Black River, Lake Rescue and Money Brook
TS Irene Short and Long-term Impacts

Tropical Storm Irene on August 29th, 2011 caused significant erosion in the headwaters region of the Black River. Road damage along Route 100 through the town of Plymouth between Black Pond and Amherst Lake closed long stretches of the highway, damaged and destroyed homes and inundated large areas of floodplain.

Money Brook crosses Route 100 one mile south of the Rte. 100A junction (-72.73168, 43.51571) and enters the Black River just east of this point. Approximately 1/3 mile upstream from Route 100 a mass failure, a large streambank slide, has existed for some years. TS Irene exacerbated this slide releasing massive amounts of sediment into the Black River system. As the brook waters reached the undersized Route 100 crossing, it buried the road in rubble and carried volumes of water and sediment onto Pingree Flats.

The mass failure on Money Brook was evaluated by Watershed Management Division staff on April 24, 2012. The mass failure slump is estimated to be 800 - 1000 feet long and 75 – 100 feet high. The slope of the failing bank is nearly vertical in places.

Money Brook is a very steep mountain stream. It drains 1.2 square miles and most of this land area is over 1200 feet in elevation. Precipitation hitting the eastern portions of Bear Mountain and Salt Ash Mountain in Calvin Coolidge State Forest collects and runs down into the brook. The brook descends a steep and narrow mountain ravine before meeting the relatively flat valley of the Black River at Route 100 and then flowing into the Black River.

The slide area is located on the northern slope of the narrow Money Brook valley. From the uppermost extent of the slide to Route 100, the channel slope is over 20%, which is an extremely steep stream slope (for comparison, the slope of the Black River near Pingree Flats is 0.2%).

Pingree Flats is located on an alluvial fan—a geologic feature which can occur where a very steep mountain stream transitions abruptly to a flat, broad valley. The sediment (boulders, gravel, sand, etc.) carried by the stream during the storm was transported down the steep slope and dropped right at the Route 100 bridge where the land flattens out, in a "fan" shape of sediment. These flat areas are important from a water quality perspective—if the majority of sediments had not dropped out at this location, they would have continue to move downstream into the Black River and on into the lakes below. Stream paths can often dramatically shift locations in alluvial fan areas. Because this natural process happens in an episodic way (decades can pass between times when the sediment dumping occurs), people tend to live on alluvial fans, because they appear to be desirable flat ground for building.

Alluvial fans are natural phenomena, the geologic process of breaking down mountains over time, and they are extremely difficult areas to manage. The likelihood of such deposition happening again is extremely high as is evident in historical pictures of floods as recently as the 1970s. The unknown is when the next will event occur, not if. Therefore, the undersized Route 100 bridge, the buildings and other infrastructure on the alluvial fan will continue to be vulnerable to flood damage.

The water in Money Brook remains brown following any rains and continues to carry a high sediment load into the Black River a full year after the storm. Today the water in the Black River above Money Brook usually runs clear unless there is precipitation. While the sediment deposited on Pingree Flats remains a concern as heavy rain or flooding may transport this load to the river, Pingree Flats is acting as a sediment storage area capturing the material transported to it during the flood and preventing it from reaching the lakes. If the site is allowed to re-vegetate, sediment will be less likely to move off site. If the former wetland features of the flats were restored additional capture of material moving down Money Brook will in all likelihood take place.

Options for remediation at the Money Brook slide are limited. The soil material is non-cohesive "Berkshire-Tunbridge complex, 35 to 50 percent slopes, very stony," which is described as gravelly fine sandy loam. Any armoring of the lower portion of the slide, toe stabilization, or carved benches in the slope would be impractical because the work would likely be buried by falling material. Pulling the slope back to a stable grade over such a large area would be prohibitively expensive in such a remote location. Also, stabilization would not be able to address the further gullying happening higher up the slide's face.

The southern side of the brook's narrow valley has bedrock ledge, making it more resistant to erosion than the northern side. Because of the confined character of the stream path, attempts to divert the stream away from the northern face would not be beneficial, as the stream would quickly rejoin the eroded area downstream. Since the new debris deposited in the channel is still loose, any project could have the potential to trigger further shifts in this unstable material.

During rainfalls the sediment load is currently being carried down the Black River to Amherst Lake, Echo Lake, Lake Rescue and through Lake Pauline all of which are on-river lakes. While other inputs are known along its course, the Black River remains greenish brown all the way to the Connecticut River.

The lake system is acting as a sediment basin with the results most evident in Lake Rescue. Newly deposited sandbars reach the surface in some areas, the main navigation channel connecting Round Pond, the northern end of Lake Rescue, with the main lake is shallow enough to cause boat grounding and water access to some homes is now limited to non-motorized boats. The State Fish and Wildlife fishing access located on Round Pond has been cleaned and continues to offer recreational access to lake users.

Re-establishing navigable channels is a priority for the Lake Rescue Association (LRA). LRA is actively pursuing permits for dredging the main channel between Round Pond and Lake Rescue to ensure boating access for recreation and to reduce the hazards posed by shallow waters to boaters and skiers. Camp Plymouth State Park on Echo Lake is also pursuing dredging to re-establish the beach area.

Establishing remediation options to address the sedimentation of the Black River and four-lake system is a priority for the Watershed Management Division. If remediation is to be successful, sediment will need to be captured at multiple points along the river upstream of the lakes. Stemming the erosion entering the river from Money Brook is not feasible so alternative options

and locations for sediment attenuation need to be sought. This effort will involve staff from ANR's Watershed Management Division programs for Planning, Lakes and Ponds, River Management and Wetlands, and will also involve USACE, the towns of Plymouth and Reading and local landowners willing to participate. It will require a long-term concerted effort involving numerous locations and many partners with a common goal of clean water for the Black River and the lake system.

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Money Brook
Plymouth, VT

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Money Brook mass failure before TS Irene (Bing.com)

Money Brook mass failure after TS Irene (Google.com)

Money Brook mass failure - April 2012

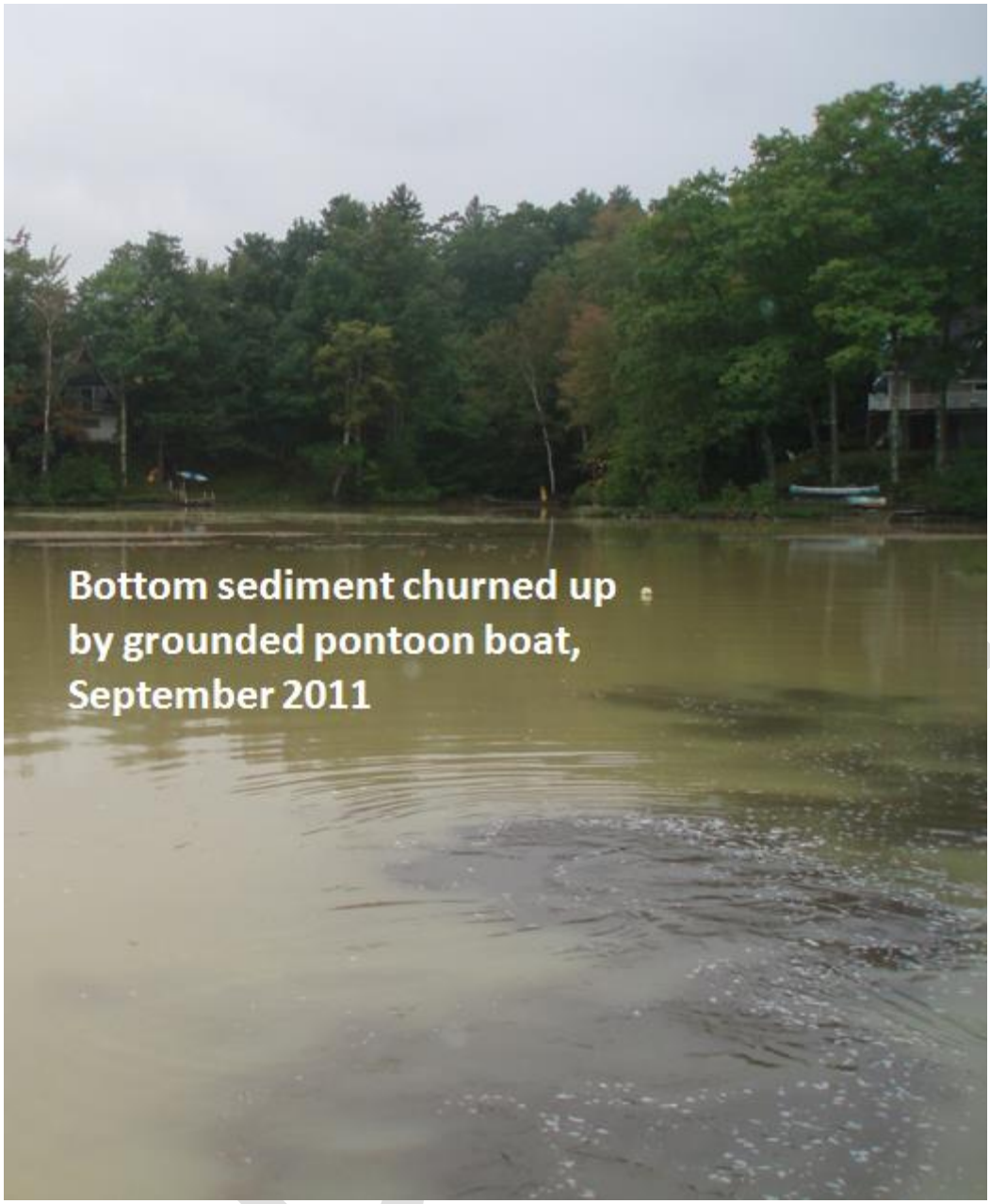
Bank materials – April 2012

Money Brook & Pingree Flats Pre-Irene

Money Brook & Pingree Flats Post-Irene

Round Pond leading into Lake Rescue post-Irene, September 2011 (VT AOT)

Black River below Pingree Flats, March 2012



Main navigation channel between Round Pond and Lake Rescue