Wadeable Stream Habitat Monitoring at Chattahoochee River National Recreation Area

Supplemental Materials—Results for 2021 Reach Surveys



Looking upstream at the monitored reach on Long Island Creek (CHAT001) at Chattahoochee River National Recreation Area on May 4, 2021.

NPS PHOTO / SECN Staff

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Headwater—First Order Streams

Survey Results for CHAT002

This section provides transect-scale figures, results, and data summary tables of the 2021 survey of CHAT002. Figures include a watershed map (Figure 1); photographs taken in the upstream, downstream, left bank, and right bank directions at each detailed transect (T2, T6, and T10) during 2021 and 2017 (Figures 2 through 25); and cross-sectional channel characteristics at each detailed transect (Figures 26 through 28). Tables describe watershed land use characteristics (Table 1), observed geomorphic channel units (Table 2), characteristics of large woody debris (Table 3), canopy cover percentages (Table 4), channel and bank characteristics (Table 5), and cross-sectional channel characteristics at each detailed transect (Tables 6 through 8).

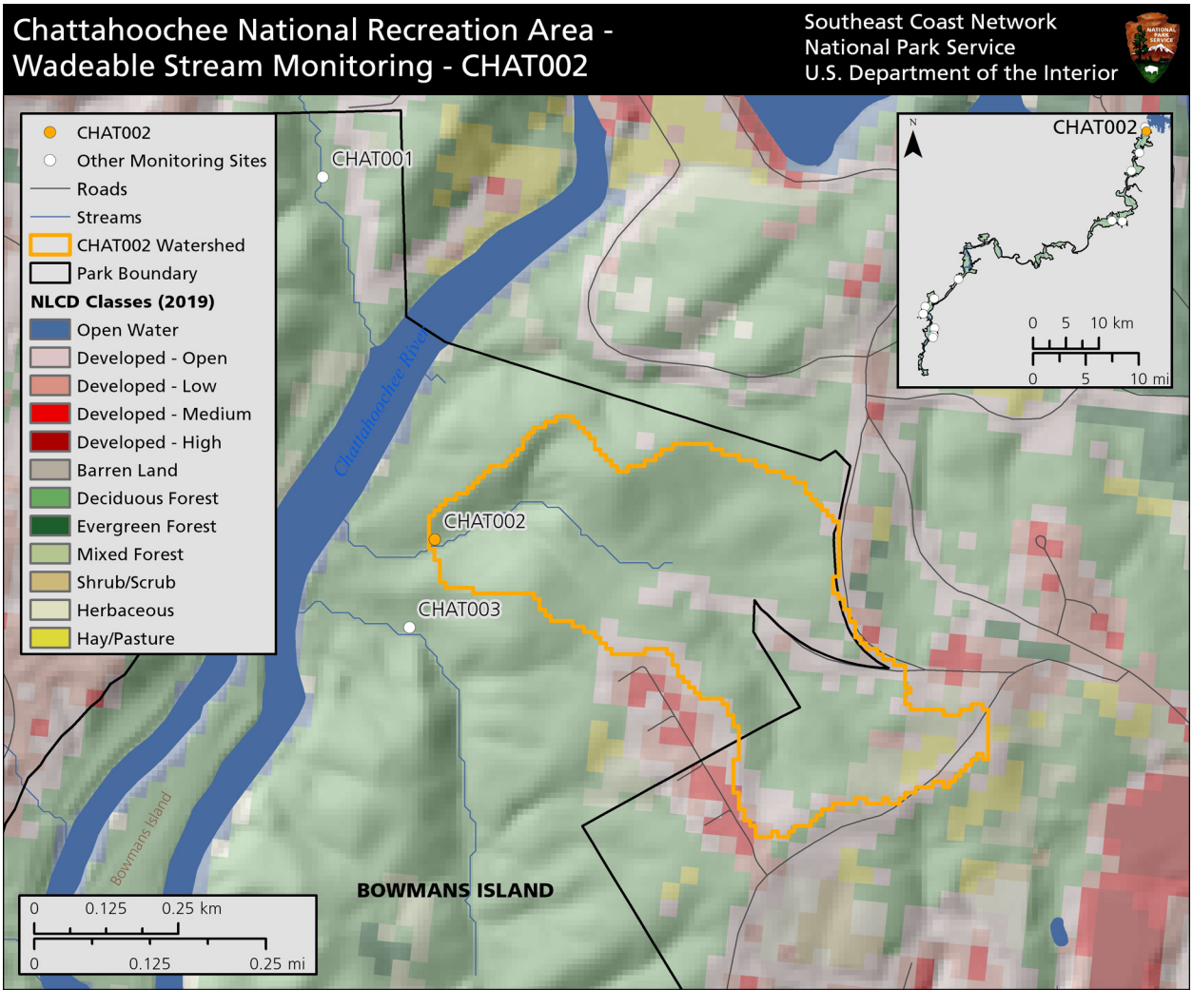


Figure 1. Map showing the watershed draining to CHAT002 at Chattahoochee National Recreation Area. The land use/land cover (NLCD 2019; Dewitz and USGS 2021), road network (USCB 2011), and perennial streams (derived from a 10 meter [32.8 feet] digital elevation model; data available from the U.S. Geological Survey) in the vicinity of the park are also shown. NPS / SECN STAFF



Figure 2. CHAT002 looking upstream from T2 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 3. CHAT002 looking upstream from T2 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 4. CHAT002 looking downstream from T2 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 5. CHAT002 looking downstream from T2 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 6. CHAT002 looking at the left bank from T2 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 7. CHAT002 looking at the left bank from T2 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 8. CHAT002 looking at the right bank from T2 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 9. CHAT002 looking at the right bank from T2 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 10. CHAT002 looking upstream from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 11. CHAT002 looking upstream from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 12. CHAT002 looking downstream from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 13. CHAT002 looking downstream from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 14. CHAT002 looking at the left bank from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 15. CHAT002 looking at the left bank from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 16. CHAT002 looking at the right bank from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 17. CHAT002 looking at the right bank from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 18. CHAT002 looking upstream from T10 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 19. CHAT002 looking upstream from T10 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 20. CHAT002 looking downstream from T10 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 21. CHAT002 looking downstream from T10 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 22. CHAT002 looking at the left bank from T10 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 23. CHAT002 looking at the left bank from T10 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 24. CHAT002 looking at the right bank from T10 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 25. CHAT002 looking at the right bank from T10 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF

Table 1. Land use/land cover characteristics from the National Land Cover Dataset (Dewitz and USGS 2021) for CHAT002.

NLCD Class	2001 percent of watershed	2004 percent of watershed	2006 percent of watershed	2008 percent of watershed	2011 percent of watershed	2013 percent of watershed	2016 percent of watershed	2019 percent of watershed
Open Water	0	0	0	0	0	0	0	0
Developed - Open[1]	0	0	0	0	0	0	0	0
Developed - Low[1]	12	13	17	17	17	17	17	17
Developed - Medium[1]	1	2	2	2	2	2	2	2
Developed - High[1]	0	0	0	0	0	0	0	0
Barren	0	0	0	0	0	0	0	0
Deciduous	0	0	0	0	0	0	0	0
Evergreen	81	80	77	77	77	77	77	77
Mixed Forest	1	0	0	0	0	0	0	0
Shrub	3	3	3	3	3	3	3	3
Grassland	0	0	0	0	0	0	0	0
Pasture	0	1	0	0	0	0	0	0
Cultivated	1	1	1	1	1	1	1	1
Woody Wetland	0	0	0	0	0	0	0	0
Herbaceous Wetland	0	0	0	0	0	0	0	0

[1] refers to the intensity or type of development

Table 2. Geomorphic channel units (GCU) observed in the area between transects at CHAT002. The data describe the percent coverage of each type of GCU.

Transect	(%) Riffle	(%) Run	(%) Glide	(%) Pool	(%) Step
1–2	30	30	30	10	0
2–3	0	100	0	0	0
3–4	100	0	0	0	0
4–5	80	20	0	0	0
5–6	40	30	0	30	0
6–7	100	0	0	0	0
7–8	10	50	30	10	0
8–9	50	0	10	20	20
9–10	80	20	0	0	0
10–11	30	60	0	10	0
Frequency	9	7	3	5	1
Max (%)	100	100	30	30	20
Mean (%)	52	31	7	8	2
Median (%)	45	25	0	5	0
SD (%)	36	32	13	10	6

Table 3. Characteristics of the large woody debris observed at CHAT002.

LWD ID	Length (m)	Diameter (m)	Volume (m^3)	Transect Interval	Function	Position
1	3.00	0.45	0.48	8	Jam, Bank Protection	Jam
2	1.06	0.21	0.04	8	None	Buried
3	1.30	0.11	0.01	8	Jam	Jam
4	11.30	0.43	1.64	1	Sediment trap	Buried
5	2.50	0.10	0.02	1	Jam	Jam
6	2.00	0.12	0.02	1	Jam	Jam
7	1.50	0.11	0.01	1	None	Free

Table 4. Variability of canopy cover observed at CHAT002.

Transect	Canopy Cover (%)
1	96
2	97
3	97
4	97
5	96
6	94
7	97
8	97
9	100
10	97
11	96
Min (%)	94
Max (%)	100
Mean (%)	97
Median (%)	97
SD (%)	1
CV	0.02

Table 5. Average reach-scale bank characteristics at CHAT002. 'L' indicates left bank and 'R' indicates right bank.

Bank Characteristics	n (L)	n (R)	Min (L)	Min (R)	Max (L)	Max (R)	Mean (L)	Mean (R)	Median (L)	Median (R)	SD (L)	SD (R)	CV (L)	CV (R)
Bank Height[1] (m)	11	11	0.54	1.00	1.38	1.53	0.93	1.17	0.88	1.12	0.31	0.16	0.33	0.14
Bankfull Height[1,2] (m)	4	2	0.54	1.06	0.88	1.07	0.67	1.07	0.62	1.07	0.15	0.01	0.22	0.01
Channel-full Height[1,2] (m)	11	11	0.65	1.00	1.67	1.53	1.13	1.24	1.16	1.24	0.30	0.18	0.27	0.15
Water Depth at Base[3] (m)	11	11	-0.07	-0.30	0.11	0.18	0.03	-0.05	0.03	0.01	0.05	0.16	–	–
Bank Undercut[2] (m)	2	6	0.11	0.08	0.17	0.80	0.14	0.31	0.14	0.20	0.04	0.28	0.30	0.90
Bank Angle [(o)]	11	11	5	2	90	91	42	52	29	51	28	28	0.67	0.54
Vegetation Cover (%)	11	11	0	10	20	70	11	33	10	30	6	21	0.56	0.66
Bank Stability[4]	11	11	Unstable	At-Risk	Very Unstable	Unstable	Unstable	Unstable	Unstable	Unstable	1.72	1.42	0.13	0.12

[1] above thalweg

[2] statistics are based on the transects where the feature is present (# in parentheses)

[3] a negative number indicates base of bank is above the water surface

[4] see Table 1 for explanation of scores

Table 6. Cross-sectional characteristics for detailed transect 1 (T2) at CHAT002.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	0.64	3.26	0.20	2.85	0.45	6.38
Channel-full	2.43	7.86	0.31	7.07	0.84	8.41
Ratio	3.83	2.41	1.59	2.48	1.88	1.32

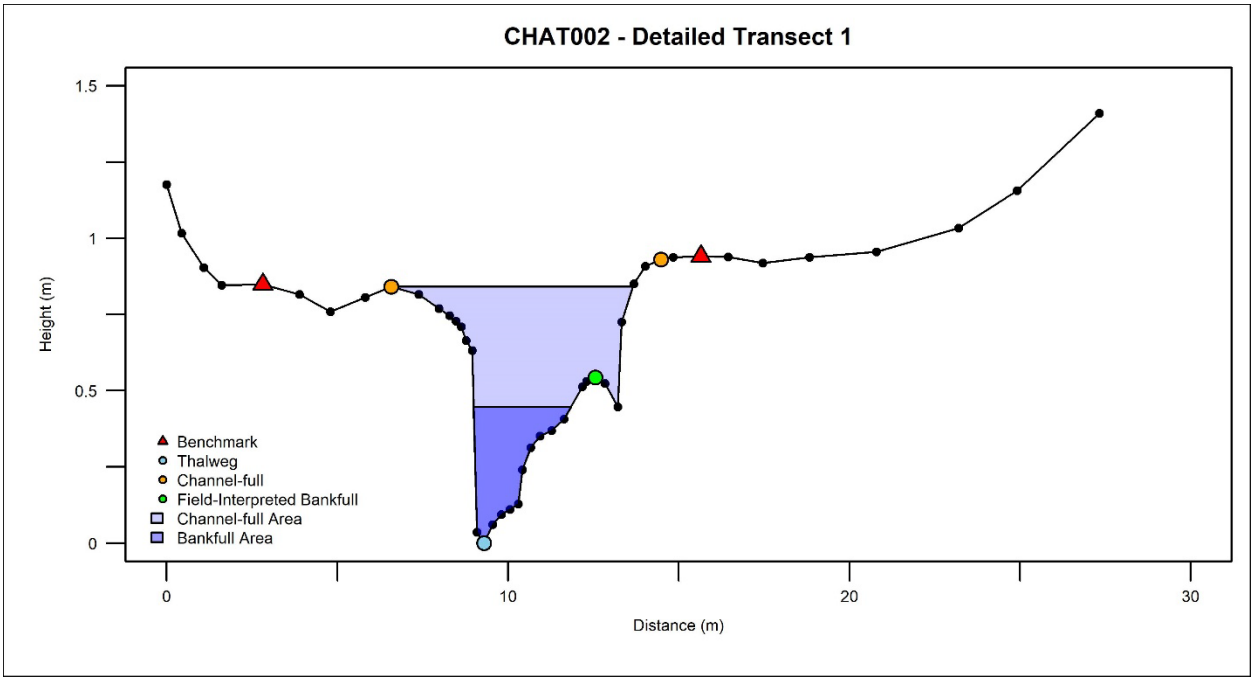


Figure 26. Detailed transect 1 (T2) at CHAT002. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Additionally, the channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 7. Cross-sectional characteristics for detailed transect 2 (T6) at CHAT002.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	0.11	2.35	0.05	2.31	0.08	30.09
Channel-full	4.92	14.41	0.34	13.51	0.65	20.78
Ratio	45.22	6.13	7.38	5.86	8.48	0.69

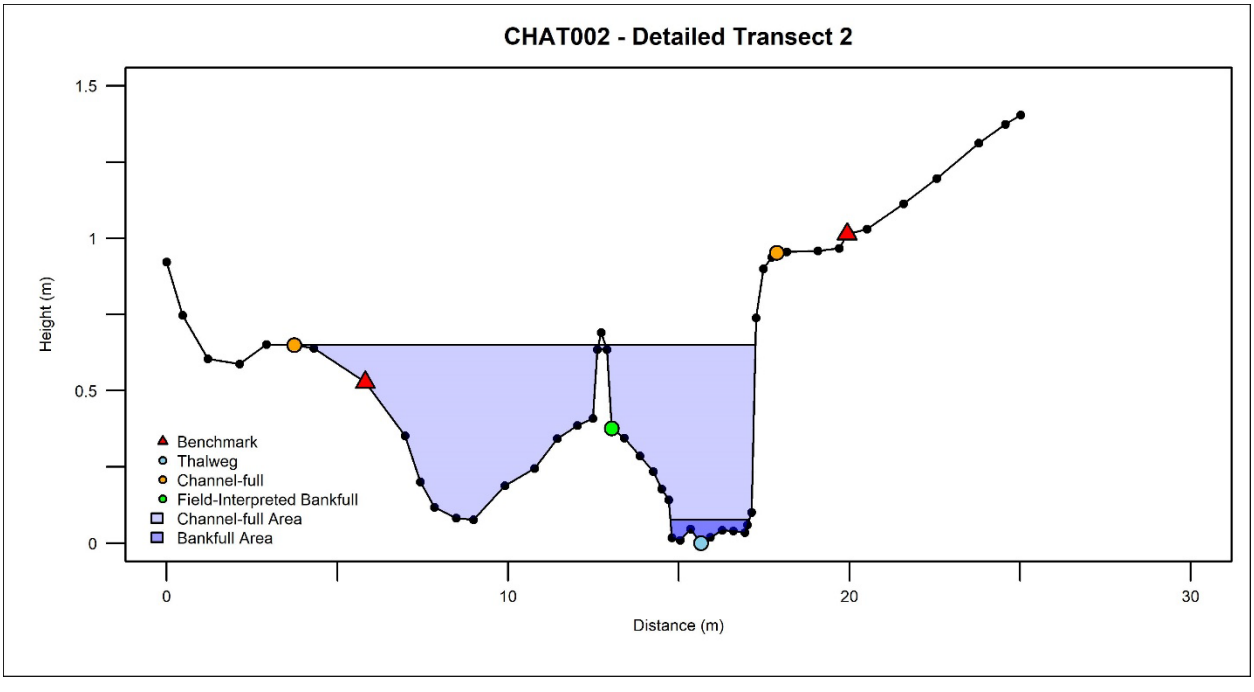


Figure 27. Detailed transect 2 (T6) at CHAT002. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 8. Cross-sectional characteristics for detailed transect 3 (T10) at CHAT002.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	0.01	0.39	0.02	0.36	0.05	6.85
Channel-full	1.71	5.10	0.34	4.67	0.61	7.68
Ratio	184.61	13.11	14.08	13.12	11.70	1.12

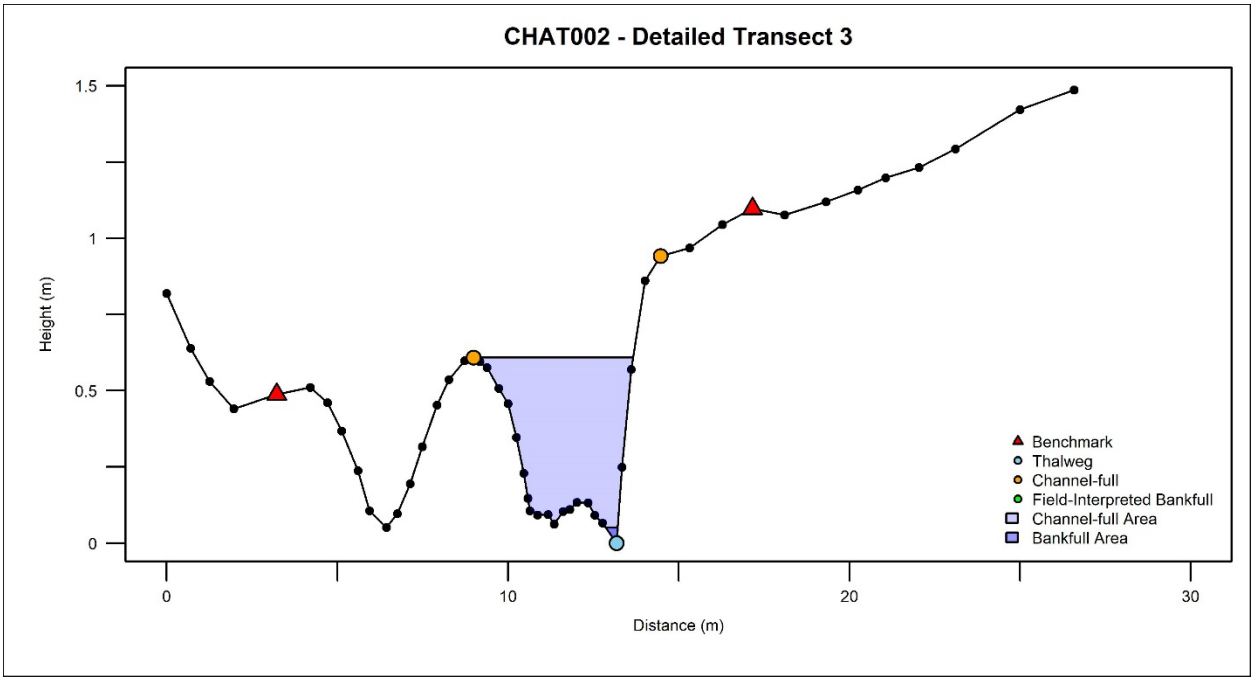


Figure 28. Detailed transect 3 (T10) at CHAT002. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Survey Results for CHAT003

This section provides transect-scale figures, results, and data summary tables of the 2021 survey of CHAT003. Figures include a watershed map (Figure 1); photographs taken in the upstream, downstream, left bank, and right bank directions at each detailed transect (T1, T6, and T11) during 2021 and 2017 (Figures 29 through 53); and cross-sectional channel characteristics at each detailed transect (Figures 54 through 56). Tables describe watershed land use characteristics (Table 9), observed geomorphic channel units (Table 10), characteristics of large woody debris (Table 11), canopy cover percentages (Table 12), channel and bank characteristics (Table 13), and cross-sectional channel characteristics at each detailed transect (Tables 14 through 16).

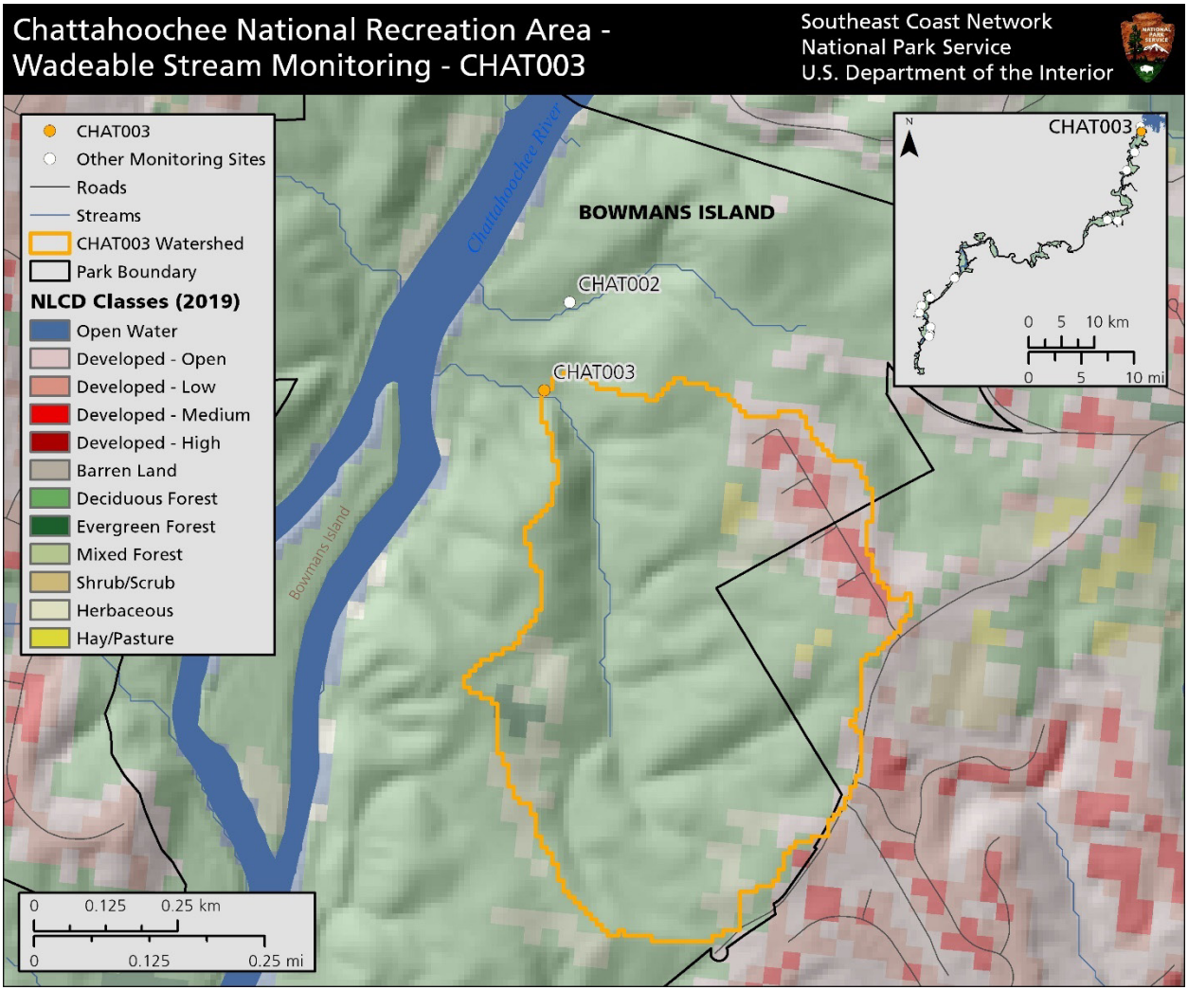


Figure 29. Map showing the watershed draining to CHAT003 at Chattahoochee National Recreation Area. The land use/land cover (NLCD 2019; Dewitz and USGS 2021), road network (USCB 2011), and perennial streams (derived from a 10 meter [32.8 feet] digital elevation model; data available from the U.S. Geological Survey) in the vicinity of the park are also shown. NPS / SECN STAFF



Figure 30. CHAT003 looking upstream from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 31. CHAT003 looking upstream from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 32. CHAT003 looking downstream from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 33. CHAT003 looking downstream from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 34. CHAT003 looking at the left bank from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 35. CHAT003 looking at the left bank from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 36. CHAT003 looking at the right bank from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 37. CHAT003 looking at the right bank from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 38. CHAT003 looking upstream from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 39. CHAT003 looking upstream from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 40. CHAT003 looking downstream from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF

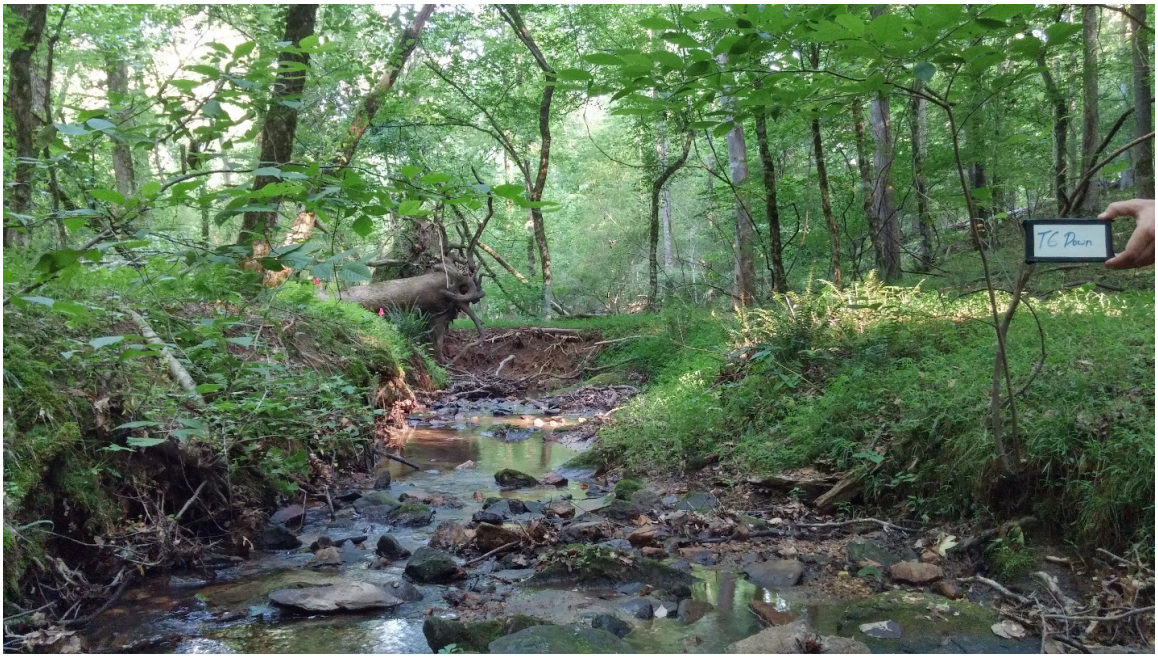


Figure 41. CHAT003 looking downstream from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 42. CHAT003 looking at the left bank from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 43. CHAT003 looking at the left bank from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 44. CHAT003 looking at the right bank from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 45. CHAT003 looking at the right bank from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 46. CHAT003 looking upstream from T11 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 47. CHAT003 looking upstream from T11 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 48. CHAT003 looking downstream from T11 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 49. CHAT003 looking downstream from T11 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 50. CHAT003 looking at the left bank from T11 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 51. CHAT003 looking at the left bank from T11 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 52. CHAT003 looking at the right bank from T11 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 53. CHAT003 looking at the right bank from T11 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF

Table 9. Land use/land cover characteristics from the National Land Cover Dataset (Dewitz and USGS 2021) for CHAT003.

NLCD Class	2001 percent of watershed	2004 percent of watershed	2006 percent of watershed	2008 percent of watershed	2011 percent of watershed	2013 percent of watershed	2016 percent of watershed	2019 percent of watershed
Open Water	0	0	0	0	0	0	0	0
Developed - Open[1]	0	0	0	0	0	0	0	0
Developed - Low[1]	12	13	17	17	17	17	17	17
Developed - Medium[1]	1	2	2	2	2	2	2	2
Developed - High[1]	0	0	0	0	0	0	0	0
Barren	0	0	0	0	0	0	0	0
Deciduous	0	0	0	0	0	0	0	0
Evergreen	81	80	77	77	77	77	77	77
Mixed Forest	1	0	0	0	0	0	0	0
Shrub	3	3	3	3	3	3	3	3
Grassland	0	0	0	0	0	0	0	0
Pasture	0	1	0	0	0	0	0	0
Cultivated	1	1	1	1	1	1	1	1
Woody Wetland	0	0	0	0	0	0	0	0
Herbaceous Wetland	0	0	0	0	0	0	0	0

[1] refers to the intensity or type of development

Table 10. Geomorphic channel units (GCU) observed in the area between transects at CHAT003. The data describe the percent coverage of each type of GCU.

Transect	(%) Riffle	(%) Run	(%) Glide	(%) Pool	(%) Step
1–2	60	30	0	10	0
2–3	0	70	0	30	0
3–4	30	60	0	0	0
4–5	90	10	0	0	0
5–6	70	20	0	0	10
6–7	30	70	0	0	0
7–8	10	60	0	0	0
8–9	100	0	0	0	0
9–10	100	0	0	0	0
10–11	60	10	0	10	20
Frequency	9	8	0	3	2
Max (%)	100	70	0	30	20
Mean (%)	55	33	0	5	3
Median (%)	60	25	0	0	0
SD (%)	36	29	0	10	7

Table 11. Characteristics of the large woody debris observed at CHAT003.

LWD ID	Length (m)	Diameter (m)	Volume (m^3)	Transect Interval	Function	Position
1	2.20	0.10	0.02	10	Bank Protection	Jam
2	6.51	0.17	0.15	10	Bank Protection	Ramp, Jam
3	3.03	0.12	0.03	9	None	Buried
4	7.07	0.40	0.89	3	Jam	Ramp, Jam
5	1.64	0.13	0.02	3	Jam	Jam
6	1.68	0.11	0.02	3	Jam	Jam
7	3.39	0.16	0.07	1	Jam	Jam

Table 12. Variability of canopy cover observed at CHAT003.

Transect	Canopy Cover (%)
1	96
2	94
3	90
4	93
5	97
6	96
7	96
8	93
9	96
10	99
11	99
Min (%)	90
Max (%)	99
Mean (%)	95
Median (%)	96
SD (%)	3
CV	0.03

Table 13. Average reach-scale bank characteristics at CHAT003. 'L' indicates left bank and 'R' indicates right bank.

Bank Characteristics	n (L)	n (R)	Min (L)	Min (R)	Max (L)	Max (R)	Mean (L)	Mean (R)	Median (L)	Median (R)	SD (L)	SD (R)	CV (L)	CV (R)
Bank Height[1] (m)	11	11	0.84	0.31	1.58	1.61	1.13	0.98	1.07	0.97	0.21	0.34	0.18	0.34
Bankfull Height[1,2] (m)	1	2	0.84	0.31	0.84	0.59	0.84	0.45	0.84	0.45	–	0.20	–	0.44
Channel-full Height[1,2] (m)	11	11	0.93	0.87	1.58	1.61	1.19	1.11	1.19	1.07	0.20	0.21	0.16	0.19
Water Depth at Base[3] (m)	11	11	-0.51	-0.04	0.04	0.10	-0.07	0.03	0.00	0.03	0.16	0.04	–	–
Bank Undercut[2] (m)	4	8	0.18	0.10	0.25	0.25	0.21	0.18	0.20	0.18	0.03	0.06	0.14	0.32
Bank Angle [(o)]	11	11	27	24	68	87	46	60	41	64	13	22	0.28	0.37
Vegetation Cover (%)	11	11	20	30	70	90	45	65	40	70	20	19	0.45	0.29
Bank Stability[4]	11	11	At-Risk	At-Risk	Unstable	Unstable	Unstable	Unstable	Unstable	Unstable	1.46	1.15	0.13	0.10

[1] above thalweg

[2] statistics are based on the transects where feature is present (# in parentheses)

[3] a negative number indicates base of bank is above the water surface

[4] Table 1 for explanation of scores

Table 14. Cross-sectional characteristics for detailed transect 1 (T1) at CHAT003.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	2.26	6.02	0.38	5.61	0.64	8.71
Channel-full	5.64	9.00	0.63	8.27	1.15	7.21
Ratio	2.50	1.50	1.67	1.48	1.78	0.83

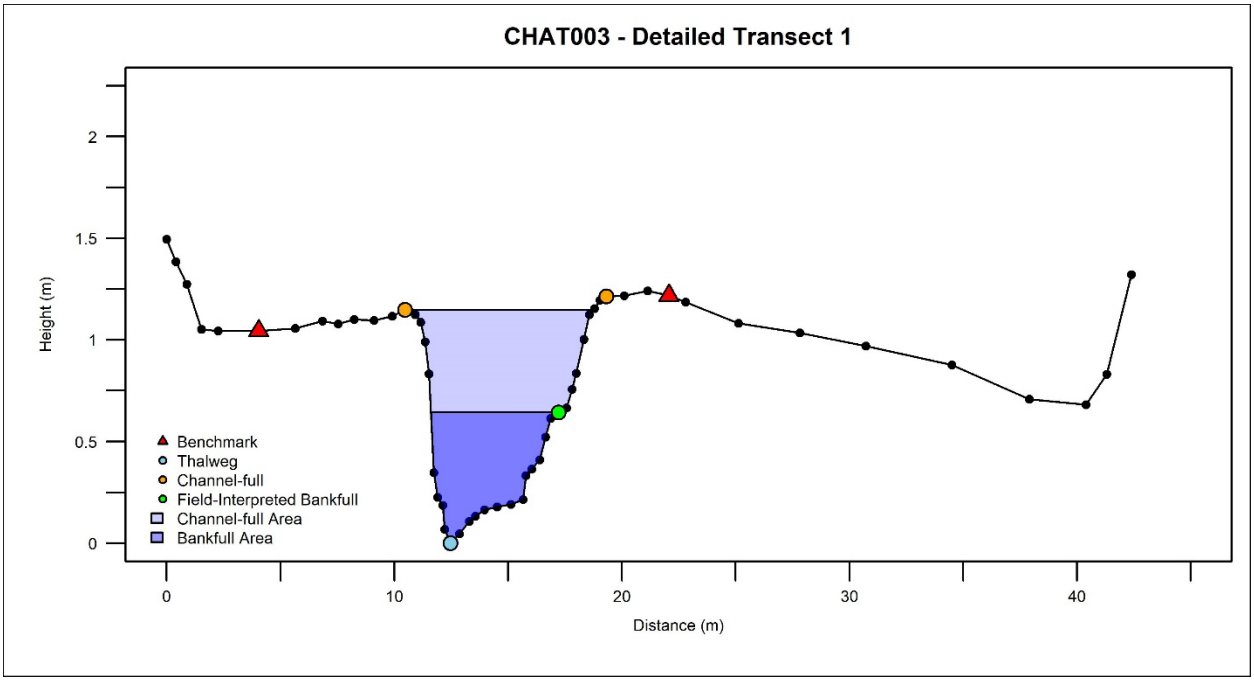


Figure 54. Detailed transect 1 (T1) at CHAT003. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Additionally, the channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 15. Cross-sectional characteristics for detailed transect 2 (T6) at CHAT003.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	0.72	3.60	0.20	3.21	0.31	10.35
Channel-full	2.54	5.66	0.45	4.92	0.79	6.26
Ratio	3.52	1.57	2.24	1.53	2.54	0.60

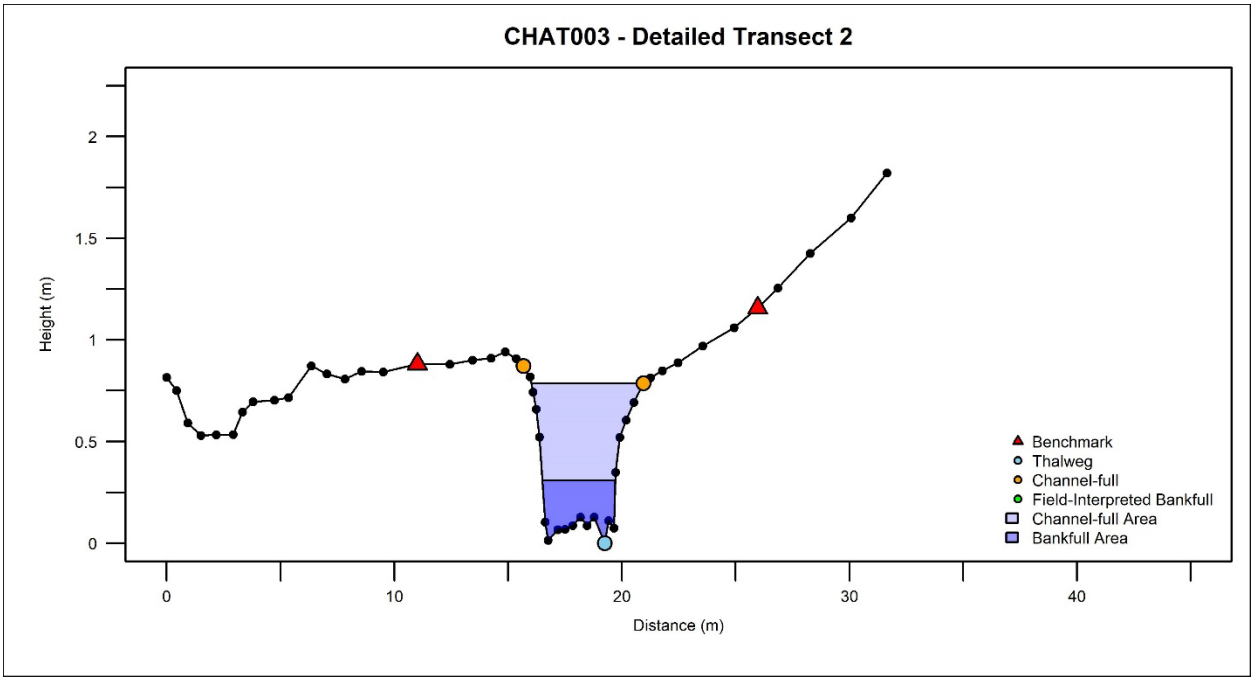


Figure 55. Detailed transect 2 (T6) at CHAT003. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 16. Cross-sectional characteristics for detailed transect 3 (T11) at CHAT003.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	0.44	2.77	0.16	2.56	0.31	8.25
Channel-full	3.43	8.87	0.39	8.20	1.08	7.61
Ratio	7.82	3.20	2.44	3.21	3.47	0.92

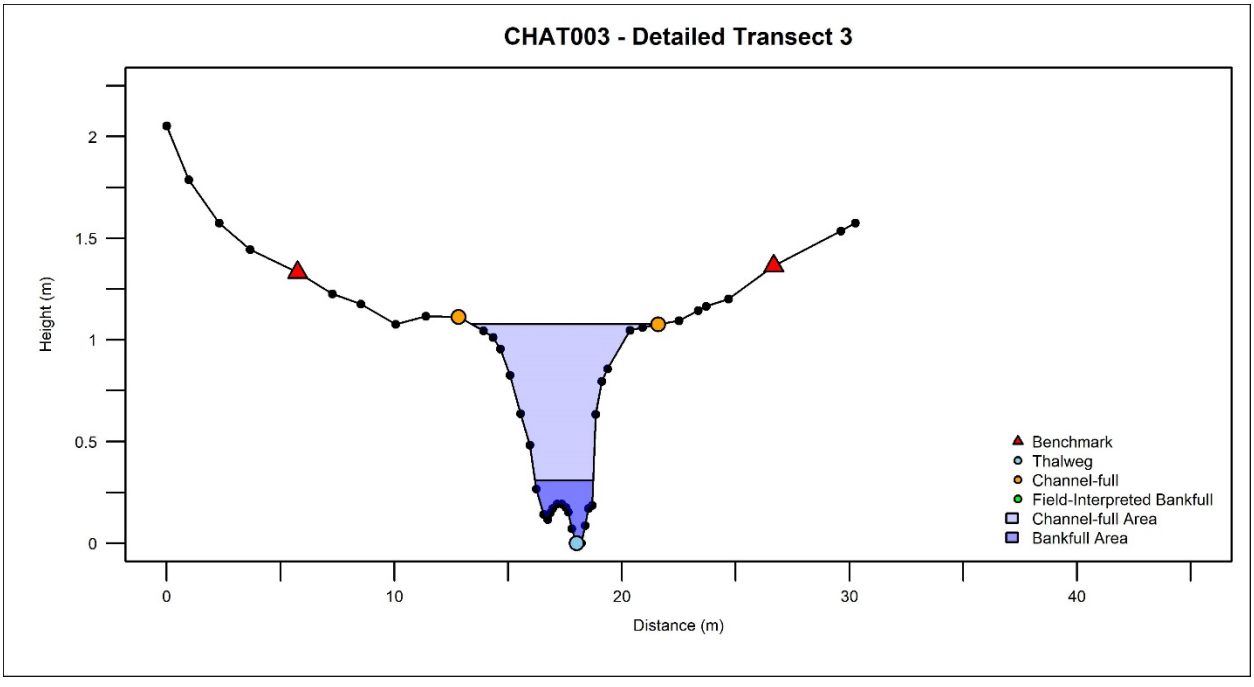


Figure 56. Detailed transect 3 (T11) at CHAT003. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Survey Results for CHAT006

This section provides transect-scale figures, results, and data summary tables of the 2021 survey of CHAT006. Figures include a watershed map (Figure 57); photographs taken in the upstream, downstream, left bank, and right bank directions at each detailed transect (T1, T6, and T11) during 2021 and 2017 (Figures 58 through 81); and cross-sectional channel characteristics at each detailed transect (Figures 82 through 84). Tables describe watershed land use characteristics (Table 17), observed geomorphic channel units (Table 18), characteristics of large woody debris (Table 19), canopy cover percentages (Table 20), channel and bank characteristics (Table 21), and cross-sectional channel characteristics at each detailed transect (Tables 22 through 24).

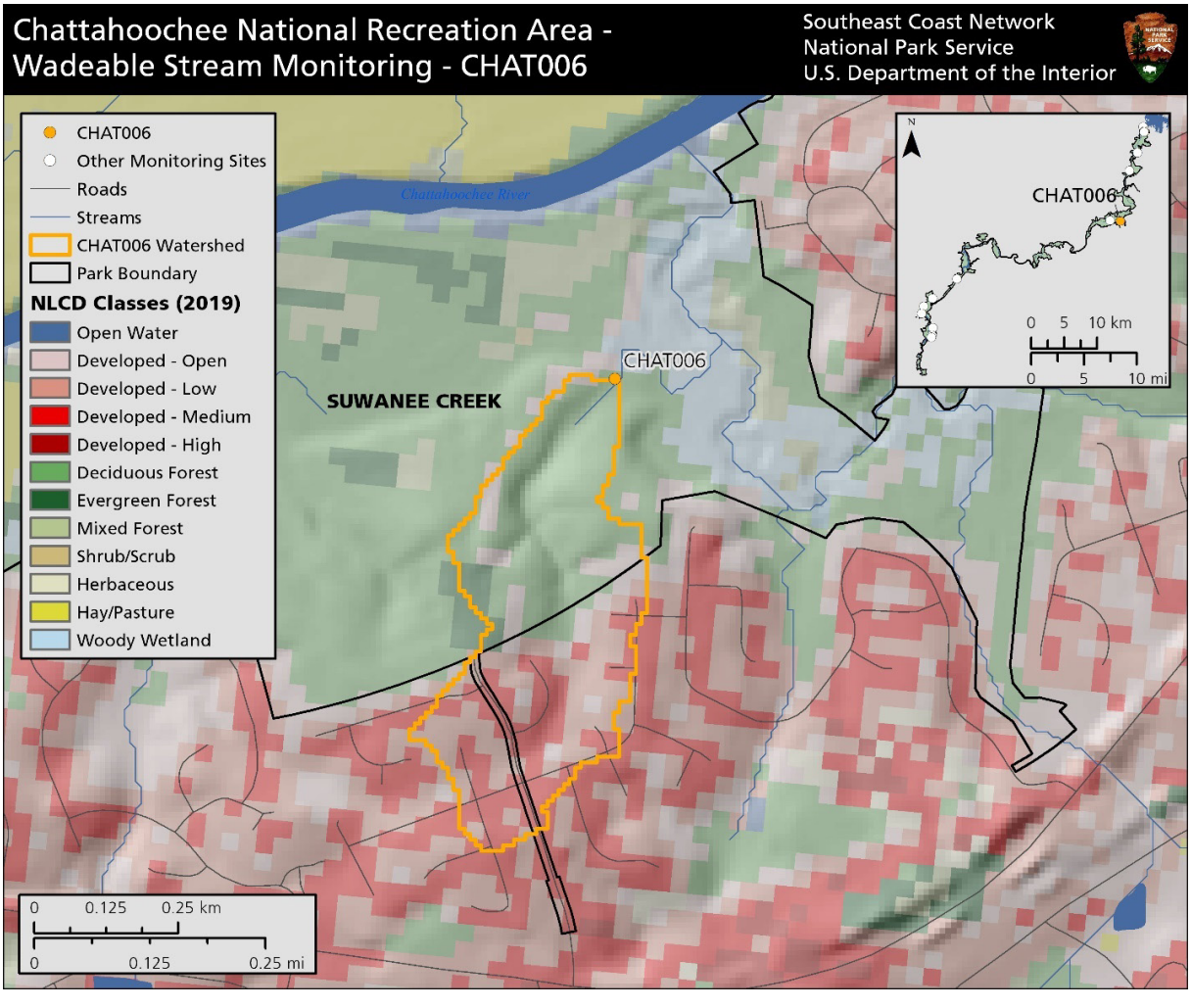


Figure 57. Map showing the watershed draining to CHAT006 at Chattahoochee National Recreation Area. The land use/land cover (NLCD 2019; Dewitz and USGS 2021), road network (USCB 2011), and perennial streams (derived from a 10 meter [32.8 feet] digital elevation model; data available from the U.S. Geological Survey) in the vicinity of the park are also shown. NPS / SECN STAFF



Figure 58. CHAT006 looking upstream from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 59. CHAT006 looking upstream from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 60. CHAT006 looking downstream from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 61. CHAT006 looking downstream from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 62. CHAT006 looking at the left bank from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 63. CHAT006 looking at the left bank from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 64. CHAT006 looking at the right bank from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 65. CHAT006 looking at the right bank from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 66. CHAT006 looking upstream from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 67. CHAT006 looking upstream from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 68. CHAT006 looking downstream from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 69. CHAT006 looking downstream from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 70. CHAT006 looking at the left bank from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 71. CHAT006 looking at the left bank from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 72. CHAT006 looking at the right bank from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 73. CHAT006 looking at the right bank from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 74. CHAT006 looking upstream from T11 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 75. CHAT006 looking upstream from T11 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 76. CHAT00 looking downstream from T11 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 77. CHAT00 looking downstream from T11 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 78. CHAT006 looking at the left bank from T11 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 79. CHAT006 looking at the left bank from T11 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 80. CHAT006 looking at the right bank from T11 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 81. CHAT006 looking at the right bank from T11 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF

Table 17. Land use/land cover characteristics from the National Land Cover Dataset (Dewitz and USGS 2021) for CHAT006.

NLCD Class	2001 percent of watershed	2004 percent of watershed	2006 percent of watershed	2008 percent of watershed	2011 percent of watershed	2013 percent of watershed	2016 percent of watershed	2019 percent of watershed
Open Water	0	0	0	0	0	0	0	0
Developed - Open[1]	12	11	11	11	11	11	11	11
Developed - Low[1]	24	24	24	24	24	24	24	24
Developed - Medium[1]	23	24	24	24	24	24	24	24
Developed - High[1]	0	0	0	0	0	0	0	0
Barren	0	0	0	0	0	0	0	0
Deciduous	38	38	38	38	38	38	38	38
Evergreen	3	3	3	3	3	3	3	3
Mixed Forest	0	0	0	0	0	0	0	0
Shrub	0	0	0	0	0	0	0	0
Grassland	0	0	0	0	0	0	0	0
Pasture	0	0	0	0	0	0	0	0
Cultivated	0	0	0	0	0	0	0	0
Woody Wetland	0	0	0	0	0	0	0	0
Herbaceous Wetland	0	0	0	0	0	0	0	0

[1] refers to the intensity or type of development

Table 18. Geomorphic channel units (GCU) observed in the area between transects at CHAT006. The data describe the percent coverage of each type of GCU.

Transect	(%) Riffle	(%) Run	(%) Glide	(%) Pool	(%) Step
1–2	30	70	0	0	0
2–3	0	20	0	80	0
3–4	0	0	0	60	40
4–5	0	20	0	80	0
5–6	0	100	0	0	0
6–7	20	80	0	0	0
7–8	0	100	0	0	0
8–9	20	80	0	0	0
9–10	30	60	0	10	0
10–11	0	100	0	0	0
Frequency	4	9	0	4	1
Max (%)	30	100	0	80	40
Mean (%)	10	63	0	23	4
Median (%)	0	75	0	0	0
SD (%)	13	37	0	35	13

Table 19. Characteristics of the large woody debris observed at CHAT006.

LWD ID	Length (m)	Diameter (m)	Volume (m^3)	Transect Interval	Function	Position
1	1.10	0.11	0.01	8	Sediment trap, Organic trap	Buried
2	1.64	0.21	0.06	8	None	Free
3	12.86	0.63	4.01	4	None	Bridge
4	7.65	0.13	0.10	4	None	Bridge
5	1.51	0.10	0.01	3	Jam	Jam
6	2.16	0.13	0.03	3	Jam	Jam
7	1.70	0.12	0.02	3	Jam	Jam
8	5.33	0.22	0.20	3	Jam	Jam

Table 20. Variability of canopy cover observed at CHAT006.

Transect	Canopy Cover (%)
1	94
2	94
3	97
4	94
5	91
6	93
7	96
8	96
9	91
10	91
11	91
Min (%)	91
Max (%)	97
Mean (%)	93
Median (%)	94
SD (%)	2
CV	0.02

Table 21. Average reach-scale bank characteristics at CHAT006. 'L' indicates left bank and 'R' indicates right bank.

Bank Characteristics	n (L)	n (R)	Min (L)	Min (R)	Max (L)	Max (R)	Mean (L)	Mean (R)	Median (L)	Median (R)	SD (L)	SD (R)	CV (L)	CV (R)
Bank Height[1] (m)	11	11	0.31	0.25	0.93	0.92	0.47	0.48	0.38	0.43	0.19	0.19	0.40	0.39
Bankfull Height[1,2] (m)	11	11	0.31	0.25	0.93	0.92	0.47	0.48	0.38	0.43	0.19	0.19	0.40	0.39
Channel-full Height[1,2] (m)	11	11	0.68	0.64	1.32	1.60	1.01	0.92	1.03	0.85	0.19	0.26	0.19	0.29
Water Depth at Base[3] (m)	11	11	–0.16	–0.08	0.15	0.00	–0.03	–0.01	–0.01	0.00	0.09	0.03	–	–
Bank Undercut[2] (m)	0	0	–	–	–	–	–	–	–	–	–	–	–	–
Bank Angle (o)	11	11	7	7	67	50	26	24	21	24	17	13	0.65	0.54
Vegetation Cover (%)	11	11	10	10	30	30	14	15	10	10	7	9	0.49	0.60
Bank Stability[4]	11	11	Unstable	Unstable	Very Unstable	Unstable	Unstable	Unstable	Unstable	Unstable	1.49	1.23	0.11	0.10

[1] above thalweg

[2] statistics are based on the transects where feature is present (# in parentheses)

[3] a negative number indicates base of bank is above the water surface

[4] See Table 1 for explanation of scores

Table 22. Cross-sectional characteristics for detailed transect 1 (T1) at CHAT006.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	0.41	3.27	0.13	3.21	0.23	14.16
Channel-full	6.05	18.36	0.33	18.20	0.61	29.65
Ratio	14.79	5.62	2.63	5.67	2.71	2.09

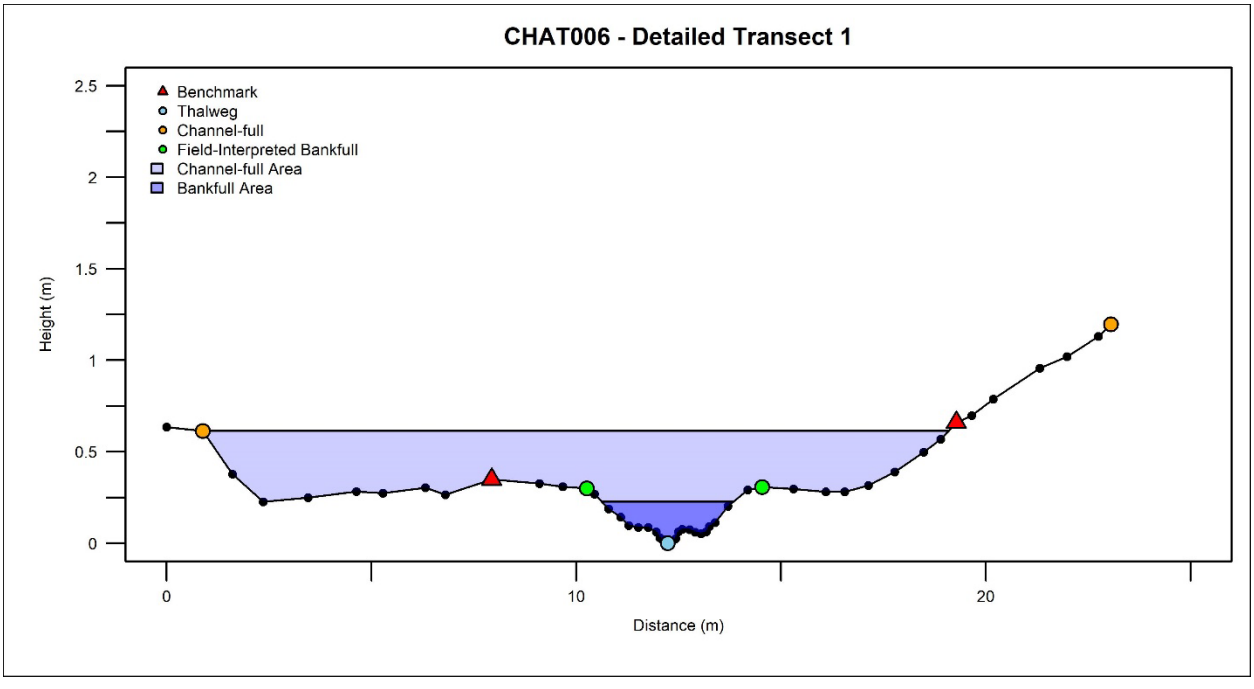


Figure 82. Detailed transect 1 (T1) at CHAT006. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Additionally, the channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 23. Cross-sectional characteristics for detailed transect 2 (T6) at CHAT006.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	0.43	2.46	0.18	2.32	0.28	8.28
Channel-full	3.81	13.89	0.27	13.64	0.61	22.46
Ratio	8.80	5.64	1.56	5.87	2.17	2.71

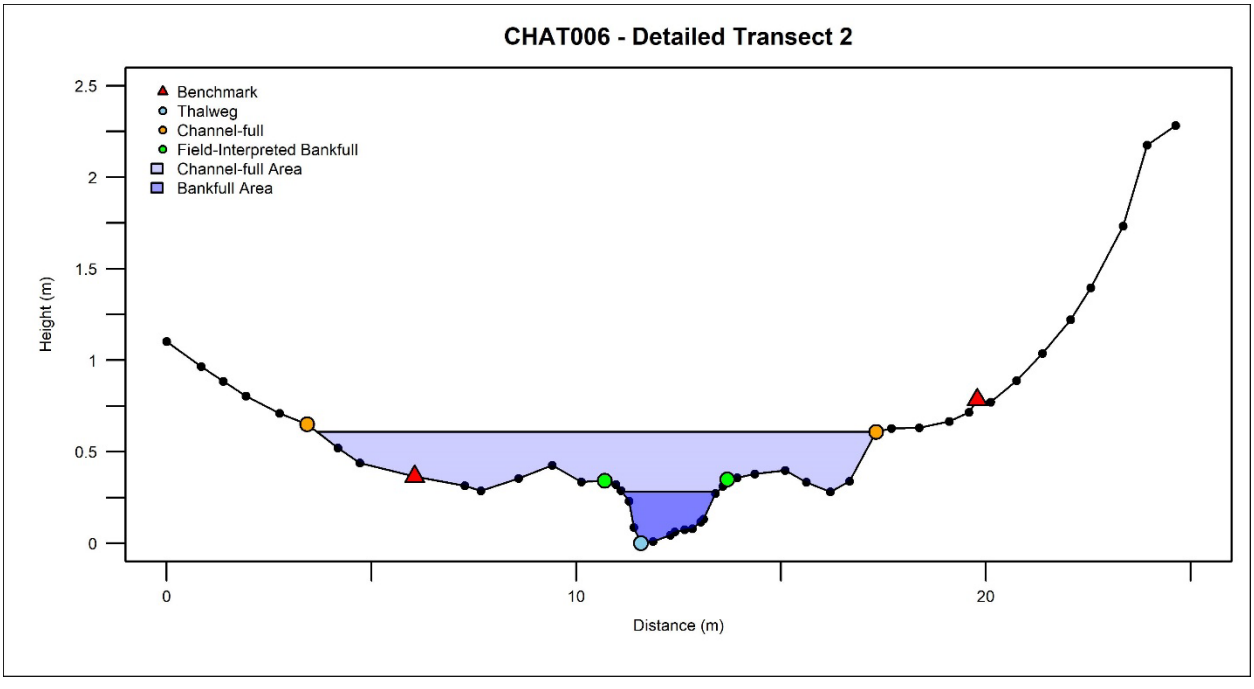


Figure 83. Detailed transect 2 (T6) at CHAT006. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 24. Cross-sectional characteristics for detailed transect 3 (T11) at CHAT006.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	1.07	5.20	0.21	4.60	0.47	9.80
Channel-full	2.00	13.40	0.15	13.20	0.55	24.11
Ratio	1.86	2.58	0.72	2.87	1.17	2.46

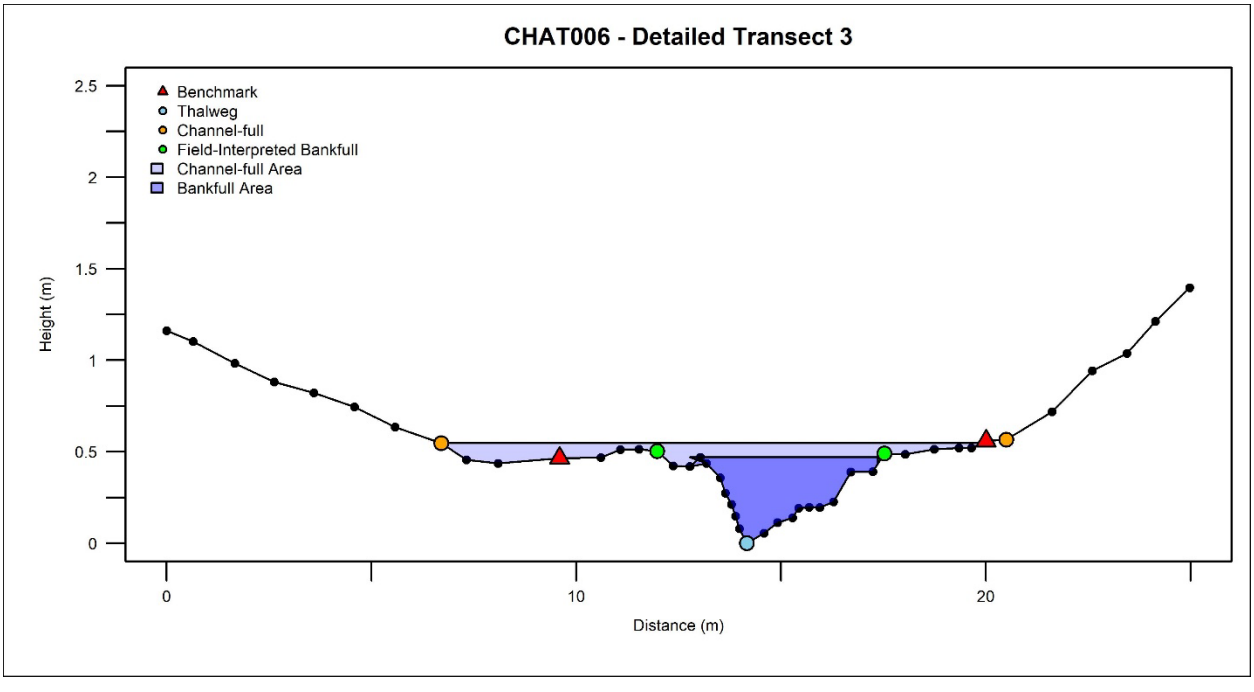


Figure 84. Detailed transect 3 (T11) at CHAT006. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Survey Results for CHAT009

This section provides transect-scale figures, results, and data summary tables of the 2021 survey of CHAT009. Figures include a watershed map (Figure 85); photographs taken in the upstream, downstream, left bank, and right bank directions at each detailed transect (T3, T7, and T11) during 2021 and 2017 (Figures 86 through 109); and cross-sectional channel characteristics at each detailed transect (Figures 110 through 112). Tables describe watershed land use characteristics (Table 25), observed geomorphic channel units (Table 26), characteristics of large woody debris (Table 27), canopy cover percentages (Table 28), channel and bank characteristics (Table 29), and cross-sectional channel characteristics at each detailed transect (Tables 30 through 32).

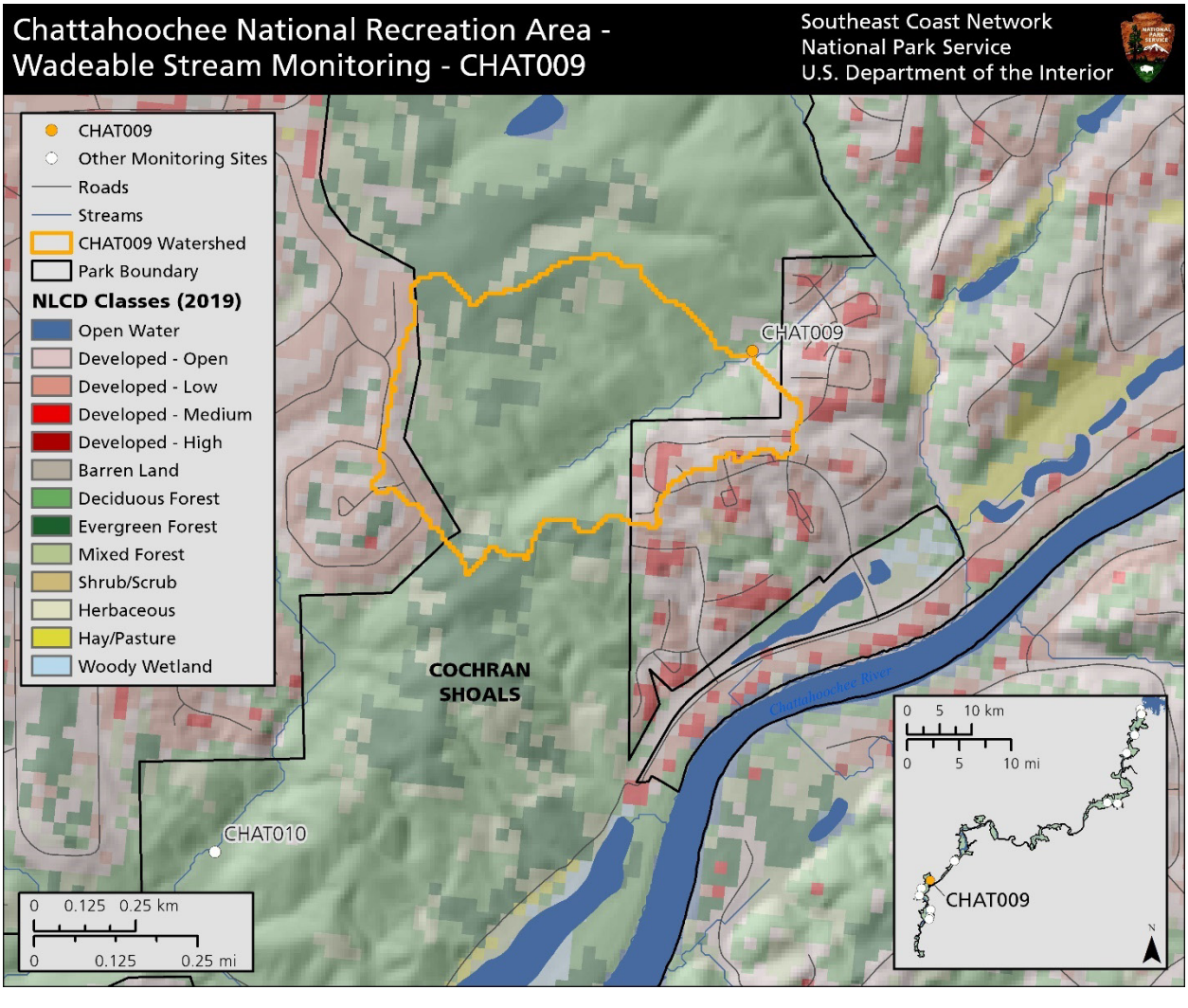


Figure 85. Map showing the watershed draining to CHAT009 at Chattahoochee National Recreation Area. The land use/land cover (NLCD 2019; Dewitz and USGS 2021), road network (USCB 2011), and perennial streams (derived from a 10 meter [32.8 feet] digital elevation model; data available from the U.S. Geological Survey) in the vicinity of the park are also shown. NPS / SECN STAFF



Figure 86. CHAT009 looking upstream from T3 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 87. CHAT009 looking upstream from T3 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 88. CHAT009 looking downstream from T3 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 89. CHAT009 looking downstream from T3 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 90. CHAT009 looking at the left bank from T3 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 91. CHAT009 looking at the left bank from T3 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 92. CHAT009 looking at the right bank from T3 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 93. CHAT009 looking at the right bank from T3 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 94. CHAT009 looking upstream from T7 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 95. CHAT009 looking upstream from T7 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 96. CHAT009 looking downstream from T7 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 97. CHAT009 looking downstream from T7 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 98. CHAT009 looking at the left bank from T7 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 99. CHAT009 looking at the left bank from T7 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 100. CHAT009 looking at the right bank from T7 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 101. CHAT009 looking at the right bank from T7 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 102. CHAT009 looking upstream from T11 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 103. CHAT009 looking upstream from T11 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 104. CHAT009 looking downstream from T11 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 105. CHAT009 looking downstream from T11 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 106. CHAT009 looking at the left bank from T11 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 107. CHAT009 looking at the left bank from T11 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 108. CHAT009 looking at the right bank from T11 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 109. CHAT009 looking at the right bank from T11 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF

Table 25. Land use/land cover characteristics from the National Land Cover Dataset (Dewitz and USGS 2021) for CHAT009.

NLCD Class	2001 percent of watershed	2004 percent of watershed	2006 percent of watershed	2008 percent of watershed	2011 percent of watershed	2013 percent of watershed	2016 percent of watershed	2019 percent of watershed
Open Water	0	0	0	0	0	0	0	0
Developed - Open[1]	12	12	12	12	12	12	12	11
Developed - Low[1]	7	7	7	7	7	7	7	7
Developed - Medium[1]	0	0	0	1	1	1	1	1
Developed - High[1]	0	0	0	0	0	0	0	0
Barren	0	0	0	0	0	0	0	0
Deciduous	60	60	60	60	60	60	60	60
Evergreen	14	14	14	14	14	14	14	14
Mixed Forest	7	7	7	7	7	7	7	7
Shrub	0	0	0	0	0	0	0	0
Grassland	0	0	0	0	0	0	0	0
Pasture	0	0	0	0	0	0	0	0
Cultivated	0	0	0	0	0	0	0	0
Woody Wetland	0	0	0	0	0	0	0	0
Herbaceous Wetland	0	0	0	0	0	0	0	0

[1] refers to the intensity or type of development

Table 26. Geomorphic channel units (GCU) observed in the area between transects at CHAT009. The data describe the percent coverage of each type of GCU.

Transect	(%) Riffle	(%) Run	(%) Glide	(%) Pool	(%) Step
1–2	80	20	0	0	0
2–3	10	90	0	0	0
3–4	0	80	0	20	0
4–5	60	40	0	0	0
5–6	100	0	0	0	0
6–7	50	50	0	0	0
7–8	20	80	0	0	0
8–9	40	60	0	0	0
9–10	90	10	0	0	0
10–11	80	20	0	0	0
Frequency	9	9	0	1	0
Max (%)	100	90	0	20	0
Mean (%)	53	45	0	2	0
Median (%)	55	45	0	0	0
SD (%)	35	32	0	6	0

Table 27. Characteristics of the large woody debris observed at CHAT009.

LWD ID	Length (m)	Diameter (m)	Volume (m^3)	Transect Interval	Function	Position
1	1.52	0.10	0.01	10	None	Ramp
2	1.30	0.10	0.01	9	Sediment trap, Organic trap	Jam
3	3.21	0.12	0.04	8	Sediment trap, Organic trap	Ramp
4	1.89	0.10	0.01	8	Bank Protection	Buried
5	1.04	0.23	0.04	7	None	Free
6	1.30	0.14	0.02	4	None	Free
7	2.64	0.10	0.02	3	None	Free
8	3.31	0.14	0.05	2	None	Ramp

Table 28. Variability of canopy cover observed at CHAT009.

Transect	Canopy Cover (%)
1	97
2	97
3	99
4	94
5	96
6	96
7	97
8	94
9	96
10	100
11	99
Min (%)	94
Max (%)	100
Mean (%)	97
Median (%)	97
SD (%)	2
CV	0.02

Table 29. Average reach-scale bank characteristics at CHAT009. 'L' indicates left bank and 'R' indicates right bank.

Bank Characteristics	n (L)	n (R)	Min (L)	Min (R)	Max (L)	Max (R)	Mean (L)	Mean (R)	Median (L)	Median (R)	SD (L)	SD (R)	CV (L)	CV (R)
Bank Height[1] (m)	11	11	0.35	0.43	1.34	1.24	0.99	0.96	1.09	1.04	0.28	0.24	0.28	0.25
Bankfull Height[1,2] (m)	2	3	0.35	0.43	0.72	0.83	0.54	0.64	0.54	0.66	0.26	0.20	0.49	0.31
Channel-full Height[1,2] (m)	11	11	0.78	0.95	1.34	1.24	1.10	1.07	1.12	1.06	0.15	0.09	0.14	0.08
Water Depth at Base[3] (m)	11	11	-0.01	-0.15	0.14	0.00	0.03	-0.09	0.02	-0.11	0.04	0.05	–	–
Bank Undercut[2] (m)	8	1	0.06	0.13	0.93	0.13	0.39	0.13	0.27	0.13	0.37	–	0.95	–
Bank Angle [(o)]	11	11	24	19	88	87	63	37	66	32	20	20	0.32	0.54
Vegetation Cover (%)	11	11	20	10	50	70	35	32	40	30	9	21	0.27	0.67
Bank Stability[4]	11	11	Unstable	At-Risk	Unstable	Unstable	Unstable	Unstable	Unstable	Unstable	1.00	1.55	0.08	0.13

[1] above thalweg

[2] statistics are based on the transects where feature is present (# in parentheses)

[3] a negative number indicates base of bank is above the water surface

[4] See Table 1 for explanation of scores

Table 30. Cross-sectional characteristics for detailed transect 1 (T3) at CHAT009.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	0.04	0.89	0.04	0.88	0.08	10.86
Channel-full	4.41	10.17	0.43	9.48	1.25	7.61
Ratio	117.03	11.41	10.26	10.82	15.44	0.70

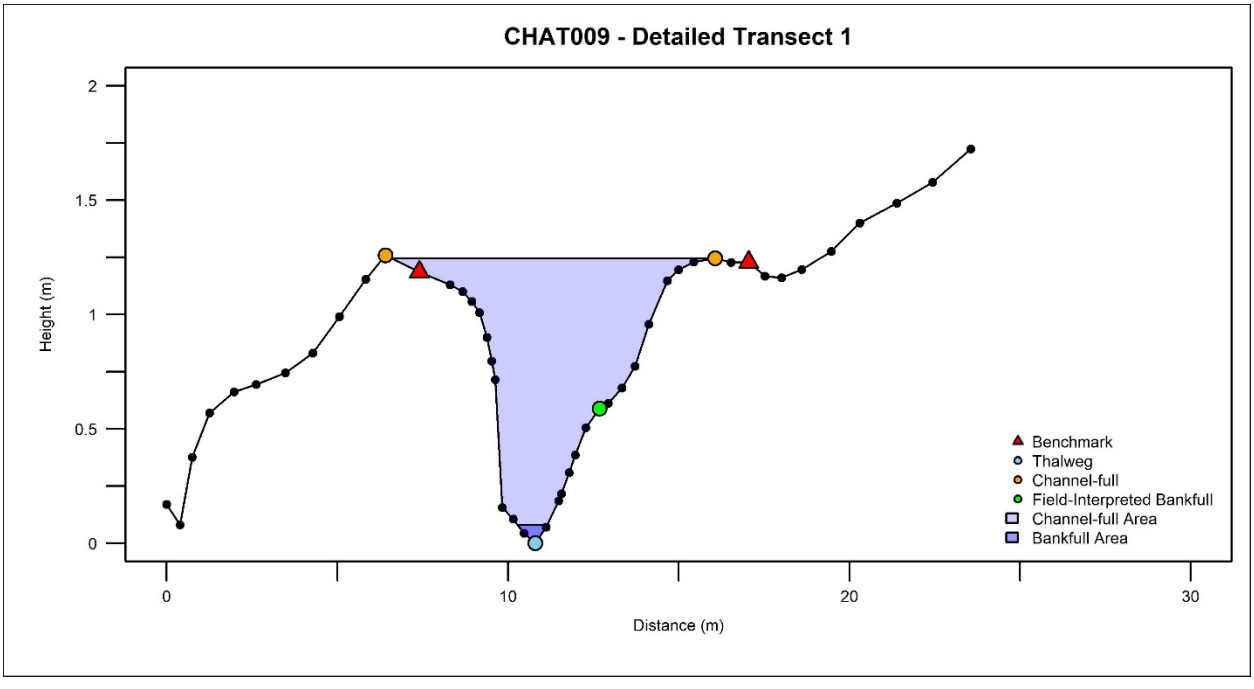


Figure 110. Detailed transect 1 (T3) at CHAT009. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Additionally, the channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 31. Cross-sectional characteristics for detailed transect 2 (T7) at CHAT009.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	2.01	4.37	0.46	3.42	0.77	4.42
Channel-full	3.17	7.57	0.42	6.54	1.03	6.38
Ratio	1.58	1.73	0.91	1.91	1.32	1.44

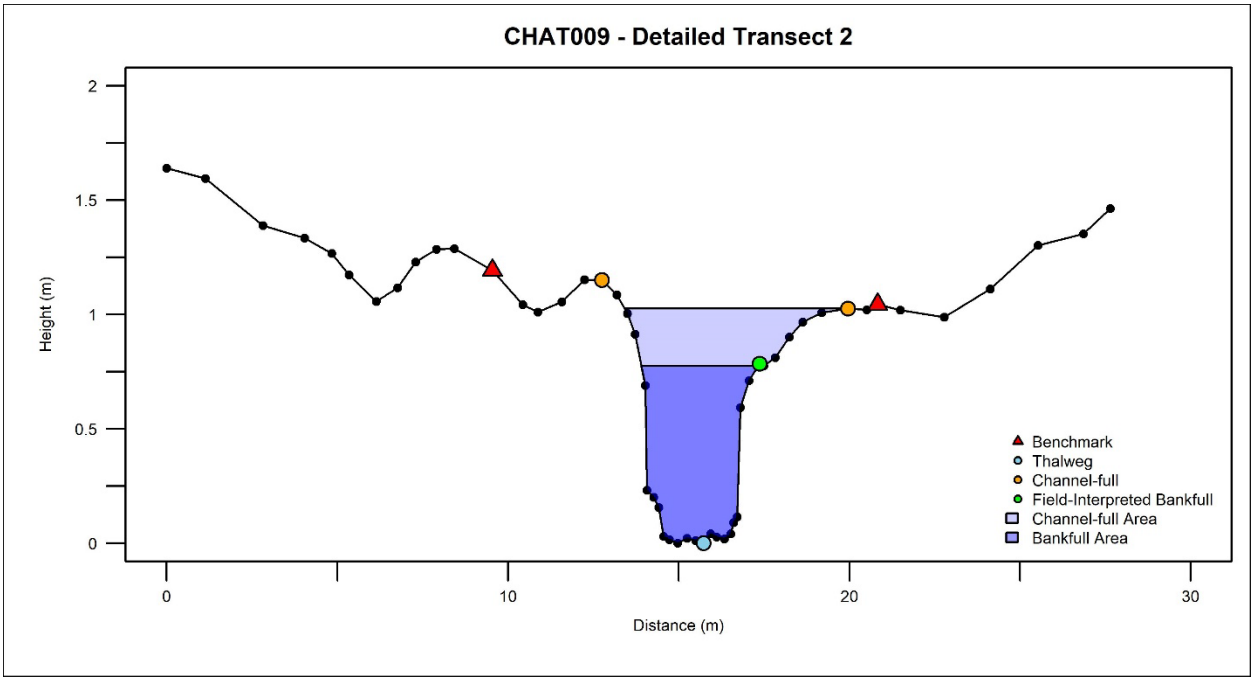


Figure 111. Detailed transect 2 (T7) at CHAT009. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 32. Cross-sectional characteristics for detailed transect 3 (T11) at CHAT009.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	1.64	4.17	0.39	3.68	0.66	5.60
Channel-full	4.13	6.82	0.60	6.02	1.15	5.24
Ratio	2.52	1.64	1.54	1.64	1.75	0.94

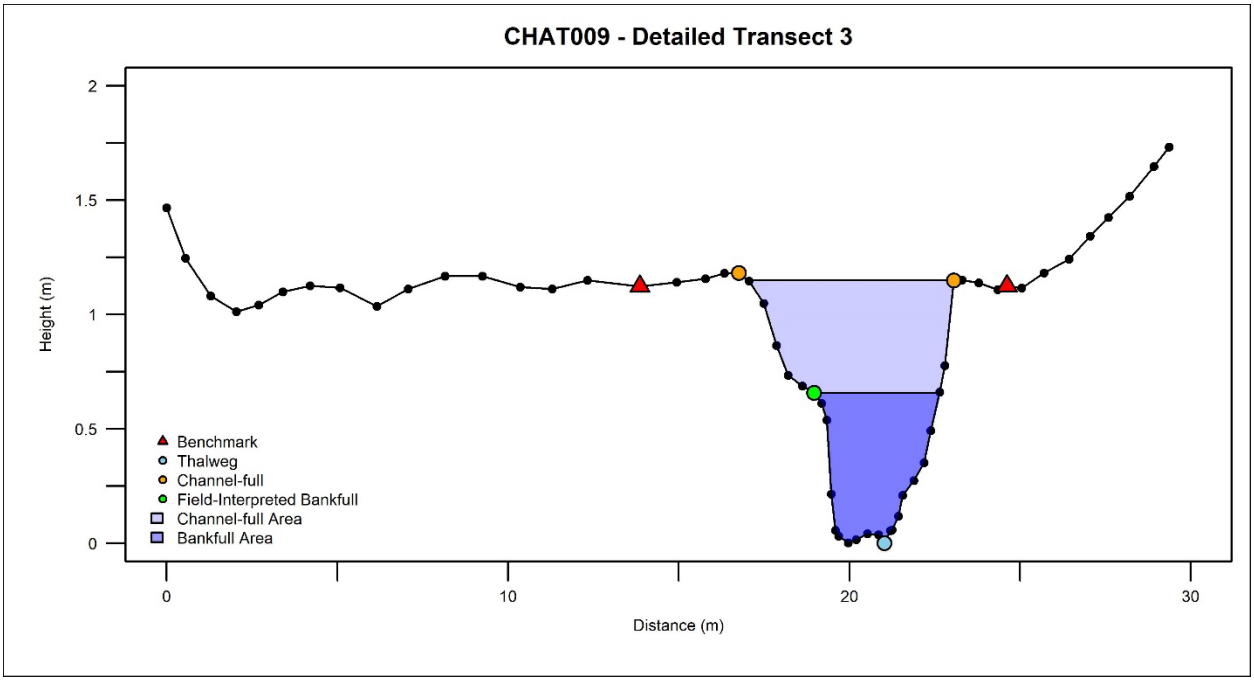


Figure 112. Detailed transect 3 (T11) at CHAT009. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Survey Results for CHAT012

This section provides transect-scale figures, results, and data summary tables of the 2021 survey of CHAT012. Figures include a watershed map (Figure 113); photographs taken in the upstream, downstream, left bank, and right bank directions at each detailed transect (T1, T6, and T9) during 2021 and 2017 (Figures 114 through 137); and cross-sectional channel characteristics at each detailed transect (Figures 138 through 140). Tables describe watershed land use characteristics (Table 33), observed geomorphic channel units (Table 34), characteristics of large woody debris (Table 35), canopy cover percentages (Table 36), channel and bank characteristics (Table 37), and cross-sectional channel characteristics at each detailed transect (Tables 38 through 40).

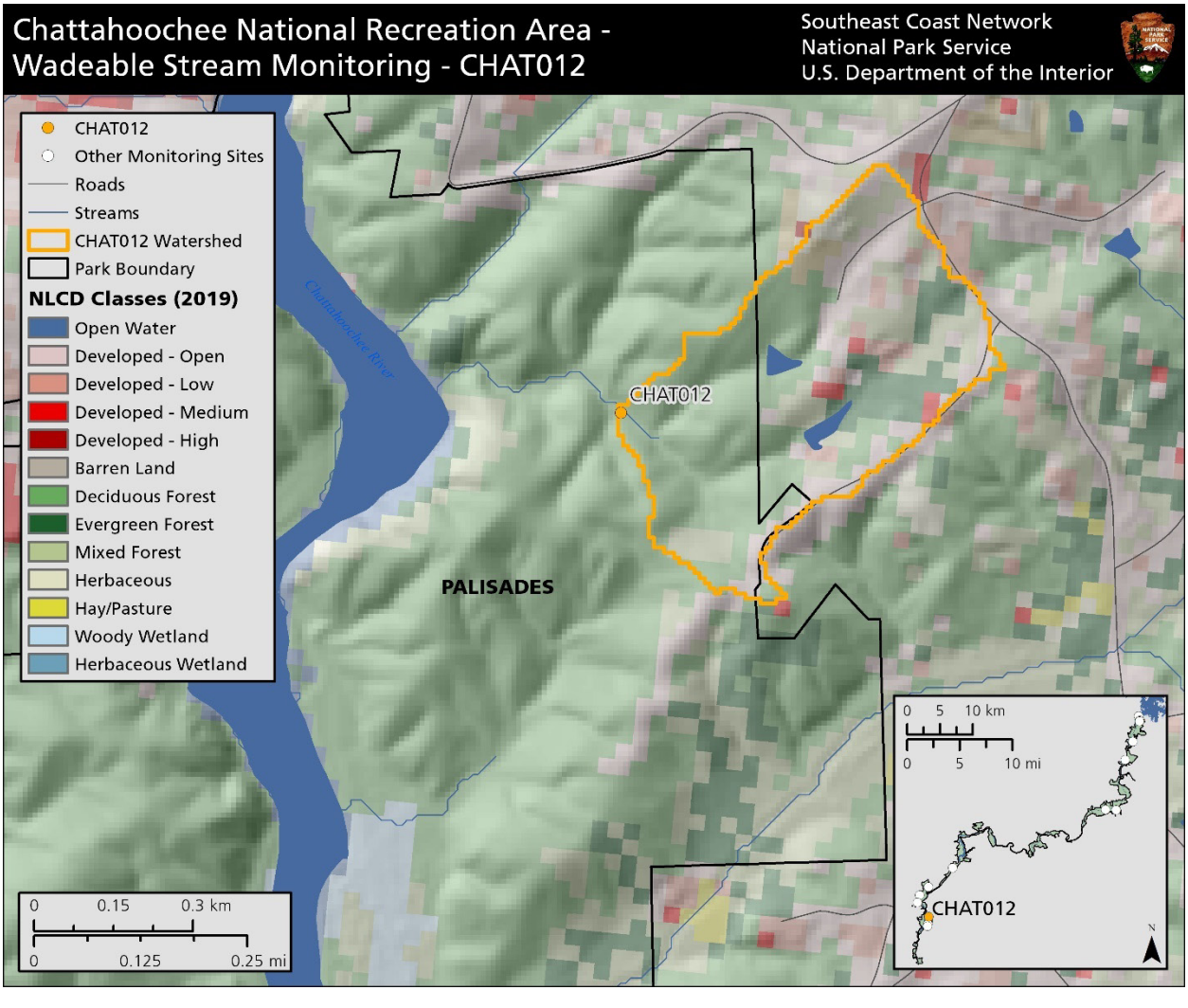


Figure 113. Map showing the watershed draining to CHAT012 at Chattahoochee National Recreation Area. The land use/land cover (NLCD 2019; Dewitz and USGS 2021), road network (USCB 2011), and perennial streams (derived from a 10 meter [32.8 feet] digital elevation model; data available from the U.S. Geological Survey) in the vicinity of the park are also shown. NPS / SECN STAFF



Figure 114. CHAT012 looking upstream from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 115. CHAT012 looking upstream from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 116. CHAT012 looking downstream from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 117. CHAT012 looking downstream from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 118. CHAT012 looking at the left bank from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 119. CHAT012 looking at the left bank from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 120. CHAT012 looking at the right bank from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 121. CHAT012 looking at the right bank from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 122. CHAT012 looking upstream from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 123. CHAT012 looking upstream from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 124. CHAT012 looking downstream from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 125. CHAT012 looking downstream from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 126. CHAT012 looking at the left bank from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 127. CHAT012 looking at the left bank from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 128. CHAT012 looking at the right bank from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 129. CHAT012 looking at the right bank from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 130. CHAT012 looking upstream from T9 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 131. CHAT012 looking upstream from T9 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 132. CHAT012 looking downstream from T9 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 133. CHAT012 looking downstream from T9 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 134. CHAT012 looking at the left bank from T9 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 135. CHAT012 looking at the left bank from T9 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 136. CHAT012 looking at the right bank from T9 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 137. CHAT012 looking at the right bank from T9 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF

Table 33. Land use/land cover characteristics from the National Land Cover Dataset (Dewitz and USGS 2021) for CHAT012.

NLCD Class	2001 percent of watershed	2004 percent of watershed	2006 percent of watershed	2008 percent of watershed	2011 percent of watershed	2013 percent of watershed	2016 percent of watershed	2019 percent of watershed
Open Water	0	0	0	0	0	0	0	0
Developed - Open[1]	18	18	18	17	17	17	18	18
Developed - Low[1]	4	4	4	4	4	4	4	4
Developed - Medium[1]	1	1	1	1	1	1	1	2
Developed - High[1]	0	0	0	0	0	0	0	0
Barren	0	0	0	0	0	0	0	0
Deciduous	50	50	50	50	50	50	46	46
Evergreen	10	10	10	10	10	10	10	10
Mixed Forest	17	17	17	17	17	17	17	17
Shrub	0	0	0	0	0	0	0	2
Grassland	0	0	0	0	0	0	3	2
Pasture	0	0	0	0	0	0	0	0
Cultivated	0	0	0	0	0	0	0	0
Woody Wetland	0	0	0	0	0	0	0	0
Herbaceous Wetland	0	0	0	0	0	0	0	0

Table 34. Geomorphic channel units (GCU) observed in the area between transects at CHAT012. The data describe the percent coverage of each type of GCU.

Transect	(%) Riffle	(%) Run	(%) Glide	(%) Pool	(%) Step
1–2	50	50	0	0	0
2–3	70	30	0	0	0
3–4	80	20	0	0	0
4–5	80	20	0	0	0
5–6	10	90	0	0	0
6–7	90	0	0	10	0
7–8	90	0	0	10	0
8–9	100	0	0	0	0
9–10	100	0	0	0	0
10–11	30	70	0	0	0
Frequency	10	6	0	2	0
Max (%)	100	90	0	10	0
Mean (%)	70	28	0	2	0
Median (%)	80	20	0	0	0
SD (%)	31	32	0	4	0

Table 35. Characteristics of the large woody debris observed at CHAT012.

LWD ID	Length (m)	Diameter (m)	Volume (m^3)	Transect Interval	Function	Position
1	3.41	0.12	0.04	6	None	Ramp
2	2.45	0.16	0.05	4	Bank Protection	Buried
3	1.77	0.21	0.06	1	Sediment trap	Jam

Table 36. Variability of canopy cover observed at CHAT012.

Transect	Canopy Cover (%)
1	96
2	99
3	99
4	96
5	93
6	88
7	99
8	96
9	99
10	96
11	99
Min (%)	88
Max (%)	99
Mean (%)	96
Median (%)	96
SD (%)	3
CV	0.03

Table 37. Average reach-scale bank characteristics at CHAT012. 'L' indicates left bank and 'R' indicates right bank.

Bank Characteristics	n (L)	n (R)	Min (L)	Min (R)	Max (L)	Max (R)	Mean (L)	Mean (R)	Median (L)	Median (R)	SD (L)	SD (R)	CV (L)	CV (R)
Bank Height[1] (m)	11	11	0.38	0.71	0.92	0.94	0.64	0.77	0.60	0.74	0.19	0.07	0.29	0.09
Bankfull Height[1,2] (m)	3	0	0.38	0.00	0.45	0.00	0.41	–	0.41	-	0.04	–	0.08	–
Channel-full Height[1,2] (m)	11	11	0.55	0.71	0.92	0.94	0.71	0.77	0.72	0.74	0.13	0.07	0.18	0.09
Water Depth at Base[3] (m)	11	11	-0.17	-0.13	0.11	0.12	-0.04	0.03	0.00	0.04	0.09	0.08	–	–
Bank Undercut[2] (m)	2	8	0.09	0.10	0.22	0.65	0.16	0.32	0.16	0.28	0.09	0.19	0.59	0.59
Bank Angle (o)	11	11	13	26	82	87	40	58	33	55	26	23	0.65	0.40
Vegetation Cover (%)	11	11	10	30	50	80	23	45	20	40	15	15	0.66	0.33
Bank Stability[4]	11	11	At-Risk	Stable	Very Unstable	Unstable	Unstable	Unstable	Unstable	Unstable	1.99	1.86	0.16	0.17

[1] above thalweg

[2] statistics are based on the transects where feature is present (# in parentheses)

[3] a negative number indicates base of bank is above the water surface

[4] See Table 1 for explanation of scores

Table 38. Cross-sectional characteristics for detailed transect 1 (T1) at CHAT012.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	0.50	2.78	0.18	2.58	0.31	8.21
Channel-full	1.63	5.10	0.32	4.74	0.66	7.17
Ratio	3.27	1.83	1.78	1.83	2.10	0.87

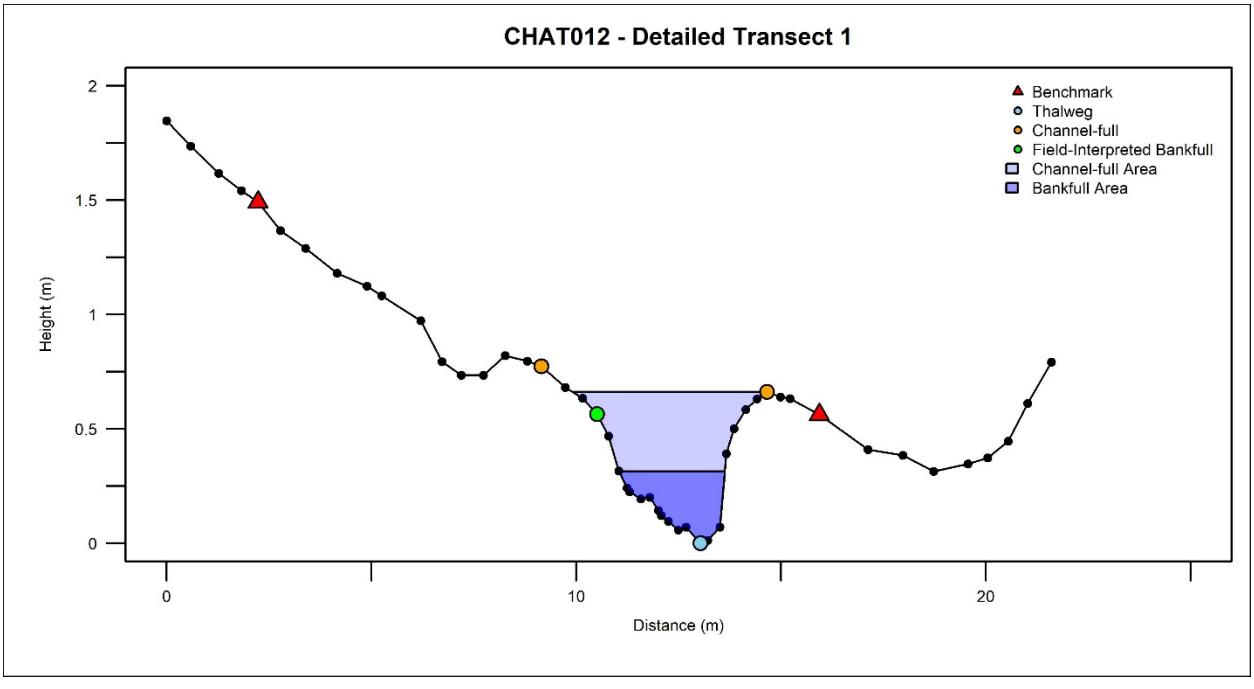


Figure 138. Detailed transect 1 (T1) at CHAT012. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Additionally, the channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 39. Cross-sectional characteristics for detailed transect 2 (T6) at CHAT012.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	0.78	3.18	0.24	2.65	0.60	4.41
Channel-full	2.18	7.31	0.30	6.72	0.88	7.60
Ratio	2.80	2.30	1.22	2.53	1.47	1.72

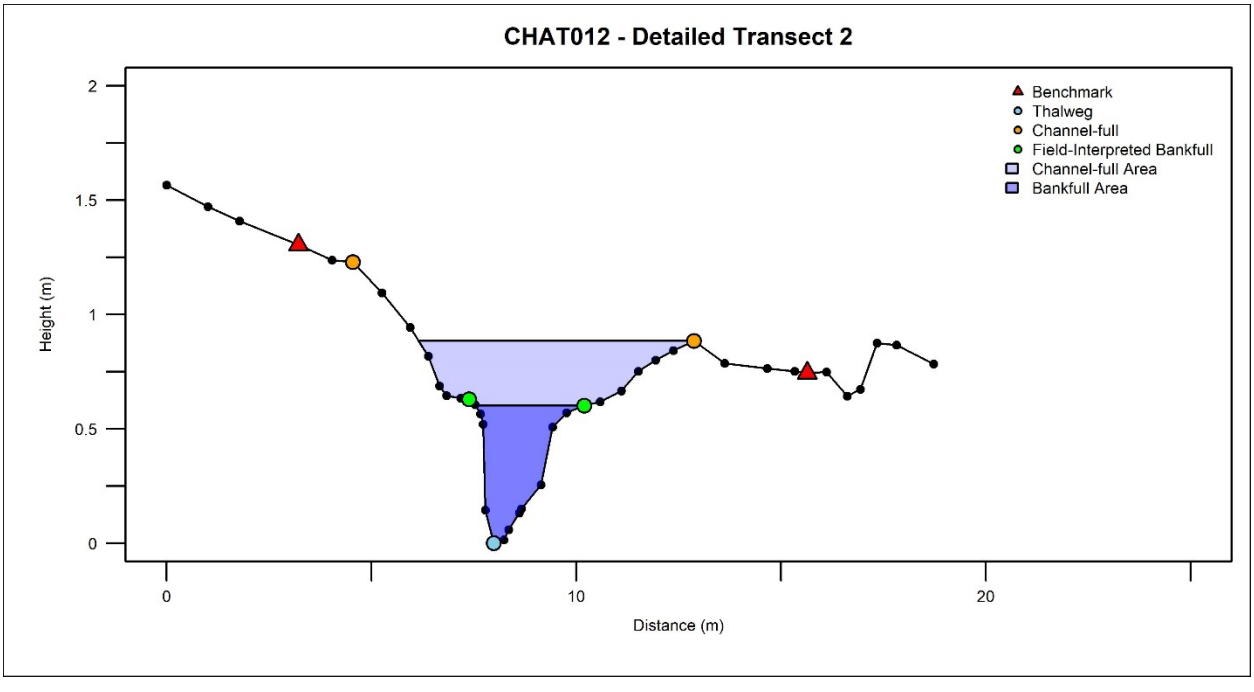


Figure 139. Detailed transect 2 (T6) at CHAT012. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 40. Cross-sectional characteristics for detailed transect 3 (T9) at CHAT012.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	0.30	1.88	0.16	1.59	0.30	5.39
Channel-full	1.11	3.94	0.28	3.46	0.64	5.37
Ratio	3.74	2.10	1.78	2.17	2.18	1.00

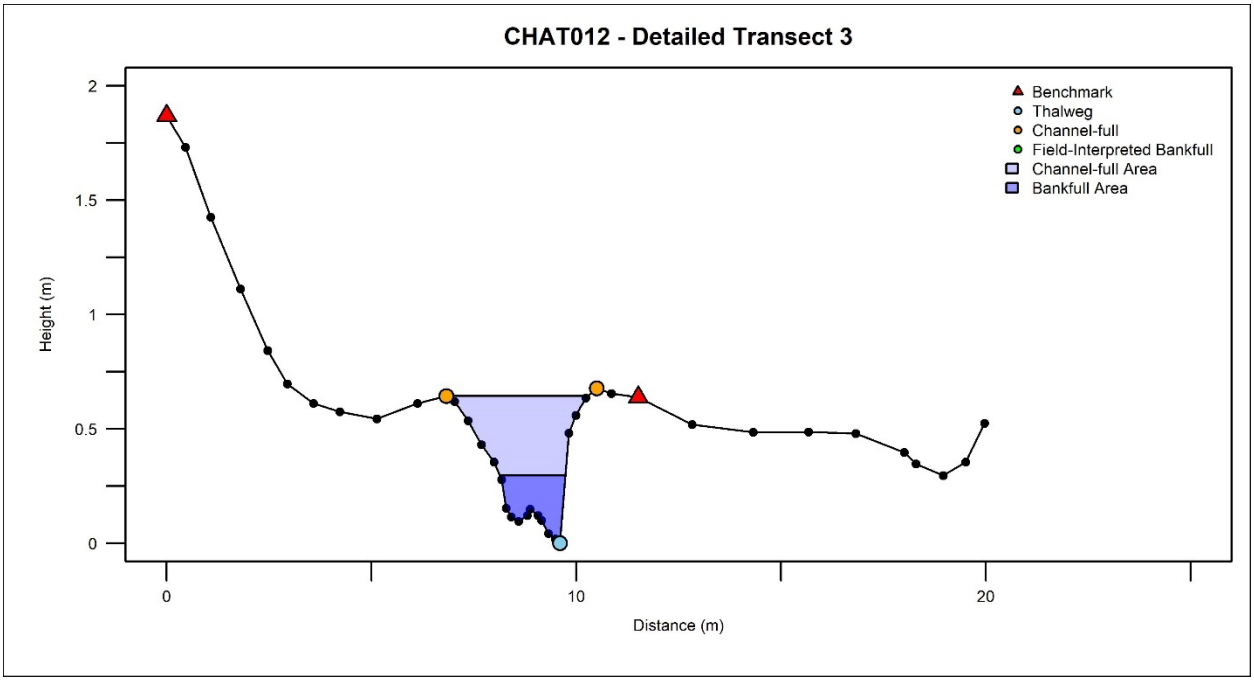


Figure 140. Detailed transect 3 (T9) at CHAT012. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Medium-Sized—Second Order Streams

Survey Results for CHAT004

This section provides transect-scale figures, results, and data summary tables of the 2021 survey of CHAT004. Figures include a watershed map (Figure 141); photographs taken in the upstream, downstream, left bank, and right bank directions at each detailed transect (T1, T5, and T9) during 2021 and 2017 (Figures 142 through 165); and cross-sectional channel characteristics at each detailed transect (Figures 166 through 168). Tables describe watershed land use characteristics (Table 41), observed geomorphic channel units (Table 42), characteristics of large woody debris (Table 43), canopy cover percentages (Table 44), channel and bank characteristics (Table 45), and cross-sectional channel characteristics at each detailed transect (Tables 46 through 48).

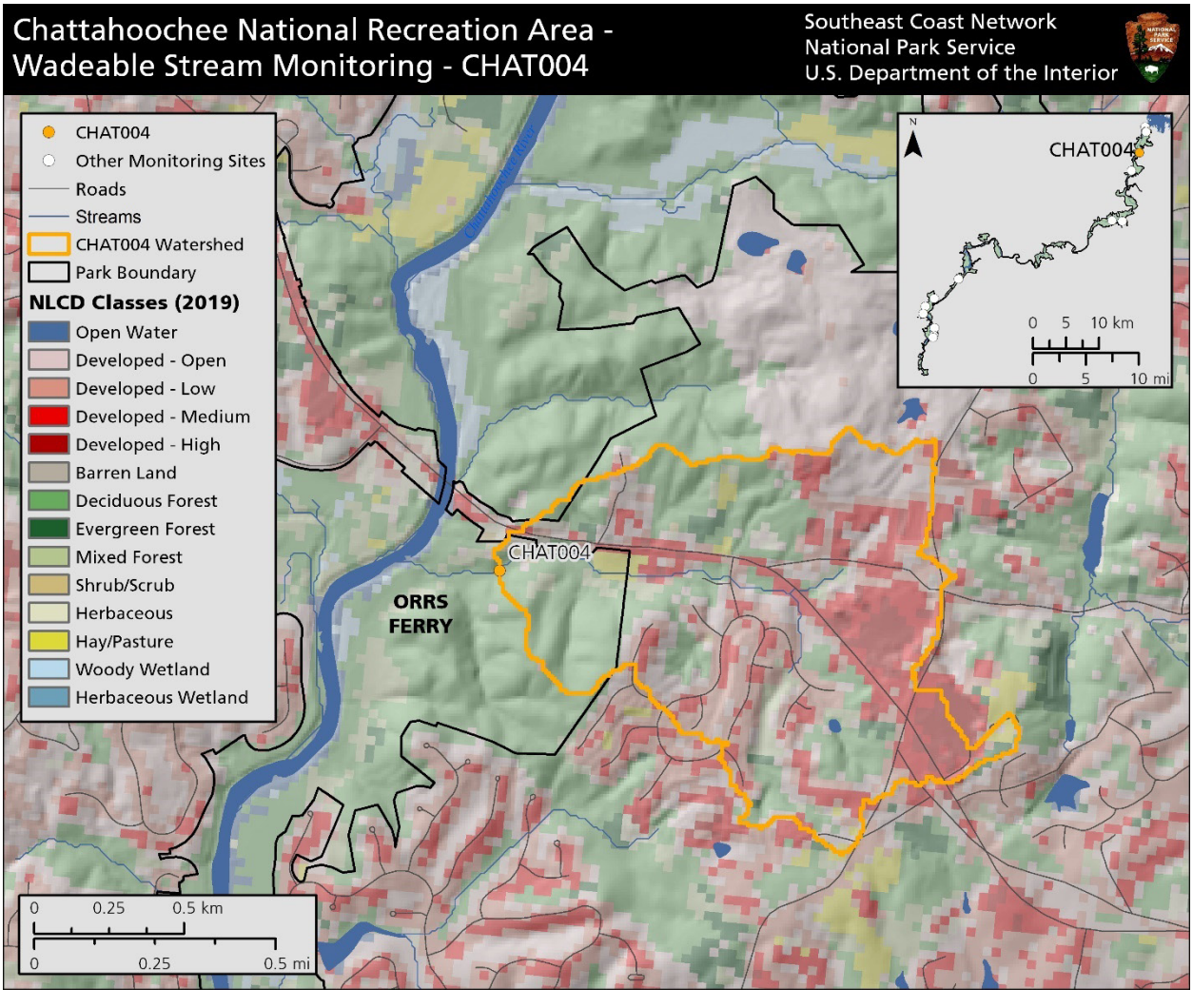


Figure 141. Map showing the watershed draining to CHAT004 at Chattahoochee National Recreation Area. The land use/land cover (NLCD 2019; Dewitz and USGS 2021), road network (USCB 2011), and perennial streams (derived from a 10 meter [32.8 feet] digital elevation model; data available from the U.S. Geological Survey) in the vicinity of the park are also shown. NPS / SECN STAFF



Figure 142. CHAT004 looking upstream from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 143. CHAT004 looking upstream from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 144. CHAT004 looking downstream from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 145. CHAT004 looking downstream from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 146. CHAT004 looking at the left bank from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 147. CHAT004 looking at the left bank from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 148. CHAT004 looking at the right bank from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 149. CHAT004 looking at the right bank from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 150. CHAT004 looking upstream from T5 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 151. CHAT004 looking upstream from T5 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 152. CHAT004 looking downstream from T5 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 153. CHAT004 looking downstream from T5 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 154. CHAT004 looking at the left bank from T5 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 155. CHAT004 looking at the left bank from T5 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 156. CHAT004 looking at the right bank from T5 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 157. CHAT004 looking at the right bank from T5 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 158. CHAT004 looking upstream from T9 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF

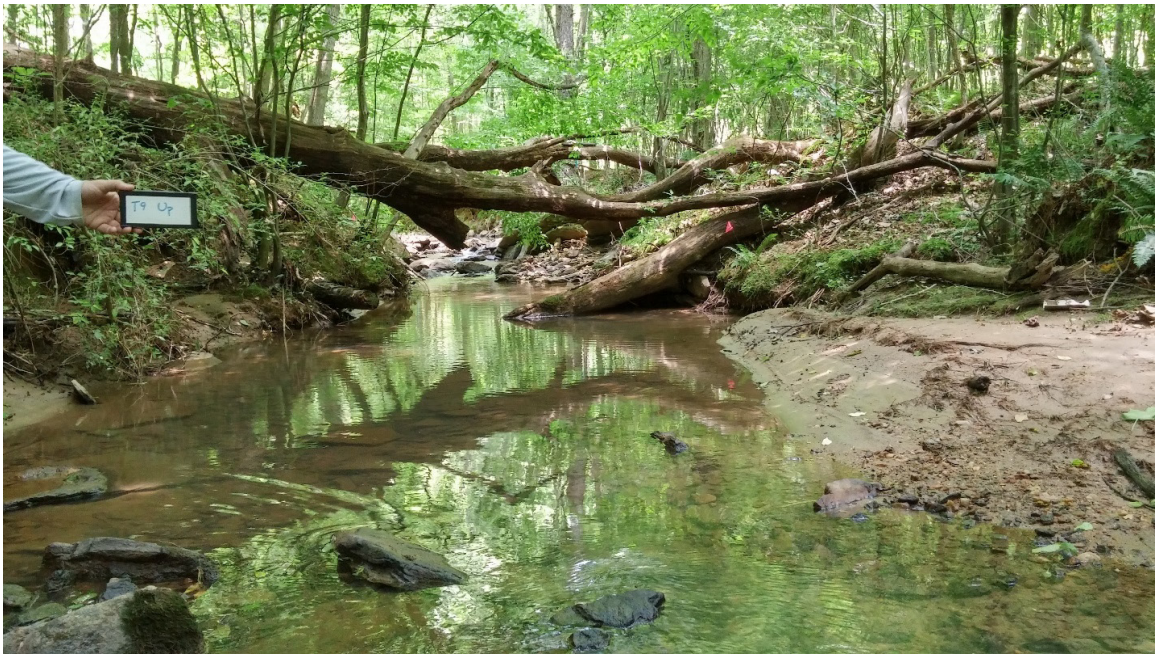


Figure 159. CHAT004 looking upstream from T9 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 160. CHAT004 looking downstream from T9 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 161. CHAT004 looking downstream from T9 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 162. CHAT004 looking at the left bank from T9 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 163. CHAT004 looking at the left bank from T9 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 164. CHAT004 looking at the right bank from T9 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 165. CHAT004 looking at the right bank from T9 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF

Table 41. Land use/land cover characteristics from the National Land Cover Dataset (Dewitz and USGS 2021) for CHAT004.

NLCD Class	2001 percent of watershed	2004 percent of watershed	2006 percent of watershed	2008 percent of watershed	2011 percent of watershed	2013 percent of watershed	2016 percent of watershed	2019 percent of watershed
Open Water	0	0	0	0	0	0	0	0
Developed - Open[1]	15	15	19	19	18	18	17	16
Developed - Low[1]	16	17	18	18	18	18	18	19
Developed - Medium[1]	9	11	12	12	15	15	17	20
Developed - High[1]	2	2	3	3	5	5	6	6
Barren	0	0	1	1	1	1	0	0
Deciduous	40	39	35	32	33	31	31	30
Evergreen	5	4	3	2	2	2	2	2
Mixed Forest	4	4	4	4	4	4	4	4
Shrub	0	1	1	1	0	0	0	1
Grassland	3	2	1	5	0	2	2	1
Pasture	6	4	4	4	4	4	4	2
Cultivated	0	0	0	0	0	0	0	0
Woody Wetland	0	0	0	0	0	0	0	0
Herbaceous Wetland	0	0	0	0	0	0	0	0

[1] refers to the intensity or type of development

Table 42. Geomorphic channel units (GCU) observed in the area between transects at CHAT004. The data describe the percent coverage of each type of GCU.

Transect	(%) Riffle	(%) Run	(%) Glide	(%) Pool	(%) Step
1–2	40	30	20	10	0
2–3	80	20	0	0	0
3–4	50	40	0	10	0
4–5	20	70	0	10	0
5–6	40	30	10	20	0
6–7	20	70	10	0	0
7–8	40	40	20	0	0
8–9	10	50	0	0	0
9–10	10	90	0	0	0
10–11	20	30	50	0	0
Frequency	10	10	5	4	0
Max (%)	80	90	50	20	0
Mean (%)	33	47	11	5	0
Median (%)	30	40	5	0	0
SD (%)	22	23	16	7	0

Table 43. Characteristics of the large woody debris observed at CHAT004.

LWD ID	Length (m)	Diameter (m)	Volume (m^3)	Transect Interval	Function	Position
1	5.41	0.22	0.21	10	Bank Protection	Buried
2	4.38	0.15	0.08	9	Bank Protection	Ramp
3	7.11	0.34	0.65	8	Jam	Ramp
4	1.83	0.10	0.01	8	None	Free
5	2.87	0.17	0.07	8	Jam	Jam
6	2.00	0.14	0.03	7	Jam	Jam
7	2.94	0.27	0.17	7	Jam	Ramp
8	1.84	0.11	0.02	7	None	Free
9	2.82	0.15	0.05	7	None	Ramp
10	6.82	0.18	0.17	6	None	Bridge
11	5.68	0.10	0.04	6	None	Bridge
12	1.59	0.15	0.03	6	None	Free
13	1.60	0.20	0.05	5	None	Ramp
14	2.76	0.10	0.02	5	None	Ramp
15	1.90	0.10	0.01	2	None	Free

Table 44. Variability of canopy cover observed at CHAT004.

Transect	Canopy Cover (%)
1	90
2	91
3	91
4	96
5	94
6	93
7	88
8	96
9	97
10	99
11	99
Min (%)	88
Max (%)	99
Mean (%)	94
Median (%)	94
SD (%)	4
CV	0.04

Table 45. Average reach-scale bank characteristics at CHAT004. 'L' indicates left bank and 'R' indicates right bank.

Bank Characteristics	n (L)	n (R)	Min (L)	Min (R)	Max (L)	Max (R)	Mean (L)	Mean (R)	Median (L)	Median (R)	SD (L)	SD (R)	CV (L)	CV (R)
Bank Height[1] (m)	11	11	0.98	0.67	2.35	2.36	1.83	1.66	1.95	1.73	0.48	0.57	0.26	0.34
Bankfull Height[1,2] (m)	3	4	0.98	0.67	1.30	1.58	1.13	1.06	1.12	0.99	0.16	0.39	0.14	0.37
Channel-full Height[1,2] (m)	11	11	1.78	1.62	2.35	2.48	2.07	2.04	2.06	1.98	0.18	0.27	0.09	0.13
Water Depth at Base[3] (m)	11	11	-0.34	-0.38	0.17	0.19	-0.06	-0.05	0.02	0.00	0.18	0.18	–	–
Bank Undercut[2] (m)	5	6	0.29	0.15	1.30	0.60	0.51	0.31	0.30	0.29	0.44	0.16	0.86	0.51
Bank Angle (o)	11	11	27	30	91	86	61	56	64	53	18	18	0.30	0.32
Vegetation Cover (%)	11	11	10	30	50	80	34	58	30	60	10	17	0.31	0.30
Bank Stability[4]	11	11	At-Risk	Unstable	Very Unstable	Unstable	Unstable	Unstable	Unstable	Unstable	2.10	1.07	0.16	0.09

[1] above thalweg

[2] statistics are based on the transects where feature is present (# in parentheses)

[3] a negative number indicates base of bank is above the water surface

[4] See Table 1 for explanation of scores

Table 46. Cross-sectional characteristics for detailed transect 1 (T1) at CHAT004.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	4.61	7.72	0.60	7.08	1.11	6.38
Channel-full	19.39	16.47	1.18	15.02	2.23	6.74
Ratio	4.21	2.13	1.97	2.12	2.01	1.06

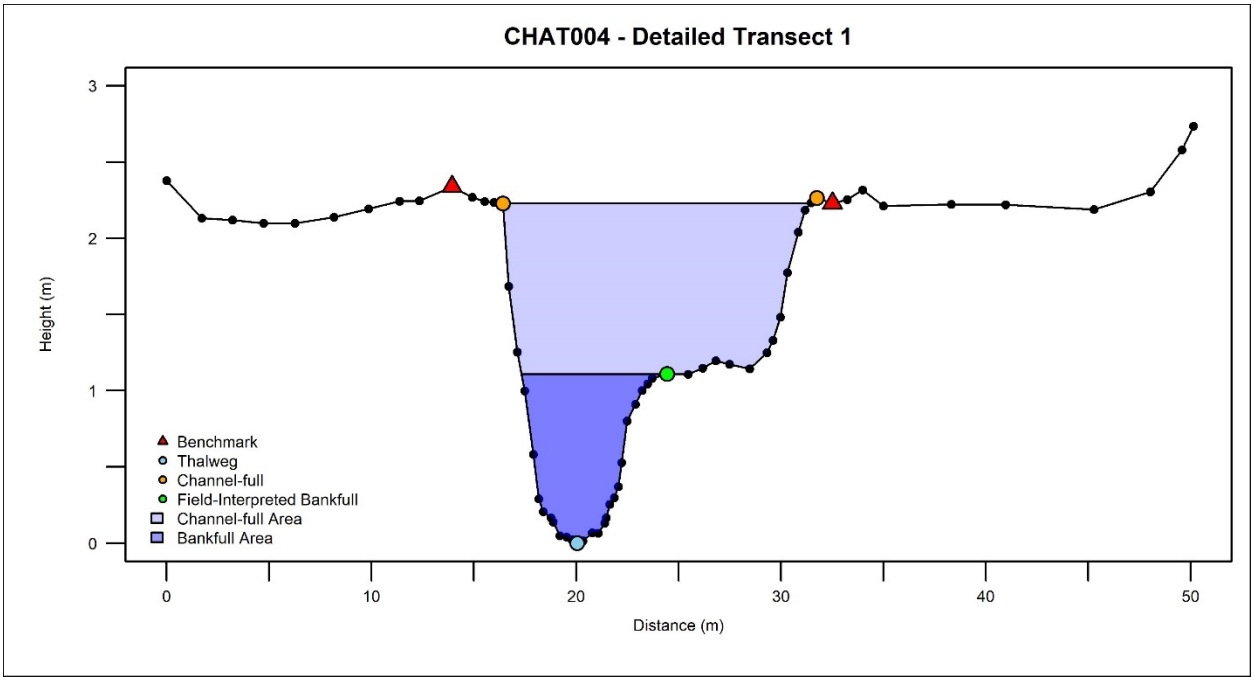


Figure 166. Detailed transect 1 (T1) at CHAT004. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Additionally, the channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 47. Cross-sectional characteristics for detailed transect 2 (T5) at CHAT004.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	4.09	6.96	0.59	6.12	0.89	6.87
Channel-full	12.25	10.90	1.12	8.94	2.02	4.44
Ratio	2.99	1.57	1.91	1.46	2.27	0.65

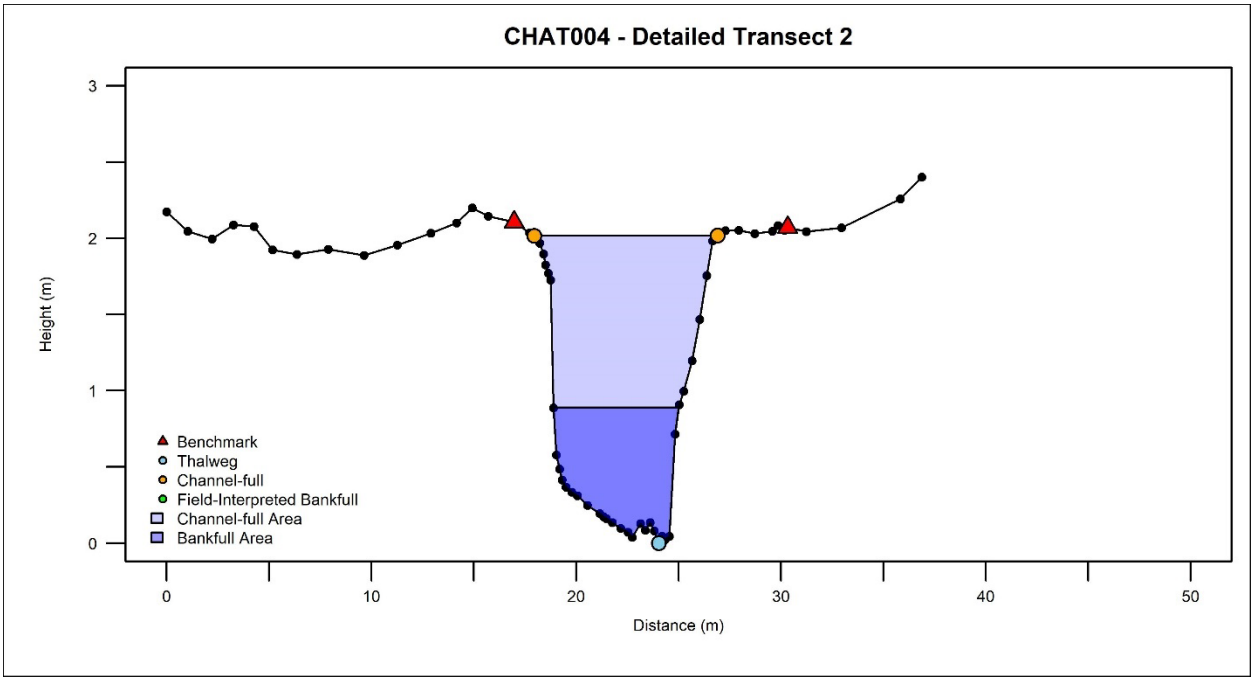


Figure 167. Detailed transect 2 (T5) at CHAT004. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 48. Cross-sectional characteristics for detailed transect 3 (T9) at CHAT004.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	3.47	5.89	0.59	5.00	0.89	5.61
Channel-full	8.73	9.29	0.94	7.70	1.78	4.33
Ratio	2.52	1.58	1.60	1.54	2.00	0.77

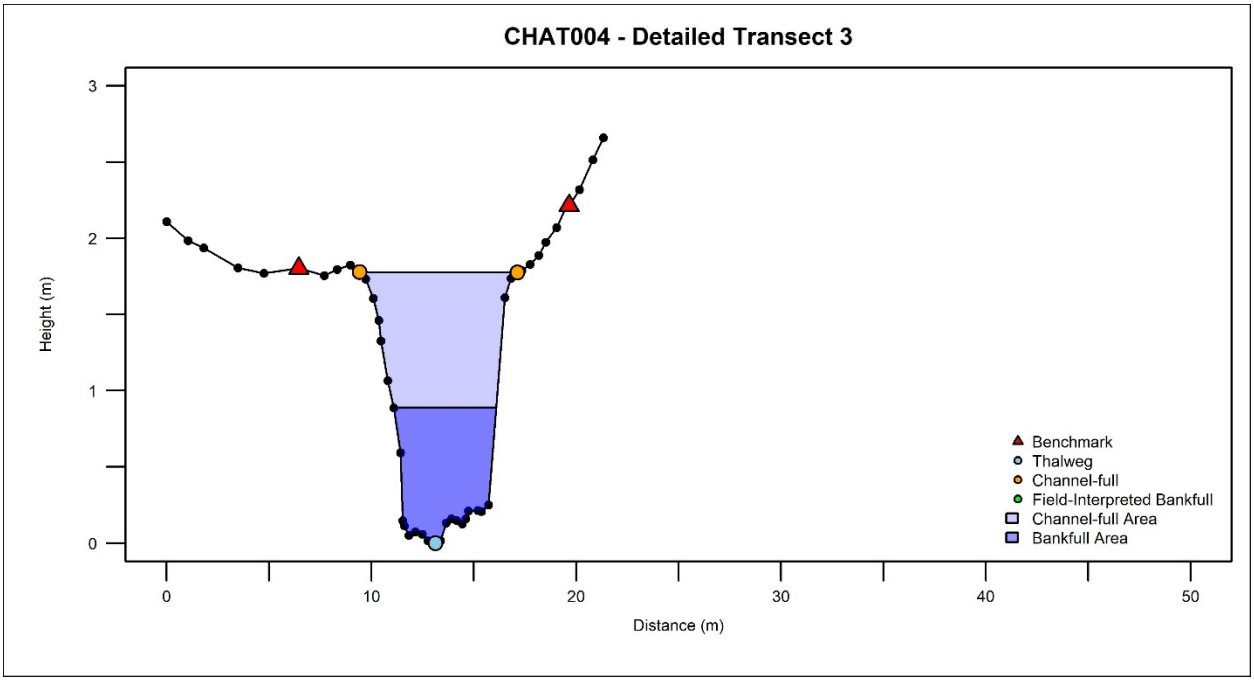


Figure 168. Detailed transect 3 (T9) at CHAT004. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Survey Results for CHAT005

This section provides transect-scale figures, results, and data summary tables of the 2021 survey of CHAT005. Figures include a watershed map (Figure 169); photographs taken in the upstream, downstream, left bank, and right bank directions at each detailed transect (T1, T6, and T11) during 2021 and 2017 (Figures 170 through 193); and cross-sectional channel characteristics at each detailed transect (Figures 194 through 196). Tables describe watershed land use characteristics (Table 49), observed geomorphic channel units (Table 50), characteristics of large woody debris (Table 51), canopy cover percentages (Table 52), channel and bank characteristics (Table 53), and cross-sectional channel characteristics at each detailed transect (Tables 54 through 56).

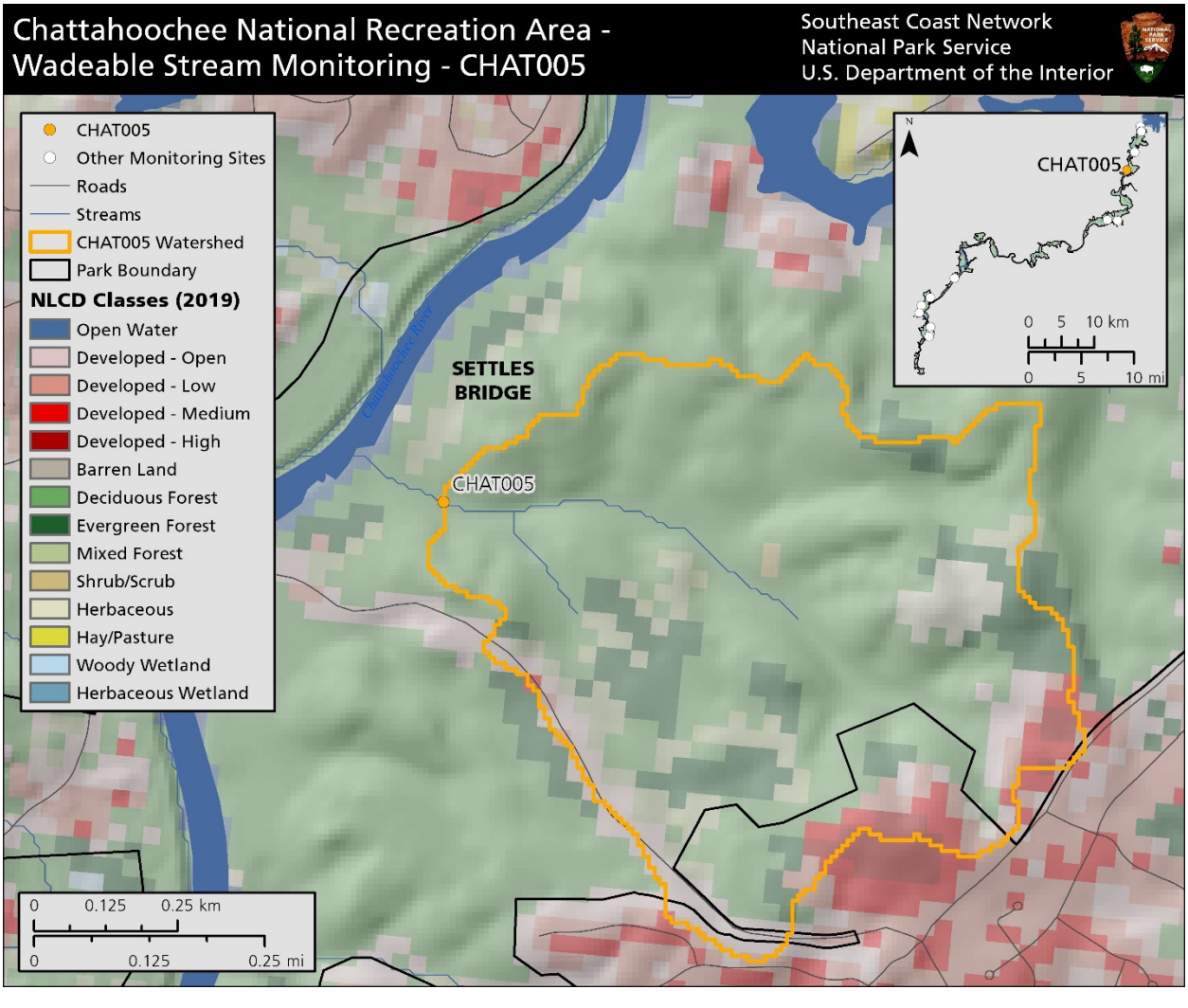


Figure 169. Map showing the watershed draining to CHAT005 at Chattahoochee National Recreation Area. The land use/land cover (NLCD 2019; Dewitz and USGS 2021), road network (USCB 2011), and perennial streams (derived from a 10 meter [32.8 feet] digital elevation model; data available from the U.S. Geological Survey) in the vicinity of the park are also shown. NPS / SECN STAFF



Figure 170. CHAT005 looking upstream from T1 (detailed transect 1) during the 2021 surveys. NPS / SECN STAFF



Figure 171. CHAT005 looking upstream from T1 (detailed transect 1) during the 2017 surveys. NPS / SECN STAFF



Figure 172. CHAT005 looking downstream from T1 (detailed transect 1) during the 2021 surveys. NPS / SECN STAFF



Figure 173. CHAT005 looking downstream from T1 (detailed transect 1) during the 2017 surveys. NPS / SECN STAFF



Figure 174. CHAT005 looking at the left bank from T1 (detailed transect 1) during the 2021 surveys. NPS / SECN STAFF



Figure 175. CHAT005 looking at the left bank from T1 (detailed transect 1) during the 2017 surveys. NPS / SECN STAFF



Figure 176. CHAT005 looking at the right bank from T1 (detailed transect 1) during the 2021 surveys. NPS / SECN STAFF



Figure 177. CHAT005 looking at the right bank from T1 (detailed transect 1) during the 2017 surveys. NPS / SECN STAFF



Figure 178. CHAT005 looking upstream from T6 (detailed transect 2) during the 2021 surveys. NPS / SECN STAFF



Figure 179. CHAT005 looking upstream from T6 (detailed transect 2) during the 2017 surveys. NPS / SECN STAFF



Figure 180. CHAT005 looking downstream from T6 (detailed transect 2) during the 2021 surveys. NPS / SECN STAFF



Figure 181. CHAT005 looking downstream from T6 (detailed transect 2) during the 2017 surveys. NPS / SECN STAFF



Figure 182. CHAT005 looking at the left bank from T6 (detailed transect 2) during the 2021 surveys. NPS / SECN STAFF



Figure 183. CHAT005 looking at the left bank from T6 (detailed transect 2) during the 2017 surveys. NPS / SECN STAFF



Figure 184. CHAT005 looking at the right bank from T6 (detailed transect 2) during the 2021 surveys. NPS / SECN STAFF



Figure 185. CHAT005 looking at the right bank from T6 (detailed transect 2) during the 2017 surveys. NPS / SECN STAFF



Figure 186. CHAT005 looking upstream from T11 (detailed transect 3) during the 2021 surveys. NPS / SECN STAFF



Figure 187. CHAT005 looking upstream from T11 (detailed transect 3) during the 2017 surveys. NPS / SECN STAFF



Figure 188. CHAT005 looking downstream from T11 (detailed transect 3) during the 2021 surveys. NPS / SECN STAFF



Figure 189. CHAT005 looking downstream from T11 (detailed transect 3) during the 2017 surveys. NPS / SECN STAFF



Figure 190. CHAT005 looking at the left bank from T11 (detailed transect 3) during the 2021 surveys. NPS / SECN STAFF



Figure 191. CHAT005 looking at the left bank from T11 (detailed transect 3) during the 2017 surveys. NPS / SECN STAFF



Figure 192. CHAT005 looking at the right bank from T11 (detailed transect 3) during the 2021 surveys. NPS / SECN STAFF



Figure 193. CHAT005 looking at the right bank from T11 (detailed transect 3) during the 2017 surveys. NPS / SECN STAFF

Table 49. Land use/land cover characteristics from the National Land Cover Dataset (Dewitz and USGS 2021) for CHAT005.

NLCD Class	2001 percent of watershed	2004 percent of watershed	2006 percent of watershed	2008 percent of watershed	2011 percent of watershed	2013 percent of watershed	2016 percent of watershed	2019 percent of watershed
Open Water	0	0	0	0	0	0	0	0
Developed - Open[1]	5	5	6	7	7	7	7	6
Developed - Low[1]	2	2	2	3	3	3	3	3
Developed - Medium[1]	1	1	1	2	2	2	2	2
Developed - High[1]	1	1	1	2	2	2	2	2
Barren	0	0	0	0	0	0	0	0
Deciduous	63	63	63	63	62	62	65	65
Evergreen	20	20	19	10	10	10	12	12
Mixed Forest	7	7	7	7	7	7	7	7
Shrub	0	0	0	0	0	4	0	0
Grassland	0	0	1	8	8	4	3	3
Pasture	0	0	0	0	0	0	0	0
Cultivated	0	0	0	0	0	0	0	0
Woody Wetland	0	0	0	0	0	0	0	0
Herbaceous Wetland	0	0	0	0	0	0	0	0

[1] refers to the intensity or type of development

Table 50. Geomorphic channel units (GCU) observed in the area between transects at CHAT005. The data describe the percent coverage of each type of GCU.

Transect	(%) Riffle	(%) Run	(%) Glide	(%) Pool	(%) Step
1–2	0	50	20	30	0
2–3	0	30	20	20	30
3–4	30	20	30	0	20
4–5	30	70	0	0	0
5–6	70	30	0	0	0
6–7	10	30	50	10	0
7–8	100	0	0	0	0
8–9	100	0	0	0	0
9–10	100	0	0	0	0
10–11	60	40	0	0	0
Frequency	8	7	4	3	2
Max (%)	100	70	50	30	30
Mean (%)	50	27	12	6	5
Median (%)	45	30	0	0	0
SD (%)	41	23	18	11	11

Table 51. Characteristics of the large woody debris observed at CHAT005.

LWD ID	Length (m)	Diameter (m)	Volume (m^3)	Transect Interval	Function	Position
1	4.67	0.22	0.18	3	Pool Formation	Jam
2	1.33	0.12	0.02	3	Bank Protection	Jam
3	1.69	0.15	0.03	3	Bank Protection	Jam
4	1.63	0.10	0.01	3	Bank Protection	Jam
5	1.22	0.22	0.05	2	Jam	Jam
6	2.66	0.28	0.16	2	None	Ramp
7	7.72	0.27	0.44	1	Sediment trap, Organic trap	Jam
8	2.91	0.27	0.17	1	Sediment trap	Bridge

Table 52. Variability of canopy cover observed at CHAT005.

Transect	Canopy Cover (%)
1	91
2	93
3	97
4	91
5	97
6	93
7	93
8	93
9	88
10	90
11	96
Min (%)	88
Max (%)	97
Mean (%)	93
Median (%)	93
SD (%)	3
CV	0.03

Table 53. Average reach-scale bank characteristics at CHAT005. 'L' indicates left bank and 'R' indicates right bank.

Bank Characteristics	n (L)	n (R)	Min (L)	Min (R)	Max (L)	Max (R)	Mean (L)	Mean (R)	Median (L)	Median (R)	SD (L)	SD (R)	CV (L)	CV (R)
Bank Height[1] (m)	11	11	0.53	0.50	2.17	1.77	1.24	1.19	1.17	1.21	0.42	0.35	0.34	0.30
Bankfull Height[1,2] (m)	3	2	0.53	0.50	1.13	0.78	0.79	0.64	0.71	0.64	0.31	0.20	0.39	0.31
Channel-full Height[1,2] (m)	11	11	1.16	1.00	2.17	1.77	1.45	1.34	1.39	1.34	0.32	0.23	0.22	0.17
Water Depth at Base[3] (m)	11	11	-0.21	-0.26	0.45	0.25	0.04	0.05	0.03	0.05	0.18	0.13	–	–
Bank Undercut[2] (m)	2	6	0.60	0.17	0.67	0.75	0.64	0.33	0.64	0.24	0.05	0.22	0.08	0.66
Bank Angle [(o)]	11	11	23	20	91	90	48	52	47	41	25	27	0.52	0.52
Vegetation Cover (%)	11	11	20	10	80	60	46	35	40	40	22	14	0.47	0.41
Bank Stability[4]	11	11	At-Risk	At-Risk	Unstable	Unstable	Unstable	Unstable	Unstable	Unstable	1.77	1.63	0.15	0.13

[1] above thalweg

[2] statistics are based on the transects where feature is present (# in parentheses)

[3] a negative number indicates base of bank is above the water surface

[4] See Table 1 for explanation of scores

Table 54. Cross-sectional characteristics for detailed transect 1 (T1) at CHAT005.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	1.21	3.50	0.35	3.05	0.52	5.86
Channel-full	5.10	6.63	0.77	5.33	1.44	3.71
Ratio	4.20	1.89	2.22	1.75	2.76	0.63

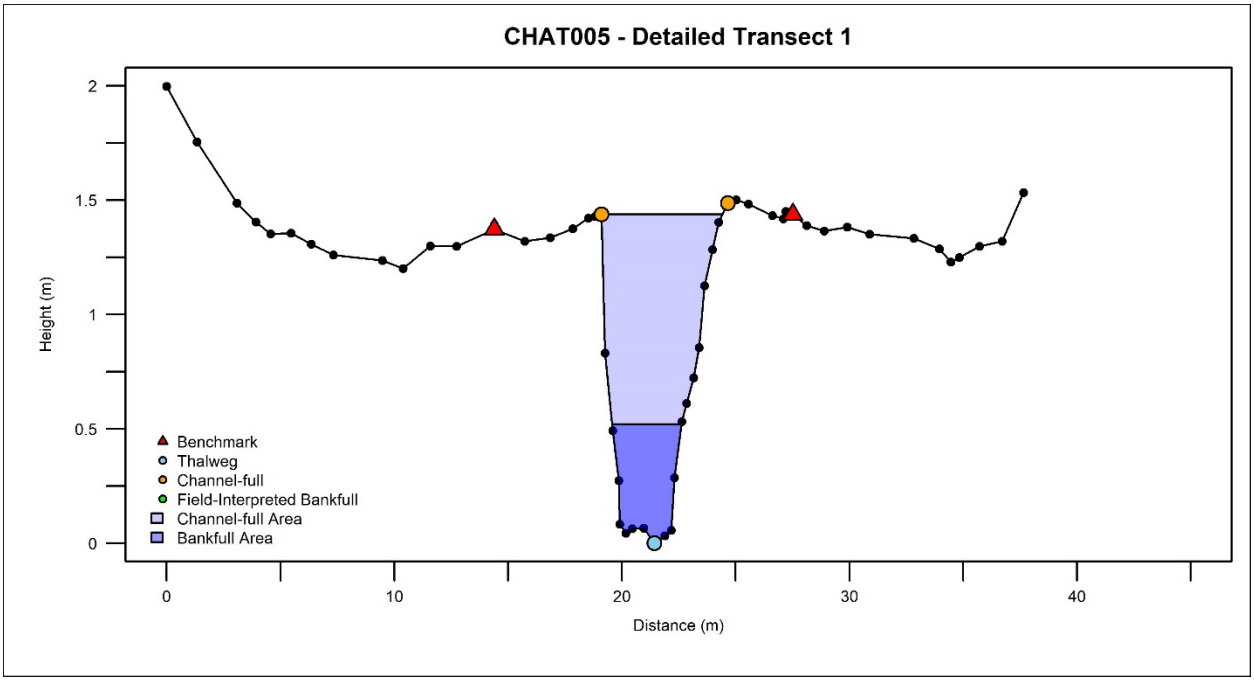


Figure 194. Detailed transect 1 (T1) at CHAT005. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Additionally, the channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 55. Cross-sectional characteristics for detailed transect 2 (T6) at CHAT005.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	1.53	4.27	0.36	3.97	0.52	7.64
Channel-full	4.78	7.01	0.68	6.28	1.17	5.38
Ratio	3.12	1.64	1.90	1.58	2.24	0.70

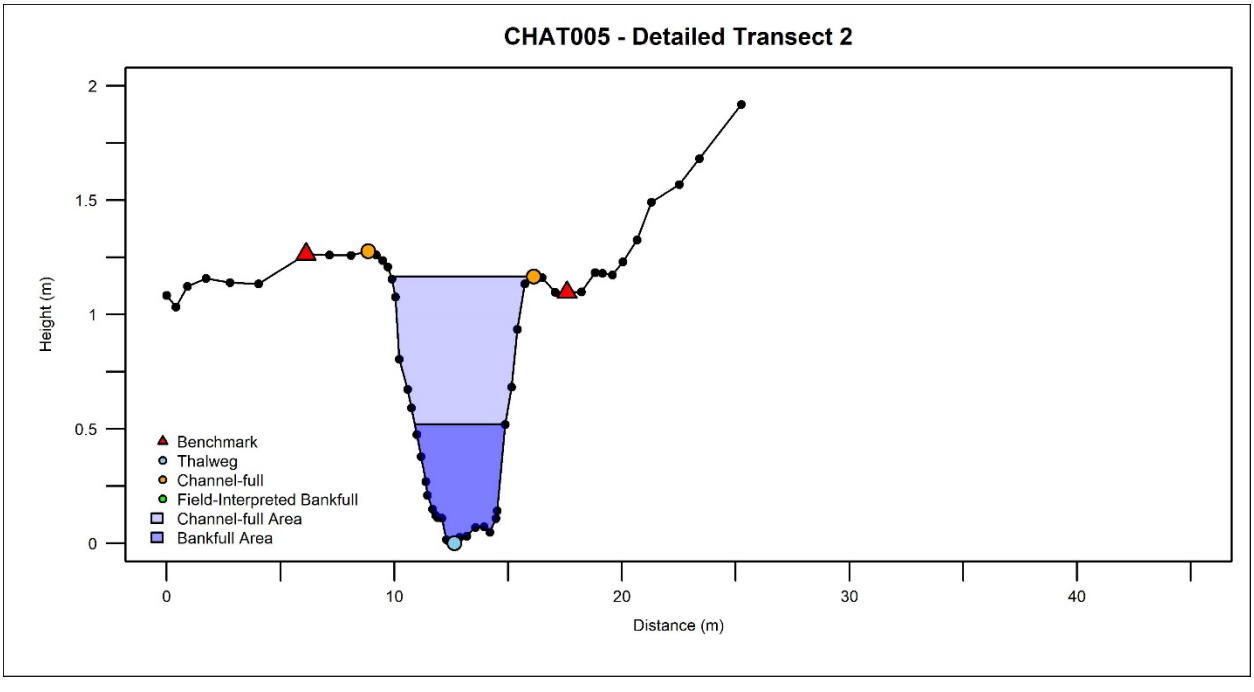


Figure 195. Detailed transect 2 (T6) at CHAT005. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 56. Cross-sectional characteristics for detailed transect 3 (T11) at CHAT005.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	1.52	4.46	0.34	4.01	0.52	7.71
Channel-full	3.95	6.21	0.63	5.11	1.07	4.78
Ratio	2.60	1.39	1.87	1.27	2.06	0.62

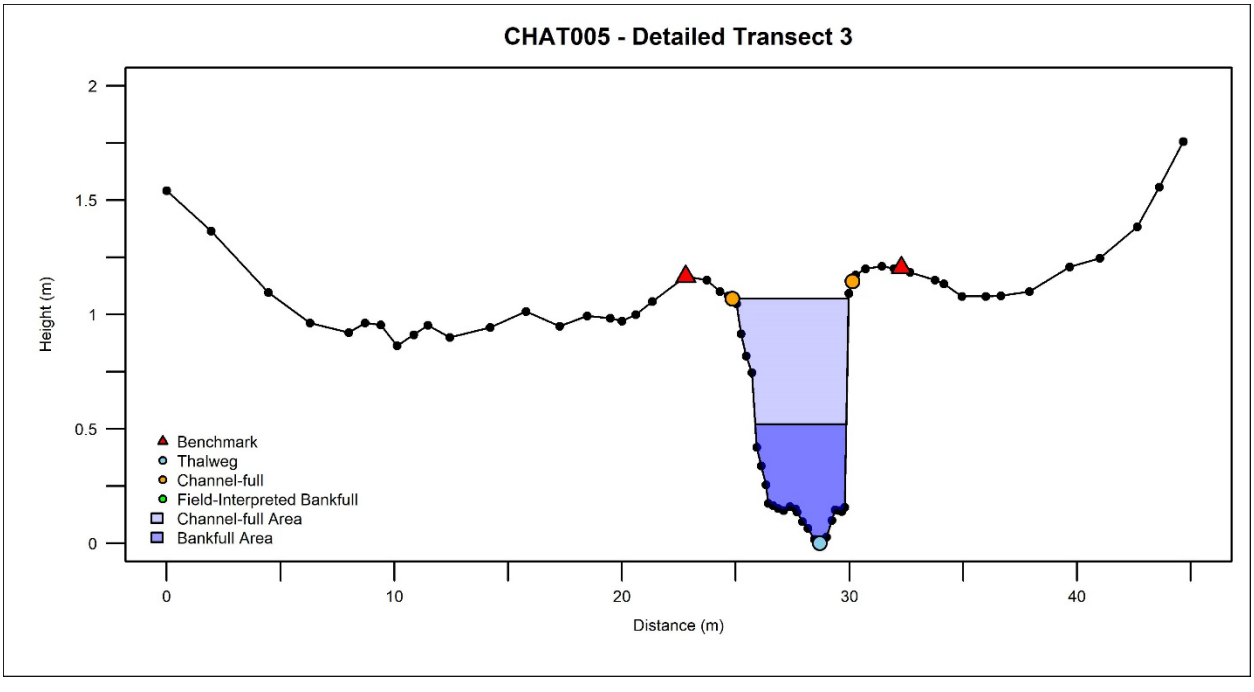


Figure 196. Detailed transect 3 (T11) at CHAT005. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Survey Results for CHAT008

This section provides transect-scale figures, results, and data summary tables of the 2021 survey of CHAT008. Figures include a watershed map (Figure 1); photographs taken in the upstream, downstream, left bank, and right bank directions at each detailed transect (T1, T6, and T11) during 2021 and 2017 (Figures 2 through 25); and cross-sectional channel characteristics at each detailed transect (Figures 26 through 28). Tables describe watershed land use characteristics (Table 1), observed geomorphic channel units (Table 2), characteristics of large woody debris (Table 3), canopy cover percentages (Table 4), channel and bank characteristics (Table 5), and cross-sectional channel characteristics at each detailed transect (Tables 6 through 8).

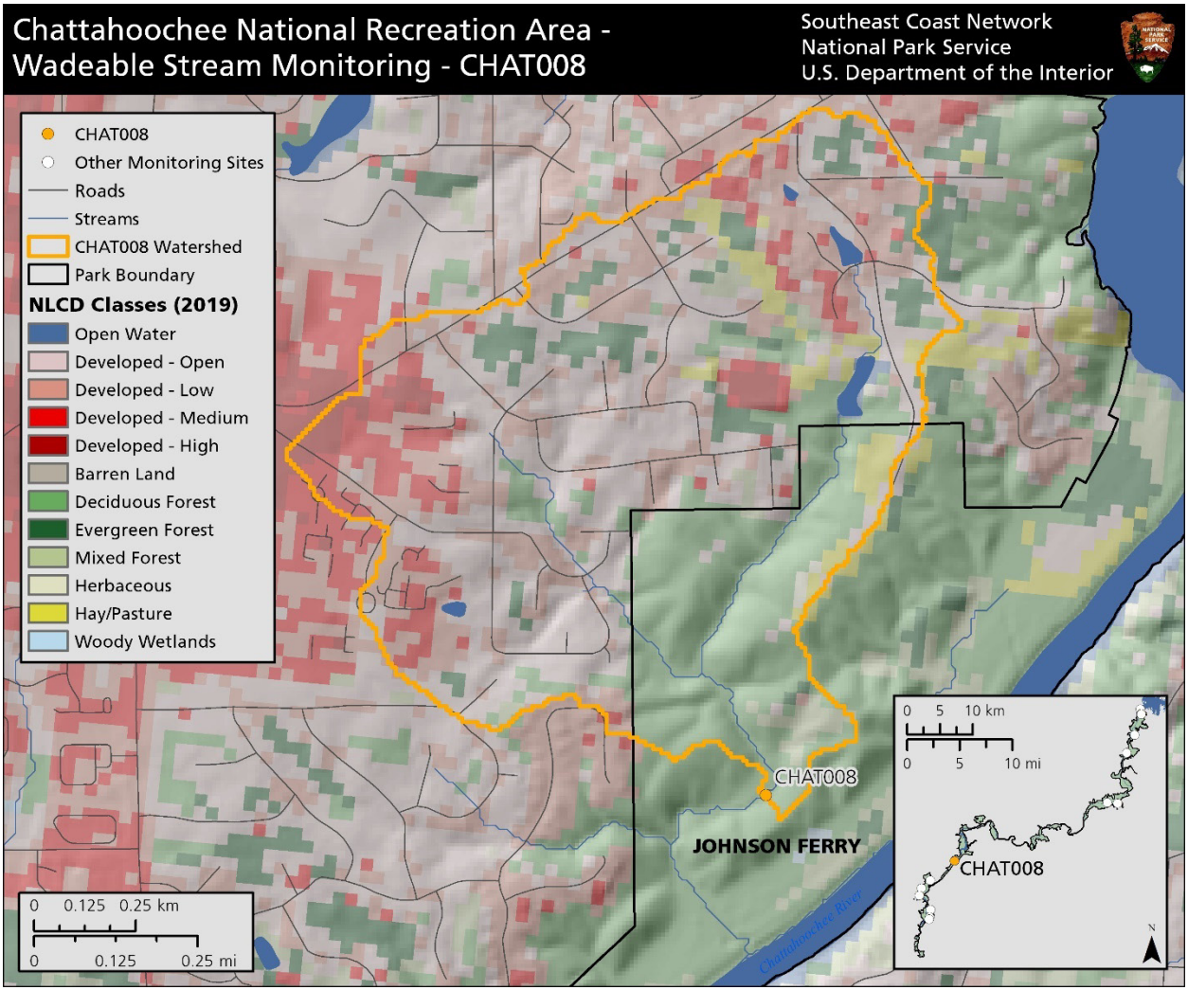


Figure 197. Map showing the watershed draining to CHAT008 at Chattahoochee National Recreation Area. The land use/land cover (NLCD 2019; Dewitz and USGS 2021), road network (USCB 2011), and perennial streams (derived from a 10 meter [32.8 feet] digital elevation model; data available from the U.S. Geological Survey) in the vicinity of the park are also shown. NPS / SECN STAFF



Figure 198. CHAT008 looking upstream from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 199. CHAT008 looking upstream from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 200. CHAT008 looking downstream from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 201. CHAT008 looking downstream from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 202. CHAT008 looking at the left bank from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 203. CHAT008 looking at the left bank from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 204. CHAT008 looking at the right bank from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 205. CHAT008 looking at the right bank from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 206. CHAT008 looking upstream from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 207. CHAT008 looking upstream from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 208. CHAT008 looking downstream from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 209. CHAT008 looking downstream from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 210. CHAT008 looking at the left bank from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 211. CHAT008 looking at the left bank from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 212. CHAT008 looking at the right bank from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 213. CHAT008 looking at the right bank from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 214. CHAT008 looking upstream from T11 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 215. CHAT008 looking upstream from T11 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 216. CHAT008 looking downstream from T11 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 217. Photograph taken on CHAT008 looking downstream from T11 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 218. CHAT008 looking at the left bank from T11 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 219. CHAT008 looking at the left bank from T11 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 220. CHAT008 looking at the right bank from T11 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 221. CHAT008 looking at the right bank from T11 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF

Table 57. Land use/land cover characteristics from the National Land Cover Dataset (Dewitz and USGS 2021) for CHAT008.

NLCD Class	2001 percent of watershed	2004 percent of watershed	2006 percent of watershed	2008 percent of watershed	2011 percent of watershed	2013 percent of watershed	2016 percent of watershed	2019 percent of watershed
Open Water	0	0	0	0	0	0	0	0
Developed - Open[1]	33	33	32	32	32	32	32	31
Developed - Low[1]	23	23	23	23	23	23	23	23
Developed - Medium[1]	6	7	7	7	7	7	7	8
Developed - High[1]	1	1	2	2	2	2	2	2
Barren	0	0	0	0	0	0	0	0
Deciduous	23	23	23	23	23	23	23	23
Evergreen	6	6	6	6	6	6	6	6
Mixed Forest	2	2	2	2	2	2	2	2
Shrub	0	0	0	0	0	0	0	0
Grassland	0	0	0	0	0	0	0	0
Pasture	4	4	4	4	4	4	4	4
Cultivated	0	0	0	0	0	0	0	0
Woody Wetland	0	0	0	0	0	0	0	0
Herbaceous Wetland	0	0	0	0	0	0	0	0

[1] refers to the intensity or type of development

Table 58. Geomorphic channel units (GCU) observed in the area between transects at CHAT008. The data describe the percent coverage of each type of GCU.

Transect	(%) Riffle	(%) Run	(%) Glide	(%) Pool	(%) Step
1–2	0	80	0	20	0
2–3	80	10	0	10	0
3–4	40	30	0	30	0
4–5	90	10	0	0	0
5–6	70	20	0	10	0
6–7	50	50	0	0	0
7–8	0	10	70	20	0
8–9	30	0	40	30	0
9–10	100	0	0	0	0
10–11	50	50	0	0	0
Frequency	8	8	2	6	0
Max (%)	100	80	70	30	0
Mean (%)	51	26	11	12	0
Median (%)	50	15	0	10	0
SD (%)	35	26	24	12	0

Table 59. Characteristics of the large woody debris observed at CHAT008.

LWD ID	Length (m)	Diameter (m)	Volume (m^3)	Transect Interval	Function	Position
1	2.90	0.14	0.04	10	Bank Protection	Buried
2	1.72	0.14	0.03	10	None	Free
3	6.70	0.15	0.12	6	Organic trap	Jam
4	4.82	0.20	0.15	6	Bank Protection	Jam
5	6.07	0.12	0.07	6	Organic trap	Jam
6	4.34	0.19	0.12	6	Organic trap	Jam
7	2.32	0.11	0.02	6	Organic trap	Jam
8	3.87	0.10	0.03	4	Organic trap	Jam
9	5.93	0.59	1.62	4	None	Ramp
10	4.54	0.11	0.04	3	Organic trap	Jam
11	5.75	0.16	0.12	2	Organic trap	Jam

Table 60. Variability of canopy cover observed at CHAT008.

Transect	Canopy Cover (%)
1	90
2	97
3	96
4	91
5	99
6	93
7	94
8	91
9	91
10	91
11	90
Min (%)	90
Max (%)	99
Mean (%)	93
Median (%)	91
SD (%)	3
CV	0.03

Table 61. Average reach-scale bank characteristics at CHAT008. 'L' indicates left bank and 'R' indicates right bank.

Bank Characteristics	n (L)	n (R)	Min (L)	Min (R)	Max (L)	Max (R)	Mean (L)	Mean (R)	Median (L)	Median (R)	SD (L)	SD (R)	CV (L)	CV (R)
Bank Height[1] (m)	11	11	0.74	0.64	1.70	1.91	1.29	1.35	1.43	1.54	0.39	0.47	0.30	0.35
Bankfull Height[1,2] (m)	5	4	0.74	0.64	1.09	0.89	0.90	0.78	0.94	0.79	0.15	0.10	0.17	0.14
Channel-full Height[1,2] (m)	11	11	1.43	1.39	1.94	1.91	1.69	1.64	1.65	1.62	0.14	0.14	0.08	0.08
Water Depth at Base[3] (m)	11	11	-0.25	-0.32	0.06	0.19	-0.09	-0.06	-0.10	-0.12	0.12	0.16	–	–
Bank Undercut[2] (m)	2	3	0.19	0.19	0.19	0.55	0.19	0.33	0.19	0.25	0.00	0.19	0.00	0.58
Bank Angle (o)	11	11	14	21	91	88	48	52	53	58	27	22	0.56	0.42
Vegetation Cover (%)	11	11	20	10	70	60	36	41	30	40	16	17	0.45	0.42
Bank Stability[4]	11	11	Unstable	Unstable	Unstable	Very Unstable	Unstable	Unstable	Unstable	Unstable	0.78	1.65	0.06	0.13

[1] above thalweg

[2] statistics are based on the transects where feature is present (# in parentheses)

[3] a negative number indicates base of bank is above the water surface

[4] See Table 1 for explanation of scores

Table 62. Cross-sectional characteristics for detailed transect 1 (T1) at CHAT008.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	3.85	7.22	0.53	6.55	0.94	6.99
Channel-full	9.68	12.13	0.80	11.18	1.56	7.15
Ratio	2.51	1.68	1.50	1.71	1.67	1.02

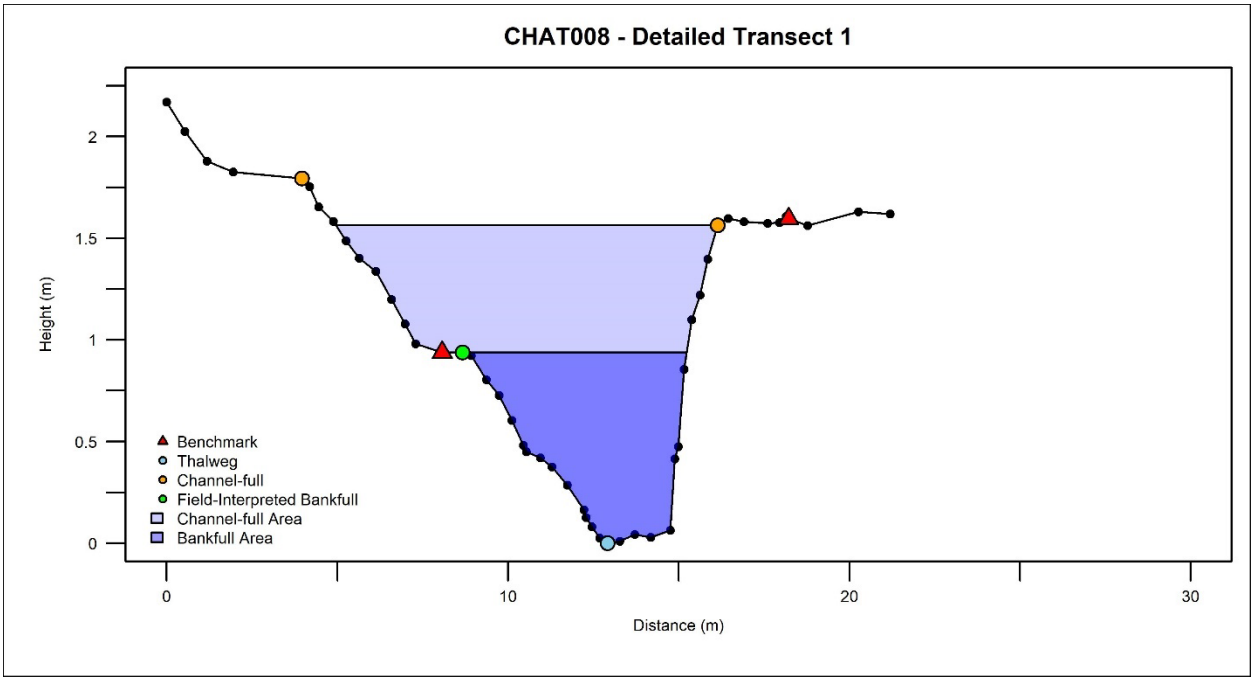


Figure 222. Detailed transect 1 (T1) at CHAT008. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Additionally, the channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 63. Cross-sectional characteristics for detailed transect 2 (T6) at CHAT008.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	4.06	8.02	0.51	7.37	0.86	8.53
Channel-full	11.97	14.36	0.83	13.32	1.62	8.22
Ratio	2.95	1.79	1.65	1.81	1.88	0.96

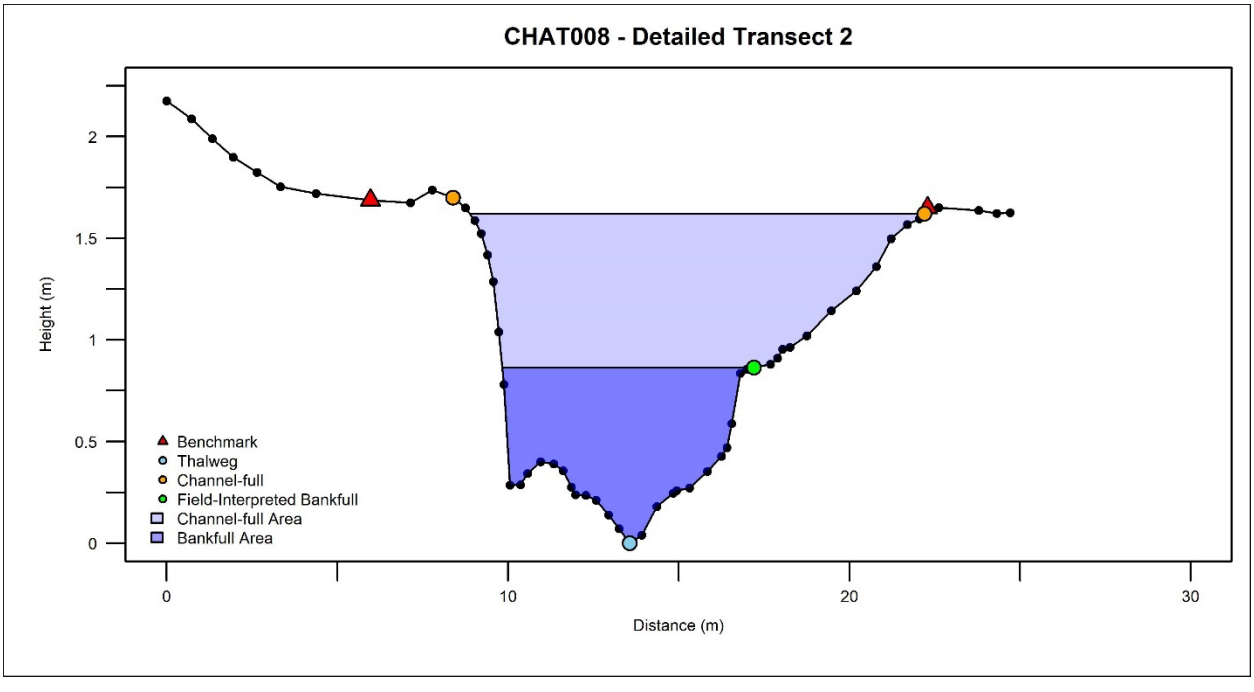


Figure 223. Detailed transect 2 (T6) at CHAT008. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 64. Cross-sectional characteristics for detailed transect 3 (T11) at CHAT008.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	1.49	6.51	0.23	6.22	0.35	17.78
Channel-full	12.12	14.96	0.81	13.92	1.40	9.93
Ratio	8.14	2.30	3.54	2.24	4.01	0.56

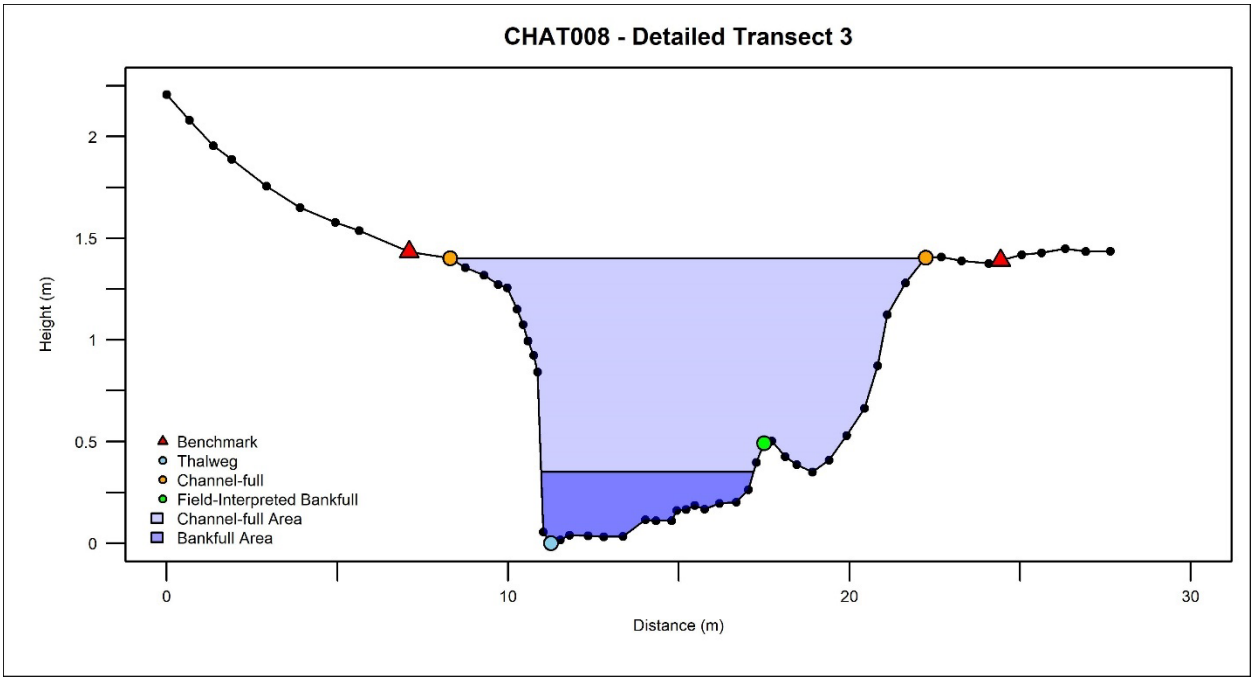


Figure 224. Detailed transect 3 (T11) at CHAT008. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Survey Results for CHAT010

This section provides transect-scale figures, results, and data summary tables of the 2021 survey of CHAT010. Figures include a watershed map (Figure 225); photographs taken in the upstream, downstream, left bank, and right bank directions at each detailed transect (T1, T8, and T10) during 2021 and 2017 (Figures 226 through 249); and cross-sectional channel characteristics at each detailed transect (Figures 250 through 252). Tables describe watershed land use characteristics (Table 65), observed geomorphic channel units (Table 66), characteristics of large woody debris (Table 67), canopy cover percentages (Table 68), channel and bank characteristics (Table 69), and cross-sectional channel characteristics at each detailed transect (Tables 70 through 72).

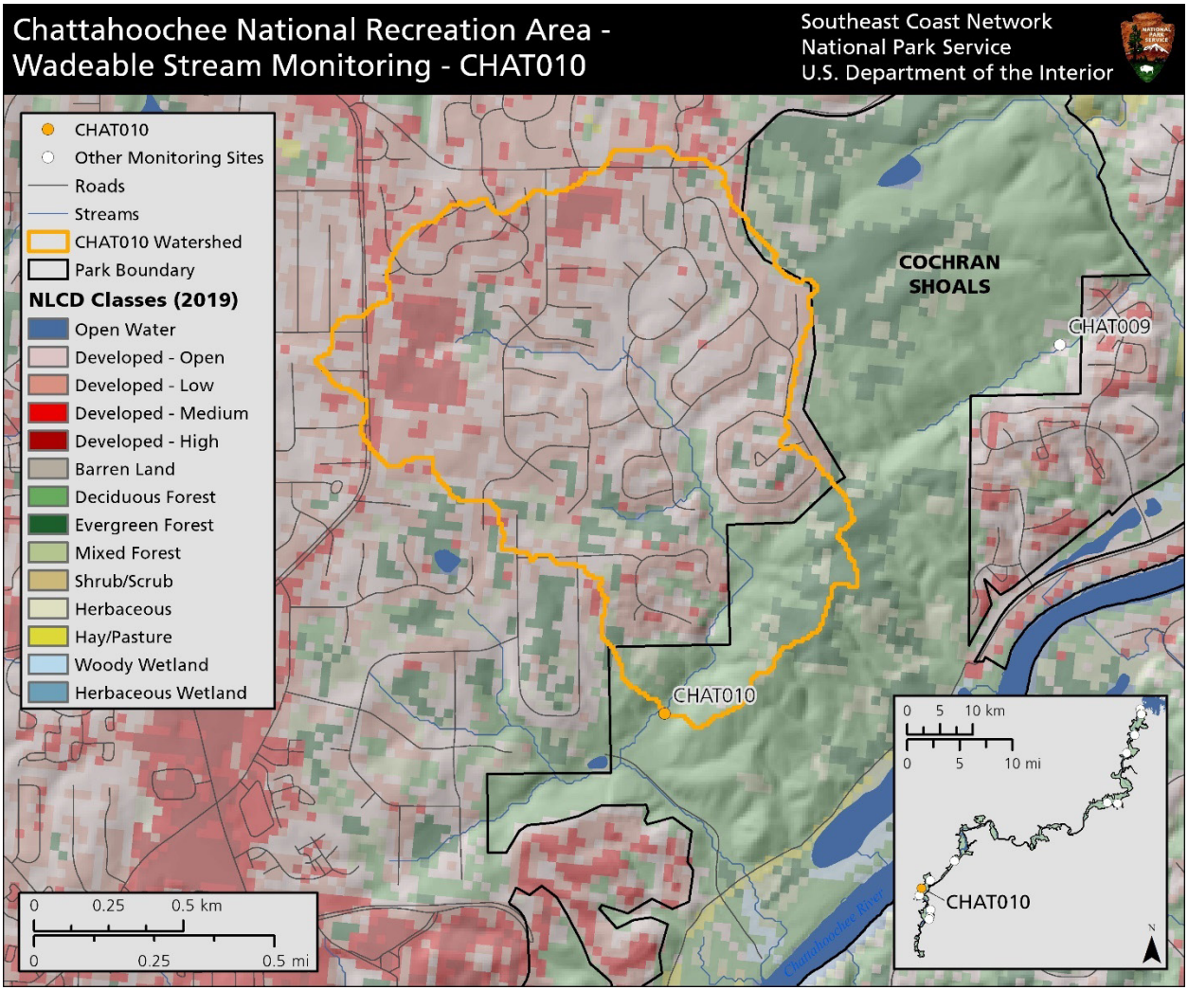


Figure 225. Map showing the watershed draining to CHAT010 at Chattahoochee National Recreation Area. The land use/land cover (NLCD 2019; Dewitz and USGS 2021), road network (USCB 2011), and perennial streams (derived from a 10 meter [32.8 ft] digital elevation model; data available from the U.S. Geological Survey) in the vicinity of the park are also shown. NPS / SECN STAFF



Figure 226. CHAT010 looking upstream from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF

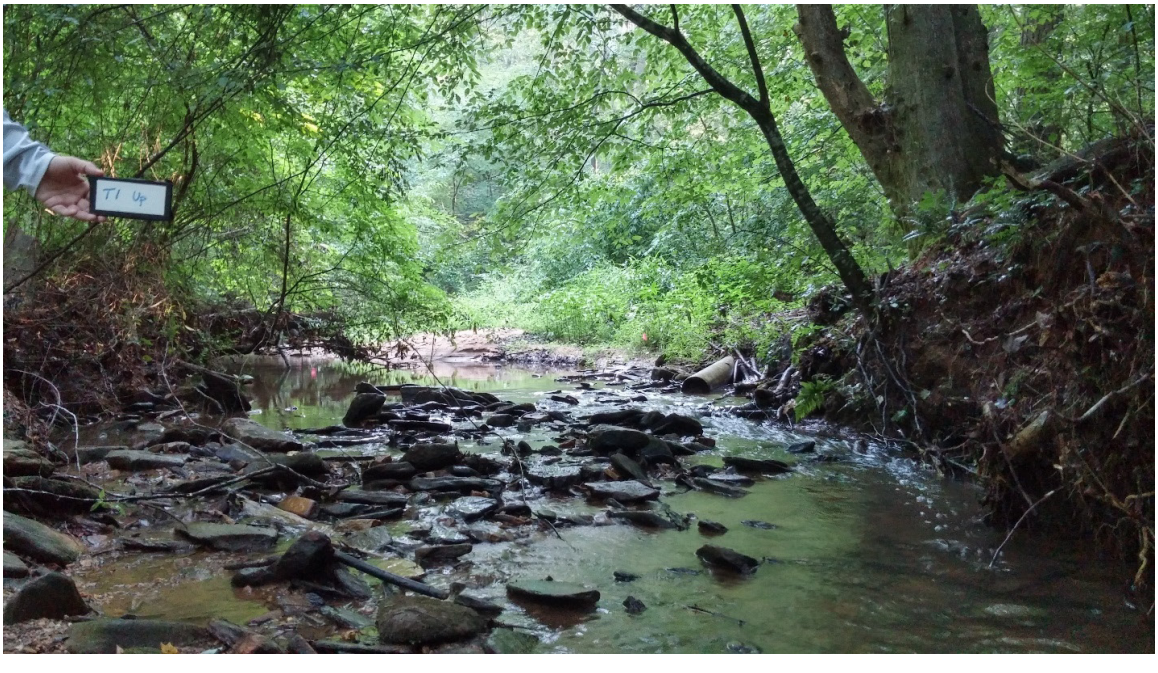


Figure 227. CHAT010 looking upstream from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 228. CHAT010 looking downstream from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 229. CHAT010 looking downstream from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 230. CHAT010 looking at the left bank from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 231. CHAT010 looking at the left bank from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 232. CHAT010 looking at the right bank from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 233. CHAT010 looking at the right bank from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 234. CHAT010 looking upstream from T8 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF

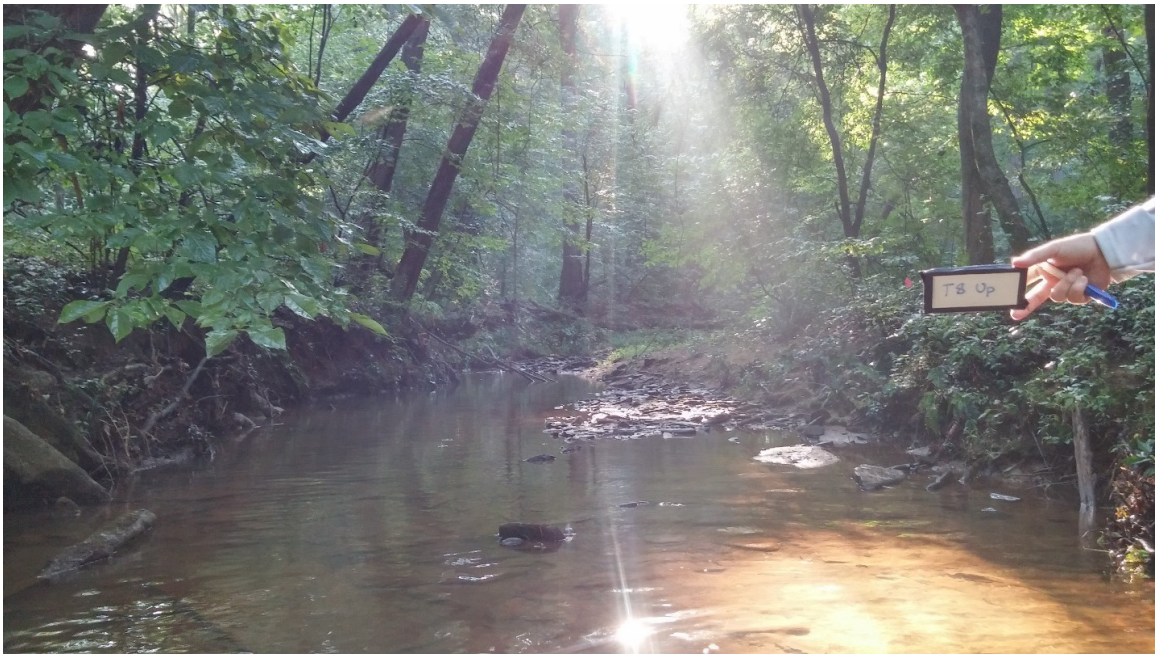


Figure 235. CHAT010 looking upstream from T8 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 236. CHAT010 looking downstream from T8 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF

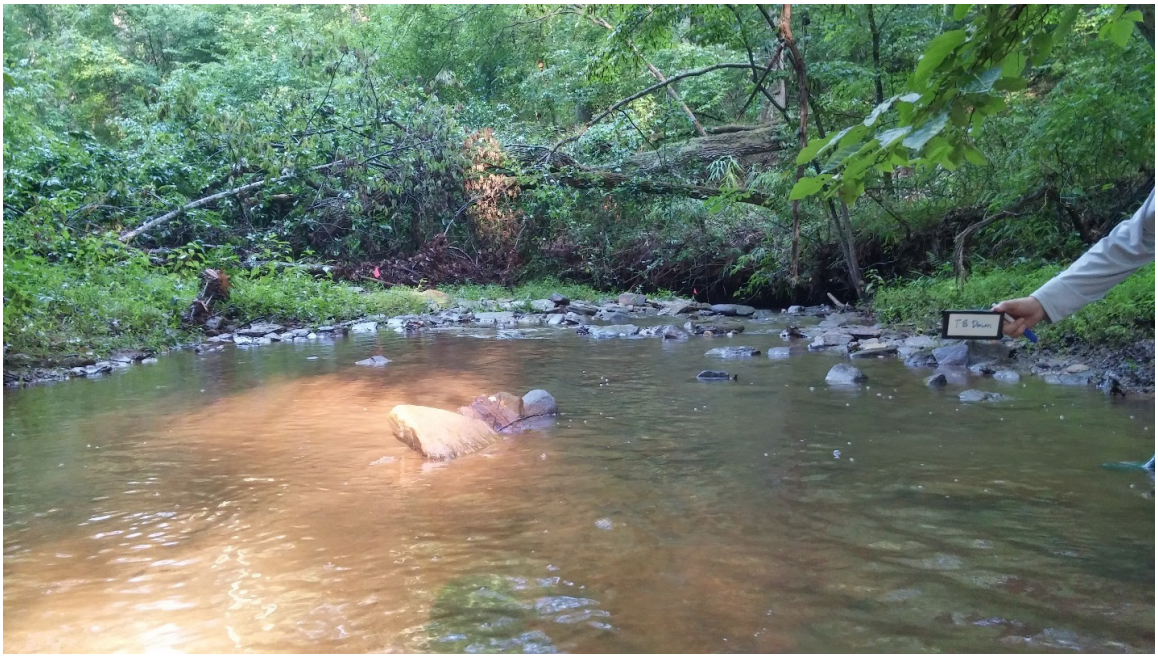


Figure 237. CHAT010 looking downstream from T8 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 238. CHAT010 looking at the left bank from T8 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 239. CHAT010 looking at the left bank from T8 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 240. CHAT010 looking at the right bank from T8 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 241. CHAT010 looking at the right bank from T8 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 242. CHAT010 looking upstream from T10 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 243. CHAT010 looking upstream from T10 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 244. CHAT010 looking downstream from T10 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 245. CHAT010 looking downstream from T10 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 246. CHAT010 looking at the left bank from T10 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 247. CHAT010 looking at the left bank from T10 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 248. CHAT010 looking at the right bank from T10 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 249. CHAT010 looking at the right bank from T10 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF

Table 65. Land use/land cover characteristics from the National Land Cover Dataset (Dewitz and USGS 2021) for CHAT001.

NLCD Class	2001 percent of watershed	2004 percent of watershed	2006 percent of watershed	2008 percent of watershed	2011 percent of watershed	2013 percent of watershed	2016 percent of watershed	2019 percent of watershed
Open Water	0	0	0	0	0	0	0	0
Developed - Open[1]	30	30	30	30	29	29	29	28
Developed - Low[1]	36	36	37	37	37	36	37	37
Developed - Medium[1]	3	4	4	4	4	4	4	6
Developed - High[1]	1	1	1	1	1	1	1	4
Barren	0	0	0	0	0	0	0	0
Deciduous	13	13	13	12	13	13	13	12
Evergreen	10	10	10	10	10	10	10	8
Mixed Forest	5	5	5	5	5	5	5	4
Shrub	0	0	0	0	0	0	0	0
Grassland	0	0	0	0	0	0	0	0
Pasture	2	2	2	2	2	2	2	0
Cultivated	0	0	0	0	0	0	0	0
Woody Wetland	0	0	0	0	0	0	0	0
Herbaceous Wetland	0	0	0	0	0	0	0	0

[1] refers to the intensity or type of development

Table 66. Geomorphic channel units (GCU) observed in the area between transects at CHAT010. The data describe the percent coverage of each type of GCU.

Transect	(%) Riffle	(%) Run	(%) Glide	(%) Pool	(%) Step
1–2	80	20	0	0	0
2–3	20	80	0	0	0
3–4	60	20	0	20	0
4–5	0	20	40	40	0
5–6	0	0	60	40	0
6–7	90	10	0	0	0
7–8	45	55	0	0	0
8–9	0	80	0	20	0
9–10	0	40	60	0	0
10–11	20	0	10	70	0
Frequency	6	8	4	5	0
Max (%)	90	80	60	70	0
Mean (%)	32	33	17	19	0
Median (%)	20	20	0	10	0
SD (%)	35	30	26	24	0

Table 67. Characteristics of the large woody debris observed at CHAT010.

LWD ID	Length (m)	Diameter (m)	Volume (m^3)	Transect Interval	Function	Position
1	4.26	0.23	0.18	6	Organic trap	Ramp
2	3.00	0.24	0.14	6	Bank Protection	Buried
3	2.26	0.11	0.02	6	None	Free
4	4.27	0.27	0.24	6	None	Free
5	2.60	0.12	0.03	6	Bank Protection	Buried
6	7.90	0.16	0.16	4	Jam	Jam
7	2.80	0.13	0.04	4	Jam	Jam
8	2.75	0.16	0.06	4	Jam	Jam
9	17.70	0.27	1.01	4	Jam	Jam
10	4.92	0.28	0.30	4	None	Buried
11	2.54	0.16	0.05	4	Jam	Jam
12	1.76	0.12	0.02	4	Jam	Jam
13	5.00	0.21	0.17	3	Jam	Jam
14	3.10	0.14	0.05	3	Jam	Jam
15	6.20	0.13	0.08	3	Organic trap	Jam
16	1.62	0.14	0.02	3	Jam	Jam

Table 68. Variability of canopy cover observed at CHAT010.

Transect	Canopy Cover (%)
1	99
2	90
3	82
4	85
5	79
6	96
7	97
8	94
9	96
10	94
11	99
Min (%)	79
Max (%)	99
Mean (%)	92
Median (%)	94
SD (%)	7
CV	0.07

Table 69. Average reach-scale bank characteristics at CHAT010. 'L' indicates left bank and 'R' indicates right bank.

Bank Characteristics	n (L)	n (R)	Min (L)	Min (R)	Max (L)	Max (R)	Mean (L)	Mean (R)	Median (L)	Median (R)	SD (L)	SD (R)	CV (L)	CV (R)
Bank Height[1] (m)	11	11	0.69	0.80	1.72	1.90	1.27	1.53	1.28	1.53	0.29	0.35	0.23	0.23
Bankfull Height[1,2] (m)	10	1	0.69	0.80	1.62	0.80	1.23	0.80	1.27	0.80	0.27	–	0.22	–
Channel-full Height[1,2] (m)	11	11	1.22	1.13	1.94	1.90	1.61	1.56	1.65	1.53	0.24	0.28	0.15	0.18
Water Depth at Base[3] (m)	11	11	-0.36	-0.21	0.02	0.31	-0.11	0.09	0.00	0.08	0.15	0.15	–	–
Bank Undercut[2] (m)	1	3	0.38	0.14	0.38	0.35	0.38	0.25	0.38	0.27	–	0.11	–	0.42
Bank Angle (o)	11	11	3	12	74	99	32	61	27	64	24	29	0.75	0.48
Vegetation Cover (%)	11	11	0	10	60	40	35	28	30	30	19	11	0.53	0.38
Bank Stability[4]	11	11	Unstable	Unstable	Very Unstable	Unstable	Unstable	Unstable	Unstable	Unstable	1.41	0.80	0.11	0.06

[1] above thalweg

[2] statistics are based on the transects where feature is present (# in parentheses)

[3] a negative number indicates base of bank is above the water surface

[4] See Table 1 for explanation of scores

Table 70. Cross-sectional characteristics for detailed transect 1 (T1) at CHAT010.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	3.55	7.98	0.45	7.32	0.80	9.16
Channel-full	7.60	10.13	0.75	9.01	1.28	7.01
Ratio	2.14	1.27	1.68	1.23	1.61	0.77

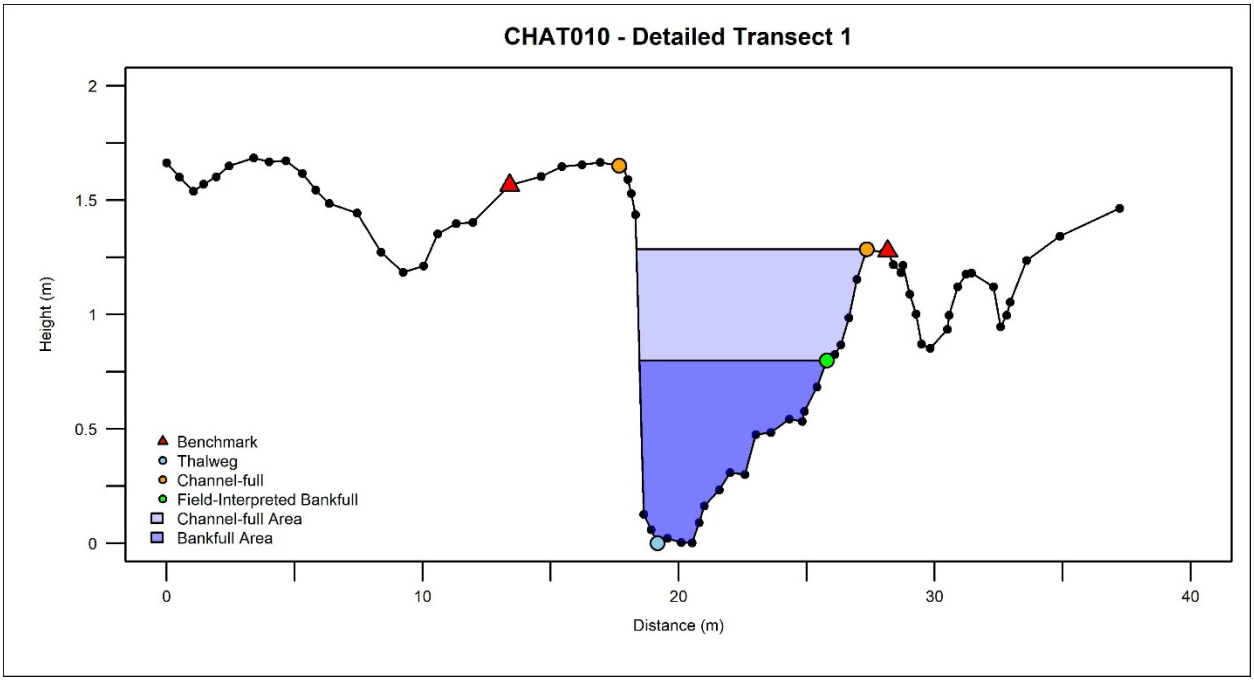


Figure 250. Detailed transect 1 (T1) at CHAT010. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Additionally, the channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 71. Cross-sectional characteristics for detailed transect 2 (T8) at CHAT010.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	4.70	7.74	0.61	7.11	0.93	7.67
Channel-full	9.94	14.12	0.70	13.31	1.42	9.37
Ratio	2.11	1.82	1.16	1.87	1.53	1.22

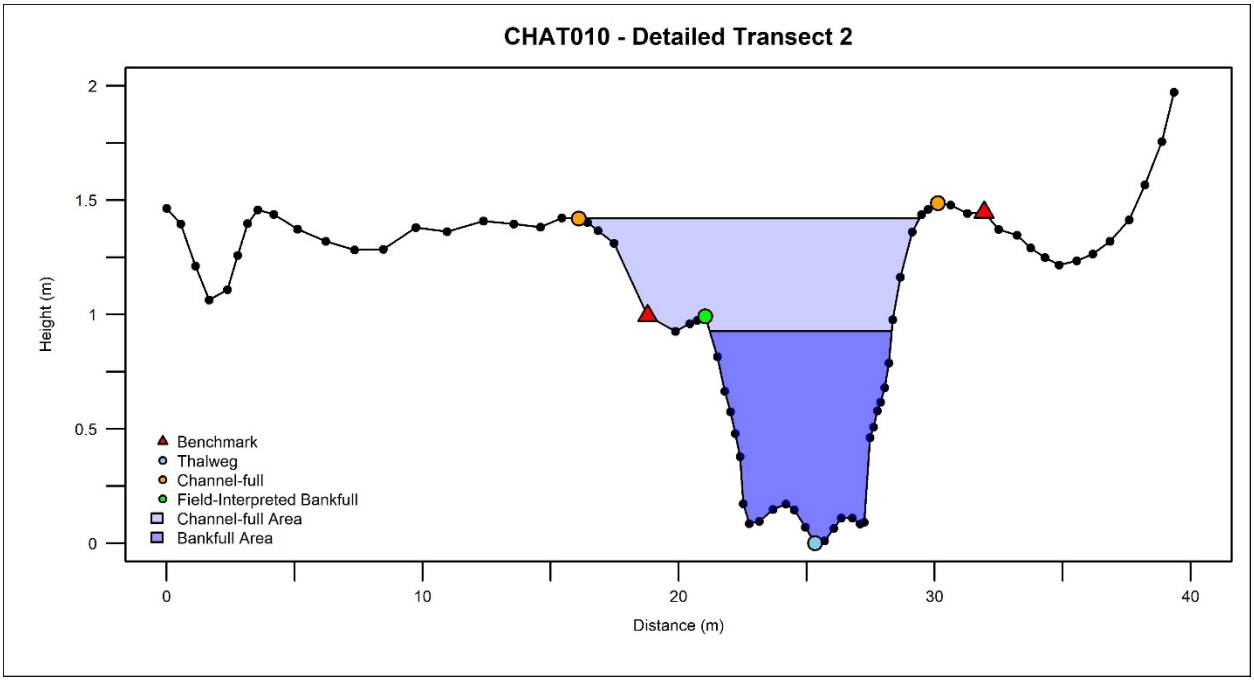


Figure 251. Detailed transect 2 (T8) at CHAT010. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 72. Cross-sectional characteristics for detailed transect 3 at CHAT010.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	7.13	9.28	0.77	8.38	1.51	5.53
Channel-full	9.39	14.15	0.66	13.18	1.70	7.74
Ratio	1.32	1.53	0.86	1.57	1.12	1.40

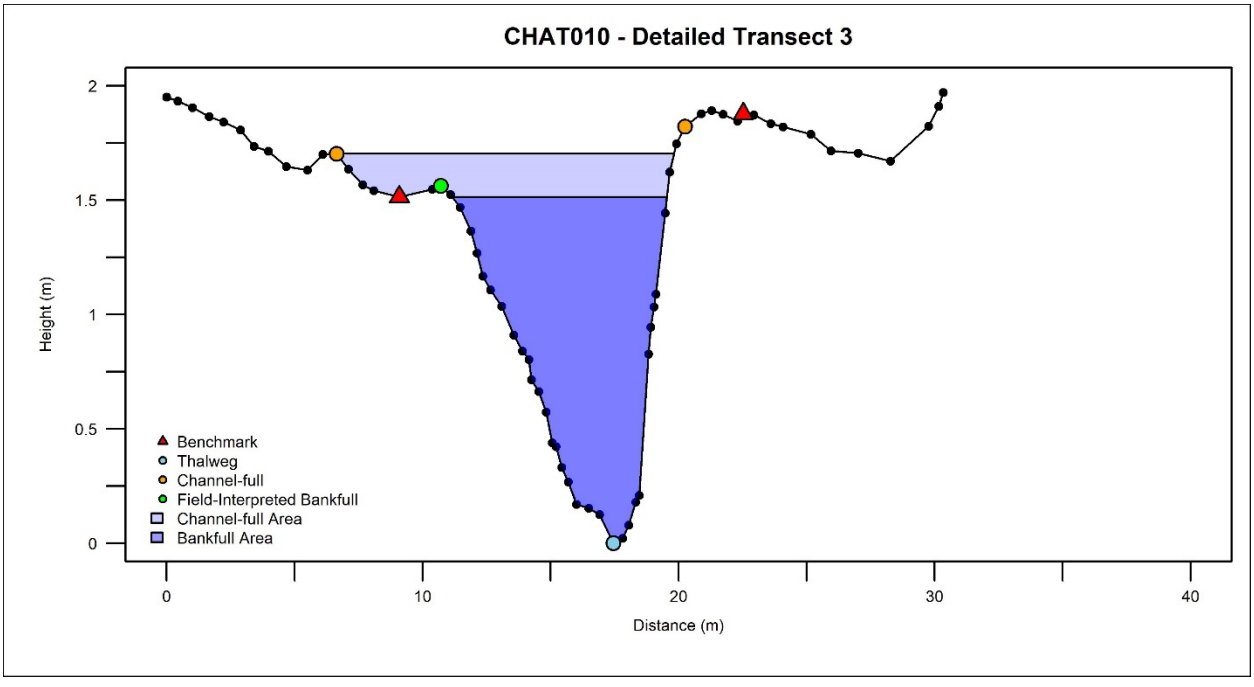


Figure 252. Detailed transect 3 (T10) at CHAT010. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Survey Results for CHAT011

This section provides transect-scale figures, results, and data summary tables of the 2021 survey of CHAT011. Figures include a watershed map (Figure 253); photographs taken in the upstream, downstream, left bank, and right bank directions at each detailed transect (T1, T4, and T6) during 2021 and 2017 (Figures 254 through 277); and cross-sectional channel characteristics at each detailed transect (Figures 278 through 280). Tables describe watershed land use characteristics (Table 73), observed geomorphic channel units (Table 74), characteristics of large woody debris (Table 75), canopy cover percentages (Table 76), channel and bank characteristics (Table 77), and cross-sectional channel characteristics at each detailed transect (Tables 78 through 80).

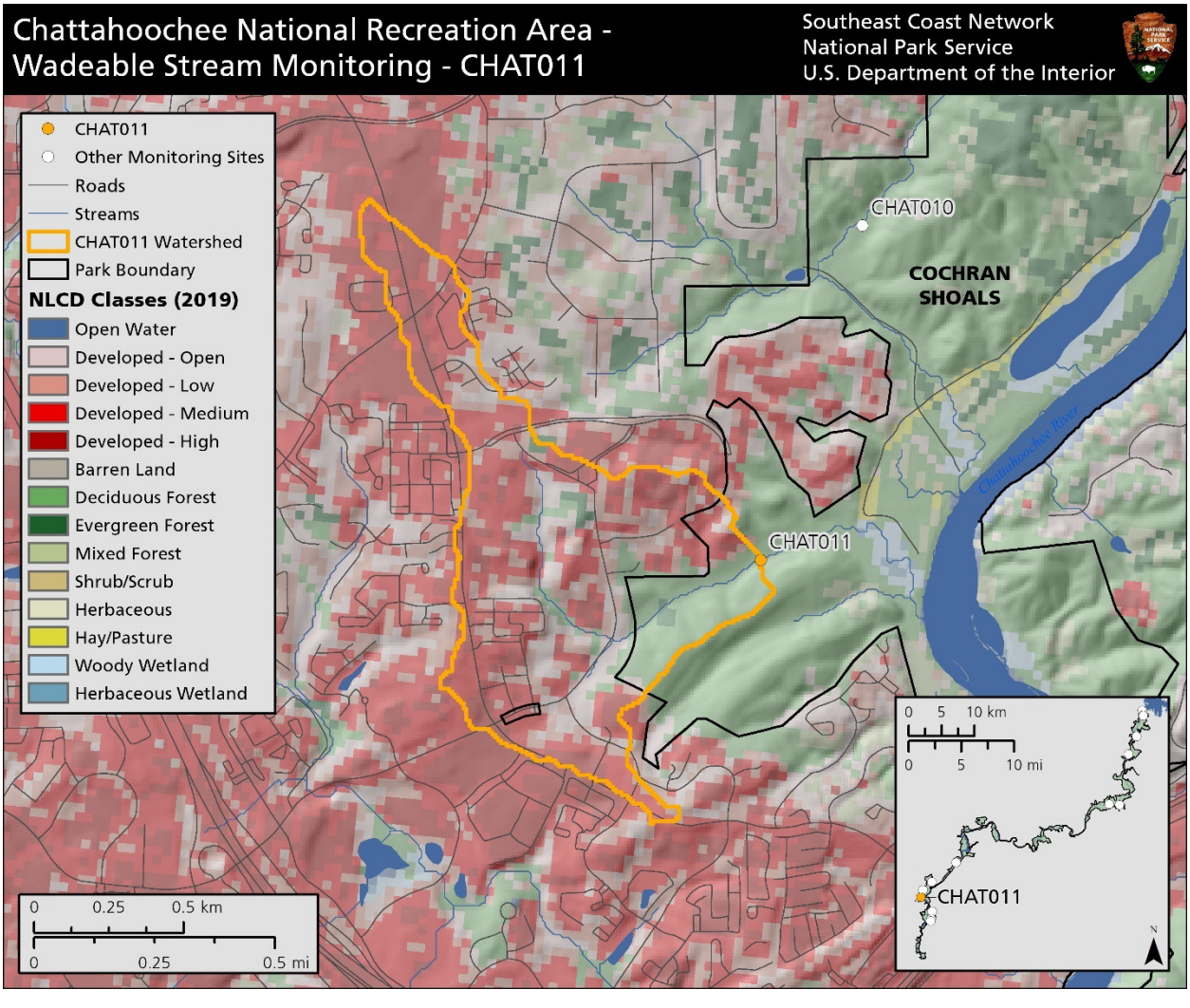


Figure 253. Map showing the watershed draining to CHAT011 at Chattahoochee National Recreation Area. The land use/land cover (NLCD 2019; Dewitz and USGS 2021), road network (USCB 2011), and perennial streams (derived from a 10 meter [32.8 ft] digital elevation model; data available from the U.S. Geological Survey) in the vicinity of the park are also shown. NPS / SECN STAFF



Figure 254. CHAT011 looking upstream from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 255. CHAT011 looking upstream from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 256. CHAT011 looking downstream from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 257. CHAT011 looking downstream from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 258. CHAT011 looking at the left bank from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 259. CHAT011 looking at the left bank from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 260. CHAT011 looking at the right bank from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 261. CHAT011 looking at the right bank from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 262. CHAT011 looking upstream from T4 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 263. CHAT011 looking upstream from T4 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 264. CHAT011 looking downstream from T4 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 265. CHAT011 looking downstream from T4 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 266. CHAT011 looking at the left bank from T4 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 267. CHAT011 looking at the left bank from T4 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 268. CHAT011 looking at the right bank from T4 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 269. CHAT011 looking at the right bank from T4 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 270. CHAT011 looking upstream from T6 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 271. CHAT011 looking upstream from T6 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 272. CHAT011 looking downstream from T6 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 273. CHAT011 looking downstream from T6 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 274. CHAT011 looking at the left bank from T6 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 275. CHAT011 looking at the left bank from T6 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 276. CHAT011 looking at the right bank from T6 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 277. CHAT011 looking at the right bank from T6 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF

Table 73. Land use/land cover characteristics from the National Land Cover Dataset (Dewitz and USGS 2021) for CHAT011.

NLCD Class	2001 percent of watershed	2004 percent of watershed	2006 percent of watershed	2008 percent of watershed	2011 percent of watershed	2013 percent of watershed	2016 percent of watershed	2019 percent of watershed
Open Water	0	0	0	0	0	0	0	0
Developed - Open[1]	9	9	13	13	13	13	13	12
Developed - Low[1]	12	12	16	17	18	18	18	18
Developed - Medium[1]	25	25	32	34	35	35	37	38
Developed - High[1]	12	12	13	14	14	14	15	15
Barren	0	0	0	0	0	0	0	0
Deciduous	30	30	19	19	18	18	16	16
Evergreen	11	9	2	2	1	1	1	1
Mixed Forest	0	0	0	0	0	0	0	0
Shrub	0	0	0	0	0	0	0	0
Grassland	0	3	4	1	0	0	0	0
Pasture	0	0	0	0	0	0	0	0
Cultivated	0	0	0	0	0	0	0	0
Woody Wetland	0	0	0	0	0	0	0	0
Herbaceous Wetland	0	0	0	0	0	0	0	0

[1] refers to the intensity or type of development

Table 74. Geomorphic channel units (GCU) observed in the area between transects at CHAT011. The data describe the percent coverage of each type of GCU.

Transect	(%) Riffle	(%) Run	(%) Glide	(%) Pool	(%) Step
1–2	80	0	0	20	0
2–3	90	0	0	10	0
3–4	70	0	0	30	0
4–5	100	0	0	0	0
5–6	100	0	0	0	0
6–7	30	60	0	10	0
7–8	0	60	40	0	0
8–9	0	0	100	0	0
9–10	0	0	70	30	0
10–11	0	0	70	30	0
Frequency	6	2	4	6	0
Max (%)	100	60	100	30	0
Mean (%)	47	12	28	13	0
Median (%)	50	0	0	10	0
SD (%)	45	25	39	13	0

Table 75. Characteristics of the large woody debris observed at CHAT011.

LWD ID	Length (m)	Diameter (m)	Volume (m^3)	Transect Interval	Function	Position
1	6.10	0.27	0.35	4	Jam	Ramp
2	5.36	0.26	0.28	4	None	Ramp
3	5.71	0.16	0.11	4	Jam	Jam
4	6.30	0.14	0.10	4	Jam	Ramp
5	4.45	0.11	0.04	2	Organic trap	Jam
6	1.60	0.20	0.05	2	Organic trap	Jam
7	7.25	0.28	0.45	2	Jam	Jam
8	5.77	0.25	0.28	1	Jam	Jam
9	1.45	0.18	0.04	1	Sediment trap, Organic trap	Jam

Table 76. Variability of canopy cover observed at CHAT011.

Transect	Canopy Cover (%)
1	94
2	93
3	93
4	91
5	90
6	88
7	88
8	88
9	94
10	94
11	90
Min (%)	88
Max (%)	94
Mean (%)	91
Median (%)	91
SD (%)	2
CV	0.03

Table 77. Average reach-scale bank characteristics at CHAT011. 'L' indicates left bank and 'R' indicates right bank.

Bank Characteristics	n (L)	n (R)	Min (L)	Min (R)	Max (L)	Max (R)	Mean (L)	Mean (R)	Median (L)	Median (R)	SD (L)	SD (R)	CV (L)	CV (R)
Bank Height[1] (m)	11	11	0.81	0.46	1.83	1.28	1.36	0.80	1.31	0.62	0.32	0.31	0.24	0.39
Bankfull Height[1,2] (m)	3	4	0.81	0.46	1.11	0.62	0.98	0.57	1.02	0.60	0.15	0.07	0.16	0.13
Channel-full Height[1,2] (m)	11	7	1.27	0.98	1.83	1.46	1.49	1.22	1.36	1.28	0.21	0.17	0.14	0.14
Water Depth at Base[3] (m)	11	11	-0.15	-0.24	0.23	0.28	0.05	0.04	0.07	0.02	0.11	0.13	–	–
Bank Undercut[2] (m)	7	2	0.10	0.17	0.85	0.34	0.35	0.26	0.25	0.26	0.25	0.12	0.73	0.47
Bank Angle [(o)]	11	11	13	7	81	82	53	39	64	39	24	24	0.45	0.62
Vegetation Cover (%)	11	11	30	20	80	70	44	53	40	60	19	18	0.44	0.35
Bank Stability[4]	11	11	At-Risk	Stable	Unstable	Unstable	Unstable	At-Risk	Unstable	Unstable	1.35	1.61	0.11	0.16

[1] above thalweg

[2] statistics are based on the transects where feature is present (# in parentheses)

[3] a negative number indicates base of bank is above the water surface

[4] See Table 1 for explanation of scores

Table 78. Cross-sectional characteristics for detailed transect 1 (T1) at CHAT011.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	2.26	6.08	0.37	5.56	0.53	10.43
Channel-full	7.53	10.33	0.73	9.44	1.26	7.48
Ratio	3.33	1.70	1.96	1.70	2.37	0.72

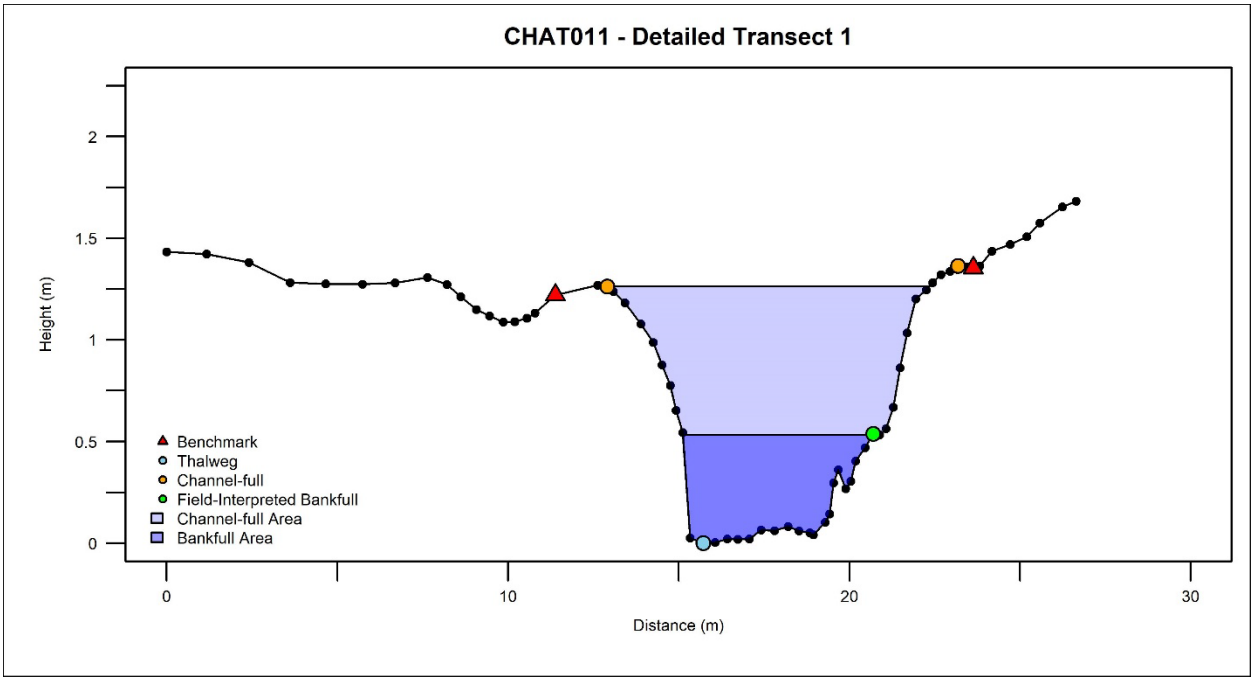


Figure 278. Detailed transect 1 (T1) at CHAT011. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Additionally, the channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 79. Cross-sectional characteristics for detailed transect 2 (T4) at CHAT011.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	1.45	5.00	0.29	4.65	0.46	10.11
Channel-full	8.24	10.06	0.82	9.00	1.44	6.27
Ratio	5.67	2.01	2.82	1.93	3.12	0.62

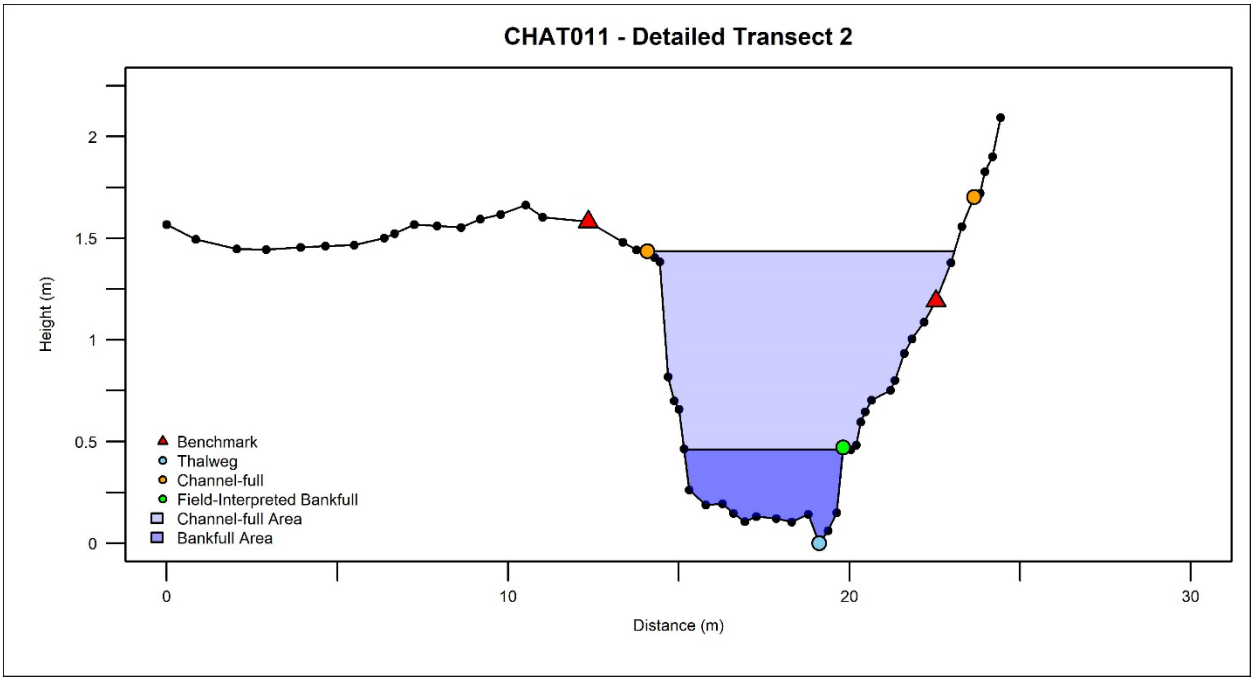


Figure 279. Detailed transect 2 (T4) at CHAT011. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 80. Cross-sectional characteristics for detailed transect 3 at CHAT011.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	3.95	7.42	0.53	6.72	0.84	8.05
Channel-full	6.20	10.88	0.57	10.12	1.11	9.10
Ratio	1.57	1.47	1.07	1.50	1.33	1.13

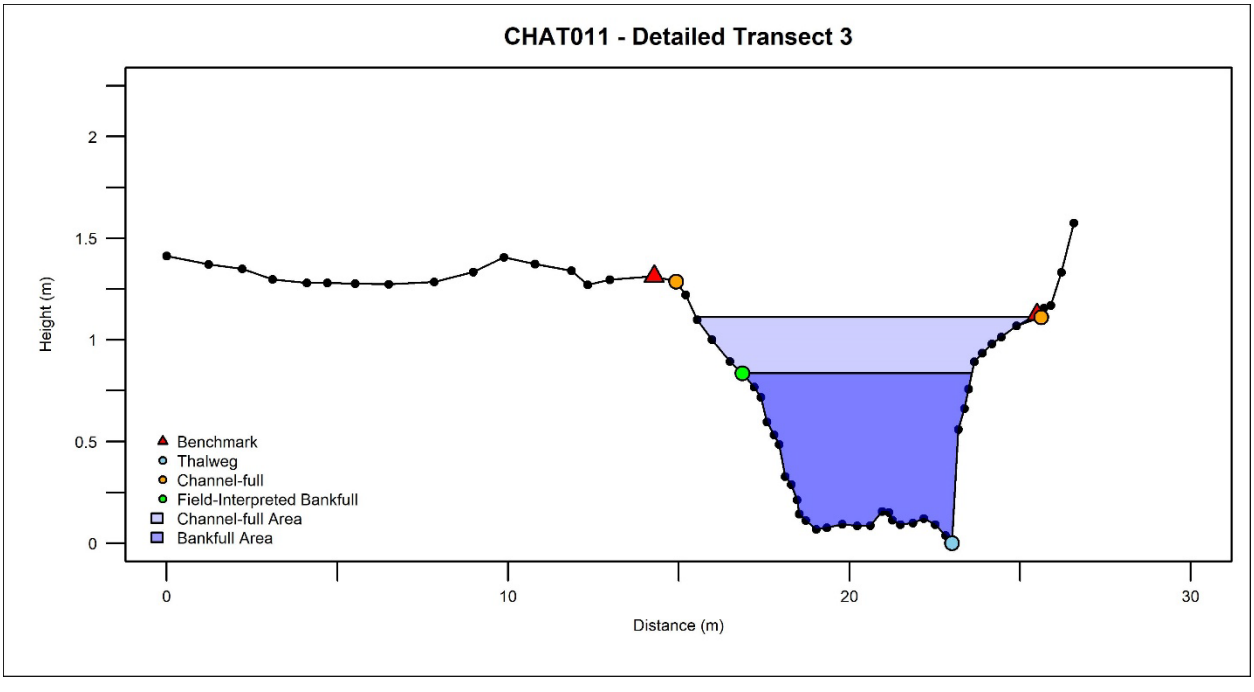


Figure 280. Detailed transect 3 (T6) at CHAT011. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Survey Results for CHAT014

This section provides transect-scale figures, results, and data summary tables of the 2021 survey of CHAT014. Figures include a watershed map (Figure 281); photographs taken in the upstream, downstream, left bank, and right bank directions at each detailed transect (T1, T6, and T10) during 2021 and 2017 (Figures 282 through 305); and cross-sectional channel characteristics at each detailed transect (Figures 306 through 308). Tables describe watershed land use characteristics (Table 81), observed geomorphic channel units (Table 82), characteristics of large woody debris (Table 83), canopy cover percentages (Table 84), channel and bank characteristics (Table 85), and cross-sectional channel characteristics at each detailed transect (Tables 86 through 88).

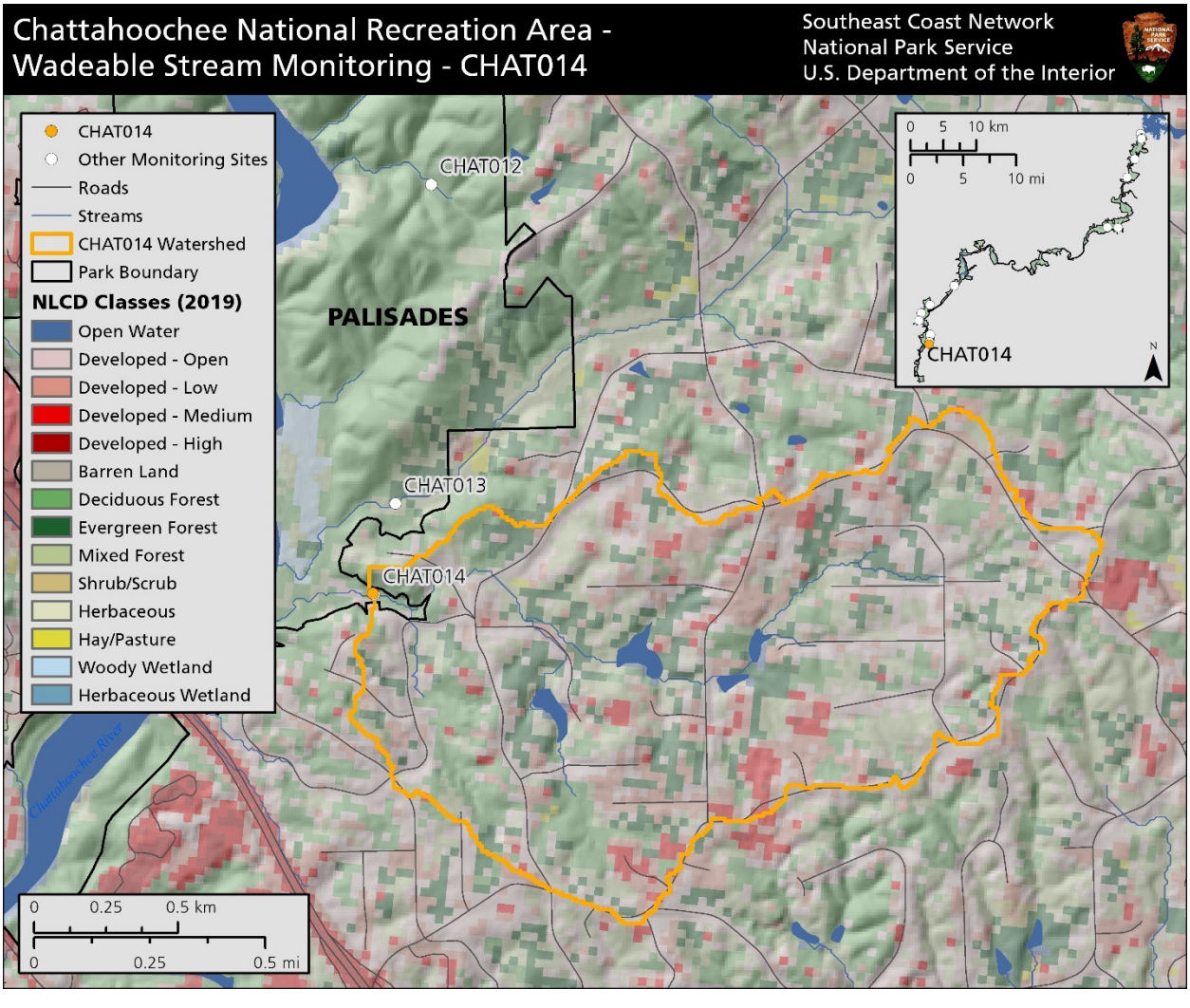


Figure 281. Map showing the watershed draining to CHAT014 at Chattahoochee National Recreation Area. The land use/land cover (NLCD 2019; Dewitz and USGS 2021), road network (USCB 2011), and perennial streams (derived from a 10 meter [32.8 feet] digital elevation model; data available from the U.S. Geological Survey) in the vicinity of the park are also shown. NPS / SECN STAFF



Figure 282. CHAT014 looking upstream from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 283. CHAT014 looking upstream from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 284. CHAT014 looking downstream from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 285. CHAT014 looking downstream from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 286. CHAT014 looking at the left bank from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 287. CHAT014 looking at the left bank from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 288. CHAT014 looking at the right bank from T1 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 289. CHAT014 looking at the right bank from T1 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 290. CHAT014 looking upstream from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 291. CHAT014 looking upstream from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 292. CHAT014 looking downstream from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 293. CHAT014 looking downstream from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 294. CHAT014 looking at the left bank from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 295. CHAT014 looking at the left bank from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 296. CHAT014 looking at the right bank from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 297. CHAT014 looking at the right bank from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 298. CHAT014 looking upstream from T10 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 299. CHAT014 looking upstream from T10 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 300. CHAT014 looking downstream from T10 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 301. CHAT014 looking downstream from T10 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 302. CHAT014 looking at the left bank from T10 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 303. CHAT014 looking at the left bank from T10 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 304. CHAT014 looking at the right bank from T10 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 305. CHAT014 looking at the right bank from T10 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF

Table 81. Land use/land cover characteristics from the National Land Cover Dataset (Dewitz and USGS 2021) for CHAT014.

NLCD Class	2001 percent of watershed	2004 percent of watershed	2006 percent of watershed	2008 percent of watershed	2011 percent of watershed	2013 percent of watershed	2016 percent of watershed	2019 percent of watershed
Open Water	1	1	1	1	1	1	1	1
Developed - Open[1]	30	30	30	30	31	30	30	30
Developed - Low[1]	15	15	16	16	16	16	17	17
Developed - Medium[1]	3	3	3	3	4	4	4	4
Developed - High[1]	0	0	0	0	0	0	0	0
Barren	0	0	0	0	0	0	0	0
Deciduous	15	15	15	14	14	14	14	14
Evergreen	16	16	16	15	15	15	15	14
Mixed Forest	19	19	18	18	18	18	18	18
Shrub	0	0	0	0	0	0	0	0
Grassland	1	0	0	1	0	0	0	1
Pasture	0	0	0	0	0	0	0	0
Cultivated	0	0	0	0	0	0	0	0
Woody Wetland	0	0	0	0	0	0	0	0
Herbaceous Wetland	0	0	0	0	0	0	0	0

[1] refers to the intensity or type of development

Table 82. Geomorphic channel units (GCU) observed in the area between transects at CHAT014. The data describe the percent coverage of each type of GCU.

Transect	(%) Riffle	(%) Run	(%) Glide	(%) Pool	(%) Step
1–2	0	0	20	80	0
2–3	0	0	20	80	0
3–4	0	20	30	50	0
4–5	0	100	0	0	0
5–6	0	100	0	0	0
6–7	0	20	50	30	0
7–8	20	70	0	10	0
8–9	10	90	0	0	0
9–10	50	20	0	30	0
10–11	40	0	0	60	0
Frequency	4	7	4	7	0
Max (%)	50	100	50	80	0
Mean (%)	12	42	12	34	0
Median (%)	0	20	0	30	0
SD (%)	19	43	18	32	0

Table 83. Characteristics of the large woody debris observed at CHAT014.

LWD ID	Length (m)	Diameter (m)	Volume (m^3)	Transect Interval	Function	Position
1	2.27	0.11	0.02	8	Sediment trap	Buried
2	1.46	0.17	0.03	8	None	Buried
3	1.19	0.22	0.05	8	None	Free
4	1.10	0.12	0.01	7	Sediment trap	Buried
5	4.22	0.27	0.24	7	Pool Formation, Sediment trap	Buried
6	4.49	0.12	0.05	5	None	Ramp
7	9.38	0.14	0.14	5	Jam	Bridge
8	4.39	0.11	0.04	5	Jam	Jam
9	1.37	0.23	0.06	5	Jam	Jam
10	1.16	0.11	0.01	5	Jam	Jam
11	1.21	0.11	0.01	5	Jam	Jam
12	4.65	0.20	0.15	2	None	Ramp

Table 84. Variability of canopy cover observed at CHAT014.

Transect	Canopy Cover (%)
1	94
2	97
3	96
4	91
5	87
6	88
7	96
8	94
9	100
10	93
11	93
Min (%)	87
Max (%)	100
Mean (%)	93
Median (%)	94
SD (%)	4
CV	0.04

Table 85. Average reach-scale bank characteristics at CHAT014. 'L' indicates left bank and 'R' indicates right bank.

Bank Characteristics	n (L)	n (R)	Min (L)	Min (R)	Max (L)	Max (R)	Mean (L)	Mean (R)	Median (L)	Median (R)	SD (L)	SD (R)	CV (L)	CV (R)
Bank Height[1] (m)	11	11	0.83	0.90	1.48	1.50	1.11	1.16	1.02	1.10	0.22	0.19	0.20	0.16
Bankfull Height[1,2] (m)	11	11	0.83	0.90	1.48	1.50	1.11	1.16	1.02	1.10	0.22	0.19	0.20	0.16
Channel-full Height[1,2] (m)	8	9	1.16	1.20	1.65	1.65	1.41	1.37	1.40	1.34	0.15	0.16	0.10	0.12
Water Depth at Base[3] (m)	11	11	-0.18	-0.19	0.25	0.26	-0.01	0.05	0.00	0.08	0.15	0.14	–	–
Bank Undercut[2] (m)	1	3	0.15	0.13	0.15	0.37	0.15	0.22	0.15	0.15	–	0.13	–	0.61
Bank Angle (o)	11	11	3	14	80	83	38	50	35	51	24	23	0.63	0.46
Vegetation Cover (%)	11	11	0	10	40	60	17	33	20	30	13	15	0.72	0.46
Bank Stability[4]	11	11	Unstable	Unstable	Very Unstable	Unstable	Unstable	Unstable	Unstable	Unstable	0.78	1.03	0.05	0.08

[1] above thalweg

[2] statistics are based on the transects where feature is present (# in parentheses)

[3] a negative number indicates base of bank is above the water surface

[4] See Table 1 for explanation of scores

Table 86. Cross-sectional characteristics for detailed transect 1 (T1) at CHAT014.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	2.86	5.02	0.57	4.16	0.97	4.27
Channel-full	6.93	29.52	0.23	28.46	1.25	22.75
Ratio	2.42	5.88	0.41	6.84	1.28	5.33

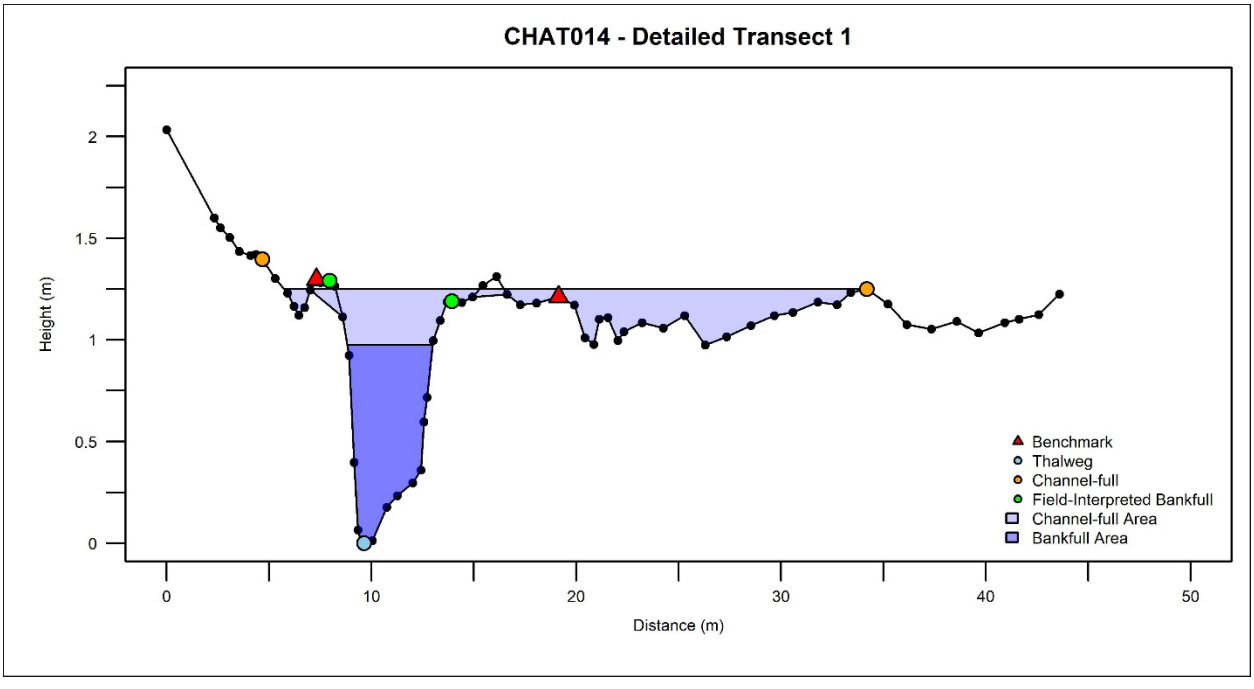


Figure 306. Detailed transect 1 (T1) at CHAT014. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Additionally, the channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 87. Cross-sectional characteristics for detailed transect 2 (T6) at CHAT014.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	1.80	4.70	0.38	4.17	0.53	7.84
Channel-full	11.06	37.99	0.29	36.79	1.21	30.44
Ratio	6.14	8.09	0.76	8.81	2.27	3.88

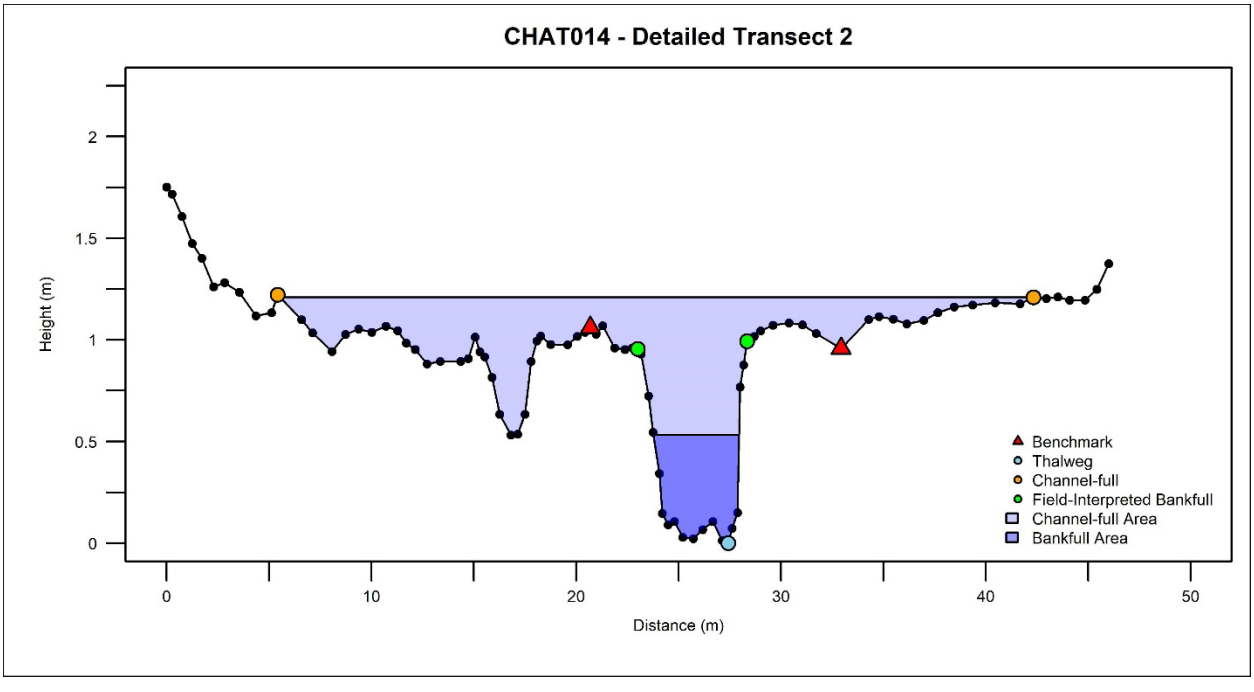


Figure 307. Detailed transect 2 at (T6) CHAT014. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 88. Cross-sectional characteristics for detailed transect 3 (T10) at CHAT014.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	2.56	6.21	0.41	5.60	0.73	7.62
Channel-full	7.32	14.34	0.51	13.61	1.18	11.51
Ratio	2.86	2.31	1.24	2.43	1.61	1.51

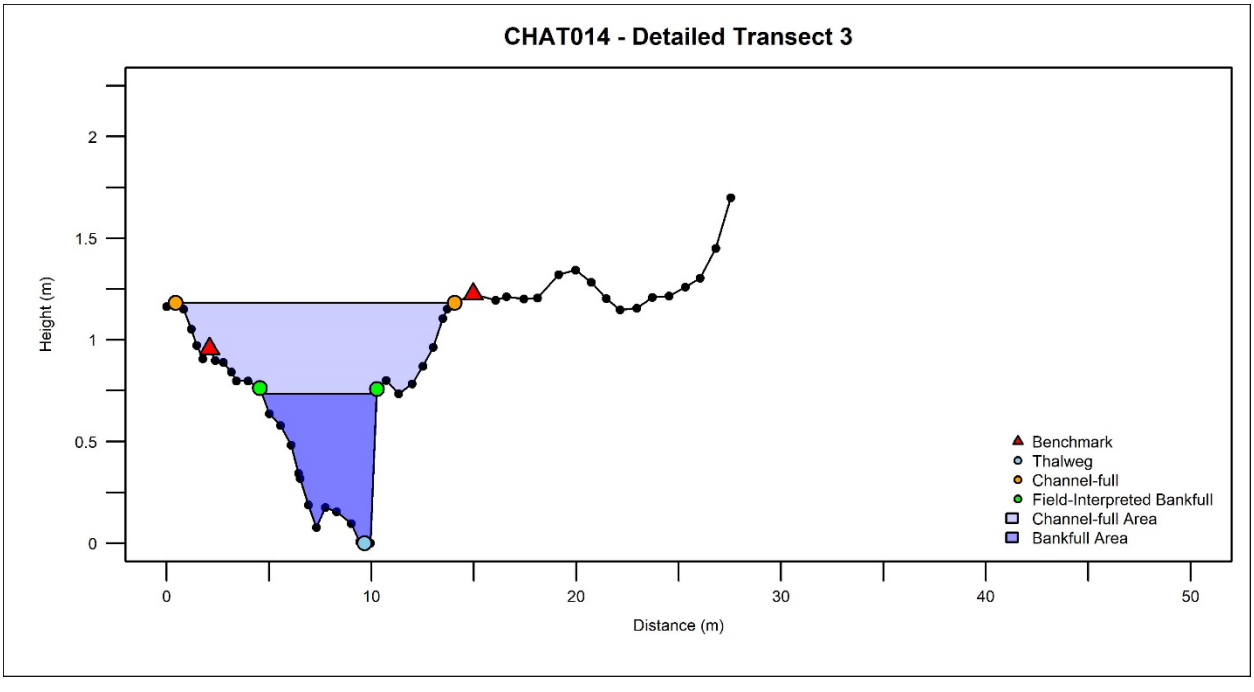


Figure 308. Detailed transect 3 (T10) at CHAT014. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Larger-Sized—Third Order Streams

Survey Results for CHAT001

This section provides transect-scale figures, results, and data summary tables of the 2021 survey of CHAT001. Figures include a watershed map (Figure 309); photographs taken in the upstream, downstream, left bank, and right bank directions at each detailed transect (T2, T6, and T8) during 2021 and 2017 (Figures 310 through 333); and cross-sectional channel characteristics at each detailed transect (Figures 334 through 336). Tables describe watershed land use characteristics (Table 89), observed geomorphic channel units (Table 90), characteristics of large woody debris (Table 91), canopy cover percentages (Table 92), channel and bank characteristics (Table 93), and cross-sectional channel characteristics at each detailed transect (Tables 94 through 96).

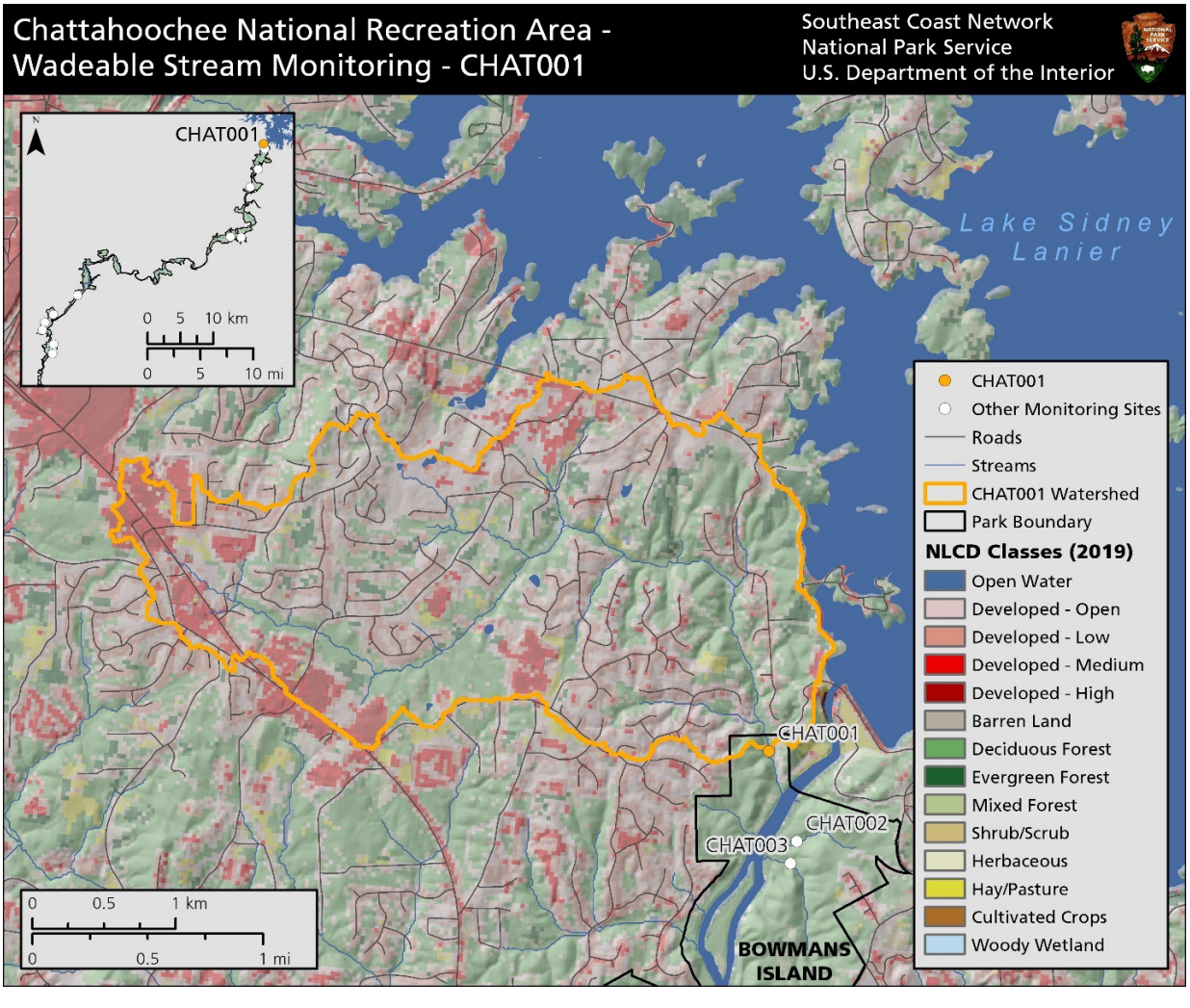


Figure 309. Map showing the watershed draining to CHAT001 at Chattahoochee National Recreation Area. The land use/land cover (NLCD 2019; Dewitz and USGS 2021), road network (USCB 2011), and perennial streams (derived from a 10 meter [32.8 feet] digital elevation model; data available from the U.S. Geological Survey) in the vicinity of the park are also shown. NPS / SECN STAFF



Figure 310. CHAT001 looking upstream from T2 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 311. CHAT001 looking upstream from T2 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 312. CHAT001 looking downstream from T2 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 313. CHAT001 looking downstream from T2 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 314. CHAT001 looking at the left bank from T2 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 315. CHAT001 looking at the left bank from T2 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 316. CHAT001 looking at the right bank from T2 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 317. CHAT001 looking at the right bank from T2 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 318. CHAT001 looking upstream from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 319. CHAT001 looking upstream from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 320. CHAT001 looking downstream from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 321. CHAT001 looking downstream from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 322. CHAT001 looking at the left bank from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 323. CHAT001 looking at the left bank from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 324. CHAT001 looking at the right bank from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 325. CHAT001 looking at the right bank from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 326. CHAT001 looking upstream from T8 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 327. CHAT001 looking upstream from T8 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 328. CHAT001 looking downstream from T8 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 329. CHAT001 looking downstream from T8 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 330. CHAT001 looking at the left bank from T8 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 331. CHAT001 looking at the left bank from T8 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 332. CHAT001 looking at the right bank from T8 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 333. CHAT001 looking at the right bank from T8 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF

Table 89. Land use/land cover characteristics from the National Land Cover Dataset (Dewitz and USGS 2021) for CHAT001.

NLCD Class	2001 percent of watershed	2004 percent of watershed	2006 percent of watershed	2008 percent of watershed	2011 percent of watershed	2013 percent of watershed	2016 percent of watershed	2019 percent of watershed
Open Water	0	0	0	0	0	0	0	0
Developed - Open[1]	27	28	31	31	32	32	32	30
Developed - Low[1]	18	19	20	22	22	22	22	22
Developed - Medium[1]	2	3	3	5	5	5	5	8
Developed - High[1]	1	1	1	1	1	1	2	3
Barren	0	0	0	0	0	0	0	0
Deciduous	33	32	29	28	28	28	27	27
Evergreen	6	5	4	4	4	4	4	4
Mixed Forest	4	4	4	4	4	4	4	4
Shrub	0	0	1	0	0	0	0	0
Grassland	2	3	2	2	1	1	1	1
Pasture	6	5	4	2	2	2	2	2
Cultivated	0	0	0	0	0	0	0	0
Woody Wetland	0	0	0	0	0	0	0	0
Herbaceous Wetland	0	0	0	0	0	0	0	0

[1] refers to the intensity or type of development

Table 90. Geomorphic channel units (GCU) observed in the area between transects at CHAT001. The data describe the percent coverage of each type of GCU.

Transect	(%) Riffle	(%) Run	(%) Glide	(%) Pool	(%) Step
1–2	70	30	0	0	0
2–3	50	40	0	10	0
3–4	80	20	0	0	0
4–5	30	40	30	0	0
5–6	60	20	10	10	0
6–7	30	60	0	10	0
7–8	10	10	30	50	0
8–9	0	0	60	40	0
9–10	0	0	20	80	0
10–11	0	20	60	20	0
Frequency	7	8	6	7	0
Max (%)	80	60	60	80	0
Mean (%)	33	24	21	22	0
Median (%)	30	20	15	10	0
SD (%)	31	19	24	27	0

Table 91. Characteristics of the large woody debris observed at CHAT001.

LWD ID	Length (m)	Diameter (m)	Volume (m^3)	Transect Interval	Function	Position
1	1.03	1.42	1.63	10	Bank Protection, Sediment trap	Jam
2	5.35	0.10	0.04	10	None	Free
3	7.86	0.11	0.07	10	None	Free
4	4.28	0.15	0.08	9	Bank Protection	Jam
5	4.50	0.11	0.04	9	Jam	Jam
6	3.96	0.10	0.03	9	Organic trap	Jam
7	2.00	0.21	0.07	6	Bank Protection	Buried
8	6.50	0.17	0.15	4	None	Free
9	5.00	0.23	0.21	4	Organic trap, Bank Protection	Ramp
10	16.50	0.16	0.33	4	Jam, Organic trap	Ramp
11	5.20	0.16	0.10	4	Bank Protection	Jam
12	2.80	0.23	0.12	3	None	Ramp
13	16.90	0.19	0.48	2	Sediment trap	Buried
14	10.90	0.21	0.38	2	Jam, Sediment trap	Buried
15	5.10	0.13	0.07	2	None	Jam
16	4.65	0.23	0.19	2	Bank Protection	Buried
17	1.14	0.15	0.02	1	Bank Protection	Buried

Table 92. Variability of canopy cover observed at CHAT001.

Transect	Canopy Cover (%)
1	84
2	46
3	49
4	69
5	65
6	90
7	75
8	87
9	74
10	81
11	72
Min (%)	46
Max (%)	90
Mean (%)	72
Median (%)	74
SD (%)	14
CV	0.20

Table 93. Average reach-scale bank characteristics at CHAT001. 'L' indicates left bank and 'R' indicates right bank.

Bank Characteristics	n (L)	n (R)	Min (L)	Min (R)	Max (L)	Max (R)	Mean (L)	Mean (R)	Median (L)	Median (R)	SD (L)	SD (R)	CV (L)	CV (R)
Bank Height[1] (m)	11	11	1.40	0.72	3.12	3.18	2.47	2.11	2.73	1.75	0.61	0.91	0.25	0.43
Bankfull Height[1,2] (m)	3	6	1.40	0.72	1.79	1.75	1.56	1.37	1.49	1.54	0.20	0.42	0.13	0.31
Channel-full Height[1,2] (m)	11	11	2.58	2.32	3.22	3.18	2.85	2.82	2.86	2.94	0.20	0.27	0.07	0.10
Water Depth at Base[3] (m)	11	11	-0.43	-0.29	0.58	0.19	0.00	0.03	0.00	0.03	0.27	0.13	–	–
Bank Undercut[2] (m)	3	2	0.29	0.25	0.34	0.62	0.31	0.44	0.30	0.44	0.03	0.26	0.09	0.60
Bank Angle (o)	11	11	11	12	74	68	45	47	49	47	24	17	0.53	0.36
Vegetation Cover (%)	11	11	0	0	80	60	28	29	20	30	23	23	0.82	0.81
Bank Stability[4]	11	11	Unstable	Unstable	Unstable	Very Unstable	Unstable	Unstable	Unstable	Unstable	0.77	1.29	0.06	0.09

[1] above thalweg

[2] statistics are based on the transects where feature is present (# in parentheses)

[3] a negative number indicates base of bank is above the water surface

[4] See Table 1 for explanation of scores

Table 94. Cross-sectional characteristics for detailed transect 1 (T2) at CHAT001.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	10.02	18.65	0.54	18.39	0.76	24.27
Channel-full	90.08	48.58	1.85	45.88	2.74	16.76
Ratio	8.99	2.60	3.45	2.49	3.61	0.69

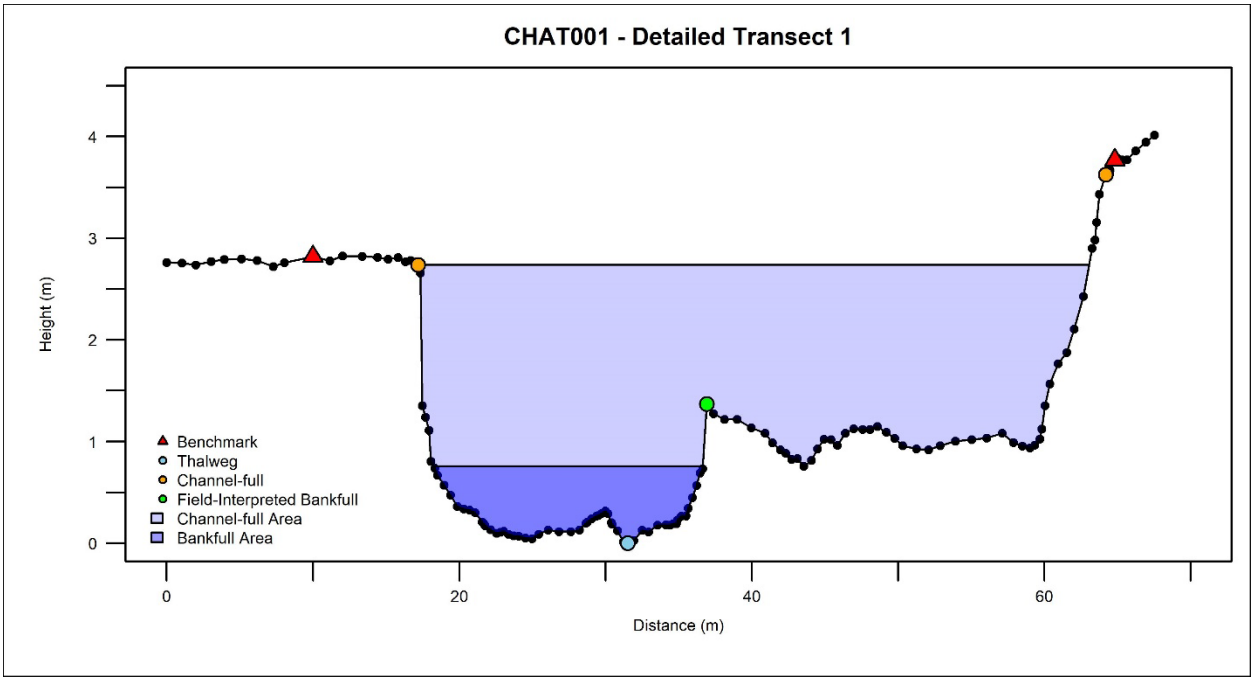


Figure 334. Detailed transect 1 (T2) at CHAT001. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Additionally, the channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 95. Cross-sectional characteristics for detailed transect 2 (T6) at CHAT001.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	12.39	19.09	0.65	18.28	1.11	16.47
Channel-full	45.31	28.47	1.59	26.65	2.59	10.30
Ratio	3.66	1.49	2.45	1.46	2.33	0.63

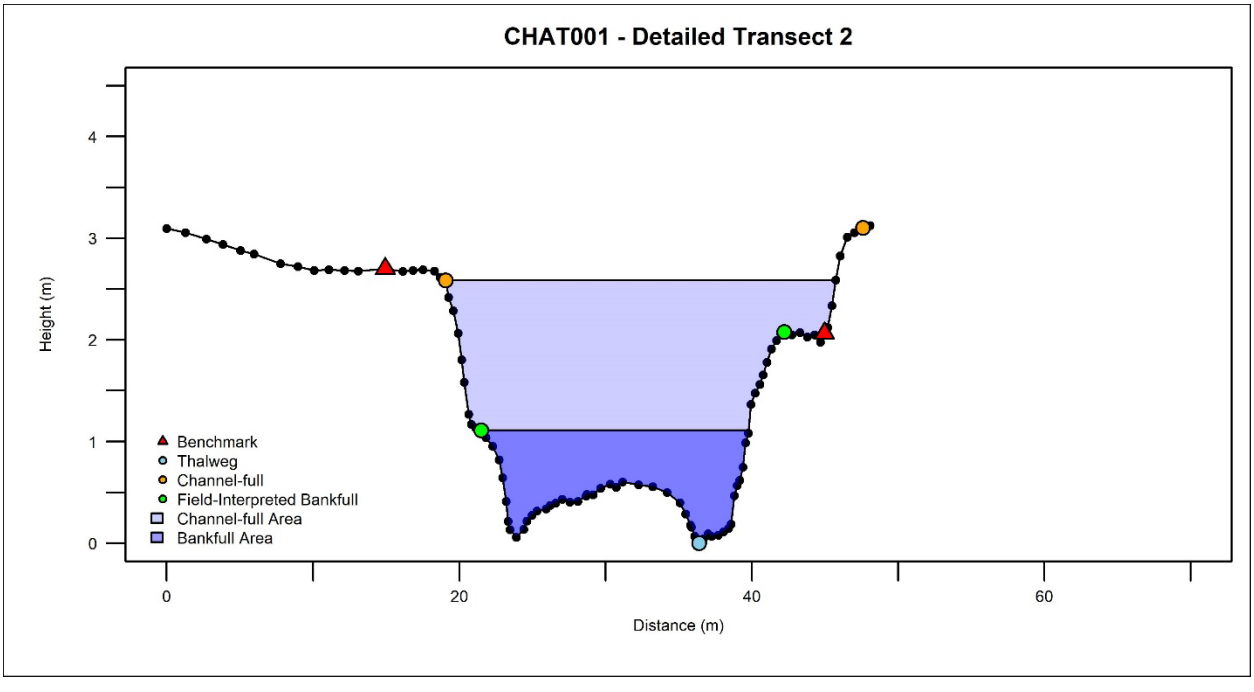


Figure 335. Detailed transect 2 (T6) at CHAT001. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 96. Cross-sectional characteristics for detailed transect 3 (T8) at CHAT001.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	10.72	13.96	0.77	13.00	1.42	9.16
Channel-full	38.37	24.78	1.55	22.38	2.80	7.99
Ratio	3.58	1.78	2.02	1.72	1.97	0.87

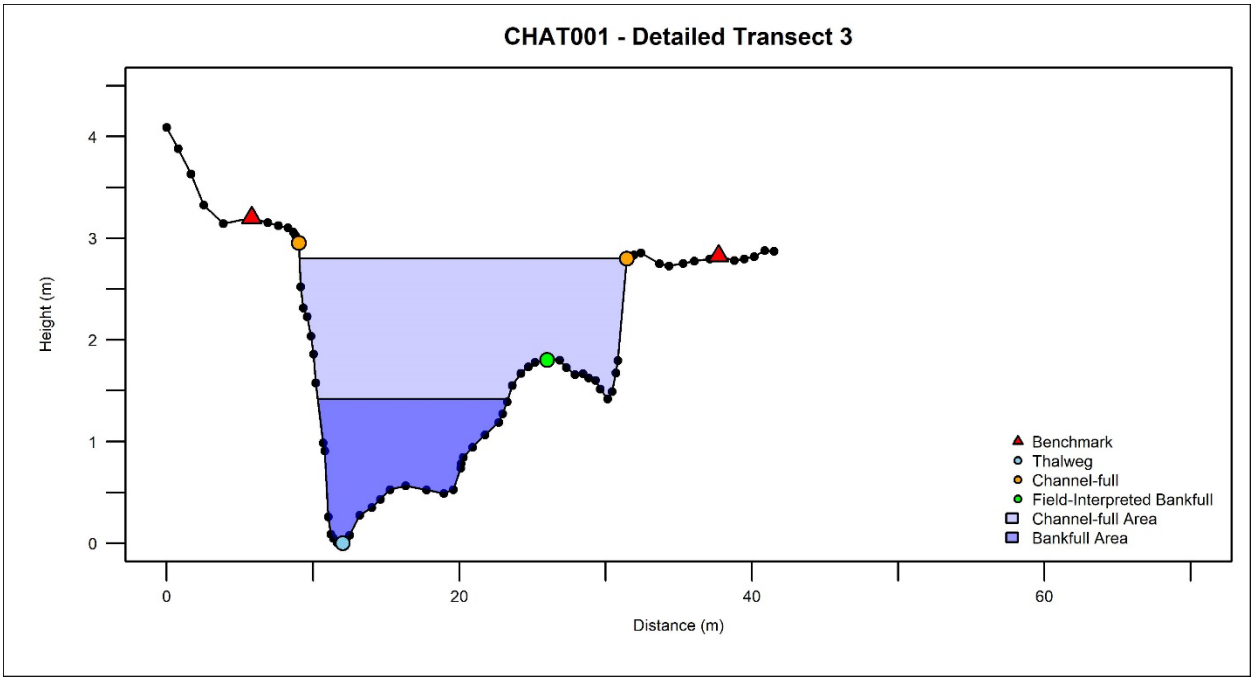


Figure 336. Detailed transect 3 (T8) at CHAT001. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Survey Results for CHAT013

This section provides transect-scale figures, results, and data summary tables of the 2021 survey of CHAT013. Figures include a watershed map (Figure 337); photographs taken in the upstream, downstream, left bank, and right bank directions at each detailed transect (T3, T6, and T11) during 2021 and 2017 (Figures 338 through 361); and cross-sectional channel characteristics at detailed transect 1 and 2 (Figures 362 through 364). Tables describe watershed land use characteristics (Table 97), observed geomorphic channel units (Table 98), characteristics of large woody debris (Table 99), canopy cover percentages (Table 100), channel and bank characteristics (Table 101), and cross-sectional channel characteristics at detailed transect 1 and 2 (Tables 102 through 104). Cross-sectional channel characteristics for detailed transect 3 (T11) are not shown because the transect could not be surveyed safely during 2021.

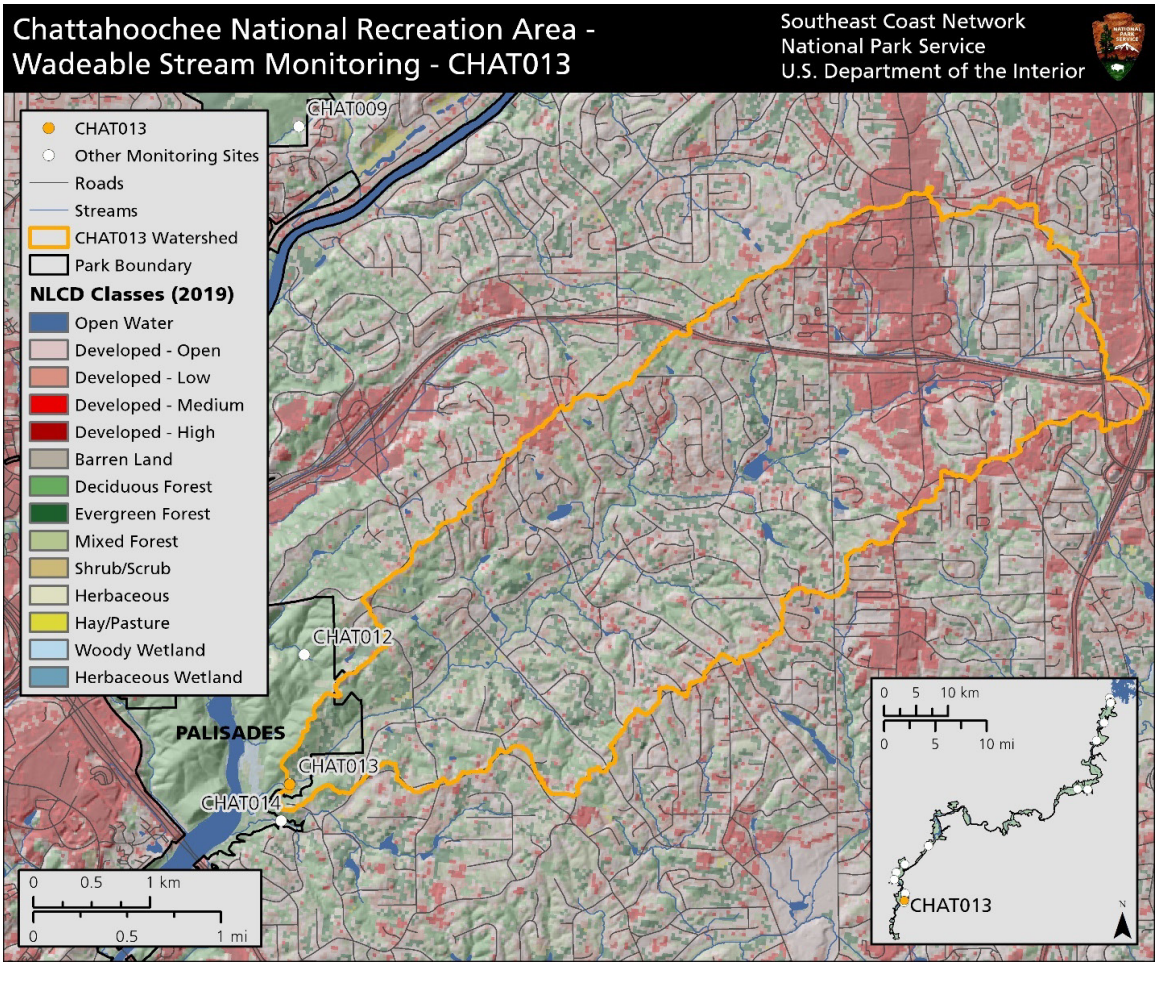


Figure 337. Map showing the watershed draining to CHAT013 at Chattahoochee National Recreation Area. The land use/land cover (NLCD 2019; Dewitz and USGS 2021), road network (USCB 2011), and perennial streams (derived from a 10 meter [32.8 feet] digital elevation model; data available from the U.S. Geological Survey) in the vicinity of the park are also shown. NPS / SECN STAFF



Figure 338. CHAT013 looking upstream from T3 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 339. CHAT013 looking upstream from T3 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 340. CHAT013 looking downstream from T3 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 341. CHAT013 looking downstream from T3 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 342. CHAT013 looking at the left bank from T3 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 343. CHAT013 looking at the left bank from T3 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 344. CHAT013 looking at the right bank from T3 (detailed transect 1) during the 2021 survey. NPS / SECN STAFF



Figure 345. CHAT013 looking at the right bank from T3 (detailed transect 1) during the 2017 survey. NPS / SECN STAFF



Figure 346. CHAT013 looking upstream from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 347. CHAT013 looking upstream from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 348. CHAT013 looking downstream from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 349. CHAT013 looking downstream from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 350. CHAT013 looking at the left bank from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 351. CHAT013 looking at the left bank from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 352. CHAT013 looking at the right bank from T6 (detailed transect 2) during the 2021 survey. NPS / SECN STAFF



Figure 353. CHAT013 looking at the right bank from T6 (detailed transect 2) during the 2017 survey. NPS / SECN STAFF



Figure 354. CHAT013 looking upstream from T11 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 355. CHAT013 looking upstream from T11 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 356. CHAT013 looking downstream from T11 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 357. CHAT013 looking downstream from T11 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 358. CHAT013 looking at the left bank from T11 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 359. CHAT013 looking at the left bank from T11 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF



Figure 360. CHAT013 looking at the right bank from T11 (detailed transect 3) during the 2021 survey. NPS / SECN STAFF



Figure 361. CHAT013 looking at the right bank from T11 (detailed transect 3) during the 2017 survey. NPS / SECN STAFF

Table 97. Land use/land cover characteristics from the National Land Cover Dataset (Dewitz and USGS 2021) for CHAT013.

NLCD Class	2001 percent of watershed	2004 percent of watershed	2006 percent of watershed	2008 percent of watershed	2011 percent of watershed	2013 percent of watershed	2016 percent of watershed	2019 percent of watershed
Open Water	0	0	0	0	0	0	0	0
Developed - Open[1]	29	29	30	29	30	29	29	29
Developed - Low[1]	17	17	18	18	18	18	18	19
Developed - Medium[1]	10	10	10	11	11	11	12	12
Developed - High[1]	4	4	4	5	5	5	5	5
Barren	0	0	0	0	0	0	0	0
Deciduous	15	15	15	14	14	14	14	13
Evergreen	11	11	10	10	10	10	9	9
Mixed Forest	12	12	12	12	11	11	11	11
Shrub	0	0	0	0	0	0	0	0
Grassland	0	0	1	0	0	0	1	1
Pasture	0	0	0	0	0	0	0	0
Cultivated	0	0	0	0	0	0	0	0
Woody Wetland	0	0	0	0	0	0	0	0
Herbaceous Wetland	0	0	0	0	0	0	0	0

[1] refers to the intensity or type of development

Table 98. Geomorphic channel units (GCU) observed in the area between transects at CHAT013. The data describe the percent coverage of each type of GCU.

Transect	(%) Riffle	(%) Run	(%) Glide	(%) Pool	(%) Step
1–2	20	30	30	20	0
2–3	80	20	0	0	0
3–4	50	20	20	10	0
4–5	0	100	0	0	0
5–6	20	80	0	0	0
6–7	0	80	20	0	0
7–8	0	30	70	0	0
8–9	0	100	0	0	0
9–10	40	10	20	30	0
10–11	20	10	10	60	0
Frequency	6	10	6	4	0
Max (%)	80	100	70	60	0
Mean (%)	23	48	17	12	0
Median (%)	20	30	15	0	0
SD (%)	27	37	22	20	0

Table 99. Characteristics of the large woody debris observed at CHAT013.

LWD ID	Length (m)	Diameter (m)	Volume (m^3)	Transect Interval	Function	Position
1	3.40	0.25	0.17	10	Sediment trap	Buried
2	4.70	0.20	0.15	10	Jam	Jam
3	1.50	0.15	0.03	10	Jam	Jam
4	2.61	0.17	0.06	10	Organic trap, Sediment trap	Buried
5	2.20	0.10	0.02	10	Organic trap, Sediment trap	Buried
6	9.20	0.10	0.07	10	Jam	Ramp
7	2.42	0.15	0.04	10	Sediment trap	Jam
8	10.14	0.26	0.54	9	Sediment trap	Buried
9	1.82	0.22	0.07	9	None	Buried
10	6.35	0.53	1.40	9	Sediment trap	Buried
11	4.10	0.18	0.10	9	Sediment trap	Buried
12	2.74	0.18	0.07	6	None	Buried
13	7.40	0.26	0.39	5	None	Buried
14	4.30	0.16	0.09	5	None	Buried
15	1.55	0.17	0.04	4	None	Buried
16	5.20	0.25	0.26	3	Bank Protection	Buried
17	4.40	0.41	0.58	3	None	Ramp
18	3.10	0.10	0.02	2	Organic trap	Jam
19	1.80	0.30	0.13	2	Organic trap, Sediment trap	Buried
20	1.70	0.21	0.06	2	None	Buried
21	12.15	0.25	0.60	1	None	Bridge

Table 100. Variability of canopy cover observed at CHAT013.

Transect	Canopy Cover (%)
1	93
2	91
3	91
4	93
5	85
6	88
7	90
8	91
9	90
10	65
11	60
Min (%)	60
Max (%)	93
Mean (%)	85
Median (%)	90
SD (%)	11
CV	0.13

Table 101. Average reach-scale bank characteristics at CHAT013. 'L' indicates left bank and 'R' indicates right bank.

Bank Characteristics	n (L)	n (R)	Min (L)	Min (R)	Max (L)	Max (R)	Mean (L)	Mean (R)	Median (L)	Median (R)	SD (L)	SD (R)	CV (L)	CV (R)
Bank Height[1] (m)	11	11	0.94	1.91	3.00	2.72	2.54	2.47	2.73	2.63	0.61	0.28	0.24	0.11
Bankfull Height[1,2] (m)	2	0	0.94	0.00	2.40	0.00	1.67	–	1.67	–	1.03	–	0.62	–
Channel-full Height[1,2] (m)	10	10	2.25	1.91	3.00	2.72	2.73	2.47	2.81	2.63	0.27	0.28	0.10	0.11
Water Depth at Base[3] (m)	11	11	-0.51	-0.28	0.12	0.30	-0.21	0.05	–0.26	0.09	0.26	0.17	–	–
Bank Undercut[2] (m)	2	5	0.20	0.23	0.45	0.40	0.33	0.36	0.33	0.40	0.18	0.07	0.54	0.21
Bank Angle (o)	11	11	27	25	74	72	48	52	48	52	14	15	0.29	0.29
Vegetation Cover (%)	11	11	20	10	60	70	42	31	45	20	17	20	0.40	0.65
Bank Stability[4]	11	11	Stable	Stable	Very Unstable	Very Unstable	Unstable	Unstable	Unstable	Unstable	2.82	2.92	0.22	0.25

[1] above thalweg

[2] statistics are based on the transects where feature is present (# in parentheses)

[3] a negative number indicates base of bank is above the water surface

[4] See Table 1 for explanation of scores

Table 102. Cross-sectional characteristics for detailed transect 1 (T3) at CHAT013.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	21.49	15.69	1.37	14.05	2.21	6.37
Channel-full	24.05	17.29	1.39	15.61	2.38	6.56
Ratio	1.12	1.10	1.02	1.11	1.08	1.03

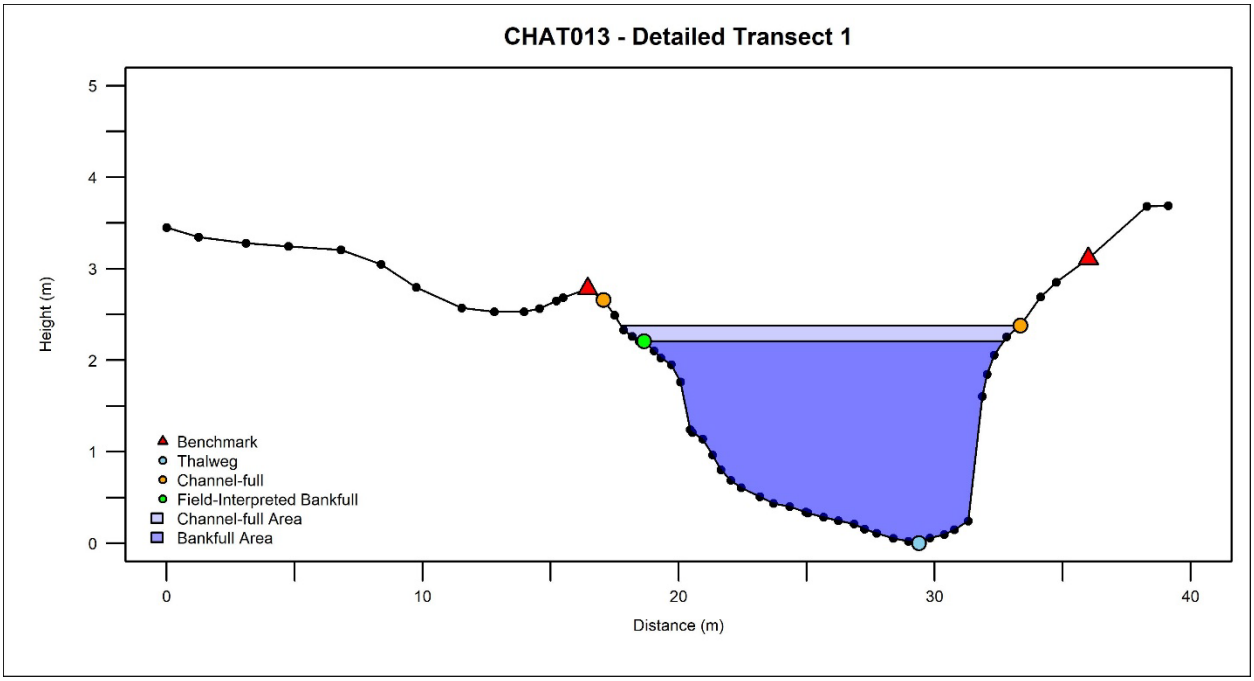


Figure 362. Detailed transect 1 (T3) at CHAT013. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and interpreted bankfull bank height are shown on the figure. Additionally, the channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

Table 103. Cross-sectional characteristics for detailed transect 2 (T6) at CHAT013.

Type	Area (m^2)	Perimeter (m)	Hydraulic Radius (m)	Width (m)	Depth (m)	Width/Depth
Bankfull	9.01	10.96	0.82	9.69	1.10	8.81
Channel-full	20.08	13.73	1.46	11.14	2.19	5.09
Ratio	2.23	1.25	1.78	1.15	1.99	0.58

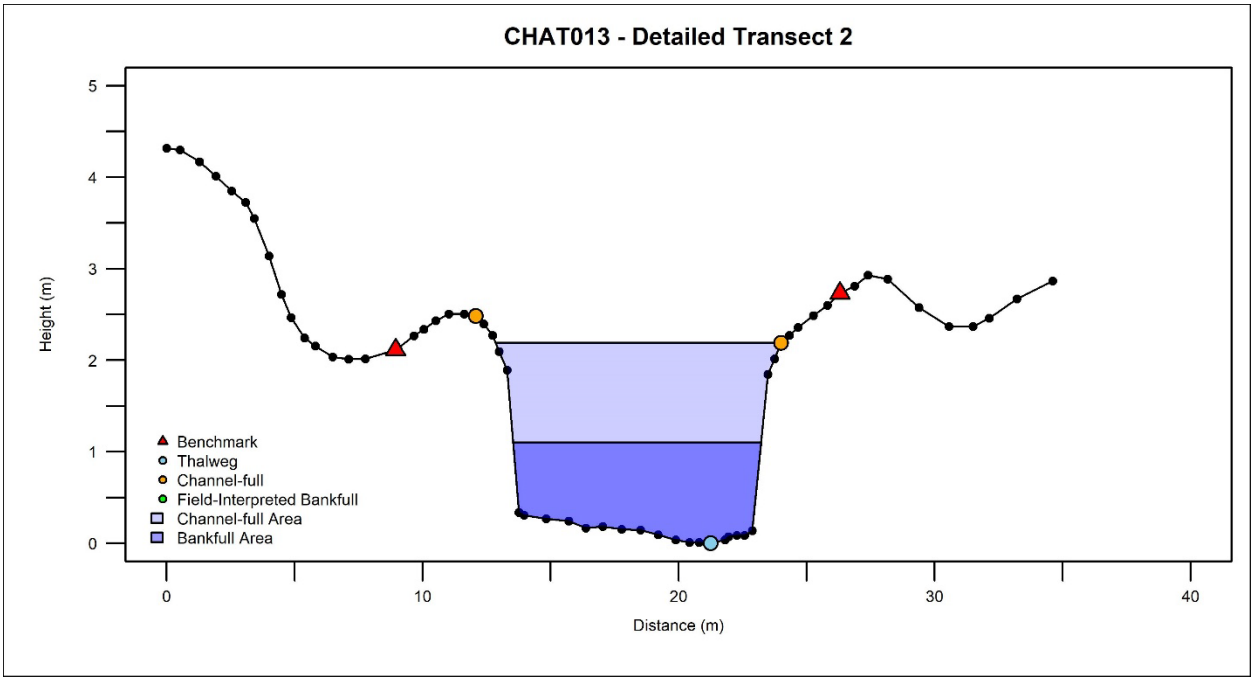


Figure 363. Detailed transect 2 (T6) at CHAT013. The surveyed locations of the left and right benchmarks, channel-full bank-tops, and bankfull bank height are shown on the figure. Channel-full (light blue) and bankfull (dark blue) cross-sectional areas are also included (channel-full cross-sectional area equals light blue plus dark blue). View is in the downstream direction (river left is on the left side of the diagram). NPS / SECN STAFF

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Dewitz, J., and U. S. Geological Survey (USGS). 2021. National Land Cover Database (NLCD) 2019 Products (ver. 2.0, June 2021): U.S. Geological Survey data release. Available at: National Land Cover Database (NLCD) 2019 Products (ver. 3.0, February 2024) - ScienceBase-Catalog (last accessed December 2024).

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