An Assessment of Forestry Best Management Practices in North Carolina, 2012-2016

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 WQ					Improperly Implemented BMP & RISK to WQ				
	S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
Overall	88	87	90	73	50	100	100	100	100	100	12	10	16	30	100
	Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

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 Rate & 95% Confidence Interval				
	S	M	P	SP	C	S	M	P	SP	C
Overall	8,344	5,772	2,485	85	2	88 ± 0.7	87 ± 0.9	90 ± 1.2	72 ± 9.4	50 ± 40.5

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 WQ					Improperly Implemented BMP & RISK to WQ				
		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	**81**	75	85	N/A	N/A	**94**	100	91	N/A	N/A	**25**	50	0	N/A	N/A
Lay out and construct the broad-based dip at right angle to the travel surface and across the full width of the road.	S	**99**	100	98	N/A	N/A	**100**	100	100	N/A	N/A	**0**	N/A	0	N/A	N/A
Excavate a shallow dip approximately 15 to 20 feet long into the uphill travel surface.	S	**98**	100	93	N/A	N/A	**100**	100	100	N/A	N/A	**0**	N/A	0	N/A	N/A
Construct and compact a slight hump across the downhill edge of the dip.	S	**99**	98	100	N/A	N/A	**100**	100	100	N/A	N/A	**50**	50	N/A	N/A	N/A
Reverse grade of the hump does not exceed 2 to 3% slope down toward the base of the dip.	S	**99**	97	100	N/A	N/A	**100**	100	100	N/A	N/A	**0**	0	N/A	N/A	N/A
Outslope the bottom of the dip at enough of an angle to turn away water and runoff - approximately 2-3% angle.	S	**99**	99	100	N/A	N/A	**100**	100	100	N/A	N/A	**0**	0	N/A	N/A	N/A
Harden the travel surface with stone or other material on slopes greater than 8%, otherwise as needed.	S	**65**	57	86	N/A	N/A	**100**	100	100	N/A	N/A	**10**	0	100	N/A	N/A
Situate the broad-based dip outlet in a manner that prevents runoff from flowing directly into streams or waterbodies.	S	**95**	96	93	N/A	N/A	**100**	100	100	N/A	N/A	**100**	100	100	N/A	N/A
Capture the sediment from the outlet as needed.	S	**94**	97	83	N/A	N/A	**100**	100	100	N/A	N/A	**60**	0	100	N/A	N/A
Avoid siting the outlet onto soft soil or fill material, unless other BMPs are utilized to prevent erosion.	S	**93**	100	93	N/A	N/A	**100**	100	100	N/A	N/A	**100**	N/A	100	N/A	N/A
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 Rate & 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	**21**	8	13	0	0	**76 ± 17**	67 ± 27	77 ± 21	N/A	N/A
Layout and construct the broad-based dip at right angle to the travel surface and across the full width of the road.	S	**133**	89	44	0	0	**98 ± 3**	98 ± 3	94 ± 8	N/A	N/A
Excavate a shallow dip approximately 15 to 20 feet long into the uphill travel surface.	S	**136**	92	44	0	0	**96 ± 3**	98 ± 3	90 ± 9	N/A	N/A
Construct and compact a slight hump across the downhill edge of the dip.	S	**136**	92	44	0	0	**97 ± 3**	96 ± 4	96 ± 7	N/A	N/A
Reverse grade of the hump does not exceed 2 to 3% slope down toward the base of the dip.	S	**82**	38	44	0	0	**97 ± 4**	93 ± 9	96 ± 7	N/A	N/A
Outslope the bottom of the dip at enough of an angle to turn away water and runoff - approximately 2-3% angle.	S	**121**	77	44	0	0	**98 ± 3**	96 ± 5	96 ± 7	N/A	N/A
Harden the travel surface with stone or other material on slopes greater than 8%, otherwise as needed.	S	**83**	61	22	0	0	**64 ± 10**	57 ± 12	81 ± 16	N/A	N/A
Situate the broad-based dip outlet in a manner that prevents runoff from flowing directly into streams or waterbodies.	S	**119**	78	41	0	0	**94 ± 4**	94 ± 6	89 ± 10	N/A	N/A
Capture the sediment from the outlet as needed.	S	**88**	70	18	0	0	**92 ± 6**	95 ± 5	77 ± 18	N/A	N/A
Avoid siting the outlet onto soft soil or fill material, unless other BMPs are utilized to prevent erosion.	S	**46**	6	40	0	0	**90 ± 9**	80 ± 28	89 ± 10	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 WQ					Improperly Implemented BMP & RISK to WQ				
		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	100	100	N/A	**100**	100	100	100	N/A	**N/A**	N/A	N/A	N/A	N/A
Set cross-drains on a 2 to 4 percent downslope angle.	S	**100**	100	100	100	N/A	**100**	100	100	100	N/A	**N/A**	N/A	N/A	N/A	N/A
Install cross-drains at an approach angle suitable to allow free flow of runoff into and through the cross-drain.	S	**100**	100	100	100	N/A	**100**	100	100	100	N/A	**N/A**	N/A	N/A	N/A	N/A
Match the base level of the cross-drain inflow to the base elevation of the ditchline.	S	**100**	100	100	N/A	N/A	**100**	100	100	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A
Install drop-inlet where the elevation of the cross-drain inlet is lower than the ditchline, as needed.	S	**100**	N/A	100	N/A	N/A	**100**	N/A	100	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A
For culvert pipes, cover the pipe with at least 1 foot of fill and harden the crossing location.	S	**100**	100	100	100	N/A	**100**	100	100	100	N/A	**N/A**	N/A	N/A	N/A	N/A
For culvert pipes, use at least a 15 inch diameter pipe on heavy flow areas.	S	**100**	100	100	N/A	N/A	**100**	100	100	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A
For culvert pipes, use at least a 12 inch diameter pipe if only needed for groundwater seeps or minimal runoff volume.	S	**100**	N/A	N/A	100	N/A	**100**	N/A	N/A	100	N/A	**N/A**	N/A	N/A	N/A	N/A
Match the cross-sectional area of the pipe to the area of the contributing ditchline.	S	**100**	100	100	N/A	N/A	**100**	100	100	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A
Minimize erosion on both ends of the cross-drain of the ditchline.	S	**100**	100	100	100	N/A	**100**	100	100	100	N/A	**N/A**	N/A	N/A	N/A	N/A
Where needed, harden the inflow headwall of the cross-drain with stone, sandbags, geotextiles, vegetation, drop-inlet, or other suitable materials.	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
Situate the cross-drain outlet in a manner that prevents runoff from flowing directly into streams or waterbodies.	S	**100**	100	100	N/A	N/A	**100**	100	100	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A
Capture the sediment below the outlet as needed.	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
Avoid siting the outlet onto soft soil or fill material, unless other BMPs are utilized to prevent erosion.	S	**100**	N/A	100	100	N/A	**100**	100	100	100	N/A	**N/A**	N/A	N/A	N/A	N/A
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 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	**3**	1	1	1	0	**72 ± 36**	60 ± 44	60 ± 44	60 ± 44	N/A
Set cross-drains on a 2 to 4% downslope angle.	S	**11**	3	2	6	0	**87 ± 20**	72 ± 36	67 ± 40	80 ± 28	N/A
Install cross-drains at an approach angle suitable to allow free flow of runoff into and through the cross-drain.	S	**11**	3	2	6	0	**87 ± 20**	72 ± 36	67 ± 40	80 ± 28	N/A
Match the base level of the cross-drain inflow to the base elevation of the ditchline.	S	**5**	3	2	0	0	**78 ± 30**	72 ± 36	67 ± 40	N/A	N/A
Install drop-inlet where the elevation of the cross-drain inlet is lower than the ditchline, as needed.	S	**2**	0	2	0	0	**67 ± 40**	N/A	67 ± 40	N/A	N/A
For culvert pipes, cover the pipe with at least 1 foot of fill and harden the crossing location.	S	**11**	3	2	6	0	**87 ± 20**	72 ± 36	67 ± 40	80 ± 28	N/A
For culvert pipes, use at least a 15 inch diameter pipe on heavy flow areas.	S	**5**	3	2	0	0	**78 ± 30**	72 ± 36	67 ± 40	N/A	N/A
For culvert pipes, use at least a 12 inch diameter pipe if only needed for groundwater seeps or minimal runoff volume.	S	**6**	0	0	6	0	**80 ± 28**	N/A	N/A	80 ± 28	N/A
Match the cross-sectional area of the pipe to the area of the contributing ditchline.	S	**5**	3	2	0	0	**78 ± 30**	72 ± 36	67 ± 40	N/A	N/A
Minimize erosion on both ends of the cross-drain of the ditchline.	S	**11**	3	2	6	0	**87 ± 20**	72 ± 36	67 ± 40	80 ± 28	N/A
Where needed, harden the inflow headwall of the cross-drain with stone, sandbags, geotextiles, vegetation, drop-inlet, or other suitable materials.	S	**3**	3	0	0	0	**72 ± 36**	72 ± 36	N/A	N/A	N/A
Situate the cross-drain outlet in a manner that prevents runoff from flowing directly into streams or waterbodies.	S	**5**	3	2	0	0	**78 ± 30**	72 ± 36	67 ± 40	N/A	N/A
Capture the sediment below the outlet as needed.	S	**3**	3	0	0	0	**72 ± 36**	72 ± 36	N/A	N/A	N/A
Avoid siting the outlet onto soft soil or fill material, unless other BMPs are utilized to prevent erosion.	S	**8**	0	2	6	0	**84 ± 24**	N/A	67 ± 40	80 ± 28	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 7. Percent Implementation of BMPs for Inside Ditchlines by Region

BMPs for Controlling Runoff: Inside Ditchlines	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		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	**100**	100	100	N/A	N/A	**100**	100	100	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A
Match the cross-sectional area of the pipe to the area of the contributing ditchline.	S	**100**	100	100	N/A	N/A	**100**	N/A	100	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A
Match the ditchline cross-sectional area to a minimum equivalent of a 15 inch culvert.	S	**100**	100	100	N/A	N/A	**100**	100	100	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A
Control runoff speed and volume.	O	**100**	100	100	N/A	N/A	**100**	100	100	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A
Install geotextiles, matting, stone or other suitable material as needed to prevent downcutting.	S	**0**	0	0	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A	**0**	0	0	N/A	N/A
Install turnouts or cross-drains at intervals adequate to carry the expected runoff.	O	**100**	100	100	N/A	N/A	**100**	100	100	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A
Situate outlet in a manner that prevents runoff from flowing directly into streams or waterbodies.	S	**100**	100	100	N/A	N/A	**100**	100	100	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A
Capture the sediment below the outlet as needed.	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
Avoid siting the outlet onto soft soil or fill material, unless other BMPs are utilized to prevent erosion.	S	**100**	100	100	N/A	N/A	**100**	100	100	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 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 Rate & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Excavate the ditchline to the minimum depth and width needed.	O	**4**	2	2	0	0	**76 ± 32**	67 ± 40	67 ± 40	N/A	N/A
Match the cross-sectional area of the pipe to the area of the contributing ditchline.	S	**8**	1	7	0	0	**84 ± 24**	60 ± 44	82 ± 26	N/A	N/A
Match the ditchline cross-sectional area to a minimum equivalent of a 15 inch culvert.	S	**8**	1	7	0	0	**84 ± 24**	60 ± 44	82 ± 26	N/A	N/A
Control runoff speed and volume.	O	**4**	2	2	0	0	**76 ± 32**	67 ± 40	67 ± 40	N/A	N/A
Install geotextiles, matting, stone or other suitable material as needed to prevent downcutting.	S	**2**	1	1	0	0	**33 ± 40**	40 ± 44	40 ± 44	N/A	N/A
Install turnouts or cross-drains at intervals adequate to carry the expected runoff.	O	**4**	2	2	0	0	**76 ± 32**	67 ± 40	67 ± 40	N/A	N/A
Situate outlet in a manner that prevents runoff from flowing directly into streams or waterbodies.	S	**7**	1	6	0	0	**82 ± 26**	60 ± 44	80 ± 28	N/A	N/A
Capture the sediment below the outlet as needed.	S	**2**	2	0	0	0	**67 ± 40**	67 ± 40	N/A	N/A	N/A
Avoid siting the outlet onto soft soil or fill material, unless other BMPs are utilized to prevent erosion.	S	**8**	1	7	0	0	**84 ± 24**	60 ± 44	82 ± 26	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 9. Percent Implementation of BMPs for Insloping, Outsloping, and Crowning by Region

BMPs for Controlling Runoff: Insloping, Outsloping, and Crowning	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		----------%----------														
On insloped roads, excavate and maintain inside ditchlines and cross-drains.	O	**100**	100	100	N/A	N/A	**100**	100	100	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A
Maintain the road surface as needed to minimize or repair ruts, holes, or depressions that hold water.	O	**71**	75	100	N/A	50	**100**	100	100	N/A	100	**50**	0	N/A	N/A	100
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 10. Sample size and 95% Confidence Intervals for Implementation of BMPs for Insloping, Outsloping, and Crowning by Region

BMPs for Controlling Runoff: Insloping, Outsloping, and Crowning	AU	Sample Size (n)					BMP Implementation Rate & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
On insloped roads, excavate and maintain inside ditchlines and cross-drains.	O	**2**	1	1	0	0	**67 ± 40**	60 ± 44	60 ± 44	N/A	N/A
Maintain the road surface as needed to minimize or repair ruts, holes, or depressions that hold water.	O	**7**	4	1	0	2	**64 ± 29**	63 ± 34	60 ± 44	N/A	50 ± 41

"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 11. Percent Implementation of BMPs for Turnouts by Region

BMPs for Controlling Runoff: Turnouts	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		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	**92**	80	100	100	N/A	**100**	100	100	100	N/A	**0**	0	N/A	N/A	N/A
Begin the inflow of the turnout at the same grade level as the road, skid trail, fireline or ditch.	S	**97**	100	99	0	N/A	**100**	100	100	N/A	N/A	**0**	N/A	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	**97**	99	98	33	N/A	**100**	100	100	100	N/A	**29**	0	0	50	N/A
Construct using a turnout angle between 15 to 30 degrees downslope.	S	**99**	100	97	100	N/A	**100**	100	100	100	N/A	**0**	N/A	0	N/A	N/A
Situate outlet in a manner that prevents runoff from flowing directly into streams or waterbodies.	S	**96**	99	93	67	N/A	**100**	100	100	100	N/A	**78**	100	67	100	N/A
Capture the sediment below the outlet as needed.	S	**94**	99	90	33	N/A	**100**	100	100	100	N/A	**80**	100	100	50	N/A
Avoid siting the outlet onto soft soil or fill material, unless other BMPs are utilized to prevent erosion.	S	**96**	100	95	100	N/A	**100**	100	100	100	N/A	**100**	N/A	100	N/A	N/A
For use in roadside ditches, minimize erosion within that ditch so the inflow of the turnout does not create a gully.	S	**85**	88	83	N/A	N/A	**100**	100	100	N/A	N/A	**0**	0	0	N/A	N/A
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

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

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Table 12. 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 Rate & 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	**36**	15	20	1	0	**88 ± 11**	74 ± 20	92 ± 13	60 ± 44	N/A
Begin the inflow of the turnout at the same grade level as the road, skid trail, fireline or ditch.	S	**251**	152	93	6	0	**96 ± 3**	99 ± 2	97 ± 4	20 ± 28	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	**226**	115	105	6	0	**96 ± 3**	98 ± 3	96 ± 4	40 ± 31	N/A
Construct using a turnout angle between 15 to 30 degrees downslope.	S	**258**	147	105	6	0	**98 ± 2**	99 ± 2	95 ± 4	80 ± 28	N/A
Situate outlet in a manner that prevents runoff from flowing directly into streams or waterbodies.	S	**216**	121	89	6	0	**95 ± 3**	98 ± 3	91 ± 6	60 ± 31	N/A
Capture the sediment below the outlet as needed.	S	**169**	112	51	6	0	**93 ± 4**	97 ± 3	87 ± 9	40 ± 31	N/A
Avoid siting the outlet onto soft soil or fill material, unless other BMPs are utilized to prevent erosion.	S	**140**	29	105	6	0	**95 ± 4**	94 ± 10	94 ± 5	80 ± 28	N/A
For use in roadside ditches, minimize erosion within that ditch so the inflow of the turnout does not create a gully.	S	**26**	8	18	0	0	**80 ± 15**	75 ± 26	77 ± 18	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 13. Percent Implementation of BMPs for Waterbars by Region

BMPs for Controlling Runoff: Waterbars	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		----------%----------														
Number and spacing between waterbars follows spacing guidance (at a minimum).	O	**67**	60	92	0	N/A	**100**	100	100	N/A	N/A	**19**	14	0	100	N/A
Excavate and construct using equipment/techniques that assure proper angles and a firm waterbar hump.	O	**86**	84	91	N/A	N/A	**100**	100	100	N/A	N/A	**50**	60	0	N/A	N/A
Tie the uphill end of the waterbar into the side / cut slope, and angle the waterbar downhill towards the outfall edge.	S	**88**	91	81	0	N/A	**100**	100	100	N/A	N/A	**0**	0	0	0	N/A
Use an angle ranging from 15 to 30 degrees (downslope) for the waterbar.	S	**91**	92	92	0	N/A	**100**	100	100	N/A	N/A	**0**	0	0	0	N/A
Excavate the trench with enough gradient to allow adequate flow of water runoff.	S	**85**	86	82	0	N/A	**100**	100	100	N/A	N/A	**0**	0	0	0	N/A
Situate outlet in a manner that prevents runoff from flowing directly into streams or waterbodies.	S	**98**	97	100	100	N/A	**100**	100	100	100	N/A	**64**	63	100	N/A	N/A
Capture the sediment below the outlet as needed.	S	**88**	89	86	N/A	N/A	**100**	100	100	N/A	N/A	**46**	44	54	N/A	N/A
Avoid siting the outlet onto soft soil or fill material, unless other BMPs are utilized to prevent erosion.	S	**86**	85	91	100	N/A	**100**	100	100	100	N/A	**22**	12	100	N/A	N/A
Establish groundcover or harden the waterbar with stone or other material, as needed.	S	**45**	46	41	0	N/A	**100**	100	100	N/A	N/A	**6**	7	0	0	N/A
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 14. Sample size and 95% Confidence Intervals for Implementation of BMPs for Waterbars by Region

BMPs for Controlling Runoff: Waterbars	AU	Sample Size (n)					BMP Implementation Rate & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Number and spacing between waterbars follows spacing guidance (at a minimum).	O	**48**	35	12	1	0	**65 ± 13**	59 ± 15	82 ± 20	40 ± 44	N/A
Excavate and construct using equipment/techniques that assure proper angles and a firm waterbar hump.	O	**43**	32	11	0	0	**83 ± 11**	81 ± 13	80 ± 22	N/A	N/A
Tie the uphill end of the waterbar into the side / cut slope, and angle the waterbar downhill towards the outfall edge.	S	**1,113**	800	312	1	0	**88 ± 2**	90 ± 2	81 ± 4	40 ± 44	N/A
Use an angle ranging from 15 to 30 degrees (downslope) for the waterbar.	S	**952**	638	312	2	0	**91 ± 2**	91 ± 2	91 ± 3	33 ± 40	N/A
Excavate the trench with enough gradient to allow adequate flow of water runoff.	S	**1,107**	798	308	1	0	**85 ± 2**	86 ± 2	81 ± 4	40 ± 44	N/A
Situate outlet in a manner that prevents runoff from flowing directly into streams or waterbodies.	S	**1,050**	768	280	2	0	**97 ± 1**	97 ± 1	99 ± 1	67 ± 40	N/A
Capture the sediment below the outlet as needed.	S	**468**	376	92	0	0	**88 ± 3**	89 ± 3	84 ± 7	N/A	N/A
Avoid siting the outlet onto soft soil or fill material, unless other BMPs are utilized to prevent erosion.	S	**425**	347	76	2	0	**86 ± 3**	85 ± 4	89 ± 7	67 ± 40	N/A
Establish groundcover or harden the waterbar with stone or other material, as needed.	S	**706**	619	85	2	0	**45 ± 4**	46 ± 4	42 ± 10	33 ± 40	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

Harvesting: Capturing Sediment

Table 15. Percent Implementation of BMPs for Capturing Sediment by Region

BMPs for Capturing Sediment	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
	S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
Overall	83	89	68	86	100	100	100	100	100	100	20	31	8	50	N/A
	Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 16. Sample size and 95% Confidence Intervals for Implementation of BMPs for Capturing Sediment by Region

BMPs for Capturing Sediment	Sample Size (n)					BMP Implementation Rate & 95% Confidence Interval				
	S	M	P	SP	C	S	M	P	SP	C
Overall	567	395	151	14	7	83 ± 3	88 ± 3	67 ± 7	78 ± 20	82 ± 25

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

Table 17. Percent Implementation of BMPs for Brush Barriers by Region

BMPs for Capturing Sediment: Brush Barriers	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		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	**85**	92	63	83	N/A	**100**	100	100	100	N/A	**11**	18	0	100	N/A
Cut large pieces of material into smaller chunks, as needed.	O	**77**	67	100	50	N/A	**100**	100	100	100	N/A	**20**	25	N/A	0	N/A
Use additional BMP measures if brush barriers fail to capture sediment.	O	**60**	56	100	N/A	N/A	**100**	100	100	N/A	N/A	**75**	75	N/A	N/A	N/A
Avoid removing the brush barrier once it is established.	S	**100**	100	100	100	N/A	**100**	100	100	100	N/A	**N/A**	N/A	N/A	N/A	N/A
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 Brush Barriers by Region

BMPs for Capturing Sediment: Brush Barriers	AU	Sample Size (n)					BMP Implementation Rate & 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	**191**	142	43	6	0	**85 ± 5**	91 ± 5	62 ± 14	70 ± 30	N/A
Cut large pieces of material into smaller chunks, as needed.	O	**22**	12	8	2	0	**73 ± 17**	63 ± 24	84 ± 24	50 ± 41	N/A
Use additional BMP measures if brush barriers fail to capture sediment.	O	**10**	9	1	0	0	**57 ± 26**	54 ± 27	60 ± 44	N/A	N/A
Avoid removing the brush barrier once it is established.	S	**182**	138	38	6	0	**99 ± 2**	99 ± 2	95 ± 8	80 ± 28	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 19. Percent Implementation of BMPs for Sediment Pits by Region

BMPs for Capturing Sediment: Sediment Pits	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		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	**94**	90	100	N/A	N/A	**100**	100	100	N/A	N/A	**100**	100	N/A	N/A	N/A
Locate the pit within stable, well-drained soils when available.	S	**100**	100	100	N/A	N/A	**100**	100	100	N/A	N/A	**N/A**	N/A	N/A	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	N/A	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A	**100**	100	N/A	N/A	N/A
Dispose or stabilize the excavated spoil material.	O	**67**	67	67	N/A	N/A	**100**	100	100	N/A	N/A	**50**	100	0	N/A	N/A
Avoid using the spoil to build up the sides of the pit.	S	**60**	90	0	N/A	N/A	**100**	100	N/A	N/A	N/A	**17**	100	0	N/A	N/A
Create a reinforced outlet for overflow capacity.	S	**56**	90	0	N/A	N/A	**100**	100	N/A	N/A	N/A	**14**	100	0	N/A	N/A
Harden the walls of the pit to minimize the risk of structural failure.	S	**6**	10	0	N/A	N/A	**100**	100	N/A	N/A	N/A	**6**	11	0	N/A	N/A
Revegetate exposed soil around the perimeter of the pit.	S	**36**	50	0	N/A	N/A	**100**	100	N/A	N/A	N/A	**6**	11	0	N/A	N/A
Clean out accumulated sediment as needed and dispose of appropriately (with stabilization as needed).	S	**50**	50	N/A	N/A	N/A	**100**	100	N/A	N/A	N/A	**100**	100	N/A	N/A	N/A
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 20. 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 Rate & 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	**17**	10	7	0	0	**86 ± 16**	79 ± 23	82 ± 26	N/A	N/A
Locate the pit within stable, well-drained soils when available.	S	**17**	10	7	0	0	**91 ± 14**	86 ± 21	82 ± 26	N/A	N/A
If the pit must be situated within unstable soils, install additional measures to provide soil stabilization around the pit.	S	**1**	1	0	0	0	**40 ± 44**	40 ± 44	N/A	N/A	N/A
Dispose or stabilize the excavated spoil material.	O	**6**	3	3	0	0	**60 ± 31**	57 ± 37	57 ± 37	N/A	N/A
Avoid using the spoil to build up the sides of the pit.	S	**15**	10	5	0	0	**58 ± 22**	79 ± 23	22 ± 30	N/A	N/A
Create a reinforced outlet for overflow capacity.	S	**16**	10	6	0	0	**55 ± 22**	79 ± 23	20 ± 28	N/A	N/A
Harden the walls of the pit to minimize the risk of structural failure.	S	**17**	10	7	0	0	**14 ± 16**	21 ± 23	18 ± 26	N/A	N/A
Revegetate exposed soil around the perimeter of the pit.	S	**25**	18	7	0	0	**38 ± 18**	50 ± 21	18 ± 26	N/A	N/A
Clean out accumulated sediment as needed and dispose of appropriately (with stabilization as needed).	S	**2**	2	0	0	0	**50 ± 41**	50 ± 41	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 21. Percent Implementation of BMPs for Silt Fences by Region

BMPs for Capturing Sediment: Silt Fences	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		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	**100**	100	100	N/A	100	**100**	100	100	N/A	100	**N/A**	N/A	N/A	N/A	N/A
Adjust BMPs accordingly if sediment is built-up behind fence.	O	**0**	N/A	0	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A	**100**	N/A	100	N/A	N/A
Limit drainage area to 100 feet of fence for every one-quarter acre of land.	S	**100**	100	100	N/A	100	**100**	100	100	N/A	100	**N/A**	N/A	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	**25**	0	0	N/A	100	**100**	N/A	N/A	N/A	100	**67**	0	100	N/A	N/A
Ends of fencing gently turned like a sideways "J", with the hook facing uphill.	S	**75**	0	100	N/A	100	**100**	N/A	100	N/A	100	**0**	0	N/A	N/A	N/A
Bury the bottom 4 to 6 inches of silt fence securely into the ground.	S	**100**	100	100	N/A	100	**100**	100	100	N/A	100	**N/A**	N/A	N/A	N/A	N/A
Install the fence so that the buried portion is along the upslope face of the fence.	S	**100**	100	100	N/A	100	**100**	100	100	N/A	100	**N/A**	N/A	N/A	N/A	N/A
Reinforce the silt fencing from being knocked over or blown out as needed.	S	**100**	100	100	N/A	100	**100**	100	100	N/A	100	**N/A**	N/A	N/A	N/A	N/A
Monitor fence and take prompt action if not sufficient.	O	**0**	N/A	0	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A	**100**	N/A	100	N/A	N/A
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 Silt Fences by Region

BMPs for Capturing Sediment: Silt Fences	AU	Sample Size (n)					BMP Implementation Rate & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Install measures upslope and downslope of silt fence as needed.	O	**4**	2	1	0	1	**76 ± 32**	67 ± 40	60 ± 44	N/A	60 ± 44
Adjust BMPs accordingly if sediment is built-up behing fence.	O	**1**	0	1	0	0	**40 ± 44**	N/A	40 ± 44	N/A	N/A
Limit drainage area to 100 feet of fence for every one-quarter acre of land.	S	**4**	1	2	0	1	**76 ± 32**	60 ± 44	67 ± 40	N/A	60 ± 44
Set fencing along the land contours and extend the fencing far beyond the expected pathway(s) of runoff flow.	S	**4**	1	2	0	1	**37 ± 34**	40 ± 44	33 ± 40	N/A	60 ± 44
Ends of fencing gently turned like a sideways "J", with the hook facing uphill.	S	**4**	1	2	0	1	**63 ± 34**	40 ± 44	67 ± 40	N/A	60 ± 44
Bury the bottom 4 to 6 inches of silt fence securely into the ground.	S	**9**	6	2	0	1	**85 ± 22**	80 ± 28	67 ± 40	N/A	60 ± 44
Install the fence so that the buried portion is along the upslope face of the fence.	S	**8**	5	2	0	1	**84 ± 24**	78 ± 30	67 ± 40	N/A	60 ± 44
Reinforce the silt fencing from being knocked over or blown out as needed.	S	**4**	1	2	0	1	**76 ± 32**	60 ± 44	67 ± 40	N/A	60 ± 44
Monitor fence and take prompt action if not sufficient.	O	**1**	0	1	0	0	**40 ± 44**	N/A	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

Table 23. Percent Implementation of BMPs for Straw Bales by Region

BMPs for Capturing Sediment: Straw Bales	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		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	**0**	N/A	0	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A	**0**	N/A	0	N/A	N/A
Set bales tightly against the ground surface and anchor.	S	**100**	100	100	N/A	N/A	**N/A**	100	100	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	**0**	N/A	0	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A	**0**	N/A	0	N/A	N/A
Monitor bales and take prompt action if not sufficient.	S	**0**	N/A	0	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A	**0**	N/A	0	N/A	N/A
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				
"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 24. 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 Rate & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Install measures upslope and downslope of bales as needed.	O	**1**	0	1	0	0	**40 ± 44**	N/A	40 ± 44	N/A	N/A
Set bales tightly against the ground surface and anchor.	S	**4**	3	1	0	0	**76 ± 32**	72 ± 36	60 ± 44	N/A	N/A
If stacking square bales, stagger to provide overlap - similar to brick laying.	S	**1**	0	1	0	0	**40 ± 44**	N/A	40 ± 44	N/A	N/A
Monitor bales and take prompt action if not sufficient.	S	**1**	0	1	0	0	**40 ± 44**	N/A	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											

Harvesting: Decks

Table 25. Percent Implementation of BMPs for Decks by Region

BMPs for Decks	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		----------%----------														
Overall		**90**	**83**	**93**	**92**	**90**	**100**	**99**	**100**	**100**	**100**	**1**	**24**	**4**	**0**	**6**
Minimize the number of decks.	O	**93**	91	96	87	93	**99**	100	100	97	100	**0**	0	0	0	0
Minimize the size of decks.	S	**90**	82	98	80	93	**100**	100	100	100	100	**0**	0	0	0	0
Establish deck at locations where soil disturbance is minimized.	S	**94**	91	99	98	86	**100**	100	100	100	100	**25**	75	0	0	10
Situate deck outside SMZ.	S	**95**	81	97	100	94	**100**	100	100	100	100	**40**	40	33	N/A	50
Situate deck outside ephemeral drainages.	S	**97**	88	100	100	100	**100**	100	100	100	100	**60**	60	N/A	N/A	N/A
Situate deck atop flat or gently sloping land.	S	**99**	95	100	100	100	**100**	98	100	100	100	**0**	0	N/A	N/A	N/A
Situate deck atop stable soil.	S	**96**	100	98	98	89	**100**	98	100	100	100	**0**	N/A	0	0	0
Install sufficient erosion control measures to control runoff and capture sediment.	S	**79**	76	78	87	76	**100**	100	100	100	100	**17**	38	0	0	20
Use groundcover materials (slash, laps, limbs, tops, etc.) as needed to minimize disturbance to exposed soils.	S	**66**	36	65	80	77	**100**	100	100	100	100	**5**	11	3	0	0
Select side-ridge location if steep terrain is unavoidable and use additional BMPs as needed.	S	**96**	95	100	N/A	N/A	**100**	100	100	N/A	N/A	**100**	100	N/A	N/A	N/A
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 Decks by Region

BMPs for Decks	AU	Sample Size (n)					BMP Implementation Rate & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Overall		**2,039**	**374**	**783**	**403**	**479**	**90 ± 1**	**83 ± 4**	**93 ± 2**	**92 ± 3**	**89 ± 3**
Minimize the number of decks.	O	**200**	35	72	39	54	**92 ± 4**	87 ± 11	94 ± 6	84 ± 11	90 ± 8
Minimize the size of decks.	S	**271**	45	99	56	71	**90 ± 4**	80 ± 11	96 ± 4	78 ± 11	91 ± 7
Establish deck at locations where soil disturbance is minimized.	S	**266**	43	97	56	70	**93 ± 3**	87 ± 10	97 ± 4	95 ± 6	84 ± 9
Situate deck outside SMZ.	S	**186**	27	92	31	36	**94 ± 3**	78 ± 15	95 ± 5	94 ± 9	90 ± 10
Situate deck outside ephemeral drainages.	S	**190**	40	86	36	28	**96 ± 3**	84 ± 11	98 ± 4	95 ± 8	94 ± 10
Situate deck atop flat or gently sloping land.	S	**267**	44	104	55	64	**99 ± 1**	92 ± 8	98 ± 3	97 ± 5	97 ± 5
Situate deck atop stable soil.	S	**270**	45	99	56	70	**95 ± 3**	96 ± 7	96 ± 4	95 ± 6	87 ± 8
Install sufficient erosion control measures to control runoff and capture sediment.	S	**114**	33	37	23	21	**78 ± 8**	73 ± 15	76 ± 13	82 ± 15	72 ± 18
Use groundcover materials (slash, laps, limbs, tops, etc.) as needed to minimize disturbance to exposed soils.	S	**251**	42	93	51	65	**66 ± 6**	37 ± 14	64 ± 10	78 ± 11	75 ± 10
Select side-ridge location if steep terrain is unavoidable and use additional BMPs as needed.	S	**24**	20	4	0	0	**90 ± 12**	88 ± 14	76 ± 32	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

Harvesting: Logging Systems

Table 27. Implementation of BMPs for Logging Systems by Region

BMPs for Logging Systems	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		----------%----------														
Overall		**86**	**89**	**93**	**90**	**72**	**100**	**100**	**100**	**99**	**100**	**24**	**44**	**27**	**0**	**24**
Single pass of equipment does not produce significant rut.	O	**87**	97	93	85	75	**100**	100	100	100	100	**12**	0	20	0	15
Harvest timber in a manner that minimizes significant changes to soil structure or organic matter.	O	**91**	89	96	92	85	**99**	100	100	97	100	**22**	25	0	0	38
Cease operations when inclement weather and/or wet site conditions persist.	O	**75**	73	87	91	36	**100**	100	100	100	100	**34**	75	43	0	25
Avoid harvesting snags when present.	O	**100**	N/A	100	100	N/A	**100**	N/A	100	100	N/A	**N/A**	N/A	N/A	N/A	N/A
Avoid harvesting dead coarse wood when present.	O	**100**	N/A	100	100	N/A	**100**	N/A	100	100	N/A	**N/A**	N/A	N/A	N/A	N/A
Avoid harvesting tree roots, stumps, or existing duff liter.	O	**100**	N/A	100	100	N/A	**100**	N/A	100	100	N/A	**N/A**	N/A	N/A	N/A	N/A
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 28. 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 Rate & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Overall		**392**	**84**	**203**	**105**	**130**	**86 ± 3**	**88 ± 7**	**92 ± 4**	**88 ± 6**	**71 ± 8**
Single pass of equipment does not produce significant rut.	O	**147**	34	72	41	52	**86 ± 6**	92 ± 10	91 ± 7	82 ± 12	73 ± 12
Harvest timber in a manner that minimizes significant changes to soil structure or organic matter.	S	**145**	35	72	38	53	**90 ± 5**	85 ± 12	94 ± 6	88 ± 10	83 ± 10
Cease operations when inclement weather and/or wet site conditions persist.	O	**91**	15	53	23	25	**74 ± 9**	69 ± 21	84 ± 10	85 ± 14	38 ± 18
Avoid harvesting snags when present.	O	**3**	0	2	1	0	**72 ± 36**	N/A	67 ± 40	60 ± 44	N/A
Avoid harvesting dead coarse wood when present.	S	**3**	0	2	1	0	**72 ± 36**	N/A	67 ± 40	60 ± 44	N/A
Avoid harvesting tree roots, stumps, or existing duff liter.	S	**3**	0	2	1	0	**72 ± 36**	N/A	67 ± 40	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

Harvesting: Rehabilitation of the Project Site

Table 29. Implementation of BMPs for Rehabilitation of the Project Site by Region

BMPs for Rehab	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		----------%----------														
Overall		**71**	**53**	**70**	**60**	**83**	**99**	**98**	**98**	**96**	**100**	**54**	**40**	**66**	**70**	**47**
Close-off access to roads and trails until stabilized.	S	**69**	67	63	57	81	**100**	100	100	100	100	**6**	0	0	33	0
Install water diversion structures to deter access as needed.	O	**70**	62	86	50	83	**100**	100	100	100	100	**0**	0	0	0	0
Install appropriate methods of runoff control and/or sediment capture.	O	**70**	76	70	50	67	**92**	92	95	50	100	**44**	50	38	50	50
Mat logging debris atop critical bare soil areas, particularly during operation.	S	**40**	6	55	57	76	**100**	100	100	100	100	**31**	33	29	33	25
Prepare soil using disking or tilling where needed. Minimize to the extent practicable.	S	**40**	N/A	N/A	0	67	**100**	N/A	N/A	N/A	100	**0**	N/A	N/A	0	0
Use fertilizer, lime, or organic matter were needed to promote seed germination.	O	**67**	100	100	N/A	0	**100**	100	100	N/A	N/A	**0**	N/A	N/A	N/A	0
Use seed or mixtures adapted for the site, soil, and time of year.	O	**80**	83	92	33	75	**100**	100	100	100	100	**60**	100	0	100	0
Spread seed evenly across the area when soil moisture and site conditions are suitable.	S	**88**	80	100	100	50	**100**	100	100	100	100	**0**	0	N/A	N/A	0
Apply mulch cover over approximately 50 to 75% of the seeded area.	S	**62**	23	93	50	75	**100**	100	100	100	100	**8**	0	0	100	0
Spread woodbark or chips several inches thick when used as primary temporary groundcover (no seed).	S	**78**	100	100	N/A	50	**100**	100	100	N/A	100	**0**	N/A	N/A	N/A	0
Spread woodbark or chips over approximately 50 to 75% of the seeded area.	S	**20**	50	0	0	N/A	**100**	100	N/A	N/A	N/A	**0**	0	0	0	N/A
Use erosion control matting when/where needed.	O	**0**	0	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	**50**	0	100	N/A	N/A
Remove debris from the stream channel to meet the relevant Forest Practice Guidelines and General Statutes.	S	**74**	74	58	75	83	**100**	100	100	100	100	**96**	100	95	100	93
If temporary, remove the stream crossing itself.	S	**90**	73	82	86	97	**100**	100	100	100	100	**88**	75	100	100	67
If temporary culvert crossing, remove all fill material or prevent material from entering stream.	S	**63**	50	100	N/A	75	**93**	86	100	N/A	100	**67**	86	N/A	N/A	0
Re-contour the streambank edges and approach-ways to resemble natural conditions pre-installation.	S	**74**	67	60	60	84	**98**	100	92	100	100	**64**	50	88	100	31
Install BMPs to control, divert, and/or capture runoff/sediment along approach-ways to prevent entry to stream.	O	**62**	55	72	43	62	**97**	100	96	83	100	**80**	80	82	100	64
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 30. 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 Rate & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Overall		**954**	**189**	**301**	**92**	**372**	**71 ± 3**	**53 ± 7**	**70 ± 5**	**59 ± 10**	**82 ± 4**
Close-off access to roads and trails until stabilized.	S	**54**	12	19	7	16	**67 ± 12**	63 ± 24	61 ± 20	55 ± 30	75 ± 20
Install water diversion structures to deter access as needed.	O	**30**	13	7	4	6	**68 ± 16**	59 ± 24	73 ± 28	50 ± 35	70 ± 30
Install appropriate methods of runoff control and/or sediment capture.	O	**54**	17	27	4	6	**69 ± 12**	72 ± 20	68 ± 17	50 ± 35	60 ± 31
Mat logging debris atop critical bare soil areas, particularly during operation.	S	**90**	35	31	7	17	**40 ± 10**	10 ± 10	54 ± 17	55 ± 30	72 ± 20
Prepare soil using disking or tilling where needed. Minimize to the extent practicable.	S	**5**	0	0	2	3	**44 ± 33**	N/A	N/A	33 ± 40	57 ± 37
Use fertilizer, lime, or organic matter were needed to promote seed germination.	O	**3**	1	1	0	1	**57 ± 37**	60 ± 44	60 ± 44	N/A	40 ± 44
Use seed or mixtures adapted for the site, soil, and time of year.	O	**25**	6	12	3	4	**76 ± 16**	70 ± 30	82 ± 20	43 ± 37	63 ± 34
Spread seed evenly across the area when soil moisture and site conditions are suitable.	S	**25**	10	11	2	2	**83 ± 14**	72 ± 24	87 ± 20	67 ± 40	50 ± 41
Apply mulch cover over approximately 50 to 75 percent of the seeded area.	S	**34**	13	15	2	4	**61 ± 16**	29 ± 22	84 ± 18	50 ± 41	63 ± 34
Spread woodbark or chips several inches thick when used as primary temporary groundcover (no seed).	S	**9**	2	3	0	4	**69 ± 26**	67 ± 40	72 ± 36	N/A	50 ± 35
Spread woodbark or chips over approximately 50 to 75% of the seeded area.	S	**5**	2	1	2	0	**33 ± 32**	50 ± 41	40 ± 44	33 ± 40	N/A
Use erosion control matting when/where needed.	O	**2**	1	1	0	0	**33 ± 40**	40 ± 44	40 ± 44	N/A	N/A
Remove debris from the stream channel to meet FPGs and GSs.	S	**171**	19	50	16	86	**73 ± 7**	70 ± 19	57 ± 13	70 ± 21	81 ± 8
If temporary, remove the stream crossing itself.	S	**156**	15	39	14	88	**89 ± 5**	69 ± 21	79 ± 12	78 ± 20	95 ± 5
If temporary culvert crossing, remove all fill material or prevent material from entering stream.	S	**24**	14	2	0	8	**61 ± 18**	50 ± 23	67 ± 40	N/A	67 ± 27
Re-contour the streambank edges and approach-ways to resemble natural conditions pre-installation.	S	**174**	18	43	15	98	**74 ± 6**	64 ± 20	60 ± 14	58 ± 22	82 ± 8
Install BMPs to control, divert, and/or capture runoff/sediment along approach-ways - preventing entry to stream.	O	**93**	11	39	14	29	**62 ± 10**	53 ± 25	70 ± 14	44 ± 23	61 ± 17

"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

Harvesting: Skid Trails

Table 31. Implementation of BMPs for Skid Trails by Region

BMPs for Skid Trails	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		----------%----------														
Overall		**79**	**70**	**82**	**78**	**86**	**100**	**100**	**100**	**100**	**100**	**12**	**8**	**18**	**10**	**17**
Concentrate skidding on as few skid trails as needed.	O	**84**	94	86	79	77	**100**	100	100	100	100	**12**	50	9	0	17
Limit primary skid trails to 10 percent of the total working area.	S	**92**	95	93	93	90	**100**	100	100	100	100	**6**	0	20	0	0
Avoid widespread or random skidding patterns with repeated passes.	O	**87**	94	93	79	80	**100**	100	100	100	100	**15**	50	20	0	18
Minimize placement and use of skid trails in ephemeral drainages.	O	**86**	85	95	74	78	**100**	100	100	100	100	**36**	0	75	13	80
Minimize skid trail width and avoid two-lane trails.	S	**97**	97	99	93	95	**100**	100	100	100	100	**3**	0	0	13	0
Minimize the extent of gouges or trenches on the ground surface.	S	**89**	89	90	90	88	**100**	100	100	100	100	**21**	20	23	0	28
Establish skid trails along land contours and keep slopes to a 25% grade.	S	**87**	79	94	89	100	**100**	100	100	100	100	**15**	9	47	0	N/A
Install waterbars, brush barriers, turnouts or use other methods as needed.	O	**57**	50	64	40	75	**97**	96	96	100	100	**25**	17	27	42	0
Lap and pack down leftover logging debris atop primary skid trails - ideally during operation.	S	**43**	2	40	44	81	**100**	100	100	100	100	**8**	5	12	10	10
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 32. 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 Rate & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Overall		**4383**	**1288**	**1378**	**629**	**1088**	**79 ± 1**	**70 ± 2**	**82 ± 2**	**78 ± 3**	**86 ± 2**
Concentrate skidding on as few skid trails as needed.	O	**201**	34	76	39	52	**83 ± 5**	90 ± 10	84 ± 8	77 ± 13	75 ± 11
Limit primary skid trails to 10 percent of the total working area.	S	**224**	38	75	43	68	**92 ± 4**	91 ± 9	91 ± 7	89 ± 10	88 ± 8
Avoid widespread or random skidding patterns with repeated passes.	O	**207**	35	76	42	54	**86 ± 5**	90 ± 10	91 ± 7	76 ± 13	78 ± 11
Minimize placement and use of skid trails in ephemeral drainages.	O	**161**	33	74	31	23	**85 ± 6**	81 ± 13	92 ± 6	72 ± 15	74 ± 17
Minimize skid trail width and avoid two-lane trails.	S	**890**	283	252	121	234	**96 ± 1**	97 ± 2	98 ± 2	92 ± 5	95 ± 3
Minimize the extent of gouges or trenches on the ground surface.	S	**971**	279	251	121	320	**89 ± 2**	89 ± 4	89 ± 4	89 ± 6	87 ± 4
Establish skid trails along land contours and keep slopes to a 25% grade.	S	**628**	273	240	92	23	**87 ± 3**	79 ± 5	93 ± 3	88 ± 7	93 ± 11
Install waterbars, brush barriers, turnouts or use other methods as needed.	O	**155**	48	83	20	4	**57 ± 8**	50 ± 14	63 ± 10	42 ± 20	63 ± 34
Lap and pack down leftover logging debris atop primary skid trails - ideally during operation.	S	**946**	265	251	120	310	**43 ± 3**	3 ± 2	40 ± 6	44 ± 9	80 ± 4

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

Harvesting: Wetlands

Table 33. Implementation of BMPs for Wetlands by Region

BMPs for Wetlands	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
	S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
	----------%----------														
Overall	**64**	**N/A**	**71**	**66**	**58**	**100**	**N/A**	**100**	**100**	**100**	**22**	**N/A**	**42**	**20**	**20**
	Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 34. Sample size and 95% Confidence Intervals for Implementation of BMPs for Wetlands by Region

BMPs for Wetlands	Sample Size (n)					BMP Implementation Rate & 95% Confidence Interval				
	S	M	P	SP	C	S	M	P	SP	C
Overall	**323**	**0**	**42**	**161**	**120**	**64 ± 5**	**N/A**	**70 ± 13**	**65 ± 7**	**58 ± 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

Table 35. Implementation of BMPs for Harvesting in Wetlands by Region

BMPs for Wetlands: Harvesting	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		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	**72**	N/A	84	67	80	**100**	N/A	100	100	100	**10**	N/A	0	8	25
Operate equipment during dry periods if possible. Minimize operations on saturated soils and near waterbodies.	O	**55**	N/A	75	64	29	**100**	N/A	100	100	100	**20**	N/A	0	25	20
Use appropriate harvesting equipment, methods, and/or techniques, i.e., shovel-mat systems.	O	**44**	N/A	0	55	40	**100**	N/A	N/A	100	100	**7**	N/A	0	0	11
Concentrate heavy equipment use to primary skid trails and decks. Minimize rutting, i.e., single pass produces more than 6 inch rut.	O	**77**	N/A	88	83	63	**100**	N/A	100	100	100	**9**	N/A	0	0	17
Minimize heavy equipment use along the edge of ditches.	O	**73**	N/A	N/A	80	60	**100**	N/A	N/A	100	100	**75**	N/A	N/A	50	100
Rehabilitate areas of significant soil disturbance.	O	**11**	N/A	0	13	10	**100**	N/A	N/A	100	100	**29**	N/A	100	43	11
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 36. Sample size and 95% Confidence Intervals for Implementation of BMPs for Harvesting in Wetlands by Region

BMPs for Wetlands: Harvesting	AU	Sample Size (n)					BMP Implementation Rate & 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	**112**	0	19	73	20	**72 ± 8**	N/A	78 ± 18	66 ± 11	75 ± 18
Operate equipment during dry periods if possible. Minimize operations on saturated soils and near waterbodies.	O	**44**	0	8	22	14	**54 ± 14**	N/A	67 ± 27	62 ± 19	33 ± 22
Use appropriate harvesting equipment, methods, and/or techniques, i.e., shovel-mat systems.	O	**27**	0	1	11	15	**45 ± 18**	N/A	40 ± 44	53 ± 25	42 ± 22
Concentrate heavy equipment use to primary skid trails and decks. Minimize rutting, i.e., single pass produces more than 6 inch rut.	O	**47**	0	8	23	16	**75 ± 12**	N/A	75 ± 26	78 ± 16	60 ± 22
Minimize heavy equipment use along the edge of ditches.	O	**15**	0	0	10	5	**69 ± 21**	N/A	N/A	72 ± 24	56 ± 33
Rehabilitate areas of significant soil disturbance.	O	**19**	0	1	8	10	**17 ± 16**	N/A	40 ± 44	25 ± 26	21 ± 23

"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 37. Implementation of Mandatory BMPs for Roads in Wetlands by Region

BMPs for Wetlands: Mandatory BMPs for Roads	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		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	**60**	N/A	N/A	0	75	**N/A**	N/A	N/A	N/A	100	**0**	N/A	N/A	0	0
Locate roads and skid trails sufficiently far from waters of the U.S.	O	**100**	N/A	N/A	N/A	100	**N/A**	N/A	N/A	N/A	100	**N/A**	N/A	N/A	N/A	N/A
Provide sufficient drainage to prevent restriction of water flow.	O	**50**	N/A	N/A	N/A	50	**N/A**	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	**N/A**	N/A	N/A	N/A	100	**N/A**	N/A	N/A	N/A	N/A
Minimize vegetation disturbance in the waters of the U.S.	O	**100**	N/A	N/A	N/A	100	**N/A**	N/A	N/A	N/A	100	**N/A**	N/A	N/A	N/A	N/A
Remove temporary fills completely and restore to original elevation.	O	**100**	N/A	N/A	N/A	100	**N/A**	N/A	N/A	N/A	100	**N/A**	N/A	N/A	N/A	N/A
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 38. Sample size and 95% Confidence Intervals for Implementation of Mandatory BMPs for Roads in Wetlands by Region

BMPs for Wetlands: Mandatory BMPs for Roads	AU	Sample Size (n)					BMP Implementation Rate & 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	**5**	0	0	1	4	**56 ± 33**	N/A	N/A	40 ± 44	63 ± 34
Locate roads and skid trails sufficiently far from waters of the U.S.	O	**2**	0	0	0	2	**67 ± 40**	N/A	N/A	N/A	67 ± 40
Provide sufficient drainage to prevent restriction of water flow.	O	**2**	0	0	0	2	**50 ± 41**	N/A	N/A	N/A	50 ± 41
Minimize encroachment of equipment into the waters of the U.S. during road construction.	O	**2**	0	0	0	2	**67 ± 40**	N/A	N/A	N/A	67 ± 40
Minimize vegetation disturbance in the waters of the U.S.	O	**2**	0	0	0	2	**67 ± 40**	N/A	N/A	N/A	67 ± 40
Remove temporary fills completely and restore to original elevation.	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

Table 39. Implementation of BMPs for Flat Roads in Wetlands by Region

BMPs for Wetlands: Flat Roads	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		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	100	100	**100**	N/A	N/A	100	100	**N/A**	N/A	N/A	N/A	N/A
Stabilize and/or harden the road surface with suitable material where high surface flows are expected.	S	**0**	N/A	N/A	N/A	0	**N/A**	N/A	N/A	N/A	N/A	**0**	N/A	N/A	N/A	0
Establish and maintain a grader ditch if needed.	O	**100**	N/A	N/A	N/A	100	**100**	N/A	N/A	N/A	100	**N/A**	N/A	N/A	N/A	N/A
Plan and implement road designs, locations, alignments and water management devices as needed to minimize hydrologic alterations.	O	**100**	N/A	N/A	N/A	100	**100**	N/A	N/A	N/A	100	**N/A**	N/A	N/A	N/A	N/A
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	**N/A**	N/A	N/A	N/A	N/A
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	**N/A**	N/A	N/A	N/A	N/A
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	**N/A**	N/A	N/A	N/A	N/A
If fill material is generated by the road construction process, place suitable mineral soil fill on the road surface or remove it from the wetland to a non-wetland area, if feasible.	O	**100**	N/A	N/A	N/A	100	**100**	N/A	N/A	N/A	100	**N/A**	N/A	N/A	N/A	N/A
After construction is completed, stabilize disturbed areas of the roadbed with vegetation as needed.	O	**0**	N/A	N/A	N/A	0	**N/A**	N/A	N/A	N/A	N/A	**0**	N/A	N/A	N/A	0
Establish and maintain groundcover vegetation along road shoulders.	O	**75**	N/A	N/A	N/A	75	**100**	N/A	N/A	N/A	100	**0**	N/A	N/A	N/A	0
On frequently used roads, apply gravel or other suitable stabilizing material on areas where erosion and sedimentation may occur.	O	**0**	N/A	N/A	N/A	0	**N/A**	N/A	N/A	N/A	N/A	**50**	N/A	N/A	N/A	50
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	**N/A**	N/A	N/A	N/A	N/A
Limit the depth, width and length of new minor drainage ditches to only that which is needed to provide effective minor drainage.	O	**50**	N/A	100	0	N/A	**100**	N/A	100	N/A	N/A	**100**	N/A	N/A	100	N/A
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 40. 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 Rate & 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	**11**	0	0	7	4	**87 ± 20**	N/A	N/A	82 ± 26	76 ± 32
Stabilize and/or harden the road surface with suitable material where high surface flows are expected.	S	**1**	0	0	0	1	**40 ± 44**	N/A	N/A	N/A	40 ± 44
Establish and maintain a grader ditch if needed.	O	**1**	0	0	0	1	**60 ± 44**	N/A	N/A	N/A	60 ± 44
Plan and implement road designs, locations, alignments and water management devices as needed to minimize hydrologic alterations.	O	**2**	0	0	0	2	**67 ± 40**	N/A	N/A	N/A	67 ± 40
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	**4**	0	0	0	4	**76 ± 32**	N/A	N/A	N/A	76 ± 32
Maintain a daylight corridor to allow more rapid drying of the road.	O	**4**	0	0	0	4	**76 ± 32**	N/A	N/A	N/A	76 ± 32
If fill material is generated by the road construction process, place suitable mineral soil fill on the road surface or remove it from the wetland to a non-wetland area, if feasible.	O	**1**	0	0	0	1	**60 ± 44**	N/A	N/A	N/A	60 ± 44
After construction is completed, stabilize disturbed areas of the roadbed with vegetation as needed.	O	**1**	0	0	0	1	**40 ± 44**	N/A	N/A	N/A	40 ± 44
Establish and maintain groundcover vegetation along road shoulders.	O	**4**	0	0	0	4	**63 ± 34**	N/A	N/A	N/A	63 ± 34
On frequently used roads, apply gravel or other suitable stabilizing material on areas where erosion and sedimentation may occur.	O	**2**	0	0	0	2	**33 ± 40**	N/A	N/A	N/A	33 ± 40
On lightly used roads, establish and maintain vegetative groundcover or other suitable stabilizing materials upon the road surface.	O	**2**	0	0	0	2	**67 ± 40**	N/A	N/A	N/A	67 ± 40
Limit the depth, width and length of new minor drainage ditches to only that which is needed to provide effective minor drainage.	O	**2**	0	1	1	0	**50 ± 41**	N/A	60 ± 44	40 ± 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

Table 41. Implementation of BMPs for Water Management in Wetlands by Region

BMPs for Wetlands: Water Management	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		----------%----------														
Design, construct, and maintain drainage system to minimize surface runoff from entering ditches.	O	**0**	N/A	0	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A	**100**	N/A	100	N/A	N/A
Conduct excavation and other operations during periods of relatively dry soils, if conditions allow.	O	**50**	N/A	0	100	N/A	**100**	N/A	N/A	100	N/A	**100**	N/A	100	N/A	N/A
Start excavation near the discharge end while leaving a plug of soil in place to serve as a temporary dam within the newly excavated ditch.	S	**0**	N/A	N/A	0	N/A	**N/A**	N/A	N/A	N/A	N/A	**100**	N/A	N/A	100	N/A
For initial construction or maintenance, deposit excavated material (spoil) atop existing roads or on top of old spoil locations, if possible.	S	**0**	N/A	N/A	0	N/A	**N/A**	N/A	N/A	N/A	N/A	**0**	N/A	N/A	0	N/A
Stabilize the spoil material as needed.	S	**0**	N/A	0	0	N/A	**N/A**	N/A	N/A	N/A	N/A	**67**	N/A	100	50	N/A
Reconsider re-filling or plugging the minor drainage ditchlines once silvicultural objectives have been met.	S	**0**	N/A	0	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A	**100**	N/A	100	N/A	N/A
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				
"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 42. Sample size and 95% Confidence Intervals for Implementation of BMPs for Water Management in Wetlands by Region

BMPs for Wetlands: Water Management	AU	Sample Size (n)					BMP Implementation Rate & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Design, construct, and maintain drainage system to minimize surface runoff from entering into the ditch(es).	O	**1**	0	1	0	0	**40 ± 44**	N/A	40 ± 44	N/A	N/A
Conduct excavation and other operations during periods of relatively dry soils, if conditions allow.	O	**2**	0	1	1	0	**50 ± 41**	N/A	40 ± 44	60 ± 44	N/A
Start excavation near the discharge end while leaving a plug of soil in place to serve as a temporary dam within the newly excavated ditch.	S	**1**	0	0	1	0	**40 ± 44**	N/A	N/A	40 ± 44	N/A
For initial construction or maintenance, deposit excavated material (spoil) atop existing roads or on top of old spoil locations, if possible.	S	**1**	0	0	1	0	**40 ± 44**	N/A	N/A	40 ± 44	N/A
Stabilize the spoil material as needed.	S	**3**	0	1	2	0	**28 ± 36**	N/A	40 ± 44	33 ± 40	N/A
Reconsider re-filling or plugging the minor drainage ditch(es) once silvicultural objectives have been met.	S	**1**	0	1	0	0	**40 ± 44**	N/A	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											

Roads and Access

Table 43. Implementation of BMPs for Roads by Region

BMPs for Roads	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		----------%----------														
Overall		**85**	**89**	**86**	**85**	**76**	**100**	**100**	**100**	**100**	**100**	**14**	**27**	**16**	**6**	**10**
Minimize road width. Light-duty roads: 10 to 14 feet wide.	S	**100**	N/A	100	100	100	**100**	N/A	100	100	100	N/A	N/A	N/A	N/A	N/A
Minimize road width. Heavy-duty roads: 14 to 20 feet wide.	S	**95**	100	100	100	80	**100**	100	100	100	100	**0**	N/A	N/A	N/A	0
Keep grade slopes to 10% or less when conditions allow.	S	**100**	100	100	100	100	**100**	100	100	100	100	N/A	N/A	N/A	N/A	N/A
Limit road segment lengths to 200 feet or less for steeper grades.	S	**100**	100	100	N/A	N/A	**100**	100	100	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Limit height of side / cut banks to 5 feet or less when conditions allow.	S	**100**	100	100	N/A	N/A	**100**	100	100	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Install cut bank no steeper than 2:1 with loose soils when conditions allow.	S	**0**	N/A	N/A	N/A	0	N/A	N/A	N/A	N/A	N/A	**0**	N/A	N/A	N/A	0
Install cut bank no steeper than 0.5:1 with tight soils when conditions allow.	S	**60**	57	67	N/A	N/A	**100**	100	100	N/A	N/A	**0**	0	0	N/A	N/A
Minimize soil disturbance and the amount of road at any stream crossing.	S	**73**	75	60	67	100	**100**	100	100	100	100	**100**	100	100	100	N/A
Use rock, stone, wooden mats, or other suitable materials for at least 50 feet from public road.	S	**73**	100	80	55	61	**100**	100	100	100	100	**0**	N/A	0	0	0
Stabilize bare soil areas using suitable technique (e.g., seed, mulch, riprap, etc.).	S	**40**	60	42	25	36	**100**	100	100	100	100	**18**	50	17	17	14
In low lying areas, keep the roadbed as close to the original ground level as possible.	S	**88**	N/A	100	100	79	**100**	N/A	100	100	100	**0**	N/A	N/A	N/A	0
In low lying areas, provide adequate cross drainage when fill material is used.	S	**75**	N/A	N/A	100	71	**100**	N/A	N/A	100	100	**0**	N/A	N/A	N/A	0
Use insloping, outsloping and/or crowning techniques as needed.	O	**73**	86	77	67	57	**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	**62**	71	78	0	0	**100**	100	100	N/A	N/A	**21**	50	20	0	25
Stabilize and/or harden the road surface - using geotextile fabric beneath - as needed.	O	**59**	86	66	29	38	**100**	100	100	100	100	**5**	100	0	0	0
Rehabilitate and stabilize the road and side / cut banks according to the standards of FPG .0209.	O	**79**	86	100	N/A	60	**100**	100	100	N/A	100	**67**	100	N/A	N/A	50
Take prompt action to protect water quality if BMPs are not properly functioning.	O	**80**	100	67	N/A	N/A	**100**	100	100	N/A	N/A	**100**	N/A	100	N/A	N/A
Clean out built-up silt and sediment from retention areas as needed.	O	**100**	100	100	N/A	N/A	**100**	100	100	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Maintain an open daylight corridor.	O	**83**	73	82	90	90	**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	**87**	93	88	100	50	**100**	100	100	100	100	**22**	0	25	N/A	25
Close access to roads when suitable to minimize unnecessary use.	O	**73**	86	90	60	25	**100**	100	100	100	100	**0**	0	0	0	0

Perform road and ditch maintenance during times when heavy precipitation is not expected.	O	**75**	50	N/A	N/A	100	**100**	100	N/A	N/A	100	**0**	0	N/A	N/A	N/A
Use information resources to exam site and determine best location for the road.	O	**100**	N/A	100	N/A	N/A	**100**	N/A	100	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Construct roads at least one year before use.	O	**89**	100	79	92	100	**100**	100	100	100	100	**0**	N/A	0	0	N/A
Minimize the number of stream crossings. Avoid crossings.	O	**98**	100	100	100	88	**100**	100	100	100	100	**100**	N/A	N/A	N/A	100
Minimize soil disturbance and road placement within ephemeral drainages.	O	**95**	89	100	100	75	**100**	100	100	100	100	**50**	100	N/A	N/A	0
Establish roads along the land contours.	O	**97**	100	97	92	100	**100**	100	100	100	100	**0**	N/A	0	0	N/A
In steep terrain, establish road along gentle hill slopes - just below the ridgeline.	O	**100**	100	100	N/A	N/A	**100**	100	100	N/A	N/A	N/A	N/A	N/A	N/A	N/A
In steep terrain, construct outsloped road with broad-based dips when conditions allow.	O	**67**	67	67	N/A	N/A	**100**	100	100	N/A	N/A	**25**	0	100	N/A	N/A
Keep road atop firm, well-drained soils.	O	**98**	94	100	100	93	**100**	100	100	100	100	**0**	0	N/A	N/A	0
Plan the road to minimize the amount of cut and/or fill needed.	O	**98**	93	100	100	100	**100**	100	100	100	100	**100**	100	N/A	N/A	N/A
Construct road to drain naturally - not into streams or waterbodies.	O	**95**	94	93	100	100	**100**	100	100	100	100	**67**	0	100	N/A	N/A
Plan adequate right-of-way width to daylight the road for drying.	O	**88**	87	85	89	94	**100**	100	100	100	100	**0**	0	0	0	0
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				
"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 44. Sample size and 95% Confidence Intervals for Implementation of BMPs for Roads by Region

BMPs for Roads	AU	Sample Size (n)					BMP Implementation Rate & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Overall		**1,228**	**237**	**569**	**217**	**205**	**85 ± 2**	**88 ± 4**	**86 ± 3**	**84 ± 5**	**76 ± 6**
Minimize road width. Light-duty roads: 10 to 14 feet wide.	S	**27**	0	12	10	5	**94 ± 10**	N/A	88 ± 18	86 ± 21	78 ± 30
Minimize road width. Heavy-duty roads: 14 to 20 feet wide.	S	**66**	9	30	12	15	**93 ± 6**	85 ± 22	94 ± 9	88 ± 18	74 ± 20
Keep grade slopes to 10% or less when conditions allow.	S	**60**	6	33	13	8	**97 ± 5**	80 ± 28	95 ± 8	89 ± 17	84 ± 24
Limit road segment lengths to 200 feet or less for steeper grades.	S	**9**	4	5	0	0	**85 ± 22**	76 ± 32	78 ± 30	N/A	N/A
Limit height of side / cut banks to 5 feet or less when conditions allow.	S	**8**	5	3	0	0	**84 ± 24**	78 ± 30	72 ± 36	N/A	N/A
Install cut bank no steeper than 2:1 with loose soils when conditions allow.	S	**1**	0	0	0	1	**40 ± 44**	N/A	N/A	N/A	40 ± 44
Install cut bank no steeper than 0.5:1 with tight soils when conditions allow.	S	**10**	7	3	0	0	**57 ± 26**	55 ± 30	57 ± 37	N/A	N/A
Minimize soil disturbance and the amount of road at any stream crossing.	S	**15**	4	5	3	3	**69 ± 21**	63 ± 34	56 ± 33	57 ± 37	72 ± 36
Use rock, stone, wooden mats, or other suitable materials for at least 50 feet from public road.	S	**109**	9	60	22	18	**73 ± 8**	85 ± 22	78 ± 10	54 ± 19	59 ± 21
Stabilize bare soil areas using suitable technique (e.g., seed, mulch, riprap, etc.).	S	**55**	5	31	8	11	**41 ± 13**	56 ± 33	43 ± 16	33 ± 27	40 ± 25
In low lying areas, keep the roadbed as close to the original ground level as possible.	S	**24**	0	1	9	14	**82 ± 15**	N/A	60 ± 44	85 ± 22	72 ± 21
In low lying areas, provide adequate cross drainage when fill material is used.	S	**8**	0	0	1	7	**67 ± 27**	N/A	N/A	60 ± 44	64 ± 29
Use insloping, outsloping and/or crowning techniques as needed.	O	**30**	7	13	3	7	**71 ± 15**	73 ± 28	71 ± 22	57 ± 37	55 ± 30
Install diversion or other structures to control and capture runoff (e.g., broad-based dips, settlement basin, etc.).	O	**37**	7	23	3	4	**61 ± 15**	64 ± 29	74 ± 17	28 ± 36	24 ± 32
Stabilize and/or harden the road surface - using geotextile fabric beneath - as needed.	O	**51**	7	29	7	8	**58 ± 13**	73 ± 28	64 ± 16	36 ± 29	42 ± 28
Rehabilitate and stabilize the road and side / cut banks according to the standards of FPG .0209.	O	**14**	7	2	0	5	**72 ± 21**	73 ± 28	67 ± 40	N/A	56 ± 33
Take prompt action to protect water quality if BMPs are not properly functioning.	O	**10**	4	6	0	0	**72 ± 24**	76 ± 32	60 ± 31	N/A	N/A
Clean out built-up silt and sediment from retention areas as needed.	O	**3**	2	1	0	0	**72 ± 36**	67 ± 40	60 ± 44	N/A	N/A
Maintain an open daylight corridor.	O	**64**	11	33	10	10	**81 ± 9**	67 ± 24	79 ± 13	79 ± 23	79 ± 23
Maintain a road surface that provides good runoff control, water quality protection, and vehicle access.	O	**70**	15	33	14	8	**85 ± 8**	84 ± 18	84 ± 12	89 ± 17	50 ± 28
Close access to roads when suitable to minimize unnecessary use.	O	**26**	7	10	5	4	**70 ± 17**	73 ± 28	79 ± 23	56 ± 33	37 ± 34
Perform road and ditch maintenance during times when heavy precipitation is not expected.	O	**4**	2	0	0	2	**63 ± 34**	50 ± 41	N/A	N/A	67 ± 40
Use information resources to exam site and determine best location for the road.	O	**1**	0	1	0	0	**60 ± 44**	N/A	60 ± 44	N/A	N/A

Construct roads at least one year before use.	O	**38**	3	14	13	8	**86 ± 11**	72 ± 36	72 ± 21	83 ± 19	84 ± 24
Minimize the number of stream crossings. Avoid crossings.	O	**57**	14	26	9	8	**95 ± 6**	89 ± 17	94 ± 10	85 ± 22	75 ± 26
Minimize soil disturbance and road placement within ephemeral drainages.	O	**44**	9	22	9	4	**92 ± 8**	77 ± 24	93 ± 12	85 ± 22	63 ± 34
Establish roads along the land contours.	O	**69**	14	35	13	7	**95 ± 6**	89 ± 17	92 ± 9	83 ± 19	82 ± 26
In steep terrain, establish road along gentle hill slopes - just below the ridgeline.	O	**7**	6	1	0	0	**82 ± 26**	80 ± 28	60 ± 44	N/A	N/A
In steep terrain, construct outsloped road with broad-based dips when conditions allow.	O	**12**	9	3	0	0	**63 ± 24**	62 ± 27	57 ± 37	N/A	N/A
Keep road atop firm, well-drained soils.	O	**96**	17	42	23	14	**96 ± 4**	86 ± 16	96 ± 7	93 ± 11	84 ± 19
Plan the road to minimize the amount of cut and/or fill needed.	O	**51**	15	22	6	8	**95 ± 7**	84 ± 18	93 ± 12	80 ± 28	84 ± 24
Construct road to drain naturally - not into streams or waterbodies.	O	**63**	17	30	6	10	**93 ± 7**	86 ± 16	88 ± 12	80 ± 28	86 ± 21
Plan adequate right-of-way width to daylight the road for drying.	O	**89**	15	40	18	16	**86 ± 7**	79 ± 19	82 ± 12	82 ± 17	85 ± 17
"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											

Stream Crossings

Table 45. Implementation of General BMPs for Stream Crossings by Region

BMPs for Stream Crossings -- General	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		----------%----------														
Overall		79	**75**	**78**	**72**	**83**	**100**	**100**	**100**	**99**	**100**	64	**76**	**63**	**67**	**54**
Avoid stream crossings when possible.	O	70	60	79	64	64	**100**	100	100	100	100	81	100	64	100	77
Minimize the number of crossings.	O	71	63	75	85	66	**99**	92	100	100	100	80	100	67	100	75
Consider crossing site when selecting crossing type.	S	90	85	86	91	95	**100**	100	100	100	100	84	100	100	100	25
Designate stream crossing location(s) using flagging, paint, or other suitable marking.	S	23	6	27	7	30	**100**	100	100	100	100	11	27	11	15	0
Install crossing at relatively straight stream section.	S	95	97	93	100	97	**100**	100	100	100	100	11	100	0	N/A	0
Minimize approach-way slope/grade.	S	94	100	87	93	98	**100**	100	100	100	100	30	N/A	38	0	0
Install crossing at a right-angle to the stream channel.	S	94	89	92	100	98	**100**	100	100	100	100	25	50	17	N/A	0
Minimize alteration of stream depth, width, gradient, and capacity.	S	76	70	72	69	83	**100**	100	100	100	100	94	100	100	75	86
Construct, install, and remove crossing during low-flow if possible.	S	100	N/A	100	100	100	**100**	N/A	100	100	100	N/A	N/A	N/A	N/A	N/A
Stabilize approach-ways using appropriate means (e.g., slash, laps, rock, etc.).	S	65	54	66	57	69	**99**	100	100	88	100	47	100	30	67	30
Rehabilitate crossing area as soon as possible.	S	61	61	44	73	68	**97**	100	88	100	100	86	89	95	100	72
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 46. Sample size and 95% Confidence Intervals for Implementation of General BMPs for Stream Crossings by Region

BMPs for Stream Crossings -- General	AU	Sample Size (n)					BMP Implementation Rate & 95% Confidence Interval				
		S	**M**	**P**	**SP**	**C**	S	M	P	SP	C
Overall		**2,948**	**561**	**1235**	**202**	**950**	**79 ± 1**	**75 ± 3**	**78 ± 3**	**72 ± 3**	**82 ± 5**
Avoid stream crossings when possible.	O	**119**	20	52	11	36	**69 ± 8**	63 ± 15	58 ± 20	77 ± 11	60 ± 25
Minimize the number of crossings.	O	**103**	19	36	13	35	**70 ± 9**	64 ± 15	61 ± 20	73 ± 14	77 ± 21
Consider crossing site when selecting crossing type.	S	**185**	34	64	11	76	**89 ± 5**	93 ± 6	82 ± 13	84 ± 9	80 ± 22
Designate stream crossing location(s) using flagging, paint, or other suitable marking.	S	**114**	16	51	14	33	**24 ± 8**	32 ± 15	15 ± 17	29 ± 12	16 ± 19
Install crossing at relatively straight stream section.	S	**199**	38	80	15	66	**95 ± 3**	94 ± 6	93 ± 9	91 ± 6	90 ± 16
Minimize approach-way slope/grade.	S	**164**	41	63	15	45	**93 ± 4**	94 ± 8	96 ± 7	85 ± 9	84 ± 18
Install crossing at a right-angle to the stream channel.	S	**207**	38	72	15	82	**93 ± 4**	95 ± 5	86 ± 11	90 ± 7	90 ± 16
Minimize alteration of stream depth, width, gradient, and capacity.	S	**217**	47	75	13	82	**75 ± 6**	81 ± 8	69 ± 13	71 ± 10	65 ± 23
Construct, install, and remove crossing during low-flow if possible.	S	**18**	0	13	1	4	**91 ± 14**	N/A	76 ± 32	89 ± 17	60 ± 44
Stabilize approach-ways using appropriate means (e.g., slash, laps, rock, etc.).	S	**224**	35	89	14	86	**64 ± 6**	68 ± 10	54 ± 16	66 ± 10	56 ± 23
Rehabilitate crossing area as soon as possible.	S	**127**	23	36	11	57	**60 ± 8**	67 ± 12	59 ± 19	45 ± 15	67 ± 24

"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 47. Implementation of BMPs for Bridgemat Stream Crossings by Region

BMPs for Stream Crossings -- Bridgemats	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		----------%----------														
Select a stream crossing location with a narrow channel width.	S	**100**	100	100	100	100	**99**	100	97	100	100	**N/A**	N/A	N/A	N/A	N/A
Select a stream crossing location with firm, stable streambanks.	S	**97**	100	97	50	100	**99**	100	97	100	100	**67**	N/A	100	50	N/A
Select a stream crossing location that has solid footing to support mats and equipment.	S	**97**	100	95	75	100	**100**	100	100	100	100	**100**	N/A	100	100	N/A
Select a stream crossing location that has high, level ground on each side.	S	**97**	100	95	75	100	**100**	100	100	100	100	**33**	N/A	50	0	N/A
Create a solid-surface with panels butted tightly together.	S	**53**	50	50	100	60	**100**	100	100	100	100	**94**	100	92	N/A	100
Keep equipment out of the channel during installation and removal unless unavoidable.	S	**84**	75	80	50	100	**100**	100	100	100	100	**100**	100	100	100	N/A
Minimize over-hang from logs, trees, or trucks/trailers.	S	**53**	0	67	100	33	**100**	N/A	100	100	100	**100**	100	100	N/A	100
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 48. 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 Rate & 95% Confidence Interval				
		S	**M**	**P**	**SP**	**C**	S	M	P	SP	C
Select a stream crossing location with a narrow channel width.	S	**87**	4	38	4	41	**98 ± 4**	96 ± 7	76 ± 32	95 ± 8	76 ± 32
Select a stream crossing location with firm, stable streambanks.	S	**114**	4	38	4	68	**96 ± 4**	97 ± 5	76 ± 32	93 ± 9	50 ± 35
Select a stream crossing location that has solid footing to support mats and equipment.	S	**106**	4	38	4	60	**96 ± 4**	97 ± 5	76 ± 32	91 ± 9	63 ± 34
Select a stream crossing location that has high, level ground on each side.	S	**99**	4	38	4	53	**95 ± 5**	97 ± 5	76 ± 32	91 ± 9	63 ± 34
Create a solid-surface with panels butted tightly together.	S	**34**	4	24	1	5	**53 ± 16**	56 ± 33	50 ± 35	50 ± 19	60 ± 44
Keep equipment out of the channel during installation and removal unless unavoidable.	S	**51**	4	30	2	15	**82 ± 10**	90 ± 16	63 ± 34	77 ± 15	50 ± 41
Minimize over-hang from logs, trees, or trucks/trailers.	S	**19**	3	12	1	3	**52 ± 20**	43 ± 37	28 ± 36	63 ± 24	60 ± 44

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

Table 49. Implementation of BMPs for Culvert Stream Crossings by Region

BMPs for Stream Crossings -- Culverts	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		----------%----------														
Use appropriate number/size of culverts.	S	**82**	75	93	67	60	**100**	100	100	100	100	**78**	75	100	100	50
Use culvert that extends at least 12 inches beyond the edge of the fill material. If shorter, inlet/outlet headwalls adequately protected.	S	**73**	65	89	67	20	**100**	100	100	100	100	**57**	83	33	100	25
Use at least a 15 inch culvert.	S	**82**	67	96	100	40	**100**	100	100	100	100	**56**	40	100	N/A	67
Place culvert in the center of existing or expected water flow.	S	**97**	92	100	100	100	**100**	100	100	100	100	**0**	0	N/A	N/A	N/A
Set culvert(s) with appropriate downslope grade.	S	**93**	96	93	50	100	**100**	100	100	100	100	**50**	0	50	100	N/A
Minimize the height that water drops from the outlet of the culvert.	S	**96**	94	100	67	100	**100**	100	100	100	100	**50**	0	N/A	100	N/A
Backfill material atop culvert at least 12 inches.	S	**90**	88	96	50	80	**100**	100	100	100	100	**0**	0	0	0	0
Pack backfill material down tightly, avoiding material with excessive debris.	S	**94**	87	96	100	100	**100**	100	100	100	100	**33**	50	0	N/A	N/A
Protect the inlet/outlet of the culvert/fill material with suitable stabilization measures.	S	**67**	47	85	33	60	**100**	100	100	100	100	**94**	89	100	100	100
Install crossing to allow floodwaters to flow around crossing as needed.	S	**40**	67	40	67	0	**100**	100	100	100	N/A	**56**	0	100	100	25
Use surface hardening materials on the culvert and approach-ways as needed.	S	**69**	50	85	67	60	**100**	100	100	100	100	**56**	56	50	100	50
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 50. 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 Rate & 95% Confidence Interval				
		S	**M**	**P**	**SP**	**C**	S	M	P	SP	C
Use appropriate number/size of culverts.	S	**51**	16	27	3	5	**80 ± 11**	56 ± 33	70 ± 21	87 ± 13	57 ± 37
Use culvert that extends at least 12 inches beyond the edge of the fill material. If shorter, inlet/outlet headwalls adequately protected.	S	**52**	17	27	3	5	**71 ± 12**	33 ± 32	62 ± 21	84 ± 14	57 ± 37
Use at least a 15 inch culvert.	S	**50**	15	27	3	5	**80 ± 11**	44 ± 33	63 ± 22	91 ± 11	72 ± 36
Place culvert in the center of existing or expected water flow.	S	**59**	26	25	3	5	**94 ± 6**	78 ± 30	87 ± 13	93 ± 11	72 ± 36
Set culvert(s) with appropriate downslope grade.	S	**59**	25	27	2	5	**91 ± 8**	78 ± 30	90 ± 12	87 ± 13	50 ± 41
Minimize the height that water drops from the outlet of the culvert.	S	**51**	16	27	3	5	**93 ± 7**	78 ± 30	85 ± 17	94 ± 10	57 ± 37
Backfill material atop culvert at least 12 inches.	S	**51**	17	27	2	5	**87 ± 9**	67 ± 32	81 ± 18	91 ± 11	50 ± 41
Pack backfill material down tightly, avoiding material with excessive debris.	S	**49**	15	27	2	5	**91 ± 8**	78 ± 30	79 ± 19	91 ± 11	67 ± 40
Protect the inlet/outlet of the culvert/fill material with suitable stabilization measures.	S	**52**	17	27	3	5	**66 ± 12**	56 ± 33	48 ± 21	81 ± 14	43 ± 37
Install crossing to allow floodwaters to flow around crossing as needed.	S	**15**	3	5	3	4	**42 ± 22**	24 ± 32	57 ± 37	44 ± 33	57 ± 37
Use surface hardening materials on the culvert and approach ways as needed.	S	**52**	18	26	3	5	**68 ± 12**	56 ± 33	50 ± 21	80 ± 15	57 ± 37

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

Table 51. Implementation of BMPs for Ford Stream Crossings by Region

BMPs for Stream Crossings – Fords	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		----------%----------														
Do not use ford crossings on skid trail crossings. Use only for truck access.	S	**28**	40	43	0	0	**100**	100	100	N/A	N/A	**100**	100	100	100	100
Install at location with relatively low streambanks.	S	**87**	100	71	N/A	100	**100**	100	100	N/A	100	**100**	N/A	100	N/A	N/A
Install at location with solid and level stream bottom.	S	**56**	67	57	0	50	**100**	100	100	N/A	100	**100**	100	100	100	100
Install at straight section of stream channel.	S	**94**	80	100	N/A	100	**100**	100	100	N/A	100	**100**	100	N/A	N/A	N/A
Use geotextile fabric as underlayment as needed.	S	**0**	N/A	0	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A	**100**	N/A	100	N/A	N/A
Use clean hardening materials on vehicle traffic surface.	S	**71**	100	100	N/A	0	**100**	100	100	N/A	N/A	**100**	N/A	N/A	N/A	100
Spread hardening materials evenly - avoid dips, humps, or ruts.	S	**100**	100	100	N/A	N/A	**100**	100	100	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A
Install ford to allow passage of natural streamflow, particularly for low-flow or dry periods.	S	**38**	50	43	0	0	**100**	100	100	N/A	N/A	**100**	100	100	100	100
Establish permanent groundcover over at least 80% of the approach-way area within the first 50 feet.	S	**15**	33	13	0	0	**100**	100	100	N/A	N/A	**59**	50	29	100	100
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 52. 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 Rate & 95% Confidence Interval				
		S	**M**	**P**	**SP**	**C**	S	M	P	SP	C
Do not use ford crossings on skid trail crossings. Use only for truck access.	S	**18**	5	7	1	5	**32 ± 20**	22 ± 30	44 ± 33	45 ± 30	40 ± 44
Install at location with relatively low streambanks.	S	**15**	5	7	0	3	**79 ± 19**	72 ± 36	78 ± 30	64 ± 29	N/A
Install at location with solid and level stream bottom.	S	**18**	6	7	1	4	**55 ± 21**	50 ± 35	60 ± 31	55 ± 30	40 ± 44
Install at straight section of stream channel.	S	**16**	5	7	0	4	**85 ± 17**	76 ± 32	67 ± 32	82 ± 26	N/A
Use geotextile fabric as underlayment as needed.	S	**2**	0	2	0	0	**33 ± 40**	N/A	N/A	33 ± 40	N/A
Use clean hardening materials on vehicle traffic surface.	S	**7**	2	3	0	2	**64 ± 29**	33 ± 40	67 ± 40	72 ± 36	N/A
Spread hardening materials evenly - avoid dips, humps, or ruts.	S	**6**	3	3	0	0	**80 ± 28**	N/A	72 ± 36	72 ± 36	N/A
Install ford to allow passage of natural streamflow, particularly for low-flow or dry periods.	S	**16**	6	7	1	2	**40 ± 22**	33 ± 40	50 ± 31	45 ± 30	40 ± 44
Establish permanent groundcover over at least 80% of the approach-way area within the first 50 feet.	S	**20**	6	8	1	5	**21 ± 17**	22 ± 30	40 ± 31	25 ± 26	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											

Table 53. Implementation of BMPs for Pole Stream Crossings by Region

BMPs for Stream Crossings -- Poles	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		----------%----------														
Maintain water flow through the pole crossing.	S	**9**	N/A	0	0	25	**100**	N/A	N/A	N/A	100	**100**	N/A	100	100	100
Protect the integrity of the channel banks (intact and stable).	S	**50**	N/A	38	50	75	**100**	N/A	100	100	100	**86**	N/A	100	0	100
Use logs that are delimbed and topped.	S	**77**	N/A	57	100	100	**100**	N/A	100	100	100	**100**	N/A	100	N/A	N/A
Use logs that are free of soil or other debris.	S	**50**	N/A	33	N/A	100	**100**	N/A	100	N/A	100	**100**	N/A	100	N/A	N/A
Use logs large enough to stack loosely.	S	**31**	N/A	14	67	33	**100**	N/A	100	100	100	**89**	N/A	83	100	100
Do not place soil within or on top of the pole crossing.	S	**50**	N/A	43	N/A	100	**100**	N/A	100	N/A	100	**100**	N/A	100	N/A	N/A
Install pole crossing to an elevation higher than the adjacent channel or bank.	S	**36**	N/A	29	0	67	**100**	N/A	100	N/A	100	**86**	N/A	100	100	0
Pack down limbs, tops, slash, or other woody material atop the approach-ways.	S	**47**	N/A	30	67	75	**100**	N/A	100	100	100	**22**	N/A	14	100	0
Remove the pole crossing immediately following use or when high-flows are expected.	S	**36**	N/A	25	100	0	**100**	N/A	100	100	N/A	**100**	N/A	100	N/A	100
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				
"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 54. 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 Rate & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Maintain water flow through the pole crossing.	S	**11**	0	6	1	4	20 ± 22	37 ± 34	N/A	20 ± 28	40 ± 44
Protect the integrity of the channel banks (intact and stable).	S	**14**	0	8	2	4	50 ± 23	63 ± 34	N/A	42 ± 28	50 ± 41
Use logs that are delimbed and topped.	S	**13**	0	7	3	3	71 ± 22	72 ± 36	N/A	55 ± 30	72 ± 36
Use logs that are free of soil or other debris.	S	**4**	0	3	0	1	50 ± 35	60 ± 44	N/A	43 ± 37	N/A
Use logs large enough to stack loosely.	S	**13**	0	7	3	3	35 ± 23	43 ± 37	N/A	27 ± 28	57 ± 37
Do not place soil within or on top of the pole crossing.	S	**8**	0	7	0	1	50 ± 28	60 ± 44	N/A	45 ± 30	N/A
Install pole crossing to an elevation higher than the adjacent channel or bank.	S	**11**	0	7	1	3	40 ± 25	57 ± 37	N/A	36 ± 29	40 ± 44
Pack down limbs, tops, slash, or other woody material atop the approach-ways.	S	**17**	0	10	3	4	48 ± 21	63 ± 34	N/A	36 ± 26	57 ± 37
Remove the pole crossing immediately following use or when high-flows are expected.	S	**11**	0	8	2	1	40 ± 25	40 ± 44	N/A	33 ± 27	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

Streamside Management Zones (SMZs)

Table 55. Implementation of BMPs for Streamside Management Zones by Region

BMPs for SMZs	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		-----%-----														
Overall		**86**	**72**	**91**	**77**	**87**	**100**	**100**	**100**	**99**	**100**	**49**	**63**	**54**	**41**	**34**
Conduct operation during dry soil conditions when possible, limiting heavy equipment use.	S	**88**	N/A	N/A	50	100	**100**	N/A	N/A	100	100	**100**	N/A	N/A	100	N/A
Avoid heavy equipment use when braided channels are close together.	S	**75**	N/A	N/A	67	100	**100**	N/A	N/A	100	100	**100**	N/A	N/A	100	N/A
Establish SMZ from the outermost channel limits, not from innermost channel bank.	S	**100**	N/A	N/A	100	100	**91**	N/A	N/A	80	100	N/A	N/A	N/A	N/A	N/A
Limit heavy equipment use along ditch edge, maintaining structural integrity.	O	**90**	N/A	100	94	88	**100**	N/A	100	100	100	**60**	N/A	N/A	100	50
During temporary ditch crossing installation and use, minimize erosion and sediment runoff.	O	**87**	N/A	100	83	88	**100**	N/A	100	100	100	**80**	N/A	N/A	100	75
During temporary ditch crossing installation and use, avoid altering water flow.	S	**74**	N/A	0	9	82	**100**	N/A	N/A	100	100	**59**	N/A	0	10	89
Minimize disturbance to the soil and groundcover within the ephemeral stream area.	S	**85**	79	89	77	79	**100**	100	100	100	100	**34**	15	58	0	17
Mark SMZs perimeter clearly using paint, flagging, or other means.	S	**58**	28	73	33	44	**100**	100	100	100	100	**6**	14	7	6	0
Avoid roads, skid trails, decks, and portable sawmills inside the SMZ.	S	**89**	69	93	81	97	**100**	100	100	100	100	**37**	71	35	11	0
Keep roads, skid trails, decks, and portable sawmills at least 10 feet away from the stream when placement in SMZ is unavoidable.	S	**77**	81	100	67	70	**100**	100	100	100	100	**33**	60	N/A	100	0
Limit heavy equipment use within 10 feet of the edges of streams and waterbodies.	S	**87**	77	94	72	92	**100**	100	100	100	100	**48**	85	47	40	0
Maintain approximately half of the pre-harvest vegetative canopy cover within the SMZ.	S	**83**	75	91	61	87	**99**	100	100	96	100	**62**	73	71	57	40
Minimize disturbance to the mid-level and understory if removing significant overstory.	S	**89**	68	93	81	97	**99**	100	100	95	100	**69**	46	83	77	0
Allow no more than 20% evenly distributed bare soil surface within the SMZ.	O	**94**	96	96	85	98	**100**	98	100	100	100	**24**	50	55	0	0
Fell and remove trees away from the stream or waterbody.	S	**89**	68	90	89	98	**100**	100	100	100	100	**67**	79	67	58	0
Avoid gouging soil in a manner that could funnel runoff and transport sediment to the waterbodies.	S	**92**	86	94	84	100	**100**	100	100	100	100	**74**	100	84	53	N/A
Service and refuel equipment outside of the SMZ, unless mechanical failure requires repair. Control fluids as needed.	S	**100**	100	100	100	100	**100**	100	100	100	100	N/A	N/A	N/A	N/A	N/A
Keep logging debris out of stream or remove promptly if introduced when operating in the SMZ (not at crossing).	S	**88**	67	90	87	96	**100**	100	100	99	100	**83**	100	72	79	100
Wrap SMZ around the head of the intermittent or perennial stream, at the ephemeral transition.	S	**87**	63	90	100	71	**100**	100	100	100	100	**85**	67	100	N/A	80
SMZ width sufficient to filter upslope pollutants and prevent stream or waterbody sedimentation/contamination.	S	**91**	67	96	92	90	**99**	100	99	100	100	**81**	94	100	89	0

SMZ width sufficient to provide stream shade and prevent adverse temperature fluctuations.	S	**87**	79	92	76	86	**100**	100	100	100	100	**96**	91	96	96	100
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				
"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 56. Sample size and 95% Confidence Intervals for Implementation of BMPs for Streamside Management Zones by Region											
BMPs for SMZs	AU	Sample Size					BMP Implementation Rate & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Overall		**6,668**	**694**	**3,802**	**1,225**	**947**	**86 ± 1**	**72 ± 3**	**91 ± 1**	**77 ± 2**	**87 ± 2**
Conduct operation during dry soil conditions when possible, limiting heavy equipment use.	S	**8**	0	0	2	6	**75 ± 26**	N/A	N/A	50 ± 41	80 ± 28
Avoid heavy equipment use when braided channels are close together.	S	**4**	0	0	3	1	**63 ± 34**	N/A	N/A	57 ± 37	60 ± 44
Establish SMZ from the outermost channel limits, not from innermost channel bank.	S	**11**	0	0	5	6	**87 ± 20**	N/A	N/A	78 ± 30	80 ± 28
Limit heavy equipment use along ditch edge, maintaining structural integrity.	O	**51**	0	1	16	34	**87 ± 9**	N/A	60 ± 44	85 ± 17	84 ± 12
During temporary ditch crossing installation and use, minimize erosion and sediment runoff.	O	**39**	0	1	6	32	**84 ± 11**	N/A	60 ± 44	70 ± 30	83 ± 13
During temporary ditch crossing installation and use, avoid altering water flow.	S	**110**	0	1	11	98	**73 ± 8**	N/A	40 ± 44	20 ± 22	80 ± 8
Minimize disturbance to the soil and groundcover within the ephemeral stream area.	S	**276**	62	172	13	29	**85 ± 4**	77 ± 10	88 ± 5	71 ± 22	76 ± 15
Mark SMZs perimeter clearly using paint, flagging, or other means.	S	**558**	50	330	108	70	**58 ± 4**	30 ± 12	73 ± 5	34 ± 9	45 ± 11
Avoid roads, skid trails, decks, and portable sawmills inside the SMZ.	S	**547**	54	332	94	67	**89 ± 3**	67 ± 12	93 ± 3	80 ± 8	94 ± 6
Keep roads, skid trails, decks, and portable sawmills at least 10 feet away from the stream when placement in SMZ is unavoidable.	S	**53**	26	4	3	20	**76 ± 11**	77 ± 15	76 ± 32	57 ± 37	67 ± 19
Limit heavy equipment use within 10 feet of the edges of streams and waterbodies.	S	**527**	57	299	106	65	**87 ± 3**	75 ± 11	93 ± 3	71 ± 9	90 ± 7
Maintain approximately half of the pre-harvest vegetative canopy cover within the SMZ.	S	**561**	61	315	109	76	**83 ± 3**	74 ± 11	91 ± 3	61 ± 9	85 ± 8
Minimize disturbance to the mid-level and understory if removing significant overstory.	S	**414**	41	265	70	38	**89 ± 3**	67 ± 14	93 ± 3	80 ± 9	93 ± 9
Allow no more than 20% evenly distributed bare soil surface within the SMZ.	O	**475**	46	279	103	47	**94 ± 2**	92 ± 8	95 ± 3	84 ± 7	94 ± 7
Fell and remove trees away from the stream or waterbody.	S	**552**	44	334	108	66	**89 ± 3**	67 ± 13	90 ± 3	88 ± 6	96 ± 5
Avoid gouging the soil in a manner that could funnel runoff and transport sediment to the waterbodies.	S	**572**	51	338	107	76	**92 ± 2**	84 ± 10	94 ± 3	83 ± 7	98 ± 4
Service and refuel equipment outside of the SMZ, unless mechanical failure requires repair. Control fluids as needed.	S	**75**	11	52	9	3	**98 ± 4**	87 ± 20	97 ± 6	85 ± 22	72 ± 36
Keep logging debris out of stream or remove promptly if introduced when operating in the SMZ (not at crossing).	S	**567**	60	331	108	68	**88 ± 3**	66 ± 12	90 ± 3	86 ± 7	93 ± 6
Wrap SMZ around the head of the intermittent or perennial stream, at the ephemeral transition.	S	**199**	24	126	32	17	**86 ± 5**	61 ± 18	89 ± 6	95 ± 9	67 ± 20
SMZ width sufficient to filter upslope pollutants and prevent stream or waterbody sedimentation/contamination.	S	**539**	55	311	106	67	**91 ± 2**	66 ± 12	95 ± 2	90 ± 6	87 ± 8

SMZ width sufficient to provide stream shade and prevent adverse temperature fluctuations.	S	**528**	52	311	106	59	**87 ± 3**	77 ± 11	92 ± 3	75 ± 8	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											

Site Preparation and Reforestation

Table 57. Implementation of BMPs for Site Preparation and Reforestation by Region

BMPs for Site Prep	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		----------%----------														
Overall		**97**	**N/A**	**86**	**100**	**100**	**100**	**N/A**	**100**	**100**	**100**	**0**	**N/A**	**0**	**N/A**	**N/A**
Minimize the amount of soil that is disturbed by the equipment blade/rake and avoid uprooting leftover trees and stumps.	O	**100**	N/A	100	N/A	100	**100**	N/A	100	N/A	100	**N/A**	N/A	N/A	N/A	N/A
Prevent the movement of significant amounts of soil into debris piles.	S	**100**	N/A	100	N/A	100	**100**	N/A	100	N/A	100	**N/A**	N/A	N/A	N/A	N/A
Minimize the removal of surface organic matter.	O	**100**	N/A	100	N/A	100	**100**	N/A	100	N/A	100	**N/A**	N/A	N/A	N/A	N/A
Maintain existing debris and groundcover within ephemeral drains or dry gullies.	O	**100**	N/A	100	N/A	100	**100**	N/A	100	N/A	100	**N/A**	N/A	N/A	N/A	N/A
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	**N/A**	N/A	N/A	N/A	N/A
Set windrows along the land's topographic contour.	S	**75**	N/A	0	N/A	100	**100**	N/A	N/A	N/A	100	**0**	N/A	0	N/A	N/A
Avoid gouging the soil surface in a manner that could funnel runoff and transport sediment into nearby waterbodies.	S	**100**	N/A	100	N/A	100	**100**	N/A	100	N/A	100	**N/A**	N/A	N/A	N/A	N/A
Dispose of seedling bags, boxes, and culled seedlings appropriately. Do not place in or near streams and waterbodies.	O	**100**	N/A	100	100	N/A	**100**	N/A	100	100	N/A	**N/A**	N/A	N/A	N/A	N/A
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 58. 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 Rate & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Overall		**30**	**0**	**7**	**1**	**22**	**91 ± 11**	**N/A**	**73 ± 28**	**60 ± 44**	**93 ± 12**
Minimize the amount of soil that is disturbed by the equipment blade/rake and avoid uprooting leftover trees and stumps.	O	**4**	0	1	0	3	**76 ± 32**	N/A	60 ± 44	N/A	72 ± 36
Prevent the movement of significant amounts of soil into debris piles.	S	**6**	0	1	0	5	**80 ± 28**	N/A	60 ± 44	N/A	78 ± 30
Minimize the removal of surface organic matter.	O	**4**	0	1	0	3	**76 ± 32**	N/A	60 ± 44	N/A	72 ± 36
Maintain existing debris and groundcover within ephemeral drains or dry gullies.	O	**2**	0	1	0	1	**67 ± 40**	N/A	60 ± 44	N/A	60 ± 44
Keep equipment out of the SMZ or riparian buffers.	S	**5**	0	0	0	5	**78 ± 30**	N/A	N/A	N/A	78 ± 30
Set windrows along the land's topographic contour.	S	**4**	0	1	0	3	**63 ± 34**	N/A	40 ± 44	N/A	72 ± 36
Avoid gouging the soil surface in a manner that could funnel runoff and transport sediment into nearby waterbodies.	S	**3**	0	1	0	2	**72 ± 36**	N/A	60 ± 44	N/A	67 ± 40
Dispose of seedling bags, boxes, and culled seedlings appropriately. Do not place in or near streams and waterbodies.	O	**2**	0	1	1	0	**67 ± 40**	N/A	60 ± 44	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

Chemicals, Fluids, and Solid Waste

Table 59. Implementation of BMPs for Chemicals, Fluids, and Solid Waste by Region

BMPs for Chemicals, Fluids, and Solid Waste	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		----------%----------														
Overall		**77**	**71**	**82**	**76**	**68**	**100**	**100**	**99**	**100**	**100**	**6**	**0**	**7**	**5**	**10**
Dispose of chemical containers properly.	O	**0**	N/A	N/A	N/A	0	**N/A**	N/A	N/A	N/A	N/A	**0**	N/A	N/A	N/A	0
Store garbage and waste in a container (or bag), empty/replace as needed, and store to prevent spillage or vandalism.	O	**65**	50	73	70	55	**100**	100	100	100	100	**0**	0	0	0	0
Empty waste containers once they are full.	O	**67**	100	50	100	100	**100**	100	100	100	100	**0**	N/A	0	N/A	N/A
Secure the waste bin after hours to prevent accidental tipping or vandalism.	O	**60**	50	69	0	50	**100**	100	100	N/A	100	**0**	0	0	0	0
Do not burn or bury garbage and trash on-site.	O	**87**	92	88	77	90	**100**	100	100	100	100	**0**	0	0	0	0
Equipment, vehicles, and machinery free of leaking fluids. No stains on the ground that would indicate leak.	O	**78**	67	83	74	75	**100**	100	100	100	100	**19**	0	22	20	50
Clean equipment with water - not degreasers or detergents.	O	**100**	N/A	N/A	N/A	100	**100**	N/A	N/A	N/A	100	**N/A**	N/A	N/A	N/A	N/A
Designate area for equipment servicing and fueling on level ground away from streams and waterbodies.	O	**100**	100	100	100	100	**100**	100	100	100	100	**N/A**	N/A	N/A	N/A	N/A
Service and fuel equipment at least 100 feet from streams, waterbodies, ditches, and ephemeral drainages.	O	**92**	100	100	83	75	**100**	100	100	100	100	**0**	N/A	N/A	0	0
Service equipment in a way that minimizes potential for fluids to enter waterbodies or the groundwater.	O	**83**	100	92	80	50	**100**	100	100	100	100	**50**	N/A	100	0	50
Keep fluid spill, containment, and clean-up tools and materials on-site (e.g., hose clamps, extra empty containers, absorbent material/pads, plastic sheeting, etc.)	O	**72**	50	67	100	100	**100**	100	100	100	100	**0**	0	0	N/A	N/A
Keep fluids secure in labeled containers that control or minimize leakage or spillage.	O	**65**	58	70	56	71	**100**	100	100	100	100	**0**	0	0	0	0
Use appropriate containers to store oils, fuels, and other fluids - minimizing leakage/spillage.	O	**98**	100	100	88	100	**98**	100	96	100	100	**0**	N/A	N/A	0	N/A
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 60. 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 Rate & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Overall		**447**	**77**	**229**	**79**	**62**	**77 ± 4**	**70 ± 10**	**81 ± 5**	**75 ± 9**	**67 ± 11**
Dispose of chemical containers properly.	O	**6**	0	0	0	6	**20 ± 28**	N/A	N/A	N/A	20 ± 28
Store garbage and waste in a container (or bag), empty/replace as needed, and store to prevent spillage or vandalism.	O	**65**	14	30	10	11	**64 ± 11**	50 ± 23	71 ± 15	64 ± 26	53 ± 25
Empty waste containers once they are full.	O	**9**	1	6	1	1	**62 ± 27**	60 ± 44	50 ± 31	60 ± 44	60 ± 44
Secure the waste bin after hours to prevent accidental tipping or vandalism.	O	**25**	6	16	1	2	**59 ± 18**	50 ± 31	65 ± 21	40 ± 44	50 ± 41
Do not burn or bury garbage and trash on-site.	O	**67**	12	32	13	10	**85 ± 9**	82 ± 20	83 ± 13	71 ± 22	79 ± 23
Equipment, vehicles, and machinery free of leaking fluids. No stains on the ground that would indicate leak.	O	**95**	15	53	19	8	**77 ± 8**	63 ± 22	81 ± 10	70 ± 19	67 ± 27
Clean equipment with water - not degreasers or detergents.	O	**1**	0	0	0	1	**60 ± 44**	N/A	N/A	N/A	60 ± 44
Designate area for equipment servicing and fueling on level ground away from streams and waterbodies.	O	**8**	1	2	4	1	**84 ± 24**	60 ± 44	67 ± 40	76 ± 32	60 ± 44
Service and fuel equipment at least 100 feet from streams, waterbodies, ditches, and ephemeral drainages.	O	**24**	3	11	6	4	**86 ± 14**	72 ± 36	87 ± 20	70 ± 30	63 ± 34
Service equipment in a way that minimizes potential for fluids to enter waterbodies or the groundwater.	O	**24**	2	13	5	4	**79 ± 16**	67 ± 40	83 ± 19	67 ± 32	50 ± 35
Keep fluid spill, containment, and clean-up tools and materials on-site (e.g., hose clamps, extra empty containers, absorbent material/pads, plastic sheeting, etc.)	O	**18**	2	12	3	1	**68 ± 20**	50 ± 41	63 ± 24	72 ± 36	60 ± 44
Keep fluids secure in labeled containers that control or minimize leakage or spillage.	O	**55**	12	27	9	7	**64 ± 12**	56 ± 24	68 ± 17	54 ± 27	64 ± 29
Use appropriate containers to store oils, fuels, and other fluids - minimizing leakage/spillage.	O	**50**	9	27	8	6	**95 ± 7**	85 ± 22	94 ± 10	75 ± 26	80 ± 28

"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

Fire Management

Table 61. Implementation of BMPs for Fire Management by Region

BMPs for Fire Management	AU	BMP Implementation					Properly Implemented & NO RISK to WQ					Improperly Implemented BMP & RISK to WQ				
		S	M	P	SP	C	S	M	P	SP	C	S	M	P	SP	C
		----------%----------														
Overall		**84**	**N/A**	**71**	**100**	**N/A**	**100**	**N/A**	**100**	**100**	**N/A**	**0**	**N/A**	**0**	**N/A**	**N/A**
Construct firelines only as deep as necessary.	O	**50**	N/A	50	N/A	N/A	**100**	N/A	100	N/A	N/A	**0**	N/A	0	N/A	N/A
Construct firelines only as wide as necessary.	O	**75**	N/A	75	N/A	N/A	**100**	N/A	100	N/A	N/A	**0**	N/A	0	N/A	N/A
Minimize using soil disturbing tractor-plow firelines.	O	**50**	N/A	50	N/A	N/A	**100**	N/A	100	N/A	N/A	**0**	N/A	0	N/A	N/A
Construct firelines that minimize erosion and runoff.	S	**67**	N/A	67	N/A	N/A	**100**	N/A	100	N/A	N/A	**0**	N/A	0	N/A	N/A
Construct firelines along the contour and avoid straight uphill/downhill placement where possible.	S	**100**	N/A	100	N/A	N/A	**100**	N/A	100	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A
Fireline slope 25% or less.	S	**100**	N/A	100	N/A	N/A	**100**	N/A	100	N/A	N/A	**N/A**	N/A	N/A	N/A	N/A
Minimize accelerated erosion into waterbodies.	S	**100**	N/A	N/A	100	N/A	**100**	N/A	N/A	100	N/A	**N/A**	N/A	N/A	N/A	N/A
Clear streams and ditches of debris.	S	**100**	N/A	N/A	100	N/A	**100**	N/A	N/A	100	N/A	**N/A**	N/A	N/A	N/A	N/A
Consider site and weather conditions in order to protect water quality.	O	**100**	N/A	100	100	N/A	**100**	N/A	100	100	N/A	**N/A**	N/A	N/A	N/A	N/A
Retain duff layer on the soil while meeting prescribed burn goals.	O	**100**	N/A	100	100	N/A	**100**	N/A	100	100	N/A	**N/A**	N/A	N/A	N/A	N/A
Keep high intensity burns out of the SMZ unless suitable WQ measures taken.	S	**100**	N/A	N/A	100	N/A	**100**	N/A	N/A	100	N/A	**N/A**	N/A	N/A	N/A	N/A
Use natural or in-place barriers to minimize fireline construction.	S	**100**	N/A	100	100	N/A	**100**	N/A	100	100	N/A	**N/A**	N/A	N/A	N/A	N/A
		Higher % is Optimal					*Higher % is Optimal*					***Lower** % is Optimal*				

"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 62. Sample size and 95% Confidence Intervals for Implementation of BMPs for Fire Management by Region

BMPs for Fire Management	AU	Sample Size (n)					BMP Implementation Rate & 95% Confidence Interval				
		S	M	P	SP	C	S	M	P	SP	C
Overall		**38**	**0**	**21**	**17**	**0**	**81 ± 12**	**N/A**	**68 ± 19**	**91 ± 14**	**N/A**
Construct firelines only as deep as necessary.	O	**4**	0	4	0	0	**50 ± 35**	N/A	50 ± 35	N/A	N/A
Construct firelines only as wide as necessary.	O	**4**	0	4	0	0	**63 ± 34**	N/A	63 ± 34	N/A	N/A
Minimize using soil disturbing tractor-plow firelines.	O	**4**	0	4	0	0	**50 ± 35**	N/A	50 ± 35	N/A	N/A
Construct firelines that minimize erosion and runoff.	S	**3**	0	3	0	0	**57 ± 37**	N/A	57 ± 37	N/A	N/A
Construct firelines along the contour and avoid straight uphill/downhill placement where possible.	S	**1**	0	1	0	0	**60 ± 44**	N/A	60 ± 44	N/A	N/A
Fireline slope 25 percent or less.	S	**2**	0	2	0	0	**67 ± 40**	N/A	67 ± 40	N/A	N/A
Minimize accelerated erosion into waterbodies.	S	**1**	0	0	1	0	**60 ± 44**	N/A	N/A	60 ± 44	N/A
Clear streams and ditches of debris.	S	**1**	0	0	1	0	**60 ± 44**	N/A	N/A	60 ± 44	N/A
Consider site and weather conditions in order to protect water quality.	O	**2**	0	1	1	0	**67 ± 40**	N/A	60 ± 44	60 ± 44	N/A
Retain duff layer on the soil while meeting prescribed burn goals.	O	**2**	0	1	1	0	**67 ± 40**	N/A	60 ± 44	60 ± 44	N/A
Keep high intensity burns out of the SMZ unless suitable WQ measures taken.	S	**4**	0	0	4	0	**76 ± 32**	N/A	N/A	76 ± 32	N/A
Use natural or in-place barriers to minimize fireline construction.	S	**10**	0	1	9	0	**86 ± 21**	N/A	60 ± 44	85 ± 22	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