



BUCKHEAD RIDGE MOSQUITO CONTROL DISTRICT REVIEW FINAL REPORT

September 2023

**Prepared for
The Florida Legislature**

**Prepared by
The Balmoral Group
165 Lincoln Avenue
Winter Park, FL 32789**

Executive Summary

Buckhead Ridge Mosquito Control District (Buckhead Ridge MCD) provides service to the community of Buckhead Ridge, an area of 781 acres or approximately 1.2 square miles of Glades County. The population of Buckhead Ridge was estimated to be at about 1,500 people in 2020 with around 1,400 households. The boundaries of Buckhead Ridge MCD are located in close proximity to the shores of Lake Okeechobee, with the management of 13 miles of waterways throughout the community being a significant operational element. The operations of Buckhead Ridge MCD are divided between the management of aquatic plants in the waterways of the community and the mitigation of mosquito populations, in accordance with its unique mission. The district's millage has been capped at 1.0 mil since 1977, but can be raised with a majority vote up to 10 mil.

Revenues are stable at around \$100,000 annually since the millage is capped, the service area is fully developed, and Buckhead Ridge MCD operates on a small scale, appropriate to its service area and mission. State funding comprises about \$20,000 of total revenues, along with occasional small grants (under \$5,000). The majority of expenses relate to chemical costs, personnel, and capital outlay due to replacing older equipment. Buckhead Ridge MCD employs four staff, all part-time, and three commissioners. Buckhead Ridge MCD operates out of a former volunteer fire department facility, and conducts meetings with the homeowner's association monthly meetings to increase community participation and transparency. The level of communication and awareness with local residents is high and new commissioners were recently elected. Barriers to more effective operations include financial constraints and canal maintenance obligations; fulfillment of ongoing canal maintenance consumes virtually the entire budget.

The Balmoral Group worked in consultation with a mosquito control expert in the course of this review and found that Buckhead Ridge MCD delivers several services focusing predominantly on aquatic vegetation management to control larval habitat. Funding challenges affect its ability to continue to deliver services in the most effective and efficient manner. There are no alternative providers of equivalent services in the district's service area. The district has demonstrated effective resource management but expenditures sometimes exceed revenues. The district receives a small amount of state funding annually, has successfully pursued small grants, and at times has relied on reserves to cover excess expenses. Its millage cap limits revenue increases while the district's costs continue to increase. The district does not have formally defined clear and measurable goals and objectives and lacks performance measures and standards; similar to other MCDs, the district monitors performance using disease prevalence metrics and has kept arbovirus case counts at zero for the current and past three fiscal years.

SCOPE

Section 189.0695, *Florida Statutes*, requires the conduct of performance reviews of Independent Mosquito Control Districts. The Balmoral Group was selected by the Office of Program Policy Analysis and Government Accountability to perform the review, which evaluates the district's programs, activities, and functions, including

- evaluating the district board's primary function and governance;
- assessing service delivery and comparing similar services provided by municipal or county governments located within the district's boundaries;
- describing district purpose, goals, objectives, performance measures, and performance standards and evaluating the extent to which they are achieved;
- analyzing resources, revenues, and costs of programs and activities; and
- providing recommendations for statutory or budgetary changes to improve the special district's program operations, reduce costs, or reduce duplication.

Based on its review, The Balmoral Group presents the following recommendations for improving mosquito control services in the Buckhead Ridge MCD:

- The district could continue to expand the use of larvicide treatments in the district.
- The district could pursue full ownership of canal properties and pursue additional grant funding for canal maintenance.
- Glades County could consider removing the millage rate cap for Buckhead Ridge MCD to allow the district to increase its revenues, but this would require a resolution by Glades County and voter approval.
- The district could formalize its goals, objectives, and performance measures and standards through a strategic planning process to consistently monitor and maintain performance information over time; the district could seek guidance from other districts that have conducted strategic planning processes.
- The Legislature could consider amending s. 388.46, *Florida Statutes*, to direct the Florida Coordinating Council on Mosquito Control to form a subcommittee consisting of mosquito professionals and researchers from around the state to develop model goals, objectives, and performance measures and standards to assist MCDs with performance monitoring.

Table of Contents

Executive Summary	i
1. Background	1
District Description	1
History and Composition	4
Intergovernmental Interactions	6
Resources for Fiscal Year 2021-22	6
2. Findings	6
Service Delivery	6
Resource Management.....	9
Goals, Objectives, and Performance Measures and Standards.....	16
3. Recommendations	19
4. District Response	22

List of Figures

Figure 1. Buckhead Ridge MCD Map	1
Figure 2. Glades County Population Projection.....	2
Figure 3. Buckhead Ridge MCD Organizational Chart	12

List of Tables

Table 1. Millage Rates and Total Taxable Value of Properties Subject to Buckhead Ridge MCD Millage	3
Table 2. Real Property Parcels Subject to Buckhead Ridge MCD Millage	4
Table 3. Tangible Personal Property Accounts Subject to District Millage	4
Table 4. Buckhead Ridge MCD Commissioner Meeting Counts.....	5
Table 5. Buckhead Ridge MCD Resources for FY 2021-22.....	6
Table 6. Buckhead Ridge MCD Services Overview	8
Table 7. Revenue and Expenditures	10
Table 8. Administrative Costs	11
Table 9. Direct Program Costs	11
Table 10. Summary of Contracted Services.....	12
Table 11. Buckhead Ridge MCD Staff Positions.....	12
Table 12. Buckhead Ridge MCD Staff Counts	13
Table 13. District Vehicles, Equipment, and Facilities.....	14
Table 14. Surveillance Equipment	14
Table 15. Performance Measures for Buckhead Ridge MCD	18
Table 16. Assessment of Performance Measures and Standards for Buckhead Ridge MCD.....	19
Table 17. Recommendations with Associated Considerations	21



1. Background

District Description

District Purpose

According to district representatives, the purpose of Buckhead Ridge MCD, as established in 1977, is to keep canals navigable and nuisance free for the residents of the largest boating district in Glades County, maintain drainage conduits into the canals, maintain the horticulture in the area, and strive to keep mosquito populations and other noxious insects low to avoid disease transmission. Unlike other independent mosquito control districts, the maintenance of navigable canals comprises the majority of Buckhead Ridge MCD’s operational effort.

Service Area

Buckhead Ridge Mosquito Control District (Buckhead Ridge MCD) provides service to the census-designated place of Buckhead Ridge, an area of 781 acres or approximately 1.2 square miles of Glades County. The very small community is a development immediately adjacent to a Lake Okeechobee lock; virtually all homes are located directly on a canal that ultimately connects to the waterway accessing Lake Okeechobee via the South Florida Water Management District (SFWMD) structure.

Buckhead Ridge MCD’s headquarters is located at 30082 East State Road 78, Suite B Okeechobee, Florida 34974 in a former fire department office. **Figure 1** shows a map of the district boundary, with the county boundary, and Buckhead Ridge MCD headquarters marked.

Figure 1. Buckhead Ridge MCD Map



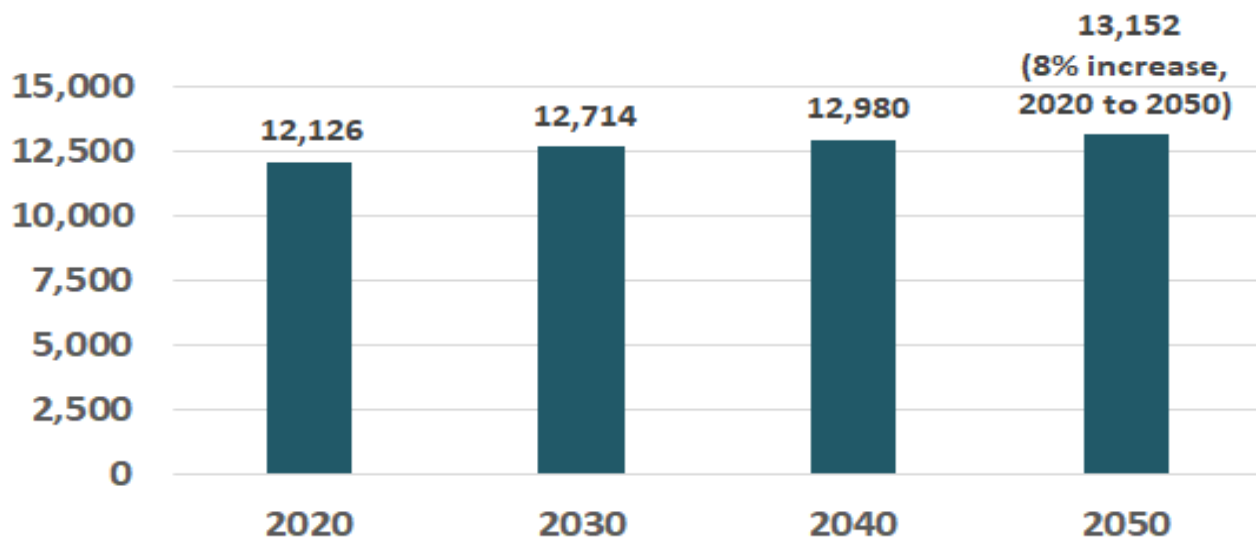
Source: The Balmoral Group (TBG) Work Product, ESRI, US Census, MCD.

Population

Buckhead Ridge’s population was estimated at 1,521 persons in 2020 according to the U.S. Census.¹ Buckhead Ridge is in an extremely rural area, with the nearest city of Okeechobee (5,250 people) over 10 miles away.

Buckhead Ridge is located in Glades County. The county population was estimated at 12,454 persons in 2022, according to the latest available U.S. Census data.² The Florida Legislature’s Office of Economic and Demographic Research (EDR) projects that Glades County’s population will increase by 8% through 2050 to 13,152 residents.³ It should be noted that while the population of Glades County is expected to grow by 8%, this same rate of growth may not be reflected in Buckhead Ridge MCD given limited space for expansion and growth. **Figure 2** shows Glades County’s projected population estimates calculated by EDR.

Figure 2. Glades County Population Projection



Source: TBG Work Product, EDR.

District Characteristics

The Community of Buckhead Ridge is located on the northwest shore of Lake Okeechobee in a relatively remote part of Glades County. As noted, the very small development of roughly 1,400 homes is dominated by retirees, who are mostly from out-of-state, and rental houses that are made available to the fishing tournament visitors that frequent the area. The community is immediately adjacent to a Lake Okeechobee lock structure maintained by the SFWMD. Single family homes in the area are modest, with many manufactured homes. Virtually all homes are canal front, and the extensive canal network, 13 miles total, connects to Lake Okeechobee via the lock structure. There is no discernable business district in Buckhead Ridge; transactions with businesses require transit to at least the City of Okeechobee, about a twenty-minute drive away. Most commercial operations within the community cater to charter fishing and boating activity.

¹ Block-level data compiled from [Decennial Census P.L. 94-171 Redistricting Data Summary Files](#) and matched to the MCD boundary in GIS.

² Population Estimates, July 1, 2022, retrieved from [U.S. Census Bureau QuickFacts: United States](#).

³ Based on 2021 Estimates, Population: 1970-2050, County projections retrieved from [Population and Demographic Data - Florida Products \(state.fl.us\)](#).

Buckhead Ridge MCD is unique in that canal maintenance comprises the bulk of its activity. The canals are owned by private landowners, and Buckhead Ridge MCD has been in negotiations to acquire ownership of the canals to allow it to pursue grant funds for maintenance. Prior to 1999, SFWMD maintained the canals. In 1999, SFWMD notified Buckhead Ridge MCD via letter that it would no longer maintain the canals and Buckhead Ridge MCD would need to do so. Given the charge to maintain navigability of the canals, the district’s board sets a schedule monthly of how many days that month that the crew can navigate the canals via boat, spraying the sides of the canal to manage vegetation, based on the budgeted capacity. The goal is to treat all 13 miles of canal frontage every month.

The Executive Director was experiencing major surgery and recovery during the review, The Balmoral Group (TBG) met with board members, reviewed files and documents onsite, and toured the facility and neighborhood with commissioners using a Buckhead Ridge MCD golf cart.

The district’s millage is capped and set at 1.0, a rate that has remained the same for at least the past 40 years but can be raised with a majority vote up to 10 mil. Due to the relatively low value of taxable property in the district, revenues are also low, which constrains daily operations. As a very small operation, Buckhead Ridge MCD’s commissioners often carry out operational tasks and generally pitch in to support operations on a daily basis.

In 2022, the average temperature of Buckhead Ridge was 79 degrees Fahrenheit, and it received about 70 inches of rain. Meteorology is the primary driving force for producing mosquitoes with heavy rainfall events being the most important. Humans are also a major contributor to the problem with waste containers, tires, and other vessels that collect water being prime producers of mosquito species that are capable of transmitting several arboviruses. The characteristics of the canals, rainfall, and human activities create an environment conducive to extensive mosquito habitats and therefore require constant mosquito control.

Real Property Data

Buckhead Ridge MCD receives ad valorem taxes to fund district operations. The total taxable value of properties within Buckhead Ridge MCD was \$105 million in the most recent fiscal year under a millage rate of 1.0 (Table 1). The number of real property parcels subject to district millage decreased to 1,434 parcels over the last four years (Table 2). However, the taxable value of real property parcels increased 29% in Fiscal Year (FY) 2022-23 compared to FY 2019-20, following changes in property values.

Table 1. Millage Rates and Total Taxable Value of Properties Subject to Buckhead Ridge MCD Millage

Buckhead Ridge MCD	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23
Millage Rate	1.0	1.0	1.0	1.0
Taxable Value of Parcels (\$Mil.)	\$73	\$76	\$81	\$94
Taxable Value of Accounts (\$Mil.)	\$9	\$12	\$11	\$11
Taxable Value of Centrally Assessed Property (\$Mil.)¹	\$0	\$0	\$0	\$0
Total Taxable Value (\$Mil.)	\$82	\$88	\$92	\$105

Source: Florida Department of Revenue (FDOR).
¹ Centrally assessed property includes railroad and private carline company assessments as defined in Rule 12D-2.011, F.A.C. There were none in Buckhead Ridge MCD.



Table 2. Real Property Parcels Subject to Buckhead Ridge MCD Millage

Buckhead Ridge MCD	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23
Just Value of Parcels (\$Mil.)	\$111	\$115	\$127	\$169
Real Property Parcels Subject to Millage	1,448	1,440	1,434	1,434
Taxable Value of Parcels (\$Mil.)	\$73	\$76	\$81	\$94

Source: FDOR.

Tangible Personal Property Data

In addition to real property, tangible personal property accounts subject to district millage total 100 accounts in FY 2022-23, down 12% since FY 2019-20 (Table 3). However, taxable value of tangible personal property accounts increased in FY 2022-23 by over 22% compared to 2019-20 due to higher asset values.

Table 3. Tangible Personal Property Accounts Subject to District Millage

Buckhead Ridge MCD	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23
Just Value of Accounts (\$Mil.)	\$10	\$13	\$12	\$12
Tangible Personal Property Accounts Subject to Millage	114	111	102	100
Taxable Value of Accounts (\$Mil.)	\$9	\$12	\$11	\$11

Source: FDOR.

History and Composition

According to information provided by the district, the Glades County Board of County Commissioners adopted Resolution 76-23 on September 13, 1976 to publicly notice a proposed ordinance establishing the Buckhead Ridge Municipal Taxing and Benefit Unit. On October 25, 1976, the same board approved the submission of a new petition requesting the board to place the creation of a taxing district for mosquito control and horticultural control of the Buckhead Ridge internal canals to a referendum vote along with a one-mill cap, to be changed only by another referendum. The stated purpose of the proposed taxing district would be to provide the following services within said district or unit:

To maintain canals as navigable channels from Buckhead Ridge to Lake Okeechobee; including all canals within said unit. To maintain drainage conduits into the canals. To maintain horticultural maintenance of all dedicated public lands. To control mosquitoes and other noxious insects and to clean up unsightly or other growth in public or private places, which are likely to harbor or become breeding places for mosquitoes or other noxious insects, and to assess the costs therefore against said property, and to render such other services as are incidental, proper or supplemental thereto....”

On May 24, 1976, the Glades County Board of County Commissioners accepted the recommendation of the Supervisor of Elections to place the creating of a MCD on the ballot for the September 28, 1976, Second Primary. Resolution 77-1 established the District on January 10, 1977, and included the following language:

...notwithstanding the provisions of Section 388.221 of the Florida Statutes, the Board of Commissioners of such District should not levy upon the real and personal property in said district a special tax in excess of one mill on the dollar unless such additional limit not exceeding ten mills

should be authorized by a majority vote of the registered electors of said district in a referendum election.

On March 14, 1977, the Glades County Board of County Commissioners recognized the new Buckhead Ridge MCD based on a vote of 147 years out of 216 total votes, and certified the board members of the newly established district.

Note, the EDR notes Resolution 97-9 as part of the district enabling authority also. TBG reviewed Resolution 97-9, produced by the Glades County Clerk of Courts. Resolution 97-9 relates to recognizing national library week and is unrelated in any way to the district. No members of the district’s board or staff were familiar with a purported amendment in 1997.

As an independent special district, Buckhead Ridge MCD is subject to Chapter 189, *Florida Statutes*. The district is also subject to Chapter 388, *Florida Statutes*, setting forth the requirements for creating and operating MCDs in this state; and Chapter 5E-13, *Florida Administrative Code*, setting forth rules adopted by the Florida Department of Agriculture and Consumer Services (DACs) for mosquito control program administration.

Pursuant to Chapter 388, *Florida Statutes*, the powers and duties of the board of commissioners include:

- Performing all duties necessary for the control and elimination of mosquitoes and other arthropods of public health importance.
- Being authorized to provide for the construction of canals, ditches, drains, dikes, fills, and other necessary works, and to install and maintain pumps, excavators, and other machinery and equipment.
- Preparing and adopting a district budget.
- Being authorized to hold, control, and acquire by gift or purchase for district use any real or personal property.
- Having all the powers of a body corporate, including the power to contract and to employ a director, employees, and others.

Pursuant to s. 388.101, *Florida Statutes*, Buckhead Ridge MCD is governed by an elected board of three commissioners who serve four-year terms. Currently, all three seats are filled.

As required by s. 388.151, *Florida Statutes*, Buckhead Ridge MCD holds publicly noticed regular monthly meetings each year, as well as two special meetings to update the annual budget for the next fiscal year (**Table 4**). Board of commissioner meetings are open to the public. Minutes and agendas are maintained in the Buckhead Ridge MCD office and available for viewing by the public. The current commissioners were recently elected and have set new goals for the district as discussed later in the report. Board meeting minutes were reviewed and reflect monthly noticed meetings generally attended by all three elected commissioners.

Table 4. Buckhead Ridge MCD Commissioner Meeting Counts

Commissioner Meetings	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23 ¹
Monthly Meetings	12	12	12	3
Special Meetings	2	2	2	0

Source: TBG Work Product, Buckhead Ridge MCD.

¹YTD 2022-23 through December 2022.



Intergovernmental Interactions

Buckhead Ridge MCD has collaborated with nearby Moore Haven MCD during emergency situations, especially during hurricane season. Buckhead Ridge MCD also collaborates with the nearby Okeechobee Health Department since it is nearer to Okeechobee than the Glades County Health Department in Moore Haven. Buckhead Ridge MCD also informally coordinates with SFWMD given its proximity to SFWMD’s major structure and the need to navigate equipment in close proximity to SFWMD property on a routine basis.

Resources for Fiscal Year 2021-22

The published FY 2022-23 millage rate established by Buckhead Ridge MCD was 1.0 (Table 5). The district received \$109,113 in revenues and spent \$111,584 in FY 2021-22. Excess expenditures were covered by the district’s prior year fund balance. In addition to commissioners, Buckhead Ridge MCD had four paid staff in FY 2021-22. Operations were run out of a former volunteer fire department facility owned by the Community of Buckhead Ridge that has one office and one warehouse.

Table 5. Buckhead Ridge MCD Resources for FY 2021-22

Resource Item	FY 2021-22 Amount
Millage Rate	1.0
FY 2021-22 Revenues	\$109,113
FY 2021-22 Expenditures	\$111,584
Number of Paid Staff	7
Vehicles	2 trucks, 2 boats
Equipment	Field equipment: 9 Surveillance equipment: 8 traps
Facilities	1 Facility, 2 buildings

Source: TBG Work Product, MCD.

The district used grant funds obtained the subsequent year to address the expenses due to Hurricane Ian in FY 2021-22.

2. Findings

Service Delivery

Buckhead Ridge MCD delivers several services but efforts focus predominantly on aquatic vegetation management to control larval habitat; the district’s funding challenges affect its ability to continue to deliver services in the most effective and efficient manner; there are no alternative providers of similar services wholly or partially in the district’s service area.

Overview of Services

Most mosquito control programs use an Integrated Pest Management (IPM) approach to control mosquito populations, which targets the different stages of a mosquito's life cycle with various prevention and control measures. IPM addresses eight areas. Surveillance of mosquito populations is an essential component of all IPM programs with chemical treatments based on the surveillance findings. IPM can also include source reduction (e.g., container disposal, water/impoundment management), larviciding and adulticiding (using ground and/or aerial treatments), biological and alternative control, and disease surveillance. Research and education are also important components of IPM programs. See attachment titled, "Integrated Pest Management" for more information. Buckhead Ridge MCD's unique mission focuses on canal vegetation maintenance and mosquito control with activities conducted in five areas of IPM.

Buckhead Ridge MCD's mosquito surveillance activities include using mosquito traps and landing rate counts to determine the necessity for mosquito spraying operations. Inspections of mosquito traps occur three times a week year-round and more frequently during the summer wet season. Buckhead Ridge MCD also works with local health departments to monitor for any cases of mosquito-borne diseases, and spraying as needed when cases arise. Locals calling in to request service also serve as a point of surveillance for Buckhead Ridge MCD. The district monitors the phone line to check for service requests.

Buckhead Ridge MCD's source reduction activities include tire abatement activities. Tires collecting water create problematic mosquito-producing habitats that are difficult to manage through routine chemical applications but can be managed through proper disposal or modification. Buckhead Ridge MCD routinely picks up waste tires abandoned around the county as tires are prime larval habitats for mosquitoes. Buckhead Ridge MCD also drills holes in tires left in yards to reduce pooling water.

Buckhead Ridge MCD's larviciding activities include hand application of larvicide near homes. Since the subdivision is dense and virtually all properties back up to canals, manual application is required as other access is not feasible. Larvicide is a new treatment program for Buckhead Ridge MCD, which has occurred since the new board took office in 2021. Previously, Buckhead Ridge MCD relied strictly on adulticide. Broader use of larvicides may be an appropriate consideration for Buckhead Ridge MCD, given reports in years past of thousands of mosquitoes detected during trap inspections.

Buckhead Ridge MCD's adulticiding activities include spraying when traps show thresholds being reached. Buckhead Ridge MCD uses two spray trucks. The application is an Ultra-Low Volume (ULV) spray where small amounts of undiluted pesticide are dispersed by truck mounted equipment. Buckhead Ridge MCD also uniquely uses boat mounted ULV spray systems to service the canal banks locally in the district. Buckhead Ridge MCD contracts out aerial spraying on an as needed basis for treatment several times a year. For the past two years, no aerial spraying was conducted as the Board determined it was not cost-effective.

Buckhead Ridge MCD's outreach and education activities include workshops three to four times a year to advise the public on the problem of water-collecting containers producing mosquitoes. In addition, monthly MCD meetings are held immediately after the monthly homeowners' association meeting, which provides an additional opportunity to educate homeowners on container mosquitoes and the need to eliminate these larval habitats. The aquatic plant management work that Buckhead Ridge MCD conducts serves as a method of source reduction by removing larval habitats while also having the added benefit of keeping canals open and navigable to boaters.

A summary of the five areas of IPM in which the district conducts activities is set forth in (Table 6).

Table 6. Buckhead Ridge MCD Services Overview

Integrated Pest Management Service	Buckhead Ridge MCD Services Provided
Mosquito Surveillance	Three times weekly ground surveillance using trap collection and analysis
Source Reduction	Maintenance of vegetation along canals to reduce sites producing mosquitoes; routine waste tire disposal or modification (drilling holes in tires)
Larviciding	Hand application of larvicides in larval habitats in residential yards
Adulticiding	Delivery of ULV adulticide using spray trucks; aerial spraying by contract services on as-needed basis
Outreach and Education	Public workshops held 3-4 times a year; monthly meetings with the public

Source: TBG Work Product, Buckhead Ridge MCD.

Analysis of Delivery of Services

Buckhead Ridge MCD delivers services that are within the scope of its charter and purposes outlined in applicable laws and regulations; all district services are directed toward the mission of canal maintenance, horticultural maintenance, and control of mosquitoes. To assess the delivery of services in the district, TBG requested information on the geographic characteristics of the district; other local governments to which the district provides services or with which it coordinates efforts; the services provided by the district; similar services provided by other entities; district studies or evaluations of alternative service delivery methods including consolidation of services with other government entities; unique contributions from the district relative to the county or municipalities; and local stakeholder perceptions of the relative value of the district’s services. In addition, TBG requested information from representatives of the Board of County Commissioners, local health department, and local parks and recreation department on their perceptions of the district’s service delivery and efficiency.

Buckhead Ridge MCD is using effective approaches for mosquito control, and the extensive management of aquatic vegetation is the primary activity to which Buckhead Ridge MCD staff devote the majority of the district’s resources. While Buckhead Ridge MCD does not provide a large number of services as compared to other districts such as nearby Lee County MCD, this is to be expected given the very small service area (one square mile) and population (1,500 residents) that it serves. Buckhead Ridge MCD maintains certification and compliance records for chemical applications and is responsive to the public. While the operation is not sophisticated, the outcomes appear to be on par with its peers, and there have been zero human cases of arbovirus identified in Glades County in the past four fiscal years. It is notable that larviciding is a relatively new treatment regimen for Buckhead Ridge MCD. Broader use of larvicides may be an appropriate consideration for Buckhead Ridge MCD, given reports in years past of thousands of mosquitoes detected during trap inspections. Larvicide use, as part of an IPM program, should be considered for expanded use moving forward if it proves beneficial.

The district faces cost challenges to deliver services that are likely to increase in severity over time given continued cost increases for chemicals, fuel, and labor. Revenues have generally not kept up with increasing costs of canal maintenance and chemical costs for pest control. The current board has taken steps to initiate cost savings measures for future years, such as obtaining a mechanical harvester and increasing the use of larvicide to prevent

outbreaks. Board minutes show that operations have been constrained by insufficiently budgeted funds at times. The district would benefit from finding additional funding sources and/or partners to help with the extensive, ongoing task of aquatic vegetation management to control larval habitat.

The mosquito control expert retained by TBG for this review did not identify any alternative methods for providing the district's services that would reduce the district's costs or improve the district's performance beyond what has been described in this section.

Comparison to Other Services

Buckhead Ridge MCD operations compare favorably to other publicly-provided services; similar services are not provided by municipalities wholly or partially within the district or Glades County. Buckhead Ridge MCD plant management and mosquito control operations do not appear to be redundant or to overlap with other publicly provided services in the county.

TBG reviewed documents available online to establish if services could be or are redundant to or overlapping with county and municipal government services. Buckhead Ridge MCD operations are confined to its very small service area. Commissioners reported that in the past county services have taken years to complete simple requests like sidewalk repairs and would be unlikely to maintain the level of service that Buckhead Ridge MCD provides if the county were to assume any of its responsibilities. Glades County Department of Health reported that Moore Haven MCD, which is also located within Glades County, provides similar services; however, Moore Haven MCD's operations do not overlap with those of Buckhead Ridge MCD and the two districts' services cannot be consolidated efficiently because of the geographical distance between the districts and the lack of similarity in services needed due to differences in development patterns and the strong canal maintenance expertise and equipment requirements for Buckhead Ridge that are not the priority for Moore Haven. Buckhead Ridge MCD's extensive canal network is unique and requires dedicated efforts to maintain.

Considerations for Consolidations

Consolidation of operations is not recommended for Buckhead Ridge MCD based on the findings of this review. TBG reviewed documentation from Buckhead Ridge MCD as well as surrounding areas. There are no services provided by other governmental entities within Glades County for which consolidation would improve efficiency or effectiveness. However, it was noted during interviews with Buckhead Ridge MCD staff that the Seminole tribe in Glades County may be starting its own district, which could potentially change circumstances and offer opportunities for collaboration in future.

Resource Management

Buckhead Ridge MCD has demonstrated effective resource management but expenditures meet or sometimes exceed revenues; the district's millage rate is capped and cannot be increased above the current rate of 1 mill.

To assess the district's resource management, TBG analyzed information on revenue sources, revenue, and expenditure trends and their possible causes; analyzed staffing trends and their possible causes; requested data on services delivered by district staff versus third-party contractors for the current and previous three fiscal years;

analyzed equipment inventory and capital investment trends; reviewed the activities the district conducts to manage costs and plan personnel; requested information on resident feedback survey data related to finances and spending by the district; reviewed performance reviews and audits; inspected facilities, service area, and operational equipment with staff; and interviewed district staff and board members.

Current and Historic Revenues and Expenditures

Revenues for Buckhead Ridge MCD have generally not kept up with increasing expenses, requiring very close management of operating costs. To review current and historic revenues and expenditures of Buckhead Ridge MCD, TBG requested and received financial information from Buckhead Ridge MCD for each year of the review period. In addition, TBG interviewed Buckhead Ridge MCD staff and reviewed documentation provided by the district, both onsite and in hard copy provided following the field visit.

Buckhead Ridge MCD’s revenues increased from \$95,489 in FY 2019-20 to \$109,113 in FY 2020-21, the vast majority of which came from ad valorem taxes. A relatively smaller share comes from other sources (**Table 7**). Buckhead Ridge MCD receives approximately \$15,000 to \$20,000 annually in state grants from DACS as additional support as a very small district. In addition, the district has applied for various grants to support purchase of a mechanical harvester and replacement of various equipment and vehicles over time. Buckhead Ridge MCD has also received federal funding in the past following disasters and is currently pursuing FEMA funds for canal clean-up following Hurricane Ian.

Buckhead Ridge MCD expenditures also increased during this time period, going from \$109,798 in FY 2019-20 to \$111,584 in FY 2021-22. Expenditures exceeded revenues by \$14,309 in FY 2019-20 and \$2,471 in FY 2021-22. For both of these fiscal years, grant funds were obtained in the subsequent year to cover/partially reimburse extraordinary expenses due to Hurricane Ian and the FY 2020-21 Zika outbreak.

Table 7. Revenue and Expenditures

Revenue and Expenditures	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23¹
Revenues	\$95,489	\$111,608	\$109,113	\$106,470
Ad Valorem	\$78,198	\$88,609	\$89,649	\$96,526
Other Sources	\$16,291	\$22,999	\$19,454	\$9,944
Expenditures	\$109,798	\$100,260	\$111,584	\$83,119
Personal Services	\$41,272	\$47,306	\$42,444	\$25,441
Operating Expenditures	\$46,223	\$44,106	\$35,184	\$47,090
Chemical and Gas	\$22,303	\$6,717	\$28,956	\$5,658
Capital Outlay	\$0	\$2,131	\$5,000	\$4,931

Source: TBG Work Product, and district annual audited financial statements. Numbers may not add up precisely due to rounding.

¹ 2023 YTD through May.

The revenues collected by Buckhead Ridge MCD are likely to be sustainable at their current levels given the recent trends in rising property values and the residential development that characterizes the service area. However, rising costs and the trend of expenditures exceeding revenues in two of the last three full fiscal years suggest that the district may need additional resources in the future. For example, Buckhead Ridge MCD staff reported that they are not able to spray as often needed due to funds that are prioritized for canal management taking money away from direct mosquito operations. In addition, commissioners reported rapidly increasing chemical costs,

consistent with reports from other districts. Because Buckhead Ridge MCD is relatively small compared to other districts, the district has little leverage to negotiate discounts or ability to store material in larger quantities than needed.

Administrative and Direct Program Costs

Financial data was provided via audits and DACS reports. Financial data were not available in a format that would allow administrative costs and direct program and activity costs to be determined for each district program and activity, nor were the data available in a format that would allow categories with amounts to be determined for administrative, direct program, and activity costs.

Buckhead Ridge MCD employs one bookkeeper/administrative position, part-time. Based on discussion with commissioners and management, and onsite observation, it is reasonable to assess that the compensation for the administrative role is the only administrative cost, given that all other costs incurred relate directly to implementation of program activities. Administrative costs ranged from 8 – 10% over the period reviewed. **Table 8** details administrative costs over the review period.

Table 8. Administrative Costs

Administrative Cost	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23 ¹
Personal Services - Admin	\$10,835	\$12,465	\$8,945	\$5,250

Source: TBG Work Product, and district annual audited financial statements. Numbers may not add up precisely due to rounding.

¹ 2023 YTD through May.

Of direct program costs, chemical costs have fluctuated the most, which is consistent with other districts. In FY 2020-21, Buckhead Ridge MCD applied for and received grant funds for Zika virus response-related costs, which offset some chemical costs. In addition, due to lower ability to spray during COVID, chemical costs were suppressed in FY 2020-21.

Based on the breakout of administration and remaining expenses considered direct program cost, costs have ranged from 78% - 114% of revenues. With continued cost increases and a capped millage, it is difficult for Buckhead Ridge MCD to sustain operations at their current levels. **Table 9** details direct program costs over the review period.

Table 9. Direct Program Costs

Direct Program Cost	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23 ¹
Personal Services - Direct	\$30,437	\$34,841	\$33,499	\$20,191
Operating Expenditures	\$46,223	\$44,106	\$35,184	\$47,090
Chemical and Gas	\$22,303	\$6,717	\$28,956	\$5,658
Capital Outlay	\$0	\$2,131	\$5,000	\$4,931
Total Direct Program Costs	\$98,963	\$87,795	\$102,639	\$77,870

Source: TBG Work Product, and district annual audited financial statements. Numbers may not add up precisely due to rounding.

¹ 2023 YTD through May.

Contracts for Services

Buckhead Ridge MCD contracts out for aerial spraying to maximize the usage of its revenues. TBG reviewed documentation provided by Buckhead Ridge MCD to determine what services were contracted rather than conducted in-house, as well as the costs for each.

Due to Buckhead Ridge MCD utilizing a ground and water fleet-based operational force, the district has no in-house capability for aerial mosquito control operations. As such, the district contracts with Clarke Mosquito Control for aerial spraying services occasionally when the need arises, usually around the holidays. Quotes have been received for aerial spraying in the past two years, but the cost was determined inefficient and unaffordable, and no spraying was conducted.

The total cost of contracted personnel from FY 2019-20 through FY 2021-22 was \$87,822 (**Table 10**).

Table 10. Summary of Contracted Services

	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23 ¹
Personal Services	\$26,872	\$32,906	\$28,044	Not received

Source: TBG Work Product, Buckhead Ridge MCD.

¹ 2023 YTD through April.

Staff

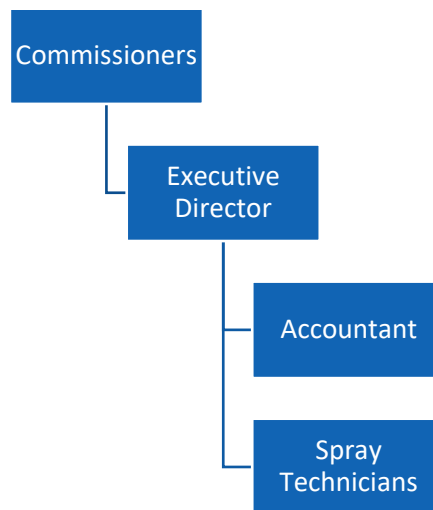
Buckhead Ridge MCD employs three commissioners and several part-time staff; the district is sufficiently staffed for a district of very small size and scale of operations. For the current and past three fiscal years, Buckhead Ridge MCD staff have consisted of seven part-time, paid staff members (three commissioners, an executive director, one accountant, and two spray technicians). Paid positions are outlined in **Table 11**. An organizational chart is provided in **Figure 3**, based on the structure observed onsite.

Table 11. Buckhead Ridge MCD Staff Positions

<ul style="list-style-type: none"> • Commissioners • Accountant 	<ul style="list-style-type: none"> • Executive Director • Spray Technicians
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Source: TBG Work Product, Buckhead Ridge MCD.

Figure 3. Buckhead Ridge MCD Organizational Chart



Source: TBG Work Product, Buckhead Ridge MCD.

Analysis of Program Staffing Levels

Buckhead Ridge MCD has had stable staffing levels for the current and past three fiscal years and appears to be appropriately staffed to meet its statutory mosquito control obligations. To assess program staffing levels, TBG reviewed documentation provided by Buckhead Ridge MCD, shadowed commissioners, observed spray technicians, and inspected site and facilities.

The program is adequately staffed for its levels of operations. The usage of part-time staff by Buckhead Ridge MCD provides for suitable personnel levels at the scale of its operations. Buckhead Ridge MCD employs an accountant, two spray technicians, and the executive director who serve as part-time personnel to minimize expenses by not hiring unneeded full-time employees with benefits. While a larger staff would allow better segregation of duties and formal internal controls, the board reviews every financial transaction, given the small volume of activity. As such, additional staff would be a cost that is not justified by the scale of operations. A display of staff counts of Buckhead Ridge MCD for the current and past three fiscal years is seen in **Table 12**. Turnover rates were not provided.

Table 12. Buckhead Ridge MCD Staff Counts

Employee Counts	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23 ¹
Commissioners	3	3	3	3
Full Time	0	0	0	0
Part Time	4	4	4	4
Contracted	0	0	0	0
Volunteers	0	0	0	0
Vacancies	0	0	0	0
Total	7	7	7	7

Source: TBG Work Product, Buckhead Ridge MCD.

¹ 2023 YTD through April.

Equipment and Facilities

Buckhead Ridge MCD equipment and facility counts have been stable during the current and past three fiscal years and have been sufficient to meet the district's historic needs but may not be sufficient for future needs.

To review equipment and facility trends, TBG analyzed documentation provided by Buckhead Ridge MCD, interviewed staff, and inspected equipment and facilities in person. The district has ongoing needs for more efficient aquatic vegetation management and has set a goal to purchase more efficient equipment, including a mechanical harvester. The district also has no generator, and during Hurricane Ian relied on external support to continue operations.

Buckhead Ridge MCD operates out of a former volunteer firefighter facility consisting of an office and a small warehouse. Buckhead Ridge MCD staff reported during interviews that the acquisition of a mechanical harvester for mosquito control operations as well as aquatic plant management is currently under negotiation with Glades County to be used and shared by both parties, and a grant request has been made to obtain one for Buckhead Ridge MCD's sole usage. Buckhead Ridge purchased an additional pontoon boat to supplement the airboat for canal servicing in FY 2021-22.

Buckhead Ridge MCD owns two pickup trucks, one airboat, and one pontoon boat in FY 2021-22 (**Table 13**).

Table 13. District Vehicles, Equipment, and Facilities

	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23 ¹
Vehicles	3	3	4	4
Airplanes	0	0	0	0
Helicopters	0	0	0	0
Boats	1	1	2	2
Trucks and Vans	2	2	2	2
Campers and Buses	0	0	0	0
ATVs and Utility Vehicles	0	0	0	0
Equipment	6	6	10	10
Field Equipment	6	6	9	9
Office Equipment			1	1
Facilities	1	1	1	1
Buildings	2	2	2	2

Source: TBG Work Product, Buckhead Ridge MCD.

¹2023 YTD through April.

Buckhead Ridge MCD also utilizes mosquito traps to determine spraying operations (**Table 14**). Buckhead Ridge MCD does not have a sentinel chicken program at this time. It should be noted that the current board took office in FY 2021-22, and some records for periods prior to that date have not been identified.

Table 14. Surveillance Equipment

Equipment	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23 ¹
Mosquito Traps	Not provided	Not provided	8	8
Sentinel Chicken Coops	0	0	0	0
Sentinel Chickens	0	0	0	0

Source: TBG Work Product, Buckhead Ridge MCD.

¹YTD 2022-23 through April.

Strategic or Other Formal Plans for the District's Future

Buckhead Ridge MCD does not have a strategic plan. Buckhead Ridge MCD Commissioners were recently elected, and the change in approach is evident in board meeting minutes. The newly elected commissioners have adopted a more forward-thinking and strategic approach, but formal strategic plans have not been adopted. The commissioners are open to input and would likely be receptive to suggestions for more formal strategic planning processes. Commissioners noted their goals to obtain more efficient equipment, improve security and accountability, and increase transparency relative to the prior set of commissioners.

TBG reviewed documentation provided by Buckhead Ridge MCD as well as conducted interviews with the district's commissioners and inspected equipment and facilities firsthand.

Buckhead Ridge MCD operates on an informal basis, spraying as needed based on trap counts and complaints by district residents. The primary plan for Buckhead Ridge MCD is to keep the canals navigable, free of excessive

plant life and mosquitoes for the benefit of the boaters and residents. Long-range plans for Buckhead Ridge MCD are to maintain current operations, recognizing that canal maintenance dominates operating expenses.

Previous Performance Reviews, Financial Audits, and Resident Feedback Surveys

Buckhead Ridge MCD audits report no previous performance concerns. Analysis of Buckhead Ridge MCD’s financial audits was conducted. There were no audit findings in Buckhead Ridge MCD’s financial statements from FY 2018-19 to FY 2021-22; auditors found that all documentation fairly represented Buckhead Ridge MCD’s financial position, with accurate financial reporting and no material findings nor weakness in internal controls. Buckhead Ridge MCD’s revenues were exceeded by costs in two of the previous three full fiscal years; in both cases, as discussed previously, grant funds were obtained the subsequent year to cover/partially reimburse extraordinary expenses due to Hurricane Ian and the FY 2020-21 Zika outbreak. Buckhead Ridge MCD’s board adjusts operations monthly to meet fiscal constraints.

Performance reviews have not been conducted during the review period.

Buckhead Ridge MCD reported no formal feedback surveys, but resident feedback has been managed in a transparent manner as noted in Board meeting minutes and in firsthand observation.

Buckhead Ridge MCD commissioners reported concerns from residents who misunderstood spraying methods and the use of toxic chemicals. The board addressed the concerns through multiple methods, including educational discussion at board meetings, displaying notices allowing residents to opt out of spraying at their property, and addressing individual residents directly. The responses appear appropriate.

Analysis of Management Reports/Data and Performance Information

Buckhead Ridge MCD staff report management information monthly to the board, which appears sufficient given the small size of the district’s operations. To assess management reporting and performance information, TBG reviewed documentation provided by Buckhead Ridge MCD and interviewed staff and commissioners of Buckhead Ridge MCD. Buckhead Ridge MCD operates with aquatic vegetation as its primary focus, and its goal is to achieve coverage of 100% of the canal over the course of each month. Buckhead Ridge MCD reports to its board on a monthly basis as to performance for the prior month. Management reports on the number of treatment missions completed, the area of canal treated, specific cost issues encountered during the month, and related topics. Performance information is sufficient given the district’s size and the operations and issues that it manages.

Evaluation of Cost, Timing, and Quality of Current Program Efforts

While it is difficult to evaluate the cost, timing, and quality of Buckhead Ridge MCD program efforts due to the lack of standardized tracking, the district is providing services needed for a district of its size and scale in an effective manner, and improvements to program financial management are ongoing. To assess cost, timing, and quality of program efforts, TBG reviewed documentation provided by Buckhead Ridge MCD, publicly available data and reports, interviewed Buckhead Ridge MCD staff and commissioners, reviewed Board meeting minutes onsite, and inspected operations.

Current program efforts include the management of aquatic plant life in the canals and the mitigation of mosquitoes. Due to having to manage both tasks with limited resources and funding, Buckhead Ridge MCD is

forced to operate less as a MCD and more as a manager of aquatic vegetation. This responsibility was formerly managed by SFWMD but was turned back to Buckhead Ridge MCD in 1999.

The newly elected commissioners have recognized the need for improvements in quality, effectiveness, and cost control, and have been proactive in identifying cost-effective and innovative best practice methods to approach their primary goals of aquatic vegetation management and mosquito control.

Goals, Objectives, and Performance Measures and Standards

Buckhead Ridge MCD does not have formally defined clear and measurable goals and objectives and lacks performance measures and standards; similar to other mosquito control districts, it monitors performance using disease prevalence metrics and has kept arbovirus counts at zero for the current and past three fiscal years.

To assess the district's goals, objectives, performance standards, and performance measures, TBG requested and reviewed the district's charter; requested the district's strategic plan and the last three years of annual reports; requested information on performance measures and standards and records of current and previous three fiscal years' measures, standards, and records of success or failure to meet the standards and (if applicable) evaluated the district's actual performance in meeting its goals and objectives. TBG assessed (if applicable) whether performance measures and standards are relevant, useful, and sufficient to evaluate the performance and costs of the programs and activities, whether they are being met, and whether they need to be revised. TBG requested and reviewed previous audits. TBG interviewed district staff and relevant local government entities about district performance and requested any available results of district-generated resident feedback surveys conducted during the current and previous three fiscal years.

Goals and Objectives

Buckhead Ridge MCD does not have clearly defined, formally defined goals and objectives but has established some general goals and objectives that align with its statutory purpose and provide some direction for programs and activities. Buckhead Ridge MCD has several primary goals that the district's operations focus on and revolve around the accomplishment of:

- Ensure zero human cases of arboviruses in Buckhead Ridge.
- Respond to all citizen service requests year around.
- Provide adulticide treatments when internal adult mosquito trap thresholds are met.
- Provide larvicide by hand in populated areas.
- Maintain the navigability of local canals via aquatic plant removal and mosquito spraying.

Commissioners also noted their goals to obtain more efficient equipment, improve security and accountability, and increase transparency, including by delivering complete financial statements each month. Staff and commissioners have aligned operations with the fundamental goals and objectives of completing 100% coverage of the 13-mile canal network each month, targeting a zero-arbovirus disease threshold and addressing all resident complaints.

These goals and objectives address several problems. Buckhead Ridge MCD places a dual-purposed focus on the management of the canals and waterways in the district boundaries. This management of canals and aquatic plants serves as both invasive plant species control and source reduction for mosquito habitats. By placing a priority on source reduction and larviciding, Buckhead Ridge MCD mitigates their use of adulticides, the cost of which has been steadily rising, straining already limited revenues.

Some expected benefits of these goals and objectives are reducing mosquito populations to prevent disease, including serious illnesses like yellow fever, West Nile virus, and eastern equine encephalitis. The general public welfare is also improved by the reduction of nuisance populations of mosquitoes and invasive plants and weeds.

Performance Measures and Standards

Buckhead Ridge MCD monitors performance using information on responses to service calls, arbovirus prevalence in the district, and financial reporting frequency but does not have additional formally defined performance measures or standards.

- (1) **Standard:** No human cases of arbovirus acquired in Florida and detected in the district.

Measure: Counts of arbovirus incidence in humans from DOH data. Buckhead Ridge MCD tracks DOH weekly arbovirus counts as published on DOH’s website. It is important to note that while the low to zero incidence of arbovirus in humans in an MCD is an indicator of success for the MCD’s activities, it is also possible that arbovirus could spread to an MCD at no fault of that MCD. For example, mosquito-borne illness could have originated in another Florida county or another country.

- (2) **Standard:** Provide adulticiding and larviciding services based on service requests received.

Measure: Responses to service requests. Buckhead Ridge MCD does not formally record or track service requests but responds to them on an ongoing basis as a measure of its performance. Exact counts of service requests and complaints are not recorded, but general estimates of monthly counts are made by the staff of Buckhead Ridge MCD. Spraying operations are conducted on the basis of mosquito counts in traps that are checked three times a week and conducted as needed based on the trap counts.

- (3) **Standard:** Deliver current financial report to commissioners and show all financial transactions monthly.

Measure: Board meeting minutes reflect delivery of current financial reports containing all financial transactions monthly. Recent board meeting minutes include printouts of all financial transactions and reflect current financial activity.

TBG conducted interviews with Buckhead Ridge MCD staff and reviewed documentation online to determine the standards of measurement of Buckhead Ridge MCD. While Buckhead Ridge MCD tracks disease prevalence in the county, it does not have other formal performance measures in place that would allow assessment of whether it is achieving its goals and objectives. This has not changed in the current and past three fiscal years.

Table 15 summarizes performance measures and standards that can be assessed meaningfully at this time.

Table 15. Performance Measures for Buckhead Ridge MCD

Performance Measures	CY 2020 ¹	CY 2021 ¹	CY 2022 ¹	CY 2023 ¹
Arbovirus Cases (Florida)	0	0	0	0
Arbovirus Cases (Travel)	0	0	0	0
Arbovirus Deaths	0	0	0	0
	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23 ²
Service Calls	Not provided	Not provided	Not provided	Not provided
Service Responses	Not provided	Not provided	Not provided	Not provided

Source: TBG Work Product, Buckhead Ridge MCD, DOH.

¹ Florida DOH data is provided by calendar year (CY).

² 2023 YTD through April.

Analysis of Goals, Objectives, and Performance Measures

Buckhead Ridge MCD’s achievement of goals shows favorable performance in keeping arbovirus counts low, and financial reporting; board members reported that service requests are addressed in a timely manner. Buckhead Ridge MCD does not have formally defined goals and objectives but appears to be achieving favorable performance standards for service requests and monitoring of disease prevalence in the district. Operations are conducted on an informal as-requested basis or based on trap counts. Meeting minutes indicate that the new board has prioritized internal controls, financial transparency, and increasing efficiency of existing equipment and staff. Anecdotally, meeting minutes show improvements across each of these elements, indicating progress across the priorities. As noted elsewhere, the newly elected commissioners have adopted a more forward-thinking and strategic approach, but formal goals and objectives and performance measures and standards have not yet been adopted.

Counts for the past four years have shown zero domestic or travel related cases of arbovirus in Glades County, therefore, Buckhead Ridge MCD has upheld their performance standard of no cases of arbovirus disease during this period. Additionally, Buckhead Ridge MCD has had no human cases of mosquito-borne diseases within their district during the last ten years. This can be seen as a success in the goal of keeping mosquitoes’ numbers down along with no evidence of disease transmission. As the community is isolated, it is less exposed to travel-related cases of disease such as dengue.

The district reports that it monitors the calls received through its phone line and that as a general average, the number of those calls have decreased over time. However, the district was unable to provide documentation to confirm this trend.

Buckhead Ridge MCD also shows achievement of its goal for timely reporting of all financial activity, with Board meeting minutes reflecting all financial transactions as a regular part of Board meetings.

The district shows favorable performance on some performance measures and standards. However, as described in the Resources section above, rising costs and the trend of expenditures exceeding revenues in two of the last three full fiscal years suggest that the district may need additional resources in the future. It is therefore uncertain whether the district will be able to achieve goals and objectives into the future within the district’s budget.

TBG interviewed staff and inspected available reports to complete the assessment.

A summary of service delivery metrics is provided in **Table 16**.

Table 16. Assessment of Performance Measures and Standards for Buckhead Ridge MCD

Performance Measure	Performance Standard	Assessment
No cases of human mosquito-borne diseases	No cases of mosquito-borne diseases reported in Buckhead Ridge MCD in the last 4 years	Standard was met.
Decrease in service requests and complaints	Decrease in service requests and complaints to the district phone line	Indeterminate due to lack of data.
Deliver current financial report and show all financial transactions monthly	Board meeting minutes reflect financial reports being received and financial transaction detail presented consistently	Standard was met.

Source: TBG analysis, based on review of information provided by Buckhead Ridge MCD.

Perceptions of the District's Performance by Local Government Stakeholders, Residents, and Other Relevant Local Stakeholders

Perceptions of Buckhead Ridge MCD's performance by other stakeholders appears to be positive and have improved from prior years. Buckhead Ridge MCD is a small district relative to others in the state and its operations are based on the direct needs of its constituents. Buckhead Ridge MCD monitors its phone calls, and comments at public meetings. Staff and commissioners noted that they have seen a decrease in complaints. Meeting minutes reflect improvement as well. However, formal documentation was not provided to demonstrate the outcomes, other than the anecdotal reports in meeting minutes. Public comment at board meetings has been reviewed. Inquiries appear to be driven by a lack of understanding of Buckhead Ridge MCD's operations, which the board has addressed. During a community tour with commissioners, residents were openly appreciative of Buckhead Ridge MCD staff and commissioners and displayed positive reception. TBG interviewed Glades Department of Health, which provided additional positive comments about the district.

3. Recommendations

Discussion and Analysis

TBG analyzed findings by fiscal year to determine if revisions to district organization or administration can improve the efficiency, effectiveness, and/or economical operation of the district and presents several recommendations for the district's and Glades County's consideration. TBG recommends that the district expand use of larvicides; seek to gain ownership of canal properties within the district; seek relief from the district's millage cap; and develop a strategic planning process to formalize goals, objectives, and performance measures and standards.

Expanded larvicide use: Larvicide is a new treatment program for Buckhead Ridge MCD, which has occurred since the new board took office in 2021. Previously, Buckhead Ridge MCD relied strictly on adulticide. Broader use of larvicides may be an appropriate consideration for Buckhead Ridge MCD, given reports in years past of thousands

of mosquitoes detected during trap inspections. The district should continue to expand its use of larvicide treatments.

Gain ownership of canal properties: Buckhead Ridge MCD's operations are divided between its mission to address aquatic vegetation and maintain the extensive canal network within its service area for navigability and mosquito control. Currently, Buckhead Ridge MCD does not fully own the canal properties within its district. Private landowners own the canals, with some property boundaries extending into the canals. The lack of district ownership prevents the district from being eligible for grant funding for canal management from the Florida Department of Environmental Protection (DEP). Buckhead Ridge MCD only claims partial ownership but is tasked with full management. Achieving full ownership will allow this funding source to open. Buckhead Ridge MCD has been actively pursuing gaining ownership of portions of the canal to better manage their responsibilities without the constraint of coordinating with private parties such as individual residents and other government entities such as SFWMD, which is responsible for control of surface vegetation but is not permitted by DEP to control the submerged vegetation that Buckhead Ridge MCD must manage.⁴ The ability to obtain additional funding through the DEP grants would better allow Buckhead Ridge MCD to clear the canals of debris and continue canal operations as a part of the district's source reduction and navigability commitments.

Relief from the millage cap: The district's millage rate has been capped at 1.0 mil since 1977. The low revenues generated by this rate due to the district's small population affect resource allocation and operational efficiencies for the district and its unique responsibilities for canal maintenance and fail to keep up with the district's escalating costs. Lifting the millage rate cap would allow the Buckhead Ridge MCD commissioners, with the approval of the district's voters, to determine the appropriate amount of resources to allocate for canal navigation and mosquito control efforts.

Strategic Plan and Performance Measurement: While Buckhead Ridge MCD does not currently have a formal strategic plan or formally established goals, objectives, or performance measures and standards, the new commissioners are actively pursuing goals of increased transparency, improved efficiencies, and aggressive cost controls. Time should be set aside to formalize these goals into performance measures, with timelines, milestones, and defined objectives, allowing assessment over time of the district's progress. The district has stated some general goals and objectives that guide its activities. The district could formalize its goals, objectives, and performance measures and standards through a strategic planning process to consistently monitor and maintain performance information over time.

The district could seek guidance on strategic planning processes and development of goals and objectives from other districts that have recently conducted such processes, such as Anastasia MCD or Indian River MCD. Florida's MCDs vary with regard to geography, incidences of species, and the scale and complexity of operations, however, there are similarities and opportunities for shared resources. Strategic planning processes such as those undertaken by Indian River MCD or Anastasia MCD could serve as a model for other MCDs.

Florida Coordinating Council on Mosquito Control: During TBG's review of the 15 independent MCDs, TBG found that most districts have not developed sufficient goals, objectives, or performance measures and standards. The Florida Coordinating Council on Mosquito Control was established by the Legislature to foster maximum efficient

⁴ A letter dated August 17, 1999, from the SFWMD to a member of Congress requesting assistance with the submerged and surface vegetation management issue stated that it was not likely that DEP would allow the management of submerged vegetation to be assumed by SFWMD. Therefore, the management of submerged vegetation in the district canals remains the responsibility of the Buckhead Ridge MCD.

use of existing resources and to assist entities involved in mosquito control with best management practices. Membership on the council includes the agency heads for DACS, DEP, and the Fish and Wildlife Conservation Commission, the State Surgeon General, as well as representatives of federal agencies, the University of Florida’s Florida Medical Entomology Laboratory, Florida MCDs, and others. The Legislature could direct the council to form a subcommittee consisting of mosquito professionals and researchers from around the state to develop model MCD goals, objectives, and performance measures and standards to assist MCDs with performance monitoring.⁵

Recommendations

A summary of recommendations is provided in **Table 17**.

Table 17. Recommendations with Associated Considerations

Recommendation	Considerations
<p>Buckhead Ridge MCD could continue to expand use of larvicide treatments in the district.</p>	<ul style="list-style-type: none"> This recommendation will have a fiscal impact of the additional cost of larvicide chemicals and associated equipment if the district expands its use; however, the costs of larvicide may be offset by a reduction in adulticide costs if the use of larvicide successfully reduces the amount of adulticide needed by the district.
<p>Buckhead Ridge MCD could pursue full ownership of canal properties and pursue additional grant funding for canal maintenance.</p>	<ul style="list-style-type: none"> Achieving full ownership of canal properties will avail Buckhead Ridge MCD of additional grant-funded sources of revenue to offset increasing costs of canal maintenance.
<p>Glades County could consider removing the millage rate cap for Buckhead Ridge MCD.</p>	<ul style="list-style-type: none"> Buckhead Ridge MCD is committed to maintaining canal navigability and mosquito control but with little ability to reduce costs while faced with declining purchasing power each year. Removing the millage cap would allow the district to increase its revenues, but this would require a resolution by Glades County and voter approval.
<p>The district could formalize its goals, objectives, and performance measures and standards through a strategic planning process to consistently monitor and maintain performance information over time; the district could seek guidance from other districts that have conducted strategic planning processes.</p>	<ul style="list-style-type: none"> This recommendation would require additional staff time and may result in additional administrative costs to the district. If Buckhead Ridge MCD chooses to seek guidance from other districts regarding strategic planning processes, staff in the other districts may incur some additional workload

⁵ Section [388.46](#), F.S.

Recommendation	Considerations
<p>The Legislature could consider amending s. 388.46, <i>Florida Statutes</i>, to direct the Florida Coordinating Council on Mosquito Control to form a subcommittee consisting of mosquito professionals and researchers from around the state to develop model goals, objectives, and performance measures and standards to assist MCDs with performance monitoring.</p>	<ul style="list-style-type: none"> • This recommendation would require a statutory change. • This recommendation would impose additional workload on council members and staff. • The council’s membership could assemble a subcommittee with a broad range of expertise that could be ideal for the development of such model performance information. • While this guidance will assist all MCDs, it will be of particular benefit to MCDs, like Buckhead Ridge MCD, that lack staff resources for the development of such performance information.

Source: TBG analysis, based on review of information provided by Buckhead Ridge MCD.

4. District Response

Each independent MCD under concurrent review by TBG was provided the option of submitting a formal response letter for inclusion in the final published report. Buckhead Ridge MCD did not provide TBG with a response letter for inclusion in the final report.



GLOSSARY OF TERMS MOSQUITO CONTROL DISTRICT REVIEWS

September 2023

Prepared for

The Florida Legislature

Prepared by

The Balmoral Group

165 Lincoln Avenue

Winter Park, FL 32789

Attachment 1

Term	Definition
Adulticide	A chemical that kills adult insects, which is usually applied as a spray; depending on the circumstances, adulticide applications can be made from the ground (most commonly with ultra-low volume spray trucks) or from the air (with either fixed- or rotary-wing aircraft or helicopters)
<i>Aedes aegypti</i> mosquitoes	The primary type of mosquitoes (commonly referred to as yellow fever mosquitoes) that spread Zika, dengue, chikungunya, and other viruses; because these mosquitoes live near and prefer to feed on humans, they are more likely to spread these viruses to humans than other types of mosquitoes
<i>Aedes albopictus</i> mosquitoes	Although competent vectors of dengue, eastern equine encephalitis, and other viruses that affect humans, these mosquitoes (commonly referred to as Asian tiger mosquitoes) feed on animals as well as humans and are, thus, less likely to spread viruses to humans than <i>Aedes aegypti</i> mosquitoes
Altosid	The trade name for a mosquito larvicide that contains a synthetic version of the juvenile hormone insect growth regulator methoprene as the active ingredient
American Mosquito Control Association (AMCA)	A professional association that includes individuals working for mosquito control programs, academics conducting research on mosquitoes and other disease vectors, and industry representatives who support mosquito control efforts around the world; the AMCA is active in member training and educating the public on the health importance of mosquito control in the U.S. and beyond; the association is international in scope and has approximately 1,500 members
<i>Anopheles</i> mosquitoes	A genus of mosquitoes with more than 400 species; female mosquitoes in approximately 40 of these species transmit malaria; this is the only genus of mosquitoes that can transmit malaria
Arbovirus	Arthropod-borne viruses that are transmitted to humans primarily through the bites of infected mosquitoes, ticks, sand flies, or midges; includes West Nile virus, eastern equine encephalitis virus, St. Louis encephalitis virus, dengue, chikungunya, Zika, California encephalitis group viruses, and malaria
Arthropod	As defined in Ch. 388, <i>Florida Statutes</i> , titled “Mosquito Control,” “arthropods” are insects of public health or nuisance importance, including all mosquitoes, midges, sand flies, dog flies, yellow flies, and house flies



Attachment 1

Term	Definition
Barrier island	Land that separates the ocean from the mainland; frequently an estuary or a lagoon will be located between the barrier island and mainland
Biogents	A company that produces mosquito traps with the goal of reducing mosquito populations that are produced in container-type habitats
<i>Bacillus thuringiensis israelensis (Bti)</i>	A naturally occurring bacteria commonly used as a mosquito larvicide since the 1980s
Chikungunya	A mosquito-transmitted disease caused by a virus that originated in Africa and is transmitted by <i>Aedes</i> mosquitoes; symptoms include fever, joint pain, and rash; the name chikungunya comes from the African Makonde language and means “to bend over in pain,” which is the stance that many who contract this disease exhibit
<i>Culex</i> mosquitoes	A genus of mosquitoes, several species of which serve as vectors of one or more important diseases of birds, humans, and other animals; the diseases they vector include West Nile virus, Japanese encephalitis, and St. Louis encephalitis.
<i>Culiseta melanura</i> mosquitoes	A species of mosquitoes (commonly referred to as the black-tailed mosquito) that is significant due to its role in the transmission cycle of eastern equine encephalitis virus and potentially West Nile virus; these mosquitoes primarily feed on birds but can spread arboviruses to mammals as well
Dengue	A mosquito-transmitted virus that causes sudden fever and acute joint pain; occasionally occurs in Florida where the mosquito vector is <i>Aedes aegypti</i> or <i>Aedes albopictus</i>
Dibrom	The trade name for an organophosphate insecticide with the active ingredient naled; used in mosquito control as an adulticide and is typically applied with aircraft
Dipper	An approximately 300 ml container attached to an extension pole that is used to sample for the presence of mosquito larvae in aquatic habitats
Eastern equine encephalitis virus (EEEV)	A mosquito-transmitted virus that is rare but very dangerous when contracted by a horse, human, or other mammal; an average of 13 cases per year were reported in the United States from 2018-2022; approximately 30% of people with EEEV die and many survivors have ongoing neurologic

Attachment 1

Term	Definition
	problems; in Florida, the freshwater swamp inhabiting mosquito <i>Culiseta melanura</i> is the primary vector of this disease
Fixed-wing aircraft	Commonly referred to as an airplane, these aircraft include stationary wings that provide lift for the aircraft; in mosquito control, these aircraft are commonly used for larvicide and adulticide applications
Florida Coordinating Council on Mosquito Control	An interagency council created in Ch. 388, <i>Florida Statutes</i> , in 1986, primarily to address issues concerning mosquito control applications, possible environmental impacts of control actions, and mosquito control management on State of Florida-owned lands
Florida Department of Agriculture and Consumer Services	The state agency that oversees and regulates mosquito control programs in Florida
Florida Department of Environmental Protection	The state agency responsible for coordinating efforts for intensified mosquito control on protected public lands when needed
Florida Department of Health (DOH)	The state agency responsible for implementing the Florida Sentinel Chicken Surveillance Program, reporting weekly data on the prevalence of arboviruses in this state, issuing public health arbovirus advisories and alerts, conducting or participating in arbovirus epidemiologic investigations, distributing weekly arbovirus epidemiology summary reports for mosquito control agencies, healthcare agencies, researchers, and others, and reporting human and animal arbovirus cases to the national arbovirus surveillance database
Florida Fish and Wildlife Conservation Commission	The state agency responsible for maintaining a database that enables the surveillance of bird mortality from arboviruses and for providing assistance and information on arboviruses in wildlife
Florida Medical Entomology Laboratory	A University of Florida laboratory (within the Institute of Food & Agricultural Sciences) that conducts research primarily on the control of mosquitoes; for the past 70 years, research at this lab has been instrumental in assisting mosquito control programs in Florida and elsewhere
Florida Mosquito Control Association (FMCA)	Created in the 1920s, the FMCA is Florida’s professional association that includes individuals working for mosquito control programs, academic personnel conducting research on mosquitoes and other disease vectors,



Attachment 1

Term	Definition
	and industry, which supports mosquito control efforts in Florida; the FMCA is active in the training of members and educating the public on the public health importance of mosquito control
Florida Sentinel Chicken Arboviral Surveillance Program	A program of the DOH that provides laboratory assistance to local agencies to monitor for the transmission of mosquito-transmitted viruses; sentinel chickens are stationed at locations throughout the state; when the chicken is bit by an arbovirus-transmitting mosquito, the chicken develops antibodies to the virus (the chicken does not become sick and cannot spread the virus to other mosquitoes); blood samples obtained from the sentinel chickens are submitted to DOH’s lab in Tampa to be examined for the presence of antibodies; when present, the results indicate that arbovirus-transmitting mosquitoes are circulating in the location, enabling the increase of mosquito control efforts to reduce the risk of humans and animals from becoming ill
Genetically modified mosquitoes	<i>Ae. aegypti</i> mosquitoes that have been genetically modified to carry two genes: 1) a self-limiting gene that prevents female mosquito offspring from surviving to adulthood; and 2) a fluorescent marker gene that glows under a special red light, thereby allowing researchers to identify the genetically modified mosquitoes in the wild; because the female offspring die before becoming adults, the population of <i>Ae. aegypti</i> mosquitoes decreases
Geographic Information System (GIS)	Integrated computer hardware and software that stores, manages, analyzes, and visualizes geographic information
Good Laboratory Practices Program (GLP)	The goal of GLP is to ensure the quality and integrity of test data related to non-clinical safety studies
Granular application	Granular applications of chemicals differ from liquid applications by having a solid particle carrying the insecticide, which can better penetrate vegetation; this application is primarily used for larvicides to deliver mosquito toxin to the water where mosquito larvae are developing
Impoundment	Impoundments along Florida’s central-east coast were created in the 1950s and 1960s by building earthen dikes around salt marshes known to produce mosquitoes; this allows the mosquito control program to manage the water level within the impoundment to prevent saltmarsh mosquitoes from laying



Attachment 1

Term	Definition
	their eggs in these areas, thus effectively reducing their populations with a minimum need for pesticides; approximately 40,000 acres of impoundments were constructed from Volusia County south to Martin County; the impoundments remain a source reduction control method in the region
Landing rates	A surveillance method to determine the extent of a mosquito problem, where a person stands in a specific location and counts the number of mosquitoes that land on them within a designated period (such as 60 seconds)
Larvicide	A chemical that kills insects in their larval stages; for mosquitoes, larvicide must be introduced into the water where the larvae are developing; depending on the circumstances, larvicide applications can be made from the ground or from the air with either fixed- or rotary-wing aircraft or drones
Light Detection and Ranging (LiDAR)	A remote sensing technology used to precisely detect objects, such as mosquitoes, in real space
Malaria	A life-threatening illness transmitted primarily in tropical locations by female mosquitoes in the genus <i>Anopheles</i> primarily in tropical locations; symptoms include fever, headache, and chills and usually occur within 10-15 days after a bite
Methoprene	A synthetic juvenile hormone, which is an insect growth regulator, that has been used as a larvicide since the mid-1970s
Millage	A tax rate on property expressed as the number of dollars assessed for each \$1000 of property value; for example, the property owner of a house valued at \$250,000, which is assessed at a millage rate of 1.0, would be charged \$250
Mosquito Control District	A local government entity enabled through a voter-approved local or state legislative act to provide mosquito control services in a geographically defined area
Mosquito counts	Surveillance of mosquito populations using a variety of techniques (e.g., traps or landing rates); this term is usually used in reference to adult mosquitoes rather than immature ones
Natular	The trade name for a larvicide that includes the bacteria spinosid as its active ingredient

Attachment 1

Term	Definition
Nuisance mosquito	A term used to designate a mosquito that typically does not transmit a pathogen such as a virus; these mosquitoes are in contrast to disease-transmitting mosquitoes that are readily capable of transmitting a pathogen
Pest resistance	The situation in which mosquitoes are no longer killed by the standard dose of an insecticide or manage to avoid coming into contact with the insecticide
Pyrethrum	A biochemical derived from a chrysanthemum plant that contains insecticidal properties; typically used in mosquito control as an adulticide
Rotary-wing aircraft	Aircraft that use a rotary blade rather than wings; a helicopter is the most common example
Rotational impoundment management	A management technique common in saltmarsh impoundments along Florida’s Indian River Lagoon where the impoundment is artificially flooded during part of the spring and summer to prevent mosquitoes from laying their eggs in the marsh and is opened for the remainder of the year through culvert pipes to provide a hydrological connection between the impounded marsh and adjacent estuary or lagoon
Saint Louis encephalitis virus	A virus most commonly transmitted by <i>Culex</i> mosquitoes that can affect the central nervous system when a human is infected
Source reduction	Refers to the elimination of habitats that can produce mosquitoes; ranges from the proper disposal of waste containers to the complicated management of impoundments
Spinosid	A naturally occurring bacteria that contains insecticidal properties; is commonly applied as a larvicide; Natular is a commercial product that uses spinosid as its active ingredient
Sterile Insect Technique	A method whereby male insects are sterilized by radiation or other means; when the sterilized male mates with the female insect, viable offspring are not produced
Subcommittee on Managed Marshes	An interagency committee created in 1986 by the Florida Legislature in Ch. 388, <i>Florida Statutes</i> , to promote the wise management of Florida’s wetlands for the mutual benefit of mosquito control and environmental enhancement
Ultra-low volume	A technique to dispense extremely small droplets of insecticide; while historically used for adulticiding, in some instances the technique is now used for larviciding



Attachment 1

Term	Definition
United States Department of Agriculture (USDA)	Through its national Agricultural Research Service, the USDA participates in Florida mosquito control efforts largely with the Center for Medical, Agricultural and Veterinary Entomology, a laboratory in Gainesville, Florida, that conducts research on the biology and control of mosquitoes and other insects
United States Environmental Protection Agency	The federal agency that regulates mosquito control in Florida primarily through their approval and enforcement of chemical labels for insecticides
Unmanned Aerial System (UAS)	Aerial vehicles and associated equipment that do not carry a human operator and are remotely piloted or fly autonomously; drones are an example of a UAS
Vector	A living organism that transmits a pathogen (e.g., virus, plasmodium, nematode) from an infected animal to a human or another animal; mosquitoes are an example of a vector
Vector surveillance	Monitoring for vectors that can be accomplished in several ways (e.g., various types of traps or landing rates)
Waste tires	Vehicle tires that are no longer of value and that have been improperly disposed in a manner that allows water to collect in the tires; some species of mosquitoes (e.g., <i>Aedes aegypti</i> or <i>Aedes albopictus</i>) lay their eggs in the standing water where the immature mosquitoes will develop to adulthood
Water management	In mosquito control, this term refers to a source reduction technique to minimize the production of mosquitoes in a particular aquatic habitat; the management of saltmarsh impoundments and some ditches are examples of water management projects
West Nile virus (WNV)	Introduced into the United States in New York around 2000, the virus is carried by birds and primarily transmitted by <i>Culex</i> mosquitoes; humans who contract the virus can develop a fever and other symptoms including headache, body aches, joint pains, and rash; most recover completely but symptoms can linger for weeks to months
Yellow fly trap	A sticky-type trap used to entangle yellow flies, a type of biting fly that occurs regularly in the Florida Panhandle, to reduce their population without insecticides



Attachment 1

Term	Definition
Zika virus	A virus that originated in the Zika region of Africa and is transmitted by the mosquitoes <i>Aedes aegypti</i> and <i>Aedes albopictus</i> ; humans who contract the virus can have symptoms similar to dengue such as fever, rash, headache, and joint pain; Zika passed from a pregnant woman to her fetus can result in birth defects including microcephaly and other brain abnormalities

Source: TBG work product.



INTEGRATED PEST MANAGEMENT SUMMARY

September 2023

Prepared for

The Florida Legislature

Prepared by

The Balmoral Group

165 Lincoln Avenue

Winter Park, FL 32789

Term	Summary
Integrated Pest Management	<p>Most mosquito control programs use an Integrated Pest Management (IPM) approach to control mosquito populations, which targets the different stages of a mosquito’s life cycle with various prevention and control measures. IPM addresses eight areas. Surveillance of mosquito populations is an essential component of all IPM programs with chemical treatments based on the surveillance findings. IPM can also include source reduction (e.g., container disposal and water/impoundment management), larviciding and adulticiding (using ground and/or aerial treatments), biological and alternative controls, and disease surveillance. Research and education are also important components of IPM programs.</p>
Mosquito Surveillance	<p>The general approach to surveillance is to define area-specific problems with mosquitoes through the establishment of a mosquito surveillance program. The program assists in determining the types of mosquito control efforts needed in each area so that pesticide applications are used only when necessary. Service requests made to mosquito control programs serve as one means of surveillance. Other means for adult mosquito surveillance include monitoring the landing rates and counts of mosquitoes in traps to determine when and where they are most prevalent and observing the effects of adulticide, larvicide, and source reduction efforts. Immature mosquito surveillance is conducted by collecting eggs, larvae, and pupae. Surveillance may also include inventorying and mapping data and using emerging technologies such as geo-referenced maps, geographic information systems (GIS), smart traps (e.g., a trap with an electronic device that differentiates mosquitoes from other insects, counts them, and wirelessly transmits the results), and unmanned aerial vehicles.</p>
Source Reduction	<p>Source reduction, also known as physical or permanent control, is considered the most effective mosquito control technique and is accomplished by eliminating larval habitats in salt marshes, freshwater habitats, temporarily flooded locations, and containers.</p> <p>Current saltmarsh source reduction techniques in Florida include</p> <ul style="list-style-type: none"> • construction of shallow ditches that enhance drainage and thus eliminate mosquito-producing sites and create connectivity among water bodies to allow larvivorous fish (fish that feed upon insect larvae) access to mosquito habitats; and • management of impoundments by maintaining a sheet of water across a saltmarsh to prevent mosquitoes from laying eggs on the soil; this achieves saltmarsh mosquito control with minimum insecticide use.

Term	Summary
	<p>Source reduction is also conducted in freshwater habitats and is based on the principle that manipulating water levels in low-lying areas will eliminate or reduce the need for insecticide use. The primary strategy used is reducing the amount of standing water or reducing the length of time that water can stand in low areas following significant rainfall.</p> <p>Another important area of source reduction is through aquatic plant management, which can be accomplished using chemical, biological, or mechanical control methods. Waste tire management is also a significant activity for many mosquito control districts because the proliferation and accumulation of discarded tires throughout the state continues to create habitats highly favored by mosquitoes, and these tires can be costly and labor-intensive to remove. Removing any receptacles that can contain water is beneficial in controlling mosquitoes.</p>
<p>Larvicides and Larviciding</p>	<p>Larvicides are insecticides used to kill insects in the larval stage. Most mosquitoes spend three to five days of their life cycle in the larval stage when they are highly susceptible to predation and control efforts; therefore, well-planned and timed larviciding is important for efficient operations to save labor costs and reduce chemical use. This also requires understanding the local mosquito ecology and patterns of arbovirus transmission to select the appropriate control techniques. Equipment used for ground application of larvicide can include trucks with sprayers mounted on the front bumper, all-terrain vehicles (ATVs), boats, and various hand-held and backpack sprayers. Aerial application uses various devices such as nozzles and metered systems that are attached to fixed-wing or rotary-wing aircraft (i.e., helicopters).</p>
<p>Adulticides and Adulticiding</p>	<p>Adulticides are insecticides used to kill adult mosquitoes. The majority of adulticiding in Florida is conducted using ultra-low volume (ULV) spraying during which an aerosol spray is released by specialized spray equipment mounted in aircraft, on the back of trucks or ATVs, or carried by hand or in a backpack. The spray drifts through the air and is effective only while it remains airborne; thus, having a short-term effect only. Where a longer-term effect is needed, residual sprays are applied to barriers or surfaces such as a stadium, park, or resident’s yard and are often applied with a modified vehicle-mounted hydraulic sprayer. The mosquito must land on the surface where the residual insecticide has been deposited for it to be effective. Equipment operators must be properly trained in equipment maintenance and adulticide application because timing, targets, and thresholds for the application are based on numerous factors and can be challenging to establish.</p>

Term	Summary
Biological and Alternative Control	<p>Biological control agents include microbial control agents (e.g., bacteria, such as <i>Bacillus thuringiensis</i> or <i>Bt</i>, that can be sprayed over waterbodies to kill developing mosquito larvae), invertebrate arthropod mosquito predators (e.g., small aquatic crustaceans, such as copepods, that eat insect larvae), and vertebrate mosquito predators (e.g., larvivorous fish and birds). It is common for mosquito control districts in Florida to provide larvivorous fish as a service to the public. For example, Collier Mosquito Control District provides <i>Gambusia</i> mosquitofish to Collier County residents to release in standing water on their property to manage mosquito larvae.</p> <p>Alternative control methods include the sterile insect technique, trapping, repellents, and bug zappers.</p>
Disease surveillance	<p>Because of its geographic location and proximity to the Caribbean, Florida is vulnerable to the introduction of new vector-borne pathogens as occurred with the introduction of Zika virus in 2016 in South Florida. Disease surveillance includes monitoring for human cases of mosquito-borne arboviral diseases including dengue, chikungunya, West Nile virus, St. Louis encephalitis, and others. In addition, many mosquito control programs conduct regular blood testing of sentinel chickens. The state established the Florida Sentinel Chicken Arboviral Surveillance Program (FSCASP) in 1977 to provide laboratory services to local agencies to monitor the transmission of certain vector-borne diseases. The services are primarily used by mosquito control programs around the state. The programs submit sentinel chicken blood samples to the Florida Department of Health’s Bureau of Laboratories in Tampa, where an antibody test is performed to identify if the chicken has been exposed to one of several viruses. Results are provided to participating agencies on a weekly basis.</p>
Mosquito Control Research	<p>Mosquito control programs must base their activities on sound and up-to-date scientific research in order to provide safe, effective, and efficient mosquito control services. Research that is either conducted or reviewed by mosquito control programs is essential to developing and implementing new and innovative methods and technologies. Numerous federal, state, and other entities conduct mosquito control research, as do several mosquito control districts in this state.</p>
Outreach and Education	<p>Increasing the public’s understanding of the work of the mosquito control districts is an important component of overall mosquito control efforts. Public education helps people understand what is involved in mosquito control, the biology of mosquitoes, ecological issues, arboviral disease transmission, and actions that can be taken to prevent mosquito bites and reduce mosquitoes in yards and</p>

Attachment 2

Term	Summary
	neighborhoods. When adequately informed, the public is in a better position to protect themselves and support mosquito control efforts. This state’s mosquito control programs and other entities, such as the Florida Department of Agriculture and Consumer Services, Florida Mosquito Control Association, and the University of Florida’s, Institute of Food and Agricultural Sciences-Florida Medical Entomology Laboratory, dedicate significant efforts toward education.

Source: TBG work product.