



Audit of the Vegetation Management Program

Project #17-10

Prepared by
Office of the Inspector General

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SOUTH FLORIDA WATER MANAGEMENT DISTRICT

October 12, 2017

Audit and Finance Committee Members:

Re: Audit of the Vegetation
Management Program - *Project*
No. 17-10

This audit was performed pursuant to the Inspector General's authority set forth in Chapter 20.055, F.S. Our objective was to determine whether the vegetation management program is meeting its goals and the herbicide application work orders are adequately monitored. Dan Sooker and I prepared this report.

Sincerely,

A handwritten signature in blue ink, reading "J. Timothy Beirnes".

J. Timothy Beirnes, CPA
Inspector General

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BACKGROUND

In accordance with the Fiscal Year 2017 Audit Plan, our Office completed an Audit of the Vegetation Management Program.

The primary purpose of the vegetation management program is to ensure that South Florida's conservation lands are preserved and the region's water resources continue to function unobstructed by aquatic vegetation. Vegetation management activities primarily benefit the District-wide water resource management and regional restoration programs. These programs integrate mechanical, biological, herbicidal and physical methods (such as fire and flooding) to control invasive vegetation. The Vegetation Management Section is primarily responsible for overseeing the vegetation management control program. The Land Stewardship Section and District field stations supplement program oversight in their areas of responsibility.

The vegetation management program's goal is to attain maintenance control over invasive plants in canals, lakes, rights-of-ways, and District properties. Maintenance control is defined as a means of applying management techniques on a continuous basis to keep invasive plant populations at the lowest feasible level. In District canals, this means maintaining floating aquatic plants at less than 1% of the entire canal surface area and 50% unobstructed for submersed plants. To attain maintenance control, multiple herbicide applications are usually required over the course of several years. As such, the Vegetation Management Section will not begin invasive plant treatment unless they can commit to reaching maintenance control in the treated area.

Invasive plants are non-indigenous vegetation that have no natural enemies, such as insects, and can often out-compete native vegetation because of the lack of growth restraints. The Florida Exotic Pest Plant Council¹ identified 165 plants as invasive species, of which, 85 are considered category 1 species that are defined as most invasive and disruptive. Category 1 invasive plants displace native species, change community structures or ecological functions, or hybridize with natives. Examples of Category 1 species are melaleuca, lygodium, water hyacinth, and hydrilla. The application of herbicide products to control exotic vegetation is usually the most cost-effective approach and account for a large majority of program expenditures. Herbicides used by the District

¹ Florida Exotic Pest Plant Council is a not-for-profit organization that supports the management of invasive exotic plants in Florida's natural areas by providing a forum for the exchange of scientific, educational and technical information. The Council's 2016 Invasive Plant List reported 85 Category 1 and 80 Category 2 invasive plants in Florida.

to control invasive exotic plants are limited to only those approved by the Environmental Protection Agency and the Florida Department of Agriculture and Consumer Services.

The primary sources of funding for vegetation management programs are the State of Florida, ad valorem taxes, and trust fund revenue. Vegetation Management Program expenditures and budget for the last three fiscal years were as follows:

Program	Expenditures FY2014-2015	Expenditures FY2015-2016	Budget FY2016-2017
Aquatic Plant Control	\$9,911,268	\$8,932,517	\$10,361,561
Exotic Plant Control	6,984,994	8,762,914	9,840,150
Terrestrial Plant Control	1,796,198	2,155,468	3,675,675
Biocontrol Exotic Plant	667,900	1,235,750	1,008,621
Mechanical Vegetation Control	389,353	327,042	474,491
Total	\$19,749,713	\$21,413,691	\$25,360,498

Vegetation Management Program expenditures have increased from Fiscal Year 2015 because of a number of reasons. New infrastructure at Picayune Strand and other District locations has led to additional vegetation management cost in the Exotic Plant Control program. FWC has increased its reimbursement for vegetation management activities in the Loxahatchee Reserve which also resulted in added Exotic Plant Control Program costs. The District has also become more reliant on outside contractors for herbicide application services and less on District staff resulting in more Terrestrial Plant Control and Aquatic Plant Control costs. Whereas, District field station staff conducted aquatic plant and other control activities in the past, herbicide application services are now largely outsourced.

OBJECTIVES, SCOPE, AND METHODOLOGY

The objective of the audit was to determine whether the vegetation management program is meeting its goals and the herbicide application work orders are adequately monitored. This program was last audited in Fiscal Year 2010. In order to accomplish our objectives, we performed the following:

- Interviewed staff that manages vegetation management program activities.
- Examined relevant work order documents related to herbicide treatments.
- Conducted site visits of herbicide treated work sites.

We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

AUDIT RESULTS

Executive Summary

Since the last audit in Fiscal Year 2010, the District has outsourced most of the vegetation management control activities to herbicide application contractors. In the past, District field station staff conducted aquatic plant spraying activities but most of these staff have been reassigned to other positions within the field stations. Only the Fort Lauderdale Field Station still conducts vegetation management control activities with District staff.

For the period October 1, 2011 through March 31, 2017, the District has expended \$68.9 million on vegetation management control activities with outside contractors. We selected 30 work orders totaling \$3.8 million to determine whether the contracted herbicide services were consistent with District work plans and that the District project managers were monitoring the work. Overall, District staff effectively monitored herbicide application service work orders, often in difficult work site locations. However, work order monitoring could be improved with more timely inspections and completion of site inspection documentation. We also found that Contract Inspection Specialists have varied knowledge of herbicide application services. As such, training would prove beneficial to ensure that staff have comparable skillsets to conduct work site inspections.

The District provides upland invasive plant and other related services on a reimbursement basis to Florida Fish and Wildlife Conservation Commission (FWC) through two 10-year agreements. We found that the District could improve cash collections by invoicing FWC more frequently (at least monthly) for reimbursable costs.

We found that approximately 85% of vegetation management work orders are negotiated as time and material contracts with a not-to-exceed maximum amount. Generally, the advantage of a time and material work order is that it can be quickly executed, even when the terrain is dense with invasive vegetation and difficult to estimate. The disadvantages of time and material contract is that the contractor has little incentive to control costs and requires thorough day-to-day District oversight by knowledgeable staff. Conversely, fixed cost contracting provides maximum incentive for the contractor to control costs and perform effectively but requires more initial planning. Herbicide application costs are difficult to estimate for certain District locations, thus, for these projects time and material work orders are the best choice. For other herbicide application projects,

fixed cost should be the default contract method. Accordingly, we recommend that the District phase in a fixed cost contract method in place of time and material work orders, when appropriate and cost effective.

Work Order Monitoring Activities Could be Improved

Since the last vegetation management program audit in Fiscal Year 2010, the District has outsourced most of the vegetation management control activities to herbicide application contractors. Vegetation control staff at District field stations previously conducted aquatic plant spraying activities, including canal inspections but most of these staff have been reassigned to other positions within the field stations. Only the Fort Lauderdale Field Station still conducts vegetation management control activities with District staff.

The District has multiple contracts with herbicide application providers. In April 2016, the District solicited cost and technical proposals from qualified contractors to provide herbicide application services. The work order contracts that were awarded in 2011 under the previous solicitation expired in September 2016. The Request for Proposal (RFP) solicitation resulted in responses from twelve contractors, of which, eight were selected and awarded multiple three-year work order contracts with two one-year renewal options. The annual budgeted amount is \$13 million per year, for a total of \$65 million, assuming the two one-year renewal options are exercised. For the period October 1, 2011 through March 31, 2017, work order awards were as follows:

Contractor	Work Order Totals
Applied Aquatic Mgmt., Inc.	\$ 31,815,200
Aquatic Vegetation Control, Inc.	11,610,996
Lake & Wetland Mgmt., Inc.	7,665,417
Florida Best Inc. of Haines City	7,502,048
Helicopter Applicators, Inc.	5,993,598
Earthbalance Corp.	1,563,179
Weedbusters, Inc.	1,033,430
Texas Aquatic Harvesting, Inc.	888,300
Native Creations, Inc.	398,836
Environmental Quality, Inc.	295,000
Aquatic Plant Mgmt., Inc.	180,000
Total	\$ 68,946,004

Herbicide contractors vary in size and expertise; for example, based on the Applied Aquatic Management, Inc. website, the company is one of the larger herbicide applicators and has significant resources including 67 licensed herbicide applicators, 52 airboats and 68

transport/spray trucks. Other qualified contractors are much smaller by comparison; therefore have less capacity.

Contractors were selected for herbicide application work based on several factors including availability. These contractors also provide herbicide application services to federal, state and local governments, which sometimes limits their availability for District work. Further, not all contractors have the equipment, staff and expertise to work on all District projects. Vegetation Management Section staff revealed that only three contractors have the equipment and qualified staff to conduct aquatic herbicide applications, which is more complex because of the variety of aquatic plants and the blending of the herbicides for effective eradication. Also, aquatic spraying in canals and lakes usually is less profitable than terrestrial herbicide application work (e.g., Loxahatchee National Wildlife Refuge).

We selected 30 work orders totaling \$3.8 million for review. Our objective was to determine whether the contracted herbicide services were consistent with the District's five-year and annual work plans. We also reviewed the contractor invoices, Weed Data Acquisition and Reports (WEEDDAR), and inspection reports to verify that District project managers were monitoring the work. Our sample included work orders for herbicide application services that were conducted throughout the District and monitored by project managers and contract inspectors from the Vegetation Management and Land Stewardship Sections, and Field Stations.

In one of the 30 work order sampled, we could not determine whether the herbicide treatments were consistent with District work plans. We also found that documentation supporting work site inspections for several work orders could be improved with timely inspections of time and material work orders and completing site inspection documentation to corroborate contractor compliance with contract terms and conditions. Our discussion with Vegetation Management Section staff revealed that herbicide application work sites were inspected within the contractual retreatment² period but the inspections was not always documented. Further, we found that Field Station Contract Inspection Specialists, inspecting the work of herbicide application contractors in their area of responsibility, have varied knowledge of herbicide application services. As such, training would prove beneficial.

² According to Section V of Exhibit B of the herbicide contractor agreement, the District has six-months from the initial treatment to have the herbicide contractor re-treat areas that were missed or ineffectively treated.

Our sample of work orders also revealed seven instances where a work crew supervisor conducted ground application services without laborer crews and was paid \$56.50 per hour during the contract period October 1, 2011 through September 30, 2016, and \$64.00 per hour for the three-year renewal agreement period starting October 1, 2016. Laborers, whose billing rates were \$22.00 per hour under the initial agreement and \$26.00 per hour for the renewal agreement, usually conduct ground applications. The District paid \$56,315 for supervisor application services. The hourly rate of supervisors and laborers include the average hourly rates, benefits, lodging and like expense, insurance, database entry, fuel, trucks, airboats ATVs, spray equipment, and other components of providing herbicide application services. In instances where supervisors conduct herbicide ground applications and are not managing work crews, the District should consider negotiating a reduced rate.

Recommendations

1. Ensure all inspections are adequately documented.

Management Response: The audit found that herbicide application worksites were inspected within the contractual retreatment period but the inspections were not always documented. The Vegetation Management STAN team has recently been working on this issue. Firstly, the team has clarified District expectations and Non-Point Discharge Elimination System (NPDES) requirements for timely inspections to be performed and documented. These requirements will be made known to each contract inspector and vegetation/land manager by their respective STAN team representatives.

Secondly, Vegetation Management in coordination with the IT Geospatial Service Section has developed a digital form and submission process for inspection reports to replace the current form. We have tested two platforms and decided the Environmental Systems Research Institute's Survey 123 will best meet the needs of users. This custom form can be loaded onto any smart device and completed while in the field. Form customization is currently being finalized.

The Survey 123 form streamlines the vegetation management inspection process by eliminating the need for manually transferring images to a database, translating field notes into a digital form, and knowledge of software required to adequately complete the form that we

currently use. With minimal training, this intuitive form can be easily created and uploaded while in the field. There are also required fields, and field hints in the form to make sure the correct information is included. All forms will be saved on the sections server and sorted by agreement and fiscal year.

Responsible Sections: The Vegetation Management Section is responsible for work flow design and control. Vegetation Management and IT Geospatial Services Sections are responsible for creating and testing the custom form. STAN team representatives are responsible for disseminating inspection requirements to their respective groups. Individual contract inspectors and vegetation/land managers are responsible for adhering to District expectations and NPDES requirements by completing and submitting vegetation management inspection forms in a timely manner.

Estimated Completion: The full scope of the improved process described above is expected to be implemented by June 2018.

2. **Ensure that contract inspectors have the proper skillset to monitor herbicide contractors. Provide training as necessary.**

Management Response: During the hiring process, each candidate for the position of contract inspector will be screened to insure they have the appropriate experience and background or can otherwise succeed in the position after undergoing the proper trainings.

Vegetation Management staff provide training through an annual Roadshow Training for field station staff specifically for the benefit of contract inspectors. During the Roadshow Training, a variety of topics are covered ranging from contracting services and procedures, aerial vs terrestrial treatments, an overview of herbicides and treatment techniques, Non-Point Discharge Elimination System (NPDES) and, Pesticide Discharge Management Plant (PDMP) implementation. Field station staff shall be encouraged to take advantage of opportunities for additional industry training through the University of Florida Institute of Food and Agricultural Sciences as well as through other local groups or by attending professional conferences such as the Florida Aquatic Plant Management Society, Florida Vegetation Management Association and The IFAs Short Course, when appropriate.

In addition to current in-house training, Vegetation Management staff will also hold quarterly meetings at each field station with field station staff including each contract inspector, professional supervisor, and assistant superintendent. This ensures there is ample one on one time that will increase communication and provide a platform where in depth questions can be brought up and answered.

Responsible Section: The Vegetation Management Section and field stations staff will coordinate training opportunities. Field stations will insure that candidates have the proper skill set.

Estimated Completion: Ongoing. Roadshow trainings were scheduled but then canceled due to Hurricane Irma. Additional training will be completed by March 31, 2018.

3. Consider reduction in contracted supervisor hourly rate when the supervisor is conducting herbicide ground applications and not supervising laborers.

Management Response: The current hourly rate for each position held by ground application services is negotiated by the Procurement Bureau and is valid for the initial three years after the contract is executed. The costs associated with fuel, truck, trailer, spray boat, watercraft, ATV, buggy etc. are factored into the supervisor rate. In the past, economic fluctuations in fuel prices have caused ground applications services contractors to request amendments to the rate of the supervisor position. The position of Crew leader/Applicator was added to the contract this cycle and the rate of this position is less than the supervisor position because it can be used for unlicensed individuals that are alone in operating equipment but are accompanied by a supervisor who is working on the same project.

Responsible Sections: The Vegetation Management Section and the Procurement Bureau will negotiate new rates.

Estimated Completion: Renegotiate prior to execution of agreement extension years. The negotiation of the extension years will be in the fall of Fiscal Year 2019

More Frequent FWC Reimbursement Requests Could Improve Cash Collection Timeline

The District provides upland invasive plant and other related services on a reimbursement basis to FWC through two 10-year agreements dated October 17, 2011 and April 16, 2012. In accordance with the agreements, the District conducts aquatic plant control and upland invasive plant operations for the FWC and requests reimbursement for costs incurred related to these agreed upon services. For the period September 2015 through March 2017, the District incurred costs of approximately \$6.3 million for external herbicide application services that were subsequently reimbursed by FWC. However, our review of the reimbursement process indicated that the District usually accumulated multiple external contractor invoices before requesting FWC reimbursement. The reimbursable amounts and the FWC billing timelines are shown in the following table:

# of Contractor Invoices in Bundle	Reimbursable Contractor Invoices	Average Number of Days		
		District Paid External Contractor Invoices	District Requested FWC Reimbursement After District Payment	FWC Reimbursement After District Request
	\$43,917	27	39	248
5	248,756	20	40	253
6	164,749	16	46	133
11	884,525	21	81	151
3	299,701	22	38	38
10	779,346	18	46	55
1	200,000	23	62	9
1	200,000	7	-	35
6	307,141	15	36	17
16	1,414,374	19	86	18
9	363,796	19	53	47
19	1,377,041	16	40	21
88	\$6,283,346	18	47	85

The District consistently paid the outside contractor invoices on average within 18 days but requested FWC reimbursement an average of 47 days after making payment and then waited approximately 85 days for reimbursement. In our judgement, the District could improve cash collection by increasing the frequency of invoicing FWC for reimbursement of eligible costs to at least monthly, thus, reducing the timeline between when the outside contractor provided the

service and invoiced the District to when the District paid the invoice and remitted the reimbursement request to FWC.

Recommendation

4. Invoice Florida Fish and Wildlife Conservation Commission for eligible reimbursable costs at least monthly.

Management Response: Currently the invoices for the Aquatic Plant Control Program (APC) are submitted to the Florida Fish and Wildlife Conservation Commission (FFWCC) monthly and the invoices for the Invasive Upland Control (IPC) Program are submitted based on task activities. We will continue to submit the APC invoices monthly. This is a reasonable and efficient treatment for this invoicing since the awarded amount is known at the beginning of the year and is expended correspondingly throughout the year (based on weather and need for plant control). After reviewing the IPC process, we believe the most efficient way to invoice for this program is quarterly, with additional invoices if necessary. The amounts awarded for this program are awarded intermittently throughout the year as new tasks or projects are funded. Accordingly, the work related to these tasks/projects is performed as new amounts are awarded. This causes the amounts expended in any month to vary from a few thousand dollars to over \$100,000. Creating invoices quarterly, with the ability to invoice more based on activity, instead of by task completion will allow us to invoice more often while not becoming inefficient by invoicing small dollar amounts. Once this new timeline is in place the process can be reviewed to ensure it meets the objective of this recommendation.

Responsible Section: Accounting, Grants & Treasury Section. The Account Receivable Unit will invoice quarterly.

Estimated Completion: Quarterly invoicing will begin with the first quarter of Fiscal Year 2018.

Transition from Time and Material Contracts to Fixed Costs Contracts

We found that approximately 85% of vegetation management work orders are negotiated as time and materials contracts with a not-to-exceed maximum amount. Generally, the advantage to a time and material work order for the District is that it can be executed quickly, which is important for aquatic spraying. It is also beneficial when the overall project cost is difficult to estimate. This can occur in District locations where the terrain is dense with invasive vegetation and difficult to inspect, but in these situations, project managers rely on aerial mapping, knowledge of the area, and experience to develop a statement of work, and determine contractor level of effort. The downside of time and material contracts is that the contractor has little incentive to control costs and requires thorough day-to-day District oversight by knowledgeable staff. Conversely, fixed cost contracting provides maximum incentive for the contractor to control costs and perform effectively but requires more initial planning. We found that the federal government allows time and materials contracts for vegetation management only if no other contract type is suitable. Herbicide application costs are difficult to estimate for certain District locations and for these projects time and material work orders are the best choice. For other herbicide application projects, fixed cost should be the default contract method. Going forward, we recommend that the District phase in fixed cost contracting in preference to time and material contracting.

Recommendation

- 5. Establish fixed cost contracting as the default alternative for herbicide application work orders. For projects where fixed cost contracts are not practical the use of time and material contracts should be justified.**

Management Response: Vegetation Management staff see the value in both fixed price work orders as well as time and material work orders dependent upon the tasks and site. As stated in the audit, herbicide application costs are difficult to estimate for certain District locations, especially where the terrain is dense with invasive vegetation and difficult to inspect. However, invasive control projects that take place in aquatic systems are not suitable for fixed price work due to the high variability and uncertainty involved in those settings.

The recent solicitation for ground application contracts unlike the previous one includes a fixed price cost option. The Land Stewardship and Vegetation Management section implemented four fixed price projects during Fiscal Year 2017 and plan on increasing the amount of fixed price projects during Fiscal Year 2018. Vegetation Management is working closely with the Land Stewardship section to implement ten fixed cost projects and we will continue to explore additional fixed cost opportunities.

Although projects that lack ambiguity or are in maintenance control are well suited for fixed price projects fixed price is not always the best option especially for small jobs. Both fixed price and time and material projects require devotion of time to initial planning, development, and monitoring. NPDES requires monitoring throughout the duration of any herbicide application project. Fixed price projects require additional coordination to have multiple contract companies present for the bid meeting.

The program used by the District to track projects known as Weed Data Acquisition and Report (WeedDAR) database was not designed to track fixed price projects. Thus, the use of fixed price projects increases the amount of time spent on data entry and can skew the data collected. The new AVATAR system will account for fixed cost project.

Responsible Sections: Vegetation Management and Land Stewardship Sections will work on increasing the number of fixed cost projects.

Estimated Completion: Ongoing. During Fiscal Year 2018, 10 fixed price projects will be put out to bid.