

Analysis of Effectiveness of Ohio NRCS Practice Standards in Addressing Five Leading Causes of Water Quality Impairment

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Explanation of Analysis of Effectiveness of Ohio NRCS Practice Standards in Addressing Five Leading Causes of Water Quality Impairment

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The United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS) provides a set of *practice standards* as listed in Ohio-USDA NRCS Field Office Technical Guide (FOTG) to facilitate implementation or installation of measures to address any number of defined farming related *resource concerns*. There are currently 101 unique *practice standards* listed in the Ohio-NRCS FOTG. Nationally, there are seventy-nine (79) defined *resource concerns* which include concerns for soil, air and water quality, plant health, soil erosion, water quantity, fish and wildlife, etc. On a semi-regular basis and most recently in 2007, the Ohio NRCS program evaluated practice effectiveness by giving a relative ranking (ranging from -5 to +5) for each practice standard against each resource concern. This ranking procedure is called the Conservation Physical Practice Effects (CPPE) ranking. Negative ranking indicates that the practice is detrimental to solving the resource concern, while positive ranking means that the practice will be of benefit in solving the resource concern.

Water quality protection is the main mission of the Ohio EPA Division of Surface Water (DSW) and water quality is regularly identified as the highest priority resource concern in USDA conservation programs such as Wetland Reserve Program (WRP), Conservation Reserve Program (CRP), Environmental Quality Incentives Program (EQIP), etc. As such, Ohio EPA staff performed a spreadsheet analysis of the Ohio NRCS 2007 CPPE rankings to identify which practices rank highest to address the variety of water quality related resource concerns.

The following paragraphs explain how the Ohio EPA-DSW analysis was performed.

1) Twenty-seven (27) **resource concerns** were identified that had any relationship with water quality and are listed below.

Compaction	Contaminants-Animal Waste and Other Organics - N
Excessive Nutrients and Organics in Surface Water	Contaminants-Animal Waste and Other Organics - P
Excessive Suspended Sediment and Turbidity in Surface Water	Contaminants-Animal Waste and Other Organics - K
Harmful Levels of Pathogens in Surface Water	Contaminants-Commercial Fertilizer - N
Harmful Levels of Pesticides in Surface Water	Contaminants-Commercial Fertilizer - P
Excessive Runoff, Flooding, or Ponding	Contaminants-Commercial Fertilizer - K
Classic Gully Erosion	Rangeland Site Stability
Ephemeral Gully Erosion	Wind
Sheet and Rill Erosion	Harmful Temperatures of Surface Water
Streambank Erosion	Excessive Subsurface Water
Contaminants - Residual Pesticides	Inadequate Outlets
Damage from Sediment Deposition	Insufficient Flows in Water Courses
Organic Matter Depletion	Reduced Capacity of Conveyances by Sediment Deposition
	Reduced Storage of Water Bodies by Sediment Accumulation

2) Five (5) leading **causes** of water quality impairment in Ohio surface water tributaries including nutrients, sediment, hydromodification & habitat, pesticides, and pathogens were selected to be included in the analysis. These causes were selected to be

analyzed with respect to the degree with which implementation of any given *practice standard* to address a given water quality related *resource* may benefit or be of detriment to a selected cause of water quality impairment

3) A relative weight factor (-1.0 to 1.0) was assigned to each selected water quality-related *resource concern* for each cause of impairment. These weights were assigned by comparing two (2) sets of independent DSW-staff assigned relative weight factor rankings (per *resource concern* and *water quality impairment cause*). The ranking weight values were based upon applicable experience and best professional judgment of staff environmental specialist analysts.

The table below provides a snap-shot of example weight factors assigned by OEPA staff per water quality impairment cause. (Four of the 27 resource concerns analyzed are shown here as an example).

Resource Concerns (based on NRCS objectives)	Compaction	Excessive Nutrients and Organics in Surface Water	Excessive Suspended Sediment and Turbidity in Surface Water	Harmful Levels of Pathogens in Surface Water
Sediment	0.4	0	1	0
Nutrient	0.6	1	0.6	0
Habitat-Hydromod	0.6	0.2	0.7	0
Pesticides	0.3	0	0.3	0
Pathogens	0.3	0	0.4	1

4) Next the relative weight per resource concern and cause of impairment were used as multipliers against CPPE rating done by Ohio NRCS, then added across all resource concerns.

Below is a snap-shot of Ohio USDA NRCS CPPE rankings by **resource concern** and **practice standard** as assigned using best professional judgment at Ohio USDA NRCS in 2007:

Resource Concern → Practice Standard	Compaction	Excessive Nutrients and Organics in Surface Water	Excessive Suspended Sediment and Turbidity in Surface Water	Harmful Levels of Pathogens in Surface Water	Harmful Levels of Pesticides in Surface Water
Critical Area Planting (342)	3	2	4	1	0
Riparian Forest Buffer (391)	4	5	5	3	4
Riparian Herbaceous Cover (390)	4	5	4	3	2
Filter Strip (393)	3	5	5	1	3
Tree/Shrub Establishment (612)	2	2	4	3	4
Pasture and Hay Planting (512)	4	2	2	1	2
Conservation Crop Rotation (328)	2	2	2	1	2
Prescribed Grazing (528)	3	1	3	1	2

5) This summation yielded total values for each practice based upon the 5 causes of water quality impairment (as described in table below). Whereas the numerical value is of relative unimportance, comparing the score of one practice to another does have value. Positive values describe that there is a degree of benefit to address a particular water quality cause of impairment, while negative values mean that the practice is detrimental, or worsens the impacts to water quality. Practices with highest positive

values would be expected to benefit water quality most when compared to practices with very low yet still positive values.

Example table describing summation by practice standard and water quality cause of impairment is below.

Rank	Resource Concern --->	SED + NUT +						
		H&H	ratio	SED	NUT	H&H	PEST	PATH
1	Critical Area Planting (342)	46.4	1.000	18.6	10.6	17.2	10.1	2.7
2	Riparian Forest Buffer (391)	40.1	0.866	12.8	11.7	15.7	15.4	5.7
3	Riparian Herbaceous Cover (390)	39.0	0.842	12.7	11.4	14.9	12.1	6.0
4	Filter Strip (393)	36.2	0.781	11.8	12.3	12.1	14.3	4.1
5	Tree/Shrub Establishment (612)	35.2	0.759	13.4	8.7	13.2	15.7	4.0
6	Pasture and Hay Planting (512)	35.1	0.757	10.4	14.6	10.1	13.2	6.4
7	Conservation Crop Rotation (328)	34.2	0.738	10.7	13.9	9.5	13.4	5.8
8	Prescribed Grazing (528)	32.9	0.710	11.7	11.2	10.0	13.1	4.6
9	Land Reconstruction, Abandoned Mined Land (543)	32.5	0.701	13.4	7.1	12.0	7.1	3.7
10	Land Reconstruction, Currently Mined Land (544)	32.5	0.701	13.4	7.1	12.0	7.1	3.7
11	Conservation Cover (327)	31.8	0.685	11.2	10.5	10.1	14.4	4.1
12	Mulching (484)	31.2	0.674	11.2	8.8	11.1	10.6	2.8
13	Field Border (386)	31.1	0.671	10.3	10.7	10.1	12.8	4.1
14	Cover Crop (340)	30.6	0.660	10.9	10.2	9.5	10.7	3.8
15	Contour Buffer Strips (332)	29.4	0.633	10.0	9.9	9.5	7.9	3.1
16	Use Exclusion (472)	29.3	0.631	10.1	9.6	9.6	4.9	5.9
17	Water and Sediment Control Basin (638)	28.5	0.615	11.0	6.7	10.7	5.7	2.6
18	Sediment Basin (350)	28.3	0.610	10.7	7.4	10.2	5.4	2.2
19	Stripcropping (585)	27.2	0.587	10.3	7.2	9.7	7.9	1.1
20	Brush Management (314)	26.6	0.574	10.1	5.8	10.7	1.3	0.3

6) The table above also provides a ranking snap-shot of the Ohio – USDA NRCS practice standards that best address a combination of sediment, nutrient and habitat & hydromodification causes of water quality impairment. Complete rankings can be found in the attached “Ranking of Ohio-USDA NRCS Practices Standards for Addressing Water Quality Causes of Impairment” document which provides the results of the rankings by water quality cause for each of the 101 NRCS practice standards, sorted from best to worst for addressing all 5 leading causes of water quality and 2 aggregations (sediment + nutrients + habitat & hydromodification AND (sediment + nutrients + habitat & hydromodification + pathogens + pesticides), totaling 7 tables.

Summary:

In summary, the practice standard rankings that can be found in the attached document, “Ranking of Ohio-USDA NRCS Practices Standard Effectiveness for Addressing Water Quality Causes of Impairment” can inform decision makers whose role it is to effectively enroll row crop farming enterprises, land managers and livestock producer in programs such as Environmental Quality Incentives Program (EQIP), to gain more widespread implementation of those practice standards that can best provide benefit toward improving water quality in Ohio tributaries based upon impairment cause (or combinations thereof), and minimizing enrollment for practices with limited benefit to water quality.

Ranking of Ohio-USDA NRCS Practices Standard Effectiveness for Addressing Water Quality Impairment
 Table 1: Ranking of Practices addressing Sediment Cause of Water Quality Impairment

Rank	Conservation Practice Standard	Cause of Water Quality Impairment					
		SED	ratio	NUT	H&H	PEST	PATH
1	Critical Area Planting (342)	18.6	1.000	10.6	17.2	10.1	2.7
2	Land Reconstruction, Abandoned Mined Land (543)	13.4	0.722	7.1	12.0	7.1	3.7
3	Land Reconstruction, Currently Mined Land (544)	13.4	0.722	7.1	12.0	7.1	3.7
4	Tree/Shrub Establishment (612)	13.4	0.719	8.7	13.2	15.7	4.0
5	Riparian Forest Buffer (391)	12.8	0.689	11.7	15.7	15.4	5.7
6	Riparian Herbaceous Cover (390)	12.7	0.686	11.4	14.9	12.1	6.0
7	Filter Strip (393)	11.8	0.636	12.3	12.1	14.3	4.1
8	Prescribed Grazing (528)	11.7	0.631	11.2	10.0	13.1	4.6
9	Mulching (484)	11.2	0.606	8.8	11.1	10.6	2.8
10	Conservation Cover (327)	11.2	0.603	10.5	10.1	14.4	4.1
11	Water and Sediment Control Basin (638)	11.0	0.594	6.7	10.7	5.7	2.6
12	Cover Crop (340)	10.9	0.589	10.2	9.5	10.7	3.8
13	Conservation Crop Rotation (328)	10.7	0.578	13.9	9.5	13.4	5.8
14	Sediment Basin (350)	10.7	0.578	7.4	10.2	5.4	2.2
15	Pasture and Hay Planting (512)	10.4	0.561	14.6	10.1	13.2	6.4
16	Stripcropping (585)	10.3	0.556	7.2	9.7	7.9	1.1
17	Field Border (386)	10.3	0.556	10.7	10.1	12.8	4.1
18	Brush Management (314)	10.1	0.544	5.8	10.7	1.3	0.3
19	Use Exclusion (472)	10.1	0.542	9.6	9.6	4.9	5.9
20	Contour Buffer Strips (332)	10.0	0.539	9.9	9.5	7.9	3.1
21	Contour Farming (330)	9.2	0.494	6.3	9.1	4.9	1.1
22	Grassed Waterway (412)	9.0	0.486	7.1	7.6	7.8	2.1
23	Diversion (362)	8.2	0.444	4.1	7.5	3.5	1.1
24	Heavy Use Area Protection (561)	8.1	0.436	5.6	6.7	3.1	4.2
25	Lined Waterway or Outlet (468)	7.8	0.422	3.8	7.0	1.3	0.0
26	Recreation Trail and Walkway (568)	7.3	0.394	3.3	7.4	2.4	-1.6
27	Constructed Wetland (656)	7.1	0.383	8.3	6.6	5.6	4.2
28	Streambank and Shoreline Protection (580)	7.1	0.383	2.8	7.2	1.3	1.1
29	Underground Outlet (620)	7.1	0.381	1.1	6.1	1.2	-0.2
30	Subsurface Drain (606)	7.0	0.378	0.2	6.0	4.3	-0.7
31	Residue Management, Seasonal (344)	6.9	0.372	7.6	5.9	4.7	3.4
32	Upland Wildlife Habitat Management (645)	6.5	0.350	2.3	4.8	1.2	0.0
33	Prescribed Burning (338)	6.0	0.325	4.3	5.0	4.0	0.2

Ranking of Ohio-USDA NRCS Practices Standard Effectiveness for Addressing Water Quality Impairment

Table 1: Ranking of Practices addressing Sediment Cause of Water Quality Impairment

Rank	Conservation Practice Standard	Cause of Water Quality Impairment					
		SED	ratio	NUT	H&H	PEST	PATH
34	Forage Harvest Management (511)	6.0	0.325	8.3	5.6	10.9	3.8
35	Cross Wind Trap Strips (589C)	5.6	0.300	3.7	5.5	4.9	0.0
36	Grade Stabilization Structure (410)	5.3	0.286	2.2	5.4	2.4	0.0
37	Roof Runoff Structure (558)	5.1	0.275	3.6	5.5	1.3	3.3
38	Pond (378)	5.1	0.272	3.6	4.8	1.9	0.0
39	Watering Facility (614)	5.0	0.269	1.7	5.1	0.9	1.1
40	Herbaceous Wind Barriers (603)	4.6	0.247	3.8	4.9	5.1	1.0
41	Recreation Land Grading and Shaping (566)	4.5	0.242	2.1	4.3	2.2	0.0
42	Wetland Restoration (657)	4.2	0.228	5.5	4.0	4.0	2.1
43	Wetland Creation (658)	4.1	0.222	5.6	4.0	4.7	2.1
44	Wetland Enhancement (659)	3.8	0.206	5.3	3.7	4.0	2.1
45	Livestock Use Area Protection (757)	3.6	0.194	3.7	3.1	1.8	2.7
46	Waste Utilization (633)	3.5	0.189	9.5	3.6	5.1	4.7
47	Structure for Water Control (587)	3.4	0.183	2.4	4.6	1.3	0.0
48	Windbreak/Shelterbelt Establishment (380)	3.4	0.181	3.2	2.0	6.5	0.7
49	Stream Crossing (578)	3.3	0.178	0.4	3.0	0.9	-3.3
50	Clearing and Snagging (326)	3.2	0.172	0.3	2.6	-0.3	0.0
51	Restoration and Management of Rare or Declining Habitats (643)	3.1	0.167	2.0	3.1	1.8	0.0
52	Pest Management (595)	3.0	0.164	3.9	2.8	13.2	1.7
53	Windbreak/Shelterbelt Renovation (650)	2.8	0.153	2.3	1.4	6.0	0.7
54	Stream Habitat Improvement and Management (395)	2.6	0.139	1.4	3.5	1.3	0.0
55	Spring Development (574)	2.5	0.136	2.9	0.7	0.3	3.1
56	Residue and Tillage Management, No-Till/Strip Till/Direct Seed (329)	2.5	0.133	6.3	2.9	7.1	4.1
57	Residue and Tillage Management, Ridge Till (346)	2.2	0.117	5.8	2.7	7.1	4.4
58	Wetland Wildlife Habitat Management (644)	2.2	0.117	1.7	2.2	2.2	1.1
59	Residue and Tillage Management, Mulch Till (345)	1.8	0.094	5.7	2.0	6.2	3.8
60	Land Smoothing (466)	1.8	0.094	0.5	-0.2	-0.4	-0.7
61	Wildlife Watering Facility (648)	1.5	0.081	1.1	1.5	0.0	1.1
62	Forest Stand Improvement (666)	1.2	0.064	3.8	4.3	5.3	3.3
63	Pumping Plant (533)	1.1	0.061	0.3	0.0	0.3	0.0
64	Open Channel (582)	1.0	0.053	1.3	0.4	1.5	0.0
65	Nutrient Management (590)	0.9	0.050	10.6	1.7	1.5	5.1
66	Access Road (560)	0.9	0.050	0.3	0.3	0.9	0.7
67	Waste Treatment Lagoon (359)	0.8	0.044	5.3	1.3	1.2	7.8

Ranking of Ohio-USDA NRCS Practices Standard Effectiveness for Addressing Water Quality Impairment

Table 1: Ranking of Practices addressing Sediment Cause of Water Quality Impairment

Rank	Conservation Practice Standard	Cause of Water Quality Impairment					
		SED	ratio	NUT	H&H	PEST	PATH
68	Water Well (642)	0.7	0.036	0.7	-0.4	-0.3	-0.1
69	Waste Storage Facility (313)	0.7	0.036	5.8	0.7	1.0	4.6
70	Wastewater Treatment Strip (635)	0.7	0.036	2.4	2.0	2.5	3.4
71	Drainage Water Management (554)	0.6	0.033	3.7	-0.4	3.2	2.1
72	Composting Facility (317)	0.5	0.028	3.1	0.7	0.4	4.6
73	Pond Sealing or Lining, Bentonite Sealant (521C)	0.5	0.028	0.9	-0.1	-0.3	0.0
74	Pond Sealing or Lining, Compacted Clay Treatment (521D)	0.5	0.028	0.9	-0.1	-0.3	0.0
75	Pond Sealing or Lining, Flexible Membrane (521A)	0.5	0.028	0.9	-0.1	-0.3	0.0
76	Pond Sealing or Lining, Soil Dispersant (521B)	0.5	0.028	0.9	-0.1	-0.3	0.0
77	Animal Mortality Facility (316)	0.5	0.028	2.5	1.0	1.2	3.6
78	Solid/Liquid Waste Separation Facility (632)	0.5	0.025	3.6	0.7	0.7	4.2
79	Hedgerow Planting (422)	0.4	0.019	2.1	1.6	3.4	0.3
80	Firebreak (394)	0.4	0.019	-0.3	0.1	-1.6	1.0
81	Manure Transfer (634)	0.3	0.017	3.3	0.4	0.0	5.3
82	Agrichemical Mixing Facility (702)	0.0	0.000	3.9	0.9	5.3	0.0
83	Fishpond Management (399)	0.0	0.000	0.5	1.1	0.3	0.0
84	Tree/Shrub Pruning (660)	0.0	0.000	0.5	0.1	1.5	0.0
85	Dry Hydrant (432)	0.0	0.000	0.0	0.0	0.0	0.0
86	Fence (382)	0.0	0.000	0.0	0.0	0.0	0.0
87	Pipeline (516)	0.0	0.000	0.0	0.0	0.0	0.0
88	Prescribed Forestry (409)	0.0	0.000	0.0	0.0	0.0	0.0
89	Shallow Water Development and Management (646)	0.0	0.000	0.0	0.0	0.0	0.0
90	Well Decommissioning (351)	0.0	0.000	0.0	0.0	0.0	0.0
91	Early Successional Habitat Development/Management (647)	0.0	0.000	-0.3	-0.7	0.0	0.0
92	Fish Passage (396)	0.0	0.000	-0.4	1.4	-0.4	0.0
93	Aquaculture Ponds (397)	0.0	0.000	-1.9	-2.0	-0.3	-2.2
94	Closure of Waste Impoundment (360)	-0.1	-0.006	0.9	0.8	0.1	-0.7
95	Bedding (310)	-0.2	-0.008	-0.4	-0.6	-1.6	-2.6
96	Animal Trails and Walkways (575)	-0.3	-0.017	0.5	0.4	1.3	1.0
97	Dike (356)	-0.4	-0.022	1.2	0.5	4.0	0.0
98	Forest Trails and Landings (655)	-1.1	-0.061	-0.9	-1.7	-2.2	-1.3
99	Surface Drainage, Field Ditch (607)	-1.8	-0.094	-2.9	-1.6	-2.4	-2.9
100	Surface Drainage, Main or Lateral (608)	-2.1	-0.111	-3.2	-1.9	-1.6	-3.2
101	Tree/Shrub Site Preparation (490)	-3.5	-0.186	-2.4	-3.5	-2.8	-0.3

Ranking of Ohio-USDA NRCS Practices Standard Effectiveness for Addressing Water Quality Impairment
 Table 2: Ranking of Practices addressing Nutrient Cause of Water Quality Impairment

Rank	Conservation Practice Standard	Cause of Water Quality Impairment					
		SED	Nutrient	ratio	H&H	PEST	PATH
1	Pasture and Hay Planting (512)	10.4	14.6	1.000	10.1	13.2	6.4
2	Conservation Crop Rotation (328)	10.7	13.9	0.953	9.5	13.4	5.8
3	Filter Strip (393)	11.8	12.3	0.842	12.1	14.3	4.1
4	Riparian Forest Buffer (391)	12.8	11.7	0.799	15.7	15.4	5.7
5	Riparian Herbaceous Cover (390)	12.7	11.4	0.777	14.9	12.1	6.0
6	Prescribed Grazing (528)	11.7	11.2	0.766	10.0	13.1	4.6
7	Field Border (386)	10.3	10.7	0.734	10.1	12.8	4.1
8	Nutrient Management (590)	0.9	10.6	0.723	1.7	1.5	5.1
9	Critical Area Planting (342)	18.6	10.6	0.723	17.2	10.1	2.7
10	Conservation Cover (327)	11.2	10.5	0.719	10.1	14.4	4.1
11	Cover Crop (340)	10.9	10.2	0.698	9.5	10.7	3.8
12	Contour Buffer Strips (332)	10.0	9.9	0.676	9.5	7.9	3.1
13	Use Exclusion (472)	10.1	9.6	0.658	9.6	4.9	5.9
14	Waste Utilization (633)	3.5	9.5	0.651	3.6	5.1	4.7
15	Mulching (484)	11.2	8.8	0.604	11.1	10.6	2.8
16	Tree/Shrub Establishment (612)	13.4	8.7	0.594	13.2	15.7	4.0
17	Forage Harvest Management (511)	6.0	8.3	0.568	5.6	10.9	3.8
18	Constructed Wetland (656)	7.1	8.3	0.565	6.6	5.6	4.2
19	Residue Management, Seasonal (344)	6.9	7.6	0.518	5.9	4.7	3.4
20	Sediment Basin (350)	10.7	7.4	0.504	10.2	5.4	2.2
21	Stripcropping (585)	10.3	7.2	0.489	9.7	7.9	1.1
22	Grassed Waterway (412)	9.0	7.1	0.486	7.6	7.8	2.1
23	Land Reconstruction, Abandoned Mined Land (543)	13.4	7.1	0.482	12.0	7.1	3.7
24	Land Reconstruction, Currently Mined Land (544)	13.4	7.1	0.482	12.0	7.1	3.7
25	Water and Sediment Control Basin (638)	11.0	6.7	0.460	10.7	5.7	2.6
26	Residue and Tillage Management, No-Till/Strip Till/Direct Seed (329)	2.5	6.3	0.432	2.9	7.1	4.1
27	Contour Farming (330)	9.2	6.3	0.428	9.1	4.9	1.1
28	Waste Storage Facility (313)	0.7	5.8	0.399	0.7	1.0	4.6
29	Brush Management (314)	10.1	5.8	0.396	10.7	1.3	0.3
30	Residue and Tillage Management, Ridge Till (346)	2.2	5.8	0.396	2.7	7.1	4.4
31	Residue and Tillage Management, Mulch Till (345)	1.8	5.7	0.388	2.0	6.2	3.8
32	Wetland Creation (658)	4.1	5.6	0.385	4.0	4.7	2.1
33	Heavy Use Area Protection (561)	8.1	5.6	0.381	6.7	3.1	4.2

Ranking of Ohio-USDA NRCS Practices Standard Effectiveness for Addressing Water Quality Impairment

Table 2: Ranking of Practices addressing Nutrient Cause of Water Quality Impairment

Rank	Conservation Practice Standard	Cause of Water Quality Impairment					
		SED	Nutrient	ratio	H&H	PEST	PATH
34	Wetland Restoration (657)	4.2	5.5	0.378	4.0	4.0	2.1
35	Wetland Enhancement (659)	3.8	5.3	0.363	3.7	4.0	2.1
36	Waste Treatment Lagoon (359)	0.8	5.3	0.360	1.3	1.2	7.8
37	Prescribed Burning (338)	6.0	4.3	0.291	5.0	4.0	0.2
38	Diversion (362)	8.2	4.1	0.277	7.5	3.5	1.1
39	Agrichemical Mixing Facility (702)	0.0	3.9	0.270	0.9	5.3	0.0
40	Pest Management (595)	3.0	3.9	0.266	2.8	13.2	1.7
41	Herbaceous Wind Barriers (603)	4.6	3.8	0.259	4.9	5.1	1.0
42	Lined Waterway or Outlet (468)	7.8	3.8	0.259	7.0	1.3	0.0
43	Forest Stand Improvement (666)	1.2	3.8	0.259	4.3	5.3	3.3
44	Drainage Water Management (554)	0.6	3.7	0.255	-0.4	3.2	2.1
45	Cross Wind Trap Strips (589C)	5.6	3.7	0.252	5.5	4.9	0.0
46	Livestock Use Area Protection (757)	3.6	3.7	0.252	3.1	1.8	2.7
47	Roof Runoff Structure (558)	5.1	3.6	0.248	5.5	1.3	3.3
48	Pond (378)	5.1	3.6	0.248	4.8	1.9	0.0
49	Solid/Liquid Waste Separation Facility (632)	0.5	3.6	0.245	0.7	0.7	4.2
50	Recreation Trail and Walkway (568)	7.3	3.3	0.223	7.4	2.4	-1.6
51	Manure Transfer (634)	0.3	3.3	0.223	0.4	0.0	5.3
52	Windbreak/Shelterbelt Establishment (380)	3.4	3.2	0.216	2.0	6.5	0.7
53	Composting Facility (317)	0.5	3.1	0.209	0.7	0.4	4.6
54	Spring Development (574)	2.5	2.9	0.201	0.7	0.3	3.1
55	Streambank and Shoreline Protection (580)	7.1	2.8	0.191	7.2	1.3	1.1
56	Animal Mortality Facility (316)	0.5	2.5	0.173	1.0	1.2	3.6
57	Wastewater Treatment Strip (635)	0.7	2.4	0.162	2.0	2.5	3.4
58	Structure for Water Control (587)	3.4	2.4	0.162	4.6	1.3	0.0
59	Upland Wildlife Habitat Management (645)	6.5	2.3	0.158	4.8	1.2	0.0
60	Windbreak/Shelterbelt Renovation (650)	2.8	2.3	0.158	1.4	6.0	0.7
61	Grade Stabilization Structure (410)	5.3	2.2	0.151	5.4	2.4	0.0
62	Recreation Land Grading and Shaping (566)	4.5	2.1	0.144	4.3	2.2	0.0
63	Hedgerow Planting (422)	0.4	2.1	0.144	1.6	3.4	0.3
64	Restoration and Management of Rare or Declining Habitats (643)	3.1	2.0	0.137	3.1	1.8	0.0
65	Watering Facility (614)	5.0	1.7	0.119	5.1	0.9	1.1
66	Wetland Wildlife Habitat Management (644)	2.2	1.7	0.119	2.2	2.2	1.1
67	Stream Habitat Improvement and Management (395)	2.6	1.4	0.097	3.5	1.3	0.0

Ranking of Ohio-USDA NRCS Practices Standard Effectiveness for Addressing Water Quality Impairment

Table 2: Ranking of Practices addressing Nutrient Cause of Water Quality Impairment

Rank	Conservation Practice Standard	Cause of Water Quality Impairment					
		SED	Nutrient	ratio	H&H	PEST	PATH
68	Open Channel (582)	1.0	1.3	0.086	0.4	1.5	0.0
69	Dike (356)	-0.4	1.2	0.079	0.5	4.0	0.0
70	Underground Outlet (620)	7.1	1.1	0.076	6.1	1.2	-0.2
71	Wildlife Watering Facility (648)	1.5	1.1	0.072	1.5	0.0	1.1
72	Pond Sealing or Lining, Bentonite Sealant (521C)	0.5	0.9	0.065	-0.1	-0.3	0.0
73	Pond Sealing or Lining, Compacted Clay Treatment (521D)	0.5	0.9	0.065	-0.1	-0.3	0.0
74	Pond Sealing or Lining, Flexible Membrane (521A)	0.5	0.9	0.065	-0.1	-0.3	0.0
75	Pond Sealing or Lining, Soil Dispersant (521B)	0.5	0.9	0.065	-0.1	-0.3	0.0
76	Closure of Waste Impoundment (360)	-0.1	0.9	0.061	0.8	0.1	-0.7
77	Water Well (642)	0.7	0.7	0.050	-0.4	-0.3	-0.1
78	Fishpond Management (399)	0.0	0.5	0.036	1.1	0.3	0.0
79	Tree/Shrub Pruning (660)	0.0	0.5	0.036	0.1	1.5	0.0
80	Animal Trails and Walkways (575)	-0.3	0.5	0.036	0.4	1.3	1.0
81	Land Smoothing (466)	1.8	0.5	0.032	-0.2	-0.4	-0.7
82	Stream Crossing (578)	3.3	0.4	0.025	3.0	0.9	-3.3
83	Pumping Plant (533)	1.1	0.3	0.022	0.0	0.3	0.0
84	Access Road (560)	0.9	0.3	0.022	0.3	0.9	0.7
85	Clearing and Snagging (326)	3.2	0.3	0.018	2.6	-0.3	0.0
86	Subsurface Drain (606)	7.0	0.2	0.014	6.0	4.3	-0.7
87	Dry Hydrant (432)	0.0	0.0	0.000	0.0	0.0	0.0
88	Fence (382)	0.0	0.0	0.000	0.0	0.0	0.0
89	Pipeline (516)	0.0	0.0	0.000	0.0	0.0	0.0
90	Prescribed Forestry (409)	0.0	0.0	0.000	0.0	0.0	0.0
91	Shallow Water Development and Management (646)	0.0	0.0	0.000	0.0	0.0	0.0
92	Well Decommissioning (351)	0.0	0.0	0.000	0.0	0.0	0.0
93	Early Successional Habitat Development/Management (647)	0.0	-0.3	-0.022	-0.7	0.0	0.0
94	Firebreak (394)	0.4	-0.3	-0.022	0.1	-1.6	1.0
95	Fish Passage (396)	0.0	-0.4	-0.025	1.4	-0.4	0.0
96	Bedding (310)	-0.2	-0.4	-0.025	-0.6	-1.6	-2.6
97	Forest Trails and Landings (655)	-1.1	-0.9	-0.061	-1.7	-2.2	-1.3
98	Aquaculture Ponds (397)	0.0	-1.9	-0.129	-2.0	-0.3	-2.2
99	Tree/Shrub Site Preparation (490)	-3.5	-2.4	-0.165	-3.5	-2.8	-0.3
100	Surface Drainage, Field Ditch (607)	-1.8	-2.9	-0.198	-1.6	-2.4	-2.9
101	Surface Drainage, Main or Lateral (608)	-2.1	-3.2	-0.216	-1.9	-1.6	-3.2

Ranking of Ohio-USDA NRCS Practices Standard Effectiveness for Addressing Water Quality Impairment
 Table 3: Ranking of Practices addressing Habitat and Hydromodification Cause of Water Quality Impairment

Rank	Conservation Practice Standards	Cause of Water Quality Impairment					
		SED	NUT	H&H	ratio	PEST	PATH
1	Critical Area Planting (342)	18.6	10.6	17.2	1.000	10.1	2.7
2	Riparian Forest Buffer (391)	12.8	11.7	15.7	0.910	15.4	5.7
3	Riparian Herbaceous Cover (390)	12.7	11.4	14.9	0.867	12.1	6.0
4	Tree/Shrub Establishment (612)	13.4	8.7	13.2	0.765	15.7	4.0
5	Filter Strip (393)	11.8	12.3	12.1	0.702	14.3	4.1
6	Land Reconstruction, Abandoned Mined Land (543)	13.4	7.1	12.0	0.698	7.1	3.7
7	Land Reconstruction, Currently Mined Land (544)	13.4	7.1	12.0	0.698	7.1	3.7
8	Mulching (484)	11.2	8.8	11.1	0.647	10.6	2.8
9	Water and Sediment Control Basin (638)	11.0	6.7	10.7	0.624	5.7	2.6
10	Brush Management (314)	10.1	5.8	10.7	0.624	1.3	0.3
11	Sediment Basin (350)	10.7	7.4	10.2	0.592	5.4	2.2
12	Field Border (386)	10.3	10.7	10.1	0.584	12.8	4.1
13	Pasture and Hay Planting (512)	10.4	14.6	10.1	0.584	13.2	6.4
14	Conservation Cover (327)	11.2	10.5	10.1	0.584	14.4	4.1
15	Prescribed Grazing (528)	11.7	11.2	10.0	0.580	13.1	4.6
16	Stripcropping (585)	10.3	7.2	9.7	0.565	7.9	1.1
17	Use Exclusion (472)	10.1	9.6	9.6	0.557	4.9	5.9
18	Conservation Crop Rotation (328)	10.7	13.9	9.5	0.553	13.4	5.8
19	Contour Buffer Strips (332)	10.0	9.9	9.5	0.549	7.9	3.1
20	Cover Crop (340)	10.9	10.2	9.5	0.549	10.7	3.8
21	Contour Farming (330)	9.2	6.3	9.1	0.529	4.9	1.1
22	Grassed Waterway (412)	9.0	7.1	7.6	0.443	7.8	2.1
23	Diversion (362)	8.2	4.1	7.5	0.435	3.5	1.1
24	Recreation Trail and Walkway (568)	7.3	3.3	7.4	0.431	2.4	-1.6
25	Streambank and Shoreline Protection (580)	7.1	2.8	7.2	0.416	1.3	1.1
26	Lined Waterway or Outlet (468)	7.8	3.8	7.0	0.404	1.3	0.0
27	Heavy Use Area Protection (561)	8.1	5.6	6.7	0.388	3.1	4.2
28	Constructed Wetland (656)	7.1	8.3	6.6	0.384	5.6	4.2
29	Underground Outlet (620)	7.1	1.1	6.1	0.357	1.2	-0.2
30	Subsurface Drain (606)	7.0	0.2	6.0	0.349	4.3	-0.7
31	Residue Management, Seasonal (344)	6.9	7.6	5.9	0.345	4.7	3.4
32	Forage Harvest Management (511)	6.0	8.3	5.6	0.325	10.9	3.8
33	Roof Runoff Structure (558)	5.1	3.6	5.5	0.318	1.3	3.3

Ranking of Ohio-USDA NRCS Practices Standard Effectiveness for Addressing Water Quality Impairment
 Table 3: Ranking of Practices addressing Habitat and Hydromodification Cause of Water Quality Impairment

Rank	Conservation Practice Standards	Cause of Water Quality Impairment					
		SED	NUT	H&H	ratio	PEST	PATH
34	Cross Wind Trap Strips (589C)	5.6	3.7	5.5	0.318	4.9	0.0
35	Grade Stabilization Structure (410)	5.3	2.2	5.4	0.314	2.4	0.0
36	Watering Facility (614)	5.0	1.7	5.1	0.294	0.9	1.1
37	Prescribed Burning (338)	6.0	4.3	5.0	0.290	4.0	0.2
38	Herbaceous Wind Barriers (603)	4.6	3.8	4.9	0.286	5.1	1.0
39	Pond (378)	5.1	3.6	4.8	0.278	1.9	0.0
40	Upland Wildlife Habitat Management (645)	6.5	2.3	4.8	0.278	1.2	0.0
41	Structure for Water Control (587)	3.4	2.4	4.6	0.267	1.3	0.0
42	Forest Stand Improvement (666)	1.2	3.8	4.3	0.247	5.3	3.3
43	Recreation Land Grading and Shaping (566)	4.5	2.1	4.3	0.247	2.2	0.0
44	Wetland Creation (658)	4.1	5.6	4.0	0.231	4.7	2.1
45	Wetland Restoration (657)	4.2	5.5	4.0	0.231	4.0	2.1
46	Wetland Enhancement (659)	3.8	5.3	3.7	0.216	4.0	2.1
47	Waste Utilization (633)	3.5	9.5	3.6	0.208	5.1	4.7
48	Stream Habitat Improvement and Management (395)	2.6	1.4	3.5	0.204	1.3	0.0
49	Livestock Use Area Protection (757)	3.6	3.7	3.1	0.180	1.8	2.7
50	Restoration and Management of Rare or Declining Habitats (643)	3.1	2.0	3.1	0.180	1.8	0.0
51	Stream Crossing (578)	3.3	0.4	3.0	0.176	0.9	-3.3
52	Residue and Tillage Management, No-Till/Strip Till/Direct Seed (329)	2.5	6.3	2.9	0.169	7.1	4.1
53	Pest Management (595)	3.0	3.9	2.8	0.165	13.2	1.7
54	Residue and Tillage Management, Ridge Till (346)	2.2	5.8	2.7	0.157	7.1	4.4
55	Clearing and Snagging (326)	3.2	0.3	2.6	0.153	-0.3	0.0
56	Wetland Wildlife Habitat Management (644)	2.2	1.7	2.2	0.129	2.2	1.1
57	Residue and Tillage Management, Mulch Till (345)	1.8	5.7	2.0	0.118	6.2	3.8
58	Windbreak/Shelterbelt Establishment (380)	3.4	3.2	2.0	0.118	6.5	0.7
59	Wastewater Treatment Strip (635)	0.7	2.4	2.0	0.118	2.5	3.4
60	Nutrient Management (590)	0.9	10.6	1.7	0.098	1.5	5.1
61	Hedgerow Planting (422)	0.4	2.1	1.6	0.090	3.4	0.3
62	Wildlife Watering Facility (648)	1.5	1.1	1.5	0.086	0.0	1.1
63	Fish Passage (396)	0.0	-0.4	1.4	0.082	-0.4	0.0
64	Windbreak/Shelterbelt Renovation (650)	2.8	2.3	1.4	0.082	6.0	0.7
65	Waste Treatment Lagoon (359)	0.8	5.3	1.3	0.075	1.2	7.8
66	Fishpond Management (399)	0.0	0.5	1.1	0.063	0.3	0.0
67	Animal Mortality Facility (316)	0.5	2.5	1.0	0.059	1.2	3.6

Ranking of Ohio-USDA NRCS Practices Standard Effectiveness for Addressing Water Quality Impairment
 Table 3: Ranking of Practices addressing Habitat and Hydromodification Cause of Water Quality Impairment

Rank	Conservation Practice Standards	Cause of Water Quality Impairment					
		SED	NUT	H&H	ratio	PEST	PATH
68	Agrichemical Mixing Facility (702)	0.0	3.9	0.9	0.051	5.3	0.0
69	Closure of Waste Impoundment (360)	-0.1	0.9	0.8	0.047	0.1	-0.7
70	Solid/Liquid Waste Separation Facility (632)	0.5	3.6	0.7	0.043	0.7	4.2
71	Waste Storage Facility (313)	0.7	5.8	0.7	0.043	1.0	4.6
72	Spring Development (574)	2.5	2.9	0.7	0.043	0.3	3.1
73	Composting Facility (317)	0.5	3.1	0.7	0.039	0.4	4.6
74	Dike (356)	-0.4	1.2	0.5	0.027	4.0	0.0
75	Manure Transfer (634)	0.3	3.3	0.4	0.024	0.0	5.3
76	Open Channel (582)	1.0	1.3	0.4	0.024	1.5	0.0
77	Animal Trails and Walkways (575)	-0.3	0.5	0.4	0.024	1.3	1.0
78	Access Road (560)	0.9	0.3	0.3	0.020	0.9	0.7
79	Tree/Shrub Pruning (660)	0.0	0.5	0.1	0.008	1.5	0.0
80	Firebreak (394)	0.4	-0.3	0.1	0.008	-1.6	1.0
81	Pumping Plant (533)	1.1	0.3	0.0	0.000	0.3	0.0
82	Dry Hydrant (432)	0.0	0.0	0.0	0.000	0.0	0.0
83	Fence (382)	0.0	0.0	0.0	0.000	0.0	0.0
84	Pipeline (516)	0.0	0.0	0.0	0.000	0.0	0.0
85	Prescribed Forestry (409)	0.0	0.0	0.0	0.000	0.0	0.0
86	Shallow Water Development and Management (646)	0.0	0.0	0.0	0.000	0.0	0.0
87	Well Decommissioning (351)	0.0	0.0	0.0	0.000	0.0	0.0
88	Pond Sealing or Lining, Bentonite Sealant (521C)	0.5	0.9	-0.1	-0.008	-0.3	0.0
89	Pond Sealing or Lining, Compacted Clay Treatment (521D)	0.5	0.9	-0.1	-0.008	-0.3	0.0
90	Pond Sealing or Lining, Flexible Membrane (521A)	0.5	0.9	-0.1	-0.008	-0.3	0.0
91	Pond Sealing or Lining, Soil Dispersant (521B)	0.5	0.9	-0.1	-0.008	-0.3	0.0
92	Land Smoothing (466)	1.8	0.5	-0.2	-0.012	-0.4	-0.7
93	Drainage Water Management (554)	0.6	3.7	-0.4	-0.024	3.2	2.1
94	Water Well (642)	0.7	0.7	-0.4	-0.024	-0.3	-0.1
95	Bedding (310)	-0.2	-0.4	-0.6	-0.035	-1.6	-2.6
96	Early Successional Habitat Development/Management (647)	0.0	-0.3	-0.7	-0.039	0.0	0.0
97	Surface Drainage, Field Ditch (607)	-1.8	-2.9	-1.6	-0.090	-2.4	-2.9
98	Forest Trails and Landings (655)	-1.1	-0.9	-1.7	-0.098	-2.2	-1.3
99	Surface Drainage, Main or Lateral (608)	-2.1	-3.2	-1.9	-0.110	-1.6	-3.2
100	Aquaculture Ponds (397)	0.0	-1.9	-2.0	-0.118	-0.3	-2.2
101	Tree/Shrub Site Preparation (490)	-3.5	-2.4	-3.5	-0.204	-2.8	-0.3

Ranking of Ohio-USDA NRCS Practices Standard Effectiveness for Addressing Water Quality Impairment
 Table 4: Ranking of Practices addressing Pesticide Cause of Water Quality Impairment

Rank	Conservation Practice Standards	Cause of Water Quality Impairment					
		SED	NUT	H&H	PESTICIDE	ratio	PATH
1	Tree/Shrub Establishment (612)	13.4	8.7	13.2	15.7	1.000	4.0
2	Riparian Forest Buffer (391)	12.8	11.7	15.7	15.4	0.981	5.7
3	Conservation Cover (327)	11.2	10.5	10.1	14.4	0.916	4.1
4	Filter Strip (393)	11.8	12.3	12.1	14.3	0.907	4.1
5	Conservation Crop Rotation (328)	10.7	13.9	9.5	13.4	0.850	5.8
6	Pasture and Hay Planting (512)	10.4	14.6	10.1	13.2	0.841	6.4
7	Pest Management (595)	3.0	3.9	2.8	13.2	0.841	1.7
8	Prescribed Grazing (528)	11.7	11.2	10.0	13.1	0.832	4.6
9	Field Border (386)	10.3	10.7	10.1	12.8	0.813	4.1
10	Riparian Herbaceous Cover (390)	12.7	11.4	14.9	12.1	0.766	6.0
11	Forage Harvest Management (511)	6.0	8.3	5.6	10.9	0.692	3.8
12	Cover Crop (340)	10.9	10.2	9.5	10.7	0.682	3.8
13	Mulching (484)	11.2	8.8	11.1	10.6	0.673	2.8
14	Critical Area Planting (342)	18.6	10.6	17.2	10.1	0.645	2.7
15	Contour Buffer Strips (332)	10.0	9.9	9.5	7.9	0.505	3.1
16	Stripcropping (585)	10.3	7.2	9.7	7.9	0.505	1.1
17	Grassed Waterway (412)	9.0	7.1	7.6	7.8	0.495	2.1
18	Residue and Tillage Management, Ridge Till (346)	2.2	5.8	2.7	7.1	0.449	4.4
19	Residue and Tillage Management, No-Till/Strip Till/Direct Seed (329)	2.5	6.3	2.9	7.1	0.449	4.1
20	Land Reconstruction, Abandoned Mined Land (543)	13.4	7.1	12.0	7.1	0.449	3.7
21	Land Reconstruction, Currently Mined Land (544)	13.4	7.1	12.0	7.1	0.449	3.7
22	Windbreak/Shelterbelt Establishment (380)	3.4	3.2	2.0	6.5	0.411	0.7
23	Residue and Tillage Management, Mulch Till (345)	1.8	5.7	2.0	6.2	0.393	3.8
24	Windbreak/Shelterbelt Renovation (650)	2.8	2.3	1.4	6.0	0.383	0.7
25	Water and Sediment Control Basin (638)	11.0	6.7	10.7	5.7	0.364	2.6
26	Constructed Wetland (656)	7.1	8.3	6.6	5.6	0.355	4.2
27	Sediment Basin (350)	10.7	7.4	10.2	5.4	0.346	2.2
28	Forest Stand Improvement (666)	1.2	3.8	4.3	5.3	0.336	3.3
29	Agrichemical Mixing Facility (702)	0.0	3.9	0.9	5.3	0.336	0.0
30	Waste Utilization (633)	3.5	9.5	3.6	5.1	0.327	4.7
31	Herbaceous Wind Barriers (603)	4.6	3.8	4.9	5.1	0.327	1.0
32	Use Exclusion (472)	10.1	9.6	9.6	4.9	0.308	5.9
33	Contour Farming (330)	9.2	6.3	9.1	4.9	0.308	1.1
34	Cross Wind Trap Strips (589C)	5.6	3.7	5.5	4.9	0.308	0.0

Ranking of Ohio-USDA NRCS Practices Standard Effectiveness for Addressing Water Quality Impairment
 Table 4: Ranking of Practices addressing Pesticide Cause of Water Quality Impairment

Rank	Conservation Practice Standards	Cause of Water Quality Impairment					PATH
		SED	NUT	H&H	PESTICIDE	ratio	
35	Residue Management, Seasonal (344)	6.9	7.6	5.9	4.7	0.299	3.4
36	Wetland Creation (658)	4.1	5.6	4.0	4.7	0.299	2.1
37	Subsurface Drain (606)	7.0	0.2	6.0	4.3	0.271	-0.7
38	Wetland Restoration (657)	4.2	5.5	4.0	4.0	0.252	2.1
39	Wetland Enhancement (659)	3.8	5.3	3.7	4.0	0.252	2.1
40	Prescribed Burning (338)	6.0	4.3	5.0	4.0	0.252	0.2
41	Dike (356)	-0.4	1.2	0.5	4.0	0.252	0.0
42	Diversion (362)	8.2	4.1	7.5	3.5	0.224	1.1
43	Hedgerow Planting (422)	0.4	2.1	1.6	3.4	0.215	0.3
44	Drainage Water Management (554)	0.6	3.7	-0.4	3.2	0.206	2.1
45	Heavy Use Area Protection (561)	8.1	5.6	6.7	3.1	0.196	4.2
46	Wastewater Treatment Strip (635)	0.7	2.4	2.0	2.5	0.159	3.4
47	Grade Stabilization Structure (410)	5.3	2.2	5.4	2.4	0.150	0.0
48	Recreation Trail and Walkway (568)	7.3	3.3	7.4	2.4	0.150	-1.6
49	Wetland Wildlife Habitat Management (644)	2.2	1.7	2.2	2.2	0.140	1.1
50	Recreation Land Grading and Shaping (566)	4.5	2.1	4.3	2.2	0.140	0.0
51	Pond (378)	5.1	3.6	4.8	1.9	0.121	0.0
52	Livestock Use Area Protection (757)	3.6	3.7	3.1	1.8	0.112	2.7
53	Restoration and Management of Rare or Declining Habitats (643)	3.1	2.0	3.1	1.8	0.112	0.0
54	Nutrient Management (590)	0.9	10.6	1.7	1.5	0.093	5.1
55	Open Channel (582)	1.0	1.3	0.4	1.5	0.093	0.0
56	Tree/Shrub Pruning (660)	0.0	0.5	0.1	1.5	0.093	0.0
57	Roof Runoff Structure (558)	5.1	3.6	5.5	1.3	0.084	3.3
58	Lined Waterway or Outlet (468)	7.8	3.8	7.0	1.3	0.084	0.0
59	Streambank and Shoreline Protection (580)	7.1	2.8	7.2	1.3	0.084	1.1
60	Animal Trails and Walkways (575)	-0.3	0.5	0.4	1.3	0.084	1.0
61	Structure for Water Control (587)	3.4	2.4	4.6	1.3	0.084	0.0
62	Stream Habitat Improvement and Management (395)	2.6	1.4	3.5	1.3	0.084	0.0
63	Brush Management (314)	10.1	5.8	10.7	1.3	0.084	0.3
64	Waste Treatment Lagoon (359)	0.8	5.3	1.3	1.2	0.075	7.8
65	Animal Mortality Facility (316)	0.5	2.5	1.0	1.2	0.075	3.6
66	Underground Outlet (620)	7.1	1.1	6.1	1.2	0.075	-0.2
67	Upland Wildlife Habitat Management (645)	6.5	2.3	4.8	1.2	0.075	0.0
68	Waste Storage Facility (313)	0.7	5.8	0.7	1.0	0.065	4.6
69	Watering Facility (614)	5.0	1.7	5.1	0.9	0.056	1.1

Ranking of Ohio-USDA NRCS Practices Standard Effectiveness for Addressing Water Quality Impairment

Table 4: Ranking of Practices addressing Pesticide Cause of Water Quality Impairment

Rank	Conservation Practice Standards	Cause of Water Quality Impairment					
		SED	NUT	H&H	PESTICIDE	ratio	PATH
70	Access Road (560)	0.9	0.3	0.3	0.9	0.056	0.7
71	Stream Crossing (578)	3.3	0.4	3.0	0.9	0.056	-3.3
72	Solid/Liquid Waste Separation Facility (632)	0.5	3.6	0.7	0.7	0.047	4.2
73	Composting Facility (317)	0.5	3.1	0.7	0.4	0.028	4.6
74	Fishpond Management (399)	0.0	0.5	1.1	0.3	0.019	0.0
75	Pumping Plant (533)	1.1	0.3	0.0	0.3	0.019	0.0
76	Spring Development (574)	2.5	2.9	0.7	0.3	0.019	3.1
77	Closure of Waste Impoundment (360)	-0.1	0.9	0.8	0.1	0.009	-0.7
78	Manure Transfer (634)	0.3	3.3	0.4	0.0	0.000	5.3
79	Wildlife Watering Facility (648)	1.5	1.1	1.5	0.0	0.000	1.1
80	Dry Hydrant (432)	0.0	0.0	0.0	0.0	0.000	0.0
81	Fence (382)	0.0	0.0	0.0	0.0	0.000	0.0
82	Pipeline (516)	0.0	0.0	0.0	0.0	0.000	0.0
83	Prescribed Forestry (409)	0.0	0.0	0.0	0.0	0.000	0.0
84	Shallow Water Development and Management (646)	0.0	0.0	0.0	0.0	0.000	0.0
85	Well Decommissioning (351)	0.0	0.0	0.0	0.0	0.000	0.0
86	Early Successional Habitat Development/Management (647)	0.0	-0.3	-0.7	0.0	0.000	0.0
87	Clearing and Snagging (326)	3.2	0.3	2.6	-0.3	-0.019	0.0
88	Pond Sealing or Lining, Bentonite Sealant (521C)	0.5	0.9	-0.1	-0.3	-0.019	0.0
89	Pond Sealing or Lining, Compacted Clay Treatment (521D)	0.5	0.9	-0.1	-0.3	-0.019	0.0
90	Pond Sealing or Lining, Flexible Membrane (521A)	0.5	0.9	-0.1	-0.3	-0.019	0.0
91	Pond Sealing or Lining, Soil Dispersant (521B)	0.5	0.9	-0.1	-0.3	-0.019	0.0
92	Water Well (642)	0.7	0.7	-0.4	-0.3	-0.019	-0.1
93	Aquaculture Ponds (397)	0.0	-1.9	-2.0	-0.3	-0.019	-2.2
94	Fish Passage (396)	0.0	-0.4	1.4	-0.4	-0.028	0.0
95	Land Smoothing (466)	1.8	0.5	-0.2	-0.4	-0.028	-0.7
96	Surface Drainage, Main or Lateral (608)	-2.1	-3.2	-1.9	-1.6	-0.103	-3.2
97	Firebreak (394)	0.4	-0.3	0.1	-1.6	-0.103	1.0
98	Bedding (310)	-0.2	-0.4	-0.6	-1.6	-0.103	-2.6
99	Forest Trails and Landings (655)	-1.1	-0.9	-1.7	-2.2	-0.140	-1.3
100	Surface Drainage, Field Ditch (607)	-1.8	-2.9	-1.6	-2.4	-0.150	-2.9
101	Tree/Shrub Site Preparation (490)	-3.5	-2.4	-3.5	-2.8	-0.178	-0.3

Ranking of Ohio-USDA NRCS Practices Standard Effectiveness for Addressing Water Quality Impairment
 Table 5: Ranking of Practices addressing Pathogen Cause of Water Quality Impairment

Rank	Conservation Practice Standard	Cause of Water Quality Impairment					ratio
		SED	NUT	H&H	PEST	PATH	
1	Waste Treatment Lagoon (359)	0.8	5.3	1.3	1.2	7.8	1.000
2	Pasture and Hay Planting (512)	10.4	14.6	10.1	13.2	6.4	0.829
3	Riparian Herbaceous Cover (390)	12.7	11.4	14.9	12.1	6.0	0.771
4	Use Exclusion (472)	10.1	9.6	9.6	4.9	5.9	0.757
5	Conservation Crop Rotation (328)	10.7	13.9	9.5	13.4	5.8	0.743
6	Riparian Forest Buffer (391)	12.8	11.7	15.7	15.4	5.7	0.729
7	Manure Transfer (634)	0.3	3.3	0.4	0.0	5.3	0.686
8	Nutrient Management (590)	0.9	10.6	1.7	1.5	5.1	0.657
9	Waste Utilization (633)	3.5	9.5	3.6	5.1	4.7	0.600
10	Prescribed Grazing (528)	11.7	11.2	10.0	13.1	4.6	0.586
11	Waste Storage Facility (313)	0.7	5.8	0.7	1.0	4.6	0.586
12	Composting Facility (317)	0.5	3.1	0.7	0.4	4.6	0.586
13	Residue and Tillage Management, Ridge Till (346)	2.2	5.8	2.7	7.1	4.4	0.571
14	Constructed Wetland (656)	7.1	8.3	6.6	5.6	4.2	0.543
15	Heavy Use Area Protection (561)	8.1	5.6	6.7	3.1	4.2	0.543
16	Solid/Liquid Waste Separation Facility (632)	0.5	3.6	0.7	0.7	4.2	0.543
17	Filter Strip (393)	11.8	12.3	12.1	14.3	4.1	0.529
18	Field Border (386)	10.3	10.7	10.1	12.8	4.1	0.529
19	Conservation Cover (327)	11.2	10.5	10.1	14.4	4.1	0.529
20	Residue and Tillage Management, No-Till/Strip Till/Direct Seed (329)	2.5	6.3	2.9	7.1	4.1	0.529
21	Tree/Shrub Establishment (612)	13.4	8.7	13.2	15.7	4.0	0.514
22	Cover Crop (340)	10.9	10.2	9.5	10.7	3.8	0.486
23	Forage Harvest Management (511)	6.0	8.3	5.6	10.9	3.8	0.486
24	Residue and Tillage Management, Mulch Till (345)	1.8	5.7	2.0	6.2	3.8	0.486
25	Land Reconstruction, Abandoned Mined Land (543)	13.4	7.1	12.0	7.1	3.7	0.471
26	Land Reconstruction, Currently Mined Land (544)	13.4	7.1	12.0	7.1	3.7	0.471
27	Animal Mortality Facility (316)	0.5	2.5	1.0	1.2	3.6	0.457
28	Wastewater Treatment Strip (635)	0.7	2.4	2.0	2.5	3.4	0.443
29	Residue Management, Seasonal (344)	6.9	7.6	5.9	4.7	3.4	0.443
30	Forest Stand Improvement (666)	1.2	3.8	4.3	5.3	3.3	0.429
31	Roof Runoff Structure (558)	5.1	3.6	5.5	1.3	3.3	0.429
32	Contour Buffer Strips (332)	10.0	9.9	9.5	7.9	3.1	0.400
33	Spring Development (574)	2.5	2.9	0.7	0.3	3.1	0.400

Ranking of Ohio-USDA NRCS Practices Standard Effectiveness for Addressing Water Quality Impairment

Table 5: Ranking of Practices addressing Pathogen Cause of Water Quality Impairment

Rank	Conservation Practice Standard	Cause of Water Quality Impairment					
		SED	NUT	H&H	PEST	PATH	ratio
34	Mulching (484)	11.2	8.8	11.1	10.6	2.8	0.357
35	Critical Area Planting (342)	18.6	10.6	17.2	10.1	2.7	0.343
36	Livestock Use Area Protection (757)	3.6	3.7	3.1	1.8	2.7	0.343
37	Water and Sediment Control Basin (638)	11.0	6.7	10.7	5.7	2.6	0.329
38	Sediment Basin (350)	10.7	7.4	10.2	5.4	2.2	0.286
39	Grassed Waterway (412)	9.0	7.1	7.6	7.8	2.1	0.271
40	Wetland Creation (658)	4.1	5.6	4.0	4.7	2.1	0.271
41	Wetland Restoration (657)	4.2	5.5	4.0	4.0	2.1	0.271
42	Wetland Enhancement (659)	3.8	5.3	3.7	4.0	2.1	0.271
43	Drainage Water Management (554)	0.6	3.7	-0.4	3.2	2.1	0.271
44	Pest Management (595)	3.0	3.9	2.8	13.2	1.7	0.214
45	Stripcropping (585)	10.3	7.2	9.7	7.9	1.1	0.143
46	Contour Farming (330)	9.2	6.3	9.1	4.9	1.1	0.143
47	Diversion (362)	8.2	4.1	7.5	3.5	1.1	0.143
48	Streambank and Shoreline Protection (580)	7.1	2.8	7.2	1.3	1.1	0.143
49	Watering Facility (614)	5.0	1.7	5.1	0.9	1.1	0.143
50	Wetland Wildlife Habitat Management (644)	2.2	1.7	2.2	2.2	1.1	0.143
51	Wildlife Watering Facility (648)	1.5	1.1	1.5	0.0	1.1	0.143
52	Herbaceous Wind Barriers (603)	4.6	3.8	4.9	5.1	1.0	0.129
53	Animal Trails and Walkways (575)	-0.3	0.5	0.4	1.3	1.0	0.129
54	Firebreak (394)	0.4	-0.3	0.1	-1.6	1.0	0.129
55	Windbreak/Shelterbelt Establishment (380)	3.4	3.2	2.0	6.5	0.7	0.086
56	Windbreak/Shelterbelt Renovation (650)	2.8	2.3	1.4	6.0	0.7	0.086
57	Access Road (560)	0.9	0.3	0.3	0.9	0.7	0.086
58	Brush Management (314)	10.1	5.8	10.7	1.3	0.3	0.043
59	Hedgerow Planting (422)	0.4	2.1	1.6	3.4	0.3	0.043
60	Prescribed Burning (338)	6.0	4.3	5.0	4.0	0.2	0.029
61	Agrichemical Mixing Facility (702)	0.0	3.9	0.9	5.3	0.0	0.000
62	Lined Waterway or Outlet (468)	7.8	3.8	7.0	1.3	0.0	0.000
63	Cross Wind Trap Strips (589C)	5.6	3.7	5.5	4.9	0.0	0.000
64	Pond (378)	5.1	3.6	4.8	1.9	0.0	0.000
65	Structure for Water Control (587)	3.4	2.4	4.6	1.3	0.0	0.000
66	Upland Wildlife Habitat Management (645)	6.5	2.3	4.8	1.2	0.0	0.000
67	Grade Stabilization Structure (410)	5.3	2.2	5.4	2.4	0.0	0.000
68	Recreation Land Grading and Shaping (566)	4.5	2.1	4.3	2.2	0.0	0.000

Ranking of Ohio-USDA NRCS Practices Standard Effectiveness for Addressing Water Quality Impairment

Table 5: Ranking of Practices addressing Pathogen Cause of Water Quality Impairment

Rank	Conservation Practice Standard	Cause of Water Quality Impairment					
		SED	NUT	H&H	PEST	PATH	ratio
69	Restoration and Management of Rare or Declining Habitats (643)	3.1	2.0	3.1	1.8	0.0	0.000
70	Stream Habitat Improvement and Management (395)	2.6	1.4	3.5	1.3	0.0	0.000
71	Open Channel (582)	1.0	1.3	0.4	1.5	0.0	0.000
72	Dike (356)	-0.4	1.2	0.5	4.0	0.0	0.000
73	Pond Sealing or Lining, Bentonite Sealant (521C)	0.5	0.9	-0.1	-0.3	0.0	0.000
74	Pond Sealing or Lining, Compacted Clay Treatment (521D)	0.5	0.9	-0.1	-0.3	0.0	0.000
75	Pond Sealing or Lining, Flexible Membrane (521A)	0.5	0.9	-0.1	-0.3	0.0	0.000
76	Pond Sealing or Lining, Soil Dispersant (521B)	0.5	0.9	-0.1	-0.3	0.0	0.000
77	Fishpond Management (399)	0.0	0.5	1.1	0.3	0.0	0.000
78	Tree/Shrub Pruning (660)	0.0	0.5	0.1	1.5	0.0	0.000
79	Pumping Plant (533)	1.1	0.3	0.0	0.3	0.0	0.000
80	Clearing and Snagging (326)	3.2	0.3	2.6	-0.3	0.0	0.000
81	Dry Hydrant (432)	0.0	0.0	0.0	0.0	0.0	0.000
82	Fence (382)	0.0	0.0	0.0	0.0	0.0	0.000
83	Pipeline (516)	0.0	0.0	0.0	0.0	0.0	0.000
84	Prescribed Forestry (409)	0.0	0.0	0.0	0.0	0.0	0.000
85	Shallow Water Development and Management (646)	0.0	0.0	0.0	0.0	0.0	0.000
86	Well Decommissioning (351)	0.0	0.0	0.0	0.0	0.0	0.000
87	Early Successional Habitat Development/Management (647)	0.0	-0.3	-0.7	0.0	0.0	0.000
88	Fish Passage (396)	0.0	-0.4	1.4	-0.4	0.0	0.000
89	Water Well (642)	0.7	0.7	-0.4	-0.3	-0.1	-0.014
90	Underground Outlet (620)	7.1	1.1	6.1	1.2	-0.2	-0.029
91	Tree/Shrub Site Preparation (490)	-3.5	-2.4	-3.5	-2.8	-0.3	-0.043
92	Closure of Waste Impoundment (360)	-0.1	0.9	0.8	0.1	-0.7	-0.086
93	Land Smoothing (466)	1.8	0.5	-0.2	-0.4	-0.7	-0.086
94	Subsurface Drain (606)	7.0	0.2	6.0	4.3	-0.7	-0.086
95	Forest Trails and Landings (655)	-1.1	-0.9	-1.7	-2.2	-1.3	-0.171
96	Recreation Trail and Walkway (568)	7.3	3.3	7.4	2.4	-1.6	-0.200
97	Aquaculture Ponds (397)	0.0	-1.9	-2.0	-0.3	-2.2	-0.286
98	Bedding (310)	-0.2	-0.4	-0.6	-1.6	-2.6	-0.329
99	Surface Drainage, Field Ditch (607)	-1.8	-2.9	-1.6	-2.4	-2.9	-0.371
100	Surface Drainage, Main or Lateral (608)	-2.1	-3.2	-1.9	-1.6	-3.2	-0.414
101	Stream Crossing (578)	3.3	0.4	3.0	0.9	-3.3	-0.429

Ranking of Ohio-USDA NRCS Practices Standard Effectiveness for Addressing Water Quality Impairment
 Table 6: Ranking of Practices addressing combination of Sediment, Nutrients and Habitat & Hydromodification Causes of Water Quality Impairment

Rank	Resource Concern --->	Causes of Water Quality Impairment							CODE
		SED + NUT + H&H	ratio	SED	NUT	H&H	PEST	PATH	
1	Critical Area Planting (342)	46.4	1.000	18.6	10.6	17.2	10.1	2.7	342
2	Riparian Forest Buffer (391)	40.1	0.866	12.8	11.7	15.7	15.4	5.7	391
3	Riparian Herbaceous Cover (390)	39.0	0.842	12.7	11.4	14.9	12.1	6.0	390
4	Filter Strip (393)	36.2	0.781	11.8	12.3	12.1	14.3	4.1	393
5	Tree/Shrub Establishment (612)	35.2	0.759	13.4	8.7	13.2	15.7	4.0	612
6	Pasture and Hay Planting (512)	35.1	0.757	10.4	14.6	10.1	13.2	6.4	512
7	Conservation Crop Rotation (328)	34.2	0.738	10.7	13.9	9.5	13.4	5.8	328
8	Prescribed Grazing (528)	32.9	0.710	11.7	11.2	10.0	13.1	4.6	528
9	Land Reconstruction, Abandoned Mined Land (543)	32.5	0.701	13.4	7.1	12.0	7.1	3.7	543
10	Land Reconstruction, Currently Mined Land (544)	32.5	0.701	13.4	7.1	12.0	7.1	3.7	544
11	Conservation Cover (327)	31.8	0.685	11.2	10.5	10.1	14.4	4.1	327
12	Mulching (484)	31.2	0.674	11.2	8.8	11.1	10.6	2.8	484
13	Field Border (386)	31.1	0.671	10.3	10.7	10.1	12.8	4.1	386
14	Cover Crop (340)	30.6	0.660	10.9	10.2	9.5	10.7	3.8	340
15	Contour Buffer Strips (332)	29.4	0.633	10.0	9.9	9.5	7.9	3.1	332
16	Use Exclusion (472)	29.3	0.631	10.1	9.6	9.6	4.9	5.9	472
17	Water and Sediment Control Basin (638)	28.5	0.615	11.0	6.7	10.7	5.7	2.6	638
18	Sediment Basin (350)	28.3	0.610	10.7	7.4	10.2	5.4	2.2	350
19	Stripcropping (585)	27.2	0.587	10.3	7.2	9.7	7.9	1.1	585
20	Brush Management (314)	26.6	0.574	10.1	5.8	10.7	1.3	0.3	314
21	Contour Farming (330)	24.6	0.530	9.2	6.3	9.1	4.9	1.1	330
22	Grassed Waterway (412)	23.8	0.512	9.0	7.1	7.6	7.8	2.1	412
23	Constructed Wetland (656)	22.0	0.474	7.1	8.3	6.6	5.6	4.2	656
24	Residue Management, Seasonal (344)	20.4	0.441	6.9	7.6	5.9	4.7	3.4	344
25	Heavy Use Area Protection (561)	20.4	0.439	8.1	5.6	6.7	3.1	4.2	561
26	Forage Harvest Management (511)	20.0	0.430	6.0	8.3	5.6	10.9	3.8	511
27	Diversion (362)	19.8	0.427	8.2	4.1	7.5	3.5	1.1	362
28	Lined Waterway or Outlet (468)	18.6	0.401	7.8	3.8	7.0	1.3	0.0	468
29	Recreation Trail and Walkway (568)	18.0	0.389	7.3	3.3	7.4	2.4	-1.6	568
30	Streambank and Shoreline Protection (580)	17.1	0.368	7.1	2.8	7.2	1.3	1.1	580
31	Waste Utilization (633)	16.6	0.358	3.5	9.5	3.6	5.1	4.7	633
32	Prescribed Burning (338)	15.3	0.330	6.0	4.3	5.0	4.0	0.2	338
33	Cross Wind Trap Strips (589C)	14.7	0.318	5.6	3.7	5.5	4.9	0.0	589C
34	Underground Outlet (620)	14.3	0.309	7.1	1.1	6.1	1.2	-0.2	620
35	Roof Runoff Structure (558)	14.2	0.306	5.1	3.6	5.5	1.3	3.3	558

Ranking of Ohio-USDA NRCS Practices Standard Effectiveness for Addressing Water Quality Impairment
 Table 6: Ranking of Practices addressing combination of Sediment, Nutrients and Habitat & Hydromodification Causes of Water Quality Impairment

Rank	Resource Concern --->	Causes of Water Quality Impairment								CODE
		SED + NUT + H&H	ratio	SED	NUT	H&H	PEST	PATH		
36	Wetland Creation (658)	13.7	0.296	4.1	5.6	4.0	4.7	2.1	658	
37	Wetland Restoration (657)	13.7	0.296	4.2	5.5	4.0	4.0	2.1	657	
38	Upland Wildlife Habitat Management (645)	13.6	0.293	6.5	2.3	4.8	1.2	0.0	645	
39	Pond (378)	13.5	0.291	5.1	3.6	4.8	1.9	0.0	378	
40	Herbaceous Wind Barriers (603)	13.3	0.287	4.6	3.8	4.9	5.1	1.0	603	
41	Subsurface Drain (606)	13.2	0.285	7.0	0.2	6.0	4.3	-0.7	606	
42	Nutrient Management (590)	13.2	0.285	0.9	10.6	1.7	1.5	5.1	590	
43	Grade Stabilization Structure (410)	12.9	0.279	5.3	2.2	5.4	2.4	0.0	410	
44	Wetland Enhancement (659)	12.8	0.277	3.8	5.3	3.7	4.0	2.1	659	
45	Watering Facility (614)	11.8	0.255	5.0	1.7	5.1	0.9	1.1	614	
46	Residue and Tillage Management, No-Till/Strip Till/Direct Seed (329)	11.7	0.252	2.5	6.3	2.9	7.1	4.1	329	
47	Recreation Land Grading and Shaping (566)	10.8	0.234	4.5	2.1	4.3	2.2	0.0	566	
48	Residue and Tillage Management, Ridge Till (346)	10.7	0.230	2.2	5.8	2.7	7.1	4.4	346	
49	Livestock Use Area Protection (757)	10.4	0.224	3.6	3.7	3.1	1.8	2.7	757	
50	Structure for Water Control (587)	10.4	0.224	3.4	2.4	4.6	1.3	0.0	587	
51	Pest Management (595)	9.8	0.211	3.0	3.9	2.8	13.2	1.7	595	
52	Residue and Tillage Management, Mulch Till (345)	9.5	0.204	1.8	5.7	2.0	6.2	3.8	345	
53	Forest Stand Improvement (666)	9.2	0.199	1.2	3.8	4.3	5.3	3.3	666	
54	Windbreak/Shelterbelt Establishment (380)	8.5	0.184	3.4	3.2	2.0	6.5	0.7	380	
55	Restoration and Management of Rare or Declining Habitats (643)	8.2	0.177	3.1	2.0	3.1	1.8	0.0	643	
56	Stream Habitat Improvement and Management (395)	7.5	0.162	2.6	1.4	3.5	1.3	0.0	395	
57	Waste Treatment Lagoon (359)	7.4	0.159	0.8	5.3	1.3	1.2	7.8	359	
58	Waste Storage Facility (313)	7.3	0.156	0.7	5.8	0.7	1.0	4.6	313	
59	Stream Crossing (578)	6.7	0.145	3.3	0.4	3.0	0.9	-3.3	578	
60	Windbreak/Shelterbelt Renovation (650)	6.6	0.142	2.8	2.3	1.4	6.0	0.7	650	
61	Spring Development (574)	6.2	0.134	2.5	2.9	0.7	0.3	3.1	574	
62	Wetland Wildlife Habitat Management (644)	6.1	0.132	2.2	1.7	2.2	2.2	1.1	644	
63	Clearing and Snagging (326)	6.1	0.131	3.2	0.3	2.6	-0.3	0.0	326	
64	Wastewater Treatment Strip (635)	5.1	0.109	0.7	2.4	2.0	2.5	3.4	635	
65	Agrichemical Mixing Facility (702)	4.8	0.104	0.0	3.9	0.9	5.3	0.0	702	
66	Solid/Liquid Waste Separation Facility (632)	4.8	0.103	0.5	3.6	0.7	0.7	4.2	632	
67	Composting Facility (317)	4.2	0.092	0.5	3.1	0.7	0.4	4.6	317	
68	Animal Mortality Facility (316)	4.1	0.087	0.5	2.5	1.0	1.2	3.6	316	
69	Wildlife Watering Facility (648)	4.0	0.087	1.5	1.1	1.5	0.0	1.1	648	
70	Hedgerow Planting (422)	4.0	0.087	0.4	2.1	1.6	3.4	0.3	422	
71	Manure Transfer (634)	4.0	0.086	0.3	3.3	0.4	0.0	5.3	634	

Ranking of Ohio-USDA NRCS Practices Standard Effectiveness for Addressing Water Quality Impairment
 Table 6: Ranking of Practices addressing combination of Sediment, Nutrients and Habitat & Hydromodification Causes of Water Quality Impairment

Rank	Resource Concern --->	Causes of Water Quality Impairment							CODE
		SED + NUT + H&H	ratio	SED	NUT	H&H	PEST	PATH	
72	Drainage Water Management (554)	3.9	0.085	0.6	3.7	-0.4	3.2	2.1	554
73	Open Channel (582)	2.6	0.057	1.0	1.3	0.4	1.5	0.0	582
74	Land Smoothing (466)	2.0	0.044	1.8	0.5	-0.2	-0.4	-0.7	466
75	Fishpond Management (399)	1.6	0.035	0.0	0.5	1.1	0.3	0.0	399
76	Closure of Waste Impoundment (360)	1.6	0.035	-0.1	0.9	0.8	0.1	-0.7	360
77	Access Road (560)	1.6	0.034	0.9	0.3	0.3	0.9	0.7	560
78	Pumping Plant (533)	1.4	0.031	1.1	0.3	0.0	0.3	0.0	533
79	Pond Sealing or Lining, Bentonite Sealant (521C)	1.3	0.029	0.5	0.9	-0.1	-0.3	0.0	521(c)
80	Pond Sealing or Lining, Compacted Clay Treatment (521D)	1.3	0.029	0.5	0.9	-0.1	-0.3	0.0	521(d)
81	Pond Sealing or Lining, Flexible Membrane (521A)	1.3	0.029	0.5	0.9	-0.1	-0.3	0.0	521(a)
82	Pond Sealing or Lining, Soil Dispersant (521B)	1.3	0.029	0.5	0.9	-0.1	-0.3	0.0	521(b)
83	Dike (356)	1.2	0.026	-0.4	1.2	0.5	4.0	0.0	356
84	Fish Passage (396)	1.1	0.023	0.0	-0.4	1.4	-0.4	0.0	396
85	Water Well (642)	1.0	0.022	0.7	0.7	-0.4	-0.3	-0.1	642
86	Tree/Shrub Pruning (660)	0.7	0.014	0.0	0.5	0.1	1.5	0.0	660
87	Animal Trails and Walkways (575)	0.6	0.013	-0.3	0.5	0.4	1.3	1.0	575
88	Firebreak (394)	0.2	0.004	0.4	-0.3	0.1	-1.6	1.0	394
89	Dry Hydrant (432)	0.0	0.000	0.0	0.0	0.0	0.0	0.0	432
90	Fence (382)	0.0	0.000	0.0	0.0	0.0	0.0	0.0	382
91	Pipeline (516)	0.0	0.000	0.0	0.0	0.0	0.0	0.0	516
92	Prescribed Forestry (409)	0.0	0.000	0.0	0.0	0.0	0.0	0.0	409
93	Shallow Water Development and Management (646)	0.0	0.000	0.0	0.0	0.0	0.0	0.0	646
94	Well Decommissioning (351)	0.0	0.000	0.0	0.0	0.0	0.0	0.0	351
95	Early Successional Habitat Development/Management (647)	-1.0	-0.021	0.0	-0.3	-0.7	0.0	0.0	647
96	Bedding (310)	-1.1	-0.024	-0.2	-0.4	-0.6	-1.6	-2.6	310
97	Forest Trails and Landings (655)	-3.7	-0.080	-1.1	-0.9	-1.7	-2.2	-1.3	655
98	Aquaculture Ponds (397)	-3.9	-0.085	0.0	-1.9	-2.0	-0.3	-2.2	397
99	Surface Drainage, Field Ditch (607)	-6.2	-0.134	-1.8	-2.9	-1.6	-2.4	-2.9	607
100	Surface Drainage, Main or Lateral (608)	-7.1	-0.153	-2.1	-3.2	-1.9	-1.6	-3.2	608
101	Tree/Shrub Site Preparation (490)	-9.4	-0.202	-3.5	-2.4	-3.5	-2.8	-0.3	490

Ranking of Ohio-USDA NRCS Practices Standard Effectiveness for Addressing Water Quality Impairment
 Table 7: Ranking of Practices addressing combination of Sediment, Nutrients, Habitat & Hydromodification,
 Pathogen and Pesticide Causes of Water Quality Impairment

		Causes of Water Quality Impairment						
Rank	Conservation Program Practice Standards	S+N+HH+P+P	ratio	SED	NUT	H&H	PEST	PATH
1	Riparian Forest Buffer (391)	61.3	1.000	12.8	11.7	15.7	15.4	5.7
2	Critical Area Planting (342)	59.2	0.966	18.6	10.6	17.2	10.1	2.7
3	Riparian Herbaceous Cover (390)	57.1	0.932	12.7	11.4	14.9	12.1	6.0
4	Tree/Shrub Establishment (612)	54.9	0.897	13.4	8.7	13.2	15.7	4.0
5	Pasture and Hay Planting (512)	54.8	0.895	10.4	14.6	10.1	13.2	6.4
6	Filter Strip (393)	54.6	0.891	11.8	12.3	12.1	14.3	4.1
7	Conservation Crop Rotation (328)	53.4	0.871	10.7	13.9	9.5	13.4	5.8
8	Prescribed Grazing (528)	50.6	0.825	11.7	11.2	10.0	13.1	4.6
9	Conservation Cover (327)	50.3	0.821	11.2	10.5	10.1	14.4	4.1
10	Field Border (386)	48.0	0.784	10.3	10.7	10.1	12.8	4.1
11	Cover Crop (340)	45.1	0.736	10.9	10.2	9.5	10.7	3.8
12	Mulching (484)	44.6	0.728	11.2	8.8	11.1	10.6	2.8
13	Land Reconstruction, Abandoned Mined Land (543)	43.2	0.705	13.4	7.1	12.0	7.1	3.7
14	Land Reconstruction, Currently Mined Land (544)	43.2	0.705	13.4	7.1	12.0	7.1	3.7
15	Contour Buffer Strips (332)	40.4	0.660	10.0	9.9	9.5	7.9	3.1
16	Use Exclusion (472)	40.0	0.653	10.1	9.6	9.6	4.9	5.9
17	Water and Sediment Control Basin (638)	36.8	0.601	11.0	6.7	10.7	5.7	2.6
18	Stripcropping (585)	36.2	0.592	10.3	7.2	9.7	7.9	1.1
19	Sediment Basin (350)	36.0	0.587	10.7	7.4	10.2	5.4	2.2
20	Forage Harvest Management (511)	34.6	0.565	6.0	8.3	5.6	10.9	3.8
21	Grassed Waterway (412)	33.7	0.550	9.0	7.1	7.6	7.8	2.1
22	Constructed Wetland (656)	31.8	0.519	7.1	8.3	6.6	5.6	4.2
23	Contour Farming (330)	30.5	0.498	9.2	6.3	9.1	4.9	1.1
24	Residue Management, Seasonal (344)	28.6	0.467	6.9	7.6	5.9	4.7	3.4
25	Brush Management (314)	28.3	0.462	10.1	5.8	10.7	1.3	0.3
26	Heavy Use Area Protection (561)	27.7	0.452	8.1	5.6	6.7	3.1	4.2
27	Waste Utilization (633)	26.4	0.431	3.5	9.5	3.6	5.1	4.7
28	Pest Management (595)	24.7	0.403	3.0	3.9	2.8	13.2	1.7
29	Diversion (362)	24.4	0.399	8.2	4.1	7.5	3.5	1.1
30	Residue and Tillage Management, No-Till/Strip Till/Direct Seed (329)	22.9	0.373	2.5	6.3	2.9	7.1	4.1
31	Residue and Tillage Management, Ridge Till (346)	22.2	0.362	2.2	5.8	2.7	7.1	4.4
32	Wetland Creation (658)	20.6	0.336	4.1	5.6	4.0	4.7	2.1
33	Lined Waterway or Outlet (468)	19.9	0.325	7.8	3.8	7.0	1.3	0.0
34	Wetland Restoration (657)	19.8	0.324	4.2	5.5	4.0	4.0	2.1
35	Nutrient Management (590)	19.8	0.323	0.9	10.6	1.7	1.5	5.1

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Rank	Conservation Program Practice Standards	Causes of Water Quality Impairment						
		S+N+HH+P+P	ratio	SED	NUT	H&H	PEST	PATH
36	Cross Wind Trap Strips (589C)	19.6	0.320	5.6	3.7	5.5	4.9	0.0
37	Streambank and Shoreline Protection (580)	19.5	0.318	7.1	2.8	7.2	1.3	1.1
38	Prescribed Burning (338)	19.5	0.318	6.0	4.3	5.0	4.0	0.2
39	Herbaceous Wind Barriers (603)	19.5	0.318	4.6	3.8	4.9	5.1	1.0
40	Residue and Tillage Management, Mulch Till (345)	19.4	0.317	1.8	5.7	2.0	6.2	3.8
41	Wetland Enhancement (659)	18.9	0.309	3.8	5.3	3.7	4.0	2.1
42	Roof Runoff Structure (558)	18.9	0.308	5.1	3.6	5.5	1.3	3.3
43	Recreation Trail and Walkway (568)	18.8	0.307	7.3	3.3	7.4	2.4	-1.6
44	Forest Stand Improvement (666)	17.9	0.292	1.2	3.8	4.3	5.3	3.3
45	Subsurface Drain (606)	16.8	0.275	7.0	0.2	6.0	4.3	-0.7
46	Waste Treatment Lagoon (359)	16.3	0.267	0.8	5.3	1.3	1.2	7.8
47	Windbreak/Shelterbelt Establishment (380)	15.7	0.256	3.4	3.2	2.0	6.5	0.7
48	Pond (378)	15.4	0.251	5.1	3.6	4.8	1.9	0.0
49	Grade Stabilization Structure (410)	15.3	0.249	5.3	2.2	5.4	2.4	0.0
50	Underground Outlet (620)	15.3	0.249	7.1	1.1	6.1	1.2	-0.2
51	Livestock Use Area Protection (757)	14.8	0.242	3.6	3.7	3.1	1.8	2.7
52	Upland Wildlife Habitat Management (645)	14.8	0.241	6.5	2.3	4.8	1.2	0.0
53	Watering Facility (614)	13.8	0.225	5.0	1.7	5.1	0.9	1.1
54	Windbreak/Shelterbelt Renovation (650)	13.3	0.217	2.8	2.3	1.4	6.0	0.7
55	Recreation Land Grading and Shaping (566)	13.1	0.213	4.5	2.1	4.3	2.2	0.0
56	Waste Storage Facility (313)	12.8	0.210	0.7	5.8	0.7	1.0	4.6
57	Structure for Water Control (587)	11.7	0.191	3.4	2.4	4.6	1.3	0.0
58	Wastewater Treatment Strip (635)	11.0	0.180	0.7	2.4	2.0	2.5	3.4
59	Agrichemical Mixing Facility (702)	10.1	0.165	0.0	3.9	0.9	5.3	0.0
60	Restoration and Management of Rare or Declining Habitats (643)	10.0	0.163	3.1	2.0	3.1	1.8	0.0
61	Solid/Liquid Waste Separation Facility (632)	9.7	0.159	0.5	3.6	0.7	0.7	4.2
62	Spring Development (574)	9.6	0.157	2.5	2.9	0.7	0.3	3.1
63	Wetland Wildlife Habitat Management (644)	9.4	0.154	2.2	1.7	2.2	2.2	1.1
64	Manure Transfer (634)	9.3	0.152	0.3	3.3	0.4	0.0	5.3
65	Drainage Water Management (554)	9.3	0.152	0.6	3.7	-0.4	3.2	2.1
66	Composting Facility (317)	9.2	0.151	0.5	3.1	0.7	0.4	4.6
67	Stream Habitat Improvement and Management (395)	8.8	0.144	2.6	1.4	3.5	1.3	0.0
68	Animal Mortality Facility (316)	8.8	0.143	0.5	2.5	1.0	1.2	3.6
69	Hedgerow Planting (422)	7.7	0.126	0.4	2.1	1.6	3.4	0.3
70	Clearing and Snagging (326)	5.8	0.095	3.2	0.3	2.6	-0.3	0.0
71	Dike (356)	5.2	0.085	-0.4	1.2	0.5	4.0	0.0

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Rank	Conservation Program Practice Standards	Causes of Water Quality Impairment						
		S+N+HH+P+P	ratio	SED	NUT	H&H	PEST	PATH
72	Wildlife Watering Facility (648)	5.1	0.084	1.5	1.1	1.5	0.0	1.1
73	Stream Crossing (578)	4.3	0.069	3.3	0.4	3.0	0.9	-3.3
74	Open Channel (582)	4.1	0.067	1.0	1.3	0.4	1.5	0.0
75	Access Road (560)	3.1	0.051	0.9	0.3	0.3	0.9	0.7
76	Animal Trails and Walkways (575)	2.9	0.048	-0.3	0.5	0.4	1.3	1.0
77	Tree/Shrub Pruning (660)	2.1	0.035	0.0	0.5	0.1	1.5	0.0
78	Fishpond Management (399)	1.9	0.031	0.0	0.5	1.1	0.3	0.0
79	Pumping Plant (533)	1.7	0.028	1.1	0.3	0.0	0.3	0.0
80	Closure of Waste Impoundment (360)	1.1	0.018	-0.1	0.9	0.8	0.1	-0.7
81	Pond Sealing or Lining, Bentonite Sealant (521C)	1.0	0.017	0.5	0.9	-0.1	-0.3	0.0
82	Pond Sealing or Lining, Compacted Clay Treatment (521D)	1.0	0.017	0.5	0.9	-0.1	-0.3	0.0
83	Pond Sealing or Lining, Flexible Membrane (521A)	1.0	0.017	0.5	0.9	-0.1	-0.3	0.0
84	Pond Sealing or Lining, Soil Dispersant (521B)	1.0	0.017	0.5	0.9	-0.1	-0.3	0.0
85	Land Smoothing (466)	0.9	0.015	1.8	0.5	-0.2	-0.4	-0.7
86	Fish Passage (396)	0.6	0.010	0.0	-0.4	1.4	-0.4	0.0
87	Water Well (642)	0.6	0.010	0.7	0.7	-0.4	-0.3	-0.1
88	Dry Hydrant (432)	0.0	0.000	0.0	0.0	0.0	0.0	0.0
89	Fence (382)	0.0	0.000	0.0	0.0	0.0	0.0	0.0
90	Pipeline (516)	0.0	0.000	0.0	0.0	0.0	0.0	0.0
91	Prescribed Forestry (409)	0.0	0.000	0.0	0.0	0.0	0.0	0.0
92	Shallow Water Development and Management (646)	0.0	0.000	0.0	0.0	0.0	0.0	0.0
93	Well Decommissioning (351)	0.0	0.000	0.0	0.0	0.0	0.0	0.0
94	Firebreak (394)	-0.4	-0.007	0.4	-0.3	0.1	-1.6	1.0
95	Early Successional Habitat Development/Management (647)	-1.0	-0.016	0.0	-0.3	-0.7	0.0	0.0
96	Bedding (310)	-5.3	-0.087	-0.2	-0.4	-0.6	-1.6	-2.6
97	Aquaculture Ponds (397)	-6.4	-0.105	0.0	-1.9	-2.0	-0.3	-2.2
98	Forest Trails and Landings (655)	-7.3	-0.118	-1.1	-0.9	-1.7	-2.2	-1.3
99	Surface Drainage, Field Ditch (607)	-11.4	-0.187	-1.8	-2.9	-1.6	-2.4	-2.9
100	Surface Drainage, Main or Lateral (608)	-12.0	-0.195	-2.1	-3.2	-1.9	-1.6	-3.2
101	Tree/Shrub Site Preparation (490)	-12.5	-0.204	-3.5	-2.4	-3.5	-2.8	-0.3