

EXECUTIVE SUMMARY

Phase 2 geomorphic assessments were completed in 2009 on 14 reaches (11.4 river miles) of the Patch Brook and Buffalo Brook tributaries to Black River, as well as one reach of the Black River main stem. This report serves as an addendum to the July 2009 Phase 2 Stream Geomorphic Assessment report for the Black River watershed completed by South Mountain Research & Consulting (SMRC) under contract to the Southern Windsor County Regional Planning Commission (SWCRPC). The reader is referred to this previous report for summaries of the regional geologic setting, hydrology, flood history, and land use as well as assessment results for surrounding reaches of Black River watershed.

In recent decades, residents in the vicinity of Lake Rescue have noted increasing volumes of sediment in a northern embayment of Lake Rescue known locally as Round Pond. Anecdotally, the aerial extent and thickness of these sand and silt deposits has increased markedly since the flood of June 1973. Patch Brook enters the Black River downstream of Echo Lake and approximately 0.6 mile upstream of Round Pond. A growing sediment delta has also been noted at Camp Plymouth State Park where the Buffalo Brook joins Echo Lake, approximately 1.2 miles upstream of Round Pond. This delta was observed to increase in size coincident with a June 2006 flood which impacted the Buffalo Brook tributary following sudden breaching of a dam at Reading Pond.

Assessment of the Patch Brook and Buffalo Brook tributaries was undertaken to: (1) evaluate the geology and land use history of the tributary watersheds; (2) identify sources of sediment in these watersheds that may be contributing to a build up of sediment deltas in Echo Lake and Round Pond; and (3) identify and prioritize restoration projects and practices to decrease sediment loading and increase flow and sediment attenuation in these tributary watersheds.

Field investigations and limited historical reviews have identified various watershed and channel disturbances that have impacted these Black River tributary reaches, including:

Watershed-scale Modifiers:

- ◆ Historic deforestation and subsequent reforestation from the mid-1800s through the early 1900s;
- ◆ Significant flood events in 1927, 1936, 1938, and 1973;
- ◆ Historic gold placer mining in the 1800s;
- ◆ Historic dams and diversions at multiple locations along the tributary reaches;
- ◆ Regulation of flows in the Black River including in-stream impoundments: Amherst Lake, Echo Lake, and Lake Rescue; and
- ◆ Upstream erosion and tributary sources of sediment.

Reach-scale Modifiers:

- ◆ Channelization (straightening) especially associated with development, bridge crossings and historic impoundments;
- ◆ Inferred gravel extraction, dredging and windrowing of the channel in response to the flood events of 1927, 1936 / 1938 and 1973, particularly along the Patch Brook through Tyson village;
- ◆ Reported gravel extraction, dredging, windrowing, impoundments, diversions, associated with historic gold placer mining along the Buffalo and Reading Pond Brook reaches in the 1800s;
- ◆ Berming along stream banks (along Dublin Road, Patch Brook; in vicinity of select bridge crossings on both tributaries);



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- ◆ Streambank armoring (rip-rap) and retaining walls;
- ◆ Floodplain encroachment by roads and residential and commercial development;
- ◆ Undersized public bridges and in-stream culverts, serving as flow constrictors at bankfull flow or higher-magnitude flood events (particularly, Patch Brook Road culvert, Tatro Road bridge, and Library Road bridge on the Patch Brook; and Scout Camp Road bridge on the Buffalo Brook);
- ◆ Stormwater runoff from roads (particularly along Patch Brook Road on the Patch Brook and a network of forest roads along the Buffalo Brook, Reading Pond Brook and tributaries); and
- ◆ Sudden breaching of the dam on Reading Pond in a June 2006 flood event, resulting in impacts to downstream reaches of the Reading Pond Brook and Buffalo Brook.

The Patch Brook and Buffalo Brook / Reading Pond Brook channels are adjusting in response to these past and present watershed and channel disturbances. Adjustments have occurred to varying degrees, depending on many factors, including the magnitude and timing of past disturbances, the erosion resistance of sediment types in the channel bed and banks, the type and density of vegetative cover along stream banks, and presence of grade controls such as exposed bedrock.

In general, given the geologic and topographic setting, many of the Patch Brook and Buffalo Brook reaches are naturally transport-dominated due to the erosion resistance offered by bedrock in the channel bed or banks, the steepness of valley gradients, and/or close confinement of the channel by bedrock-controlled steep valley walls. Along some of the reaches where a limited degree of floodplain connection and deposition might have been expected, due to a locally broader valley section or reduced gradients, historic channel and floodplain modifications (straightening, berming, armoring) and encroachments (roads, bridges, homes, commercial buildings) in the river corridor have converted these reaches to a more transport-dominated condition. Due to increased erosional scour through these straightened and partly incised and entrenched reaches, they now serve as a source of sediment to downstream reaches. The Patch Brook reaches along Dublin Road are an example of this condition. Only a few segments in the Patch Brook watershed (and none in the Buffalo Brook watershed) have reasonable or partial access to the floodplain, and (where presently unconstrained by human-constructed features) may represent key sediment attenuation assets (three segments of Patch Brook reach M40T5.04 in the Calvin Coolidge State Forest). Overall, a more effective approach to address sedimentation in these tributary channels, may be to focus on mitigating point sources of increased stormwater and sediment loading - e.g., by controlling stormwater inputs along road lengths and at crossing locations, by re-wilding sections of abandoned forest roads in mid- to lower-reaches of the Buffalo Brook watershed where road segments now concentrate stormwater runoff and serve as a large source of sediment to downstream reaches.

A limited number of opportunities for river corridor restoration and conservation have been identified based on the Phase 2 geomorphic assessment results. A preliminary project listing forms the basis for follow-on project development and planning activities which can be carried out by watershed stakeholders.

