

Final Report

Tasks 1, 2, and 3

For Project Entitled

**Nutrient Loading Rates, Reduction Factors and
Implementation Costs Associated with BMPs and
Technologies**

Prepared for

South Florida Water Management District

by

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INTRODUCTION

The South Florida Water Management District (SFWMD), in cooperation with the Florida Department of Environmental Protection (FDEP) and the Florida Department of Agriculture and Consumer Services (FDACS), is developing the protection plans for both Caloosahatchee River and St. Lucie River watersheds as required by the Northern Everglades and Estuaries Protection Program (Section 373.4595, F.S). The plans will be developed partially based on a nutrient reduction spreadsheet approach detailing how nitrogen (N) and phosphorus (P) reductions will be achieved. The spreadsheet provides load reduction estimates resulting from Best Management Practices (BMPs), as well as local and regional projects. The letter report titled "Phosphorus Reduction Performance and Implementation Costs under BMPs and Technologies in the Lake Okeechobee Protection Plan Area" provides only part of the input data needed for the BMP spreadsheet for these additional watersheds. Therefore, the overall objectives of this project are to: 1) develop nutrient (nitrogen and phosphorus) loading rates, BMP reduction factors and implementation costs for both watersheds; and 2) conduct a detailed literature review and data analysis to quantify the BMP effectiveness for each commodity and soil type statewide.

METHODOLOGY AND RESULTS

The approach taken for developing the nutrient reduction spreadsheets for Caloosahatchee River and St. Lucie River watersheds was to update the previously developed spreadsheets for the Lake Okeechobee watershed using the additional literature data, land use data, observed flow and nutrient load data, and information from the watershed modeling project for the two watersheds. The SFWMD provided the land use breakdown for the two watersheds for twenty major land use categories, which included the six new land use categories (low density residential, medium density residential, high density residential, horse farms, transportation, and utilities). The following section describes how these data were used to develop the final unit nutrient load and BMP reduction spreadsheets. Though the methodology was very similar for both the Caloosahatchee and the St. Lucie watersheds, they are both included in order to highlight data sources and verification differences.

St. Lucie River Watershed

Figure 1 shows the basins within the St. Lucie River watershed. The 2004 land use distribution for this watershed was provided by SFWMD and is presented in Table 1. As can be seen, the table provides additional land use breakdowns beyond the twenty primary land use categories required for the project. These additional data were used during the development of the unit loads, but were integrated within the twenty categories for the final tables to prevent confusion. Measured data were provided by the SFWMD as presented in Table 2, which compared to data obtained from the Comprehensive Everglades Restoration Plan (CERP) System-wide Performance Measure Documentation Sheet (April 5, 2007).

The initial estimates of the unit nutrient loads were developed from the Lake Okeechobee Basin data provided in the BMP Letter Report (SWET, 2006b), general Florida estimates by Harper and Baker (2003 and 2007), and data collected within the basin by Graves, et al (2004). The

final N and P unit loads for the watershed presented in Table 3 were developed as an iterative process starting with the initial unit loads estimates linked to a basin spreadsheet where the accumulative N and P loads from each basin could be calculated by multiplying the land use acreage by the unit loads. The net N and P loads were then compared to the measured basin and basin loads to verify if the net loads were at least in the ballpark and how the calculated and measured N and P loads for each of the basins compared. It was clear that the dominant land uses in the western basins were improved pasture and citrus while the eastern basins were much more residential and urban. Using this cross information, it was possible to estimate the relative importance of the various land uses and adjustments were made accordingly to obtain a reasonable agreement of runoff and nutrient loads and concentrations for each of the basins. However, it was observed that there was a potential problem using the measured flow data for net load estimates because of the high runoff variability between basins as seen in Table 2 for the annual runoff in terms of inches per year. Therefore, the cross basin comparisons focused more on matching the concentrations because they would be less influenced by any flow errors that might be the result of unmeasured inter-basin transfers. Since the unit loads are a function of both concentration and flow, it was first necessary to establish reasonable runoff coefficients for the various land uses (Harper and Baker, 2007). The resulting annual average runoff for the various land uses are provided in Table 3. Table 3 also provides the resulting N and P unit loads and concentrations from the iterative process of adjusting individual land use unit loads, which multiplied by the acreage of each land use within the basins (Table 4) to obtain reasonable basin runoff (Table 5), P loads (Table 6), and N loads (Table 7) comparison to observed data. The P unit load factors were adjusted individually. The N unit loads were also initially adjusted individually, but then a global multiplier factor was used to obtain reasonable matches to observed data. The verification for the N and P concentrations is also provided in Tables 6 and 7, respectively at the bottom of the tables. Note that the net calculated loads are slightly higher than observed data because these represent net source loads which do not reflect the additional assimilation that is expected in the stream and canals before reaching the basin outlets. Stream assimilation rates have been evaluated and new algorithms developed and upgraded by SWET (2001 and 2006a), where they found that P assimilation (20% to 50%) occurs mostly in the upland overland flow and small streams. Major sloughs/wetland systems were also found to have P assimilation rates in a similar range, while P assimilation rates in the canals and larger stream conveyances had much lower rates of 2% to 20%. Since the predominant flow features, below where the unit P source loads are, being estimated are canals and larger stream, the additional P assimilation was estimated to be in the order of 10%. Due to denitrification processes, N assimilation was estimated to be 50% larger than P, but very little data are available to verify the N values.

The next step was to establish BMP N and P reduction estimates for the St. Lucie watershed. This task was done by starting with the BMP reduction spreadsheets developed by SWET (2006b). These spreadsheets were expanded to include six additional land use categories and N responses. The BMP effectiveness values are based on the review and the author's involvement in numerous studies and modeling projects around Florida. Typically, the studies provided more information on crop responses to water and fertility management than water quality responses. Where water quality responses were available, they were limited to specific crop management and soil conditions. There are no specific reports that provided BMP effectiveness values for the basin; therefore, the values for the St. Lucie watershed had to be estimated based on best

professional judgment utilizing models that simulate the primary processes within the soil-plant environment based on results from numerous field and laboratory studies.

A complete description of the BMP information used in developing the BMP effectiveness values will be provided in the Task 4 report of this project, and therefore will only be briefly summarized here. The primary sources of agricultural BMP information were research and extension reports completed by Institute of Food and Agriculture Sciences, University of Florida (IFAS, UF) in association with various state agencies and grower groups, while urban BMP information was primarily from summary reports by Environmental Research and Design, Inc. and University of Central Florida. For citrus, the studies by Brian Bowman and David Calvert at the Indian River Research and Education Center and Ashok Alva and S. Paramasivam at the Citrus Research and Education Center were primarily used, while the best source of cow-calf production studies came from the Cattle Research Station at Ona and the Buck Island Ranch studies. Vegetable production BMPs were reviewed from research studies across the state, but focused mostly on work out of IFAS' Gulf Coast (Immokalee) and the old Bradenton Research and Education Centers. Though many of the research studies focused more on crop production responses to management practices as opposed to water quality responses, their results were very useful in bracketing the economical feasibility limits for BMPs. To further access the actual water quality responses, both field studies and hydrologic transport modeling were evaluated. The Watershed Assessment Model (WAM) model was used extensively in the Okeechobee and Caloosahatchee basins and provided BMP responses beyond the specific conditions covered by field studies.

A report developed by Dr. Harvey Harper (2003) for the northern Lake Okeechobee watershed was primarily used for the urban BMPs responses for P. Nitrogen responses were taken from reports developed by Harper and Baker (2003, 2007). The N reduction estimates were adjusted based on WAM modeling experience because the reductions reported by Harper and Baker were only associated with surface water reductions and therefore any losses to groundwater that might re-emerge elsewhere were not being accounted for. In particular, N in percolated stormwater can easily enter groundwater and eventually re-emerge downstream. This effect is most prominent in dry detention systems.

BMP implementation costs were typically not provided with the research studies and therefore had to be developed by SWET, Inc. Cost estimates tried to take into account the following factors: saved fertilizer, equipment and construction, operation and maintenance, energy/fuel, crop yield reduction, crop displacement, and land purchases. In agriculture when a BMP requires additional land for BMPs, such as for retention/detention systems, the area is typically carved out of existing land holdings, so the costs are associated with lost crop production (displacement), where as in urban settings, new land will typically need to be purchased for such systems. High land costs in urban settings will therefore make urban projects, particularly stormwater retrofit projects, very expensive.

The resulting BMP reduction estimates and costs for P and N are presented in Appendix A. These tables reflect the updated unit loads provided in Table 3. Table 8 provides a summary of the P unit loads and estimated BMP reduction factors for the three categories of owner implemented BMPs, cost share BMPs, and alternative practices. Owner implemented BMPs

reflect those that would likely be implemented by land owners without incentives, while the cost share BMPs are those that a reasonably funded cost share program or modest regulatory approach would obtain implementation. The alternative practices are those that are more expensive but would be needed if additional nutrient reductions are needed beyond what the first two levels could obtain. The P reduction values provided in Table 8 are taken directly from Appendix A where the existing level of BMPs implemented has been taken into account in the “typical” value. The “typical” value was selected within the presented range of reduction responses that reflect existing conditions with no BMPs to those with high levels of BMPs implemented. These ranges also reflect natural variations due to soils and farm layouts, but the level of BMP implementation is the dominant factor. Therefore, assumptions had to be made as to the current level of BMPs for each land use.

Table 9 provides the same information as Table 8 except for N instead of P. This table provides a summary of the N unit loads and estimated BMP reduction factors for the three categories of owner implemented BMPs, cost share BMPs, and alternative practices.

Caloosahatchee River Watershed

Figure 2 shows the basins within the Caloosahatchee watershed. The 2004 land use distribution for the Caloosahatchee watershed was provided by SFWMD and is presented in Table 10. As can be seen, the table provides additional land use breakdowns beyond the twenty primary land use categories required for the project. These additional data were used during the development of the unit loads, but were integrated within the twenty categories for the final tables to prevent confusion. Measured data for the major structures on the C-43 canal were provided by the SFWMD and are presented in Table 11. Because of the influence of the Lake Okeechobee releases, only the basin (Freshwater West) between the S-78 and S-79 structures was considered reliable enough for comparisons to actual land source area discharges. Unmonitored flow releases from the Lake Okeechobee, Nicodemus Slough, and the S-4 basin into the Freshwater East basin were considered more problematic than potential bypass water around S-78 as documented by the WAM model results (SWET, 2008). Therefore, the loads differences between these two structures shown in Table 11 were used for verification of the land use unit loads. The high measured discharge rates are a concern and are discussed further below.

The initial estimates of the unit nutrient loads were developed from the Okeechobee Basin data provided in the BMP Letter Report (SWET, 2006b), general Florida estimates by Harper and Baker (2003 and 2007), WMM EMC estimates developed by CDM (2007), and the WAM modeling results for the USACE (SWET, 2008). The final N and P unit loads for the C-43 basin presented in Table 12 were developed as an iterative process starting with the initial unit loads estimates linked to a basin spreadsheet where the accumulative N and P loads from each basin could be calculated by multiplying the land use acreage by the unit loads. The net N and P loads were then compared to the measured basin and basin loads to verify if the net loads were at least in the ballpark and how the calculated and measured N and P loads for each of the basins compared. It was clear that the dominant land uses in the western basins were improved pasture and citrus with limited urban around the Le Belle area. The more highly developed area is located in the western (tidal and north coastal) basins. Using just the Freshwater West basin, however, it was possible to estimate the relative importance of the various land uses and

adjustments were made accordingly to obtain a reasonable agreement of runoff and nutrient loads and concentrations for each of the basins. However, it was observed that measured runoff for the Freshwater West basin seems high at 22 inches per year as seen in Table 14, which makes the unit loads higher than expected. Therefore, the basin comparisons focused more on matching the concentrations because they would be less influenced by any flow errors that might be the result of unmeasured inter-basin transfers. Since the unit loads are a function of both concentration and flow, it was first necessary to establish reasonable runoff coefficients for the various land uses (Harper and Baker, 2007). The resulting annual average runoff for the various land uses are provided in Table 12. Table 12 also provides the resulting N and P unit loads and concentrations from the iterative process of adjusting individual land use unit loads which multiplied by the acreage of each land use within the basins (Table 13) to obtain reasonable basin runoff (Table 14), P loads (Table 15), and N loads (Table 16) comparison to observed data. The P unit load factors were adjusted individually. The N unit loads were also initially adjusted individually, but then a global multiplier factor was used to obtain reasonable matches to observed data at the basin level. The verification for the N and P loads and concentrations is also provided in Tables 15 and 16, respectively at the bottom of the tables. Note that the net calculated loads and concentrations are slightly higher than observed data because these represent net source loads which do not reflect the additional assimilation that is expected in the streams and canals before reaching the basin outlets. In-stream assimilation rates have been evaluated and new algorithms developed and upgraded by SWET (2001 and 2006a), where they found that P assimilation (20% to 50%) occurs mostly in the upland overland flow and small streams. Major sloughs/wetland systems were also found to have P assimilation rates in a similar range, while P assimilation rates in the canals and larger stream conveyances had much lower rates of 2% to 20%. Since the predominant flow features below where the unit P source loads are being estimated are canals and larger stream, the additional P assimilation was estimated to be in the order of 10%. Due to denitrification processes, N assimilation was estimated to be 50% larger than P, but very little data are available to verify the N values.

The next step was to establish BMP N and P reduction estimates for the Caloosahatchee watershed. This task was done by starting with the BMP reduction spreadsheets developed by SWET (2006b). These spreadsheets were expanded to include six additional land use categories and N responses. The BMP effectiveness values are based on the review and personal involvement in numerous studies and modeling projects around Florida. Typically, the studies provided more information on crop responses to water and fertility management than water quality responses. Where water quality responses were available they were limited to specific crop management and soil conditions. There are no specific reports that provided BMP effectiveness values for the basin and therefore the values for the C-43 had to be estimated based on best professional judgment utilizing models that simulate the primary processes within the soil-plant environment based on results from numerous field and laboratory studies.

A complete description of the BMP information used in developed the BMP effectiveness values will be provided in the Task 4 report of this project, and therefore will only be briefly summarized here. The primary sources of agricultural BMP information were research and extension reports completed by IFAS in association with various state agencies and grower groups, while urban BMP information were primarily from summary reports by Environmental Research and Design, Inc. and University of Central Florida. For all of the crops growth on the

muck soils in the eastern part of the basin, particularly sugarcane and vegetable, studies done by the Everglades Research and Education Center were used. For citrus the studies by Brian Bowman and David Calvert at the Indian River Research and Education Center and Ashok Alva and S. Paramasivam at the Citrus Research and Education Center were primarily used, while the best source of cow-calf production studies came from the Cattle Research Station at Ona and the Buck Island Ranch studies. Vegetable production BMPs were reviewed from research studies across the state, but focused mostly on work out of IFAS' Gulf Coast (Immokalee) and the old Bradenton Research and Education Centers. Though many of the research studies focused more on crop production responses to management practices as opposed to water quality responses, their results were very useful in bracketing the economical feasibility limits for BMPs. To further access the actual water quality responses both field studies and hydrologic transport modeling was evaluated. The WAM model was used extensively in the Okeechobee and Caloosahatchee basins and provided BMP responses beyond the specific conditions covered by field studies.

A report developed by Dr. Harvey Harper (2003) for the northern Lake Okeechobee watershed was primarily used for the urban BMPs responses for P. Nitrogen responses were taken from reports developed by Harper and Baker (2003, 2007). The N reduction estimates were adjusted based on WAM modeling experience because the reductions reported by Harper and Baker were only associated with surface water reductions and therefore any losses to groundwater that might re-emerge elsewhere were not being accounted for. In particular, nitrogen in percolated stormwater can easily enter groundwater and eventually re-emerge downstream. This effect is most prominent in dry detention systems.

BMP implementation costs were typically not provided with the research studies and therefore had to be developed by SWET, Inc. Cost estimates tried to take into account the following factors: saved fertilizer, equipment and construction, operation and maintenance, energy/fuel, crop yield reduction, crop displacement, and land purchases. In agriculture when a BMP requires additional land for BMPs, such as for retention/detention systems, the area is typically carved out of existing land holdings so the costs are associated with lost crop production (displacement), where as in urban settings, new land will typically need to be purchased for such systems. High land costs in urban settings will therefore make urban projects, particularly stormwater retrofit projects, very expensive.

The resulting BMP reduction estimates and costs for P and N are presented in Appendix B. These tables reflect the updated unit loads provided in Table 12. Table 17 provides a summary of the P unit loads and estimated BMP reduction factors for the three categories of owner implemented BMPs, cost share BMPs, and alternative practices. Owner implemented BMPs reflect those that would likely be implemented by land owners without incentives, while the cost share BMPs are those that a reasonably funded cost share program or modest regulatory approach would obtain implementation. The alternative practices are those that are more expensive but would be needed if additional nutrient reductions are needed beyond what the first two levels could obtain. The nutrient reduction values provided in Table 17 are taken directly from Appendix B where the existing level of BMPs implemented has been taken into account in the "typical" value. The "typical" value was selected within the presented range of reduction responses that reflect existing conditions with no BMPs to those with high levels of BMPs

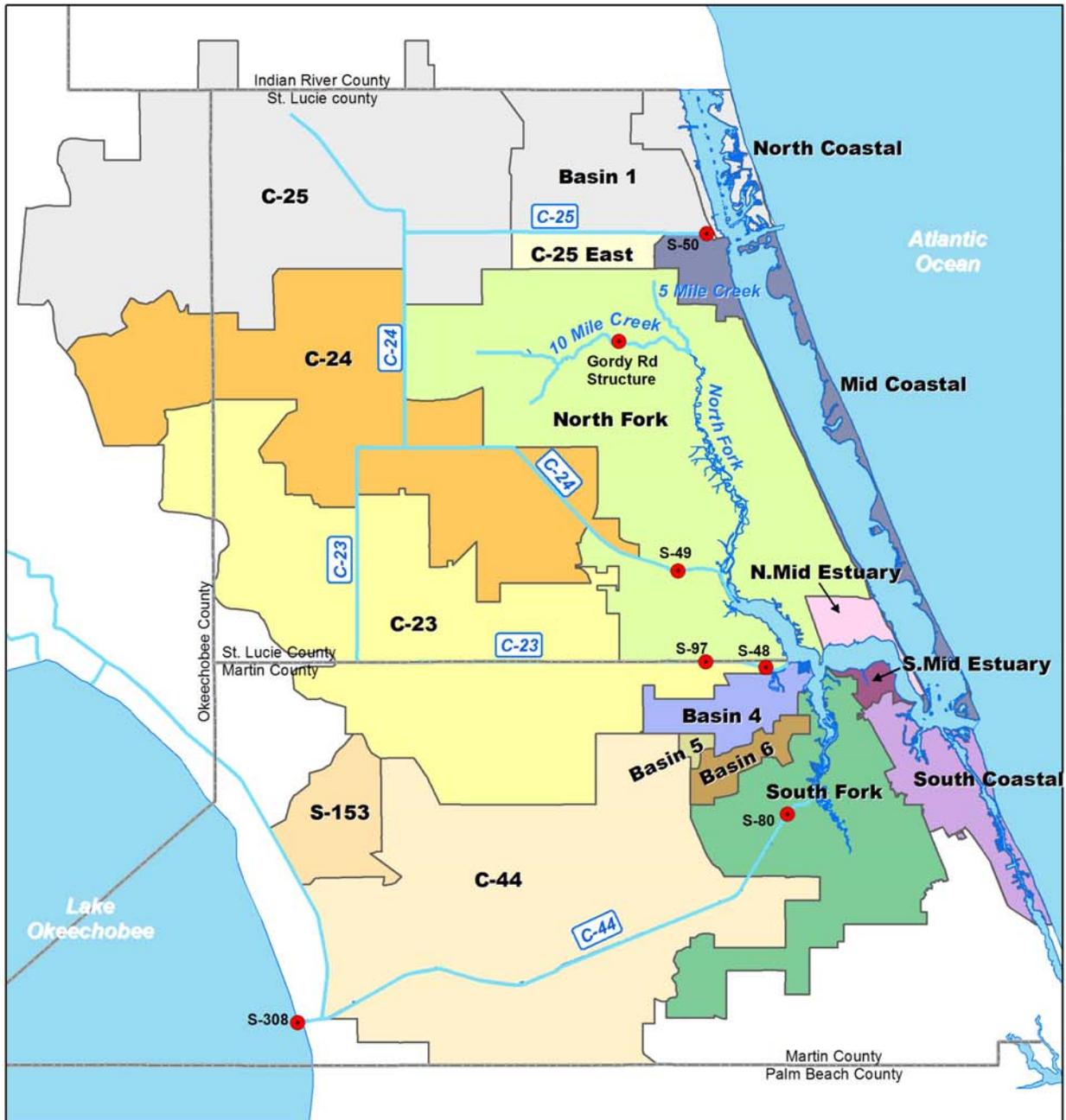
implemented. These ranges also reflect natural variations due to soils and farm layouts, but the level of BMP implementation is the dominant factor. Therefore, assumptions had to be made as to the current level of BMPs for each land use.

Table 18 provides the same information as Table 17 except for N. This table provides a summary of the N unit loads and estimated BMP reduction factors for the three categories of owner implemented BMPs, cost share BMPs, and alternative practices.

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Figure 1. Basin Layout for the St. Lucie River Watershed



Indian River Lagoon and St. Lucie Estuary Watershed With Primary Basins

* C-25, Basin 1, and North Coastal Drainage Basins Flow directly into the Indian River Lagoon

● SFWMD Structures/ WQM Monitoring Sites

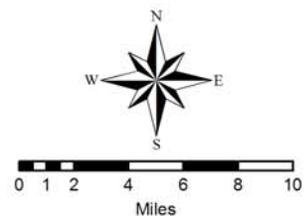


Figure 2. Basin Layout for the Caloosahatchee River Watershed

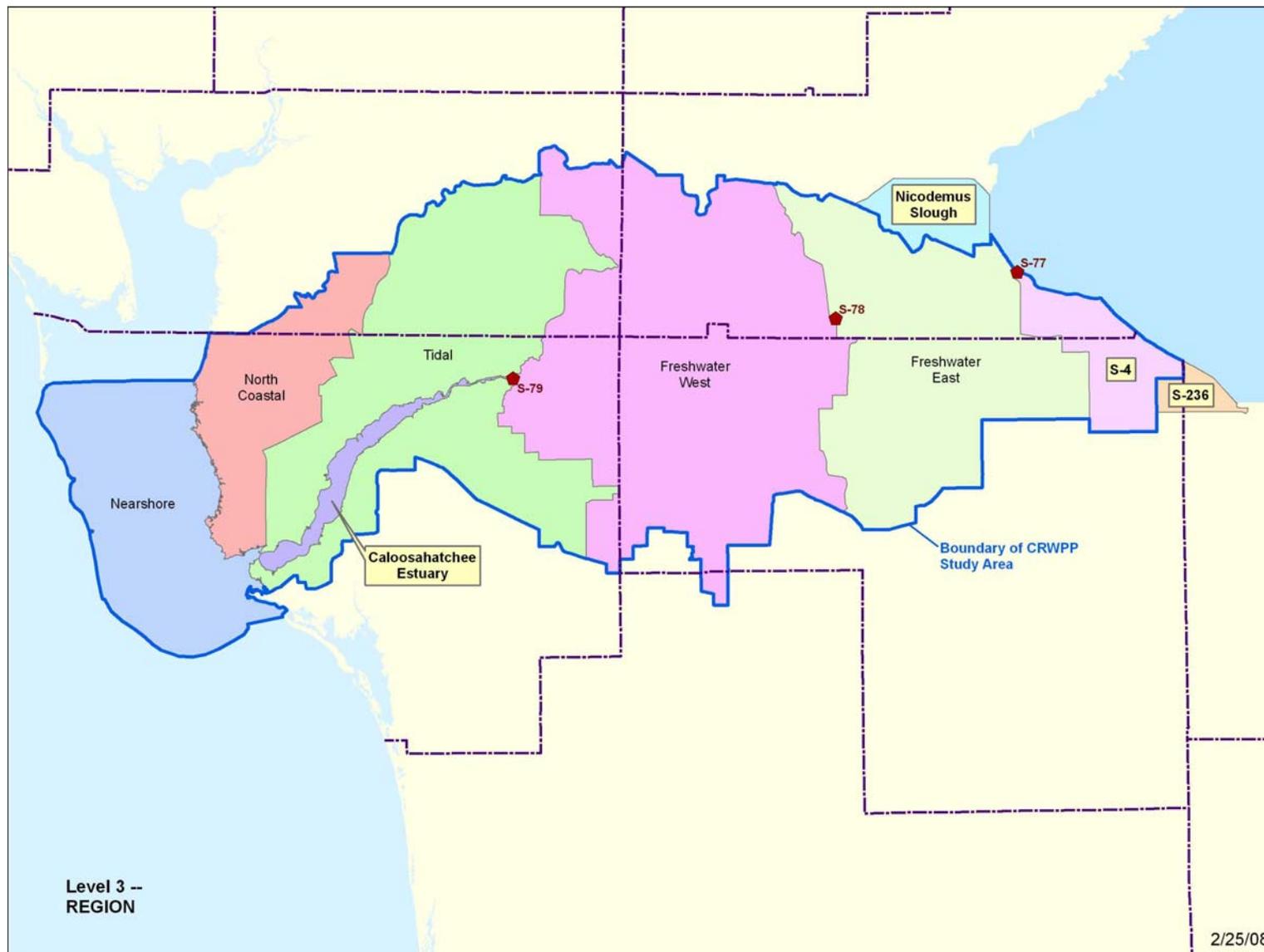


Table 1. Land Use Distribution in the St. Lucie Watershed

Land Use Category	Land Use Description	FLUCCS	Area (ac)	Percent	Sum_Area (ac)	Percent
Residential Low Density	Residential Low Density	1100	22,050	4.29%	22,050	4.30%
Residential Medium Density	Residential Medium Density	1200	38,206	7.43%	38,206	7.40%
Residential High Density	Residential High Density	1300	7,698	1.50%	7,698	1.50%
Other Urban	Commercial and Services	1400	5,090	0.99%	15,907	3.10%
	Industrial	1500	2,034	0.40%		
	Extractive	1600	640	0.12%		
	Institutional	1700	2,977	0.58%		
	Recreational	1800	5,167	1.00%		
Improved Pastures	Improved Pastures	2110	106,321	20.67%	106,321	20.70%
Unimproved Pastures	Unimproved Pastures	2120	15,033	2.92%	15,033	2.90%
Woodland Pastures/Rangeland	Woodland Pastures	2130	25,205	4.90%	39,351	7.70%
	Rangeland	3000	14,147	2.75%		
Row Crops	Row Crops	2140	7,881	1.53%	7,881	1.50%
Sugar Cane	Sugar Cane	2156	5,562	1.08%	5,562	1.10%
Citrus	Citrus	2210	116,442	22.64%	116,442	22.60%
Sod Farms	Sod Farms	2420	294	0.06%	294	0.10%
Ornamentals	Ornamentals	2430	1,246	0.24%	1,246	0.20%
Horse Farms	Horse Farms	2510	784	0.15%	784	0.20%
Dairies	Dairies	2520	419	0.08%	419	0.10%
Other Areas	Field Crops	2150	2,800	0.54%	4,108	0.80%
	Other Groves	2230	48	0.01%		
	Cattle Feeding Operations	2310	105	0.02%		
	Poultry Feeding Operations	2320	107	0.02%		
	Tree Nurseries	2410	463	0.09%		
	Specialty Farms	2500	133	0.03%		
	Aquaculture	2540	204	0.04%		
	Fallow Crop Land	2610	248	0.05%		
Tree Plantations	Tree Plantations	4400	0	0.00%	0	0.00%
Water	Water	5000	11,411	2.22%	11,411	2.20%
Natural Areas	Upland Forests	4000	37,608	7.31%	105,380	20.50%
	Wetlands	6000	61,052	11.87%		
	Barren Land	7000	2,613	0.51%		
	Open Land	1900	4,108	0.80%		
Transportation	Transportation	8100	5,665	1.10%	5,665	1.10%
Communication/Utilities	Communication	8200	91	0.02%	10,529	2.00%
	Utilities	8300	10,438	2.03%		
Total			514,287	100.00%	514,287	100.00%

Table 2 Summary of Measured Nitrogen and Phosphorus Load to SLE

Sub-watershed	Area (acres)	Average Annual Discharge⁽¹⁾ (1995-2005) (Acre-ft)	Calculated Runoff (in)	Average Annual TN Load⁽²⁾ (1995-2005) (MTons)	Average Annual TN Conc. (Calculated) (1995-2005) (ppb)	Average Annual TP Load⁽²⁾ (1995-2005) (MTons)	Average Annual TP Conc. (Calculated) (1995-2005) (ppb)
Basins 4 5 6	15055	23620	18.8	34	1182	6	218.96
C-23	112675	152789	16.3	330	1750	91	480.55
C-24	87706	178853	24.5	355	1609	76	343.25
C-44&S-153	129719	158194	14.6	300	1540	40	203.38
North Fork*	119168	126152	12.7	185	1191	43	278
Tidal St. Lucie**	49965	59408	14.3	91	1244	21	285.16
Lake Okeechobee	-	414754		922	1802	96	188.14
Total	514287	1113771		2218	1615	373	271.33

*North Fork basin includes North Fork and N. Mid. Estuary

**Tidal St. Lucie basin includes South Fork and S. Mid. Estuary

(1) Measured data are used for flow from C-23 basin, C-24 basin, C-44&S-153 basin, and Lake Okeechobee. WaSh Model output data are used for flow from North Fork basin, South Fork basin, and Basin 4 5 6.

(2) Measured data are used for TN and TP concentrations for C-23 basin, C-24 basin, C-44&S-153 basin, and Lake Okeechobee. WaSh Model output data are used for TN and TP concentrations for North Fork basin, South Fork basin, and Basin 4 5 6.

Table 3. Estimated Runoff, Unit N and P Loads and Concentration for 2004 Land Uses in the St. Lucie Watershed

Land Use Category	Land Use Description	FLUCCS	Runoff (in/yr)	Unit N Load	N Conc. (mg/l)	Unit P Load (lbs/acre/yr)	P Conc. (mg/l)
Residential Low Density	Residential Low Density ¹	1100	17.57	4.95	1.25	0.49	0.12
Residential Medium Density	Residential Medium Density ²	1200	20.76	7.20	1.53	1.40	0.30
Residential High Density	Residential High Density ²	1300	23.96	10.80	1.99	3.00	0.55
Other Urban	Commercial and Services ²	1400	25.55	9.90	1.71	1.40	0.24
	Industrial ²	1500	27.15	9.00	1.47	2.40	0.39
	Extractive ²	1600	23.96	6.30	1.16	0.66	0.12
	Institutional ²	1700	23.96	6.30	1.16	2.40	0.44
	Recreational ²	1800	17.57	6.30	1.59	0.96	0.24
Improved Pastures	Improved Pastures	2110	19.16	9.99	2.30	1.90	0.44
Unimproved Pastures	Unimproved Pastures	2120	15.97	4.95	1.37	0.92	0.25
Woodland Pastures/Rangeland	Woodland Pastures	2130	15.97	3.69	1.02	0.88	0.24
	Rangeland	3000	15.97	3.69	1.02	0.28	0.08
Row Crops	Row Crops	2140	22.36	13.50	2.67	4.50	0.89
Sugar Cane	Sugar Cane	2156	19.16	7.20	1.66	0.63	0.15
Citrus	Citrus	2210	19.16	7.65	1.76	1.80	0.42
Sod Farms	Sod Farms	2420	19.16	8.10	1.87	2.52	0.58
Ornamentals	Ornamentals	2430	19.16	10.80	2.49	2.90	0.67
Horse Farms	Horse Farms	2510	15.97	14.40	3.99	1.82	0.50
Dairies	Dairies	2520	15.97	18.00	4.98	9.38	2.60
Other Areas	Field Crops	2150	15.97	5.96	1.65	2.96	0.82
	Mixed Crops	2160	19.16	9.90	2.28	3.50	0.81
	Fruit Orchards	2220	19.16	8.10	1.87	2.30	0.53
	Other Groves	2230	19.16	8.10	1.87	2.30	0.53
	Cattle Feeding Operations	2310	19.16	48.65	11.22	8.96	2.07
	Poultry Feeding Operations	2320	19.16	9.00	2.08	1.50	0.35
	Tree Nurseries	2410	15.97	10.80	2.99	2.90	0.80
	Specialty Farms	2500	15.97	7.20	1.99	1.82	0.50
	Aquaculture	2540	7.99	9.00	4.98	0.70	0.39
	Fallow Crop Land	2610	19.16	6.30	1.45	0.70	0.16
Tree Plantations	Tree Plantations	4400	15.97	2.79	0.77	0.18	0.05
Water	Water	5000	3.19	0.81	1.12	0.05	0.07
Natural Areas	Upland Forests (not including 4400's)	4000	14.37	2.25	0.69	0.28	0.09
	Wetlands	6000	1.60	1.35	3.74	0.01	0.03
	Barren Land	7000	23.96	6.30	1.16	0.75	0.14
	Open Land	1900	15.97	3.60	1.00	0.28	0.08
Transportation	Transportation	8100	27.15	8.28	1.35	1.65	0.27
Communication/Utilities	Communications	8200	15.97	5.40	1.49	0.48	0.13
	Utilities	8300	15.97	5.40	1.49	0.48	0.13

1 Assumed on Septic

2 Assumed Discharge from WWT outside basin

Table 4. Acreage of Land Uses within the St. Lucie Watershed

FLUCCS	Basins 4 5 6	C-23	C-24	C-44&S-153	North Fork*	Tidal St. Lucie**	Grand Total
1100	4315.6	1909.4	1236.1	1813.7	9445	3329.8	22049.7
1200	1236.1	303.7	2505.9	314.9	30453.4	3392.3	38206.3
1300	702.6		295	185.7	4784.2	1730.3	7697.8
1400	222.9	9	39.8	204.4	3453.9	1159.8	5089.8
1500	133.2	48.3	55.5	76.7	1552.3	167.8	2033.7
1600	0.8	411.5			92.3	135.2	639.8
1700	110.3	661.7	21.7	97.7	1567.1	518.3	2976.7
1800	683.8	254.8	665.6	209.5	2308.4	1045.2	5167.3
1900	110.8	9.8	74.7	148.7	3291.5	472.2	4107.5
2110	1006.7	33628	33949.7	23185	4998.8	9552.4	106320.6
2120	86.4	5062	6064.3	2167.9	558.4	1094.1	15033.1
2130	374.6	8697.3	6890.3	6457.9	1071.8	1712.9	25204.8
2140	156.1	1696.2	1550.3	852.5	1166.2	2459.9	7881.1
2150		1574.6	834.7	390.9			2800.2
2156				5240.1		321.7	5561.8
2210	30.2	32466.1	17487.8	42754.5	20678.2	3025.4	116442.2
2220							0
2230	5	17.1			26.2		48.3
2310		104.7					104.7
2320			44.3	62.5			106.8
2410	100.2	153.8	55.5	85.3	68.3	0.1	463.1
2420				294.1			294.1
2430	211		25.1	267.6	237.9	504.4	1246
2500				28.7	23.9	79.9	132.6
2510	53.7	54	14.1	591.6		71.1	784.4
2520		419.1					419.1
2540	60.1	70.4	23.3		9.5	40.8	204.2
2610		216.7			31.3		247.9
3000	394.5	1603.5	220.1	6383.5	3494	2051	14146.6
4000	2679	2723.8	1264.5	11535.9	12030.8	7373.6	37607.6
5000	382.5	1810.5	1218.4	1890.7	4317.3	1791.3	11410.7
6000	1262.5	16278.9	12248.2	15114.6	9485.1	6662.2	61051.5
7000		1108.1	297.8	939	235.2	33.2	2613.4
8100	297.6	455.4	521.1	611.2	2623.4	1156.6	5665.3
8200	10.9	10.2		5.6	64.3		91
8300	428.3	916.1	102.4	7808.5	1099.2	83.1	10437.6
Grand Total	15055.4	112674.5	87705.8	129718.9	119167.9	49964.7	514287.2

*North Fork basin includes North Fork and N.Mid.Estuary

**Tidal St. Lucie basin includes South Fork and S.Mid.Estuary

Table 5. Runoff in Acre-ft/yr to Stream within the St. Lucie Watershed by Land Use

FLUCCS	Basins 4 5 6	C-23	C-24	C-44&S-153	North Fork*	Tidal St. Lucie**	Grand Total
1100	6318	2795	1810	2655	13827	4875	32280
1200	2139	525	4336	545	52689	5869	66102
1300	1403	0	589	371	9551	3454	15367
1400	475	19	85	435	7355	2470	10838
1500	301	109	126	174	3512	380	4601
1600	2	821	0	0	184	270	1277
1700	220	1321	43	195	3128	1035	5942
1800	1001	373	974	307	3379	1530	7565
1900	147	13	99	198	4381	628	5467
2110	1608	53706	54219	37028	7983	15256	169799
2120	115	6737	8071	2885	743	1456	20007
2130	499	11575	9170	8595	1426	2280	33544
2140	291	3160	2889	1588	2173	4583	14684
2150	0	2096	1111	520	0	0	3727
2156	0	0	0	8369	0	514	8882
2210	48	51850	27929	68281	33024	4832	185964
2220	0	0	0	0	0	0	0
2230	8	27	0	0	42	0	77
2310	0	167	0	0	0	0	167
2320	0	0	71	100	0	0	171
2410	133	205	74	114	91	0	616
2420	0	0	0	470	0	0	470
2430	337	0	40	427	380	806	1990
2500	0	0	0	38	32	106	176
2510	71	72	19	787	0	95	1044
2520	0	558	0	0	0	0	558
2540	40	47	16	0	6	27	136
2610	0	346	0	0	50	0	396
3000	525	2134	293	8496	4650	2730	18827
4000	3209	3263	1515	13818	14410	8832	45046
5000	102	482	324	503	1149	477	3037
6000	168	2167	1630	2012	1262	887	8125
7000	0	2212	595	1875	470	66	5217
8100	673	1030	1179	1383	5935	2617	12818
8200	15	14	0	7	86	0	121
8300	570	1219	136	10392	1463	111	13891
Grand Total	20417	149043	117341	172566	173382	66183	698,932
(in/yr)	16	16	16	16	17	16	16

*North Fork basin includes North Fork and N.Mid.Estuary

**Tidal St. Lucie basin includes South Fork and S.Mid.Estuary

Verification

Lake Okee			414,754
	Calculated	Total	1,113,686
	Measured		1,113,771

Table 6. Net P Loads in Pounds/year to Stream within the St. Lucie Watershed by Land Use

FLUCCS	Basins 4 5 6	C-23	C-24	C-44&S-153	North Fork*	Tidal St. Lucie**	Grand Total
1100	2115	936	606	889	4628	1632	10804
1200	1731	425	3508	441	42635	4749	53489
1300	2108	0	885	557	14353	5191	23093
1400	312	13	56	286	4835	1624	7126
1500	320	116	133	184	3726	403	4881
1600	1	272	0	0	61	89	422
1700	265	1588	52	234	3761	1244	7144
1800	656	245	639	201	2216	1003	4961
1900	31	3	21	42	922	132	1150
2110	1913	63893	64504	44052	9498	18150	202009
2120	79	4657	5579	1994	514	1007	13830
2130	330	7654	6063	5683	943	1507	22180
2140	702	7633	6976	3836	5248	11070	35465
2150	0	4668	2475	1159	0	0	8301
2156	0	0	0	3301	0	203	3504
2210	54	58439	31478	76958	37221	5446	209596
2220	0	0	0	0	0	0	0
2230	12	39	0	0	60	0	111
2310	0	938	0	0	0	0	938
2320	0	0	66	94	0	0	160
2410	291	446	161	247	198	0	1343
2420	0	0	0	741	0	0	741
2430	612	0	73	776	690	1463	3613
2500	0	0	0	52	43	145	241
2510	98	98	26	1077	0	129	1428
2520	0	3931	0	0	0	0	3931
2540	42	49	16	0	7	29	143
2610	0	152	0	0	22	0	174
3000	110	449	62	1787	978	574	3961
4000	750	763	354	3230	3369	2065	10530
5000	19	91	61	95	216	90	571
6000	13	163	122	151	95	67	611
7000	0	831	223	704	176	25	1960
8100	491	751	860	1008	4329	1908	9348
8200	5	5	0	3	31	0	44
8300	206	440	49	3748	528	40	5010
Grand Total	13264	159686	125049	153531	141301	59983	652814
Conc.(ppbl)	233	384	382	319	292	325	335
Meas.Conc.(ppb)	219	481	343	203	278	285	
Lake Okee (lbs)							211200
Calc. (Mt/yr)	6	73	57	70	64	27	393
Measured (Mt/yr)	6	91	76	40	43	21	373

*North Fork basin includes North Fork and N.Mid.Estuary

**Tidal St. Lucie basin includes South Fork and S.Mid.Estuary

Table 7. Net N Loads in Pounds/year to Stream within the St. Lucie Watershed by Land Use

FLUCCS	Basins 4 5 6	C-23	C-24	C-44&S-153	North Fork*	Tidal St. Lucie**	Grand Total
1100	21362	9452	6119	8978	46753	16483	109146
1200	8900	2187	18042	2267	219264	24425	275085
1300	7588	0	3186	2006	51669	18687	83136
1400	2207	89	394	2024	34194	11482	50389
1500	1199	435	500	690	13971	1510	18303
1600	5	2592	0	0	581	852	4031
1700	695	4169	137	616	9873	3265	18753
1800	4308	1605	4193	1320	14543	6585	32554
1900	399	35	269	535	11849	1700	14787
2110	10057	335944	339158	231618	49938	95428	1062143
2120	428	25057	30018	10731	2764	5416	74414
2130	1382	32093	25425	23830	3955	6321	93006
2140	2107	22899	20929	11509	15744	33209	106395
2150	0	9384	4975	2330	0	0	16689
2156	0	0	0	37729	0	2316	40045
2210	231	248366	133782	327072	158188	23144	890783
2220	0	0	0	0	0	0	0
2230	41	139	0	0	212	0	391
2310	0	5094	0	0	0	0	5094
2320	0	0	399	563	0	0	961
2410	1082	1661	599	921	738	1	5001
2420	0	0	0	2382	0	0	2382
2430	2279	0	271	2890	2569	5448	13457
2500	0	0	0	207	172	575	955
2510	773	778	203	8519	0	1024	11295
2520	0	7544	0	0	0	0	7544
2540	541	634	210	0	86	367	1838
2610	0	1365	0	0	197	0	1562
3000	1456	5917	812	23555	12893	7568	52201
4000	6028	6129	2845	25956	27069	16591	84617
5000	310	1467	987	1531	3497	1451	9243
6000	1704	21977	16535	20405	12805	8994	82420
7000	0	6981	1876	5916	1482	209	16464
8100	2464	3771	4315	5061	21722	9577	46909
8200	59	55	0	30	347	0	491
8300	2313	4947	553	42166	5936	449	56363
Grand Total	79917	762762	616731	803355	723011	303076	3288847
Conc.(ppb)	1404	1836	1885	1670	1496	1643	1688
Meas.Conc.(ppb)	1182	1750	1609	1540	1191	1244	
Lake Okee (lbs)							2028400
Calc. (Mt/yr)	36	347	280	365	329	138	2417
Measured (Mt/yr)	34	330	355	300	185	91	2217

*North Fork basin includes North Fork and N.Mid.Estuary

**Tidal St. Lucie basin includes South Fork and S.Mid.Estuary

Table 8. Land Use Categories, Unit Load Factors, and P Reduction Factors for the St. Lucie Watershed

Land Use Category	Land Use Description	FLUCCS	Unit P Load (lbs/acre/yr)	Estimated Phosphorus Reduction		
				Owner Implemented BMPs	Cost Share BMPs	Alternative Practices
Residential Low Density	Residential Low Density ¹	1100	0.49	5%	5%	70%
Residential Medium Density	Residential Medium Density ²	1200	1.40	5%	5%	70%
Residential High Density	Residential High Density ²	1300	3.00	5%	5%	70%
Other Urban	Commercial/Industrial ²	1400-1800	1.54	5%	5%	70%
Improved Pastures	Improved Pastures	2110	1.90	11%	19%	49%
Unimproved Pastures	Unimproved Pastures	2120	0.92	7%	13%	44%
Woodland Pastures/Rangeland	Woodland/Range Pastures	2130/3000	0.66	4%	6%	35%
Row Crops	Row Crops	2140	4.50	30%	30%	50%
Sugar Cane	Sugar Cane	2156	0.63	10%	23%	52%
Citrus	Citrus	2210	1.80	12%	5%	52%
Sod Farms	Sod Farms	2420	2.52	20%	27%	50%
Ornamentals	Ornamentals	2430	2.90	32%	35%	50%
Horse Farms	Horse Farms	2510	1.82	20%	22%	49%
Dairies	Dairies	2520	9.38	9%	28%	48%
Other Areas	Other Areas	2150-2610	2.78	15%	25%	36%
Tree Plantations	Tree Plantations	4400	0.18	1%	10%	50%
Water	Water	5000	0.05	0%	0%	0%
Natural Areas	Forrests/wetlands/Open	4000/6000	0.14	0%	0%	0%
Transportation	Transportation	8100	1.65	10%	23%	52%
Communication/Utilities	Communication/Utilities	8200/8300	0.48	5%	5%	50%

1 Assumed on Septic

2 Assumed all of Discharge from WWT outside basin

Table 9. Land Use Categories, Unit Load Factors, and N Reduction Factors for the St. Lucie Watershed

Land Use Category	Land Use Description	FLUCCS	Unit N Load (lbs/acre/yr)	Estimated Nitrogen Reduction		
				Owner Implemented BMPs	Cost Share BMPs	Alternative Practices
Residential Low Density	Residential Low Density ¹	1100	4.95	15%	15%	15%
Residential Medium Density	Residential Medium Density ²	1200	7.20	25%	25%	15%
Residential High Density	Residential High Density ²	1300	10.80	30%	25%	15%
Other Urban	Commercial/Industrial ²	1400-1800	7.80	25%	25%	15%
Improved Pastures	Improved Pastures	2110	9.99	17%	10%	30%
Unimproved Pastures	Unimproved Pastures	2120	4.95	11%	8%	30%
Woodland Pastures/Rangeland	Woodland/Range Pastures	2130/3000	3.69	4%	6%	20%
Row Crops	Row Crops	2140	13.50	30%	30%	50%
Sugar Cane	Sugar Cane	2156	7.20	10%	23%	52%
Citrus	Citrus	2210	7.65	10%	5%	52%
Sod Farms	Sod Farms	2420	8.10	20%	27%	50%
Ornamentals	Ornamentals	2430	10.80	25%	25%	25%
Horse Farms	Horse Farms	2510	14.40	30%	22%	30%
Dairies	Dairies	2520	18.00	20%	40%	48%
Other Areas	Other Areas	2150-2610	7.91	15%	25%	36%
Tree Plantations	Tree Plantations	4400	2.79	5%	10%	25%
Water	Water	5000	0.81	0%	0%	0%
Natural Areas	Forrests/wetlands/Open	4000/6000	1.88	0%	0%	0%
Transportation	Transportation	8100	8.28	20%	23%	25%
Communication/Utilities	Communication/Utilities	8200/8300	5.40	5%	5%	50%

1 Assumed on Septic

2 Assumed all of Discharge from WWT outside basin

Table 10. Land Use Distribution for the Caloosahatchee Watershed

Land Use Category	Land Use Description	FLUCCS	Area (ac)	Percent	Area (ac)	Percent
Residential Low Density	Residential Low Density	1100	76,863	7.12%	76,863	7.10%
Residential Medium Density	Residential Medium Density	1200	33,396	3.09%	33,396	3.10%
Residential High Density	Residential High Density	1300	11,453	1.06%	11,453	1.10%
Other Urban	Commercial and Services	1400	8,906	0.82%	23,568	2.20%
	Industrial	1500	2,648	0.25%		
	Extractive	1600	2,278	0.21%		
	Institutional	1700	3,675	0.34%		
	Recreational	1800	6,062	0.56%		
Improved Pastures	Improved Pastures	2110	117,152	10.85%	117,152	10.80%
Unimproved Pastures	Unimproved Pastures	2120	23,827	2.21%	23,827	2.20%
Woodland Pastures/Rangeland	Woodland Pastures	2130	20,280	1.88%	78,130	7.20%
	Rangeland	3000	57,850	5.36%		
Row Crops	Row Crops	2140	9,656	0.89%	9,656	0.90%
Sugar Cane	Sugar Cane	2156	87,741	8.13%	87,741	8.10%
Citrus	Citrus	2210	96,684	8.95%	96,684	9.00%
Sod Farms	Sod Farms	2420	5,070	0.47%	5,070	0.50%
Ornamentals	Ornamentals	2430	861	0.08%	861	0.10%
Horse Farms	Horse Farms	2510	202	0.02%	202	0.00%
Dairies	Dairies	2520	56	0.01%	56	0.00%
Other Areas	Field Crops	2150	5,326	0.49%	10,909	1.00%
	Mixed Crops	2160	17	0.00%		
	Fruit Orchards	2220	12	0.00%		
	Other Groves	2230	1,995	0.18%		
	Tree Nurseries	2410	971	0.09%		
	Specialty Farms	2500	165	0.02%		
	Aquaculture	2540	215	0.02%		
Fallow Crop Land	2610	2,209	0.20%			
Tree Plantations	Tree Plantations	4400	42,498	3.94%	42,498	3.90%
Water	Water	5000	130,368	12.07%	130,368	12.10%
Natural Areas	Upland Forests (not including 4400's)	4000	84,379	7.81%	324,289	30.00%
	Wetlands	6000	184,666	17.10%		
	Barren Land	7000	5,866	0.54%		
	Open Land	1900	49,378	4.57%		
Transportation	Transportation	8100	4,915	0.46%	4,915	0.50%
Communication/Utilities	Communications	8200	96	0.01%	2,159	0.20%
	Utilities	8300	2,063	0.19%		
Total			1,079,796	100.00%	1,079,796	100.00%

Table 11. Summary of Annual Flow and Loads for TP and TN along the main stem of the Caloosahatchee River (C-43 Canal)

Calendar Year	S-77 (02292000)					S-78 (02292480)					S-79 (02292900)					Basin Between S78 and S79				
	Flow	TP Load	TP Conc.	TN Load	TN Conc.	Flow	TP Load	TP Conc.	TN Load	TN Conc.	Flow	TP Load	TP Conc.	TN Load	TN Conc.	Flow	TP Load	TP Conc.	TN Load	TN Conc.
	acre-feet	mtons	ug/L	mtons	mg/L	acre-feet	mtons	ug/L	mtons	mg/L	acre-feet	mtons	ug/L	mtons	mg/L	acre-feet	mtons	ug/L	mtons	mg/L
1990	120,575	14.0	94	237.6	1.60	174,966	33.0	153	322.4	1.49	423,951	101.0	193	936.9	1.79	248,986	68	222	614	2.00
1991	63,594	7.3	93	136.2	1.74	288,783	72.1	202	670.0	1.88	922,265	193.2	170	1,890.5	1.66	633,481	121	155	1,221	1.56
1992	193,275	22.9	96	344.7	1.45	437,933	93.2	172	756.4	1.40	943,491	406.5	349	2,198.8	1.89	505,559	313	502	1,442	2.31
1993	500,243	30.7	50	1,382.3	2.24	645,118	68.2	86	972.4	1.22	1,230,588	182.0	120	2,334.1	1.54	585,470	114	158	1,362	1.89
1994	770,253	50.7	53	1,345.0	1.42	1,044,125	119.2	93	2,201.9	1.71	1,633,414	216.6	108	3,380.2	1.68	589,289	97	134	1,178	1.62
1995	2,110,116	113.5	44	4,311.3	1.66	2,381,744	186.4	63	3,244.1	1.10	3,379,883	314.1	75	5,482.4	1.32	998,139	128	104	2,238	1.82
1996	474,489	47.0	80	797.6	1.36	568,330	58.2	83	853.6	1.22	941,009	129.5	112	1,647.2	1.42	372,680	71	155	794	1.73
1997	158,049	16.2	83	393.5	2.02	290,448	36.2	101	661.3	1.85	756,311	114.8	123	1,413.3	1.51	465,864	79	137	752	1.31
1998	1,618,473	135.5	68	2,988.8	1.50	1,831,790	204.9	91	3,216.9	1.42	2,613,724	296.8	92	4,309.0	1.34	781,933	92	95	1,092	1.13
1999	564,104	52.4	75	945.3	1.36	848,093	123.6	118	1,602.2	1.53	1,578,821	324.1	166	3,041.8	1.56	730,729	201	222	1,440	1.60
2000	477,520	104.7	178	1,683.5	2.86	409,244	47.1	93	687.8	1.36	619,878	118.6	155	1,061.9	1.39	210,634	71	275	374	1.44
2001	72,771	9.0	101	172.2	1.92	176,661	66.0	303	462.5	2.12	835,815	232.8	226	1,694.6	1.64	659,154	167	205	1,232	1.52
2002	466,052	57.4	100	969.6	1.69	888,496	154.4	141	1,774.4	1.62	1,491,120	318.2	173	3,166.7	1.72	602,624	164	220	1,392	1.87
2003	1,396,713	101.5	59	2,454.0	1.42	1,745,887	209.3	97	3,239.4	1.50	2,589,761	335.0	105	4,529.1	1.42	843,874	126	121	1,290	1.24
2004	1,120,739	127.3	92	2,146.6	1.55	1,247,980	128.0	83	1,996.4	1.30	1,853,038	230.2	101	2,815.2	1.23	605,058	102	137	819	1.10
2005	2,266,435	384.6	138	4,597.7	1.64	2,898,397	476.4	133	5,821.6	1.63	3,734,684	577.7	125	6,740.1	1.46	836,287	101	98	918	0.89
2006	353,758	65.1	149	732.9	1.68	463,033	88.2	154	856.5	1.50	920,989	193.0	170	1,689.2	1.49	457,956	105	186	833	1.47
1990-2006	748,656	78.8	85	1,508.2	1.63	961,237	127.3	107	1,725.9	1.46	1,556,985	252.0	131	2,843.0	1.48	595,748	125	170	1,117	1.52
1995-2005	975,042	104.5	87	1,950.9	1.62	1,207,915	153.7	103	2,141.8	1.44	1,854,004	272.0	119	3,263.7	1.43	646,089	118	148	1,122	1.41

Table 12. Estimated Runoff, Unit N and P Loads and Concentration for 2004 Land Uses in the Caloosahatchee Watershed

Land Use Category	Land Use Description	FLUCCS	Runoff (in/yr)	Unit N Load (lbs/acre/yr)	N Conc. (mg/l)	Unit P Load (lbs/acre/yr)	P Conc. (mg/l)
Residential Low Density	Residential Low Density ¹	1100	27.43	7.26	1.17	0.68	0.11
Residential Medium Density	Residential Medium Density ²	1200	32.42	10.56	1.44	1.93	0.26
Residential High Density	Residential High Density ²	1300	39.90	15.84	1.75	4.14	0.46
Other Urban	Commercial and Services ²	1400	39.90	14.52	1.61	1.93	0.21
	Industrial ²	1500	42.39	13.20	1.38	3.31	0.35
	Extractive ²	1600	37.41	9.24	1.09	0.91	0.11
	Institutional ²	1700	37.41	9.24	1.09	3.31	0.39
	Recreational ²	1800	27.43	9.24	1.49	1.32	0.21
Improved Pastures	Improved Pastures	2110	29.93	14.65	2.16	1.93	0.29
Unimproved Pastures	Unimproved Pastures	2120	24.94	7.26	1.29	0.99	0.18
Woodland Pastures/Rangeland	Woodland Pastures	2130	24.94	5.41	0.96	0.83	0.15
	Rangeland	3000	19.95	5.41	1.20	0.25	0.06
Row Crops	Row Crops	2140	34.91	19.80	2.51	3.45	0.44
Sugar Cane	Sugar Cane	2156	29.93	10.56	1.56	0.55	0.08
Citrus	Citrus	2210	29.93	11.22	1.66	0.90	0.13
Sod Farms	Sod Farms	2420	29.93	11.88	1.75	2.79	0.41
Ornamentals	Ornamentals	2430	29.93	15.84	2.34	4.00	0.59
Horse Farms	Horse Farms	2510	24.94	21.12	3.74	2.51	0.45
Dairies	Dairies	2520	24.94	26.40	4.68	12.94	2.29
Other Areas	Field Crops	2150	24.94	8.74	1.55	4.09	0.73
	Mixed Crops	2160	29.93	14.52	2.14	4.83	0.71
	Fruit Orchards	2220	29.93	11.88	1.75	3.17	0.47
	Other Groves	2230	29.93	11.88	1.75	3.17	0.47
	Cattle Feeding Operations	2310	29.93	71.35	10.54	12.37	1.83
	Poultry Feeding Operations	2320	29.93	13.20	1.95	2.07	0.31
	Tree Nurseries	2410	24.94	15.84	2.81	4.00	0.71
	Specialty Farms	2500	24.94	10.56	1.87	2.51	0.45
	Aquaculture	2540	12.47	13.20	4.68	0.97	0.34
	Fallow Crop Land	2610	29.93	9.24	1.36	0.97	0.14
Tree Plantations	Tree Plantations	4400	14.96	4.09	1.21	0.21	0.06
Water	Water	5000	4.99	1.19	1.05	0.07	0.06
Natural Areas	Upland Forests (not including 4400's)	4000	14.96	3.30	0.97	0.10	0.03
	Wetlands	6000	7.48	1.98	1.17	0.01	0.01
	Barren Land	7000	37.41	9.24	1.09	1.04	0.12
	Open Land	1900	24.94	5.28	0.94	0.39	0.07
Transportation	Transportation	8100	49.88	12.14	1.08	2.28	0.20
Communication/Utilities	Communications	8200	27.43	7.92	1.28	0.66	0.11
	Utilities	8300	24.94	7.92	1.40	0.66	0.12

1 Assumed on Septic

2 Assumed about 70% of Discharge from WWT outside basin

Table 13. Acreage of Land Uses within the Caloosahatchee Watershed

FLUCCS	Caloosahatchee Estuary	Freshwater East	Freshwater West	Nearshore	North Coastal	S-4	Tidal	Grand Total
1100	19	3,015	14,869	4236	24,084	548	30,092	76,863
1200	65	383	1,758	1741	1,825	1,506	26,118	33,396
1300	15	59	398	983	1,434	77	8,486	11,453
1400	8	191	688	421	384	428	6,787	8,906
1500		236	445	6	23	1,264	673	2,648
1600		553	22	3	340	68	1,292	2,278
1700	0	105	245	91	475	213	2,545	3,675
1800	11	76	472	1193	1,039	257	3,014	6,062
1900	1	2,437	25,047	522	6,947	204	14,220	49,378
2110	1	36,795	55,555	231	2,381	797	21,392	117,152
2120		5,752	12,736	30	436		4,873	23,827
2130	3	5,924	10,033	67	83		4,171	20,280
2140		1,080	6,354	363	228		1,632	9,656
2150		422	1,269	8	56	38	3,533	5,326
2156		52,751	2,058			32,932		87,741
2160			17					17
2210		26,593	69,008	193		66	824	96,684
2220							12	12
2230			53	1793	6		143	1,995
2410		174	111	185		270	230	971
2420		289	2,947				1,833	5,070
2430		16	369	160	15		300	861
2500			79			17	68	165
2510		140	38				24	202
2520		18					38	56
2540		27	91				97	215
2610		133	1,124	80	68		803	2,209
3000	50	4,966	21,510	3087	8,929	278	19,030	57,850
4000	51	7,791	23,793	3396	10,881	359	38,108	84,379
4400		12,923	28,403		69		1,103	42,498
5000	15780	2,061	3,639	94206	6,848	717	7,117	130,368
6000	275	30,329	63,513	24493	21,682	1,193	43,181	184,666
7000		1,910	2,244	67	456	675	514	5,866
8100	6	741	645	36	488	330	2,668	4,915
8200		20	24		10		42	96
8300	1	388	171	62	395	268	777	2,063
Grand Total	16,285	198,299	349,734	137653	89,583	42,504	245,738	1,079,796

Table 14. Runoff in Acre-ft/year to Streams within the Caloosahatchee Watershed by Land Use

FLUCCS	Caloosahatchee Estuary	Freshwater East	Freshwater West	Nearshore	North Coastal	S-4	Tidal	Grand Total
1100	43	6892	33990	9683	55055	1253	68788	175704
1200	176	1035	4749	4703	4930	4069	70559	90221
1300	50	196	1323	3268	4768	256	28216	38081
1400	27	635	2288	1400	1277	1423	22567	29612
1500	0	834	1572	21	81	4465	2378	9355
1600	0	1724	69	9	1060	212	4027	7101
1700	0	327	764	284	1481	664	7933	11456
1800	25	174	1079	2727	2375	587	6890	13857
1900	2	5064	52051	1085	14437	424	29551	102614
2110	2	91758	138540	576	5938	1988	53346	292148
2120	0	11953	26467	62	906	0	10127	49515
2130	6	12311	20850	139	172	0	8668	42144
2140	0	3142	18486	1056	663	0	4748	28093
2150	0	877	2637	17	116	79	7342	11068
2156	0	131548	5132	0	0	82124	0	218804
2160	0	0	42	0	0	0	0	42
2210	0	66316	172089	481	0	165	2055	241106
2220	0	0	0	0	0	0	30	30
2230	0	0	132	4471	15	0	357	4975
2410	0	362	231	384	0	561	478	2018
2420	0	721	7349	0	0	0	4571	12643
2430	0	40	920	399	37	0	748	2147
2500	0	0	164	0	0	35	141	343
2510	0	291	79	0	0	0	50	420
2520	0	37	0	0	0	0	79	116
2540	0	28	95	0	0	0	101	223
2610	0	332	2803	200	170	0	2002	5509
3000	83	8256	35760	5132	14844	462	31637	96176
4000	64	9714	29667	4234	13567	448	47516	105210
4400	0	16113	35415	0	86	0	1375	52990
5000	6559	857	1512	39154	2846	298	2958	54184
6000	171	18908	39596	15270	13517	744	26921	115128
7000	0	5954	6995	209	1421	2104	1602	18285
8100	25	3080	2681	150	2028	1372	11089	20428
8200	0	46	55	0	23	0	96	219
8300	2	806	355	129	821	557	1615	4287
Grand Total	7,235	400,330	645,938	95,245	142,636	104,289	460,562	1,856,254

Verification

Calculated Runoff 645,938
 Measured Runoff 646,089
 (inches) 22.17

Table 15. Net P Loads in Pounds/year to Stream within the Caloosahatchee Watershed by Land Use

FLUCCS	Caloosahatchee Estuary	Freshwater East	Freshwater West	Nearshore	North Coastal	S-4	Tidal	Grand Total
1100	13	2,039	10,054	2,864	16,286	371	20,348	51,975
1200	126	740	3,396	3,364	3,526	2,910	50,460	64,521
1300	62	244	1,648	4,070	5,937	319	35,132	47,415
1400	15	369	1,329	813	742	827	13,112	17,206
1500	-	782	1,474	20	76	4,186	2,229	8,770
1600	-	504	20	3	310	62	1,177	2,075
1700	-	348	811	301	1,573	705	8,429	12,172
1800	15	101	625	1,580	1,376	340	3,993	8,031
1900	0	942	9,678	202	2,684	79	5,495	19,080
2110	2	71,088	107,332	446	4,600	1,540	41,329	226,338
2120	-	5,715	12,654	30	433	-	4,842	23,675
2130	2	4,905	8,307	55	69	-	3,454	16,792
2140	-	3,726	21,921	1,252	787	-	5,630	33,313
2150	-	1,726	5,192	33	229	155	14,454	21,789
2156	-	29,119	1,136	-	-	18,178	-	48,433
2160	-	-	82	-	-	-	-	82
2210	-	23,854	61,900	173	-	59	739	86,726
2220	-	-	-	-	-	-	38	38
2230	-	-	168	5,691	19	-	454	6,332
2410	-	696	444	740	-	1,081	920	3,886
2420	-	806	8,215	-	-	-	5,110	14,133
2430	-	64	1,477	640	60	-	1,201	3,446
2500	-	-	198	-	-	43	171	414
2510	-	352	95	-	-	-	60	507
2520	-	233	-	-	-	-	492	725
2540	-	26	88	-	-	-	94	208
2610	-	128	1,086	77	66	-	776	2,134
3000	12	1,234	5,343	767	2,218	69	4,727	14,370
4000	5	753	2,298	328	1,051	35	3,681	8,151
4400	-	2,675	5,879	-	14	-	228	8,797
5000	1,089	142	251	6,500	473	49	491	8,995
6000	4	419	876	338	299	16	596	2,548
7000	-	1,977	2,323	69	472	699	532	6,071
8100	14	1,687	1,469	82	1,111	751	6,075	11,191
8200	-	13	16	-	7	-	28	64
8300	1	257	113	41	262	178	515	1,367
Grand Total	1,360	157,662	277,903	30,481	44,679	32,652	237,011	781,770

Verification Data for Freshwater West

Calculated	277,903 lbs/year 0.158 mg/l
Measured	260,240 lbs/year 0.148 mg/l

Table 16. Net N Loads in Pounds/year to Stream within the Caloosahatchee Watershed by Land Use

FLUCCS	Caloosahatchee Estuary	Freshwater East	Freshwater West	Nearshore	North Coastal	S-4	Tidal	Grand Total
1100	138	21,889	107,949	30,753	174,850	3,978	218,468	558,025
1200	686	4,044	18,564	18,385	19,272	15,903	275,806	352,662
1300	238	935	6,304	15,571	22,715	1,220	134,418	181,416
1400	116	2,773	9,990	6,113	5,576	6,215	98,547	129,315
1500	-	3,115	5,874	79	304	16,685	8,884	34,954
1600	-	5,110	203	28	3,142	628	11,938	21,049
1700	-	970	2,264	841	4,389	1,968	23,516	33,957
1800	102	702	4,361	11,023	9,600	2,375	27,849	56,013
1900	5	12,867	132,248	2,756	36,680	1,077	75,082	260,716
2110	15	539,120	813,992	3,385	34,886	11,678	313,436	1,716,511
2120	-	41,760	92,463	218	3,165	-	35,378	172,984
2130	16	32,061	54,299	363	449	-	22,573	109,755
2140	-	21,384	125,809	7,187	4,514	-	32,314	191,189
2150	-	3,689	11,093	70	490	332	30,883	46,556
2156	-	557,051	21,732	-	-	347,762	-	926,545
2160	-	-	247	-	-	-	-	247
2210	-	298,373	774,270	2,165	-	741	9,245	1,084,794
2220	-	-	-	-	-	-	143	143
2230	-	-	630	21,301	71	-	1,699	23,701
2410	-	2,756	1,758	2,930	-	4,277	3,643	15,381
2420	-	3,433	35,010	-	-	-	21,776	60,232
2430	-	253	5,845	2,534	238	-	4,752	13,638
2500	-	-	834	-	-	180	718	1,742
2510	-	2,957	803	-	-	-	507	4,266
2520	-	475	-	-	-	-	1,003	1,478
2540	-	356	1,201	-	-	-	1,280	2,838
2610	-	1,229	10,386	739	628	-	7,420	20,411
3000	271	26,876	116,412	16,707	48,324	1,505	102,990	313,084
4000	168	25,710	78,517	11,207	35,907	1,185	125,756	278,451
4400	-	52,881	116,225	-	282	-	4,513	173,902
5000	18,747	2,448	4,323	111,917	8,135	852	8,455	154,877
6000	545	60,051	125,756	48,496	42,930	2,362	85,498	365,639
7000	-	17,648	20,735	619	4,213	6,237	4,749	54,202
8100	73	8,999	7,833	437	5,926	4,008	32,400	59,688
8200	-	158	190	-	79	-	333	760
8300	8	3,073	1,354	491	3,128	2,123	6,154	16,339
Grand Total	21,127	1,755,149	2,709,474	316,316	469,895	433,288	1,732,127	7,437,458

Verification

Calculated	2,709,474 lbs/year 1.543 mg/l
Measured	2,468,224 lbs/year 1.405 mg/l

Table 17. Land Use Categories, Unit Load Factors, and P Reduction Factors for the Caloosahatchee Watershed

Land Use Category	Land Use Description	FLUCCS	Unit P Load (lbs/acre/yr)	Estimated Phosphorus Reduction		
				Owner Implemented BMPs	Cost Share BMPs	Alternative Practices
Residential Low Density	Residential Low Density ¹	1100	0.68	5%	5%	70%
Residential Medium Density	Residential Medium Density ²	1200	1.93	5%	5%	70%
Residential High Density	Residential High Density ²	1300	4.14	5%	5%	70%
Other Urban	Commercial/Industrial ²	1400-1800	2.05	5%	5%	70%
Improved Pastures	Improved Pastures	2110	1.93	11%	19%	49%
Unimproved Pastures	Unimproved Pastures	2120	0.99	7%	13%	44%
Woodland Pastures/Rangeland	Woodland/Range Pastures	2130/3000	0.40	4%	6%	35%
Row Crops	Row Crops	2140	3.45	30%	30%	50%
Sugar Cane	Sugar Cane	2156	0.55	10%	23%	52%
Citrus	Citrus	2210	0.90	12%	20%	42%
Sod Farms	Sod Farms	2420	2.79	20%	27%	50%
Ornamentals	Ornamentals	2430	4.00	32%	35%	50%
Horse Farms	Horse Farms	2510	2.51	20%	22%	49%
Dairies	Dairies	2520	12.94	9%	28%	48%
Other Areas	Other Areas	2150-2610	3.20	15%	25%	36%
Tree Plantations	Tree Plantations	4400	0.21	1%	10%	50%
Water	Water	5000	0.07	0%	0%	0%
Natural Areas	Forrests/wetlands/Open	4000/6000	0.11	0%	0%	0%
Transportation	Transportation	8100	2.28	10%	23%	52%
Communication/Utilities	Communication/Utilities	8200/8300	0.66	5%	5%	50%

1 Assumed on Septic

2 Assumed about 70% of Discharge from WWT outside basin

Table 18. Land Use Categories, Unit Load Factors, and N Reduction Factors for Caloosahatchee Watershed

Land Use Category	Land Use Description	FLUCCS	Unit N Load (lbs/acre/yr)	Estimated Nitrogen Reduction		
				Owner Implemented BMPs	Cost Share BMPs	Alternative Practices
Residential Low Density	Residential Low Density ¹	1100	7.26	15%	15%	15%
Residential Medium Density	Residential Medium Density ²	1200	10.56	25%	25%	15%
Residential High Density	Residential High Density ²	1300	15.84	30%	25%	15%
Other Urban	Commercial/Industrial ²	1400-1800	11.68	25%	25%	15%
Improved Pastures	Improved Pastures	2110	14.65	17%	10%	30%
Unimproved Pastures	Unimproved Pastures	2120	7.26	11%	8%	30%
Woodland Pastures/Rangeland	Woodland/Range Pastures	2130/3000	5.41	4%	6%	20%
Row Crops	Row Crops	2140	19.80	30%	30%	50%
Sugar Cane	Sugar Cane	2156	10.56	10%	23%	52%
Citrus	Citrus	2210	11.22	10%	20%	42%
Sod Farms	Sod Farms	2420	11.88	20%	27%	50%
Ornamentals	Ornamentals	2430	15.84	25%	25%	25%
Horse Farms	Horse Farms	2510	21.12	30%	22%	30%
Dairies	Dairies	2520	26.40	20%	40%	48%
Other Areas	Other Areas	2150-2610	10.18	15%	25%	36%
Tree Plantations	Tree Plantations	4400	4.09	5%	10%	25%
Water	Water	5000	1.19	0%	0%	0%
Natural Areas	Forrests/wetlands/Open	4000/6000	2.96	0%	0%	0%
Transportation	Transportation	8100	12.14	20%	23%	25%
Communication/Utilities	Communication/Utilities	8200/8300	7.92	5%	5%	50%

1 Assumed on Septic

2 Assumed about 70% of Discharge from WWT outside basin

Appendix A
Current condition assumptions, existing loads, potential load reductions, and
costs of implementation for the primary land uses
in the St. Lucie River watershed

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BMPs for Medium Density Residential

Assume for Typical Condition							
Medium Density Residential Assumed average development size of 200 ac Moderately Managed Lawns Limited Pond retention Limited Lawn Irrigation Existing P Load 1.40 lbs-P/ac/yr Existing P Concentration 0.30 mg/l Average Annual Runoff 20.76 in/yr							
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility	Owner	0 to 10	5	0	0	0	Slow
Reduced P Fertilization (testing, placement, and type)	Cost share	20 to 80	50	6400	2048	2926	Fast
Dry Retention/Swales 0.25"	Cost share	30 to 90	80	8000	2560	2286	Fast
Wet Detention - 0.25"	Cost share	0 to 25	15	20	6.4	30	Fast
Street Sweeping	Cost share	10 to 60	20	440	140.8	503	Fast
Sediment/Baffle Boxes	Alternative	15 to 35	25	3200	1024	2926	Fast
Dry Detention - Regional	Alternative	40 to 80	65	4000	1280	1407	Fast
Wet Detention - Regional	Alternative	20 to 90	70	3200	1024	1045	Fast
Stormwater R/D and Chemical Treatment ⁴							
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMPs 2 Costs presented on per acre of entire development basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 High O&M Costs							
Owner/Cost Share BMP Program		0 to 20	10	6400	2048	14629	Moderate
Reduced P Fertilization, Swales, and limited Dry Retention/Sweeping							
Owner BMP Program		0 to 10	5	0	0	0	Slow
Reduced P Fertilization							
Cost Share BMP Program		5 to 50	5	6400	2048	29257	Fast
Limited Dry Retention, Street Sweeping, Sediment R/D and Wetland Restoration							
Alternative BMP Program		20 to 90	70	3200	1024	1045	Fast
Stormwater R/D with Chemical Treatment							

BMPs for High Density Residential

Assume for Typical Condition							
High Density Residential Assumed average development size of 200 ac Moderately Managed Lawns Limited Pond retention Limited Lawn Irrigation Existing P Load 3.00 lbs-P/ac/yr Existing P Concentration 0.55 mg/l Average Annual Runoff 23.96 in/yr							
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility Reduced P Fertilization (testing, placement, and type)	Owner	0 to 10	5	0	0	0	Slow
Dry Retention/Swales 0.25"	Cost share	20 to 80	50	6400	2048	1365	Fast
Wet Detention - 0.25"	Cost share	30 to 90	80	8000	2560	1067	Fast
Street Sweeping	Cost share	0 to 25	15	20	6.4	14	Fast
Sediment/Baffle Boxes	Cost share	10 to 60	20	440	140.8	235	Fast
Dry Detention - Regional	Alternative	15 to 35	25	3200	1024	1365	Fast
Wet Detention - Regional	Alternative	40 to 80	65	4000	1280	656	Fast
Stormwater R/D and Chemical Treatment ⁴	Alternative	20 to 90	70	3200	1024	488	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMPs 2 Costs presented on per acre of entire development basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 High O&M Costs							
Owner/Cost Share BMP Program Reduced P Fertilization, Swales, and limited Dry Retention/Sweeping		0 to 20	10	6400	2048	6827	Moderate
Owner BMP Program Reduced P Fertilization		0 to 10	5	0	0	0	Slow
Cost Share BMP Program Limited Dry Retention, Street Sweeping, Sediment R/D and Wetland Restoration		5 to 50	5	6400	2048	13653	Fast
Alternative BMP Program Stormwater R/D with Chemical Treatment		20 to 90	70	3200	1024	488	Fast

BMPs for Other Urban

Assume for Typical Condition							
Medium Density Residential with Mixed Commercial Assumed average development size of 200 ac Moderately Managed Lawns Limited Pond retention Limited Lawn Irrigation Existing P Load 1.54 lbs-P/ac/yr Existing P Concentration 0.30 mg/l Average Annual Runoff 22.80 in/yr							
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility Reduced P Fertilization (testing, placement, and type)	Owner	0 to 10	5	0	0	0	Slow
Dry Retention/Swales 0.25"	Cost share	20 to 80	50	6400	2048	2656	Fast
Wet Detention - 0.25"	Cost share	30 to 90	80	8000	2560	2075	Fast
Street Sweeping	Cost share	0 to 25	15	20	6.4	28	Fast
Sediment/Baffle Boxes	Cost share	10 to 60	20	440	140.8	456	Fast
Dry Detention - Regional	Alternative	15 to 35	25	3200	1024	2656	Fast
Wet Detention - Regional	Alternative	40 to 80	65	4000	1280	1277	Fast
Stormwater R/D and Chemical Treatment ⁴	Alternative	20 to 90	70	3200	1024	949	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMPs 2 Costs presented on per acre of entire development basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 High O&M Costs							
Owner/Cost Share BMP Program Reduced P Fertilization, Swales, and limited Dry Retention/Sweeping		0 to 20	10	6400	2048	13279	Moderate
Owner BMP Program Reduced P Fertilization		0 to 10	5	0	0	0	Slow
Cost Share BMP Program Limited Dry Retention, Street Sweeping, Sediment R/D and Wetland Restoration		5 to 50	5	6400	2048	26558	Fast
Alternative BMP Program Stormwater R/D with Chemical Treatment		20 to 90	70	3200	1024	949	Fast

BMPs for Cow Calf Production

Improved Pastures

Assume for Typical Condition								
3 ac / cow								
Assumed average farm size of 500 ac								
Existing P fertilization of 3 lbs P/ac								
No retention or wetland restoration								
Bahia grass								
Animals have access to streams								
Existing P Load 1.90 lbs-P/ac/yr								
Existing P Concentration 0.44 mg/l								
Average Annual Runoff 19.16 in/yr								
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response	
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)		
Fertility	Reduced P Fertilization (testing, split, placement, and type)	Owner	0 to 30	10	2.2	2.2	12	Slow
	Better N and Micros Fertilization	Owner	0 to 20	3	5.5	5.5	96	Slow
Grass Management (variety, mowing, burning, irrigation, etc.)		Owner	0 to 20	2	5.5	1.76	46	Slow
Improved Grazing Management								
	Rotational Grazing	Cost share	0 to 30	3	5.5	1.76	31	Moderate
	Reduced Stocking Rate ⁴ (4ac /cow)	Owner	0 to 10	3	165	52.8	926	Slow
HIA and Direct Water Access Prevention								
	Improved Watering Facilities to move cattle from streams	Cost share	0 to 20	10	11	3.52	19	Fast
	Provide Alternative Shade to move cattle from streams	Alternative	0 to 10	2	16.5	5.28	139	Fast
	Feeder/Minerals and Water Placement	Owner	0 to 30	3	2.2	0.704	12	Fast
	Critical Area Fencing	Cost share	2 to 20	5	44	14.08	148	Fast
	Retention Basin by Working Pens	Cost share	2 to 10	5	3.3	1.056	11	Fast
Buffer Strips		Cost share	0 to 10	5	44	14.08	148	Fast
Stormwater R/D		Cost share	5 to 40	15	44	14.08	49	Fast
Wetland Restoration		Cost share	2 to 15	5	11	3.52	37	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁵		Alternative	20 to 90	70	220	70.4	53	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP								
2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.								
3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.								
4 This practice would typically be unacceptable to most farmers, but if significant feed is being purchased then it should be considered								
5 High O&M Costs								
Owner/Cost Share BMP Program			10 to 50	30	49.5	15.84	28	Moderate
P reduced to zero, Better N Management, Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Improved Grass Management, Feed Placement, Critical Area Fencing, and Moderate Wetland Restoration/Retention								
Owner BMP Program			0 to 25	11	11	4	17	Slow
P Reduced to zero, Better N Management, Grass Management, and Feeder/Minerals and Water Placement								
Cost Share BMP Program			10 to 50	19	38.5	12	34	Moderate
Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Critical Area Fencing, and Moderate Wetland Restoration/Retention								
Alternative BMP Program			20 to 90	49	110	35	38	Fast
Provide Alternative Shade to move cattle from streams and Edge-of-farm Stormwater R/D and Chemical Treatment								

BMPs for Cow Calf Production

Unimproved Pasture

Assume for Typical Condition		
8 ac per cow		
Assumed average farm size of 500 ac		
Existing P fertilization of 1 lbs P/ac		
No retention or wetland restoration		
Bahia grass / native		
Animals have access to streams		
Existing P Load	0.92	lbs-P/ac/yr
Existing P Concentration	0.25	mg/l
Average Annual Runoff	15.97	in/yr

BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility							
Better N and Micros Fertilization - No P added	Owner	0 to 10	1	2.2	2.2	239	Slow
Grass Management (chopping, mowing, burning, etc.)	Owner	0 to 10	2	2.2	0.704	38	Slow
Improved Grazing Management							
Rotational Grazing (limited)	Cost share	0 to 5	3	5.5	1.76	64	Moderate
HIA and Direct Water Access Prevention							
Improved Watering Facilities to move cattle from streams	Owner	0 to 10	5	5.5	1.76	38	Fast
Feeder/Minerals and Water Placement	Owner	0 to 10	3	2.2	0.704	26	Fast
Critical Area Fencing	Alternative	2 to 10	3	11	3.52	128	Fast
Retention Basin by Working Pens	Cost share	2 to 10	3	3.3	1.056	38	Fast
Stormwater R/D	Cost share	2 to 15	7	22	7.04	109	Fast
Wetland Restoration	Cost share	2 to 10	4	11	3.52	96	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	20 to 70	50	110	35.2	77	Fast

1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP

2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.

3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.

4 High O&M Costs

Owner/Cost Share BMP Program Some rotational grazing, new water facilities, retention basin basin by working pens, improved grass management, feed placement, and moderate wetland restoration/retention	5 to 30	20	13.2	4.224	23	Moderate
Owner BMP Program Improved Grass Management, Watering Facilities, and Feed Placement	0 to 20	7	2.2	1	11	Slow
Cost Share BMP Program Some Rotational Grazing, retention basin basin by working pens, and moderate wetland restoration/retention	5 to 25	13	11	4	29	Moderate
Alternative BMP Program Critical Area Fencing and Edge-of-farm Stormwater R/D and Chemical Treatment	20 to 70	44	55	18	43	Fast

BMPs for Cow Calf Production

Rangeland and Wooded Pasture

Assume for Typical Condition		
16ac per cow		
Assumed average farm size of 500 ac		
Existing P fertilization of 0 lbs P/ac		
No retention or wetland restoration		
Bahia grass / native		
Animals have access to streams		
Existing P Load	0.66	lbs-P/ac/yr
Existing P Concentration	0.18	mg/l
Average Annual Runoff	15.97	in/yr

BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility							
Better N and Micros Fertilization - No P added	Owner	0 to 10	1	2.2	2.2	331	Slow
Grass Management (chopping, mowing, burning, etc.)	Owner	0 to 10	2	2.2	0.704	53	Slow
Improved Grazing Management							
Rotational Grazing (limited)	Cost share	0 to 5	3	5.5	1.76	88	Moderate
HIA and Direct Water Access Prevention							
Improved Watering Facilities to move cattle from streams	Owner	0 to 10	5	5.5	1.76	53	Fast
Feeder/Minerals and Water Placement	Owner	0 to 10	3	2.2	0.704	35	Fast
Critical Area Fencing	Alternative	2 to 10	3	11	3.52	177	Fast
Retention Basin by Working Pens	Cost share	2 to 10	3	3.3	1.056	53	Fast
Stormwater R/D	Cost share	2 to 20	10	22	7.04	106	Fast
Wetland Restoration	Cost share	2 to 10	4	11	3.52	132	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	20 to 70	40	110	35.2	132	Fast

1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP

2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.

3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.

4 High O&M Costs

Owner/Cost Share BMP Program Some rotational grazing, new water facilities, retention basin basin by working pens, improved grass management, feed placement, and moderate wetland restoration/retention	5 to 30	10	13.2	4.224	64	Moderate
Owner BMP Program Improved Grass Management, Watering Facilities, and Feed Placement	0 to 20	4	2.2	1	26	Slow
Cost Share BMP Program Some Rotational Grazing, retention basin basin by working pens, and moderate wetland restoration/retention	5 to 25	6	11	4	88	Moderate
Alternative BMP Program Critical Area Fencing and Edge-of-farm Stormwater R/D and Chemical Treatment	20 to 70	35	55	18	76	Fast

BMPs for Row Crop

Assume for Typical Condition							
Potatoes Spring Crop Assumed average farm size of 100 ac Existing P fertilization of 100 lbs P/ac No retention or wetland restoration Seepage Irrigation with 60' furrows Existing P Load 4.50 lbs-P/ac/yr Existing P Concentration 0.89 mg/l Average Annual Runoff 22.36 in/yr							
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility	Owner	20 to 70	30	11	11	8	Slow
Water Management (irrigation and drainage, riser board control)	Cost share	0 to 40	10	11	3.52	8	Fast
Water Reuse from Retention/Detention Ponds	Alternative	0 to 20	10	33	10.56	23	Fast
Erosion Control (sediment trap in front of risers)	Alternative	0 to 5	2	11	3.52	39	Fast
Off Season In-Field Retention	Cost share	0 to 15	5	11	3.52	16	Fast
Off Season Cover Crop	Cost share	0 to 10	4	55	17.6	98	Fast
Stormwater R/D	Cost share	10 to 55	25	220	70.4	63	Fast
Wetland Restoration	Cost share	5 to 20	10	11	3.52	8	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	20 to 90	50	550	176	78	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 High O&M Costs							
Owner/Cost Share BMP Program		10 to 80	60	220	70.4	26	Moderate
Reduced P Fertilization, Water Management, additional Stormwater Retention, Cover Crop, and limited Wetland Restoration/Retention							
Owner BMP Program		20 to 70	30	11	3.52	3	Slow
Reduced P Fertilization							
Cost Share BMP Program		10 to 50	30	209	66.88	50	Fast
Water Management, additional Stormwater Retention, Cover Crop, and limited Wetland Restoration/Retention							
Alternative BMP Program		20 to 90	50	440	140.8	63	Fast
Water Reuse from Retention/Detention Ponds, Erosion Control, and Edge-of-farm stormwater R/D and Chemical Treatment							

BMPs for Sugarcane

Assume for Typical Condition							
3 year ratoon Assumed average farm size of 400 ac Existing P fertilization of 30 lbs P/ac Limited retention or wetland restoration Seepage Irrigation with 330' furrows Existing P Load 0.63 lbs-P/ac/yr Existing P Concentration 0.15 mg/l Average Annual Runoff 19.16 in/yr							
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility pH management	Owner	0 to 20	10	0	0	0	Fast
Reduced P Fertilization (testing, split, placement, and type)		10 to 50	20	0	0	0	Slow
Water Management (irrigation and drainage, in-field retention)	Cost share	0 to 20	10	11	3.52	56	Fast
Water Reuse from Retention/Detention Ponds	Alternative	0 to 20	10	33	10.56	168	Fast
Stormwater R/D	Cost share	5 to 45	15	110	35.2	372	Fast
Wetland Restoration	Cost share	2 to 15	7	11	3.52	80	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	20 to 90	70	220	70.4	160	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 High O&M Costs							
Owner/Cost Share BMP Program Reduced P fertilization, water management, and limited wetland restoration/retention		10 to 70	33	110	35	169	Moderate
Owner BMP Program Reduced P Fertilization		10 to 50	10	2.2	0	0	Slow
Cost Share BMP Program Water Management and limited Wetland Restoration/Retention		10 to 60	23	107.8	34	238	Fast
Alternative BMP Program Water Reuse from Retention/Detention Ponds and Edge-of-farm stormwater R/D and Chemical Treatment		20 to 90	52	275	88	269	Fast

BMPs for Citrus

Assume for Typical Condition							
Two row crown bedded Assumed average farm size of 200 ac Grass Management between Trees Pond retention with limited wetland restoration Micro jet irrigation and fertigation of young stock Existing P Load 1.80 lbs-P/ac/yr Existing P Concentration 0.41 mg/l Average Annual Runoff 19.16 in/yr							
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility							
Reduced P Fertilization (testing, placement, and type)	Owner	0 to 25	10	0	0	0	Slow
Better N and Micros Fertilization	Owner	0 to 5	2	0	0	0	Slow
Water Management (irrigation and drainage)	Cost share	0 to 20	5	0	0	0	Fast
Water Reuse from Retention/Detention Ponds ⁴	Alternative	0 to 50	10	33	10.56	59	Fast
Grass Management between Trees	Owner	0 to 5	2	22	7.04	196	Moderate
Grassed Waterways	Alternative	0 to 15	5	110	35.2	391	Fast
Stormwater R/D ⁵	Alternative	10 to 60	40	440	140.8	196	Fast
Wetland Restoration	Alternative	5 to 20	10	44	14.08	78	Fast
Edge-of-farm Stormwater R/D and Chemical Treatment ⁶	Alternative	20 to 90	70	220	70.4	56	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 Values shown are for using existing ponds for water reuse, if new facilities are needed then cost would increase significantly. 5 Average of pre/post 1984 stormwater management requirements, i.e. P > .6ppm if developed prior to 1984 and less if developed after 1984. Groves developed after 1984 would probably have stormwater R/D systems, so little addition benefit would be expected for newer groves. 6 High O&M Costs							
Owner/Cost Share BMP Program		10 to 50	17	75	24	245	Moderate
Reduced P Fertilization, Better N Management, Grass Management between Trees, additional Stormwater Retention, and limited Wetland Restoration/Retention							
Owner BMP Program		0 to 25	12	5.5	0	0	Slow
Reduced P Fertilization, Better N Management, and Grass Management between Trees							
Cost Share BMP Program		0 to 20	5	77	24.64	274	Fast
Water Management (irrigation and drainage)							
Alternative BMP Program		20 to 90	52	242	77	83	Fast
Fertigation, Grassed Waterways, and Edge-of-farm Stormwater R/D with Chemical Treatment							

BMPs for Sod / Turf Grass

Assume for Typical Condition							
Bermudagrass Assumed average farm size of 100 ac Existing P fertilization of 70 lbs P/ac No retention or wetland restoration Seepage Irrigation with 100' furrows Existing P Load 2.52 lbs-P/ac/yr Existing P Concentration 0.58 mg/l Average Annual Runoff 19.16 in/yr							
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility	Owner	10 to 50	20	2.2	2.2	4	Slow
Reduced P Fertilization (testing, split, placement, and type)	Cost Share	0 to 20	10	11	3.52	14	Fast
Water Management (irrigation and drainage, riser board control)	Alternative	0 to 15	5	55	17.6	140	Fast
Erosion Control (Buffer Strips and sediment traps)	Cost Share	5 to 40	25	110	35.2	56	Fast
Stormwater R/D	Cost Share	2 to 15	8	11	3.52	17	Fast
Wetland Restoration	Alternative	20 to 90	50	330	105.6	84	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴							
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 High O&M Costs							
Owner/Cost Share BMP Program		10 to 70	47	110	35.2	30	Moderate
Reduced P fertilization, water management, additional stormwater retention, and limited wetland restoration							
Owner BMP Program		10 to 50	20	2.2	2.2	4	Slow
Reduced P Fertilization							
Cost Share BMP Program		10 to 50	27	107.8	34	51	Fast
Water Management, additional Stormwater Retention, Cover Crop, and limited Wetland Restoration/Retention							
Alternative BMP Program		20 to 70	50	330	105.6	84	Fast
Erosion Control, and Edge-of-farm stormwater R/D and Chemical Treatment							

BMPs for Ornamentals

Assume for Typical Condition							
Ornamental Nursery Assumed average farm size of 10 ac Existing P fertilization of 160 lbs P/ac No retention or wetland restoration Overhead Irrigation							
Existing P Load 2.90 lbs-P/ac/yr							
Existing P Concentration 0.67 mg/l							
Average Annual Runoff 19.16 in/yr							
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility	Owner	20 to 70	30	11	11	13	Slow
Reduced P Fertilization (testing, split, placement, and type)	Owner	20 to 70	30	11	11	13	Slow
Water Management (irrigation and drainage, riser board control)	Cost share	0 to 40	10	11	4	12	Fast
Water Reuse from Retention/Detention Ponds	Alternative	0 to 20	10	33	11	36	Fast
Erosion Control (sediment trap in front of risers)	Alternative	0 to 5	2	11	4	61	Fast
Off Season In-Field Retention	Cost share	0 to 15	5	11	4	24	Fast
Off Season Cover Crop	Cost share	0 to 10	4	55	18	152	Fast
Stormwater R/D	Cost share	10 to 65	40	220	70	61	Fast
Wetland Restoration	Cost share	0 to 10	4	11	4	30	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	20 to 90	50	550	176	121	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP							
2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.							
3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.							
4 High O&M Costs							
Owner/Cost Share BMP Program		10 to 80	67	220	70	36	Moderate
Reduced P Fertilization, Water Management, additional Stormwater Retention, Cover Crop, and limited Wetland Restoration/Retention							
Owner BMP Program		20 to 70	32	11	4	4	Slow
Reduced P Fertilization							
Cost Share BMP Program		10 to 50	35	209	67	66	Fast
Water Management, additional Stormwater Retention, Cover Crop, and limited Wetland Restoration/Retention							
Alternative BMP Program		20 to 90	50	440	141	97	Fast
Water Reuse from Retention/Detention Ponds, Erosion Control, and Edge-of-farm stormwater R/D and Chemical Treatment							

BMPs for Horse Farms

Assume for Typical Condition								
1 ac / horse Assumed average farm size of 10 ac Existing P fertilization of 5 lbs P/ac No retention or wetland restoration Bahia grass Existing P Load 1.82 lbs-P/ac/yr Existing P Concentration 0.50 mg/l Average Annual Runoff 15.97 in/yr								
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response	
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)		
Fertility	Reduced P Fertilization (testing, split, placement, and type)	Owner	0 to 30	15	2.2	2.2	8	Slow
	Better N and Micros Fertilization	Owner	0 to 20	10	5.5	5.5	30	Slow
	Grass Management (variety, mowing, burning, irrigation, etc.)	Owner	0 to 20	2	5.5	1.76	48	Slow
Improved Grazing Management	Rotational Grazing	Cost share	0 to 30	3	5.5	1.76	32	Moderate
	Reduced Stocking Rate ⁴ (2ac/horse)	Owner	0 to 10	20	165	52.8	145	Slow
HIA and Direct Water Access Prevention	Improved Watering Facilities to move animals from streams	Cost share	0 to 20	5	11	3.52	39	Fast
	Provide Alternative Shade to move animals from streams	Alternative	0 to 10	1	16.5	5.28	290	Fast
	Feeder/Minerals and Water Placement	Owner	0 to 30	3	2.2	0.704	13	Fast
	Critical Area Fencing	Cost share	2 to 20	2	44	14.08	387	Fast
Buffer Strips		Cost share	0 to 10	5	44	14.08	155	Fast
Stormwater R/D		Cost share	5 to 40	15	44	14.08	52	Fast
Wetland Restoration		Cost share	2 to 15	5	11	3.52	39	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁵		Alternative	20 to 90	70	220	70.4	55	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 This practice would typically be unacceptable to most farmers, but if significant feed is being purchased then it should be considered 5 High O&M Costs								
Owner/Cost Share BMP Program			10 to 50	42	49.5	15.84	21	Moderate
P reduced to zero, Better N Management, Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Improved Grass Management, Feed Placement, Critical Area Fencing, and Moderate Wetland Restoration/Retention								
Owner BMP Program			0 to 25	20	11	4	10	Slow
P Reduced to zero, Better N Management, Grass Management, and Feeder/Minerals and Water Placement								
Cost Share BMP Program			10 to 50	22	38.5	12	31	Moderate
Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Critical Area Fencing, and Moderate Wetland Restoration/Retention								
Alternative BMP Program			20 to 90	49	110	35	39	Fast
Provide Alternative Shade to move cattle from streams and Edge-of-farm Stormwater R/D and Chemical Treatment								

BMPs for Dairies

Assume for Typical Condition							
1000 head Dairy, dry cows pastured on site, 400 heifer/springers on site Assumed average farm size of 700 ac Existing P fertilization of 0 lbs P/ac No existing retention or wetland restoration Stargrass Pastures Animals are fenced from streams Existing P Load 9.38 lbs-P/ac/yr Existing P Concentration 2.59 mg/l Average Annual Runoff 15.97 in/yr							
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Barn Waste							
Feed Ration Management	Owner	0 to 25	8	2.2	2.2	3	Slow
Solids Separation for Off Site Disposal	Alternative	0 to 10	3	5.5	1.76	6	Slow
Expanded Waste Storage Ponds	Alternative	----	----	----	----	----	----
Expanded Sprayfields	Alternative	----	----	----	----	----	----
Improved Pasture Management (See Cow-Calf Imp., Pasture)	Owner	10 to 40	20	16.5	5.28	3	Moderate
Improved Forage/Sprayfield Management - P balanced, new crops	Owner	0 to 15	5	0	0	0	Slow
HIA Management							
Add Housing to Move Animals off Fields ⁴	Alternative	30 to 70	50	3,929	1257	268	Slow
Stormwater Retention / Expanded Sprayfield	Alternative	20 to 70	40	440	140.8	38	Moderate
Edge-of-field Chemical Treatment ⁵	Alternative	50 to 90	70	550	176	27	Fast
Buffer Strips	Alternative	0 to 10	5	44	14.08	30	Moderate
Stormwater R/D	Cost Share	15 to 50	30	1100	352	125	Fast
Wetland Restoration	Cost Share	5 to 20	10	11	3.52	4	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁵	Alternative	50 to 90	70	550	176	27	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Value only include implementation cost, i.e. doesn't include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 Includes associated waste pond and sprayfield expansions 5 High O&M Costs							
Owner/Cost Share BMP Program		20 to 65	37	1045	334.4	301	Moderate
Stormwater R/D and Wetland Restoration							
Feed Management							
Owner BMP Program		0 to 25	9	2.2	2	7	Slow
Feed Ration Management							
Cost Share BMP Program		20 to 60	28	1042.8	333.696	316	Fast
Stormwater R/D and Wetland Restoration							
Alternative BMP Program		20 to 90	48	550	176	39	Fast
Barn Waste							
Solids Separation for Off Site Disposal		0 to 10	3	6	1.76	6	Slow
Expanded Waste Storage Ponds ⁴		----	----	----	----	----	----
Expanded Sprayfields ⁴		----	----	----	----	----	----
HIA Management							
Add Housing to Move Animals off Fields ⁴		30 to 70	50	3929	1257	268	Slow
Stormwater Retention / Expanded Sprayfield		20 to 70	40	440	141	38	Moderate
Edge-of-field Chemical Treatment ⁵		50 to 90	70	550	176	27	Fast
Buffer Strips		0 to 10	5	44	14	30	Moderate
Edge-of-farm stormwater R/D and Chemical Treatment ⁵		50 to 90	70	550	176	27	Fast

BMPs for Field Crop (Hayland) Production

Assume for Typical Condition							
Assumed average farm size of 500 ac Existing P fertilization of 60 lbs P/ac No retention or wetland restoration Various Land Uses including hay, orchards, poultry, etc. Existing P Load 2.78 lbs-P/ac/yr Existing P Concentration 0.77 mg/l Average Annual Acres 15.97 in/yr							
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility							
Reduced P Fertilization (testing, split, placement, and type)	Owner	0 to 50	15	2.2	2.2	5	Slow
Better N and Micros Fertilization	Owner	0 to 20	3	5.5	5.5	66	Slow
Grass Management (variety, mowing, burning, irrigation, etc.)	Owner	0 to 20	2	5.5	1.76	32	Slow
Buffer Strips	Cost share	0 to 10	5	44	14.08	101	Fast
Stormwater R/D	Cost share	10 to 40	20	55	17.6	32	Fast
Wetland Restoration	Cost share	5 to 20	10	11	3.52	13	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	20 to 90	36	220	70.4	70	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 High O&M Costs							
Owner/Cost Share BMP Program P reduced to zero, Better N Management, Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Improved Grass Management, Feed Placement, Critical Area Fencing, and Moderate Wetland Restoration/Retention		10 to 60	40	50	15.84	14	Moderate
Owner BMP Program P Reduced to zero, Better N Management, Grass Management, and Feeder/Minerals and Water Placement		0 to 25	15	11	4	8	Slow
Cost Share BMP Program Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Critical Area Fencing, and Moderate Wetland Restoration/Retention		10 to 50	25	39	12	18	Moderate
Alternative BMP Program Provide Alternative Shade to move cattle from streams and Edge-of-farm Stormwater R/D and Chemical Treatment		20 to 90	36	110	35	35	Fast

BMPs for Pine Plantation

Assume for Typical Condition							
Planted Pine Plantation (20 yr rotation)							
Assumed average farm size of 200 ac							
Existing P fertilization of 5 lbs P/ac							
No retention or wetland restoration							
Existing P Load 0.18 lbs-P/ac/yr							
Existing P Concentration 0.05 mg/l							
Average Annual Runoff 15.97 in/yr							
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Reduced P Fertilization (testing, placement, and type)	Owner	0 to 10	1	0	0	0	Slow
Stormwater R/D	Cost share	2 to 15	8	22	22	1528	Fast
Wetland Restoration	Cost share	1 to 5	2	11	3.52	978	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	20 to 70	50	110	35.2	391	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP							
2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.							
3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.							
4 High O&M Costs							
Owner/Cost Share BMP Program		2 to 25	11	22	22	1111	Moderate
Reduced P Fertilization, Stormwater R/D, and limited Wetland Restoration							
Owner BMP Program		0 to 25	1	0	0	0	Slow
Reduced P Fertilization							
Cost Share BMP Program		10 to 50	10	22	20	1111	Fast
Stormwater R/D and limited Wetland Restoration							
Alternative BMP Program		20 to 70	50	100	32	355	Fast
Edge-of-farm Stormwater R/D and Chemical Treatment							

BMPs for Transportation Corridors

Assume for Typical Condition							
50% Paved Surface							
Bahia Grass Shoulders							
Existing P fertilization of 15 lbs P/ac							
Limited retention or wetland restoration							
Existing P Load 1.65 lbs-P/ac/yr							
Existing P Concentration 0.27 mg/l							
Average Annual Runoff 27.15 in/yr							
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility pH management	Owner Cost share Cost share Alternative	0 to 20	10	0	0	0	Fast
Reduced P Fertilization (testing, split, placement, and type)		10 to 50	20	0	0	0	Slow
Stormwater R/D		5 to 45	15	110	35.2	142	Fast
Wetland Restoration		2 to 15	7	11	3.52	30	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴		20 to 90	70	220	70.4	61	Fast
<p>1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP</p> <p>2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.</p> <p>3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.</p> <p>4 High O&M Costs</p>							
Owner/Cost Share BMP Program Reduced P fertilization, water management, and limited wetland restoration/retention		10 to 70	33	110	35	65	Moderate
Owner BMP Program Reduced P Fertilization		10 to 50	10	2.2	0	0	Slow
Cost Share BMP Program Water Management and limited Wetland Restoration/Retention		10 to 60	23	107.8	34	91	Fast
Alternative BMP Program Water Reuse from Retention/Detention Ponds and Edge-of-System stormwater R/D and Chemical Treatment		20 to 90	52	275	88	103	Fast

BMPs for Communications and Utilities

Assume for Typical Condition							
Marginally Maintained Bahia Grass							
No Pond retention							
Existing P Load 0.48 lbs-P/ac/yr							
Existing P Concentration 0.13 mg/l							
Average Annual Runoff 15.97 in/yr							
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility							
Reduced P Fertilization (testing, placement, and type)	Owner	0 to 10	5	0	0	0	Slow
Dry/Wet Retention 0.25"	Cost share	0 to 20	2	1280	409.6	42667	Fast
Wet Restoration	Cost share	0 to 20	3	1600	512	35556	Fast
Dry Detention - Regional	Alternative	15 to 35	25	3200	1024	8533	Fast
Wet Detention - Regional	Alternative	40 to 80	65	4000	1280	4103	Fast
<p>1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMPs</p> <p>2 Costs presented on per acre of entire development basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.</p> <p>3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.</p> <p>4 High O&M Costs</p>							
Owner/Cost Share BMP Program		0 to 20	10	6400	2048	42667	Moderate
Reduced P Fertilization, limited dry/wet retention, and wetland restoration							
Owner BMP Program		0 to 10	5	0	0	0	Slow
Reduced P Fertilization							
Cost Share BMP Program		5 to 50	5	6400	2048	85333	Fast
Selective limited dry/wet retention and Wetland Restoration							
Alternative BMP Program		15 to 80	50	3200	1024	4267	Fast
Stormwater R/D with Chemical Treatment							

BMPs for Low Density Residential

Assume for Typical Condition							
Low Density Residential Assumed average development size of 200 ac Moderately Managed Lawns Mid-IFAS 1.5 lb-N/1000ft2 Limited Pond retention Limited Lawn Irrigation Existing N Load 4.95 lbs-P/ac/yr Existing N Concentration 1.24 mg/l Average Annual Runoff 17.57 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility	Owner	0 to 30	15	11	3.52	5	Fast
Reduced N Fertilization (IFAS low, placement, and type)	Cost share	10 to 40	15	6400	2048	2758	Fast
Dry Retention/Swales ⁴ 0.25"	Cost share	10 to 40	20	8000	2560	2586	Fast
Wet Detention - 0.25"	Cost share	0 to 10	2	20	6.4	65	Fast
Street Sweeping	Cost share	2 to 30	15	440	140.8	190	Fast
Sediment/Baffle Boxes	Alternative	5 to 35	15	3200	1024	1379	Fast
Dry Detention - Regional	Alternative	5 to 30	15	4000	1280	1724	Fast
Wet Detention - Regional							
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMPs 2 Costs presented on per acre of entire development basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 Adjusted down to correct for reported Dry Detention reductions not including ground water re-emergent N loads.							
Owner/Cost Share BMP Program		0 to 50	30	6411	2051.52	1381	Fast
Reduced N Fertilization, Swales, and limited Dry Retention/Sweeping							
Owner BMP Program		0 to 30	15	11	3.52	5	Fast
Reduced N Fertilization							
Cost Share BMP Program		10 to 40	15	6400	2048	2758	Fast
Limited Dry Retention, Street Sweeping, Sediment R/D and Wetland Restoration							
Alternative BMP Program		5 to 35	15	3200	1024	1379	Fast
Stormwater R/D with Chemical Treatment							

BMPs for Medium Density Residential

Assume for Typical Condition							
Medium Density Residential Assumed average development size of 200 ac Moderately Managed Lawns Mid-IFAS 3.5 lb-N/1000ft ² Limited Pond retention Limited Lawn Irrigation Existing N Load 7.20 lbs-N/ac/yr Existing N Concentration 1.53 mg/l Average Annual Runoff 20.76 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility	Owner	0 to 50	25	15	4.8	3	Fast
Reduced N Fertilization (IFAS low, placement, and type)	Cost share	10 to 50	25	6400	2048	1138	Fast
Dry Retention/Swales ⁴ 0.25"	Cost share	10 to 40	20	8000	2560	1778	Fast
Wet Detention - 0.25"	Cost share	0 to 10	2	20	6.4	44	Fast
Street Sweeping	Cost share	2 to 30	15	440	140.8	130	Fast
Sediment/Baffle Boxes	Alternative	5 to 35	15	3200	1024	948	Fast
Dry Detention - Regional	Alternative	5 to 30	15	4000	1280	1185	Fast
Wet Detention - Regional							
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMPs 2 Costs presented on per acre of entire development basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 Adjusted down to correct for reported Dry Detention reductions not including ground water re-emergent N loads.							
Owner/Cost Share BMP Program		0 to 70	50	6415	2052.8	570	Fast
Reduced N Fertilization, Swales, and limited Dry Retention/Sweeping							
Owner BMP Program		0 to 60	25	15	4.8	3	Fast
Reduced N Fertilization							
Cost Share BMP Program		5 to 50	25	6400	2048	1138	Fast
Limited Dry Retention, Street Sweeping, Sediment R/D and Wetland Restoration							
Alternative BMP Program		5 to 35	15	3200	1024	948	Fast
Stormwater R/D with Chemical Treatment							

BMPs for High Density Residential

Assume for Typical Condition							
High Density Residential Assumed average development size of 200 ac Moderately Managed Lawns Mid-IFAS 3.5 lb-N/1000ft2 Limited Pond retention Limited Lawn Irrigation Existing N Load 10.80 lbs-N/ac/yr Existing N Concentration 1.99 mg/l Average Annual Runoff 23.96 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility	Owner	0 to 60	30	15	4.8	1	Fast
Reduced N Fertilization (IFAS low, placement, and type)	Cost share	10 to 50	25	6400	2048	759	Fast
Dry Retention/Swales ⁴ 0.25"	Cost share	10 to 40	20	8000	2560	1185	Fast
Wet Detention - 0.25"	Cost share	0 to 10	2	20	6.4	30	Fast
Street Sweeping	Cost share	2 to 30	15	440	140.8	87	Fast
Sediment/Baffle Boxes	Alternative	5 to 35	15	3200	1024	632	Fast
Dry Detention - Regional	Alternative	5 to 30	15	4000	1280	790	Fast
Wet Detention - Regional							
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMPs 2 Costs presented on per acre of entire development basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 Adjusted down to correct for reported Dry Detention reductions not including ground water re-emergent N loads.							
Owner/Cost Share BMP Program		0 to 70	55	6415	2052.8	346	Fast
Reduced N Fertilization, Swales, and limited Dry Retention/Sweeping							
Owner BMP Program		0 to 60	30	15	4.8	1	Fast
Reduced N Fertilization							
Cost Share BMP Program		5 to 50	25	6400	2048	759	Fast
Limited Dry Retention, Street Sweeping, Sediment R/D and Wetland Restoration							
Alternative BMP Program		5 to 35	15	3200	1024	632	Fast
Stormwater R/D with Chemical Treatment							

BMPs for Other Urban

Assume for Typical Condition							
Mixed Commercial, Industrial, institutional, recreation Assumed average development size of 200 ac Moderately Managed Lawns Mid-IFAS 3.5 lb-N/1000ft2 Limited Pond retention Limited Lawn Irrigation Existing N Load 7.80 lbs-N/ac/yr Existing N Concentration 1.51 mg/l Average Annual Runoff 22.80 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility	Owner	0 to 50	25	15	4.8	2	Fast
Reduced N Fertilization (IFAS low, placement, and type)	Cost share	10 to 50	25	6400	2048	1051	Fast
Dry Retention/Swales ⁴ 0.25"	Cost share	10 to 40	20	8000	2560	1642	Fast
Wet Detention - 0.25"	Cost share	0 to 10	2	20	6.4	41	Fast
Street Sweeping	Cost share	2 to 30	15	440	140.8	120	Fast
Sediment/Baffle Boxes	Alternative	5 to 35	15	3200	1024	876	Fast
Dry Detention - Regional	Alternative	5 to 30	15	4000	1280	1094	Fast
Wet Detention - Regional							
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMPs 2 Costs presented on per acre of entire development basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 Adjusted down to correct for reported Dry Detention reductions not including ground water re-emergent N loads.							
Owner/Cost Share BMP Program		0 to 70	50	6415	2052.8	527	Fast
Reduced N Fertilization, Swales, and limited Dry Retention/Sweeping							
Owner BMP Program		0 to 50	25	15	4.8	2	Fast
Reduced N Fertilization							
Cost Share BMP Program		10 to 50	25	6400	2048	1051	Fast
Limited Dry Retention, Street Sweeping, Sediment R/D and Wetland Restoration							
Alternative BMP Program		5 to 35	15	3200	1024	876	Fast
Stormwater R/D with Chemical Treatment							

BMPs for Cow Calf Production

Improved Pastures

Assume for Typical Condition								
3 ac / cow								
Assumed average farm size of 500 ac								
Existing N fertilization of 120 lbs N/ac								
No retention or wetland restoration								
Bahia grass								
Animals have access to streams								
Existing N Load 9.99 lbs-N/ac/yr								
Existing N Concentration 2.30 mg/l								
Average Annual Runoff 19.16 in/yr								
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response	
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)		
Fertility	Reduced N Fertilization (IFAS, placement, and type)	Owner	0 to 30	15	2.2	2.2	1	Fast
	Better Micros Fertilization	Owner	0 to 20	3	5.5	5.5	18	Fast
Grass Management (variety, mowing, burning, irrigation, etc.)		Owner	0 to 20	2	5.5	1.76	9	Fast
Improved Grazing Management								
	Rotational Grazing	Cost share	0 to 30	3	5.5	1.76	6	Fast
	Reduced Stocking Rate ⁴ (4ac /cow)	Owner	0 to 10	5	165	52.8	106	Fast
HIA and Direct Water Access Prevention								
	Improved Watering Facilities to move cattle from streams	Cost share	0 to 20	10	11	3.52	4	Fast
	Provide Alternative Shade to move cattle from streams	Alternative	0 to 10	2	16.5	5.28	26	Fast
	Feeder/Minerals and Water Placement	Owner	0 to 30	3	2.2	0.704	2	Fast
	Critical Area Fencing	Cost share	2 to 20	5	44	14.08	28	Fast
	Retention Basin by Working Pens	Cost share	2 to 10	5	3.3	1.056	2	Fast
Buffer Strips		Cost share	0 to 10	5	44	14.08	28	Fast
Stormwater R/D		Cost share	5 to 40	15	44	14.08	9	Fast
Wetland Restoration		Cost share	2 to 15	5	11	3.52	7	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁵		Alternative	5 to 70	50	220	70.4	14	Fast
¹ Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP ² Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. ³ The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. ⁴ This practice would typically be unacceptable to most farmers, but if significant feed is being purchased then it should be considered ⁵ High O&M Costs								
Owner/Cost Share BMP Program			10 to 50	27	49.5	15.84	6	Fast
P reduced to zero, Better N Management, Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Improved Grass Management, Feed Placement, Critical Area Fencing, and Moderate Wetland Restoration/Retention								
Owner BMP Program			0 to 25	17	11	4	2	Fast
Reduced N Fertilization (IFAS, placement, and type) Grass Management, and Feeder/Minerals and Water Placement								
Cost Share BMP Program			10 to 50	10	38.5	12	12	Fast
Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Critical Area Fencing, and Moderate Wetland Restoration/Retention								
Alternative BMP Program			5 to 60	30	110	35	12	Fast
Provide Alternative Shade to move cattle from streams and Edge-of-farm Stormwater R/D and Chemical Treatment								

BMPs for Cow Calf Production

Unimproved Pasture

Assume for Typical Condition		
8 ac per cow		
Assumed average farm size of 500 ac		
Existing N fertilization of 60 lbs N/ac		
No retention or wetland restoration		
Bahia grass / native		
Animals have access to streams		
Existing N Load	4.95	lbs-N/ac/yr
Existing N Concentration	1.37	mg/l
Average Annual Runoff	15.97	in/yr

BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility							
Reduced N Fertilization (IFAS, placement, and type)	Owner	0 to 20	9	1.2	1.2	3	Fast
Grass Management (chopping, mowing, burning, etc.)	Owner	0 to 10	2	2.2	0.704	7	Fast
Improved Grazing Management							
Rotational Grazing (limited)	Cost share	0 to 5	3	5.5	1.76	12	Fast
HIA and Direct Water Access Prevention							
Improved Watering Facilities to move cattle from streams	Owner	0 to 10	5	5.5	1.76	7	Fast
Feeder/Minerals and Water Placement	Owner	0 to 10	3	2.2	0.704	5	Fast
Critical Area Fencing	Alternative	2 to 10	3	11	3.52	24	Fast
Retention Basin by Working Pens	Cost share	2 to 10	3	3.3	1.056	7	Fast
Stormwater R/D	Cost share	2 to 15	7	22	7.04	20	Fast
Wetland Restoration	Cost share	2 to 10	4	11	3.52	18	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	5 to 50	25	110	35.2	28	Fast

1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP

2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.

3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.

4 High O&M Costs

Owner/Cost Share BMP Program Some rotational grazing, new water facilities, retention basin basin by working pens, improved grass management, feed placement, and moderate wetland restoration/retention	5 to 30	19	13.2	4.224	4	Fast
Owner BMP Program Improved Grass Management, Watering Facilities, and Feed Placement	0 to 20	11	2.2	1	1	Fast
Cost Share BMP Program Some Rotational Grazing, retention basin basin by working pens, and moderate wetland restoration/retention	5 to 30	8	11	4	9	Fast
Alternative BMP Program Critical Area Fencing and Edge-of-farm Stormwater R/D and Chemical Treatment	5 to 60	30	55	18	12	Fast

BMPs for Cow Calf Production

Rangeland and Wooded Pasture

Assume for Typical Condition		
16ac per cow		
Assumed average farm size of 500 ac		
Existing N fertilization of 10 lbs N/ac		
No retention or wetland restoration		
Bahia grass / native		
Animals have access to streams		
Existing N Load	3.69	lbs-N/ac/yr
Existing N Concentration	1.02	mg/l
Average Annual Runoff	15.97	in/yr

BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility							
Better N and Micros Fertilization - No P added	Owner	0 to 10	1	2.2	1	27	Fast
Grass Management (chopping, mowing, burning, etc.)	Owner	0 to 10	2	2.2	0.704	10	Fast
Improved Grazing Management							
Rotational Grazing (limited)	Cost share	0 to 5	3	5.5	1.76	16	Fast
HIA and Direct Water Access Prevention							
Improved Watering Facilities to move cattle from streams	Owner	0 to 10	5	5.5	1.76	10	Fast
Feeder/Minerals and Water Placement	Owner	0 to 10	3	2.2	0.704	6	Fast
Critical Area Fencing	Alternative	2 to 10	3	11	3.52	32	Fast
Retention Basin by Working Pens	Cost share	2 to 10	3	3.3	1.056	10	Fast
Stormwater R/D	Cost share	2 to 20	10	22	7.04	19	Fast
Wetland Restoration	Cost share	2 to 10	4	11	3.52	24	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	5 to 50	25	110	35.2	38	Fast

1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP

2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.

3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.

4 High O&M Costs

Owner/Cost Share BMP Program Some rotational grazing, new water facilities, retention basin basin by working pens, improved grass management, feed placement, and moderate wetland restoration/retention	5 to 30	10	13.2	4.224	11	Fast
Owner BMP Program Improved Grass Management, Watering Facilities, and Feed Placement	0 to 20	4	2.2	1	5	Fast
Cost Share BMP Program Some Rotational Grazing, retention basin basin by working pens, and moderate wetland restoration/retention	5 to 25	6	11	4	16	Fast
Alternative BMP Program Critical Area Fencing and Edge-of-farm Stormwater R/D and Chemical Treatment	5 to 50	20	55	18	24	Fast

BMPs for Row Crop

Assume for Typical Condition							
Potatoes Spring Crop							
Assumed average farm size of 100 ac							
Existing N fertilization of 225 lbs N/ac							
No retention or wetland restoration							
Seepage Irrigation with 60' furrows							
Existing N Load 13.50 lbs-N/ac/yr							
Existing N Concentration 2.67 mg/l							
Average Annual Runoff 22.36 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility	Owner	20 to 70	30	18	18	4	Fast
Water Management (irrigation and drainage, riser board control)	Cost share	0 to 40	10	11	3.52	3	Fast
Water Reuse from Retention/Detention Ponds	Alternative	0 to 20	10	33	10.56	8	Fast
Erosion Control (sediment trap in front of risers)	Alternative	0 to 5	2	11	3.52	13	Fast
Off Season In-Field Retention	Cost share	0 to 15	5	11	3.52	5	Fast
Off Season Cover Crop	Cost share	0 to 10	4	55	17.6	33	Fast
Stormwater R/D	Cost share	10 to 55	25	220	70.4	21	Fast
Wetland Restoration	Cost share	5 to 20	10	11	3.52	3	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	5 to 70	50	550	176	26	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP							
2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.							
3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.							
4 High O&M Costs							
Owner/Cost Share BMP Program		10 to 80	60	220	70.4	9	Fast
Reduced N Fertilization, Water Management, additional Stormwater Retention, Cover Crop, and limited Wetland Restoration/Retention							
Owner BMP Program		20 to 70	30	11	3.52	1	Fast
Reduced N Fertilization							
Cost Share BMP Program		10 to 50	30	209	66.88	17	Fast
Water Management, additional Stormwater Retention, Cover Crop, and limited Wetland Restoration/Retention							
Alternative BMP Program		5 to 70	50	440	140.8	21	Fast
Water Reuse from Retention/Detention Ponds, Erosion Control, and Edge-of-farm stormwater R/D and Chemical Treatment							

BMPs for Sugarcane

Assume for Typical Condition							
3 year ratoon on organic soils							
Assumed average farm size of 400 ac							
Existing N fertilization of 30 lbs N/ac							
Limited retention or wetland restoration							
Seepage Irrigation with 330' furrows							
Existing N Load 7.20 lbs-N/ac/yr							
Existing N Concentration 1.66 mg/l							
Average Annual Runoff 19.16 in/yr							
BMPs	Type	N Reduction²		Initial Cost of BMP² (\$/ac)	Annual Cost³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility pH management	Owner	0 to 20	10	1	1	1	Fast
Reduced N Fertilization (testing, split, placement, and type)		10 to 50	20	2	2	1	Fast
Water Management (irrigation and drainage, in-field retention)	Cost share	0 to 20	10	11	3.52	5	Fast
Water Reuse from Retention/Detention Ponds	Alternative	0 to 20	10	33	10.56	15	Fast
Stormwater R/D	Cost share	5 to 45	15	110	35.2	33	Fast
Wetland Restoration	Cost share	2 to 15	7	11	3.52	7	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	5 to 70	50	220	70.4	20	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP							
2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.							
3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.							
4 High O&M Costs							
Owner/Cost Share BMP Program		10 to 70	33	110.8	35	15	Fast
Reduced N fertilization, water management, and limited wetland restoration/retention							
Owner BMP Program		10 to 50	10	3	1	1	Fast
Reduced N Fertilization							
Cost Share BMP Program		10 to 60	23	107.8	34	21	Fast
Water Management and limited Wetland Restoration/Retention							
Alternative BMP Program		5 to 70	52	275	88	24	Fast
Water Reuse from Retention/Detention Ponds and Edge-of-farm stormwater R/D and Chemical Treatment							

BMPs for Citrus

Assume for Typical Condition							
Two row crown bedded Assumed average farm size of 200 ac Grass Management between Trees Pond retention with limited wetland restoration Micro jet irrigation and fertigation of young stock Existing N Load at 160 lb-N/ac/yr fertilizer 7.65 lbs-N/ac/yr Existing N Concentration 1.76 mg/l Average Annual Runoff 19.16 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility							
Reduced N Fertilization (IFAS, placement, and type)	Owner	0 to 25	10	20	6.4	8	Fast
Better Micros Fertilization	Owner	0 to 5	2	0	0	0	Fast
Water Management (irrigation and drainage)	Cost share	0 to 20	5	0	0	0	Fast
Water Reuse from Retention/Detention Ponds ⁴	Alternative	0 to 50	10	33	10.56	14	Fast
Grass Management between Trees	Owner	0 to 5	2	22	7.04	46	Fast
Grassed Waterways	Alternative	0 to 15	5	110	35.2	92	Fast
Stormwater R/D ⁵	Alternative	10 to 60	40	440	140.8	46	Fast
Wetland Restoration	Alternative	5 to 20	10	44	14.08	18	Fast
Edge-of-farm Stormwater R/D and Chemical Treatment ⁶	Alternative	5 to 70	50	220	70.4	18	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 Values shown are for using existing ponds for water reuse, if new facilities are needed then cost would increase significantly. 5 Average of pre/post 1984 stormwater management requirements, i.e. P > .6ppm if developed prior to 1984 and less if developed after 1984. Groves developed after 1984 would probably have stormwater R/D systems, so little addition benefit would be expected for newer groves. 6 High O&M Costs							
Owner/Cost Share BMP Program		10 to 50	15	490	156.8	137	Fast
Reduced P Fertilization, Better N Management, Grass Management between Trees, additional Stormwater Retention, and limited Wetland Restoration/Retention							
Owner BMP Program		0 to 25	10	20	6.4	8	Fast
Reduced N Fertilization (IFAS, placement, and type) Better Micros Fertilization							
Cost Share BMP Program		0 to 20	5	470	150.4	393	Fast
Water Management (irrigation and drainage)							
Alternative BMP Program		5 to 70	52	242	77	19	Fast
Fertigation, Grassed Waterways, and Edge-of-farm Stormwater R/D with Chemical Treatment							

BMPs for Sod / Turf Grass

Assume for Typical Condition							
Bermudagrass Assumed average farm size of 100 ac Existing N fertilization of 190 lbs N/ac No retention or wetland restoration Seepage Irrigation with 100' furrows Existing N Load 8.10 lbs-N/ac/yr Existing N Concentration 1.87 mg/l Average Annual Runoff 19.16 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility	Owner	10 to 50	20	2.2	2.2	1	Fast
Reduced N Fertilization (testing, split, placement, and type)	Cost share	0 to 20	10	11	3.52	4	Fast
Water Management (irrigation and drainage, riser board control)	Alternative	0 to 15	5	55	17.6	43	Fast
Erosion Control (Buffer Strips and sediment traps)	Cost share	5 to 40	25	110	35.2	17	Fast
Stormwater R/D	Cost share	2 to 15	8	11	3.52	5	Fast
Wetland Restoration	Alternative	20 to 70	50	330	105.6	26	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴							
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 High O&M Costs							
Owner/Cost Share BMP Program		10 to 70	47	110	35.2	9	Fast
Reduced N fertilization, water management, additional stormwater retention, and limited wetland restoration							
Owner BMP Program		10 to 50	20	2.2	2.2	1	Fast
Reduced N Fertilization							
Cost Share BMP Program		10 to 50	27	107.8	34	16	Fast
Water Management, additional Stormwater Retention, Cover Crop, and limited Wetland Restoration/Retention							
Alternative BMP Program		20 to 70	50	330	105.6	26	Fast
Erosion Control, and Edge-of-farm stormwater R/D and Chemical Treatment							

BMPs for Ornamentals

Assume for Typical Condition							
Ornamental Nursery Assumed average farm size of 10 ac Existing N fertilization of 160 lbs N/ac No retention or wetland restoration Overhead Irrigation							
Existing N Load 10.80 lbs-N/ac/yr							
Existing N Concentration 2.49 mg/l							
Average Annual Runoff 19.16 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility	Owner	10 to 50	25	11	11	4	Fast
Water Management (irrigation and drainage, riser board control)	Cost share	0 to 40	10	11	4	3	Fast
Water Reuse from Retention/Detention Ponds	Alternative	0 to 20	10	33	11	10	Fast
Erosion Control (sediment trap in front of risers)	Alternative	0 to 5	2	11	4	16	Fast
Off Season In-Field Retention	Cost share	0 to 15	5	11	4	7	Fast
Off Season Cover Crop	Cost share	0 to 30	15	55	18	11	Fast
Stormwater R/D	Cost share	10 to 65	40	220	70	16	Fast
Wetland Restoration	Cost share	0 to 10	4	11	4	8	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	5 to 70	50	550	176	33	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP							
2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.							
3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.							
4 High O&M Costs							
Owner/Cost Share BMP Program		10 to 80	50	220	70	13	Fast
Reduced N Fertilization, Water Management, additional Stormwater Retention, Cover Crop, and limited Wetland Restoration/Retention							
Owner BMP Program		10 to 50	25	11	4	1	Fast
Reduced N Fertilization							
Cost Share BMP Program		10 to 50	25	209	67	25	Fast
Water Management, additional Stormwater Retention, Cover Crop, and limited Wetland Restoration/Retention							
Alternative BMP Program		10 to 50	25	440	141	52	Fast
Water Reuse from Retention/Detention Ponds, Erosion Control, and Edge-of-farm stormwater R/D and Chemical Treatment							

BMPs for Horse Farms

Assume for Typical Condition							
1 ac / horse Assumed average farm size of 10 ac Existing N fertilization of 180 lbs N/ac No retention or wetland restoration Bahia grass Existing N Load 14.40 lbs-N/ac/yr Existing N Concentration 3.98 mg/l Average Annual Runoff 15.97 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility	Reduced N Fertilization (IFAS, placement, and type)	0 to 60	30	4.2	4.2	1	Fast
	Better Micros Fertilization	0 to 20	3	5.5	5.5	13	Fast
	Grass Management (variety, mowing, burning, irrigation, etc.)	0 to 20	2	5.5	1.76	6	Fast
Improved Grazing Management	Rotational Grazing	0 to 30	3	5.5	1.76	4	Fast
	Reduced Stocking Rate ⁴ (2ac/horse)	0 to 20	10	165	52.8	37	Fast
HIA and Direct Water Access Prevention	Improved Watering Facilities to move animals from streams	0 to 20	5	11	3.52	5	Fast
	Provide Alternative Shade to move animals from streams	0 to 10	1	16.5	5.28	37	Fast
	Feeder/Minerals and Water Placement	0 to 30	3	2.2	0.704	2	Fast
	Critical Area Fencing	2 to 20	2	44	14.08	49	Fast
Buffer Strips		0 to 10	5	44	14.08	20	Fast
Stormwater R/D		5 to 40	15	44	14.08	7	Fast
Wetland Restoration		2 to 15	5	11	3.52	5	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁵	Alternative	5 to 70	50	220	70.4	10	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 This practice would typically be unacceptable to most farmers, but if significant feed is being purchased then it should be considered 5 High O&M Costs							
Owner/Cost Share BMP Program		10 to 70	52	49.5	15.84	2	Fast
P reduced to zero, Better N Management, Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Improved Grass Management, Feed Placement, Critical Area Fencing, and Moderate Wetland Restoration/Retention							
Owner BMP Program		0 to 60	30	11	4	1	Fast
Reduced N Fertilization (IFAS, placement, and type) Grass Management, and Feeder/Minerals and Water Placement							
Cost Share BMP Program		10 to 50	22	38.5	12	4	Fast
Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Critical Area Fencing, and Moderate Wetland Restoration/Retention							
Alternative BMP Program		5 to 60	30	110	35	8	Fast
Provide Alternative Shade to move cattle from streams and Edge-of-farm Stormwater R/D and Chemical Treatment							

BMPs for Dairies

Assume for Typical Condition							
1000 head Dairy, dry cows pastured on site, 400 heifer/springers on site Assumed average farm size of 700 ac Existing N fertilization of 100 lbs N/ac No existing retention or wetland restoration Stargrass Pastures Animals are fenced from streams Existing N Load 18.00 lbs-N/ac/yr Existing N Concentration 4.98 mg/l Average Annual Runoff 15.97 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Barn Waste							
Feed Ration Management	Owner	0 to 25	1	2.2	2.2	12	Fast
Solids Separation for Off Site Disposal	Alternative	0 to 10	1	5.5	1.76	10	Fast
Expanded Waste Storage Ponds	Alternative	----	----	----	----	----	----
Expanded Sprayfields	Alternative	----	----	----	----	----	----
Improved Pasture Management (See Cow-Calf Imp., Pasture)	Owner	10 to 40	20	16.5	5.28	1	Fast
Improved Forage/Sprayfield Management - N/P balanced, new crops	Owner	0 to 15	5	0	0	0	Fast
HIA Management							
Add Housing to Move Animals off Fields ⁴	Alternative	30 to 70	50	3,929	1257	140	Fast
Stormwater Retention / Expanded Sprayfield	Alternative	20 to 70	40	440	140.8	20	Fast
Edge-of-field Chemical Treatment ⁵	Alternative	5 to 30	15	550	176	65	Fast
Buffer Strips	Alternative	0 to 10	5	44	14.08	16	Fast
Stormwater R/D	Cost share	15 to 50	30	1100	352	65	Fast
Wetland Restoration	Cost share	5 to 20	10	11	3.52	2	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁵	Alternative	5 to 70	50	550	176	20	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Value only include implementation cost, i.e. doesn't include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 Includes associated waste pond and sprayfield expansions 5 High O&M Costs							
Owner/Cost Share BMP Program		20 to 65	60	1045	334.4	97	Fast
Stormwater R/D and Wetland Restoration N Fertilizer Reduction							
Owner BMP Program		10 to 40	20	2.2	0.704	0	Fast
N Fertilizer Management							
Cost Share BMP Program		20 to 60	40	1042.8	333.696	46	Fast
Stormwater R/D and Wetland Restoration							
Alternative BMP Program		20 to 90	48	750	240	28	Fast
Barn Waste							
Solids Separation for Off Site Disposal		0 to 10	1	6	1.76	10	Fast
Expanded Waste Storage Ponds ⁴		----	----	----	----	----	----
Expanded Sprayfields ⁴		----	----	----	----	----	----
HIA Management							
Add Housing to Move Animals off Fields ⁴		30 to 70	50	3929	1257	140	Fast
Stormwater Retention / Expanded Sprayfield		20 to 70	40	440	141	20	Fast
Edge-of-field Chemical Treatment ⁵		5 to 30	15	550	176	65	Fast
Buffer Strips		0 to 10	5	44	14	16	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁵		5 to 70	50	550	176	20	Fast

BMPs for Field Crop (Hayland) Production

Assume for Typical Condition							
Assumed average farm size of 500 ac Existing N fertilization of 180 lbs N/ac No retention or wetland restoration Various Land Uses including hay, orchards, poultry, etc. Existing N Load 7.91 lbs-N/ac/yr Existing N Concentration 2.19 mg/l Average Annual Acres 15.97 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility							
Reduced N Fertilization (IFAS, placement, and type)	Owner	0 to 50	15	2.2	2.2	2	Fast
Better Micros Fertilization	Owner	0 to 20	3	5.5	5.5	23	Fast
Grass Management (variety, mowing, burning, irrigation, etc.)	Owner	0 to 20	2	5.5	1.76	11	Fast
Buffer Strips	Cost share	0 to 10	5	44	14.08	36	Fast
Stormwater R/D	Cost share	10 to 40	20	55	17.6	11	Fast
Wetland Restoration	Cost share	5 to 20	10	11	3.52	4	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	5 to 70	50	220	70.4	18	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 High O&M Costs							
Owner/Cost Share BMP Program P reduced to zero, Better N Management, Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Improved Grass Management, Feed Placement, Critical Area Fencing, and Moderate Wetland Restoration/Retention		10 to 60	40	58	18.56	6	Fast
Owner BMP Program Reduced N Fertilization (IFAS, placement, and type) Grass Management, and Feeder/Minerals and Water Placement		0 to 25	15	11	4	3	Fast
Cost Share BMP Program Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Critical Area Fencing, and Moderate Wetland Restoration/Retention		10 to 50	25	47	15	8	Fast
Alternative BMP Program Provide Alternative Shade to move cattle from streams and Edge-of-farm Stormwater R/D and Chemical Treatment		5 to 70	36	110	35	12	Fast

BMPs for Pine Plantation

Assume for Typical Condition							
Planted Pine Plantation (20 yr rotation)							
Assumed average farm size of 200 ac							
Existing N fertilization of 5 lbs N/ac							
No retention or wetland restoration							
Existing N Load 2.79 lbs-N/ac/yr							
Existing N Concentration 0.77 mg/l							
Average Annual Runoff 15.97 in/yr							
BMPs	Type	N Reduction¹		Initial Cost of BMP² (\$/ac)	Annual Cost³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Reduced N Fertilization (testing, placement, and type)	Owner	0 to 15	5	3	3	22	Fast
Stormwater R/D	Cost share	2 to 15	8	22	22	99	Fast
Wetland Restoration	Cost share	1 to 5	2	11	3.52	63	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	5 to 50	25	110	35.2	50	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP							
2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.							
3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.							
4 High O&M Costs							
Owner/Cost Share BMP Program		2 to 25	15	22	22	53	Fast
Reduced N Fertilization, Stormwater R/D, and limited Wetland Restoration							
Owner BMP Program		0 to 15	5	3	0	0	Fast
Reduced N Fertilization							
Cost Share BMP Program		3 to 20	10	16.5	12.76	46	Fast
Stormwater R/D and limited Wetland Restoration							
Alternative BMP Program		5 to 50	25	110	35.2	50	Fast
Edge-of-farm Stormwater R/D and Chemical Treatment							

BMPs for Transportation Corridors

Assume for Typical Condition							
50% Paved Surface							
Bahia Grass Shoulders							
Existing N fertilization of 35 lbs N/ac							
Limited retention or wetland restoration							
Existing N Load 8.28 lbs-N/ac/yr							
Existing N Concentration 1.35 mg/l							
Average Annual Runoff 27.15 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility pH management	Owner	0 to 20	3	2	2	8	Fast
Reduced N Fertilization (testing, split, placement, and type)		10 to 50	20	2	2	1	Fast
Stormwater R/D	Cost share	5 to 45	15	110	35.2	28	Fast
Wetland Restoration	Cost share	2 to 15	7	11	3.52	6	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	5 to 50	25	220	70.4	34	Fast
¹ Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP ² Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. ³ The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. ⁴ High O&M Costs							
Owner/Cost Share BMP Program		10 to 70	43	111.8	36	10	Fast
Reduced N fertilization, water management, and limited wetland restoration/retention							
Owner BMP Program		10 to 50	20	4	1	5	Fast
Reduced N Fertilization							
Cost Share BMP Program		10 to 60	23	107.8	34	18	Fast
Water Management and limited Wetland Restoration/Retention							
Alternative BMP Program		5 to 50	25	220	70	34	Fast
Water Reuse from Retention/Detention Ponds and Edge-of-System stormwater R/D and Chemical Treatment							

BMPs for Communications and Utilities

Assume for Typical Condition							
Marginally Maintained Bahia Grass							
No Pond retention							
Existing N Load 5.40 lbs-N/ac/yr							
Existing N Concentration 1.49 mg/l							
Average Annual Runoff 15.97 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility							
Reduced P Fertilization (testing, placement, and type)	Owner	0 to10	5	0	0	0	Fast
Dry/Wet Retention 0.25"	Cost share	0 to 20	2	1280	409.6	3793	Fast
Wet Restoration	Cost share	0 to 20	3	1600	512	3160	Fast
Dry Detention - Regional	Alternative	15 to 35	25	3200	1024	759	Fast
Wet Detention - Regional	Alternative	40 to 80	65	4000	1280	365	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMPs							
2 Costs presented on per acre of entire development basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.							
3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.							
4 High O&M Costs							
Owner/Cost Share BMP Program		0 to 20	10	6400	2048	3793	Moderate
Reduced N Fertilization,limited dry/wet retention, and wetland restoration							
Owner BMP Program		0 to 10	5	0	0	0	Fast
Reduced N Fertilization							
Cost Share BMP Program		5 to 50	5	6400	2048	7585	Fast
Selective limited dry/wet retention and Wetland Restoration							
Alternative BMP Program		15 to 80	50	3200	1024	379	Fast
Stormwater R/D with Chemical Treatment							

Appendix B
Current condition assumptions, existing loads, potential load reductions, and
costs of implementation for the primary land uses
in the Caloosahatchee River watershed

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BMPs for Medium Density Residential

Assume for Typical Condition							
Medium Density Residential Assumed average development size of 200 ac Moderately Managed Lawns Limited Pond retention Limited Lawn Irrigation Existing P Load 1.93 lbs-P/ac/yr Existing P Concentration 0.26 mg/l Average Annual Runoff 32.42 in/yr							
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility	Owner	0 to 10	5	0	0	0	Slow
Reduced P Fertilization (testing, placement, and type)	Cost share	20 to 80	50	6400	2048	2120	Fast
Dry Retention/Swales 0.25"	Cost share	30 to 90	80	8000	2560	1656	Fast
Wet Detention - 0.25"	Cost share	0 to 25	15	20	6.4	22	Fast
Street Sweeping	Cost share	10 to 60	20	440	140.8	364	Fast
Sediment/Baffle Boxes	Alternative	15 to 35	25	3200	1024	2120	Fast
Dry Detention - Regional	Alternative	40 to 80	65	4000	1280	1019	Fast
Wet Detention - Regional	Alternative	20 to 90	70	3200	1024	757	Fast
Stormwater R/D and Chemical Treatment ⁴							
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMPs 2 Costs presented on per acre of entire development basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 High O&M Costs							
Owner/Cost Share BMP Program		0 to 20	10	6400	2048	10600	Moderate
Reduced P Fertilization, Swales, and limited Dry Retention/Sweeping							
Owner BMP Program		0 to 10	5	0	0	0	Slow
Reduced P Fertilization							
Cost Share BMP Program		5 to 50	5	6400	2048	21201	Fast
Limited Dry Retention, Street Sweeping, Sediment R/D and Wetland Restoration							
Alternative BMP Program		20 to 90	70	3200	1024	757	Fast
Stormwater R/D with Chemical Treatment							

BMPs for High Density Residential

Assume for Typical Condition							
High Density Residential Assumed average development size of 200 ac Moderately Managed Lawns Limited Pond retention Limited Lawn Irrigation Existing P Load 4.14 lbs-P/ac/yr Existing P Concentration 0.46 mg/l Average Annual Runoff 39.90 in/yr							
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility	Owner	0 to 10	5	0	0	0	Slow
Reduced P Fertilization (testing, placement, and type)	Cost share	20 to 80	50	6400	2048	989	Fast
Dry Retention/Swales 0.25"	Cost share	30 to 90	80	8000	2560	773	Fast
Wet Detention - 0.25"	Cost share	0 to 25	15	20	6.4	10	Fast
Street Sweeping	Cost share	10 to 60	20	440	140.8	170	Fast
Sediment/Baffle Boxes	Alternative	15 to 35	25	3200	1024	989	Fast
Dry Detention - Regional	Alternative	40 to 80	65	4000	1280	476	Fast
Wet Detention - Regional	Alternative	20 to 90	70	3200	1024	353	Fast
Stormwater R/D and Chemical Treatment ⁴							
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMPs 2 Costs presented on per acre of entire development basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 High O&M Costs							
Owner/Cost Share BMP Program		0 to 20	10	6400	2048	4947	Moderate
Reduced P Fertilization, Swales, and limited Dry Retention/Sweeping							
Owner BMP Program		0 to 10	5	0	0	0	Slow
Reduced P Fertilization							
Cost Share BMP Program		5 to 50	5	6400	2048	9894	Fast
Limited Dry Retention, Street Sweeping, Sediment R/D and Wetland Restoration							
Alternative BMP Program		20 to 90	70	3200	1024	353	Fast
Stormwater R/D with Chemical Treatment							

BMPs for Other Urban

Assume for Typical Condition							
Medium Density Residential with Mixed Commercial Assumed average development size of 200 ac Moderately Managed Lawns Limited Pond retention Limited Lawn Irrigation Existing P Load 2.05 lbs-P/ac/yr Existing P Concentration 0.25 mg/l Average Annual Runoff 36.34 in/yr							
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility	Owner	0 to 10	5	0	0	0	Slow
Reduced P Fertilization (testing, placement, and type)	Cost share	20 to 80	50	6400	2048	2001	Fast
Dry Retention/Swales 0.25"	Cost share	30 to 90	80	8000	2560	1563	Fast
Wet Detention - 0.25"	Cost share	0 to 25	15	20	6.4	21	Fast
Street Sweeping	Cost share	10 to 60	20	440	140.8	344	Fast
Sediment/Baffle Boxes	Alternative	15 to 35	25	3200	1024	2001	Fast
Dry Detention - Regional	Alternative	40 to 80	65	4000	1280	962	Fast
Wet Detention - Regional	Alternative	20 to 90	70	3200	1024	715	Fast
Stormwater R/D and Chemical Treatment ⁴							
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMPs 2 Costs presented on per acre of entire development basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 High O&M Costs							
Owner/Cost Share BMP Program		0 to 20	10	6400	2048	10003	Moderate
Reduced P Fertilization, Swales, and limited Dry Retention/Sweeping							
Owner BMP Program		0 to 10	5	0	0	0	Slow
Reduced P Fertilization							
Cost Share BMP Program		5 to 50	5	6400	2048	20006	Fast
Limited Dry Retention, Street Sweeping, Sediment R/D and Wetland Restoration							
Alternative BMP Program		20 to 90	70	3200	1024	715	Fast
Stormwater R/D with Chemical Treatment							

BMPs for Cow Calf Production

Improved Pastures

Assume for Typical Condition								
3 ac / cow								
Assumed average farm size of 500 ac								
Existing P fertilization of 3 lbs P/ac								
No retention or wetland restoration								
Bahia grass								
Animals have access to streams								
Existing P Load 1.93 lbs-P/ac/yr								
Existing P Concentration 0.29 mg/l								
Average Annual Runoff 29.93 in/yr								
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response	
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)		
Fertility	Reduced P Fertilization (testing, split, placement, and type)	Owner	0 to 30	10	2.2	2.2	11	Slow
	Better N and Micros Fertilization	Owner	0 to 20	3	5.5	5.5	95	Slow
Grass Management (variety, mowing, burning, irrigation, etc.)		Owner	0 to 20	2	5.5	1.76	46	Slow
Improved Grazing Management								
	Rotational Grazing	Cost share	0 to 30	3	5.5	1.76	30	Moderate
	Reduced Stocking Rate ⁴ (4ac /cow)	Owner	0 to 10	3	165	52.8	911	Slow
HIA and Direct Water Access Prevention								
	Improved Watering Facilities to move cattle from streams	Cost share	0 to 20	10	11	3.52	18	Fast
	Provide Alternative Shade to move cattle from streams	Alternative	0 to 10	2	16.5	5.28	137	Fast
	Feeder/Minerals and Water Placement	Owner	0 to 30	3	2.2	0.704	12	Fast
	Critical Area Fencing	Cost share	2 to 20	5	44	14.08	146	Fast
	Retention Basin by Working Pens	Cost share	2 to 10	5	3.3	1.056	11	Fast
Buffer Strips		Cost share	0 to 10	5	44	14.08	146	Fast
Stormwater R/D		Cost share	5 to 40	15	44	14.08	49	Fast
Wetland Restoration		Cost share	2 to 15	5	11	3.52	36	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁵		Alternative	20 to 90	70	220	70.4	52	Fast
¹ Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP ² Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. ³ The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. ⁴ This practice would typically be unacceptable to most farmers, but if significant feed is being purchased then it should be considered ⁵ High O&M Costs								
Owner/Cost Share BMP Program			10 to 50	30	49.5	15.84	27	Moderate
P reduced to zero, Better N Management, Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Improved Grass Management, Feed Placement, Critical Area Fencing, and Moderate Wetland Restoration/Retention								
Owner BMP Program			0 to 25	11	11	4	17	Slow
P Reduced to zero, Better N Management, Grass Management, and Feeder/Minerals and Water Placement								
Cost Share BMP Program			10 to 50	19	38.5	12	34	Moderate
Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Critical Area Fencing, and Moderate Wetland Restoration/Retention								
Alternative BMP Program			20 to 90	49	110	35	37	Fast
Provide Alternative Shade to move cattle from streams and Edge-of-farm Stormwater R/D and Chemical Treatment								

BMPs for Cow Calf Production

Unimproved Pasture

Assume for Typical Condition		
8 ac per cow		
Assumed average farm size of 500 ac		
Existing P fertilization of 1 lbs P/ac		
No retention or wetland restoration		
Bahia grass / native		
Animals have access to streams		
Existing P Load	0.99	lbs-P/ac/yr
Existing P Concentration	0.18	mg/l
Average Annual Runoff	24.94	in/yr

BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility							
Better N and Micros Fertilization - No P added	Owner	0 to 10	1	2.2	2.2	221	Slow
Grass Management (chopping, mowing, burning, etc.)	Owner	0 to 10	2	2.2	0.704	35	Slow
Improved Grazing Management							
Rotational Grazing (limited)	Cost share	0 to 5	3	5.5	1.76	59	Moderate
HIA and Direct Water Access Prevention							
Improved Watering Facilities to move cattle from streams	Owner	0 to 10	5	5.5	1.76	35	Fast
Feeder/Minerals and Water Placement	Owner	0 to 10	3	2.2	0.704	24	Fast
Critical Area Fencing	Alternative	2 to 10	3	11	3.52	118	Fast
Retention Basin by Working Pens	Cost share	2 to 10	3	3.3	1.056	35	Fast
Stormwater R/D	Cost share	2 to 15	7	22	7.04	101	Fast
Wetland Restoration	Cost share	2 to 10	4	11	3.52	89	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	20 to 70	50	110	35.2	71	Fast

1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP

2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.

3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.

4 High O&M Costs

Owner/Cost Share BMP Program Some rotational grazing, new water facilities, retention basin basin by working pens, improved grass management, feed placement, and moderate wetland restoration/retention	5 to 30	20	13.2	4.224	21	Moderate
Owner BMP Program Improved Grass Management, Watering Facilities, and Feed Placement	0 to 20	7	2.2	1	10	Slow
Cost Share BMP Program Some Rotational Grazing, retention basin basin by working pens, and moderate wetland restoration/retention	5 to 25	13	11	4	27	Moderate
Alternative BMP Program Critical Area Fencing and Edge-of-farm Stormwater R/D and Chemical Treatment	20 to 70	44	55	18	40	Fast

BMPs for Cow Calf Production

Rangeland and Wooded Pasture

Assume for Typical Condition		
16ac per cow		
Assumed average farm size of 500 ac		
Existing P fertilization of 0 lbs P/ac		
No retention or wetland restoration		
Bahia grass / native		
Animals have access to streams		
Existing P Load	0.40	lbs-P/ac/yr
Existing P Concentration	0.08	mg/l
Average Annual Runoff	21.24	in/yr

BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility							
Better N and Micros Fertilization - No P added	Owner	0 to 10	1	2.2	2.2	552	Slow
Grass Management (chopping, mowing, burning, etc.)	Owner	0 to 10	2	2.2	0.704	88	Slow
Improved Grazing Management							
Rotational Grazing (limited)	Cost share	0 to 5	3	5.5	1.76	147	Moderate
HIA and Direct Water Access Prevention							
Improved Watering Facilities to move cattle from streams	Owner	0 to 10	5	5.5	1.76	88	Fast
Feeder/Minerals and Water Placement	Owner	0 to 10	3	2.2	0.704	59	Fast
Critical Area Fencing	Alternative	2 to 10	3	11	3.52	294	Fast
Retention Basin by Working Pens	Cost share	2 to 10	3	3.3	1.056	88	Fast
Stormwater R/D	Cost share	2 to 20	10	22	7.04	177	Fast
Wetland Restoration	Cost share	2 to 10	4	11	3.52	221	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	20 to 70	40	110	35.2	221	Fast

1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP

2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.

3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.

4 High O&M Costs

Owner/Cost Share BMP Program Some rotational grazing, new water facilities, retention basin basin by working pens, improved grass management, feed placement, and moderate wetland restoration/retention	5 to 30	10	13.2	4.224	106	Moderate
Owner BMP Program Improved Grass Management, Watering Facilities, and Feed Placement	0 to 20	4	2.2	1	44	Slow
Cost Share BMP Program Some Rotational Grazing, retention basin basin by working pens, and moderate wetland restoration/retention	5 to 25	6	11	4	147	Moderate
Alternative BMP Program Critical Area Fencing and Edge-of-farm Stormwater R/D and Chemical Treatment	20 to 70	35	55	18	126	Fast

BMPs for Row Crop

Assume for Typical Condition							
Potatoes Spring Crop							
Assumed average farm size of 100 ac							
Existing P fertilization of 100 lbs P/ac							
No retention or wetland restoration							
Seepage Irrigation with 60' furrows							
Existing P Load 3.45 lbs-P/ac/yr							
Existing P Concentration 0.44 mg/l							
Average Annual Runoff 34.91 in/yr							
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility	Owner	20 to 70	30	11	11	11	Slow
Water Management (irrigation and drainage, riser board control)	Cost share	0 to 40	10	11	3.52	10	Fast
Water Reuse from Retention/Detention Ponds	Alternative	0 to 20	10	33	10.56	31	Fast
Erosion Control (sediment trap in front of risers)	Alternative	0 to 5	2	11	3.52	51	Fast
Off Season In-Field Retention	Cost share	0 to 15	5	11	3.52	20	Fast
Off Season Cover Crop	Cost share	0 to 10	4	55	17.6	128	Fast
Stormwater R/D	Cost share	10 to 55	25	220	70.4	82	Fast
Wetland Restoration	Cost share	5 to 20	10	11	3.52	10	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	20 to 90	50	550	176	102	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP							
2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.							
3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.							
4 High O&M Costs							
Owner/Cost Share BMP Program		10 to 80	60	220	70.4	34	Moderate
Reduced P Fertilization, Water Management, additional Stormwater Retention, Cover Crop, and limited Wetland Restoration/Retention							
Owner BMP Program		20 to 70	30	11	3.52	3	Slow
Reduced P Fertilization							
Cost Share BMP Program		10 to 50	30	209	66.88	65	Fast
Water Management, additional Stormwater Retention, Cover Crop, and limited Wetland Restoration/Retention							
Alternative BMP Program		20 to 90	50	440	140.8	82	Fast
Water Reuse from Retention/Detention Ponds, Erosion Control, and Edge-of-farm stormwater R/D and Chemical Treatment							

BMPS for Sugarcane

Assume for Typical Condition							
3 year ratoon Assumed average farm size of 400 ac Existing P fertilization of 30 lbs P/ac Limited retention or wetland restoration Seepage Irrigation with 330' furrows Existing P Load 0.55 lbs-P/ac/yr Existing P Concentration 0.08 mg/l Average Annual Runoff 29.93 in/yr							
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility pH management	Owner	0 to 20	10	0	0	0	Fast
Reduced P Fertilization (testing, split, placement, and type)		10 to 50	20	0	0	0	Slow
Water Management (irrigation and drainage, in-field retention)	Cost share	0 to 20	10	11	3.52	64	Fast
Water Reuse from Retention/Detention Ponds	Alternative	0 to 20	10	33	10.56	191	Fast
Stormwater R/D	Cost share	5 to 45	15	110	35.2	425	Fast
Wetland Restoration	Cost share	2 to 15	7	11	3.52	91	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	20 to 90	70	220	70.4	182	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 High O&M Costs							
Owner/Cost Share BMP Program Reduced P fertilization, water management, and limited wetland restoration/retention		10 to 70	33	110	35	193	Moderate
Owner BMP Program Reduced P Fertilization		10 to 50	10	2.2	0	0	Slow
Cost Share BMP Program Water Management and limited Wetland Restoration/Retention		10 to 60	23	107.8	34	272	Fast
Alternative BMP Program Water Reuse from Retention/Detention Ponds and Edge-of-farm stormwater R/D and Chemical Treatment		20 to 90	52	275	88	307	Fast

BMPS for Sod / Turf Grass

Assume for Typical Condition							
Bermudagrass Assumed average farm size of 100 ac Existing P fertilization of 70 lbs P/ac No retention or wetland restoration Seepage Irrigation with 100' furrows Existing P Load 2.79 lbs-P/ac/yr Existing P Concentration 0.41 mg/l Average Annual Runoff 29.93 in/yr							
BMPS	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility	Owner	10 to 50	20	2.2	2.2	4	Slow
Water Management (irrigation and drainage, riser board control)	Cost share	0 to 20	10	11	3.52	13	Fast
Erosion Control (Buffer Strips and sediment traps)	Alternative	0 to 15	5	55	17.6	126	Fast
Stormwater R/D	Cost share	5 to 40	25	110	35.2	51	Fast
Wetland Restoration	Cost share	2 to 15	8	11	3.52	16	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	20 to 90	50	330	105.6	76	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 High O&M Costs							
Owner/Cost Share BMP Program		10 to 70	47	110	35.2	27	Moderate
Reduced P fertilization, water management, additional stormwater retention, and limited wetland restoration							
Owner BMP Program		10 to 50	20	2.2	2.2	4	Slow
Reduced P Fertilization							
Cost Share BMP Program		10 to 50	27	107.8	34	46	Fast
Water Management, additional Stormwater Retention, Cover Crop, and limited Wetland Restoration/Retention							
Alternative BMP Program		20 to 70	50	330	105.6	76	Fast
Erosion Control, and Edge-of-farm stormwater R/D and Chemical Treatment							

BMPs for Ornamentals

Assume for Typical Condition							
Ornamental Nursery Assumed average farm size of 10 ac Existing P fertilization of 160 lbs P/ac No retention or wetland restoration Overhead Irrigation							
Existing P Load 4.00 lbs-P/ac/yr							
Existing P Concentration 0.59 mg/l							
Average Annual Runoff 29.93 in/yr							
BMPs	Type	P Reduction¹		Initial Cost of BMP² (\$/ac)	Annual Cost³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility	Owner	20 to 70	30	11	11	9	Slow
Water Management (irrigation and drainage, riser board control)	Cost share	0 to 40	10	11	4	9	Fast
Water Reuse from Retention/Detention Ponds	Alternative	0 to 20	10	33	11	26	Fast
Erosion Control (sediment trap in front of risers)	Alternative	0 to 5	2	11	4	44	Fast
Off Season In-Field Retention	Cost share	0 to 15	5	11	4	18	Fast
Off Season Cover Crop	Cost share	0 to 10	4	55	18	110	Fast
Stormwater R/D	Cost share	10 to 65	40	220	70	44	Fast
Wetland Restoration	Cost share	0 to 10	4	11	4	22	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	20 to 90	50	550	176	88	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP							
2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.							
3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.							
4 High O&M Costs							
Owner/Cost Share BMP Program Reduced P Fertilization, Water Management, additional Stormwater Retention, Cover Crop, and limited Wetland Restoration/Retention		10 to 80	67	220	70	26	Moderate
Owner BMP Program Reduced P Fertilization		20 to 70	32	11	4	3	Slow
Cost Share BMP Program Water Management, additional Stormwater Retention, Cover Crop, and limited Wetland Restoration/Retention		10 to 50	35	209	67	48	Fast
Alternative BMP Program Water Reuse from Retention/Detention Ponds, Erosion Control, and Edge-of-farm stormwater R/D and Chemical Treatment		20 to 90	50	440	141	70	Fast

BMPs for Horse Farms

Assume for Typical Condition								
1 ac / horse Assumed average farm size of 10 ac Existing P fertilization of 5 lbs P/ac No retention or wetland restoration Bahia grass Existing P Load 2.51 lbs-P/ac/yr Existing P Concentration 0.44 mg/l Average Annual Runoff 24.94 in/yr								
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response	
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)		
Fertility	Reduced P Fertilization (testing, split, placement, and type)	Owner	0 to 30	15	2.2	2.2	6	Slow
	Better N and Micros Fertilization	Owner	0 to 20	10	5.5	5.5	22	Slow
	Grass Management (variety, mowing, burning, irrigation, etc.)	Owner	0 to 20	2	5.5	1.76	35	Slow
Improved Grazing Management	Rotational Grazing	Cost share	0 to 30	3	5.5	1.76	23	Moderate
	Reduced Stocking Rate ⁴ (2ac/horse)	Owner	0 to 10	20	165	52.8	105	Slow
HIA and Direct Water Access Prevention	Improved Watering Facilities to move animals from streams	Cost share	0 to 20	5	11	3.52	28	Fast
	Provide Alternative Shade to move animals from streams	Alternative	0 to 10	1	16.5	5.28	210	Fast
	Feeder/Minerals and Water Placement	Owner	0 to 30	3	2.2	0.704	9	Fast
	Critical Area Fencing	Cost share	2 to 20	2	44	14.08	280	Fast
Buffer Strips		Cost share	0 to 10	5	44	14.08	112	Fast
Stormwater R/D		Cost share	5 to 40	15	44	14.08	37	Fast
Wetland Restoration		Cost share	2 to 15	5	11	3.52	28	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁵		Alternative	20 to 90	70	220	70.4	40	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 This practice would typically be unacceptable to most farmers, but if significant feed is being purchased then it should be considered 5 High O&M Costs								
Owner/Cost Share BMP Program			10 to 50	42	49.5	15.84	15	Moderate
P reduced to zero, Better N Management, Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Improved Grass Management, Feed Placement, Critical Area Fencing, and Moderate Wetland Restoration/Retention								
Owner BMP Program			0 to 25	20	11	4	7	Slow
P Reduced to zero, Better N Management, Grass Management, and Feeder/Minerals and Water Placement								
Cost Share BMP Program			10 to 50	22	38.5	12	22	Moderate
Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Critical Area Fencing, and Moderate Wetland Restoration/Retention								
Alternative BMP Program			20 to 90	49	110	35	29	Fast
Provide Alternative Shade to move cattle from streams and Edge-of-farm Stormwater R/D and Chemical Treatment								

BMPs for Dairies

Assume for Typical Condition							
1000 head Dairy, dry cows pastured on site, 400 heifer/springers on site Assumed average farm size of 700 ac Existing P fertilization of 0 lbs P/ac No existing retention or wetland restoration Stargrass Pastures Animals are fenced from streams Existing P Load 12.94 lbs-P/ac/yr Existing P Concentration 2.29 mg/l Average Annual Runoff 24.94 in/yr							
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Barn Waste							
Feed Ration Management	Owner	0 to 25	8	2.2	2.2	2	Slow
Solids Separation for Off Site Disposal	Alternative	0 to 10	3	5.5	1.76	5	Slow
Expanded Waste Storage Ponds	Alternative	----	----	----	----	----	----
Expanded Sprayfields	Alternative	----	----	----	----	----	----
Improved Pasture Management (See Cow-Calf Imp., Pasture)	Owner	10 to 40	20	16.5	5.28	2	Moderate
Improved Forage/Sprayfield Management - P balanced, new crops	Owner	0 to 15	5	0	0	0	Slow
HIA Management							
Add Housing to Move Animals off Fields ⁴	Alternative	30 to 70	50	3,929	1257	194	Slow
Stormwater Retention / Expanded Sprayfield	Alternative	20 to 70	40	440	140.8	27	Moderate
Edge-of-field Chemical Treatment ⁵	Alternative	50 to 90	70	550	176	19	Fast
Buffer Strips	Alternative	0 to 10	5	44	14.08	22	Moderate
Stormwater R/D	Cost share	15 to 50	30	1100	352	91	Fast
Wetland Restoration	Cost share	5 to 20	10	11	3.52	3	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁵	Alternative	50 to 90	70	550	176	19	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Value only include implementation cost, i.e. doesn't include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 Includes associated waste pond and sprayfield expansions 5 High O&M Costs							
Owner/Cost Share BMP Program		20 to 65	37	1045	334.4	218	Moderate
Stormwater R/D and Wetland Restoration							
Feed Management							
Owner BMP Program		0 to 25	9	2.2	2	7	Slow
Feed Ration Management							
Cost Share BMP Program		20 to 60	28	1042.8	333.696	316	Fast
Stormwater R/D and Wetland Restoration							
Alternative BMP Program		20 to 90	48	550	176	28	Fast
Barn Waste							
Solids Separation for Off Site Disposal		0 to 10	3	6	1.76	5	Slow
Expanded Waste Storage Ponds ⁴		----	----	----	----	----	----
Expanded Sprayfields ⁴		----	----	----	----	----	----
HIA Management							
Add Housing to Move Animals off Fields ⁴		30 to 70	50	3929	1257	194	Slow
Stormwater Retention / Expanded Sprayfield		20 to 70	40	440	141	27	Moderate
Edge-of-field Chemical Treatment ⁵		50 to 90	70	550	176	19	Fast
Buffer Strips		0 to 10	5	44	14	22	Moderate
Edge-of-farm stormwater R/D and Chemical Treatment ⁵		50 to 90	70	550	176	19	Fast

BMPs for Field Crop (Hayland) Production

Assume for Typical Condition							
Assumed average farm size of 500 ac Existing P fertilization of 60 lbs P/ac No retention or wetland restoration Various Land Uses including hay, orchards, poultry, etc. 0.14 Existing P Load 3.20 lbs-P/ac/yr Existing P Concentration 0.53 mg/l Average Annual Acres 26.63 in/yr							
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility							
Reduced P Fertilization (testing, split, placement, and type)	Owner	0 to 50	15	2.2	2.2	5	Slow
Better N and Micros Fertilization	Owner	0 to 20	3	5.5	5.5	57	Slow
Grass Management (variety, mowing, burning, irrigation, etc.)	Owner	0 to 20	2	5.5	1.76	28	Slow
Buffer Strips	Cost share	0 to 10	5	44	14.08	88	Fast
Stormwater R/D	Cost share	10 to 40	20	55	17.6	28	Fast
Wetland Restoration	Cost share	5 to 20	10	11	3.52	11	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	20 to 90	36	220	70.4	61	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 High O&M Costs							
Owner/Cost Share BMP Program P reduced to zero, Better N Management, Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Improved Grass Management, Feed Placement, Critical Area Fencing, and Moderate Wetland Restoration/Retention		10 to 60	40	50	15.84	12	Moderate
Owner BMP Program P Reduced to zero, Better N Management, Grass Management, and Feeder/Minerals and Water Placement		0 to 25	15	11	4	7	Slow
Cost Share BMP Program Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Critical Area Fencing, and Moderate Wetland Restoration/Retention		10 to 50	25	39	12	15	Moderate
Alternative BMP Program Provide Alternative Shade to move cattle from streams and Edge-of-farm Stormwater R/D and Chemical Treatment		20 to 90	36	110	35	31	Fast

BMPS for Pine Plantation

Assume for Typical Condition							
Planted Pine Plantation (20 yr rotation)							
Assumed average farm size of 200 ac							
Existing P fertilization of 5 lbs P/ac							
No retention or wetland restoration							
Existing P Load 0.21 lbs-P/ac/yr							
Existing P Concentration 0.06 mg/l							
Average Annual Runoff 14.96 in/yr							
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Reduced P Fertilization (testing, placement, and type)	Owner	0 to 10	1	0	0	0	Slow
Stormwater R/D	Cost share	2 to 15	8	22	22	1329	Fast
Wetland Restoration	Cost share	1 to 5	2	11	3.52	850	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	20 to 70	50	110	35.2	340	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP							
2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.							
3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.							
4 High O&M Costs							
Owner/Cost Share BMP Program		2 to 25	11	22	22	1111	Moderate
Reduced P Fertilization, Stormwater R/D, and limited Wetland Restoration							
Owner BMP Program		0 to 25	1	0	0	0	Slow
Reduced P Fertilization							
Cost Share BMP Program		10 to 50	10	22	20	1111	Fast
Stormwater R/D and limited Wetland Restoration							
Alternative BMP Program		20 to 70	50	100	32	355	Fast
Edge-of-farm Stormwater R/D and Chemical Treatment							

BMPS for Transportation Corridors

Assume for Typical Condition							
50% Paved Surface							
Bahia Grass Shoulders							
Existing P fertilization of 15 lbs P/ac							
Limited retention or wetland restoration							
Existing P Load 2.28 lbs-P/ac/yr							
Existing P Concentration 0.20 mg/l							
Average Annual Runoff 49.88 in/yr							
BMPs	Type	P Reduction¹		Initial Cost of BMP² (\$/ac)	Annual Cost³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility pH management	Owner Cost share Cost share Alternative	0 to 20	10	0	0	0	Fast
Reduced P Fertilization (testing, split, placement, and type)		10 to 50	20	0	0	0	Slow
Stormwater R/D		5 to 45	15	110	35.2	103	Fast
Wetland Restoration		2 to 15	7	11	3.52	22	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴		20 to 90	70	220	70.4	44	Fast
<p>1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP</p> <p>2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.</p> <p>3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.</p> <p>4 High O&M Costs</p>							
Owner/Cost Share BMP Program Reduced P fertilization, water management, and limited wetland restoration/retention		10 to 70	33	110	35	47	Moderate
Owner BMP Program Reduced P Fertilization		10 to 50	10	2.2	0	0	Slow
Cost Share BMP Program Water Management and limited Wetland Restoration/Retention		10 to 60	23	107.8	34	66	Fast
Alternative BMP Program Water Reuse from Retention/Detention Ponds and Edge-of-System stormwater R/D and Chemical Treatment		20 to 90	52	275	88	74	Fast

BMPs for Communications and Utilities

Assume for Typical Condition							
Marginally Maintained Bahia Grass							
No Pond retention							
Existing P Load 0.66 lbs-P/ac/yr							
Existing P Concentration 0.12 mg/l							
Average Annual Runoff 25.05 in/yr							
BMPs	Type	P Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	P Removed (\$/lb/ac/yr)	
Fertility	Owner	0 to10	5	0	0	0	Slow
Reduced P Fertilization (testing, placement, and type)	Cost share	0 to 20	2	1280	409.6	30918	Fast
Dry/Wet Retention 0.25"	Cost share	0 to 20	3	1600	512	25765	Fast
Wet Restoration	Alternative	15 to 35	25	3200	1024	6184	Fast
Dry Detention - Regional	Alternative	40 to 80	65	4000	1280	2973	Fast
Wet Detention - Regional							
<p>1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMPs</p> <p>2 Costs presented on per acre of entire development basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.</p> <p>3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.</p> <p>4 High O&M Costs</p>							
Owner/Cost Share BMP Program		0 to 20	10	6400	2048	30918	Moderate
Reduced P Fertilization,limited dry/wet retention, and wetland restoration							
Owner BMP Program		0 to 10	5	0	0	0	Slow
Reduced P Fertilization							
Cost Share BMP Program		5 to 50	5	6400	2048	61836	Fast
Selective limited dry/wet retention and Wetland Restoration							
Alternative BMP Program		15 to 80	50	3200	1024	3092	Fast
Stormwater R/D with Chemical Treatment							

BMPs for Low Density Residential

Assume for Typical Condition							
Low Density Residential Assumed average development size of 200 ac Moderately Managed Lawns Mid-IFAS 1.5 lb-N/1000ft2 Limited Pond retention Limited Lawn Irrigation Existing N Load 7.26 lbs-P/ac/yr Existing N Concentration 1.17 mg/l Average Annual Runoff 27.43 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility	Owner	0 to 30	15	11	3.52	3	Fast
Reduced N Fertilization (IFAS low, placement, and type)	Cost share	10 to 40	15	6400	2048	1881	Fast
Dry Retention/Swales ⁴ 0.25"	Cost share	10 to 40	20	8000	2560	1763	Fast
Wet Detention - 0.25"	Cost share	0 to 10	2	20	6.4	44	Fast
Street Sweeping	Cost share	2 to 30	15	440	140.8	129	Fast
Sediment/Baffle Boxes	Alternative	5 to 35	15	3200	1024	940	Fast
Dry Detention - Regional	Alternative	5 to 30	15	4000	1280	1175	Fast
Wet Detention - Regional							
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMPs 2 Costs presented on per acre of entire development basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 Adjusted down to correct for reported Dry Detention reductions not including ground water re-emergent N loads.							
Owner/Cost Share BMP Program		0 to 50	30	6411	2051.52	942	Fast
Reduced N Fertilization, Swales, and limited Dry Retention/Sweeping							
Owner BMP Program		0 to 30	15	11	3.52	3	Fast
Reduced N Fertilization							
Cost Share BMP Program		10 to 40	15	6400	2048	1881	Fast
Limited Dry Retention, Street Sweeping, Sediment R/D and Wetland Restoration							
Alternative BMP Program		5 to 35	15	3200	1024	940	Fast
Stormwater R/D with Chemical Treatment							

BMPs for Medium Density Residential

Assume for Typical Condition							
Medium Density Residential Assumed average development size of 200 ac Moderately Managed Lawns Mid-IFAS 3.5 lb-N/1000ft ² Limited Pond retention Limited Lawn Irrigation Existing N Load 10.56 lbs-N/ac/yr Existing N Concentration 1.44 mg/l Average Annual Runoff 32.42 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility Reduced N Fertilization (IFAS low, placement, and type)	Owner	0 to 50	25	15	4.8	2	Fast
Dry Retention/Swales ⁴ 0.25"	Cost share	10 to 50	25	6400	2048	776	Fast
Wet Detention - 0.25"	Cost share	10 to 40	20	8000	2560	1212	Fast
Street Sweeping	Cost share	0 to 10	2	20	6.4	30	Fast
Sediment/Baffle Boxes	Cost share	2 to 30	15	440	140.8	89	Fast
Dry Detention - Regional	Alternative	5 to 35	15	3200	1024	646	Fast
Wet Detention - Regional	Alternative	5 to 30	15	4000	1280	808	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMPs 2 Costs presented on per acre of entire development basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 Adjusted down to correct for reported Dry Detention reductions not including ground water re-emergent N loads.							
Owner/Cost Share BMP Program Reduced N Fertilization, Swales, and limited Dry Retention/Sweeping		0 to 70	50	6415	2052.8	389	Fast
Owner BMP Program Reduced N Fertilization		0 to 60	25	15	4.8	2	Fast
Cost Share BMP Program Limited Dry Retention, Street Sweeping, Sediment R/D and Wetland Restoration		5 to 50	25	6400	2048	776	Fast
Alternative BMP Program Stormwater R/D with Chemical Treatment		5 to 35	15	3200	1024	646	Fast

BMPs for High Density Residential

Assume for Typical Condition							
High Density Residential Assumed average development size of 200 ac Moderately Managed Lawns Mid-IFAS 3.5 lb-N/1000ft2 Limited Pond retention Limited Lawn Irrigation Existing N Load 15.84 lbs-N/ac/yr Existing N Concentration 1.75 mg/l Average Annual Runoff 39.90 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility	Owner	0 to 60	30	15	4.8	1	Fast
Reduced N Fertilization (IFAS low, placement, and type)	Cost share	10 to 50	25	6400	2048	517	Fast
Dry Retention/Swales ⁴ 0.25"	Cost share	10 to 40	20	8000	2560	808	Fast
Wet Detention - 0.25"	Cost share	0 to 10	2	20	6.4	20	Fast
Street Sweeping	Cost share	2 to 30	15	440	140.8	59	Fast
Sediment/Baffle Boxes	Alternative	5 to 35	15	3200	1024	431	Fast
Dry Detention - Regional	Alternative	5 to 30	15	4000	1280	539	Fast
Wet Detention - Regional							
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMPs 2 Costs presented on per acre of entire development basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 Adjusted down to correct for reported Dry Detention reductions not including ground water re-emergent N loads.							
Owner/Cost Share BMP Program		0 to 70	55	6415	2052.8	236	Fast
Reduced N Fertilization, Swales, and limited Dry Retention/Sweeping							
Owner BMP Program		0 to 60	30	15	4.8	1	Fast
Reduced N Fertilization							
Cost Share BMP Program		5 to 50	25	6400	2048	517	Fast
Limited Dry Retention, Street Sweeping, Sediment R/D and Wetland Restoration							
Alternative BMP Program		5 to 35	15	3200	1024	431	Fast
Stormwater R/D with Chemical Treatment							

BMPs for Other Urban

Assume for Typical Condition							
Mixed Commercial, Industrial, institutional, recreation Assumed average development size of 200 ac Moderately Managed Lawns Mid-IFAS 3.5 lb-N/1000ft2 Limited Pond retention Limited Lawn Irrigation Existing N Load 11.68 lbs-N/ac/yr Existing N Concentration 1.42 mg/l Average Annual Runoff 36.34 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility Reduced N Fertilization (IFAS low, placement, and type)	Owner	0 to 50	25	15	4.8	2	Fast
Dry Retention/Swales ⁴ 0.25"	Cost share	10 to 50	25	6400	2048	701	Fast
Wet Detention - 0.25"	Cost share	10 to 40	20	8000	2560	1096	Fast
Street Sweeping	Cost share	0 to 10	2	20	6.4	27	Fast
Sediment/Baffle Boxes	Cost share	2 to 30	15	440	140.8	80	Fast
Dry Detention - Regional	Alternative	5 to 35	15	3200	1024	584	Fast
Wet Detention - Regional	Alternative	5 to 30	15	4000	1280	731	Fast
<p>1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMPs</p> <p>2 Costs presented on per acre of entire development basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.</p> <p>3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.</p> <p>4 Adjusted down to correct for reported Dry Detention reductions not including ground water re-emergent N loads.</p>							
Owner/Cost Share BMP Program Reduced N Fertilization, Swales, and limited Dry Retention/Sweeping		0 to 70	50	6415	2052.8	352	Fast
Owner BMP Program Reduced N Fertilization		0 to 50	25	15	4.8	2	Fast
Cost Share BMP Program Limited Dry Retention, Street Sweeping, Sediment R/D and Wetland Restoration		10 to 50	25	6400	2048	701	Fast
Alternative BMP Program Stormwater R/D with Chemical Treatment		5 to 35	15	3200	1024	584	Fast

BMPs for Cow Calf Production

Improved Pastures

Assume for Typical Condition								
3 ac / cow								
Assumed average farm size of 500 ac								
Existing N fertilization of 120 lbs N/ac								
No retention or wetland restoration								
Bahia grass								
Animals have access to streams								
Existing N Load 14.65 lbs-N/ac/yr								
Existing N Concentration 2.16 mg/l								
Average Annual Runoff 29.93 in/yr								
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response	
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)		
Fertility	Reduced N Fertilization (IFAS, placement, and type)	Owner	0 to 30	15	2.2	2.2	1	Fast
	Better Micros Fertilization	Owner	0 to 20	3	5.5	5.5	13	Fast
Grass Management (variety, mowing, burning, irrigation, etc.)		Owner	0 to 20	2	5.5	1.76	6	Fast
Improved Grazing Management								
	Rotational Grazing	Cost share	0 to 30	3	5.5	1.76	4	Fast
	Reduced Stocking Rate ⁴ (4ac /cow)	Owner	0 to 10	5	165	52.8	72	Fast
HIA and Direct Water Access Prevention								
	Improved Watering Facilities to move cattle from streams	Cost share	0 to 20	10	11	3.52	2	Fast
	Provide Alternative Shade to move cattle from streams	Alternative	0 to 10	2	16.5	5.28	18	Fast
	Feeder/Minerals and Water Placement	Owner	0 to 30	3	2.2	0.704	2	Fast
	Critical Area Fencing	Cost share	2 to 20	5	44	14.08	19	Fast
	Retention Basin by Working Pens	Cost share	2 to 10	5	3.3	1.056	1	Fast
Buffer Strips		Cost share	0 to 10	5	44	14.08	19	Fast
Stormwater R/D		Cost share	5 to 40	15	44	14.08	6	Fast
Wetland Restoration		Cost share	2 to 15	5	11	3.52	5	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁵		Alternative	5 to 70	50	220	70.4	10	Fast
¹ Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP ² Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. ³ The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. ⁴ This practice would typically be unacceptable to most farmers, but if significant feed is being purchased then it should be considered ⁵ High O&M Costs								
Owner/Cost Share BMP Program			10 to 50	27	49.5	15.84	4	Fast
P reduced to zero, Better N Management, Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Improved Grass Management, Feed Placement, Critical Area Fencing, and Moderate Wetland Restoration/Retention								
Owner BMP Program			0 to 25	17	11	4	1	Fast
Reduced N Fertilization (IFAS, placement, and type) Grass Management, and Feeder/Minerals and Water Placement								
Cost Share BMP Program			10 to 50	10	38.5	12	8	Fast
Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Critical Area Fencing, and Moderate Wetland Restoration/Retention								
Alternative BMP Program			5 to 60	30	110	35	8	Fast
Provide Alternative Shade to move cattle from streams and Edge-of-farm Stormwater R/D and Chemical Treatment								

BMPs for Cow Calf Production

Unimproved Pasture

Assume for Typical Condition		
8 ac per cow		
Assumed average farm size of 500 ac		
Existing N fertilization of 60 lbs N/ac		
No retention or wetland restoration		
Bahia grass / native		
Animals have access to streams		
Existing N Load	7.26	lbs-N/ac/yr
Existing N Concentration	1.29	mg/l
Average Annual Runoff	24.94	in/yr

BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility							
Reduced N Fertilization (IFAS, placement, and type)	Owner	0 to 20	9	1.2	1.2	2	Fast
Grass Management (chopping, mowing, burning, etc.)	Owner	0 to 10	2	2.2	0.704	5	Fast
Improved Grazing Management							
Rotational Grazing (limited)	Cost share	0 to 5	3	5.5	1.76	8	Fast
HIA and Direct Water Access Prevention							
Improved Watering Facilities to move cattle from streams	Owner	0 to 10	5	5.5	1.76	5	Fast
Feeder/Minerals and Water Placement	Owner	0 to 10	3	2.2	0.704	3	Fast
Critical Area Fencing	Alternative	2 to 10	3	11	3.52	16	Fast
Retention Basin by Working Pens	Cost share	2 to 10	3	3.3	1.056	5	Fast
Stormwater R/D	Cost share	2 to 15	7	22	7.04	14	Fast
Wetland Restoration	Cost share	2 to 10	4	11	3.52	12	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	5 to 50	25	110	35.2	19	Fast

1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP

2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.

3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.

4 High O&M Costs

Owner/Cost Share BMP Program Some rotational grazing, new water facilities, retention basin basin by working pens, improved grass management, feed placement, and moderate wetland restoration/retention	5 to 30	19	13.2	4.224	3	Fast
Owner BMP Program Improved Grass Management, Watering Facilities, and Feed Placement	0 to 20	11	2.2	1	1	Fast
Cost Share BMP Program Some Rotational Grazing, retention basin basin by working pens, and moderate wetland restoration/retention	5 to 30	8	11	4	6	Fast
Alternative BMP Program Critical Area Fencing and Edge-of-farm Stormwater R/D and Chemical Treatment	5 to 60	30	55	18	8	Fast

BMPs for Cow Calf Production

Rangeland and Wooded Pasture

Assume for Typical Condition		
16ac per cow		
Assumed average farm size of 500 ac		
Existing N fertilization of 10 lbs N/ac		
No retention or wetland restoration		
Bahia grass / native		
Animals have access to streams		
Existing N Load	5.41	lbs-N/ac/yr
Existing N Concentration	1.12	mg/l
Average Annual Runoff	21.24	in/yr

BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility							
Better N and Micros Fertilization - No P added	Owner	0 to 10	1	2.2	1	18	Fast
Grass Management (chopping, mowing, burning, etc.)	Owner	0 to 10	2	2.2	0.704	7	Fast
Improved Grazing Management							
Rotational Grazing (limited)	Cost share	0 to 5	3	5.5	1.76	11	Fast
HIA and Direct Water Access Prevention							
Improved Watering Facilities to move cattle from streams	Owner	0 to 10	5	5.5	1.76	7	Fast
Feeder/Minerals and Water Placement	Owner	0 to 10	3	2.2	0.704	4	Fast
Critical Area Fencing	Alternative	2 to 10	3	11	3.52	22	Fast
Retention Basin by Working Pens	Cost share	2 to 10	3	3.3	1.056	7	Fast
Stormwater R/D	Cost share	2 to 20	10	22	7.04	13	Fast
Wetland Restoration	Cost share	2 to 10	4	11	3.52	16	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	5 to 50	25	110	35.2	26	Fast

1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP

2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.

3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.

4 High O&M Costs

Owner/Cost Share BMP Program Some rotational grazing, new water facilities, retention basin basin by working pens, improved grass management, feed placement, and moderate wetland restoration/retention	5 to 30	10	13.2	4.224	8	Fast
Owner BMP Program Improved Grass Management, Watering Facilities, and Feed Placement	0 to 20	4	2.2	1	3	Fast
Cost Share BMP Program Some Rotational Grazing, retention basin basin by working pens, and moderate wetland restoration/retention	5 to 25	6	11	4	11	Fast
Alternative BMP Program Critical Area Fencing and Edge-of-farm Stormwater R/D and Chemical Treatment	5 to 50	20	55	18	16	Fast

BMPs for Row Crop

Assume for Typical Condition							
Potatoes Spring Crop							
Assumed average farm size of 100 ac							
Existing N fertilization of 225 lbs N/ac							
No retention or wetland restoration							
Seepage Irrigation with 60' furrows							
Existing N Load 19.80 lbs-N/ac/yr							
Existing N Concentration 2.50 mg/l							
Average Annual Runoff 34.91 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility	Owner	20 to 70	30	18	18	3	Fast
Water Management (irrigation and drainage, riser board control)	Cost share	0 to 40	10	11	3.52	2	Fast
Water Reuse from Retention/Detention Ponds	Alternative	0 to 20	10	33	10.56	5	Fast
Erosion Control (sediment trap in front of risers)	Alternative	0 to 5	2	11	3.52	9	Fast
Off Season In-Field Retention	Cost share	0 to 15	5	11	3.52	4	Fast
Off Season Cover Crop	Cost share	0 to 10	4	55	17.6	22	Fast
Stormwater R/D	Cost share	10 to 55	25	220	70.4	14	Fast
Wetland Restoration	Cost share	5 to 20	10	11	3.52	2	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	5 to 70	50	550	176	18	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP							
2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.							
3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.							
4 High O&M Costs							
Owner/Cost Share BMP Program		10 to 80	60	220	70.4	6	Fast
Reduced N Fertilization, Water Management, additional Stormwater Retention, Cover Crop, and limited Wetland Restoration/Retention							
Owner BMP Program		20 to 70	30	11	3.52	1	Fast
Reduced N Fertilization							
Cost Share BMP Program		10 to 50	30	209	66.88	11	Fast
Water Management, additional Stormwater Retention, Cover Crop, and limited Wetland Restoration/Retention							
Alternative BMP Program		5 to 70	50	440	140.8	14	Fast
Water Reuse from Retention/Detention Ponds, Erosion Control, and Edge-of-farm stormwater R/D and Chemical Treatment							

BMPS for Sugarcane

Assume for Typical Condition							
3 year ratoon on organic soils Assumed average farm size of 400 ac Existing N fertilization of 30 lbs N/ac Limited retention or wetland restoration Seepage Irrigation with 330' furrows Existing N Load 10.56 lbs-N/ac/yr Existing N Concentration 1.56 mg/l Average Annual Runoff 29.93 in/yr							
BMPs	Type	N Reduction ²		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility pH management	Owner	0 to 20	10	1	1	1	Fast
Reduced N Fertilization (testing, split, placement, and type)		10 to 50	20	2	2	1	Fast
Water Management (irrigation and drainage, in-field retention)	Cost share	0 to 20	10	11	3.52	3	Fast
Water Reuse from Retention/Detention Ponds	Alternative	0 to 20	10	33	10.56	10	Fast
Stormwater R/D	Cost share	5 to 45	15	110	35.2	22	Fast
Wetland Restoration	Cost share	2 to 15	7	11	3.52	5	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	5 to 70	50	220	70.4	13	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 High O&M Costs							
Owner/Cost Share BMP Program Reduced N fertilization, water management, and limited wetland restoration/retention		10 to 70	33	110.8	35	10	Fast
Owner BMP Program Reduced N Fertilization		10 to 50	10	3	1	1	Fast
Cost Share BMP Program Water Management and limited Wetland Restoration/Retention		10 to 60	23	107.8	34	14	Fast
Alternative BMP Program Water Reuse from Retention/Detention Ponds and Edge-of-farm stormwater R/D and Chemical Treatment		5 to 70	52	275	88	16	Fast

BMPs for Citrus

Assume for Typical Condition							
Two row crown bedded Assumed average farm size of 200 ac Grass Management between Trees Pond retention with limited wetland restoration Micro jet irrigation and fertigation of young stock Existing N Load at 160 lb-N/ac/yr fertilizer 11.22 lbs-N/ac/yr Existing N Concentration 1.66 mg/l Average Annual Runoff 29.93 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility							
Reduced N Fertilization (IFAS, placement, and type)	Owner	0 to 25	10	20	6.4	6	Fast
Better Micros Fertilization	Owner	0 to 5	2	0	0	0	Fast
Water Management (irrigation and drainage)	Cost share	0 to 20	5	0	0	0	Fast
Water Reuse from Retention/Detention Ponds ⁴	Cost share	0 to 50	10	33	10.56	9	Fast
Grass Management between Trees	Owner	0 to 5	2	22	7.04	31	Fast
Grassed Waterways	Alternative	0 to 15	5	110	35.2	63	Fast
Stormwater R/D ⁵	Cost share	10 to 60	40	440	140.8	31	Fast
Wetland Restoration	Cost share	5 to 20	10	44	14.08	13	Fast
Edge-of-farm Stormwater R/D and Chemical Treatment ⁶	Alternative	5 to 70	50	220	70.4	13	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 Values shown are for using existing ponds for water reuse, if new facilities are needed then cost would increase significantly. 5 Average of pre/post 1984 stormwater management requirements, i.e. P > .6ppm if developed prior to 1984 and less if developed after 1984. Groves developed after 1984 would probably have stormwater R/D systems, so little addition benefit would be expected for newer groves. 6 High O&M Costs							
Owner/Cost Share BMP Program		10 to 50	30	490	156.8	47	Fast
Reduced P Fertilization, Better N Management, Grass Management between Trees, additional Stormwater Retention, and limited Wetland Restoration/Retention							
Owner BMP Program		0 to 25	10	20	6.4	6	Fast
Reduced N Fertilization (IFAS, placement, and type) Better Micros Fertilization							
Cost Share BMP Program		5 to 50	20	470	150.4	67	Fast
Stormwater R/D and Wetland Restoration							
Alternative BMP Program		5 to 70	42	242	77	16	Fast
Fertigation, Grassed Waterways, and Edge-of-farm Stormwater R/D with Chemical Treatment							

BMPS for Sod / Turf Grass

Assume for Typical Condition							
Bermudagrass Assumed average farm size of 100 ac Existing N fertilization of 190 lbs N/ac No retention or wetland restoration Seepage Irrigation with 100' furrows Existing N Load 11.88 lbs-N/ac/yr Existing N Concentration 1.75 mg/l Average Annual Runoff 29.93 in/yr							
BMPS	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility	Owner	10 to 50	20	2.2	2.2	1	Fast
Reduced N Fertilization (testing, split, placement, and type)	Cost share	0 to 20	10	11	3.52	3	Fast
Water Management (irrigation and drainage, riser board control)	Alternative	0 to 15	5	55	17.6	30	Fast
Erosion Control (Buffer Strips and sediment traps)	Cost share	5 to 40	25	110	35.2	12	Fast
Stormwater R/D	Cost share	2 to 15	8	11	3.52	4	Fast
Wetland Restoration	Alternative	20 to 70	50	330	105.6	18	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴							
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 High O&M Costs							
Owner/Cost Share BMP Program		10 to 70	47	110	35.2	6	Fast
Reduced N fertilization, water management, additional stormwater retention, and limited wetland restoration							
Owner BMP Program		10 to 50	20	2.2	2.2	1	Fast
Reduced N Fertilization							
Cost Share BMP Program		10 to 50	27	107.8	34	11	Fast
Water Management, additional Stormwater Retention, Cover Crop, and limited Wetland Restoration/Retention							
Alternative BMP Program		20 to 70	50	330	105.6	18	Fast
Erosion Control, and Edge-of-farm stormwater R/D and Chemical Treatment							

BMPs for Ornamentals

Assume for Typical Condition							
Ornamental Nursery							
Assumed average farm size of 10 ac							
Existing N fertilization of 160 lbs N/ac							
No retention or wetland restoration							
Overhead Irrigation							
Existing N Load 15.84 lbs-N/ac/yr							
Existing N Concentration 2.34 mg/l							
Average Annual Runoff 29.93 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility	Owner	10 to 50	25	11	11	3	Fast
Water Management (irrigation and drainage, riser board control)	Cost share	0 to 40	10	11	4	2	Fast
Water Reuse from Retention/Detention Ponds	Alternative	0 to 20	10	33	11	7	Fast
Erosion Control (sediment trap in front of risers)	Alternative	0 to 5	2	11	4	11	Fast
Off Season In-Field Retention	Cost share	0 to 15	5	11	4	4	Fast
Off Season Cover Crop	Cost share	0 to 30	15	55	18	7	Fast
Stormwater R/D	Cost share	10 to 65	40	220	70	11	Fast
Wetland Restoration	Cost share	0 to 10	4	11	4	6	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	5 to 70	50	550	176	22	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP							
2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.							
3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.							
4 High O&M Costs							
Owner/Cost Share BMP Program		10 to 80	50	220	70	9	Fast
Reduced N Fertilization, Water Management, additional Stormwater Retention, Cover Crop, and limited Wetland Restoration/Retention							
Owner BMP Program		10 to 50	25	11	4	1	Fast
Reduced N Fertilization							
Cost Share BMP Program		10 to 50	25	209	67	17	Fast
Water Management, additional Stormwater Retention, Cover Crop, and limited Wetland Restoration/Retention							
Alternative BMP Program		10 to 50	25	440	141	36	Fast
Water Reuse from Retention/Detention Ponds, Erosion Control, and Edge-of-farm stormwater R/D and Chemical Treatment							

BMPs for Horse Farms

Assume for Typical Condition								
1 ac / horse Assumed average farm size of 10 ac Existing N fertilization of 180 lbs N/ac No retention or wetland restoration Bahia grass Existing N Load 21.12 lbs-N/ac/yr Existing N Concentration 3.74 mg/l Average Annual Runoff 24.94 in/yr								
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response	
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)		
Fertility	Reduced N Fertilization (IFAS, placement, and type)	Owner	0 to 60	30	4.2	4.2	1	Fast
	Better Micros Fertilization	Owner	0 to 20	3	5.5	5.5	9	Fast
	Grass Management (variety, mowing, burning, irrigation, etc.)	Owner	0 to 20	2	5.5	1.76	4	Fast
Improved Grazing Management	Rotational Grazing	Cost share	0 to 30	3	5.5	1.76	3	Fast
	Reduced Stocking Rate ⁴ (2ac /horse)	Owner	0 to 20	10	165	52.8	25	Fast
HIA and Direct Water Access Prevention	Improved Watering Facilities to move animals from streams	Cost share	0 to 20	5	11	3.52	3	Fast
	Provide Alternative Shade to move animals from streams	Alternative	0 to 10	1	16.5	5.28	25	Fast
	Feeder/Minerals and Water Placement	Owner	0 to 30	3	2.2	0.704	1	Fast
	Critical Area Fencing	Cost share	2 to 20	2	44	14.08	33	Fast
Buffer Strips		Cost share	0 to 10	5	44	14.08	13	Fast
Stormwater R/D		Cost share	5 to 40	15	44	14.08	4	Fast
Wetland Restoration		Cost share	2 to 15	5	11	3.52	3	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁵		Alternative	5 to 70	50	220	70.4	7	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 This practice would typically be unacceptable to most farmers, but if significant feed is being purchased then it should be considered 5 High O&M Costs								
Owner/Cost Share BMP Program			10 to 70	52	49.5	15.84	1	Fast
P reduced to zero, Better N Management, Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Improved Grass Management, Feed Placement, Critical Area Fencing, and Moderate Wetland Restoration/Retention								
Owner BMP Program			0 to 60	30	11	4	1	Fast
Reduced N Fertilization (IFAS, placement, and type) Grass Management, and Feeder/Minerals and Water Placement								
Cost Share BMP Program			10 to 50	22	38.5	12	3	Fast
Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Critical Area Fencing, and Moderate Wetland Restoration/Retention								
Alternative BMP Program			5 to 60	30	110	35	6	Fast
Provide Alternative Shade to move cattle from streams and Edge-of-farm Stormwater R/D and Chemical Treatment								

BMPs for Dairies

Assume for Typical Condition							
1000 head Dairy, dry cows pastured on site, 400 heifer/springers on site Assumed average farm size of 700 ac Existing N fertilization of 100 lbs N/ac No existing retention or wetland restoration Stargrass Pastures Animals are fenced from streams Existing N Load 26.40 lbs-N/ac/yr Existing N Concentration 4.67 mg/l Average Annual Runoff 24.94 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Barn Waste							
Feed Ration Management	Owner	0 to 25	1	2.2	2.2	8	Fast
Solids Separation for Off Site Disposal	Alternative	0 to 10	1	5.5	1.76	7	Fast
Expanded Waste Storage Ponds	Alternative	----	----	----	----	----	----
Expanded Sprayfields	Alternative	----	----	----	----	----	----
Improved Pasture Management (See Cow-Calf Imp., Pasture)	Owner	10 to 40	20	16.5	5.28	1	Fast
Improved Forage/Sprayfield Management - N/P balanced, new crops	Owner	0 to 15	5	0	0	0	Fast
HIA Management							
Add Housing to Move Animals off Fields ⁴	Alternative	30 to 70	50	3,929	1257	95	Fast
Stormwater Retention / Expanded Sprayfield	Alternative	20 to 70	40	440	140.8	13	Fast
Edge-of-field Chemical Treatment ⁵	Alternative	5 to 30	15	550	176	44	Fast
Buffer Strips	Alternative	0 to 10	5	44	14.08	11	Fast
Stormwater R/D	Cost share	15 to 50	30	1100	352	44	Fast
Wetland Restoration	Cost share	5 to 20	10	11	3.52	1	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁵	Alternative	5 to 70	50	550	176	13	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Value only include implementation cost, i.e. doesn't include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 Includes associated waste pond and sprayfield expansions 5 High O&M Costs							
Owner/Cost Share BMP Program		20 to 65	60	1045	334.4	66	Fast
Stormwater R/D and Wetland Restoration							
N Fertilizer Reduction							
Owner BMP Program		10 to 40	20	2.2	0.704	0	Fast
N Fertilizer Management							
Cost Share BMP Program		20 to 60	40	1042.8	333.696	32	Fast
Stormwater R/D and Wetland Restoration							
Alternative BMP Program		20 to 90	48	750	240	19	Fast
Barn Waste							
Solids Separation for Off Site Disposal		0 to 10	1	6	1.76	7	Fast
Expanded Waste Storage Ponds ⁴		----	----	----	----	----	----
Expanded Sprayfields ⁴		----	----	----	----	----	----
HIA Management							
Add Housing to Move Animals off Fields ⁴		30 to 70	50	3929	1257	95	Fast
Stormwater Retention / Expanded Sprayfield		20 to 70	40	440	141	13	Fast
Edge-of-field Chemical Treatment ⁵		5 to 30	15	550	176	44	Fast
Buffer Strips		0 to 10	5	44	14	11	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁵		5 to 70	50	550	176	13	Fast

BMPs for Field Crop (Hayland) Production

Assume for Typical Condition							
Assumed average farm size of 500 ac Existing N fertilization of 180 lbs N/ac No retention or wetland restoration Various Land Uses including hay, orchards, poultry, etc. Existing N Load 10.18 lbs-N/ac/yr Existing N Concentration 1.69 mg/l Average Annual Acres 26.63 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility							
Reduced N Fertilization (IFAS, placement, and type)	Owner	0 to 50	15	2.2	2.2	1	Fast
Better Micros Fertilization	Owner	0 to 20	3	5.5	5.5	18	Fast
Grass Management (variety, mowing, burning, irrigation, etc.)	Owner	0 to 20	2	5.5	1.76	9	Fast
Buffer Strips	Cost share	0 to 10	5	44	14.08	28	Fast
Stormwater R/D	Cost share	10 to 40	20	55	17.6	9	Fast
Wetland Restoration	Cost share	5 to 20	10	11	3.52	3	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	5 to 70	50	220	70.4	14	Fast
1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP 2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. 3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. 4 High O&M Costs							
Owner/Cost Share BMP Program P reduced to zero, Better N Management, Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Improved Grass Management, Feed Placement, Critical Area Fencing, and Moderate Wetland Restoration/Retention		10 to 60	40	58	18.56	5	Fast
Owner BMP Program Reduced N Fertilization (IFAS, placement, and type) Grass Management, and Feeder/Minerals and Water Placement		0 to 25	15	11	4	2	Fast
Cost Share BMP Program Rotational Grazing, New Water Facilities, Retention Basin by Working Pens, Critical Area Fencing, and Moderate Wetland Restoration/Retention		10 to 50	25	47	15	6	Fast
Alternative BMP Program Provide Alternative Shade to move cattle from streams and Edge-of-farm Stormwater R/D and Chemical Treatment		5 to 70	36	110	35	10	Fast

BMPs for Pine Plantation

Assume for Typical Condition							
Planted Pine Plantation (20 yr rotation)							
Assumed average farm size of 200 ac							
Existing N fertilization of 5 lbs N/ac							
No retention or wetland restoration							
Existing N Load 4.09 lbs-N/ac/yr							
Existing N Concentration 1.21 mg/l							
Average Annual Runoff 14.96 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Reduced N Fertilization (testing, placement, and type)	Owner	0 to 15	5	3	3	15	Fast
Stormwater R/D	Cost share	2 to 15	8	22	22	67	Fast
Wetland Restoration	Cost share	1 to 5	2	11	3.52	43	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	5 to 50	25	110	35.2	34	Fast
<p>1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP</p> <p>2 Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.</p> <p>3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.</p> <p>4 High O&M Costs</p>							
Owner/Cost Share BMP Program		2 to 25	15	22	22	36	Fast
Reduced N Fertilization, Stormwater R/D, and limited Wetland Restoration							
Owner BMP Program		0 to 15	5	3	0	0	Fast
Reduced N Fertilization							
Cost Share BMP Program		3 to 20	10	16.5	12.76	31	Fast
Stormwater R/D and limited Wetland Restoration							
Alternative BMP Program		5 to 50	25	110	35.2	34	Fast
Edge-of-farm Stormwater R/D and Chemical Treatment							

BMPS for Transportation Corridors

Assume for Typical Condition							
50% Paved Surface							
Bahia Grass Shoulders							
Existing N fertilization of 35 lbs N/ac							
Limited retention or wetland restoration							
Existing N Load 12.14 lbs-N/ac/yr							
Existing N Concentration 1.07 mg/l							
Average Annual Runoff 49.88 in/yr							
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)	
Fertility pH management	Owner	0 to 20	3	2	2	5	Fast
Reduced N Fertilization (testing, split, placement, and type)		10 to 50	20	2	2	1	Fast
Stormwater R/D	Cost share	5 to 45	15	110	35.2	19	Fast
Wetland Restoration	Cost share	2 to 15	7	11	3.52	4	Fast
Edge-of-farm stormwater R/D and Chemical Treatment ⁴	Alternative	5 to 50	25	220	70.4	23	Fast
¹ Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMP ² Costs presented on per acre of entire farm basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs. ³ The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M. ⁴ High O&M Costs							
Owner/Cost Share BMP Program		10 to 70	43	111.8	36	7	Fast
Reduced N fertilization, water management, and limited wetland restoration/retention							
Owner BMP Program		10 to 50	20	4	1	6	Fast
Reduced N Fertilization							
Cost Share BMP Program		10 to 60	23	107.8	34	12	Fast
Water Management and limited Wetland Restoration/Retention							
Alternative BMP Program		5 to 50	25	220	70	23	Fast
Water Reuse from Retention/Detention Ponds and Edge-of-System stormwater R/D and Chemical Treatment							

BMPs for Communications and Utilities

Assume for Typical Condition								
Marginally Maintained Bahia Grass								
No Pond retention								
Existing N Load		7.92	lbs-N/ac/yr					
Existing N Concentration		1.40	mg/l					
Average Annual Runoff		25.05	in/yr					
BMPs	Type	N Reduction ¹		Initial Cost of BMP ² (\$/ac)	Annual Cost ³		Quickness of Response	
		Range %	Typical %		per acre (\$/ac/yr)	N Removed (\$/lb/ac/yr)		
Fertility	Reduced P Fertilization (testing, placement, and type)	Owner	0 to 10	5	0	0	0	Fast
Dry/Wet Retention	0.25"	Cost share	0 to 20	2	1280	409.6	2586	Fast
Wet Restoration		Cost share	0 to 20	3	1600	512	2155	Fast
Dry Detention - Regional		Alternative	15 to 35	25	3200	1024	517	Fast
Wet Detention - Regional		Alternative	40 to 80	65	4000	1280	249	Fast
<p>1 Estimated values assume no other BMPs applied. Note, combined BMPs will reduce effectiveness of individual BMPs</p> <p>2 Costs presented on per acre of entire development basis unless otherwise noted. Costs value only include implementation cost, i.e. does not include O&M Costs.</p> <p>3 The annual cost include amortized capital costs at 10% interest over a twenty-year life span and a 20% per year of capital cost for annual O&M.</p> <p>4 High O&M Costs</p>								
Owner/Cost Share BMP Program			0 to 20	10	6400	2048	2586	Moderate
Reduced N Fertilization, limited dry/wet retention, and wetland restoration								
Owner BMP Program			0 to 10	5	0	0	0	Fast
Reduced N Fertilization								
Cost Share BMP Program			5 to 50	5	6400	2048	5172	Fast
Selective limited dry/wet retention and Wetland Restoration								
Alternative BMP Program			15 to 80	50	3200	1024	259	Fast
Stormwater R/D with Chemical Treatment								