Neversink River East Branch

MANAGEMENT UNIT 14

Summary of Post-Flood Recommendations

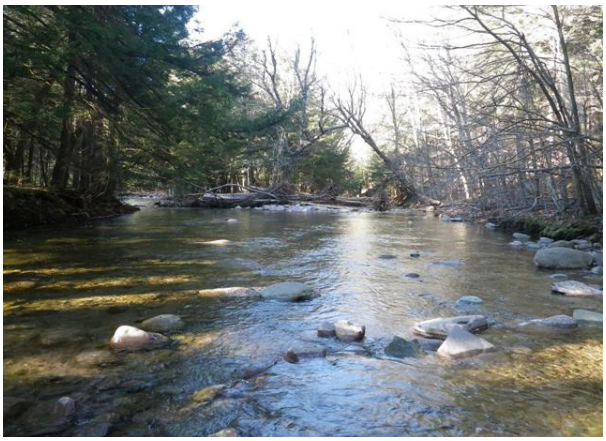
Intervention Level	Passive restoration of the bank erosion site between Station 47800 and Station 47920. (BEMS NEB14_47700) Full Restoration of the main channel between Station 47900 and Station 47700 Assisted restoration of the bank erosion site between Station 46930 and Station 46900. (BEMS NEB14_46900) (continues into EBMU13) Full restoration of the stream reaches impacted by emergency recovery work from Station 47200 through Station 46200 in Management Unit 13.
Stream Morphology	No change.
Riparian Vegetation	No change.
Infrastructure	No change.
Aquatic Habitat	No change.
Flood Related Threats	No change.
Water Quality	None.
Further Assessment	No change.

Stream Channel and Floodplain Current Conditions

The following description of stream morphology is the result of a survey conducted in December, 2011. "Left" and "right" references are oriented looking downstream, photos are also oriented looking downstream unless otherwise noted. Stationing references, however, proceed upstream, in feet, from an origin (Station 0) at the confluence with the Neversink Reservoir. Italicized terms are defined in the glossary.

As previously reported, this section of stream in Management Unit 14 is characterized by large woody debris obstructions supplied by the dense forest upstream and on adjacent valley walls. New woody material was released and existing materials were relocated throughout the channel and floodplains during flooding that has occurred since the summer of 2010. This led to significant changes in channel alignment and sediment transport patterns throughout this management unit.

During the 2010 survey, accumulation of woody debris in this management unit was first evident at Station 50100, where a log jam obstruction across the main channel had caused a portion of the flow to divert into a secondary side channel. (See photo A13 on page 5 for pre-flood condition). Remarkably, there was no significant change observed at this location during the post-flood survey. The main channel at this divergence remained stable through the flood. This stream reach could be considered for use as a *reference reach* providing a blueprint of stream morphology for future restoration projects in this section of the Neversink River. (See photo A2 on page 5 for pre-flood condition) The channel consists of a long and shallow riffle system that is confined by the valley wall on the right bank, resulting in scour and undercutting of some of the trees along this bank.



Log jam in main channel post-flood (Dec, 2011). (IMGP1477)

A depositional area begins at Station 48300, where a side bar consisting of cobbles had formed on the left bank. This side bar has aggraded due to flood-related sediment deposition and a fairly significant side channel has developed along the left valley wall since the 2010 survey (see photo A28 on Page 6 for pre-flood condition).

Channel along right valley wall post-flood (Dec, 2011). (IMGP1480)

Side channel along left valley wall (facing upstream). (IMGP1490)

This side channel is at a lower elevation than the main channel, which will likely lead to accelerated *aggradation* through this section and formation of a center bar. Prior to the formation of this significant side channel, a 120-foot long segment of erosion on the right bank had formed on the outside of the meander bend (BEMS NEB14_47700). This bank segment is currently experiencing less erosive pressure due to the change in channel planform alignment through this stream reach (see photo A43 on Page 7 for pre-flood condition).

Recommendations for this 300-foot long stream reach include blocking of the side channel with secured woody debris / root wad revetment to encourage pooling, slow water velocity, and promote sediment deposition. This could improve the alignment and dimensions of the main channel in this section, helping to restore sediment transport through this stream reach. The eroding bank segment on the right bank may stabilize without treatment (*passive restoration*), but minimally it should be monitored for changes in condition.

The channel begins to approach the first occurrence of development on the East Branch near the downstream end of this management unit. A *gabion basket* was previously located on the right bank at Station 47200 (See photo A51 on Page 8 for pre-flood condition). These gabions were destroyed during a flood event since July, 2010; only remnants of the gabion baskets remain. Instead a sidecast berm separates an excavated channel from the braided right floodplain through this section of the river.

The downstream end of this management unit is an area characterized by channel divergences and braiding caused by the accumulation of large woody debris. While the debris jams shifted during flood events, the braided character of the floodplain remains intact. However, the sidecast berm now blocks flow to several channels, including the furthest right channel. This channel, which extends into Management Unit 13, is adjacent to open mowed fields on the right bank at Station 46930 in the mowed and maintained Alexander Tison Preserve.

Mowed and maintained fields at Tison Preserve. (IMGP1510)

Continuing downstream on the main channel, an undersized excavated channel conveys flow through an area of sediment deposition from Station 47700 to Station 47450.

Side channel along left valley wall (facing upstream). (IMGP1490)

Undersized excavated channel through depositional area. (IMGP1503)

Full restoration is recommended for this site including removal of the berms and reconnection of the main channel, side channels and floodplain through Station 46200 in Management Unit 13. As constructed, the berms will not sustain successive high flows. They are instead likely to fail, creating unpredictable flooding and resetting of the channel planform alignment, thwarting the objectives of the emergency stream work, and re-establishing the threat to infrastructure downstream. The restoration effort could also include re-shaping of the channel downstream to establish a channel planform, longitudinal profile, and channel dimensions that will enable the stream to transport sediment effectively in future flood events. Post-September 18, 2012 update: Work was performed on this reach following TS Irene through the Emergency Watershed Protection program.

During the 2010 survey, hydraulic erosion was documented beginning at Station 46930 due to a lack of woody vegetation to provide adequate root structure and stability to the stream bank under high flows (BEMS NEB14_46900). While this bank erosion has been partially covered with cobbles since the flood events, a riparian buffer would improve stability of this bank during future high flow events. Recommendations for this bank erosion site minimally include *assisted restoration* with riparian planting techniques to restore the forest connectivity and stabilize the bank. This riparian buffer restoration could occur in conjunction with the *full restoration* recommended above.