CITRUS COUNTY MOSQUITO CONTROL DISTRICT REVIEW FINAL REPORT

September 2023

Prepared for

The Florida Legislature

Prepared by

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Executive Summary

Citrus County Mosquito Control District (Citrus County MCD) is an independent special district that serves the entirety of Citrus County, Florida. Citrus County MCD totals 773 square miles, spanning the western protected coastal habitats, center urban areas, and eastern protected inland conservation areas of the county. The district is a moderately sized MCD, serving a population of just over 158,009 residents in 2022. While Citrus County only has a quarter mile of sandy beaches, it is well known for numerous state parks, preserves, campgrounds, and ecotourism.

The Florida Office of Economic and Demographic Research (EDR) projects Citrus County's population to increase by 22% to 186,965 residents in by 2050. With the recent completion of the Suncoast Parkway extension from U.S. 98 in Hernando County and State Road 44 in Citrus County, development has accelerated in the service area.

Citrus County has thousands of acres of federally and state-owned environmental protected areas that generate mosquitoes prolifically and have associated restrictions on Citrus County MCD operations. About 147,139 households paid ad valorem taxes to support Citrus County MCD operations in fiscal year (FY) 2021-22 (October 1, 2021 through September 30, 2022). The same budget year included about $9 billion in taxable value for real property and $2.1 billion in taxable value from 7,286 tangible personal property accounts that are subject to district millage.

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.

Citrus County MCD was established in 1953 to be supervised by an elected board of three commissioners. The board is actively engaged in the review of operational success, financial stewardship, and efficiency. The district is characterized by having extensive natural and environmentally sensitive lands that surround developed residential and tourist-heavy areas. These characteristics require mosquito control operations that largely focus on prevention of mosquito infestation via surveillance, monitoring, larviciding and targeted adulticiding, along with limited aquatic weed control. Source control activities also include waste tire collection, which can be costly for districts due to waste tire disposal fees. Waste tires create habitat for mosquitoes that is difficult to manage with chemical treatment.

The Balmoral Group worked in consultation with a mosquito control expert in the course of this review and found that Citrus County MCD follows industry standards for Integrated Pest Management and provides mosquito control services within the scope of the district's chapter law and the Florida Statutes; other local government entities located wholly or partially within Citrus County MCD do not provide similar mosquito control services. The district is managing its resources in an efficient and effective manner to achieve its goals and objectives. Citrus County MCD has several goals and objectives that adequately address its statutory purpose; it monitors

performance using service call responses and disease prevalence metrics but could develop additional performance measures and standards.

Based on its review, The Balmoral Group presents the following recommendations for the improvement of mosquito control services in the Citrus County MCD:

- The district could adopt 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 standards and measures to assist MCDs with performance monitoring.

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1. Background

District Description

District Purpose

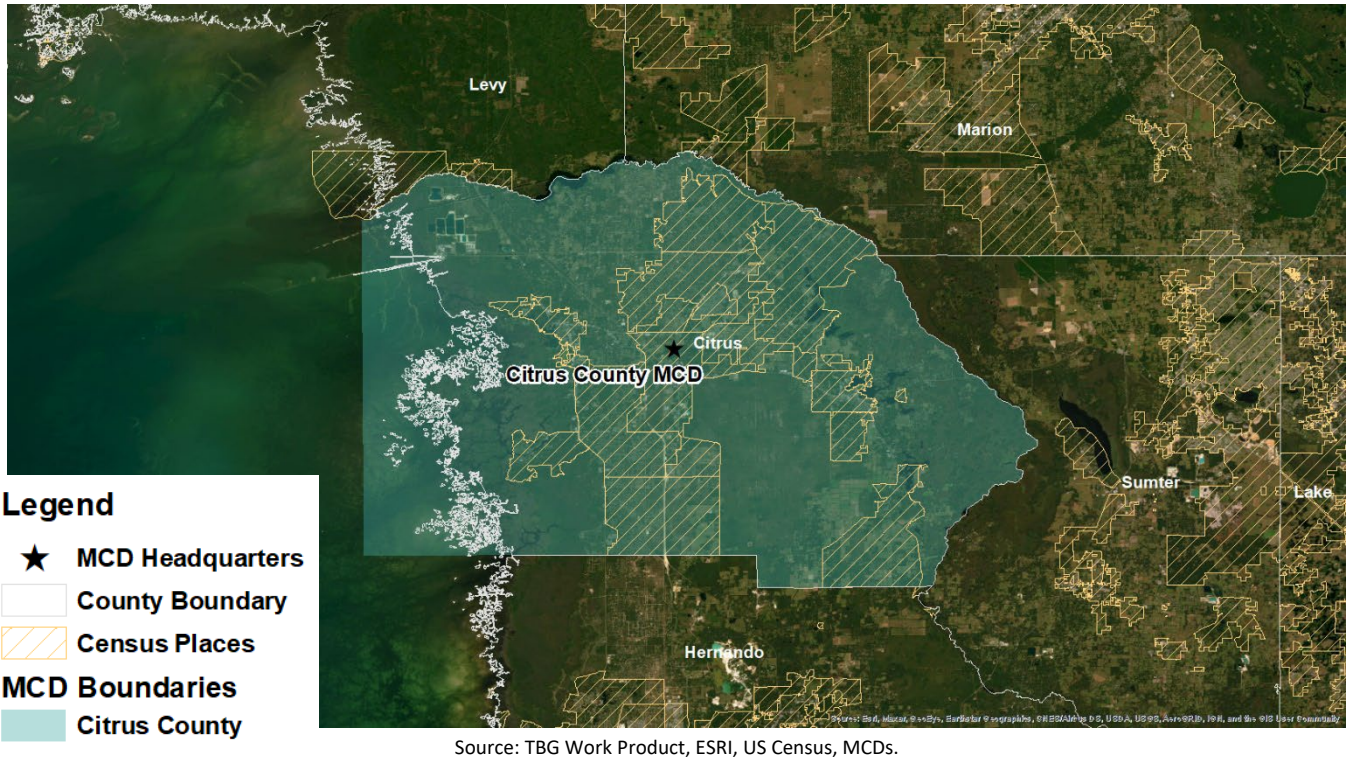
According to district representatives, the purpose of Citrus County Mosquito Control District (Citrus County MCD), as established in 1953, is to control the nuisance and disease-carrying mosquito populations within Citrus County, Florida. Since inception, Citrus County MCD's goals have aligned with promoting the health, safety, and welfare of Citrus County residents and visitors through an evolving program of integrated pest management practices and technological advancements.

Service Area

Citrus County Mosquito Control District (MCD) serves the entirety of Citrus County, Florida, totaling 773 square miles. However, there are several wildlife management areas and preserves in Citrus County that require coordination with state and federal entities for potential treatment. In the county's urban areas, rapid residential development across the county has increased service needs to control mosquito populations.

Citrus County MCD's headquarters is located at 968 N. Lecanto Hwy, Lecanto, Florida 34461. **Figure 1** is a map of the district boundary, with the county boundary and Citrus County MCD's current headquarters marked.

Figure 1. Citrus County MCD Map

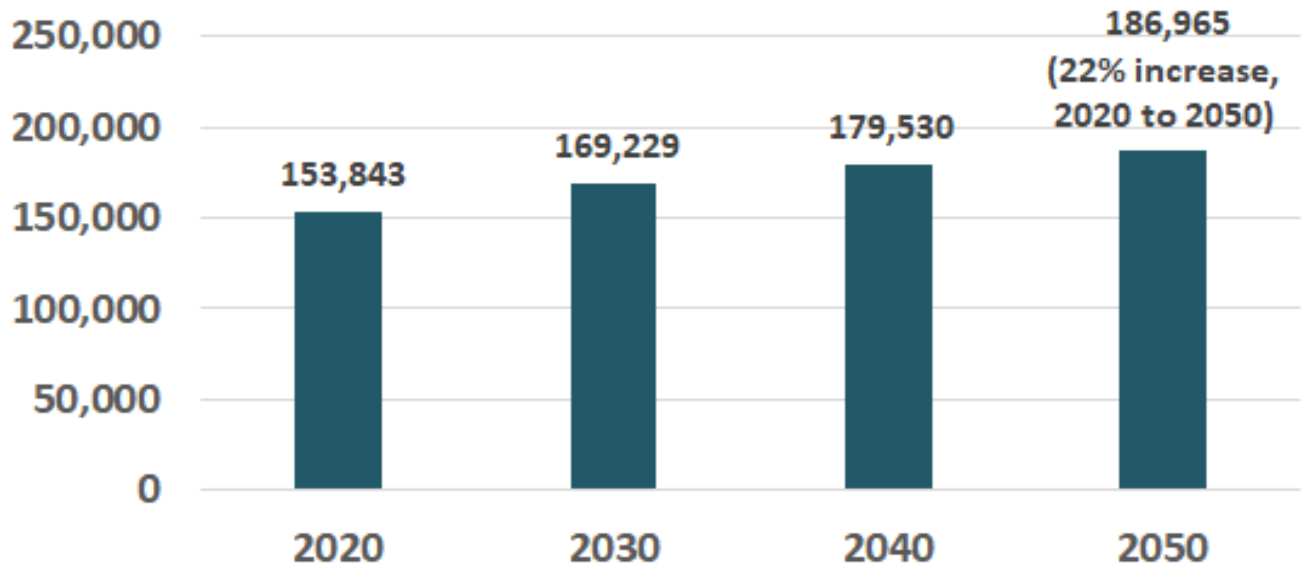


Source: TBG Work Product, ESRI, US Census, MCDs.

Population

Citrus County's population was estimated at 162,529 persons in 2022 according to the U.S. Census.[1] The Florida Legislature's Office of Economic and Demographic Research (EDR) projects Citrus County's population to increase by 22% in 2050 to 186,965 residents compared to a 2020 baseline. [2] **Figure 2** shows Citrus County's projected population estimates as reported by EDR.

Figure 2. Citrus County Population Projection



Source: TBG Work Product, EDR.

District Characteristics

Citrus County is on the west coast of Florida, with more than 20 miles of inland lakes and coastline on the Gulf of Mexico. Adjacent counties include Levy, Marion, Sumter, and Hernando Counties. In 2022, the average annual temperature was 72.3 degrees Fahrenheit, while precipitation totaled 55.89 inches through the end of the year.

A majority of Citrus County's salt marsh and hardwood swamp shoreline is in conservation, including the Crystal River National Wildlife Refuge, managed by the U.S. Fish and Wildlife Service, and the state-run Crystal River Preserve State Park. Portions of the Nature Coast Aquatic Preserve and Marjorie Harris Carr Cross Florida Greenway also fall within the Citrus County MCD service area. While Citrus County has only 0.25 miles of sandy beaches, numerous state and federal parks and campgrounds provide opportunities for outdoor recreation and ecotourism.

Natural areas commonly include larval habitat, so controlling mosquito populations in these areas is critical to quality of life in both the coastal and inland portions of the county. Preserve and refuge areas require careful coordination with both state and federal regulators, as mosquito treatment is restricted.

[1] Population Estimates, July 1, 2022 retrieved from U.S. Census Bureau QuickFacts: United States.
[2] Based on 2021 Estimates, Population: 1970-2050, County projections retrieved from Population and Demographic Data - Florida Products (state.fl.us).

The majority of the county's residents are located in the center of the county, with a few outlying cities and towns interspersed with conservation lands. In the urban areas, rapid residential development has increased service needs to control backyard disease-carrying container mosquitoes and aquatic larval habitats. The Suncoast Parkway extension opened in 2022 between U.S. 98 in Hernando County and State Road 44 in Citrus County, which will contribute to further development in the county.

Meteorology is the primary driving force for producing mosquitoes with heavy rainfall events creating standing pools of water that serve as larval habitat for mosquito species capable of transmitting several arboviruses. Changing water levels through tidal events can also produce such pools. Humans contribute to the problem by allowing water to stand in waste containers, garden pots, tires, and other vessels. The characteristics of the natural areas of the district, combined with the growing population in urban areas and the meteorological conditions, create an environment conducive to extensive mosquito habitats that require constant mosquito control. The needed services to control mosquitoes include routine surveillance of mosquito-producing habitats, source reduction through aerial and/or ground treatments using pesticides to treat areas with large mosquito populations, and regular testing for disease transmission in animals.

Real Property Data

Citrus County MCD receives ad valorem taxes to fund district operations. The total taxable value of properties within Citrus County MCD was over $12 billion in the most recent fiscal year under a millage rate of 0.4307 (**Table 1**). Real property parcels subject to district millage increased by 684 parcels between FY 2019-20 and 2022-23 (**Table 2**). Millage rates have declined 4% since FY 2019-20, while the taxable value of real property parcels increased 28% in FY 2022-23 compared to 2019-20, following changes in property values.

Table 1. Millage Rates and Total Taxable Value of Properties Subject to Citrus County MCD Millage

Citrus County MCD	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23
Millage Rate	0.4478	0.4478	0.4307	0.4307
Taxable Value of Parcels ($Mil.)	$8,008	$8,507	$9,060	$10,261
Taxable Value of Accounts ($Mil.)	$2,152	$2,147	$2,115	$1,907
Taxable Value of Centrally Assessed Property ($Mil.)[1]	$1	$1	$1	$1
Total Taxable Value ($Mil.)	**$10,161**	**$10,655**	**$11,176**	**$12,169**

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.*

Table 2. Real Property Parcels Subject to Citrus County MCD Millage

Citrus County MCD	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23
Just Value of Parcels ($Mil.)	$13,627	$14,420	$15,585	$19,495
Real Property Parcels Subject to Millage	146,865	146,932	147,139	147,549
Taxable Value of Parcels ($Mil.)	$8,008	$8,507	$9,060	$10,261

Source: FDOR.

Tangible Personal Property Data

In addition to real property, tangible personal property accounts subject to district millage totaled 7,274 accounts in FY 2022-23, down 2% since FY 2019-20 (**Table 3**). The taxable value of tangible personal property accounts decreased in FY 2022-23 by 11% compared to 2020.

Table 3. Tangible Personal Property Accounts Subject to Citrus County MCD Millage

Citrus County MCD	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23
Just Value of Accounts ($Mil.)	$3,903	$3,966	$3,979	$3,776
Tangible Personal Property Accounts Subject to Millage	7,415	7,345	7,286	7,274
Taxable Value of Accounts ($Mil.)	$2,152	$2,147	$2,115	$1,907

Source: FDOR.

History and Composition

According to district representatives, Citrus County MCD was established in 1953 as an independent special district for the purpose of controlling mosquito populations in Citrus County. The district's creation was ratified and confirmed by the Legislature in Chapter 99-432, *Laws of Florida,* which is the most recent legislative enactment governing the district. The district is also subject to Chapter 189, *Florida Statutes*, given its status as an independent special district; Chapter 388, *Florida Statutes*, setting forth the requirements for creating and operating MCDs in this state; and Chapter 5E-13, *Florida Administration Code*, setting forth rules adopted by the Florida Department of Agriculture and Consumer Services (DACS) for mosquito control program administration.

The Citrus County MCD Board of Commissioners is comprised of three elected members. Members of the board must be resident registered electors. The positions include a chairperson, secretary/vice chairperson, and treasurer. There are no vacant positions at the time of this report.

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 employ a director, employees, and others.

As required by s. 388.151, *Florida Statutes,* the board of commissioners holds monthly meetings, with an agenda published online prior to the proceedings of each assembly.[3] In addition to regular monthly meetings, special

[3] Documents - CCMCD (citrusmosquito.org)

meetings may be called to discuss the draft and final budget for the upcoming fiscal year, as well as one-off topics like district banking practices and aerial activities. A board meeting calendar is published on Citrus County MCD's website each year as well. [4] The board's meetings are open to the public and noticed and conducted in accordance with s. 189.015, *Florida Statutes*. Between October 1, 2022 and June 30, 2023, nine regular board meetings have been held (**Table 4**).

Table 4. Citrus County MCD Commissioner Meeting Counts

Commissioner Meetings	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23[1]
Monthly Meetings	12	12	12	9
Special Meetings	2	4	4	0

Source: TBG Work Product, Citrus County MCD.
[1] 2023 YTD through June.

Intergovernmental Interactions

Citrus County MCD has not received any state grants or federal funding in FY 2022-23, or in the past three fiscal years.

Citrus County MCD interacts with several government entities at the federal, state, and local levels. At the federal level, Citrus County MCD cooperates with the U.S. Forest Service and National Wildlife Refuge to assist with vector management on protected lands to promote public health and maintain the pristine environment.

At the state level, Citrus County MCD provides detailed budgets tracking expected revenues and expenditures at the beginning of each fiscal year, along with monthly reports of actual earnings and expenses, to the DACS. Citrus County MCD also works with the Southwest Florida Water Management District, Florida Department of Environmental Protection (DEP), the Florida Fish and Wildlife Conservation Commission (FWCC), and other state environmental interests about mosquito control activities on conservation lands and in state parks. Citrus County MCD also participates in research projects with other special districts and university affiliated programs.

Citrus County MCD works closely with the Citrus County Health Department and the Florida Department of Health (DOH) for arbovirus disease response by providing vector surveillance and efficient control methods. The DOH also assists in tracking mosquito-borne disease outbreaks for all districts.

At the local level, Citrus County MCD meets with several of the surrounding mosquito control districts and County Board of Commissioners to discuss trends and best practices in the region once a year as well. For public outreach, Citrus County MCD coordinates with the Citrus County School Board, Sheriff's Department, and municipalities such as Inverness and Crystal River.

Resources for Fiscal Year 2021-22

The published FY 2021-22 millage rate established by Citrus County MCD was 0.4307. The district received $4.84 million in revenues and spent $4.85 in FY 2021-22. The district had 31 paid staff and owned 38 vehicles and three buildings in FY 2021-22 (**Table 5**).

[4] 2023 Board Meeting Calendar.pdf (citrusmosquito.org)

Table 5. Citrus County MCD Resources for FY 2021-22

Resource Item	FY 2021-22 Amount
Millage Rate	0.4307
FY 2021-22 Revenues	$4.84 million
FY 2021-22 Expenditures	$4.85 million
Number of Paid Staff	31
Vehicles	1 boat, 24 trucks and vans, 11 utility vehicles, 2 helicopters
Equipment	60 Field equipment, 7 lab equipment, 18 office equipment Surveillance equipment: 49 total, 45 mosquito traps, 10 chicken coops
Facilities	1 facility and 4 buildings

Source: TBG Work Product, Citrus County MCD.

2. Findings

Service Delivery

Citrus County MCD provides services in all areas of Integrated Pest Management efficiently and effectively within the scope of the district's chapter law and the Florida Statutes; other local government entities located wholly or partially within Citrus County MCD do not provide similar mosquito control services.

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; 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.

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. Citrus County MCD conducts activities in each of the eight areas of IPM.

Citrus County MCD's mosquito surveillance activities include ground and aerial surveillance to pinpoint areas of concern and find, identify, and measure mosquito populations, as well as weekly mosquito trap collection and

analysis from 41 sites. Citrus County MCD also assesses landing rate counts at well-known adult mosquito locations or newly discovered larval habitats to monitor mosquito populations. The district's sentinel chicken program enables weekly disease surveillance, with regular blood samples collected and submitted to a DOH laboratory.

Source reduction activities include citizen complaint investigations in residential and public areas and the ongoing treatment of the distinct habitats of Citrus County, including saltmarsh, urban, and freshwater areas. The most common form of source reduction in Citrus County MCD is emptying containers around the homes of residents, including birdbaths, buckets, and kiddy pools. Used tires are another source of standing water that have the potential to become larval mosquito habitats. TBG requested but did not receive information on the number of tires collected or the funds spent by the district on waste tire collection

Mosquito larval sampling and larvicide treatment by truck or helicopter is also conducted to prevent adult mosquitoes from hatching. Aerial treatment is used for larger, more remote areas of the county that would be difficult to spray by truck or by foot. Oils and films, soil bacterium, and insect growth regulators are used to kill mosquito larvae. Some alternative larval control activities include maintaining a mosquito-eating fish hatchery (Gambusia) and other fish-rearing sites to be stocked in seasonal water bodies.

Citrus County MCD's adulticiding activities are carried out by truck or helicopter when adult mosquitoes are most active, most residents are inside, and non-target species are least active. Adulticide activities are only carried out when justified by adult mosquito trapping, landing rate counts, and arbovirus activity.

Operational research to improve application efficiencies and the science of mosquito control are also a focus of Citrus County MCD. Geographic Information System (GIS) software is used to track service requests, adulticide missions, inspection data, trap data, and aerial treatments.

Outreach and education activities include an online, interactive Virtual Open House and the Fight the Bite campaign, which detail the operations of Citrus County MCD and give examples of how residents can reduce mosquito production in residential areas. [5,6] A dedicated Public Education Specialist has also given presentations at elementary schools on the life cycle of mosquitoes and the district has hosted summer camps to teach youth about the various sources of larval mosquito habitats. Other interactions with the public typically occur through resident service requests, public commissioner meetings, and the operation of interactive booths at various county events, including the Manatee Festival in Crystal River, Florida and the Citrus County Sheriff's Office All Hazards Expo in Inverness, Florida.

A summary of the eight areas of IPM in which Citrus County MCD conducts activities is set forth in (**Table 6**).

[5] Welcome to the Citrus County Mosquito Control District! (arcgis.com)
[6] Fight the Bite - CCMCD (citrusmosquito.org)

Table 6. Citrus County MCD Services Overview

Integrated Pest Management Service	Citrus County MCD Services Provided
Mosquito Surveillance	Weekly ground and aerial surveillance using trap collection, landing rate counts, and other analysis
Disease Surveillance	Regular blood sample collection from sentinel chickens and submittal of samples to the state laboratory in Tampa
Source Reduction	Emptying containers when responding to resident service requests and community education on source reduction
Larviciding	Application of larvicides using trucks or helicopters; oils and films, soil bacterium, and insect growth regulators
Adulticiding	Delivery of ultra-low volume (ULV) insecticide using trucks, ATVs, or occasionally by helicopter
Biological and Alternative Control	Mosquito-eating fish hatchery (Gambusia)
Mosquito Control Research	Ongoing research efforts to identify new methods and technologies to improve treatment efficiency
Outreach and Education	Education and outreach facilitated through several avenues, including schools, summer camps, annual open house events, an online Virtual Open House, resident service requests, and public meetings

Source: TBG Work Product, Citrus County MCD.

Analysis of Delivery of Services

Citrus County MCD delivers several mosquito control services across all main areas of IPM that are within the scope of its charter and purposes outlined in applicable laws and regulations. Citrus County MCD provides services in all eight areas of IPM, and all district services are directed toward the abatement and control of mosquitoes. No services were noted that fall outside the district's charter or applicable laws and regulations. As described above, Citrus County MCD covers a fairly unique service area, which includes a dense urban center surrounded by protected and recreation lands. 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 but did not receive any stakeholder responses after multiple contacts. 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.

While TBG did not receive an individual response to an information request, the Citrus County Board of County Commissioners (BOCC) approved a resolution in support of the district on June 20, 2023, which essentially addresses the questions posed to the board by TBG regarding the delivery of mosquito control services by the Citrus County MCD. The resolution indicates that the BOCC views the district and its operations favorably. The BOCC resolution acknowledges the unique contributions and value of the district to the county, supports the continued operation of the district, states that the county does not desire to assume the responsibilities of the district, and that it does not believe there are any worthwhile cost savings or economies of scale that would be achieved by Citrus County taking over the functions of what the BOCC perceives to be a highly successful MCD. The resolution states that the BOCC recommends to the Florida Legislature that the current independent special

district status of the Citrus County MCD be retained in the Laws of Florida and that it directs its Clerk to provide the resolution to the Governor, Senate President, Speaker of the House, and Citrus County Legislative Delegation.

Citrus County MCD conducts source control, including removal of container such as tires that can create larval habitat. Tires create problematic mosquito-producing habitats that are difficult to manage through routine chemical applications but can be managed through proper disposal. In Florida, DEP regulates the disposal of waste tires by creating requirements for the collection and disposal of waste tires at solid waste management facilities and waste tire processing facilities across the state.[7] These facilities typically charge fees for the disposal of waste tires, which MCDs are required to pay if they choose to collect and dispose of waste tires. These facilities may not be able to waive the fees they charge due to bond requirements for their facilities. Districts like Citrus County MCD would benefit from additional sources of funding to help incentivize continued collection of waste tires in the county.

Comparison to Other Services

Other local government entities located wholly or partially within the Citrus County MCD do not provide similar mosquito control services. TBG interviewed staff and reviewed documents available online to establish if services could be or are redundant to or overlapping with county and municipal government services. Services similar to those provided by Citrus County MCD are not provided by county and municipal governments located within the district. Citrus County MCD operations are fairly sophisticated, and other local governments are likely not equipped to deliver the services that the district oversees and administers.

Considerations for Consolidations

Consolidation of operations is not recommended for Citrus County MCD based on the findings of this review. Citrus County MCD operates throughout the entirety of Citrus County and no other similar service has been identified for consolidation.

Resource Management

Citrus County MCD is managing its resources in an efficient and effective manner to achieve its goals and objectives.

To assess the district's resource management, TBG analyzed information on revenue sources and on 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 last 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; and interviewed district staff.

[7] Sections 403.717 and 403.718, *F.S.* and Ch. 62-711, *F.A.C.*

Current and Historic Revenues and Expenditures

Revenues and expenditures were relatively consistent, with revenues collected exceeding expenditures in two of the past three full fiscal years. To review the current and historic revenues and expenditures of Citrus County MCD, TBG requested and received financial information from FY 2019-20 through May 2022-23. In addition, TBG interviewed Citrus County MCD staff and reviewed documentation both published online and as provided from Citrus County MCD's accounting and operation systems.

Citrus County MCD's fiscal year begins October 1st and ends September 30th. Citrus County MCD's funding is primarily comprised of ad valorem taxes. The Citrus County Property Appraiser, with approval from the Florida Department of Revenue (FDOR), certifies the county's tax roll each year and provides the information to the Citrus County Tax Collector, which in turn collects monies authorized under the district's taxing authority. Millage rates are set each year by Citrus County MCD's Board of Commissioners.

Revenues increased slightly from $4.60 million in FY 2019-20 to $4.84 million in FY 2021-22, with the majority of revenues in each year coming from ad valorem taxes and a relatively small percentage from other sources like interest earnings (**Table 7**). Expenditures also increased during the same time period from $3.80 million in FY 2019-20 to $4.85 million in FY 2021-22. Revenues have exceeded expenditures in two of the past three full fiscal years. Expenditures were greater than revenues in FY 2021-22 by approximately $10,000.

Citrus County MCD's millage rate has remained fairly constant over the review period as well (starting at 0.4478 in FY 2019-20 and declining to 0.4307 in FY 2021-22). As the taxable value of properties continues to increase and additional residential developments are completed in Citrus County, the revenues of the district will likely remain sufficient to support its operations.

Table 7. Revenue and Expenditures

Revenue and Expenditures (in $Mil.)	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23[1]
Revenues	$4.60	$4.84	$4.84	**$4.96**
Ad Valorem	$4.40	$4.63	$4.65	$4.88
Other Sources	$0.19	$0.21	$0.19	$0.08
Expenditures	$3.80	$4.74	$4.85	**$4.11**
Administrative Costs	$0.60	$0.79	$1.25	$1.13
Direct Program and Activity Costs	$3.19	$3.95	$3.60	$2.98
Other Expenditures	$0	$0	$0	$0

Source: TBG Work Product, Citrus County MCD.
[1] 2023 YTD through May.

Administrative Costs

Expenditures on administrative costs increased during the review period. As requested by TBG, Citrus County MCD provided a breakdown of total expenditures by administrative and other program costs such depreciation for FY 2019-20 through May of FY 2022-23.

Costs fell into several categories, with the highest amounts of administrative costs during the review period including the indirect Personal Services and Personal Service Benefits, Land and Buildings, and Operating Expenses

categories (**Table 8**). Citrus County MCD recently completed construction on a double hangar to house their two helicopters, accounting for the rise in expenditures in the Land and Buildings category In FY 2021-22 and FY 2022-23.

Table 8. Administrative Cost Data

Expenditure Category[1]	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23[2]
Personal Services	$225,200	$230,826	$253,651	$189,936
Personal Service Benefits	$117,655	$134,332	$150,522	$113,424
Operating Expenses	$209,082	$249,153	$289,741	$222,553
Travel, Utilities, Repair, & Maintenance	$30,443	$45,636	$25,520	$24,846
Supplies and Materials	$21,968	$17,587	$13,068	$20,079
Land and Buildings	$0	$109,169	$512,916	$559,637
Total	**$604,349**	**$786,703**	**$1,245,419**	**$1,130,475**

Source: TBG Work Product, Citrus County MCD.
[1] Categorization of administrative costs was completed by Citrus County MCD based on an outline provided by TBG to ensure consistency across reports.
[2] 2023 YTD through May.

Direct Program Costs

Expenditures on direct program costs were approximately $3 to $4 million from FY 2019-20 through FY 2021-22. As requested by TBG, Citrus County MCD provided a breakdown of total expenditures by direct program costs for FY 2019-20 through May of FY 2022-23.

Expenditures on direct Personal Services and Personal Service Benefits increased between FY 2019-20 and FY 2021-22 (**Table 9**). Direct Operating Expenses spiked in FY 2020-21 due to contracted services provided by Vector Disease Control International (VDCI). At the time, contracted aerial spraying was necessary as Citrus County MCD's helicopter had a major failure at the beginning of the season and was out of service for over a year. Direct Travel, Utilities, Repair, & Maintenance-related costs fluctuated a great deal during the review period, largely due to annual increases and decreases in equipment maintenance costs. Another large direct expenditure category, Supplies and Materials, saw cost decreases in FY 2021-22 compared to the prior two fiscal years, largely due to fluctuations in chemical costs and program needs. Total direct program costs declined from FY 2020-21 through May of FY 2023.

Table 9. Direct Program Cost Data

Expenditure Category[1]	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23[2]
Personal Services	$765,930	$835,811	$885,332	$598,193
Personal Service Benefits	$400,193	$486,411	$525,374	$357,224
Operating Expenses	$6,820	$275,872	$9,753	$6,881
Travel, Utilities, Repair, & Maintenance	$170,346	$315,126	$83,189	$445,958
Supplies and Materials	$1,846,851	$1,999,422	$1,285,807	$1,256,346
Machinery & Equipment	$2,259	$40,431	$811,075	$316,938
Total	**$3,192,398**	**$3,953,072**	**$3,600,530**	**$2,981,539**

Source: TBG Work Product, Citrus County MCD.
[1] Categorization of direct program costs was completed by Citrus County MCD based on an outline provided by TBG to ensure consistency across reports.
[2] 2023 YTD through May.

Contracts for Services

Contracted service costs were relatively consistent during the review period, expect for FY 2020-21 when aerial operations were outsourced. TBG reviewed documentation provided by Citrus County MCD to determine what services were contracted out rather than being conducted in-house.

Citrus County MCD contracts out several administrative services, including legal services and annual program audits. The increase in direct Other Contractual Services costs in FY 2020-21 includes payments to VDCI for aerial spraying during an extended period of in-house helicopter downtime. Except for FY 2020-21, expenditures on contracted services are relatively low compared to other districts.[8] Indian River MCD has the most expenses in contracted services of districts of similar size. Expenses for Indian River MCD range from $321,840 to $226,982 through FY 2019-2020 to FY 2022-2023. Citrus County MCD has significant lower costs other than FY 2020-21. **Table 10** summarizes the cost of contracted services during the period of review.

Table 10. Summary of Contracted Services

Expenditure Category[1]	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23[2]
Professional Services	$0	$0	$0	$0
Legal & Engineering Services	$12,329	$21,713	$55,120	$14,669
Accounting & Auditing	$21,412	$21,555	$20,939	$17,976
Other Contractual Services	$4,517	$273,119	$6,726	$4,511
Total	**$38,258**	**$316,387**	**$82,785**	**$37,156**

Source: TBG Work Product, Citrus County MCD.
[1] Categorization of contracted costs was completed by Citrus County MCD based on an outline provided by TBG to ensure consistency across reports.
[2] 2023 YTD through May.

Staff

Citrus County MCD employed 25 in-house staff members in FY 2021-22 with a range of responsibilities and expertise. TBG examined detailed staffing information provided by Citrus County MCD, as well as documentation available online and through DACS reporting and audits.

According to Citrus County MCD's Detailed Work Plan filed with DACS, the district budgeted for about 30 positions in FY 2021-22, including three commissioners, 25 full-time workers with a wide range of responsibilities and expertise, one seasonal/on call pilot, and one intern (**Table 11**). Citrus County MCD had no contracted staff or volunteers in FY 2022, but does run an intern program to recruit new staff. The majority of Citrus County MCD staff are involved in direct program operations. In addition to one full-time helicopter pilot, the Citrus County MCD budgets for another on call/seasonal pilot for backup. An organizational chart is provided in **Figure 3**.

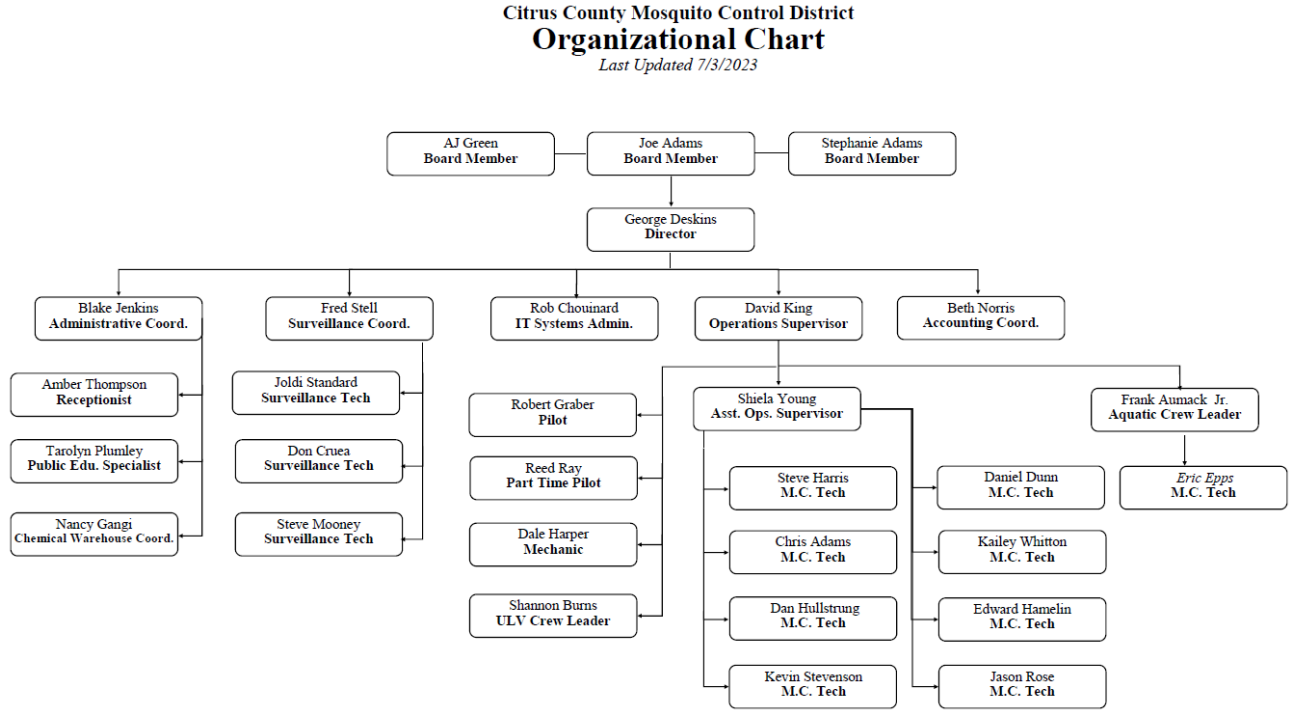
[8] TBG reviewed FY 2021-22 expenditures and total available staff positions across the 15 MCDs as part of this review and categorized districts as follows: very small districts are those with expenditures less than $1 million and staff under 10 (Buckhead Ridge, Fort Myers Beach, and Moore Haven MCDs); small districts are those with expenditures between $1 and $5 million and staff between 11 and 49 (Amelia Island, Beach, Citrus, East Flagler, Indian River, and South Walton County MCDs); moderately-sized districts are those with expenditures between $5 and $10 million and staff between 11 and 49 (Anastasia, Manatee, and Pasco MCDs); and large districts are those with expenditures over $11 million and more than 50 staff positions (Collier, Keys, and Lee MCDs).

Table 11. Citrus County MCD Staff Positions

• Commissioners • Executive Director • Administrative Coordinator • Public Education Specialist • Accounting Coordinator • IT Systems Administrator • Receptionist	• Operations Supervisor • Assistant Operations Supervisor • Aquatic Crew • ULV Crew Leader • Surveillance Coordinator	• Surveillance Techs • Helicopter Pilot • Equipment Mechanic • Mosquito Control Tech 2 • Mosquito Control Tech 1 • On Call Pilot/Seasonal • Interns

Source: Citrus County MCD.

Figure 3. Citrus County MCD Organizational Chart



Source: Citrus County MCD.

Analysis of Program Staffing Levels

Citrus County MCD had a stable number of commissioners and employees over the review period and is appropriately staffed for the scale and scope of its operations compared to other similarly sized MCDs in Florida. To assess program staffing levels, TBG reviewed documentation provided by Citrus County MCD and interviewed staff.

According to actual employment data provided by Citrus County MCD, typically has 3 commissioners, between 23 to 26 full-time staff, and 2 to 3 part-time staff, including seasonal workers and interns. The majority of Citrus County MCD staff are involved in direct program operations. Citrus County MCD has not engaged with volunteers

according to interviews and does not have any contracted positions. A few positions remained vacant over the study period. Annual terminations have decreased since FY 2019-20, lowering the turnover rate from 25% in FY 2019-20 to 13% in FY 2021-22. Citrus MCD's staffing practices, positions, and organization are appropriate for the scale and scope of its operations compared to other similarly sized MCDs in the state. Indian River MCD is a similarly sized district in both area and budget with a staff of 35, similar to Citrus County MCD's staffing shown in (**Table 12**). Beach MCD and East Flagler MCD are smaller in area and budget but have similar ratios of staff size to budget as Citrus County MCD.

Table 12. Citrus County 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	23	23	25	26
Part Time/Seasonal	2	2	3	3
Contracted	0	0	0	0
Volunteers	0	0	0	0
Vacancies	2	2	3	4
Total Positions	**28**	**28**	**31**	**32**
Annual Termination	7	5	4	0
Turnover Rate	25%	18%	13%	0%

Source: TBG Work Product, Citrus County MCD.
[1] 2023 YTD through April.

Equipment and Facilities

Equipment and vehicles owned by Citrus County MCD are sufficient for current operations compared to similarly sized mosquito control districts and are being serviced regularly to maintain and maximize efficiency in operational capabilities. TBG analyzed documentation provided by Citrus County MCD and interviewed staff to review any trends or changes in the level of equipment and facilities purchased or maintained over the review period.

Citrus County MCD owns two helicopters: (1) A 1973 Bell-206 model purchased in 2004 for $350,000 and (2) A Bell-206B III model purchased in FY 2021-22 for $700,000. The additional helicopter was purchased in FY 2021-22 because repeated mechanical issues with their existing helicopter limited district services while being inoperable for over a year. During this time, Citrus County MCD contracted out aerial spraying operations.

Other vehicles owned by Citrus County MCD as of FY 2022-23 include one boat, 24 trucks, and 11 ATVs and utility vehicles. A 2021 Ford F-350 was purchased in FY 2021-22 for $33,469 and two 2019 Ford F-150s were purchased in FY 2019-20 for $19,464 each. Ten Sportsman 450 ATVs were also acquired in FY 2019-20 for $5,499 each.

Other assets owned by Citrus County MCD include 64 pieces of field equipment, including a $39,084 Isolair Wet Broadcaster System, seven pieces of lab equipment, including five microscopes priced under $2,000 each, and 16 pieces of office equipment (computers, servers, and furniture). A Dell Power Edge R740XD server was purchased in 2019 for $10,167 to upgrade computing capacity. Citrus County MCD operates numerous sentinel chicken sites, and collects weekly data from 19 Center for Disease Control and Prevention (CDC) Light/CO2 Traps and 22 New

Jersey Light Traps. The CDC traps are moved from time to time, but the New Jersey traps are in more permanent locations.

Citrus County MCD owns one facility site with four buildings, including a main office and space to facilitate field and laboratory operations. In FY 2022-23, an aircraft hangar was built on the property. Current facilities appear sufficient to maintain the current service area, but may need additions as the population of Citrus County continues to grow. A summary of the number of vehicles, equipment, and buildings owned by Citrus County MCD is provided in **Table 13** by fiscal year. The number of utility field vehicles has decreased as Citrus County MCD has changed operations to rely less on fogging activities. A summary of surveillance equipment at established sites around Citrus County is shown in **Table 14**.

Citrus County MCD compares to other districts of similar size in expected equipment ownership. Beach MCD has 18 trucks and vans, 2 helicopters, 37 pieces of surveillance equipment, and 73 pieces of other equipment. Indian River MCD also has 30 trucks and vans, and 23 traps. In comparison to other districts, Citrus County MCD has an appropriate amount of equipment and resources.

Table 13. District Vehicles, Equipment, and Facilities

	FY 2019-20	FY 2020-21	FY 2021-22	FY 2022-23[1]
Vehicles	**47**	**37**	**39**	**38**
Helicopters	1	1	2	2
Boats	1	1	1	1
Trucks and Vans	23	23	24	24
ATVs and Utility Vehicles	22	12	12	11
Equipment	**77**	**77**	**85**	**87**
Field Equipment	57	56	60	64
Lab Equipment	4	5	7	7
Office Equipment	16	16	18	16
Facilities	**1**	**1**	**1**	**1**
Buildings	4	4	4	4

Source: TBG Work Product, Citrus County MCD.
[1] 2023 YTD through April.

Table 14. Surveillance Equipment

Equipment	FY 2019-20	FY 2020-21	2021-22	2022-23[1]
Mosquito Traps	**36**	**36**	**33**	**45**
BG-Sentinel	4	4	4	4
CDC LT TRAP/CO2	10	10	10	22
New Jersey Light	22	22	19	19
Sentinel Chicken Coops	12	12	10	10
Sentinel Chickens	72	72	72	72

Source: TBG Work Product, MCD.
[1] 2023 YTD through April.

Strategic or Other Formal Plans for the District's Future

Citrus County MCD has no formal strategic plans but has developed future plans with their Board. To assess Citrus County MCD's plans for the future, TBG reviewed documentation provided by the district and found on the official website and information gleaned from interviews.

In FY 2021-22, Citrus County MCD issued a public statement supporting the use of IPM to avoid impacting non-target species when preforming mosquito control. In addition, Citrus County MCD plans to continue reducing adulticide activities and concentrate on treating larval mosquito populations to reduce chemical use. Using ULV applications, timing applications to avoid non-targets, and improving communication with the public, Citrus County MCD strives to balance public health and environmental stewardship.

A formal Strategic Plan is recommended to further expand upon Citrus County MCD's future plans.

Previous Performance Reviews, Financial Audits, and Resident Feedback Surveys

Citrus County MCD had no identified issues with performance reviews or residential feedback. There were no material findings nor weakness in internal controls identified in the FY 2019-20 through FY 2021-22 audits. Analysis of Citrus County MCD's financial audits was conducted for FY 2019-20 through FY 2021-22, as provided by the district and confirmed with the annual reports published on the Florida Auditor General's website.[9]

In FY 2018-19, independent auditors found a material weakness with Citrus County MCD's reporting of post-employment benefits. Citrus County MCD administrators responded to the finding by implementing procedures to ensure accounting entries are reviewed by management. This issue was resolved and did not appear on any subsequent financial statements or audits. Auditors found no issues during the FY 2019-20 to FY 2021-22 periods and determined that all submitted documentation fairly represented the District's financial position.

Citrus County MCD has not used resident surveys to collect feedback, nor were other performance review documents identified. Interaction with the public is typically through public commissioner meetings, resident service requests, and public outreach such as the 2022 Virtual Open House conducted by Citrus County MCD.

Analysis of Management Reports/Data and Performance Information

Citrus County MCD actively manages performance of its operations and administration to measure results in a timely manner. To assess management reporting and performance information, TBG reviewed documentation provided by Citrus County MCD, interviewed staff, and reviewed online documentation.

The governing board of commissioners receives weekly updates from Citrus County MCD staff to monitor disease transmission and operational successes and failures. The information reviewed reflects regular monitoring of performance, identification of issues as they arise, and discussion of opportunities to improve efficiency and effectiveness. Examples include weekly tracking of rainfall and mosquitoes trapped as well as collection of feedback from citizens. Management applies performance information to adjust operations appropriately.

One of the primary ways Citrus County MCD measures the success of its programs is the regular testing and monitoring for human cases of mosquito-borne diseases. The sentinel chicken program provides a metric for measuring the prevalence of mosquito-borne diseases in the county without potentially endangering human life. Citrus County MCD records trap counts, chicken coop inspection results, and the number of chicken and human cases of arbovirus on a weekly basis. Timely lab results allow for treatment missions the same or next day, before mosquitoes proliferate.

[9] Florida Auditor General - E-Files (flauditor.gov)

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

Citrus County MCD has demonstrated careful management of funds based on an analysis of annual budgets, financial audits, and income statements. In addition, the district routinely conducts activities to identify new methods to improve efficiencies and reduce costs. To assess cost, timing, and quality of program efforts, TBG reviewed documentation provided by Citrus County MCD, publicly available data online, and interviewed staff. The fiscal, operational, and management activities align well with the Citrus County MCD mission and are of appropriate in size and scale for its tasks. Citrus County MCD is considered a well-managed MCD by peers across the state. Citrus County MCD programs include continuous monitoring and surveillance to ensure effective treatments through aerial and truck-based larviciding and aquatic weed control to prevent the need for adulticides as much as possible. In addition to protecting the environment and local conservation lands, reducing the need for adulticiding reduces costs and inefficiencies associated with one-off treatments or re-treatments.

Concern over balancing controlling mosquitoes while preventing adverse effects to beneficial species like bees and butterflies has been addressed by Citrus County MCD as well. With a public statement in FY 2021-22, Citrus County MCD reaffirmed its commitment to reducing environmental impacts on the thousands of acres of conservation lands in the county. In an attempt to reduce the use of harsher adulticides, Citrus County MCD concentrates on larval aquatic habitats to prevent their emergence into the environment altogether. In addition, the larvicides used by the district do not pose unreasonable risks to human health according to the U.S. EPA. Citrus County MCD has also maintained a mosquito fish hatchery to feed on mosquito larvae as another form of biological mosquito control.

Citrus County MCD has successfully purchased a second helicopter to assist in the timely delivery of mosquito control services, achieving its stated goal in FY 2021-22. Previously, Citrus County MCD relied on an older model helicopter only that routinely went down for maintenance and resulted in extended lag times between surveillance indicating aerial treatments were needed and when the spraying could occur. In addition, the program's move away from adulticides to increased use of larvicides will benefit from the additional aerial support.

On a day-to-day basis, Citrus County MCD uses a myriad of approaches to monitor and measure its effectiveness. Citrus County MCD monitors on a real-time basis the completion rate of missions, the area treated by truck manually, or aerially, and other parameters. GIS software is used to map and visualize service requests, ULV spray missions, inspection data, trap data, and aerial treatments. This technology allows for cluster identification and helps the district allocate resources efficiently and economically.

Goals, Objectives, and Performance Measures and Standards

Citrus County MCD has several goals and objectives that adequately address its statutory purpose; it monitors performance using service call responses and disease prevalence metrics but could develop additional performance measures and standards.

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 evaluated the district's actual performance in meeting its goals and objectives. TBG assessed 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 previous performance reviews and requested and reviewed audits. In addition, 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

Citrus County MCD's chapter law does not delineate specific programmatic goals for the district, and the district does not have a strategic plan that specifies goals and objectives. Because the district does not have formally defined goals, TBG interviewed staff and reviewed documents prepared by Citrus County MCD or available online to enumerate the district's goals and objectives:

- Curbing mosquito populations that may become a nuisance or a threat to public health in Citrus County.
- Increasing larvicide and source reduction efforts to prevent the growth of disease spreading adults.
- Reducing environmental impacts on the thousands of acres of conservation lands in Citrus County.
- Acquisition of a second helicopter for aerial operations to reduce downtime and lag when the first helicopter is down for maintenance (this goal was achieved in FY 2021-22).
- Reducing the use of ULV trucks from six full-time trucks to just one.

Objectives

Citrus County MCD uses best practices and procedures to meet mosquito control objectives while limiting impacts to other non-target species and district residents and visitors according to interviews with Citrus County MCD staff and documents prepared by the district or found online by TBG.

Citrus County MCD's staff reported that its objectives include:

- Ground and aerial surveillance and monitoring areas of concern, including weekly trap and sentinel chicken collections and landing rate counts.
- Review of resident service requests to assist with resource allocation.
- Using larvicides and other biological controls, such as mosquito fish, to prevent adult mosquitoes from developing.
- Limited aquatic weed control to help curb larval and pupal populations, especially in floating plants like water hyacinth and water lettuce.
- Using ULV spray applications to control adult mosquitoes in times of increased activity.
- Effectively tracking service requests, fog missions, inspection data, trap data, aerial treatments using GIS software.
- Communicating with the public through citizen service requests, receiving written or verbal resident feedback, an interactive virtual open house, and other means.

The problems addressed by the district's goals and objectives relate to controlling mosquito populations in the district, reducing environmental impacts, and communicating effectively with the public. Concern over balancing

controlling mosquitoes while preventing adverse effects to beneficial species like bees and butterflies has been addressed by Citrus County MCD. In an attempt to reduce the use of harsher adulticides, Citrus County MCD concentrates on larval habitats to prevent the emergence of adult mosquitoes into the environment. In addition, larvicides used do not pose unreasonable risks to human health according to the U.S. Environmental Protection Agency (EPA). Citrus County MCD also uses *Gambusia* (mosquito fish) to feed on mosquito larvae as another form of biological mosquito control.

The expected benefits of the districts goals and objectives are that the application of specific IPM practices and technologies will effectively manage mosquito populations in the district, that use of technology will reduce environmental impacts, and that communication with the public will improve through various outreach and communication activities. Some expected benefits of reducing mosquito populations are the prevention of disease, including serious illnesses like encephalitis, West Nile virus, Zika virus, yellow fever, and dengue fever. The general public welfare is also improved with the reduction of nuisance mosquito populations.

Performance Measures and Standards

Citrus County MCD monitors performance using information on responses to service calls and arbovirus prevalence in the district but has not developed performance measures and standards that it can use to track achievement of each of its goals and objectives. TBG reviewed documents prepared by Citrus County MCD, interviewed staff, and reviewed records provided by the district and records available online or through the DOH website.

The district has developed several goals and objectives, and it tracks activities with data. For example, the district monitors weekly rainfall and mosquito trap counts and uses this information to determine when and where to apply mosquito control treatments. However, it has not established formal performance measures and standards with which to track its progress toward achieving all district goals and objectives over time. The district does track arbovirus prevalence in the district and responses to service calls with the following measures and standards.

1. **Standard:** Zero human cases of arboviruses acquired in Florida and detected in Citrus County.

   Measure: Citrus County MCD conducts weekly arbovirus surveillance and monitors weekly Florida DOH reports.

2. **Standard:** Address citizen requests for mosquito control efforts in a timely manner.

   Measure: All calls to the Citrus County MCD office and requests made through the website are reviewed. The district uses resident complaints to identify where clusters of mosquitoes may be occurring to help make informed decisions about the level of response needed. While the district reported that it aims to respond to requests in a timely manner, it did not report a specific standard for timeliness.

Analysis of Goals, Objectives, and Performance Measures

Citrus County MCD has goals and objectives but needs additional performance standards and measures to allow it to measure progress towards its goals; locally acquired arbovirus counts have been zero over the review period and the district has consistently responded to service requests.

Based on the data reported in this review, Citrus County MCD has effectively curbed mosquito populations that could become a nuisance or a threat to public health within the current and last three calendar years. Zero human arbovirus cases were reported by Florida DOH in Citrus County over the review period. In addition, no human

deaths have occurred according to district staff. Citrus County MCD's goal to increase larvicide efforts to prevent the growth of disease-spreading adults has been successful. The district has responded to all service calls in the current and past three fiscal years and reported average resolution response times between 20.56 and 28.82 hours.

Table 15 illustrates performance measures that were able to be quantified by Citrus County MCD, including documented human arbovirus cases from the Florida DOH for the current and past three calendar years and district service calls and responses for the current and past three fiscal years. A summary of Citrus County MCD performance measures and a brief assessment of whether standards were met is provided in **Table 16.**

Table 15. Performance Measures for Citrus County MCD

Performance Measure	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	1,454	2,979	1,629	388
Service Responses	1,454	2,979	1,629	388
Average Resolution Response Time	20.56 hours	25.39 hours	19.67 hours	28.82 hours

Source: TBG Work Product, Citrus County MCD, Florida DOH.
[1] Florida DOH data is provided by calendar year (CY).
[2] 2023 YTD through April.

Table 16. Assessment of Performance Measures and Standards for Citrus County MCD

Performance Measure	Performance Standard	Assessment
Human arbovirus disease cases	Zero human cases of arboviruses acquired in Florida and detected in Citrus County	Standard was met.
Calls received and responded to	Address citizen requests for mosquito control efforts in a timely manner	Standard of responding to all service calls was met; standard of responding to calls in a timely manner is indeterminate due to the lack of a specific district standard on timeliness, but all service calls were resolved in approximately 24 hours or less, suggesting timely response.

Source: TBG analysis, based on review of information provided by Citrus County MCD.

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

Perception of Citrus County MCD's performance appears positive based on stakeholder feedback. TBG reviewed online documentation relating to public information and stakeholder workshops, as well as resident and other

stakeholder comments and feedback provided by Citrus County MCD, and interviewed district staff to assess public perceptions.

Although Citrus County MCD has not completed resident surveys, feedback is collected through the online service request portal to track resident satisfaction with district services. In addition, emails from residents who attended outreach events reflected positively on Citrus County MCD's expertise and training. Several other stakeholders, including students, public-school staff, Citrus County Parks & Recreation, and state agencies like Florida Forever, have expressed appreciation for Citrus County MCD's presentations and outreach efforts through cards and emails. Citrus County MCD also launched a virtual open house in 2022 to serve as public outreach and inform residents about the operations and services they support with their tax dollars. Reception has been largely positive.

TBG reached out directly to the Florida DOH in Citrus County and the Citrus County Parks & Recreation for stakeholder input on Citrus County operations, but received no response after multiple attempts. As described in the "Service Delivery" section of the report, the Citrus County BOCC approved a resolution in support of the district on June 20, 2023, indicating that the BOCC views the district and has a very favorable position regarding the district's purpose and operations and expressed strong support for the district's continuation.

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. TBG determined that the district could consider revisions to its strategic planning processes and that the Legislature may wish to consider directing the Florida Coordinating Council on Mosquito Control to develop model goals, objectives, and performance measures and standards to assist MCDs in this state.

Strategic Plan and Performance Measurement: Citrus County MCD does not currently have a formal strategic plan or formally established goals, objectives, or performance measures and standards. The district could adopt goals, objectives, and performance measures and standards through a strategic planning process to consistently monitor and maintain performance information over time. A successful strategic plan includes outlining the mission, vision, and background of the district as well as identifying the operational and growth needs to fulfill the future needs of mosquito control within the district in a timely manner with sufficient staff and resources and within budget. A successful strategic plan outlines goals of the district over a specified time horizon, typically five years and may include identifying potential capital improvement projects and opportunities for the district to improve efficiencies.

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 mosquito control districts 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 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 the DACS, DEP, and FWCC, 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 standards and measures to assist MCDs with performance monitoring.[10]

Recommendations

Table 17 summarizes recommendations and associated considerations.

Table 17. Recommendations with Associated Considerations

Recommendation	Considerations
The district could adopt 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.	• This recommendation would require additional staff time and may result in additional administrative costs to the district. • Staff in other districts may incur some additional workload if Citrus County MCD chooses to seek guidance from other districts regarding 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 standards and measures to assist MCDs with performance monitoring.	• 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 that lack staff resources for the development of such performance information.

Source: TBG analysis, based on review of information provided by Citrus County MCD.

[10] Section 388.46, *F.S.*

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. Citrus County MCD did not provide TBG with a response letter for inclusion in the final report.

Attachment 1

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)
***Aedes aegypti* 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
***Aedes albopictus* 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 *Aedes aegypti* 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
***Anopheles* 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, *Florida Statutes*, 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
***Bacillus thuringiensis israelensis* (*Bti*)**	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 *Aedes* 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
***Culex* 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.
***Culiseta melanura* 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 *Aedes aegypti* or *Aedes albopictus*
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

Term	Definition
	problems; in Florida, the freshwater swamp inhabiting mosquito *Culiseta melanura* 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, *Florida Statutes,* 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,

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	*Ae. aegypti* 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 *Ae. aegypti* 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

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 *Anopheles* 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

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 *Culex* 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, *Florida Statutes,* 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

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., *Aedes aeypti* or *Aedes albopictus*) 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 *Culex* 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

Term	Definition
Zika virus	A virus that originated in the Zika region of Africa and is transmitted by the mosquitoes *Aedes aegypti* and *Aedes albopictus;* 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.

Attachment 2

INTEGRATED PEST MANAGEMENT SUMMARY

September 2023

Prepared for

The Florida Legislature

Prepared by

The Balmoral Group

165 Lincoln Avenue

Winter Park, FL 32789

Attachment 2

Term	Summary
Integrated Pest Management	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.
Mosquito Surveillance	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.
Source Reduction	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. Current saltmarsh source reduction techniques in Florida include • 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
	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. 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.
Larvicides and Larviciding	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).
Adulticides and Adulticiding	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.

Term	Summary
Biological and Alternative Control	Biological control agents include microbial control agents (e.g., bacteria, such as *Bacillus thuringiensis* or *Bt*, 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 Gambusia mosquitofish to Collier County residents to release in standing water on their property to manage mosquito larvae. Alternative control methods include the sterile insect technique, trapping, repellents, and bug zappers.
Disease surveillance	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.
Mosquito Control Research	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.
Outreach and Education	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

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.