

EXHIBIT 37

THE EVIDENCE OF EXCESSIVE EMBEDDED SEDIMENT AND SURFACE EXPOSED FINE SEDIMENT

Surface fines and embeddedness constitute similar but different ways of measuring the suitability of stream substrates for invertebrate and trout habitat. Embeddedness measures the degree to which cobbles and large gravels are buried or surrounded by fine sediment deposition. Surface fines describe the percentage of streambed area with exposed fine sized sediments (<.85MM per EPA). In any case, the Chattooga in North Carolina exhibits both symptoms of trout habitat impairment. Excessive small particle size sandy sediment (< 2MM) has deposited and become embedded up and down an approximate 2.2 mile segment of the Chattooga. This degraded condition reaches from just below the confluence of Green Creek downstream to where Cane Creek enters on river right. This sediment degraded section constitutes almost 40% of the approximate 5.7 miles of the public's *Outstanding Resource Waters* reaching from Green Creek down to the South Carolina state line at Ellicott Rock.

Using Google earth's aerial imagery from 4/25/2014 (NASA), a birds-eye tour reveals the length, width, and widespread reach of this water pollution. The all engulfing plumes of embedded sediment are clearly visible in this 4/25/2014 aerial imagery.

In multiple places, this blanket of sediment is bank to bank and over a foot deep. This embedded sediment has *significantly* decreased the average pool depth while filling in the interstitial crevices in faster moving water and causing the rocks lying on the river bed to become encased as if concrete had been poured into these crevices and around these rocks.

This has degraded the *quantity and quality of stream bed habitat* which remains suitable for eastern brook, rainbow, or brown trout *to use successfully for spawning/reproductive purposes, feeding, and resting.*

The Chattooga River's geomorphology is dominated by bedrock ledge cascades, shallow high gradient riffles, and deep low gradient pools. These physical characteristics intensify the adverse impacts of trout habitat loss caused by this excessive embedded sediment.

Unfortunately, major and minor pools found on this part of the Chattooga have seen their depth decreased from their baseline condition. The extent of this embedded sediment problem seems to have exponentially increased since 2012. One or two of the largest pools retains a depth that may exceed the optimal minimum but the substrate on the stream bed in the tails of the pools where trout have been known to spawn appear to have an increased amount of embedded sandy sediment present. The smaller pools have been devastated.

Individual brown trout are found throughout the year in association with structure in relatively deep water within a single home pool. Brown trout on the Chattooga tend to keep small home ranges (estimated at 5 meters) during normal activity, especially so over the warmest months (mortality may ensue when water temperature exceeds 80° F) and when not seeking to spawn.

During the winter months, brown trout may maintain a larger home range. However, brown trout on the Chattooga in South Carolina were shown to anchor to a preferred location within a home pool for as long as 30 weeks.¹¹ Clearly, the quality of the home pool habitat is critical to brown trout and quality pools are generally at least 1-2 meters in depth. (USFS 1994, Raleigh et al, 1986). *The lack of optimal pool depth constitutes a major threat to trout survival, especially during periods of low flow and high water temperatures.*

At the same time, this river's average water temperature threatens to rise in connection with the significant loss of shade occurring because of the massive die off of eastern hemlocks caused by the wooly adelgid infestation. The Chattooga Cliffs Section of river *was once described as being in a "near natural condition" by the Chief of the Forest Service in 1976.*¹² .

Current conditions no longer mirror the former *outstanding trout habitat and trout fisheries which provided the justification for reclassifying this narrow creek to Outstanding Resource Waters in 1989.* Neither does the attendant current condition of the trout buffer reflect conditions in 2007 when the United States Forest Service documented them with a comprehensive biophysical inventory of the entire 57 mile wild and scenic corridor. Today's degraded conditions must neither be allowed to be exacerbated by the United States Forest Service's management activities, nor avoided by the state of North Carolina which has responsibility for placing this degraded segment on the Section 303(d) list as a water quality limited segment. *Consequently, the Environmental Protection Agency ("EPA") must not approve North Carolina's Section 303(d) list without adding this water quality limited segment.*

¹¹ *Seasonal Movement of Brown Trout in a Southern Appalachian River*, Kyle H. Burrell, Clemson Univ., et al, Transactions of the American Fisheries Society 129:1373-1379, 2000 at page 1375.

¹² In 1976, an overall assessment of the river's unique features was articulated *by no less than the Chief of the United States Forest Service* —not by regional or district officials. This assessment provided the Chattooga River's first management plan: *Development Plan-Chattooga Wild and Scenic River*, Federal Register, John R. McGuire, Chief, United States Forest Service, Vol. 41, No. 56 p. 11847-11848, March 22, 1976. (the "1976 Chattooga River Plan"). In that plan the Chief described the relevant parts of the river in North Carolina as being in a "near natural" condition. Id.at page 11847.

The two photographs below show the same location on October 31, 2014 and June 6, 2015 @ approximately 35 03 26.61 N 83 07 03.89 W. **35.057500 -83.117778**



The first photo shows how the stones in this section of riffle waters are smothered with small particle sediment at October 31, 2014. The photo on the right shows the continuing embedded condition on June 6, 2015. Compare those conditions to the EPA rapid assessment protocol photos below.



Optimal Range (William Taft, MI DNR)



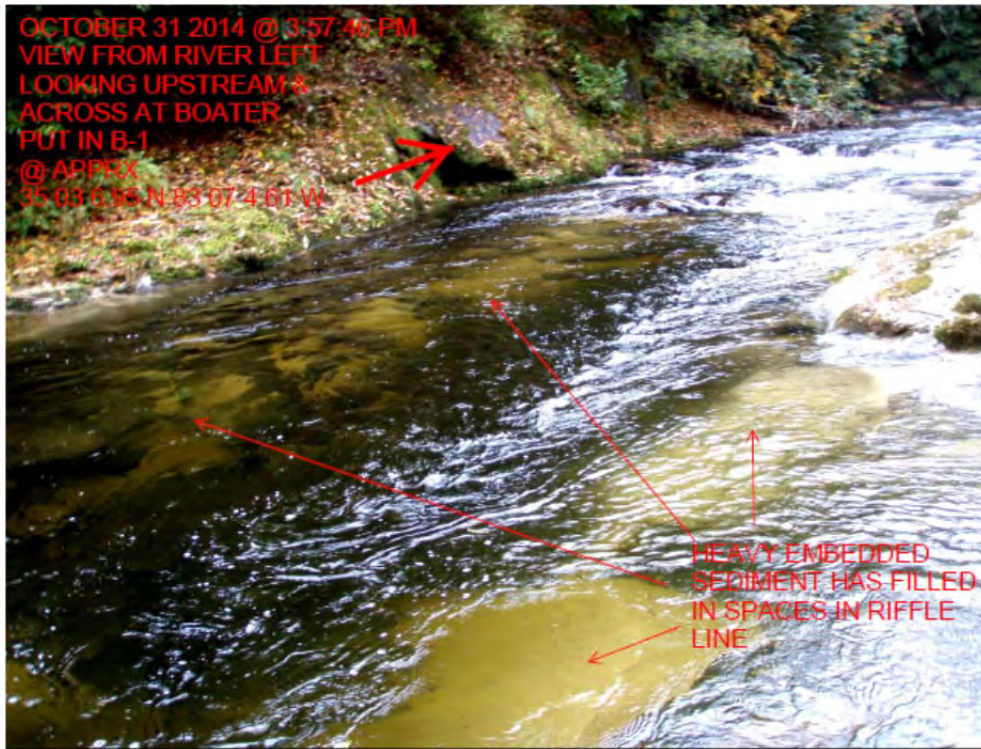
Poor Range (William Taft, MI DNR)

EMBEDDEDNESS: EPA RAPID BIOASSESSMENT PROTOCOL

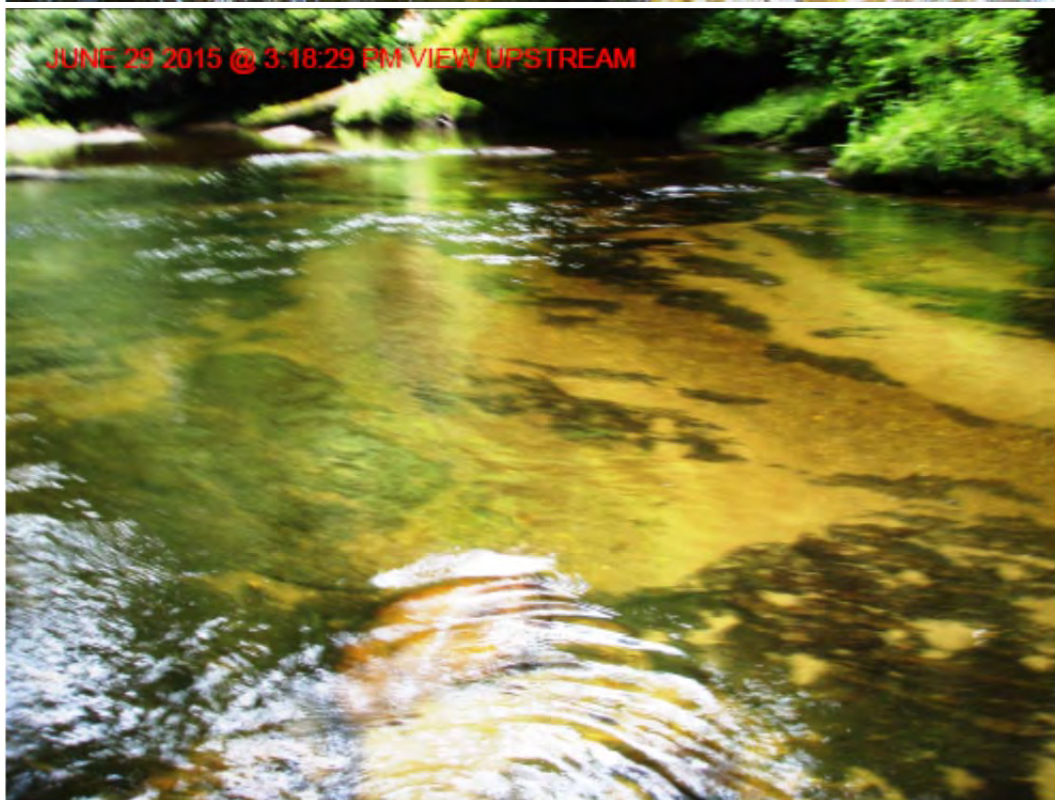
Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
2.a Embeddedness (high gradient)	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0

Source: *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers: Periphyton, Benthic Macroinvertebrates, and Fish, Second Edition*, United States Environmental Protection Agency, Chapter 5, Habitat Assessment And Physicochemical Parameters, at page 5-13.

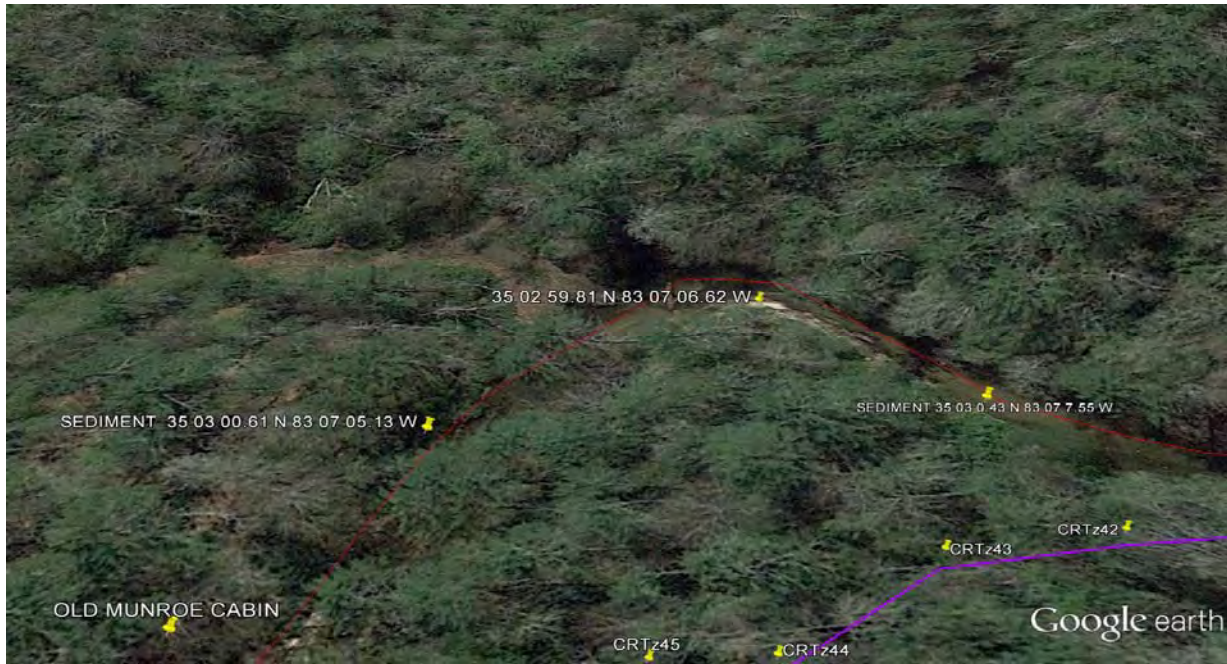
Applying the EPA’s Rapid Bioassessment Protocol, these riffle waters on the Chattooga ought to be assigned a “Poor” habitat condition score. Unfortunately, these two examples of “Poor” condition riffle waters are *typical* of conditions observed up and down this segment of the Chattooga.



The top photo above is nearer to Green Creek and the second photo is just above Cane Creek. They are miles apart and yet both exhibit the same condition of embedded sediment in riffle waters.



Floyd photos June 29, 2015 @ 3:18 PM. These two photos show embedded sediment spread across the entire width of the stream in riffle waters at 35 02 07.88 N 83 07 38.56 W. This riffle water is found on a shelf above a plunge pool just above the huge logjam.



Source: NASA Imagery Date 4/25/2014



Floyd Photograph, June 29, 2015 @ 3:50:07 PM View Downstream 70 CFS @ Burrell's Ford @ Apprx. 35 02 59.81 N 83 07 06.62 W. This site is located where the river turns right approximately .7 miles downstream from the Green Creek boater put in. See the Google earth aerial above for a birds-eye view. The embedded sediment is bank to bank. The interstitial habitat is filled in with sediment.



This photograph, taken on October 31, 2014, looks downstream towards where the river turns to the right in the photo shown on the previous page.

This straight and relatively wide reach of riffle water has been significantly impaired. This photograph evidences a lengthy section of the river where the rocks on the stream bed are fast disappearing under an increasingly deep blanket of fine particle sandy sediment.



Source: NASA Imagery Date 4/25/2014



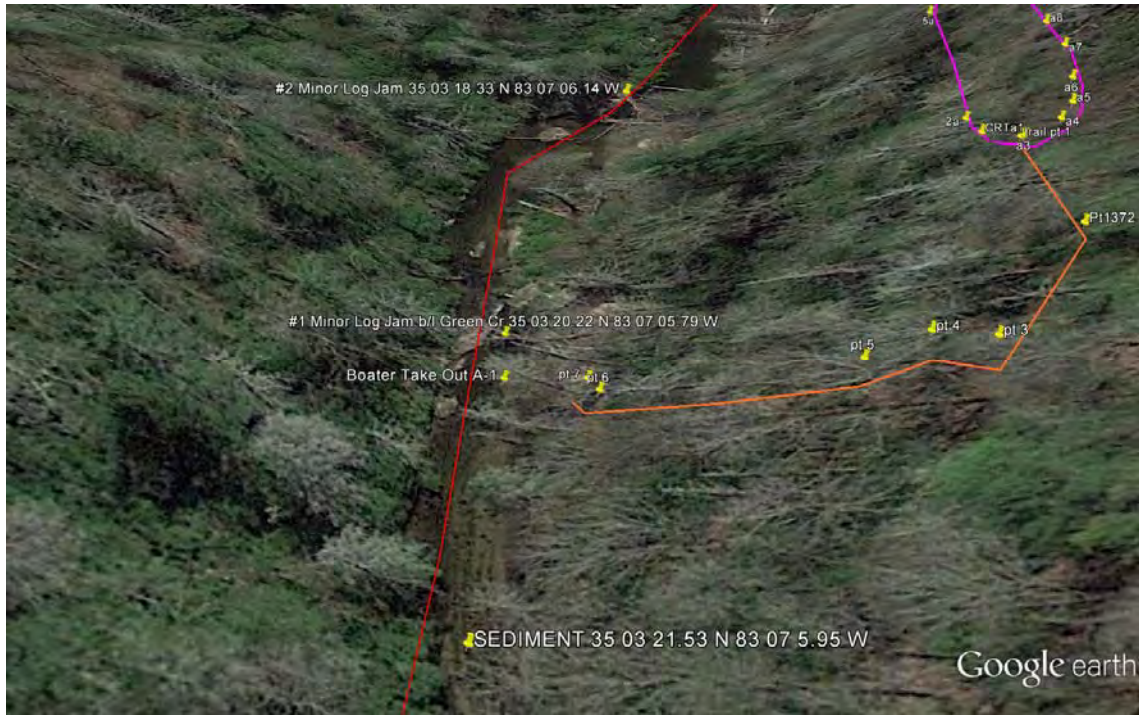
Floyd Photograph, June 29, 2015 @ 4:49:44 PM View Upstream at Tail of Norton Mill Creek Pool @ Apprx. 35 02 26.85 N 83 07 29.53 W Flow @ 70 CFS @ Burrell's Ford. The depth of this pool has been significantly reduced.



Source: NASA Imagery Date 4/25/2014



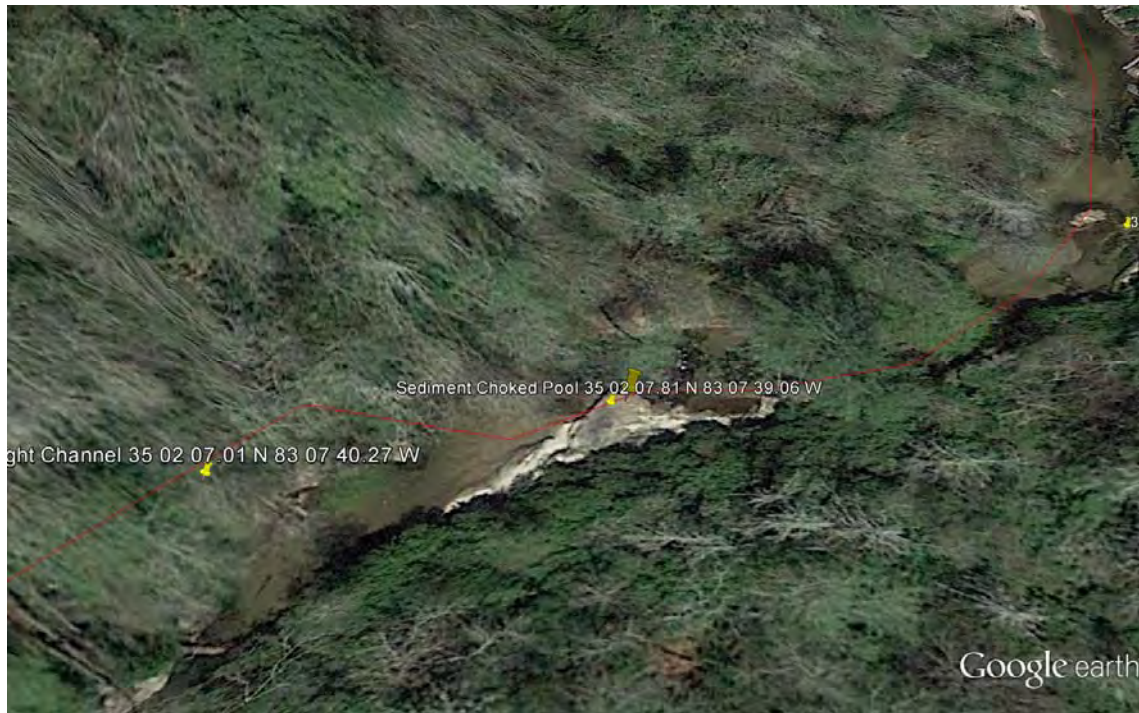
Floyd Photograph, June 29, 2015 @ 2:45:48 PM View Upstream @ 35 02 02.04 N 83 07 42.76 W (approximately .25 miles above confluence of Cane Creek) and immediately in front of the huge logjam.



Source: Imagery Date 4/25/2014 (NASA)



The left photo looks downstream at the first of two logjams just minutes downstream of the paddler launch site below Green Creek. The photo on the right is turned around and looking back upstream from the logjam. Note the hiking staff. It evidences how the sediment was over a foot deep.



Source: Imagery Date 4/25/2014 (NASA)



Floyd photos @ June 29, 2015. View is upstream. This used to be a *beautiful little* pool where trout were abundantly present @ approximately 35° 02' 07.81" N 83° 07' 39.66" W. This is no longer the case. See the aerial above.



Figure 5. Boaters portaging around log jam within Chattooga Cliffs Reach.
(Photo provided by Todd Corey.)

In spite of the stated intentions to document the field assessment, only a single photograph of this logjam was included in the 2007 Expert Boater Report. This photo is remarkable for what it did not reveal. *The photograph did not disclose any degraded physical condition in front of this logjam.* Here are two photographs that fill that void.



Floyd photo. June 29, 2015 @ 2:45:18 PM. View is downstream looking at the huge logjam @ 35 02 02.03 N 83 07 42.76 W. The sediment is bank to bank. This sediment condition continues upstream from here.



Floyd photo. May 22, 2014 @ 12:59:43 PM View is downstream. Sediment in foreground appears to be less than that present in June 29, 2015. You can still see the rocks on the river bed in the middle of the creek.

