

## **House Committee on Natural Resources, Fish & Wildlife**

River Corridor testimony regarding H.120 – April 15, 2021

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Good morning, Chair Sheldon and Committee members for the opportunity to provide testimony today. For the record, my name is Lauren Oates and I am the Climate & Energy Policy Manager at The Nature Conservancy in Vermont. Though here in my official TNC capacity, I did want to note that prior to joining TNC in 2019, I worked for the State of Vermont on flood resilience and climate adaptation and I have also been appointed by the Senate to the Vermont Climate Council to provide expertise in natural hazard resilience.

Before I jump into river corridors, I want to first note that TNC endorses the incorporation of the ecosystem protection considerations in our state land use laws, recognizing the societal, economic, and natural benefits healthy ecosystems convey to both our natural and human communities. TNC also endorses revising our state land use laws to directly address climate change mitigation and adaptation, and are glad to see each explicitly called out in H.120.

As one of our most significant ecosystems, I'll start our discussion on River Corridors with a very shallow dive into river science and fluvial geomorphology. I'll then discuss a few of the ecosystem services our river corridors provide and close with a quick summary of our current regulatory authority of river corridors and the need to enhance them.

Healthy, natural river systems provide a suite of ecological services that benefit both people and nature – from transport of rainwater and snowmelt to the provision of safe drinking water, recreational opportunities, and spiritual connection. Intact rivers have ready access to their floodplains to disperse energy and the space to meander to slow velocity and reduce erosion during high precipitation or significant snowmelt events. In contrast, managed, highly-channelized rivers have high banks that render rivers unable to release their energy, unless or until they cut a new course at high velocity, often damaging or destroying built infrastructure on their new path.

Rivers naturally meander, especially in locations as topographically diverse as Vermont. By creating that trademark curving path, a river lengthens its distance and subsequently decreases its slope, just as a switchback on a hiking trail reduces slope and lengthens the trail. This natural river meandering reduces erosive energy, as does natural vegetation on our rivers' banks, which again those banks need to be – and in their natural state they are – low for ease of floodplain access.

The simplest way to understand the difference between floodplains and river corridors is that floodplains represent the areas where rivers rise and fall vertically (think y-axis) while river corridors represent the potential meandering path from side to side horizontally (think x-axis). Flooding of the floodplain is called inundation flooding, while flooding of a river corridor is called fluvial erosion flooding.

For mapping purposes, we typically use FEMA's mapped Special Flood Hazard Area to delineate those areas subject to a 1% chance annual flood, while we use DEC's river corridor mapping to help us understand where a river may meander. Both mapping layers are available on the ANR Natural Resources Atlas for public use. Based on my experience with and exposure to the DEC river corridor mapping process, which currently includes provisions for river corridor map amendment. Act 250 projects in river corridors get a site visit from a DEC River Scientist to verify accuracy of river corridor mapping. The DEC Act 250 procedure – as well as the Flood Hazard Area & River Corridor rule – allow for infill/redevelopment for existing settlements, and it has been my experience that parcel scale determinations by DEC Rivers incorporate considerations of local/site-based

geology and often result in projects moving forward. I would strongly recommend the committee bring in Rob Evans, the State's Rivers Program Manager.

River corridors convey a whole suite of ecosystems services, and are critical to flood resilience, water quality, and fish and wildlife habitat.

#### **Flood resilience:**

- On the near 10-year anniversary of Tropical Storm Irene, it is important to note that the storm cause caused nearly three-quarters of a billion dollars in damages statewide, with over 70% attributed to fluvial erosion.
- Compiled data over several decades' worth of flooding events estimate that 75% of flood damages in Vermont come from fluvial erosion, not inundation flooding.
- This should not come as a surprise, as we have dramatically modified our rivers since European settlement. River dredging has disconnected them from their floodplains, river straightening has increased their slope, and river armoring has prevented them from course correcting. These changes have impeded the ability of our rivers to meander naturally and dissipate their energy and sediment.
- Further, our historic development patterns in our valleys and alongside our rivers has expanded these modifications, exacerbating fluvial erosion and consequently putting our communities at heightened risk.
- As climate models predict more frequent, more severe precipitation events, our river corridors are more vulnerable than ever to significant erosion and as a result, our communities more vulnerable to rivers cutting a new course through our villages and along our roads.
- Finally, decreases in native biodiversity and increases in invasive species have compounding impacts to our riparian vegetation, with shallower roots unable to hold the soil more securely on the banks during these severe precipitation events.

#### **Water quality:**

- The fluvial erosion resulting from the aforementioned modifications to our rivers significantly impacts water quality, too.
- Increased erosion events lead to increased sediment deposition and nutrient delivery into our lakes and ponds, increasing cyanobacteria (blue-green algae) blooms and impacting drinking water.
- Increased development in or near our river corridors leads to reduced pervious surfaces for water saturation, decreasing groundwater resources and increasing stormwater runoff which further declines our water quality.

#### **Fish & Wildlife Habitat**

- These erosive events and declined water quality directly impact Vermont's native fish and wildlife habitat, which are abundant in intact river systems.
- Erosive forces can scour river bottom habitats in some areas while increasing sediment deposition in others, both of which reduce availability and quality of habitat for stream insects that are key to the aquatic food chain and can impact populations of fish and other wildlife that depend on them, and also directly reduce viable habitat for fish and other aquatic wildlife.
- Decreased riparian vegetation reduces shade coverage from our rivers, increasing water temperatures resulting in significantly reduced fish habitat, which disrupts the natural ecosystem, food chains and native biodiversity.

Beyond these ecosystem services, there is also a significant economic value of our river corridors. For example, protection of our river corridors has an at-least \$7 to \$1 return on investment in avoided flood damages, and a

2018 Vermont Trust for Public Land report on State Conservation found that for every \$1 invested in conservation, \$9 in economic value in natural goods and services can be realized.

The State's Flood Ready Vermont website shows that approximately 50 of our towns have adopted river corridor protection bylaws, and about half of them are considered "early adopters", adopting partial river corridor protection standards that only protect major river corridors and, at most, a few tributaries. That leaves 5% of Vermont's towns covered by full municipal river corridor regulations. Even with those regulations, we are still seeing development in our river corridors. In 2017, a TNC and Conservation Law Foundation-funded graduate student researched the differences in development in river corridors and floodplains between towns that had adopted river corridor protection bylaws and those that had not. The student found that even though there was a significant decrease in development in the river corridors and floodplains in towns with municipal river corridor regulations, development still occurred. Reviewing the 2011-2016 timeframe, the student found that 133 new structures were built in those towns without river corridor bylaws whereas 66 new structures were developed in those towns with protections. And given general confusion over inundation vs. fluvial erosion flooding, and the fact that FEMA does not recognize the latter through its NFIP, enhanced river corridor regulation is rendered even more critical for achieving flood resilience.

Currently, our floodplains and river corridors are regulated through a patchwork of regulatory jurisdictions: municipal land use regulations, Act 250 and the DEC Flood Hazard Area & River Corridor Rule, the latter of which only regulates activities exempt from municipal regulation (e.g. State-owned buildings/facilities, Required Agricultural Practices, and Section 248/Public Utility Commission energy projects). Each of these jurisdictions falls short on protecting our floodplains and river corridors.

And while TNC and the broader river management and restoration community are working to restore our rivers and mitigate further degradation, these efforts are not sufficient at the scale necessary to achieve healthy, intact river systems and the vital benefits they can provide for people and nature.

In order to protect these valuable ecosystem services, we must have broad, undeveloped river corridors in Vermont. We need to give them the space to flood, meander and move over time. In order to do this at scale, we need enhanced regulatory mechanisms to steer development away from currently undeveloped river corridors and ensure any additional development in already-developed areas of our river corridors does not exacerbate flooding and fluvial erosion.

Thank you.

Lauren Oates

