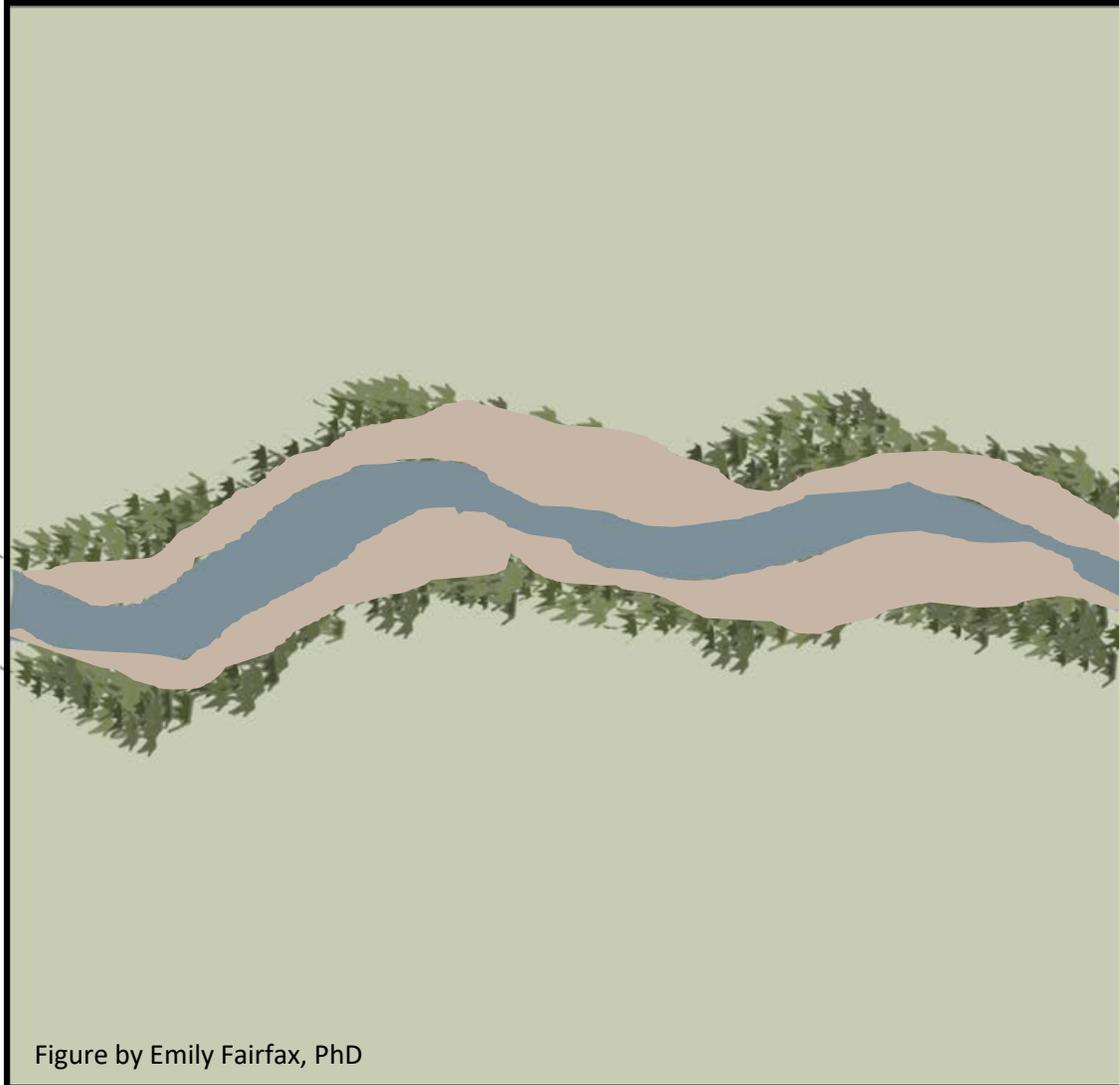
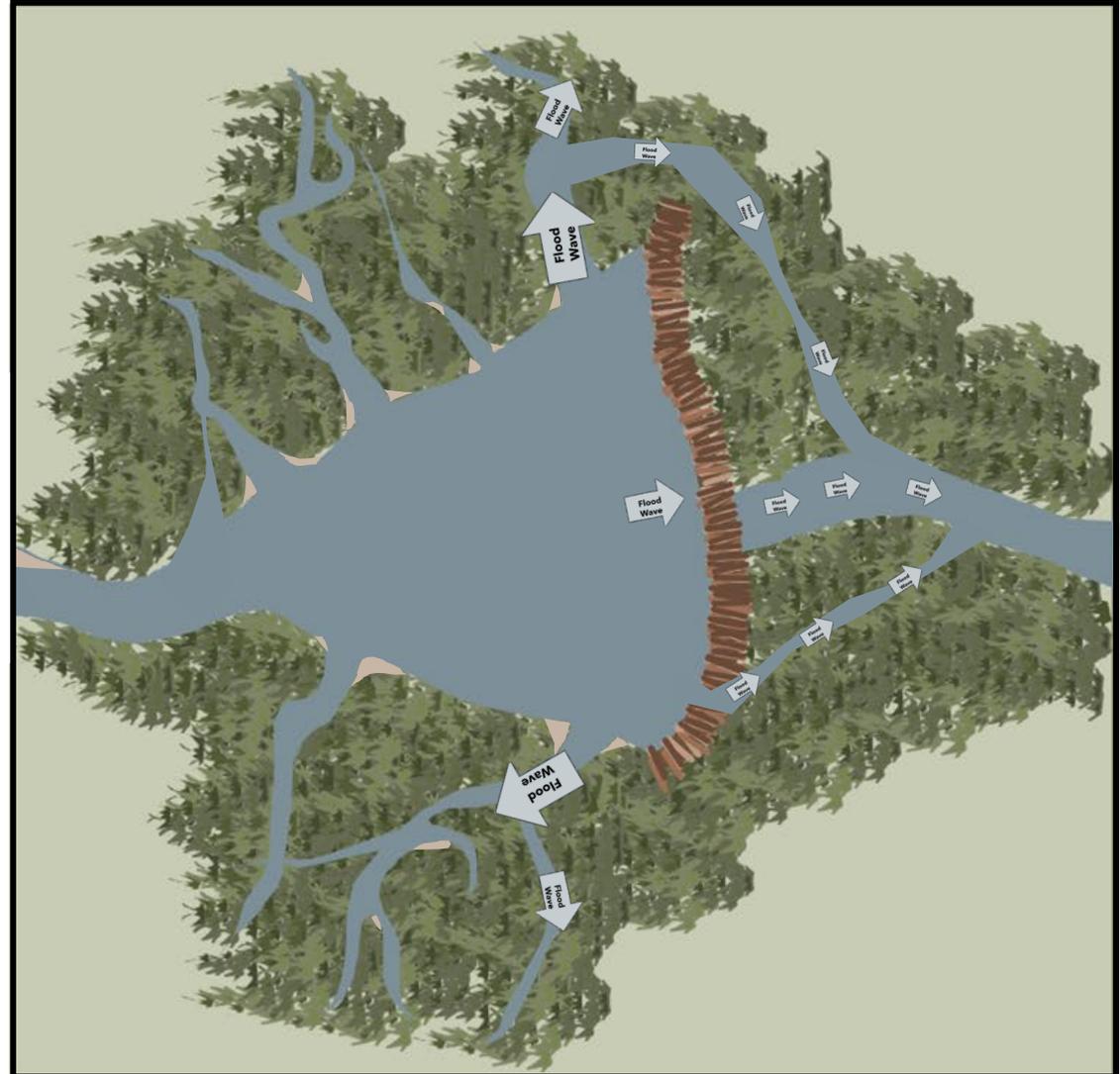
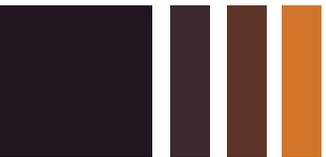


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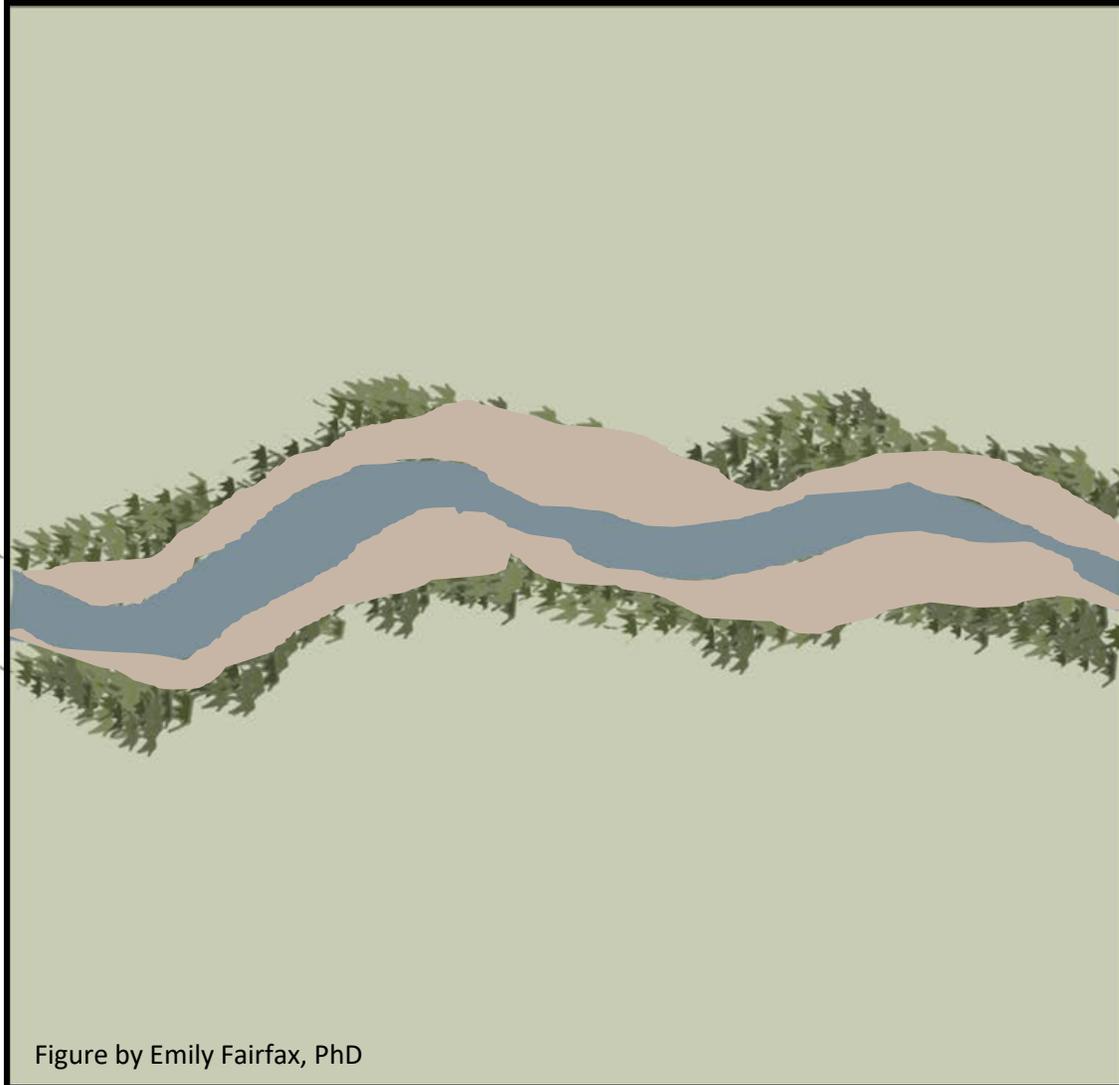
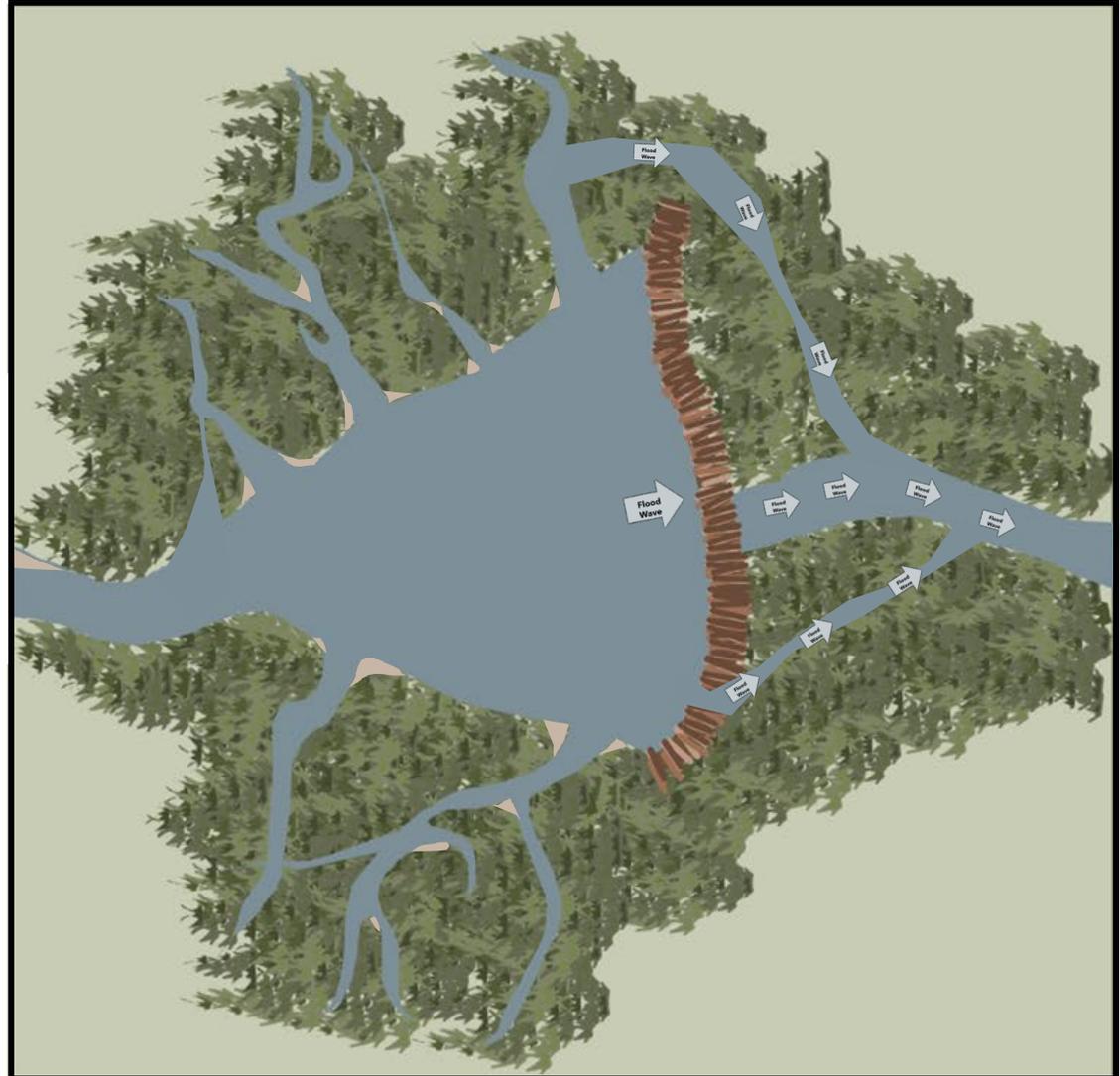
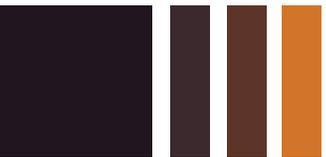
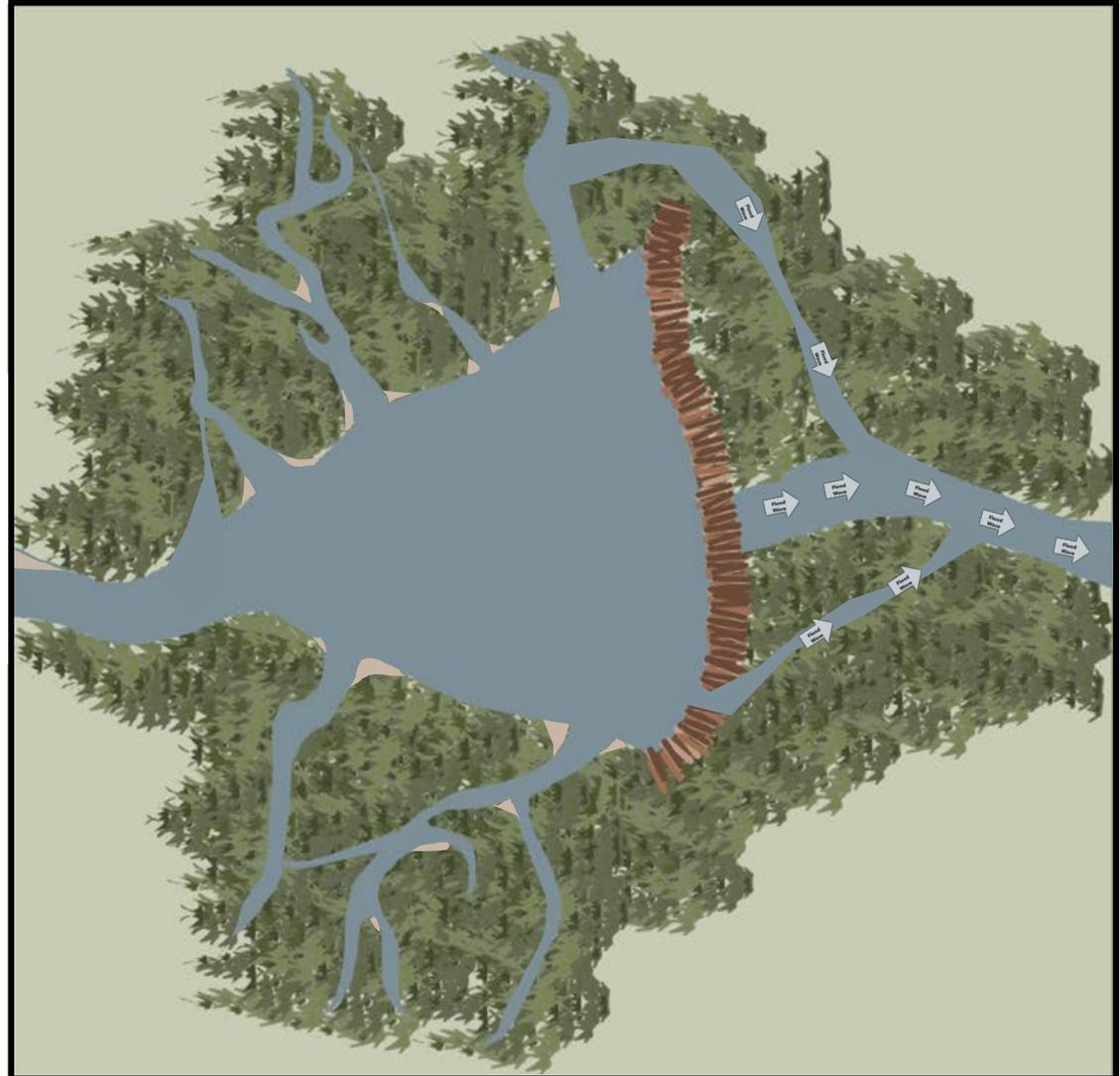
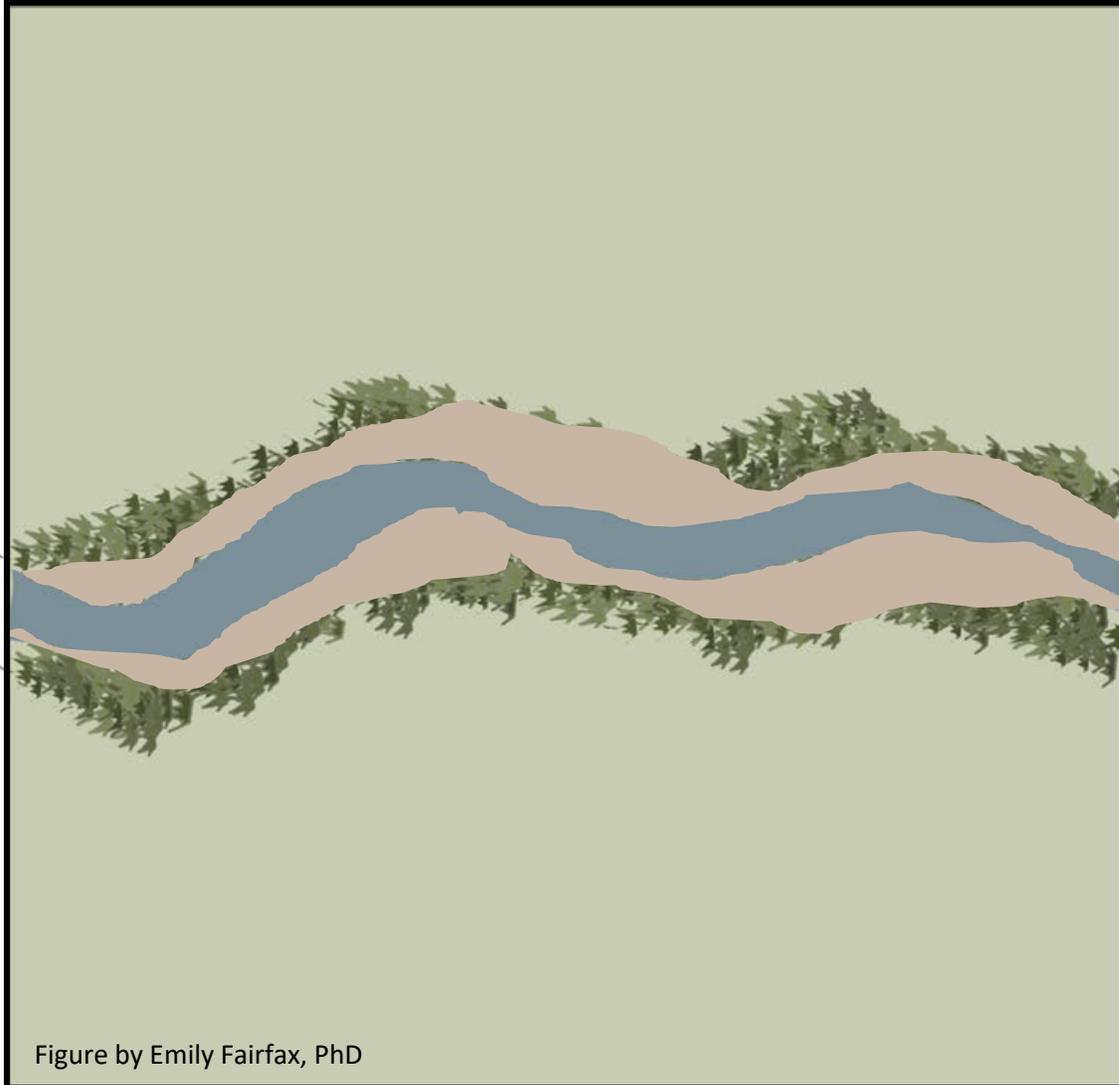


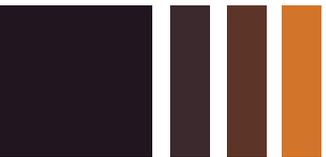
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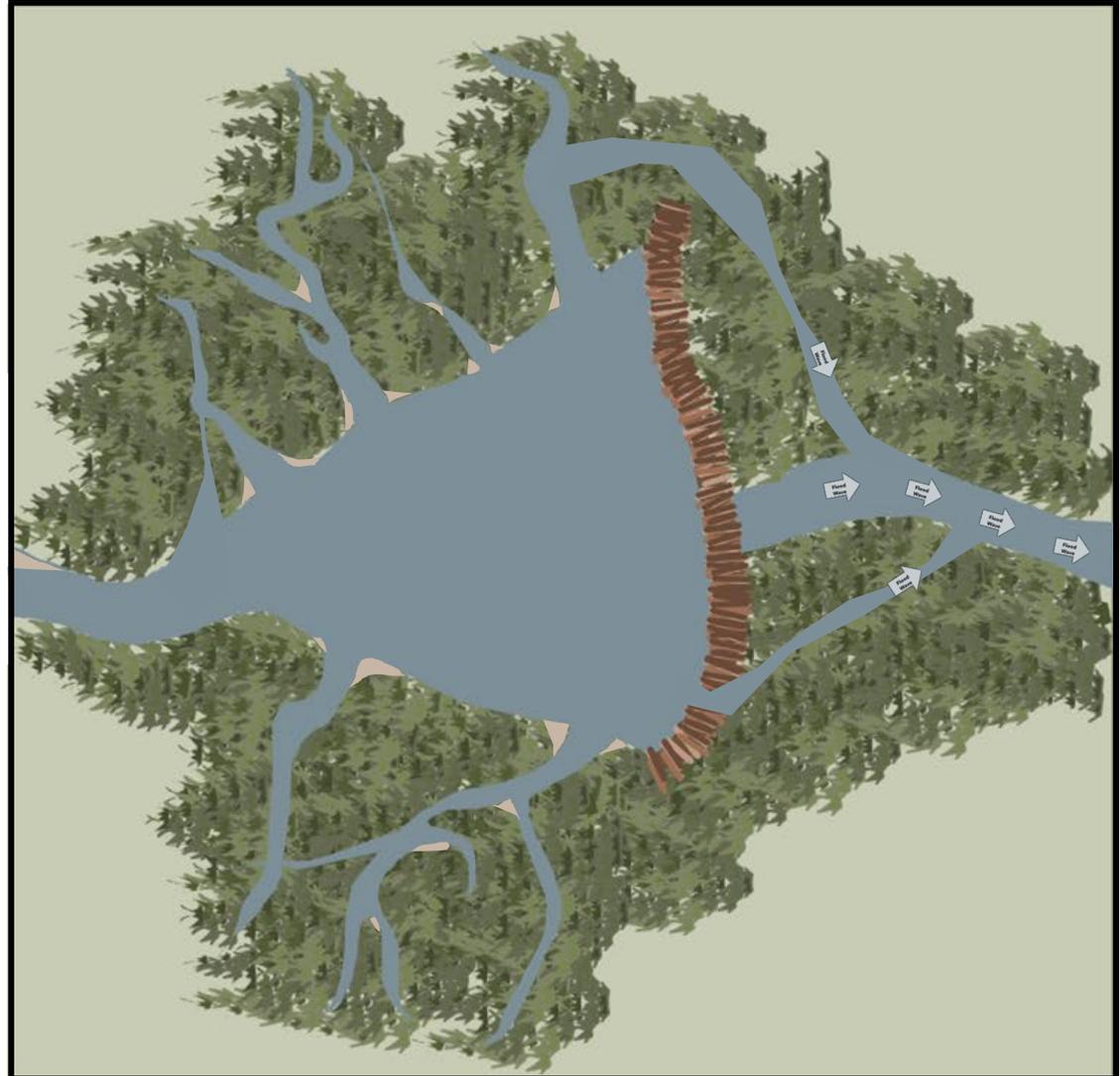
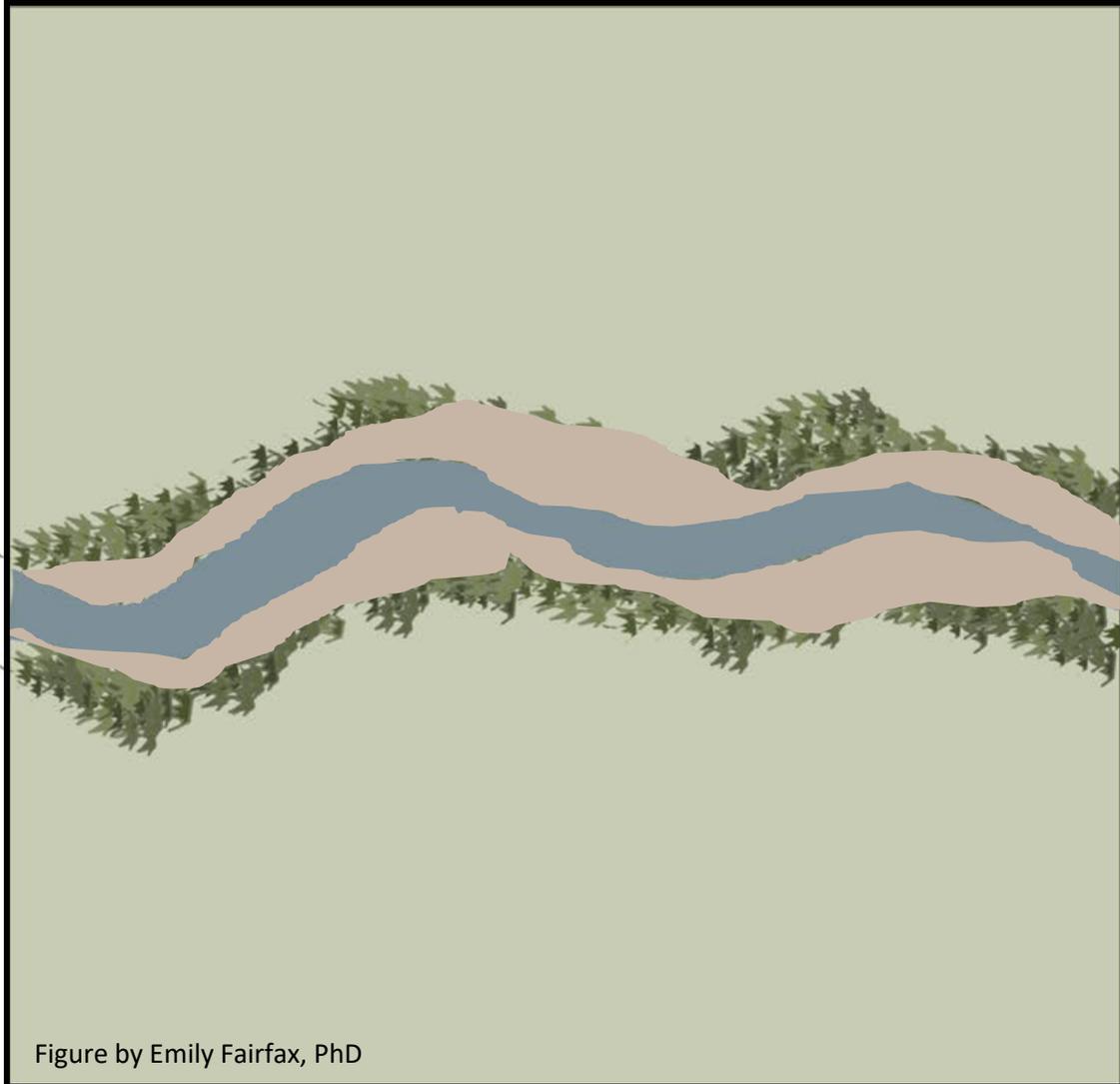


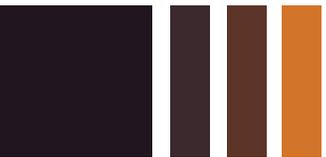
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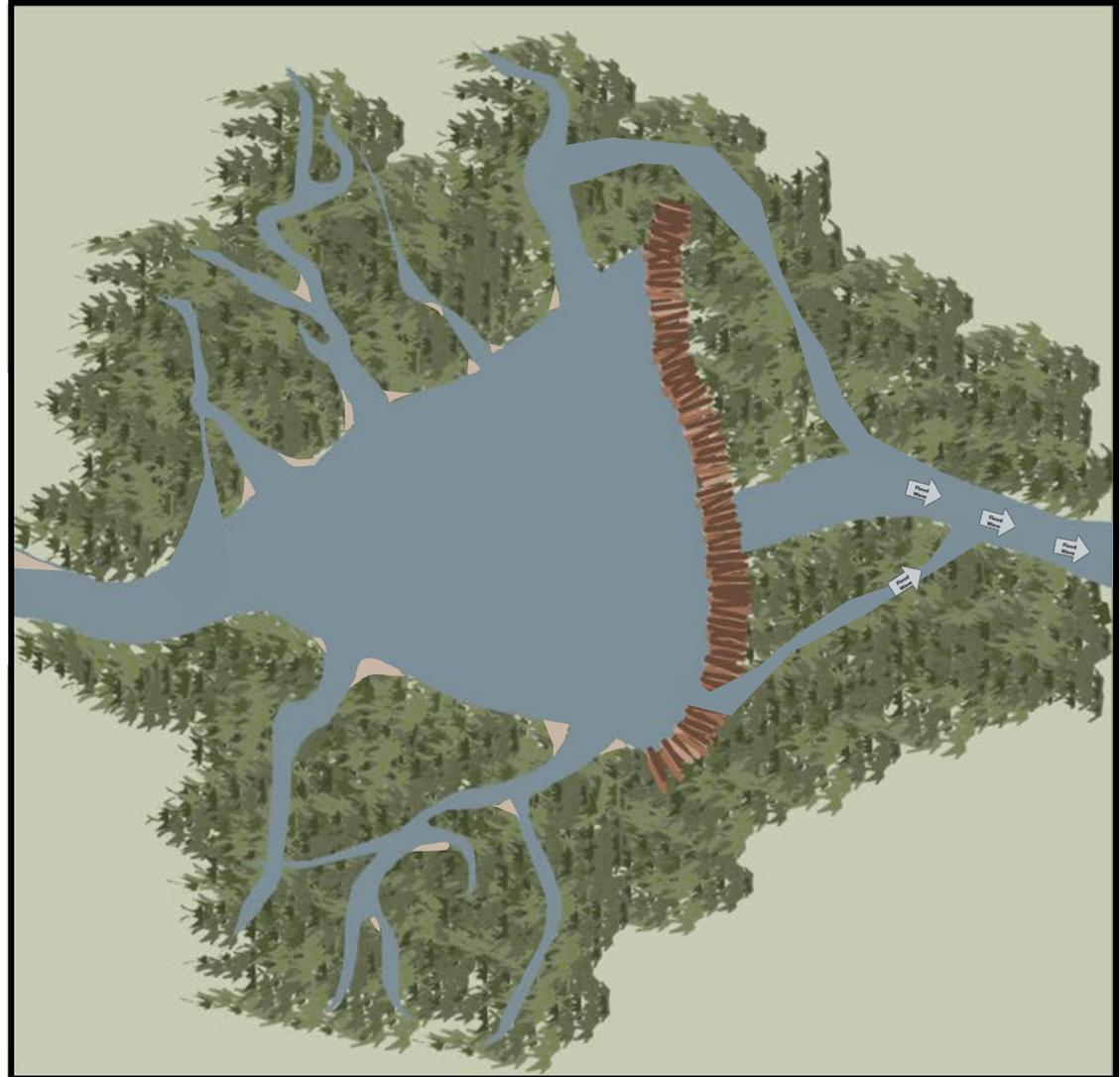
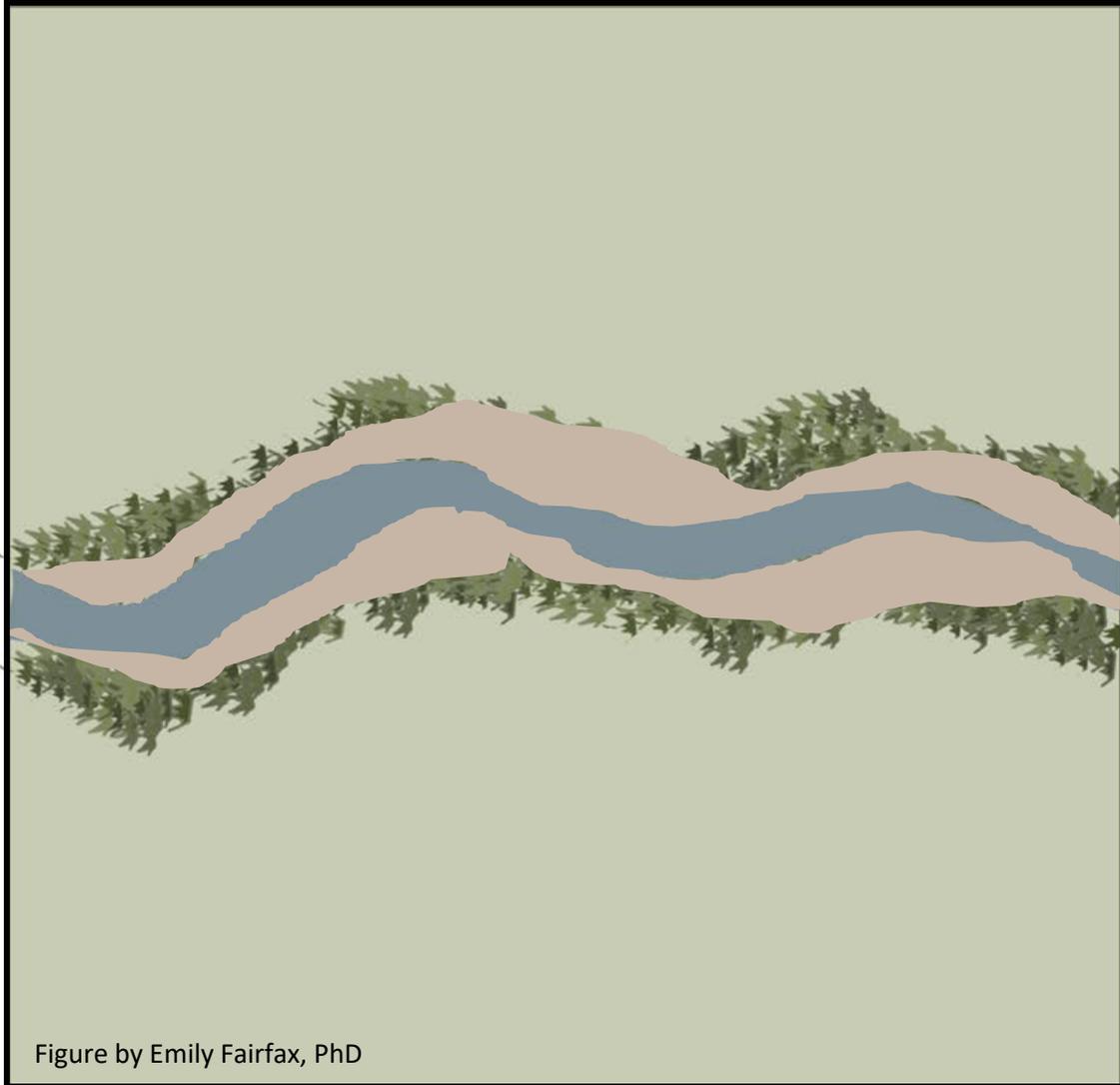


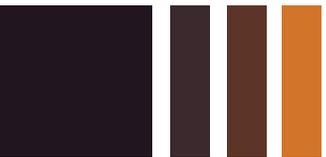
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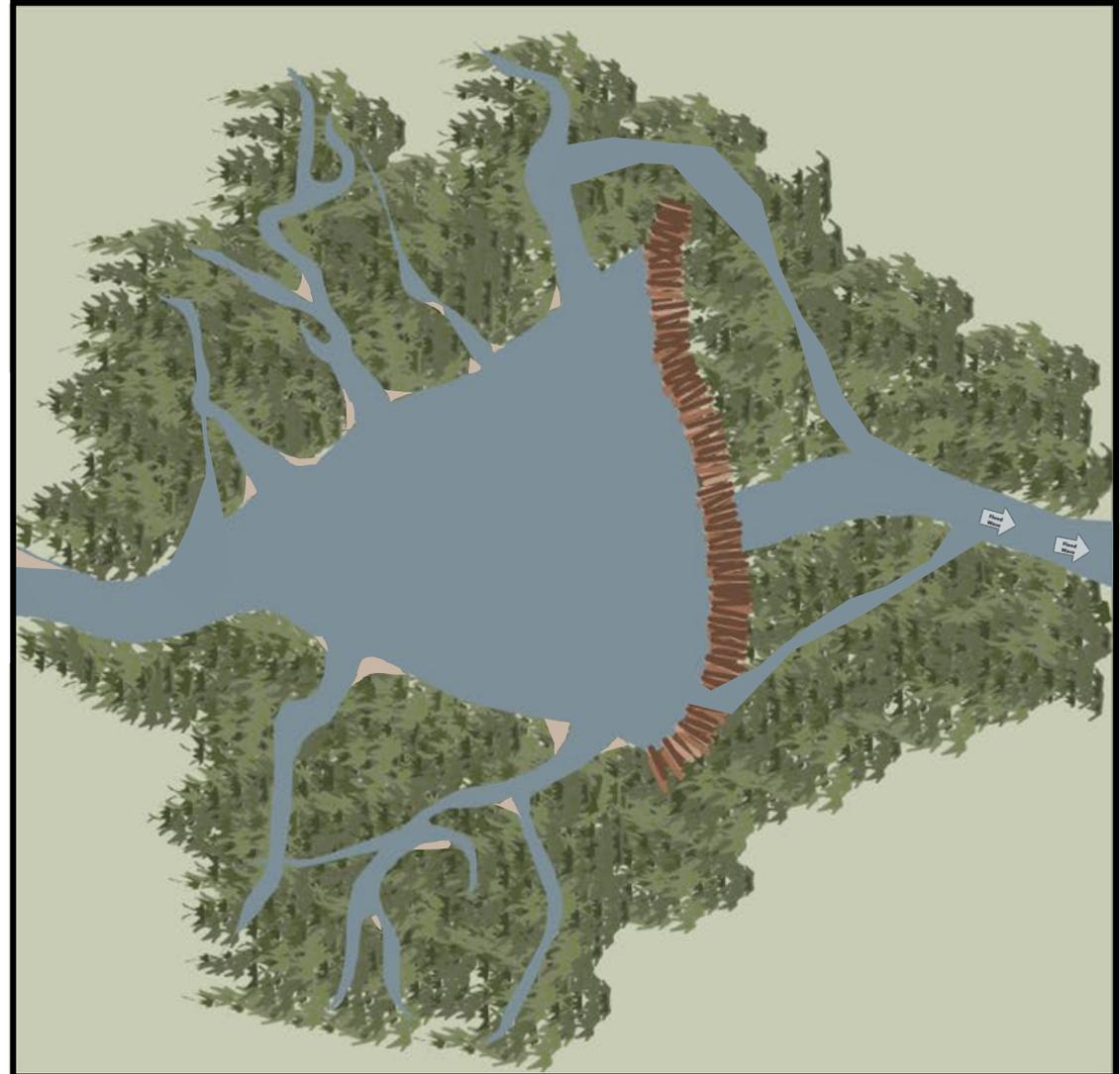
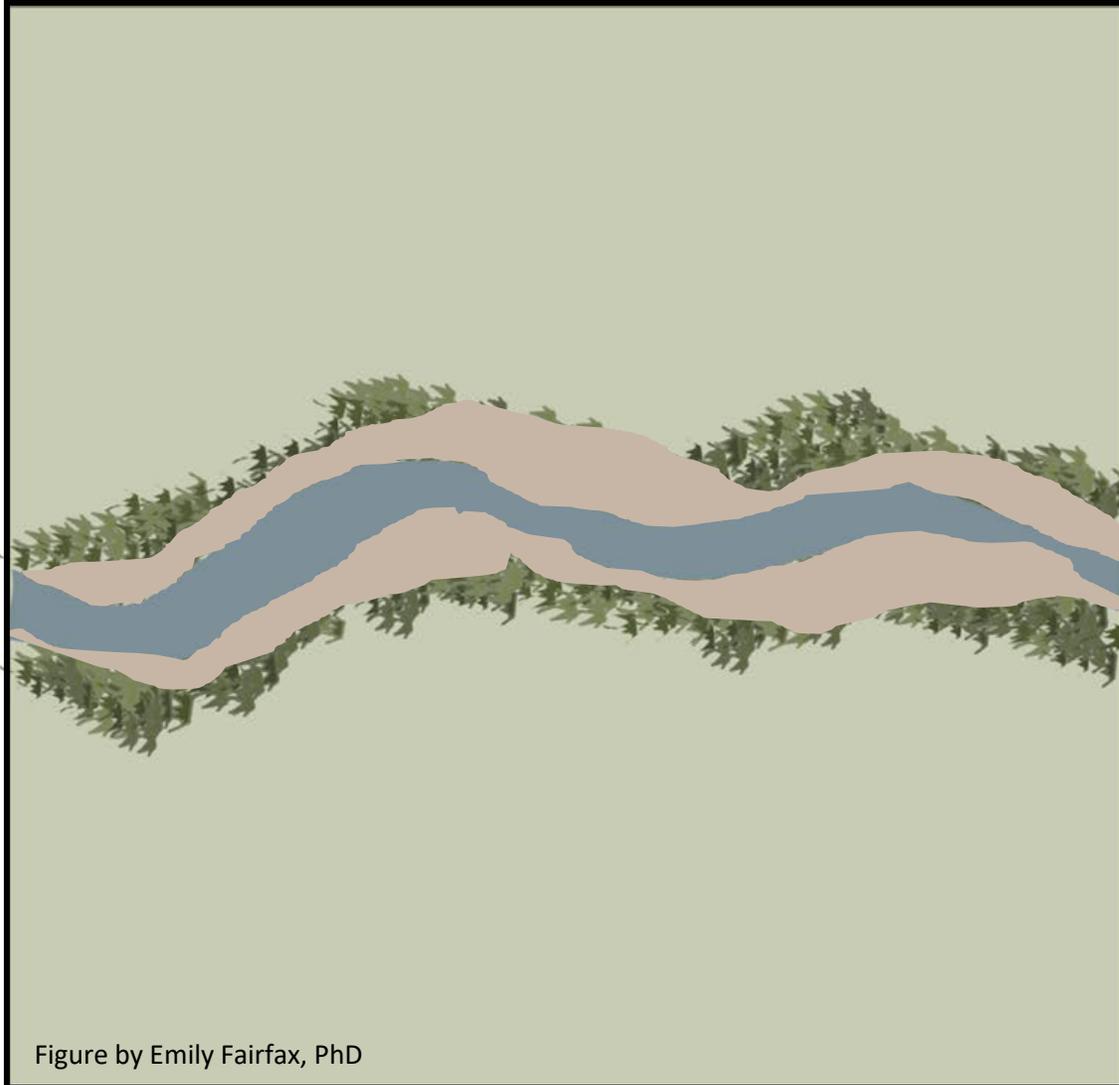


Complexity Builds Resilience: Starting with Floods



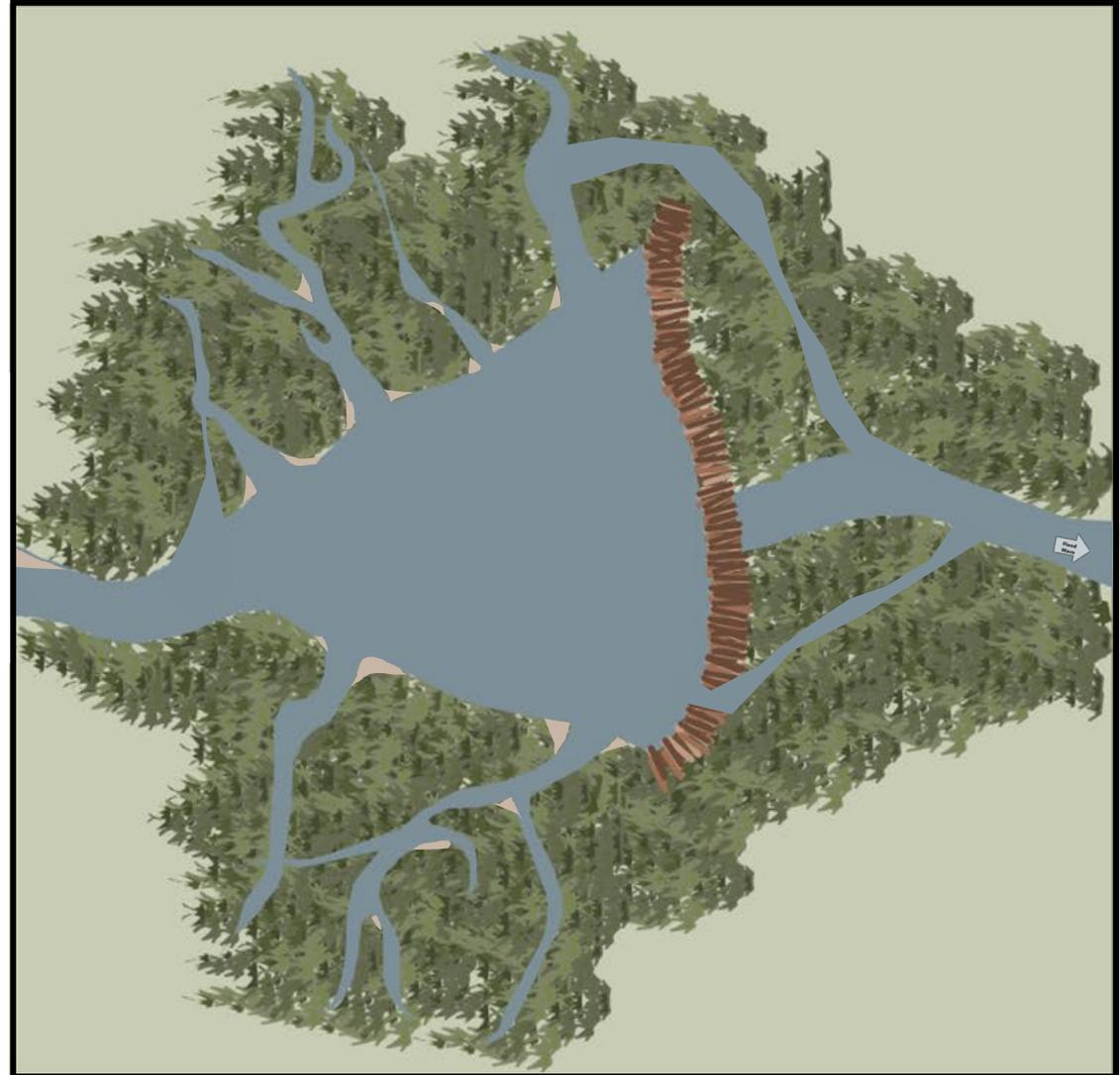
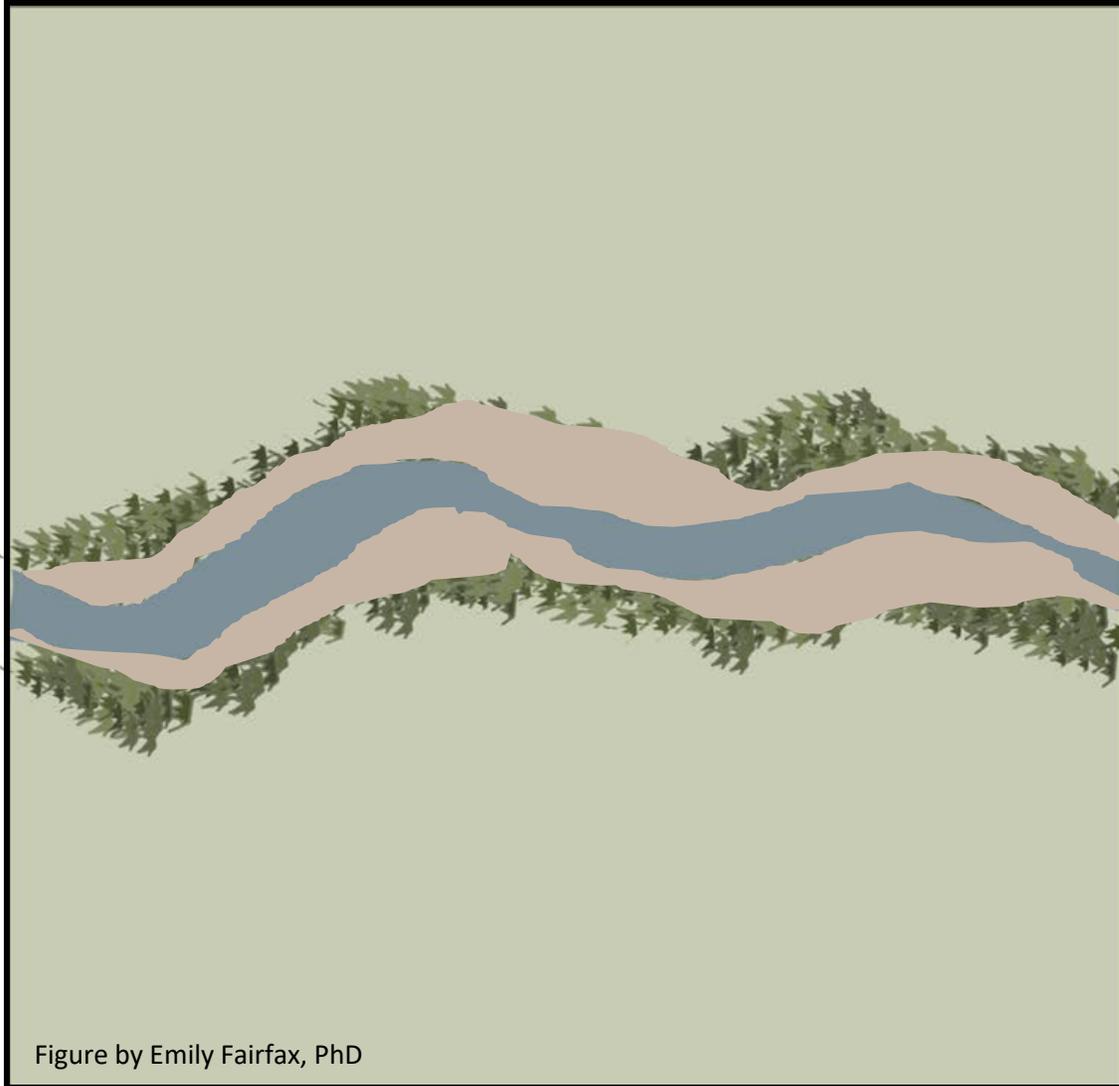


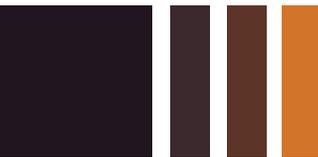
Complexity Builds Resilience: Starting with Floods





Complexity Builds Resilience: Starting with Floods





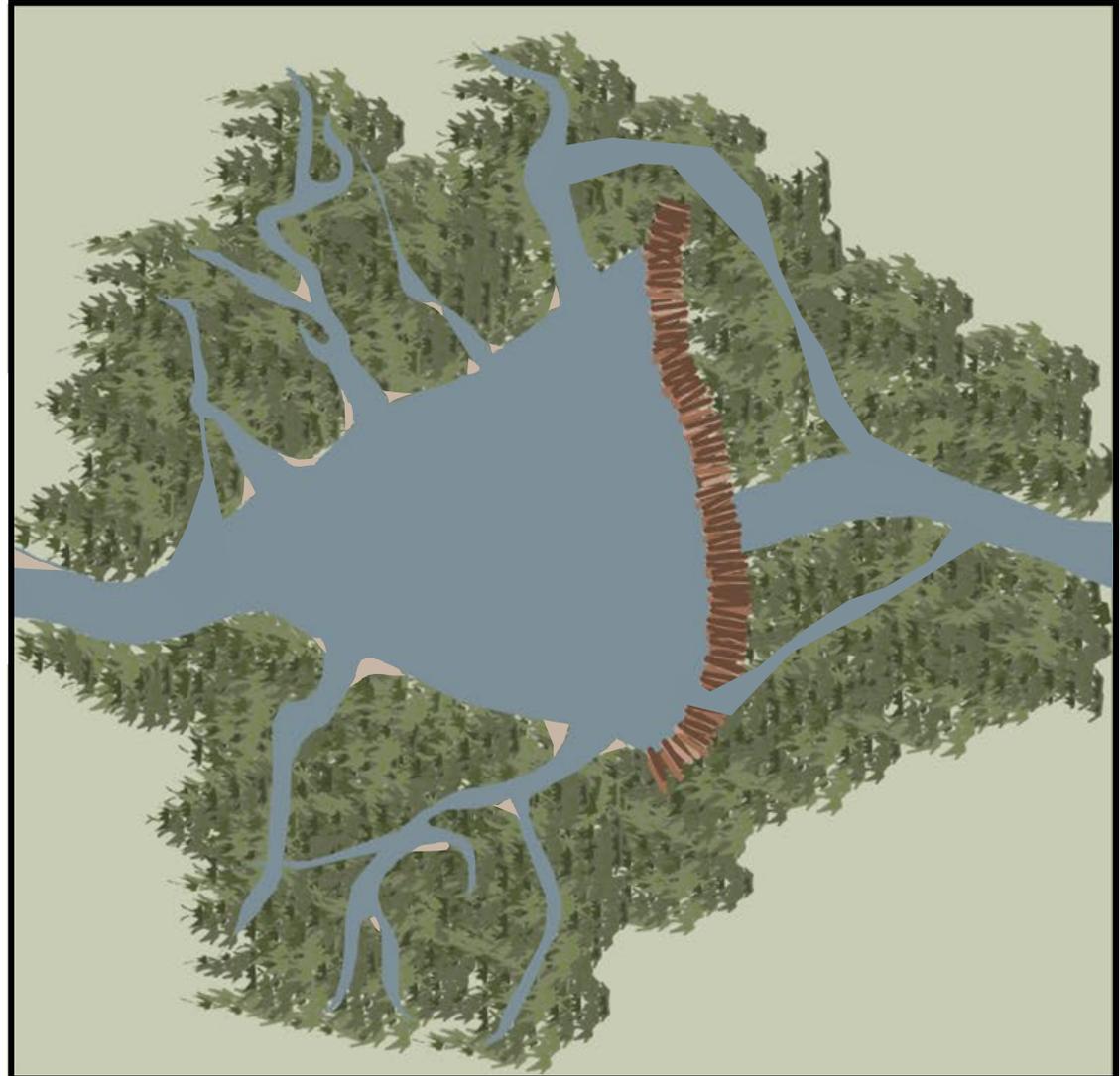
Complexity Builds Resilience: Starting with Floods

EROSION

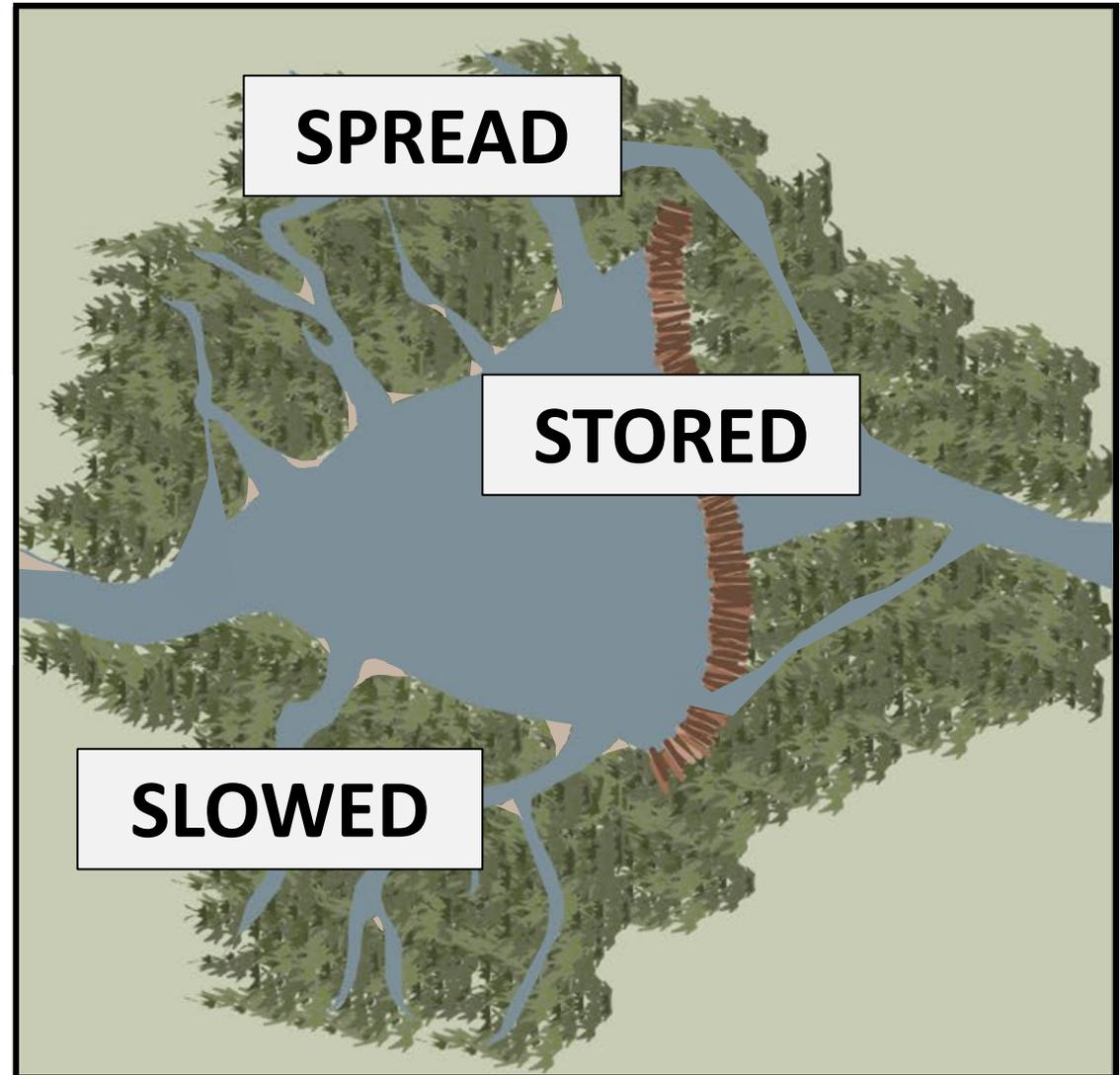
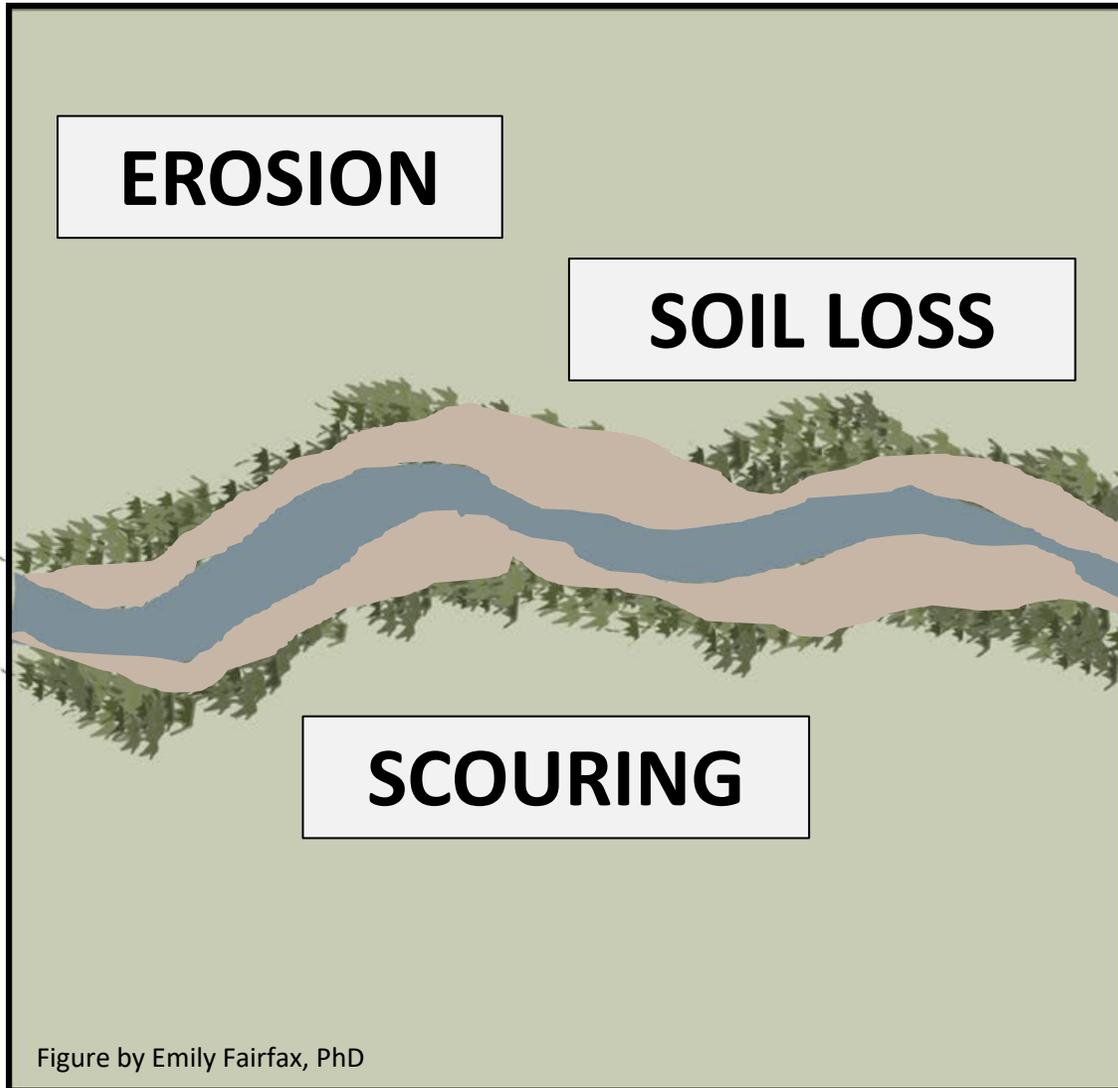
SOIL LOSS

SCOURING

Figure by Emily Fairfax, PhD

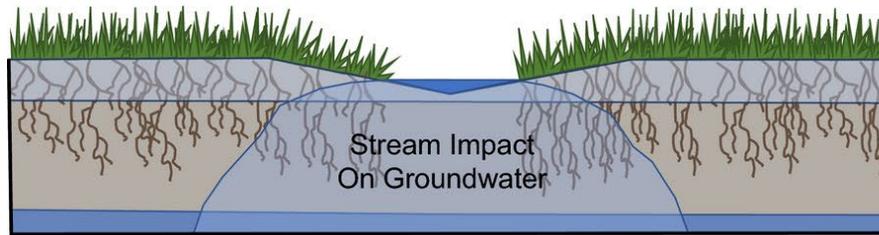


Complexity Builds Resilience: Starting with Floods



Beaver ponds provide reliable, consistent habitat.

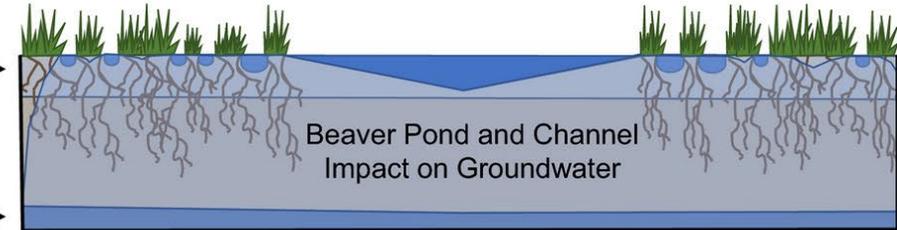
Stream without Beavers



← Infiltrating
Precipitation →

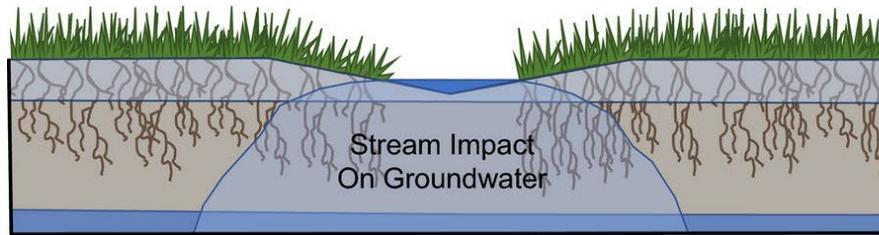
← Deep
Water Table →

Stream with Beavers



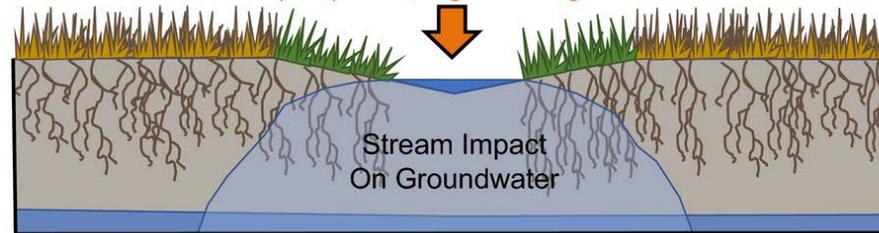
Beaver ponds provide reliable, consistent habitat.

Stream without Beavers

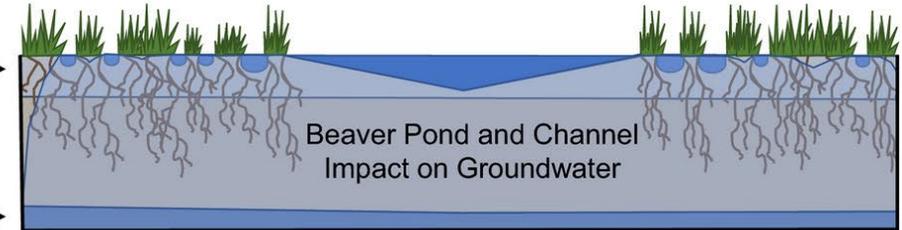


Drought Conditions

less precipitation, veg relies on groundwater



Stream with Beavers



Drought Conditions

less precipitation, veg relies on groundwater



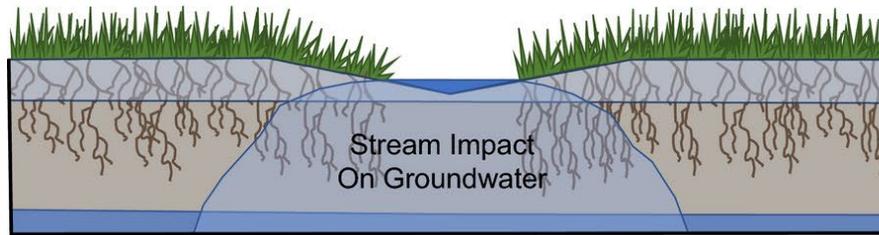
Infiltrating
Precipitation

Deep
Water Table

Deep
Water Table

Beaver ponds provide reliable, consistent habitat.

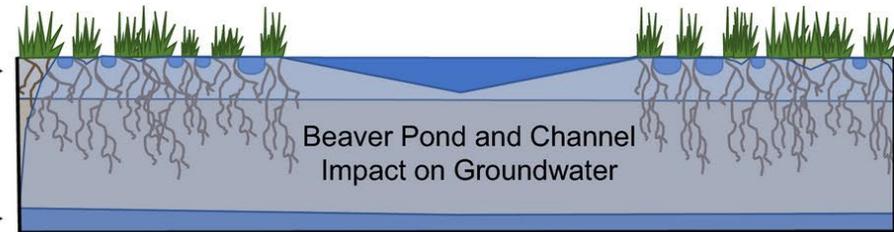
Stream without Beavers



Infiltrating
Precipitation

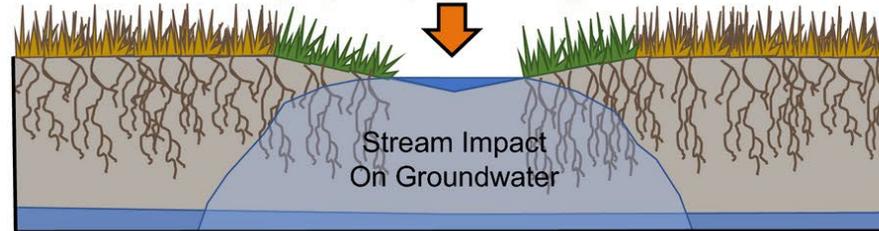
Deep
Water Table

Stream with Beavers



Drought Conditions

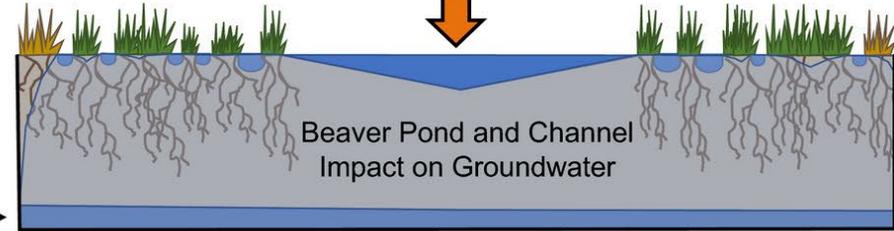
less precipitation, veg relies on groundwater



Deep
Water Table

Drought Conditions

less precipitation, veg relies on groundwater



Ecohydrology

RESEARCH ARTICLE

Using remote sensing to assess the impact of beaver damming on riparian evapotranspiration in an arid landscape

Emily Fairfax  Eric E. Small



Biological Conservation

Volume 141, Issue 2, February 2008, Pages 556-567



Beaver (*Castor canadensis*) mitigate the effects of climate on the area of open water in boreal wetlands in western Canada

Glynnis A. Hood ^a  , Suzanne E. Bayley ^a 

Beaver ponds provide reliable, consistent habitat.

Stream without Beavers

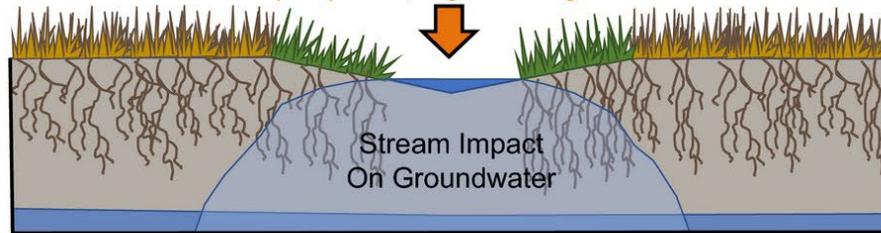


Infiltrating Precipitation

Deep Water Table

Drought Conditions

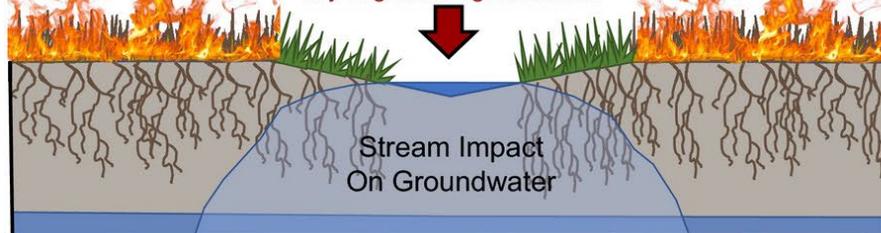
less precipitation, veg relies on groundwater



Deep Water Table

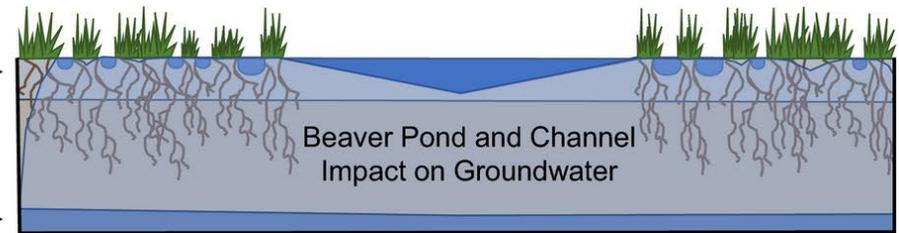
Fire Conditions

dry vegetation ignites/burns



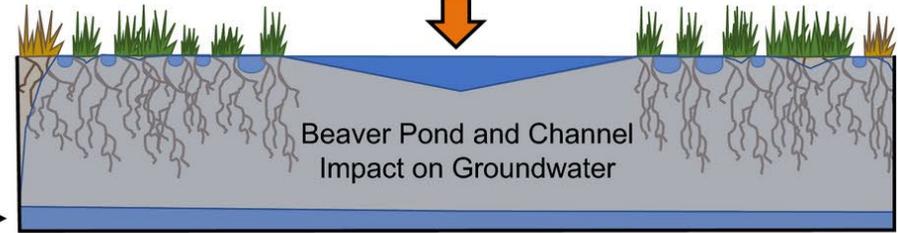
Deep Water Table

Stream with Beavers



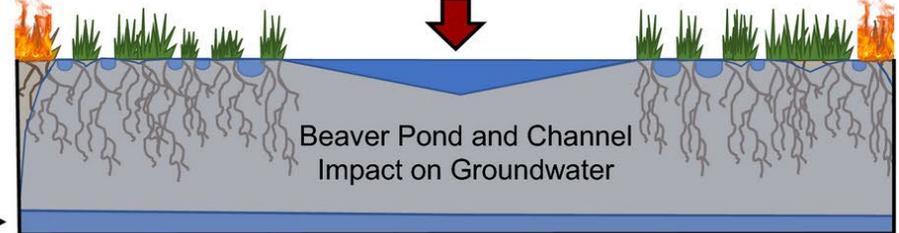
Drought Conditions

less precipitation, veg relies on groundwater



Fire Conditions

dry vegetation ignites/burns



Deep Water Table



Emily Fairfax

And beaver-engineered landscapes are valuable, and beavers are a natural resource beyond fur.

Mammal Review



Review | [Full Access](#)

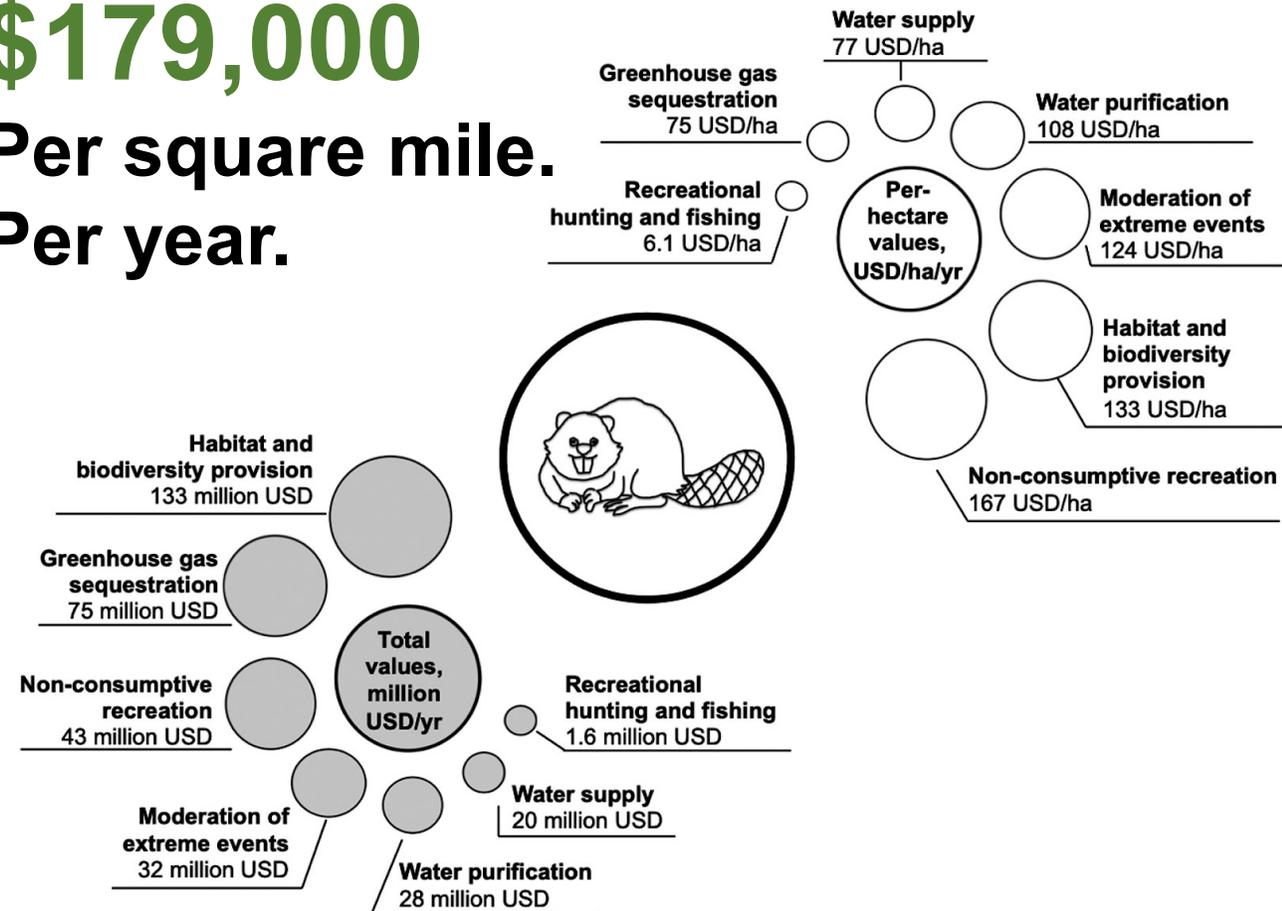
Ecosystem services provided by beavers *Castor* spp.

Stella Thompson , Mia Vehkaoja , Jani Pellikka , Petri Nummi 

First published: 01 October 2020 | <https://doi.org/10.1111/mam.12220>

Ecosystem service	Ecosystem service category	Number of value estimates
Moderation of extreme events (FloodDrought)	Regulating	11
Greenhouse gas sequestration (GHG)	Regulating	8
Water purification (Quality)	Regulating	26
Water supply (Supply)	Provisioning	6
Recreational hunting and fishing (HuntFish)	Provisioning	3
Habitat and biodiversity provision (HabBio)	Supporting	8
Nutrient cycling*	Supporting	0
Non-consumptive recreation (Recreation)	Cultural	17
Historical value*	Cultural	0

\$179,000
Per square mile.
Per year.



Water Quality is a Key Ecosystem Service



ELSEVIER

Science of The Total Environment

Volume 968, 10 March 2025, 178871



The impact of beaver dams on distribution of waterborne *Escherichia coli* and turbidity in an agricultural landscape

Hannah L. White ^a  , Rosie Fellows ^a, Luke Woodford ^a, [Michael J. Ormsby ^a](#),
[Ollie van Biervliet ^{b,c}](#), Alan Law ^a, Richard S. Quilliam ^a, Nigel J. Willby ^a

[Home](#) > [Wetlands Ecology and Management](#) > [Article](#)

Induced mobilization of stored metal precipitates from beaver (*Castor canadensis*) created wetlands on a mine drainage impacted stream

Original Paper | Published: 16 October 2021

Volume 30, pages 127–137, (2022) [Cite this article](#)

The impact of beaver impoundments on the water chemistry of two Appalachian streams

Authors: [Brian E Margolis](#), [Mark S Castro](#), and [Richard L Raesly](#) | [AUTHORS INFO & AFFILIATIONS](#)

Publication: Canadian Journal of Fisheries and Aquatic Sciences • November 2001 • <https://doi.org/10.1139/f01-166>

Biodiversity is a Key Ecosystem Service

Freshwater Biology / Volume 61, Issue 4 / p. 486-499

Original Article | [Full Access](#)

Habitat engineering by beaver benefits aquatic biodiversity and ecosystem processes in agricultural streams

Alan Law , Fiona McLean, Nigel J. Willby

First published: 11 February 2016

<https://doi.org/10.1111/fwb.12721>

Citations: 82

Freshwater Biology / Volume 58, Issue 7 / p. 1523-1538

Original Article | [Full Access](#)

Beaver dams maintain fish biodiversity by increasing habitat heterogeneity throughout a low-gradient stream network

Joseph M. Smith , Martha E. Mather

First published: 26 April 2013

<https://doi.org/10.1111/fwb.12153>

Citations: 55



Science of The Total Environment

Volume 950, 10 November 2024, 175166



Ecosystem engineers cause biodiversity spill-over: Beavers are associated with breeding bird assemblages on both wetlands and adjacent terrestrial habitats

Izabela Fedyń ^a, Wojciech Sobociński ^b, Sławomir Czyżowicz ^a,
Jakub Wyka ^a, Michał Ciach ^a  

North American Journal of Fisheries Management 40:427–445, 2020
© 2020 American Fisheries Society
ISSN: 0275-5947 print / 1548-8675 online
DOI: 10.1002/nafm.10422

ARTICLE

Effect of Beaver on Brook Trout Habitat in North Shore, Lake Superior, Streams

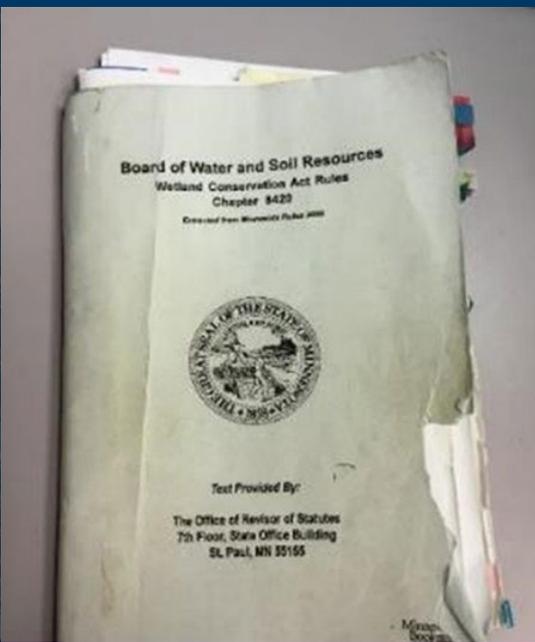
Kathryn M. Renik*  and Andrew W. Hafs

Aquatic Biology Program, Department of Biology, Bemidji State University, 1500 Birchmont Drive Northeast, Bemidji, Minnesota 56601, USA



efairfax@umn.edu





MN Wetland Conservation Act: 2024 Statutory Amendments and proposed rule changes

Wetland Conservation Act 201 Virtual Training - February 19

Agenda:

Overview of 2024 Statute Changes

Rule update

De minimis & utility exemptions

Wetland classification system

Definitions

Agricultural Exemption

Drainage exemption

<https://bwsr.state.mn.us/wca-rulemaking>

Amendments to WCA Statutes since the current rule was adopted (2009)

- 2011
- 2012
- 2015
- 2017
- **2024**

Some amendments require the completion of rulemaking before they become effective, others have been effective since passage.

We will discuss the 2024 amendments, most of which were effective August 1, 2024.

WCA Rulemaking

- Second preliminary draft rule on BWSR website
- Next steps:
 - Post to website
 - Solicit Comments, review, address
 - Final draft rule reviewed by BWSR Board
 - Notice in State Register, public comment, possible hearings, final publication in State Register (early 2026?)

BWSR website WCA Rulemaking page: <https://bwsr.state.mn.us/wca-rulemaking>



[Buffers](#) ▾

[Wetlands](#) ▾

[Easements](#) ▾

[Technical Resources](#) ▾

[Water Planning](#) ▾

[Operational Resources](#) ▾

[Grants](#) ▾

WETLAND REGULATORY PROGRAMS

[Wetlands Regulation in Minnesota](#)

[WCA Program Reports](#)

WETLAND CONSERVATION ACT RESOURCES

[Wetland Conservation Act Contacts](#)

[Joint Application Form](#)

[WCA Forms and Templates](#)

[WCA Program Guidance and Information](#)

MITIGATION & BANKING

[Wetland Bank Credits and Fees](#)

[Wetland Bank Transaction Forms](#)

[Wetland Bank Guidance and Information](#)

[Local Government Road Wetland Replacement Program](#)

[Wetland Bank & Mitigation Easements](#)

[In-Lieu Fee Mitigation Program](#)

[Agricultural Wetland Bank](#)

DELINEATION, ASSESSMENT & RESTORATION

[Wetland Delineation](#)

[Wetland Functional Assessment](#)

[Wetland Restoration](#)

MN WETLAND PROFESSIONAL CERTIFICATION PROGRAM

[Minnesota Wetland Professional Certification Program](#)

[Wetland Training Opportunities](#)

[Online Wetland Training](#)

SPECIAL PROJECTS

[Wetland Conservation Act Rulemaking](#)

[Wisconsin - Minnesota Wetland Functional Assessment Initiative](#)

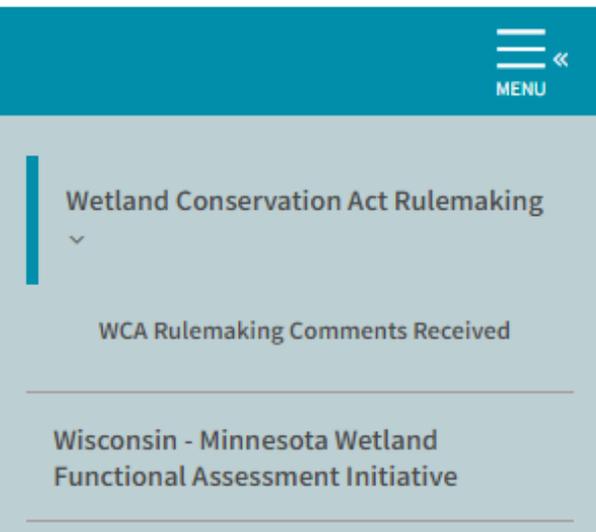
[404 Assumption](#)

[Minnesota Stream Quantification Tool and Debit Calculator](#)

[Waters of the U.S.](#)

- Includes link to State Register Request for Comments.
- Link to statute changes includes a written summary and narrated presentation.

Wetland Conservation Act Rulemaking



The screenshot shows a teal sidebar menu. At the top right is a 'MENU' icon with a double arrow. Below it, the text 'Wetland Conservation Act Rulemaking' is displayed with a downward arrow. Further down, 'WCA Rulemaking Comments Received' is listed. At the bottom, 'Wisconsin - Minnesota Wetland Functional Assessment Initiative' is visible.

The Minnesota Board of Water and Soil Resources (BWSR) is responsible for promulgation of the Wetland Conservation Act (WCA) Rules. The WCA Rules are codified in Minnesota Rules Chapter 8420 based on the standards and authorizations contained in state statute. WCA took effect with an interim program in 1992 and began operating under formally adopted rules in January 1994. The Legislature has passed numerous amendments to WCA since its original passage and the rules have undergone multiple revisions. The current WCA Rule was adopted in 2009 and multiple statute changes have occurred since adoption.

Rulemaking in Minnesota follows the procedures outlined in the Minnesota Administrative Procedure Act (APA), Minnesota Statutes, Chapter 14. BWSR staff utilize the [Minnesota Rulemaking Manual](#) as a procedural guide for WCA Rulemaking. The current WCA Rulemaking process was initiated in 2015 when an initial request for comments was published in the State Register. A supplemental request for comments was published on January 20, 2022.

Another supplemental request for comments based on the addition of 2024 statute changes was published in the **July 8, 2024 edition** of the [State Register](#).

This page contains information relating to WCA Rulemaking, WCA statutes, public comments, and stakeholder participation. See our page on the WCA statute changes related to this rulemaking [2011 – 2024 WCA Statute Changes](#) (link) including recent information on outreach associated with the 2024 statute changes.

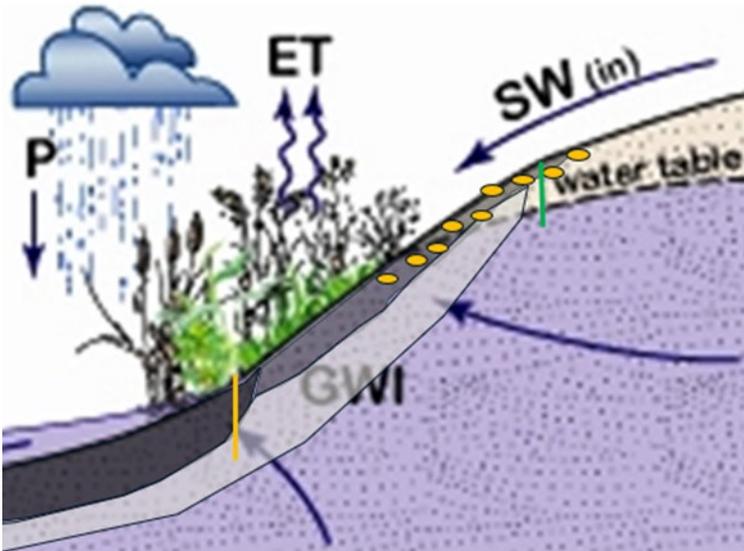
WCA Rulemaking

- Rule making efforts include:
 - Clarification of statute changes from 2024
 - Updating definitions to align with state changes
 - Removal of Circular 39 Type references
 - Tribal notification (for projects within tribal boundary)
 - Clarification of ag. exemptions
 - Banking and mitigation clarification on construction certification, monitoring period
 - Changes to BSAs to align with ecological zones (metro)
 - Enforcement language consistency

Change to the how “wetland type” is defined in MN Statute

Wetland type.

"Wetland type" means a wetland type classified according to *Wetlands of the United States*, United States Fish and Wildlife Service Circular 39 (1971 edition), ~~as summarized in this subdivision~~ or *A Hydrogeomorphic Classification for Wetlands, United States Army Corps of Engineers (August 1993), including updates, supplementary guidance, and replacements, if any, as determined by the board.*



HGM Class	Circular 39	Eggers & Reed	Cowardin Vegetation Class	Typical Water Regimes
Depression	1	Seasonally Flooded Basins	PEM- Emergent	Seasonally Flooded
Riverine	1	Floodplain Forests	PFO- Forested	Temporary Flooded
Depression Sloped	2	Sedge Meadows	PEM- Emergent	Saturated
Organic Flat				
Riverine Depression	2	Fresh (wet) Meadows	PEM- Emergent	Saturated
Mineral Flat				
Depression Sloped	2	Wet to Wet-Mesic Prairies	PEM- Emergent	Saturated
Depression Lacustrine Fringe	3	Shallow Marsh	PEM- Emergent	Semi permanently flooded (up to 6")
Depression Lacustrine Fringe	4	Deep Marsh	PEM- Emergent PAB-aquatic bed	Semi permanently to permanently flooded (6"-3')
Depression Lacustrine Fringe	5	Shallow, Open Water	PEM- Emergent PUB-Unconsolidated Bottom	Permanently flooded (up to 8.2')
Mineral Flat Sloped	6	Shrub-Carr	PSS- Scrub-shrub	All regimes except permanently flooded (Saturated most of growing season)
Mineral Flat Sloped	6	Alder Thicket	PSS- Scrub-shrub	All regimes except permanently flooded (Saturated most of growing season)
Mineral Flat Sloped	7	Hardwood Swamp	PFO- Forested	All regimes except permanently flooded (Saturated most of growing season)
Mineral Flat Organic Flat Sloped	7	Coniferous Swamp	PFO- Forested	All regimes except permanently flooded (Saturated most of growing season)
Organic Flat	8	Open Bog	PML- Moss-lichen	Saturated
Organic Flat	8	Coniferous Bog	PFO- Forested	Saturated

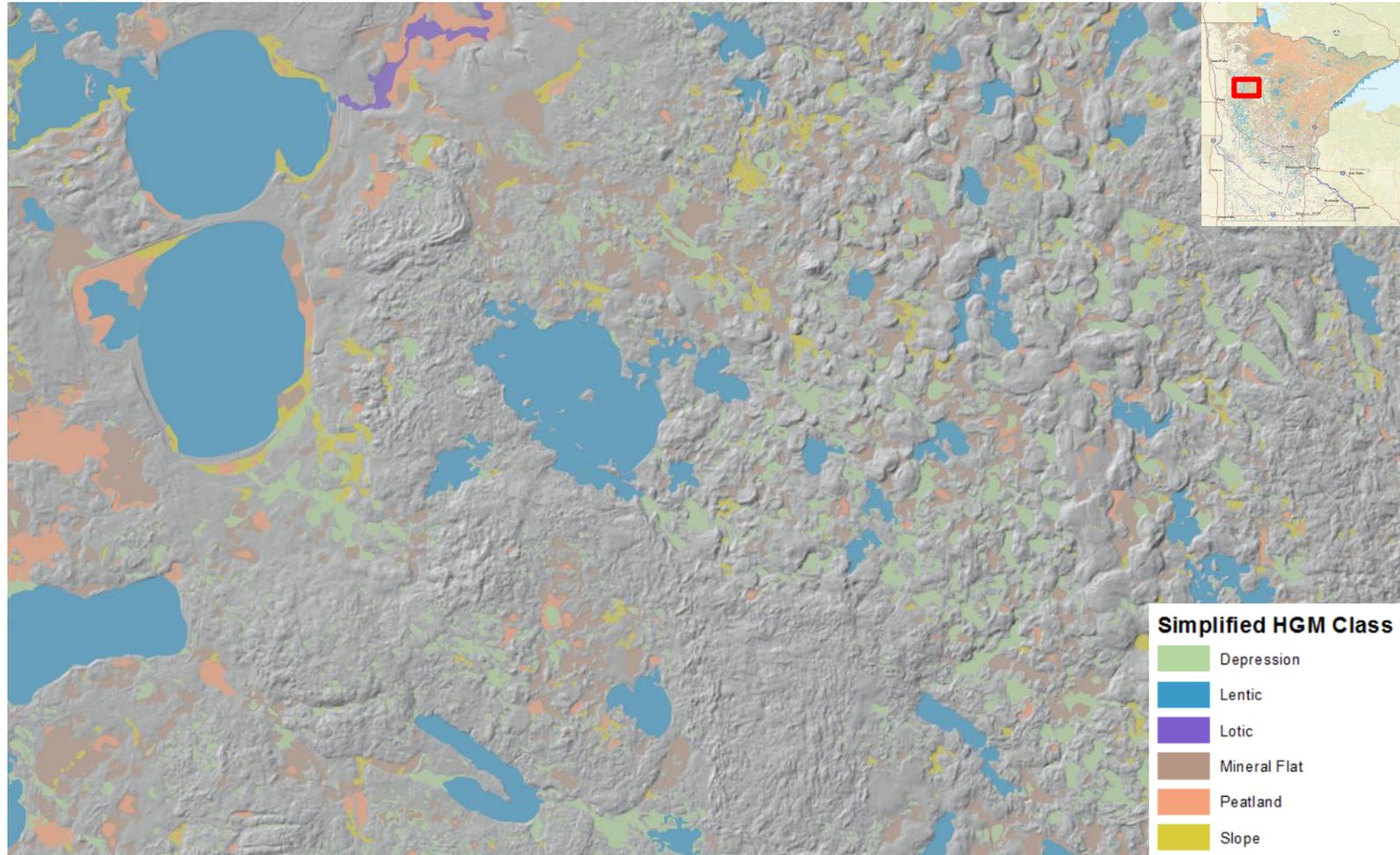
Hydrogeomorphic Method of Classifying Wetlands

Establishes classes based on geomorphology, hydrology and hydraulic functions of wetlands.

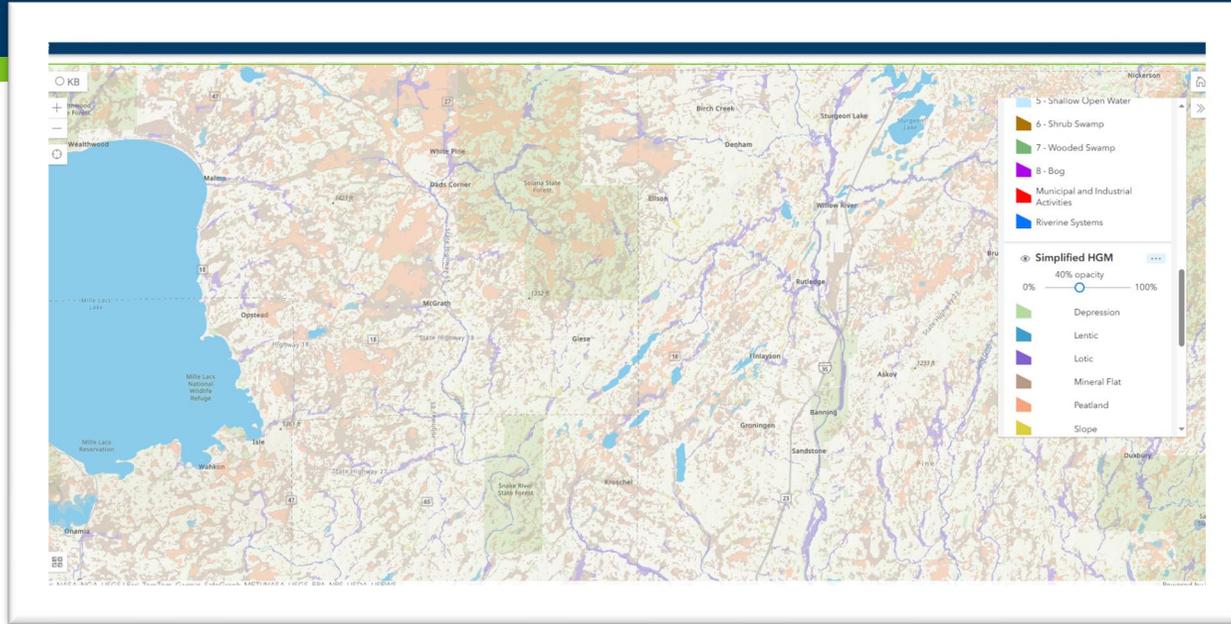
Classification Name	Definition
Lacustrine	Wetland occurs within a topographic depression that has a closed elevation contour that allows the accumulation of surface water and is restricted to the margin of a depressional lake basin.
Riverine	Wetland occurs on a nearly level landform and lies along and is influenced by flooding from a stream, river or flow-through ditch.
Slope	Wetland occurs on a slope (generally >2%) with groundwater discharge as its primary source of hydrology.
Mineral Flat	Wetland occurs on a nearly level landform, is not significantly influenced by flooding from a stream, river or flow-through ditch and has predominately mineral soils.
Organic Flat	Wetland occurs on a nearly level landform, is not significantly influenced by flooding from a stream, river or flow-through ditch and has predominately organic soils.
Depression	Wetland occurs within a topographic depression that has a closed elevation contour that allows the accumulation of surface water and is not associated with the margin of a depressional lake basin.

Parameters of HGM

- Geomorphology- landscape position
 - Where a wetland situated and the shape of the landscape
- Hydrology- water source and output
 - Why the wetland is there
- Hydraulics- hydrodynamics
 - What it does



How is HGM going to be used in MN?



- Wetland Type
- NWI (<https://wetland-finder.dnr.state.mn.us/>)
- Functional Assessment (new 2024)
- Guidance for Submitting Wetland Delineations in MN (requirements for HGM and Eggers and Reed only)

WI/MN Wetland Rapid Assessment Method User Guide

Version 1.0, July 2024

Assessment Area Information	
Assessment Information	
Assessor Details	
1 Site Name:	
2 Assessor Name:	
3 Date of Desktop Assessment:	8/6/2024
4 Date of Field Assessment:	8/6/2024
5 If delineated, file reference number (if known):	W-023
Location Details	
6 Nearest Town:	Duluth
7 County:	St Louis
8 State:	Minnesota
9 Latitude (decimal degrees):	46.841000
10 Longitude (decimal degrees):	-92.111000
11 PLSS, quarter/quarter section or tax lot(s) reference:	
12 Size of the Assessment Area (AA, in acres):	100.00
12.1 Size of the Assessment Area (AA, in square kilometers):	0.404686
13 Size of the catchment area draining into the AA (in acres):	350.00
14 The percentage equal to the AA divided by the Catchment Area?	28.6%
15 What is the dominant HGM class?	Riverine - Upper Perennial

Permanently and Semipermanently flooded areas

- 2009 Rule language:
- Subp. 51. **Permanently and semipermanently flooded area of a ~~type 3, 4, or 5~~ wetland.** "Permanently and semipermanently flooded area of a ~~type 3, 4, or 5~~ wetland" means the portion of a ~~type 3, 4, or 5~~ wetland below the level where the water has been maintained for a sufficient period of time to leave evidence upon the landscape, commonly the point where the natural vegetation changes from predominantly aquatic to predominantly terrestrial.



Permanently and Semipermanently flooded areas- Circular 39 & Eggers & Reed

Circular 39	Eggers & Reed
1	Seasonally Flooded Basins
1	Floodplain Forests
2	Sedge Meadows
2	Fresh (wet) Meadows
2	Wet to Wet-Mesic Prairies
2	Calcareous Fens
3	Shallow Marsh
4	Deep Marsh
5	Shallow, Open Water
6	Shrub-Carr
6	Alder Thicket
7	Hardwood Swamp
7	Coniferous Swamp
8	Open Bog
8	Coniferous Bog

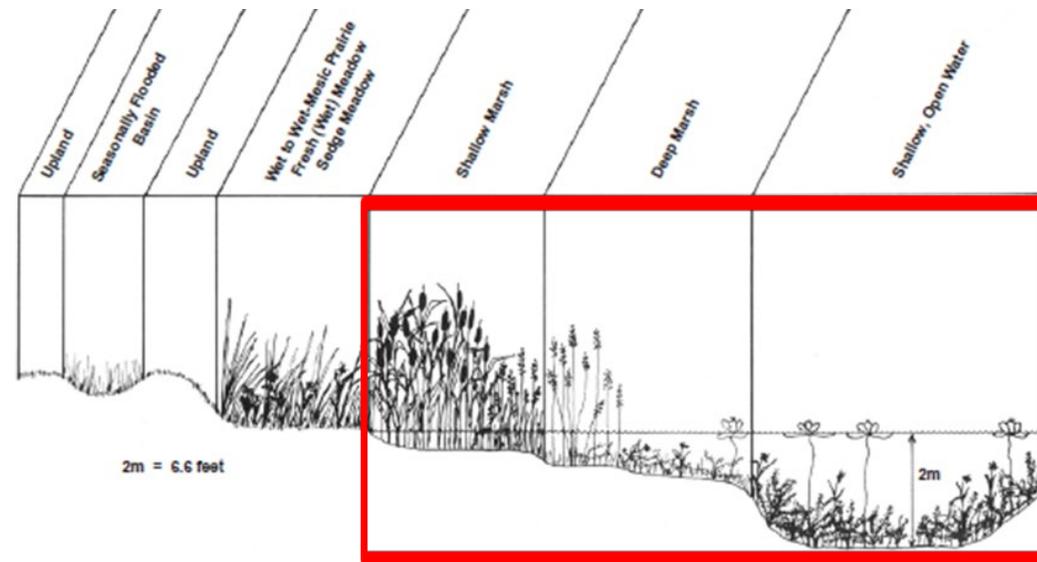
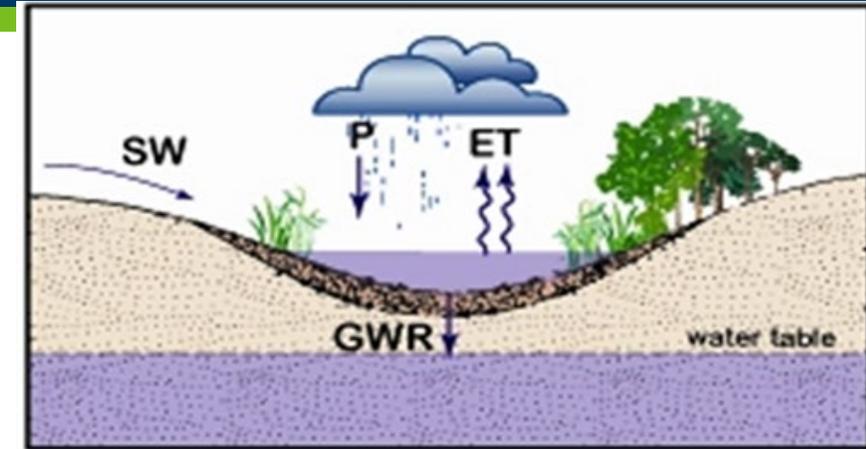


FIGURE 6 - Generalized Cross Section of a Meadow-Marsh-Open Water Complex

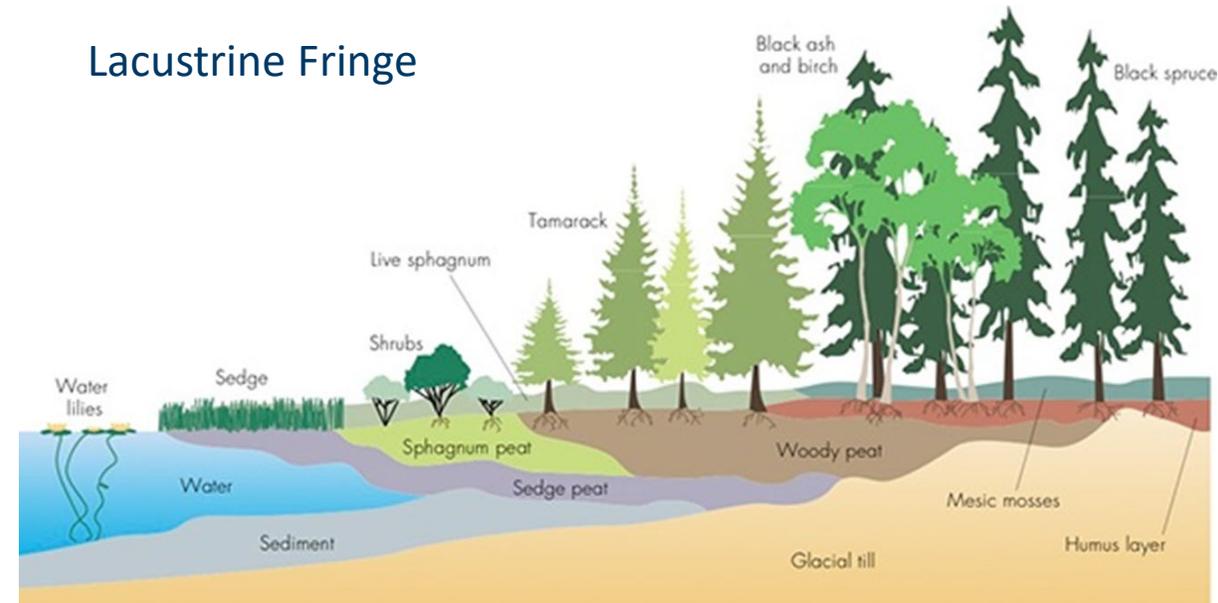
permanently and semipermanently flooded areas- Hydrogeomorphic Method

HGM Class	Typical Water Regimes
Mineral Flat	All regimes except permanently flooded (Saturated most of growing season)
Organic Flat	All regimes except permanently flooded (Saturated most of growing season)
Organic Flat	Saturated
Sloped	Saturated
Riverine	Temporary Flooded
Lacustrine Fringe	Semi permanently to permanently flooded (up to 8.2')
Depression	Seasonally Flooded
Depression	Saturated
Depression	Semi permanently flooded (up to 6")



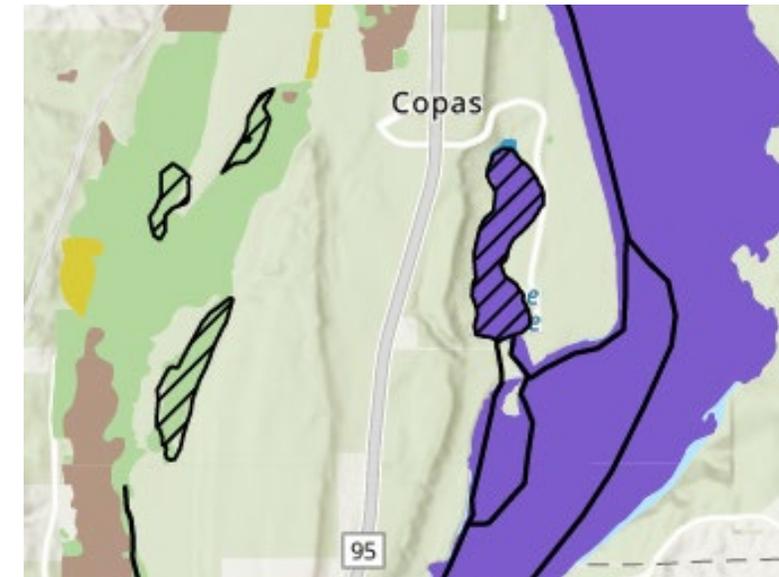
Surface Water - Depression

Lacustrine Fringe

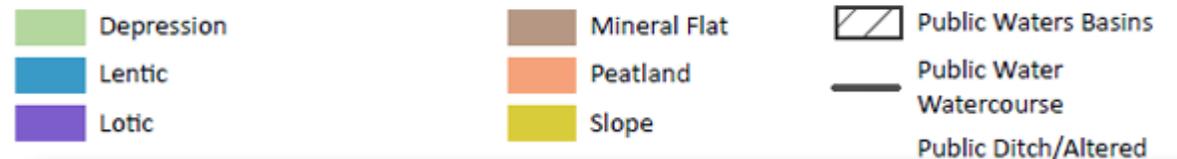


Non-PW Deepwater Habitats Now Regulated by WCA

- Water bodies that are too deep to be wetlands (generally >8.2 feet deep) and are not big enough to meet the criteria for Public Waters (>2.5 ac in metro, >10 ac non-metro) are now subject to WCA regulations.
- This change is **effective August 1**. Most of these water bodies include a fringe of wetland that was already regulated by WCA.



Simplified Hydrogeomorphic Classification



Deepwater Habitat



Deepwater aquatic habitats are areas that are permanently inundated at mean annual water depths >8.2 ft or permanently inundated areas less than or equal to 8.2 ft that do not support rooted-emergent or woody plant species

They have the follow diagnostic characteristics:

- 1) vegetation- no rooted-emergent or woody plant species are present in these permanently inundated areas
- 2) Soil- the substrate technically is not defined as a soil if the mean water depth is >8.2 ft or if it will not support rooted emergent or woody plants

Regulatory Authority for Non-PW Intermittent/Perennial Streams added to WCA

- BWSR can adopt rules that protect or mitigate impacts to watercourses that are upstream of Public Waters watercourses (drainage area >2 sq miles).
- This change is not effective until rules are adopted in a future rulemaking when the necessary resources and expertise are acquired to implement it.

Streams



De Minimis Exemption

WCA has a de minimis which exempts relatively small wetland impacts associated with a project. The threshold for this exemption varied by many factors. The exemption was changed as follows:

- Eliminated thresholds based on wetland “type” and location in the 11-county metro area.
- Clarifies that if project wetland impacts exceed the applicable de minimis threshold, all wetland impacts require replacement.
- Additional restrictions added to prevent dividing property to increase de minimis amounts.
- Eliminated previous restrictions related to the landowner's portion of the wetland and the cumulative area drained or filled since 1992.
- Thresholds were changed...

Exemptions – de minimis

- The de minimis exemption covers small impacts to wetlands typically used for driveways, culverts, small projects by landowners, etc.
- Very specific requirements depending on location in state, local area, shoreland, etc.

Table 1: Maximum de minimis exemption amounts for per MS 103G.2241 (Aug. 1, 2024)			
Impacts to wetlands, excluding permanent and semipermanently flooded areas of wetland.	Presettlement area of state	Impact area up to (acres):	Impact area up to: (square feet):
Outside of Shoreland Wetland Protection Zone	Greater than 80 percent area	One-quarter (1/4)	10,890
	50 to 80 percent area	One-tenth (1/10)	4,356
	Less than 50 percent area	One-twentieth (1/20)	2,178
Within Shoreland Protection Zone, but beyond structure setback	Statewide	N/A	100
Within Shoreland Protection Zone and structure setback	Statewide	N/A	20 ▲ (100)
Impacts to permanent and semipermanently flooded areas of wetlands	Statewide	N/A	400
▲ Increased amount shown in parenthesis may be allowed if wetland is isolated from the public water, or if permanent water runoff retention or infiltration measures are established in proximity to the impact and approved by the shoreland management authority.			

Utilities Exemption

- Previous exemption: impacts to wetlands resulting from the installation, maintenance, repair or replacement of utility lines meeting certain requirements including a 0.5-acre threshold.
- New exemption: requires that the project be authorized under a permit issued by the U.S. Army Corps of Engineers*. The 0.5-acre threshold was eliminated.

*How does the rescinded definition of WOTUS (continuous surface connection) per March 12, 2025 Corps/EPA memo effect? May limit Federal jurisdiction on more wetlands in MN.

Utility Exemption

- **Utilities MS 103G.2241**

A replacement plan for wetlands is not required for wetland impacts resulting from:

- new placement or maintenance, repair, enhancement, realignment, or replacement of existing utility or utility-type service, including pipelines, when wetland impacts are **authorized under and conducted in accordance** with a permit issued by the United States Army Corps of Engineers under section 404 of the federal Clean Water Act
- Repair and updating existing septic systems to comply with local, state and federal regulations



Agricultural Exemption

The following provisions were removed from the agricultural exemption:

- Agricultural activities impacting a wetland that was planted, in a crop rotation, or set aside program in six of the 10 years prior to 1991.
- Agricultural activities impacting a wetland on ag pastureland remaining in the same use (restricted to certain wetland types and sizes).

Ag Exemption

The following provisions were added to the agricultural exemption:

- Impacts to wetlands on agricultural land labeled as prior-converted cropland (PC) by the USDA Natural Resources Conservation Service (NRCS).
- Impacts to wetlands on agricultural land resulting from drainage *maintenance* activities authorized by NRCS were labeled as farmed wetland (FW), farmed-wetland pasture (FWP) or wetland (W).
- ❖ Labels must be identified on a “Certified” Wetland Determination.

Drainage Exemption

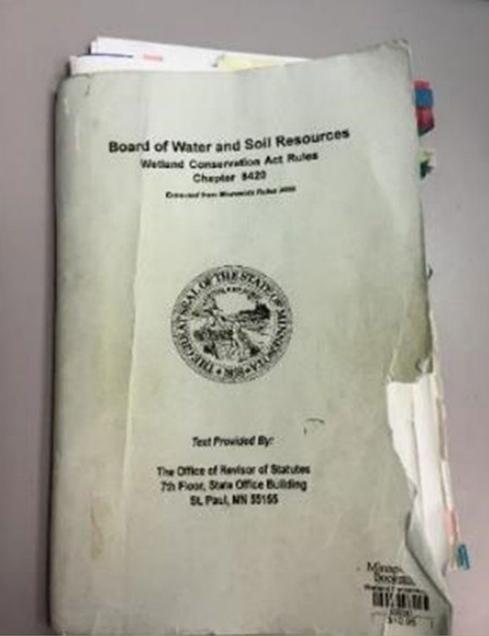
The following provisions were removed from the drainage exemption:

- Draining wetlands (certain type restrictions) in an unincorporated area on land that has been assessed drainage benefits for a public drainage system (with various requirements).
- Wetland impacts on lands that were planted with annually seeded crops, in a crop rotation, or set aside 8 of the last 10 most recent years.

Maintenance/Repair Provision

Now, the “public” drainage maintenance exemption is the same as the “private” drainage maintenance exemption.

- What remains the same for public systems:
 - ✓ Drainage maintenance that drains wetlands that have existed for 25 years or less is still exempt.
- What changed for public systems:
 - ✓ Now all wetlands that have existed for more than 25 years will need to be evaluated for potential impacts, not just types 3, 4, and 5.



2024 Wetland Conservation Act (WCA) Amendments: Agricultural Exemptions

2024 WCA Statute Changes

Significant Amendments to Ag-Related Exemptions

Removed from Statute:

- X “6 of 10 prior to 1991”
- X Pasture land exemption
- X “8 of 10”
- X Drainage exemption for unincorporated land assessed drainage benefits

Added to Statute:

- ✓ “Prior Converted Cropland” (PC)
- ✓ NRCS authorized maintenance

2024 WCA Statute Changes

The New Agricultural Exemption

Replacement plan is not required for:

- impacts to wetlands on agricultural land labeled prior converted (PC) cropland and “PC”
- impacts to wetlands resulting from drainage maintenance activities authorized by the Natural Resources Conservation Service, on areas labeled farmed wetland, farmed-wetland pasture, and wetland “Maintenance”

The prior converted cropland, farmed wetland, farmed-wetland pasture, or wetland must be labeled on a valid final certified wetland determination issued by the Natural Resources Conservation Service. Applicable to both

Landowner is responsible to provide a copy of the final certified wetland determination (026 and CWD map) to, and allow the Natural Resources Conservation Service to share related information with, the local government unit and the board for purposes of verification;

Guidance/Clarifying Rule Provisions

- Documentation requirements when LGU requires verification
- Landowner burden of proof
- Qualification criteria for Prior Converted Cropland (PC)
- Prohibition on impacts to other wetlands from drainage maintenance activities on FW/FWP/W that involve relocation of any part of the system
- Ag Drainage Maintenance Exemption – What is “authorized”?

Agricultural Exemption – Administration and Applicability

- Not a joint program (WCA/Farm Program) exemption.
- Current or past farm program participation not required.

Agricultural Exemption – Applicable Labels



Imagery Year: 2021

Legend

- Not Evaluated
- PC/NW
- W

T106 R23 S1
Waseca County

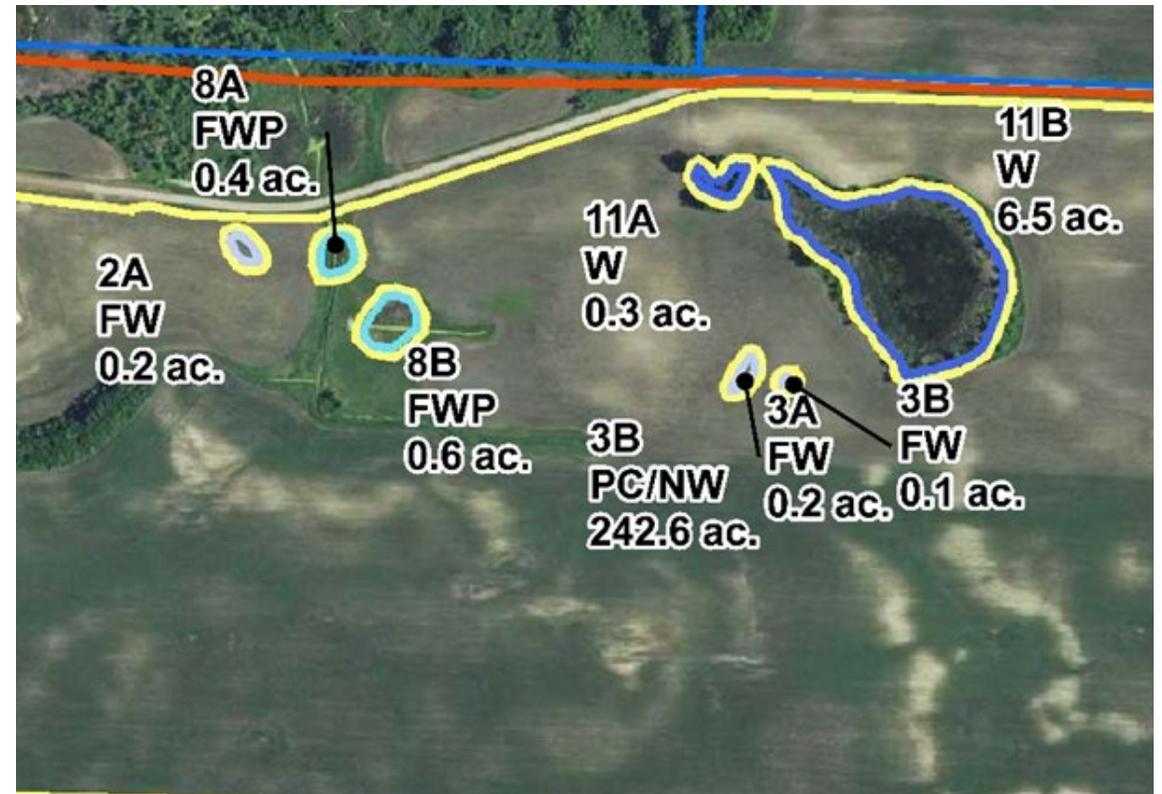
1:5,400 1 inch = 450 feet

Feet

225 12.5 0 225 450



This certified wetland determination/delineation has been conducted for the purpose of implementing the wetland conservation provisions of the Food Security Act of 1985. This determination/delineation may not be valid for identifying the extent of the Corps of Engineers' (COE) Clean Water Act jurisdiction for this site. Other federal, state or local permits or restrictions may apply to activities impacting wetlands. Contact the US Fish and Wildlife Service for information concerning conservation easements. Contact the Local Governmental Unit (LGU) for State Wetland Conservation Act permits and Minnesota Department of Natural Resources for protected water permits prior to initiating wetland activities by completing the "Minnesota Joint Project Notification Form" available from the LGU.





Certified Wetland Determination

Customer: John Doe

Tract: 4120

5/2/2023

Wetland (WCA)
labeled PC

Field 1
PC
139.7 ac.

8
PC/NW
2.5 ac.

T105 R22 S9 Example Twp
Example County

2021 Imagery

1:4,800 1 inch = 400 feet
400 200 0 400 Feet



This certified wetland determination has been conducted for the purpose of implementing the wetland conservation provisions of the Food Security Act of 1985. This determination may not be valid for identifying the extent of the Corps of Engineers (COE) Clean Water Act jurisdiction for this site. Other federal, state or local permits or restrictions may apply to activities impacting wetlands. Contact the US Fish and Wildlife Service for information concerning conservation assessments. Contact the Local Governmental Unit (LGU) for State Wetland Conservation Act permits and Minnesota Department of Natural Resources for protected water permits prior to initiating wetland activities by completing the "Minnesota Joint Project Notification Form" available from the LGU.

PC

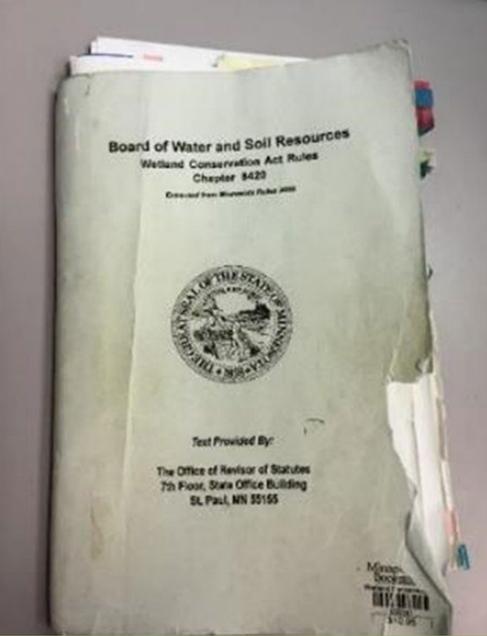
Example – PC Exemption

Context:

- ✓ Valid, final CWD w/label of PC.
- ✓ Wetland is on agricultural land.
- ✓ No adjacent wetlands.

Outcome:

- All impacts to Field 1 (PC) are exempt.



Provision 2: FW, FWP and W Maintenance Exemption Implementation

“...impacts to wetlands resulting from drainage maintenance activities authorized by [NRCS] on areas labeled farmed wetland, farmed-wetland pasture, and wetland.”

What is “maintenance” under the USDA’s WC Provisions?

- Based on effect.
- May involve system reconfiguration and/or relocation.
- Disabling and replacement or clean out to same size, same depth, etc., generally qualifies as maintenance.
- Activity is not limited to original specifications.
- May compensate for additional inputs that have occurred over time.
- A project that exceeds the best resulting conditions of the pre-85 drainage manipulation is generally not maintenance.

WCA Ag Drainage Maintenance Exemption Key Considerations

- Occurs to (not necessarily on) areas labeled W, FW, or FWP.
- Must be authorized under NRCS' Wetland Conservation (WC) provisions.
- May result in impacts to other wetlands (other labels, unlabeled wetlands, wetlands on non-agricultural land, etc.)

WCA Ag Drainage Maintenance Exemption Requirements for Verification

The landowner must provide either:

- A. specific written confirmation from NRCS that the activity is authorized under the WC Provisions, OR
- “Specific”: NRCS evaluated the same activity, with the same specifications, at the same location.

WCA Ag Drainage Maintenance Exemption Requirements for Verification

- B. documentation sufficient to demonstrate that the maintenance activity does not exceed the hydrologic conditions
- resulting from drainage manipulations that occurred anytime prior to December 23, 1985, and,
 - that exist during the wet portion of the growing season during normal climatic conditions.

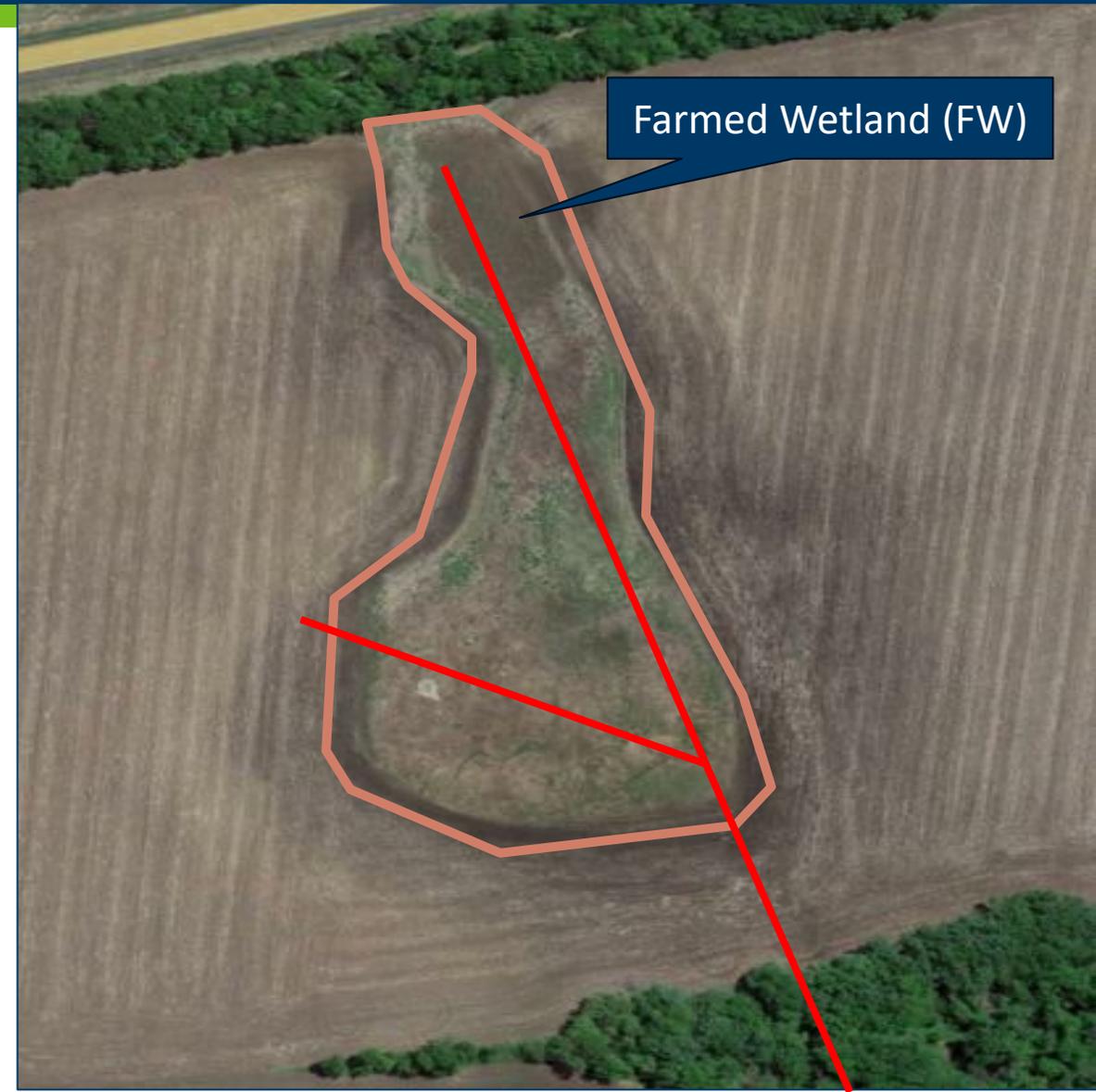
Drainage Maintenance Example – Tile Replacement

Context:

- CWD of **FW**.
- Existing tile to be disabled and replaced using same characteristics as existing system.
- Verification: As-built documentation provided.
- Proposal matches existing system capacity/effect.

Outcome:

- ✓ Impacts are exempt.



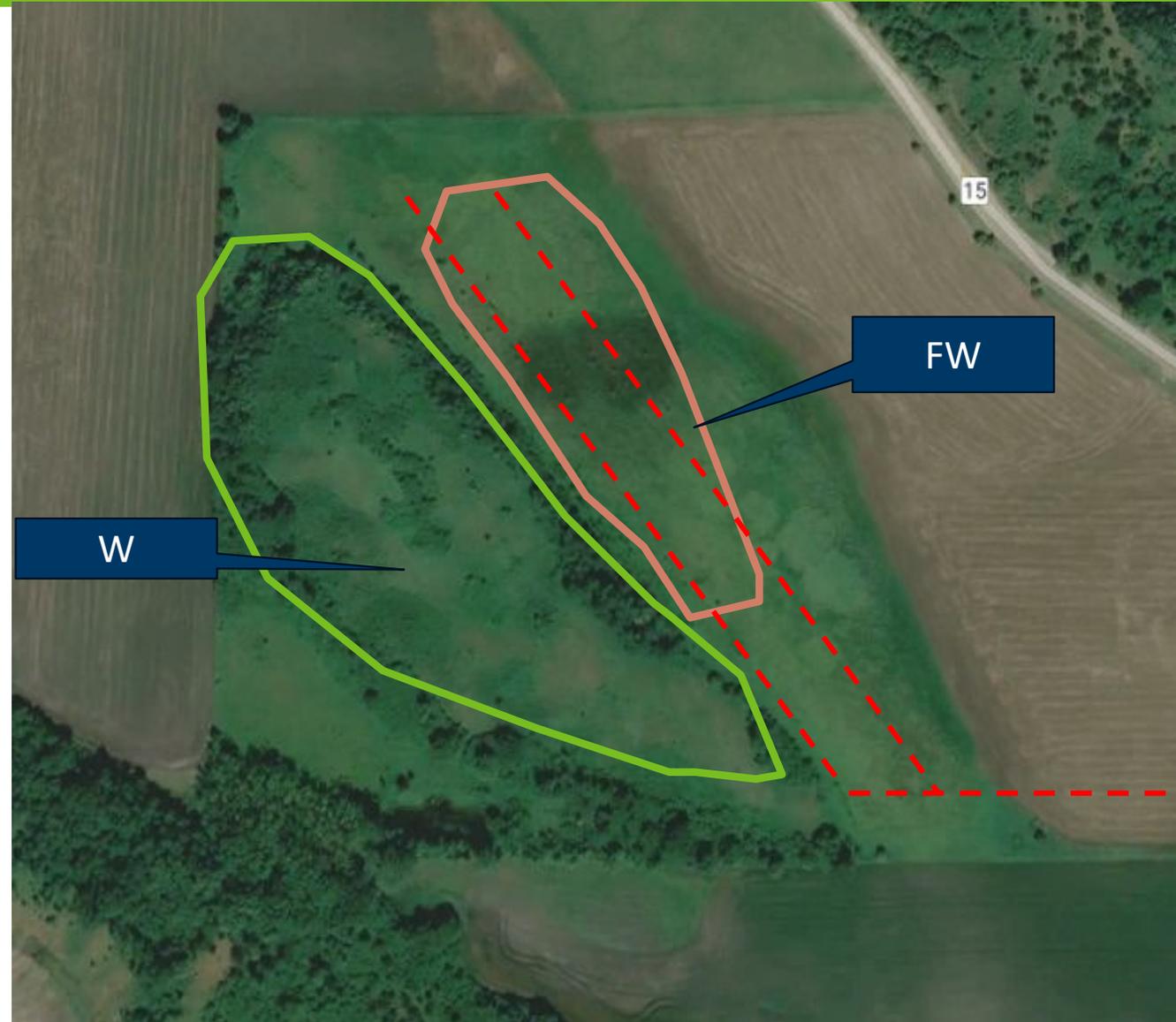
Drainage Maintenance Example – Clearly Improved Scope and Effect

Context:

- CWD of **W** and **FW**.
- Existing tile (**red**) in FW replaced at same location and spacing; diameter increased by 2", depth by 2'.
- As-built documentation provided.

Outcome:

- ✗ Exceeds maintenance on the FW, AND
- ✗ Effects to other wetland (W) not exempt under agricultural exemption because activity in FW does not qualify as maintenance.



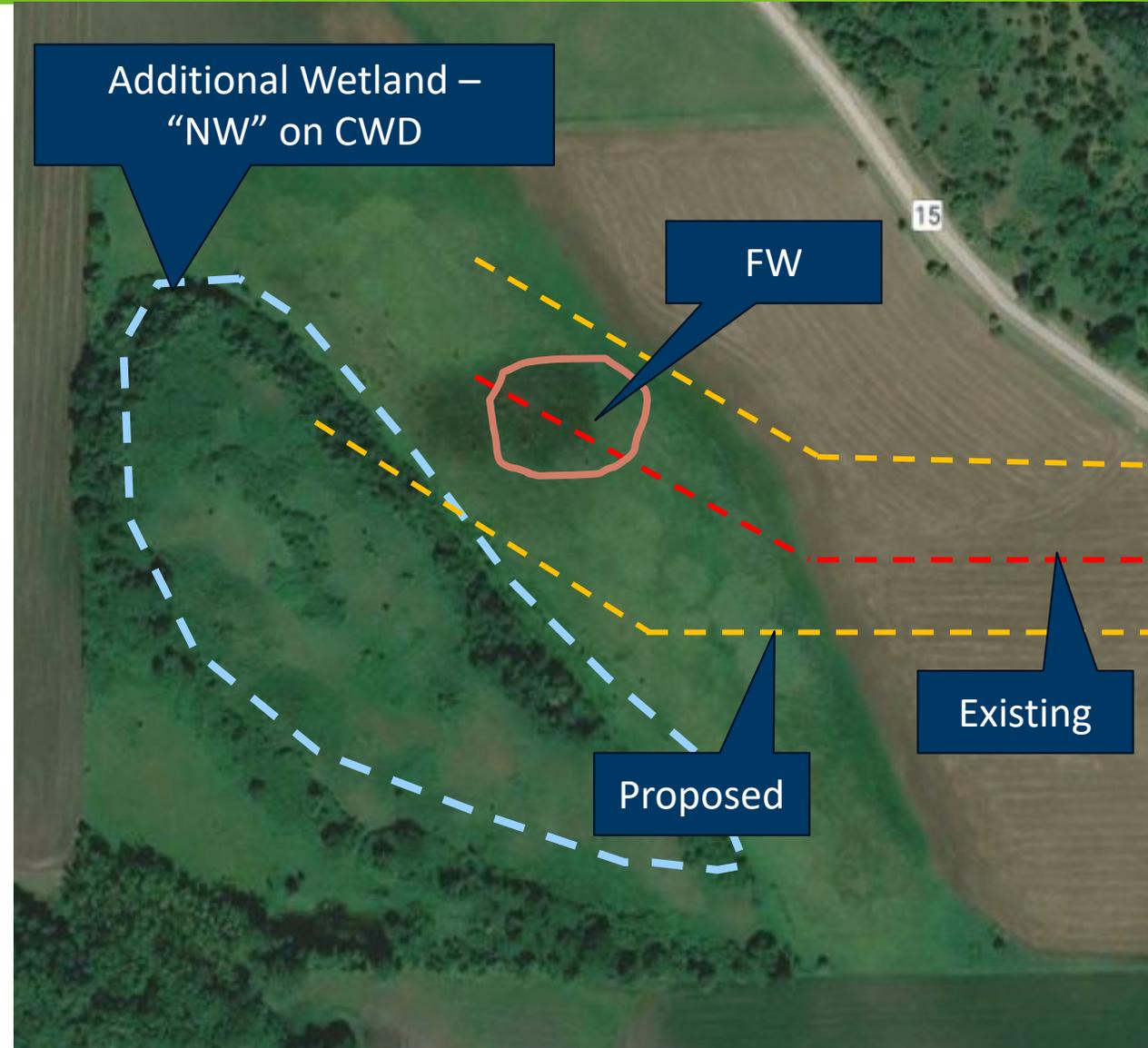
Drainage Maintenance Example – Other Wetlands/Tile Relocation

Context:

- CWD of **FW** with remainder of area “NW”.
- Additional wetland exists on “NW” area.
- Existing (**red**) tile in FW to be replaced (**yellow**) by relocation, at increased diameter and depth.
- NRCS-authorized maintenance on FW.
- No other exemption applies to additional (NW) wetland.

Outcome:

- ✗ Impacts to other wetland result from relocation.
- ✗ Impacts to other wetland are not exempt.
- △ Impacts to the other wetland would have been exempt if original tile had been replaced in-place.



2024 WCA Statute Changes

Significant Amendments to Drainage Exemption

Removed from Statute:

- X Wetland type for eligibility
- X Public Vs. Private Drainage
- X “8 of 10 most recent years” removed

Added to Statute:

- ✓ Clarifies repairs completed by public drainage authorities to prevent wetland drainage only apply to **public systems**

New Statute Language

Subd. 3. Drainage.

- (a) A replacement plan is not required for draining or filling of wetlands, except for draining wetlands that have been **in existence for more than 25 years**, resulting from maintenance and repair of existing drainage systems, including public drainage systems.
- (b) A public drainage authority may, as part of the repair of a **public drainage system**, as defined in section 103E.005, subdivision 12, install control structures, realign the ditch, construct dikes along the ditch, or make other modifications as necessary to prevent the drainage of wetlands.

Sec. 80. Minnesota Statutes 2022, section 103G.2241, subdivision 2, is amended to read:

Subd. 2. Drainage. (a) For the purposes of this subdivision, "public drainage system" means a drainage system as defined in section 103E.005, subdivision 12, and any ditch or tile lawfully connected to the drainage system.

(b) A replacement plan is not required for draining of type 1 wetlands, or up to five acres of type 2 or 6 wetlands, in an unincorporated area on land that has been assessed drainage benefits for a public drainage system, provided that:

(1) during the 20-year period that ended January 1, 1992:

(i) there was an expenditure made from the drainage system account for the public drainage system;

(ii) the public drainage system was repaired or maintained as approved by the drainage authority; or

(iii) no repair or maintenance of the public drainage system was required under section 103E.705, subdivision 1, as determined by the public drainage authority; and

(2) the wetlands are not drained for conversion to:

(i) platted lots;

(ii) planned unit, commercial, or industrial developments; or

(iii) any development with more than one residential unit per 40 acres, except for parcels subject to local zoning standards that allow for family members to establish an additional residence on the same 40 acres.

If wetlands drained under this paragraph are converted to uses prohibited under clause (2) during the ten-year period following drainage, the wetlands must be replaced under section 103G.222.

(c) A replacement plan is not required for draining or filling of wetlands, except for draining types 3, 4, and 5 wetlands that have been in existence for more than 25 years, resulting from maintenance and repair of existing public drainage systems.

(d) (a) A replacement plan is not required for draining or filling of wetlands, except for draining wetlands that have been in existence for more than 25 years, resulting from maintenance and repair of existing drainage systems other than, including public drainage systems.

(e) A replacement plan is not required for draining agricultural land that:

(1) was planted with annually seeded crops before July 5, except for crops that are normally planted after that date, in eight out of the ten most recent years prior to the impact;

(2) was in a crop rotation seeding of pasture grass, cover crop, or legumes, or was fallow for a crop production purpose, in eight out of the ten most recent years prior to the impact; or

(3) was enrolled in a state or federal land conservation program and met the requirements of clause (1) or (2) before enrollment.

(f) The (b) A public drainage authority may, as part of the repair of a public drainage system, as defined in section 103E.005, subdivision 12, install control structures, realign the ditch, construct dikes along the ditch, or make other modifications as necessary to prevent the drainage of the wetland wetlands.

(g) Wetlands of all types that would be drained as a part of a public drainage repair project are eligible for the permanent wetlands preserve under section 103F.516. The board shall give priority to acquisition of easements on types 3, 4, and 5 wetlands that have been in existence for more than 25 years on

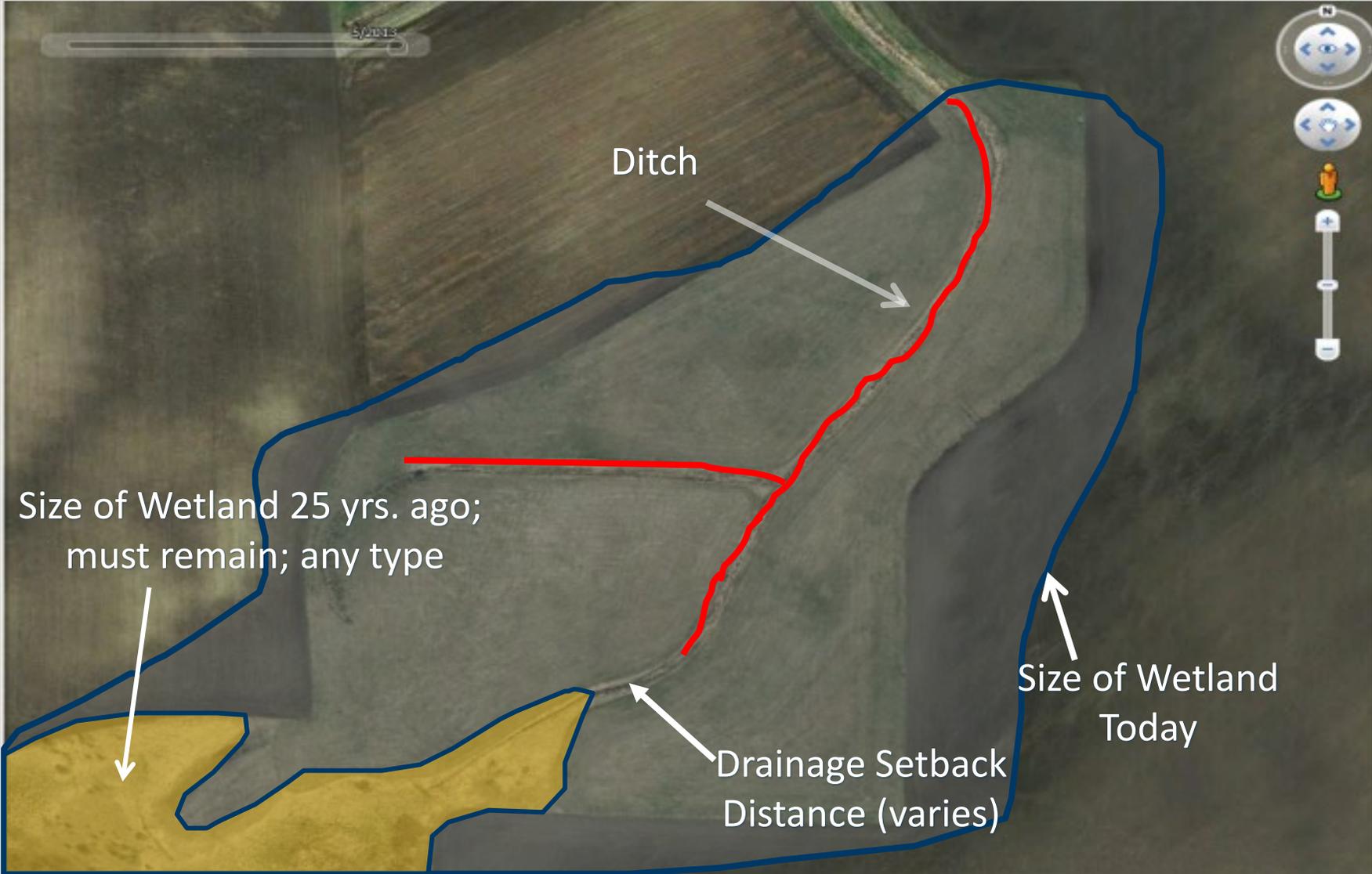
Ditch Maintenance

CONDITIONS:

- Spoil must be placed and stabilized to minimize impacts.
 - remove
 - place on existing spoil
 - incorporate
 - side cast (new fill)
- Ditch must be stable and not degrade water quality downstream.



Drainage/Ditch Maintenance Illustration





Questions?