

## **Appendix E. Rapid Habitat Assessment Field Data**

## HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME <u>TCL</u>	LOCATION	
STATION # _____ RIVERMILE _____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY <u>Sheila</u>	DATE <u>8/23/00</u> TIME <u>9:00</u> <u>AM</u> PM	REASON FOR SURVEY

	Habitat Parameter	Condition Category			
		Optimal	Suboptimal	Marginal	Poor
Parameters to be evaluated in sampling reach	<b>1. Epifaunal Substrate/ Available Cover</b>	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	<b>SCORE</b>	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0
	<b>2. Pool Substrate Characterization</b>	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
	<b>SCORE</b>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 <u>6</u>	5 4 3 2 1 0
	<b>3. Pool Variability</b>	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	<b>SCORE</b>	20 19 18 17 16	15 14 13 12 11	10 9 <u>8</u> 7 6	5 4 3 2 1 0
	<b>4. Sediment Deposition</b>	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	<b>SCORE</b>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	<u>5</u> 4 3 2 1 0
	<b>5. Channel Flow Status</b>	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	<b>SCORE</b>	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0

**HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)**

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
<b>6. Channel Alteration</b>  Channelization or dredging absent or minimal; stream with normal pattern.						Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.					
	<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
<b>7. Channel Sinuosity</b>  The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)						The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					Channel straight; waterway has been channelized for a long distance.					
	<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
<b>8. Bank Stability (score each bank)</b>  Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.						Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.					
	SCORE ___ (LB)	Left Bank		10	9	8	7	6	5	4	3	2	1	0							
	SCORE ___ (RB)	Right Bank		10	9	8	7	6	5	4	3	2	1	0							
<b>9. Vegetative Protection (score each bank)</b>  More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.						70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.					
	SCORE ___ (LB)	Left Bank		10	9	8	7	6	5	4	3	2	1	0							
	SCORE ___ (RB)	Right Bank		10	9	8	7	6	5	4	3	2	1	0							
<b>10. Riparian Vegetative Zone Width (score each bank riparian zone)</b>  Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.						Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.					
	SCORE ___ (LB)	Left Bank		10	9	8	7	6	5	4	3	2	1	0							
	SCORE ___ (RB)	Right Bank		10	9	8	7	6	5	4	3	2	1	0							

Total Score 74

## HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME <u>TC2</u>	LOCATION	
STATION # _____ RIVERMILE _____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY <u>Shella</u>	DATE <u>8/24/06</u> TIME <u>9:00</u> <u>AM</u> PM	REASON FOR SURVEY

	Habitat Parameter	Condition Category			
		Optimal	Suboptimal	Marginal	Poor
Parameters to be evaluated in sampling reach	1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE	20 19 18 17 16	15 14 13 <u>12</u> 11	10 9 8 7 6	5 4 3 2 1 0
	2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
	SCORE	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0
	3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	SCORE	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 <u>7</u> 6	5 4 3 2 1 0	
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.	
SCORE	20 19 18 17 16	15 14 13 <u>12</u> 11	10 9 8 7 6	5 4 3 2 1 0	

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Habitat Parameter	Condition Category																			
	Optimal					Suboptimal					Marginal					Poor				
<b>6. Channel Alteration</b>	Channelization or dredging absent or minimal; stream with normal pattern.																			
	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.																			
SCORE	20 19 18 17 16					15 14 13 12 11					10 9 8 7 6					5 4 3 2 1 0				
	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.																			
<b>7. Channel Sinuosity</b>	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)																			
	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.																			
SCORE	20 19 18 17 16					15 14 13 12 11					10 9 8 7 6					5 4 3 2 1 0				
	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.																			
<b>8. Bank Stability (score each bank)</b>	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.																			
	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.																			
SCORE ___ (LB)	Left Bank 10 9					8 7 6					5 4 3					2 1 0				
	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.																			
SCORE ___ (RB)	Right Bank 10 9					8 7 6					5 4 3					2 1 0				
	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.																			
<b>9. Vegetative Protection (score each bank)</b>	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.																			
	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.																			
SCORE ___ (LB)	Left Bank 10 9					8 7 6					5 4 3					2 1 0				
	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.																			
SCORE ___ (RB)	Right Bank 10 9					8 7 6					5 4 3					2 1 0				
	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.																			
<b>10. Riparian Vegetative Zone Width (score each bank riparian zone)</b>	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.																			
	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.																			
SCORE ___ (LB)	Left Bank 10 9					8 7 6					5 4 3					2 1 0				
	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.																			
SCORE ___ (RB)	Right Bank 10 9					8 7 6					5 4 3					2 1 0				
	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.																			

Total Score 103

## HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME <u>SCAI</u>	LOCATION	
STATION # _____ RIVERMILE _____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET # _____	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY <u>Dave &amp; Sheila</u>	DATE <u>6/16/06</u> TIME <u>10:30</u> <u>AM</u> PM	REASON FOR SURVEY

	Habitat Parameter	Condition Category			
		Optimal	Suboptimal	Marginal	Poor
Parameters to be evaluated in sampling reach	1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 (9) 8 7 6	5 4 3 2 1 0
	2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
	SCORE	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1 0
	3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 (7) 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.	
SCORE	20 19 18 17 16	15 14 13 12 11	(10) 9 8 7 6	5 4 3 2 1 0	
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.	
SCORE	20 19 18 17 16	15 14 13 12 11	(10) 9 8 7 6	5 4 3 2 1 0	

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
<b>6. Channel Alteration</b>	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
<b>SCORE</b>	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1 0
<b>7. Channel Sinuosity</b>	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
<b>SCORE</b>	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	(5) 4 3 2 1 0
<b>8. Bank Stability (score each bank)</b>	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
<b>SCORE ___ (LB)</b>	Left Bank 10 9	8 (7) 6	5 4 3	2 1 0
<b>SCORE ___ (RB)</b>	Right Bank 10 9	8 (7) 6	5 4 3	2 1 0
<b>9. Vegetative Protection (score each bank)</b>	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
<b>SCORE ___ (LB)</b>	Left Bank 10 9	8 7 6	5 (4) 3	2 1 0
<b>SCORE ___ (RB)</b>	Right Bank 10 9	8 7 6	5 (4) 3	2 1 0
<b>10. Riparian Vegetative Zone Width (score each bank riparian zone)</b>	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
<b>SCORE ___ (LB)</b>	Left Bank 10 9	8 7 6	5 4 3	2 1 (0)
<b>SCORE ___ (RB)</b>	Right Bank 10 9	8 7 6	5 4 3	2 1 (0)

Parameters to be evaluated broader than sampling reach

Total Score 87

## HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME <u>SCA 2</u>	LOCATION	
STATION # _____ RIVERMILE _____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET # _____	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY <u>Sreila + Kristine</u>	DATE <u>6/17/10</u> TIME <u>3:50</u> AM <input checked="" type="radio"/> PM	REASON FOR SURVEY

	Habitat Parameter	Condition Category			
		Optimal	Suboptimal	Marginal	Poor
Parameters to be evaluated in sampling reach	1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
	SCORE	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1 0
	3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	SCORE	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.	
SCORE	20 19 18 17 16	(15) 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.	
SCORE	20 19 18 17 16	15 (14) 13 12 11	10 9 8 7 6	5 4 3 2 1 0	



HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
<b>6. Channel Alteration</b>	Channelization or dredging absent or minimal; stream with normal pattern.	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.	Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.	Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.
SCORE	20 19 18 17 <b>16</b>	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
<b>7. Channel Sinuosity</b>	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.	Channel straight; waterway has been channelized for a long distance.
SCORE	20 19 18 17 <b>16</b>	15 14 13 12 11	10 9 8 <b>7</b> 6	5 4 3 2 1 0
<b>8. Bank Stability (score each bank)</b>	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.	Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.	Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.
SCORE ___ (LB)	Left Bank 10 9	8 7 <b>6</b>	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 7 <b>6</b>	5 4 3	2 1 0
<b>9. Vegetative Protection (score each bank)</b>	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.	50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.	Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.
Note: determine left or right side by facing downstream.				
SCORE ___ (LB)	Left Bank 10 9	<b>8</b> 7 6	5 4 3	2 1 0
SCORE ___ (RB)	Right Bank 10 <b>9</b>	8 7 6	5 4 3	2 1 0
<b>10. Riparian Vegetative Zone Width (score each bank riparian zone)</b>	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.	Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.	Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.
SCORE ___ (LB)	Left Bank 10 9	8 7 6	5 4 <b>3</b>	2 1 0
SCORE ___ (RB)	Right Bank 10 9	8 <b>7</b> 6	5 4 3	2 1 0

Parameters to be evaluated broader than sampling reach

Total Score 129

## HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME <u>SCBI</u>	LOCATION	
STATION # _____ RIVERMILE _____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET # _____	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY <u>Sheila &amp; Kristine</u>	DATE <u>6/14/06</u> TIME <u>10:00</u> <u>AM</u> PM	REASON FOR SURVEY

	Habitat Parameter	Condition Category			
		Optimal	Suboptimal	Marginal	Poor
Parameters to be evaluated in sampling reach	<b>1. Epifaunal Substrate/ Available Cover</b>	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	<b>SCORE</b>	20 19 18 17 16	15 14 13 <u>12</u> 11	10 9 8 7 6	5 4 3 2 1 0
	<b>2. Pool Substrate Characterization</b>	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
	<b>SCORE</b>	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0
	<b>3. Pool Variability</b>	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	<b>SCORE</b>	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0
	<b>4. Sediment Deposition</b>	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	<b>SCORE</b>	20 <u>19</u> 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	<b>5. Channel Flow Status</b>	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	<b>SCORE</b>	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0

**HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)**

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
<b>6. Channel Alteration</b>  Channelization or dredging absent or minimal; stream with normal pattern.						Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.					
	<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
<b>7. Channel Sinuosity</b>  The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)						The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					Channel straight; waterway has been channelized for a long distance.					
	<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
<b>8. Bank Stability (score each bank)</b>  Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.						Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.					
	<b>SCORE</b> __ (LB)	Left Bank		10	9	8	7	6	5	4	3	2	1	0							
	<b>SCORE</b> __ (RB)	Right Bank		10	9	8	7	6	5	4	3	2	1	0							
<b>9. Vegetative Protection (score each bank)</b>  More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.						70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.					
	<b>SCORE</b> __ (LB)	Left Bank		10	9	8	7	6	5	4	3	2	1	0							
	<b>SCORE</b> __ (RB)	Right Bank		10	9	8	7	6	5	4	3	2	1	0							
<b>10. Riparian Vegetative Zone Width (score each bank riparian zone)</b>  Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.						Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.					
	<b>SCORE</b> __ (LB)	Left Bank		10	9	8	7	6	5	4	3	2	1	0							
	<b>SCORE</b> __ (RB)	Right Bank		10	9	8	7	6	5	4	3	2	1	0							

**Total Score** 118

## HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME <u>SCB2</u>	LOCATION	
STATION # _____ RIVERMILE _____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY <u>Sheila &amp; Kristine</u>	DATE <u>6/12/06</u> TIME <u>4:17</u> <u>AM</u> PM	REASON FOR SURVEY

Parameters to be evaluated in sampling reach	Habitat Parameter	Condition Category			
		Optimal	Suboptimal	Marginal	Poor
	<b>1. Epifaunal Substrate/ Available Cover</b>	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE	20 19 18 17 16	<u>15</u> 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	<b>2. Pool Substrate Characterization</b>	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
	SCORE	20 19 18 17 16	15 14 <u>13</u> 12 11	10 9 8 7 6	5 4 3 2 1 0
	<b>3. Pool Variability</b>	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	SCORE	20 19 18 17 16	15 14 13 <u>12</u> 11	10 9 8 7 6	5 4 3 2 1 0
	<b>4. Sediment Deposition</b>	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	SCORE	20 19 <u>18</u> 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	<b>5. Channel Flow Status</b>	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	SCORE	20 19 18 17 16	15 14 13 <u>12</u> 11	10 9 8 7 6	5 4 3 2 1 0

**HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)**

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
<b>6. Channel Alteration</b>	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.					
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>7. Channel Sinuosity</b>	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					Channel straight; waterway has been channelized for a long distance.					
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>8. Bank Stability (score each bank)</b>	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.					
SCORE ___ (LB)	Left Bank		10	9	8	7	6	5	4	3	Right Bank		2	1	0						
SCORE ___ (RB)	Right Bank		10	9	8	7	6	5	4	3	Left Bank		2	1	0						
<b>9. Vegetative Protection (score each bank)</b>	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.					70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.					
SCORE ___ (LB)	Left Bank		10	9	8	7	6	5	4	3	Right Bank		2	1	0						
SCORE ___ (RB)	Right Bank		10	9	8	7	6	5	4	3	Left Bank		2	1	0						
<b>10. Riparian Vegetative Zone Width (score each bank riparian zone)</b>	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.					Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.					
SCORE ___ (LB)	Left Bank		10	9	8	7	6	5	4	3	Right Bank		2	1	0						
SCORE ___ (RB)	Right Bank		10	9	8	7	6	5	4	3	Left Bank		2	1	0						

Total Score 141

## HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME <u>NFI</u>	LOCATION	
STATION # _____ RIVERMILE _____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY <u>Sheila</u>	DATE <u>6/19/06</u> TIME <u>1:30</u> AM <input type="radio"/> PM <input checked="" type="radio"/>	REASON FOR SURVEY

	Habitat Parameter	Condition Category			
		Optimal	Suboptimal	Marginal	Poor
Parameters to be evaluated in sampling reach	<b>1. Epifaunal Substrate/ Available Cover</b>	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE	20 19 18 17 16	15 <u>14</u> 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	<b>2. Pool Substrate Characterization</b>	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 <u>6</u>	5 4 3 2 1 0
	<b>3. Pool Variability</b>	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 <u>6</u>	5 4 3 2 1 0
	<b>4. Sediment Deposition</b>	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 <u>8</u> 7 6	5 4 3 2 1 0
	<b>5. Channel Flow Status</b>	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	SCORE	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0

HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Habitat Parameter	Condition Category																										
	Optimal					Suboptimal					Marginal					Poor											
<b>6. Channel Alteration</b>	Channelization or dredging absent or minimal; stream with normal pattern.																										
	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.																
<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0						
<b>7. Channel Sinuosity</b>	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)																										
	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					Channel straight; waterway has been channelized for a long distance.																
<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0						
<b>8. Bank Stability (score each bank)</b>	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.																										
	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.																
	SCORE __ (LB)	Left Bank		10	9	8	7	6	5	4	3	2	1	0	SCORE __ (RB)	Right Bank		10	9	8	7	6	5	4	3	2	1
<b>9. Vegetative Protection (score each bank)</b>	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.																										
	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.																
	SCORE __ (LB)	Left Bank		10	9	8	7	6	5	4	3	2	1	0	SCORE __ (RB)	Right Bank		10	9	8	7	6	5	4	3	2	1
<b>10. Riparian Vegetative Zone Width (score each bank riparian zone)</b>	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.																										
	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.																
	SCORE __ (LB)	Left Bank		10	9	8	7	6	5	4	3	2	1	0	SCORE __ (RB)	Right Bank		10	9	8	7	6	5	4	3	2	1

Total Score 95

## HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME <u>NF2</u>	LOCATION	
STATION # _____ RIVERMILE _____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET # _____	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY <u>Sheila &amp; Kristine</u>	DATE <u>6/19/06</u> TIME <u>9:15</u> <u>AM</u> PM	REASON FOR SURVEY

	Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor	
Parameters to be evaluated in sampling reach	<b>1. Epifaunal Substrate/ Available Cover</b>	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE	20 19 18 17 <u>16</u>	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	<b>2. Pool Substrate Characterization</b>	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
	SCORE	20 19 18 17 16	15 <u>14</u> 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	<b>3. Pool Variability</b>	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	SCORE	20 19 18 17 16	15 14 13 12 <u>11</u>	10 9 8 7 6	5 4 3 2 1 0
<b>4. Sediment Deposition</b>	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.	
SCORE	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0	
<b>5. Channel Flow Status</b>	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.	
SCORE	20 19 18 17 16	15 14 13 12 11	<u>10</u> 9 8 7 6	5 4 3 2 1 0	



HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
<b>6. Channel Alteration</b>	Channelization or dredging absent or minimal; stream with normal pattern.																				
	Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.										
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>7. Channel Sinuosity</b>	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)																				
	The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					Channel straight; waterway has been channelized for a long distance.										
SCORE	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>8. Bank Stability (score each bank)</b>	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.																				
	Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.										
	SCORE __ (LB)	Left Bank		10	9		8	7	6			5	4	3			2	1	0		
SCORE __ (RB)	Right Bank		10	9		8	7	6			5	4	3			2	1	0			
<b>9. Vegetative Protection (score each bank)</b>	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.																				
	70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by native vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.										
	SCORE __ (LB)	Left Bank		10	9		8	7	6			5	4	3			2	1	0		
SCORE __ (RB)	Right Bank		10	9		8	7	6			5	4	3			2	1	0			
<b>10. Riparian Vegetative Zone Width (score each bank riparian zone)</b>	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.																				
	Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.										
	SCORE __ (LB)	Left Bank		10	9		8	7	6			5	4	3			2	1	0		
SCORE __ (RB)	Right Bank		10	9		8	7	6			5	4	3			2	1	0			

Total Score 131

## HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME <u>JCA</u>	LOCATION	
STATION # _____ RIVERMILE _____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY <u>Sheila</u>	DATE <u>7/7/04</u> TIME <u>10:00</u> (AM) PM	REASON FOR SURVEY

	Habitat Parameter	Condition Category			
		Optimal	Suboptimal	Marginal	Poor
Parameters to be evaluated in sampling reach	<b>1. Epifaunal Substrate/ Available Cover</b>	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	<b>SCORE</b>	20 19 18 17 16	15 14 13 12 11	(10) 9 8 7 6	5 4 3 2 1 0
	<b>2. Pool Substrate Characterization</b>	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
	<b>SCORE</b>	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1 0
	<b>3. Pool Variability</b>	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	<b>SCORE</b>	20 19 18 17 16	15 14 (13) 12 11	10 9 8 7 6	5 4 3 2 1 0
	<b>4. Sediment Deposition</b>	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.
	<b>SCORE</b>	20 19 18 17 16	15 14 13 12 (11)	10 9 8 7 6	5 4 3 2 1 0
	<b>5. Channel Flow Status</b>	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.
	<b>SCORE</b>	20 19 18 17 16	15 14 13 12 11	10 (9) 8 7 6	5 4 3 2 1 0

**HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)**

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
<b>6. Channel Alteration</b>  Channelization or dredging absent or minimal; stream with normal pattern.						Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.					
	<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
<b>7. Channel Sinuosity</b>  The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)						The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					Channel straight; waterway has been channelized for a long distance.					
	<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
<b>8. Bank Stability (score each bank)</b>  Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.						Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.					
	<b>SCORE ___ (LB)</b>	Left Bank		10	9	8	7	6	5	4	3	2	1	0							
	<b>SCORE ___ (RB)</b>	Right Bank		10	9	8	7	6	5	4	3	2	1	0							
<b>9. Vegetative Protection (score each bank)</b>  More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.						70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.					
	<b>SCORE ___ (LB)</b>	Left Bank		10	9	8	7	6	5	4	3	2	1	0							
	<b>SCORE ___ (RB)</b>	Right Bank		10	9	8	7	6	5	4	3	2	1	0							
<b>10. Riparian Vegetative Zone Width (score each bank riparian zone)</b>  Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.						Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.					
	<b>SCORE ___ (LB)</b>	Left Bank		10	9	8	7	6	5	4	3	2	1	0							
	<b>SCORE ___ (RB)</b>	Right Bank		10	9	8	7	6	5	4	3	2	1	0							

**Total Score** 98

## HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME <u>JC2</u>	LOCATION	
STATION # _____ RIVERMILE _____	STREAM CLASS	
LAT _____ LONG _____	RIVER BASIN	
STORET #	AGENCY	
INVESTIGATORS		
FORM COMPLETED BY <u>Sheila</u>	DATE <u>7/7/00</u> TIME <u>1:30</u> AM <input checked="" type="radio"/> PM	REASON FOR SURVEY

	Habitat Parameter	Condition Category			
		Optimal	Suboptimal	Marginal	Poor
Parameters to be evaluated in sampling reach	1. Epifaunal Substrate/ Available Cover	Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and not transient).	30-50% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	10-30% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 10% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	2. Pool Substrate Characterization	Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.	Mixture of soft sand, mud, or clay; mud may be dominant; some root mats and submerged vegetation present.	All mud or clay or sand bottom; little or no root mat; no submerged vegetation.	Hard-pan clay or bedrock; no root mat or vegetation.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	3. Pool Variability	Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.	Majority of pools large-deep; very few shallow.	Shallow pools much more prevalent than deep pools.	Majority of pools small-shallow or pools absent.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 20-50% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 50-80% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 80% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	

**HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)**

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
<b>6. Channel Alteration</b>	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.					
<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>7. Channel Sinuosity</b>	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					Channel straight; waterway has been channelized for a long distance.					
<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
<b>8. Bank Stability (score each bank)</b>	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.					
<b>SCORE __ (LB)</b>	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
<b>SCORE __ (RB)</b>	Right Bank 10 9					8 7 6					5 4 3					2 1 0					
<b>9. Vegetative Protection (score each bank)</b>	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.					70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.					
<b>SCORE __ (LB)</b>	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
<b>SCORE __ (RB)</b>	Right Bank 10 9					8 7 6					5 4 3					2 1 0					
<b>10. Riparian Vegetative Zone Width (score each bank riparian zone)</b>	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.					Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.					
<b>SCORE __ (LB)</b>	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
<b>SCORE __ (RB)</b>	Right Bank 10 9					8 7 6					5 4 3					2 1 0					

**Total Score** 175

## Appendix F. Water Chemistry, Habitat Assessment, Nutrient, and Benthic Macroinvertebrate Data

Table F1. Date, pH, temperature, and conductivity at each study reach when benthic macroinvertebrates were sampled.

Site*	Grazed vs. Exclusion	Date	pH	Temperature (°C)	Conductivity (µS)
TC	Grazed	8/23/2006	7.8	18.8	540
	Exclusion	8/24/2006	7.5	18.6	540
	% diff.		-3.8	-1.1	0.0
SCA	Grazed	6/16/2006	8.4	18.6	210
	Exclusion	6/15/2006	8.1	17.1	240
	% diff.		-3.6	-8.1	14.3
SCB	Grazed	6/14/2006	8.1	15.2	230
	Exclusion	6/13/2006	8.3	15.1	230
	% diff.		2.5	-0.7	0.0
NF	Grazed	6/19/2006	8.4	21.9	350
	Exclusion	6/19/2006	8.2	19.9	420
	% diff.		-2.4	-9.1	20.0
JC	Grazed	7/7/2006	6.9	18.8	80 <sup>†</sup>
	Forested	7/7/2006	7.1	19.5	80 <sup>†</sup>
	% diff.		2.9	3.7	0.0

\* TC – Tom’s Creek, SCA – Sinking Creek A, SCB – Sinking Creek B, NF – North Fork of the Roanoke River, JC – Johns Creek

† Conductivity meter broken on 7/7/2006, measurement taken 6/21/2006 and 6/22/2006

**Table F2. SCI benthic macroinvertebrate metrics for each reach.**

Site*	Grazed vs. Exclusion	Taxa Richness	EPT index	% Ephemeroptera	% P+T-Hydropsych.	% Scrapers	% Chironomidae	% 2 DXminant	MFBI	SCI
TC	Grazed	14	7	6	6	52.8	6.5	66.7	4.5	60.6
	Exclusion	17	7	3	3	51	9.5	61.5	4.7	60.1
	% diff	21.4	0	-50.2	-50.2	-3.4	46.6	-7.8	4.8	-0.8
SCA	Grazed	20	11	11.1	11.1	70.5	0.5	59.9	3.9	73.2
	Exclusion	23	13	4.1	4.1	81.1	0	66.4	4	69.5
	% diff	15	18.2	-62.7	-62.7	15	-100	10.8	2.5	-5.1
SCB	Grazed	21	11	9.2	9.2	69.3	5	52.8	3.9	74.5
	Exclusion	17	9	16.3	16.3	57.1	18.2	44.8	3.9	72.8
	% diff	-19	-18.2	77.2	77.2	-17.5	261.2	-15	-1.2	-2.3
NF	Grazed	14	7	1.5	1.5	75.6	5	71.1	3.8	60
	Exclusion	17	7	0.5	0.5	82.5	4.1	79.3	3.8	59.3
	% diff	21.4	0	-69.1	-69.1	9.1	-16.6	11.4	-0.8	-1.2
JC	Grazed	18	9	4.5	4.5	40.5	0	49.5	4	70.5
	Forested	18	8	11	11	55.5	2.5	51	3.4	73.7
	% diff	0	-11.1	142	142	37.2	0	2.9	-15.1	4.6

\* TC – Tom’s Creek, SCA – Sinking Creek A, SCB – Sinking Creek B, NF – North Fork of the Roanoke River, JC – Johns Creek

**Table F3. Benthic macroinvertebrate metrics (non-SCI) for each reach.**

Metric	Grazed vs. Exclusion	Site*				
		TC	SCA	SCB	NF	JC
Percent	Grazed	88.4	87.4	90.8	39.8	59.0
Crawlers and	Exclusion	85.5	77.4	76.8	42.4	59.0
Clingers	% diff	-3.3	-11.5	-15.4	6.5	0.0
Percent	Grazed	11.6	4.3	8.3	16.9	8.0
Sprawlers and	Exclusion	14.5	6.9	21.2	13.4	8.0
Burrowers	% diff	25.3	59.0	156.5	-21.0	0.0
Percent	Grazed	50.9	57.5	47.7	35.8	18.0
Elmidae and	Exclusion	49.0	60.4	29.6	38.2	18.0
Psephenidae	% diff	-3.8	5.0	-38.0	6.8	0.0
Percent	Grazed	19.9	9.2	0.5	1.0	1.5
Hydropsychidae	Exclusion	22.5	3.7	5.9	0.0	1.5
	% diff	13.0	-59.8	1188.7	-100.0	0.0

\* TC – Tom’s Creek, SCA – Sinking Creek A, SCB – Sinking Creek B, NF – North Fork of the Roanoke River, JC – Johns Creek



**Table F4. Benthic macroinvertebrate type (family level) and number collected.**

Family	Site*									
	TC1	TC2	SCA1	SCA2	SCB1	SCB2	NF1	NF2	JC1	JC2
Lymnaeidae	0	0	0	0	0	3	0	0	0	0
Physidae	0	0	1	0	0	0	0	0	0	0
Hydrobiidae	0	0	17	33	0	0	80	93	66	66
Pleuroceridae	4	2	0	10	38	17	0	0	0	0
Viviparidae	0	0	0	0	0	0	0	1	0	0
Sphaeriidae	3	2	0	3	0	0	1	3	2	2
Lumbriculidae	0	2	2	6	1	0	0	0	5	5
Baetidae	19	7	6	1	0	6	1	1	2	2
Caenidae	4	1	2	2	3	5	19	11	1	1
Ephemeridae	0	0	0	1	1	0	4	3	0	0
Ephemerellidae	0	1	6	3	18	14	2	3	0	0
Heptageniidae	0	2	6	1	8	8	0	2	9	9
Isonychiidae	1	0	1	0	0	0	0	0	36	36
Leptophlebiidae	0	0	0	1	0	0	0	0	0	0
Tricorthidae	0	0	0	1	0	0	0	0	0	0
Aeshnidae	0	7	1	4	4	6	0	1	0	0
Cordulegastridae	0	0	0	0	0	0	0	0	2	2
Libellulidae	0	1	0	0	0	0	0	3	1	1
Gomphidae	0	0	0	1	0	0	0	0	0	0
Chloroperlidae	0	0	0	1	0	0	0	0	0	0
Leuctridae	0	0	0	0	2	0	0	0	0	0
Peltoperlidae	0	0	2	0	13	0	0	0	0	0
Perlidae	0	0	11	2	0	2	0	0	13	13
Corixidae	0	0	0	0	2	1	0	1	0	0
Veliidae	0	0	0	0	0	0	2	0	0	0
Corydalidae	0	0	0	0	2	0	0	0	4	4
Brachycentridae	0	0	0	0	1	0	0	1	0	0
Glossomatidae	0	0	0	1	0	0	0	0	0	0
Helicopsychidae	1	0	1	0	0	2	0	0	0	0
Hydropsychidae	43	45	19	8	1	12	2	0	3	3
Odontoceridae	0	0	3	0	4	28	0	1	0	0
Philopotamidae	11	3	6	4	1	1	2	0	8	8
Polycentropodidae	1	3	0	1	1	0	1	0	1	1
Dytiscidae	0	0	0	0	0	0	5	1	0	0
Elmidae	101	78	105	111	77	54	63	79	25	25
Psephenidae	9	20	14	20	27	6	9	4	11	11
Chaoboridae	0	0	1	1	0	0	0	0	0	0
Chironomidae	14	19	1	0	11	37	10	9	5	5
Simuliidae	1	3	0	0	1	0	0	0	6	6
Tipulidae	4	4	2	1	2	1	0	0	0	0
Total organisms	216	200	207	217	218	203	201	217	200	200

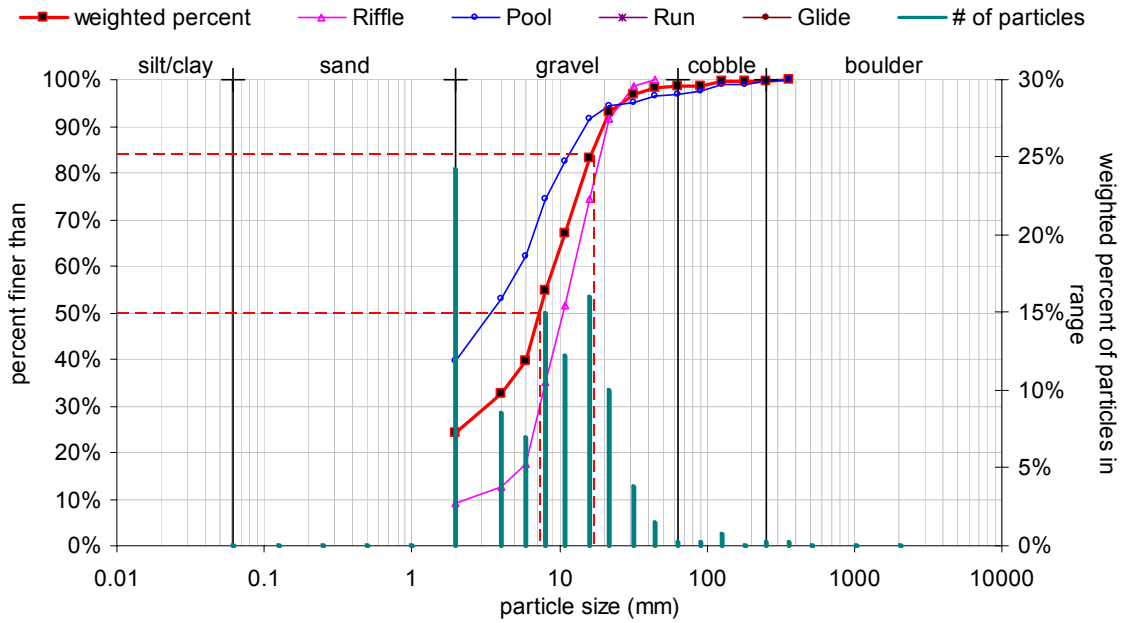
\*TC1-grazed Tom's Creek, TC2-livestock exclusion Tom's Creek, SCA1-Sinking Creek A grazed, SCA2-Sinking Creek A livestock exclusion, SCB1-Sinking Creek B grazed, SCB2- Sinking Creek B livestock exclusion, NF1- North Fork of the Roanoke River grazed, NF2- North Fork of the Roanoke River livestock exclusion, JC1- Johns Creek grazed, JC2- Johns Creek livestock exclusion stream reach

## **Appendix G. Survey and Pebble Count Figures**

This appendix of geomorphic assessment surveys includes the pebble count distributions for two pools and two riffles, the longitudinal profiles for each reach, and two riffle and pool cross-sections with data collected as described in Methods.

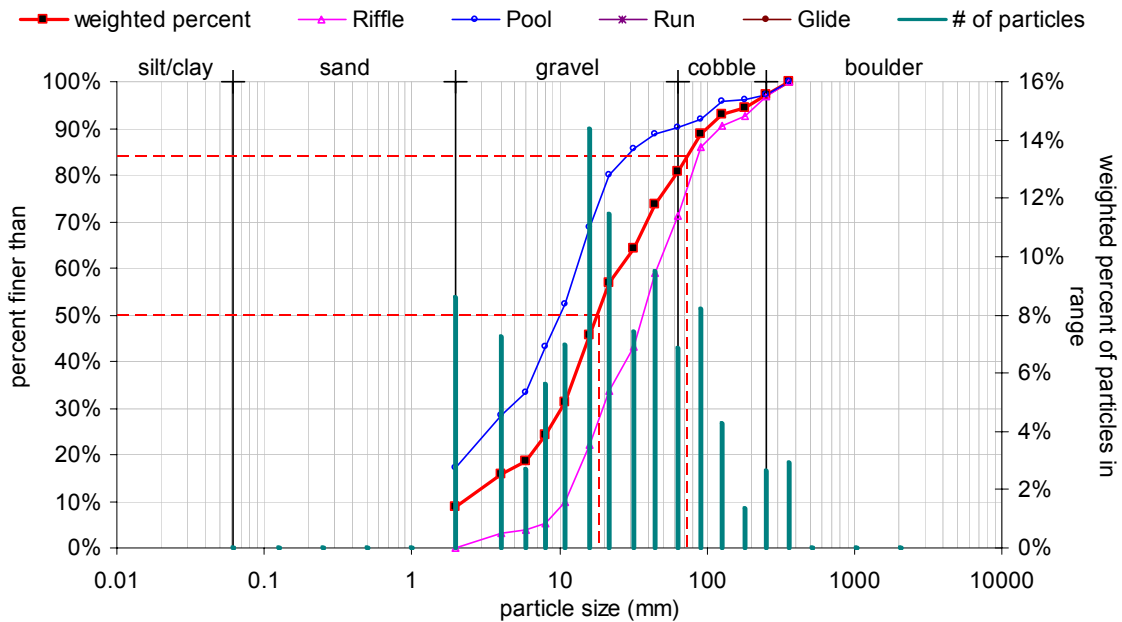
**Figure G1**

Tom's Creek grazed reach: Weighted pebble count by bed features: 50% pool, 50% riffle



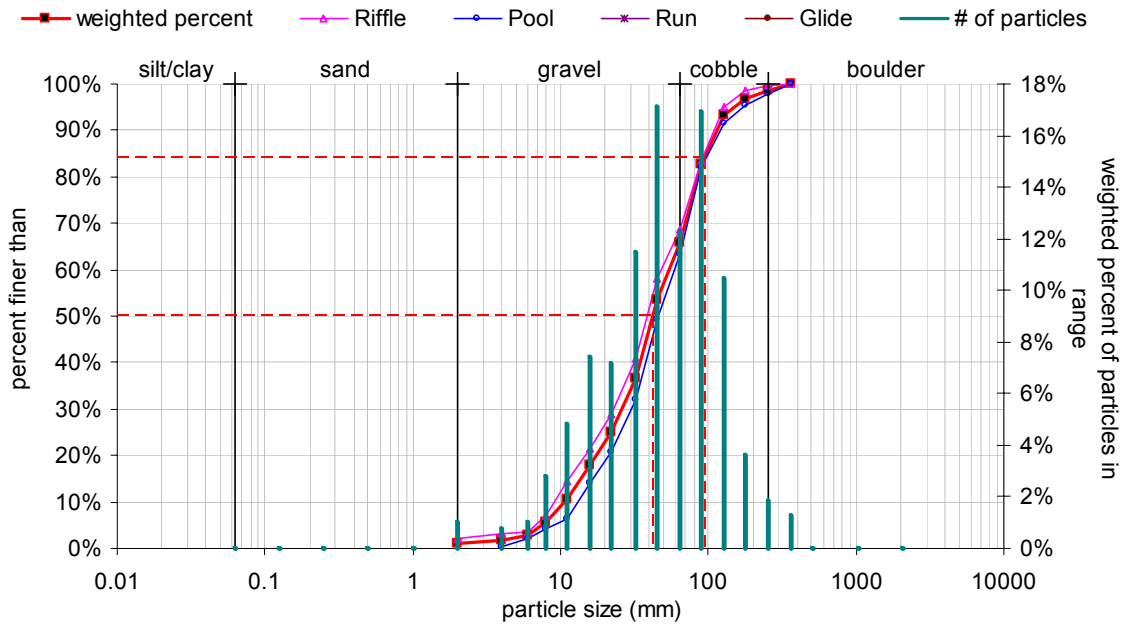
**Figure G2**

Tom's Creek livestock exclusion reach: Weighted pebble count by bed features: 50% pool, 50% riffle



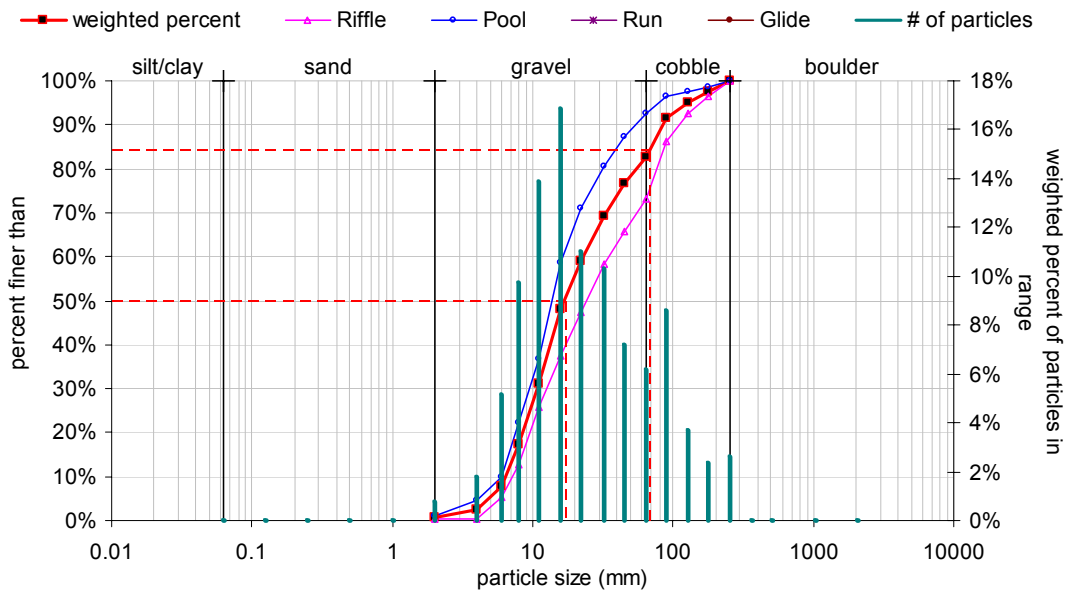
**Figure G3**

Sinking Creek A grazed reach: Weighted pebble count by bed features: 50% pool, 50% riffle



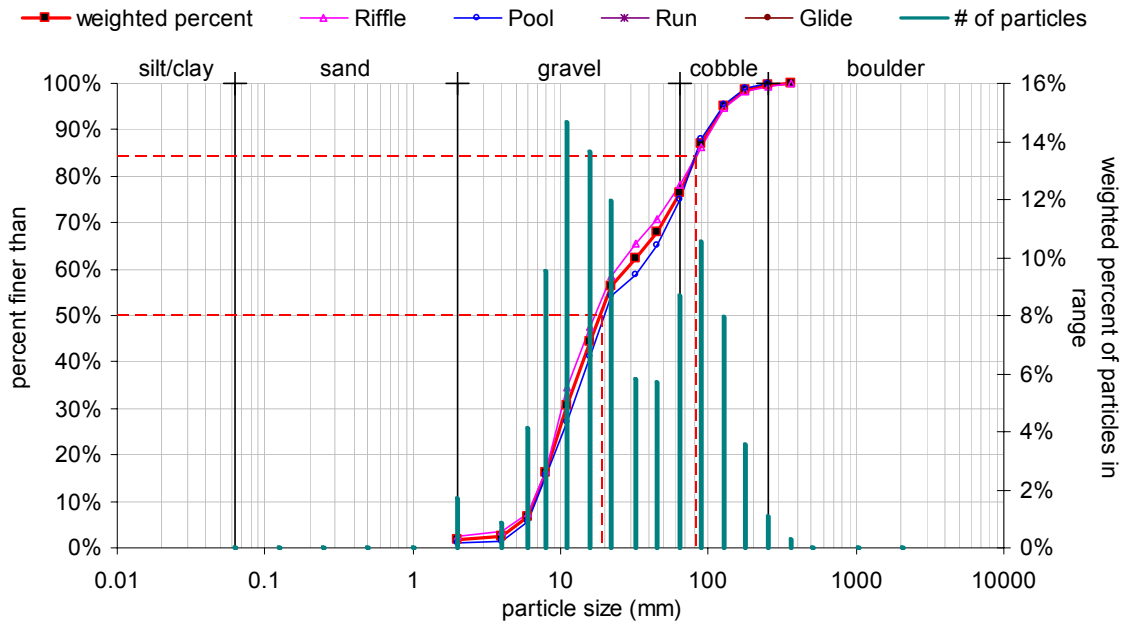
**Figure G4**

Sinking Creek A livestock exclusion: Weighted pebble count by bed features: 50% pool, 50% riffle



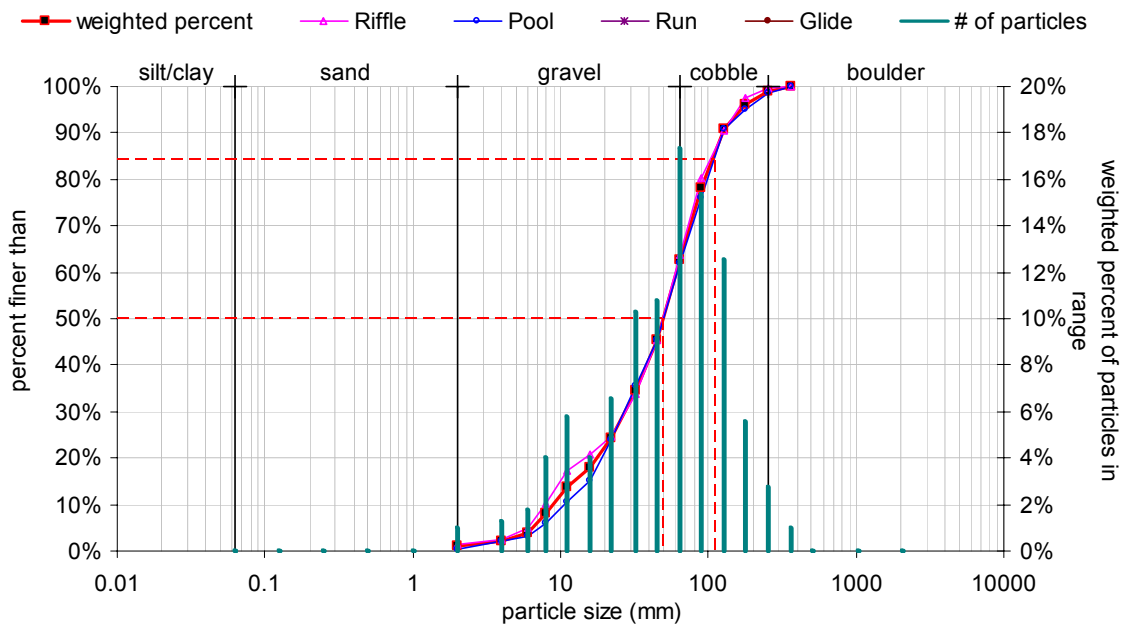
**Figure G5**

Sinking Creek B grazed reach: Weighted pebble count by bed features: 50% pool, 50% riffle



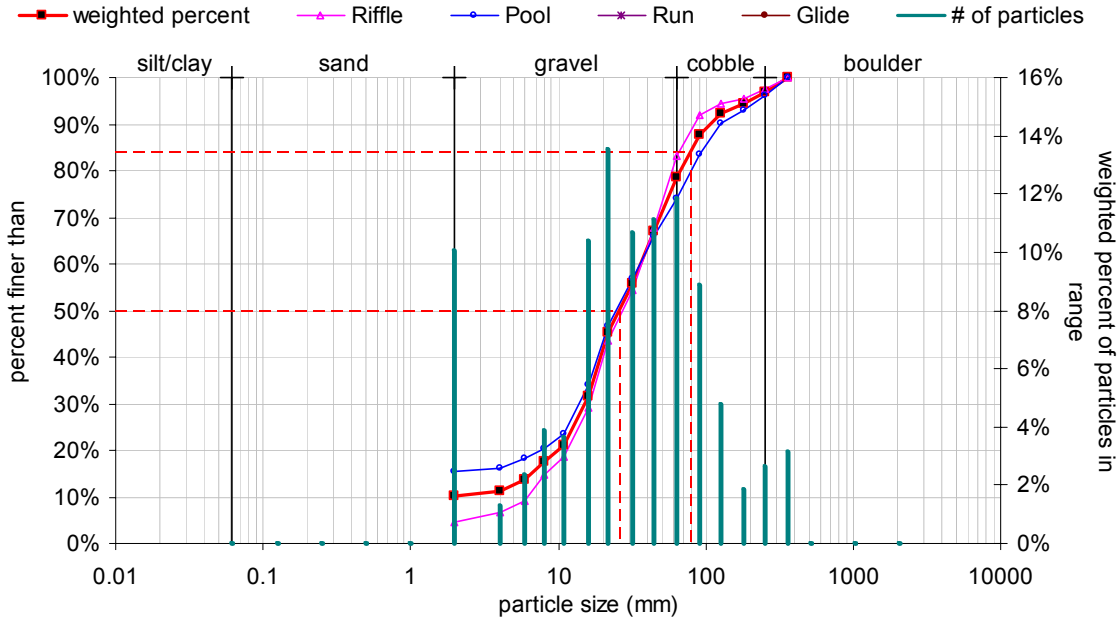
**Figure G6**

Sinking Creek B livestock exclusion reach: Weighted pebble count by bed features: 50% pool, 50% riffle



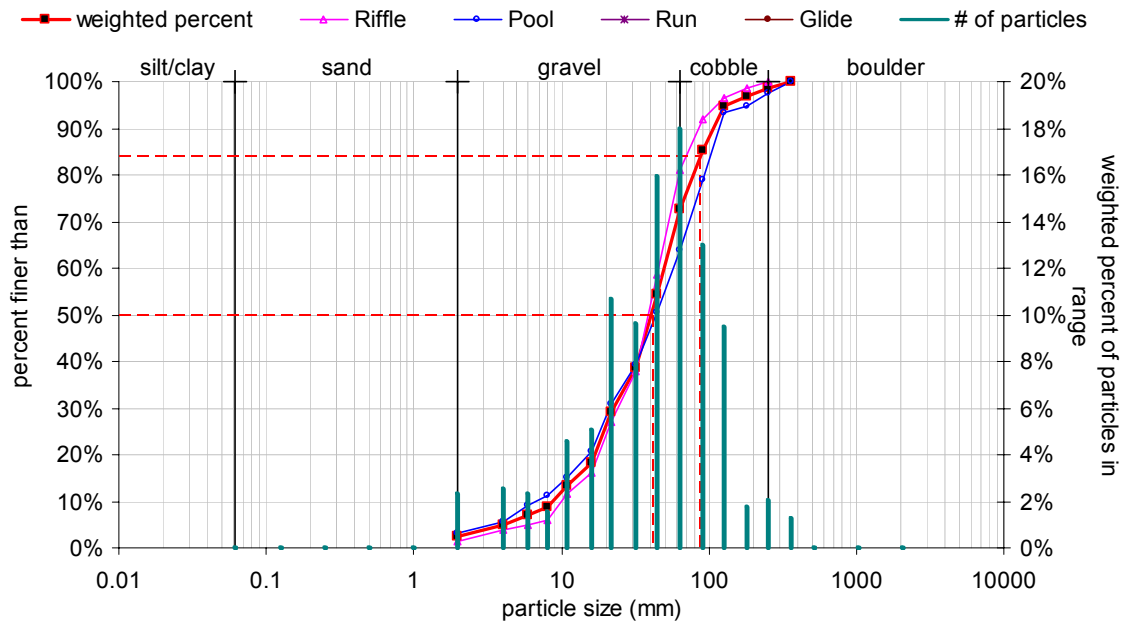
**Figure G7**

North Fork of the Roanoke River grazed reach: Weighted pebble count by bed features: 50% pool, 50% riffle



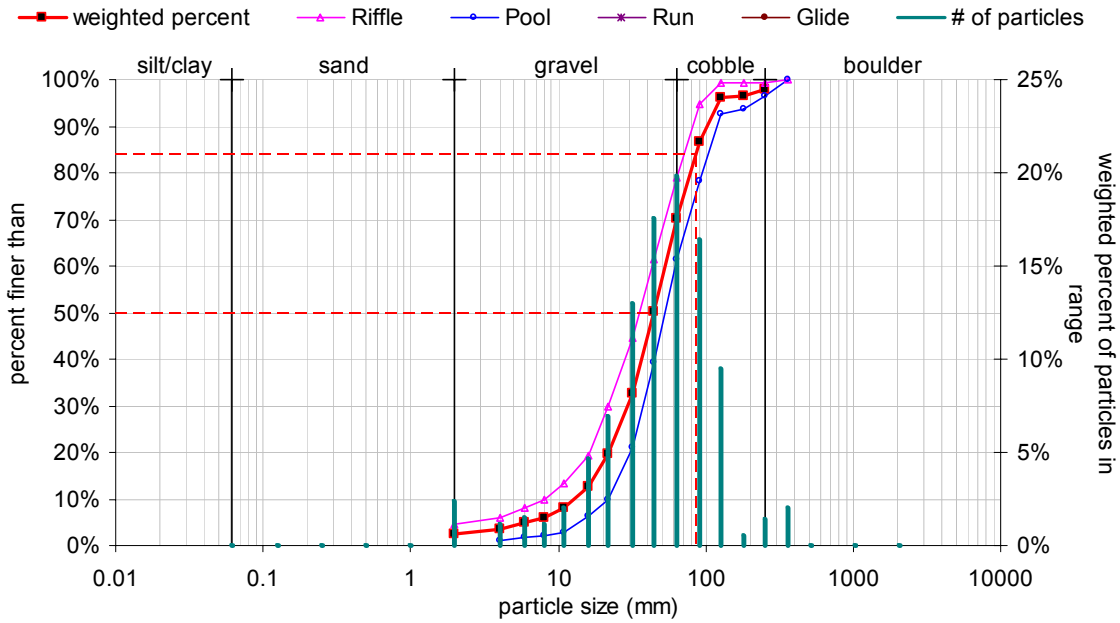
**Figure G8**

North Fork of the Roanoke River livestock exclusion reach: Weighted pebble count by bed features: 50% pool, 50% riffle



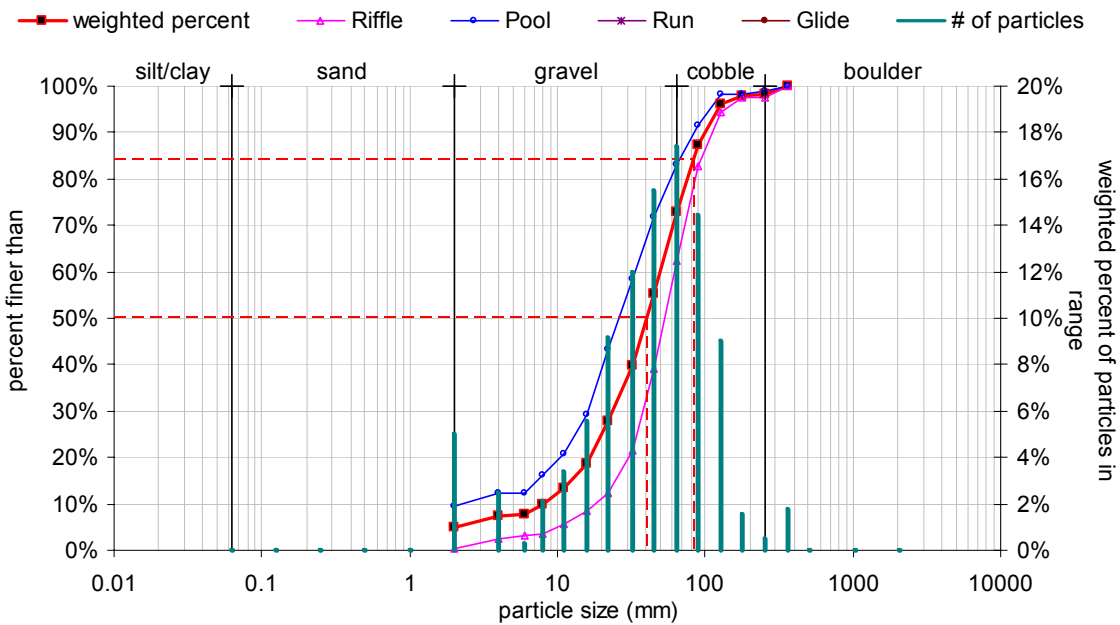
**Figure G9**

Johns Creek grazed reach: Weighted pebble count by bed features: 50% pool, 50% riffle

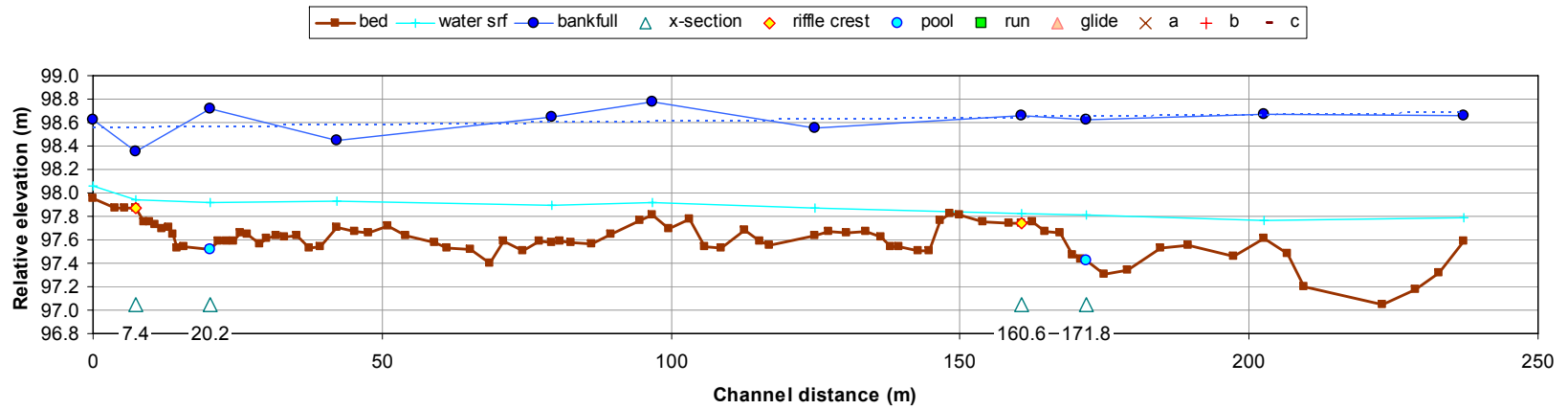


**Figure G10**

Johns Creek livestock exclusion reach: Weighted pebble count by bed features: 50% pool, 50% riffle

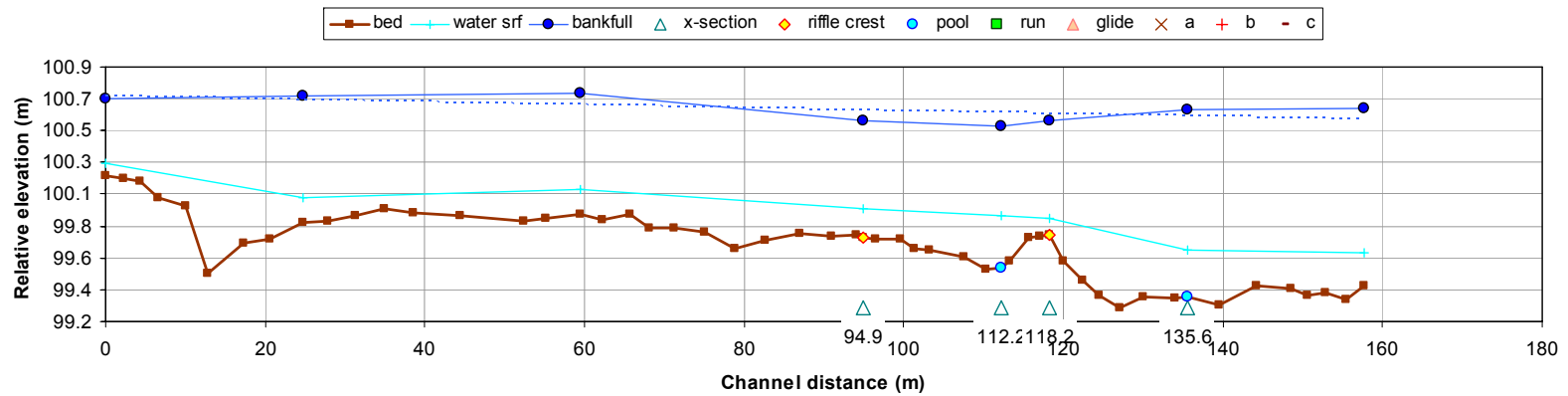


**Figure G11**  
Tom's Creek grazed reach: Longitudinal Profile



149

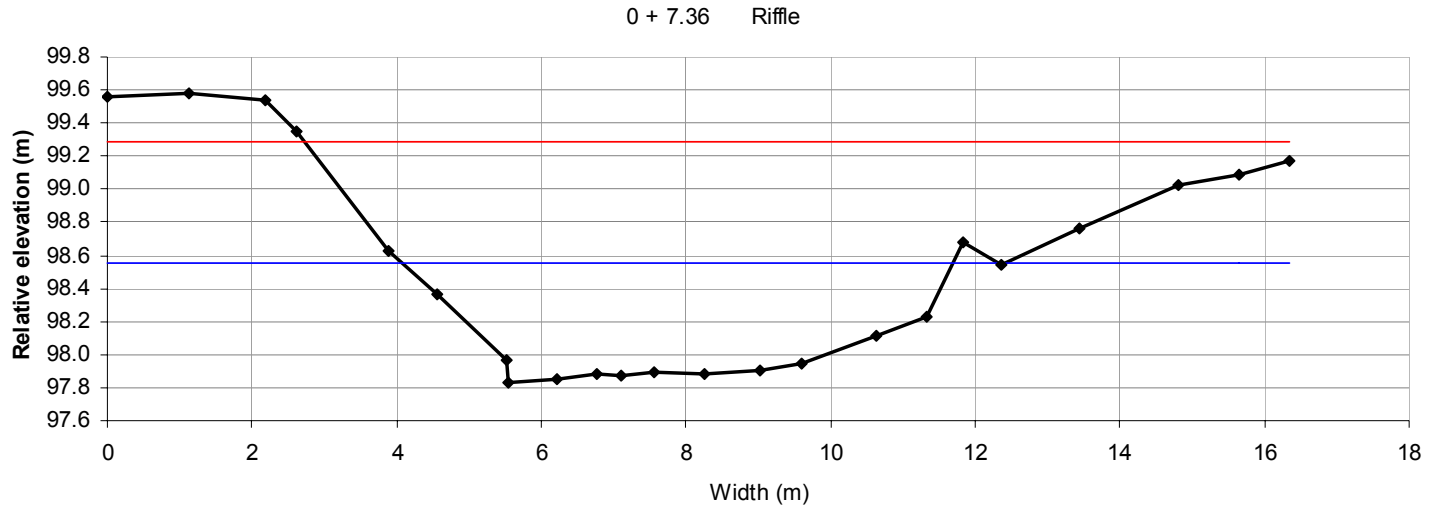
**Figure G12**  
Tom's Creek livestock exclusion reach: Longitudinal Profile





**Figure G13**

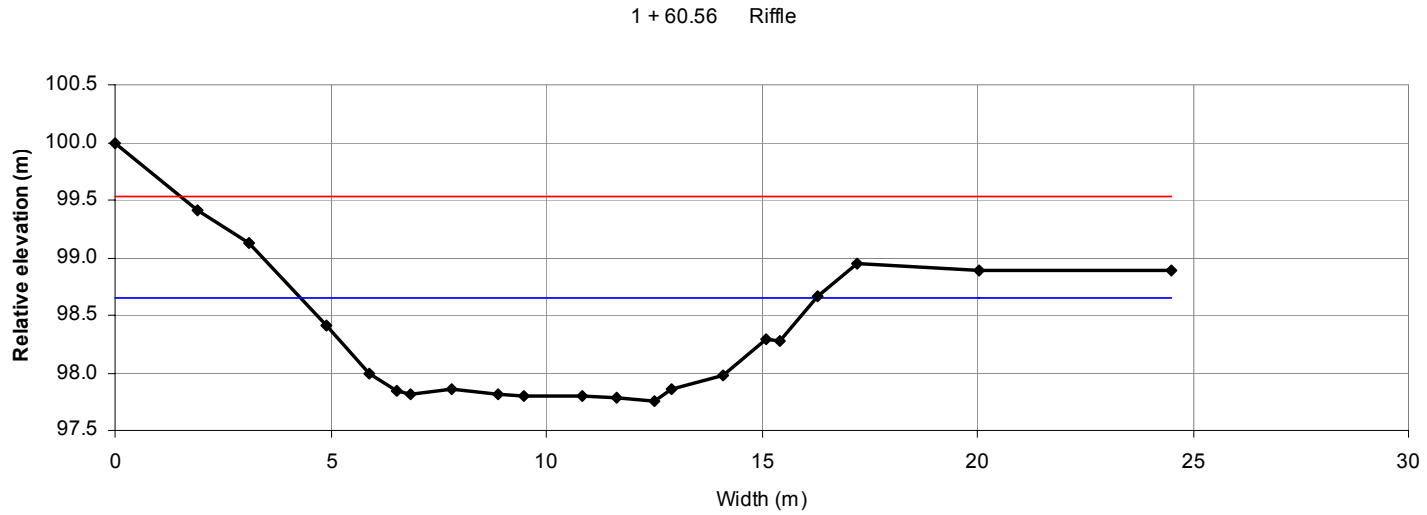
Tom's Creek grazed reach: Riffle 1



150

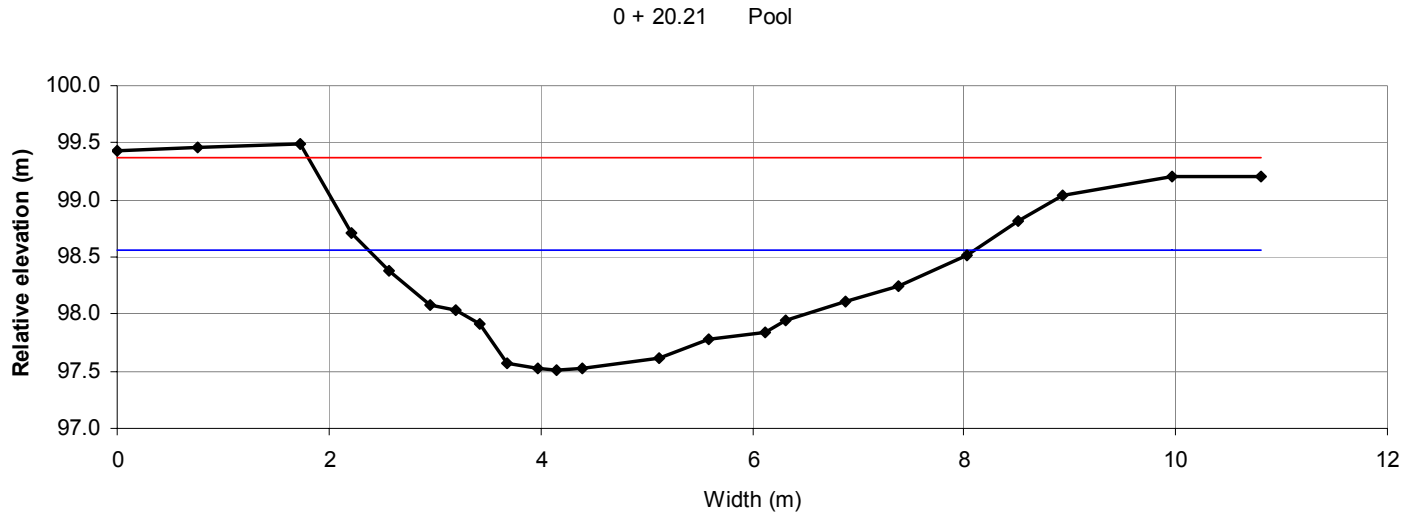
**Figure G14**

Tom's Creek grazed reach: Riffle 2



**Figure G15**

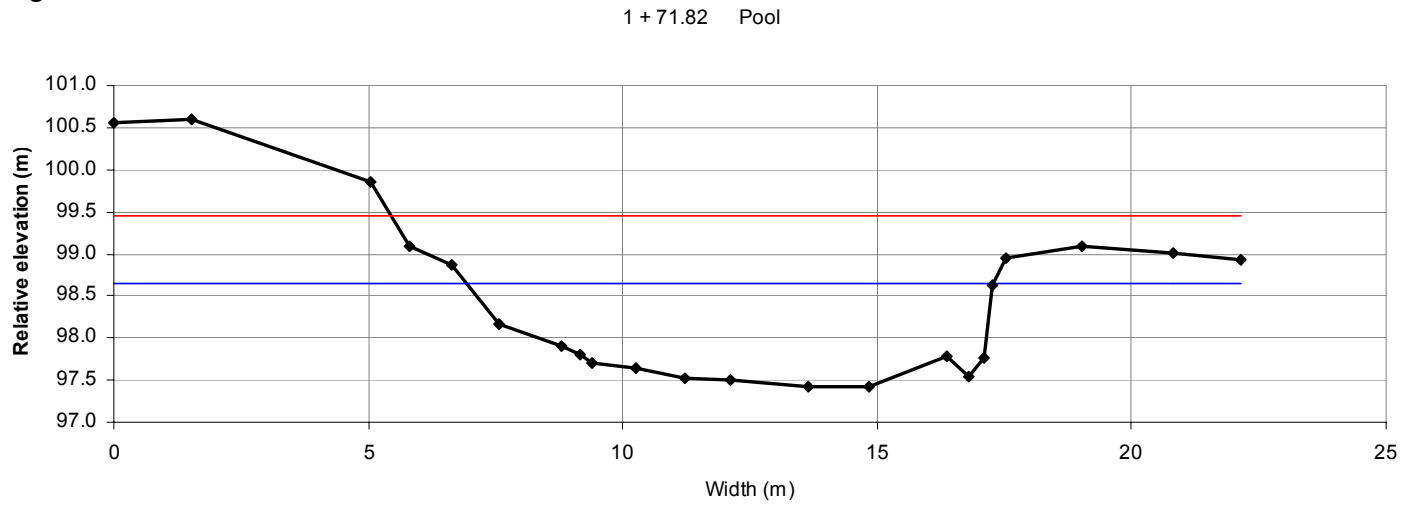
Tom's Creek grazed reach: Pool 1



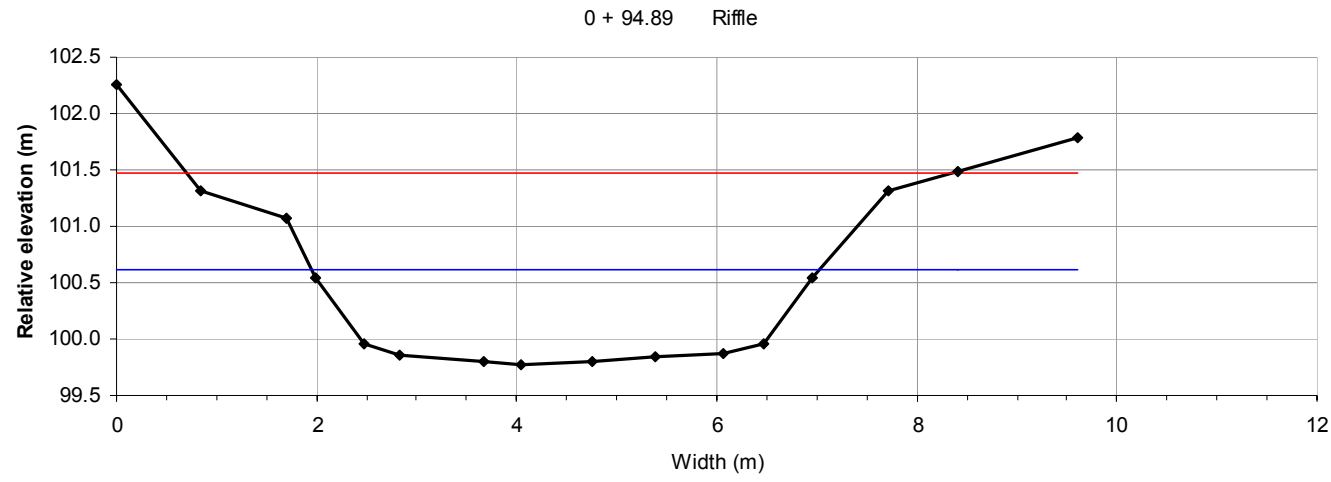
151

**Figure G16**

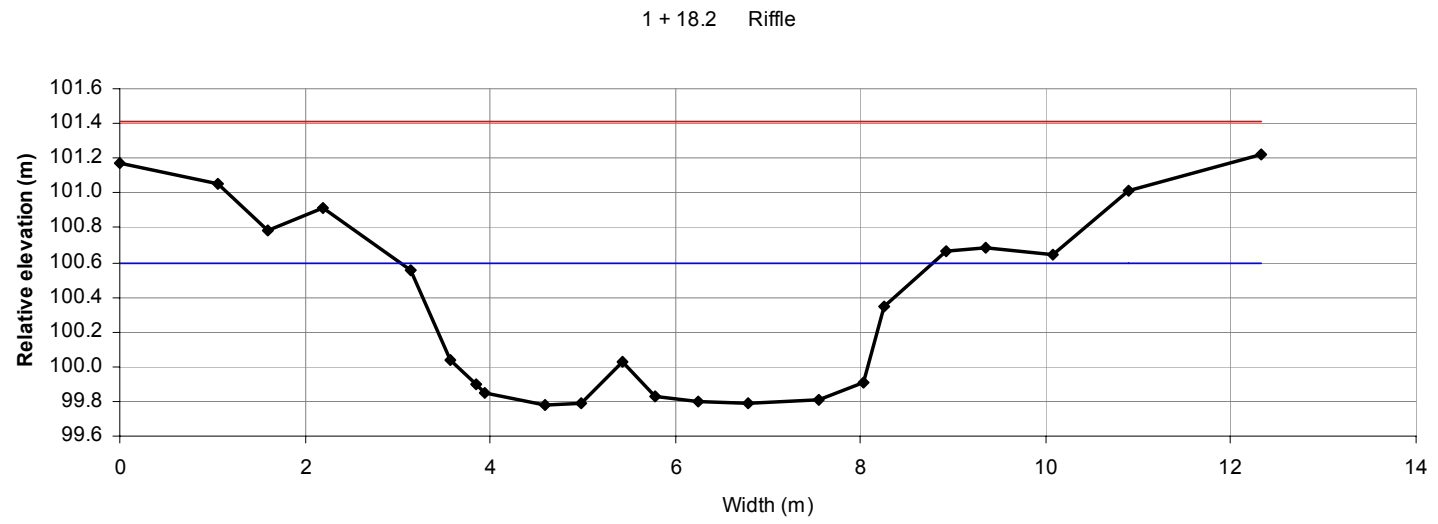
Tom's Creek grazed reach: Pool 2



**Figure G17**  
Tom's Creek livestock exclusion reach: Riffle 1



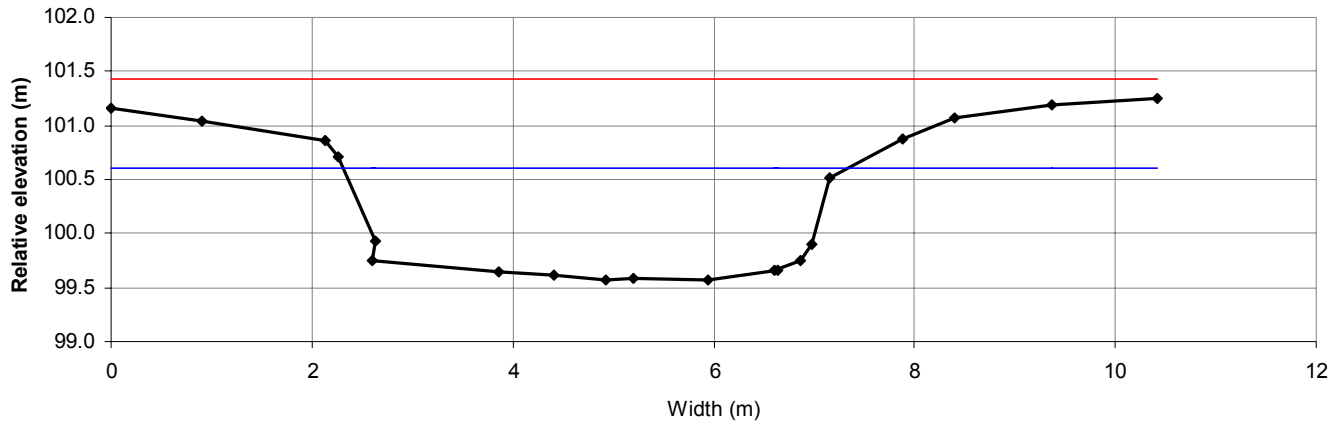
**Figure G18**  
Tom's Creek livestock exclusion reach: Riffle 2



**Figure G19**

Tom's Creek livestock exclusion reach: Pool 1

1 + 12.18 Pool

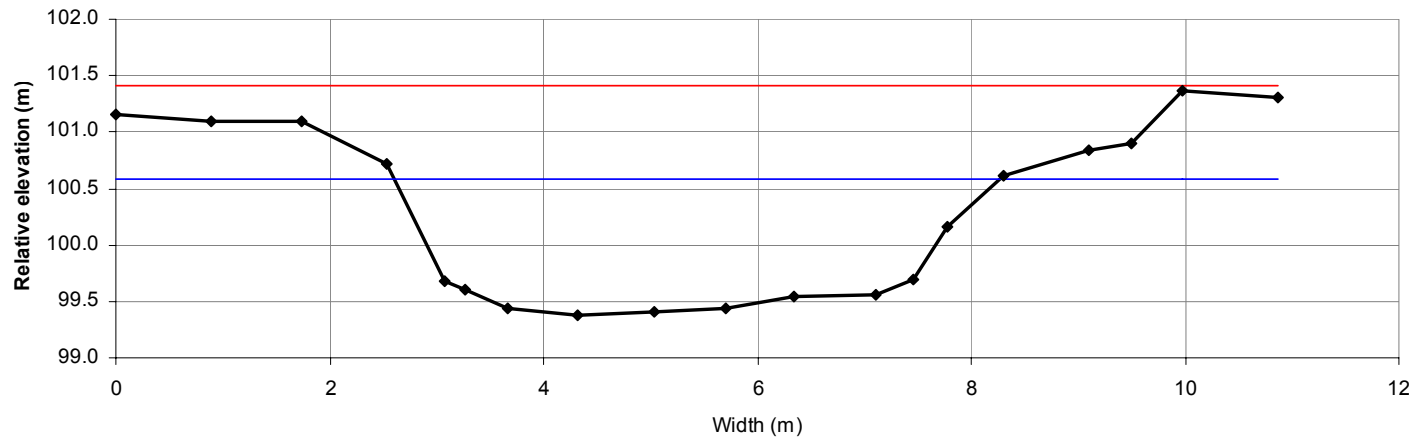


153

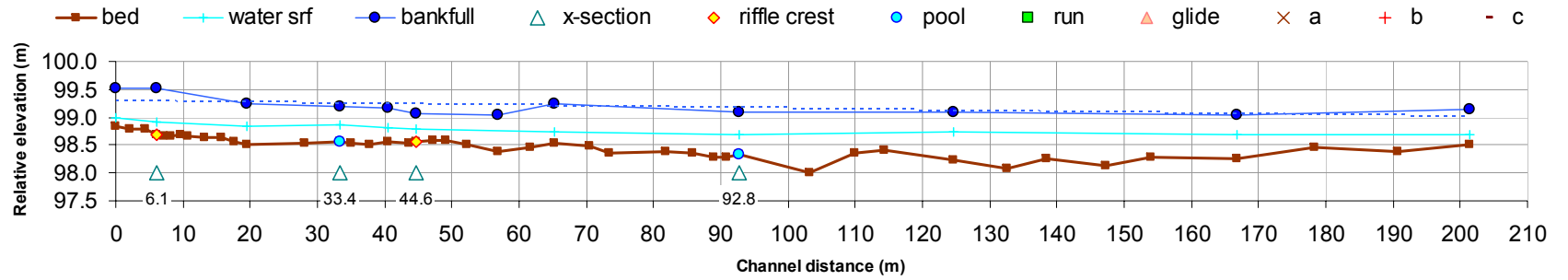
**Figure G20**

Tom's Creek livestock exclusion reach: Pool 2

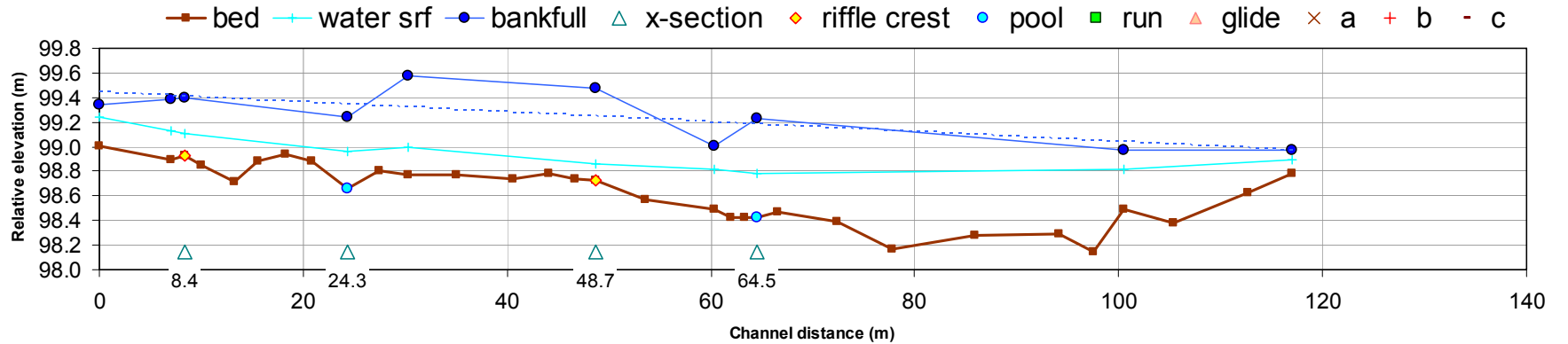
1 + 35.57 Pool



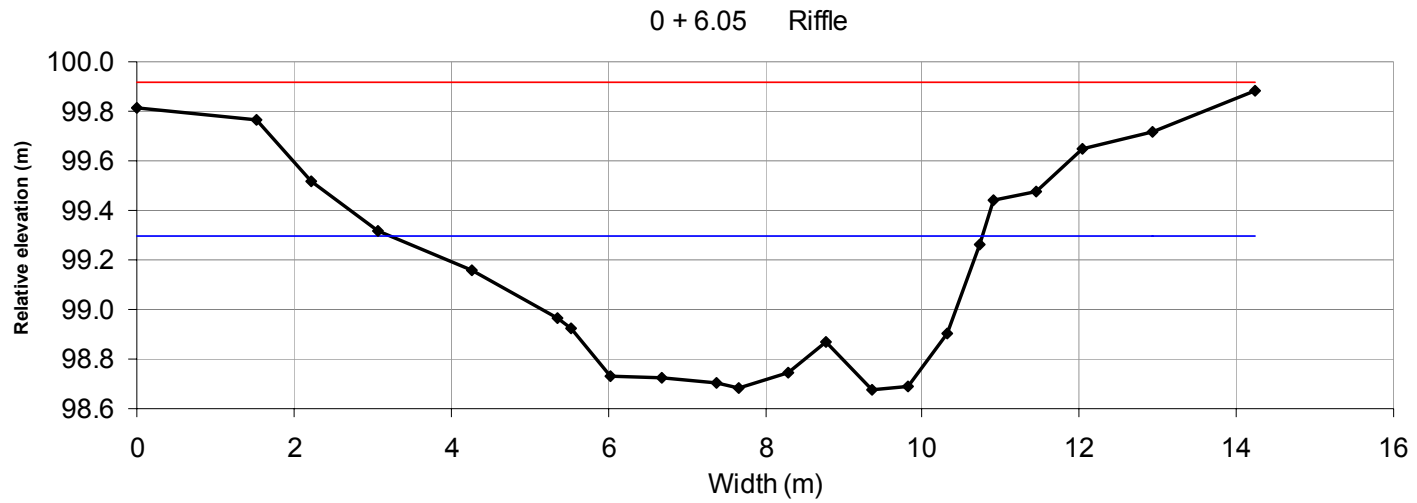
**Figure G21**  
Sinking Creek A grazed reach: Longitudinal Profile



**Figure G22**  
Sinking Creek A livestock exclusion reach: Longitudinal Profile

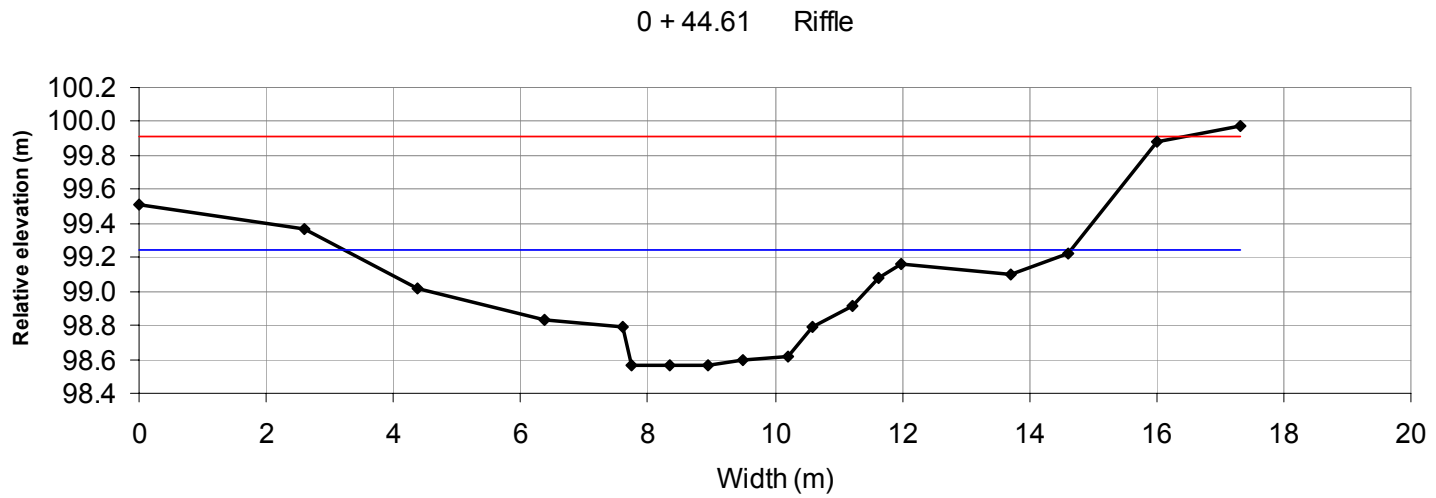


**Figure G23**  
Sinking Creek A grazed reach: Riffle 1



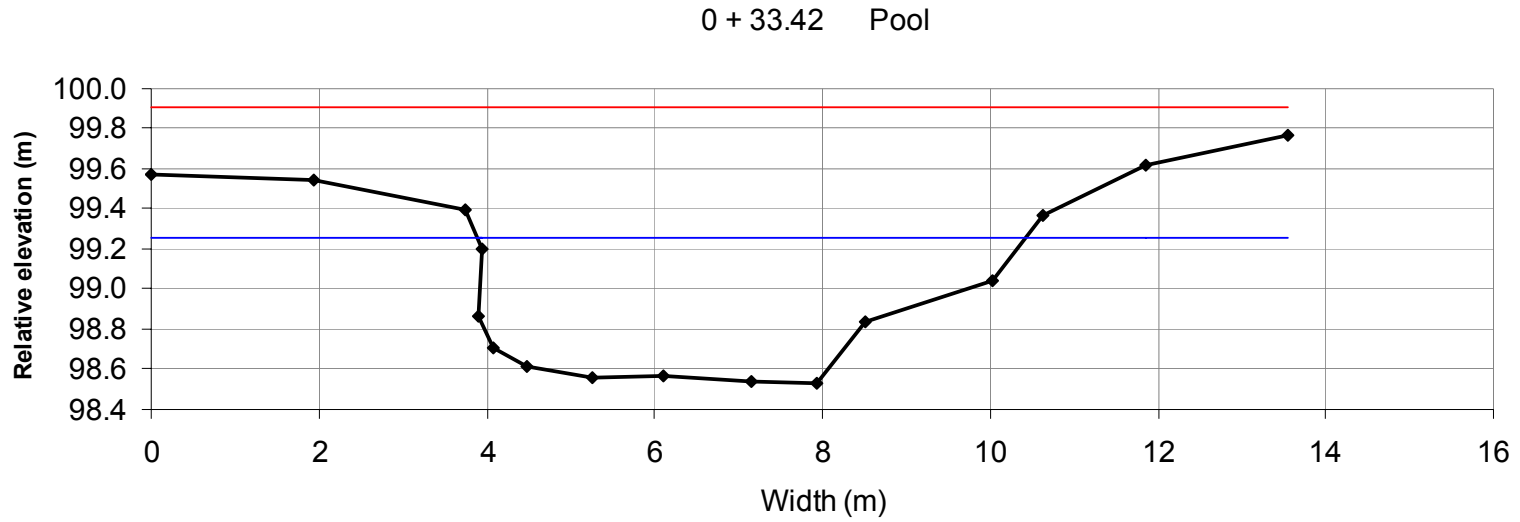
155

**Figure G24**  
Sinking Creek A grazed reach: Riffle 2



**Figure G25**

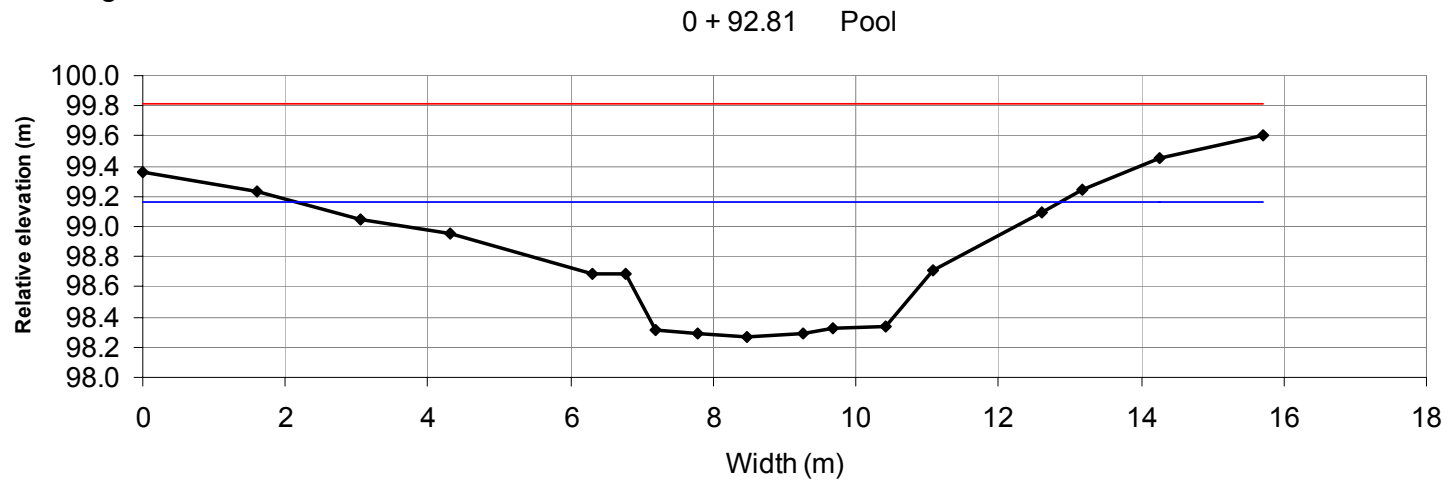
Sinking Creek A grazed reach: Pool 1



156

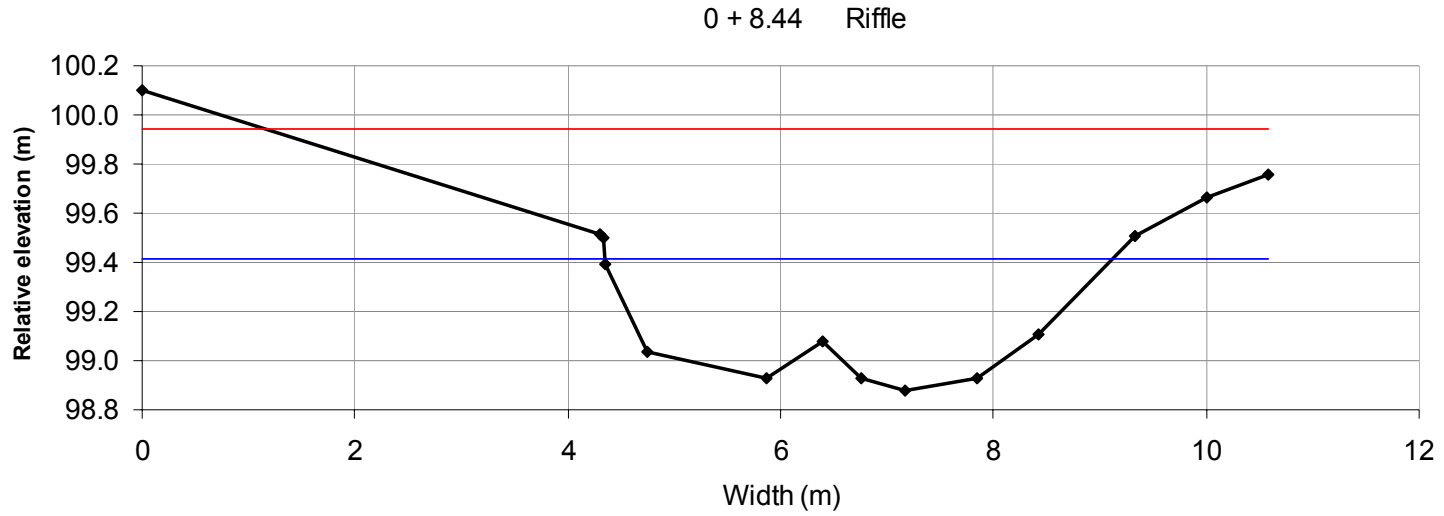
**Figure G26**

Sinking Creek A grazed reach: Pool 2



**Figure G27**

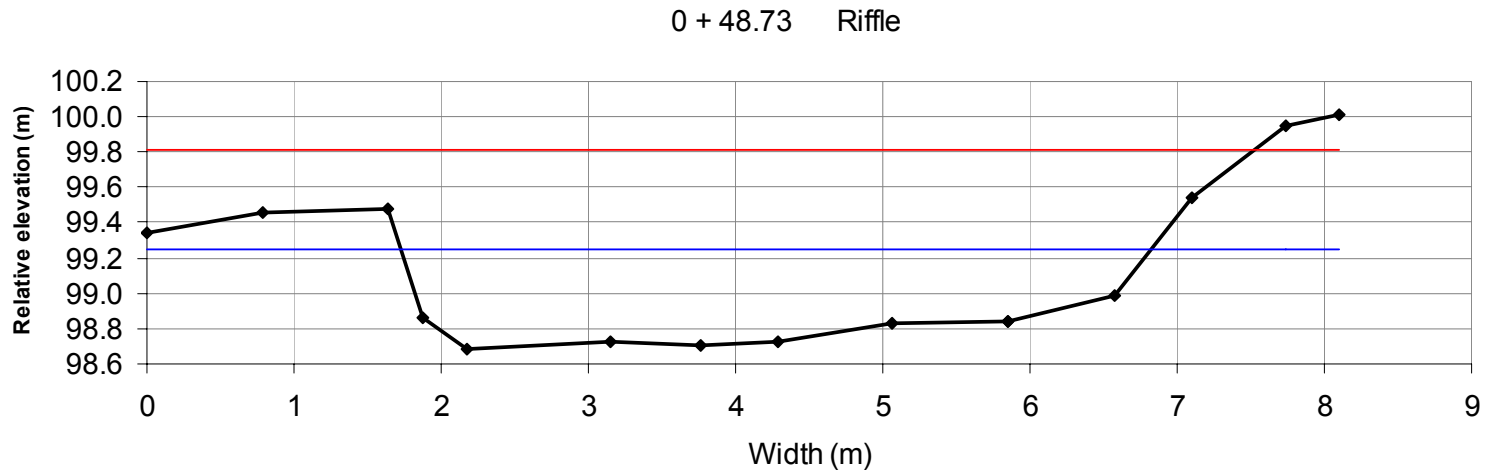
Sinking Creek A livestock exclusion reach: Riffle 1



157

**Figure G28**

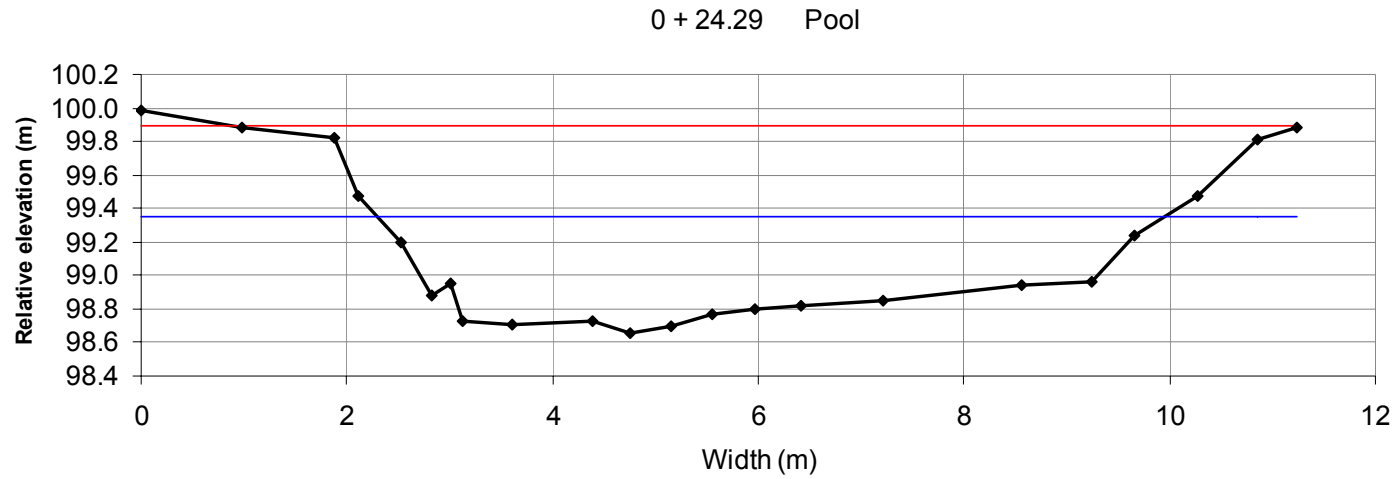
Sinking Creek A livestock exclusion reach: Riffle 2



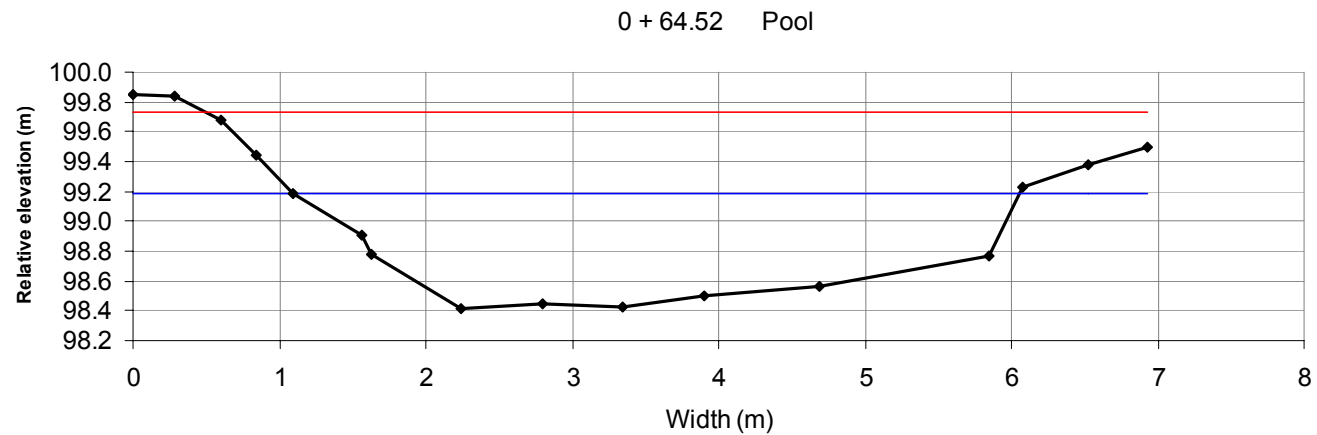


**Figure G29**

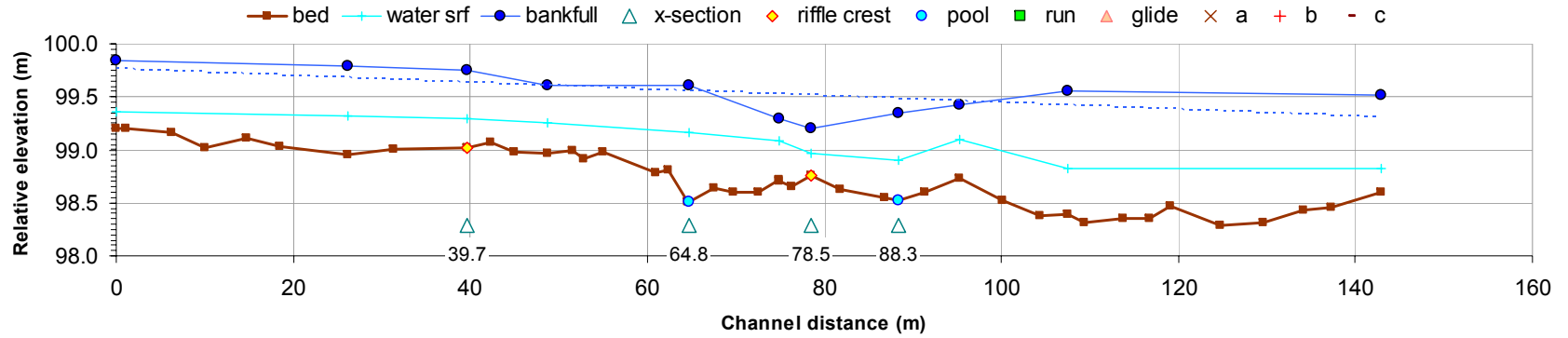
Sinking Creek A livestock exclusion reach: Pool 1

**Figure G30**

Sinking Creek A livestock exclusion reach: Pool 2

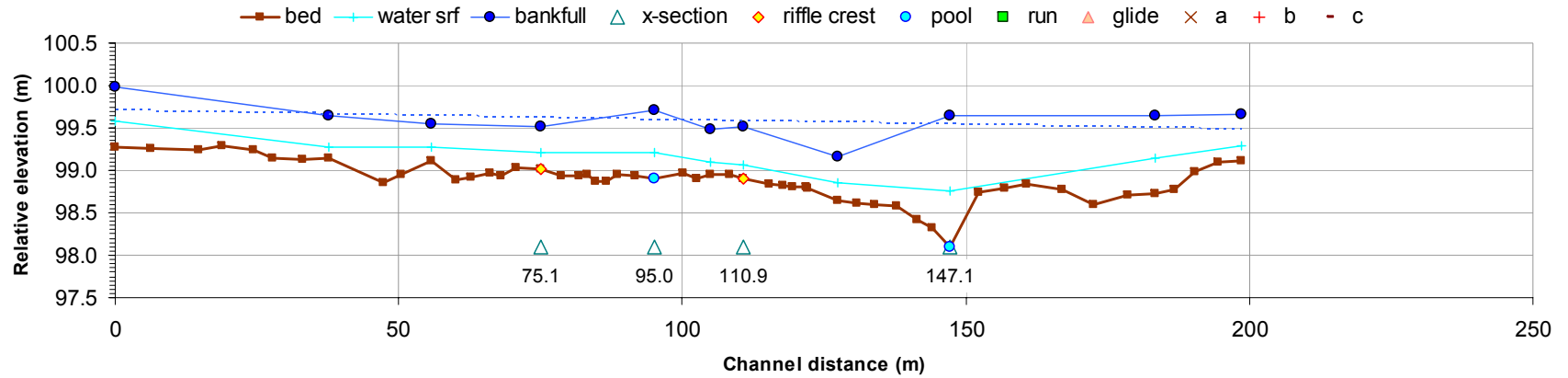


**Figure G31**  
Sinking Creek B grazed reach: Longitudinal Profile



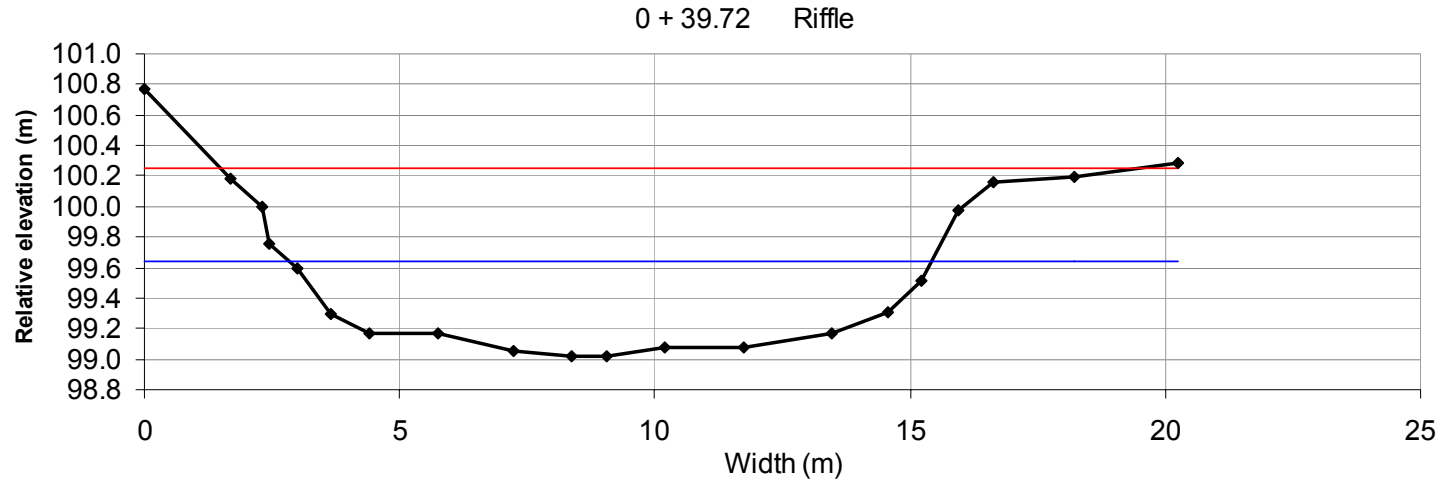
159

**Figure G32**  
Sinking Creek B livestock exclusion: Longitudinal Profile



**Figure G33**

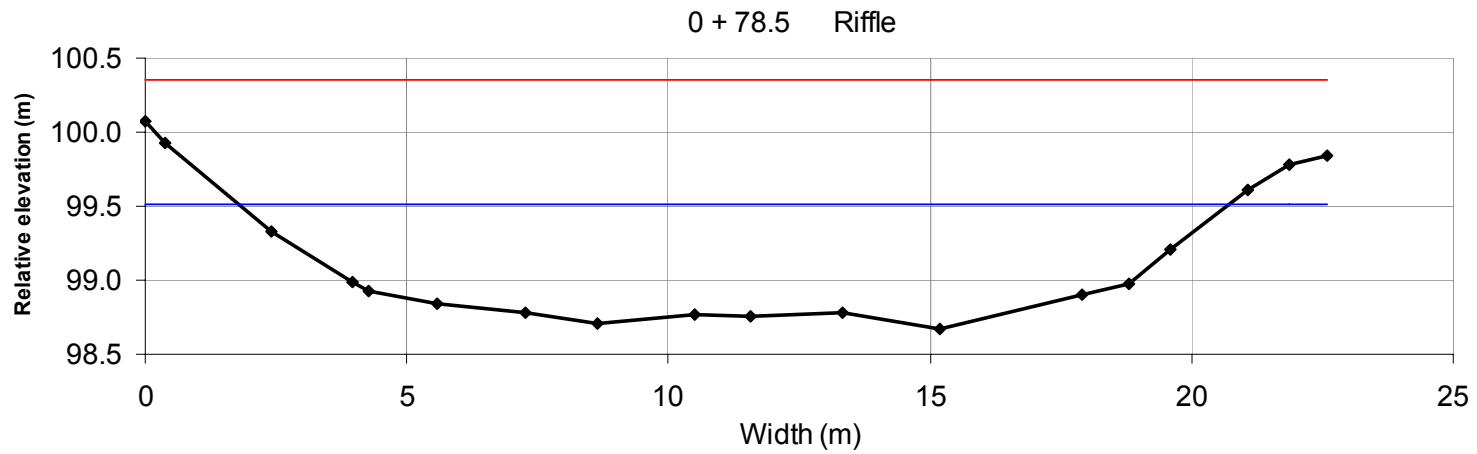
Sinking Creek B grazed reach: Riffle 1



160

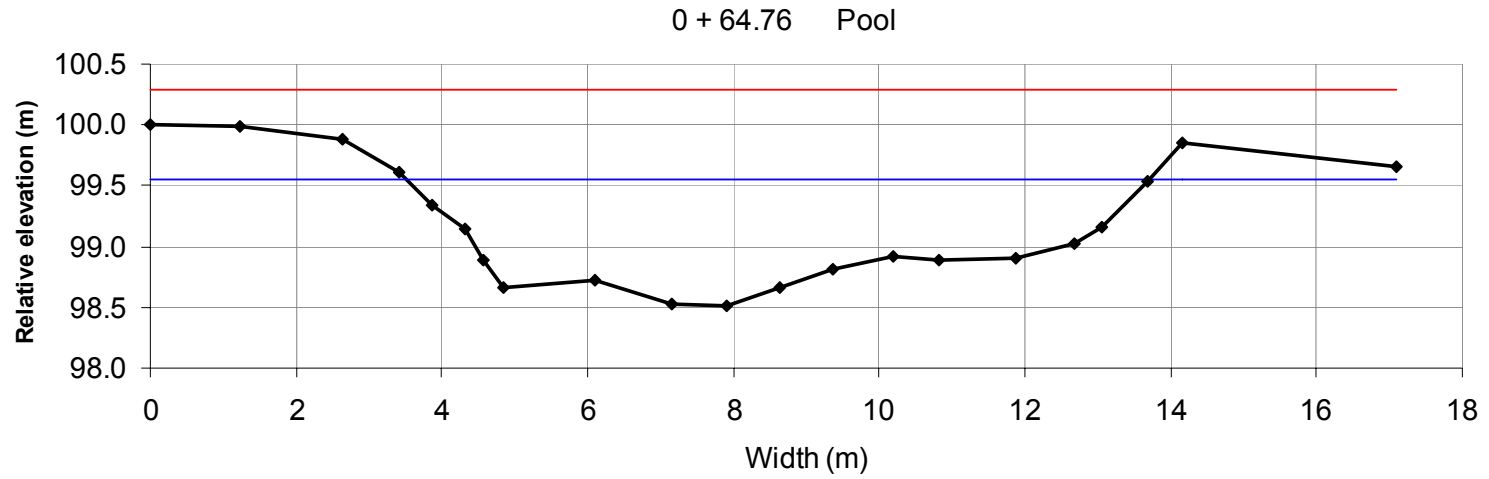
**Figure G34**

Sinking Creek B grazed reach: Riffle 2



**Figure G35**

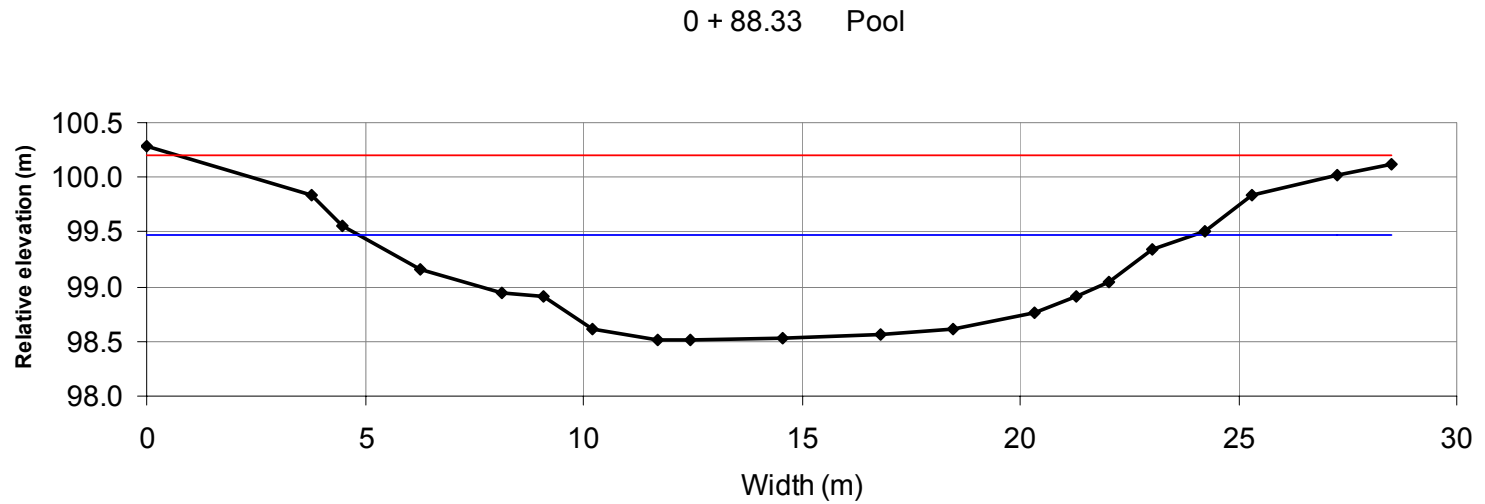
Sinking Creek B grazed reach: Pool 1



191

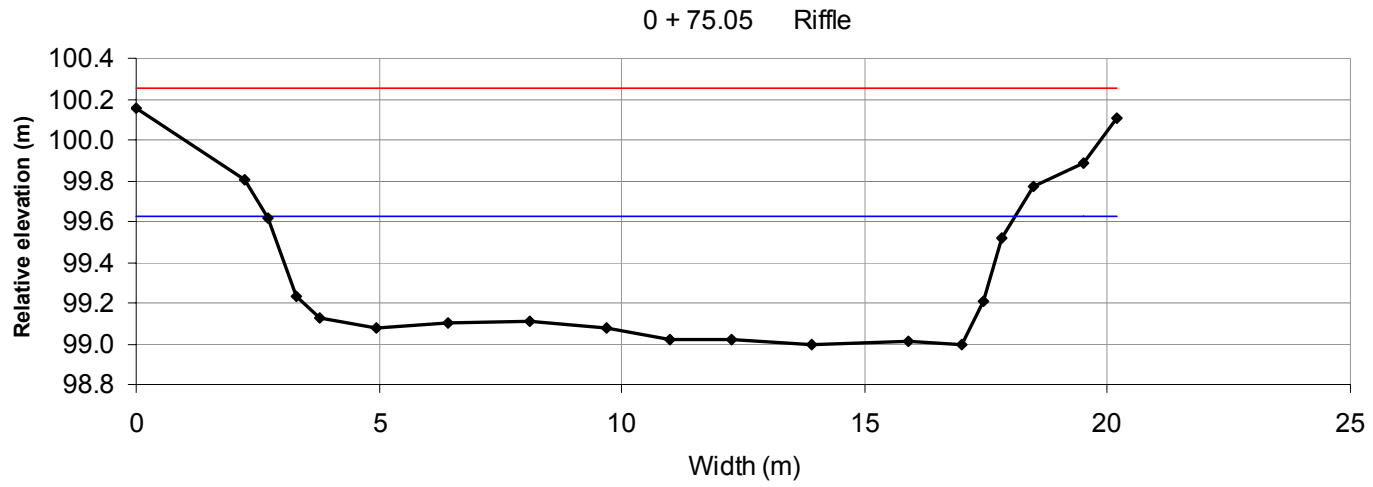
**Figure G36**

Sinking Creek B grazed reach: Pool 2



**Figure G37**

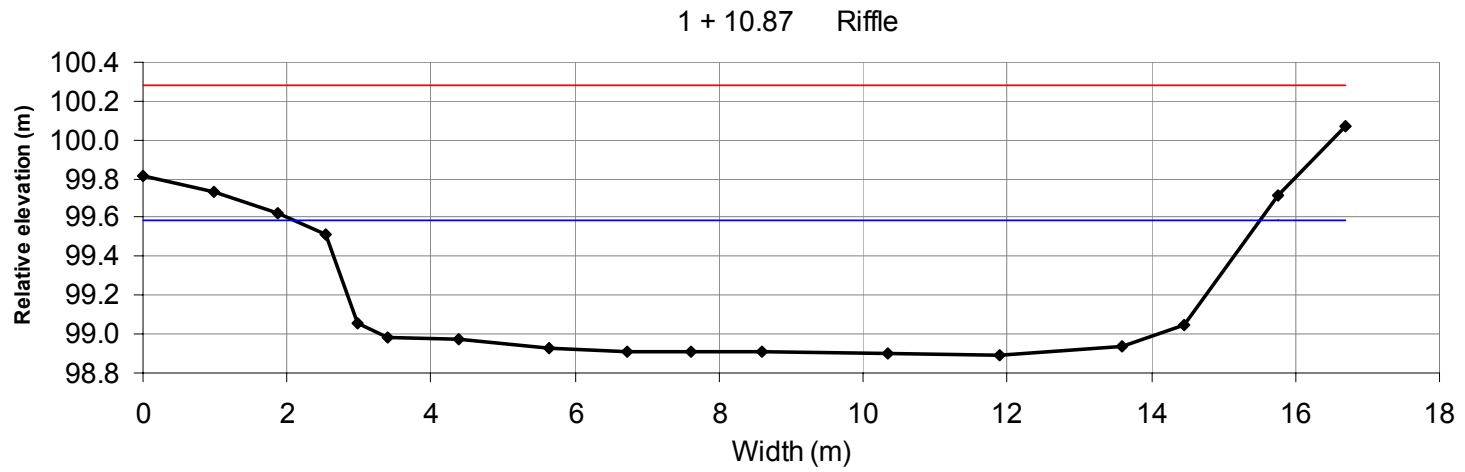
Sinking Creek B livestock exclusion: Riffle 1



162

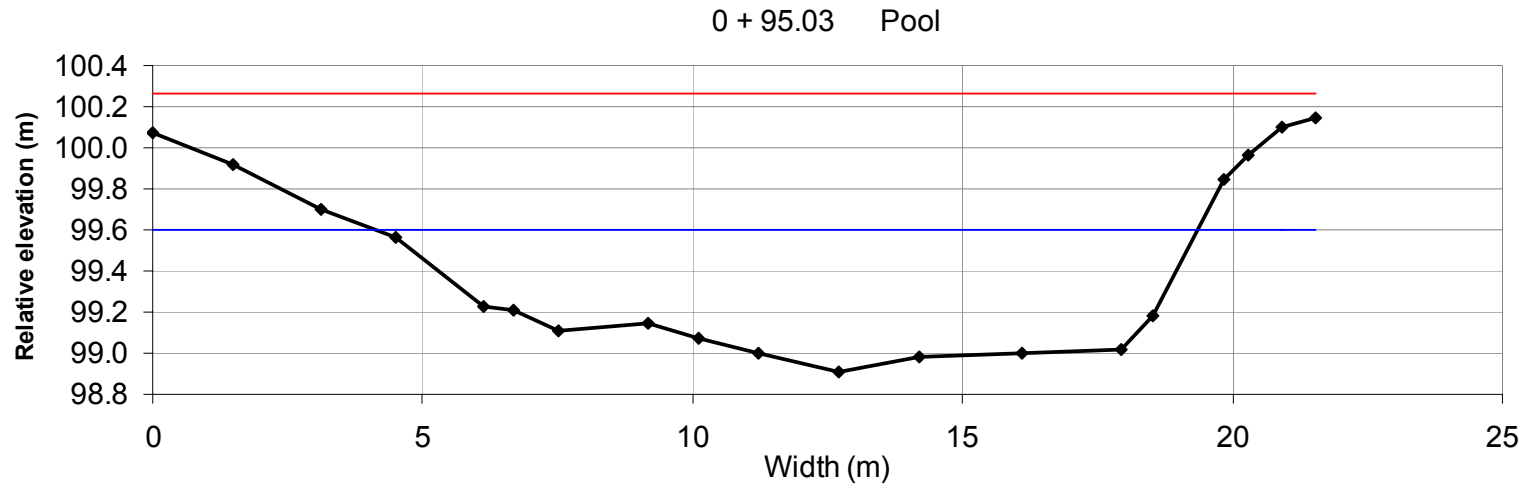
**Figure G38**

Sinking Creek B livestock exclusion: Riffle 2



**Figure G39**

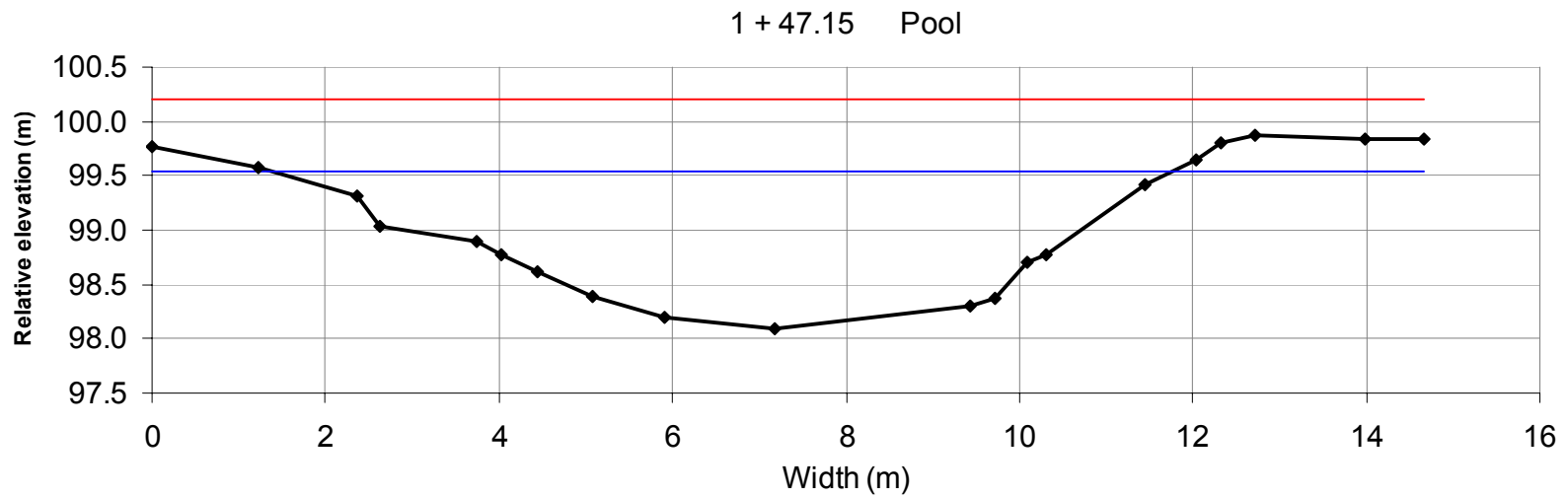
Sinking Creek B livestock exclusion: Pool 1



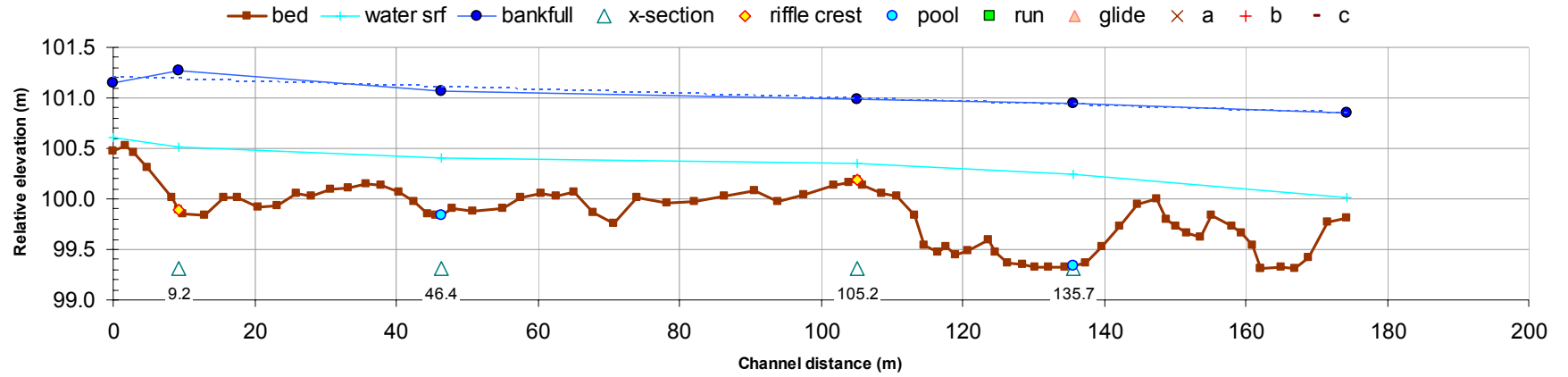
163

**Figure G40**

Sinking Creek B livestock exclusion: Pool 2

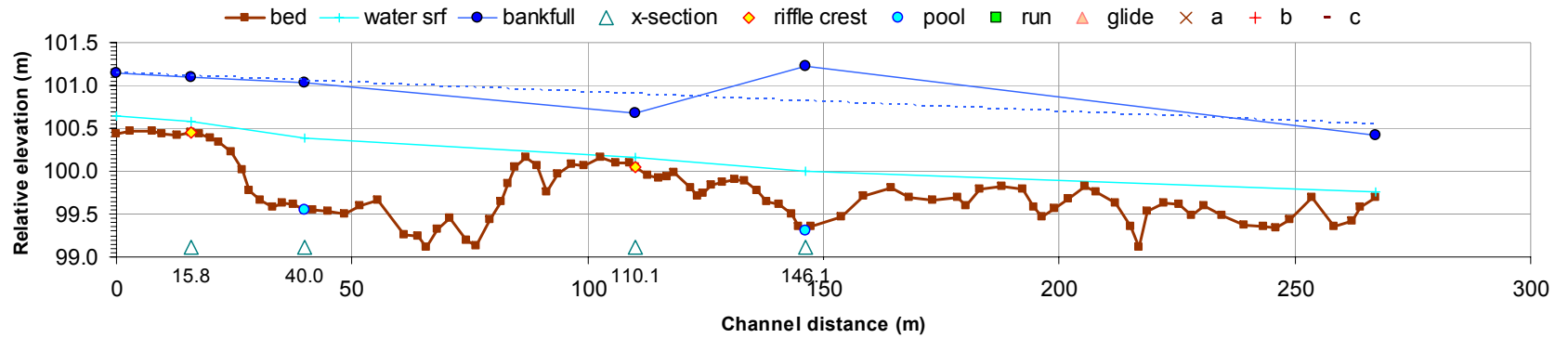


**Figure G41**  
North Fork of the Roanoke River grazed reach: Longitudinal Profile

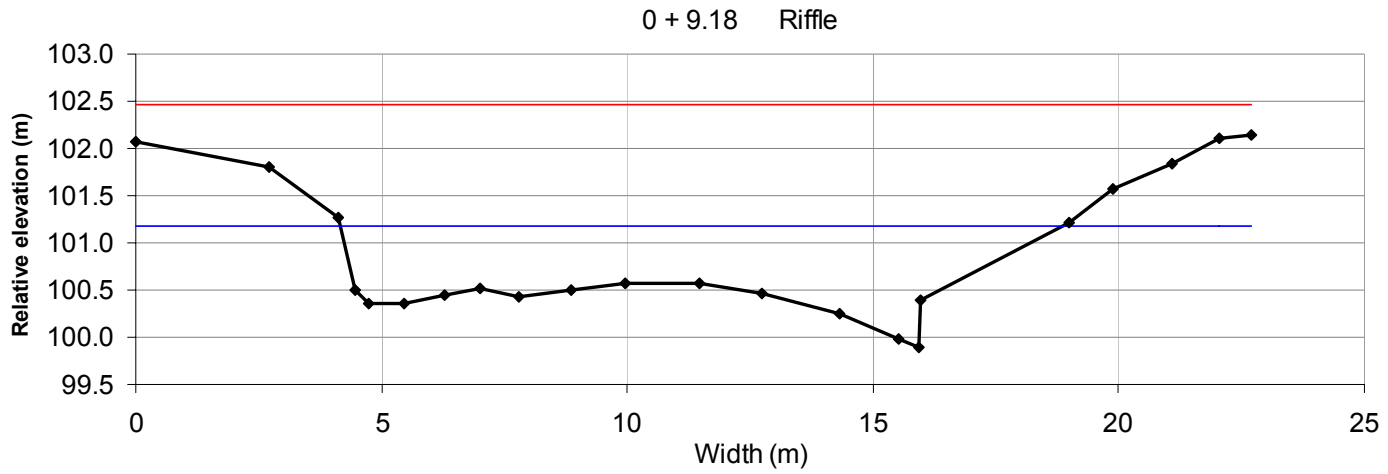


164

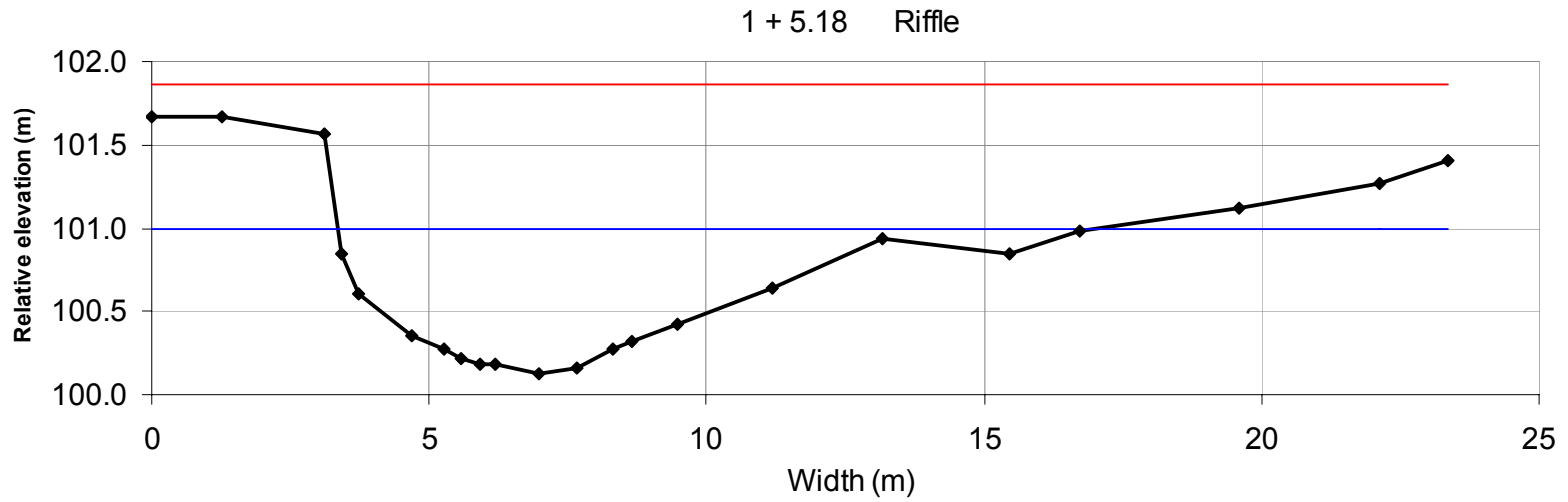
**Figure G42**  
North Fork of the Roanoke River livestock exclusion reach: Longitudinal Profile



**Figure G43**  
North Fork of the Roanoke River grazed reach: Riffle 1



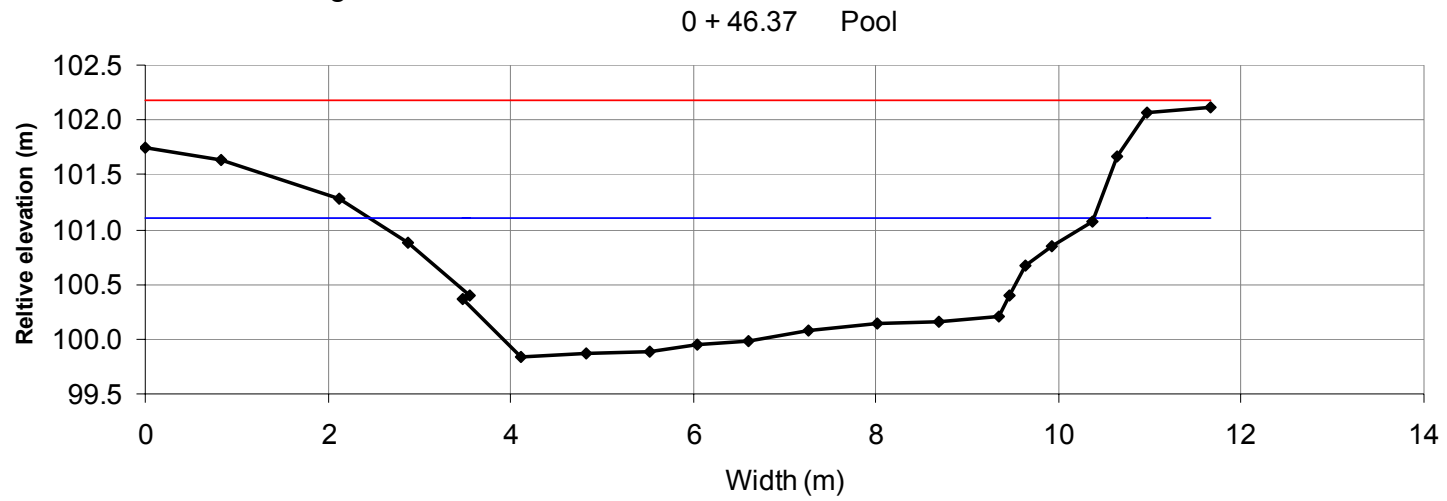
**Figure G44**  
North Fork of the Roanoke River grazed reach: Riffle 2



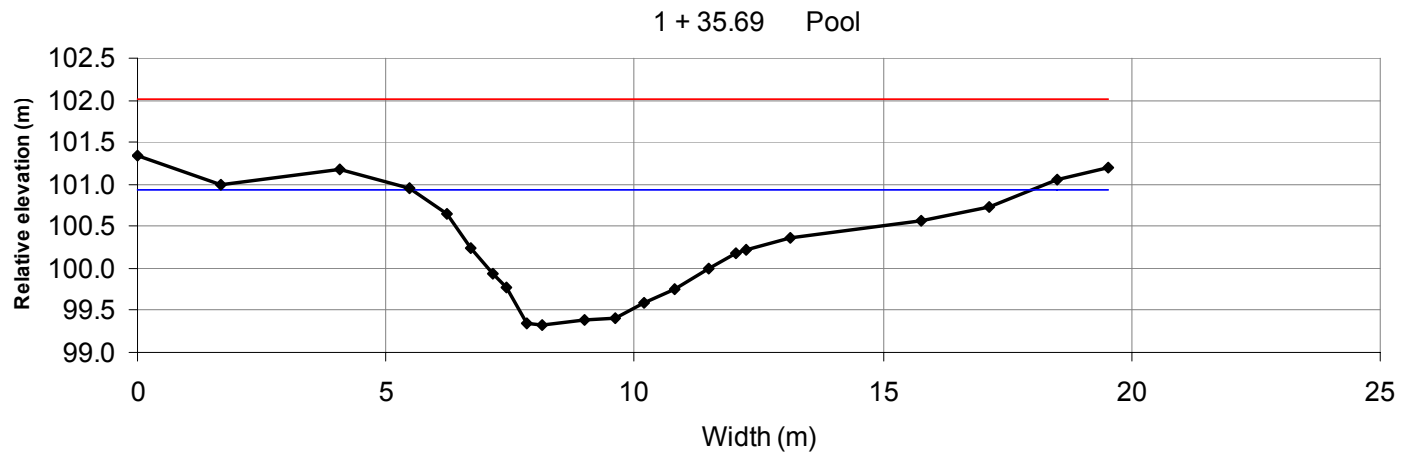


**Figure G45**

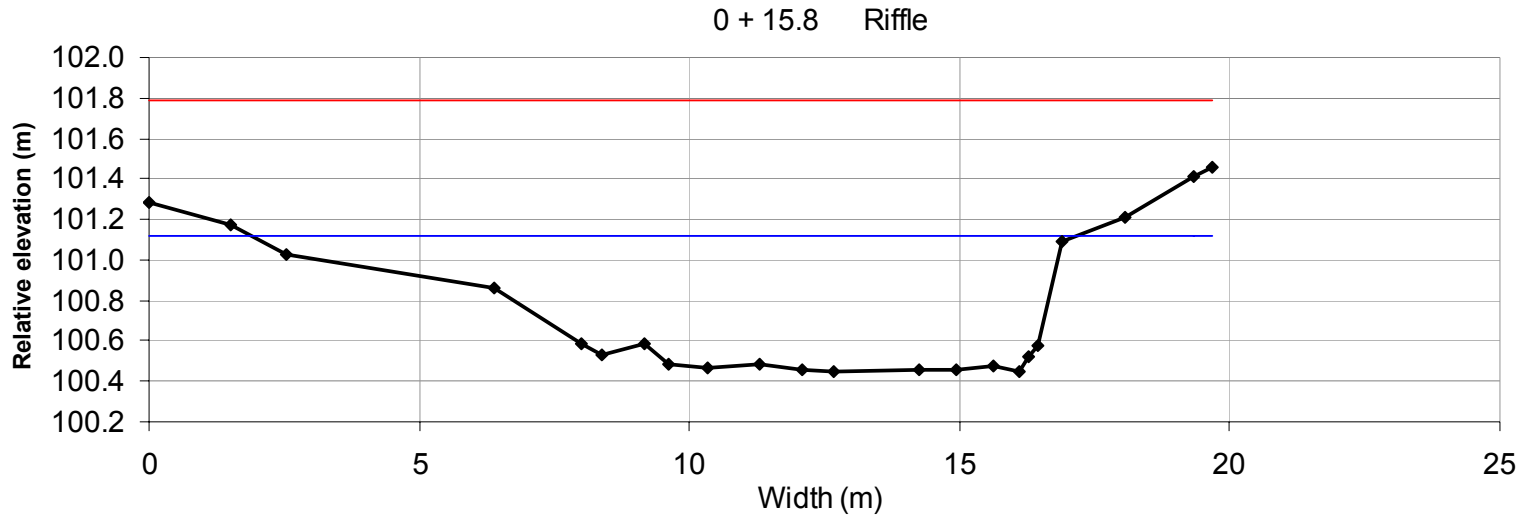
North Fork of the Roanoke River grazed reach: Pool 1

**Figure G46**

North Fork of the Roanoke River grazed reach: Pool 2

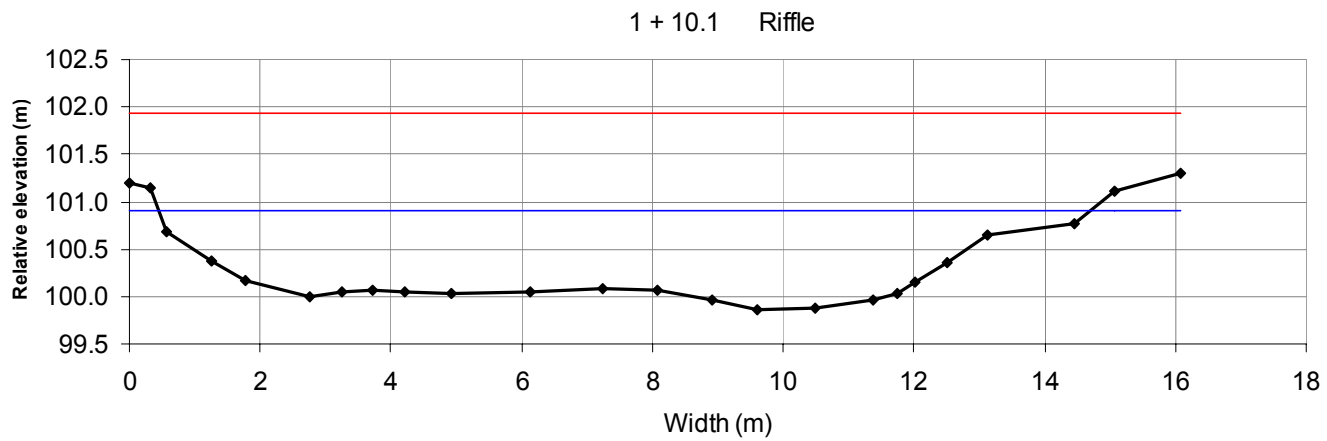


**Figure G47**  
North Fork of the Roanoke River livestock exclusion reach: Riffle 1



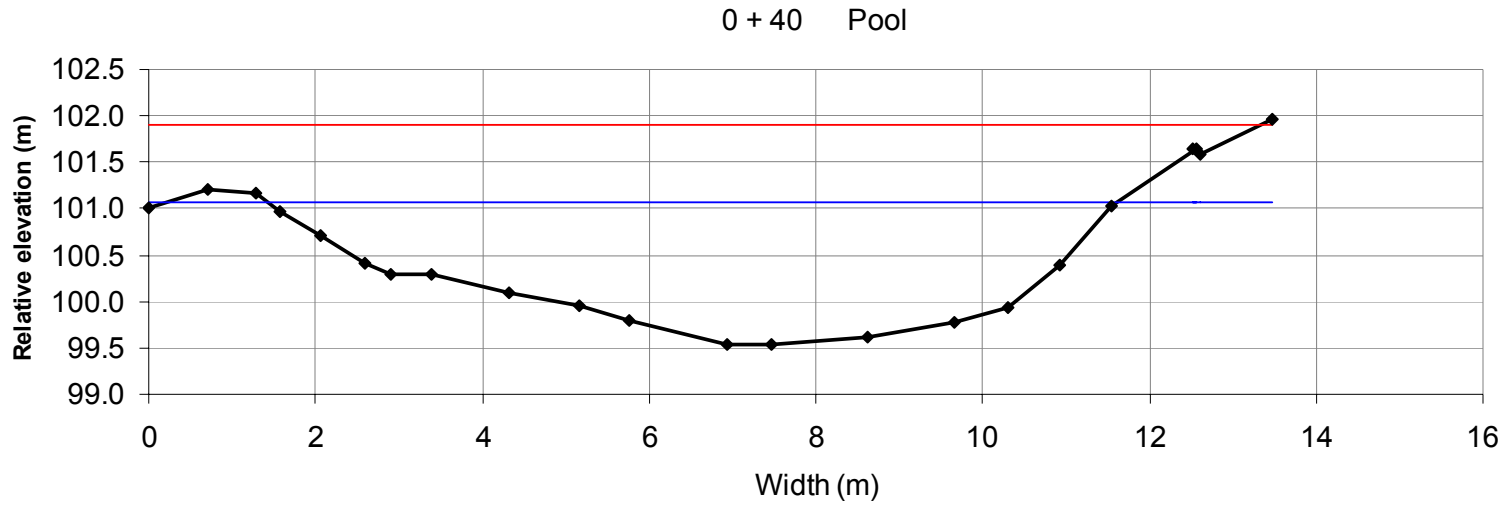
167

**Figure G48**  
North Fork of the Roanoke River livestock exclusion reach: Riffle 2



**Figure G49**

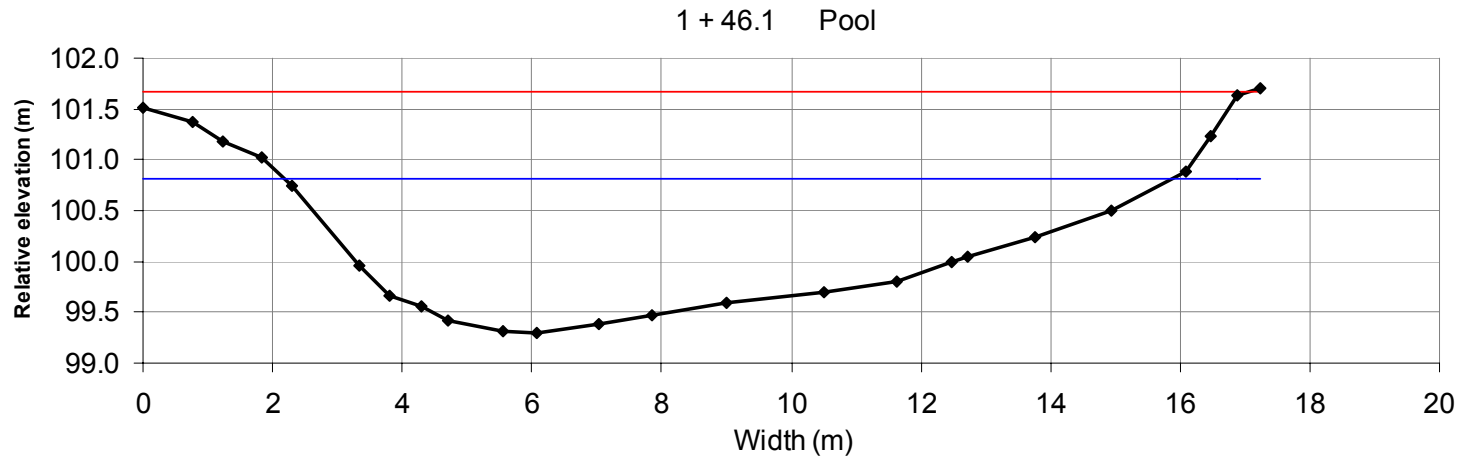
North Fork of the Roanoke River livestock exclusion reach: Pool 1



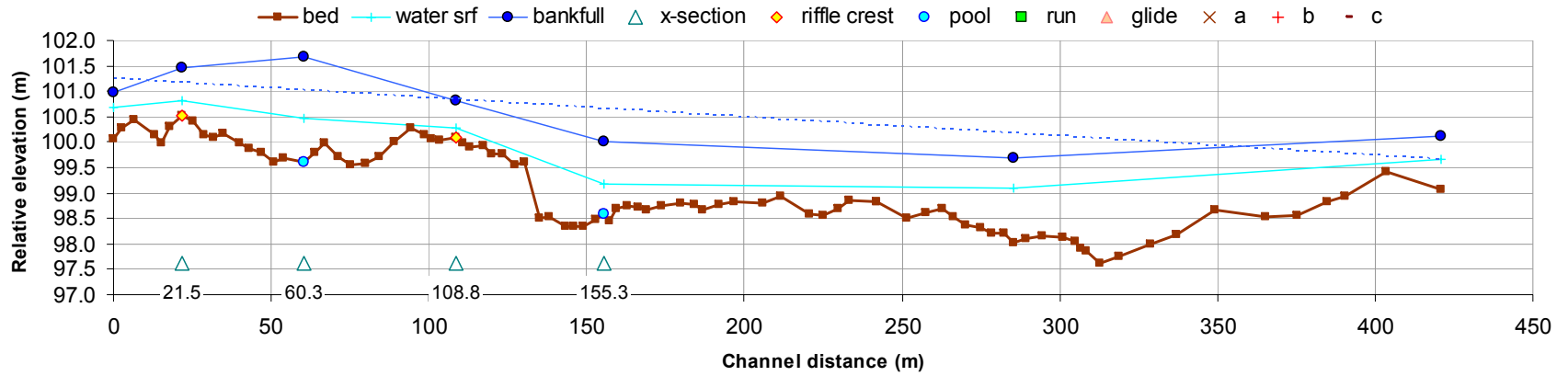
168

**Figure G50**

North Fork of the Roanoke River livestock exclusion reach: Pool 2

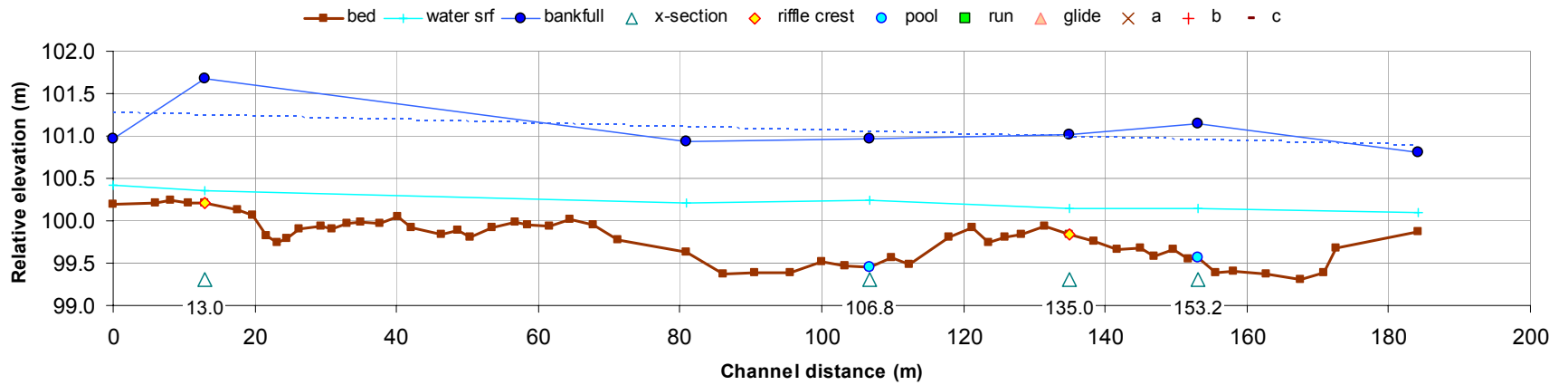


**Figure G51**  
Johns Creek grazed reach: Longitudinal Profile



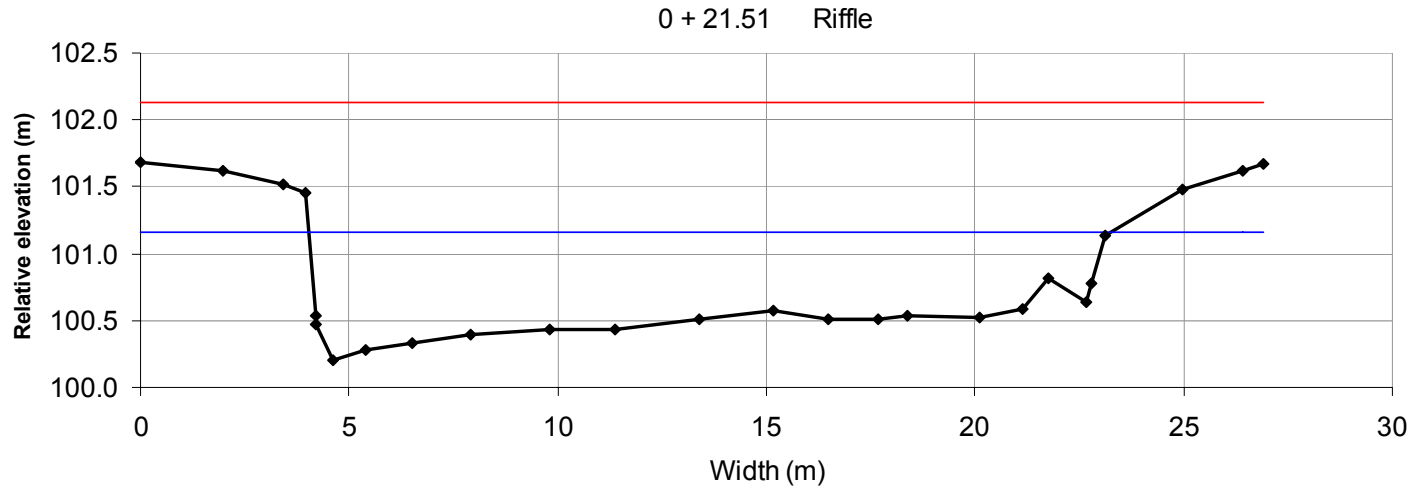
169

**Figure G52**  
Johns Creek livestock exclusion reach: Longitudinal Profile



**Figure G53**

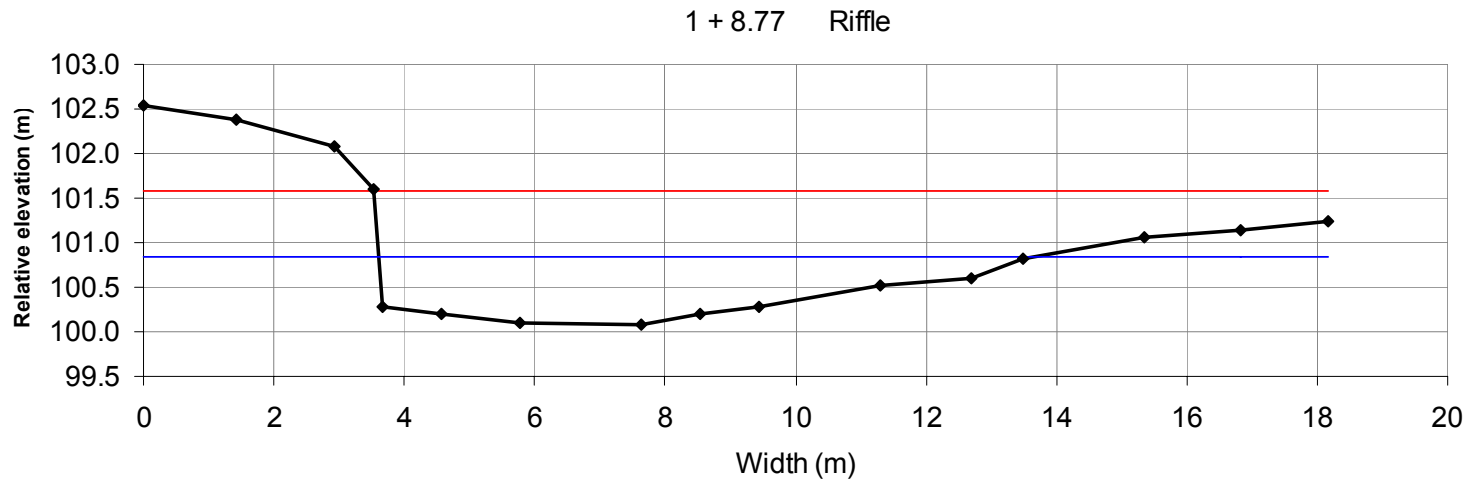
Johns Creek grazed reach: Riffle 1



170

**Figure G54**

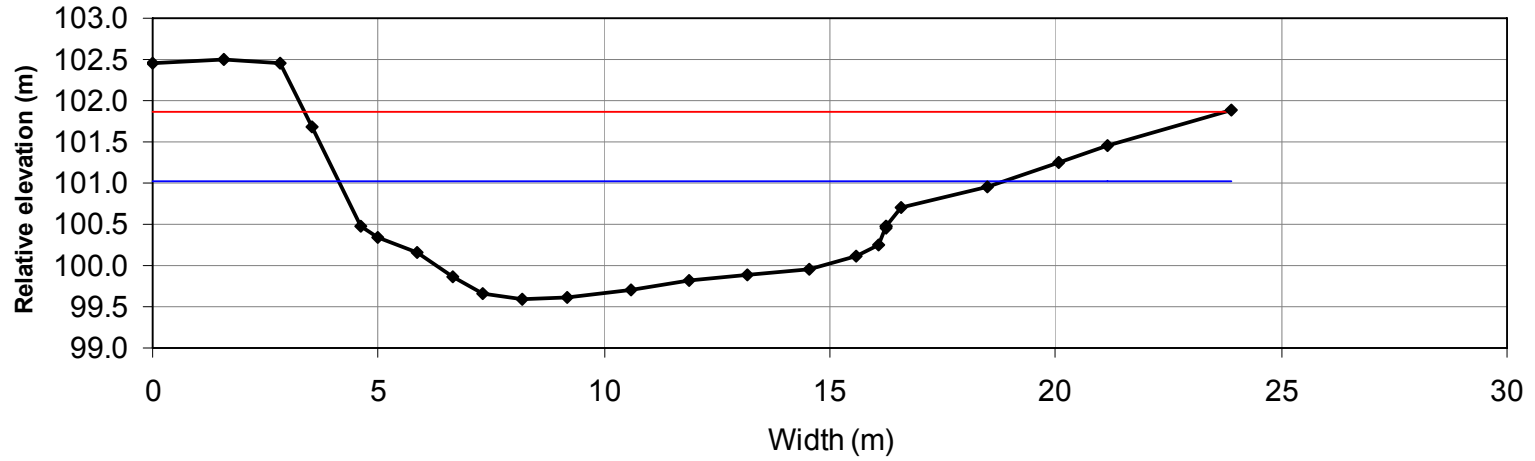
Johns Creek grazed reach: Riffle 2



**Figure G55**

Johns Creek grazed reach: Pool 1

0 + 60.31 Pool

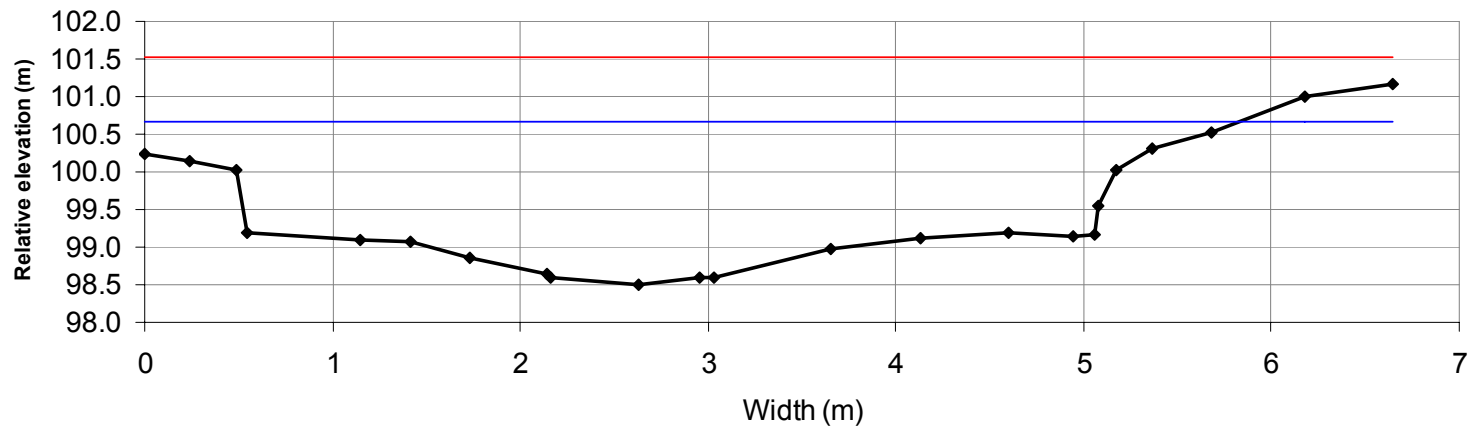


171

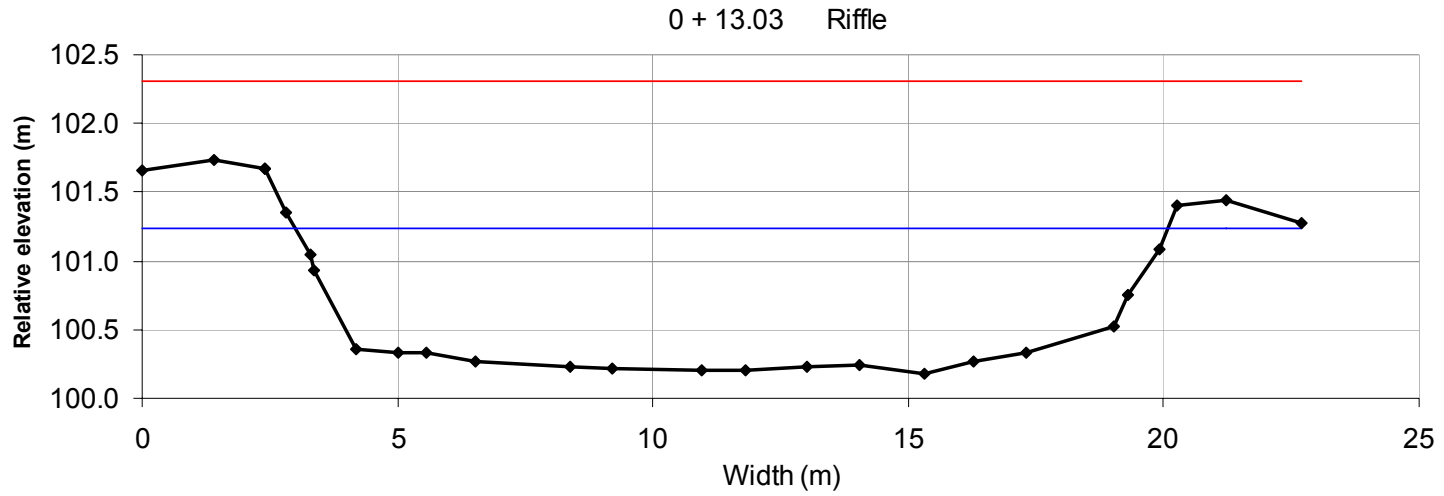
**Figure G56**

Johns Creek grazed reach: Pool 2

1 + 55.29 Pool

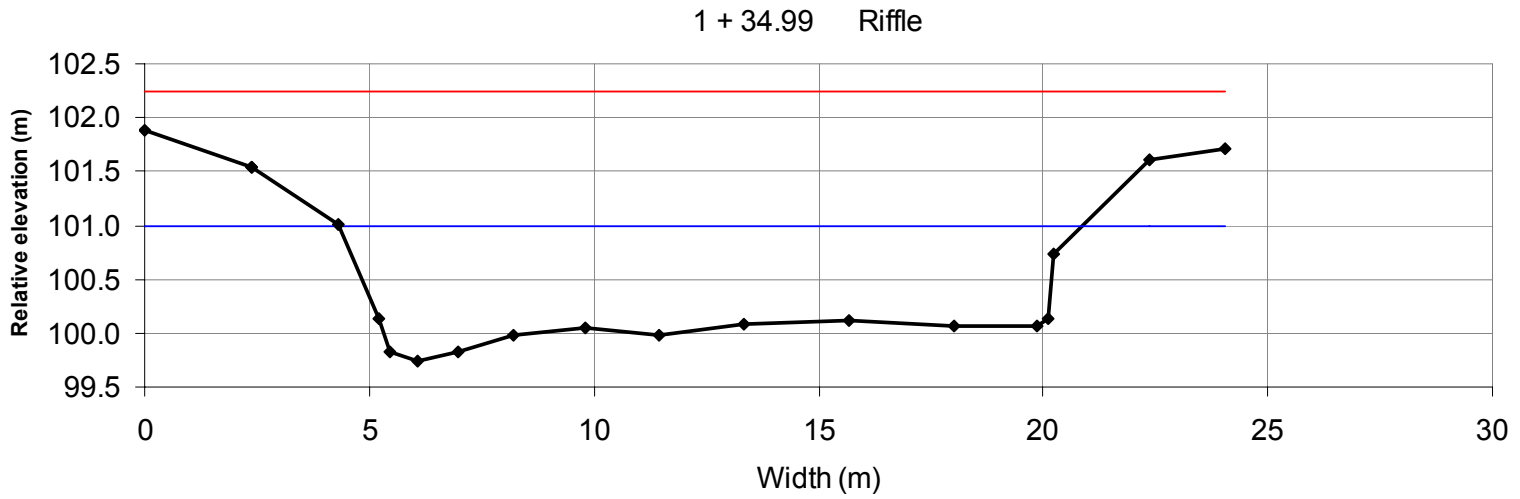


**Figure G57**  
Johns Creek livestock exclusion reach: Riffle 1



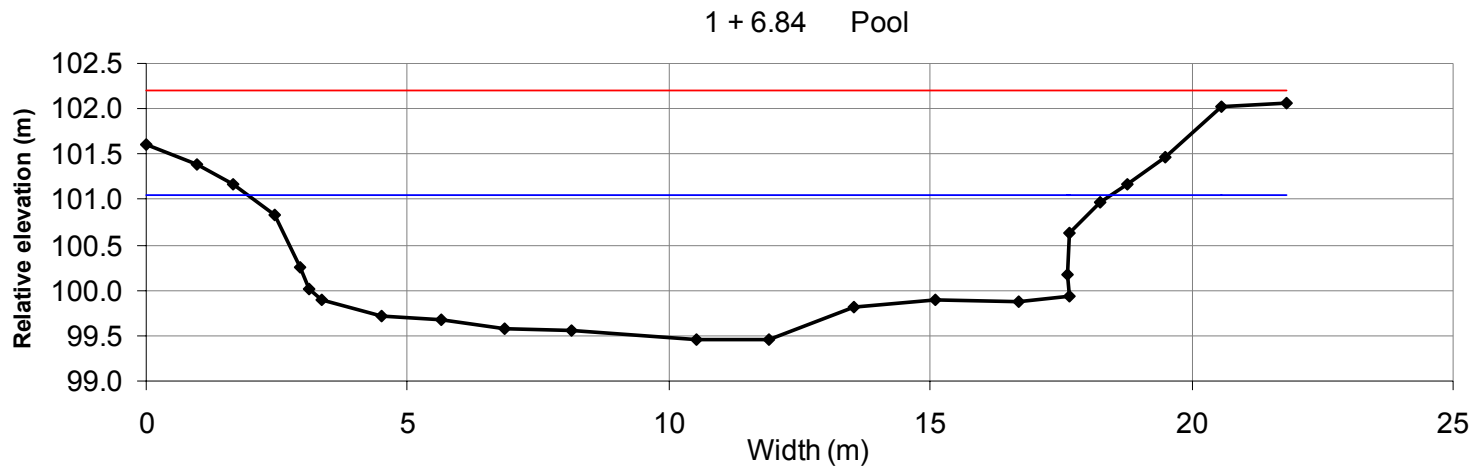
172

**Figure G58**  
Johns Creek livestock exclusion reach: Riffle 1



**Figure G59**

Johns Creek livestock exclusion reach: Pool 1



173

**Figure G60**

Johns Creek livestock exclusion reach: Pool 2

