

An Assessment of Forestry Best Management Practices in North Carolina, 2018-2020

Appendix B: Sample Size and Confidence Intervals for BMP Implementation Data

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Harvesting: Controlling Runoff

Table 1. Percent Implementation of BMPs for Controlling Runoff by Region															
BMPs for Controlling Runoff	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
	S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
Overall	76	78	69	79	65	100	100	100	100	100	3	2	5	0	0
	<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<u>Lower % is Optimal</u>				
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain															

Table 2. Sample size and 95% Confidence Intervals for Implementation of BMPs for Controlling Runoff by Region											
BMPs for Controlling Runoff	Sample Size (n)					BMP Implementation & 95% Confidence Interval					
	S	M	P	SP	C	S	M	P	SP	C	
Overall	4,275	3,206	957	96	16	76 ± 1	78 ± 1	69 ± 3	79 ± 8	65 ± 21	
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain											

Table 3. Percent Implementation of BMPs for Broad-based Dips by Region																
BMPs for Controlling Runoff: Broad-based Dips	AU	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
Number and distance between dips follows spacing guidance (at a minimum).	O	50	50	n/a	n/a	n/a	100	100	n/a	n/a	n/a	0	0	n/a	n/a	n/a
		<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<u>Lower % is Optimal</u>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain																

Table 4. Sample size and 95% Confidence Intervals for Implementation of BMPs for Broad-based Dips by Region											
BMPs for Controlling Runoff: Broad-based Dips	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Number and distance between dips follows spacing guidance (at a minimum).	O	6	6	0	0	0	50 ± 31	50 ± 31	n/a	n/a	n/a
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey											
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain											

Table 5. Percent Implementation of BMPs for Cross-Drains by Region																
BMPs for Controlling Runoff: Cross-Drains	AU	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
Number and distance between cross-drain culverts follows spacing guidance (at a minimum).	O	100	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<u>Lower % is Optimal</u>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain																

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Table 6. Sample size and 95% Confidence Intervals for Implementation of BMPs for Cross-Drains by Region											
BMPs for Controlling Runoff: Cross-Drains	AU	Sample Size (n)					BMP Implementation Rate & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Number and distance between cross-drain culverts follows spacing guidance (at a minimum).	O	1	1	n/a	n/a	n/a	60 ± 44	60 ± 44	n/a	n/a	n/a
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey											
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Table 7. Percent Implementation of BMPs for Inside Ditchlines by Region																			
BMPs for Controlling Runoff: Inside Ditchlines	AU	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality							
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C			
		-----%-----																	
Excavate the ditchline to the minimum depth and width needed.	O	91	80	100	n/a	n/a	100	100	100	n/a	n/a	0	0	0	n/a	n/a			
Match the cross-sectional area of the pipe to the area of the contributing ditchline.	S	67	50	100	n/a	n/a	100	100	100	n/a	n/a	0	0	0	n/a	n/a			
Match the ditchline cross-sectional area to a minimum equivalent of a 15 inch culvert.	S	55	60	50	n/a	n/a	100	100	100	n/a	n/a	0	0	0	n/a	n/a			
Control runoff speed and volume.	O	30	25	33	n/a	n/a	100	100	100	n/a	n/a	14	33	0	n/a	n/a			
Install geotextiles, matting, stone or other suitable material as needed to prevent downcutting.	S	30	25	33	n/a	n/a	100	100	100	n/a	n/a	14	33	0	n/a	n/a			
Install turnouts or cross-drains at intervals adequate to carry the expected runoff.	O	33	20	43	n/a	n/a	100	100	100	n/a	n/a	13	25	0	n/a	n/a			
Situate outlet in a manner that prevents runoff from flowing directly into streams or waterbodies.	S	80	67	100	n/a	n/a	100	100	100	n/a	n/a	20	33	0	n/a	n/a			
Capture the sediment below the outlet as needed.	S	50	60	0	n/a	n/a	100	100	100	n/a	n/a	33	50	0	n/a	n/a			
					<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<u>Lower % is Optimal</u>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																			
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Table 8. Sample size and 95% Confidence Intervals for Implementation of BMPs for Inside Ditchlines by Region											
BMPs for Controlling Runoff: Inside Ditchlines	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Excavate the ditchline to the minimum depth and width needed.	O	11	5	6	0	0	80 ± 22	67 ± 32	80 ± 28	11	5
Match the cross-sectional area of the pipe to the area of the contributing ditchline.	S	3	2	1	0	0	57 ± 37	50 ± 41	60 ± 44	3	2
Match the ditchline cross-sectional area to a minimum equivalent of a 15 inch culvert.	S	11	5	6	0	0	53 ± 25	56 ± 33	50 ± 31	11	5
Control runoff speed and volume.	O	10	4	6	0	0	36 ± 26	37 ± 34	40 ± 31	10	4
Install geotextiles, matting, stone or other suitable material as needed to prevent downcutting.	S	10	4	6	0	0	36 ± 26	37 ± 34	40 ± 31	10	4
Install turnouts or cross-drains at intervals adequate to carry the expected runoff.	O	12	5	7	0	0	37 ± 24	33 ± 32	45 ± 30	12	5
Situate outlet in a manner that prevents runoff from flowing directly into streams or waterbodies.	S	5	3	2	0	0	67 ± 32	57 ± 37	67 ± 40	5	3
Capture the sediment below the outlet as needed.	S	6	5	1	0	0	50 ± 31	56 ± 33	40 ± 44	6	5
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey											
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Table 9. Percent Implementation of BMPs for Turnouts by Region																
BMPs for Controlling Runoff: Turnouts	A U	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		-----%-----														
Number and distance between turnouts follows spacing guidance (at a minimum).	O	22	13	30	100	n/a	100	100	100	100	n/a	7	0	21	0	n/a
Begin the inflow of the turnout at the same grade level as the road, skid trail, fireline or ditch.	S	97	98	92	100	n/a	100	100	100	100	n/a	0	0	0	0	n/a
Excavate the turnout with enough outlet gradient angle so runoff can drain in a controlled manner, generally from 1 to 3 is adequate.	S	99	100	92	100	n/a	100	100	100	100	n/a	0	0	0	0	n/a
Construct using a turnout angle between 15 to 30 degrees downslope.	S	99	100	92	100	n/a	100	100	100	100	n/a	0	0	0	0	n/a
Situate outlet in a manner that prevents runoff from flowing directly into streams or waterbodies.	S	96	98	88	100	n/a	100	100	100	100	n/a	60	100	33	0	n/a
Capture the sediment below the outlet as needed.	S	80	82	72	100	n/a	100	100	100	100	n/a	12	11	13	0	n/a
Avoid siting the outlet onto soft soil or fill material, unless other BMPs are utilized to prevent erosion.	S	69	75	55	100	n/a	100	100	100	100	n/a	25	33	20	0	n/a
For use in roadside ditches, minimize erosion within that ditch so the inflow of the turnout does not create a gully.	S	0	n/a	0	n/a	n/a	0	n/a	0	n/a	n/a	0	n/a	0	n/a	n/a
		<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<u><i>Lower % is Optimal</i></u>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																
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Table 10. Sample size and 95% Confidence Intervals for Implementation of BMPs for Turnouts by Region											
BMPs for Controlling Runoff: Turnouts	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Number and distance between turnouts follows spacing guidance (at a minimum).	O	54	32	20	2	0	24 ± 11	17 ± 13	33 ± 19	67 ± 40	n/a
Begin the inflow of the turnout at the same grade level as the road, skid trail, fireline or ditch.	S	255	214	38	3	0	97 ± 2	97 ± 2	88 ± 10	72 ± 36	n/a
Excavate the turnout with enough outlet gradient angle so runoff can drain in a controlled manner, generally from 1 to 3 is adequate.	S	254	213	38	3	0	98 ± 2	99 ± 2	88 ± 10	72 ± 36	n/a
Construct using a turnout angle between 15 to 30 degrees downslope.	S	257	216	38	3	0	98 ± 2	99 ± 2	88 ± 10	72 ± 36	n/a
Situate outlet in a manner that prevents runoff from flowing directly into streams or waterbodies.	S	142	114	25	3	0	95 ± 4	97 ± 3	83 ± 14	72 ± 36	n/a
Capture the sediment below the outlet as needed.	S	133	101	29	3	0	80 ± 7	81 ± 8	70 ± 16	72 ± 36	n/a
Avoid siting the outlet onto soft soil or fill material, unless other BMPs are utilized to prevent erosion.	S	26	12	11	3	0	67 ± 17	69 ± 23	53 ± 25	72 ± 36	n/a
For use in roadside ditches, minimize erosion within that ditch so the inflow of the turnout does not create a gully.	S	2	0	2	0	0	33 ± 40	n/a	33 ± 40	n/a	n/a
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey											
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Table 11. Percent Implementation of BMPs for water bars by Region																
BMPs for Controlling Runoff: Water bars	A U	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		-----%-----														
Number and spacing between water bars follows spacing guidance (at a minimum).	O	26	15	32	67	100	100	100	100	100	100	4	3	5	0	0
Excavate and construct using equipment/techniques that assure proper angles and a firm water bar hump.	O	68	66	73	73	67	100	100	100	100	100	0	0	0	0	0
Tie the uphill end of the water bar into the side/cut slope and angle the water bar downhill towards the outfall edge.	S	80	82	73	91	100	100	100	100	100	100	0	0	0	0	0
Use an angle ranging from 15 to 30 degrees (downslope) for the water bar.	S	86	87	83	100	67	100	100	100	100	100	0	0	0	0	0
Excavate the trench with enough gradient to allow adequate flow of water runoff.	S	85	83	89	91	n/a	100	100	100	100	n/a	2	0	11	0	n/a
Situate outlet in a manner that prevents runoff from flowing directly into streams or waterbodies.	S	96	95	100	n/a	n/a	100	100	100	n/a	n/a	14	14	0	n/a	n/a
Capture the sediment below the outlet as needed.	S	67	72	51	82	67	100	100	100	100	100	2	1	5	0	0
Avoid siting the outlet onto soft soil or fill material, unless other BMPs are utilized to prevent erosion.	S	69	86	52	100	n/a	100	100	100	100	n/a	13	0	15	0	n/a
Establish groundcover or harden the water bar with stone or other material, as needed.	S	33	36	28	0	33	100	100	100	100	100	1	0	3	0	0
		<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<u>Lower % is Optimal</u>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain																

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Table 12. Sample size and 95% Confidence Intervals for Implementation of BMPs for Water bars by Region											
BMPs for Controlling Runoff: Water bars	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Number and spacing between water bars follow spacing guidance (at a minimum).	O	69	34	31	3	1	27 ± 10	18 ± 13	34 ± 16	57 ± 37	60 ± 44
Excavate and construct using equipment/techniques that assure proper angles and a firm water bar hump.	O	496	369	113	11	3	68 ± 4	66 ± 5	73 ± 8	67 ± 24	57 ± 37
Tie the uphill end of the water bar into the side/cut slope and angle the water bar downhill towards the outfall edge.	S	490	363	113	11	3	80 ± 4	81 ± 4	72 ± 8	80 ± 22	72 ± 36
Use an angle ranging from 15 to 30 degrees (downslope) for the water bar.	S	507	380	113	11	3	86 ± 3	86 ± 3	82 ± 7	87 ± 20	57 ± 37
Excavate the trench with enough gradient to allow adequate flow of water runoff.	S	409	318	80	11	0	84 ± 4	83 ± 4	87 ± 7	80 ± 22	n/a
Situate outlet in a manner that prevents runoff from flowing directly into streams or waterbodies.	S	194	142	52	0	0	95 ± 3	94 ± 4	97 ± 6	n/a	n/a
Capture the sediment below the outlet as needed.	S	383	285	84	11	3	67 ± 5	71 ± 5	51 ± 10	74 ± 23	57 ± 37
Avoid siting the outlet onto soft soil or fill material, unless other BMPs are utilized to prevent erosion.	S	48	14	27	7	0	67 ± 13	78 ± 20	52 ± 18	82 ± 26	n/a
Establish groundcover or harden the water bar with stone or other material, as needed.	S	481	359	108	11	3	34 ± 4	36 ± 5	29 ± 8	13 ± 20	43 ± 37
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey											
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain											

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Harvesting: Capturing Sediment

BMPs for Capturing Sediment	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
	S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
Overall	94	91	95	100	100	100	100	100	100	100	14	0	33	0	0
	<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<u>Lower % is Optimal</u>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey															
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain															

BMPs for Capturing Sediment	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
	S	M	P	SP	C	S	M	P	SP	C
Overall	689	282	354	47	6	94 ± 2	91 ± 3	94 ± 3	96 ± 6	80 ± 28
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain										

BMPs for Capturing Sediment: Brush Barriers	A U	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
-----%-----																
Pile and pack down brush to achieve close contact with the ground surface.	S	98	100	97	100	1	100	100	100	100	100	50	n/a	50	n/a	n/a
Cut large pieces of material into smaller chunks, as needed.	O	100	100	100	100	100	100	100	100	100	n/a	n/a	n/a	n/a	n/a	
Use additional BMP measures if brush barriers fail to capture sediment.	O	46	100	13	n/a	n/a	100	100	100	n/a	n/a	43	n/a	43	n/a	n/a
Avoid removing the brush barrier once it is established.	S	100	100	100	100	100	100	100	100	100	n/a	n/a	n/a	n/a	n/a	
		<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<u>Lower % is Optimal</u>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain																

BMPs for Capturing Sediment: Brush Barriers	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Pile and pack down brush to achieve close contact with the ground surface.	S	229	71	132	23	3	97 ± 2	97 ± 5	96 ± 4	93 ± 11	29 ± 36
Cut large pieces of material into smaller chunks, as needed.	O	148	49	90	8	1	99 ± 2	96 ± 6	98 ± 3	84 ± 24	60 ± 44
Use additional BMP measures if brush barriers fail to capture sediment.	O	13	5	8	0	0	47 ± 24	78 ± 30	25 ± 26	n/a	n/a
Avoid removing the brush barrier once it is established.	S	199	67	114	16	2	99 ± 2	97 ± 5	98 ± 3	90 ± 15	67 ± 40
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey											
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain											

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Table 17. Percent Implementation of BMPs for Sediment Pits by Region																
BMPs for Capturing Sediment: Sediment Pits	A U	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		-----%-----														
Excavate the pit with a suitable opening and depth to capture the expected sediment runoff, minimizing disturbance.	S	100	100	100	n/a	n/a	100	100	100	n/a	n/a	0	0	0	n/a	n/a
Locate the pit within stable, well-drained soils when available.	S	83	100	0	n/a	n/a	100	100	100	n/a	n/a	0	0	0	n/a	n/a
If the pit must be situated within unstable soils, install additional measures to provide soil stabilization around the pit.	S	0	0	0	n/a	n/a	100	100	100	n/a	n/a	0	0	0	n/a	n/a
Dispose or stabilize the excavated spoil material.	O	75	75	n/a	n/a	n/a	100	100	n/a	n/a	n/a	0	0	n/a	n/a	n/a
Avoid using the spoil to build up the sides of the pit.	S	0	n/a	0	n/a	n/a	100	n/a	100	n/a	n/a	0	n/a	0	n/a	n/a
Create a reinforced outlet for overflow capacity.	S	0	n/a	0	n/a	n/a	100	n/a	100	n/a	n/a	0	n/a	0	n/a	n/a
Harden the walls of the pit to minimize the risk of structural failure.	S	0	0	n/a	n/a	n/a	100	100	n/a	n/a	n/a	0	0	n/a	n/a	n/a
Revegetate exposed soil around the perimeter of the pit.	S	38	43	0	n/a	n/a	100	100	100	n/a	n/a	0	0	0	n/a	n/a
		<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<i>Lower % is Optimal</i>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain																

Table 18. Sample size and 95% Confidence Intervals for Implementation of BMPs for Sediment Pits by Region											
BMPs for Capturing Sediment: Sediment Pits	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Excavate the pit with a suitable opening and depth to capture the expected sediment runoff, minimizing disturbance.	S	8	7	1	0	0	84 ± 24	82 ± 26	60 ± 44	n/a	n/a
Locate the pit within stable, well-drained soils when available.	S	6	5	1	0	0	70 ± 30	78 ± 30	40 ± 44	n/a	n/a
If the pit must be situated within unstable soils, install additional measures to provide soil stabilization around the pit.	S	3	2	1	0	0	28 ± 36	33 ± 40	40 ± 44	n/a	n/a
Dispose or stabilize the excavated spoil material.	O	4	4	0	0	0	63 ± 34	63 ± 34	n/a	n/a	n/a
Avoid using the spoil to build up the sides of the pit.	S	1	0	1	0	0	40 ± 44	n/a	40 ± 44	n/a	n/a
Create a reinforced outlet for overflow capacity.	S	1	0	1	0	0	40 ± 44	n/a	40 ± 44	n/a	n/a
Harden the walls of the pit to minimize the risk of structural failure.	S	1	1	0	0	0	40 ± 44	40 ± 44	n/a	n/a	n/a
Revegetate exposed soil around the perimeter of the pit.	S	8	7	1	0	0	42 ± 28	45 ± 30	40 ± 44	n/a	n/a
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey											
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain											

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Appendix B: Sample Size and Confidence Intervals for BMP Implementation Data

BMPs for Capturing Sediment: Silt Fences	A U	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		-----%-----														
Install measures upslope and downslope of silt fence as needed.	O	77	77	n/a	n/a	n/a	100	100	n/a	n/a	n/a	0	0	n/a	n/a	n/a
Adjust BMPs accordingly if sediment is built-up behind fence.	O	38	50	0	n/a	n/a	100	100	100	n/a	n/a	20	0	50	n/a	n/a
Limit drainage area to 100 feet of fence for every one-quarter acre of land.	S	100	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	0	0	n/a	n/a	n/a
Set fencing along the land contours and extend the fencing far beyond the expected pathway(s) of runoff flow.	S	81	79	100	n/a	n/a	100	100	100	n/a	n/a	0	0	0	n/a	n/a
Ends of fencing gently turned like a sideways "J", with the hook facing uphill.	S	100	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	0	0	n/a	n/a	n/a
		<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<i>Lower % is Optimal</i>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain																

BMPs for Capturing Sediment: Silt Fences	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Install measures upslope and downslope of silt fence as needed.	O	13	13	0	0	0	71 ± 22	71 ± 22	n/a	n/a	n/a
Adjust BMPs accordingly if sediment is built-up behind fence.	O	8	6	2	0	0	42 ± 28	50 ± 31	33 ± 40	n/a	n/a
Limit drainage area to 100 feet of fence for every one-quarter acre of land.	S	12	12	0	0	0	88 ± 18	88 ± 18	n/a	n/a	n/a
Set fencing along the land contours and extend the fencing far beyond the expected pathway(s) of runoff flow.	S	16	14	2	0	0	75 ± 20	72 ± 21	67 ± 40	n/a	n/a
Ends of fencing gently turned like a sideways "J", with the hook facing uphill.	S	7	7	0	0	0	82 ± 26	82 ± 26	n/a	n/a	n/a
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey											
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain											

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Appendix B: Sample Size and Confidence Intervals for BMP Implementation Data

Table 21. Percent Implementation of BMPs for Straw Bales by Region																
BMPs for Capturing Sediment: Straw Bales	A U	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		-----%-----														
Install measures upslope and downslope of bales as needed.	O	100	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Adjust BMPs accordingly if sediment is built-up behind bales.	O	0	0	n/a	n/a	n/a	0	0	n/a	n/a	n/a	n/a	0	n/a	n/a	n/a
Set bales tightly against the ground surface and anchor.	S	100	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
If stacking square bales, stagger to provide overlap - similar to brick laying.	S	100	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Monitor bales and take prompt action if not sufficient.	S	0	0	n/a	n/a	n/a	100	100	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
		<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<u>Lower % is Optimal</u>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain																

Table 22. Sample size and 95% Confidence Intervals for Implementation of BMPs for Straw Bales by Region												
BMPs for Capturing Sediment: Straw Bales	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval					
		S	M	P	SP	C	S	M	P	SP	C	
Install measures upslope and downslope of bales as needed.	O	1	1	0	0	0	60 ± 44	60 ± 44	n/a	n/a	n/a	
Adjust BMPs accordingly if sediment is built-up behind bales.	O	1	1	0	0	0	40 ± 44	40 ± 44	n/a	n/a	n/a	
Set bales tightly against the ground surface and anchor.	S	5	5	0	0	0	78 ± 30	78 ± 30	n/a	n/a	n/a	
If stacking square bales, stagger to provide overlap - similar to brick laying.	S	4	4	0	0	0	76 ± 32	76 ± 32	n/a	n/a	n/a	
Monitor bales and take prompt action if not sufficient.	S	1	1	0	0	0	40 ± 44	40 ± 44	n/a	n/a	n/a	
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey												
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain												

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Appendix B: Sample Size and Confidence Intervals for BMP Implementation Data

Harvesting: Decks

Table 23. Percent Implementation of BMPs for Decks by Region																
BMPs for Decks	A U	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		-----%-----														
Overall		97	94	96	99	98	100	100	100	100	100	3	9	0	0	0
Minimize the number of decks.	O	95	95	94	98	96	100	100	100	100	100	0	0	0	0	0
Minimize the size of decks.	S	95	95	92	98	100	100	100	100	100	100	0	0	0	0	0
Establish deck at locations where soil disturbance is minimized.	S	97	98	98	100	92	100	100	100	100	100	0	0	0	0	0
Situate deck outside SMZ.	S	100	98	100	100	100	100	100	100	100	100	0	0	0	0	0
Situate deck outside ephemeral drainages.	S	98	95	98	100	100	100	100	100	100	100	0	0	0	0	0
Situate deck atop flat or gently sloping land.	S	100	98	100	100	100	100	100	100	100	100	0	0	0	0	0
Situate deck atop stable soil.	S	98	100	98	100	94	100	100	100	100	100	0	0	0	0	0
Install sufficient erosion control measures to control runoff and capture sediment.	S	90	84	88	100	100	100	100	100	100	100	14	33	0	0	0
Use groundcover materials (slash, laps, limbs, tops, etc.) as needed to minimize disturbance to exposed soils.	S	93	74	93	100	100	100	100	100	100	100	6	9	0	0	0
Select side-ridge location if steep terrain is unavoidable and use additional BMPs as needed.	S	100	100	100	100	n/a	100	100	100	100	n/a	0	0	0	0	n/a
		<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<u>Lower % is Optimal</u>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain																

North Carolina BMP Implementation Survey Report 2018-2020
Appendix B: Sample Size and Confidence Intervals for BMP Implementation Data

Table 24. Sample size and 95% Confidence Intervals for Implementation of BMPs for Decks by Region											
BMPs for Decks	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Overall		2005	358	785	370	492	97 ± 1	93 ± 3	96 ± 1	99 ± 1	97 ± 2
Minimize the number of decks.	O	217	37	80	43	57	95 ± 3	90 ± 10	92 ± 6	94 ± 8	94 ± 7
Minimize the size of decks.	S	253	43	97	48	65	94 ± 3	92 ± 8	90 ± 6	94 ± 7	97 ± 5
Establish deck at locations where soil disturbance is minimized.	S	253	43	97	48	65	96 ± 2	94 ± 8	96 ± 4	96 ± 6	90 ± 7
Situate deck outside SMZ.	S	242	43	91	45	63	99 ± 1	94 ± 8	98 ± 3	96 ± 7	97 ± 5
Situate deck outside ephemeral drainages.	S	233	43	93	44	53	98 ± 2	92 ± 8	96 ± 4	96 ± 7	97 ± 5
Situate deck atop flat or gently sloping land.	S	229	43	97	36	53	99 ± 2	94 ± 8	98 ± 3	95 ± 8	97 ± 5
Situate deck atop stable soil.	S	252	43	97	48	64	97 ± 2	96 ± 7	96 ± 4	96 ± 6	91 ± 7
Install sufficient erosion control measures to control runoff and capture sediment.	S	70	19	33	10	8	88 ± 8	78 ± 18	84 ± 12	86 ± 21	84 ± 24
Use groundcover materials (slash, laps, limbs, tops, etc.) as needed to minimize disturbance to exposed soils.	S	250	43	96	47	64	92 ± 3	72 ± 13	91 ± 6	96 ± 6	97 ± 5
Select side-ridge location if steep terrain is unavoidable and use additional BMPs as needed.	S	6	1	4	1	0	80 ± 28	60 ± 44	76 ± 32	60 ± 44	n/a
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey											
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain											

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Appendix B: Sample Size and Confidence Intervals for BMP Implementation Data

Harvesting: Logging Systems

Table 25. Implementation of BMPs for Logging Systems by Region																
BMPs for Logging Systems	A U	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		-----%-----														
Overall		86	95	86	93	75	100	100	100	100	100	7	20	15	0	0
Single pass of equipment does not produce significant rut.	O	96	100	96	100	100	100	100	100	100	100	11	0	33	0	0
Harvest timber in a manner that minimizes significant changes to soil structure or organic matter.	O	85	89	84	93	75	100	100	100	100	100	6	25	8	0	0
Cease operations when inclement weather and/or wet site conditions persist.	O	63	94	65	56	35	100	100	100	100	100	7	0	17	0	0
		<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<u>Lower % is Optimal</u>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain																

Table 26. Sample size and 95% Confidence Intervals for Implementation of BMPs for Logging Systems by Region												
BMPs for Logging Systems	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval					
		S	M	P	SP	C	S	M	P	SP	C	
Overall		508	91	188	95	134	86 ± 3	93 ± 5	85 ± 5	91 ± 6	75 ± 7	
Single pass of equipment does not produce significant rut.	O	214	37	77	43	57	95 ± 3	95 ± 8	94 ± 6	96 ± 7	97 ± 5	
Harvest timber in a manner that minimizes significant changes to soil structure or organic matter.	S	214	37	77	43	57	84 ± 5	86 ± 11	83 ± 8	89 ± 10	74 ± 11	
Cease operations when inclement weather and/or wet site conditions persist.	O	80	17	34	9	20	62 ± 10	86 ± 16	63 ± 15	54 ± 27	37 ± 19	
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey												
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain												

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Appendix B: Sample Size and Confidence Intervals for BMP Implementation Data

Harvesting: Rehabilitation of the Project Site

Table 27. Implementation of BMPs for Rehabilitation of the Project Site by Region																
BMPs for Rehab	A U	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		-----%-----														
Overall		82	87	80	81	85	99	99	99	100	100	36	21	38	28	52
Close off access to roads and trails until stabilized.	S	57	77	45	50	69	100	100	100	100	100	0	0	0	0	0
Install water diversion structures to deter access as needed.	O	71	n/a	60	n/a	100	100	n/a	100	n/a	100	0	n/a	0	n/a	0
Install appropriate methods of runoff control and/or sediment capture.	O	65	65	63	60	86	98	100	96	100	100	35	0	43	75	0
Mat logging debris atop critical bare soil areas, particularly during operation.	S	75	71	71	85	100	99	100	99	100	100	32	15	35	57	100
Use seed or mixtures adapted for the site, soil, and time of year.	O	100	100	100	n/a	n/a	100	100	100	n/a	n/a	0	0	0	n/a	n/a
Spread seed evenly across the area when soil moisture and site conditions are suitable.	S	69	100	60	n/a	100	100	100	100	n/a	100	50	0	50	n/a	0
Apply mulch cover over approximately 50 to 75 of the seeded area.	S	67	100	60	n/a	n/a	100	100	100	n/a	n/a	50	0	50	n/a	n/a
Spread wood bark or chips several inches thick when used as primary temporary groundcover (no seed).	S	100	n/a	100	n/a	n/a	100	n/a	100	n/a	n/a	0	n/a	100	n/a	n/a
Spread wood bark or chips over approximately 50 to 75 of the seeded area.	S	100	n/a	100	n/a	100	100	n/a	100	n/a	100	0	n/a	0	n/a	0
Use erosion control matting when/where needed.	O	50	100	40	n/a	n/a	100	100	100	n/a	n/a	33	0	33	n/a	n/a
Remove debris from the stream channel to meet the relevant Forest Practice Guidelines and General Statutes.	S	92	95	91	90	89	100	100	100	100	100	71	100	70	33	100
If temporary, remove the stream crossing itself.	S	98	100	97	100	100	100	100	100	100	100	100	0	100	0	0
If temporary culvert crossing, remove all fill material or prevent material from entering stream.	S	90	100	75	100	n/a	100	100	100	100	n/a	100	0	100	0	n/a
Re-contour the streambank edges and approach ways to resemble natural conditions pre-installation.	S	90	98	85	94	90	100	98	100	100	100	50	0	50	0	80
Install BMPs to control, divert, and/or capture runoff/sediment along approach ways to prevent entry to stream.	O	82	87	82	77	80	98	97	98	100	100	58	44	58	38	91
		<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<i>Lower % is Optimal</i>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain																

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Appendix B: Sample Size and Confidence Intervals for BMP Implementation Data

Table 28. Sample size and 95% Confidence Intervals for Implementation of BMPs for Rehabilitation of the Project Site by Region											
BMPs for Rehab	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Overall		1778	333	984	251	210	82 ± 2	87 ± 4	80 ± 2	81 ± 5	85 ± 5
Close-off access to roads and trails until stabilized.	S	168	26	69	34	39	56 ± 7	73 ± 16	45 ± 11	50 ± 16	68 ± 14
Install water diversion structures to deter access as needed.	O	7	0	5	0	2	64 ± 29	n/a	56 ± 33	n/a	67 ± 40
Install appropriate methods of runoff control and/or sediment capture.	O	77	17	43	10	7	64 ± 10	62 ± 21	62 ± 14	57 ± 26	73 ± 28
Mat logging debris atop critical bare soil areas, particularly during operation.	S	331	70	192	46	23	75 ± 5	70 ± 11	70 ± 6	82 ± 11	93 ± 11
Use seed or mixtures adapted for the site, soil, and time of year.	O	5	1	4	0	0	78 ± 30	60 ± 44	76 ± 32	n/a	n/a
Spread seed evenly across the area when soil moisture and site conditions are suitable.	S	13	2	10	0	1	65 ± 23	67 ± 40	57 ± 26	n/a	60 ± 44
Apply mulch cover over approximately 50 to 75 percent of the seeded area.	S	12	2	10	0	0	63 ± 24	67 ± 40	57 ± 26	n/a	n/a
Spread wood bark or chips several inches thick when used as primary temporary groundcover (no seed).	S	17	0	17	0	0	91 ± 14	n/a	91 ± 14	n/a	n/a
Spread wood bark or chips over approximately 50 to 75 of the seeded area.	S	19	0	18	0	1	92 ± 13	n/a	91 ± 14	n/a	60 ± 44
Use erosion control matting when/where needed.	O	6	1	5	0	0	50 ± 31	60 ± 44	44 ± 33	n/a	n/a
Remove debris from the stream channel to meet FPGs and GSs.	S	203	42	113	29	19	91 ± 4	91 ± 9	90 ± 6	85 ± 13	83 ± 16
If temporary, remove the stream crossing itself.	S	148	16	97	24	11	97 ± 3	90 ± 15	95 ± 5	93 ± 11	87 ± 20
If temporary culvert crossing, remove all fill material or prevent material from entering stream.	S	20	11	8	1	0	84 ± 16	87 ± 20	67 ± 27	60 ± 44	n/a
Re-contour the streambank edges and approach ways to resemble natural conditions pre-installation.	S	353	58	193	51	51	89 ± 3	95 ± 6	85 ± 5	91 ± 8	87 ± 9
Install BMPs to control, divert, and/or capture runoff/sediment along approach ways - preventing entry to stream.	O	399	87	200	56	56	82 ± 4	86 ± 7	81 ± 5	75 ± 11	78 ± 11
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey											
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain											

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Appendix B: Sample Size and Confidence Intervals for BMP Implementation Data

Harvesting: Skid Trails

Table 29. Implementation of BMPs for Skid Trails by Region																
BMPs for Skid Trails	AU	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		-----%-----														
Overall		73	58	74	85	83	100	100	100	100	100	1	0	3	1	0
Concentrate skidding on as few skid trails as needed.	O	96	92	95	100	96	100	100	100	100	100	11	0	25	0	0
Limit primary skid trails to 10 percent of the total working area.	S	97	97	95	100	98	100	100	100	100	100	0	0	0	0	0
Avoid widespread or random skidding patterns with repeated passes.	O	92	86	89	100	95	100	100	100	100	100	6	0	11	0	0
Minimize placement and use of skid trails in ephemeral drainages.	O	79	77	79	86	81	100	100	100	100	100	4	0	8	0	0
Minimize skid trail width and avoid two-lane trails.	S	84	81	81	87	88	100	100	100	100	100	0	1	0	0	0
Minimize the extent of gouges or trenches on the ground surface.	S	69	64	70	76	70	100	100	100	100	100	1	0	3	0	0
Establish skid trails along land contours and keep slopes to a 25 grade.	S	71	60	79	98	100	100	100	100	100	100	0	0	1	0	0
Install water bars, brush barriers, turnouts or use other methods as needed.	O	60	56	62	77	100	100	100	100	100	100	4	1	9	17	0
Lap and pack down leftover logging debris atop primary skid trails - ideally during operation.	S	61	22	67	82	83	100	100	100	100	100	1	0	4	2	0
		<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<u>Lower % is Optimal</u>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain																

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Table 30. Sample size and 95% Confidence Intervals for Implementation of BMPs for Skid Trails by Region											
BMPs for Skid Trails	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Overall		8,311	2,456	3,228	1,130	1,497	73 ± 1	58 ± 2	74 ± 2	84 ± 2	83 ± 2
Concentrate skidding on as few skid trails as needed.	O	216	37	80	42	57	95 ± 3	88 ± 11	93 ± 6	96 ± 7	94 ± 7
Limit primary skid trails to 10 percent of the total working area.	S	215	37	80	41	57	96 ± 3	93 ± 9	93 ± 6	96 ± 7	95 ± 6
Avoid widespread or random skidding patterns with repeated passes.	O	215	36	80	42	57	91 ± 4	83 ± 12	87 ± 7	96 ± 7	92 ± 7
Minimize placement and use of skid trails in ephemeral drainages.	O	131	35	56	14	26	79 ± 7	74 ± 14	77 ± 11	78 ± 20	77 ± 15
Minimize skid trail width and avoid two-lane trails.	S	2,033	512	781	303	437	84 ± 2	80 ± 3	81 ± 3	87 ± 4	88 ± 3
Minimize the extent of gouges or trenches on the ground surface.	S	1,996	507	756	303	430	69 ± 2	64 ± 4	70 ± 3	76 ± 5	70 ± 4
Establish skid trails along land contours and keep slopes to a 25 grade.	S	888	443	370	64	11	71 ± 3	60 ± 5	79 ± 4	96 ± 5	87 ± 20
Install water bars, brush barriers, turnouts or use other methods as needed.	O	662	358	273	26	5	60 ± 4	56 ± 5	61 ± 6	73 ± 16	78 ± 30
Lap and pack down leftover logging debris atop primary skid trails - ideally during operation.	S	1,955	491	752	295	417	61 ± 2	22 ± 4	67 ± 3	81 ± 4	83 ± 4

S: Statewide, **M:** Mountains, **P:** Piedmont, **SP:** Southeastern Plains, **C:** Mid-Atlantic Coastal Plain

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Harvesting: Wetlands

BMPs for Wetlands	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
	S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
	-----%-----														
Overall	81	n/a	75	71	86	100	n/a	100	100	100	0	n/a	0	0	0
	<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<u>Lower % is Optimal</u>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey															
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain															

BMPs for Wetlands	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
	S	M	P	SP	C	S	M	P	SP	C
Overall	86	0	4	24	58	80 ± 8	n/a	63 ± 34	68 ± 18	84 ± 9
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey										
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain										

BMPs for Wetlands: Harvesting	A U	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		-----%-----														
Minimize harvesting activity in sensitive areas, i.e., wetter than normal areas or near waterbodies.	O	77	n/a	0	78	83	100	n/a	100	100	100	0	n/a	0	0	0
Operate equipment during dry periods if possible. Minimize operations on saturated soils and near waterbodies.	O	67	n/a	100	71	60	100	n/a	100	100	100	0	n/a	0	0	0
Use appropriate harvesting equipment, methods, and/or techniques, i.e., shovel-mat systems.	O	75	n/a	100	0	100	100	n/a	100	100	100	0	n/a	0	0	0
Concentrate heavy equipment use to primary skid trails and decks. Minimize rutting, i.e., single pass produces more than 6 inch rut.	O	89	n/a	100	67	100	100	n/a	100	100	100	0	n/a	0	0	0
Minimize heavy equipment use along the edge of ditches.	O	100	n/a	n/a	100	100	100	n/a	n/a	100	100	0	n/a	n/a	0	0
Rehabilitate areas of significant soil disturbance.	O	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
		<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<u>Lower % is Optimal</u>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain																

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BMPs for Wetlands: Harvesting	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Minimize harvesting activity in sensitive areas, i.e., wetter than normal areas or near waterbodies.	O	22	0	1	9	12	73 ± 17	n/a	40 ± 44	69 ± 26	75 ± 22
Operate equipment during dry periods if possible. Minimize operations on saturated soils and near waterbodies.	O	18	0	1	7	10	64 ± 20	n/a	60 ± 44	64 ± 29	57 ± 26
Use appropriate harvesting equipment, methods, and/or techniques, i.e., shovel-mat systems.	O	4	0	1	1	2	63 ± 34	n/a	60 ± 44	40 ± 44	67 ± 40
Concentrate heavy equipment use to primary skid trails and decks. Minimize rutting, i.e., single pass produces more than 6 inch rut.	O	18	0	1	6	11	82 ± 17	n/a	60 ± 44	60 ± 31	87 ± 20
Minimize heavy equipment use along the edge of ditches.	O	7	0	0	1	6	82 ± 26	n/a	n/a	60 ± 44	80 ± 28
Rehabilitate areas of significant soil disturbance.	O	1	0	0	0	1	60 ± 44	n/a	n/a	n/a	60 ± 44
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey											
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain											

BMPs for Wetlands: Mandatory BMPs for Roads	AU	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
Minimize number, width, and total length of permanent and temporary roads and skid trails.	O	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Locate roads and skid trails sufficiently far from waters of the U.S.	O	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Provide sufficient drainage to prevent restriction of water flow.	O	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Minimize encroachment of equipment into the waters of the U.S. during road construction.	O	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Minimize vegetation disturbance in the waters of the U.S.	O	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
		<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<i>Lower % is Optimal</i>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain																

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BMPs for Wetlands: Mandatory BMPs for Roads	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Minimize number, width, and total length of permanent and temporary roads and skid trails.	O	1	0	0	0	1	60 ± 44	n/a	n/a	n/a	60 ± 44
Locate roads and skid trails sufficiently far from waters of the U.S.	O	1	0	0	0	1	60 ± 44	n/a	n/a	n/a	60 ± 44
Provide sufficient drainage to prevent restriction of water flow.	O	1	0	0	0	1	60 ± 44	n/a	n/a	n/a	60 ± 44
Minimize encroachment of equipment into the waters of the U.S. during road construction.	O	1	0	0	0	1	60 ± 44	n/a	n/a	n/a	60 ± 44
Minimize vegetation disturbance in the waters of the U.S.	O	1	0	0	0	1	60 ± 44	n/a	n/a	n/a	60 ± 44

"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey
S: Statewide, **M:** Mountains, **P:** Piedmont, **SP:** Southeastern Plains, **C:** Mid-Atlantic Coastal Plain

BMPs for Wetlands: Flat Roads	AU	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
Keep road grade as close to original land surface grade as possible.	S	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Construct roads during periods of relatively dry soils when possible.	O	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Minimize the lateral extent of wetland disturbance during construction.	O	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Maintain a daylight corridor to allow more rapid drying of the road.	O	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Establish and maintain groundcover vegetation along road shoulders.	O	0	n/a	n/a	n/a	0	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
On lightly used roads, establish and maintain vegetative groundcover or other suitable stabilizing materials upon the road surface.	O	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
		<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<i>Lower % is Optimal</i>				

"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey
S: Statewide, **M:** Mountains, **P:** Piedmont, **SP:** Southeastern Plains, **C:** Mid-Atlantic Coastal Plain

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Table 38. Sample size and 95% Confidence Intervals for Implementation of BMPs for Flat Roads in Wetlands by Region											
BMPs for Wetlands: Flat Roads	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Keep road grade as close to original land surface grade as possible.	S	1	0	0	0	1	60 ± 44	n/a	n/a	n/a	60 ± 44
Construct roads during periods of relatively dry soils when possible.	O	1	0	0	0	1	60 ± 44	n/a	n/a	n/a	60 ± 44
Minimize the lateral extent of wetland disturbance during construction.	O	1	0	0	0	1	60 ± 44	n/a	n/a	n/a	60 ± 44
Maintain a daylight corridor to allow more rapid drying of the road.	O	1	0	0	0	1	60 ± 44	n/a	n/a	n/a	60 ± 44
Establish and maintain groundcover vegetation along road shoulders.	O	1	0	0	0	1	40 ± 44	n/a	n/a	n/a	40 ± 44
On lightly used roads, establish and maintain vegetative groundcover or other suitable stabilizing materials upon the road surface.	O	1	0	0	0	1	60 ± 44	n/a	n/a	n/a	60 ± 44
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey											
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain											

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Roads and Access

Table 39. Implementation of BMPs for Roads by Region																
BMPs for Roads	A U	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		-----%-----														
Overall		84	90	79	83	96	100	100	100	100	100	23	19	18	58	0
Minimize road width. Light-duty roads: 10 to 14 feet wide.	S	100	100	100	100	100	100	100	100	100	100	0	0	0	0	0
Minimize road width. Heavy-duty roads: 14 to 20 feet wide.	S	88	83	89	83	90	100	100	100	100	100	0	0	0	0	0
Keep grade slopes to 10 or less when conditions allow.	S	93	100	91	100	n/a	100	100	100	100	100	0	0	0	0	0
Limit road segment lengths to 200 feet or less for steeper grades.	S	82	83	76	100	100	100	100	100	100	100	20	0	0	25	0
Limit height of side / cut banks to 5 feet or less when conditions allow.	S	100	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	0	0	n/a	n/a	n/a
Install cut bank no steeper than 2:1 with loose soils when conditions allow.	S	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Minimize soil disturbance and the amount of road at any stream crossing.	S	80	100	70	71	89	100	100	100	100	100	56	0	50	100	0
Use rock, stone, wooden mats, or other suitable materials for at least 50 feet from public road.	S	95	100	94	90	100	100	100	100	100	100	0	0	0	0	0
Stabilize bare soil areas using suitable technique (e.g., seed, mulch, riprap, etc.).	S	67	67	60	78	80	100	100	100	100	100	24	33	21	50	0
In low lying areas, keep the roadbed as close to the original ground level as possible.	S	88	n/a	50	100	100	100	100	100	100	100	0	n/a	0	0	0
In low lying areas, provide adequate cross drainage when fill material is used.	S	50	n/a	0	n/a	100	100	n/a	100	n/a	100	0	n/a	0	n/a	0
Use insloping, outsloping and/or crowning techniques as needed.	O	88	100	77	100	100	100	100	100	100	100	0	0	0	0	0
Install diversion or other structures to control and capture runoff (e.g., broad-based dips, settlement basin, etc.).	O	50	100	41	33	n/a	100	100	100	100	n/a	42	0	30	100	n/a
Stabilize and/or harden the road surface - using geotextile fabric beneath - as needed.	O	77	60	72	80	100	100	100	100	100	100	25	0	20	100	0
Rehabilitate and stabilize the road and side / cut banks according to the standards of FPG .0209.	O	56	50	38	50	100	100	100	100	100	100	43	0	40	100	0
Take prompt action to protect water quality if BMPs are not properly functioning.	O	14	0	0	33	n/a	100	100	100	100	n/a	100	100	100	100	n/a
Clean out built-up silt and sediment from retention areas as needed.	O	83	100	100	50	n/a	100	100	100	100	n/a	0	0	0	0	n/a
Maintain an open daylight corridor.	O	89	88	86	89	100	100	100	100	100	100	0	0	0	0	0
Maintain a road surface that provides good runoff control, water quality protection, and vehicle access.	O	79	67	76	78	100	100	100	100	100	100	43	33	33	100	0

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Close access to roads when suitable to minimize unnecessary use.	O	62	83	52	63	88	100	100	100	100	100	0	0	0	0	0
Use information resources to exam site and determine best location for the road.	O	100	n/a	100	n/a	100	100	n/a	100	n/a	100	0	n/a	0	n/a	0
Construct roads at least one year before use.	O	95	100	92	n/a	100	100	100	n/a	100	100	0	0	0	n/a	0
Minimize the number of stream crossings. Avoid crossings.	O	96	89	100	83	100	100	100	100	100	100	0	0	0	0	0
Minimize soil disturbance and road placement within ephemeral drainages.	O	86	100	77	100	100	100	100	100	100	100	0	0	0	0	0
Establish roads along the land contours.	O	93	100	88	100	100	100	100	100	100	100	0	0	0	0	0
In steep terrain, establish road along gentle hill slopes - just below the ridgeline.	O	88	100	82	100	100	100	100	100	100	100	0	0	0	0	0
In steep terrain, construct outsloped road with broad-based dips when conditions allow.	O	79	100	63	100	100	100	100	100	100	100	0	0	0	0	0
Keep road atop firm, well-drained soils.	O	92	100	88	90	100	100	100	100	100	100	0	0	0	100	0
Plan the road to minimize the amount of cut and/or fill needed.	O	94	83	95	100	100	100	100	100	100	100	0	0	0	0	0
Construct road to drain naturally - not into streams or waterbodies.	O	81	100	73	75	91	100	100	100	100	100	56	0	50	100	0
Plan adequate right-of-way width to daylight the road for drying.	O	93	100	90	89	100	100	100	100	100	100	0	0	0	0	0
Use full-bench construction in sloping terrain where soil is loose and prone to sliding or accelerated erosion.	O	67	100	0	n/a	n/a	100	100	100	n/a	n/a	0	0	0	n/a	n/a
		<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<u><i>Lower % is Optimal</i></u>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain																

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Table 409. Sample size and 95% Confidence Intervals for Implementation of BMPs for Roads by Region											
BMPs for Roads	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Overall		1040	161	576	139	164	84 ± 2	89 ± 5	79 ± 3	82 ± 6	95 ± 3
Minimize road width. Light-duty roads: 10 to 14 feet wide.	S	31	3	21	4	3	94 ± 9	72 ± 36	92 ± 12	76 ± 32	72 ± 36
Minimize road width. Heavy-duty roads: 14 to 20 feet wide.	S	40	6	18	6	10	84 ± 11	70 ± 30	82 ± 17	70 ± 30	79 ± 23
Keep grade slopes to 10 or less when conditions allow.	S	29	4	22	3	0	88 ± 12	76 ± 32	85 ± 15	72 ± 36	n/a
Limit road segment lengths to 200 feet or less for steeper grades.	S	28	6	17	3	2	78 ± 15	70 ± 30	72 ± 20	72 ± 36	67 ± 40
Limit height of side / cut banks to 5 feet or less when conditions allow.	S	2	2	0	0	0	67 ± 40	67 ± 40	n/a	n/a	n/a
Install cut bank no steeper than 2:1 with loose soils when conditions allow.	S	1	0	0	0	1	60 ± 44	n/a	n/a	n/a	60 ± 44
Minimize soil disturbance and the amount of road at any stream crossing.	S	44	8	20	7	9	77 ± 12	84 ± 24	67 ± 19	64 ± 29	77 ± 24
Use rock, stone, wooden mats, or other suitable materials for at least 50 feet from public road.	S	60	8	31	10	11	92 ± 7	84 ± 24	89 ± 11	79 ± 23	87 ± 20
Stabilize bare soil areas using suitable technique (e.g., seed, mulch, riprap, etc.).	S	63	9	35	9	10	66 ± 11	62 ± 27	59 ± 15	69 ± 26	72 ± 24
In low lying areas, keep the roadbed as close to the original ground level as possible.	S	8	0	2	2	4	75 ± 26	n/a	50 ± 41	67 ± 40	76 ± 32
In low lying areas, provide adequate cross drainage when fill material is used.	S	2	0	1	0	1	50 ± 41	n/a	40 ± 44	n/a	60 ± 44
Use insloping, outslowing and/or crowning techniques as needed.	O	25	6	13	1	5	83 ± 14	80 ± 28	71 ± 22	60 ± 44	78 ± 30
Install diversion or other structures to control and capture runoff (e.g., broad-based dips, settlement basin, etc.).	O	24	4	17	3	0	50 ± 19	76 ± 32	43 ± 21	43 ± 37	n/a
Stabilize and/or harden the road surface - using geotextile fabric beneath - as needed.	O	35	5	18	5	7	74 ± 14	56 ± 33	68 ± 20	67 ± 32	82 ± 26
Rehabilitate and stabilize the road and side / cut banks according to the standards of FPG .0209.	O	16	2	8	2	4	55 ± 22	50 ± 41	42 ± 28	50 ± 41	76 ± 32
Take prompt action to protect water quality if BMPs are not properly functioning.	O	7	1	3	3	0	27 ± 28	40 ± 44	28 ± 36	43 ± 37	n/a
Clean out built-up silt and sediment from retention areas as needed.	O	6	2	2	2	0	70 ± 30	67 ± 40	67 ± 40	50 ± 41	n/a
Maintain an open daylight corridor.	O	66	8	37	9	12	87 ± 8	75 ± 26	83 ± 12	77 ± 24	88 ± 18
Maintain a road surface that provides good runoff control, water quality protection, and vehicle access.	O	68	9	38	9	12	78 ± 10	62 ± 27	74 ± 13	69 ± 26	88 ± 18
Close access to roads when suitable to minimize unnecessary use.	O	55	6	33	8	8	61 ± 12	70 ± 30	51 ± 16	58 ± 28	75 ± 26
Use information resources to exam site and determine best location for the road.	O	3	0	2	0	1	72 ± 36	n/a	67 ± 40	n/a	60 ± 44
Construct roads at least one year before use.	O	21	6	13	0	2	88 ± 14	80 ± 28	83 ± 19	n/a	67 ± 40
Minimize the number of stream crossings. Avoid crossings.	O	54	9	29	6	10	93 ± 7	77 ± 24	94 ± 10	70 ± 30	86 ± 21

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Minimize soil disturbance and road placement within ephemeral drainages.	O	49	6	30	6	7	83 ± 10	80 ± 28	74 ± 15	80 ± 28	82 ± 26
Establish roads along the land contours.	O	57	9	34	9	5	90 ± 8	85 ± 22	84 ± 12	85 ± 22	78 ± 30
In steep terrain, establish road along gentle hill slopes - just below the ridgeline.	O	24	5	17	1	1	82 ± 15	78 ± 30	76 ± 19	60 ± 44	60 ± 44
In steep terrain, construct outsloped road with broad-based dips when conditions allow.	O	14	4	8	1	1	72 ± 21	76 ± 32	58 ± 28	60 ± 44	60 ± 44
Keep road atop firm, well-drained soils.	O	65	9	34	10	12	90 ± 7	85 ± 22	84 ± 12	79 ± 23	88 ± 18
Plan the road to minimize the amount of cut and/or fill needed.	O	31	6	19	3	3	89 ± 11	70 ± 30	87 ± 15	72 ± 36	72 ± 36
Construct road to drain naturally - not into streams or waterbodies.	O	48	7	22	8	11	79 ± 11	82 ± 26	69 ± 18	67 ± 27	80 ± 22
Plan adequate right-of-way width to daylight the road for drying.	O	61	9	31	9	12	91 ± 7	85 ± 22	86 ± 12	77 ± 24	88 ± 18
Use full-bench construction in sloping terrain where soil is loose and prone to sliding or accelerated erosion.	O	3	2	1	0	0	57 ± 37	67 ± 40	40 ± 44	n/a	n/a
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey											
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain											

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Stream Crossings

BMPs for Stream Crossings -- General	A U	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		-----%-----														
Overall		89	88	90	88	87	99	99	99	100	100	32	27	40	13	36

BMPs for Stream Crossings -- General	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Overall	O	4,624	1,017	2,316	619	672	89 ± 1	88 ± 2	89 ± 1	88 ± 3	87 ± 3

BMPs for Stream Crossings -- General	A U	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		-----%-----														
Avoid stream crossings when possible.	O	69	83	71	60	58	100	100	100	100	100	21	0	25	0	40
Minimize the number of crossings.	O	68	64	71	81	46	100	100	100	100	100	28	13	43	0	29
Consider crossing site when selecting crossing type.	S	92	96	92	94	85	100	100	100	100	100	37	0	60	0	20
Designate stream crossing location(s) using flagging, paint, or other suitable marking.	S	76	65	79	77	72	100	100	100	100	100	4	0	10	0	0
Install crossing at relatively straight stream section.	S	96	93	96	97	97	100	100	100	100	100	10	0	20	0	0
Minimize approach way slope/grade.	S	100	99	100	100	100	100	100	100	100	100	0	0	0	0	0
Install crossing at a right-angle to the stream channel.	S	97	91	99	97	97	100	100	100	100	100	0	0	0	0	0
Minimize alteration of stream depth, width, gradient, and capacity.	S	88	88	88	90	81	100	100	100	100	96	59	40	86	0	40
Construct, install, and remove crossing during low-flow if possible.	S	92	100	85	100	100	100	100	100	100	100	50	0	50	0	0
Stabilize approach ways using appropriate means (e.g., slash, laps, rock, etc.).	S	85	81	86	81	88	98	97	98	98	100	41	43	38	30	71
Rehabilitate crossing area as soon as possible.	S	83	87	82	75	88	98	98	96	100	100	54	86	47	22	100
		<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<u>Lower % is Optimal</u>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain																

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Table 46. Sample size and 95% Confidence Intervals for Implementation of BMPs for Bridgemat Stream Crossings by Region											
BMPs for Stream Crossings -- Bridgemats	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Overall		1,096	118	669	183	126	97 ± 1	95 ± 4	97 ± 1	98 ± 2	94 ± 4
Select a stream crossing location with a narrow channel width.	S	270	24	164	49	33	99 ± 1	93 ± 11	99 ± 2	96 ± 6	95 ± 8
Select a stream crossing location with firm, stable streambanks.	S	248	24	154	41	29	96 ± 3	93 ± 11	96 ± 3	96 ± 7	88 ± 12
Select a stream crossing location that has solid footing to support mats and equipment.	S	249	24	156	41	28	97 ± 2	93 ± 11	96 ± 3	96 ± 7	88 ± 12
Select a stream crossing location that has high, level ground on each side.	S	250	24	156	41	29	96 ± 3	86 ± 14	96 ± 3	93 ± 8	88 ± 12
Create a solid-surface with panels butted tightly together.	S	42	10	22	6	4	87 ± 10	72 ± 24	85 ± 15	80 ± 28	76 ± 32
Keep equipment out of the channel during installation and removal unless unavoidable.	S	26	6	12	5	3	94 ± 10	80 ± 28	88 ± 18	78 ± 30	72 ± 36
Minimize over-hang from logs, trees, or trucks/trailers.	S	11	6	5	0	0	87 ± 20	80 ± 28	78 ± 30	n/a	n/a

S: Statewide, **M:** Mountains, **P:** Piedmont, **SP:** Southeastern Plains, **C:** Mid-Atlantic Coastal Plain

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Table 47. Implementation of BMPs for Culvert Stream Crossings by Region																
BMPs for Stream Crossings -- Culverts	A U	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		-----%-----														
Overall		74	78	67	73	81	100	100	100	100	100	40	18	58	0	65
Use appropriate number/size of culverts.	S	63	81	43	50	69	100	100	100	100	100	41	33	59	0	0
Use culvert that extends at least 12 inches beyond the edge of the fill material. If shorter, inlet/outlet headwalls adequately protected.	S	50	40	47	50	83	100	100	100	100	100	10	0	25	0	0
Use at least a 15 inch culvert.	S	95	88	100	100	100	100	100	100	100	100	0	0	0	0	0
Place culvert in the center of existing or expected water flow.	S	96	97	93	100	100	100	100	100	100	100	67	0	100	0	0
Set culvert(s) with appropriate downslope grade.	S	95	93	93	100	100	100	100	100	100	100	50	0	100	0	0
Minimize the height that water drops from the outlet of the culvert.	S	80	67	93	50	100	100	100	100	100	100	31	30	100	0	0
Backfill material atop culvert at least 12 inches.	S	89	97	86	50	100	100	100	100	100	100	22	0	50	0	0
Pack backfill material down tightly, avoiding material with excessive debris.	S	88	93	72	100	100	100	100	100	100	100	60	0	75	0	0
Protect the inlet/outlet of the culvert/fill material with suitable stabilization measures.	S	62	79	47	75	54	100	100	100	100	100	71	67	71	0	100
Install crossing to allow floodwaters to flow around crossing as needed.	S	14	12	15	33	0	100	100	100	100	100	36	13	43	0	75
Use surface hardening materials on the culvert and approach ways as needed.	S	65	79	54	71	50	98	100	94	100	100	63	29	83	0	83
		<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<i>Lower % is Optimal</i>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain																

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Table 48. Sample size and 95% Confidence Intervals for Implementation of BMPs for Culvert Stream Crossings by Region											
BMPs for Stream Crossings -- Culverts	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Overall		862	326	319	81	136	74 ± 3	78 ± 4	67 ± 5	72 ± 10	80 ± 7
Use appropriate number/size of culverts.	S	78	31	30	4	13	62 ± 11	77 ± 14	44 ± 17	50 ± 35	65 ± 23
Use culvert that extends at least 12 inches beyond the edge of the fill material. If shorter, inlet/outlet headwalls adequately protected.	S	80	30	30	8	12	50 ± 11	41 ± 17	47 ± 17	50 ± 28	75 ± 22
Use at least a 15 inch culvert.	S	83	34	28	8	13	93 ± 6	84 ± 12	94 ± 10	84 ± 24	89 ± 17
Place culvert in the center of existing or expected water flow.	S	83	32	30	8	13	94 ± 5	92 ± 10	88 ± 12	84 ± 24	89 ± 17
Set culvert(s) with appropriate downslope grade.	S	79	30	28	8	13	93 ± 6	88 ± 12	88 ± 12	84 ± 24	89 ± 17
Minimize the height that water drops from the outlet of the culvert.	S	79	30	28	8	13	78 ± 9	65 ± 16	88 ± 12	50 ± 28	89 ± 17
Backfill material atop culvert at least 12 inches.	S	80	30	29	8	13	87 ± 7	91 ± 11	82 ± 14	50 ± 28	89 ± 17
Pack backfill material down tightly, avoiding material with excessive debris.	S	80	30	29	8	13	86 ± 8	88 ± 12	70 ± 16	84 ± 24	89 ± 17
Protect the inlet/outlet of the culvert/fill material with suitable stabilization measures.	S	82	29	32	8	13	62 ± 10	76 ± 15	47 ± 16	67 ± 27	53 ± 24
Install crossing to allow floodwaters to flow around crossing as needed.	S	58	17	27	6	8	16 ± 9	19 ± 18	19 ± 14	40 ± 31	16 ± 24
Use surface hardening materials on the culvert and approach ways as needed.	S	80	33	28	7	12	64 ± 10	76 ± 14	53 ± 17	64 ± 29	50 ± 25

S: Statewide, **M:** Mountains, **P:** Piedmont, **SP:** Southeastern Plains, **C:** Mid-Atlantic Coastal Plain

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Table 49. Implementation of BMPs for Ford Stream Crossings by Region																
BMPs for Stream Crossings – Fords	A U	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		-----%-----														
Overall		69	92	59	50	50	100	100	100	100	100	46	0	53	0	67
Do not use ford crossings on skid trail crossings. Use only for truck access.	S	53	100	31	0	50	100	100	100	100	73	0	82	0	100	
Install at location with relatively low streambanks.	S	100	100	100	100	100	100	100	100	100	0	0	0	0	0	
Install at location with solid and level stream bottom.	S	76	100	62	100	50	100	100	100	100	71	0	60	0	100	
Install at straight section of stream channel.	S	100	100	100	100	100	100	100	100	100	0	0	0	0	0	
Use geotextile fabric as underlayment as needed.	S	0	0	0	n/a	0	100	100	100	n/a	100	11	0	0	n/a	33
Use clean hardening materials on vehicle traffic surface.	S	46	80	25	0	50	100	100	100	100	33	0	33	0	100	
Spread hardening materials evenly - avoid dips, humps, or ruts.	S	65	100	56	0	0	100	100	100	100	25	0	50	0	0	
Install ford to allow passage of natural streamflow, particularly for low-flow or dry periods.	S	74	100	55	100	50	100	100	100	100	71	0	60	0	100	
Establish permanent groundcover over at least 80 of the approach-way area within the first 50 feet.	S	55	90	56	0	0	100	100	100	100	40	0	43	0	60	
		<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<u>Lower % is Optimal</u>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain																

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Table 50. Sample size and 95% Confidence Intervals for Implementation of BMPs for Ford Stream Crossings by Region											
BMPs for Stream Crossings -- Fords	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Overall		242	85	105	16	36	68 ± 6	90 ± 6	59 ± 9	50 ± 22	50 ± 16
Do not use ford crossings on skid trail crossings. Use only for truck access.	S	32	10	16	2	4	53 ± 16	86 ± 21	35 ± 21	33 ± 40	50 ± 35
Install at location with relatively low streambanks.	S	33	10	16	2	5	95 ± 8	86 ± 21	90 ± 15	67 ± 40	78 ± 30
Install at location with solid and level stream bottom.	S	29	10	13	2	4	73 ± 15	86 ± 21	59 ± 24	67 ± 40	50 ± 35
Install at straight section of stream channel.	S	28	11	10	2	5	94 ± 10	87 ± 20	86 ± 21	67 ± 40	78 ± 30
Use geotextile fabric as underlayment as needed.	S	9	4	2	0	3	15 ± 22	24 ± 32	33 ± 40	n/a	28 ± 36
Use clean hardening materials on vehicle traffic surface.	S	28	10	12	2	4	47 ± 17	72 ± 24	31 ± 23	33 ± 40	50 ± 35
Spread hardening materials evenly - avoid dips, humps, or ruts.	S	23	10	9	2	2	63 ± 18	86 ± 21	54 ± 27	33 ± 40	33 ± 40
Install ford to allow passage of natural streamflow, particularly for low-flow or dry periods.	S	27	10	11	2	4	71 ± 16	86 ± 21	53 ± 25	67 ± 40	50 ± 35
Establish permanent groundcover over at least 80 of the approach-way area within the first 50 feet.	S	33	10	16	2	5	54 ± 16	79 ± 23	55 ± 22	33 ± 40	22 ± 30
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey											
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain											

Table 5110. Implementation of BMPs for Pole Stream Crossings by Region																
BMPs for Stream Crossings -- Poles	AU	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
Overall		84	75	33	100	94	100	100	100	100	100	0	0	0	0	0
Maintain water flow through the pole crossing.	S	60	n/a	100	n/a	50	100	n/a	100	n/a	100	0	n/a	0	n/a	0
Protect the integrity of the channel banks (intact and stable).	S	82	100	0	100	100	100	100	100	100	0	0	0	0	0	0
Do not place soil within or on top of the pole crossing.	S	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Install pole crossing to an elevation higher than the adjacent channel or bank.	S	100	100	n/a	n/a	100	100	100	n/a	n/a	100	0	0	n/a	n/a	0
Pack down limbs, tops, slash, or other woody material atop the approach ways.	S	75	0	50	100	100	100	100	100	100	0	0	0	0	0	0
Remove the pole crossing immediately following use or when high-flows are expected.	S	100	100	n/a	n/a	100	100	100	n/a	n/a	100	0	0	n/a	n/a	0
<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<i>Lower % is Optimal</i>						
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain																

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Table 52. Sample size and 95% Confidence Intervals for Implementation of BMPs for Pole Stream Crossings by Region											
BMPs for Stream Crossings -- Poles	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Overall		51	8	6	3	34	82 ± 10	67 ± 27	40 ± 31	72 ± 36	90 ± 10
Maintain water flow through the pole crossing.	S	5	0	1	0	4	56 ± 33	n/a	60 ± 44	n/a	50 ± 35
Protect the integrity of the channel banks (intact and stable).	S	17	2	3	2	10	76 ± 19	67 ± 40	28 ± 36	67 ± 40	86 ± 21
Do not place soil within or on top of the pole crossing.	S	2	0	0	0	2	67 ± 40	n/a	n/a	n/a	67 ± 40
Install pole crossing to an elevation higher than the adjacent channel or bank.	S	3	2	0	0	1	72 ± 36	67 ± 40	n/a	n/a	60 ± 44
Pack down limbs, tops, slash, or other woody material atop the approach ways.	S	12	2	2	1	7	69 ± 23	33 ± 40	50 ± 41	60 ± 44	82 ± 26
Remove the pole crossing immediately following use or when high-flows are expected.	S	12	2	0	0	10	88 ± 18	67 ± 40	n/a	n/a	86 ± 21
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey											
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain											

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Streamside Management Zones (SMZs)

Table 53. Implementation of BMPs for Streamside Management Zones by Region																
BMPs for SMZs	A U	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		-%														
Overall		98	98	98	99	99	100	100	100	100	100	21	17	28	14	12
Conduct operation during dry soil conditions when possible, limiting heavy equipment use.	S	71	100	0	100	n/a	100	100	0	100	n/a	100	0	100	0	n/a
Avoid heavy equipment use when braided channels are close together.	S	67	n/a	0	100	n/a	100	n/a	0	100	n/a	100	n/a	0	100	n/a
Establish SMZ from the outermost channel limits, not from innermost channel bank.	S	100	100	100	100	n/a	100	100	100	100	n/a	0	0	0	0	n/a
Limit heavy equipment use along ditch edge, maintaining structural integrity.	O	78	100	50	100	n/a	100	100	100	100	n/a	0	0	0	0	n/a
During temporary ditch crossing installation and use, minimize erosion and sediment runoff.	O	90	n/a	n/a	100	89	100	n/a	n/a	100	100	0	n/a	n/a	0	0
During temporary ditch crossing installation and use, avoid altering water flow.	S	90	n/a	n/a	100	89	100	n/a	n/a	100	100	0	n/a	n/a	0	0
Minimize disturbance to the soil and groundcover within the ephemeral stream area.	S	89	n/a	n/a	n/a	89	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Mark SMZs perimeter clearly using paint, flagging, or other means.	S	58	31	61	64	61	100	100	100	100	100	11	9	15	0	7
Avoid roads, skid trails, decks, and portable sawmills inside the SMZ.	S	75	59	76	86	76	100	100	100	100	100	6	5	7	6	5
Keep roads, skid trails, decks, and portable sawmills at least 10 feet away from the stream when placement in SMZ is unavoidable.	S	95	91	94	97	97	100	100	100	100	100	32	11	38	25	50
Limit heavy equipment use within 10 feet of the edges of streams and waterbodies.	S	69	53	76	0	60	100	100	100	100	100	41	29	53	33	0
Maintain approximately half of the pre-harvest vegetative canopy cover within the SMZ.	S	93	88	94	99	93	100	100	100	100	100	39	42	37	100	36
Minimize disturbance to the mid-level and understory if removing significant overstory.	S	92	92	93	94	85	100	100	100	100	100	22	0	41	13	9

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Allow no more than 20 evenly distributed bare soil surface within the SMZ.	O	83	57	86	89	71	100	100	100	100	100	43	0	53	100	29
Fell and remove trees away from the stream or waterbody.	S	99	99	99	99	97	100	100	100	100	100	80	100	100	100	50
Avoid gouging soil in a manner that could funnel runoff and transport sediment to the waterbodies.	S	98	98	98	100	100	100	100	100	100	100	17	0	20	0	0
Service and refuel equipment outside of the SMZ, unless mechanical failure requires repair. Control fluids as needed.	S	98	96	98	99	99	100	100	100	100	100	65	100	60	100	0
Keep logging debris out of stream or remove promptly if introduced when operating in the SMZ (not at crossing).	S	100	n/a	100	n/a	n/a	100	n/a	100	n/a	n/a	0	n/a	0	n/a	n/a
Wrap SMZ around the head of the intermittent or perennial stream, at the ephemeral transition.	S	91	84	93	90	92	100	100	100	100	100	20	27	22	8	17
SMZ width sufficient to filter upslope pollutants and prevent stream or waterbody sedimentation/contamination.	S	83	82	90	90	42	100	100	100	100	100	13	0	25	33	0
SMZ width sufficient to provide stream shade and prevent adverse temperature fluctuations.	S	93	94	93	96	90	100	100	100	100	100	26	33	32	20	13
<i>Higher % is Optimal</i>							<i>Higher % is Optimal</i>					<i>Lower % is Optimal</i>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain																

BMPs for SMZs	AU	Sample Size					BMP Implementation & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Overall		8,086	945	4,304	1,234	1,603	98 ± 0	97 ± 1	97 ± 1	99 ± 1	99 ± 1
Conduct operation during dry soil conditions when possible, limiting heavy equipment use.	S	7	1	2	4	0	64 ± 29	60 ± 44	33 ± 40	76 ± 32	n/a
Use matting systems for skid trails and/or roads.	O	6	0	2	4	0	60 ± 31	n/a	33 ± 40	76 ± 32	n/a
Avoid heavy equipment use when braided channels are close together.	S	7	1	2	4	0	82 ± 26	60 ± 44	67 ± 40	76 ± 32	n/a
Establish SMZ from the outermost channel limits, not from innermost channel bank.	S	9	1	4	4	0	69 ± 26	60 ± 44	50 ± 35	76 ± 32	n/a
Limit heavy equipment use along ditch edge, maintaining structural integrity.	O	61	0	0	5	56	88 ± 8	n/a	n/a	78 ± 30	87 ± 9
During temporary ditch crossing installation and use, minimize erosion and sediment runoff.	O	39	0	0	2	37	86 ± 11	n/a	n/a	67 ± 40	86 ± 11

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During temporary ditch crossing installation and use, avoid altering water flow.	S	36	0	0	0	36	85 ± 12	n/a	n/a	n/a	85 ± 12
Minimize disturbance to the soil and groundcover within the ephemeral stream area.	S	304	32	171	55	46	58 ± 6	33 ± 16	61 ± 7	63 ± 12	60 ± 14
Mark SMZs perimeter clearly using paint, flagging, or other means.	S	787	98	419	118	152	75 ± 3	59 ± 10	76 ± 4	84 ± 7	75 ± 7
Avoid roads, skid trails, decks, and portable sawmills inside the SMZ.	S	807	97	427	126	157	95 ± 2	89 ± 6	94 ± 2	95 ± 4	96 ± 3
Keep roads, skid trails, decks, and portable sawmills at least 10 feet away from the stream when placement in SMZ is unavoidable.	S	93	15	70	3	5	68 ± 9	53 ± 23	74 ± 10	28 ± 36	56 ± 33
Limit heavy equipment use within 10 feet of the edges of streams and waterbodies.	S	802	96	426	125	155	93 ± 2	86 ± 7	93 ± 2	98 ± 3	92 ± 4
Maintain approximately half of the pre-harvest vegetative canopy cover within the SMZ.	S	809	98	428	126	157	91 ± 2	90 ± 6	93 ± 2	92 ± 5	85 ± 6
Minimize disturbance to the mid-level and understory if removing significant overstory.	S	161	7	121	9	24	82 ± 6	55 ± 30	85 ± 6	77 ± 24	68 ± 18
Allow no more than 20 evenly distributed bare soil surface within the SMZ.	O	807	98	426	126	157	99 ± 1	97 ± 4	99 ± 1	98 ± 3	96 ± 3
Fell and remove trees away from the stream or waterbody.	S	393	63	234	45	51	98 ± 1	96 ± 5	97 ± 2	96 ± 7	96 ± 6
Avoid gouging the soil in a manner that could funnel runoff and transport sediment to the waterbodies.	S	806	98	425	126	157	98 ± 1	94 ± 5	97 ± 2	98 ± 3	98 ± 2
Service and refuel equipment outside of the SMZ, unless mechanical failure requires repair. Control fluids as needed.	S	15	0	15	0	0	90 ± 16	n/a	90 ± 16	n/a	n/a
Keep logging debris out of stream or remove promptly if introduced when operating in the SMZ (not at crossing).	S	763	96	390	124	153	91 ± 2	83 ± 7	93 ± 3	89 ± 6	91 ± 5
Wrap SMZ around the head of the intermittent or perennial stream, at the ephemeral transition.	S	139	11	78	31	19	82 ± 6	74 ± 23	88 ± 7	86 ± 12	43 ± 20
SMZ width sufficient to filter upslope pollutants and prevent stream or waterbody sedimentation/contamination.	S	808	98	428	126	156	93 ± 2	92 ± 6	93 ± 2	95 ± 4	89 ± 5
SMZ width sufficient to provide stream shade and prevent adverse temperature fluctuations.	S	427	35	236	71	85	96 ± 2	90 ± 10	95 ± 3	96 ± 5	94 ± 5

"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey

S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain

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Site Preparation and Reforestation

Table 55. Implementation of BMPs for Site Preparation and Reforestation by Region																
BMPs for Site Prep	A U	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		-----%-----														
Overall		69	n/a	n/a	n/a	69	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Keep equipment out of the SMZ or riparian buffers.	S	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Avoid gouging the soil surface in a manner that could funnel runoff and transport sediment into nearby waterbodies.	S	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Dispose of seedling bags, boxes, and culled seedlings appropriately. Do not place in or near streams and waterbodies.	O	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Conduct bedding when soil moisture conditions are appropriate to avoid impacts to soil structure and infiltration.	O	0	n/a	n/a	n/a	0	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Minimize number of passes made with bedding equipment.	O	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Align beds along the land contours.	S	50	n/a	n/a	n/a	50	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Retain undisturbed groundcover between beds.	O	67	n/a	n/a	n/a	67	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Stop beds at the outer edge of the SMZ or riparian buffer.	S	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Keep beds from connecting into a stream or water drainage system.	S	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Stagger bed openings from one bed row to the next when gap openings are used within rows.	S	0	n/a	n/a	n/a	0	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Minimize uprooting of leftover trees and stumps.	O	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Minimize intensive soil disturbance and reduce the risk of erosion and sediment transport.	O	0	n/a	n/a	n/a	0	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Avoid creating large contiguous areas of exposed bare soil.	O	33	n/a	n/a	n/a	33	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Minimize the potential of concentrating surface runoff.	O	67	n/a	n/a	n/a	67	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Conduct vegetation management and site prep within the SMZ or riparian buffer via lopping.	S	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Retain sufficient shade within the SMZ to prevent adverse temperature fluctuations.	S	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Keep felled or lopped vegetation out of streams and waterbodies.	S	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Prevent the movement of significant amounts of soil into debris piles.	S	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
Minimize the removal of surface organic matter.	S	100	n/a	n/a	n/a	100	100	n/a	n/a	n/a	100	0	n/a	n/a	n/a	0
		<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<i>Lower % is Optimal</i>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain																

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Appendix B: Sample Size and Confidence Intervals for BMP Implementation Data

Table 56. Sample size and 95% Confidence Intervals for Implementation of BMPs for Site Preparation and Reforestation by Region											
BMPs for Site Preparation and Reforestation	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Overall		39	0	0	0	39	68 ± 14	n/a	n/a	n/a	68 ± 14
Keep equipment out of the SMZ or riparian buffers.	S	1	0	0	0	1	60 ± 44	n/a	n/a	n/a	60 ± 44
Avoid gouging the soil surface in a manner that could funnel runoff and transport sediment into nearby waterbodies.	S	1	0	0	0	1	60 ± 44	n/a	n/a	n/a	60 ± 44
Dispose of seedling bags, boxes, and culled seedlings appropriately. Do not place in or near streams and waterbodies.	O	1	0	0	0	1	60 ± 44	n/a	n/a	n/a	60 ± 44
Conduct bedding when soil moisture conditions are appropriate to avoid impacts to soil structure and infiltration.	O	2	0	0	0	2	33 ± 40	n/a	n/a	n/a	33 ± 40
Minimize number of passes made with bedding equipment.	O	2	0	0	0	2	67 ± 40	n/a	n/a	n/a	67 ± 40
Align beds along the land contours.	S	2	0	0	0	2	50 ± 41	n/a	n/a	n/a	50 ± 41
Retain undisturbed groundcover between beds.	O	3	0	0	0	3	57 ± 37	n/a	n/a	n/a	57 ± 37
Stop beds at the outer edge of the SMZ or riparian buffer.	S	4	0	0	0	4	76 ± 32	n/a	n/a	n/a	76 ± 32
Keep beds from connecting into a stream or water drainage system.	S	4	0	0	0	4	76 ± 32	n/a	n/a	n/a	76 ± 32
Stagger bed openings from one bed row to the next when gap openings are used within rows.	S	3	0	0	0	3	28 ± 36	n/a	n/a	n/a	28 ± 36
Minimize uprooting of leftover trees and stumps.	O	3	0	0	0	3	72 ± 36	n/a	n/a	n/a	72 ± 36
Minimize intensive soil disturbance and reduce the risk of erosion and sediment transport.	O	2	0	0	0	2	33 ± 40	n/a	n/a	n/a	33 ± 40
Avoid creating large contiguous areas of exposed bare soil.	O	3	0	0	0	3	43 ± 37	n/a	n/a	n/a	43 ± 37
Minimize the potential of concentrating surface runoff.	O	3	0	0	0	3	57 ± 37	n/a	n/a	n/a	57 ± 37
Conduct vegetation management and site prep within the SMZ or riparian buffer via lopping.	S	1	0	0	0	1	60 ± 44	n/a	n/a	n/a	60 ± 44
Retain sufficient shade within the SMZ to prevent adverse temperature fluctuations.	S	1	0	0	0	1	60 ± 44	n/a	n/a	n/a	60 ± 44
Keep felled or lopped vegetation out of streams and waterbodies.	S	1	0	0	0	1	60 ± 44	n/a	n/a	n/a	60 ± 44
Prevent the movement of significant amounts of soil into debris piles.	S	1	0	0	0	1	60 ± 44	n/a	n/a	n/a	60 ± 44
Minimize the removal of surface organic matter.	S	1	0	0	0	1	60 ± 44	n/a	n/a	n/a	60 ± 44
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey											
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain											

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Appendix B: Sample Size and Confidence Intervals for BMP Implementation Data

Chemicals, Fluids, and Solid Waste

Table 57. Implementation of BMPs for Chemicals, Fluids, and Solid Waste by Region																
BMPs for Chemicals, Fluids, and Solid Waste	A U	BMP Implementation					Properly Implemented & NO RISK to Water Quality					Improperly Implemented BMP & RISK to Water Quality				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		-----%-----														
Overall		29	33	33	n/a	0	100	100	100	n/a	100	0	0	0	n/a	0
Store garbage and waste in a container (or bag), empty/replace as needed, and store to prevent spillage or vandalism.	O	33	n/a	40	n/a	0	100	n/a	100	n/a	100	0	n/a	0	n/a	0
Empty waste containers once they are full.	O	0	n/a	0	n/a	n/a	100	n/a	100	n/a	n/a	0	n/a	0	n/a	n/a
Secure the waste bin after hours to prevent accidental tipping or vandalism.	O	0	n/a	0	n/a	n/a	100	n/a	100	n/a	n/a	0	n/a	0	n/a	n/a
Do not burn or bury garbage and trash on-site.	O	33	n/a	33	n/a	n/a	100	n/a	100	n/a	n/a	0	n/a	0	n/a	n/a
Equipment, vehicles, and machinery free of leaking fluids. No stains on the ground that would indicate leak.	O	0	0	0	n/a	0	100	100	100	n/a	100	0	0	0	n/a	0
Designate area for equipment servicing and fueling on level ground away from streams and waterbodies.	O	100	100	100	n/a	n/a	100	100	100	n/a	n/a	0	0	0	n/a	n/a
Service and fuel equipment at least 100 feet from streams, waterbodies, ditches, and ephemeral drainages.	O	75	100	67	n/a	n/a	100	100	100	n/a	n/a	0	0	0	n/a	n/a
Service equipment in a way that minimizes potential for fluids to enter waterbodies or the groundwater.	O	0	0	n/a	n/a	n/a	100	100	n/a	n/a	n/a	0	0	n/a	n/a	n/a
Keep fluids secure in labeled containers that control or minimize leakage or spillage.	O	0	0	0	n/a	0	100	100	100	n/a	100	0	0	0	n/a	0
Use appropriate containers to store oils, fuels, and other fluids - minimizing leakage/spillage.	O	0	0	n/a	n/a	0	100	100	n/a	n/a	100	0	0	n/a	n/a	0
		<i>Higher % is Optimal</i>					<i>Higher % is Optimal</i>					<i>Lower % is Optimal</i>				
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey																
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain																

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Table 58. Sample size and 95% Confidence Intervals for Implementation of BMPs for Chemicals, Fluids, and Solid Waste by Region											
BMPs for Chemicals, Fluids, and Solid Waste	AU	Sample Size (n)					BMP Implementation & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Overall		31	6	21	0	4	31 ± 15	40 ± 31	36 ± 19	n/a	24 ± 32
Store garbage and waste in a container (or bag), empty/replace as needed, and store to prevent spillage or vandalism.	O	6	0	5	0	1	40 ± 31	n/a	44 ± 33	n/a	40 ± 44
Empty waste containers once they are full.	O	1	0	1	0	0	40 ± 44	n/a	40 ± 44	n/a	n/a
Secure the waste bin after hours to prevent accidental tipping or vandalism.	O	1	0	1	0	0	40 ± 44	n/a	40 ± 44	n/a	n/a
Do not burn or bury garbage and trash on-site.	O	6	0	6	0	0	40 ± 31	n/a	40 ± 31	n/a	n/a
Equipment, vehicles, and machinery free of leaking fluids. No stains on the ground that would indicate leak.	O	3	1	1	0	1	28 ± 36	40 ± 44	40 ± 44	n/a	40 ± 44
Designate area for equipment servicing and fueling on level ground away from streams and waterbodies.	O	2	1	1	0	0	67 ± 40	60 ± 44	60 ± 44	n/a	n/a
Service and fuel equipment at least 100 feet from streams, waterbodies, ditches, and ephemeral drainages.	O	4	1	3	0	0	63 ± 34	60 ± 44	57 ± 37	n/a	n/a
Service equipment in a way that minimizes potential for fluids to enter waterbodies or the groundwater.	O	1	1	0	0	0	40 ± 44	40 ± 44	n/a	n/a	n/a
Keep fluids secure in labeled containers that control or minimize leakage or spillage.	O	5	1	3	0	1	22 ± 30	40 ± 44	28 ± 36	n/a	40 ± 44
Use appropriate containers to store oils, fuels, and other fluids - minimizing leakage/spillage.	O	2	1	0	0	1	33 ± 40	40 ± 44	n/a	n/a	40 ± 44
"n/a" indicates that an instance of that individual BMP in that ecoregion was not observed during the survey											
S: Statewide, M: Mountains, P: Piedmont, SP: Southeastern Plains, C: Mid-Atlantic Coastal Plain											