

2014 PROGRESS REPORT

for the Everglades West Coast Basin Management Action Plan

prepared by the
Division of Environmental Assessment and Restoration
Water Quality Restoration Program
Florida Department of Environmental Protection
Tallahassee, Florida 32399

in cooperation with the
Everglades West Coast Stakeholders

June 2015

ACKNOWLEDGMENTS

This 2014 Progress Report for the Everglades West Coast Basin Management Action Plan was prepared as part of a statewide watershed management approach to restore and protect Florida's water quality. It was prepared by the Florida Department of Environmental Protection in cooperation with the Everglades West Coast stakeholders.



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LIST OF ACRONYMS AND ABBREVIATIONS

BMAP	Basin Management Action Plan
BMP	Best Management Practice
CDD	Community Development District
CHNEP	Charlotte Harbor National Estuary Program
Department	Florida Department of Environmental Protection
DO	Dissolved Oxygen
FDACS	Florida Department of Agriculture and Consumer Services
FDOT	Florida Department of Transportation
FFL	Florida-Friendly Landscaping
FY	Fiscal Year
FYN	Florida Yards and Neighborhoods (Program)
GIS	Geographic Information System
lbs/yr	Pounds Per Year
mg/L	Milligrams Per Liter
MS4	Municipal Separate Storm Sewer System
N	Nitrogen
NNC	Numeric Nutrient Criteria
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
OAWP	FDACS' Office of Agricultural Water Policy
PSA	Public Service Announcement
SFWMD	South Florida Water Management District
STORET	STOrage and RETrieval (Database)
TMDL	Total Maximum Daily Load
TN	Total Nitrogen
UV	Ultraviolet
WBID	Waterbody Identification

SUMMARY

TOTAL MAXIMUM DAILY LOADS

Hendry Creek and the Imperial River are both located in the Estero Bay Planning Unit within the Everglades West Coast Basin. Hendry Creek is located in the southwest part of Lee County in southwest Florida, approximately three miles south of the city of Fort Myers and about three miles southeast of the city of Cape Coral. For assessment purposes, Hendry Creek is divided into a predominantly freshwater segment and a predominantly marine segment. The creek flows south for approximately six miles into north Estero Bay and drains a watershed of about 15.35 square miles. Most development is in the north end of the watershed, and wetlands and water dominate the southern portion. The Imperial River watershed covers approximately 23.1 square miles, of which 6.9 square miles are surface waters. Oak Creek and Leitner Creek flow into the upstream portion of the Imperial River. Both of these drainage areas, as well as the adjacent watershed, contain extensive areas of cropland and pastureland. As the Imperial River runs adjacent to the city of Bonita Springs, it receives extensive amounts of urban runoff along the majority of its length.

The dissolved oxygen (DO) Total Maximum Daily Loads for Hendry Creek and the Imperial River were adopted by the Florida Department of Environmental Protection in August 2008. The Everglades West Coast Basin Management Action Plan addresses the TMDLs for the following segments with waterbody identification (WBID) numbers: WBIDs 3258B and 3258B1 in Hendry Creek (now only WBID 3258B2) and WBID 3258E in the Imperial River (now combined with WBID 3258C to become WBID 3258EA).

The Everglades West Coast BMAP was adopted in November 2012 to implement the total nitrogen (TN) TMDLs in the watershed to address the DO impairment. This is the second annual Progress Report for the Everglades West Coast BMAP, and it describes the activities that occurred during the reporting period from December 1, 2013, through November 30, 2014.

SUMMARY OF LOAD REDUCTIONS

During the second annual BMAP reporting period, Lee County and the Florida Department of Transportation (FDOT) increased their street sweeping activities in the Hendry Creek Basin, reducing TN by an additional 122 pounds per year (lbs/yr). In addition, the reductions from the implementation of agricultural best management practices (BMPs) were quantified and are estimated at 78 lbs/yr of TN. The reductions mentioned above are in addition to those projects given credit before BMAP adoption.

Therefore, the total reduction to date is 6,864 lbs/yr of TN, or 66.5% of the reductions needed to meet the TMDL. **Figure ES-1** shows progress towards the Hendry Creek TN TMDL load reduction.

In the Imperial River Basin, Lee County increased street sweeping, reducing TN by an additional 108 lbs/yr. In addition, the TN reductions from agricultural BMP implementation were quantified and are estimated to be 10,837 lbs/yr. The reductions mentioned above are in addition to those projects given credit before BMAP adoption. Therefore, the total reduction to date is 14,478 lbs/yr of TN, or 24% of the reductions needed to meet the TMDL. **Figure ES-2** shows progress towards the Imperial River TN TMDL load reduction.

WATER QUALITY MONITORING

Lee County continued monitoring at 14 water quality stations in the Hendry Creek Basin. At four of these stations, the Department's South District collected data quarterly. Lee County also continued monitoring at five water quality stations in the Imperial River Basin. In addition, the city of Bonita Springs continued monitoring at seven water quality stations in the Imperial River Basin.

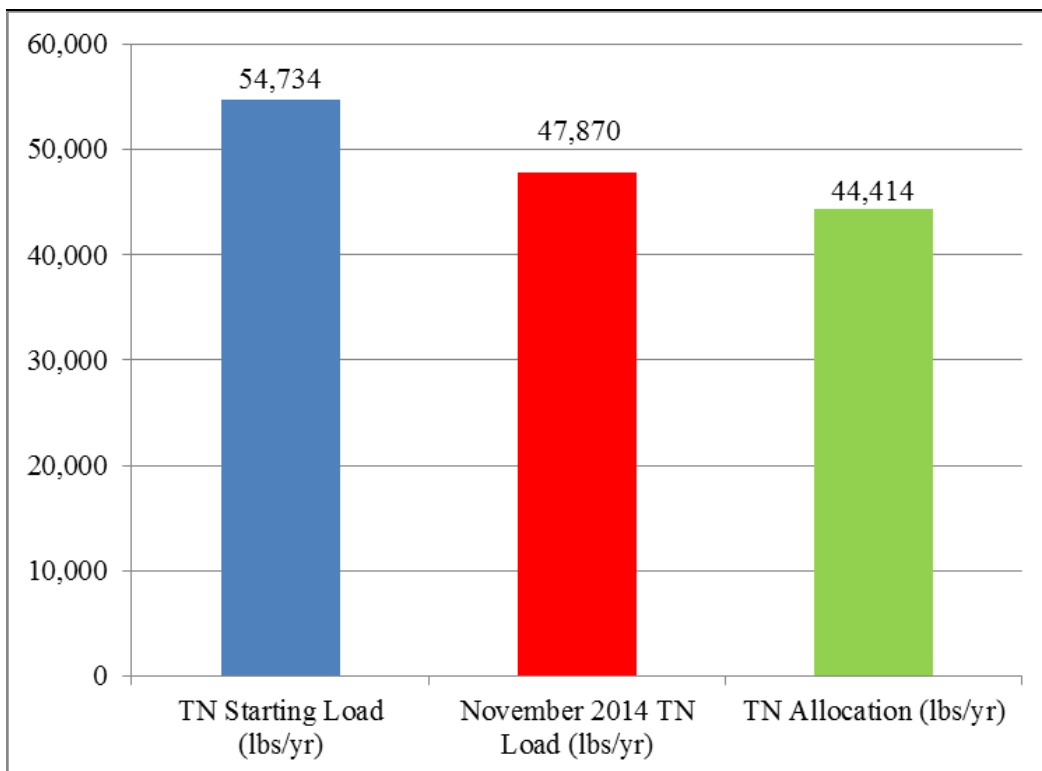


FIGURE ES-1: PROGRESS TOWARDS THE HENDRY CREEK TN TMDL THROUGH NOVEMBER 30, 2014

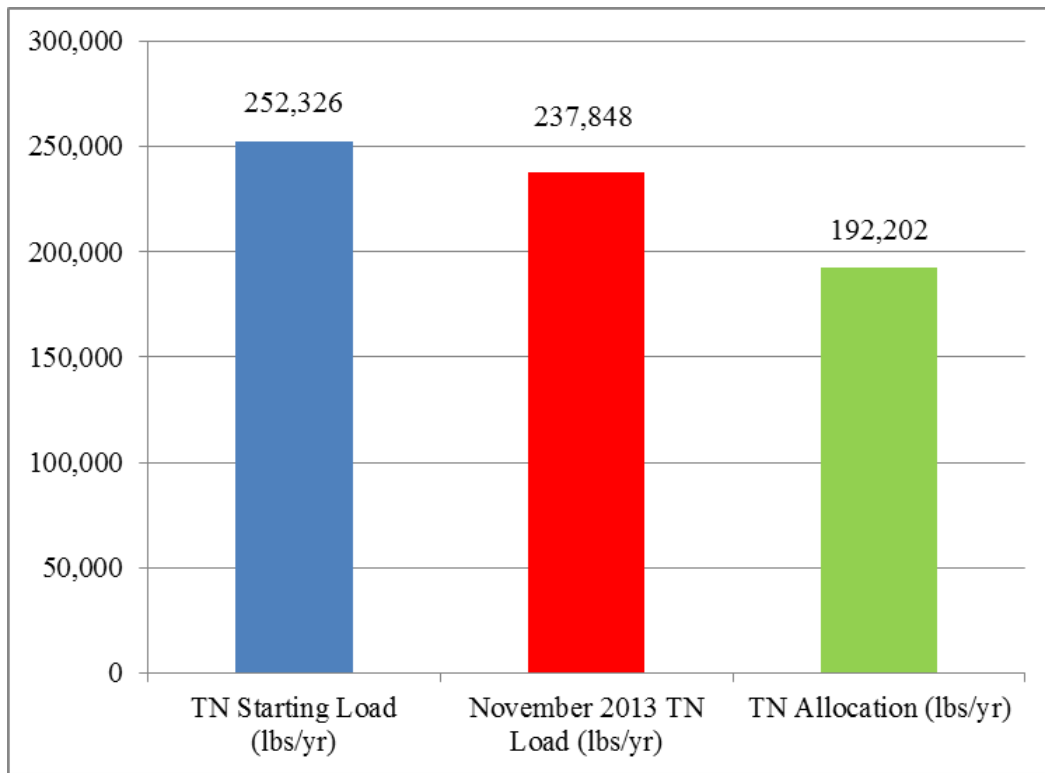


FIGURE ES-2: PROGRESS TOWARDS THE IMPERIAL RIVER TN TMDL THROUGH NOVEMBER 30, 2014

Section 1: INTRODUCTION

1.1 PURPOSE OF THE REPORT

This is the second annual Progress Report for the Everglades West Coast Basin Management Action Plan. **Section 2** and **Section 3** describe the activities that occurred during the period from December 1, 2013, through November 30, 2014, for the Hendry Creek and Imperial River Basins, respectively. **Section 4** describes the water quality monitoring that occurred during the reporting period.

1.2 TOTAL MAXIMUM DAILY LOADS FOR THE EVERGLADES WEST COAST BASIN

Hendry Creek and the Imperial River are both located in the Estero Bay Planning Unit within the Everglades West Coast Basin. Estero Bay proper is a shallow, subtropical lagoon with an area of 17.7 square miles (11,317 acres) and is separated from the Gulf of Mexico by barrier islands. Seagrass beds are common in the bay, but high turbidity restricts seagrass growth to shallow depths. Five major tributaries flow into Estero Bay: Imperial River, Estero River, Spring Creek, Mullock Creek, and Hendry Creek.

Hendry Creek is located in the southwest part of Lee County in southwest Florida, approximately three miles south of the city of Fort Myers and approximately three miles southeast of the city of Cape Coral (see **Figure 1**). For assessment purposes, Hendry Creek is divided into a predominantly freshwater segment and a predominantly marine segment. U.S. Route 41 runs between the two segments. Hendry Creek flows south for approximately six miles into north Estero Bay and drains a watershed of about 15.35 square miles (9,824 acres). Most development is in the northern end of the watershed, and wetlands and water dominate the southern portion.

The Imperial River watershed covers approximately 23.1 square miles (14,784 acres), of which 6.9 square miles (4,416 acres) are surface waters (see **Figure 2**). Oak Creek and Leitner Creek flow into the upstream portion of the Imperial River. Both of these drainage areas, as well as the adjacent watershed, contain extensive areas of cropland and pastureland. As the Imperial River runs adjacent to the city of Bonita Springs, it receives extensive amounts of urban runoff along the majority of its length.

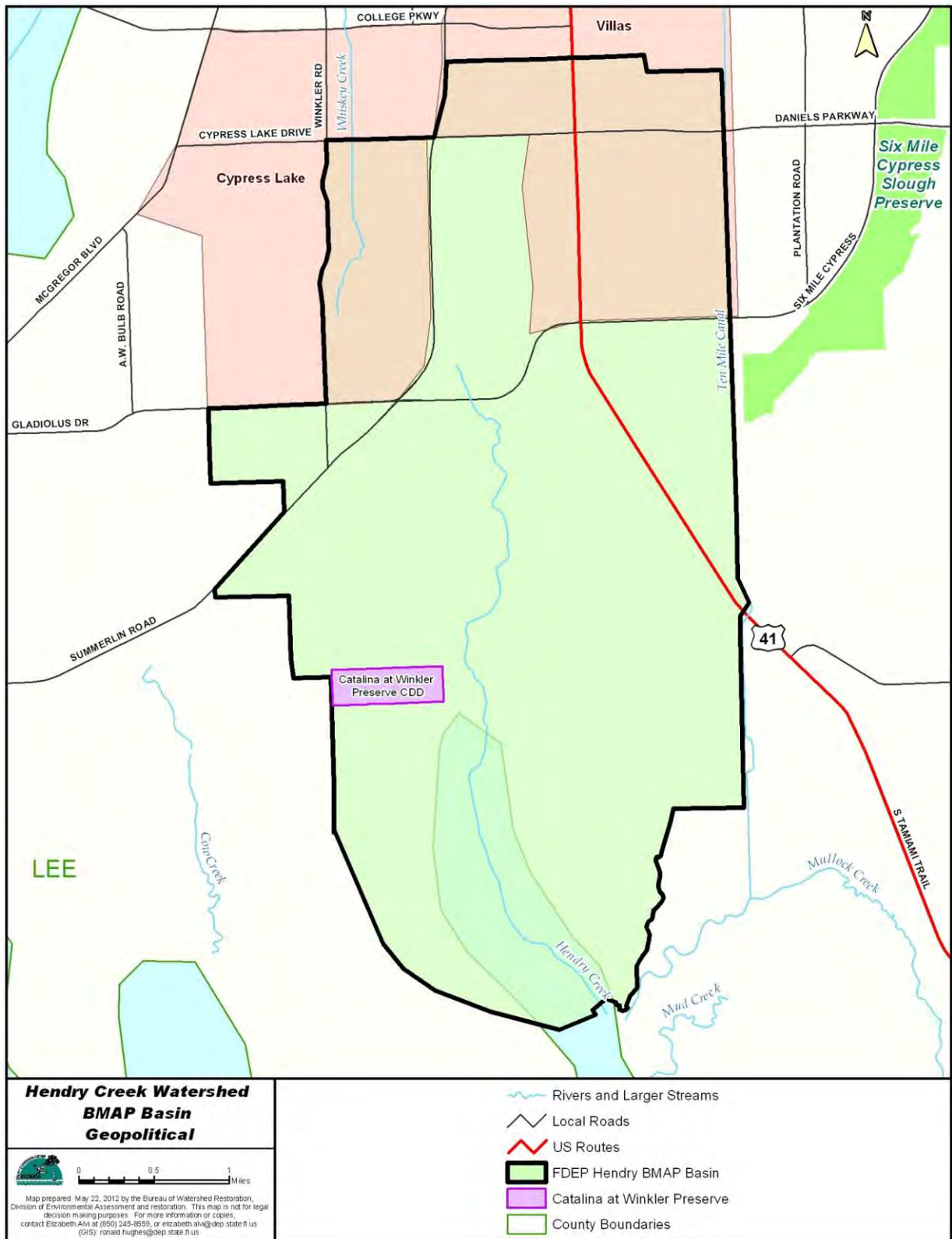


FIGURE 1: HENDRY CREEK BASIN

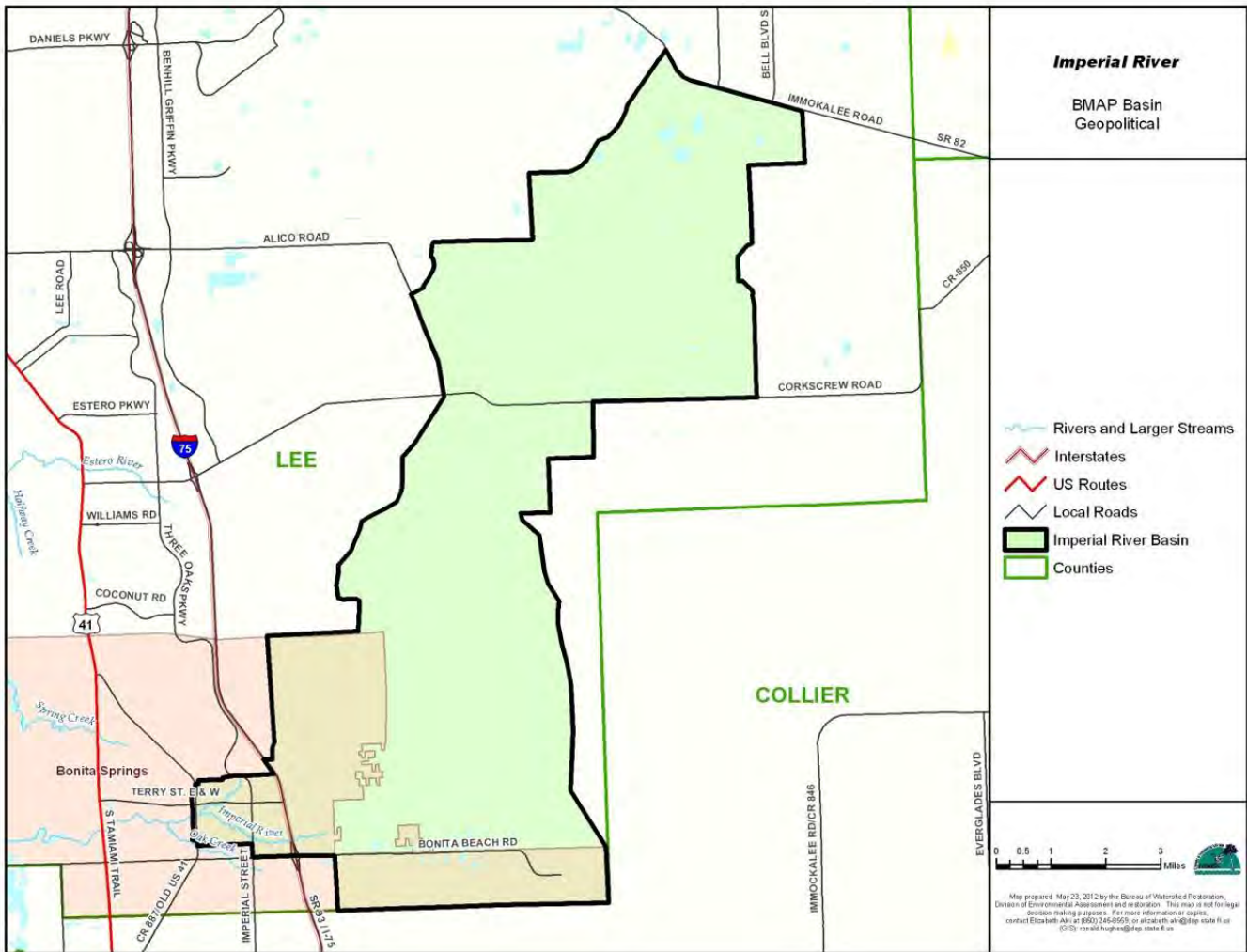


FIGURE 2: IMPERIAL RIVER BASIN

Hendry Creek and the Imperial River were determined to be impaired for low dissolved oxygen (DO), caused by high concentrations of total nitrogen (TN). The TN TMDLs for these waterbodies were adopted by the Florida Department of Environmental Protection in August 2008. The Everglades West Coast BMAP addresses the TN TMDLs for the following segments with waterbody identification (WBID) numbers: WBIDs 3258B and 3258B1 in Hendry Creek (now only WBID 3258B2) and WBID 3258E in the Imperial River (now combined with WBID 3258C to become WBID 3258EA). **Table 1** lists the TMDLs and pollutant load allocations adopted by rule for the watersheds.

In the original Hendry Creek TMDL, there were two distinct TN target concentrations (0.74 milligrams per liter [mg/L] and 0.60 mg/L) assigned to the freshwater portion (WBID 3258B) and the marine portion (WBID 3258B1), respectively. For the purposes of the first phase of the BMAP, 0.74 mg/L was used as the target concentration for the entire BMAP area.

TABLE 1: EVERGLADES WEST COAST TMDLS

NPDES – National Pollutant Discharge Elimination System

WBID	WATERBODY	PARAMETER	TMDL (MG/L)	WASTELOAD ALLOCATION FOR NPDES) STORMWATER (% REDUCTION)	LOAD ALLOCATION (% REDUCTION)
3258B	Hendry Creek	TN	0.74	44%	44%
3258B1	Hendry Creek	TN	0.60	44%	44%
3258E	Imperial River	TN	0.74	24.87%	24.87%

1.3 RESPONSIBLE PARTIES AND KEY STAKEHOLDERS

The following organizations and entities are key stakeholders with assigned load reductions in the Hendry Creek portion of the Everglades West Coast BMAP:

- Agriculture.
- Catalina at Winkler Preserve Community Development District (CDD).
- Lee County.
- Florida Department of Transportation (FDOT) District 1.

The following organizations and entities are key stakeholders with assigned load reductions in the Imperial River portion of the Everglades West Coast BMAP:

- Agriculture.
- City of Bonita Springs.
- Lee County.
- FDOT District 1.

In addition to the these entities, the Florida Department of Agriculture and Consumer Services (FDACS), the Department, and the South Florida Water Management District (SFWMD) are essential to the implementation of the BMAP activities.

1.4 BMAP ALLOCATIONS

To assign allocations based on a load reduction, the Department utilized simplified runoff and loading calculations to estimate the land-based TN load and reduced the resulting value to the TMDL TN concentration. This approach is an interim measure while the Department reevaluates the TMDL.

Using the runoff and loading calculations, the nonpoint source background load was calculated. This is defined as the load resulting from the watershed if all loads were converted to nonurban and nonagricultural land uses.

The second step was to determine the nonpoint source nonbackground load, which is the difference between the existing load and the nonpoint source background load. This is essentially the anthropogenic nonpoint source load used to allocate load reductions. To assign allocations, the percent of the total nonpoint source nonbackground load was determined for each entity. Based on the allocations, the load reductions were assigned to each entity as shown in **Table 2** for Hendry Creek and **Table 3** for the Imperial River.

TABLE 2: TN REQUIRED REDUCTIONS FOR THE HENDRY CREEK BASIN ENTITIES

ENTITY	AREA (ACRES)	EXISTING TN LOAD (POUNDS PER YEAR [LBS/YR])	ALLOCATION (LBS/YR)	PERCENT REDUCTION	REDUCTION REQUIRED (LBS/YR)
Lee County	10,166	53,582	43,498	18.8%	10,084
Catalina CDD	111	158	158	0.2%	0
FDOT	89	325	262	19.4%	63
Agriculture	98	668	495	25.9%	173
TOTAL	10,464	54,734	44,414	18.9%	10,320

TABLE 3: TN REQUIRED REDUCTIONS FOR THE IMPERIAL RIVER BASIN ENTITIES

ENTITY	AREA (ACRES)	EXISTING TN LOAD (LBS/YR)	ALLOCATION (LBS/YR)	PERCENT REDUCTION	REDUCTION REQUIRED (LBS/YR)
Lee County	26,113	94,469	92,913	1.6%	1,556
City of Bonita Springs	7,154	37,426	27,524	26.5%	9,903
FDOT	96	347	252	27.4%	95
Agriculture	11,597	120,084	71,514	40.4%	48,570
TOTAL	44,960	252,326	192,202	23.8%	60,125

Section 2: HENDRY CREEK ACTIVITIES DURING THE REPORTING YEAR

Section 2.1 through **Section 2.2** describe the accomplishments in the Hendry Creek Basin over the past year, and the individual project tables are included in **Appendix A**.

2.1 ACTIVITIES BY ENTITY IN THE HENDRY CREEK BASIN

2.1.1 FDOT DISTRICT 1

FDOT District 1 continues to implement its street sweeping program throughout Lee County and within the Hendry Creek Basin. Street sweeping miles were increased during the reporting period, and TN reduction credits for the current reporting period are reflected in **Appendix A: BMAP Projects**. In addition, FDOT started the statewide implementation of mandatory Illicit Discharge Detection and Elimination training for all staff and contractors working within FDOT's rights-of-way.

2.1.2 LEE COUNTY

Lee County Department of Transportation continued with its street sweeping program and recycled 53.5 tons of street sweepings in the Hendry Creek watershed during Fiscal Year (FY) 2013/2014.

Lee County maintenance activities in the Lakes Park Filter Marsh (see **Figure 3**) included 10 harvesting events removing 392 cubic yards of vegetation for this reporting period.

Five Watershed Education Training – Ponds, Lakes, and Neighborhoods workshops were held throughout Lee County during the reporting period, with a total of 325 homeowners in attendance (see **Figure 4**). Through this program, 367 educational handouts were distributed and a [website](#) was created that includes educational materials and announcements for workshops held in the Everglades West Coast watershed. Public outreach initiatives included partnerships with the Charlotte Harbor National Estuary Program (CHNEP), neighboring municipalities, Lee County Hyacinth Control District, local private consulting firms, SFWMD, Lee County Extension Services, Florida Native Plant Society volunteers, Florida Gulf Coast University, CDDs, homeowner associations, and volunteer homeowner groups. These initiatives educated residents on stormwater pollution prevention with an emphasis on impacts to neighborhood ponds and issues pertaining to pond management. In some cases, the initiatives focused on gaining homeowner consensus for participation in pilot projects to implement water quality best management practices (BMPs).



FIGURE 3: LEE COUNTY LAKES PARK FILTER MARSH, AUGUST 2014



FIGURE 4: LEE COUNTY WATERSHED EDUCATION TRAINING – PONDS, LAKES, AND NEIGHBORHOODS WORKSHOP, NOVEMBER 2014

CHNEP is currently seeking grant funding to expand the educational initiatives and develop a fund to help homeowner associations install water quality improvement BMPs in their neighborhood lakes and ponds. In addition, the Watershed Education Training – Ponds, Lakes, and Neighborhoods curriculum supports the level of detail required for Lee County Extension Services to offer continuing education units for professionals who participate in the workshops, expanding interest in the workshops to reach a larger audience and increase attendance.

Through the Citizen’s Stormwater Academy, staff provided presentations with visual examples of stormwater pollution and how pollution affects individuals personally. Facts were provided about the watersheds, and brochures were distributed with information about pollution prevention and contact information for reporting pollution issues. Training was provided on how to identify and report pollution issues. Training, assistance, and materials on how to mark storm drains were made available. The materials for this public education initiative were funded in partnership with CHNEP and delivered by Lee County staff to the county’s NPDES co-permittee drainage districts.

In addition to a curriculum delivered by staff, neighborhood stewardship activities included marking storm drains to raise awareness and conducting follow-up visits to help concerned citizens troubleshoot pollution issues in their neighborhoods. Materials made available to complement the Citizen’s Stormwater Academy curriculum included a custom “frequently asked questions” sheet entitled “Choices Matter.” Other materials included water drop-shaped refrigerator magnets that list contact information for reporting stormwater system problems to Lee County Natural Resources and the Department of Transportation, and storm drain marking materials. There have also been requests for additional monthly scheduling of Citizen’s Stormwater Academy workshops from Lee County’s co-permittees.

Lee County rolled out an updated Fertilize Smart campaign, “Don’t Feed the Monster,” including an updated [website](#), a [Facebook site](#), brochures, and a public service announcement (PSA) [video](#) featuring “The Slime Monster” (see **Figure 5**).

Florida Native Plant Society volunteers in partnership with Lee County Natural Resources and Lowe’s in Estero held two fertilizer ordinance education workshops during peak shopping days on July 5 and September 5, 2014. The society estimates that it educated approximately 200 clients at Lowe’s on each day for a total of 400 residents educated. Lee County also continued Compliance and Enforcement Activities (**Table 4**) for the County Fertilizer Ordinance. **Table 5** summarizes Lee County’s Public Education and Outreach activities.



FIGURE 5: LEE COUNTY'S FERTILIZE SMART CAMPAIGN, "DON'T FEED THE MONSTER"

TABLE 4: LEE COUNTY FERTILIZER ORDINANCE COMPLIANCE AND ENFORCEMENT ACTIVITIES

COMPLIANCE ACTIVITY	NUMBER OF INSPECTIONS
Compliant with Ordinance	26
Warning of Noncompliance	7
Written Citation of Noncompliance (with fine)	16
TOTAL INSPECTIONS FROM 12/2013 TO 11/2014	49

TABLE 5: PUBLIC EDUCATION AND OUTREACH ACTIVITIES

N/A – Not applicable

CATEGORY	TOTAL 2013	FLORIDA YARDS AND NEIGHBORHOODS (FYN) 2014	FLORIDA FRIENDLY LANDSCAPING (FFL) 2014	TOTAL 2014
Estimated Percentage of Population Reached by Activities in Total	5%	5%	15%	5%
Brochures/Flyers/Fact Sheets Distributed	14,000	3,632	96,000	99,632
Newspaper/Magazine Articles Published/Distributed	N/A	N/A	35	35
Newspaper/Magazine Readers (actual and online)	N/A	N/A	210,000	210,000
Neighborhood Presentations: Number of Participants	5,800	1,721	2,904	4,625
Neighborhood Presentations: Number Conducted	55	22	54	72
Public Displays (e.g., kiosks, storyboards, posters, etc.)	22	16	8	24
Radio or Television PSAs	2	1	5	6

CATEGORY	TOTAL 2013	FLORIDA YARDS AND NEIGHBORHOODS (FYN) 2014	FLORIDA FRIENDLY LANDSCAPING (FFL) 2014	TOTAL 2014
YouTube Views	N/A	N/A	121,831	121,831
School Presentations: Number of Participants	18	221	0	221
Seminars/Workshops: Number of Participants	15,200	789	3,100	3,889
Special Events: Number Conducted	8	3	1	4
Special Events: Numbers of Participants	8,200	2,300	4,000	6,300
Website: Number of Hits/Visitors to Stormwater-Related Pages	79,000	87,000	250,000	337,000

In December 2013, Lee County concluded a study in the Lakes Park Filter Marsh to determine the effectiveness of ultraviolet (UV) light as a treatment BMP for denitrification. The UV pilot system (see **Figure 6**) was installed in a trailer located at the discharge end of the Lakes Park serpentine stormwater treatment system in Lee County. The pilot system consisted of an intake unit that pumped water into the trailer from the Lakes Park filter marsh (feed water), a Trojan UV reactor, and two columns with lime rock substrate—one that contained aerobic bacteria and one carbon substrate included in anoxic conditions. Supplemental air was supplied to Column 1 to enhance nitrification, and lower DO conditions were maintained in Column 2 to encourage denitrification. Samples were collected at four locations—feed water, post-UV filter, after Column 1, and after Column 2—and submitted for analysis. Field parameters were measured on site.



FIGURE 6: LEE COUNTY LAKES PARK UV FILTER NITROGEN REDUCTION PHASE I PILOT PROJECT, DECEMBER 2013

The primary objective of the pilot study was met during the first phase of the testing. Ammonia nitrogen increased markedly after the UV reactor and then decreased after Column 1. Ammonia nitrogen in the feed water was 0.008 ± 0.004 mg/L as N, slightly above the method detection limit. After the UV reactor, ammonia nitrogen increased to 0.060 ± 0.033 mg/L as N, approximately equal to 7.5 times the concentration in the feed water. TN, organic nitrogen, and dissolved organic nitrogen showed a general decreasing trend through the system. Organic nitrogen decreased from 0.58 ± 0.06 mg/L as N in the feed water, to 0.52 ± 0.05 mg/L as N after the UV reactor, and to 0.44 ± 0.21 mg/L as N after Column 2. The decrease of organic nitrogen and the increase of ammonia nitrogen after the UV reactor suggested the conversion of organic nitrogen in the feed water to the bioavailable ammonia nitrogen form by exposing the feed water to UV radiation.

The concentrations of TN, organic nitrogen, ammonia nitrogen, and nitrate/nitrite in the Lakes Park feed water during the pilot testing period were much lower than the levels obtained prior to the construction of the filter marsh project at Lakes Park in 2012. Testing with water containing higher concentrations of nitrogen will provide more insight into the effectiveness of the UV system and more realistic estimates of this technology's potential. A review of the historical TN data provided by Lee County Natural Resources staff suggested that water quality monitoring station CES01 in the Caloosahatchee River Basin, located upstream of water control structure S-79, could be a better testing site with relatively higher concentrations of total organic nitrogen and nitrate/nitrite in the surface water. The UV pilot system was installed in a trailer located upstream of the S-79 lock near the Olga Water Treatment Plant in Lee County.

Lee County Natural Resources staff have been meeting monthly to discuss data analysis done offline to characterize and prioritize watersheds for capital improvement planning and budgeting. Various criteria are used, including the following:

- Impairment, BMAP, or TMDL status.
- Annual geometric mean TN values and their percent exceedance over the new numeric nutrient criteria (NNC).
- Habitat assessment.

Lee County initiated bacterial management plans to address the fecal coliform TMDLs in Hendry Creek. Activities include the proactive inspections of strip malls to ensure that their waste disposal equipment is properly containing stormwater runoff and that areas of concern identified in the previous “Walk the WBID” (Walk the Waterbody) activities have been addressed.

2.1.3 AGRICULTURE

FDACS currently has five field staff in the SFWMD region who work with producers on BMP enrollment and implementation. FDACS' activities include initial enrollment, follow up to provide technical assistance, BMP implementation assurance visits, the management of water quality– and water supply–related projects and contracts, and coordination with the SFWMD on agriculture-related permitting questions. Staff also participate in the development of the various BMAPs in the SFWMD region.

Landowners who sign Notices of Intent (NOIs) agree to implement applicable BMPs on their enrolled properties. As of September 31, 2014, FDACS had enrolled 30.7 acres in the Hendry Creek Basin (**Table 6**) based on the entire parcel acreage.

TABLE 6: AGRICULTURAL ACREAGE, BMP ENROLLMENT, AND FUTURE ENROLLMENT GOALS FOR THE HENDRY CREEK BASIN

¹ FDACS staff-adjusted acreage for the purposes of enrollment is based on a review of more recent aerial imagery in the basin and local staff observations.
N/A – Not applicable

2004 SFWMD LAND USE	2004 ACRES	FDACS-ADJUSTED ACRES FOR ENROLLMENT ¹	RELATED FDACS' BMP PROGRAMS	ACREAGE ENROLLED	RELATED NOIS
Pasture	0.2	N/A	Cow/Calf, Future (Hay)	0.0	0
Row/Field/Mixed Crops	87.1	50.5	Vegetable/Agronomic Crops	0.0	0
Tree Nurseries	0.0	5.0	Future Nursery, Specialty Fruit and Nut	0.0	0
Ornamentals	10.6	35.6	Container Nursery	30.7	2
TOTAL	97.9	91.1	N/A	30.7	2

In the Hendry Creek Basin, land uses in agricultural operations include improved pasture, row crops, and ornamentals. According to 2004 land use data, these comprise about 98 acres in the basin (**Table 7**). When looking at the portion of the enrolled acreage associated with these agricultural land uses, a total of 26.7 acres was enrolled as of September 2014 (**Figure 7**). The BMPs implemented on this acreage resulted in estimated reductions of 78 lbs/yr of TN.

Not all the acreage listed as agriculture in **Table 6** is included in enrollment calculations, because the NOIs document the estimated total number of acres on which applicable BMPs are implemented, not the land use acreage mapped as agriculture. Land use data can contain nonproduction acres (such as buildings, parking lots, and fallow acres) that will not be used in BMAP reduction calculations. There also may be acreage that is not appropriate for enrollment in FDACS' Office of Agricultural Water Policy (OAWP) BMPs, such as lands not in commercial production.

TABLE 7: SUMMARY OF AGRICULTURAL ENROLLMENT IN THE HENDRY CREEK BASIN

CATEGORY	ACRES
Total 2004 Acres	98
Enrolled Acres Used for TN Reduction Estimates	27
Estimated TN Reduction (lbs/yr)	78
Remaining Acres To Enroll	71

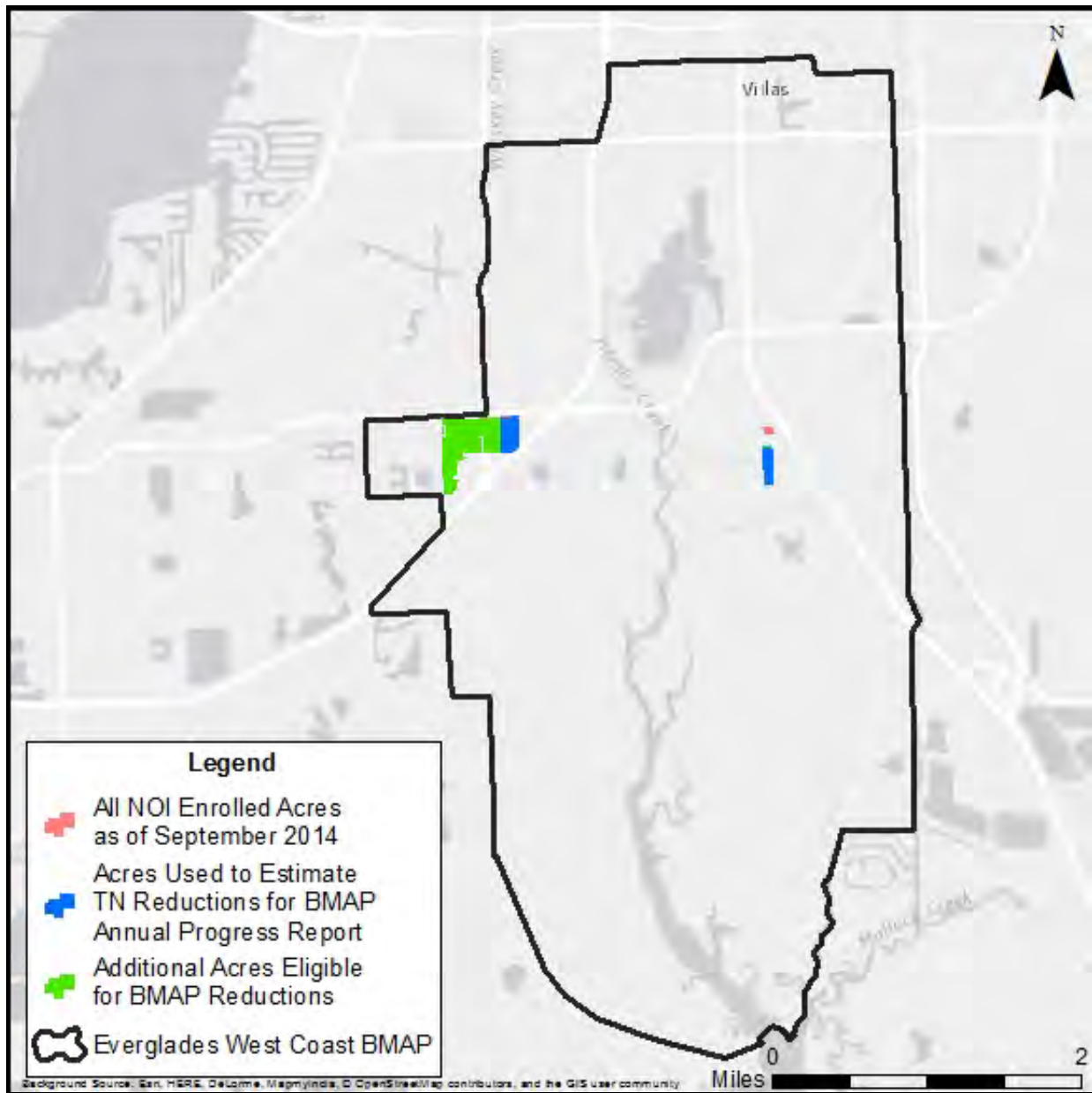


FIGURE 7: FDACS' BMP PROGRAM ENROLLMENTS IN THE HENDRY CREEK BASIN AS OF SEPTEMBER 2014

2.2 SUMMARY OF LOAD REDUCTIONS IN THE HENDRY CREEK BASIN

Table 8 summarizes the projects completed in the Hendry Creek Basin during the second annual BMAP reporting period; these projects reduced TN by an estimated 200 lbs/yr. The reduction is in addition to those projects given credit before BMAP adoption and in the 2013 Progress Report. Therefore, the total reductions to date are 6,864 lbs/yr of TN, or 66.5% of the reductions needed to meet the TMDL.

TABLE 8: SUMMARY OF PROJECTS COMPLETED IN THE REPORTING PERIOD (DECEMBER 1, 2013–NOVEMBER 30, 2014) IN THE HENDRY CREEK BASIN

N/A – Not applicable

ENTITY	PROJECT NUMBER	PROJECT NAME	TN REDUCTION (LBS/YR)
FDOT	HC-FDOT-3	Street Sweeping – Additional Reductions	72
Lee County	LC-2	Street Sweeping – Additional Reductions	50
Agriculture	N/A	Agricultural BMPs	78
TOTAL	N/A	TOTAL REDUCTIONS IN REPORTING PERIOD	200

Figure 8 shows progress towards the TN TMDL load reductions. The first bar shows the starting load for urban and agricultural stormwater runoff. The second bar shows the current estimated loading based on those projects shown as completed in the BMAP, those completed as part of the 2013 Progress Report, and those listed above. The third bar shows the total allocation for stormwater runoff to meet the TMDL.

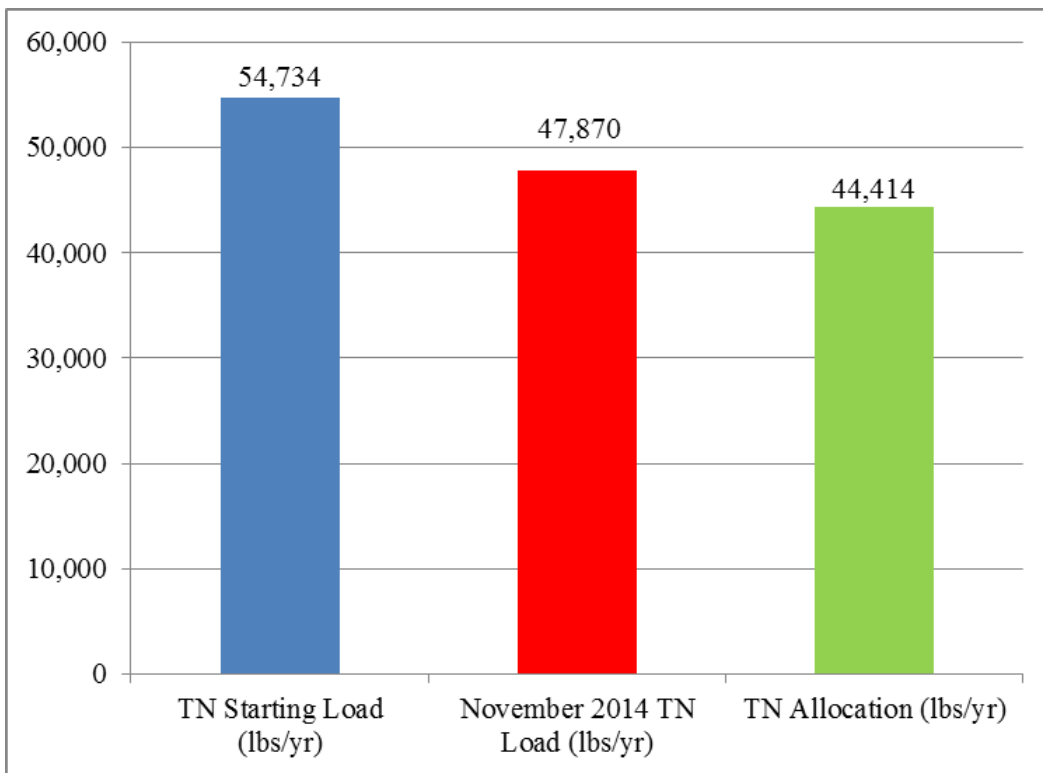


FIGURE 8: PROGRESS TOWARDS THE HENDRY CREEK TN TMDL THROUGH NOVEMBER 30, 2014

Section 3: IMPERIAL RIVER ACTIVITIES DURING THE REPORTING YEAR

Section 3.1 and **Section 3.2** describe the accomplishments in the Imperial River Basin over the past year, and the individual project tables are included in **Appendix A**.

3.1 ACTIVITIES BY ENTITY IN THE IMPERIAL RIVER BASIN

3.1.1 CITY OF BONITA SPRINGS

The city of Bonita Springs applied for and received \$250,000 in grant funds from the Department to construct a water quality improvement project in the downtown Bonita Springs area at the Felts Avenue site. The city retained Sutron Engineering to research and assess the viability and effectiveness of constructing a woodchip-based denitrifying bioreactor. A video-teleconference presentation was provided to Department staff on October 21, 2014, with a white paper provided as a follow up, explaining the concept for consideration. The city developed a conceptual project plan to install the bioreactor on the Felts site, including monitoring the input loads and reactor outfall to confirm its effectiveness.

Atkins Global was contracted to develop a geographic information system (GIS)–based project siting and evaluation tool that utilizes loading factors identified in the *Draft March 2010 Stormwater Quality Applicant’s Handbook*.

The Lee County Conservation 20/20 Program and Lee County Natural Resources staff were contacted to discuss a potential joint project to rehydrate the Lee County 20/20 Pine Lake Preserve property. This property lies within the limits of the city of Bonita Springs and is adjacent to city-owned property near the upper reaches of the Imperial River, in a stretch of the river known as the Kehl Canal. Monitoring has consistently shown that the Kehl Canal provides the largest source of nitrogen entering the Imperial River watershed. This opportunity to rehydrate the Pine Lake Preserve with water from the Kehl Canal will help meet the BMAP’s prescribed reductions, while achieving the Conservation 20/20 Program’s ecosystem restoration goals.

During this reporting period, two Watershed Education Training – Ponds, Lakes, and Neighborhoods workshops were held to educate the public on ecofriendly lake management techniques. One FYN educational event was held to highlight less-intensive FFL plants and landscaping techniques.

3.1.2 LEE COUNTY

The Lee County Department of Transportation continued its street sweeping program and recycled 81.0 tons of street sweepings in the Hendry Creek watershed during FY 2013/2014.

Lee County Natural Resources staff met monthly to discuss data analysis done offline to characterize and prioritize watersheds for capital improvement planning and budgeting. Various criteria were used, including impairment, BMAP, or TMDL status; annual geometric mean TN values and their percent exceedance over the new NNC; and habitat assessment. The prioritization of watersheds has been used in mapping exercises to identify vacant lands that could be potential sites for stormwater improvement projects. Over the last year, four vacant parcels were identified for potential water quality project sites in the Imperial River watershed. In addition, Lee County Conservation 20/20 is in final negotiations for the purchase of a total of 55 acres in the Corkscrew Regional Ecosystem Watershed (Imperial River watershed) in 2014.

Lee County also continued its education and outreach efforts (see **Section 2.1.2** for more details).

3.1.3 AGRICULTURE

In the Imperial River Basin, land uses in agricultural operations include citrus, field and row crops, fallow cropland, pastures (improved, unimproved, and woodland), ornamentals, specialty farms, and tree nurseries. According to 2004 land use data, these land uses comprise about 11,605 acres within the Imperial River Basin (**Table 9**).

TABLE 9: AGRICULTURAL ACREAGE, BMP ENROLLMENT, AND FUTURE ENROLLMENT GOALS FOR THE IMPERIAL RIVER BASIN

¹ FDACS staff-adjusted acreage for the purposes of enrollment is based on a review of more recent aerial imagery in the basin and local staff observations.
N/A – Not applicable

2004 SFWMD LAND USE	2004 ACRES	FDACS-ADJUSTED ACRES FOR ENROLLMENT ¹	RELATED FDACS' BMP PROGRAMS	ACREAGE ENROLLED	RELATED NOIs
Pasture	5,076.5	3,245.9	Cow/Calf, Future (Hay)	0.0	0
Row/Field/Mixed Crops	5,098.8	2,535.3	Vegetable/Agronomic Crops	5,777.3	6
Fallow Cropland	319.4	N/A	N/A	N/A	N/A
Citrus	944.0	717.8	Ridge Citrus, Flatwoods Citrus	756.1	2
Tree Nurseries	68.5	23.3	Future Nursery, Specialty Fruit and Nut	0.0	0
Ornamentals	67.7	51.7	Container Nursery	73.5	5
Specialty Farms	29.7	12.1	Conservation Plan Rule	N/A	N/A
TOTAL	11,604.6	6,586.2	N/A	6,606.9	13

When assessing the portion of the enrolled acreage associated with these agricultural land uses, a total of 4,399.3 acres was enrolled as of December 2014 (**Table 10** and **Figure 9**). The BMPs implemented on this acreage result in estimated reductions of 10,837 lbs/yr of TN.

Not all of the acreage listed as agriculture is included in enrollment calculations, because the NOIs document the estimated total number of acres on which applicable BMPs are implemented, not the land use acreage mapped as agriculture. Land use data can contain nonproduction acres (such as buildings, parking lots, and fallow acres) that are not used in BMAP reduction calculations. There also may be acreage that is not appropriate for enrollment in OAWP BMPs, such as lands not in commercial production.

TABLE 10: SUMMARY OF AGRICULTURAL ENROLLMENT IN THE IMPERIAL RIVER BASIN

CATEGORY	ACRES
Total 2004 Acres	11,605
Enrolled Acres Used for TN Reduction Estimates	4,399
Estimated TN Reduction (lbs/yr)	10,837
Remaining Acres To Enroll	7,206

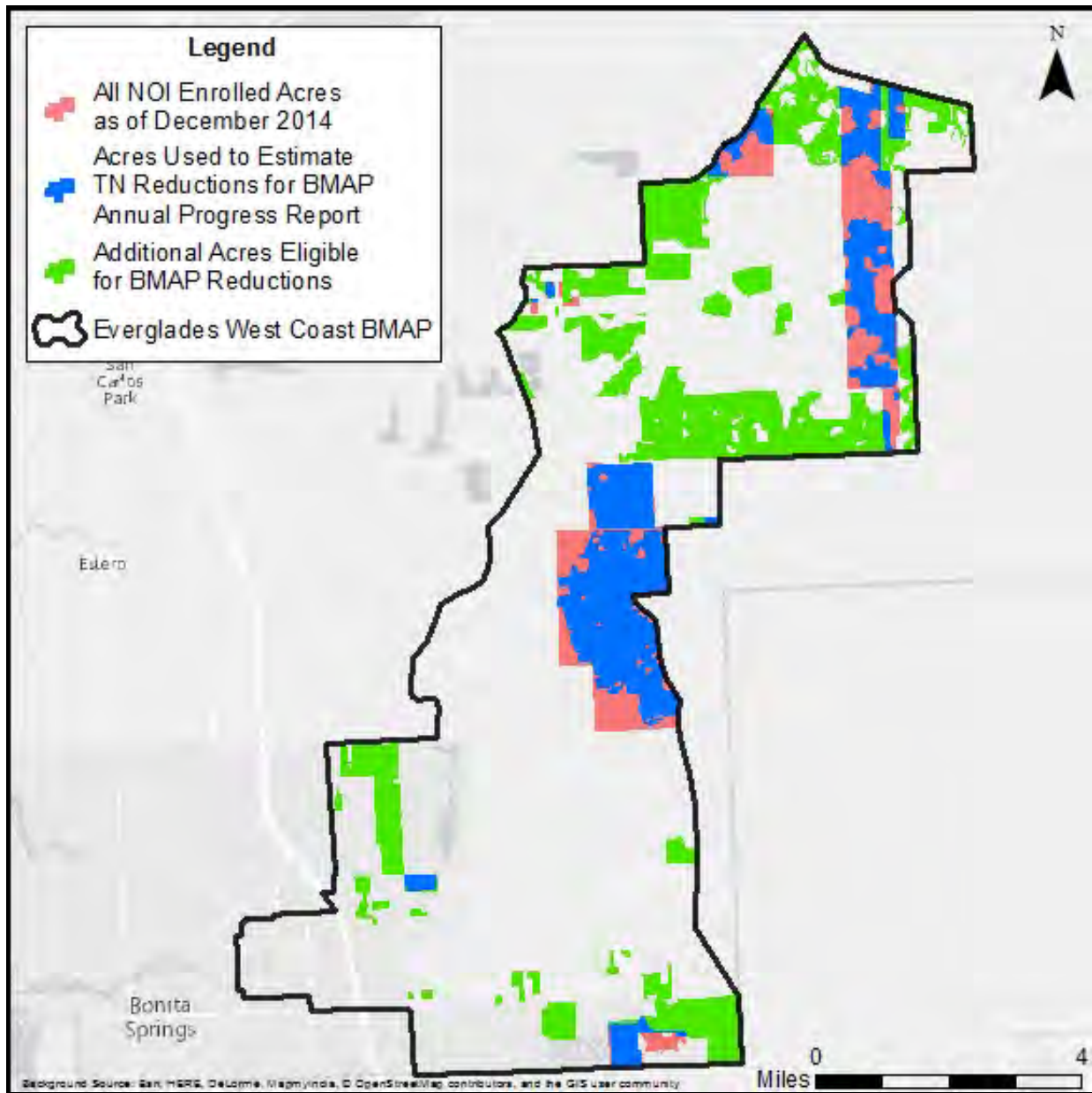


FIGURE 9: FDACS' BMP PROGRAM ENROLLMENTS FOR THE IMPERIAL RIVER BASIN AS OF DECEMBER 2014

3.2 SUMMARY OF LOAD REDUCTIONS IN THE IMPERIAL RIVER BASIN

Table 11 summarizes the projects completed in the Imperial River Basin during the second annual BMAP reporting period. These projects reduced TN by an estimated 10,945 lbs/yr. The reductions are in addition to those projects given credit before BMAP adoption. Therefore, the total reductions to date are 14,478 lbs/yr of TN, or 24% of the reductions needed to meet the TMDL.

TABLE 11: SUMMARY OF PROJECTS COMPLETED IN THE REPORTING PERIOD (DECEMBER 1, 2013–NOVEMBER 30, 2014) IN THE IMPERIAL RIVER BASIN

N/A – Not applicable

ENTITY	PROJECT NUMBER	PROJECT NAME	TN REDUCTION (LBS/YR)
Lee County	LC-3	Street Sweeping – Additional Reductions	108
Agriculture	N/A	Agricultural BMPs	10,837
TOTAL	N/A	TOTAL REDUCTIONS IN REPORTING PERIOD	10,945

Figure 10 shows progress towards the TN TMDL load reductions. The first bar shows the starting load for urban and agricultural stormwater runoff. The second bar shows the current estimated loading based on those projects shown as completed in the BMAP, those completed as part of the 2013 Progress Report, and those listed above. The third bar shows the total allocation for stormwater runoff to meet the TMDL.

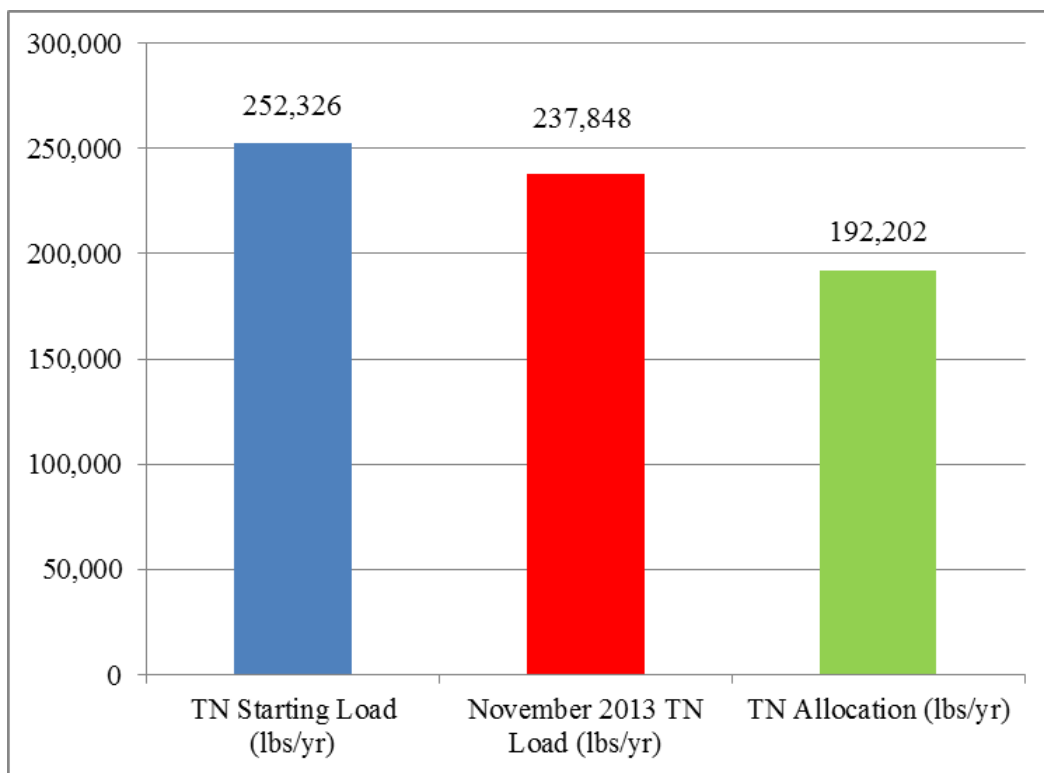


FIGURE 10: PROGRESS TOWARDS THE IMPERIAL RIVER TN TMDL THROUGH NOVEMBER 30, 2014

Section 4: WATER QUALITY MONITORING

The Everglades West Coast BMAP monitoring plan was designed to enhance the understanding of basin loads, identify areas with high nutrient concentrations, and track water quality trends. The information gathered through the monitoring plan will measure progress towards achieving the TMDL and provide a better understanding of watershed loading. All responsible stakeholders participated in the monitoring plan in the second year of BMAP implementation. In addition, Lee County, Catalina at Winkler Preserve CDD, the city of Bonita Springs, and FDOT District 1 are regulated under Phase I municipal separate storm sewer system (MS4) permits, for which they submit monitoring data and analyses to the Department annually. A few highlights of the BMAP monitoring efforts are described below.

4.1 HENDRY CREEK WATER QUALITY MONITORING

Lee County continued monitoring at 14 water quality stations in the basin, and these data are uploaded to the Florida Storage and Retrieval (STORET) database. In addition, at four of these stations, the Department's South District collected data quarterly.

4.2 IMPERIAL RIVER WATER QUALITY MONITORING

Lee County continued monitoring at five water quality stations in the basin, and these data are uploaded to the STORET database. The city of Bonita Springs continued monitoring at seven water quality stations in the basin, and these data are uploaded to STORET.

4.3 GROUND WATER NUTRIENT STUDY

A study is under way to help understand the sources of nitrogen in the basin, including ground water contribution and source identification. A network of 30 shallow water wells has been established throughout four basins, two of which are within the Everglades West Coast BMAP area (see **Figure 11** and **Figure 12**). Quarterly sampling for the parameters listed below is planned for a two-year period. To date, data from three quarters have been collected. The parameters included in this study are as follows:

- Boron.
- Chloride.
- Ammonia.
- Nitrite and Nitrate.
- Potassium.
- Total Kjeldahl Nitrogen.
- Sucralose.
- Total Phosphorus.
- Depth to Water.
- pH.
- Temperature.
- Specific Conductance.
- Dissolved Oxygen.
- Turbidity.
- Oxidation Reduction Potential.

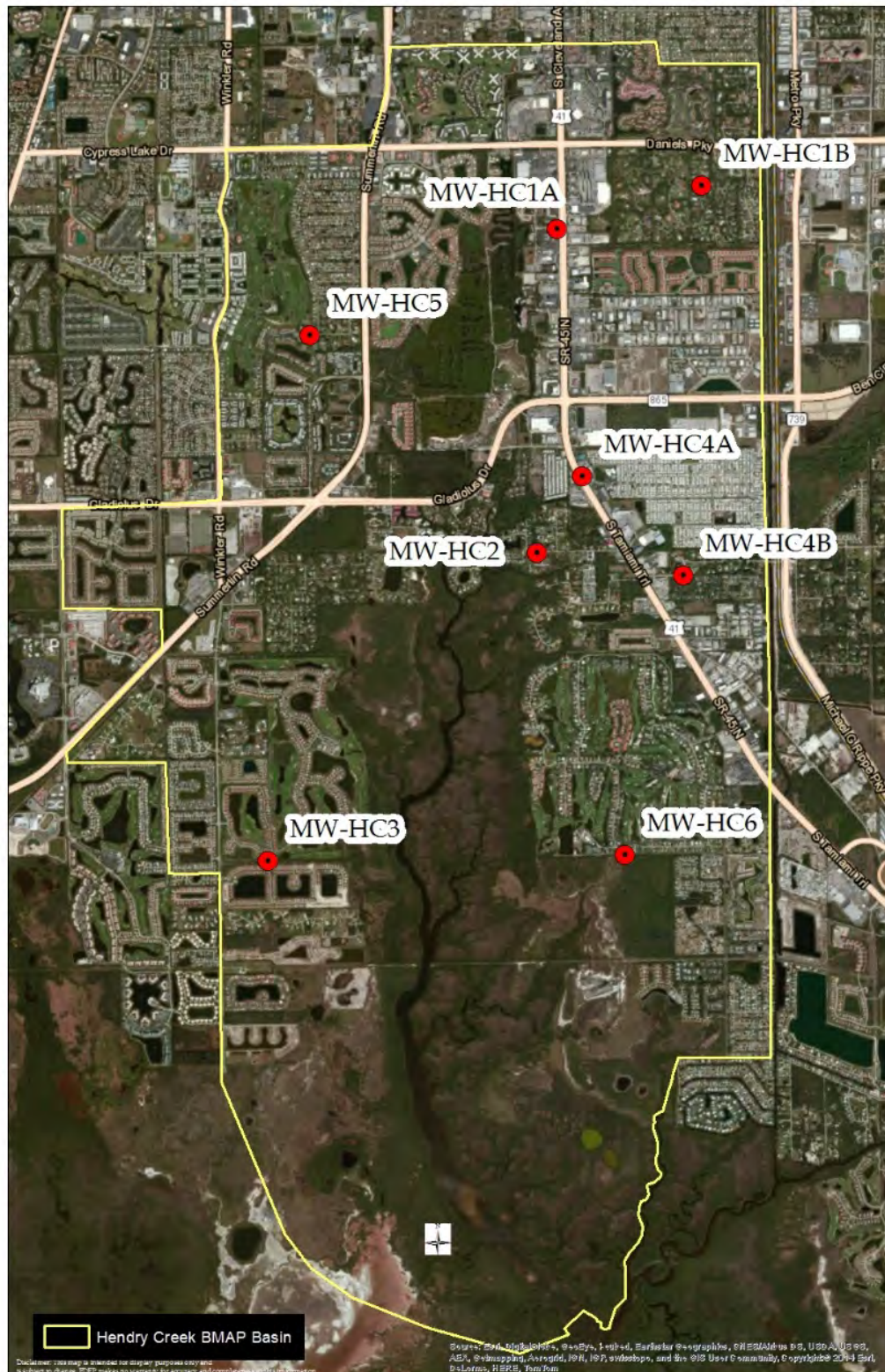


FIGURE 11: GROUND WATER NUTRIENT STUDY WELL NETWORK FOR THE HENDRY CREEK BASIN

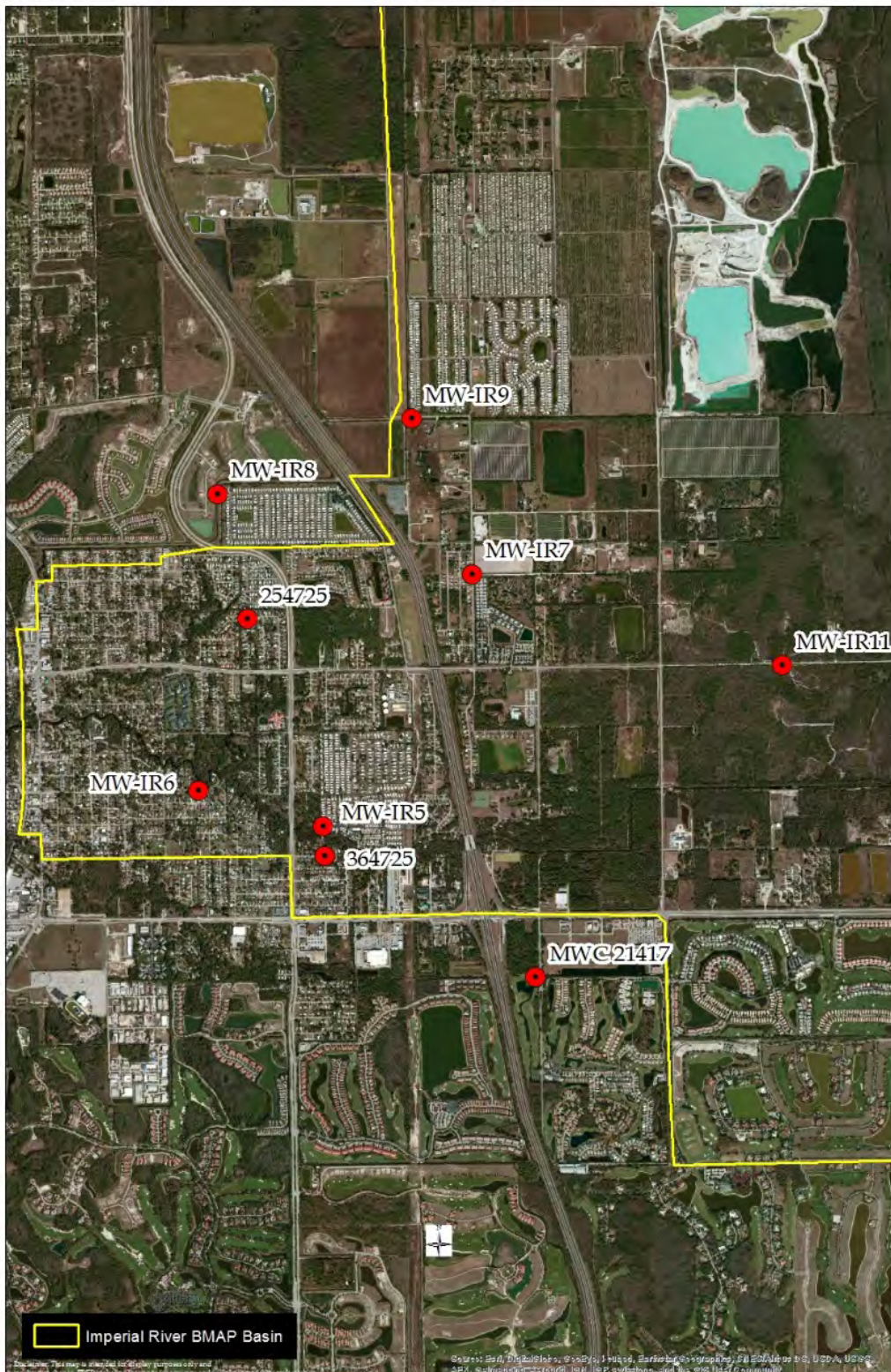


FIGURE 12: GROUND WATER NUTRIENT STUDY WELL NETWORK FOR THE IMPERIAL RIVER BASIN

APPENDIX A: BMAP PROJECTS

The BMAP project tables in this appendix show the implementation status of the BMAP projects as of November 30, 2014. The tables provide information on the nutrient reduction attributed to each individual project in lbs/yr. These projects were submitted to provide reasonable assurance to the Department that each entity has a plan on how to meet its allocation; however, this list of projects is meant to be flexible enough to allow for changes that may occur over time, provided that the reduction is still met within the specified period.

TABLE A-1: LEE COUNTY PROJECTS IN THE HENDRY CREEK BASIN

N/A – Not applicable

PROJECT NUMBER	PROJECT NAME	TYPE OF BMP	ACRES TREATED	ESTIMATED COST	STATUS	PROJECT TN REDUCTION (LBS/YR)
LC-1	Lakes Park Water Quality Restoration	Hydraulic Restoration	1,749	\$3,500,000	Completed	4,533
LC-2	Street Sweeping	Street Sweeping	10,166	N/A	Ongoing	76
LC-3	Education/Fertilizer Ordinance	Ordinances	10,166	N/A	Completed	1,980
LC-4	Island Park Filter Marsh	Hydraulic Restoration	N/A	\$925,000	Completed	Unknown

TOTAL TN REDUCTION = 6,589 LBS/YR

TABLE A-2: FDOT PROJECTS IN THE HENDRY CREEK BASIN

N/A – Not applicable

¹ Projects were listed but had unproved credit.

PROJECT NUMBER	PROJECT NAME	TYPE OF BMP	ACRES TREATED	ESTIMATED COST	STATUS	PROJECT TN REDUCTION (LBS/YR)
HC-FDOT-1	Wet Detention Ponds (1, 2, and 3)	Wet Detention	89	N/A	Completed	105
HC-FDOT-2	Roadside Swales	Swale with Ditch Blocks	N/A	N/A	Completed	N/A
HC-FDOT-3	Street Sweeping	Sweeping	89	N/A	Ongoing	89
HC-FDOT-4	Education/Fertilizer Ordinance	Ordinances	89	N/A	Completed	3

TOTAL TN REDUCTION = 197 LBS/YR

TABLE A-3: FDACS' NOI ENROLLMENT REDUCTION ESTIMATES IN THE HENDRY CREEK BASIN AS OF SEPTEMBER 2014

N/A – Not applicable

2004 SFWMD LAND USE	ACREAGE	TN LOAD DELIVERED (LBS/YR)	TN REDUCTION ESTIMATE (%)	TN REDUCTION (LBS/YR)
Ornamentals	10	101	25%	25
Row Crops	17	175	30%	53
TOTAL	27	276	N/A	78

TABLE A-4: LEE COUNTY PROJECTS IN THE IMPERIAL RIVER BASIN

N/A – Not applicable

PROJECT NUMBER	PROJECT NAME	TYPE OF BMP	ACRES TREATED	ESTIMATED COST	STATUS	PROJECT TN REDUCTION (LBS/YR)
LC-1	CREW	Conservation Purchase	15	N/A	Completed	0
LC-2	Pine Lake Preserve	Conservation Purchase	129	N/A	Completed	1
LC-3	Street Sweeping	Street Sweeping	26,113	N/A	Ongoing	115
LC-4	Imperial Marsh	Conservation Purchase	477	N/A	Completed	1,440
LC-5	Education/Fertilizer Ordinance	Ordinances	26,113	N/A	Completed	6

TOTAL TN REDUCTION = 1,562 LBS/YR

TABLE A-5: BONITA SPRINGS PROJECTS IN THE IMPERIAL RIVER BASIN

N/A – Not applicable

PROJECT NUMBER	PROJECT NAME	TYPE OF BMP	ACRES TREATED	ESTIMATED COST	STATUS	PROJECT TN REDUCTION (LBS/YR)
BS-1	Education/Fertilizer Ordinance	Ordinances	7,154	N/A	Completed	696
BS-2	FYN Program	Ordinances	7,154	N/A	Ongoing	835
BS-3	Old 41 Catch Basin Inserts	Catch Basin Inserts	21	N/A	Completed	5
BS-4	Residential Dry Detention	Dry Detention	4	N/A	Completed	1
BS-5	Morton Avenue Swales	Swale with Raised Inlet	26	N/A	Completed	212
BS-6	Marni Fields	Dry Detention	16	N/A	Completed	6
BS-7	Felts Avenue Stormwater Treatment	Dry Retention	31	N/A	Completed	258
BS-8	Street Sweeping	Street Sweeping	7,154	N/A	Ongoing	45

TOTAL TN REDUCTION = 2,058 LBS/YR

TABLE A-6: FDOT PROJECTS IN THE IMPERIAL RIVER BASIN

N/A – Not applicable

PROJECT NUMBER	PROJECT NAME	TYPE OF BMP	ACRES TREATED	ESTIMATED COST	DEADLINE	PROJECT TN REDUCTION (LBS/YR)
IR-FDOT-1	Wet Detention Ponds (5d, 7C, and 9B)	Wet Detention	96	N/A	Completed	18
IR-FDOT-2	Roadside Swales	Swale with Ditch Blocks	N/A	N/A	Completed	N/A
IR-FDOT-3	Education/Fertilizer Ordinance	Ordinances	96	N/A	Completed	3

TOTAL TN REDUCTION = 21 LBS/YR

TABLE A-7: FDACS' NOI ENROLLMENT REDUCTION ESTIMATES IN THE IMPERIAL RIVER BASIN AS OF DECEMBER 2014

N/A – Not applicable

2004 SFWMD LAND USE	ACREAGE	TN LOAD DELIVERED (LBS/YR)	TN REDUCTION ESTIMATE (%)	TN REDUCTION (LBS/YR)
Citrus	587	6,074	10%	607
Field Crops	40	412	15%	62
Improved Pasture	954	9,870	17%	1,678
Ornamentals	26	265	25%	66
Row Crops	2,663	27,562	30%	8,268
Tree Nurseries	18	185	25%	46
Unimproved Pasture	85	884	11%	97
Woodland Pasture	27	281	4%	11
TOTAL	4,399	45,532	N/A	10,837