

I'd like to talk about Vermont's aquatic resources, some TNC science to help guide investments we make in protecting and restoring those resources.

Vermont's freshwater resources

VT has more aquatic species than any other New England state

Threats

Barriers to movement (dams, culverts)

Poor river management and development

Nonpoint source pollution

Invasive Species

Climate change



We have many species in the Lake Champlain Basin and nowhere else in VT or New England, from lake sturgeon, stone cats and redhorses (all fish), to pink heelsplitters and pocketbook mussels. In the CT River basin we have one of 2 strongholds for the globally endangered Dwarf Wedge mussel, and we are improving fish passage for migratory fish up and down the hydrodams of the CT R watershed for species like American shad. Vermont and northern New England are strongholds for brook trout, once common throughout eastern North America but declining to the south of us.

Threats. Our wild populations are well managed. But it takes all players to make the improvements needed: public agencies, private land trusts, small watershed groups, the Lake Champlain Committee, the VT River Conservancy and the CT River Conservancy, and the private sector consulting ecologists and engineers who assess and design restoration projects. We don't overharvest the way we used to, taking walleye and salmon right off their spawning grounds in big nets, or harvesting mussels to make buttons from their shells. But some of our past actions need mitigation now, and the overarching threat of climate change makes it all the more urgent, because our aquatic populations will be even more stressed.



The Nature Conservancy has developed some science-based tools to help prioritize investments in freshwater resources. Funding is always limited, and we design our tools to be shared widely with others.

Dam Screening Tools: Just like terrestrial wildlife, aquatic animals need to move to thrive—for feeding, breeding, dispersal of young and places to escape the heat of the summer, which causes low oxygen and can be fatal if animals can't move around to a colder habitat. We have assessed most of Vermont's 1,000 known dams for their ecological impact, and prioritized them for removal based on the potential to improve our rivers. We are certain that at least 200 of these dams have no useful purpose; we call them "deadbeat dams." And this is an under-estimate. We actively work with partners on high priority dam removals.



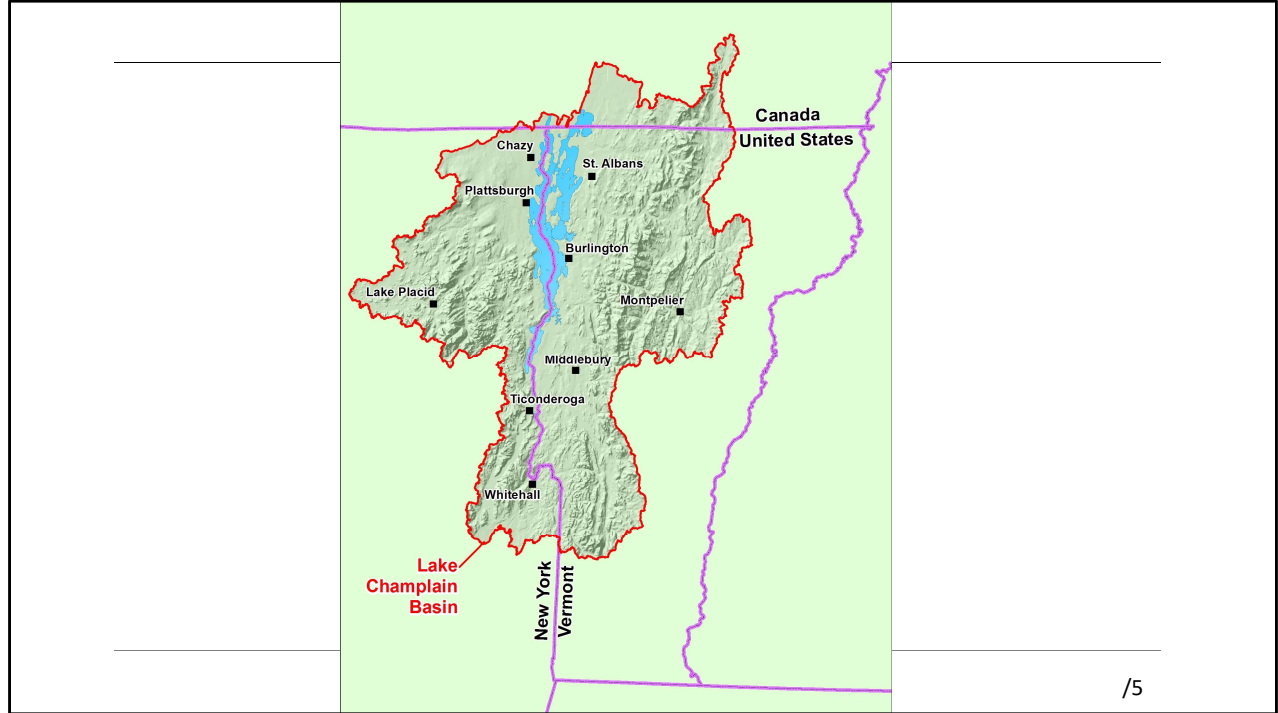
Nature-based Solutions

The use of Nature for tackling environmental and societal challenges

Nature-based solutions deliver **ecosystem services** to people and communities

Why am I showing you a tree when I'm supposed to be talking about water? What happens on the land affects the water. TNC is pursuing an approach called Nature Based Solutions, the use of Nature for tackling current challenges. NBS provide ecosystem services to our lives such as clean water, clean air, reduced flooding, wildlife habitat, attractive scenery and places to recreate.

Forests and Wetlands are Natural Capital: the "living systems on which we depend for survival" Like money in the bank, we can live off the interest...as long as we don't dip into the principal, the forests and wetlands of our state.



What happens on the land, doesn't stay on the land. It ends up in the water. Lake Champlain's watershed is **18 times** larger than the area of the lake. In the VT portion of the Lake Champlain Basin, all the phosphorus, sediments and other pollutants wash off the land into a relatively small lake, and climate change will bring warming temperatures, and more severe droughts and flooding.



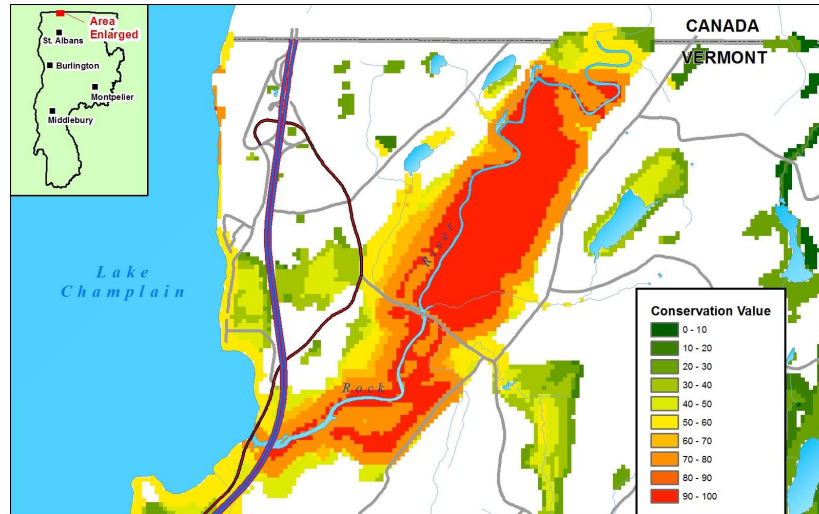
TNC has created a tool, called the Water Quality Blueprint, to help us prioritize where we would restore the land to benefit the water. This investment in land restoration is a nature-based solution.

The goal of the blueprint is an accessible tool that helps people conserve and restore areas that provide the most benefit to both water quality and conservation goals.

It is a prioritization of floodplains and other river, lake, and wetland-related areas for conservation and water quality value. So, by restoring and protecting critical land areas, we serve our ultimate goal of improving water quality.

And we wanted to provide a solution not just for TNC, but for the many others doing this kind of work.

Rock River wetlands



[Water Quality Blueprint for the Lake Champlain Basin](#)

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You can zoom in with our online tool and look at your area; here's an example. The Rock River flows from its headwaters in Franklin Co. VT, up into Canada, and back down into VT and into Lake Champlain. Along the way, further upstream, there are many agricultural lands. The wetlands of the lower Rock River score very highly (red and orange) for their ability to trap and retain phosphorus and sediments, and there are opportunities to restore more of them here on abandoned agricultural land.



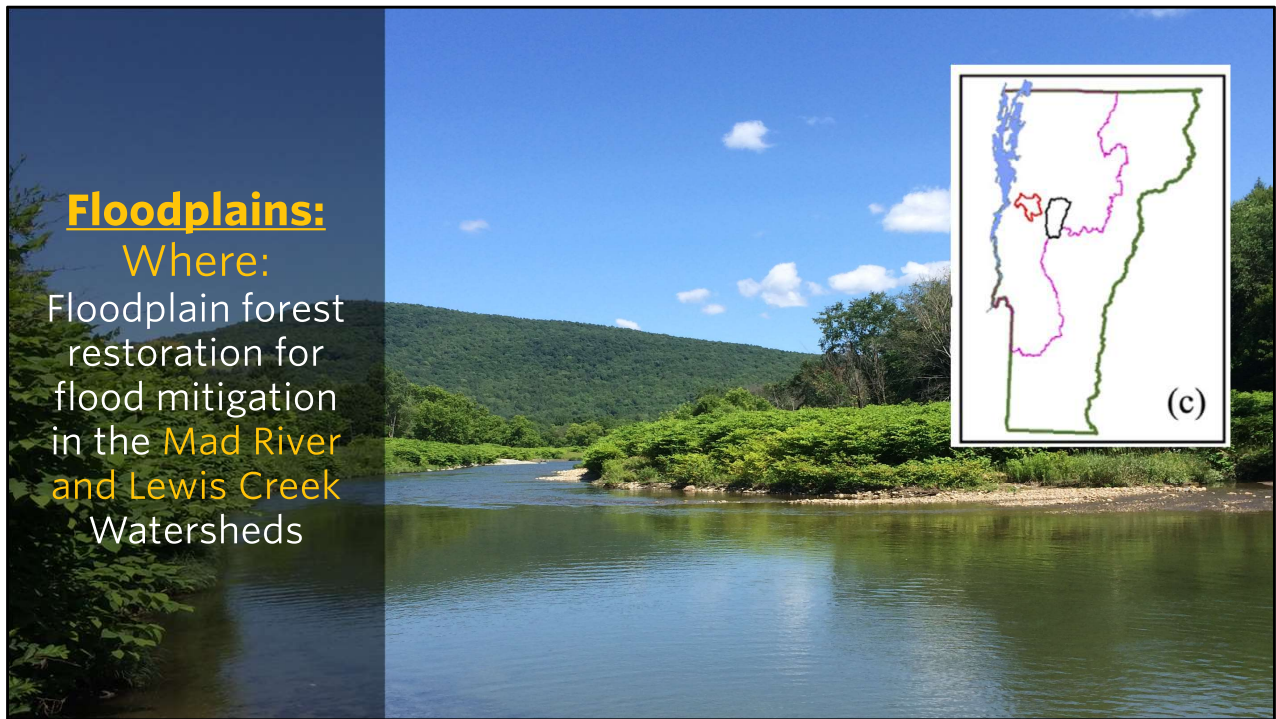
Research Question:

How, where & at what cost
can nature-based solutions
be used to reduce flooding
and phosphorus
in the Lake Champlain
basin?

We wanted to measure what nature-based solutions could do for water quality and flooding problems.

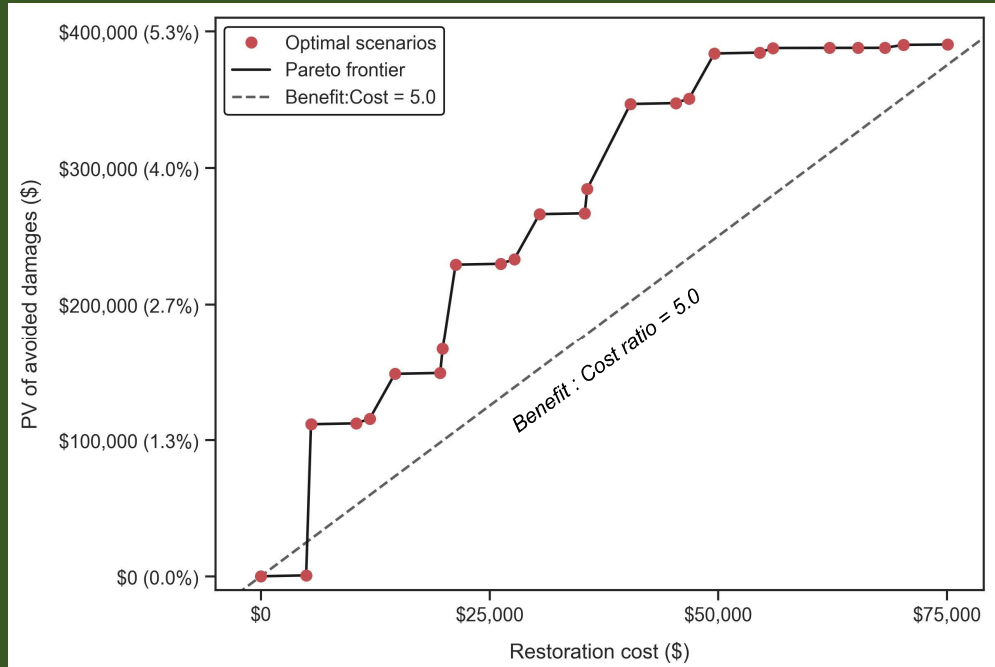
We turned to the folks who have expertise in both natural systems and in economic valuation: the Gund Institute for Environment at the University of Vermont. We funded practical, applied research with mostly private sources of funding.

Why? VT is under a federal order from the EPA to reduce phosphorus in Lake Champlain, and we have had a federal disaster declaration in VT every 1.5 years for the last ten years due to flooding.



There are two parts to this research. The first is a pilot study looking at the potential to reduce flooding impacts in two rivers.

The
benefits
outweigh
costs by
> 5 to 1



Here are results for Lewis Creek. Each red dot represents an optimal restoration scenario, where **the benefits of restoration outweigh the costs by at least 2-to-1 (as measured by avoided flood damages to downstream property.)**



There are a lot of places in the Lake Champlain basin where wetlands have been converted to agriculture (black areas on map.) We wanted to know if restoration would help with phosphorus reduction.

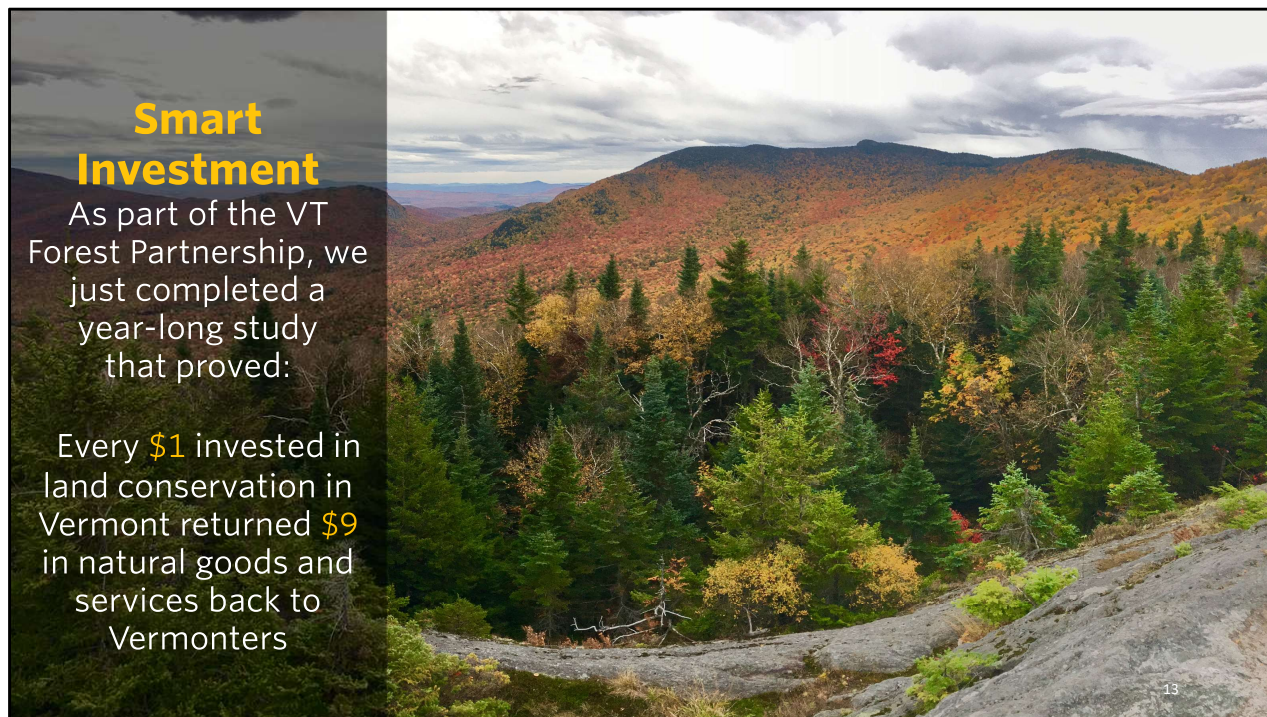


Cost Benefits of Wetland Restoration:

- Wetland restoration can meet 1/3 of VT's phosphorus reduction goal for Lake Champlain
- 135 wetlands contribute most highly to phosphorus reduction

We learned that wetland restoration can help us meet 1/3 of Vermont's required P reduction goal and we have some idea of the priority sites for restoration. That's a nature-based solution!

I'm going to turn this over to Phil now to wrap up.



The approach of nature-based solutions was recently reinforced by a new study commissioned by the VT Forest Partnership and conducted by the Trust for Public Land's national Conservation Economics team. The study found that for every \$1 of state investment in land conservation over the past 30 years, Vermonters have received \$9 in natural goods and services such as water quality protection, flood control, and food production. In addition, conserved lands were found to play a key role in sustaining Vermont's multi-billion-dollar farming, forestry, outdoor recreation and tourism industries.

Between this study and the results of the Gund study that Rose shared, there is compelling new evidence that targeted investments in nature and conservation yield outsized benefits in multiple ways, and can play a critical role in helping to meet our water quality and other pressing environmental challenges.