~~SJR-2021-002~~
SJR 2021-011

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

GOVERNING BOARD OF THE ST. JOHNS RIVER WATER MANAGEMENT DISTRICT,

Petitioner,

vs.

DOAH CASE NO. 20-002471
SJRWMD F.O.R NO. 2020-12

CHRISTOPHER DOUGLAS LEIFFER, AS TRUSTEE OF THE C&K FAMILY TRUST DATED JANUARY 31, 2020, AND KIRK STEPHEN LEIFFER, AS TRUSTEE OF THE C&K FAMILY TRUST DATED JANUARY 31, 2020,

Respondents.

_____/

FINAL ORDER

The Division of Administrative Hearings, by its designated Administrative Law Judge, the Honorable Francine M. Ffolkes ("ALJ"), held a formal administrative hearing in this case on September 10, 2020. Petitioner St. Johns River Water Management District ("District") and Respondents Christopher Douglas Leiffer, as Trustee of the C&K Family Trust dated January 31, 2020, and Kirk Stephen Leiffer, as Trustee of the C&K Family Trust dated January 31, 2020 (collectively, "Respondents") submitted their respective Proposed Recommended Orders to the ALJ on October 8, 2020. The ALJ entered a Recommended Order on November 24, 2020. The Recommended Order contains findings of fact and conclusions of law regarding activity on Respondents' property.

Respondents' property ("Property") is located in Sorrento, Lake County, Florida, which is within the Wekiva River Protection Area as defined in section 369.303(9), Florida Statutes ("F.S."). Respondents leased the property to Whitewater Farms, Inc. Christopher Leiffer is the

president of Whitewater Farms, Inc., and Kirk Leiffer is the corporate representative of Whitewater Farms, Inc.

On April 28, 2020, the District filed an Administrative Complaint, alleging Respondents created a borrow pit and haul road on the Property, without obtaining an Environmental Resource Permit ("ERP"). Respondents disputed the facts, requested an administrative hearing, and asserted two affirmative defenses: that their activity was exempt from ERP requirements under the agricultural exemptions in sections 373.406(2) and (3), F.S. Respondents withdrew the affirmative defense for the section 373.406(2) exemption before the administrative hearing.

The ALJ's Recommended Order concludes that the Respondents constructed a borrow pit/sand mine and haul road on the Property without the necessary ERP, and that these activities were not exempt from ERP requirements under section 373.406(3), F.S. The Recommended Order recommends that the District adopt the findings, corrective actions, and timeframes in which to complete them, as set forth in the Administrative Complaint.

Once a recommended order is issued, the parties may file exceptions to it. §120.57(1)(k), F. S., Fla. Admin. Code R. 28-106.217(1). Exceptions may dispute findings of fact or conclusions of law in the Recommended Order. *Id*. If a party does not file exceptions to a recommended order, it waives its right to do so. *Envtl. Coal. of Fla., Inc. v. Broward County*, 586 So. 2d 1212, 1212 (Fla. 1st DCA 1991). If exceptions are filed, the other parties may file responses. *Id*. In this case, Attorneys for the District timely filed one exception, and Respondents timely filed 15 exceptions. Both the District and Respondents filed timely responses to the exceptions.

The District's Governing Board, in Policy 120(28), has delegated to the Chairman of the Governing Board ("Chairman"), or in the Chairman's absence, the Vice-Chairman, the authority

to rule on exceptions to recommended orders and to issue final orders resulting from administrative complaints.

Scope of Review

Each exception must clearly identify the disputed portion of the Recommended Order by page number or paragraph, identify the legal basis for the exception, and include appropriate and specific citations to the record. § 120.57(1)(k), F. S.

The Chairman has reviewed the record, which includes those matters identified in section 120.57(1)(f), F.S., the hearing transcript, the exhibits admitted into evidence, the ALJ's Recommended Order, the District's exception and Respondents' response thereto, and the Respondents' exceptions and District's responses thereto. The scope of this review is limited to accepting, rejecting, or modifying findings of fact and conclusions of law contained in the ALJ's Recommended Order.

Findings of Fact

The Chairman must accept findings of fact if supported by competent substantial record evidence. The Chairman may not consider evidence not contained in the record, make additional findings, or reweigh record evidence. *See* § 120.57(1)(k)-(*l*), F. S., *Walker v. Bd. of Prof'l Eng'rs*, 946 So. 2d 604, 605 (Fla. 1st DCA 2006) (weight of the evidence), *Fla. Power & Light v. State Siting Bd.*, 693 So. 2d 1025, 1026-27 (Fla. 1st DCA 1997) (additional findings). The ALJ's findings of fact may not be rejected or modified unless the Chairman, after a review of the entire record, states specifically that a finding was not based upon competent substantial evidence or that the proceedings on which the finding was based did not comply with essential requirements of law. *See* § 120.57(1)(*l*), F. S.

Competent evidence is "evidence sufficiently relevant and material to the ultimate determination 'that a reasonable mind would accept it as adequate to support the conclusion reached.'" *City of Hialeah Gardens v. Miami-Dade Charter Found., Inc.*, 857 So. 2d 202, 204 (Fla. 3d DCA 2003) (quoting *DeGroot v. Sheffield*, 95 So. 2d 912, 916 (Fla. 1957)). Substantial evidence "provides a factual basis from which a fact at issue may reasonably be inferred." *City of Hialeah Gardens*, 857 So. 2d at 204. Thus, competent substantial evidence is record evidence that is sufficiently relevant and material, and adequately provides the factual bases to support the ALJ's findings of fact.

Failure to comply with the essential requirements of law means more than a mere mistake in law occurred. *Yang Enter., Inc. v. Georgalis*, 988 So. 2d 1180, 1182-83 (Fla. 1st DCA 2008). For a proceeding to depart from the essential requirements of law, it must violate a clearly established principle of law that results in a miscarriage of justice.[1] *Abbey v. Patrick*, 16 So. 3d 1051, 1053-54 (Fla. 1st DCA 2009).

Conclusions of Law

In considering the ALJ's legal conclusions, the Chairman may reject or modify only those conclusions or administrative rule interpretations over which the District has substantive jurisdiction. *See* § 120.57(1)(*l*), F. S., *State Contracting and Engineering Corp. v. Dept. of Transp.*, 709 So. 2d 607, 610 (Fla. 1st DCA 1998). Substantive jurisdiction in this context includes areas in which the District has expertise, including interpretation of District rules and provisions of the ERP Applicant's Handbook, and conclusions based on such interpretations. In contrast, technical matters of law generally resolved by judicial or quasi-judicial officers, such as

[1] For example, if an administrative law judge made a finding on her own, without the parties having an opportunity to present evidence or argument on the matter, the proceeding did not comply with the essential requirements of law because the parties were not afforded due process. *State, Dep't of Fin. Serv. v. Mistretta*, 946 So. 2d 79, 80 (Fla. 1st DCA 2006).

evidentiary rulings, application of affirmative defenses, and attorney fee awards are not within the District's substantive jurisdiction. *See G.E.L. Corp. v. Dept. of Environmental Protection*, 875 So. 2d 1257, 1263 (Fla. 5th DCA 2004) (attorney fees), *Deep Lagoon Boat Club, Ltd. v. Sheridan*, 784 So. 2d 1140, 1141-42 (Fla. 2d DCA 2001) (affirmative defenses), *Barfield v. Dept. of Health*, 805 So. 2d 1008, 1011 (Fla. 1st DCA 2001) (evidentiary rulings).

If rejecting or modifying a conclusion of law or interpretation of an administrative rule, the Chairman must state the reasoning specifically and find that his substituted conclusion or interpretation is as or more reasonable than the one rejected or modified. *See* § 120.57(1)(*l*), F. S.

District's Exception

The District filed one exception, in which the District suggests a revision to the ALJ's Finding of Fact 26. (Dist. Except. 1).[2] Finding of Fact 26 states, in part:

> 26. Thus, the Revised Mass Grading Plan does not match the Blueberry & Hay Production Farm Plan. The Revised Mass Grading Plan shows excavation of overburden down to 60 and 70 feet below the current existing ground surface, construction of a haul road, and erosion measures to control stormwater runoff. …

(R.O. ¶26). The District asserts that the portion of the sentence reading "[t]he Revised Mass Grading Plan shows excavation of overburden down to 60 to 70 feet below the current existing ground surface" is not supported by competent substantial evidence. (Dist. Except.). Respondents do not dispute the District's reasoning. (Resp. to Dist. Except.). The requirements for rulings on exceptions to findings of fact are provided by statute:

[2] Citations to the transcript will reflect the page number and take the form (T. 1). Citations to joint exhibits entered into evidence at the hearing will reflect the exhibit number and page number, if appropriate, in the form (Jt. Ex. 1, p. 1). Citations to Respondents' Proposed Recommended Order will cite the paragraph number and take the form (Resp. P.R.O. ¶1). Citations to District Exhibit 45 will take the form (Ex. 45). Citations to the Recommended Order will reflect the paragraph number and take the form (R.O. ¶1). Citations to District's exception will take the form (Dist. Except.). Citations to the Respondents' response to District's exception will reflect the exception number and take the form (Resp. to Dist. Except.). Citations to the Respondents' exceptions will take the form (Resp. Except. 1). Citations to the District's response to Respondents' Exceptions will take the form (Dist. Resp. 1).

> The agency may not reject or modify the findings of fact unless the agency first determines from a review of the entire record, and states with particularity in the order, that the findings of fact were not based upon competent substantial evidence or that the proceedings on which the findings were based did not comply with the essential requirements of law.

§ 120.57(1)(*l*), Fla. Stat. A review of the entire record finds no reference to the excavation of overburden at 60 to 70 feet below the current existing ground surface. Rather, the testimony and Joint Exhibit 11 both show that the bottom elevation of the borrow pit ranges from elevation 60 to 70 feet, while the excavation activity is described as ranging from 15 to 30 feet below ground surface. (Jt. Ex. 11, p. 5; T. 33, 39, 41). As it appears to have been an inadvertent error, the District's Exception is accepted, and Finding of Fact 26 is revised to read:

> 26. Thus, the Revised Mass Grading Plan does not match the Blueberry & Hay Production Farm Plan. The Revised Mass Grading Plan shows excavation of overburden down to 60 and 70 feet, construction of a haul road, and erosion measures to control stormwater runoff. Then, upon completion of construction and excavation, the Blueberry & Hay Production Farm Plan is implemented. For example, the Revised Mass Grading Plan shows a dry retention pond would be constructed, while the Blueberry & Hay Production Farm Plan shows a wet retention tailwater recovery pond would be constructed.

Respondents' Exceptions

Exception 1

Respondents' Exception 1 takes exception to a portion of the second sentence of the ALJ's Finding of Fact 4, which states "The Farm Plan, submitted to the Lake County Property Appraiser, is a narrative description of proposed clearing and mass grading of approximately 40 acres of the Property resulting in construction of six blueberry fields." Respondents claim the portion of the finding stating "submitted to the Lake County Property Appraiser" is not supported by competent substantial evidence because the ALJ did not also state that the Farm

Plan was submitted to the District. (Resp. Except. 1). The District maintains that by seeking to add the additional information about the receipt of the Farm Plan by the District to the ALJ's finding, Respondents are requesting an additional finding of fact. (Dist. Resp. 1).

The Chairman may not reject or modify a finding of fact unless a review of the entire record shows that the finding was not based upon competent substantial evidence. § 120.57(1)(l), F. S. The record reveals that the Farm Plan was submitted to the Lake County Property Appraiser. (Jt. Ex. 32, p. 24, Jt. Ex. 45, p. 2). Thus, the record contains evidence sufficiently relevant and material, and adequately provides the factual basis to support the ALJ's finding; therefore, it is supported by competent substantial evidence. *City of Hialeah Gardens*, 857 So. 2d at 204. Additionally, to the extent Respondents seek an additional finding of fact, the Chairman does not have authority to make additional findings of fact. *See Florida Power & Light Co. v. State*, 693 So.2d 1025 (Fla. 1st DCA 1997). Accordingly, Respondents' Exception 1 is rejected.

Exception 2

Respondents take exception to the portion of the ALJ's Finding of Fact 11 that states:

> 11. At the final hearing, Chris Leiffer admitted to giving an interview to a news reporter during the pendency of this administrative proceeding, and admitted to saying: "You can't pay $2 million for a property and plant blueberries on it and say, hey, I'm going to make money. You can't do it. The priority is the dirt."

(R.O. ¶11). Respondents assert that the first three sentences are not supported by competent substantial evidence because the statement by Christopher Leiffer was made as part of a television news interview given outside of the hearing, and the entire interview was not admitted into evidence. (Resp. Except. 2). Respondents argue that even if the ALJ admitted a portion of the interview, she should not have considered the portion unless the entire interview was

admitted into evidence, because considering only the portion would violate the evidentiary rule of completeness. *Id*.

The District points out that Respondents did not raise the rule of completeness objection during the hearing, did not request that any additional portions of the television news interview be admitted during Christopher Leiffer's direct testimony, and did not offer any additional evidence related to the interview during his cross examination testimony. (Dist. Resp. 2). Additionally, the statement was admissible as an admission against interest pursuant to section 90.803(18), F.S. *Id*.

The Chairman may not reject or modify a finding of fact unless a review of the entire record shows that the finding was not based upon competent substantial evidence. § 120.57(1)(l), F. S. A review of the transcript shows that the District called Christopher Leiffer as a witness. (T. 75). Respondents objected twice during the portion of his direct testimony related to the television news interview. (T. 82-85). The first objection was based on the statement having been untimely disclosed; the interview having been outside of the hearing, not probative, and highly prejudicial; and the questions could be asked of Christopher Leiffer during his testimony. (T. 83). The ALJ directed that District counsel could ask the questions that were asked in the interview. (T. 83-84). The second objection was based on the quoted portion of the interview being based on facts not in evidence. (T. 84). The ALJ overruled the second objection. *Id*.

During his direct testimony, District counsel asked Christopher Leiffer the following question:

> Did you tell the news reporter that—and I quote here—"You can't pay $2 million for a property and plant blueberries on it and say, hey, I'm going to make money. You can't do it. The priority is the dirt"?

(T. 84). Christopher Leiffer responded as follows:

> So yes, I did, but what they left out that was probably, I think the clip was maybe 30, 40 seconds. They left out—it was a total of about a five-minute interview. They left out a lot of what I said.

(T. 84-85). On cross examination, Respondents' counsel asked a follow up question about a contract and a question about Christopher Leiffer's intent to plant blueberries. (T. 85-86). Respondents' counsel did not ask any additional questions about the interview. *Id*.

The Chairman may reject or modify only those conclusions or administrative rule interpretations over which the District has substantive jurisdiction. *See* § 120.57(1)(*l*), F. S., *State Contracting and Engineering Corp.*, 709 So. 2d at 610. Substantive jurisdiction in this context does not extend to the ALJ's evidentiary rulings or include a ruling on an evidentiary objection raised in an objection. *Barfield*, 805 So. 2d at 1011. Additionally, the record, including Christopher Leiffer's testimony, is sufficiently relevant and material, and adequately provides the factual basis to support the portion of the ALJ's Finding of Fact 11 to which Respondents take exception. Accordingly, the finding is supported by competent substantial evidence. *City of Hialeah Gardens*, 857 So. 2d at 204. Respondents' Exception 2 is rejected.

Exception 3

Respondents take exception to the last sentence of the ALJ's Finding of Fact 15, which states as follows: "At the hearing Mr. Prather testified: 'I don't know what else it could be, other than a borrow pit operation.'" (R.O. ¶15). Respondents assert that this sentence is not based on competent substantial evidence because Mr. Prather was qualified and testified as an expert in Environmental Resource Permitting and Compliance, but not as an expert in Agriculture, and his opinion that the activities at issue constituted a borrow pit was personal opinion rather than expert opinion. (Resp. Except. 3).

The District responds with citations to the record showing that Mr. Prather is the District's Director of the Division of Regulatory Services, overseeing permitting and compliance operations, that he has worked in the field of environmental permitting for more than 20 years, and he observed excavation equipment and dirt hauling activities at the Property. (Dist. Resp. 3). The rules of evidence permit experts to provide opinion testimony, and it is the role of the ALJ to weigh the evidence. *Id*. The District may not reject the ALJ's findings unless there is no competent substantial evidence from which the finding could reasonably be inferred. *Id*.

The Chairman may not reject or modify a finding of fact unless a review of the entire record shows that the finding was not based upon competent substantial evidence. § 120.57(1)(l), F. S. The record shows that District counsel tendered Mr. Prather as an expert in Environmental Resource Permit regulation and compliance. (T. 65). Respondents did not object, and the ALJ accepted Mr. Prather as an expert in those areas. (T. 65-66). Mr. Prather explained in his direct testimony that he had visited the Whitewater Farms property twice in April 2020 after receipt of several complaints regarding dump truck traffic to and from the property, hauling sand, and that he had observed several dump trucks entering the property empty and leaving full of sand. (T. 66, 67-68). On one of the visits, he saw one of the dump trucks leave the property and travel to a site where the Wekiva Parkway was being constructed, near Wekiva Road. (T. 68-69).

Mr. Prather explained that he made an inspection report that includes photographs and documents the visit and the observations at the time, and that while not typical, he had visited the property because staff had recently left the office to telework and been asked not to make trips into the field while COVID-19 was being addressed. (T. 70). Mr. Prather has worked in the field of environmental permitting for more than 20 years. (T. 63-64, Jt. Ex. 20). Mr. Prather's current and most recent job duties, totaling the last approximately eight years, include running efficient,

effective permitting and compliance operations. (T. 63-64). He has discussed borrow pits with staff frequently because there are "quite a few" in Lake County and other areas within the District. (T. 72). Based on his own observations, complaints from residents and the local municipality, and information and analysis provided to him by staff, he concluded that the activity of taking sand out of the area and to a construction site is consistent with borrow pit operations and not consistent with District rules.[3] (T. 70-71, 72-73, Jt. Ex. 3).

Thus, the record shows that Mr. Prather, in reaching his conclusion, relied on his own observations of activities at the site, general discussions with staff about borrow pit operations in Lake County and in other areas of the District, review of complaints from residents and the local municipality, and information and analysis provided to him by staff. Experts may testify in terms of opinion or inference and may be required to specify the facts or data upon which the opinion is based. § 90.705(1), F. S. *See also Booker v. Sumter Cty. Sheriff's Office*, 166 So. 3d 189, 194 (Fla. 2d DCA 2015) (doctors, who relied on multiple published medical studies, their examinations of the patient, and review of the patient's medical records, provided testimony that was based on more than their clinical experience and was not "pure opinion" testimony). It is the ALJ's function to consider the evidence presented, resolve conflicts, and judge witness credibility. *See Heifetz*, 475 So. 2d at 1281. The Chairman may not reweigh record evidence. *Id*. *See also Walker*, 946 So. 2d at 605.

The record contains evidence that is sufficiently relevant and material, and adequately provides the factual basis to support the last sentence of the ALJ's Finding of Fact 15.

[3] Cameron Dewey, a District Regulatory Division staff member, who was accepted as an expert in stormwater engineering and water resource engineering, also testified that the activities occurring on the Property consist of alteration and construction of a "large scale borrow excavation area" that exceeds permitting thresholds and requires an individual ERP. (T. 23-24, 32, 43).

Accordingly, competent substantial evidence supports the ALJ's finding. *City of Hialeah Gardens*, 857 So. 2d at 204. Respondents' Exception 3 is rejected.

Exception 4

Respondents take exception to the first sentence of the ALJ's Finding of Fact 19. The first sentence of Finding of Fact 19 states: "On May 28, 2020, Respondents applied for an ERP to authorize borrow pit operations ongoing on approximately 40 acres of the Property." (R.O. ¶19). Respondents assert that this sentence is not supported by competent substantial evidence because the application does not contain the phrase "borrow pit." (Resp. Except. 4).

The District maintains that ample record evidence shows that the ongoing operation is a borrow pit, including witness testimony from both District and Respondents' experts that the ongoing activities are consistent with a borrow pit operation, District witness testimony that the project exceeds three permitting thresholds, and Respondents' application for an individual ERP to authorize the activities. (Dist. Resp. 4).

The Chairman may not reject or modify a finding of fact unless a review of the entire record shows that the finding was not based upon competent substantial evidence. § 120.57(1)(l), F. S. The record includes a copy of the application. (Jt. Ex. 5, 8, 9, 10, 11). Testimony describes the plan sheets contained in the application as depicting the borrow pit activities at the Property. (T. 28-30, 33-34). Testimony by multiple witnesses, including District and Respondents' witnesses, also describes the activities occurring at the Property as those of a borrow pit activity or those that meet the definition of a borrow pit activity. (T. 30, 31, 71, 161, 197). A Binding Determination by the Florida Department of Agriculture and Consumer Services ("FDACS") also concludes that "[t]he extent of the excavation and alteration of the site's hydrology indicate that the activities undertaken are consistent with the occupation of sand mining, and not that of a

bona fide agricultural activity." (Jt. Ex. 45, p. 6) (emphasis in original). Thus, the record includes evidence that is sufficiently relevant and material and provides a factual basis from which the finding that an ERP application to authorize borrow pit activities had been submitted. Accordingly, competent substantial evidence supports the first sentence of the ALJ's Finding of Fact 19. *See City of Hialeah Gardens*, 857 So. 2d at 204. Respondents' Exception 4 is rejected.

Exception 5

Respondents' Exception 5 takes exception to the ALJ's Findings of Fact 30, 31, and 32. Finding of Fact 30 states:

> 30. The extent of the excavation and alteration of the Property's hydrology indicates that the activities undertaken are consistent with the occupation of sand mining. Alterations to the topography of the land are not for purposes consistent with the normal and customary practice of agriculture in the area.

(R.O. ¶30). Finding of Fact 31 states:

> 31. A massive excavation project is not the equivalent of leveling or contouring to prevent erosion for planting blueberry crops. Instead of excavating nearly 30 feet of soil to create a near-level ground surface for the proposed planting of blueberries, a normal and customary option would have been to design the blueberry rows to follow the land's natural contours.

(R.O. ¶31). Finding of Fact 32 states:

> 32. The landowner is not engaged in the occupation of agriculture as to the proposed blueberry production area of the property. The primary function of the significant excavation activities on the blueberry farm portion of the Property is for the mining activity itself.

(R.O. ¶32).

The gravamen of Respondents' argument in Exception 5 is that the ALJ erred in considering facts contained in the FDACS Binding Determination. (Resp. Except. 5)

Respondents assert that because the Binding Determination establishes whether the section 373.406(2), F.S., permit exemption applies to the Property, but Respondents only sought to have determined in this proceeding whether the section 373.406(3), F.S., permit exemption applies, the facts in the Binding Determination are irrelevant. *Id*. Respondents assert that the Binding Determination is only relevant to permit exemptions under section 373.406(2), F.S., because under this subsection, agricultural activities are "normal and customary," whereas under section 373.406(3), F.S., there is no reference to a normal and customary nature of the agricultural activities. *Id*. Therefore, consideration of the facts in the Binding Determination regarding the section 373.406(2), F.S., permitting exemption in the analysis of the section 373.406(3), F.S., permitting exemption is not supported by competent substantial evidence. *Id*.

The District asserts that Findings of Fact 30, 31, and 32 are supported by competent substantial evidence. (Dist. Resp. 5). Respondents did not challenge the Binding Determination, of which the ALJ took judicial notice, so the findings contained therein are deemed the facts of the case. *Id*. The Binding Determination is relevant to the three disputed issues of material fact Respondents identified in their Amended Request for Administrative Hearing, which they filed after FDACS issued the Binding Determination:

> (1) Whether the Trusts' activities as alleged in the Complaint are for purposes consistent with agriculture. The Trust contends that they are. (Amended Request, ¶5(a)).
>
> (2) Whether the Trust is engaged in the occupation of agriculture on the lands addressed in the Complaints. The Trust contends that it is. (Amended Request, ¶5(b)).
>
> (3) Whether the Trusts' activities as alleged in the Administrative Complaint are for the sole or predominant purpose of impounding or obstructing surface waters. The Trust contends that they were not. (Amended Request, ¶5(c)).

Id. (citing Respondents' Amended Request, ¶5). At the final hearing, Respondents alleged their activities were exempt from permit requirements because they meet the "agricultural closed system" exemption in section 373.406(3), F.S. *Id*. The District asserts that regardless of whether the "agricultural" exemption in section 373.406(2) or the "agricultural closed system" exemption in section 373.406(3) is applied, non-agricultural activities or aspirational agricultural activities do not qualify for either. *Id*. (citing *Suggs v. Southwest Fla. Water Management Dist.*, Case No. 08-3530 at ¶20 R.O. (Fla. DOAH Feb. 19, 2009) (Recommended Order), *adopted* (*Southwest Fla. Water Management Dist.* April 1, 2009)).

The Chairman may not reject or modify a finding of fact unless a review of the entire record shows that the finding was not based upon competent substantial evidence. § 120.57(1)(l), F. S. Additionally, the Chairman may not consider evidence not contained in the record, make additional findings, or reweigh record evidence. *See* § 120.57(1)(k)-(*l*), F. S., *Walker*, 946 So. 2d at 605 (weight of the evidence), *Fla. Power & Light*, 693 So. 2d at 1026-27 (additional findings). The ALJ took judicial notice of the Binding Determination, and it was admitted into evidence as Exhibit 45. (R.O. p. 4, T. 7-9). To the extent Respondents are making an evidentiary objection based on the relevance of the Binding Determination, the Chairman does not have authority to make such a ruling. *Barfield*, 805 So. 2d at 1011.

Regarding Finding of Fact 30, the record shows that activities on the Property are consistent with the occupation of sand mining, including large scale mass grading with large dump trucks observed exiting the property daily. (Ex. 45, pp.2, 6; T. 68, 71, 73). Testimony by both District and Respondents' witnesses also describes the activities occurring at the Property as those of a borrow pit activity or those that meet the definition of a borrow pit activity. (T. 30, 31, 71, 161, 197). District expert Ms. Dewey's testimony describes the plan sheets contained in the

application as depicting the borrow pit activities at the Property, and the ongoing activities at the Property, excavating and removing sand, are consistent with borrow pit activities (T. 28-30, 32-34, 44, 54, 198, 217, 218).

The Binding Determination also states that excavations similar to those FDACS staff observed on the Property are not normal and customary for typical agricultural practice or the specific geographic area of the Property. (Ex. 45, p. 7). Respondents' expert Mr. Ray's testimony describes excavation and grading on the Property as not normal and customary grading activity for a blueberry farm. (T. 158-159). Additionally, District expert Ms. Dewey stated that she had been to blueberry farms in Lake and Orange Counties, where blueberry plants have been planted on rolling or flat terrain, with minimal contouring, and she had not seen excavation activities for row crops or contour farming. (T. 27, 199-200).

Thus, the record includes evidence, found in the Binding Determination, other exhibits, and testimony, that is sufficiently relevant and material and provides a factual basis to support the ALJ's findings that the extent of excavation and alteration of the Property's hydrology indicates the activities are consistent with sand mining, and topographical alterations of the land are not for purposes consistent with the normal and customary practice of agriculture. Accordingly, competent substantial evidence supports Finding of Fact 30. *See City of Hialeah Gardens*, 857 So. 2d at 204.

Regarding Finding of Fact 31, the record shows that "[i]n the case of the blueberry production areas…[a] massive excavation project is not the equivalent of leveling or contouring to prevent erosion. Instead of excavating nearly 30 feet of soil to create a near-level ground surface for the proposed planting of blueberries, a normal and customary option would have been to design the blueberry rows to follow the land's natural contours." (Ex. 45, p.7). Contour

farming would have been consistent with the historical practice of blueberry farming in the state. *Id*. The published FDACS Best Management Practices for water quality do not support the excavation on the Property. *Id*. Most blueberry plantings are prepared using native soils and existing grades. (Ex. 45, p. 8).

Additionally, District expert Ms. Dewey opined that most blueberry farms use minimal contouring. (T. 27). Ms. Dewey noted the distinction between contouring, which was used where the hay field is depicted, and the removal of 15 to 30 feet of material involved in the excavation project. (T. 200). Respondents' expert Mr. Ray testified that the construction of a 30-foot-deep pit was not a normal and customary practice for a blueberry farm. (T. 158). Mr. Ray testified he was not aware of any blueberry activities where the site had been altered to the degree the Property had been. (T. 159).

Thus, the record includes evidence, found in the Binding Determination and testimony from both District and Respondents' witnesses that is sufficiently relevant and material and provides a factual basis to support the ALJ's findings that a massive excavation project is not the same as leveling or contouring to prevent erosion for planting blueberry crops, and instead, a normal and customary option would have been to design the blueberry rows to follow the land's natural contours. Accordingly, competent substantial evidence supports Finding of Fact 31. *See City of Hialeah Gardens*, 857 So. 2d at 204.

Regarding Finding of Fact 32, the Binding Determination shows that Respondents are not engaged in the occupation of agriculture as it relates to the "purported blueberry production areas." (Ex. 45, p. 6). "The primary function of the significant excavation activities on the blueberry farm portion of the Property – 30 feet of excavation when contour farming would require minimal grading – is for the mining activity itself." (Ex. 45, 8). Additionally, District

experts Mr. Prather and Ms. Dewey testified that the ongoing activities at the Property, excavating and removing sand, are consistent with borrow pit activities (T. 30, 32-33, 44, 54, 71, 198, 217, 218). Respondents' expert Mr. Ray also testified that the activities on the Property include grading with exported materials, and that any exporting of materials from a site would meet the definition of a borrow pit. (T. 161). Christopher Leiffer also indicated that excavation would be ongoing following blueberry planting, and he confirmed that he gave a television interview and stated that "the priority is the dirt." (T. 82, 84).

Thus, the record includes evidence, found in the Binding Determination and testimony from both District and Respondents' witnesses that is sufficiently relevant and material and provides a factual basis to support the ALJ's findings that Respondents were not engaged in the occupation of agriculture as to the proposed blueberry production area and the primary function of the significant excavation activities on the blueberry farm portion of the Property is for mining. Accordingly, competent substantial evidence supports Finding of Fact 32. *See City of Hialeah Gardens*, 857 So. 2d at 204.

For these reasons, competent substantial evidence supports the ALJ's Findings of Fact 30, 31, and 32. Accordingly, Respondents' Exception 5 is rejected.

Exception 6

Respondents take exception to the ALJ's Finding of Fact 33, which states:

> The District's expert, Ms. Dewey, persuasively testified that she has not seen excavation activities of this type for row crops, and the ongoing activities at the Property are consistent with a sand mining operation. Blueberry plants are typically planted at ground-level and very minimal contouring is needed. Ms. Dewey did agree that normal contouring was performed for the hay field, but planting blueberries at the bottom of a 30-foot pit was inconsistent with other blueberry farms in the area.

(R.O. ¶33).

Respondents assert that Finding of Fact 33 is not supported by competent substantial evidence because Ms. Dewey is not an agricultural expert. (Resp. Except. 6). Respondents' agricultural expert testimony was therefore unrebutted, and the ALJ may not reject unrebutted expert testimony unless she finds that it is incredible, illogical, or unreasonable, and the ALJ did not provide such an explanation in this case. *Id*.

The District maintains that competent substantial evidence supports the ALJ's finding because the ALJ accepted Ms. Dewey as an expert in stormwater engineering and water resource engineering, which necessarily includes engineered systems on agricultural land, and she has experience reviewing permit applications that include agricultural activities and borrow pits. (Dist. Resp. 6). Thus, Respondents' expert testimony was rebutted, and the Chairman does not have authority to reweigh evidence. *Id*. Further, the ALJ overruled Respondents' objection that Ms. Dewey was not qualified to testify about agricultural activities. *Id*. To the extent Respondents seek review of this ruling, the Chairman does not have authority to review evidentiary rulings. *Id*.

The Chairman may not reject or modify a finding of fact unless a review of the entire record shows that the finding was not based upon competent substantial evidence. § 120.57(1)(l), F.S. The Chairman is without authority to reweigh evidence or decide which expert testimony to accept. *See Walker*, 946 So. 2d at 605 (weight of the evidence), *Collier Med. Ctr. v. Dep't. of Health & Rehab Servs.*, 462 So. 2d 83, 85 (Fla. 1st DCA 1985) (expert testimony). Additionally, to the extent Respondents take exception to the ALJ's evidentiary ruling, the Chairman does not have authority to disturb that ruling. *See Barfield*, 805 So. 2d at 1011.

The record shows that the ALJ accepted Ms. Dewey as an expert in the field of stormwater engineering and water resource engineering. (T. 24). Ms. Dewey has been a District

employee for 33 years, and she has reviewed over 1,000 ERPs, including 50 to 100 for borrow pits, and oversees review engineers that review projects involving agricultural activities. (T. 23, 25-26). Ms. Dewey has participated in the District's water quality monitoring program, which involved visiting reservoirs or stormwater ponds on agricultural land to collect samples and assess how the systems were operating and functioning. (T. 26). Ms. Dewey has also visited blueberry farms personally and professionally at the request of landowners to perform site visits or review permit applications. (T. 26-27). The ALJ overruled Respondents' objection to Ms. Dewey's testimony regarding the excavation activities at the Property and their relation to agricultural activities. (T. 199).

The first sentence of Finding of Fact 33 states, "The District's expert, Ms. Dewey, persuasively testified that she has not seen excavation activities of this type for row crops, and the ongoing activities at the Property are consistent with a sand mining operation." (R.O. ¶33). The record shows that Ms. Dewey testified that she has not seen excavation activities for row crops or contour farming. (T. 199-200). She also testified that the ongoing activities at the Property, excavating and removing sand, are consistent with borrow pit activities (T. 30, 32-33, 44, 54, 198, 217, 218). Additionally, Respondents' expert Mr. Ray, whom the ALJ accepted as an expert in environmental land use planning for agriculture, testified that he was not aware of any other blueberry farm in Lake County or central Florida for which the site had been altered to the extent of the site alteration in this case. (T. 131, 158-59). Respondents' expert Mr. Ray also testified that the activities at the Property include grading with exported materials, and that any exporting of materials from a site would meet the definition of a borrow pit. (T. 161). Thus, the record includes evidence that is sufficiently relevant and material and provides a factual basis to support the ALJ's finding that "Ms. Dewey[] persuasively testified that she has not seen

excavation activities of this type for row crops, and the ongoing activities at the Property are consistent with a sand mining operation." Accordingly, competent substantial evidence supports the first sentence of Finding of Fact 33. *See City of Hialeah Gardens*, 857 So. 2d at 204.

The second sentence of Finding of Fact 33 states, "Blueberry plants are typically planted at ground-level and very minimal contouring is needed." (R.O. ¶33). The record shows that Ms. Dewey testified that she has visited blueberry farms in Lake and Orange Counties, and the blueberry plants have been planted on rolling or flat terrain, with minimal contouring. (T. 27). Additionally, Ms. Dewey testified that she had not seen excavation activities for row crops or contour farming, (T. 199-200), and Mr. Ray testified that he was not aware of any other blueberry farm in Lake County or central Florida for which the site had been altered to the extent of the site alteration in this case. (T. 131, 158-59). Thus, the record includes evidence that is sufficiently relevant and material and provides a factual basis for the finding that blueberry plants are typically planted at ground level with minimal contouring. Accordingly, competent substantial evidence supports the second sentence of the ALJ's Finding of Fact 33. *See City of Hialeah Gardens*, 857 So. 2d at 204.

The third sentence of Finding of Fact 33 states, "Ms. Dewey did agree that normal contouring was performed for the hay field, but planting blueberries at the bottom of a 30-foot pit was inconsistent with other blueberry farms in the area." (R.O. ¶33). The record shows that Ms. Dewey testified that contouring had been performed in the areas shown on the plans as hay field, and the activity in the excavation area was not contouring, but excavation, "removal of 15 to 30 feet of material." (T. 200). Additionally, she stated that she had been to blueberry farms in Lake and Orange Counties, where blueberry plants have been planted on rolling or flat terrain, with minimal contouring, and she had not seen excavation activities for row crops or contour

farming. (T. 27, 199-200). Thus, the record includes evidence that is sufficiently relevant and material and provides a factual basis for the finding that Ms. Dewey agreed that normal contouring was performed for the hay field, but planting blueberries at the bottom of a 30-foot pit was inconsistent with other blueberry farms in the area. Accordingly, competent substantial evidence supports the third sentence of the ALJ's Finding of Fact 33. *See City of Hialeah Gardens*, 857 So. 2d at 204.

For these reasons, competent substantial evidence supports Finding of Fact 33. Respondents' Exception 6 is therefore rejected.

Exception 7

Respondents take exception to the ALJ's Finding of Fact 34, which states, "Respondents admit that the current priority is removal of fill dirt to fulfill the contract. The more persuasive evidence establishes that the ongoing excavation activities on the Property are not 'agricultural.'" (R.O. ¶34). Respondents assert that the finding is not supported by competent substantial evidence because the statement by Christopher Leiffer was made in a television news interview, which was not admitted into evidence at the hearing, and for the reasons supporting Respondents' Exception 6. (Resp. Except. 7).

The District counters that evidentiary rulings and weighing the evidence are not within the Chairman's authority. (Dist. Resp. 7). Additionally, the District notes that although Respondents did not raise a hearsay objection to Christopher Leiffer's statement at the hearing, rule 28-106.203(3), F.A.C., provides that hearsay is admissible in DOAH proceedings, provided that the hearsay statement alone is not sufficient to support a finding unless the evidence falls within an exception to the hearsay rule. *Id*.

The Chairman may not reject or modify a finding of fact unless a review of the entire record shows that the finding was not based upon competent substantial evidence. § 120.57(1)(l), F. S. The Chairman is without authority to reweigh evidence. *See Walker*, 946 So. 2d at 605. Regarding the first sentence of Finding of Fact 34, the transcript shows that the District called Christopher Leiffer as a witness. (T. 75). Respondents objected twice during the portion of his direct testimony related to the television news interview. (T. 82-85). The first objection was based on the statement having been untimely disclosed; the interview having been outside of the hearing, not probative, and highly prejudicial; and the questions could be asked of Christopher Leiffer during his testimony. (T. 83). The ALJ directed that District counsel could ask the questions that were asked in the interview. (T. 83-84). The second objection was based on the quoted portion of the interview being based on facts not in evidence. (T. 84). The ALJ overruled the second objection. *Id*.

During his direct testimony, District counsel asked Christopher Leiffer the following question:

> Did you tell the news reporter that—and I quote here—"You can't pay $2 million for a property and plant blueberries on it and say, hey, I'm going to make money. You can't do it. The priority is the dirt"?

(T. 84). Christopher Leiffer responded as follows:

> So yes, I did, but what they left out that was probably, I think the clip was maybe 30, 40 seconds. They left out—it was a total of about a five-minute interview. They left out a lot of what I said.

(T. 84-85). On cross examination, Respondents' counsel asked a follow up question about a contract and a question about Christopher Leiffer's intent to plant blueberries. (T. 85-86). Respondents' counsel did not ask any additional questions about the interview. *Id*.

Further, Christopher Leiffer stated that there was a $2,170,000.00 contract to sell approximately 700,000 cubic yards of fill material from the Property for the State Road 46, Wekiva Parkway Project; he had been in the trucking business his entire life; and he had not hired a blueberry planting consultant until after giving a deposition in this case. (Jt. Ex. 2, T. 75-76, 81, 98, 101-102). Kirk Leiffer indicated there was no written business plan for blueberry production, and blueberries had not been purchased. (T. 126, 127). Christopher Leiffer also indicated that excavation would be ongoing following blueberry planting. (T. 82).

The record, including Christopher Leiffer's and Kirk Leiffer's testimony, is sufficiently relevant and material, and adequately provides the factual basis to support the first sentence of Finding of Fact 34; thus, it is supported by competent substantial evidence. *City of Hialeah Gardens*, 857 So. 2d at 204. Additionally, the Chairman may reject or modify only those conclusions or administrative rule interpretations over which the District has substantive jurisdiction. *See* § 120.57(1)(*l*), F. S., *State Contracting and Engineering Corp.*, 709 So. 2d at 610. Substantive jurisdiction in this context does not extend to the ALJ's evidentiary rulings, so the Chairman does not have authority to disturb the ALJ's evidentiary ruling or rule on the evidentiary issue Respondents raised in this Exception. *Barfield*, 805 So. 2d at 1011.

Regarding the second sentence of Finding of Fact 34, the record shows that the ALJ accepted Ms. Dewey as an expert in the field of stormwater engineering and water resource engineering. (T. 24). Ms. Dewey has been a District employee for 33 years, and she has reviewed over 1,000 ERPs, including 50 to 100 for borrow pits, and oversees review engineers that review projects for agricultural activities. (T. 23, 25-26). Ms. Dewey has participated in the District's water quality monitoring program, which involved visiting reservoirs or stormwater ponds on agricultural land to collect samples and assess how the systems were operating and functioning.

(T. 26). Ms. Dewey has also visited blueberry farms personally and professionally at the request of landowners to perform site visits or review permit applications. (T. 26-27). The ALJ overruled Respondents' objection to Ms. Dewey's testimony regarding the excavation activities at issue at the site and their relation to agricultural activities. (T. 199). As discussed above, the Chairman is without authority to reweigh evidence or decide which expert testimony to accept. *See Walker*, 946 So. 2d at 605 (weight of the evidence), *Collier Med. Ctr.*, 462 So. 2d at 83 (expert testimony). Additionally, to the extent Respondents take exception to the ALJ's evidentiary ruling regarding Ms. Dewey's testimony, the Chairman does not have authority to disturb that ruling. *See Barfield*, 805 So. 2d at 1011.

Additionally, the record shows that Ms. Dewey testified that she has visited blueberry farms in Lake and Orange Counties, and the blueberry plants have been planted on rolling or flat terrain, with minimal contouring. (T. 27). Ms. Dewey stated that she has not seen excavation activities for row crops or contour farming. (T. 199-200). She further stated that the ongoing activities at the Property, excavating and removing sand, are consistent with borrow pit activities (T. 30, 32-33, 44, 54, 198, 217, 218). She said that contouring had been performed in the areas shown on the plans as hay field, and the activity in the excavation area was not contouring, but excavation, "removal of 15 to 30 feet of material." (T. 200). The activities she observed at the site are borrow activities, which she does not consider to be agricultural. (T. 198-199). Additionally, Respondents' expert Mr. Ray testified that he was not aware of any other blueberry farm in Lake County or central Florida for which the site had been altered to the extent of the site alteration in this case. (T. 131, 158-59). Respondents' expert Mr. Ray also testified that any exporting of materials from a site would meet the definition of a borrow pit, and the activities on the Property include grading with exported materials. (T. 161). Thus, the record includes

evidence that is sufficiently relevant and material and provides a factual basis for the second sentence in Finding of Fact 34. Competent substantial evidence supports the second sentence. *See City of Hialeah Gardens*, 857 So. 2d at 204.

Accordingly, competent substantial evidence supports the ALJ's Finding of Fact 34. Respondents' Exception 7 is rejected.

Exception 8

Respondents take exception to the ALJ's Finding of Fact 43, which states, "Respondents did not prove by a preponderance of the evidence that the ongoing activities on the Property are exempt as an agricultural closed system." (R.O. ¶43). Respondents assert that competent substantial evidence does not support this finding because Respondents' expert testimony from Mr. Ray, who was the only expert qualified to testify regarding the agricultural nature of the activities at the site, was unrebutted and therefore must be accepted by the ALJ. (Resp. Except. 8). Additionally, Respondents assert that Ms. Dewey testified that the farm operations, once construction of the Farm Plan is completed, would be an exempt activity. *Id*.

The District maintains that competent substantial evidence supports the finding because the record contains testimony, including that of Ms. Dewey, whom the ALJ accepted as an expert, and exhibits demonstrating that the current activities on the site are not agricultural in nature and require a permit. (Dist. Resp. 8). The ALJ overruled Respondents' objection to Ms. Dewey testifying about whether the activities at the Property are agricultural. The District also points out that Respondents' expert agreed that the activities on the Property are not normal and customary grading activities and meet the definition of a borrow pit. *Id*. Additionally, the District notes that the Chairman may not reweigh evidence or judge witness credibility, and regardless of the eventual project on a site, whether a project needs a permit is based on the current activities

at the site. *Id*. (citing *A. Duda and Sons, Inc. v. St. Johns River Water Management Dist.*, 17 So. 3d 738 (Fla. 5th DCA 2009), *Suggs v. Southwest Fla. Water Management Dist.*, Case No. 08-3530 at ¶20 R.O. (Fla. DOAH Feb. 19, 2009) (Recommended Order), *adopted* (*Southwest Fla. Water Management Dist.* April 1, 2009).

The Chairman may not reject or modify a finding of fact unless a review of the entire record shows that the finding was not based upon competent substantial evidence. § 120.57(1)(l), F. S. The Chairman is without authority to reweigh evidence or decide which expert testimony to accept. *See Walker*, 946 So. 2d at 605 (weight of the evidence), *Collier Med. Ctr.*, 462 So. 2d at 85 (expert testimony).

As discussed previously, the record shows that the ALJ accepted Ms. Dewey as an expert in the field of stormwater engineering and water resource engineering. (T. 24). Ms. Dewey has been a District employee for 33 years, and she has reviewed over 1,000 ERPs, including 50 to 100 for borrow pits, and oversees review engineers that review projects for agricultural activities. (T. 23, 25-26). Ms. Dewey has participated in the District's water quality monitoring program, which involved visiting reservoirs or stormwater ponds on agricultural land to collect samples and assess how the systems were operating and functioning. (T. 26). Ms. Dewey has also visited blueberry farms personally and professionally at the request of landowners to perform site visits or review permit applications. (T. 26-27). The ALJ overruled Respondents' objection to Ms. Dewey's testimony regarding the excavation activities on the Property and their relation to agricultural activities. (T. 199). The Chairman is without authority to reweigh evidence or decide which expert testimony to accept. *See Walker*, 946 So. 2d at 605 (weight of the evidence), *Collier Med. Ctr. v. Dep't. of Health & Rehab Servs.*, 462 So. 2d 83, 85 (Fla. 1st DCA 1985) (expert testimony). Additionally, to the extent Respondents take exception to the ALJ's

evidentiary ruling, the Chairman does not have authority to disturb that ruling. *See Barfield*, 805 So. 2d at 1011.

The record also shows that Ms. Dewey testified that she has visited blueberry farms in Lake and Orange Counties, and the blueberry plants have been planted on rolling or flat terrain, with minimal contouring. (T. 27). Ms. Dewey stated that she has not seen excavation activities for row crops or contour farming. (T. 199-200). She further stated that the ongoing activities at the Property, excavating and removing sand, are consistent with borrow pit activities (T. 30, 32-33, 44, 54, 198, 217, 218). She said there are differences between the farm plan and the mass grading plans that had been submitted to the District. (T. 48-50). Contouring had been performed in the areas shown on the plans as hay field, and the activity in the excavation area is not contouring, but excavation, "removal of 15 to 30 feet of material." (T. 200). The activities she observed on the Property are borrow activities, which she does not consider to be agricultural. (T. 198-199).

The record also shows that Mr. Prather observed borrow pit activities occurring on the Property. He explained that he had visited the Property twice in April 2020 after receipt of several complaints regarding dump truck traffic to and from the Property, hauling sand, and he had observed several dump trucks entering the Property empty and leaving full of sand. (T. 66, 67-68). On one of the visits, he saw one of the dump trucks leave the Property and travel to a site where the Wekiva Parkway was being constructed, near Wekiva Road. (T. 68-69).

Additionally, Respondents' expert, Mr. Ray, whom the ALJ accepted as an expert in environmental land use planning for agriculture, testified that he was not aware of any other blueberry farm in Lake County or central Florida for which the site had been altered to the extent of the site alteration in this case. (T. 131, 158-59). Mr. Ray also testified that exporting materials

from the Property would meet the definition of a borrow pit, and the activities on the Property include grading with exported materials. (T. 161).

Further, Christopher Leiffer stated there is a contract to sell approximately 700,000 cubic yards of fill material from the site, for $2,170,000.00, for the State Road 46, Wekiva Parkway Project. (Jt. Ex. 2, T. 75-76, 81). He stated he had been in the trucking business his entire life and did not hire a consultant to assist with blueberry planting until after he gave a deposition in this case. (T. 98, 101-102). Kirk Leiffer stated he did not have a written business plan for blueberry production and that blueberries had not been purchased. (T. 126, 127). Christopher Leiffer also said excavation would be ongoing following blueberry planting, and he confirmed that he gave a television interview and stated that "the priority is the dirt." (T. 82, 84).

Additionally, FDACS concluded, in the portion of its analysis in which it determined whether "the landowner engaged in the occupation of agriculture, silviculture, floriculture, or horticulture," that the hay field was agriculture, but the potential blueberry production areas were separate from the hay, and the blueberry areas were not agriculture. Specifically:

> **YES.** FDACS finds that White Water Farms is engaged in the occupation of agriculture as it relates to the hay fields. This finding is based on the landowner having an agricultural classification for the property from the Lake County Property Appraiser's office, recently conducting a silvicultural harvest, and having planted bermudagrass sprigs to develop a permanent hay field. This finding is limited to the areas of the property where bermudagrass has been planted.
>
> **NO.** FDACS finds that White Water Farms is not engaged in the occupation of agriculture as it relates to the purported blueberry production areas. This finding is based on current and ongoing sand mining activities in this area, the fact that no Consumptive Use Permit has been issued by the District, and that no blueberry plants were evident on the site in preparation for planting. Further, the existing agricultural classification as timber does not support the proposed production scheme. The extent of the excavation and alteration of the site's hydrology indicate that the activities

> undertaken are consistent with the occupation of sand mining, and not that of a *bona fide* agricultural activity.

(Ex. 45, p. 6) (emphasis in original).

Thus, the record includes evidence that is sufficiently relevant and material and provides a factual basis for the ALJ's finding that Respondents did not prove by a preponderance of the evidence that the ongoing activities at the site are exempt as an agricultural closed system. Accordingly, competent substantial evidence supports Finding of Fact 43. *See City of Hialeah Gardens*, 857 So. 2d at 204.

To the extent Respondents take exception to examination of the current activities on the Property versus future intended activities, Respondents have not proposed an alternative conclusion or rule application that is as or more reasonable than that of the ALJ.

Accordingly, Respondents' Exception 8 is rejected.

Exception 9

Respondents take exception to the portion of the ALJ's Conclusion of Law 46 that states, "Respondents' commencement of the activities without first obtaining the required District ERP permit violates chapter 373 and rule 62-330.020." (R.O. ¶46). Respondents assert that the sentence is not supported by competent substantial evidence because their expert, Mr. Ray, who was the only expert qualified to testify about the agricultural nature of the activities, testified that the activities were agricultural, and their expert, Mr. Wicks, testified that the temporary dry pond constructed to support the ongoing activities was to be replaced by a permanent system containing a tailwater pond. (Resp. Except. 9). Mr. Wicks explained that the activities described in the Farm Plan meet the requirements of a closed system under section 373.406(3), F.S. *Id*. Therefore, the ALJ could not have concluded that Respondents do not meet the "agricultural

closed system" exemption under section 373.406(3), F.S., and were required to obtain an ERP. *Id*.

The District maintains that the facts underlying the ALJ's conclusion are supported by competent substantial evidence because the ALJ accepted Ms. Dewey's expert testimony that the activities at the Property are not agricultural in nature, the ongoing operation is a borrow pit that exceeds three permitting thresholds under rule 62-330.020, F.A.C., and Respondents' expert, Mr. Ray, admitted that the ongoing activities are a borrow pit (Dist. Resp. 9).

Respondents do not suggest an alternative conclusion or rule interpretation that is as or more reasonable than that of the ALJ.

Notwithstanding, to the extent Respondents seek rejection or modification of Conclusion of Law 46 because the facts underlying it are not supported by competent substantial evidence, the Chairman may not reject or modify a finding of fact unless a review of the entire record shows that the finding was not based upon competent substantial evidence. § 120.57(1)(l), F. S. The Chairman is without authority to reweigh evidence or decide which expert testimony to accept. *See Walker*, 946 So. 2d at 605 (weight of the evidence), *Collier Med. Ctr.*, 462 So. 2d at 85 (expert testimony).

The record shows that the ALJ accepted Ms. Dewey as an expert in the field of stormwater engineering and water resource engineering. (T. 24). Ms. Dewey has been a District employee for 33 years, and she has reviewed over 1,000 ERP, including 50 to 100 for borrow pits, and oversees review engineers that review projects for agricultural activities. (T. 23, 25-26). Ms. Dewey has participated in the District's water quality monitoring program, which involved visiting reservoirs or stormwater ponds on agricultural land to collect samples and assess how the systems were operating and functioning. (T. 26). Ms. Dewey has also visited blueberry farms

personally and professionally at the request of landowners to perform site visits or review permit applications. (T. 26-27). The ALJ overruled Respondents' objection to Ms. Dewey's testimony regarding the excavation activities at the Property and their relation to agricultural activities. (T. 199). To the extent Respondents take exception to the ALJ's evidentiary ruling, the Chairman does not have authority to disturb that ruling. *See Barfield*, 805 So. 2d at 1011.

Regarding whether the nature of the activities at the Property are agriculture, the record shows that Ms. Dewey testified that she has not seen excavation activities for row crops or contour farming. (T. 199-200). The record also shows that Ms. Dewey testified that the ongoing activities at the Property, excavating and removing sand, are consistent with borrow pit activities (T. 30, 32-33, 44, 54, 198, 217, 218). Additionally, Respondents' expert Mr. Ray testified that he was not aware of any other blueberry farm in Lake County or central Florida for which the site had been altered to the extent of the site alteration in this case. (T. 131, 158-59). Respondents' expert Mr. Ray also testified that any exporting of materials from a site would meet the definition of a borrow pit, and the activities on the Property include grading with exported materials (T. 161).

Additionally, FDACS found, in the portion of its analysis regarding whether the landowner was engaged in the occupation of agriculture, that the Property had two "separate and distinct" active operations—a hay field and an approximately 30-acre large scale, mass grading and excavation area with six separate fields of approximately five acres each. (Ex. 45, p. 6.) The excavation work included large dump trucks entering and exiting the Property. *Id*. No blueberry plants were observed on the site, no consumptive use permit had been issued, and the existing agricultural classification was timber. *Id*. As to the "purported blueberry production areas" FDACS concluded that "the extent of excavation and alteration of the site's hydrology indicate

that the activities undertaken are consistent with the occupation of sand mining, and not that of a *bona fide* agricultural activity." *Id*. (emphasis in original).

Further, Christopher Leiffer stated that there is a contract to sell approximately 700,000 cubic yards of fill material from the site, for $2,170,000.00, for the State Road 46, Wekiva Parkway Project. (Jt. Ex. 2, T. 75-76, 81). He stated he had been in the trucking business his entire life and did not hire a consultant to assist with blueberry planting until after he gave a deposition in this case. (T. 98, 101-102). Kirk Leiffer stated he did not have a written business plan for blueberry production and indicated that blueberries had not been purchased. (T. 126, 127). Christopher Leiffer also said that excavation would be ongoing following blueberry planting, and he confirmed that he gave a television interview and stated, "the priority is the dirt." (T. 82, 84).

Regarding the closed system, Mr. Wicks read the statutory definition of "closed system" from section 373.403(6), F.S.: "The title closed system means any reservoir or works located entirely within agricultural land owned or controlled by the user and which requires water only for the filling, replenishing, and maintaining the water level thereof." (T. 175). Mr. Wicks explained that the grading plan and the farm plan define the activities on the Property. (T. 177). The "initial mass grading project" provides a dry retention. *Id*. For the hay and blueberry production, the dry retention will be converted to a tailwater recovery pond "as part of developing the beds for the planting areas." (T. 177-178). Mr. Wicks opined that the farm plan establishes a closed system once construction is completed. (T. 175).

Ms. Dewey explained the difference between mass grading and a borrow pit. (T. 191). Mass grading generally involves moving dirt around within a site, and a borrow pit involves the excavated material being removed from the site. *Id*. She also explained that a dry retention pond

is not a closed system. (T. 205-206). Applying the statutory definition, she explained that there are two prongs – the first is that it is located entirely within agricultural land, and the second is that water is required only for filling, replenishing, and maintaining the water level. (T. 206). As to the first prong, she stated that the current activity is a borrow pit, so the system is not on agricultural land. *Id*. As to the second prong, she stated that the pond does not continue water; it is designed to be a dry pond and recover the water. *Id*.

Regarding permit requirements, Ms. Dewey explained that the District looks at current ongoing activities to determine whether a permit is required. (T. 220). She explained that the current excavation activities on the Property exceed three thresholds in rule 62-330.020, F.A.C. (T. 35-36). Specifically to the activities at issue, rule 62-330.020, F.A.C., requires a permit before construction, alteration, operation, maintenance, removal, or abandonment of any project that by itself or in combination with an activity conducted after October 1, 2013 cumulatively results in more than 4,000 square feet of impervious surface area subject to vehicular traffic, a total project area of more than five acres, or the capability of impounding more than 40 acre feet of water. *Id*. Ms. Dewey continued, stating that the haul roads being used at the Property exceed the 4,000-square foot area threshold; the excavation area is approximately 35 acres, which exceeds the five acre threshold; and the 30 to 35-acre excavation area, based upon the depth, would have the capability of impounding more than 40 acre feet of water. *Id*.

Thus, the record includes evidence that is sufficiently relevant and material and provides a factual basis to support a factual finding that the Property did not contain an agricultural closed system, which underlies the ALJ's conclusion that "Respondents' commencement of the activities without first obtaining the required District ERP permit violates chapter 373 and rule 62-330.020." Accordingly, competent substantial evidence supports the ALJ's findings necessary

to reach the conclusion in the excepted portion of Conclusion of Law 46. *See generally City of Hialeah Gardens*, 857 So. 2d at 204.

For the foregoing reasons, Respondents' Exception 9 is rejected.

Exception 10

Respondents' Exception 10 states, "The Leiffers take exception to the Conclusion in Paragraph 52 that it is 'Petitioner's position' that the Section 373.406(2), F.S. exemption requires the agricultural practice to be 'normal and customary' and the Section 373.406(3), F.S. exemption does not because it is not supported by competent substantial evidence." (Resp. Except. 10). It appears that Respondents take issue with the second sentence of the ALJ's Conclusion of Law 52, which states, "Respondents' position is that subsection 373.406(2) requires the agricultural activity to be 'normal and customary,' while subsection 373.406(3) does not."[4] (R.O. ¶52). Respondents also take issue with the fourth sentence of the ALJ's Conclusion of Law 52, which states, "It would be incongruous to ignore the finding of the state agriculture agency about what constitutes the practice of agriculture. *See, e.g. Meeks ex rel. Estate of Meeks v. Fla. Power & Light Co.*, 816 So. 2d 1125, 1131 (Fla. 5th DCA 2002) (reflecting that sections of a statute be considered together and interpreted in such a way as to bring them in harmony with one another); *WFTV, Inc. v. Wilken*, 675 So. 2d 674, 679 (Fla. 4th DCA 1996) (reflecting that in determining the legislative intent of a specific subsection, other subsections of a statute may be considered)." (R.O. ¶52).

It appears that Respondents' argument is that the ALJ erred because the plain language of the statute shows that the section 373.406(2) exemption requires the agricultural practice to be

[4] Respondents stated in their Proposed Recommended Order, "Further, the tests for the determination if an activity is agriculture is different under Florida Statutes Sections 373.406(2) and (3). Subsection (2) requires the agricultural activity to be 'normal and customary' while Subsection (3) does not." (Resp. P.R.O. ¶56).

"normal and customary," but the section 373.406(3) exemption does not. (Resp. Except. 10). Because the tests are different, the ALJ should have applied the principle of statutory construction providing that the mention of one thing implies the exclusion of another, to exclude as irrelevant the facts and conclusions in the FDACS Binding Determination from her consideration of whether Respondents are exempt from permit requirements under section 373.406(3), F.S. *Id*. To the extent the ALJ relied on facts and conclusions related to the 373.406(2), F.S., exemption determination for her consideration of the section 373.406(3), F.S., exemption, the conclusion that Respondents are not exempt is in error because it is not based on facts supported by competent substantial evidence. *Id*.

The District asserts that the Chairman can only reject or modify conclusions of law if the revision is as or more reasonable than the ALJ's conclusion of law. (Dist. Resp. 10). The District contends that Conclusion of Law 52 is not erroneous for two reasons. *Id*. First, to the extent it is based on Findings of Fact 30, 31, and 32, those findings are supported by competent substantial evidence, which the Chairman may not reweigh. *Id*. Second, while sections 373.406(2) and (3), F.S., are worded differently, both contain the term "agricultural," and the ALJ's application of the statutory interpretation principle requiring that sections of a statute be read together to bring harmony and avoid an unreasonable or absurd result is correct. *Id*. The District also cites a previous case in which the same set of facts was used to support findings related to both the "agricultural exemption" in section 373.406(2), F.S., and the "agricultural closed system" exemption in section 373.406(3), F.S. *Id*. (citing *Suggs v. Southwest Fla. Water Management Dist.*, Case No. 08-3530 at ¶20 R.O. (Fla. DOAH Feb. 19, 2009) (Recommended Order), *adopted* (*Southwest Fla. Water Management Dist.* April 1, 2009).

As discussed in the ruling on Respondents' Exception 5 above, Findings of Fact 30, 31, and 32 are supported by competent substantial evidence. To the extent Respondents are making an evidentiary objection based on the relevance of the Binding Determination, including the facts and conclusions contained therein, the Chairman does not have the authority to make such a ruling. *Barfield*, 805 So. 2d at 1011.

The Chairman may only reject or modify an ALJ's conclusion of law or rule interpretation by stating with particularity the reasons for rejecting or modifying it, and must make a finding that the substituted conclusion of law or rule interpretation is as or more reasonable than the ALJ's. *See* § 120.57(1)(l), F. S.

Section 373.406(2), F.S., states in pertinent part:

> Notwithstanding s. 403.927, nothing herein, or in any rule, regulation, or order adopted pursuant hereto, shall be construed to affect the right of any person engaged in the occupation of agriculture, silviculture, floriculture, or horticulture to alter the topography of any tract of land, including, but not limited to, activities that may impede or divert the flow of surface waters or adversely impact wetlands, for purposes consistent with the normal and customary practice of such occupation in the area. However, such alteration or activity may not be for the sole or predominant purpose of impeding or diverting the flow of surface waters or adversely impacting wetlands.

A plain reading of this subsection shows three requirements for an activity to be exempt. First, the person must be engaged in the occupation of agriculture, silviculture, floriculture, or horticulture. *Id*. Second, proposed topography alterations must be for purposes consistent with the normal and customary practice of such occupation in the area. *Id*. Third, alterations or proposed alterations must not be for the sole or predominant purpose of impeding or diverting the flow of surface waters or adversely impacting wetlands. *Id. See also* Fla. Admin. Code R.

5M-15.005(1) (implementing section 373.406(2), F.S., and setting forth the three-part test applied to exemption claims pursuant thereto).

Neither the first nor the third requirement of this subsection make any reference to "normal and customary." Thus, analysis of the first requirement, whether someone is engaged in the occupation of agriculture, can be made without considering normal and customary practices. The FDACS Binding Determination confirms this. The Binding Determination shows that FDACS evaluated the first requirement, whether someone is engaged in the occupation of agriculture, without any reference to "normal and customary," or generally accepted practices for the type of operation and the region. (Ex. 45, p. 6). *See also* Fla. Admin. Code R. 5M-15.001(1) (defining "normal and customary practice in the area"). Specifically, in its analysis of the first requirement, FDACS found two "separate and distinct" active operations on the Property—one hay and one sand mining. (Ex. 45, p. 6). Regarding the sand mining, FDACS applied the first requirement to the facts it observed on site:

> FDACS finds that White Water Farms is not engaged in the occupation of agriculture as it relates to the purported blueberry production areas. This finding is based on current and ongoing sand mining activities in this area, the fact that no Consumptive Use Permit has been issued by the District, and that no blueberry plants were evident on the site in preparation for planting. Further, the existing agricultural classification as timber does not support the proposed production scheme. The extent of the excavation and alteration of the site's hydrology indicate that the activities undertaken are consistent with the occupation of sand mining, and not that of a *bona fide* agricultural activity.

Id. (emphasis in original). FDACS made no reference to or analysis of normal and customary, or generally accepted practices for blueberry farming or blueberry farming practices in the geographic area. *Id*.

Section 373.406(3), F.S., states in pertinent part:

> Nothing herein, or in any rule, regulation, or order adopted pursuant hereto, shall be construed to be applicable to construction, operation, or maintenance of any agricultural closed system. However, part II of this chapter shall be applicable as to the taking and discharging of water for filling, replenishing, and maintaining the water level in any such agricultural closed system.

As in the first requirement under section 373.406(2), F.S., this subsection does not reference "normal and customary." Thus, a determination of whether something is "agricultural" under this subsection can similarly be made without consideration of what is "normal and customary." In *Suggs*, an ALJ analyzed claims for exemptions under both sections 373.406(2) and (3), F.S., using the same body of evidence. *Suggs v. Southwest Fla. Water Management Dist.*, Case No. 08-3530 at ¶20 R.O. (Fla. DOAH Feb. 19, 2009) (Recommended Order), *adopted* (*Southwest Fla. Water Management Dist.* April 1, 2009). Accordingly, at the least, facts used to determine whether an activity is exempt under the first requirement in section 373.406(2), F.S., could also be used to determine whether an activity is exempt under section 373.406(3), F.S.

All parts of a statute must be read together to achieve a consistent whole, and all related provisions should be read together when possible, to achieve harmony. *Forsythe v. Longboat Key Beach Erosion Control Dist.*, 604 So. 2d 452, 455 (Fla. 1992). *See also Meeks ex rel. Estate of Meeks v. Fla. Power & Light Co.*, 816 So. 2d 1125, 1131 (Fla. 5th DCA 2002), *WFTV, Inc. v. Wilken*, 675 So. 2d 674, 679 (Fla. 4th DCA 1996). Reading sections 373.406(2) and (3), F.S., together to achieve a consistent whole, "agriculture" does not have two separate meanings or require two different sets of facts upon which to apply the respective analyses. Rather, section 373.406(2), F.S., has three requirements. The first includes consideration of the occupation of agriculture, without reference to "normal and customary" practices, and the second includes consideration of "normal and customary" practices of agriculture. Section 373.406(3), F.S., includes consideration of an "agricultural closed system" without reference to "normal and

customary" practices. To avoid an absurd result, whether something is "agriculture" in the first requirement under section 373.406(2), F.S., and whether something is "agricultural" under section 373.406(3), F.S., can be determined using at least the same set of facts.

Even if the principle Respondents' assert—the mention of one thing implies the exclusion of another—applies, the result is the same. "Normal and customary" is not mentioned in the first requirement of section 373.406(2), F.S. Applying this principle, because the legislature did not include "normal and customary," consideration of "normal and customary" is excluded from the first requirement of section 373.406(2), F.S. Thus, analyses of both the first requirement in section 373.406(2), F.S., and the requirements in section 373.406(3), F.S., respectively, are made without consideration of what is "normal and customary." This is confirmed in FDACS rules, and by the analysis of the first requirement in the FDACS Binding Determination, as discussed above. *See* Fla. Admin. Code R. 5M-15.005(1), Ex. 45, p. 6.

Thus, the interpretation Respondents assert is not as or more reasonable than the ALJ's conclusion in Conclusion of Law 52 that it would be incongruous to ignore the state agriculture agency's finding about what is the practice of agriculture.

Additionally, to the extent Respondents assert the fact findings underlying the ALJ's conclusion that the activities on the Property are not agriculture are not supported by competent substantial evidence, record evidence other than the Binding Determination shows that competent substantial evidence supports such a finding, as discussed in detail in the rulings on Respondents' Exceptions 3, 4, 6, 7, and 8.

Accordingly, Respondents' Exception 10 is rejected.

Exception 11

Respondents' Exception 11 takes issue with the last sentence of the ALJ's Conclusion of Law 53, which states "Respondents' attempt to use the District's definitions in section 14.7 of the A.H., Vol. II to overcome DACS' Binding Determination is not persuasive." (R.O. ¶53). Respondents assert that it is an incorrect application of law and is not supported by competent substantial evidence because the findings of the Binding Determination have no application to the section 373.406(3), F.S., exemption; the only testimony or evidence regarding the applicable definitions of "agriculture" and "agricultural activity" shows that the definitions in Section 14.7 of the District's Applicant's Handbook Volume II apply to determine eligibility for the section 373.406(3), F.S., exemption; and the only agricultural expert testified that the "farm activities" meet the definitions of "agriculture" and "agricultural activity" of the District's Applicant's Handbook Volume II, Section 14.7. (Resp. Except. 11).

The District maintains that Ms. Dewey testified that the definitions in Section 14.7 of the District's Applicant's Handbook Volume II apply only to agricultural activities that do not meet an exemption and require an ERP, and competent substantial evidence supports the ALJ's finding that the Respondents' activities are mining, not agriculture. (Dist. Resp. 11).

The Chairman may only reject or modify an ALJ's conclusion of law or interpretation of administrative rule by stating with particularity the reasons for rejecting or modifying it, and must make a finding that the substituted conclusion of law or interpretation of administrative rule is as or more reasonable than the ALJ's. *See* § 120.57(1)(l), F. S.

To the extent Respondents assert that the facts in the Binding Determination cannot be considered in the ALJ's analysis of the section 373.406(3), F.S. exemption, they have not

asserted an interpretation or application of a rule or law that is as or more reasonable than the ALJ's conclusion, as discussed in the ruling on Respondents' Exception 10.

To the extent Respondents assert that the last sentence of Conclusion of Law 53 is not supported by competent substantial evidence because it is based on Finding of Fact 34, that finding is supported by competent substantial evidence, as discussed in the ruling on Respondents' Exception 7.

To the extent Respondents suggest that the last sentence of Conclusion of Law 53 is erroneous because Respondents' expert Mr. Ray testified that the definitions in section 14.7 of the District's Applicant's Handbook Volume II apply to statutory determinations under section 373.406(3), F.S., the record contains District expert Ms. Dewey's testimony that explains the definitions apply to activities that require an ERP. (T. 194). As discussed previously, the record shows that the ALJ accepted Ms. Dewey as an expert in the field of stormwater engineering and water resource engineering. (T. 24). Ms. Dewey has been a District employee for 33 years, and she has reviewed over 1,000 Environmental Resource Permits, including 50 to 100 for borrow pits, and oversees review engineers that review projects for agricultural activities. (T. 23, 25-26). The ALJ overruled Respondents' objection to Ms. Dewey's testimony regarding the excavation activities at the Property and their relation to agricultural activities. (T. 199). The Chairman is without authority to reweigh evidence or decide which expert testimony to accept. *See Walker*, 946 So. 2d at 605 (weight of the evidence), *Collier Med. Ctr.*, 462 So. 2d at 85 (expert testimony). To the extent Respondents take exception to the ALJ's evidentiary ruling, the Chairman does not have authority to disturb that ruling. *See Barfield*, 805 So. 2d at 1011.

Ms. Dewey specifically explained that while the Applicant's Handbook Volume I applies statewide, each water management district has its own Volume II Applicant's Handbook. (T.

194). Section 14 of the District's Volume II Applicant's Handbook includes the District's prior ERP rules applicable to "projects that were an agricultural activity and they still exceeded a permit threshold." *Id*. Additionally the Binding Determination does not contain any reference to the definitions in section 14.7 of the District's Applicant's Handbook Volume II. (Ex. 45).

Thus, the record includes evidence that is sufficiently relevant and material and provides support for the factual findings underlying the last sentence of the ALJ's Conclusion of Law 53. *See generally City of Hialeah Gardens*, 857 So. 2d at 204.

Chapter 62-330 of the Florida Administrative Code, which includes rule 62-330.020, applies statewide. *See* Fla. Admin. Code R. 62-330.010 ("This chapter, together with the rules and all documents it incorporates by reference, implements the comprehensive, statewide [ERP] program under Section 373.4131, F.S."). Rule 62-330.010(4)(a), F.A.C., incorporates the Applicant's Handbook Volume I, "General and Environmental," and states that it applies "statewide to all activities regulated under Chapter 62-330, F.A.C. It includes explanations, procedures, guidance, standards, and criteria on what is regulated by this chapter, the types of permits available, how to submit an application or notice for a regulated activity to the Agencies, how applications and notices are reviewed, the standards and criteria for issuance, and permit duration and modification." Rule 62-330.010(4)(b), F.A.C., provides that an Applicant's Handbook Volume II has been adopted for use within each District. This means that there is a different Applicant's Handbook Volume II for each water management district.

Rule 62-330.020, F.A.C. contains the permit thresholds—a list of which activities require an ERP. Rule 62-330.051, F.A.C., lists the activities that exceed a threshold—and would otherwise require an ERP under rule 62-330.020—that are exempt. Among these exemptions are

"[a]ctivities conducted in conformance with the exemptions in section 373.406, [F.S.]." Fla. Admin. Code R. 62-330.051(2).

Thus, as set forth in the ERP rules, the determination of whether an activity exceeds a threshold and would require an ERP is based on the statewide rules, which include chapter 62-330, F.A.C., and Volume I of the Applicant's Handbook. Similarly, if the activity would otherwise exceed a threshold and require an ERP, but it falls under a listed exemption, that determination is based on the statewide rules, which include chapter 62-330, F.A.C., and Volume I of the Applicant's Handbook. In other words, the definitions in section 14 of the District's Volume II Applicant's Handbook do not apply until it is determined that the activity exceeds a threshold and would require an ERP pursuant to rule 62-330.020, F.A.C., does not meet one of the exemptions listed in rule 62-330.051, F.A.C., and is located specifically within the St. Johns River Water Management District. Respondents' suggested use of definitions from the District's Applicant's Handbook Volume II, which applies only within the District and not statewide, would require application of a "local" definition to an analysis that relies on statewide uniformity. If other water management districts in Florida have different definitions of "agriculture" or "agricultural activity" or do not define those terms in their respective volume II handbooks, statewide rules would no longer have consistent statewide application.

Accordingly, Respondents have cited to expert testimony that contains their preferred rule interpretation, but they have not proposed a conclusion or rule interpretation that is as or more reasonable than the last sentence of the ALJ's Conclusion of Law 53. Respondents' Exception 11 is rejected.

Exception 12

Respondents take exception to the portion of the ALJ's Conclusion of Law 55 that states "Respondents' system is not a 'closed system.'" (R.O. ¶55). Respondents assert that the uncontroverted expert testimony is that the Revised Mass Grading Plan is an interim construction document that contains plans to manage stormwater during construction of the complete system, which would be an exempt activity upon completion. (Resp. Except. 12). The ALJ erred by not accepting uncontroverted expert testimony, so this portion of the ALJ's conclusion is not supported by competent substantial evidence. (Resp. Except. 12).

The District maintains that Ms. Dewey's testimony that the District reviews the current ongoing activities, which are a borrow pit and are not a closed system, to determine whether a permit is required, rebuts the expert testimony Respondents cite. (Dist. Resp. 12). The Chairman does not have authority to reweigh the evidence, and the ALJ is even free to reject unrebutted expert testimony. *Id*. Therefore, the ALJ's conclusion is supported by competent substantial evidence. *Id*.

The Chairman may only reject or modify an ALJ's conclusion of law or interpretation of administrative rule by stating with particularity the reasons for rejecting or modifying it, and must make a finding that the substituted conclusion of law or interpretation of administrative rule is as or more reasonable than the ALJ's. *See* § 120.57(1)(l), F. S.

In the record, Mr. Wicks read the statutory definition of "closed system" from section 373.403(6), F.S.: "The title closed system means any reservoir or works located entirely within agricultural land owned or controlled by the user and which requires water only for the filling, replenishing, and maintaining the water level thereof." (T. 175). Mr. Wicks explained that the grading plan and the farm plan define the activities on the Property. (T. 177). The "initial mass

grading project" provides a dry retention. *Id*. For the hay and blueberry production, the dry retention will be converted to a tailwater recovery pond "as part of developing the beds for the planting areas." (T. 177-178). Mr. Wicks opined that the farm plan establishes a closed system once construction is completed. (T. 175).

Ms. Dewey explained the difference between mass grading and a borrow pit. (T. 191). Mass grading generally involves moving dirt around within a site, and a borrow pit involves the excavated material being removed from the site. *Id*. She also explained that a dry retention pond is not a closed system. (T. 205-206). Applying the statutory definition, she explained that there are two prongs – the first is that it is located entirely within agricultural land, and the second is that water is required only for filling, replenishing, and maintaining the water level. (T. 206). As to the first prong, she stated that the current activity is a borrow pit, so the system is not on agricultural land. *Id*. As to the second prong, she stated that the pond does not continue water; it is designed to be a dry pond and recover the water. *Id*. The District looks at the current ongoing activities to determine whether a permit is required, and a permit is required for the activities at the Property. (T. 200-201, 220).

The record shows that the ALJ accepted both Mr. Wicks and Ms. Dewey as experts, and overruled Respondents' objection to Ms. Dewey's testimony regarding the excavation activities at the Property and their relation to agricultural activities. (T. 24, 171, 199). The Chairman is without authority to reweigh evidence or decide which expert testimony to accept. *See Walker*, 946 So. 2d at 605 (weight of the evidence), *Collier Med. Ctr.*, 462 So. 2d at 85 (expert testimony).

The record also contains additional evidence regarding the nature of the current activities at the Property. District experts Ms. Dewey and Mr. Prather observed excavation and removal of

sand, which are consistent with borrow pit activities. (T. 30, 32-33, 44, 54, 198, 217, 218). FDACS found, in the portion of its analysis regarding whether the landowner was engaged in the occupation of agriculture, that the Property had two "separate and distinct" active operations—a hay field and an approximately 30-acre large scale, mass grading and excavation area with six separate fields of approximately five acres each. (Ex. 45, p. 6.) The excavation work included large dump trucks entering and exiting the Property. *Id*. No blueberry plants were observed on the site, no consumptive use permit had been issued, and the existing agricultural classification was timber. As to the "purported blueberry production areas" FDACS concluded that "the extent of excavation and alteration of the site's hydrology indicate that the activities undertaken are consistent with the occupation of sand mining, and not that of a *bona fide* agricultural activity." *Id*. (emphasis in original).

Respondents' expert Mr. Ray also testified that the activities on the Property include grading with exported materials, and that any exporting of materials from a site would meet the definition of a borrow pit. (T. 161). Kirk Leiffer indicated there was no written business plan for blueberry production, and blueberries had not been purchased. (T. 126, 127). Christopher Leiffer stated there was a $2,170,000.00 contract to sell approximately 700,000 cubic yards of fill material from the Property for the State Road 46, Wekiva Parkway Project; he had been in the trucking business his entire life; and he had hired a blueberry planting consultant after giving a deposition in this case. (Jt. Ex. 2, T. 75-76, 81, 98, 101-102). Christopher Leiffer admitted stating that the "priority is the dirt" and said excavation would be ongoing following blueberry planting. (T. 82, 84).

Thus, to the extent Respondents assert the last sentence of the ALJ's Conclusion of Law 55 is based on facts that are not supported by competent substantial evidence, the record includes

evidence that is sufficiently relevant and material and provides a factual basis to support the ALJ's finding that Respondents' system is not a closed system. Accordingly, competent substantial evidence supports the facts underlying this portion of Conclusion of Law 55. *See City of Hialeah Gardens*, 857 So. 2d at 204.

Respondents did not suggest alternative conclusion or rule interpretation that is as or more reasonable than that of the ALJ.

For these reasons, Respondents' Exception 12 is rejected.

Exception 13

Respondents' Exception 13 takes issue with the ALJ's application in Conclusion of Law 56 of the requirement in the agricultural closed system exemption in section 373.406(3), F.S., that it shall not be construed to eliminate the requirement that generally accepted engineering practices apply to construction, operation, and maintenance of a dam, dike, or levee. (Resp. Except. 13). Respondents argue that because no dam, dike, or levee has been constructed on the Property, this requirement is not applicable. *Id*.

The District maintains that as a statute enacted to protect the public health, safety, and welfare from further harm to water resources, the statute must be liberally construed to carry out its purposes, and conversely, exceptions to the regulatory authority in chapter 373 must be narrowly construed against the person claiming a statutory exception. (Dist. Resp. 13). The District further asserts that record testimony from its expert, Ms. Dewey, shows that the Respondents' design plan does not follow generally accepted engineering practices and the failure of the side slopes of the area being excavated would cause damage similar to that of a dam, dike, or levee, and Respondents did not demonstrate that such harm is unlikely. *Id*.

The Chairman may only reject or modify an ALJ's conclusion of law or interpretation of administrative rule by stating with particularity the reasons for rejecting or modifying it, and must make a finding that the substituted conclusion of law or interpretation of administrative rule is as or more reasonable than the ALJ's. *See* § 120.57(1)(l), F.S.

To prevail on their affirmative defense under section 373.406(3), F.S., Respondents had the burden to prove by a preponderance of the evidence that the activities on the Property are exempt from ERP regulation under Chapter 373, Part IV, F.S. *See Hough v. Menses*, 95 So.2d 410, 412 (Fla. 1957). To do so, Respondents must prove that the activities on the Property are construction, operation, or maintenance of an agricultural closed system, and such construction, operation or maintenance meets generally accepted engineering practices for construction, operation, and maintenance of dams, dikes, or levees. § 373.406(3), F.S.

The ALJ's Findings of Fact and Conclusions of Law that the activities on the Property are not an "agricultural closed system" are supported by competent substantial evidence, and Respondents have not proposed an interpretation of a statute or rule that is as or more reasonable than the ALJ's, as discussed in the rulings on Exceptions 7, 9, and 12, above.

The ALJ also reached a conclusion based on Ms. Dewey's testimony that Respondents' proposed design does not follow generally accepted engineering practices and that any failure of the borrow pit's side slopes would cause harm similar to the failure of a dam, dike, or levee. (R.O. ¶56). District expert Ms. Dewey testified that she had concern that the side slopes of the excavation area were too steep, and she was concerned about whether they could be maintained because it would be "very prone to erosion and failure." (T. 198). Because of the size of the area being excavated, she had concern that if the side slopes were to fail, there would be a potential for harm equivalent to that of a dam, dike, or levee. (T. 213). She also stated that the District

applies generally accepted engineering practices for anything the District reviews within permit applications. *Id*.

To obtain an ERP, an applicant must provide reasonable assurance that, among others, the construction, alteration, operation, maintenance, removal, or abandonment of the project will be capable, based on generally accepted engineering and scientific principles, of performing and functioning as proposed. Fla. Admin. Code r. 62-330.301(1)(i). Among others, rule 62-330.301 implements section 373.413, F.S., which provides that the Florida Department of Environmental Protection and the District may require permits and impose reasonable conditions necessary to assure that construction or alteration of any stormwater management system, dam, impoundment, reservoir, appurtenant work, or works will comply with chapter 373 and applicable rules promulgated thereto, and will not be harmful to the water resources. *Id*., § 373.413, F. S. The provisions of chapter 373, F.S., shall be liberally construed "in order to effectively carry out its purposes." § 373.616, F. S. Chapter 373's purposes include, among others, to promote the health, safety, and general welfare of the people of Florida and to prevent harm to Florida's water resources. *See* § 373.016, F. S.

Further, exceptions to the regulatory authority conferred to agencies in chapter 373, F.S., are to be narrowly construed against the person claiming the exception. *See Still v. DACS*, Case No. 15-5750 at ¶ 28 (Fla. DOAH Feb. 2, 2016), *adopted* (Fla. Dept. of Agriculture and Consumer Svcs. April 27, 2016) (citing *Samara Dev. Corp. v. Marlow*, 556 So.2d 1097, 1100 (Fla. 1990)). Thus, a liberal construction of chapter 373 to promote the health, safety, and welfare of Floridians and prevent harm to Florida's water resources, and a narrow construction of the agricultural closed system exemption, together, do not result in an application in which generally accepted engineering practices apply only to dams, dikes, and levees. Rather, such an

interpretation would include application of generally accepted engineering principles to construction, alteration, operation, maintenance, removal, or abandonment of any stormwater management system, dam, impoundment, reservoir, appurtenant work, or works, as provided in rule 62-330.301(1)(i), F.A.C.

Accordingly, Respondents' proposed interpretation that because the activities on the Property do not include a dam, dike, or levee, generally accepted scientific and engineering principles should not apply, is not as or more reasonable than the ALJ's conclusion. Therefore, Respondents' Exception 13 is rejected.

Exception 14

Respondents take exception to the ALJ's Conclusion of Law 57, which states "Respondents did not prove by a preponderance of the evidence that the ongoing activities on the Property are exempt as an agricultural system." (R.O. ¶57). The gravamen of Respondents' argument is that it is not supported by competent substantial evidence because the only witness qualified to testify about agriculture testified that the activities on the Property are agriculture, and the only expert engineering testimony regarding whether the activities on the Property constituted a closed system was that the operations are a closed system or will be a closed system upon completion of construction. (Resp. Except. 14).

The District maintains that the ALJ accepted Ms. Dewey as an expert and overruled Respondents' objection as to whether Ms. Dewey could testify about the agricultural aspects of the project. (Dist. Resp. 14). The District asserts that the Chairman cannot overrule the ALJ's evidentiary decision to accept Ms. Dewey as an expert witness or reweigh evidence, resolve conflicts therein, or judge witness credibility to support a different conclusion of law. *Id*. Ms.

Dewey testified that the current construction on the Property is a borrow pit, and not a closed system, and it requires a permit. *Id*.

The Chairman may only reject or modify an ALJ's conclusion of law or interpretation of administrative rule by stating with particularity the reasons for rejecting or modifying it, and must make a finding that the substituted conclusion of law or interpretation of administrative rule is as or more reasonable than the ALJ's. *See* § 120.57(1)(l), F. S.

As discussed previously, the record shows that the ALJ accepted Ms. Dewey as an expert in the field of stormwater engineering and water resource engineering. (T. 24). Ms. Dewey has been a District employee for 33 years, and she has reviewed over 1,000 ERPs, including 50 to 100 for borrow pits, and oversees review engineers that review projects for agricultural activities. (T. 23, 25-26). Ms. Dewey has participated in the District's water quality monitoring program, which involved visiting reservoirs or stormwater ponds on agricultural land to collect samples and assess how the systems were operating and functioning. (T. 26). Ms. Dewey has also visited blueberry farms personally and professionally at the request of landowners to perform site visits or review permit applications. (T. 26-27). The ALJ overruled Respondents' objection to Ms. Dewey's testimony regarding the excavation activities on the Property and their relation to agricultural activities. (T. 199). The Chairman is without authority to reweigh evidence or decide which expert testimony to accept. *See Walker*, 946 So. 2d at 605 (weight of the evidence), *Collier Med. Ctr.,* 462 So. 2d at 85 (Fla. 1st DCA 1985) (expert testimony). Additionally, to the extent Respondents take exception to the ALJ's evidentiary ruling, the Chairman does not have authority to disturb that ruling. *See Barfield*, 805 So. 2d at 1011.

Regarding whether the nature of the activities at the Property is agriculture, the record shows that Ms. Dewey testified that she has not seen excavation activities for row crops or

contour farming. (T. 199-200). The record also shows that Ms. Dewey testified that the ongoing activities at the Property, excavating and removing sand, are consistent with borrow pit activities (T. 30, 32-33, 44, 54, 198, 217, 218). Additionally, Respondents' expert Mr. Ray testified that he was not aware of any other blueberry farm in Lake County or central Florida for which the site had been altered to the extent of the site alteration in this case. (T. 131, 158-59). Respondents' expert Mr. Ray also testified that the activities on the Property include grading with exported materials, and that any exporting of materials from a site would meet the definition of a borrow pit. (T. 161).

Additionally, FDACS found, in the portion of its analysis about whether the landowner was engaged in the occupation of agriculture, that the Property had two "separate and distinct" active operations—a hay field and an approximately 30-acre large scale, mass grading and excavation area with six separate fields of approximately five acres each. (Ex. 45, p. 6.) The excavation work included large dump trucks entering and exiting the Property. *Id*. No blueberry plants were observed on the site, no consumptive use permit had been issued, and the existing agricultural classification was timber. As to the "purported blueberry production areas" FDACS concluded that "the extent of excavation and alteration of the site's hydrology indicate that the activities undertaken are consistent with the occupation of sand mining, and not that of a *bona fide* agricultural activity." *Id*. (emphasis in original).

Further, Christopher Leiffer stated that there was a contract to sell approximately 700,000 cubic yards of fill material from the site, for $2,170,000.00, for the State Road 46, Wekiva Parkway Project. (Jt. Ex. 2, T. 75-76, 81). He stated he had been in the trucking business his entire life and had hired a consultant to assist with blueberry planting after he gave a deposition in this case. (T. 98, 101-102). Kirk Leiffer stated he did not have a written business plan for

blueberry production and indicated that blueberries had not been purchased. (T. 126, 127). Christopher Leiffer also said that excavation would be ongoing following blueberry planting, and he confirmed that he gave a television interview and stated, "the priority is the dirt." (T. 82, 84).

Regarding the closed system, Mr. Wicks read the statutory definition of "closed system" from section 373.403(6), F.S.: "The title closed system means any reservoir or works located entirely within agricultural land owned or controlled by the user and which requires water only for the filling, replenishing, and maintaining the water level thereof." (T. 175). Mr. Wicks explained that the grading plan and the farm plan define the activities on the Property. (T. 177). The "initial mass grading project" provides a dry retention. *Id*. For the hay and blueberry production, the dry retention will be converted to a tailwater recovery pond "as part of developing the beds for the planting areas." (T. 177-178). Mr. Wicks opined that the farm plan establishes a closed system once construction is completed. (T. 175).

Ms. Dewey explained the difference between mass grading and a borrow pit. (T. 191). Mass grading generally involves moving dirt around within a site, and a borrow pit involves the excavated material being removed from the site. *Id*. She also explained that a dry retention pond is not a closed system. (T. 205-206). Applying the statutory definition, she explained that there are two prongs – the first is that it is located entirely within agricultural land, and the second is that water is required only for filling, replenishing, and maintaining the water level. (T. 206). As to the first prong, she stated that the current activity is a borrow pit, so the system is not on agricultural land. *Id*. As to the second prong, she stated that the pond does not continue water; it is designed to be a dry pond and recover the water. *Id*. The District looks at the current ongoing activities to determine whether a permit is required, and a permit is required for the activities at the Property. (T. 200-201, 220).

The record also shows that Ms. Dewey testified that she has visited blueberry farms in Lake and Orange Counties, and the blueberry plants have been planted on rolling or flat terrain, with minimal contouring. (T. 27). Ms. Dewey stated that she has not seen excavation activities for row crops or contour farming. (T. 199-200). She further stated that the ongoing activities at the Property, excavating and removing sand, are consistent with borrow pit activities (T. 30, 32-33, 44, 54, 198, 217, 218). She said that there are differences between the farm plan and the mass grading plans that had been submitted to the District. (T. 48-50). Contouring had been performed in the areas shown on the plans as hay field, and the activity in the excavation area is not contouring, but excavation, "removal of 15 to 30 feet of material." (T. 200). The activities she observed at the Property are borrow activities, which she does not consider to be agricultural. (T. 198-199).

Thus, the record includes evidence that is sufficiently relevant and material and provides a factual basis for the ALJ's finding that Respondents did not prove by a preponderance of the evidence that the ongoing activities at the site are exempt as an agricultural closed system. Accordingly, competent substantial evidence supports the facts underlying Conclusion of Law 57. *See City of Hialeah Gardens*, 857 So. 2d at 204. Respondents did not suggest a conclusion or rule interpretation that is as or more reasonable than that of the ALJ.

For these reasons, Respondents' Exception 14 is rejected.

Exception 15

Respondents take exception to the ALJ's recommendation "for all the reasons stated above." Respondents have not stated any additional reasons for any of their exceptions. Accordingly, for the same reasons as indicated in the ruling on each of Respondents' Exceptions 1-14, Exception 15 is rejected.

For the foregoing reasons, **IT IS ORDERED**:

1. Finding of Fact 26 of the Recommended Order entered November 24, 2020, attached as Exhibit A, is revised to read:

> 26. Thus, the Revised Mass Grading Plan does not match the Blueberry & Hay Production Farm Plan. The Revised Mass Grading Plan shows excavation of overburden down to 60 and 70 feet, construction of a haul road, and erosion measures to control stormwater runoff. Then, upon completion of construction and excavation, the Blueberry & Hay Production Farm Plan is implemented. For example, the Revised Mass Grading Plan shows a dry retention pond would be constructed, while the Blueberry & Hay Production Farm Plan shows a wet retention tailwater recovery pond would be constructed.

2. All other portions of the Recommended Order entered November 24, 2020, attached as Exhibit A, are **ADOPTED** in their entirety, including the ultimate findings in the Recommendation, as follows:

   a. Respondents commenced construction and operation of a borrow pit/sand mine and haul road on the Property without the necessary ERP;

   b. Respondents' construction and operation of a borrow pit/sand mine and haul road on the Property are not exempt under subsection 373.406(3), F.S.; and

   c. Respondents shall perform the corrective actions from the April 28, 2020 Complaint, attached as Exhibit B, within the timeframes provided therein.

DONE AND ORDERED on January 13, 2021, in Palatka, Florida.

ST. JOHNS RIVER WATER
MANAGEMENT DISTRICT

BY: _____
Douglas Burnett
Governing Board Chairman

RENDERED on January 13th, 2021.

BY: Susan Hatchell
for Courtney Waldron, District Clerk

Copies furnished to:

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Counsel for Respondents Christopher Douglas Leiffer, as Trustee of the C&K Family Trust dated January 31, 2020; and Kirk Stephen Leiffer, as Trustee of the C&K Family Trust dated January 31, 2020

NOTICE OF RIGHTS

1. Pursuant to section 120.569, Florida Statutes, the purpose of this notice is to inform each party's attorney of record that judicial review of the Final Order in this case is available under Section 120.68, Florida Statutes.

2. Pursuant to Section 120.68, Florida Statutes, a party who is adversely affected by the Final Order may seek review in the appellate district where the District maintains its headquarters or where a party resides or as otherwise provided by law by filing a notice of appeal or petition for review in accordance with the Florida Rules of Appellate Procedure within 30 days of the rendering of the Final Order. The District's headquarters are in Palatka, Florida, and in this case, the Final Order was rendered on January 13, 2021.

3. Failure to observe the relevant time frames for filing a petition for judicial review will result in waiver of that right to review.

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that on January 13, 2021, a copy of this NOTICE OF RIGHTS has been sent by email to the following:

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Office of General Counsel
St. Johns River Water Management District
4049 Reid Street, Palatka, FL 32177

Exhibit A

STATE OF FLORIDA
DIVISION OF ADMINISTRATIVE HEARINGS

GOVERNING BOARD OF THE ST. JOHNS RIVER WATER MANAGEMENT DISTRICT,

Petitioner,

vs. Case No. 20-2471

CHRISTOPHER DOUGLAS LEIFFER, AS TRUSTEE OF THE C AND K FAMILY TRUST DATED JANUARY 31, 2020, AND KIRK STEPHEN LEIFFER, AS TRUSTEE OF THE C AND K FAMILY TRUST DATED JANUARY 31, 2020,

Respondents.
_____/

RECOMMENDED ORDER

Pursuant to notice, there was a final hearing in this enforcement proceeding on September 10, 2020, via Zoom conference. The hearing was conducted by Francine M. Ffolkes, a designated Administrative Law Judge of the Division of Administrative Hearings (DOAH).

APPEARANCES

For Petitioner: Sharon Wyskiel, Esquire
Elizabeth S. Schoonover,
Assistant General Counsel
St. Johns River Water
Management District
4049 Reid Street
Palatka, Florida 32177

For Respondents: Jimmy D. Crawford, Esquire
Lindsay C. Holt, Esquire
Crawford Modica & Holt
702 West Montrose Street
Clermont, Florida 34711

STATEMENT OF THE ISSUE

The main issue in this case is whether the ongoing excavation activities by Respondents, Christopher Douglas Leiffer, as Trustee of the C&K Family Trust dated January 31, 2020, and Kirk Stephen Leiffer, as Trustee of the C&K Family Trust dated January 31, 2020 (Respondents), require an environmental resource permit (ERP) from Petitioner, Governing Board of the St. Johns River Water Management District (District). To make that determination, it is pertinent to determine whether Respondents' activities constitute an "agricultural closed system" and qualify for the statutory exemption under subsection 373.406(3), Florida Statutes.

PRELIMINARY STATEMENT

On April 28, 2020, the District initiated this enforcement proceeding by serving Respondents with an Administrative Complaint and Proposed Order (Complaint). The Complaint alleged that Respondents commenced construction and operation of a borrow pit without first obtaining the required ERP permit. In the Complaint, the District sought that Respondents obtain an after-the-fact permit or remediation of Respondents' property affected by these activities. Respondents challenged the Complaint on May 11, 2020, by requesting an administrative hearing. The challenge disputed the Complaint's factual allegations and also asserted two affirmative defenses. Respondents asserted that the activities were exempt from ERP permitting under the agricultural exemptions in subsections 373.406(2) and (3).

The challenge was referred to DOAH and scheduled for a final hearing. Prior to the hearing, the District requested the Department of Agriculture and Consumer Services (DACS) make a Binding Determination as to whether Respondents' activities qualified for the subsection 373.406(2) agricultural exemption. On July 24, 2020, DACS issued a Binding Determination, finding that the portion of the property that Respondents alleged was a proposed blueberry farm and the District alleged was a borrow pit, did not qualify for the subsection 373.406(2) agricultural exemption. On August 20, 2020, the District requested the undersigned take judicial notice (official recognition) of the Binding Determination. The undersigned took official recognition and received the Binding Determination into evidence on September 1, 2020.

Respondents did not challenge the Binding Determination of DACS by requesting an administrative hearing. Instead, on July 31, 2020, Respondents sought leave to amend their challenge to withdraw their affirmative defense under subsection 373.406(2). Leave was granted on August 31, 2020, and Respondents filed their amended challenge on September 1, 2020.

On August 27, 2020, Respondents filed a Motion in Limine requesting the undersigned exclude DACS's Binding Determination and the proposed final hearing testimony of DACS employees Christopher Pettit and Bill Bartnick. The Motion in Limine was denied as to the exclusion of the Binding Determination, and granted as to the exclusion of Mr. Pettit and Mr. Bartnick's proposed testimony at the final hearing.

At the final hearing, the District presented the fact testimony of Christopher Leiffer, individually and as co-trustee of the C&K Family Trust; and Kirk Leiffer, individually and as co-trustee of the C&K Family Trust and as the corporate representative of White Water Farms, Inc. The District also

presented the expert testimony of Cameron Dewey, P.E., an expert in the fields of stormwater engineering and water resource engineering; Jeffrey Prather, an expert in the fields of ERP regulation and compliance; and proffered the testimony of Christopher Pettit. The parties' joint exhibits 1 through 16, 18 through 28, 36, 37, 44, and 45, were admitted into evidence. The parties stipulated to entry of a revised version of joint exhibit 40, which was entered into evidence at the hearing. The parties stipulated to entry of supplemental joint exhibits 32 through 35, which were admitted into evidence and filed with DOAH on September 16, 2020.

Respondents presented the fact testimony of Kirk Leiffer, individually, and as co-trustee of the C&K Family Trust, and as the corporate representative of White Water Farms, Inc. Respondents presented the expert testimony of William "Bill" Ray, an expert in the field of environmental land use and planning for agriculture; and Kenneth R. "Ted" Wicks, P.E., an expert in the field of civil engineering for the design and development of farm projects.

The two-volume Transcript of the hearing was filed at DOAH on October 6, 2020.[1] The parties timely filed their proposed recommended orders, which were carefully considered in the preparation of this Recommended Order.

References to the Florida Statutes are to the 2019 version, unless otherwise indicated.

[1] The parties' proposed recommended orders refer to a Joint Notice of Filing Hearing Transcript (Notice), filed on September 28, 2020. The Notice was not accompanied by the Transcript, which was, in fact, received by the clerk of DOAH and docketed on October 6, 2020.

FINDINGS OF FACT

Based on the parties' stipulations, on matters officially recognized, and the evidence adduced at the final hearing, the following Findings of Fact are made.

The Parties

1. The District is authorized by sections 373.413, 373.414, and 373.416 to administer and enforce the environmental resource permitting requirements for the management and storage of surface waters. The District implements these statutes, in pertinent part, through Florida Administrative Code Chapter 62-330.

2. Respondents own approximately 80 acres of real property in Sorrento, Lake County, Florida, which they acquired by Warranty Deed on January 31, 2020 (the Property). The Property was largely a planted pine plantation, until the planted pines were harvested in early 2020 by the Respondents.

3. The Property is located within the Wekiva River Protection Area as defined in section 369.303(9), Florida Statutes.

Chronology of Events

4. In 2019, prior to acquiring the Property by Warranty Deed, Respondents' experts Bill Ray and Ted Wicks developed an "Agricultural Management and Improvement Plan" for Whitewater Farms, Inc., dated April 6, 2019 (Farm Plan). The Farm Plan, submitted to the Lake County Property Appraiser, is a narrative description of proposed clearing and mass grading of approximately 40 acres of the Property resulting in construction of six blueberry fields. The other 40 acres of the Property were proposed for hay and silage production.

5. At first, Lake County issued a Local Government Notification (Notification) to the District that the White Water Farms proposal by the Property's prior owners was "pre-empted from adhering to the comprehensive plan and local development regulations due its agricultural classification." This Notification was dated June 27, 2019.

6. However, on August 23, 2019, Lake County sent a letter to the District rescinding the June 27, 2019, Notification. Lake County's letter stated that after reviewing the full application provided by the District, "the proposed grading activities on the subject site do not constitute bona-fide agricultural activities and appears to be a borrow-pit." The letter further stated that borrow-pits require approval through the "Mining Conditional Use Permit" process.

7. The Whitewater Farms proposal to the District was a permit application that was withdrawn by Ted Wicks in early September 2019 after receiving Lake County's August 23, 2019, letter. The District's file notations indicate that there were other outstanding additional information items, and if a new application was submitted within 365 days, the permit fee would be transferred.

8. Whitewater Farms, Inc., currently leases the Property from the C&K Family Trust dated January 31, 2020. Respondent, Christopher Leiffer, a co-trustee of the C&K Family Trust dated January 31, 2020, is president of Whitewater Farms, Inc. Respondent, Kirk Leiffer, a co-trustee of the C&K Family Trust dated January 31, 2020, is the corporate representative for Whitewater Farms, Inc.

9. On April 2, 2020, Christopher Leiffer, president of Whitewater Farms, Inc., signed a purchase agreement with SEMA Construction, Inc., to provide up to 700,000, plus or minus, cubic yards of fill dirt for the Wekiva Beltway extension roadway project. The total purchase price is $2.17 million. As of the date of the final hearing, Respondents have provided approximately 200,000 cubic yards of fill dirt to SEMA Construction, Inc. Excavation activities at the Property began shortly after the purchase agreement was signed, i.e., the latter part of the first week of April 2020.

10. The purchase agreement requires the fill dirt be provided at the rate requested, which varies from 100 to 300 truckloads on a daily basis including weekends. More specifically, the purchase agreement requires that

operations at "the borrow pit" location will be "from 6:30am to 5:00pm Monday through Saturday."

11. At the final hearing, Chris Leiffer admitted to giving an interview to a news reporter during the pendency of this administrative proceeding, and admitted to saying: "You can't pay $2 million for a property and plant blueberries on it and say, hey, I'm going to make money. You can't do it. The priority is the dirt." Kirk Leiffer also admitted that they have not farmed before, and that "We -- my family, myself, we've been in the trucking and excavation business my whole life."

12. Kirk Leiffer testified that they intend to continue excavation activities at the Property as long as necessary to fulfill the purchase agreement. He also testified that they intend to start planting blueberries in November or December of this year. Thus, both activities may occur simultaneously.

13. Cameron Dewey, one of the District's expert witnesses, testified that she first noticed clearing of the Property when she drove past the Property in March of this year. Then on April 6, 2020, the District staff sent a warning letter as part of its investigation into activities at the Property. The warning letter notified Respondents' counsel that the District had received a complaint that "[i]t appears that soil is being excavated, stockpiled and sold without the benefit of a District permit or determination." The warning letter recommended that all construction activity cease until the investigation was complete.

14. Jeff Prather, the District's other expert witness, testified that on April 9, 2020, he drove to the Property and observed trucks entering and leaving the Property with sand. Mr. Prather followed one of the trucks from the Property and observed the truck moving toward a site where the Wekiva Parkway is being constructed. Mr. Prather visited the Property again on April 14, 2020, and observed heavy earth-moving equipment.

15. The District received complaints regarding dump truck traffic from neighbors and from Lake County that were consistent with Mr. Prather's

observations. At the hearing Mr. Prather testified: "I don't know what else it could be, other than a borrow pit operation."

16. On April 28, 2020, the District served Respondents with the Complaint. The Complaint specifically alleged the following activities require a permit:

> 13. Respondents have commenced construction of a project that exceeds five acres.
> 14. Respondents have commenced construction of a project that is capable of impounding more than 40-acre feet of water.
>
> 15. Respondents have constructed a haul road that is more than 4,000 square feet of impervious and/or semi-impervious surface area subject to vehicular traffic.

17. In the Complaint, the District proposed to adopt the following corrective actions:

> 32. Respondents shall either: obtain an after-the-fact permit for the unauthorized borrow pit operation or remediate the Property. Respondents shall notify the District of which option they chose within 14 days of rendition of the Final Order. If Respondents fail to provide written notice of their selection within that 14-day period, it will be deemed an abandonment by Respondents of their election to seek an after-the-fact permit. Such abandonment shall activate the requirement that Respondents remediate the property as specified in paragraph [34] below.
>
> 33. If Respondents elect to obtain a permit, then within 45 days of rendition of the Final Order, Respondents shall submit to the District a complete permit application, including the applicable permit fee, to address the unauthorized borrow pit operation on the Property. For any unpermitted activity for which Respondents seek an after-the-fact permit, the complete permit application must provide reasonable assurance of meeting the standards and criteria in rules 62-330.301 and 62-

> 330.302, F.A.C. Upon issuance of the after-the-fact permit, Respondents shall comply with all conditions of the permit. Failure to timely respond to a request for additional information that results in a Final Order administratively denying the application, will require the Respondents to remediate the Property as specified in paragraph [34]. Similarly, denial of the application on a substantive basis for not meeting applicable requirements will require remediation of the Property as specified in paragraph [34]. In either case, the remediation plan shall be submitted to the District for review within 14 days of rendition of the Final Order denying the application for a permit. The Respondents shall complete the remediation plan within 30 days of the District's written approval of the plan
>
> 34. If Respondents elect to remediate the Property, Respondents shall submit a remediation plan to the District for review and approval within 45 days of rendition of the Final Order.
>
> a. The plan shall include, at a minimum, the removal of the haul roads, regrading and stabilizing the slopes of the borrow pit, and a timeframe for completion of the remediation plan, which shall be no later than 30 days from approval of the remediation plan by the District.
>
> b. Within 7 days of completion of the activities described in the remediation plan, Respondent shall so notify the District in writing and request an inspection.

18. Respondents challenged the Complaint on May 11, 2020, by requesting the instant administrative hearing. The challenge disputed the Complaint's factual allegations and also asserted two affirmative defenses. Respondents asserted that the activities were exempt from ERP permitting under the agricultural exemptions in subsections 373.406(2) and (3). After the District obtained the Binding Determination regarding the subsection 373.406(2) agricultural exemption, Respondents withdrew that affirmative defense.

19. On May 28, 2020, Respondents applied for an ERP to authorize the borrow pit operations ongoing on approximately 40 acres of the Property. The application remains incomplete for several reasons including a lack of the Notification from Lake County required by subsection 13.3.6 of the Applicant's Handbook (AH), Vol. II.

20. The application was signed by Kirk Leiffer, "Kirk Stephen Leiffer," as Trustee of the C&K Family Trust. Attachments to the application include: the Warranty Deed; an aerial location map showing the Property in an undisturbed state; White Water Farms Mass Grading Plans, Sheets 1 through 5, dated May 13, 2020; and White Water Farms Blueberry & Hay Production Farm Plan, Sheets 1 through 4, dated May 13, 2020. After the District's requests for additional information (RAI), White Water Farms – Mass Grade stormwater management calculations were signed and sealed on August 12, 2020, and submitted to the District. In addition, the White Water Farms Mass Grading Plan was revised on June 17, 2020 (Revised Mass Grading Plan).

Respondents' Current Activities on the Property

21. In June 2020, Ms. Dewy entered the Property to perform a site inspection. While on the Property, she observed the southern portion of the borrow pit being excavated and a deep trench surrounding the southern portion. She also observed two excavators on the Property, and that material was being removed and hauled off-site in trucks.

22. In July 2020, Ms. Dewey observed a large number of trucks entering and leaving the Property with sand. At the hearing, Ms. Dewey testified that in her experience, she has observed blueberry farms in Lake County only plant blueberries on the existing rolling terrain. She testified that she has observed only minimal contouring, where uneven surfaces are smoothed out.

23. Respondents' expert, Mr. Ray, also testified that he is not aware of any blueberry farm site in central Florida that has been altered to such an extent

as Respondents' Property. Mr. Ray also admitted the activities on the Property meet the definition of a borrow pit.

24. The excavation of a 30-foot deep borrow pit is not a normal and customary grading activity for a blueberry farm. In fact, the extent of the excavation and alteration of the Property's hydrology indicates that the activities are more consistent with the occupation of sand mining.

25. Respondents' expert, Mr. Wicks, testified that the Revised Mass Grading Plan and Stormwater Calculations describe and illustrate the construction phase of the blueberry portion of the farm, and are temporary construction documents, designed to be replaced by the Blueberry & Hay Production Farm Plan and narrative Farm Plan upon completion of construction.

26. Thus, the Revised Mass Grading Plan does not match the Blueberry & Hay Production Farm Plan. The Revised Mass Grading Plan shows excavation of overburden down to 60 and 70 feet below the current existing ground surface, construction of a haul road, and erosion measures to control stormwater runoff. Then, upon completion of construction and excavation, the Blueberry & Hay Production Farm Plan is implemented. For example, the Revised Mass Grading Plan shows a dry retention pond would be constructed, while the Blueberry & Hay Production Farm Plan shows a wet retention tailwater recovery pond would be constructed.

Respondents' Proposed Activities on the Property

27. The Blueberry & Hay Production Farm Plan contemplates six productions fields to be excavated and planted in phases. Fields 1 and 2 are a combined 10.78 acres. Fields 3 and 4 are a combined 9.54 acres. Fields 5 and 6 are a combined 12.5 acres. The result is a combined total of 32.82 acres of blueberry farm fields.

28. Respondents' experts admit that while it is not a normal and customary practice in blueberry farming in Central Florida, there are benefits to planting blueberries between 15 and 30 feet below the existing

Property grade. These benefits include enabling a closed system for stormwater treatment, which eliminates potential offsite stormwater/surface water pollution and encouraging water conservation by utilizing a tailwater pond for irrigation. Other benefits include reducing pesticide and herbicide wind drift, and irrigation water wind drift. And finally, minimizing nutrient pollution to the aquifer by re-filtering irrigation water from the tailwater pond through the hay field and soil, and minimizing noise impacts to the neighbors, from air cannons used to deter birds and from machinery noise.

29. Respondents admit that the Revised Mass Grading Plan describes a project that is over five acres, contains a total of over 4,000 square feet of impervious and semi-impervious surface areas subject to vehicular traffic, and is capable of impounding more than 40,000 acre-feet of water. Respondents do not dispute that the borrow pit operation started in early April 2020, is ongoing, and unless otherwise exempt, is required to obtain an ERP from the District.

Binding Determination's Findings

30. The extent of the excavation and alteration of the Property's hydrology indicates that the activities undertaken are consistent with the occupation of sand mining. Alterations to the topography of the land are not for purposes consistent with the normal and customary practice of agriculture in the area.

31. A massive excavation project is not the equivalent of leveling or contouring to prevent erosion for planting blueberry crops. Instead of excavating nearly 30 feet of soil to create a near-level ground surface for the proposed planting of blueberries, a normal and customary option would have been to design the blueberry rows to follow the land's natural contours.

32. The landowner is not engaged in the occupation of agriculture as to the proposed blueberry production area of the property. The primary function of the significant excavation activities on the blueberry farm portion of the Property is for the mining activity itself.

Agricultural Closed System Exemption

33. The District's expert, Ms. Dewey, persuasively testified that she has not seen excavation activities of this type for row crops, and the ongoing activities at the Property are consistent with a sand mining operation. Blueberry plants are typically planted at ground-level and very minimal contouring is needed. Ms. Dewey did agree that normal contouring was performed for the hay field, but planting blueberries at the bottom of a 30-foot pit was inconsistent with other blueberry farms in the area.

34. Respondents admit that the current priority is removal of fill dirt to fulfill the contract. The more persuasive evidence establishes that the ongoing excavation activities on the Property are not "agricultural."

35. The Revised Mass Grading Plan and Stormwater Calculations describe and illustrate construction and operation of a borrow pit/sand mine. The more persuasive evidence establishes that this activity is not an integral part of preparing the Property for blueberry farming.

36. Respondents' expert, Mr. Wicks, admitted that the Property in its current state does not contain a "closed system." The more persuasive evidence establishes that it currently contains a dry retention pond developed to capture stormwater runoff as exemplified in the Revised Mass Grading Plan.

37. On May 28, 2020, Respondents applied for an ERP to authorize the borrow pit operations ongoing on approximately 40 acres of the Property. The information or lack of information in the application caused the District to be concerned that the ongoing activities do not meet generally accepted engineering practices both for borrow pit/sand mine operations and the claim of an "agricultural closed system."

38. The District's expert, Ms. Dewey, testified that the water table level in this area is generally very deep. The ERP application showed soil boring information for the Property. However, neither soil boring was located within the area of the borrow pit. Soil boring information from within the area of the

borrow pit is important in order to determine the location of the confining layer in relation to the bottom of the borrow pit.

39. Ms. Dewey also testified that two soil borings located outside of the borrow pit area would not be sufficient to determine where the confining layer is located because the confining layer tends to fluctuate in this area of Central Florida.

40. Sufficiently specific soil boring information would enable the District to determine whether Respondents' excavation activities would fracture the confining layer and cause harm to groundwater resources. Respondents' expert, Mr. Wicks, claimed they maintained a minimum of five feet of bottom elevation above an estimated seasonal high water table. However, Mr. Wicks's claim is based on the two soil borings taken outside the footprint of the borrow pit.

41. In addition, Respondents have proposed a three-to-one (3:1) side slope for the borrow pit. Ms. Dewey testified that a 3:1 side slope for a depth of 20 to 30 feet is steep for a borrow pit. Because of the sandy soils in this area, Ms. Dewey is concerned about the slopes' stabilization, and whether they can be maintained in perpetuity. A side slope that is too steep is prone to erosion and failure, and does not meet generally accepted engineering practices. Slope failure in this borrow pit would be similar to the harm caused by failure of a dam, dike, or levee.

Ultimate Findings

42. The District's prima facie case demonstrated that the ongoing activities on the Property exceed the ERP permitting thresholds.

43. Respondents did not prove by a preponderance of the evidence that the ongoing activities on the Property are exempt as an agricultural closed system.

CONCLUSIONS OF LAW

44. The District has jurisdiction over Respondents, the Property, and the unauthorized borrow pit/sand mine activities that are ongoing on the Property. *See* §§ 373.069(2), 373.219, 373.413, and 373.416, Fla. Stat.

45. The District has authority to issue a written administrative complaint to alleged violators whenever the District has reason to believe that a violation of any provision of chapter 373, or any regulation promulgated thereunder has occurred, is occurring, or is about to occur. *See* § 373.119(1), Fla. Stat. The administrative complaint may order that necessary corrective action(s) be taken within a reasonable time prescribed by such order. *Id*.

46. Respondents' ongoing borrow pit/sand mine activities constitute a regulated activity under rule 62-330.020. Respondents' commencement of the activities without first obtaining the required District ERP permit violates chapter 373 and rule 62-330.020. *See* § 373.430(1)(b), Fla. Stat.; Fla. Admin. Code R. 62-330.020(2)(b), (d), and (e).

47. The District's prima facie case proved that the ongoing activities on the Property exceed the ERP permitting thresholds in rule 62-330.020, and the activities began without first obtaining the required ERP permit.

48. In this case, Respondents assert that their activities qualify for the exemption under section 373.406(3). Exemptions from the regulatory authority of chapters 373 or 403, Florida Statutes, are to be narrowly construed against the person claiming the statutory exemption. *See Still v. Dep't of Ag. & Consumer Servs.*, Case No. 15-5750 at RO ¶30 (Fla. DOAH Feb. 2, 2016; Fla. DACS Apr. 27, 2016)(citing *Samara Dev. Corp. v. Marlow*, 556 So. 2d 1097, 1100 (Fla. 1990); *Pal-Mar Water Mgmt. Dist. v. Bd. of Cty. Comm'rs of Martin Cty.*, 384 So. 2d 232, 233 (Fla. 4th DCA 1980)(affirming final order finding project was not an agricultural closed system "in light of the strict construction against a party claiming a statutory exemption."). Respondents carry the ultimate burden of proving that their activities qualify for the claimed exemption.

49. Respondents must prove by a preponderance of the evidence that their activities are exempt. *See* § 120.57(1)(j), Fla. Stat. ("Findings of fact shall be based upon a preponderance of the evidence, . . . and shall be based exclusively on the evidence of record and on matters officially recognized.")

50. Section 373.403 contains exemptions from the requirement to obtain an ERP permit for agricultural uses. Section 373.403 provides, in pertinent part:

> (2) Notwithstanding s. 403.927, nothing herein, or in any rule, regulation, or order adopted pursuant hereto, shall be construed to affect the right of any person engaged in the occupation of agriculture, silviculture, floriculture, or horticulture to alter the topography of any tract of land, including, but not limited to, activities that may impede or divert the flow of surface waters or adversely impact wetlands, for purposes consistent with the normal and customary practice of such occupation in the area. However, such alteration or activity may not be for the sole or predominant purpose of impeding or diverting the flow of surface waters or adversely impacting wetlands. This exemption applies to lands classified as agricultural pursuant to s. 193.461 and to activities requiring an environmental resource permit pursuant to this part. This exemption does not apply to any activities previously authorized by an environmental resource permit or a management and storage of surface water permit issued pursuant to this part or a dredge and fill permit issued pursuant to chapter 403. This exemption has retroactive application to July 1, 1984.
>
> (3) Nothing herein, or in any rule, regulation, or order adopted pursuant hereto, shall be construed to be applicable to construction, operation, or maintenance of any agricultural closed system. However, part II of this chapter shall be applicable as to the taking and discharging of water for filling, replenishing, and maintaining the water level in any such agricultural closed system. This subsection shall not be construed to eliminate the

> necessity to meet generally accepted engineering practices for construction, operation, and maintenance of dams, dikes, or levees.

51. In this case, DACS found in the Binding Determination that, as to the alleged blueberry farm, Respondents are not engaged in the occupation of agriculture and Respondents' activities are not consistent with the practice of agriculture. For these reasons, the subsection 373.406(2) agricultural exemption does not apply, and Respondents abandoned this affirmative defense prior to the final hearing. Section 373.407 gives DACS the exclusive authority to make the determination regarding the subsection 373.406(2) exemption, and its findings are binding.

52. Respondents argue that the tests for the determination if an activity is agriculture is different under subsection 373.406(2) and (3). Respondents' position is that subsection 373.406(2) requires the agricultural activity to be "normal and customary," while subsection 373.406(3) does not. However, the same undisputed facts exist regarding the ongoing activities at the Property. It would be incongruous to ignore the finding of the state agriculture agency about what constitutes the practice of agriculture. *See, e.g., Meeks ex rel. Estate of Meeks v. Fla. Power & Light Co.*, 816 So. 2d 1125, 1131 (Fla. 5th DCA 2002)(reflecting that sections of a statute be considered together and interpreted in such a way as to bring them in harmony with one another); *WFTV, Inc. v. Wilken*, 675 So. 2d 674, 679 (Fla. 4th DCA 1996)(reflecting that in determining the legislative intent of a specific subsection, other subsections of a statute may be considered).

53. For example, in *Suggs v. Southwest Florida Water Management District*, Case No. 08-3530 (Fla. DOAH Feb. 19, 2009; SWFWMD Apr. 1, 2009), the same facts were used to determine the application of both the agricultural exemption of subsection 373.406(2), and the agricultural closed system exemption of subsection 373.406(3). Respondents' attempt to use the

District's definitions in section 14.7 of the A.H., Vol. II, to overcome DACS' Binding Determination is not persuasive.

54. Under subsection 373.403(6), a "'closed system' means any reservoir or works located entirely within agricultural lands owned or controlled by the user and which requires water only for the filling, replenishing, and maintaining the water level thereof." Thus, a closed system requires: (1) a reservoir or works, (2) water, and (3) the water level be maintained for the reservoir or works. "A 'closed system', as defined by statute, requires water, as well as a reservoir or works." *St. Johns River Water Mgmt. Dist., v. Molica,* Case No. 08-4359 at FO pg. 39 (Fla. DOAH June 12, 2009; Supp. Fla. DOAH Sept. 21, 2009; SJRWMD July 27, 2012).

55. Respondents' Revised Mass Grading Plan, for their ongoing borrow pit/sand mine activities, depicts a dry borrow pit and a dry retention pond, with stormwater calculations for that pond showing no stormwater will be left within the pond. Respondents' system is not a "closed system."

56. In addition, the subsection 373.406(3) exemption provides that "[t]his subsection shall not be construed to eliminate the necessity to meet generally accepted engineering practices for construction, operation, and maintenance of dams, dikes, or levees." The District's expert witness testified that Respondents' proposed design does not follow generally accepted engineering practices, and that any failure of the side slopes of the borrow pit would cause harm similar to failure of a dam, dike, or levee. *See generally Corp. of President of Church of Jesus Christ of Latter-Day Saints v. St. Johns River Water Mgmt. Dist.*, 489 So. 2d 59 (Fla. 5th DCA 1986)(reflecting that statutory exemptions from environmental permitting should be narrowly construed to minimize adverse environmental harm).

57. Respondents did not prove by a preponderance of the evidence that the ongoing activities on the Property are exempt as an agricultural closed system.

RECOMMENDATION

Based on the foregoing Findings of Fact and Conclusions of Law, it is RECOMMENDED that the District enter a Final Order: (i) adopting the finding that Respondents commenced construction and operation of a borrow pit/sand mine and haul road on the Property without the necessary ERP permit; (ii) adopting the finding that Respondents' construction and operation of a borrow pit/sand mine and haul road on the Property are not exempt under subsection 373.406(3); and (iii) adopting the corrective actions from the April 28, 2020, Complaint ordering Respondents to perform the corrective actions within the timeframes provided therein.

DONE AND ENTERED this 24th day of November, 2020, in Tallahassee, Leon County, Florida.

FRANCINE M. FFOLKES
Administrative Law Judge
Division of Administrative Hearings
The DeSoto Building
1230 Apalachee Parkway
Tallahassee, Florida 32399-3060
(850) 488-9675
Fax Filing (850) 921-6847
www.doah.state.fl.us

Filed with the Clerk of the
Division of Administrative Hearings
this 24th day of November, 2020.

COPIES FURNISHED:

Jimmy D. Crawford, Esquire
Crawford Modica & Holt
702 West Montrose Street
Clermont, Florida 34711
(eServed)

Sharon Wyskiel, Esquire
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4049 Reid Street
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Diana M. Johnson, Esquire
Alachua County Public Schools
620 East University Avenue
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Ann B. Shortelle, Ph.D., Executive Director
St. Johns River Water Management District
4049 Reid Street
Post Office Box 1429
Palatka, Florida 32178-1429
(eServed)

NOTICE OF RIGHT TO SUBMIT EXCEPTIONS

All parties have the right to submit written exceptions within 15 days from the date of this Recommended Order. Any exceptions to this Recommended Order should be filed with the agency that will issue the Final Order in this case.

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

GOVERNING BOARD OF
THE ST. JOHNS RIVER WATER
MANAGEMENT DISTRICT,

Complainant,

SJRWMD F.O.R. NO. 2020-12

vs.

CHRISTOPHER DOUGLAS LEIFFER,
as TRUSTEE OF THE C&K FAMILY TRUST
DATED JANUARY 31, 2020, and KIRK STEPHEN
LEIFFER, as TRUSTEE OF THE C&K FAMILY
TRUST DATED JANUARY 31, 2020
_____/

ADMINISTRATIVE COMPLAINT AND PROPOSED ORDER

TO: Christopher D. Leiffer
4324 Edgewater Drive
Orlando, FL 32804

Kirk S. Leiffer
4324 Edgewater Drive
Orlando, FL 32804

Jimmy D. Crawford, Esq.
702 W. Montrose Street
Clermont, FL 34711

Complainant, Governing Board of the St. Johns River Water Management District ("District"), in support of its Administrative Complaint and Proposed Order regarding Christopher Douglas Leiffer, as trustee of the C&K Family Trust dated January 31, 2020, and Kirk Stephen Leiffer, as trustee of the C&K Family Trust dated January 31, 2020, ("Respondents") alleges the following:

FINDINGS OF FACT

1. The District is a special taxing district created by Chapter 373, Florida Statutes (F.S.), and is charged with the duty to prevent harm to the water resources of the District and to administer and enforce Chapter 373, F.S, and the rules implementing that chapter.

2. More specifically, sections 373.413, 373.414, and 373.416 of the Florida Statutes authorize the District to administer and enforce the environmental resource permitting requirements for the management and storage of surface waters, including activities in wetlands or other surface waters. The District has implemented these statutes, in pertinent part, through Chapter 62-330 of the Florida Administrative Code (F.A.C.).

3. Respondents own approximately 80 acres of real property in Lake County, Florida, which are identified as Parcel ID numbers 08-19-28-0003-000-02000 (AK#3816197), 07-19-28-0004-000-02000 (AK#3801481) and 08-19-28-0003-000-01700 (AK#3801484) (collectively, the "Property"). The location of the Property is shown on Exhibit 1.

4. The Property is located within the Wekiva River Protection Area as defined in 369.303(9), F.S.

5. Between April 3, 2020, and April 7, 2020, District staff received multiple citizen complaints, which included photographs, regarding land clearing and excavating activities on the Property.

6. On April 6, 2020, District staff sent a letter by email to Respondents notifying them that the land clearing and excavating activities may require an environmental resource permit. District staff also recommended that all construction activity cease on the Property until District staff's investigation was complete. *See* Exhibit 2.

7. On April 9, 2020, District staff observed and photographed earthwork activity and a number of excavators and dump trucks entering and leaving the Property. No on-site processing of the soil was observed. District staff also followed one of the dump trucks to its destination and found that the dirt was being delivered to the Wekiva Parkway project, an ongoing road construction project in Orange, Lake, and Seminole Counties.

8. On April 10, 2020, District staff received an email from Lake County staff with numerous videos depicting dump trucks entering and leaving the Property.

9. On April 16, 2020, Respondents' consultant submitted a response to the District's April 6th compliance letter. Respondents' consultant states that the project is a "bona fide farming operation" and "it is exempt under the applicable sections of 373.406, F.S., specifically as a closed system as noted in s.373.406(3)." *See* Exhibit 3.

10. On April 17, 2020, Respondents' consultant provided District staff with a copy of the Farm Plan referenced in their April 16th response. *See* Exhibit 4.

11. The Farm Plan states that Respondents seek to produce blueberries and hay/silage as an interim or alternative cover crop.

12. Respondents' Farm Plan indicates that 40 acres of an approximately 80-acre site will be cleared and excavated. Respondents' grading plan, which was included as part of the Farm Plan, indicates that the site will be divided between blueberry production and hay production areas. The blueberry production area will consist of approximately 40 acres, being divided into six (6) cells. The cells will be excavated to a minimum depth of approximately 15 feet and a maximum depth of approximately 30 feet. The grading plan also shows the construction of a haul road through the Property. *See* Exhibit 5.

Activities Requiring a Permit

13. Respondents have commenced construction of a project that exceeds five acres.

14. Respondents have commenced construction of a project that is capable of impounding more than 40-acre feet of water.

15. Respondents have constructed a haul road that is more than 4,000 square feet of impervious and/or semi-impervious surface area subject to vehicular traffic.

Borrow Pit Operation

16. Pursuant to section 2.0, Environmental Resource Permit Applicant's Handbook Volume I (A.H. Vol. I), a "borrow pit" is defined as "a location where the soil or other natural deposits on or in the earth are removed from their location so as to make them suitable for use to build up land."

17. On April 10, 2020, representatives of Respondents admitted that "Owners are obligated under certain third-party agreement(s) to deliver offsite excavated materials." *See* Exhibit 6 at p. 11

18. Based upon the admission of Respondents' representatives, District staff's field observations, and review of the Farm Plan, the excavation activity on the Property constitutes a "borrow pit" operation.

Agricultural Closed System Exemption

19. The construction of a 40-acre borrow pit to a maximum depth of 30 feet is inappropriate and unreasonable for a bona fide blueberry and hay/silage farming operation.

20. The planting of blueberries within a borrow pit at varying depths of 15 to 30 feet within the pit is inappropriate and unreasonable for a bona fide blueberry farming operation.

21. The Best Management Practices for Florida Specialty Fruit and Nut Crops (the "BMP") adopted by the Florida Department of Agriculture and Consumer Services (FDACS), which applies to the cultivation of blueberries, provides the following guidance relating to site preparation:

> *Land Leveling for New Plantings*
> Develop a plan for land leveling, with consultation from a public or private engineer to discuss your site-specific needs. Use laser technology for best results, and balance cut and fill amount for the most efficient use of materials. Periodic grading or floating may be needed to eliminate mounds or depressions that form. Deposit unused ***spoil*** material in a suitable upland location. Consider reusing this material somewhere on-site as road base, etc.

See Florida Department of Agriculture and Consumer Services, *Water Quality/Quantity Best Management Practices for Florida Specialty Fruit and Nut* Crops (2011 Edition), DACS P-01589, at 7.

22. Notably, the BMP references periodic grading to eliminate mounds and depressions, not the construction of a 30-foot deep borrow pit to facilitate blueberry production.

23. Furthermore, the BMP indicates that activities that alter on-site hydrology may require an ERP:

> *Permit Exemptions*
> Some agricultural activities, especially those that alter on-site hydrology, may require an Environmental Resource Permit (ERP) or other surface water permit: for example, the construction of a stormwater management system (e.g., retention or detention pond). Check with your water management district before beginning construction of any stormwater management system to see whether a permit is needed…"

See id. at 2.

24. The construction of the 40-acre borrow pit will alter on-site hydrology.

25. On April 24, 2020, District staff received an email from FDACS with accompanying site visit notes and pictures from its inspection of the Property. The inspector

indicated that he "did not observe any active agricultural activities on the site" and that "the current activities would most likely not be considered normal or customary" for the proposed blueberry production. The inspector also explained to the Respondents that FDACS "would not enroll the property until [Mr. Leiffer] obtains the appropriate permits from SJRWMD as well as approval from Lake County." *See* Exhibit 7.

26. Based upon District staff's field observations, review of the Farm Plan, and FDACS' site inspection, the activities on the Property are not a "bona fide farming operation" and are not exempt from permitting under section 373.406(3), F.S.

CONCLUSIONS OF LAW

27. The District has jurisdiction over Respondents, the Property, and the unauthorized borrow pit operation described in the Findings of Fact. *See* §§ 373.069(2), 373.219, 373.413 and 373.416, F.S.

28. The District has the authority to issue a written administrative complaint to be served upon an alleged violator whenever the Executive Director of the District has reason to believe that a violation of any provision of Chapter 373 of the Florida Statutes or any regulation promulgated thereunder has occurred, is occurring, or is about to occur. *See* §373.119(1), F.S. The administrative complaint may order that necessary corrective action be taken within a reasonable time to be prescribed in such order. *Id*.

29. Respondents' activities described in the Findings of Fact constitute a regulated activity under 62-330.020, F.A.C. Under this chapter, "a permit is required prior to the construction, alteration, operation, maintenance, removal, or abandonment of any project that" results in a "total project area of more than five acres," has the "capability of impounding more than 40-acre feet of water," or has a "total of more than 4,000 square feet of impervious and semi-

impervious surface areas subject to vehicular traffic." *See* Rule 62-330.020(2)(b), (d), (e), F.A.C. Further, section 2.0(a)18, A.H. Vol. I, provides that "construction" includes land clearing. Respondents' commencement of the activities described in the Findings of Fact without first obtaining the required District permit violates Chapter 373, F.S., and Chapter 62-330, F.A.C. *See* Rule 62-330.020(2)(b), (d), (e), F.A.C., and Section 373.430(1), F.S.

PROPOSED ORDER

In accordance with section 373.119, F.S., the District has alleged that the activities described in the Findings of Fact constitute violations of Florida law. This proposed order states what you, as Respondents, must do in order to correct and address the violations alleged in the administrative complaint.

The District will adopt this proposed order as a final order in this case unless you, as Respondents, timely file a petition for administrative hearing under Chapters 40C-1 and 28-106, F.A.C., and the Notice of Rights attached hereto. Absent such a timely petition, this proposed order will become final and effective after rendition (filing) by the District Clerk. If you, as Respondents, fail to comply with this final order, the District may file suit seeking enforcement of this order in court under sections 373.129 and 373.136(1), F.S., and seek penalties, costs, and reasonable attorney's fees.

The District is authorized to commence a cause of action in circuit court and seek not only enforcement of the Final Order, but also a civil penalty in an amount not exceeding Ten Thousand Dollars ($10,000.00) per offense per day for violations of Chapter 373, F.S. *See* Section 373.129(5), F.S. Additionally, the District is authorized to recover investigative costs and reasonable attorney's fees expended in the enforcement of its programs and those delegated to it. *See* Section 373.129(6), F.S.

CORRECTIVE ACTIONS

The District proposes the following order in this matter:

30. Respondents shall not undertake any further construction or alteration on the Property, unless authorized by District permit or this order.

31. Within 7 days of rendition of the final order, Respondents shall implement appropriate erosion and sediment controls. Control measures include practices such as the proper installation of silt fencing, hay bales, erosion control mats, and temporary weirs. All control measures shall be installed and maintained in accordance with the guidelines and specifications in the Erosion and Sediment Control Designer and Review Manual (Florida Department of Environmental Protection and Florida Department of Transportation June 2007) and the *Florida Stormwater, Erosion and Sedimentation Control Inspector's Manual (Florida Department of Environmental Protection, Nonpoint Source Management Section, July 2008)*, copies of which have been provided by the District to Respondents. Copies of these manuals are available on the District's website at www.sjrwmd.com.

32. Respondents shall either: obtain an after-the-fact permit for the unauthorized borrow pit operation or remediate the Property. Respondents shall notify the District of which option they chose within 14 days of rendition of the Final Order. If Respondents fail to provide written notice of their selection within that 14-day period, it will be deemed an abandonment by Respondents of their election to seek an after-the-fact permit. Such abandonment shall activate the requirement that Respondents remediate the property as specified in paragraph 31 below.

33. If Respondents elect to obtain a permit, then within 45 days of rendition of the Final Order, Respondents shall submit to the District a complete permit application, including the applicable permit fee, to address the unauthorized borrow pit operation on the Property. For any unpermitted activity for which Respondents seek an after-the-fact permit, the complete permit

application must provide reasonable assurance of meeting the standards and criteria in rules 62-330.301 and 62-330.302, F.A.C. Upon issuance of the after-the-fact permit, Respondents shall comply with all conditions of the permit. Failure to timely respond to a request for additional information that results in a Final Order administratively denying the application, will require the Respondents to remediate the Property as specified in paragraph 31. Similarly, denial of the application on a substantive basis for not meeting applicable requirements will require remediation of the Property as specified in paragraph 31. In either case, the remediation plan shall be submitted to the District for review within 14 days of rendition of the Final Order denying the application for a permit. The Respondents shall complete the remediation plan within 30 days of the District's written approval of the plan.

34. If Respondents elect to remediate the Property, Respondents shall submit a remediation plan to the District for review and approval within 45 days of rendition of the Final Order.

a. The plan shall include, at a minimum, the removal of the haul roads, re-grading and stabilizing the slopes of the borrow pit, and a timeframe for completion of the remediation plan, which shall be no later than 30 days from approval of the remediation plan by the District.

b. Within 7 days of completion of the activities described in the remediation plan, Respondent shall so notify the District in writing and request an inspection.

35. Respondents, after receipt of a request for authorization from the District, which Respondents shall not unreasonably withhold, shall allow all authorized District representatives access to the Property at reasonable times for the purpose of determining compliance with the terms of this order.

DATED on this 28 day of April, 2020.

ST. JOHNS RIVER WATER
MANAGEMENT DISTRICT

Ann B. Shortelle, Ph.D.
Executive Director

NOTICE OF RIGHTS

1. The person or persons named as a respondent in this Administrative Complaint and Proposed Order have the right to request an administrative hearing to be conducted in accordance with sections 120.569 and 120.57(1) of the Florida Statutes, and to be represented by counsel or other qualified representative. Any request for a hearing must comply with the requirements set forth in rule 28-106.2015(5) of the Florida Administrative Code. Mediation under section 120.573 of the Florida Statutes is not available.

2. Any request for a hearing must be filed with the St. Johns River Water Management District (District) either by delivery at the office of the District Clerk at District Headquarters, P. O. Box 1429, Palatka Florida 32178-1429 (4049 Reid St., Palatka, FL 32177) or by e-mail to the District Clerk at Clerk@sjrwmd.com, no later than 14 days after the date the Administrative Complaint and Proposed Order is served. A request for a hearing is deemed filed upon receipt of the complete request by the District Clerk at the District Headquarters in Palatka, Florida. A request for a hearing received by the District Clerk after 5:00 p.m., or on a Saturday, Sunday, or legal holiday, shall be deemed filed as of 8:00 a.m. on the next regular District business day. These requirements are set forth in chapter 28-106 of the Florida Administrative Code, in section 373.119 of the Florida Statutes, and in the District's Statement of Agency Organization and Operation (issued pursuant to rule 28-101.001, Florida Administrative Code). The District's acceptance of a request for hearing filed by email is subject to certain conditions contained in the District's Statement of Agency Organization and Operation, which is available for viewing at www.sjrwmd.com/agency_statement.pdf. These conditions include, but are not limited to, the request for hearing being in the form of a PDF or TIFF file and being capable of being stored and printed by the District. Further, pursuant to the District's Statement of Agency Organization and Operation, the District Clerk does not accept requests for hearing by facsimile (fax), and attempting to deliver a request for hearing by facsimile is prohibited and shall not constitute filing.

3. Failure to file a request for hearing within 14 days after the date the Administrative Complaint and Proposed Order is served shall constitute a waiver of the right to an administrative hearing. (Subsection 373.119(1) of the Florida Statutes).

4. The right to an administrative hearing and the relevant procedures to be followed are governed by chapter 120 of the Florida Statutes, section 373.119 of the Florida Statutes, and chapter 28-106 of the Florida Administrative Code.

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that the foregoing Administrative Complaint and Proposed Order, along with Notice of Rights, have been furnished by certified mail to:

Christopher D. Leiffer
4324 Edgewater Drive
Orlando, FL 32804
(Certified Mail No. 7016 2710 0000 7168 8439)

Kirk S. Leiffer
4324 Edgewater Drive
Orlando, FL 32804
(Certified Mail No. 7016 2710 0000 7168 8446)

Jimmy D. Crawford, Esq.
702 W. Montrose Street
Clermont, FL 34711
(Certified Mail No. 7016 2710 0000 7168 8453)

on this 28th day of April, 2020.

Sharon M. Wyskiel, Esq.
Fla. Bar No. 0125171
St. Johns River Water Management District
4049 Reid Street
Palatka, FL 32177-2529
Phone: (386) 643-1986
Email: swyskiel@sjrwmd.com

St. Johns River
Water Management District
Ann B. Shortelle, Ph.D., Executive Director
4049 Reid Street • P.O. Box 1429 • Palatka, FL 32178-1429 • 386-329-4500
On the internet at www.sjrwmd.com.

Whitewater Farms SR. 44 Sorrento
Compliance Item: 1390170

0 150 300
Feet

Exhibit 1

St. Johns River
Water Management District
Ann B. Shortelle, Ph.D., Executive Director

601 South Lake Destiny Road, Suite 200 • Maitland, FL 32751 • 407-659-4800
On the internet at www.sjrwmd.com.

April 6, 2020

Jimmy D. Crawford, Esq.
Crawford, Modica & Holt
Chartered Attorneys at Law
702 W. Montrose Street
Clermont, FL 34711
Sent via email: jcrawford@cmlawyers.com

Sent via Certified Mail
7007 0710 0003 3162 9170

Re: **Warning Letter**
Whitewater Farms – SR 44, Sorrento, FL
Parcel Numbers 071928000400002000 and 081928000300002000;
Item Number: 1390170
(Please reference the item number on all correspondence.)

Dear Mr. Crawford:

The St. Johns River Water Management District (District) received a complaint regarding possible unpermitted activities at the above reference property. The complainant has informed the District of the following activities:

- It appears soil is being excavated, stockpiled and sold without the benefit of a District permit or determination. (62-330.020(2)(d), Florida Administrative Code)

In addition, based on this information, the construction activity on the above referenced project site is inconsistent with the exempt activities pursuant to Section 373.406(13), Florida Statutes (F.S.). **The District recommends you cease all construction activity until our investigation is complete.**

Violations of Florida Statues or administrative rules may result in liability for damages and restoration, and the judicial imposition of civil penalties, pursuant to Section 373.129 F.S. which authorizes the District to enforce its rules and permits through legal action as necessary, and to seek substantial civil penalties per offense per day for violations of its rules or permits.

Please contact Allen Baggett at (386) 937-1360 or Abaggett@sjrwmd.com **by April 16, 2020** to arrange a meeting for the parties to meet to discuss timely resolution of this

Exhibit 2

matter. The District is interested in receiving any additional facts that you may have which assist in determining whether any violations have occurred.

Please be advised that this Warning Letter is part of a District investigation, preliminary to agency action in accordance with Section 120.57(5), F.S. We look forward to your cooperation in completing our investigation and resolving this as soon as possible.

Sincerely,

Brad Purcell
Environmental Resource Program Manager
Division of Regulatory Services

CC: Regulatory File

Melanie Marsh, Lake County
Sent via email: mmarsh@lakecountyfl.gov

C and K Family Trust
4324 Edgewater Drive
Orlando, FL 32804

Wicks Engineering Services, Inc.

225 West Main Street ♦ Tavares, Florida 32778
P (352) 343-8667 F (352) 343-8665

April 16, 2020

Mr. Allen Baggett
St Johns River Water Management District
Abaggett@sjrwmd.com

RE: Whitewater Farms – SR 44, Sorrento FL
Warning Letter
Item Number 1390170

Good Afternoon Allen,

In response to the attached Warning Letter dated April 6, 2020, regarding the current activities at White Water Farms, the following response is submitted.

The cited activities in the letter are not being conducted at the Farm. No farm pond construction is underway or planned for the agricultural operation. Also, no buildings or processing facilities are planned at present.

The parcels are "Agricultural classified" by the Lake County Property Appraiser and as such meet the provisions of s. 193.461 fs. As a bona fide farming operation, it is exempt under the applicable sections of Section 373.406 FS, specifically as a closed system as noted in s.373.406(3). A formal Farm Plan has been prepared and has been enrolled with the Florida Department of Agriculture and Consumer Services. This enrollment provides a Notice of Intent to follow and implement the best management practices for the farming/growing operation as published and supported by FDACS. The Farm Plan implementation of the provisions of applicable best management practices contained within an adopted BMAP will also be included. The Farm Plan includes the grading plan and detail for preparation of the Hay Fields and Blueberry production areas. A copy will be provided to the District for review.

If further discussion is necessary, please let me know and I will advise the Owner and his Legal Counsel.

Thanks,

Ted Wicks

Ted Wicks, P.E.

TW:kh

Enclosures: Warning Letter

Ec: Jimmy Crawford, Esq jcrawford@cmlawyers.com
C and K Family Trust
Brad Purcell bpurcell@sjrwmd.com
Bill Ray wrayassoc@aol.com

White Water Farms, INC

SR 44

Sorrento, Florida 32776

Sec. 7 & 8; Tw. 19-South; Rng 26-East

Prepared for

Lake County Property Appraiser

Attention: Glenn Hubbard Agricultural Specialist
320 W. Main Street
P.O. Box 1027
Tavares, FL 32778-1027

Prepared by
Ray and Associates
Planning and Environmental
William (Bill) A. Ray, AICP & Environmental Specialist
352-425-8881

wrayassoc@aol.com

William A. Ray, AICP, Agricultural Specialist

Last Revised April 6th, 2019

Exhibit 4

Table of Contents

I. General Description
II. Blueberry Field Planting Plan
III. Guidance for alternative or interim Agricultural Crop BMPs
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2. Site Aerial
3. FLUCFCS
4. Topo
5. NRCS Soil Report
6. FDEP/NWI Wetlands
7. Appendix 7: BMPs Example of Record Keeping
8. Notice of intent to Implement BMPs
9. Agricultural Crop Emergency Contacts

Cary Baker
Lake County Property Appraiser
Attention: Glenn Hubbard Agricultural Specialist 320 W. Main Street

P.O. Box 1027
Tavares, FL 32778-1027

Transmitted via Email: GHubbard@LCPAFL.org

Subject: **Agricultural Management and Improvement Plan for White Water Farms, INC property comprising approximately 80.16$^{+/-}$ Acres and located in Lake County, Florida.**

Dear Glen:
Ray and Associates is pleased to provide your office with the Agricultural Management Plan for the property identified by Lake County Property Records as owned by C & K Family Trust located in northeastern Lake County in the Mt. Plymouth / Sorrento area on SR 44.

This Agricultural Management Plan is provided to the Lake County Property Appraiser to provide information related to continual development of *bona fide Agricultural Activity* and retaining an Agricultural Classification for the subject property.

The Agricultural Plan covers approximately; 80.16$^{+/-}$ Acres

It is the intention of the property owner to continue to manage this property as a bona fide agricultural operation in a continual and on-going basis. Further clearing, tree and stump removal, regrading and improvements may occur during the implementation of this agricultural plan. Specific site activities are governed by environmental conditions such as soil moisture, rainfall, availability of desirable plant material and other constraints typically associated with Agricultural and Farming activities.

If necessary, please contact me so we may arrange a site visit and review of the agricultural operation associated with the subject lands.

If you have any questions or require additional information, do not hesitate to contact me.

William (Bill) A. Ray, AICP President
Ray and Associates

CC: White Water Farms, INC.
William (Bill) A. Ray, AICP President Ray and Associates

CC: White Water Farms, INC.

AGRICULTURAL MANAGEMENT PLAN

I. General description

This report is written to request retention/establishment of the Agricultural Classification for the subject property leased and operated by White Water Farms, INC. This request is made referencing 3 properties identified by Lake County property records as owned by C & K Family Trust.

The subject property consists of approximately 80.16$^{+/-}$ acres. The subject parcel can be found on Exhibit 1 and is identified by Lake County Property Appraisers office as:

Parcel Number	AltKey #	Acreage$^{+/-}$
07-19-28-0004-000-02000	3801481	39.36
08-19-28-0003-000-01700	3801484	0.65
08-19-28-0003-000-02000	3816197	40.15
Total		**80.16$^{+/-}$**

(From Lake county Property Appraiser's Data Base)

This update Agricultural Management Plan is provided to the Lake County Property Appraiser to provide information related to continual and ongoing bona fide Agricultural Activity and supporting the existing Agricultural Classification for the subject property. The total site is comprised of approximately 80.16$^{+/-}$ Acres based upon Lake County Property Appraiser's GIS Data Base. The site has approximately 80.16$^{+/-}$ Acres of uplands/agricultural lands. There are no Jurisdictional Wetlands on the subject site. No adverse or permanent impacts to wetlands are anticipated or proposed under this plan.

See Exhibit 4 & 4.1: Topo and Exhibit 6 Wetlands

Beginning over 15 years ago with prior ownership and continuing through June of 2019, the subject property has been utilized as Silvicultural Lands under varying degrees of management. Beginning in May 2019, upon Leasing of the site, White Water Farms, Inc. together with the prior owners began the process of planning, engineering, converting and improving the site to an alternative "bona fide" Agricultural Use and desires to continue its existing Agricultural Classification beginning in January 1st 2020. It is the owner's intention to continue with the Agricultural Development of theproperty.

Due to tree maturity and other environmental and economic conditions, it was determined that reestablishing Silvicultural production as an agricultural use on the subject site was not desirable.

The property owner proposes to clear and mass grade the approximate 40 Acres of the 80.16 Acre upland portion of the site. See Grading Plans prepared by Wicks Engineering which are attached.
Fields 1-2 consists of a Total of 10.78 acres at elevation 60'
Fields 3-4 consist of a Total of 9.52 Acres at elevation 65'
Fields 5-6 consist of a Total of 12.05 acres at Elevation 70"
Additional improvements will consist of soil augmentation / preparation (disking), planting and managing a Commercial Blue Berry Farm in accordance with FDACS Agricultural Best Management Practices (BMPs).

It is understood this will be a Phased implementation plan. When one section of approximately 5 Acres beginning in the southeastern area has been mass graded, it shall immediately begin the process of being prepared and planted with Blue Berries, while also simultaneously beginning the next phase of Mass Grading the adjacent land. It is not the intention of this plan to delay agricultural improvements until the entire site has been mass graded.

Plant material has been identified and can be obtained locally. There is a viable demand for quality Blueberries throughout the southeast. Experienced local Agricultural professionals will be overseeing and completing the necessary improvements.

The owner is in the process of completing the Notice of Intent to Implement Best Management Practices (BMPs) for Florida Vegetable and Agronomic Crops as approved by the FDACS. Based upon Guidance found in the BMPs and working with professionals having extensive knowledge and experience in the local Agricultural industry the following Agricultural implementation is presented.
See Exhibit 8 NOIs BMPs.

II. Blue Berry Planting Plan

Due to site topography, it is the landowners desire to generally level and mass grade the subject site to approximately the 60' to 70' contours in order to approximate the beneficial advantages associated with High Tunnels or Shade Cloth Covered Beds. The creation of the Site Contained Farm operation accommodates the below:

- Greater efficiency utilizing drip and fixed overhead irrigation
- Water conservation and reuse
- Freeze/frost protection
- Temperature/wind control at different annual crop stages
- Elimination of any agricultural surface water runoff
- Noise abatement
- Significant reduction of “drift” of agricultural chemical application

The Grading Plan to be implemented can greatly reduce and even eliminate the adverse impacts that traditional High Wind Tunnels can contribute to (such as erosion and drainage issues), since these structures increase the amount of impervious area in a field and may increase concentrate runoff.

This plan for New Plantings Develop and Land Leveling, as generally described in Florida Specialty Fruit and Nut BMPs, has been developed with consultation from Wicks Engineering to implement the site-specific needs. Site grading will use laser technology for best results, utilizing cut and fill for the most efficient use of materials. Periodic grading or floating may be needed to eliminate mounds or depressions that form.

As experienced and typical to Central Florida, the natural soil pH levels of the subject site are expected to low. After Clearing and Grading, it is recommended that specific soil tests be completed to determine if additional organic material should be incorporated into the soil and the existing pH is between 4.0 and 5.5.

Blueberry Field Establishment Plan

STEPS	DESCRIPTION
1	Harvest Timber, Clear and Grub, and Mass Grade the Subject site to the approximate contour elevation of 60' to 70' and complete adequate soil augmentation with organic material as necessary. See Wicks Engineering plans
2	Southern Highbush varieties will be planted on Pine Bark raised Beds with drip and overhead irrigation.
3	Planting and agricultural improvement will occur in approximate 3 - 10+ Acre Phases (1 Phase = Two (2) 5 Acre Fields). As one 5 Acre Field is graded it will be improved and planted while grading is beginning on the adjacent 5-acre field.
3	The leveled lands are to be planted with "Pine Bark raised beds" are to be planted at spacing of 2.5' by 9' equaling a 1,936 plants per acre.
4	Bare-root or container-grown plants will be used. It is best to use plants about 1.5 to 2 feet tall with well-developed root systems that are not pot-bound. Roots of bare-rooted plants will be kept moist but not overly wet prior to and during planting.
5	Based upon soil testing it is recommended that preliminary soil amendments including Pine Bark Beds with the objective of obtaining a consistent soil pH of approximately 4.3. (Blueberries require a soil pH of 4.0–5.5.) Southern highbush cultivars are not recommended for soils with less than 3% organic matter unless additional organic matter is added as a soil amendment and mulches are added to the site.
6	Plant material will be obtaining from a professional nursery that utilizes propagation and growing systems that optimize plant health. Only healthy plants that are virus-tested and certified and that have proper branching and uniformity will be planted.
7	Fertilization of Blueberries is recommended to be frequent with light application of nutrients. Blueberries can be killed or damaged by over-fertilization. It is recommended to be conservative and gradually increase fertilizer rates as specific site experience with existing soil types is developed.
8	After planting, when the soil is well settled from irrigation or rainfall, give un-mulched plants 1 ounce per plant of 12-4-8 (N-P_2O_5-K_2O) with 2% magnesium (Mg). Use of ammoniacal nitrogen or nitrogen from urea or organic sources, rather than from nitrate sources is recommended. Chlorine levels should be maintained as low as possible, preferably below 2%. A special formulation called "blueberry special" is available in Florida and meets these requirements.
9	Both drip irrigation and fixed overhead irrigation methods will be utilized to maintained soil moisture necessary for crop establishment and production. Overhead irrigation is additionally necessary as a method to provide Cold Protection when the average hour temperatures are expected to be less than 33° (32° F and below). Cold Protection is critical for all phenological stages of blooming and post bloom periods of Blueberry production. Owner is currently in the process of obtaining an agricultural CUP from the SJRWMD together with the necessary pumping and transmission equipment.

Note: See Exhibit 7: Appendix 7 for list of record-keeping requirements and example record-keeping forms.
See Exhibit 8: Notice of Intent to Implement BMPs
See Exhibit 9: for Emergency Contact Information regarding Agricultural assistance

III. Additional Guidance from Best Management Practices / Florida Vegetable and Agronomics Crops 2015 Edition, FDACS

Hay and Silage Production Systems as an interim or alternative cover crop:

The first phase of the Agricultural Improvements will facilitate the harvesting of the existing timber and pushing, pilling and burning the waste material and stumps. This will be conducted in accordance with Silvicultural and Agricultural BMP. Lands not being mass graded to the approximate elevation of 50" will be placed in hay production. The Mass Grading is planned to begin in the East and work towards the West across the site.

There are millions of acres of grazing land in the state of Florida. It varies from forested range in the northern region to planted pastures in the southern region. Besides supporting cow/calf operations, some of these pastures are also used for hay/silage production. In some parts of the state, such as in the Suwannee River valley, many fields are exclusively planted and managed for hay/silage (collectively referred to as forage) production.
Warm-season perennial grasses provide the bulk of hay production in Florida. Bermudagrass, stargrass, and Bahia grass dominate, primarily because they thrive in warmer weather, which can be six to eight months of the year depending on the location. However, the cool-season grasses generally are higher in quality (digestibility). Grown primarily in North Florida, the cool-season grasses include small grains (rye, wheat, oats, and triticale) and annual ryegrass. Legumes, such as perennial peanut or clover, also may be used for hay production. Some producers also plant summer annual grasses, such as corn, sorghum, and millet, for silage to supplement animal feedstock.

Maturity stage at harvest is the most important factor determining quality, as forage quality usually declines with advancing maturity. Table 4 provides guidance for the recommended harvest stages for various types of hay.

Nutrient Management

Balanced fertilization is necessary to achieve efficient growth, adequate root development, and cold hardiness of forages. As in other crops, the main nutrients required are Nitrogen, Phosphorus, and Potassium, and in lesser amounts secondary nutrients and micronutrients. Nitrogen is the nutrient that forages use in higher quantities as a building block for amino acids and proteins needed for growth. Adding Nitrogen often results in improved forage nutritive value by increasing the crude protein content. Phosphorus is native in many Florida soils but it may be deficient in some. Many forage crops extract enough Phosphorus from the subsoil even when levels in the surface are low. Potassium, like Nitrogen, is also mobile in sandy soils and applications are typically required as are calcium, magnesium, sulfur, and some micronutrients.

Table 4. Recommended Stages to Harvest Hay Crops

Plant	Time of Harvest
Alfalfa	Bud stage for first cutting, one-tenth bloom for later cuttings
Bahiagrass	10 to 12-inch height
Bermudagrass	15 to 18-inch height
Clovers	Early bloom
Oats, Barley, Wheat	Boot to early head stage
Perennial Peanut	12 to 14-inch height
Soybean or Cowpea	Mid to full bloom
Sorghum-Sudangrass	30 to 40-inch height
Hermathria	Between 4 and 6 weeks

The amount of fertilizer to apply will depend on how the forage is used. To achieve the potential production used in a typical hay system (5 to 8 tons/acre), the required amounts of nutrients cannot be supplied by the soil alone. This is especially true with multiple cuttings. If the production system includes a mix of legumes that fix Nitrogen, there will be some contribution of Nitrogen but usually no more than about 30 to 40 lbs N/acre. Producers should follow the fertilization recommendations in Nutrient Management of Vegetable and Agronomic Row Crops Handbook at: http://edis.ifas.ufl.edu/ss639.

Special Water Quality Considerations

Due to their high yield and tissue nutrient concentration, forages can reduce excess soil nutrients (such as Nitrogen or Phosphorus) when they are harvested for hay, silage, or used a green chop. Given their extensive root systems, forages not only efficiently extract nutrients, but also minimize soil compaction and erosion by water and wind.

Sometimes, irrigation of forage crops is used to manage wastewater from dairy operations or municipal water treatment facilities. Under either of these scenarios, multiple cropping systems should be used to maximize the removal of residual soil nutrients. Also, careful nutrient management planning is needed to ensure that crops are fertilized at the proper agronomic rate.

Irrigation Management

Irrigation of forage crops grown for hay or silage is common, due to sandy soils, uneven distribution of rainfall, and multiple yearly harvests. In Florida, there are approximately 196,000 acres of silage and hay crops under irrigation. The irrigation systems most used are center-pivot and lateral- move equipment, which are permanent self-propelled systems. Portable and large traveling-gun systems are sometimes used.

Average water use for bermudagrass irrigation ranges from 0.12 inches to: 0.16 inches/day in March;

0.18 inches/day in May, June, and July; 0.16 inches/day in August; and 0.14 inches/day in September. Producers should educate themselves on their particular forage crop's water use requirement to ensure that the proper amount of water is applied during each irrigation event.

Harvesting and Storage

Certain forages are harvested, stored, and later fed to livestock as silage. Crops such as corn and sorghum are particularly well-suited to harvesting as silage because of their high energy value and their thick stalks which delay drying. Once harvested, silage is stored in a silo (absence of air, low pH) and preserved by naturally occurring acids until it is used as feed.

Bermudagrass and Bahia grass are usually harvested as hay and, in North Florida, may be cut and harvested up to four times per year. Hay baled at too high a moisture level will generate excessive heat and can even catch on fire. Further, hay stored outside for a prolonged period may result in leaf shatter, dry matter loss, and reduced forage quality due to rain. To offset this effect, hay bales should be stored under roof, or, if stored outside, oriented in north-south rows to get more exposure to sunlight.

Major losses in forage quality generally occur due to poor storage and feeding techniques. Ultimately, a reduction in quality increases the level of animal refusal during feeding and will require additional feed supplementation to offset the animal's nutritional requirements. For more information about silage management, go to: https://www.pioneer. com/home/site/us/livestock-feed-nutrition/.

Accurate laboratory testing of feed and forage will provide the information needed to formulate animal feeding rations; and provides a basis for commercial hay sales. For more information about forage quality, sample collection and laboratory analysis, see the publication, Understanding and Improving Forage Quality at:

http://extension.uga.edu/publications/files/ pdf/B%201425_1.pdf.

Hay and Silage Production System BMPs

Hay and Silage Nutrient Management Level I BMPs:

1. For established stands of hay, take soil samples during the dormant season and test them on an annual basis. Base Phosphorus fertilization rate on soil test results from a public or private lab that employs the standard testing methods used by the UF-IFAS Extension Soils Testing Laboratories. Refer to Appendix 2 for guidance on accepted P extraction methods and sample collection. Keep a copy of all laboratory test results to track changes over time.

2. Maintain and calibrate fertilizer application equipment.

3. Fertilize perennial grasses for hay crops in the spring as soon as the crop starts growing. Apply up to 80 lbs N/acre/cutting, and all of the recommended P and K in early spring. Reduce the Nitrogen accordingly, after the next-to last cutting in the fall.

4. Begin spring harvest (first cutting) of hay when the grass reaches the recommended height(s) listed in Table 4.

5. For producers growing annual silage or other forages, consult UF-IFAS recommendations in the Nutrient Management of Vegetable and Agronomic Row Crops Handbook (SP 500), as revised.

6. Keep records of all nutrient applications that contain N or P up to 80 lbs N/acre/cutting, and all of the recommended P and K in early spring. Reduce the N accordingly, after the next-to last cutting in the fall.

7. Begin spring harvest (first cutting) of hay when the grass reaches the recommended height(s) listed in Table 4.

8. For producers growing annual silage or other forages, consult UF-IFAS recommendations in the Nutrient Management of Vegetable and Agronomic Row Crops Handbook (SP 500), as revised.

9. Keep records of all nutrient applications that contain Nitrogen or Phosphorus.

Hay and Silage Irrigation Management Level. I BMPs:

1. Use available tools and data to assist in making irrigation decisions. Tools may include water table observation wells, on-site soil moisture sensors, crop water use information, and weather data. Real-time weather data is available through the FAWN website, or by installing your own on-site weather station.

2. Install rain gauges on your operation and monitor them to help schedule irrigation events. Rain events of ¼ to ½ inch are usually enough to substitute for the next irrigation event..

3. If a Mobile Irrigation Lab is available, get an evaluation to check the distribution (sprinkler) or emission uniformity and the conveyance efficiency of the irrigation system(s). This should be done every three to five years. Adjust as needed.

4. Do not irrigate beyond field capacity

   Note: See Exhibit 7 Appendix 7 for list of record-keeping requirements and example record-keeping forms.
   See Exhibit 9 for emergency Contact Information regarding Agricultural assistance

IV. Water Supplies

The owner is currently in the process of obtaining the required St. Johns River Water Management District Consumptive Use Permit (CUP) for agricultural use. This permit will specifically designate allows for the withdrawal of water in adequate volume to provide both moisture irrigation and freeze protection.

Adequate Pumps powered by either Diesel or an Electric engine will be installed on site and will be placed in service as necessary. Irrigation will be provided using both Drip and Overhead methods.

A copy of the SJRWMD CUP application and permit will be provided during annual reporting.

V. Wetlands and other Natural features.

There are no permanent or adverse impacts proposed to Jurisdictional Wetlands or Water bodies located on the subject property. There are no “high priority” ranked Rare or Unique Natural Habitats identified by the Florida Natural Areas Inventory (FNAI) on the subject property.

The existing Agricultural Use of the subject property is intended to continue. The subject property will in “bona fide” Agricultural Use and development as of January 1st, 2020.

We will consistently evaluate and monitor the planting of the $80.16^{+/-}$ Acres to determine if any replanting needs to occur. As part of the continual bona fide agricultural operation the owner will also continue with the planting process in accordance with this plan.

VI. Reporting

Annual Reports will be provided to the Lake County Property Appraiser demonstrating and confirming the bona fide Agricultural Use of the subject site.

References

1. UF-IFAS, Florida's Commercial Blueberry Industry,https://edis.ifas.ufl.edu/pdffiles/AC/AC03100.pdf

2. UF-IFAS, Improving the Precision of Blueberry Frost Protection Irrigation, https://site.extension.uga.edu/baconag/files/2015/12/FE97900-Blueberry-Frost-Protection.pdf

3. UF-IFAS, Establishment and Production Costs for Southern Highbush Blueberry Orchards in Florida: Enterprise Budget and Profitability Analysis, https://edis.ifas.ufl.edu/fe1002

4. UF-IFAS, Forages of Florida website. http://edis.ifas.ufl.edu/topic_book_florida_forage_handbook

5. UF-IFAS, Silage Harvesting Equipment, Publication DS53.http://edis.ifas.ufl.edu/ag180

6. UF-IFAS, Bahiagrass: A Quick Reference, Publication AG271.http://edis.ifas.ufl.edu/AG271

7. UF-IFAS, Bermudagrass: A Quick Reference, Publication SSAGR264.http://edis.ifas.ufl.edu/AG272

8. UF-IFAS, Standardized Fertilization Recommendations for Agronomic Crops. Publication SL-129. http://edis.ifas.ufl.edu/SS163 6

9.. UF-IFAS, Fertilizing and Liming Forage Crops, Publication AG179. http://edis.ifas.ufl.edu/AG179

Ray and Associates: White Water Farms Inc. Tract: Exhibit 1: Location

April 29, 2019

Cadastral 2017 (Property Appraiser Parcels) - Public View

1:18,056

0 0.13 0.25 0.5 mi

0 0.2 0.4 0.8 km

Esri, HERE, Garmin, (c) OpenStreetMap contributors, Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, Source: Esri,

Map created by Map Direct, powered by ESRI.

Ray and Associates: White Water Farms, Inc. Tract: Exhibit 2: Aerial

April 29, 2019

Cadastral 2017 (Property Appraiser Parcels) - Public View

1:4,514

0 0.03 0.07 0.13 mi

0 0.05 0.1 0.2 km

Esri, HERE, Garmin, (c) OpenStreetMap contributors, Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, Source: Esri,

Map created by Map Direct, powered by ESRI.

Ray and Associates: White Water Farms, Inc. Tract: Exhibit 3: FLUCFCS

April 29, 2019

Cadastral 2017 (Property Appraiser Parcels) - Public View

Statewide Land Use Land Cover

Residential Low Density

Residential Medium Density

Residential High Density

Commercial and Services

Industrial

1:9,028

0 0.05 0.1 0.2 mi

0 0.1 0.2 0.4 km

Ray and Associates: White Water Farms, INC Tract: Exhibit 4: Topo

April 7, 2020

Elevation Contours and Depressions

0 - 10

10 - 20

20 - 30

30 - 40

40 - 50

50 - 60

60 - 70

70 - 80

80 - 90

90 - 100

100 - 125

1:4,514

0 0.03 0.07 0.13 mi

0 0.05 0.1 0.2 km

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Lake County Area, Florida

Ray and Associates: White Water Farms Inc: Exhibit 5: Soils

April 29, 2019

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:4,380 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 50 100 200 300

Feet
0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Lake County Area, Florida
Survey Area Data: Version 18, Sep 13, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Feb 15, 2016—Nov 26, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
8	Candler sand, 0 to 5 percent slopes	80.16	100.0%
Totals for Area of Interest		**80.16**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Lake County Area, Florida

8—Candler sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2t3z1
Elevation: 10 to 260 feet
Mean annual precipitation: 47 to 56 inches
Mean annual air temperature: 68 to 77 degrees F
Frost-free period: 280 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Candler and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Candler

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, interfluve, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Eolian deposits and/or sandy and loamy marine deposits

Typical profile

A - 0 to 6 inches: sand
E - 6 to 63 inches: sand
E and Bt - 63 to 80 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on ridges and dunes of xeric uplands (G154XB111FL), Sandy soils on ridges and dunes of xeric uplands (G155XB111FL)

Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R155XY002FL), Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Minor Components

Tavares

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex, concave
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

Millhopper

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R154XY002FL)
Hydric soil rating: No

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Ray and Associates: White Water Farms, Inc. Tract: Exhibit 6: Wetlands FDEP / NWI

April 29, 2019

1:18,056

0 0.13 0.25 0.5 mi

0 0.2 0.4 0.8 km

Cadastral 2017 (Property Appraiser Parcels) - Public View

Wetlands

Estuarine and Marine Deepwater

Estuarine and Marine Wetland

Freshwater Emergent Wetland

Freshwater Forested/Shrub Wetland

Freshwater Pond

Lake

Other

U.S. Fish and Wildlife Service, National Standards and Support Team, wetlands_team@fws.gov, Esri, HERE, Garmin, (c) OpenStreetMap

Map created by Map Direct, powered by ESRI.

APPENDIX 7: EXAMPLE RECORD-KEEPING FORMS

Keeping records aids in operating and maintaining BMPs. To reiterate, BMPs that have a pencil icon require records to be kept for a minimum of five years.

You may maintain your records as hard copies or in an electronic format, depending on your preference. Below is an example of a set of record-keeping forms. You may use these tables, develop your own, or choose commercially available record-keeping software suited to your operation.

Soil Sample Records (Retain all Lab Results)				
Sample Date	**Field Location**	**# of Samples**	**Name of Lab**	**Records Location**

Tissue Sample Records (Retain all Lab Results)				
Sample Date	**Field Location**	**# of Samples**	**Name of Lab**	**Records Location**

Fertilization Records (Retain all Receipts)								
Field Name					Production Acreage		Year	
Brand	**Application method**	**Grade $N\text{-}P_2O_5\text{-}K_2O$**	**% CRN**	**% CRP_2O_5**	**Amount of fertilizer applied (lbs/total production acreage)**	**Amount of fertilizer applied (lbs/acre)**	**Total N applied (lbs/acre)**	**Total P_2O_5 applied (lbs/acre)**

Rainfall (inches)											
Jan.	**Feb.**	**Mar.**	**April**	**May**	**June**	**July**	**Aug.**	**Sep.**	**Oct.**	**Nov.**	**Dec.**

Well Records					
Location	**Year Constructed**	**Constructed By**	**Last Modified**	**Modified By**	**Records Location**

ADAM H. PUTNAM
COMMISSIONER

Florida Department of Agriculture and Consumer Services
Office of Agricultural Water Policy

FDACS-OAWP
Mayo Building
407 S. Calhoun St. MS-E1
Tallahassee, FL 32399

NOTICE OF INTENT TO IMPLEMENT

WATER QUALITY / QUANTITY BMPs FOR FLORIDA VEGETABLE AND AGRONOMIC CROPS (2015)

Rule 5M-8.002, F.A.C.

- **Complete all sections of the Notice of Intent** (NOI). The NOI may list multiple properties only if they are within the same county, they are owned or leased by the same person or entity, and the same BMPs identified on the checklist are applicable to them.
- Submit the **NOI** and the **BMP Checklist**, to the Florida Department of Agriculture and Consumer Services (FDACS), at the address below.
- **Keep a copy of the NOI and the BMP checklist in your files** as part of your BMP record keeping.

You can visit https://www.flrules.org/gateway/ChapterHome.asp?Chapter=5m-8 to obtain an electronic version of this NOI form.

If you would like assistance in completing this NOI form or the BMP Checklist, or with implementing BMPs, contact FDACS staff at (850) 617-1727 or AgBmpHelp@freshfromflorida.com.

Mail this completed form and the BMP Checklist to: FDACS Office of Agricultural Water Policy
Mayo Building, 407 S. Calhoun Street, MS-E1
Tallahassee, Florida 32399

Person To Contact

Name: KIRK LEIFFER

Business Relationship to Landowner/Leaseholder: OWNER

Mailing Address: 4324 EDGEWATER DRIVE

City: ORLANDO State: FL Zip Code: 32804

Telephone: 407-451-7897 FAX:

Email: KLEIFFER@earthlink.net

☐ **Landowner or** ☐ **Leaseholder Information** *(check all that apply)*

NOTE: If the Landowner/Leaseholder information is the same as the Contact Information listed above, please check: ☒ **Same as above.** If not, complete the contact information below.

Name:

Mailing Address:

City: State: Zip Code:

Telephone: FAX:

Email:

Operation Name: WHITE WATER FARMS, INC

County: LAKE

Tax Parcel Identification Number(s) from County Property Appraiser
Please submit a copy of your county tax bill(s) for all enrolled property, with owner name, address, and the tax parcel ID number(s) clearly visible. If you cannot provide a copy of the tax bill(s), please write the parcel owner's name and tax parcel ID number(s) below in the format the county uses. Attach a separate sheet if necessary *(see form provided)*.

Parcel No.: 07-19-28-0004-000-02000 Parcel Owner:

Parcel No.: 07-19-28-0003-000-01700 Parcel Owner:

Parcel No.: 07-19-28-0003-000-02000 Parcel Owner:

Parcel No.: Parcel Owner:

Parcel No.: Parcel Owner:

☐ Additional parcels are listed on separate sheet. *(check if applicable)*

Total # of acres of all parcels listed *(as shown property tax records)*: 80.16 AC

Total # of acres on which BMPs will be implemented under this NOI: 80.16 AC

In accordance with section 403.067(7)(c)2, Florida Statutes, I submit the foregoing information and the BMP Checklist as proof of my intent to implement the BMPs applicable to the parcel(s) enrolled under this Notice of Intent.

Print Name: KIRK LEIFER

(check all that apply) ☒ Landowner ☐ Leaseholder ☐ Authorized Agent *(see below)**

**Relationship to Landowner or Leaseholder:*

Signature: [signature] Date: 4-3-2020

Name of Staff Assisting with NOI:

NOTES:

1. You must keep records of BMP implementation, as specified in the BMP manual. All BMP records are subject to inspection.
2. You must notify FDACS if there is a full or partial change in ownership with regard to the parcel(s) enrolled under this NOI.
3. Please remember that it is your responsibility to stay current with future updates of this manual. Visit the following website periodically to check for manual updates: http://www.freshfromflorida.com/Divisions-Offices/Agricultural-Water-Policy

APPENDIX 8: CONTACT INFORMATION

Emergency Information

Emergency Reporting Numbers	24 hours	
State Warning Point *Division of Emergency Management – contact in case of oil or hazardous substance spill*	Toll-Free	1-800-320-0519

Emergency Information and Follow-Up Numbers	Monday - Friday	
State Warning Point Information Line	8:00 am - 5:00 pm	(850) 413-9900
DEP Emergency Response	8:00 am - 5:00 pm	(850) 245-2010
State Emergency Response Commission *For follow-up reporting only*	Toll-Free	1-800-635-7179

Non-Emergency Information

Florida State Agency Numbers **Toll Free**

Department of Agriculture and Consumer Services www.freshfromflorida.com

Office of Agricultural Water Policy ..... (850) 617-1727
Division of Agricultural and Environmental Services ..... (850) 617-7900
Bureau of Pesticides ..... (850) 617-7917
Bureau of Compliance Monitoring ..... (850) 617-7850

Department of Environmental Protection www.dep.state.fl.us

Non-point Source Management Section ..... (850) 245-2836
Hazardous Waste Management Section ..... (850) 245-8707
Northwest District Office (Pensacola) ..... (850) 595-8300
Northeast District Office (Jacksonville) ..... (904) 256-1700
Central District Office (Orlando) ..... (407) 897-4100
Southeast District Office (West Palm) ..... (561) 681-6600
Southwest District Office (Tampa) ..... (813) 632-7600
South District Office (Ft. Myers) ..... (239) 344-5600

Water Management Districts www.flwaterpermits.com

Northwest Florida (Tallahassee) ..... (850) 539-5999
Suwannee River (Live Oak) ..... (386) 362-1001 1-800-226-1066
St. Johns River (Palatka) ..... (904) 329-4500 1-800-451-7106
Southwest Florida (Brooksville) ..... (352) 796-7211 1-800-423-1476
South Florida (West Palm) ..... (561) 686-8800 1-800-432-2045

Other Helpful Numbers – *Main offices*

NRCS – Florida Office (Gainesville) ..... (352) 338-9500
UF/IFAS Extension Administration ..... (352) 392-1761
Association of Florida Conservation Districts
Soil and Water Conservation Districts ..... (407) 321-8212

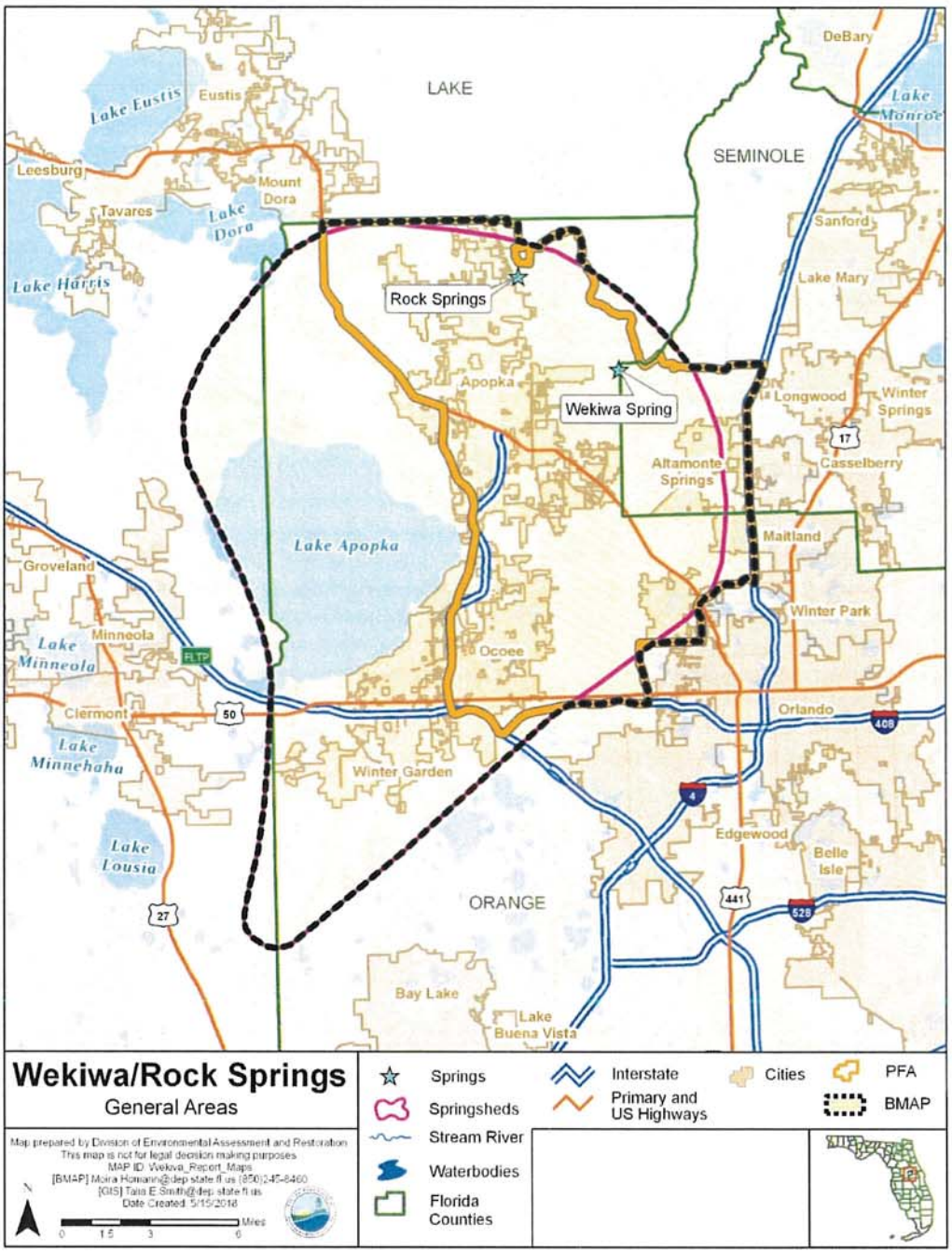
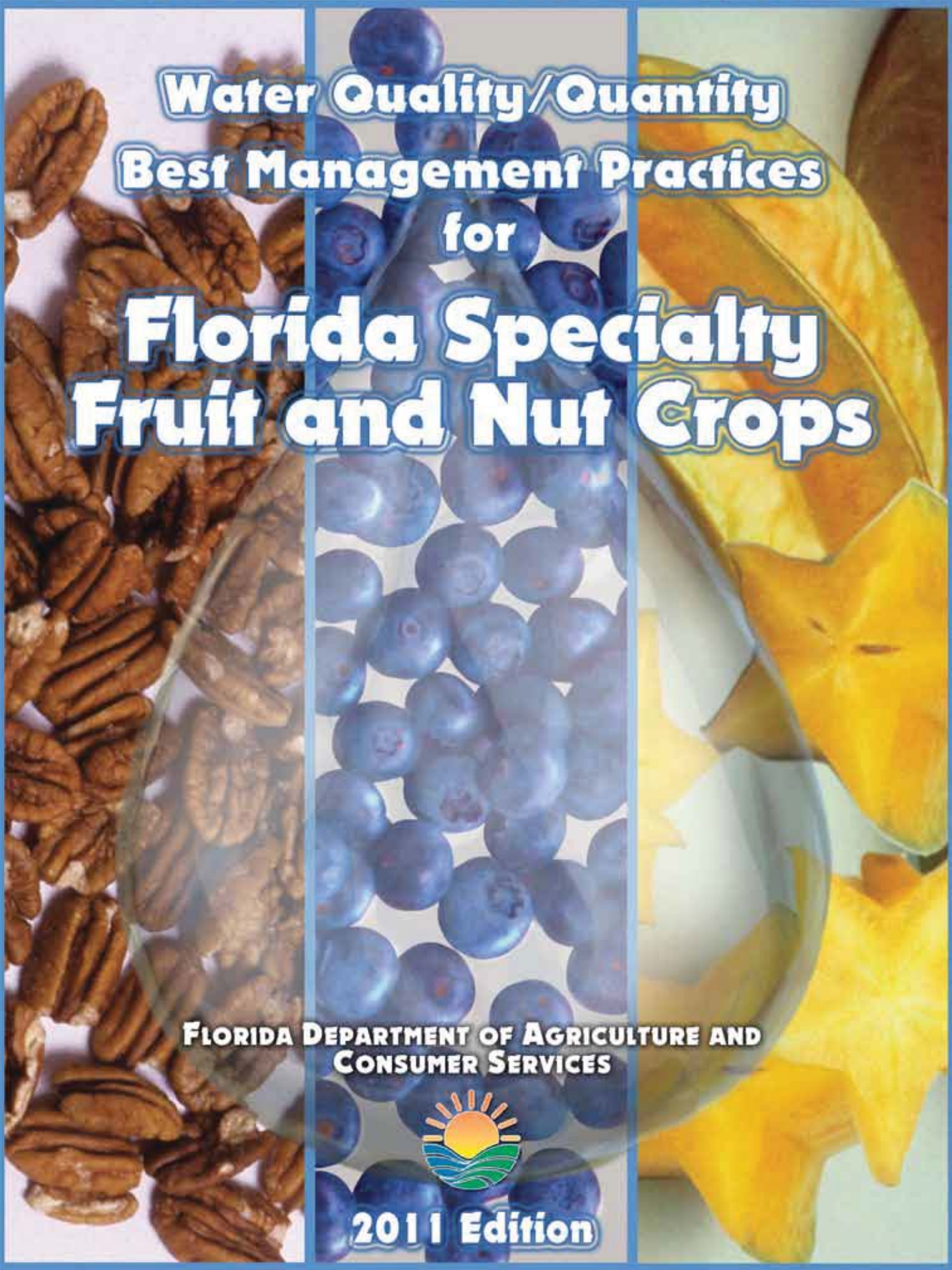


Figure ES-1. Wekiwa Spring and Rock Springs BMAP and PFA boundaries



Water Quality/Quantity Best Management Practices for Florida Specialty Fruit and Nut Crops

Florida Department of Agriculture and Consumer Services

2011 Edition

DACS-P-01589

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FLORIDA SPECIALTY FRUIT AND NUT CROP BMP CHECKLIST 62

Office of the Commissioner
(850) 488-3022

The Capitol
400 South Monroe Street
Tallahassee, Florida 32399-0800

Florida Department of Agriculture and Consumer Services
Commissioner Adam H. Putnam

COMMENTS BY COMMISSIONER ADAM H. PUTNAM

Dear Agricultural Producers:

This manual, *Water Quality/Quantity Best Management Practices for Florida Specialty Fruit and Nut Crops*, reflects the hard work of representatives of the industry; federal, state, and local government; and other stakeholders. In general, agricultural lands maintain valuable water recharge areas and preserve open spaces. The BMPs in this manual address water quality and quantity impacts from production activities and help maintain the environmental advantages of keeping the land in agriculture.

While best management practices have been in place for many years in our state, their role in environmental protection was formally established in 1999 with the passage of the Florida Watershed Restoration Act. This legislation provides the framework for implementing Florida's Total Maximum Daily Load program, which sets water quality targets for impaired waters. It also identifies best management practices implementation as the means for agriculture to help meet those targets.

As Florida's population continues to increase, there are more impacts to and competition for Florida's limited water resources. All Floridians must take part in conserving and protecting these resources. This manual represents the industry's commitment to do just that.

As a native Floridian whose family has long been involved in agriculture, I want to thank all who participated with the Department in the development of this important manual. With the active support and participation of so many dedicated people, I am optimistic about the future of Florida's agricultural industry. I trust that you will join me in supporting this valuable water resource protection effort.

Sincerely,

Adam H. Putnam
Commissioner of Agriculture

ACKNOWLEDGEMENTS

The following is a list of individuals who participated in the development of this manual. Each of these individuals and their organizations made important contributions to the process, and their work is sincerely appreciated.

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Editor

Terry Pride – Florida Department of Agriculture and Consumer Services

INTRODUCTION

Operations Intended to Use this Manual

This manual is adopted by the Florida Department of Agriculture and Consumer Services (FDACS), and is designed for use by commercial farm operations that produce either nut crops (e.g., pecans), stone fruit (e.g., peaches, plums, and nectarines), tropical fruits (e.g., avocados, lychees, mamey sapotes, papayas), blueberries, grapes, brambles (e.g., blackberries and raspberries), or similar fruit and nuts. Growers that produce crops other than those covered by this manual should use the appropriate FDACS BMP manual.

Things to Keep in Mind as You Use this Manual

- Italicized words that appear in ***bolded italics*** are defined in the glossary.
- Specific record-keeping requirements are noted using a pencil icon: 
- BMPs or guidance intended for tropical fruit operations only are identified by the following icon: 

You can access this manual electronically at www.floridaagwaterpolicy.com.

Overview of the Industry

Tropical Fruits

Commercial acreage of the tropical fruit industry is about 12,000 acres, with 90 percent of the acreage concentrated in Miami-Dade County. Other counties with commercial acreage include Lee, Collier, Palm Beach, Indian River, St. Lucie, Broward, Martin, Charlotte, Pasco, and Sarasota counties.

Florida has about 11,925 acres specialty fruits, including:

- 7,500 acres in avocado.
- 600 acres in mango.
- 850 acres in longan.
- 700 acres in lychee.
- 504 acres in banana.
- 486 acres in mamey sapote.
- 400 acres in guava.
- 375 acres in papaya.
- 510 acres, collectively, in carambola, jackfruit, kumquat, sapodilla, sugar apple, pitaya, and passion fruit.

No recent industry-wide value estimate is available; however, a gross estimate is $75 million, not taking into account increased production from new plantings and new crops, the economic impact from the commercial tropical fruit production in counties other than Miami-Dade County, and the tropical fruit nursery industry.

Temperate Fruit and Nut Crops

A variety of temperate fruit and nut crops are grown commercially in Florida. Of these only blueberry and pecan are surveyed annually by the United States Department of Agriculture (USDA) National Agricultural Statistics Service (NASS). Where NASS data is not available, gross estimates of acreage are given. Commercial acreage includes:

- 7,500 acres in pecan.
- 3,500 acres in blueberry.
- 920 acres, collectively, in peach, muscadine grape, blackberry, and persimmon.

Of these, blueberry has shown the most growth during the last decade. The value of Florida's blueberry industry has steadily increased, and was valued at $73 million as of 2009 (second behind Michigan in farm gate value). Florida's pecan industry has remained steady for the past several years, and is valued at $2.2 million (2009). Few new pecan groves have been established recently. Peach acreage has expanded during the past three to four years and shows relatively high potential for continued growth in central and north-central Florida. While acreage is small, interest in commercial blackberry production in Florida has increased during the past two years, and a Florida Blackberry Growers' Association was formed in 2009.

Best Management Practices Defined

Best Management Practices are individual practices or combinations of practices that, based on research, field-testing, and expert review, have been determined to be the most effective and practicable means for maintaining or improving water quality. BMPs typically are implemented in combination to prevent, reduce, or treat pollutant discharges. BMPs must be based on sound science, be technically feasible, and be economically viable.

The industry remains committed to protecting water resources through the implementation of BMPs. This manual, which has been endorsed by the

major industry associations, has been developed to promote BMPs for specialty fruit and nut crop operations in Florida. Although these practices are designed primarily to protect water quality, some of the BMPs will also have water conservation benefits.

BMPs and Water Quality

Studies conducted by the Environmental Protection Agency (EPA) indicate that nonpoint sources (both urban and agricultural) are the nation's greatest contributors to water pollution. Much of the contribution is due to rainwater carrying pollutants (including manure and fertilizer) into lakes, rivers, wetlands, estuaries, and ground water. It is good stewardship and makes good sense for growers to prevent or minimize these impacts by using BMPs. In fact, the Florida Legislature has established BMP implementation as the non-regulatory means for agricultural nonpoint sources to comply with state water quality standards. When you implement BMPs you are also confirming the Legislature's support for this approach.

Under the Federal Clean Water Act and Florida law, the Florida Department of Environmental Protection (FDEP) must identify impaired surface waters and establish total maximum daily loads (TMDLs) for pollutants entering these waters. A TMDL establishes the maximum amount of a pollutant that can be discharged to a waterbody and still meet state water quality standards. Some pollutants for which TMDLs have been set include: total phosphorus, total nitrogen, total suspended solids, and coliform bacteria.

FDEP may develop and adopt Basin Management Action Plans (BMAPs), which contain the activities that affected interests will undertake to reduce point and nonpoint source pollutant loadings. In ***watersheds*** with adopted BMAPs, and in some other areas, agricultural producers either must implement FDACS-adopted BMPs or conduct water quality monitoring prescribed by FDEP or the water management district.

Florida already has adopted a significant number of TMDLs, and many more waterbodies are listed for TMDL development. This list encompasses lakes, rivers, streams, springs, and estuarine systems. More information on listed waterbodies and adopted TMDLs is available at http://www.dep.state.fl.us/water/tmdl/index.htm. To see a map of BMAP areas, go to http://www.dep.state.fl.us/water/watersheds/bmap.htm. If you need help figuring out whether you are in a BMAP area, call (850) 617-1727, or e-mail AgBMPHelp@freshfromflorida.com.

Benefits of Implementing BMPs

Before FDACS adopts BMPs, the FDEP reviews them and determines whether they will be effective in addressing water quality impacts from agricultural operations. Benefits to enrolling in and implementing FDACS BMPs include:

- A presumption of compliance with state water quality standards for the pollutants addressed by the BMPs.
- Release from the provisions of s. 376.307(5), F.S., (fines for damages) for pollutants addressed by the BMPs.
- Technical assistance with BMP implementation.
- Eligibility for cost-share for certain BMPs (as available).
- The Florida Right to Farm Act generally prohibits local governments from regulating an agricultural activity that is addressed through rule-adopted BMPs when farmers implement them.
- Producers who implement FDACS-adopted BMPs might qualify for exemptions from water management district surface water permitting, and/or satisfy other permitting requirements.
- Some BMPs increase production efficiency and reduce costs.
- BMP participation demonstrates agriculture's commitment to water resource protection, and maintains support for this approach to meeting water quality and conservation goals.

Implementation of BMPs does not excuse agricultural operations from complying with applicable permitting or other regulatory requirements.

Permit Exemptions

Some agricultural activities, especially those that alter on-site hydrology, may require an Environmental Resource Permit (ERP) or other surface water permit: for example, the construction of a stormwater management system (e.g., retention or detention pond). Check with your water management district before beginning construction of any stormwater management system to see whether a permit is needed, or whether the following exemptions apply:

- Under subsection 373.406(2), F.S., any person engaged in the occupation of agriculture may alter the topography of any tract of land for purposes consistent with the practice of agriculture. However, these activities may not be for

the sole or predominant purpose of impounding or obstructing surface waters. Agricultural activities that meet these criteria may qualify for a statutory exemption from an ERP. Ask your water management district whether there are any notification requirements.

- Under 373.406(9), F.S., environmental restoration activities on agricultural lands that have minimal or insignificant impacts to water resources may also be exempt from an ERP, upon written request by the producer and written notification from FDEP or the water management district that the proposed activity qualifies for the exemption.

Even if an exemption applies, agricultural producers within a watershed with an adopted BMAP that addresses agricultural loadings either must implement BMPs or conduct water-quality monitoring.

Local Government Regulation

In general, nonresidential farm buildings are exempt from the Florida Building Code and associated county building codes, in accordance with sections 604.50 and 553.73, Florida Statutes (F.S.). However, permits may still be required for construction or improvement of certain farm buildings, so it is important to check with your county building and permitting office before beginning construction.

The Florida Right to Farm Act (section 823.14, F.S.) provides that, with certain exceptions, a farm that has been in operation for one year or more and was not a nuisance at the time of its established date of operation is not a public or private nuisance, if the farm conforms to generally accepted agricultural and management practices. In addition, the Act provides that a local government may not adopt any ordinance, regulation, rule, or policy to limit an activity of a bona fide farm operation (with an agricultural land classification under s. 193.461, F.S.) if the activity is regulated through implemented BMPs adopted by FDEP, FDACS, or a water management district. Not all activities conducted on a farm are addressed by adopted BMPs.

POTENTIAL WATER QUALITY IMPACTS ASSOCIATED WITH SPECIALTY FRUIT AND NUT CROP FARMS

Most specialty fruit and nut crops are produced on perennial trees, shrubs, or vines. In South Florida, many commodities are cultivated on sandy, high-water-table soils with little relief or slope, thereby requiring drainage infrastructure. South Florida also has well-drained, highly calcareous (rockland) soils, which are unique to the region and support many tropical fruit crops. In contrast, North Florida generally has more relief, and heavier (clay-type), lower-water-table soils. These differences create regional production and water quality challenges.

Nutrients

Excess nitrogen and phosphorus are the most common causes of water quality impairments in Florida. These nutrients can enter surface waters through stormwater runoff or leach through soils into ground water. While there are potential water quality issues associated with the use of other agricultural inputs, such as pesticides, this manual focuses on nutrient-related impacts addressed by many TMDLs.

The nitrogen form most abundant in natural waters is nitrate. Due to its high mobility, nitrate can also leach into ground water. Phosphorus is one of the key elements necessary for growth of plants and animals. In terms of freshwater ecology, it tends to be the (growth) limiting nutrient. Phosphorus is more effectively retained in the soil than nitrogen. However, phosphorus enters waterbodies attached to particulate matter via sediment transport, or can be dissolved in water. In some soils, phosphorus is prone to leaching into ground water.

High levels of nutrients in surface waters can result in abnormal plant growth, including algae. Algae are essential to aquatic systems; as a vital part of the food chain, algae provide the nutrition necessary to support aquatic animal life. Certain types of algae also provide habitat for aquatic organisms. However, excess algal production can cause many problems in a waterbody. The presence of algal blooms, noxious weeds, and too many floating aquatic plants can block sunlight necessary for photosynthesis by submerged aquatic plants. The mass die off and decomposition of these materials lowers the available dissolved oxygen, which can lead to fish kills.

Blue-green algae (***Cyanobacteria***) can become so abundant that they will cause a scum layer to form on the surface, shading the sunlight-dependent life below and disturbing the food chain. Untreated surface water (any water not obtained through a public water system) with increased Cyanobacteria poses a health risk. Livestock and pet deaths have been attributed to consumption of water with an abundance of Cyanobacteria, which produce a toxin known to cause liver and nervous system effects in humans. Potential risks from recreational contact include skin, respiratory, and mucous membrane irritation.

Fecal Coliforms

Fecal coliforms from uncomposted manure or improperly treated or applied ***biosolids*** are another cause of water quality degradation. The likelihood of contamination is increased if these materials are applied in excess of agronomic rates or under wet weather conditions. While high fecal coliform counts do not result in eutrophic conditions, the decomposition of fecal and other organic matter in water can lead to increased biological oxygen demand and lower dissolved oxygen levels. Fecal coliforms also can have health impacts such as dysentery, gastrointestinal infections, ear infections, and skin infections, especially in open wounds.

Sedimentation

Sedimentation occurs when eroded soils are washed into surface waters, creating a buildup of solids on the bottom and suspended solids (turbidity) in the water column. Sedimentation impacts most commonly associated with farm operations come from the erosion of unprotected soils.

Sediments can fill in water bodies, clog waterways, carry pollutants, and affect water clarity. These effects combine to reduce fish, shellfish, and plant populations, and decrease the overall productivity of lakes, streams, estuaries, and coastal waters. Decreased penetration by sunlight can affect the feeding and breeding behaviors of fish, and the sediments themselves can clog gills and cause irritation to the mucous membranes covering the eyes and scales. As the sediment settles, fish eggs can be buried. Recreational use may also decline because of reduced fish populations, less visibility, and reduced desirability of downstream swimming areas.

Deposited sediment also reduces the flow capacity of ditches, streams, rivers, and navigation channels, which can result in more frequent maintenance dredging or flooding. Nutrients and other contaminants can attach to sediments, which can contribute to downstream water quality impairments. Chemicals, such as some pesticides, phosphorus, and ammonium, may be transported in sediment. Over time, these chemicals may be released from the sediment and become suspended in the water column.

Impervious Areas

Impervious areas (packing houses, parking lots, etc.) can be useful on a farm, and in some cases are necessary, but they should be limited as much as possible. Impervious areas can increase and channelize the runoff (flow) from the farm, which can lead to greater erosion rates. This problem can be compounded downstream, because high flows often cause undercutting and slumping along stream banks, leading to increased stream sedimentation. Check with your water management district before creating any new impervious areas on your property, since this may be a regulated activity.

KEYS TO POLLUTION PREVENTION

It is the agricultural industry's responsibility to protect water quality by implementing good land and water management practices. BMPs include many prevention measures that minimize potential water quality and quantity impacts. Implementing BMPs helps demonstrate the industry's commitment to protecting water resources, and garners support for this non-regulatory approach. Below are key guidelines for implementing the specific BMPs laid out in this manual.

Understand Water Quality Issues on Your Operation

Water quality relates to water's chemical, biological, and physical characteristics. Elevated levels of phosphorus, nitrogen, sediment, bacteria, and organic material all contribute to the degradation of water quality. The potential for discharges from farm operations to cause water quality problems varies, depending on soil type, slope, drainage features, nutrient management, and activities in or near ***wetlands***, surface waters, or karst features. Your farm management practices determine your operation's impact on water quality. For more information on water quality, go to the following link: http://lakewatch.ifas.ufl.edu/LWcirc.html.

Manage Nutrient Sources Properly

You can minimize pollutants that leave your property by controlling the types and uses of materials you use on your farm. Nutrient-related pollutants can come from excess use of commercial fertilizers, manure, and/or biosolids. Managing nutrients carefully is critical to protecting water quality.

Manage Irrigation Carefully

Water is the carrier for nearly all pollutants. Precisely managing irrigation inputs by keeping water (moisture) primarily in the plant's root zone will significantly reduce nutrient-related impacts from fertilizers. Over-irrigating may exceed the soil's water-holding capacity and lead to runoff or leaching.

Minimize the Potential for Erosion Impacts

Land clearing, culvert installation, road building, ditch and canal maintenance, pasture renovation activities, and cultivating short-term crops can expose soil and lead to erosion that can increase pollutant loading. It is important to take appropriate erosion control measures during these activities.

CONSIDERATIONS FOR ESTABLISHING OR EXPANDING OPERATIONS: SITE SELECTION AND PREPARATION

Proper site selection and preparation are extremely important in successfully establishing specialty fruit and nut crops. Eliminating potential problems through simple design adjustments made before planting can reduce inputs, water quality impacts, and production costs.

Site selection and preparation likely will vary between regions of the state, depending on crop type, soil type(s), seasonal-high groundwater conditions, topography, and climate. New planting sites should be selected based on factors such as climatic conditions, proximity to urban areas, previous agricultural use, drainage characteristics, flooding history, residual pest populations, and whether or not the soil type is suited to the commodity.

When preparing the site, growers should utilize management tools such as soil testing, fumigation, use of soil amendments, bed preparation and spacing, and land leveling. Follow the guidance below as appropriate for your site and crop.

General Guidance for Site Preparation and Planting

- Choose a site that has the climatic and soil characteristics suitable to the crop type, and good air circulation to minimize pest and disease vectors.
- When converting from silviculture to other agricultural uses, it is a good idea to have a wetlands delineation performed prior to site preparation, to establish the boundaries of all onsite wetlands that may be in your planned production area. This will allow you to establish appropriate setbacks and/or buffers pursuant to the BMPs in this manual.
- Follow the proper spacing and bed-height requirements for your particular crop. If unsure, contact your local county extension agent for more information on specific crop spacing.
- If using soil amendments and/or pH-adjusting materials, manage these inputs so that nutrient management and water conservation are optimized.
- Adjust fertilizer and irrigation application amounts to account for the differences in nutrient and water holding capacities as bedding materials age.

See University of Florida Institute of Food and Agricultural Sciences (UF-IFAS), *Water and Environmental Considerations for the Design and Development of Citrus Groves*, CIR-1419, at: http://edis.ifas.ufl.edu/CH163 .

Considerations in Using High Tunnels or Shade-cloth Covered Beds

High tunnels are in-field structures generally consisting of metal, plastic, or wooden frames and polyethylene covers, with no electrical ventilation, mechanical ventilation, or heating systems. High tunnels may be used for frost/freeze protection, extension/expansion of the growing season, pest prevention, and reduction of input loss/transport, among others. They can reduce the use of water, pesticides, and other inputs. However, there is the potential for high tunnels to contribute to erosion and drainage issues, since these structures increase the amount of impervious area in a field and may concentrate runoff. Growers who use high tunnels should follow applicable USDA Natural Resources Conservation Service (USDA-NRCS) standards for these structures. Practices such as cover crops, diversions, and grassed waterways should be used in conjunction with high tunnels when there are related stormwater issues.

Another site preparation practice that is gaining popularity in some segments of the industry is the covering of plant beds with shade-cloth as part of a raised-bed culture system. This bed covering has the potential to concentrate stormwater runoff in fields, thereby contributing to erosion and drainage issues. Growers need to be especially aware of these concerns in areas with highly erodible soils and excessive slope.

Land Leveling for New Plantings

Develop a plan for land leveling, with consultation from a public or private engineer to discuss your site-specific needs. Use laser technology for best results, and balance cut and fill amount for the most efficient use of materials. Periodic grading or floating may be needed to eliminate mounds or depressions that form. Deposit unused ***spoil*** material in a suitable upland location. Consider reusing this material somewhere on-site as road base, etc.

Tropical fruit growers - Preparing rockland soil for planting may include, but is not limited to: clearing and leveling the site; rock-plowing to form a 4- to 8-inch plowed soil layer; leveling the plowed site; forming beds, if needed, from the plowed soil; and/or rock trench to form trenches 12 to 24 inches deep and 18 to 40 inches wide, and/or augur holes into the limestone-based bedrock below the plowed layer.

For more information on land leveling, see the USDA-NRCS, Precision Land Farming, Code 462; and Irrigation Land Leveling, Code 464, FOTG Section IV, http://www.nrcs.usda.gov/technical/efotg.

Rehabilitation of Existing Groves/Orchards

Fruit and nut orchards can develop conditions that require rehabilitation. With pest pressures, inadequate pruning, increasing age, and/or lack of proper management, shrubs or trees may become dwarfed and experience significant decline. Wholesale rehabilitation involves replanting the entire site; however, re-budding of rootstock seedlings or replanting dead or missing shrub or tree sites may be all that is needed.

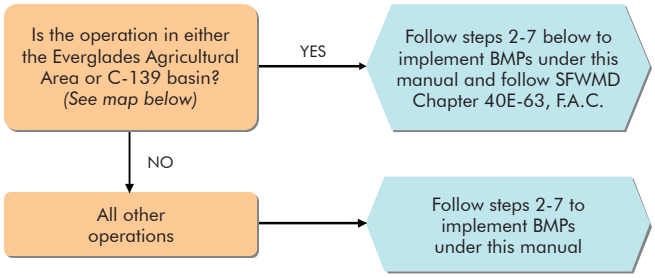
In the case of commercial blueberry production, as plants reach their full production potential in 7 or 8 years and taper off, wholesale orchard rehabilitation is usually needed. Practices that are especially important during the first year of rehabilitation include:

- Instituting proper sediment control measures before and during replanting, especially if farming on highly erodible lands.
- Disking and floating the field to insure that all low spots are filled in as much as possible.
- Evaluating the irrigation system, including applicable filters, lines, hoses and emitters, as they may require unplugging, maintenance, repair, and/or replacement.
- Implementing squirrel control measures, if needed, through baiting and mechanical trapping.
- Pruning shrubs or trees to remove approximately 35 percent of the mass the first year.

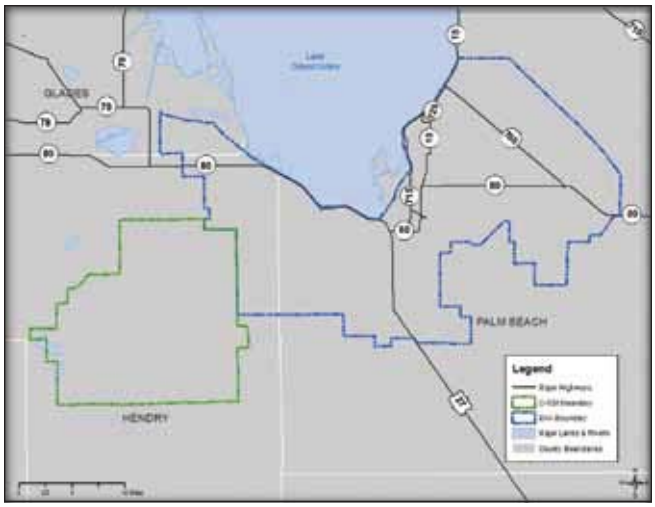
USER'S GUIDE TO BMP ENROLLMENT AND IMPLEMENTATION

The steps below will help you select which BMPs to implement to reduce or avoid impacts to water quality coming from your operation.

1. **Choose the Pathway Applicable to You:** In the flowchart below, identify the circumstances that apply to you.



Note: *In areas where FDEP has adopted a Basin Management Action Plan, agricultural operations must either implement applicable FDACS-adopted BMPs or monitor their water quality.*



2. **Request On-farm Technical Assistance, as Needed:** FDACS, UF-IFAS BMP Implementation Teams, Soil and Water Conservation Districts (SWCDs), USDA-NRCS and/or UF-IFAS Extension staff are available to assist with the mechanics of BMP identification and selection. To get assistance, call (850) 617-1729 or email AgBmpHelp@FreshFromFlorida.com.

3. **Conduct an Inventory:** The selection of BMPs begins with a basic inventory of the farm's natural features, which will help you determine how the operation of your farm may affect environmentally sensitive areas. **When developing the inventory, sketch your farm/facility, noting buildings, pastures, electrical and plumbing lines, and water sources.** Identify areas of particular concern that need to be addressed. These may include streams, wetlands, springs, ***sinkholes***, and ponded or other poorly drained areas, among others. You can use the inventory as a starting point to select the BMPs applicable to your farm. To help you conduct your inventory effectively, the following tools are available:

- ✓ Aerial photographs (http://earth.google.com/index.html, or other providers)
- ✓ USDA-NRCS soil survey maps (http://websoilsurvey.nrcs.usda.gov/app/)
- ✓ USGS topographic maps (http://topomaps.usgs.gov)
- ✓ National Wetlands Inventory (http://www.fws.gov/wetlands/data/index.html)
- ✓ Historic rainfall records (http://www.ncdc.noaa.gov/oa/ncdc.html)

4. **Select the Applicable BMPs:** Carefully read BMP sections 1.0 through 6.0 and select all of the **Level I** and **Level II BMPs** in the manual that are applicable to your operation and are technologically and economically feasible for you to implement. Record the BMPs on the checklist in **Appendix 10** of this manual. The checklist includes a column for you to schedule BMP implementation if a practice is not already in place.

   Level I BMPs focus primarily on management actions, rather than structural practices. In general, Level I BMPs should not require cost share to implement, though there may be a few exceptions. Depending on the location and specific conditions of the farm, not all of the Level I BMPs may be applicable to a particular site.

   Level II BMPs address water quality risk features that require more attention. Producers may need to implement one or more of these BMPs, based on site-specific needs identified by the Level II assessment questions.

   It is advisable to consolidate your inventory and all your BMP decision-making, including the BMP Checklist, into a simple implementation plan. This can serve as a record of scheduled and completed BMPs, including operation and maintenance activities. A well thought-out, written plan enables managers and owners to

schedule their activities and accomplish their objectives. Remember to keep the plan available and update it regularly. It will help you communicate with your employees, your county extension agent, USDA-NRCS staff, or others.

5. **File a Notice of Intent to Implement (NOI) BMPs:** Complete and submit to FDACS an NOI, contained in **Appendix 10** of this manual, along with the BMP checklist. Once received by FDACS, the Notice of Intent formally enrolls your operation under the BMP program. Implementation of the BMPs provides a presumption of compliance with state water quality standards for the pollutants the BMPs address. Implementation includes ongoing record keeping and maintenance of the BMPs.
6. **Implement the BMPs:** Implement all applicable Level I and Level II BMPs as soon as practicable, but no later than 18 months after submittal of the Notice of Intent to Implement.
7. **Keep Records on BMP Implementation:** FDACS Rule 5M-13.005, F.A.C., requires record-keeping to document BMP implementation. Fertilizer applications and rainfall amounts are two types of record-keeping. Record-keeping requirements are highlighted in the manual using this figure:  All BMP records should be accurate, clear, and well-organized. You may develop your own record-keeping forms or use the ones provided in **Appendix 7**. You must retain the records for at least 5 years. However, it is desirable to retain records for as long as possible, to address any potential future legal issues. All documentation is subject to review.

BMP Implementation Follow-Up

FDACS has developed a BMP "Implementation Assurance" program to help evaluate how BMPs are being implemented, and to gather feedback on whether there are obstacles to using any of the practices. On a staggered schedule by BMP program, FDACS mails surveys to enrollees, which contain questions about BMP-related activities on enrolled operations. FDACS staff also visit selected operations to get more direct input from producers. The Implementation Assurance effort helps in:

- Documenting the level of participation in implementing agricultural BMPs.
- Identifying needs for education and implementation assistance.
- Reinforcing the importance of BMP implementation.
- Evaluating the effectiveness of FDACS BMP programs.
- Updating FDACS NOI records.

Your participation in these follow-up activities is important to the continuing success of agricultural BMP programs in Florida.

BEST MANAGEMENT PRACTICES

1.0 NUTRIENT MANAGEMENT

Nutrient Management *is control of the amount, source, placement, form, and timing of the application of nutrients and soil amendments to ensure adequate soil fertility for plant production and to minimize impacts to water quality.*

Primary Macronutrients

Growers commonly use fertilizer materials that contain nitrogen (N), phosphorus (P), and potassium (K) sources, which are the macronutrients most readily assimilated by plants. A balance needs to be maintained between all major and minor elements to ensure proper plant growth and maintain plant health. In addition, applying macronutrients such as N and P in excess of plant nutrient uptake can result in nutrient-laden runoff to surface waters or leaching to ground water, especially in Florida's sandy soils. Potassium is associated with movement of water, nutrients, and carbohydrates in plant cells and tissue. Excessive K fertilization can contribute to high soil electrical conductivity levels, which may limit root growth and tolerance to drought.

Soils

Understanding the physical, chemical, and colloidal properties of your soil type is important to choosing effective nutrient management practices. For example, at near-neutral soil pH levels, some of Florida's soils naturally provide adequate phosphorous, while some of the sandier, highly leached soils may not contain phosphorus levels that support optimum plant growth. These variations require different management practices to assure adequate phosphorus levels while minimizing adverse environmental impacts.

Nitrogen compounds are readily oxidized to nitrate in most Florida soils, and nitrate does not attach well to mineral soil particles or organic matter. Consequently, growers almost always have to add supplemental N fertilizer to meet a crop's specific nutrient requirement.

A soil test may indicate the need for supplemental P. The addition of P helps to ensure a healthy crop by encouraging root growth, stalk strength, and resistance to root rot diseases. Most soluble P fertilizer materials are in the inorganic form so they can be readily absorbed by plants. Soils predominantly comprised of coarse uncoated sands are very prone to leaching P, and are more common in areas of Central and South Florida. Uncoated soils series where P leaching may be a concern include the following:

Common *Uncoated Soils Series*			
Adamsville	Estero	Neilhurst	Ridgewood
Archbold	Hallandale	Nettles	Satellite
Basinger	Hobe	Oldsmar	St. Lucie
Broward	Immokalee	Orsino	Smyrna
Canaveral	Jonathan	Ortega	Tavares
Candler	Kershaw	Ousley	Valkaria
Dade	Lawnwood	Penney	Wabasso
Deland	Leon	Pomello	Wauchula
Duette	Myakka	Pomona	Waveland
EauGallie	Narcoosee	Pompano	Zolfo

Soil Testing and Interpretation

Soil test-based nutrient recommendations rely on a correlation between nutrient levels in the soil and predicted plant response. However, information to make this correlation for some specialty fruit and nut crops is limited. If this is the case, growers still should use soil testing to monitor soil pH and as a general indication of nutrients in the soil, such as P, calcium (Ca), magnesium (Mg), etc. Soil samples are fairly easy to obtain. **Figure 1** shows a common soil probe used to obtain representative soil samples.

Figure 1

For most mature perennial fruit and nut crops, soil testing should be conducted every three years to monitor soil pH, cation exchange capacity, and percent of organic matter. Annual plant tissue analysis of macro (N, P, K), secondary, and minor essential elements is useful in fine-tuning a nutrient management program. The exception to this is blueberries, which will need to rely solely on tissue testing, as blueberry growers generally use a bed of pure pine bark or pine bark mixed with native soil. Soil and tissue testing records are a critical part of your fertilizer management documentation.

The amount of nutrients extracted from soils through laboratory analysis is not a direct measure of nutrient availability to plants. The levels of extracted P, Ca, and Mg typically are divided into five categories: very low, low, medium, high, and very high. For more information on soil testing, see **Appendix 3** of this manual, or go to http://edis.ifas.ufl.edu/SS186.

Tissue Testing and Interpretation

One of the best tools for measuring plant health and making fertilization decisions is leaf tissue analysis. For perennial fruit and nut crops, past records of leaf tissue composition can be used to fine-tune a fertilization program for optimum plant growth and minimum environmental impact. Leaf tissue analysis, along with observation and soil testing, can help determine the effectiveness of a fertilization program, and is especially useful for detecting micronutrient deficiencies even before visual symptoms appear. In most fruit and nut crops, leaf samples should be taken from mid-shoot areas of fully expanded (mature) leaves from current season growth. **Table 1** below shows recommended leaf nutrient content ranges for some specialty fruit and nut crops.

Timing and Targeting Fertilizer Applications

Because of the cost of fertilizer and the potential for nutrient-related adverse impacts to water quality from over-fertilization, growers should understand the specific crop nutrient requirement (CNR) and the timing factors associated with fertilizing, and should apply fertilizer material to target areas only.

Table 1. Recommended Leaf Nutrient Content for Specialty Fruit and Nut Crops*

Crops	% N	% P	% K	% Mg
Atemoya	2.50-3.00	0.16-0.20	1.00-1.50	0.35-0.50
Avocado	1.70-2.00	0.09-0.14	1.30-1.70	0.39-0.65
Banana	2.00	0.15	2.50	0.25
Blueberry	1.80-2.10	0.12-0.4	0.35-0.65	0.12-0.25
Brambles	2.50-3.00	0.35-0.40	2.00-2.50	0.70-0.90
Carambola	1.70-2.00	0.15-0.25	1.30-1.70	0.92-1.30
Guava	1.60-1.80	0.20-0.30	1.40-1.60	0.20-0.30
Longan	1.40-1.90	-	-	-
Lychee	1.50-1.70	0.15-0.30	0.70-0.80	0.35-0.45
Mamey Sapote	2.10-2.30	0.12-0.15	1.21-1.82	0.25
Mango	1.00-1.50	0.09-0.18	0.30-1.00	0.15-0.40
Muscadine Grape	1.65-2.15	0.12-0.18	0.80-1.20	0.15-0.25
Papaya (petioles)	3.50-5.00	0.17-0.21	2.50-3.00	0.26-0.29
Passionfruit	4.75-5.25	0.25-0.35	2.00-2.50	0.25-0.35
Peach	2.75-3.50	0.12-0.50	1.50-2.50	0.25-0.50
Pecan	2.70-3.50	0.14-0.30	1.25-2.50	0.30-0.60
Persimmon	1.50-2.50	0.10-0.35	1.93-3.70	0.17-0.46

* *Adapted from information from http://trec.ifas.ufl.edu/fruitscapes/, except for Persimmon, which comes from Horticultural Research Center of New Zealand. http://www.hortnet.co.nz/publications/guides/fertmanual/persimon.htm*

Note: *These ranges may vary and are influenced by soil type, leaf age and position, fruiting or non-fruiting, cultivar, and crop load.*

Fertilizer is generally applied during the growing season in multiple applications, based on observation, experience, and leaf tissue sample analysis. Multiple factors affect timing, such as: species, cultivar, region, climate, soil type and pH, and the maturity of the shrub/tree.

Foliar application of micronutrients is common for many fruit crop species; however, this technique should be used only when the probability of rainfall is low, in order to avoid washing nutrients from leaf surfaces.

Nutrient Considerations for Tropical Fruit Crops

In South Florida, tropical and subtropical fruit crops are grown on a variety of soil types, including low- to high-pH sandy soils (e.g., EauGallie sand, Matclacha gravelly fine sand), muck soils, and high-pH ***calcareous*** soils (e.g., Krome gravelly loam, Chekika gravelly loam). Because of the lack of an accurate soil test for calcareous soils, leaf tissue analysis is more important than soil testing for monitoring and managing fertilizer inputs in these soils.

Fertilizer practices vary widely by tropical fruit and nut crop species and by soil type (i.e., pH and organic matter content). The addition of granular fertilizer to tropical fruit crops grown in neutral- to low-pH soil(s) is generally effective. Tropical and subtropical fruit crops grown in muck soils generally do not need additional nitrogen. Tropical and subtropical fruit crops grown in the high-pH (7-8.5) calcareous soils of south Miami-Dade County or calcareous, high-pH sandy soils (some areas of southeastern Florida) require foliar applications of magnesium and minor elements such as manganese, zinc, molybdenum, and boron, and soil-drench applications of chelated-iron materials. An example of this fertilization practice is shown in **Figure 2**.

Figure 2

In general, growers will make a slurry of water and chelated-iron materials and apply it as a soil drench under the tree canopy. For more information on production on calcareous soils, refer to UF-IFAS Extension Publication SL183, *Calcareous Soils in Miami-Dade County* which can be found at: http://edis.ifas.ufl.edu/TR004.

Nutrient Considerations for Temperate Fruit Crops

Temperate fruit crops are grown on a variety of soil types in Florida, ranging from sandy loams with clay subsoils, to deep, well-drained sands, to poorly-drained flatwoods soils. Fertilizer recommendations based on soil test results are for the most part lacking due to the wide variety of climatic and soil-related conditions encountered in Florida. Soil tests are beneficial for monitoring soil pH and the levels of elements that may accumulate over time, such as phosphorus. Leaf nutrient analyses can be used in combination with subjective assessments of plant growth and vigor to make adjustments to fertilizer programs.

Under Florida conditions, most temperate fruit crops are irrigated; therefore, fertilization and irrigation practices should be designed to minimize fertilizer loss through leaching. For most shallow-rooted crops, multiple applications of dry granular fertilizer are probably more efficient than one or two applications per year. Some growers are increasing the relative amount of fertilizer applied via low-volume irrigation systems (fertigation) and/or using slow or controlled-release fertilizers as a portion of their overall nutrient program. Micronutrient sprays are common for some crops, each crop having its own particular nutrient requirements. For example, zinc deficiency is very common with peach trees on sandy soils, and supplemental zinc, either soil-applied or as a foliar spray, is often needed. Blueberries require acidic soil conditions (pH ~ 4.5), and irrigation water (pH ~ 7.0+) is often acidified to prevent an upward drift in soil pH, which can negatively affect the availability of micro-nutrients such as iron, zinc, and manganese.

Nutrient Management BMPs

1.1 Soil and Tissue Testing

Level I BMPs:

✓ **1.** In non-amended mineral soils, base fertilization rates for P on soil test-based recommendations from a lab that uses a method accepted by the UF-IFAS Extension Soil Testing Laboratory. Keep a copy of all laboratory test results. In amended soils or rockland soils of south Miami-Dade County, use tissue testing as an alternative to determine P fertilization needs.

✓ **2.** Use tissue testing to diagnose the effectiveness of a fertilization program and to deter-

mine the need for and appropriate amount of supplemental fertilizer applications. Keep a copy of all laboratory test results.

References:

1. UF-IFAS, Soil pH and Electrical Conductivity: A County Extension Soil Lab Manual, CIR 1081. http://edis.ifas.ufl.edu/SS118
2. UF-IFAS, Plant Tissue Test Information Sheet, SL 131. http://edis.ifas.ufl.edu/SS182

Note: *See Appendix 3 for important information on soil and tissue sampling.*

1.2 General Fertilizer Management

Level I BMPs:

✓ **1.** If available, use the UF-IFAS-recommended fertilization rates for your crop for N, P, and K. If UF-IFAS recommendations are not available, use another credible source, such as U.S. land grant institutions, other recognized universities, or USDA. If using a source other than UF-IFAS, list the source in the comments section at the end of the BMP checklist.

Be aware of soil pH and micronutrient needs. Do not over-apply N in an attempt to cover micronutrient deficiencies.

✓ **2.** Store fertilizers in a manner that protects them from wind and rainfall.

✓ **3.** Calibrate fertilizer application equipment for maximum distribution uniformity.

✓ **4.** When applying soluble fertilizers, use smaller, more frequent (split) applications to minimize the potential for leaching.

✓ **5.** Keep records of all nutrient applications. Include, at a minimum: date of application, total amount applied, acreage covered, fertilizer analysis or grade, % of controlled-release fertilizer (if applicable), rate per acre, and application method.

References:

1. USDA-NRCS, Nutrient Management, Code 590, FOTG Section IV. http://www.nrcs.usda.gov/technical/efotg/
2. Procedure for Calibrating Granular Applicators. ASABE EP 371.1
3. UF-IFAS, Calcareous Soils in Miami-Dade County, SL183. http://edis.ifas.ufl.edu/TR004.
4. UF-IFAS, Fruitscapes. http://trec.ifas.ufl.edu/fruitscapes/
5. University of Georgia Horticulture Department, Suggestions for Organic Blueberry Production in Georgia. http://www.caes.uga.edu/Publications/numberedPubs.cfm
6. University of Georgia Extension, Blueberry Fertilization in Soil., Fruit Publication 01-1. http://www.caes.uga.edu/Publications/numberedPubs.cfm
7. University of Georgia Extension, Cultural Management of Commercial Pecan Orchards. Bulletin 1304. http://pubsadmin.caes.uga.edu/files/pdf/B%201304_3.PDF

1.3 Fertigation

Level I BMPs:

✓ **1.** Based on the flow rate of the irrigation system, calibrate the injection system while the irrigation system is operating. Operating pressures and flow characteristics will influence the injection rate.

✓ **2.** Use highly water-soluble fertilizer sources and inject fertilizer on a frequent (e.g., daily or weekly) basis, depending upon your fertilization and irrigation schedule. Application of small amounts more frequently will reduce the potential for leaching beyond the root zone.

References:

1. UF-IFAS, Water Test Information Sheet, SL 133. http://edis.ifas.ufl.edu/SS184
2. UF-IFAS, Fertigation Nutrient Sources and Application Considerations for Citrus, Circular 1410. http://edis.ifas.ufl.edu/CH185
3. UF-IFAS, Field Evaluation of Microirrigation Water Application Uniformity, Bulletin 265. http://edis.ifas.ufl.edu/AE094

1.4 Other Nutrient Sources

Level I BMPs:

✓ **1.** If using reclaimed water, adjust your nitrogen and phosphorus fertilization rates to account for the nutrient content in the reclaimed water, based on the water quality data from the water supplier.

✓ **2.** If using composted manure or biosolids, determine their nutrient concentrations before using them, and adjust fertilization rates accordingly.

References:

1. UF-IFAS, The Basics of Biosolids Application to Land in Florida, SL-205. http://edis.ifas.ufl.edu/SS424
2. FDEP, Biosolids Rule, Chapter 62-640, F.A.C. http://www.dep.state.fl.us/legal/Rules/mainrulelist.htm

Note: *See Appendix 7 for list of record-keeping requirements and example record-keeping forms.*

2.0 IRRIGATION MANAGEMENT

Irrigation Management *involves selecting and maintaining the appropriate irrigation system for your crop; and adjusting irrigation methods, scheduling, and amounts to maximize irrigation efficiency, based on monitoring soil, plant, and weather conditions.*

According to 2005 United States Geological Survey data, there are approximately 1.8 million acres of irrigated farmland in Florida, which comprise about 11% of all the agricultural land uses within the state. Fruit crops, vegetables, field crops, and ornamentals account for most of the irrigated crop acreage to date.

In Florida, irrigation/water management and nutrient management are inextricably linked. The goal of proper irrigation management is to keep both the irrigation water and the fertilizer in the crop root zone. This requires knowledge of the characteristics (particularly rooting depth) of the crop, so that water and fertilizer inputs can be precisely targeted and properly managed. It also requires knowledge of the characteristics of the primary soil type to determine how these influence the availability of water to the plant.

Irrigation System Design and Installation

Irrigation system design involves selecting the irrigation system appropriate for physical characteristics of your site, crop water needs, and water source.

The two main types of irrigation systems used in Florida are semi-closed seepage irrigation, and pressurized systems such as micro-sprinkler, drip, or sprinkler. Irrigation system design depends on factors such as topography, soil type, crop type, and water source. It is important to know the volume and quality of the irrigation water source before designing and installing an irrigation system, especially for micro-sprinkler, sprinkler, or drip irrigation systems.

Irrigation system design requires in-depth technical knowledge, and should be handled by trained professionals. These professionals use existing standards and criteria, as well as manufacturers' recommendations, to design the most appropriate irrigation system for a particular location. For information about professionals who design and install irrigation systems, please visit the Florida Section of the American Society of Agricultural and Biological Engineers (http://www.fl-asabe.org/fasabeweb_006.htm).

Growers who are considering installing new or retrofitting existing irrigation systems should consult the information in **Appendix 5** before making a final design decision.

Semi-Closed Seepage Irrigation Systems

These systems convey water through pipes that discharge water to the field via spigots, to raise

the water table below the crop. Increasingly, semi-closed seepage irrigation systems are being used in combination with drip irrigation systems to best meet crop water and nutrient needs. However, these systems are relatively inefficient; therefore, growers on seep systems should evaluate the feasibility of converting to a pressurized system that is more efficient than seep. USDA-NRCS or UF-IFAS extension agents should be able to assist in this evaluation. In addition, water management district, state, and/or federal cost-share funding may be available.

Pressurized Irrigation Systems

These systems deliver water under pressure via closed pipelines and/or laterals. The most common pressurized systems used in the production of fruit and nut crops in Florida are drip (see **Figure 3**), micro-sprinklers, and high-volume overhead or under-tree solid set irrigation. High-volume guns are used less frequently. A typical irrigation system consists of four main components:

Figure 3

1. **Water Supply Mechanisms** (e.g., a water source, pumps, filters, valves, water gates and/or level controls.)
2. **Water Conveyance Mechanisms** (e.g., canals and main ditches, a main pipe, manifold pipes, lateral hoses or pipes, and/or isolation valves.)
3. **Water Application Mechanisms** (e.g., spigots; sprinkler, micro-sprinkler, or wobbling heads; spaghetti tubes; and/or spray guns.)
4. **Control Mechanisms** (e.g., manual or automatic float switches, computerized control systems, weather stations, and/or soil moisture sensors.)

Irrigation Water Sources

Agricultural irrigation water sources can come from ground or surface water. Ground water can contain high levels of minerals that can form scale, which may plug emitters. Additionally, elevated chloride and total dissolved solids (TDS) concentrations can significantly stress crops, leading to low fruit yield, plant damage, and impacts to both on-site and off-site water resources. Water quality analyses can help determine whether the water is appropriate to use on your crop, and to identify the best type of irrigation system to deliver the water, based on its chemistry.

Algal and bacteria growth can be problems associated with using surface water. Algal cells and organic residues of algae can pass through irrigation system filters and form aggregates that may plug emitters. Surface water can also contain organic debris, which must be filtered to prevent irrigation system plugging.

For more information on irrigation water source issues, go to: http://edis.ifas.ufl.edu/AE032.

Well Construction Permits

Florida's five water management districts have the primary regulatory authority for issuing well-construction and water-use permits for agriculture. Well-construction permits are required prior to the drilling, construction and/or repair of a well. These permits ensure that wells are constructed by qualified, licensed contractors to meet safety, durability and resource protection standards. The water management districts sometimes delegate the issuance of well-construction permits to county governments. For more information about water management district permitting requirements, go to: http://www.dep.state.fl.us/water/waterpolicy/districts.htm.

Alternative Irrigation Water Sources

Alternative irrigation water sources are non-traditional agricultural water supplies, primarily reclaimed and/or onsite surface water sources.

As Florida continues to grow in population, agriculture in the state must compete more and more with the urban sector for water supply. Growers are being asked to use more sustainable sources of irrigation water, such as reclaimed water, tailwater recovery, and rainfall harvesting. Use of alternative sources can also benefit water quality. For instance, tailwater recovery allows nutrients to be re-used on-site and not discharged to downstream waters.

Reclaimed Water

In recent years, the use of reclaimed water has been on the rise in Florida, as shown in **Figure 4**. This is mostly due to the high influx of people to the state over the last twenty years and the resulting increase in treated domestic wastewater available for use. Regulations governing reclaimed water use are contained in Chapter 62-610, Florida Administrative Code. The rule requires that the reclaimed water receive secondary treatment, filtration, and high-level disinfection. Irrigation using reclaimed

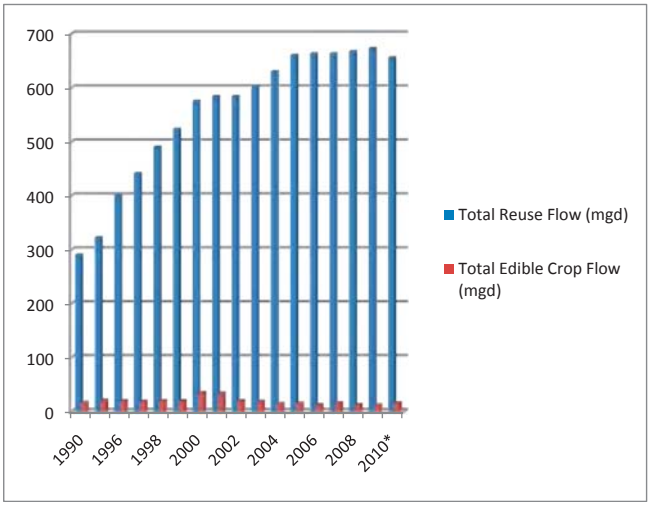


Figure 4: *Please note that the 2010 reuse and edible crop flows are based on the draft 2010 reuse inventory report and may be subject to change.*

water for crops that will not be peeled, skinned, cooked, or thermally processed before human consumption is allowed only if the irrigation method used will preclude direct contact with the reclaimed water. Examples given in the rule are ridge and furrow, drip, and subsurface irrigation. Any type of irrigation system may be used to grow crops that will be peeled, skinned, cooked, or thermally processed before human consumption.

Using reclaimed water involves a contractual arrangement with a wastewater treatment plant. Many wastewater treatment plants have a need to dispose of their water, which often occurs during rainy times when the crop does not need water. It is important to review your contract so that you are not obligated to over-irrigate during wet-weather periods. Over-irrigating wastes water and can damage crops and cause excessive leaching of nitrogen or phosphorus from the soil.

Work with the water management district to arrange for a backup water source in case the reclaimed water source is not sufficient or becomes unavailable or economically unfeasible.

Tailwater Recovery

Tailwater recovery systems have ponds that are installed to collect and re-apply irrigation water and/or rainfall that discharges or seeps from production fields. An example layout is depicted in **Figure 5**. These systems can be constructed also to intercept subsurface lateral flow, which makes them very suitable in high groundwater-table environments. Tailwater recovery systems can also help protect and preserve water resources, since they retain and/or reuse excess nutrients, rather than allowing them to reach downstream natural systems.

Figure 5

Tailwater recovery systems often are used with semi-closed seepage irrigation systems to recover runoff from a field. This water is then pumped back into the irrigation system for reuse. The use of a combined semi-closed seepage and drip irrigation system along with tailwater recovery has led to significant reductions in water-use and nutrient loss.

Take into consideration the following when determining whether and/or how to implement tailwater recovery:

- You can use tailwater recovery if you have a seepage or flood irrigation system, and site-specific conditions make it practicable.
- Tailwater recovery ponds should be located at the lowest elevation(s) on your farm/field(s), and sized according to runoff volume and rates. In some cases, tailwater cannot be collected by gravity and must be collected via pumps.
- Design the pond(s) to maximize use and minimize impact to your farm and neighboring properties.
- In order to minimize disease risk when growing high-value crops, use chlorine or other approved disinfectants, as applicable, in the collected tailwater.
- Seek technical assistance so that your pond(s) can be appropriately sized and built to maximize use and minimize impacts to your farm or neighboring properties.

Note: *The installation of tailwater recovery ponds may require an Environmental Resource Permit or other type of authorization, so growers should check with their water management district before installing them.*

Horizontal Wells

Based on water quality impacts, there may be permitting limitations to using groundwater. As an alternative, horizontal wells allow access to shallow surficial aquifers as a water source for irrigation, if the soil type and aquifer characteristics are acceptable.

Trenching and the placement of a horizontal well screen in the surficial aquifer create a flow path through impermeable layers, and provide an efficient means of recovering shallow groundwater. This groundwater source is recharged by rain. However, horizontal wells are best used as a supplemental irrigation source because of the relatively low amount of water produced. Consider using horizontal wells if you are in an area with a high water table and other irrigation water sources are not sufficient.

Protecting the Water Source

Backflow Prevention

It is important to ensure that the irrigation water source does not become contaminated through the backflow of chemicals being injected into the irrigation system. Florida law requires backflow prevention (antisiphon) devices on all irrigation systems used for the application of pesticides or fertilizers (i.e., fertigation) (see **Appendix 6**). An example of such a device is shown in **Figure 6**.

Figure 6

Backflow prevention should include a check valve between the irrigation pump and the injection device to prevent backward flow; a low-pressure drain to prevent seepage past the check valve; a vacuum relief valve to ensure that a siphon cannot develop; and a check valve on the injection line. For more information on backflow prevention, go to: http://edis.ifas.ufl.edu/AE032.

Saline Water

All natural waters contain soluble salts; however, the amount and type of salts they contain vary greatly. Irrigation water can degrade when wells are pumped at high rates or for prolonged periods. Sometimes "up-coning" can occur from pumping, whereby saline water, rather than fresh water, is drawn into the well. Similarly, salt water intrusion from ground water pumping near coastal areas can create a problem with some irrigation wells. During the dry season salinity levels in ditches, canals, and reservoirs can increase through evaporation and irrigation water re-use (tailwater recovery).

Saline water typically is unsuitable for irrigation because of its high content of total dissolved solids (TDS). Saline irrigation water remediation consists of a few options:

- **Back-Plugging** – If fractures of flow zones in the well casing can be identified through well logging instrumentation, then the well may be a candidate for back-plugging. In this case, a cement type material is injected into the well casing and sealed to a particular depth.
- **Surface Water Augmentation** – If a surface water reservoir exists, then saline groundwater can be mixed with the reservoir water to lower the total salt concentration. If using augmentation, water quality monitoring is important.
- **Fertilizer Selection and Split Application** – A fertilization program that uses soluble fertilizers with a relatively low concentration of salts in frequent applications (more than 2-3 times per year), and/or that incorporates controlled-release fertilizer, normally results in less potential for salt injury. Refer to http://edis.ifas.ufl.edu/ae171 to assist you in selection of fertilizer materials with a low salt index.

Irrigation System Maintenance

Maintenance is necessary on any irrigation system to keep the system operating at peak efficiency according to manufacturer's recommendations. The benefits of maintaining irrigation systems in good working condition include water conservation, uniform plant growth and production, and reduced operation and maintenance costs.

Irrigation system maintenance involves: (1) calibration, (2) preventive maintenance, (3) corrective maintenance, and (4) recordkeeping. All farms should follow a regular, well-documented maintenance program. Regular calibration of each irrigation system and water meter is needed to ensure

that the correct amount of water is delivered. Regular visual inspections should be conducted to identify any necessary repairs or corrective actions. In some parts of the state, Mobile Irrigation Laboratories (MILs) are available, free of charge, to perform irrigation system evaluations and propose system improvements and basic maintenance recommendations.

For traditional open-ditch seepage irrigation systems, water control structures (such as risers and culverts) should be kept clean and operational. Maintenance of semi-closed seepage irrigation systems includes operational checks of pump stations (pump and engine/motor), and cleaning and maintaining all pipes, spigots, and valves in working order. Maintenance of pressurized pipe systems includes operational checks of pump stations, valves, and irrigation emitters, and maintenance of irrigation lines through chlorination/acidification and flushing. ***Chelating*** and ***sequestering agents*** are available to prevent plugging caused by scale deposition. Malfunctioning or worn-out nozzles need to be replaced with similar ones that have the same flow and pressure characteristics.

Tracking Irrigation System Performance

It is also important to measure the amount of water that is actually delivered through the irrigation system, via a water meter or a calibrated flow measurement device. Knowing the flow or volume will help you determine how well your irrigation system and irrigation schedule are working.

Keeping irrigation records (amount applied, duration of irrigation events, etc.) will help you track and minimize the amount of water used and the costs associated with running the irrigation system.

Managing Irrigation

Efficient irrigation provides greater water resource protection and reduced operational costs through more efficient water use. It conserves water, reduces the chances of over- or under-irrigating, and reduces leaching of agrichemicals in areas that are prone to such losses.

Inefficient irrigation can result in over-applying or under-applying water to a crop, as well as inadvertently irrigating a non-production area. Over-irrigation wastes water and promotes nutrient leaching. Efficient irrigation targets the application of water to the plant's root zone, using only the amount needed for proper plant growth.

Ensuring efficient irrigation requires development of a site-specific irrigation management plan that incorporates the use of information on soil properties, topography, crop types, ***evapotranspiration*** (ET), and seasonal climatic conditions in order to generate customized irrigation methods and schedules. This can be part of an overall BMP implementation plan.

Precision Irrigation

One way to ensure efficient irrigation is through "precision irrigation," which is equipment-based and can involve high-technology methods employing computers, geographic information systems, remote-sensing equipment, etc. At its most sophisticated level, it allows irrigation events to be adjusted in real time for location, frequency, and duration, based on soil properties and weather conditions. At present these systems are too costly for most small- to medium-size grove operations. However, you may want to explore the feasibility of installing equipment and computer software that will provide you with real-time, site-specific irrigation and/or weather information for your farm. You may contact FDACS, UF-IFAS Extension, or an independent contractor for help.

Irrigation Scheduling

Irrigation scheduling consists of determining when to start irrigating, at what intervals to irrigate, and how long to irrigate. In order to develop an irrigation schedule, you should:

- Estimate irrigation water requirements.
- Adjust the estimate based on available soil moisture content, soil water tension, or historic or real-time ET and appropriate crop factors.
- Make further adjustments based on replenishment of soil moisture through rainfall.

Irrigation Water Amounts

Irrigation water amounts are primarily determined by the crop's water requirements, the water-retention characteristics of the soil, the chemical characteristics of the irrigation water, and type and efficiency of the irrigation system.

Crop water requirements refer to the actual water needs for plant growth, taking into account ET and other climatic factors. Enough water should be applied only to wet the entire root zone. Irrigating too often encourages shallow rooting, increases soil compaction, and favors disease outbreaks.

Irrigation Scheduling Considerations

Table 2. Potential Evapotranspiration Rates (ETp) - From UF IFAS Circular 825

Month	North Region ETp (inches/day)	South Region ETp (inches/day)
Jan	0.07	0.09
Feb	0.10	0.12
Mar	0.13	0.15
Apr	0.17	0.19
May	0.19	0.2
June	0.19	0.19
July	0.18	0.19
Aug	0.17	0.17
Sept	0.15	0.16
Oct	0.12	0.14
Nov	0.09	0.11
Dec	0.06	0.09

Irrigation scheduling should be based on information such as: potential ET rates, as noted in **Table 2**; rainfall total, which can be determined by rain gauges; and soil moisture, which can be determined by sensors. More refined ET rates can be obtained from FAWN and the National Weather Service. Coupled with this technology, the observation of visual symptoms, such as wilting, will enhance the efficiency of irrigation scheduling.

Irrigation system water loss rates are affected by sunlight, wind speed, relative humidity, and air temperatures. Water loss can be reduced by irrigating when conditions do not favor excessive evaporation, especially when overhead irrigation systems are used. Irrigation should occur in the early morning hours before air temperatures rise and relative humidity drops. Irrigating at this time also allows sufficient time for infiltration into the soil, and allows the plant canopy to dry, thereby reducing disease development.

Prior to implementing an irrigation schedule, the irrigation system must be evaluated to determine the system's rate of application per acre. MILs can help with this.

Weather-Related Information

The University of Florida operates the Florida Automated Weather Network, known as the FAWN system, which maintains weather stations throughout most of the state. FAWN provides growers accurate, real-time weather data, which can be accessed via the internet or by phone. A FAWN station is depicted in **Figure 7**. Each station measures air temperature, soil temperature, evapotranspiration, wind speed and direction, rainfall, relative humidity and solar radiation. These parameters are critical to calculate supplemental irrigation requirements for your crop. FAWN also provides information on other irrigation tools. You can access this information at: http://fawn.ifas.ufl.edu.

Figure 7

Special-Case Irrigation Measures

Frost/Freeze Protection

Protecting specialty crops from frost and freezes is a challenge for growers. Options include sprinkler irrigation, application of foam material, use of synthetic row covers for young plants, and soil banking, among others. Each method has application in certain areas for specific crops.

Most growers use irrigation water and/or site selection to protect crops. When using the irrigation system as the main source of cold protection, the proper application and timing of water is critical. FAWN has developed tools to help determine

under what climatic conditions to use your irrigation system for frost and freeze protection (see http://fawn.ifas.ufl.edu/tools/). It is also critical that you adhere to any frost/freeze protection provisions in your consumptive use/water use permit.

Drought

Droughts can be devastating to crops. The National Drought Mitigation Center maintains a number of tools to assist growers in monitoring the intensity level of a drought. You can access these tools at http://drought.unl.edu/dm/monitor.html. Growers should closely monitor soil moisture levels, and irrigate at night or at other times when the least amount of evaporative loss will occur. Irrigation frequency and duration should be based on rooting depth to provide adequate moisture to the crop root zone. If starting a new orchard, consider using drought resistant varieties, if available. As always, growers should contact their water management district to inquire about water shortage requirements.

Irrigation Management BMPs

2.1 Irrigation Decision-Making and Management Practices

Using the practices below, maintain soil moisture within the recommended range for the crop and soil type. Base your irrigation amounts and timing on crop water demands, soil moisture availability, and weather conditions. Contact your local UF-IFAS Extension or USDA-NRCS office to obtain specific information (i.e., water-holding capacity, depth to water table) about the soils on your farm, and to determine what the water demand is for your particular crop(s). This is usually expressed as an inch-per-acre or gallons-per-plant application amount.

Level I BMPs:

- ✓ **1.** Use available tools and data to assist in making irrigation decisions, such as on-site soil moisture sensors to determine available soil moisture, crop water use information, and weather data pertinent to your farm. Real-time weather data is available by visiting FAWN, USGS, and water management district websites. If one is available, get a Mobile Irrigation Lab evaluation to assist you.
- ✓ **2.** Keep records of total rainfall received, using on-site rain gauges.
- ✓ **3.** Install rain shutoff devices on irrigation systems.
- ✓ **4.** Minimize application losses due to evaporation and wind drift by irrigating early in the morning, late in the afternoon, at night, and/or when cloud cover is abundant and wind speed is minimal.
- ✓ **5.** Do not irrigate beyond field capacity. When irrigation needs are greater (during long, warm days when the crop is near harvest) or when plants are flowering or developing fruit, splitting irrigation events into 2 or 3 daily applications may be of benefit.
- ✓ **6.** When sub-surface irrigation is used, maintain the water table at a level no higher than necessary to reach plant roots.

References:

1. UF-IFAS, Using Tensiometers for Irrigation Scheduling in Tropical Fruit Groves, TR-002. http://edis.ifas.ufl.edu/TR002
2. UF-IFAS, Tensiometers for Soil Moisture Measurement and Irrigation Scheduling, CIR-487. http://edis.ifas.ufl.edu/AE146
3. Food and Agricultural Organization, Crop Evapotranspiration – Guidelines for Computing Crop Water Requirements, FAO Paper 56. http://www.fao.org/docrep/X0490E/X0490E00.htm
4. UF-IFAS, Field Evaluation of Micro-irrigation Water Application Uniformity, BUL-265. http://edis.ifas.ufl.edu/AE094
5. UF-IFAS, Field Devices for Monitoring Soil Water Content, BUL-343. http://edis.ifas.ufl.edu/AE266
6. USDA-NRCS, Irrigation System-Sprinkler, Code 442; and Irrigation Water Management, Code 449, FOTG Section IV. http://www.nrcs.usda.gov/technical/efotg/

2.2 General Irrigation System Maintenance

Level I BMPs:

- ✓ **1.** Test irrigation source water quality to detect issues with water chemistry that may affect maintenance needs (e.g., related to chemical precipitation and clogging) and fertilization requirements. Adjust your maintenance actions as needed.
- ✓ **2.** Maintain pump stations and wells, and related components, in good working order. Check them at least annually, and more frequently during periods of high use. Replace parts as needed.

✓ **3.** Use water meters (flow or volume) or other measuring devices/calculations to determine how much water is applied to the irrigated area. Document this information and use it to help you determine how well your irrigation system and irrigation schedule are working, and make any needed schedule adjustments or system repairs.

✓ **4.** Monitor water meters or other measuring devices for unusually high or low readings to detect possible leaks or other problems in the system. Make any needed repairs.

✓ **5.** If one is available, get an MIL to check the distribution or emission uniformity and the conveyance efficiency of the irrigation system(s). This should be done every three to five years.

✓ **6.** Maintain a record-keeping system for inspection and maintenance of all irrigation system components. Records should be compared over time for any changes that would indicate problems with the system.

References:

1. UF-IFAS, Potential Impacts of Improper Irrigation System Design, Agricultural Engineering Fact Sheet 73. http://edis.ifas.ufl.edu/AE027
2. National Center for Appropriate Technology, Equipment Maintenance: The Florida Irrigator's Pocket Guide. www.ncat.org

2.3 Pressurized Irrigation Systems

Level I BMPs:

✓ **1.** Examine sprinkler nozzles or emitters for wear and malfunction, and replace them as necessary.

✓ **2.** Clean and maintain filtration equipment so it will operate within the recommended pressure range.

✓ **3.** Flush irrigation lines regularly to prevent emitter clogging. To reduce sediment build up, make flushing part of a regular maintenance schedule. If fertigating, prevent microbial growth by flushing all fertilizer from the lateral lines before shutting down the irrigation system.

If you find that there is a significant pressure difference across the irrigation laterals or across any main pipe, you can use pressure-compensating emitters or valves to correct for pressure differences.

References:

1) UF-IFAS, Evaporation Loss During Sprinkler Irrigation, BUL290, http://edis.ifas.ufl.edu/pdffiles/AE/AE04800.pdf
2) UF-IFAS, Causes and Prevention of Emitter Plugging in Micro-Irrigation Systems, BUL 258. http://edis.ifas.ufl.edu/ae032

2.4 Non-pressurized Irrigation Systems

Level I BMPs:

✓ **1.** Clean debris and control weeds in irrigation ditches and canals, to maintain water flow and direction.

✓ **2.** Keep water-level-control structures (such as culverts and risers) in irrigation ditches in good working order.

References:

1) USDA-NRCS, Irrigation Systems, Surface and Subsurface, Code 443. http://www.nrcs.usda.gov/technical/efotg/

2.5 Reclaimed Water

Level I BMPs:

If you are using reclaimed water:

✓ **1.** As needed, design or retrofit irrigation systems to handle reclaimed water, taking into account source water quality and delivery pressures.

✓ **2.** Separate reclaimed water supplies from existing ground or surface water sources to prevent cross-contamination.

References:

1. FDEP, Water Reuse for Florida: Strategies for Effective Use of Reclaimed Water. http://www.dep.state.fl.us/water/reuse/docs/valued_resource_Final-Report.pdf
2. FDEP, Reuse of Reclaimed Water and Land Application, Rule Chapter 62-610, F.A.C. http://www.dep.state.fl.us/legal/Rules/mainrulelist.htm

2.6 Special-Case Irrigation Measures

Level I BMPs:

✓ **1.** When using irrigation for frost/freeze protection, monitor wet-bulb temperatures to conserve water as much as possible. You can find this information at: http://fawn.ifas.ufl.edu/tools/.

✓ **2.** If practicable for your operation, use alternative frost/freeze protection measures, such as application of foam material, synthetic row covers, and/or soil banking, among others.

✓ **3.** During a drought, closely monitor soil moisture levels. Whenever practicable, irrigate at times when the least amount of evaporative loss will occur.

During drought or freeze events, contact your water management district to inquire about water shortage requirements. It is critical that you adhere to any frost/freeze protection provisions in your consumptive use/water use permit.

Note: *See Appendix 7 for list of record-keeping requirements and example record-keeping forms.*

3.0 SEDIMENT AND EROSION CONTROL

Sediment and Erosion Control Measures *are permanent or temporary practices that prevent sediment loss from fields, slow water flow, and/or trap and collect debris and sediments in runoff water.*

The first principle of erosion control is to maintain vegetation to hold soil and decrease the velocity of runoff water. Runoff containing sediments with nutrients and pesticides attached can adversely affect surface waters or ground water. Site characteristics such as clay-type soils and/or sloped terrain can significantly increase the risk of erosion and off-site sediment transport.

Erosion control begins with limiting the loss of soil from crop areas by minimizing the amount of land that is cleared of vegetation. Removal of natural vegetation and topsoil increases the potential for soil erosion, which can change runoff characteristics and result in loss of soil and increased turbidity and sedimentation in surface waters. When clearing vegetation to develop crop areas, re-vegetation should occur as quickly as possible. Vegetation on row middles should be maintained, unless plant health or other over-riding issues prevent it. All land-clearing activities should be planned and conducted when soil moisture and wind conditions are appropriate to prevent transport of sediment by air or water.

Water and Wind Erosion

In Florida, water-caused erosion in agricultural areas is generally characterized as sheet erosion, a process in which soil particles are moved across the surface by sheet flow, often a result of stormwater runoff. It can remove the topsoil layer, which reduces overall soil fertility. Rill erosion occurs as water flow increases, concentrating in small channels, or rills (see **Figure 8**). Rills are usually only a fraction of an inch deep, and can be removed during mechanical tillage. However, rill erosion can remove substantial amounts of soil by allowing water to move faster, thereby increasing its erosive potential. Sheet and rill erosion carry finer, smaller soil particles with higher proportions of nutrients and pesticides. Rills can enlarge into gully erosion, which can be difficult to control and can render parts of a field worthless. Waterways can also be affected through streambank erosion where the waterway channel may erode, or the banks may be undercut and cave in, particularly during higher than normal flows.

Figure 8

Wind erosion is generally less of a problem in Florida because of a predominance of sandy soils.

It occurs when wind velocity exceeds 12 mph (one foot above the ground) on soils with little to no vegetative cover. Most wind-borne particles are composed of silt and clay.

Ditch Construction and Maintenance

Agricultural ditches and/or grassed waterways are essential components of the field site plan and layout. They can vary from field ditches to laterals and mains, which are sometimes connected to larger canal systems. Ditches have an engineered limit (***conveyance capacity***) that governs how much water the ditch can store or convey. It is important to know the specific water requirements of the crop you are growing, so that you can factor in existing soil moisture conditions before designing ditches.

An effective field ditch network functions primarily to distribute water without causing excessive erosion, water losses, and/or degradation of water quality to the downstream receiving system. Properly designed and constructed agricultural ditches are very important; however, equally important is the implementation of an appropriate maintenance program to ensure that the ditches function as designed. This includes maintaining adequate vegetative cover to prevent erosion.

Groundwater Protection

Sediment movement into ground water is generally not an issue in most locations in Florida. However, areas of karst topography, where sediment and sediment-borne pollutants can enter groundwater through direct underground links (caves, conduits, sinks), are a concern in certain parts of the state. These sediments can re-emerge through a spring vent and affect water clarity and turbidity.

Sediment and Erosion Control BMPs

3.1 Road Maintenance

Minimize the amount of vegetation that is cleared when constructing roads, buildings, etc. Use silt fences when protection under sheetflow conditions is needed for up to 6 months during construction activities. Properly trench in, backfill, and compact silt fences in accordance with the Florida Stormwater, Erosion, and Sediment Control Inspector's Manual referenced below.

Level I BMPs:

✓ **1.** Stabilize access roads that cross streams and creeks, using rock crossings, culverts, or bridges.

✓ **2.** Maintain vegetative cover on road banks.

✓ **3.** When constructing above-grade access roads, follow USDA-NRCS FOTG Conservation Practice No. 560, and locate the road(s) a minimum of 25 feet from regulated wetlands.

Check with your water management district to see whether a permit is needed for above-grade access road construction.

References:

1. Farming for Clean Water in South Carolina: A Handbook of Conservation Practices. http://www.epa.gov/owow/nps/bestnpsdocs.html#agriculture
2. The Florida Stormwater, Erosion, and Sedimentation Control Inspector's Manual, FDEP. http://www.dep.state.fl.us/water/nonpoint/docs/erosion/erosion-inspectors-manual.pdf
3. National Management Measures for the Control of Nonpoint Pollution from Agriculture, Chapter 4C, EPA Document No. 841B03004. http://www.epa.gov/nps/agmm/

3.2 Ditch Maintenance

Level I BMPs:

✓ **1.** As needed, use selective control of broadleaf vegetation to maintain a permanent grass cover on ditch banks.

✓ **2.** In areas subject to high water velocities, protect ditch banks from erosion using ***riprap***, concrete, headwalls, or other buffering materials.

✓ **3.** Keep riser board control structures free from obstructions.

✓ **4.** Do not remove sediments below the ditch's original invert elevation, which can be determined by permit drawings, basic survey drawings, and/or changes in soil characteristics and color. Keep drawings of the design cross-sectional area.

Level II BMPs:

If your answer to the question below is "yes," implement Level II BMP 3.2.5.

Question: *Under normal hydrologic conditions, have you observed a sand bar or significant gully erosion where your drainage ditches/canals meet, or at a point where runoff exits your property?*

☐ *Yes* ☐ *No*

✓ **5.** Contact the USDA-NRCS County Office for assistance in correcting existing ditch or field erosion, and to prevent future erosion.

References:

1. USDA-NRCS, Irrigation Field Ditch, Code 388; Surface Drainage-Field Ditch, Code 607, and Surface Drainage-Main or Lateral, Code 608, FOTG Section IV. http://www.nrcs.usda.gov/technical/efotg
2. USDA-NRCS, Sediment Basin, Code 350; Structure for Water Control, Code 587; and Water and Sediment Control Basin, Code 587, FOTG Section IV. http://www.nrcs.usda.gov/technical/efotg

3.3 Middles Management

Level I BMPs:

✓ **1.** As practicable, maintain vegetative cover in row middles.

4.0 STORMWATER MANAGEMENT

Stormwater Management *is the on-site management of rainfall and associated runoff through the use of nonstructural and structural BMPs to provide flood protection and water quality protection.*

Alteration of the land (e.g., construction of impervious surfaces such as roads, driveways, parking lots, urban and agricultural structures) increases stormwater runoff. Lack of appropriate stormwater management can lead to on-site and off-site flooding, increased pollutant loading to surface and ground waters, and erosion and sedimentation.

Construction of a stormwater management system (e.g., retention or detention pond) may alter on-site hydrology, and therefore may require an ERP or other WMD surface water management permit. Check with your water management district before beginning construction of any stormwater management system.

Some operations may already have an ERP or other WMD surface water management permit that contains on-site stormwater management requirements. However, if stormwater problems exist that are not addressed by a WMD permit, it is important to develop and implement a stormwater management plan suited to the operation's unique circumstances.

Stormwater BMPs

4.1 Stormwater Management

Level I BMPs:

✓ **1.** Operate and maintain all stormwater management conveyances (swales, ditches, and canals) to ensure they perform their intended function.

Level II BMPs:

If your answer to the following question is "yes," implement Level II BMPs 4.1.2 and 4.1.3:

Question: *Does your operation have flooding issues that have not been addressed by an ERP or other WMD surface water management permit?*

☐ *Yes* ☐ *No*

✓ **2.** Develop and implement a written stormwater management plan that specifically addresses various levels of rainfall, with the goal of reducing the volume of off-site discharge. Include guidelines for regular inspection of BMPs, and steps to implement operation and maintenance provisions.

✓ **3.** Evaluate the plan's effectiveness, and make adjustments as needed.

In developing a stormwater management plan:

- Contact your local USDA-NRCS District Conservationist to obtain information about the soil types for the proposed or existing farm location. The District Conservationist can identify soil types that are historically prone to flooding or standing water. Evaluate the storage capacity, size, and elevations of existing ditches, ponds, creeks, rivers, and wetlands, and the size, layout, and elevations of the fields. You should also contact your county or water management district to obtain maps (FEMA, FIRM) or other information related to flooding issues at the proposed or existing location. You can access this information via the web at: http://www.fema.gov/hazard/map/firm.shtm.
- Consult with a public or private agricultural engineer to discuss your stormwater management needs and considerations, especially if you are on poorly drained lands. Find an engineer qualified to provide an appropriate stormwater runoff analysis for your site.
- Determine the maximum storm size for which you want to provide flood protection. The flood control design storm addressed by WMD ERP regulations varies from a 25-year, 24-hour storm to a 100-year, 3-day storm. For example, a 25-year, 24-hour storm produces from 8 to 10 inches of rainfall in a 24-hour period. Generally, the larger the design storm event used, the more extensive the stormwater management system needs to be. Factors that will affect this decision include land availability, the existence of internal natural features such as creeks, rivers, ponds, or wetlands, the potential to flood downstream property owners, and costs.
- Include both nonstructural pollution prevention BMPs and structural BMPs, as needed.

References:

1. USDA-NRCS, Runoff Management System, Code 570, FOTG-Section IV. http://www.nrcs.usda.gov/technical/efotg
2. Water Management Districts, ERP Stormwater Quality Applicant's Handbook.
3. ANSI/ASABE, Design and Construction of Surface Drainage Systems on Agricultural Lands in Humid Areas, EP302.4. http://www.asabe.org/standards/index.html

5.0 WATER RESOURCES PROTECTION

Water Resources *are distinct hydrologic features, including wetlands, springs, streams, and aquifers.*

Wetlands, Springs, and Streams Protection

Under Florida Law, wetlands are areas that are inundated or saturated by surface water or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soils. Florida wetlands generally include swamps, marshes, bayheads, bogs, cypress domes and strands, sloughs, wet prairies, riverine swamps, hydric seepage slopes, tidal marshes, mangrove swamps and other similar areas. Florida wetlands generally do not include longleaf or slash pine flatwoods with an understory dominated by saw palmetto.

Chapter 62-340, Florida Administrative Code, entitled *Delineation of the Landward Extent of Wetlands and Surface Waters*, contains the methodology that must be used by all state and local governments in Florida to determine the boundary between wetlands and uplands and other surface waters. The National Food Security Act manual is used by USDA-NRCS to determine wetlands boundaries on agricultural lands. In most cases, both methodologies produce the same or nearly the same determinations.

Springs are defined by the Florida Geological Survey as a point where underground water emerges to the earth's surface. They flow naturally from underlying aquifers and are classified based on their magnitude, or amount of flow coming from the spring vent. Springs and spring runs attract wildlife, provide over-wintering habitat for endangered manatees, contain unique biological communities, and are important archeological sites.

The area within ground water and surface water basins that contributes to the flow of the spring is a spring's recharge basin, also called "springshed," as depicted in **Figure 9**. This area may extend for miles from the spring, and the size of the area may fluctuate as a result of underground water levels. First magnitude springs discharge 64.6 million gallons per day (MGD) or more; second magnitude springs discharge between 6.46 to 64.6 MGD. FDEP has initiated an effort to delineate springsheds in the state, on a prioritized basis.

Wetlands and springs are important components of Florida's water resources. Wetlands often serve as spawning areas and nurseries for many species of fish and wildlife, perform important flood-storage roles, cycle nutrients in runoff water, contribute moisture to the hydrologic cycle, and add plant and animal diversity. They can also provide limited grazing opportunities. Both wetlands and springs

Figure 9

offer valuable recreational opportunities for the public and can provide an economic benefit to the surrounding communities.

Rivers and streams are naturally flowing watercourses. There are approximately 51,000 miles of rivers and streams in Florida. They are generally classified as sand-bottom, calcareous, swamp and bog, alluvial, or spring-fed systems. There are three measurable components that contribute to stream flow: base flow, interflow, and surface runoff. Surface runoff is most affected by rainfall (stormwater runoff) and contributes most to peak flow. Rivers and streams can readily transport pollutants received in stormwater runoff to wetlands, lakes, estuaries, and other water bodies. Consequently, it is important to minimize pollutant discharges to rivers and streams.

Conservation Buffers

Conservation buffers are permanently vegetated, non-cultivated areas that function to retain water and soil onsite to help reduce pollutants in surface water runoff. They include field borders, filter strips, grassed waterways, and ***riparian*** buffers, and are particularly effective in providing water quality treatment near sensitive discharge areas.

- *Field borders* are strips of permanent vegetation, either natural or planted, at the edge or perimeter of fields. They function primarily to help reduce erosion from wind and water, protect soil and water quality, and provide wildlife habitat. Install or maintain field borders when creating new fields adjacent to highly urbanized areas. Consider installing field borders in existing fields, based on the intensity of your operation and surrounding properties.
- *Filter strips and grassed waterways* are areas of permanent vegetation between crop field areas that drain to natural waterbodies. Their main purpose is to decrease the velocity of runoff water and remove sediment particles before they reach surface waters.
- *Riparian buffers* can be forested or herbaceous areas located adjacent to streams, which help reduce amounts of sediment, organic material, nutrients, and pesticides in surface water sheetflow. Riparian buffers are most effective on highly sloped lands when next to perennial or intermittent streams with high ground water recharge potential.

Consider using native vegetation to establish conservation buffers. Conservation buffers should be inspected periodically, and restored as needed in order to maintain their intended purpose. Any use of fertilizers, pesticides, or other chemicals should be done so as to not compromise the intended purpose of the buffer. As necessary, use prescribed burns in accordance with DOF guidelines, to maintain the native vegetation and discourage the establishment of nuisance vegetation.

Aquifer Protection

With the majority of Florida's water supply originating from underground sources (***aquifers***), it is extremely important that agricultural operations help protect wellheads from contamination. Successful wellhead protection includes complying with regulatory requirements and using commonsense measures with regard to well placement and agricultural practices near wells. For existing wells, the focus should be on management activities near the wellhead, aimed at reducing the potential for contamination. For new-well construction, the initial focus should be on well location and following sound well-construction practices, followed by proper maintenance.

Water Resources Protection BMPs

5.1 Wetlands Protection

Do not dredge or fill in wetlands. Consult with the water management district and the USDA-NRCS prior to conducting activities in or near wetlands to ensure that you are complying with any permitting or USDA program eligibility requirements.

Minimize adverse water quality impacts to receiving wetlands by progressively applying measures until

the problem is adequately addressed. Practices such as filter strips, conservation buffers, swales, or holding water on-site may preclude the need for more aggressive treatment measures.

Note: *Use a USDA county soil survey map to help identify the location of wetlands, hydric soils, or frequently flooded areas. If you do not have an environmental resource permit (which provides a wetlands delineation), seek technical assistance from the water management district or USDA-NRCS to determine the landward boundary of wetlands on your operation.*

Level I BMPs:

✓ **1.** Install and/or maintain a minimum 25-foot non-fertilized ***vegetated buffer*** upland of the landward boundary of all wetlands, unless you have an existing water management district permit (ERP, MSSW) that specifies a different buffer.

✓ **2.** For existing operations without an ERP that are unable to meet the 25-foot vegetated buffer, submit to FDACS a written description of the alternative measures you will take to protect the wetlands from water quality impacts (see BMP checklist).

When broadcast-applying fertilizer near a wetlands buffer, ensure that the fertilizer does not land inside the buffer.

Level II BMPs:

If your answer to the following question is "yes," implement Level II BMP 5.1.3:

Question: *Do you have ditches that discharge directly into wetlands?* ☐ *Yes* ☐ *No*

✓ **3.** Use spreader swales (or other means as needed) to intercept water discharging from the ditch(es), in order to reduce flow velocities and provide sheetflow through vegetative buffers prior to reaching the wetlands. Provide to FDACS a written description of the means you will use (see BMP checklist).

References:

1. USDA-NRCS, Wetland Enhancement, Code 659, Nutrient Management, Code 590, FOTG-Section IV. http://www.nrcs.usda.gov/technical/efotg
2. EPA, National Management Measures for the Control of Nonpoint Pollution from Agriculture. http://www.epa.gov/nps/agmm/chap4c.pdf

5.2 Streams Protection

Level I BMPs:

✓ **1.** Install and/or maintain a riparian buffer along ***perennial streams*** on production areas that exceed 1-percent slope and discharge directly to the streams. Contact FDACS, USDA-NRCS, or a Technical Service Provider for assistance in properly designing the riparian buffer in accordance with USDA-NRCS Codes 390 and/or 391 in Reference (1) below.

✓ **2.** Locate and size any stream crossings to minimize impacts to riparian buffer vegetation and function. Refer to USDA-NRCS Stream Crossing, Code 578 for design criteria.

References:

1. USDA-NRCS Field Border, Code 386, Riparian Herbaceous Cover, Code 390, Riparian Forest Buffer, Code 391, Filter Strip, Code 393 and Grassed Waterway, Code 412, FOTG-Section IV. http://www.nrcs.usda.gov/technical/efotg

5.3 Protection for First- and Second-Magnitude Spring Recharge Basins

Level I BMPs:

✓ **1.** Install and/or maintain a 100-foot vegetated, non-fertilized buffer upland of the landward boundary of springs and spring runs.

✓ **2.** Install and/or maintain a 50-foot vegetated, non-fertilized buffer around sinkholes and other karst features.

✓ **3.** If you have a sinkhole on your property, never use it to dispose of used pesticide containers or other refuse.

References:

1. Department of Community Affairs, Protecting Florida's Springs, Land Use Planning Strategies and Best Management Practices. http://www.dca.state.fl.us/fdcp/DCP/publications/Files/springsmanual.pdf

5.4 Well Operation and Protection

When installing a new well, contact your regional water management district to see whether the well requires a consumptive use/water use permit. Potable water wells as defined by Chapter 62-521, F.A.C, must follow the requirements of that rule.

Locate new wells up-gradient as far as possible from likely pollutant sources, such as petroleum

storage tanks, septic tanks, chemical mixing areas, or fertilizer storage facilities. Use a licensed Florida water well contractor, and drill new wells according to local government code and water management district well construction permit requirements.

 Agricultural operations located in South Miami-Dade County should refer to and follow Chapter 40E-30.302, F.A.C., for general well permitting information and to determine whether they are subject to special regulations for this region. Consult Reference 4 below for more information.

Level I BMPs:

- ✓ **1.** Use backflow-prevention devices at the wellhead to prevent contamination of the water source.
- ✓ **2.** Inspect wellheads and pads at least annually for leaks or cracks, and make any necessary repairs.
- ✓ **3.** Cap or valve wells in accordance with water management district requirements.
- ✓ **4.** Exclude crop production activities within a 75-foot radius of drinking water wellheads. This radius can be reduced to 25 feet if well-construction records show well-casing depths that extend through ***confining layers***.
- ✓ **5.**  Maintain records of new well construction and modifications to existing wells.

References:

1. USDA-NRCS Water Well, Code 642, FOTG-Section IV. http://www.nrcs.usda.gov/technical/efotg
2. FDEP, Water Well Permitting and Construction Requirements, Rule Chapter 62-532, F.A.C. http://www.dep.state.fl.us/legal/Rules/rulelistnum.htm
3. SFWMD, General Permits for Water Wells within SFWMD; Thresholds for South Dade County, Rule 40E-30.302, F.A.C. https://my.sfwmd.gov/pls/portal/docs/PAGE/PG_GRP_SFWMD_ENVIROREG/PORTLET_RULESSTATUTESAND/TAB383534/40E-30.PDF
4. Florida Water Permits. http://flwaterpermits.com/

Note: *See Appendix 7 for list of record-keeping requirements and example record-keeping forms.*

6.0 INTEGRATED PEST MANAGEMENT

Integrated Pest Management (IPM) *combines the monitoring of pest and environmental conditions with the judicious use of cultural, biological, physical, and chemical controls to manage pest problems.*

Under Florida law (section 482.021, F.S.), IPM is defined as: …*"the selection, integration, and implementation of multiple pest control techniques based on predictable economic, ecological, and sociological consequences, making maximum use of naturally occurring pest controls, such as weather, disease agents, and parasitoids, using various biological, physical, chemical, and habitat modification methods of control, and using artificial controls only as required to keep particular pests from surpassing intolerable population levels predetermined from an accurate assessment of the pest damage potential and the ecological, sociological, and economic cost of other control measures."*

Most cultural control methods are designed to help plants avoid contact with pests, create unfavorable or avoid unfavorable conditions for pests, and eradicate or reduce the incidence of pests in a plant or field. Biological controls (and some cultural controls) aim to improve plant resistance to pests or to utilize organisms that prey upon pests. Physical methods generally are used to deter, trap, destroy, or provide barriers to pests. Chemical methods involve the use of chemical pesticides or repellants.

The basic steps of an IPM program are as follows:

- Identify key pests.
- Determine the pest's life cycle and which stage of the life cycle to target (for an insect pest, whether it is an egg, larva/nymph, pupa, or adult).
- Use cultural, biological, and physical methods to prevent problems from occurring (for example, prepare the site and select resistant plant cultivars); and/or reduce pest habitat (for example, practice good sanitation). Consider all of the cultural, biological, and physical control measures available and appropriate before moving to a chemical control method for preventing and controlling pest infestations.
- Decide which pest management practices are appropriate, and implement associated corrective actions.
- Direct the control where the pest lives or feeds. Use properly timed preventive chemical applications only when your experience indicates that they are likely to control the target pest effectively, while minimizing the economic and environmental costs.

Scouting

Scouting is the most important element of a successful IPM program. It involves monitoring pest presence and development throughout the growing season. By observing plant conditions regularly and noting which pests are present, an informed decision can be made regarding severity of crop damage and what pest control method is necessary.

In Florida, migratory birds can destroy a mature fruit or nut crop. These birds can adversely affect crop yield, crop quality, and can create food safety issues through the possible transmission of bacterial and viral diseases to humans through fecal droppings.

Pests may be present for some time before they are observed or actual crop damage occurs. Therefore, it is essential to record the results of scouting in order to develop historical information, document patterns of pest activity, and document the treatment's success or failure. It is also important to determine whether the "corrective actions" actually reduced or prevented pest populations, were economical, and minimized risks. It is recommended that growers record this information, and use it when making similar decisions in the future.

Cultural Controls

Site selection, plant selection and establishment, and production techniques are cultural control practices. Site selection should take the soil type(s) and site elevation into consideration to avoid prolonged surface flooding, which can encourage fungal growth. Growers should practice strict sanitation and planting stock should be disease-free. Planting schemes should promote air circulation, which reduces the incidence of disease.

Crops near resting areas, wooded areas, power lines, and ponds are generally vulnerable to pests. Managing the habitat around crop production areas to encourage predator species of nuisance animals or reducing the habitat of the nuisance animals is another control method option. However, simply altering the habitat may not provide complete control of nuisance animals, because birds can fly 10 to 15 miles from a resting site to feed.

Biological Controls

Biological controls involve the use of natural enemies to control or suppress pests, or the active manipulation of antagonistic organisms to reduce pest population densities to acceptable levels. Natural enemies help to reduce the amount of pesticides needed to control pests, thus protecting water quality and reducing production costs. Biological control techniques should be tailored to the pest's life cycle, availability of effective predators and parasites, environmental conditions, and historical data.

Predators and parasites (insects, mites, and microbes) are the most commonly used biological control agents, and are known as "beneficials." These alone will generally not prevent damage from pests, but can reduce the severity. A management plan for the use of beneficials must be closely adhered to in order for it to be technically and economically effective over the long-term.

In falconry, the practice of "abatement flights" (using predator birds to chase or scare nuisance birds), is an emerging control option and has been used by California grape and cherry growers since 1995. Falcons are generally flown during morning and evening hours. One falcon can patrol anywhere from 20 to 100 acres. Use of native vegetation in borders and buffers may encourage native hawks (and owls) to reside and hunt in the area. Growers interested in finding out more about abatement flights are encouraged to contact the Florida Hawking Fraternity, or visit their website at http://www.f-h-f.org/

Physical Controls

The Environmental Protection Agency (EPA) regulates various mechanical devices and allows their use in order to minimize or prevent negative impacts from nuisance pests. EPA refers to these as "pest control devices." A product is a *pest control device* if it uses only physical or mechanical means to trap, destroy, repel, or mitigate any pest and does not include any pesticidal substance or mixture of substances.

Pest control devices alone are not required to be registered with EPA. However, if a device and a pesticide product are packaged together, the combined product is a pesticide product subject to registration requirements. For more information, refer to the website http://www.epa.gov/pesticides/factsheets/devices.htm.

Restrictions Related to Controlling Migratory Bird Populations

Migratory birds are protected by the Federal Migratory Bird Treaty Act of 1918. It is illegal to take, kill or possess migratory birds, pursuant to 16 U.S.C.A. §703 and associated federal regulations. Under certain circumstances, federal depredation permits may be obtained from the United States Fish and Wildlife Service (USFWS) for the lethal control of

certain species, where non-lethal control cannot reduce the damage to acceptable levels.

It is illegal to shoot migratory birds without a federal depredation permit; therefore, growers should consult with the USFWS before taking this level of intervention. Furthermore, there can be unintended consequences in using shot. Fired shot can lodge within fruit and pose unacceptable food safety hazards. Lead shot can also contaminate acidic soil/water environments and create unintended hazardous waste issues. If shot is used, steel and other non-toxic shot are alternatives.

Non-lethal physical controls for nuisance animals include physical barriers to prevent the targeted species from getting to the crop, and sensory devices designed to frighten or disturb the targeted species (scare tactics). Affected growers should use the more passive control measures first (barriers), subsequently employing more aggressive measures as crop damage warrants.

Physical Barriers

Netting is an effective way to reduce bird damage in high-value crops. In most cases, netting is placed directly over plants or bushes, but for some fruits, such as blueberries, a framework is built and the netting is suspended from it. Fencing may offer some relief from other nuisance animals. Electric fence constructed 5 to 6 feet high may be used as a physical barrier to control deer problems.

Sensory Devices

Scare tactics generally include audible and visual sensory devices. Visual deterrents such as whirlers, streamers, scare-eye balloons, lasers, reflectors, and predator models are seldom effective if used alone. Their efficacy is increased if supplemented with sound devices such as alarms, recorded (bird) distress calls, or fireworks (which includes exploders and propane cannons). In Florida, fireworks are governed by Chapter 791, F.S.

The Occupational Safety and Health Administration regulates allowable exposure times for sound, and has determined that it is safe for humans to listen to a 100-decibel sound for up to two hours a day. High-decibel sound devices for nuisance animal control usually consist of bio-acoustics, acoustics, ultrasonics, and propane cannons as shown in **Figure 10**.

For sound devices to be effective in deterring nuisance birds, they must be managed according to the habits and characteristics of the nuisance bird species. In general, best results are obtained

Figure 10

when sounds are presented at random intervals, a range of different sounds is used, the sound source is moved frequently, and sounds are supported by other methods, such as distress calls and/or visual deterrents. Otherwise, birds will usually become accustomed to these devices. Refer to the website http://icwdm.org/handbook/birds/Dispersal.asp for more information about bird behavior and related dispersal techniques.

When using high-decibel sound devices, especially propane cannons, growers should first communicate with and inform adjacent (residential) neighbors as to the reasons for using the devices. Growers using high-decibel sound devices on lands classified as agriculture pursuant to section 193.461, F.S., that are adjacent to residential areas, must employ the following measures to mitigate the disturbance to neighbors.

- Only use sound devices when bird predation has been corroborated.
- Start control no sooner than 15 days before the crop ripens.

- Use electronic timers or sensors to activate devices during peak feeding times.
- Shut off devices 30 minutes after sunset; do not resume activities sooner than 30 minutes before sunrise.
- Use the devices in accordance with manufacturers' recommendations, paying particular attention to the recommended number of devices per acre.
- Alternate or relocate devices at least every 4 days to avoid habituation.
- If using propane cannons:
  - When using hay bales placed directly behind the cannon to muffle the sound, devices can be located within 300 feet from the nearest residence. Otherwise, locate them no closer than 450 feet from the nearest residence.
  - If the device is adjustable, use the lowest decibel-level setting effective in controlling pests.
  - Set each cannon's blast intervals to not less than three minutes apart. If using more than one cannon in the vicinity of residential areas, increase the blast intervals so that sequential firing of multiple cannons meets this restriction as much as possible.
  - Aim the devices away from adjacent residences. Employ directional noise baffle barriers if feedback from neighbors warrants.
  - Ensure that propane tank valves do not leak, causing inadvertent blasts. For updates on recalled valves and/or tanks refer to the website http://www.doacs.state.fl.us/standard/lpgas/industryupdates.html.
  - Regularly monitor bird activity to ensure the cannon's effectiveness.

Chemical Controls

The EPA and the FDACS regulate the use of pesticides in the U.S. The term pesticide is defined by EPA as any substance or mixture of substances intended for *preventing, destroying, repelling,* or *mitigating* any pest. Chemical control involves the use of pesticides, as necessary. Factors that influence the selection of chemical controls include:

- The product's registration status within Florida.
- The effectiveness of the product against the target pest.
- The potential risk of a particular pesticide for beneficial organisms (e.g., honey bees).
- The product's cost effectiveness.
- The potential hazards to applicators, bystanders (e.g., residents, nearby businesses), the environment (i.e., non-target organisms, water quality), food safety, and the viability of an orchard or fruit crop.
  - Certain pesticides may be of concern because of the potential toxicity to non-target plant, invertebrate, fish, and wildlife species.
  - Pesticide use may result in ***phytotoxicity*** to trees, foliage and/or the crop. Some combinations of pesticides or overlapping applications of incompatible materials can cause phytotoxicity.
  - Limitation of or restrictions on application areas - Product selection may be influenced by a farm's location relative to residential areas, human traffic in the vicinity, and weather conditions favoring drift of materials to non-target sites.
- Impact on development of pest resistance - Resistance develops because one or more individuals in any given pest population may tolerate or resist effects of exposure to a specific pesticide active ingredient. When used consecutively for several applications, the offspring of resistant individuals multiply, and eventually establish a resistant population. Consequently, management decisions need to consider the known impacts of a pesticide on pest resistance development. In general, repeated use of any pesticide over a short period of time should be avoided.

Repellent Pesticides

Even though the use of repellents is somewhat limited in Florida, it may be a viable option to consider. Repellents have been demonstrated to be effective on certain species. Below is a list of the registered active ingredients for repellent use in Florida:

- 4-Aminopyridine
- Capsaicin
- Denatonium saccharide
- Methyl Anthranilate
- Naphthalene
- Nicarbazin
- Polybutene
- Thiram
- Thymol

When using a repellant (or any other pesticide) on a specific fruit or nut crop, the label must be followed to ensure legal application. Growers should contact the FDACS, Division of Agricultural Environmental Services at 850-617-7940 to ensure that a particular pesticide product is registered for sale, distribution, and use in Florida.

Lethal Pesticides

Choosing the proper pesticide in this class also requires familiarity with product labels and performance. **Always follow the label directions.** The label is the single most important document in determining the correct use of a pesticide, and state and federal pesticide laws require strict adherence to label directions.

Proper records of all pesticide applications should be kept according to state and federal requirements. These records help to establish proof of proper use, facilitate the comparison of results of different applications, or find the cause of an error. Sample record keeping forms can be found at the FDACS Bureau of Compliance Monitoring at: http://www.freshfromflorida.com/onestop/forms/13340.pdf.

Certain pesticides are classified as Restricted Use Pesticides (RUPs). Florida Pesticide Law (Chapter 487, F.S.) requires licensed applicators to keep records of all RUP use. Pursuant to Rule 5E-9.032, F.A.C., information on RUPs must be recorded within two working days of the application and maintained for two years from the application date.

Use of native vegetation in field borders and buffers can attract beneficial insects and help reduce the imbalance in which crop pests thrive. There are many other important issues involving pesticide use that affect storage, calibration, mixing and loading, and spill management decisions. For additional information, contact your County Extension Agent or the Division of Agricultural Environmental Services of the Florida Department of Agriculture and Consumer Services at http://www.flaes.org.

Pest Management BMPs

Practice IPM and use all pesticides in accordance with the label. Rinse, recycle, or dispose of empty pesticide containers following federal, state, and local regulations. When applying a pesticide close to a stream, canal, pond, or other waterbody, choose a pesticide with an active ingredient that has a lower toxicity to aquatic organisms.

6.1 Pesticide Use

Level I BMPs:

- ✓ **1.** Store pesticides in an enclosed, roofed structure with an impervious floor and lockable door, at least 100 feet from wetlands or other waterbodies.
- ✓ **2.** When practicable, construct a permanent mix/load facility with an impermeable surface, and locate it at least 100 feet from wells and/or surface waters. Where permanent facilities are not practicable, use portable mix/load stations.
- ✓ **3.** When field mixing is necessary, conduct loading activities at random locations in the field, with the aid of nurse tanks if applicable. Use a check valve or air gap separation to prevent backflow into the tank when filling a sprayer.

References:
(See Appendix 2 for additional references)

1. FDACS/FDEP, Best Management Practices for Agrichemical Handling and Farm Equipment Maintenance Manual. http://www.floridaagwaterpolicy.com/BestManagementPractices.html
2. UF-IFAS, Integrated Pest Management Program. http://ipm.ifas.ufl.edu/
3. Southern Region Integrated Pest Management Center. http://www.sripmc.org/
4. UF-IFAS, Protecting Water Resources from Agricultural Pesticides, CIR PI-1. http://edis.ifas.ufl.edu/PI001

APPENDICES

APPENDIX 1: ACRONYM LIST AND GLOSSARY

Advective Freezes: Occurs when a cold air mass ranging from 500 to more than 5,000 feet above land moves into an area bringing freezing temperatures. Wind speeds are usually above 5 mph and clouds may be present. Attempts to protect crops by modifying the environment are very limited under these conditions

Aquifer: Soil or rock formation that contains ground water and serves as a source of water that can be pumped to the surface

Best Management Practices (BMPs): A practice or combination of practices based on research, field-testing, and expert review, to be the most effective and practicable on-location means, including economic and technological considerations, for improving water quality in agricultural and urban discharges. Best management practices for agricultural discharges shall reflect a balance between water quality improvements and agricultural productivity

BMAP: Basin Management Action Plan

Calcareous: Mostly or partly composed of calcium carbonate, in other words, containing lime or being chalk-like

Chelation: Process by which a molecule can form several bonds to a single metal ion.

CNR: Crop Nutrient Requirement

Conveyance Capacity: The amount of flow (generally expressed in cubic feet per second) that a canal/ditch can carry based on the size, shape, slope, and condition of the canal/ditch

Confining Layer: A layer of earth material, usually clay, which does not readily transmit water; thus restricting the vertical movement of water into and out of an aquifer

Cyanobacteria: Also known as blue-green bacteria, which produce their energy through photosynthesis. Certain Cyanobacteria produce cyanotoxins that can be toxic to animals and humans

Deciduous Crops: These include trees, shrubs and herbaceous perennials, which lose all of their leaves for part of the year

Dew Point Temperature: The temperature to which air must be cooled, at constant barometric pressure, for water vapor to condense into water. When the dew point temperature falls below freezing, it is often called the frost point, as the water vapor then becomes frost

DOF: Division of Forestry

EDIS: Electronic Document Information System

EPA: Environmental Protection Agency

ERP: Environmental Resource Permit

Evapotranspiration (ET): The combined loss of water through evaporation and emission of water vapor through plant leaf openings (stomata).

F.A.C.: Florida Administrative Code

FAWN: Florida Automated Weather Network

FDACS: Florida Department of Agriculture and Consumer Services

FDEP: Florida Department of Environmental Protection

FEMA: Federal Emergency Management Agency

FIRM: Flood Insurance Rate Map

FOTG: Field Office Technical Guide

F.S.: Florida Statutes

GIS: Geographical Information Systems

IPM: Integrated Pest Management

MGD: Million Gallons Per Day

MIL: Mobile Irrigation Lab

MPH: Miles per Hour

MSSW: Management and Storage of Surface Waters

N-P-K: Nitrogen, Phosphorus and Potassium

NOI: Notice of Intent

Perennial Streams: Streams or rivers that flow in a well-defined channel throughout most of the year under typical climatic conditions

Permanent Wilting Point: The level of soil moisture at which plants wilt and fail to recover their turgidity

Phytotoxicity: The toxic effect of a compound on plant growth. Such damage may be caused by a wide variety of compounds, including trace metals, pesticides, or salinity

PSI: Pounds per Square Inch

Restricted Use Pesticides (RUPs): Pesticides registered by EPA that may only be applied by or under the direct supervision of trained and certified applicators

Rip-rap: Large, loose angular stones that serve as a permanent erosion-resistant ground cover

Riparian: Vegetated areas along a watercourse through which energy, materials, and water pass. Riparian areas characteristically have a high water table and are subject to periodic flooding and influence from the adjacent watercourse

Septage: A mixture of sludge, fatty materials, human feces, and wastewater removed during the pumping of an onsite sewage treatment and disposal system

Sequestering Agents: A chemical compound used to tie up undesirable ions, keep them in solution, and eliminate or reduce their effects

Sinkhole: For the purposes of this manual, a sinkhole is an opening in the ground resulting from the collapse of overlying soil, sediment, or rock into underground voids created by the dissolution of limestone or dolostone.

Spoil: The soil material obtained from excavating an area to construct such works as canals/ditches and/or ponds. This material is typically used to build berms and/or dikes along or in the vicinity of the excavation site.

SWCD: Soil and Water Conservation District

TMDL: Total Maximum Daily Load

UF-IFAS: University of Florida, Institute of Food and Agricultural Sciences

Uncoated sands: Sand particles that lack clay and organic matter coating, and have poor water and nutrient holding capacities.

USDA-NRCS: United States Department of Agriculture, Natural Resources Conservation Service

USFWS: United States Fish and Wildlife Service

USGS: United States Geological Survey

Vegetated Buffer: An area covered with vegetation suitable for nutrient uptake and soil stabilization, located between a production area and a receiving water or wetland.

Watershed: Drainage basin or region of land where water drains downhill into a specified body of water

Wet Bulb Temperature: The lowest temperature that can be reached by the evaporation of water only; it is an indication of the amount of moisture in the air

Wetlands: As defined in section 373.019(25), F.S., wetlands means those areas that are inundated or saturated by surface water or ground water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soils. Soils present in wetlands generally are classified as hydric or alluvial, or possess characteristics that are associated with reducing soil conditions. The prevalent vegetation in wetlands generally consists of facultative or obligate hydrophytic macrophytes that are typically adapted to areas having soil conditions described above.

WMDs: Water Management Districts

APPENDIX 2: ADDITIONAL BMP REFERENCES

General BMP References

1. *The Florida Irrigator's Pocket Guide*

This guide, developed by the National Center for Appropriate Technology, lists both water management and equipment management practices, and includes a schedule of common maintenance tasks. The guide also focuses on conserving and protecting water, soil, energy and natural resources. Currently, this guide does not reside on any website.

2. *Southern Region Small Fruits Consortium*

The Consortium has developed integrated management guides for blueberries, brambles, and grapes. The guides focus on sprayer calibration and integrated pest management strategies. They can be found at:

http://www.smallfruits.org/SmallFruitsRegGuide/index.htm

3. *The Florida Stormwater, Erosion, and Sedimentation Control Inspector's Manual*

To improve the lack of compliance with BMPs for Florida's stormwater regulatory program, the Department of Environmental Protection has developed a training program curriculum on the use, installation, and maintenance of erosion, sedimentation, and stormwater BMPs. The training program is primarily directed towards inspectors and contractors, however, permit reviewers and public works personnel will also benefit from this program. The manual can be found at: http://www.dep.state.fl.us/water/nonpoint/docs/erosion/erosion-inspectors-manual.pdf

4. *Using Manure and Compost as Nutrient Sources for Fruit and Vegetable Crops*

This publication, developed by University of Minnesota Extension addresses differences between the composition of fresh and composted manure, nutrient availability from manure/compost, and a calculation method of how much manure/compost to apply. The publication can be found at: http://www.extension.umn.edu/distribution/horticulture/M1192.html

University of Florida – Institute of Food and Agricultural Sciences References

1. *Integrated Pest Management Strategies, UF-IFAS Circular 1149*

This circular describes the principles of integrated pest management (IPM) and recommends strategies for implementation. This publication is no longer available on the internet. Contact your local county extension agent.

2. *South Florida Tropical Fruit Growers Perspectives: Water Conservation Management Practices, UF-IFAS.*

This publication summarizes research done on Miami-Dade's tropical fruit production and provides general information on the most common water quality and quantity Best Management Practices done by growers.

http://edis.ifas.ufl.edu/pdffiles/AE/AE39600.pdf

3. *Electronic Data Information Source*

This is an electronic publication database with thousands of publications on agricultural practices for nearly any agricultural enterprise in the state of Florida, including specialty fruit and nut crops. http://edis.ifas.ufl.edu

4. *Fruitscapes*

This website is an extension of UF-IFAS and provides information on temperate, subtropical, and tropical fruit. It has links for each individual fruit or nut and connects recent research to appropriate management and growing strategies. The website can be found at http://trec.ifas.ufl.edu/fruitscapes/

5. *The Pecan Tree, UF-IFAS Publication HS229*

This publication describes strategies for production of pecans in Florida, and can be found at http://edis.ifas.ufl.edu/HS229

USDA – Natural Resources Conservation Service References

All references below accessed at:
http://www.nrcs.usda.gov/technical/eftog

1. Conservation Practice Standard No. 342 (Critical Area Planting)
2. Conservation Practice Standard No. 362 (Diversion)

3. Conservation Practice Standard No. 464 (Irrigation Land Leveling)
4. Conservation Practice Standard No. 460 (Land Leveling)
5. Conservation Practice Standard No. 412 (Grassed Waterway)
6. Conservation Practice Standard No. 393 (Filter Strip)
7. Conservation Practice Standard No. 441 (Micro-Irrigation)

Additional References on Integrated Pest Management

1. Southeast Regional Blueberry Integrated Management Guide.
2. USDA, Booth, Thurman. 1994. Bird Dispersal Techniques.Animal and Plant Health Inspection Service.
3. Connecticut Department of Agriculture. 2004. Crop Protection Permit Application.
4. Curtis, Paul., Fargione, Michael. Birds. Cornell University, College of Agriculture and Life Sciences.
5. Curtis Nelms, et.al., 1990. Assessment of Bird Damage to Early-Ripening Blueberries in Florida. Vertebrate Pest Conference Proceedings, pgs. 302-306.
6. Florida Department of Environmental Protection. 2004. Best Management Practices for Environmental Stewardship of Florida Shooting Ranges. Bureau of Solid and Hazardous Waste.
7. Fraser, et.al. 1998. Bird Control on Grape and Tender Fruits. Ontario Ministry of Agriculture, pgs.1-14.
8. International Commission on Biological Effects of Noise. 2001. Calculations with Sound Power Level for Industrial Areas.
9. Michigan Department of Agriculture. 2008. Generally Accepted Agricultural and Management Practices for Pesticide Utilization and Pest Control, pg.7.
10. Midwest Small Fruit Pest Management Handbook. Reducing Bird and Other Wildlife Damage in Berries and Grapes, pgs. 192-194.
11. UF-IFAS, Smith, Hugh., Capinera, John. 2005. Natural Enemies and Biological Control. ENY-822.
12. Gary D., Zon Manufacturing Representative, 1-800-657-8214, Personal Conversation 1/26/09
13. National Farmers' Union. 2006. Bird Scarers Code of Practice.
14. Bishop, J., et.al., 2003. Review of International Research Literature Regarding the Effectiveness of Auditory Bird Scaring Techniques and Potential Alternatives. England Department for Environment, Food and Rural Affairs, pgs. 2-52.

APPENDIX 3: SOIL AND TISSUE TESTING INFORMATION

Soil Testing

The soil testing process comprises four major steps, and understanding each one clearly will increase the reliability of the process tremendously. The steps in the soil testing process are:

- soil sampling
- sample analysis
- interpretation of test results
- nutrient recommendations

Soil Sampling: Soil samples need to be representative of the field and soil types and the soil analysis results will be only as good as the submitted sample is. Samples collected from areas that differ from typical characteristics of the farm should be submitted separately and should not be consolidated with the primary samples. Using a management zone (area on the farm that is managed similarly) as a guiding factor to collect and consolidate samples is strongly recommended to optimize resources. Consult the UF-IFAS Extension Fact Sheet SL181 for further information on soil sampling strategies and/or to obtain the appropriate soil test sheet which can be found at: http://soilslab.ifas.ufl.edu/ESTL%20Tests.asp

Sample Analysis: The soil samples that are submitted to the testing laboratories undergo a series of physical and chemical processes that are specific to the soil types, crops, and management regimes. Once the soil samples are homogenized through grinding and/or sieving, a precise volume of the sample will be extracted for plant nutrient through an extraction procedure. The following standard methods are followed at the UF-IFAS Soil Testing Laboratories for different soils in Florida:

a) Mehlich-1 extraction - this method is performed on all acid-mineral soils up to a soil pH of 7.3.

b) AB-DTPA extraction – this method is performed on alkaline (calcareous) soils with a pH of 7.4 and above.

3) Water extraction - this method is used for extraction of P in all organic soils.

4) Acetic acid extraction - this method is performed on all organic soils for extraction of K, Mg, Ca, Si, and Na.

It is extremely important that procedures used at the laboratories are well understood before submitting the samples since most BMPs are tied to the standardized procedures used by the labs at the land-grant universities in the state such as UF-IFAS. Similarly, it is also very important to note that the UF-IFAS laboratory does not offer any test for N since there is no reliable test for plant available N under Florida conditions. N recommendations are based on crop nutrient requirements found in the research literature. More information regarding the procedures used at the UF-IFAS Extension Soil Testing Laboratory in Gainesville can be found in the extension publication, Circular 1248.

Interpretation of Test Results: The primary goal of state laboratories in offering the soil testing service is to provide interpretation of the soil test results based on soil test-crop response trials and field calibration of the test results with the optimum economic yields of the various plant species. Economic yield increases resulting from added nutrients cannot be obtained once the test results are interpreted as 'High' resulting in no recommendation for that particular nutrient. The interpretations provided are specific to the soil and plant species. Current interpretation tables can be obtained from SL 189, UF-IFAS extension fact sheet.

Nutrient Recommendations: To reiterate, nutrient recommendations based on soil test results are formulated based on the optimum economic crop response to an added nutrient to the soil.

Tissue Testing

Tissue testing is the analysis and diagnosis of the plant's nutritional status based on its chemical composition. It is commonly performed as analyses on dried blades, leaves or dried petioles or on sap from fresh petioles, with results compared to recommended nutrient ranges.

Efficient fertilizer management is important to reduce costs, conserve natural resources, and to minimize potential impacts on the environment. These goals can be achieved through optimum management of the fertilizer component. Timely tissue testing is an important tool used in fertilizer management through monitoring the plant's nutritional status, and such testing is also used in diagnosing suspected problems like nutritional deficiency, toxicity or imbalance. As a management

tool, tissue testing can increase your return by preventing deficiencies that can reduce yield(s), market quality, and profitability.

Methodology: Begin sampling soon after the crop is established and continue at regular intervals (weekly or biweekly). Individual plants, even side-by-side, may have different nutritional status. Therefore, by sampling a sufficiently large number of plants, the effect of this error due to inherent variability should be minimized. It is preferable to include a soil sample together with a tissue sample when submitting samples to a diagnostic lab, since the soil sample may indicate other factors - such as pH - that may influence crop growth, nutrient availability, and uptake. Avoid plant tissue testing if the field has received foliar nutrient sprays containing micronutrients or nutrient-containing pesticides. Also, avoid sampling plants damaged by pests, diseases, or other chemicals when trying to monitor the nutritional status of the sod.

Whole-leaf sampling will be most useful early in the season, while later in the season, it can help to point to changes in fertilization practices that are needed for the next season. Fresh petiole sap testing for N and K, practiced regularly throughout the season, can help manage the current crop as well as provide guidance for the next crop. Sample a recently matured leaf blade. Collect enough leaf material so that the sample is representative of the crop stand, and that the sample is large enough to perform the required analyses.

If a deficiency is suspected, collect one *composite sample* from the area exhibiting the disorder and a second sample from an otherwise "normal" section for comparison when trying to diagnose a nutrient deficiency. Separate and properly label the "disorder" sample and the "normal" sample in order to make a valid comparison after analyses. Keep notes on condition of the sod and stage of growth, weather, and other variables for future reference.

Be careful not to crush or damage samples during cleansing. Avoid using tap water to rinse blade samples, since it can be high in nutrients such as calcium, iron, magnesium, or sulfate sulfur. Use distilled water instead. In most situations, cleansing is not needed. Blot the samples dry with absorbent paper after rinsing, and air-dry the samples several hours before shipment. Wrap the samples in absorbent paper and place them in a large envelope if a plant analysis kit is not available, and mail immediately.

Select a reputable laboratory that provides interpretations and recommendations based upon test results, which are appropriate for your growing region. Interpretation guidelines should be based on actual field research, not on "typically observed" or historical lab databases. The laboratory should be reliable and accredited and also offer a routine turnaround of less than 48 hours.

For more information please see SL 131, Plant Tissue Information Sheet, Soil and Water Science Department, at: http://edis.ifas.ufl.edu/SS182.

References:

1. Sartain, J.B. 2001. Soil Testing and Interpretation for Florida Turfgrasses. SL181. Soil and Water Science, Cooperative Extension Service. IFAS, p. 2. http://edis.ifas.ufl.edu/SS317.
2. Mylavarapu, R.S. and E.D. Kennelley. 2002. UF-IFAS Extension Soil Testing Laboratory Analytical Procedures and Training Manual. Soil and Water Science, Circular 1248, Cooperative Extension Service, IFAS, http://edis.ifas.ufl.edu/SS312.
3. Mylavarapu, R.S. 2002. The Process of Standardized Nutrient Recommendation Development for Successful Crop Production and Environmental Protection. SL 189, Soil and Water Science, Cooperative Extension Service, IFAS. http://edis.ifas.ufl.edu/SS401.

APPENDIX 4: INCENTIVE PROGRAMS FOR QUALIFYING FARMS

The implementation of Best Management Practices can reduce non-point sources of pollution, conserve valuable soil and water resources, and improve water quality. The implementation of these management practices can also be expensive and, in some cases, may not be economically feasible for agricultural producers. To reduce the financial burden associated with the implementation of selected practices, several voluntary cost-share programs have been established. These programs are designed to conserve soil and water resources and improve water quality in receiving watercourse. The narrative below is intended to provide basic information regarding the primary federal, state, and regional cost-share programs. Sources of additional information have also been included, and growers are encouraged to contact the identified agencies or organizations for current information about each program.

I. Programs Administered by USDA – Farm Services Agency (FSA)

Conservation Reserve Program (CRP): This program encourages farmers to convert highly erodible cropland or other environmentally sensitive lands to vegetative cover including grasses and/or trees. This land use conversion is designed to improve sediment control and provide additional wildlife habitat. Program participants receive annual rental payments for the term of the contract in addition to cost share payments for the establishment of vegetative cover. CRP generally applies to highly erodible lands and is more applicable to North Florida.

Conservation Reserve Enhancement Program (CREP): CREP uses a combination of federal and state resources to address agricultural resource problems in specific geographic regions. This program (which is not limited to highly erodible lands) is designed to improve water quality, minimize erosion, and improve wildlife habitat in geographic regions that have been adversely impacted by agricultural activities.

Emergency Conservation Program (ECP): The ECP provides financial assistance to farmers and operators for the restoration of farmlands on which normal farming operations have been impeded by natural disasters. More specifically, ECP funds are available for restoring permanent fences, terraces, diversions, irrigation systems, and other conservation installations. The program also provides funds for emergency water conservation measures during periods of severe drought.

For further information on CRP and CREP, including eligibility criteria, please contact your local USDA Service Center. Information is also available on the Internet at www.fsa.usda.gov.

II. Programs Administered by USDA-NRCS

Conservation Plans

Conservation planning is a natural resource problem-solving and management process, with the goal of sustaining natural resources. Conservation Plans include strategies to maintain or improve yields, while also protecting soil, water, air, plant, animal, and human resources. They are particularly well-suited to livestock operations and farming operations that produce multiple commodities.

Conservation Plans are developed in accordance with the USDA-NRCS FOTG. Because not all the specific BMPs in this manual may be contained in the FOTG, Conservation Plans developed under this manual must also include the applicable Level I and II BMPs. Assistance in developing a plan can be obtained through the local Soil and Water Conservation District (SWCD), the USDA-NRCS, the Cooperative Extension Service, and private consultants who function as technical service providers. However, the decisions included in the Conservation Plan are the responsibility of the owner or manager of the farm. Conservation Plans are usually required to receive cost share for any of the programs described below.

Environmental Quality Incentives Program (EQIP): EQIP provides financial assistance for the implementation of selected management practices. Eligibility for the program requires that the farm have a USDA-NRCS approved conservation plan. Practices eligible for EQIP cost share are designed to improve and maintain the health of natural resources and include cross-fences, water control structures, brush management, prescribed burning, nutrient management and other erosion control measures.

Conservation Security Program (CSP): CSP is a voluntary conservation program that supports

ongoing stewardship on private lands. It rewards farmers and operators who are meeting the highest standards of conservation and environmental management. Its mission is to promote the conservation and improvement of soil, water, air, energy, plant and animal life.

Wetlands Reserve Program (WRP): WRP is a voluntary program designed to restore wetlands. Program participants can establish easements (30-year or perpetual) or enter into restoration cost-share agreements. In exchange for establishing a permanent easement, the landowner usually receives payment up to the agricultural value of the land and 100 percent of the wetland restoration cost. Under the 30-year easement, land and restoration payments are generally reduced to 75 percent of the perpetual easement amounts. In exchange for the payments received, landowners agree to land use limitations and agree to provide wetland restoration and protection.

Wildlife Habit Incentives Program (WHIP): The Wildlife Habitat Incentives Program provides financial incentives for the development of fish and wildlife habitat on private lands. Program eligibility requires that landowners develop and implement a Wildlife Habitat Development Plan. Participants enter multiyear (5 to10 year) agreements with USDA-NRCS.

For further information on these programs, including eligibility criteria, please contact your local USDA Service Center. Information is also available on the Internet at the following web site: www.nrcs.usda.gov

III. Programs Administered by State and Regional Entities

Office of Agricultural Water Policy: In order to assist agricultural producers in the implementation of BMPs, the Florida Department of Agriculture and Consumer Services/Office of Agricultural Water Policy contracts with several of the state's Soil and Water Conservation Districts and Resource Conservation and Development Councils to provide cost share, as funding is available.

Water Management District Cost-Share Programs: Some of the water management districts may have agricultural cost share programs in place for eligible producers.

For further information on these programs, including eligibility criteria, please contact your Soil and Water Conservation District, the Water Management District, or the Florida Department of Agriculture and Consumer Services. Information and links to other sites are also available on the Internet at the following web site: www.floridaagwaterpolicy.com

APPENDIX 5: INSTALLING NEW IRRIGATION SYSTEMS: DESIGN CONSIDERATIONS

Drip Irrigation (Grove, Orchard)

Drip irrigation involves a low-volume, low-pressure system and is generally considered a desirable option for grove/orchard irrigation. The system consists of buried PVC pipe mains and sub-mains with ½" to ¾" polyethylene laterals. Water application is controlled by drip emitters, which either are attached to the laterals or are an integral part of the system. Laterals may be on the ground surface, totally buried, or buried with emitters pointed to the surface. The output rate (usually 1 to 2 gallons/hour) and number of emitters per tree depends on the type of tree, the tree size, and tree-spacing requirements. Pressure-compensating emitters are preferred; however, if non-pressure compensating emitters are used, the system should be designed such that emitter pressures do not significantly vary from the design operating pressure.

Seepage Irrigation

Seepage irrigation artificially raises the water table. It is a fundamental irrigation method for "top-down" irrigation of crops that cannot tolerate saturated growing conditions. Depending on the crop type, seepage irrigation may be employed as a semi-closed or flood system. Growers should note that water management district, state, and/or federal cost-share funding may be available to convert seepage irrigation to a more efficient system.

- A semi-closed system utilizes a series of rows and spigots, allowing water to run down the field through furrows to saturate the field and raise the water table. While still effective, this method can result in the offsite discharge of irrigation water. This not only wastes water, but also leaches fertilizers more quickly.
- Flood irrigation is used more typically in regions with very little or no topographic relief. Using this technique, a great deal of water is required to hydrate large areas by filling perimeter ditches. This method is highly inefficient, costly, and difficult to manage.

Micro-sprinklers (Grove, Orchard)

Micro-sprinklers are commonly used in groves/orchards as an alternative to drip irrigation. These systems are commonly used on citrus, pecans, peaches and other tree fruits.

Micro-sprinkler systems are very similar to drip systems, with buried PVC mains and sub-mains and polyethylene laterals. Water application is controlled by a small plastic sprinkler attached to a plastic stake, and water is supplied from the lateral by a small diameter supply tube. Output rates can vary from 5 to 50 gallons per hour, and sprinkler heads can be changed to accommodate different spray patterns. Depending on tree size and spacing, there will usually be either one or two micro-sprinklers per tree. To ensure uniform water distribution, the system should be designed so that micro-sprinkler pressures do not vary more than plus or minus 10 percent from the design operating pressure.

Some reasons for using micro-sprinklers include:

- Water quality concerns can be minimized by using less water.
- Sites with deep sandy soils will produce a better wetted perimeter.
- Ease of detecting problems such as leaks and clogged emitters.

Traveling Gun

This term refers to either cable-tow or hard-hose traveling sprinkler systems. The primary advantage of traveler systems is that they can be easily moved from field to field and are well suited to fields of irregular size and shape. While travelers tend to have the poorest overall water-use efficiency among sprinkler alternatives, they are easy to move around.

Regardless of the drive mechanism, new traveler systems should be equipped with hard-hose systems so that the sprinkler cart travels at a uniform speed from the beginning of the pull until the hose is fully wound onto the hose reel. Nozzle sizes on gun type travelers are typically ½ to 2 inches in diameter and require high operating pressures of 75 to 100 PSI at the gun for uniform distribution. Nozzle type (ring versus taper bore) should be selected to match irrigation application rates to soil infiltration rates.

Solid Set

Solid-set systems include both portable-pipe and buried systems. These systems may be preferable for high-value crops. For maximum water savings, sprinklers should have a reduced angle that is below 23 degrees trajectory. A solid-set system should be designed to maintain adequate pressure and provide overlap. Solid-set systems with automatic controllers are well suited for irrigating during non-peak evapotranspiration periods, although larger nozzles or additional system components may be needed to compensate for peak periods.

 High-volume solid-set irrigation systems are very common in the tropical/ subtropical fruit crop industry of south Florida. Generally, these systems are designed to put out 0.2 to 0.4 inches of water per acre per hour. Properly managed, these systems are useful for irrigating to meet crop water needs and for freeze protection.

For more information about irrigation systems and related water conservation practices, go to: http://www.nespal.org/SIRP/IWC/Report/conserv.rpt980728.pdf.

APPENDIX 6: CHEMIGATION/FERTIGATION STATUTORY REFERENCES

487.064 Antisiphon requirements for irrigation systems.

(1) Any irrigation system used for the application of pesticides must be equipped with an antisiphon device adequate to protect against contamination of the water supply. The requirements of this section shall also apply to water supply lines to pesticide mixing-loading equipment other than those systems which incorporate a physical gap between the water source and the application equipment.

(2) It is unlawful for any person to apply chemicals through an irrigation system which is not equipped with an antisiphon device as required by this section, or to mix and load pesticides for application unless there is a physical gap or its equivalent between the line from the water source and the application equipment.

(3) The department may establish by rule specific requirements for antisiphon devices and for sites where pesticide mixing-loading occurs.

(4) Any governmental agency which requires antisiphon devices on irrigation systems used for the application of chemicals shall use the specific antisiphon device requirements adopted by the department.

576.087 Antisiphon requirements for irrigation systems.

(1) Any irrigation system used for the application of fertilizer must be equipped with an antisiphon device adequate to protect against contamination of the water supply.

(2) It is unlawful for any person to apply fertilizer through an irrigation system which is not equipped with an antisiphon device as required by this section.

(3) The department shall establish specific requirements for antisiphon devices.

(4) Any governmental agency which requires antisiphon devices on irrigation systems used for the application of fertilizer shall use the specific antisiphon device requirements adopted by the department.

Note: *The FDACS Bureau of Compliance Monitoring is responsible for antisiphon requirements. Go to their website for more information at: http://www.flaes.org/complimonitoring/index.html*

APPENDIX 7: EXAMPLE RECORD-KEEPING FORMS

Record keeping aids in operating and maintaining BMPs. The following record keeping is required:

1.2.5 Keep records of all nutrient applications. Include, at a minimum: date of application, total amount applied, acreage covered, fertilizer analysis or grade, rate per acre, and application method.

2.1.2 Keep records of total rainfall received, using on-site rain gauges.

2.2.6 Maintain a record-keeping system for inspection and maintenance of all irrigation system components.

3.2.4 Keep drawings of the design cross-sectional area of ditches.

5.4.5 Maintain records of new well construction and modifications to existing wells.

The tables below serve as a set of templates to develop your own record-keeping system. You may maintain your records as hard copies or in an electronic format, depending on your preference. You may use these tables, develop your own, or choose commercially available record-keeping software suited to your commodity.

Soil Sample Records *(Retain all Lab Results)*				
Date	**Field Location**	**# of Samples**	**Name of Lab**	**Records Location**

Tissue Sample Records				
Sample Date	**Field Location**	**# of Samples**	**Name of Lab**	**Records Location**

Fertilization/Nutrient Records *(Retain all Receipts)*						
Date	**Location**	**Acreage Covered**	**Type[1]**	**Formulation[2]**	**Grade[3]**	**Rate (Lbs/Acre)**

Rainfall *(in.)*											
Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.

Well Records					
Location	Year Constructed	Constructed By	Last Modified	Modified By	Records Location

[1] Organic, Inorganic, Chemical
[2] Granular, Water Soluble, etc.
[3] e.g. 10-10-10

APPENDIX 8: CONTACT INFORMATION

Emergency Information

Emergency Reporting Numbers

State Warning Point *(24 hours/Toll-Free)* 1-800-320-0519
Division of Emergency Management - contact in case of oil or hazardous substance spill.

Emergency Information and Follow-Up Numbers

State Warning Point Information Line *(Monday – Friday 8:00 am - 5:00 pm)* 850-413-9900

DEP Emergency Response *(Monday – Friday 8:00 am - 5:00 pm)* 850-245-2010

State Emergency Response Commission 1-800-635-7179
For follow-up reporting only.

Non-Emergency Information

Florida State Agency Numbers		**Toll Free**
Department of Agriculture and Consumer Services	**www.freshfromflorida.com**	
Office of Agricultural Water Policy	(850) 617-1727	
Division of Agricultural and Environmental Services	(850) 488-3731	
Bureau of Pesticides	(850) 487-0532	
Bureau of Compliance Monitoring	(850) 488-8731	
Department of Environmental Protection	**www.dep.state.fl.us**	
Non-point Source Management Section	(850) 245-7508	
Hazardous Waste Management Section	(850) 245-8707	
Northwest District Office (Pensacola)	(850) 595-8300	
Northeast District Office (Jacksonville)	(904) 807-3300	
Central District Office (Orlando)	(407) 894-7555	
Southeast District Office (West Palm)	(561) 681-6600	
Southwest District Office (Tampa)	(813) 632-7600	
South District Office (Ft. Myers)	(941) 332-6975	
Water Management Districts	**www.flwaterpermits.com**	
Northwest Florida (Tallahassee)	(850) 539-5999	
Suwannee River (Live Oak)	(386) 362-1001	1-800-226-1066
St. John's River (Palatka)	(904) 329-4500	1-800-451-7106
Southwest Florida (Brooksville)	(352) 796-7211	1-800-423-1476
South Florida (West Palm)	(561) 686-8800	1-800-432-2045

Other Helpful Numbers – Main offices

USDA-NRCS - Florida Office (Gainesville) ..... (352) 338-9500

UF-IFAS Extension Administration ..... (352) 392-1761

Association of Florida Conservation Districts ..... (407) 321-8212
Soil and Water Conservation Districts

Florida Fruit and Vegetable Association ..... (321) 241-5200

APPENDIX 9: RULE 5M-13

CHAPTER 5M-13
BEST MANAGEMENT PRACTICES FOR FLORIDA SPECIALTY FRUIT AND NUT CROP OPERATIONS

5M-13.001 Purpose.

The purpose of this rule is to effect pollutant reduction through the implementation of agricultural Best Management Practices (BMPs) that may be determined to have minimal individual or cumulative adverse impacts to the water resources of the state.

Rulemaking Authority 403.067(7)(c)2., 570.07(10), 570.07(23) FS. Law Implemented 403.067(7)(c)2. FS. History–New 5-25-11.

5M-13.002 Approved Best Management Practices.

The manual titled Water Quality/Quantity Best Management Practices for Florida Specialty Fruit and Nut Crops (2011 Edition), DACS P-01589, is hereby adopted and incorporated by reference. Copies of the manual may be obtained from the University of Florida Cooperative Extension Service county office or from the Florida Department of Agriculture and Consumer Services (FDACS), Office of Agricultural Water Policy, 1203 Governor Square Boulevard, Suite 200, Tallahassee, FL, 32301 or accessed online at http://www.flrules.org/Gateway/reference.asp?No=Ref-00258

Rulemaking Authority 403.067(7)(c)2., 570.07(10), 570.07(23) FS. Law Implemented 403.067(7)(c)2. FS. History–New 5-25-11.

5M-13.003 Presumption of Compliance.

Pursuant to Section 403.067(7)(c)3., F.S., agricultural operations that implement BMPs, in accordance with FDACS rules, that have been verified by the Florida Department of Environmental Protection as effective in reducing pollutants addressed by the practices are presumed to comply with state water quality standards, and are released from the provisions of Section 376.307(5), F.S., for those pollutants. In order to meet the requirements for a presumption of compliance and release from Section 376.307(5), F.S., the producer must:

(1) Submit a Notice of Intent to Implement, as provided in Rule 5M-13.004, F.A.C., that identifies the applicable BMPs;

(2) Implement all applicable BMPs in accordance with the timeline requirements in Rule 5M-13.004, F.A.C.; and

(3) Maintain records to document the implementation and maintenance of the identified BMPs, in accordance with Rule 5M-13.005, F.A.C.

Rulemaking Authority: 403.067(7)(c)2., 570.07(10), 570.07(23) FS. Law Implemented 403.067(7)(c)2. FS. History–New 5-25-11.

5M-13.004 Notice of Intent to Implement.

A Notice of Intent to Implement (NOI) and the accompanying BMP Checklist, both of which are in the Appendix of the manual referenced in Rule 5M-13.002, F.A.C., shall be submitted to the FDACS Office of Agricultural Water Policy, 1203 Governor Square Boulevard, Suite 200, Tallahassee, Florida 32301. The Notice of Intent to Implement Water Quality/Quantity BMPs for Florida Specialty Fruit and Nut Crops (DACS-01548, Rev. 06/10), hereby adopted and incorporated by reference, may be obtained from FDACS or accessed online at http://www.flrules.org/Gateway/reference.asp?No=Ref-00266

(1) The NOI shall include:

(a) The name of the property owner, the location of the property, and the property tax ID number(s) or other property identification information;

(b) The amount of acreage on which BMPs will be implemented;

(c) The name and contact information of a person to contact;

(d) The signature of the land owner, lease holder, or an authorized agent; and

(e) A BMP Checklist with a schedule for implementation, as contained in the manual. The producer shall select the applicable BMPs by following the instructions in the manual. Except as provided in the manual, all applicable Level I BMPs must be implemented as soon as practicable, but no later than 18 months after submittal of the Notice of Intent to Implement.

(2) Submittal of the NOI enables the producer to receive assistance with BMP implementation.

Rulemaking Authority 403.067(7)(c)2., 570.07(10), 570.07(23) FS. Law Implemented 403.067(7)(c)2. FS. History–New 5-25-11.

5M-13.005 BMP Record Keeping.

Participants must keep records as directed in the manual to document implementation and maintenance of the practices submitted to FDACS. Records must be retained for at least 5 years. All records are subject to inspection.

Rulemaking Authority 403.067(7)(c)2., 570.07(10), 570.07(23) FS. Law Implemented 403.067(7)(c)2. FS. History–New 5-25-11.

APPENDIX 10

Notice of Intent to Implement Form and BMP Checklist

ADAM H. PUTNAM
COMMISSIONER

Florida Department of Agriculture and Consumer Services
Office of Agricultural Water Policy

FDACS-OAWP
1203 Governor's Sq. Blvd.
Suite 200
Tallahassee. FL 32301

NOTICE OF INTENT TO IMPLEMENT
WATER QUALITY BMPs FOR
FLORIDA FLORIDA SPECIALTY FRUIT AND NUT CROPS

Rule 5M-13.004, F.A.C.

- **Complete all sections of the Notice of Intent** (NOI). Each NOI may list only properties that are within the same county and are owned or leased by the same person or entity, and on which applicable BMPs will be identified and implemented under this manual.
- Submit the **NOI**, along with the **BMP Checklist**, to the Florida Department of Agriculture and Consumer Services (FDACS), at the address below.
- **Keep a copy of the NOI and the BMP checklist in your files** as part of your BMP record keeping.

You can visit http://www.freshfromflorida.com/onestop/forms/01548.pdf to obtain an electronic version of this Notice of Intent to Implement (NOI) form.

If you would like assistance in completing this NOI form or the BMP Checklist, or in implementing BMPs, contact FDACS staff at (850) 617-1727 or AgBmpHelp@freshfromflorida.com.

Mail this completed form and the BMP Checklist to: **FDACS Office of Agricultural Water Policy**
1203 Governor's Square Boulevard, Suite 200
Tallahassee, Florida 32301

Person To Contact

Name: _____

Business Relationship to Landowner/Leaseholder: _____

Mailing Address: _____

City: _____ State: _____ Zip Code: _____

Telephone: _____ FAX: _____

Email: _____

☐ **Landowner or** ☐ **Leaseholder Information** *(check all that apply)*
NOTE: If the Landowner/Leaseholder information is the same as the Contact Information listed above, please check: ☐ **Same as above**. If not, complete the contact information below.

Name: _____

Mailing Address: _____

City: _____ State: _____ Zip Code: _____

Telephone: _____ FAX: _____

Email: _____

Complete the following information for the property on which BMPs will be implemented under this NOI. You may list multiple parcels if they are located within the same county and are owned or leased by the same person or entity.

Operation Name: _____

County: _____

Tax Parcel Identification Number(s) from County Property Appraiser

Please submit a copy of your county tax bill(s) for all enrolled property, with owner name, address, and the tax parcel ID number(s) clearly visible. **If you cannot provide a copy of the tax bill(s), please write the parcel owner's name and tax parcel ID number(s) below in the format the county uses**. Attach a separate sheet if necessary *(see form provided)*.

Parcel No.: _____ Parcel Owner: _____

Parcel No.: _____ Parcel Owner: _____

Parcel No.: _____ Parcel Owner: _____

Parcel No.: _____ Parcel Owner: _____

Parcel No.: _____ Parcel Owner: _____

☐ Additional parcels are listed on separate sheet. *(check if applicable)*

Total # of acres of all parcels listed ***(as shown property tax records)***: _____

Total # of acres on which BMPs will be implemented under this NOI: _____

In accordance with section 403.067(7)(c)2, Florida Statutes, I submit the foregoing information and the BMP Checklist as proof of my intent to implement the BMPs applicable to the parcel(s) enrolled under this Notice of Intent.

Print Name: _____

(check all that apply) ☐ **Landowner** ☐ **Leaseholder** ☐ **Authorized Agent** *(see below)**

**Relationship to Landowner or Leaseholder:* _____

Signature: _____ Date: _____

Name of Staff Assisting with NOI:

NOTES:

1. You must keep records of BMP implementation, as specified in the BMP manual. All BMP records are subject to inspection.
2. You must notify FDACS if there is a full or partial change in ownership with regard to the parcel(s) enrolled under this NOI.
3. Please remember that it is your responsibility to stay current with future updates of this manual. Visit the following website periodically to check for manual updates: www.floridaagwaterpolicy.com

Additional Tax Parcel Listings

Operation Name: _____

County: _____

Parcel No.: _____ Parcel Owner: _____

Parcel No.: _____ Parcel Owner: _____

Parcel No.: _____ Parcel Owner: _____

Parcel No.: _____ Parcel Owner: _____

Parcel No.: _____ Parcel Owner: _____

Parcel No.: _____ Parcel Owner: _____

Parcel No.: _____ Parcel Owner: _____

Parcel No.: _____ Parcel Owner: _____

Parcel No.: _____ Parcel Owner: _____

Parcel No.: _____ Parcel Owner: _____

Parcel No.: _____ Parcel Owner: _____

Parcel No.: _____ Parcel Owner: _____

Parcel No.: _____ Parcel Owner: _____

Parcel No.: _____ Parcel Owner: _____

Parcel No.: _____ Parcel Owner: _____

FLORIDA SPECIALTY FRUIT AND NUT CROP BMP CHECKLIST

Checklist Instructions

Note: Before you fill out this checklist, follow the section on BMP Enrollment and Implementation, which begins on page 9 of this manual. Read the text and the BMPs in Sections 1.0 - 6.0 before filling out the checklist, in order to know what the practices entail.

1. Check "In Use" for each BMP that you are currently practicing and will continue to practice.

2. For the applicable BMPs you do not implement currently but will implement, enter the month and year you plan to implement them in the "Planned" column. FDACS rule requires that applicable Level 1 BMPs in the manual be implemented as soon as practicable, but not later than 18 months after submittal of the NOI. However, if you need more time to implement practice 5.2.1, you must provide justification in the section provided at the end of the checklist.

3. If you are using or will be using a practice similar to a BMP in the checklist, you may enter AMU (alternative measures used) under the "In Use" or "Planned" column. Be sure to include an implementation date (month/year) in the "Planned" column. Explain in the comments section what alternative measure(s) you are or will be implementing. If applicable, include the NRCS FOTG number associated with the practice.

4. For BMPs you will not implement, check all of the following that apply under "Will Not Implement."
- **NA** = Not Applicable (you do not have a resource concern that requires use of the BMP).
- **TNF** = Technically Not Feasible.
- **ENF** = Economically Not Feasible.
- **Other** = You must explain your reason in the comments section at the end of the checklist.

5. Make sure you follow the record-keeping requirements. BMPs that include record keeping are marked by the following pencil icon:

6. Mail this BMP checklist with your NOI form to FDACS, and keep a copy of both documents in your files.

		In Use/CP#	Planned	Will not implement *(check reason below)*			
BMP #	**BMP Group** (See body of manual for full description)	**Check/ or AMU**	**Month/ Year**	**NA**	**TNF**	**ENF**	**Other**
	1.0 Nutrient Management						
	1.1. Level I – Soil and Tissue Testing						
	1. In non-amended mineral soils, base fertilization rates for P on soil test-based recommendations from a lab that uses a method accepted by the UF/IFAS Extension Soil Testing Laboratory. Keep a copy of all laboratory test results. In amended soils or rockland soils of south Miami-Dade County, use tissue testing as an alternative to determine P fertilization needs.						
	2. Use tissue testing to diagnose the effectiveness of a fertilization program and to determine the need for and appropriate amount of supplemental fertilizer applications. Keep a copy of all laboratory test results.						
	1.2. Level I – General Fertilizer Management						
	1. If available, use the IFAS-recommended fertilization rates for your crop for N, P, and K. If IFAS recommendations are not available, use another credible source, such as U.S. land grant institutions, other recognized universities, or USDA. If using a source other than IFAS, list the source in the comments section at the end of the BMP checklist.						

BMP #	BMP Group (See body of manual for full description)	In Use/CP# Check/ or AMU	Planned Month/ Year	Will not implement *(check reason below)* NA	TNF	ENF	Other
	2. Store fertilizers in a manner that protects them from wind and rainfall.						
	3. Calibrate fertilizer application equipment for maximum distribution uniformity.						
	4. When applying soluble fertilizers, use smaller, more frequent (split) applications to minimize the potential for leaching.						
	5. Keep records of all nutrient applications. Include, at a minimum: date of application, total amount applied, acreage covered, fertilizer analysis or grade, % of controlled-release fertilizer (if applicable), rate per acre, and application method.						
	1.3. Level I – Fertigation						
	1. Based on the flow rate of the irrigation system, calibrate the injection system while the irrigation system is operating. Operating pressures and flow characteristics will influence the injection rate.						
	2. Use highly water-soluble fertilizer sources and inject fertilizer on a frequent (e.g., daily or weekly) basis, depending upon your fertilization and irrigation schedule. Application of small amounts more frequently will reduce the potential for leaching beyond the root zone.						
	1.4. Level I – Other Nutrient Sources						
	1. If using reclaimed water, adjust your nitrogen and phosphorus fertilization rates to account for the nutrient content in the reclaimed water, based on the water quality data from the water supplier.						
	2. If using composted manure or biosolids, determine their nutrient concentrations before using them, and adjust fertilization rates accordingly.						
	2.0 Irrigation Management						
	2.1. Level I – Irrigation Decision-Making and Management Practices						
	1. Use available tools and data to assist in making irrigation decisions, such as on-site soil moisture sensors to determine available soil moisture, crop water use information, and weather data pertinent to your farm. Real-time weather data is available by visiting FAWN, USGS, and water management district websites. If one is available, get a Mobile Irrigation Lab evaluation to assist you.						
	2. Keep records of total rainfall received, using on-site rain gauges.						
	3. Install rain shutoff devices on irrigation systems.						
	4. Minimize application losses due to evaporation and wind drift by irrigating early in the morning, late in the afternoon, at night, and/or when cloud cover is abundant and wind speed is minimal.						

BMP #	BMP Group (See body of manual for full description)	In Use/CP# Check/ or AMU	Planned Month/ Year	Will not implement *(check reason below)* NA	TNF	ENF	Other
5.	Do not irrigate beyond field capacity. When irrigation needs are greater (during long, warm days when the crop is near harvest) or when plants are flowering or developing fruit, splitting irrigation events into 2 or 3 daily applications may be of benefit.						
6.	When sub-surface irrigation is used, maintain the water table at a level no higher than necessary to reach plant roots.						
2.2.	**Level I – General Irrigation System Maintenance**						
1.	Test irrigation source water quality to detect issues with water chemistry that may affect maintenance needs (e.g., related to chemical precipitation and clogging) and fertilization requirements. Adjust your maintenance actions as needed.						
2.	Maintain pump stations and wells, and related components, in good working order. Check them at least monthly, and more frequently during periods of high use. Replace parts as needed.						
3.	Use water meters (flow or volume) or other measuring devices/ calculations to determine how much water is applied to the irrigated area. Document this information and use it to help you determine how well your irrigation system and irrigation schedule are working, and make any needed schedule adjustments or system repairs.						
4.	Monitor water meters or other measuring devices for unusually high or low readings to detect possible leaks or other problems in the system. Make any needed repairs.						
5.	If one is available, get an MIL to check the distribution or emission uniformity and the conveyance efficiency of the irrigation system(s). This should be done every three to five years.						
6.	Maintain a record-keeping system for inspection and maintenance of all irrigation system components. Records should be compared over time for any changes that would indicate problems with the system.						
2.3.	**Level I – Pressurized Irrigation Systems**						
1.	Examine sprinkler nozzles or emitters for wear and malfunction, and replace them as necessary.						
2.	Clean and maintain filtration equipment so it will operate within the recommended pressure range.						
3.	Flush irrigation lines regularly to prevent emitter clogging. To reduce sediment build up, make flushing part of a regular maintenance schedule. If fertigating, prevent microbial growth by flushing all fertilizer from the lateral lines before shutting down the irrigation system.						
2.4.	**Level I – Non-Pressurized Irrigation Systems**						
1.	Clean debris and control weeds in irrigation ditches and canals, to maintain water flow and direction.						

BMP #	BMP Group (See body of manual for full description)	In Use/CP# Check/ or AMU	Planned Month/ Year	Will not implement *(check reason below)* NA	TNF	ENF	Other
2.	Keep water-level-control structures (such as culverts and risers) in irrigation ditches in good working order.						
2.5.	**Level I – Reclaimed Water**						
1.	As needed, design or retrofit irrigation systems to handle reclaimed water, taking into account source water quality and delivery pressures.						
2.	Separate reclaimed water supplies from existing ground or surface water sources to prevent cross-contamination.						
2.6.	**Level I – Special-Case Irrigation Measures**						
1.	When using irrigation for frost/freeze protection, monitor wet-bulb temperatures to conserve water as much as possible. You can find this information at http://fawn.ifas.ufl.edu/tools/.						
2.	If practicable for your operation, use alternative frost/freeze protection measures, such as application of foam material, synthetic row covers, and/or soil banking, among others.						
3.	During a drought, closely monitor soil moisture levels. Whenever practicable, irrigate at times when the least amount of evaporative loss will occur.						
3.0	**Sediment and Erosion Control Measures**						
3.1.	**Level I – Road Maintenance**						
1.	Stabilize access roads that cross streams and creeks, using rock crossings, culverts, or bridges.						
2.	Maintain vegetative cover on road banks.						
3.	When constructing above-grade roads, follow USDA-NRCS FOTG Conservation Practice No. 560, and locate the road(s) a minimum of 25 feet from regulated wetlands.						
3.2.	**Level I – Ditch Maintenance**						
1.	As needed, use selective control of broad leaf vegetation to maintain a permanent grass cover on ditch banks.						
2.	In areas subject to high water velocities, protect ditch banks from erosion using rip-rap, concrete, headwalls, or other buffering materials.						
3.	Keep riser board control structures free from obstructions.						
4.	Do not remove sediments below the ditch's original invert elevation, which can be determined by permit drawings, basic survey drawings, and/or changes in soil characteristics and color. Keep drawings of the design cross-sectional area.						
5.	**Level II – Check Dams / Sediment Traps**						
	Under normal hydrologic conditions, have you observed a sand bar or significant gully erosion where your drainage ditches/canals meet or at a joint where runoff exits your property?						
	Contact the USDA-NRCS County Office for assistance in correcting existing ditch or field erosion, and to prevent future erosion.						

BMP #	BMP Group (See body of manual for full description)	In Use/CP# Check/ or AMU	Planned Month/ Year	Will not implement *(check reason below)* NA	TNF	ENF	Other
3.3.	**Level I – Middles Management**						
1.	As practicable, maintain vegetative cover in row middles.						
	4.0 Stormwater Management						
4.1.	**Level I – Stormwater Management**						
1.	Operate and maintain all stormwater management conveyances (swales, ditches, and canals) to ensure they perform their intended function.						
2.	**Level II – Stormwater Management Plan**						
	Does your operation have flooding issues that have not been addressed by an ERP or other WMD sutface water management permit?						
	Develop and implement a written stormwater management plan that specifically addresses various levels of rainfall, with the goal of reducing the volume of off-site discharge. Include guidelines for regular inspection of BMPs, and steps to implement operation and maintenance provisions.						
3.	Evaluate the plan's effectiveness, and make adjustments as needed.						
	5.0 Water Resources Protection						
5.1.	**Level I – Wetlands Protection**						
1.	Install and/or maintain a minimum 25-foot non-fertilized vegetated buffer upland of the landward boundary of all wetlands, unless you have an existing water management district permit (ERP, MSSW) that specifies a different buffer.						
2.	For existing operations without an ERP that are unable to meet the 25-foot vegetated buffer, submit to FDACS a written description of the alternative measures you will take to protect the wetlands from water quality impacts (see Comments Section at the end of this BMP checklist).						
3.	**Level II – Channelized Discharge to Wetlands**						
	Do you have ditches that discharge directly into wetlands?						
	Use spreader swales (or other means as needed) to intercept water discharging from the ditch(es), in order to reduce flow velocities and provide sheetflow through vegetative buffers prior to reaching the wetlands. Provide to FDACS a written description of the means you will use (see Comments Section at the end of this BMP checklist).						
5.2.	**Level I – Streams Protection**						
1.	Install and/or maintain a riparian buffer along perennial streams on production areas that exceed 1-percent slope and discharge directly to the streams. Contact FDACS, NRCS, or a Technical Service Provider for assistance in properly designing the riparian buffer in accordance with USDA-NRCS Codes 390 and/or 391 in Reference (1) below.						

BMP #	BMP Group (See body of manual for full description)	In Use/CP# Check/ or AMU	Planned Month/ Year	Will not implement *(check reason below)* NA	TNF	ENF	Other
	2. Locate and size any stream crossings to minimize impacts to riparian buffer vegetation and function. Refer to USDA-NRCS Stream Crossing, Code 578 for design criteria.						
	5.3. Level I – Protection for First- and Second-Magnitude Springs Recharge Basins						
	1. Install and/or maintain a 100-foot vegetated, non-fertilized buffer upland of the landward boundary of springs and spring runs.						
	2. Install and/or maintain a 50-foot vegetated, non-fertilized buffer around sinkholes and other karst features.						
	3. If you have a sinkhole on your property, never use it to dispose of used pesticide containers or other refuse.						
	5.4. Level I – Well Operation and Protection						
	1. Use backflow-prevention devices at the wellhead to prevent contamination of the water source.						
	2. Inspect wellheads and pads at least annually for leaks or cracks, and make any necessary repairs.						
	3. Cap or valve wells in accordance with water management district requirements.						
	4. Exclude crop production activities within a 75-foot radius of drinking water wellheads. This radius can be reduced to 25 feet if well-construction records show well-casing depths that extend through confining layers.						
	5. Maintain records of new well construction and modifications to existing wells.						
	6.0 Integrated Pest Management						
	6.1. Level I – Pesticide Use						
	1. Store pesticides in an enclosed, roofed structure with an impervious floor and lockable door, at least 100 feet from wetlands or other waterbodies.						
	2. When practicable, construct a permanent mixlload facility with an impermeable surface, and locate it at least 100 feet from wells and/or surface waters. Where permanent facilities are not practicable, use portable mixlload stations.						
	3. When field mixing is necessary, conduct loading activities at random locations in the field, with the aid of nurse tanks if applicable. Use a check valve or air gap separation to prevent backflow into the tank when filling a sprayer.						

Specialty Fruit and Nut BMP Checklist Comments Section

BMP #	Describe Alternative Measures Used
1.2.1	
5.1.2	
5.1.3	
BMP #	
BMP #	
BMP #	
BMP #	
BMP #	**Justification for additional time to implement specified Level I BMP**
5.2.1	
BMP #	**Enter "Other" reasons for not implementing BMPs**

UF IFAS Extension UNIVERSITY of FLORIDA

FE979

Improving the Precision of Blueberry Frost Protection Irrigation[1]

Tatiana Borisova, Tori Bradley, Mercy Olmstead, and Jeffrey Williamson[2]

Acknowledgements

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Highlights

- This study estimates the potential diesel cost savings and water savings associated with precision cold protection irrigation for blueberry when the irrigation decision accounts for cold hardiness at different blooming stages.
- Precision cold protection irrigation is employed at critical temperatures (32°F and below), depending on the blueberry blooming stage. In practice, growers often follow a uniform strategy, initiating the irrigation systems at 31°F–35°F, with limited consideration of the blueberry blooming stage, to minimize the risk of losing yield and irrigation system freezing due to cold weather.
- For six production seasons (2009–2015) with growers in Alachua, Marion, Hillsborough, and Polk Counties, the number and duration of cold weather events that required cold protection irrigation were much higher given the uniform strategy, compared with the precision strategy, which translates into significant difference in pumping costs and water use.

Figure 1. Blueberries from a Central Florida hobby farm (Source: Sally Lanigan, UF/IFAS)

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- The difference between the uniform and precision irrigation strategies was especially significant in northern counties, but it was noticeable for the southern counties as well.
- For six production seasons (2009–2015), the average estimated difference in water pumping costs for precision and uniform strategies was $515 per pump for growers in Alachua, and $170 per pump for the growers in Hillsborough and Polk Counties, respectively (or $15.8 and $8.5 per acre).
- There was also a significant difference between the volumes of water pumped for cold protection given precision and uniform practices. The estimated average water savings are 120 and 65 thousand gallons per acre per season for the growers in Northern (Alachua and Marion) and Central Florida (Hillsborough and Polk Counties), respectively. If the water is valued at $4 per thousand gallons (average residential water rate for customers using 8 thousand gallons per month), the value of the water use reduction is $481/acre and $259/acre, respectively.

Blueberry Production in Florida Is Growing in Importance

Florida's early-ripening southern highbush blueberry cultivars form the basis for potentially lucrative enterprises for Florida growers, allowing them to take advantage of an early market before other states can compete with higher volumes of berries sold at lower prices. During the months of April and May, Florida is the main supplier of blueberries in the United States (Williamson and Crane 2010; Williamson et al. 2012; Williamson et al. 2014). Because of the market advantage of these early-blooming and early-ripening cultivars grown in Florida, the acreage dedicated to blueberry production has increased significantly. From 2007 to 2012, the number of farms with harvested blueberry crops increased by 87 percent (from 442 to 825 farms), while the harvested acreage increased by 160 percent (from 2,376 to 6,179 acres) (USDA 2012a). By 2012, the production value for Florida blueberries had increased to $62 million (USDA 2012b).

Four counties had especially significant harvested blueberry acreage (USDA 2012a): Alachua and Marion (northern Florida), and Polk and Hillsborough (southern Florida). These counties provided the focal point for this study. Because blueberries grown in central and south Florida usually bloom about a week or 10 days before the berries in north Florida, the distinction between the two regions is economically important.

Potential Money Savings for Improved Precision in Cold Protection Irrigation

Even with Florida's generally warm climate, Florida's blueberries require frost and freeze protection to ensure that cold temperatures do not damage the buds, flowers, and young fruit, thus reducing marketable yields. The traditional practice is to use overhead sprinkler irrigation to reduce the effect of the cold air temperature on sensitive plant organs (Figure 2). More information on frost and freeze protection can be found by reading EDIS publication HS216 [Protecting Blueberries from Freezes in Florida] (Williamson et al. 2004). Researchers differentiate frost and freeze events (Perry 2001), but in this publication, we refer to both events as "cold weather."

An example of one practice that saves growers money on production and reduces per-acre water withdrawals is adjusting the cold protection irrigation to match cold

Figure 2. Cold protection at a private blueberry farm in Alachua County, Florida (Source: Thomas Wright, UF/IFAS)

hardiness for different blooming stages. We refer to this practice as the "precision cold protection irrigation scenario" (or just "precision scenario"). In this study, this practice is compared with the "uniform cold protection irrigation scenario" (or just "uniform scenario"), when the irrigation is applied without considering the cold hardiness for various blooming stages. The objective of this study is to estimate the potential savings in diesel costs and water withdrawal volumes associated with precision cold protection as compared with the uniform scenario.

Critical Air Temperatures during Blueberry Blooming

Existing research shows that the critical temperature depends on bud and flowering stages (also referred to as phenological stages of blueberry during bloom; Figure 3). The temperature can also depend on the blueberry cultivar. For example, EDIS publication HS216 [Protecting Blueberries from Freezes in Florida] (Williamson et al. 2004) summarizes past studies (i.e., Gerber and Martsolf 1965; Spiers 1978) and states that for rabbiteye cultivars, the critical temperature ranges from 25°F for swollen flower buds to 28°F and even higher for fully opened flowers. Similarly, Michigan State University (MSU 2012) and Longstroth (2012) discuss bud swell and tight cluster stages as being relatively cold-resistant, and petal fall/green fruit stage being the most cold-sensitive, even though these studies do not specify the blueberry cultivar or the research methods used to establish the critical temperatures.

Figure 3. Stages of blueberry blooming (Source: Elizabeth Conlan, Mercy Olmstead, and Jeffrey Williamson, UF/IFAS)

Given significant need for information to assist Florida producers with frost protection decisions, UF researchers are currently conducting laboratory experiments to evaluate the hardiness of southern highbush blueberry cultivars, which are typically grown in Florida. However, until this research is completed, Williamson et al. (2004), MSU (2012), and Longstroth (2012) are used as the general guidance for precision cold protection irrigation scenario.

Cold Protection Irrigation Practices Used by Growers

Informal discussions with several Florida blueberry growers and Extension experts revealed that growers typically initiate their irrigation systems between air temperatures of 31°F–35°F, especially during full-bloom and green-fruit stages. Turning the irrigation system on at temperatures above freezing can be warranted. For example, there is a brief initial *reduction* in temperature when the cold protection irrigation system is turned on and the plant becomes wet (due to evaporative cooling) (Bucklin and Haman 2013). Also, during cold and calm nights with no clouds, there may be pockets of cold air in lower-lying areas, or cold air may be trapped close to the ground (radiation freeze), potentially cooling the plants to temperatures below the temperatures reported by weather stations. Producers can also turn the irrigation system on at temperatures above 32°F to prevent the irrigation system from freezing later during the cold night. Growers are also aware of different cold tolerances at different blooming and post-blooming stages. However, several blooming stages can be observed on blueberry plants at the same time, making the cold protection irrigation decision more complex. Topography also affects the temperature in different farm locations, and these differences in temperature results in irrigating the whole farm to protect the most susceptible areas.

As can be seen from this discussion, the decision to turn the cold protection irrigation system on is usually based on past experiences of the producers (it is more art than science). There is also one common theme that arises when speaking with growers about their reasons for turning the irrigation systems on at specific temperatures: the risk of losing yield to a cold weather event. Growers would rather initiate their irrigation at a higher temperature to ensure that they will not wait too long and experience an unexpected temperature drop to dangerous levels.

Comparing Uniform and Precison Cold Protection Irrigation

Blueberries in the northern and southern counties of Florida are susceptible to cold weather damage at slightly different calendar periods due to differences in blooming times, but generally, the months of January, February, and March are the most important for cold protection. Most of March typically comprises the post-bloom period when cold protection is needed to protect young fruits. In this study, for the northern counties (Alachua and Marion), January 30th to February 25th are used as the blooming stage, and for the southern counties (Polk and Hillsborough), January 10th to February 5th are used as the blooming stage. These periods are divided into five equal intervals to approximately represent the transition between bud stages (Table 1).

Table 2 summarizes temperatures considered critical for turning on cold protection irrigation. To represent the uniform cold protection irrigation scenario, we consider periods with the average hourly air temperature of less than 33°F (32°F and below) as critical, for all phenological stages of blooming and post-blooming. In turn, while additional

research is needed to provide recommendations given blueberry cultivars and production conditions specific for Florida, the Michigan State University publication is used as a general guidance for the precision cold protection irrigation scenario. Note that the critical temperatures are generally lower for the precision scenario (except post-blooming stage), implying that this strategy can lower water use and pumping costs in comparison with the uniform scenario.

For both precision and uniform scenarios, we assume that cold protection is applied only given a wind speed of less than 10 to 12 miles per hour (Williamson et al. 2004). Finally, once the irrigation system is turned on, we assume that it stays on until the *wet bulb* temperature rises to 33°F (Jackson et al. undated; Harrison et al. 1972).

The air temperatures for each year and each county with significant blueberry acreage were collected from the Florida Automated Weather Network (FAWN) online database (FAWN 2015). For each county, weather information was downloaded for one weather station, and the average hourly air temperature records measured at 60 cm (or approximately 2 feet) height were used. We also examined average hourly wind speed (measured at 10 meters or approximately 33 feet, since this data were readily available from FAWN), and wet-bulb temperature (calculated at 2 meter or 7 feet height).

Fuel Costs and Hourly Water Use

A farm diesel cost of $2.50/gallon was used, based on subtracting the 2015 federal and state taxes ($0.580 for Florida) (EIA 2015b) from the 2015 diesel prices for the lower Atlantic states ($3.08) (EIA 2015a). The cost estimate was verified through discussions with several growers.

The average diesel use per pump was assumed to be 8.5 gallons of diesel per hour. It was also assumed that pumps typically employed by growers have the capacity of pumping approximately 2.7 thousand gallons of water per minute (or 163 thousand gallons per hour, with an application rate of 0.3 inches/hour). Based on these assumptions, the cost of running a water pump is $21.25/hour, or $0.13/thousand gallons of water.

It was assumed that each pump serves approximately 20 acres. The size of blueberry farms varied significantly in Florida; hence, the total costs related to cold protection irrigation varied from farm to farm. We used the area served by one pump (20 acres) as the basis for our estimations. Table 2 summarizes the assumptions made in this study and can be used with weather data from blueberry-producing counties to determine the costs of growers for cold protection irrigation.

Altering Cold Protection Irrigation to Save Costs and Water Use

Duration of Cold Weather Events

When looking at 2010–2015, the number and the duration of cold weather events that required irrigation were significantly higher given the uniform cold protection irrigation as compared with the precision scenario (Table 3). In Alachua and Marion Counties, the number of cold weather protection events reduced from approximately 4 per season, to 2 to 3 per season. The total duration of cold weather events was significantly longer for the uniform scenario as compared with the precision scenario (with the average difference of 14.8 hours per season).

In Hillsborough and Polk Counties, the number of cold weather events per season is relatively small, still the precision scenario is estimated to reduce the number from 1 to 2 per season, to 0 or 1 event. The duration of cold weather protection irrigation shrinks by 8 hours per season on average.

Pumping Costs

For Alachua and Marion Counties, average reduction in cold weather protection irrigation associated with the precision scenario can be translated into $315 reduction in cost per pump per season (recall that we assumed that each pump serves 20 acres, and hence, the reduction is $15.8 / acre). For Hillsborough and Polk Counties, the average reduction in cold protection irrigation was 8 hours that is associated with $170 reduction in pumping costs per pump (or $8.5/acre). Table 4 summarizes estimated cold protection irrigation costs for the precision and uniform scenarios for the four counties examined. Not surprisingly, the cold protection irrigation costs are the highest for Alachua County, and the lowest for Polk County.

The diesel costs shown in Table 4 only account for one pump running at 8.5 gallons of diesel per hour. Many farms run more than one pump. On larger farms, there may be 20 or more pumps to consider. For example, consider a hypothetical farm in Alachua County that has 200 acres of blueberries served by 10 pumps. If the uniform scenario is followed, the average cost would be approximately $6,600 (assuming the cold protection irrigation needs to be turned on about 4 times per season, for the combined duration of 41 hours). In contrast, if the precision cold protection

irrigation scenario is followed, the grower would pay almost 50 percent less, or an average of $3,700 per season (reducing the number of the irrigation events to 2 to 3 times per season, with the total duration of 17 hours). This is a difference of almost $3,000 per season for this large farm. For growers who wish to determine their own pumping costs based on their individual operations, Tables 6 and 6 illustrate the necessary calculations.

Cold Protection Irrigation Water Use

There is also a substantial difference in the volumes of water being pumped for cold protection given precision and uniform scenarios. We assume that cold protection requires 162.9 thousand gallons per hour to protect 20 acres of blueberry, or 8.1 thousand gallons to protect 1 acre for 1 hour (Table 5). Reduction in irrigation duration by 14.8 hours means 120.2 thousand gallon of water use reduction per acre per season for Alachua and Marion Counties. For Polk and Hillsborough counties, 8 hour reduction in cold weather protection duration results in 64.8 thousand gallon reduction in water use per acre per season. Note that in some seasons, the difference can be even higher. If the water is valued at $4 per thousand gallons (which is an estimated average price paid by residential customers using 8 thousand gallons per month, Raftellis Consultants Inc. 2012), then the water use reduction resulting from switching from the uniform to precision strategy would be valued at $481/acre for Alachua and Marion Counties, and $259/acre for Hillsborough and Polk Counties.

Study Limitations

The temperatures for the precision cold protection irrigation scenario used in this study are based on a publication developed by Michigan State University (MSU 2012); these temperatures are similar to the recommendations in Longstroth (2012), and are not developed specifically for Florida. Additional research will allow for a more accurate definition of the critical temperature for blueberry cultivars grown in Florida so that growers can ensure high yields while conserving water and saving money on cold protection irrigation.

Longstroth (2012) acknowledges slight damage in petals or flowers for temperatures close to the recommended temperatures. Not all petal or flower damage translates into yield losses; and neither Longstroth (2012) nor MSU (2012) offers any description of the effect (or the lack of effect) of petal or flower damage on yield.

In our analysis, we made a few assumptions that may oversimplify some cases. Specifically, we considered a fixed time interval for blooming and post-blooming stages; however, the timing of blooming can shift from year to year, depending on weather conditions. Furthermore, we made a set of assumptions to characterize common grower practices and farm setup, while acknowledging some variability in real grower decisions. Finally, in estimating water pumping costs, we accounted for diesel costs only, and we did not consider other possible costs, such as labor and pump depreciation and maintenance.

Conclusions

Growers who follow the research-based critical temperature recommendations for cold protection techniques given different flowering stages can decrease their diesel costs for cold protection irrigation. However, accurate temperature monitoring in blueberry fields is critical and may require several onsite strategically placed weather stations or sheltered thermometers. It is also important to understand the temperature differences between a weather station or sheltered thermometer and actual plant tissue. Depending on the county, growers can expect to reduce the length of cold protection irrigation by up to 41 hours per season, reducing pumping costs by up to $871 per pump per season (or $44 per acre per season). Average reductions are $315 per pump per season in Alachua and Marion Counties (or $15.8 / acre per season) and $170 per pump per season in Polk and Hillsborough Counties (or $8.5/acre). Growers can also expect *significant* reductions in water use for cold protection: averages per season are 120.2 thousand gallons per acre in Marion and Alachua, and 64.8 thousand gallons per acre for Polk and Hillsborough Counties. This water use reduction is valued highly (one of the metrics can be the average price of $4/thousand gallons paid by residential customers for tap water, Raftellins Consulting 2012).

It should be noted that this study does not consider the yields predicted using alternate cold protection strategies, or the possibility of irrigation system freezing if the irrigation system is not turned on. Some strategies may prove to be more effective than others in terms of amount of berries lost versus the amount of berries the grower is able to save and harvest following the cold weather events. More research is needed to determine the best strategies for cold protection that results in the highest yield. When coupled with the savings from adhering to the research-based critical temperatures, a high yield strategy will become even more lucrative for growers.

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Table 1. Florida blueberry bud stages and critical temperatures used in the study

Bud development, blooming, and post-blooming stages	Dates		Critical air temperatures for cold protection irrigation	
	Southern counties (Polk & Hillsborough)	Northern counties (Alachua & Marion)	Precision scenario	Uniform scenario
3–Tight Cluster	Jan 10–Jan 14	Jan 30–Feb 3	23°F (–5.0°C)*	33°F (0.6°C)
4–Early Pink	Jan 15–Jan 19	Feb 4–Feb 8	25°F (–3.9°C)*	33°F (0.6°C)
5–Late Pink	Jan 20–Jan 24	Feb 9–Feb 13	27°F (–2.8°C)*	33°F (0.6°C)
6–Full Bloom	Jan 25–Jan 29	Feb 14–Feb 18	28°F (–2.2°C)*	33°F (0.6°C)
7–Petal Fall	Jan 30–Feb 5	Feb 19–Feb 25	32°F (0.0°C)*	33°F (0.6°C)
8–Post-bloom – young fruit	Feb 6–Mar 15	Feb 26–Mar 31	33°F (0.6°C)**	33°F (0.6°C)

* Source: MSU (2012). ** assumed to be the same as common growers' practice.

Table 2. Assumptions made to characterize blueberry farming practices

Assumption description	Value
Area served by one water pump, acres	20.0
Water pump capacity, thousand gallons of water per minute	2.7
Water application rate for cold protection, inches per hour	0.3
Water pump diesel use, gallons of diesel per hour	8.5
Diesel cost, $/gallon	$2.50
Diesel cost per hour per pump, $/hour	$21.25
Cost of water pumping per acre per hour, $/(hour*acre)	$1.06
Cost of water pumping, $/thousand gallons of water	$0.13

Table 3. Cold weather events per county per year, 2010–2015

County (City)	Year	Number of cold events		Total duration of cold events (hours)		
		Precision cold protection irrigation	Uniform cold protection irrigation	Precision cold protection irrigation	Uniform cold protection irrigation	Difference
Northern Florida						
Alachua County (Alachua)	2010	6	12	40	81	41
	2011	0	5	0	32	32
	2012	2	3	22	34	12
	2013	7	10	48	69	21
	2014	0	1	0	3	3
	2015	5	5	36	46	10
Marion County (Citra)	2010	5	7	32	50	18
	2011	0	2	0	12	12
	2012	2	2	16	22	6
	2013	2	5	17	34	17
	2014	0	0	0	0	0
	2015	2	3	15	21	6
Average for Northern FL		2.4	4.2	17.4	31.1	14.8
Central Florida						
Hillsborough County (Dover)	2010	2	5	10	51	41
	2011	0	3	0	18	18
	2012	1	1	10	10	0
	2013	1	1	4	4	0
	2014	0	0	0	0	0
	2015	1	1	8	8	0
Polk County (Lake Alfred)	2010	1	4	2	37	35
	2011	0	1	0	6	6
	2012	1	1	5	5	0
	2013	1	1	2	2	0
	2014	0	0	0	0	0
	2015	0	0	0	0	0
Average for Central FL		0.6	1.4	3.2	10.5	8.0

Table 4. Estimataed cost and savings *per pump* (serving 20 acres) for cold weather events in four Florida counties, January 2010 – March 2015

Year	Alachua County			Marion County		
	Precision	Uniform	*Savings*	Precision	Uniform	*Savings*
2010	$850.0	$1,721.3	*$871.3*	$680.0	$1,062.5	*$382.5*
2011	$0.0	$680.0	*$680.0*	$0.0	$255.0	*$255.0*
2012	$467.5	$722.5	*$255.0*	$340.0	$467.5	*$127.5*
2013	$1,020.0	$1,466.3	*$446.3*	$361.3	$722.5	*$361.3*
2014	$0.0	$63.8	*$63.8*	$0.0	$0.0	*$0.0*
2015	$765.0	$977.5	*$212.5*	$318.8	$446.3	*$127.5*
Year	Hillsborough County			Polk County		
	Precision	Uniform	*Savings*	Precision	Uniform	*Savings*
2010	$212.5	$1,083.8	*$871.3*	$42.5	$786.3	*$743.8*
2011	$0.0	$382.5	*$382.5*	$0.0	$127.5	*$127.5*
2012	$212.5	$212.5	*$0.0*	$106.3	$106.3	*$0.0*
2013	$85.0	$85.0	*$0.0*	$42.5	$42.5	*$0.0*
2014	$0.0	$0.0	*$0.0*	$0.0	$0.0	*$0.0*
2015	$170.0	$170.0	*$0.0*	$0.0	$0.0	*$0.0*

Table 5. Estimation of diesel cost per gallon of water

Assumptions	
Water application rate:	0.3 inches per hour
Area irrigated by one pump:	20 acres
Farm diesel cost:	$21.25 per pump per hour
Convert water application rate into gallons per hour	
1 acre-inch per hour:	27,154.29 gallons of water
Water application rate per hour per acre by one pump (at 0.3 inches/hour):	27,154.29 gallons*.3 inches per hour = 8,143.59 gallons per acre per hour
Total water application rate per hour for 20 acres served by one pump	8,143.59*20 acres=162,871.74 gallons water per pump per hour
Estimate cost of water pumping	
	$21.25 / 162,871.74 gallons = $0.00013/gallon of water or $0.13/thousand gallons of water

Table 6. Pumping cost estimation

Diesel price ($/gallon):	$2.50
Assumed gallons of diesel used per pump per hour (gallon/hour)	8.5
Diesel cost for one pump per hour ($/hour)	$2.50*8.5= $21.25 of diesel per pump per hour
Diesel cost per hour per farm:	Diesel cost per hour per pump ($21.25) * number of pumps
Diesel cost per hour per acre	Diesel cost per hour per pump/acres served by the pump

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Improving the Precision of Blueberry Frost Protection Irrigation[1]

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Highlights

- This study estimates the potential diesel cost savings and water savings associated with precision cold protection irrigation for blueberry when the irrigation decision accounts for cold hardiness at different blooming stages.
- Precision cold protection irrigation is employed at critical temperatures (32°F and below), depending on the blueberry blooming stage. In practice, growers often follow a uniform strategy, initiating the irrigation systems at 31°F–35°F, with limited consideration of the blueberry blooming stage, to minimize the risk of losing yield and irrigation system freezing due to cold weather.
- For six production seasons (2009–2015) with growers in Alachua, Marion, Hillsborough, and Polk Counties, the number and duration of cold weather events that required cold protection irrigation were much higher given the uniform strategy, compared with the precision strategy, which translates into significant difference in pumping costs and water use.

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Blueberry Production in Florida Is Growing in Importance

Florida's early-ripening southern highbush blueberry cultivars form the basis for potentially lucrative enterprises for Florida growers, allowing them to take advantage of an early market before other states can compete with higher volumes of berries sold at lower prices. During the months of April and May, Florida is the main supplier of blueberries in the United States (Williamson and Crane 2010; Williamson et al. 2012; Williamson et al. 2014). Because of the market advantage of these early-blooming and early-ripening cultivars grown in Florida, the acreage dedicated to blueberry production has increased significantly. From 2007 to 2012, the number of farms with harvested blueberry crops increased by 87 percent (from 442 to 825 farms), while the harvested acreage increased by 160 percent (from 2,376 to 6,179 acres) (USDA 2012a). By 2012, the production value for Florida blueberries had increased to $62 million (USDA 2012b).

Four counties had especially significant harvested blueberry acreage (USDA 2012a): Alachua and Marion (northern Florida), and Polk and Hillsborough (southern Florida). These counties provided the focal point for this study. Because blueberries grown in central and south Florida usually bloom about a week or 10 days before the berries in north Florida, the distinction between the two regions is economically important.

Potential Money Savings for Improved Precision in Cold Protection Irrigation

Even with Florida's generally warm climate, Florida's blueberries require frost and freeze protection to ensure that cold temperatures do not damage the buds, flowers, and young fruit, thus reducing marketable yields. The traditional practice is to use overhead sprinkler irrigation to reduce the effect of the cold air temperature on sensitive plant organs (Figure 2). More information on frost and freeze protection can be found by reading EDIS publication HS216 [Protecting Blueberries from Freezes in Florida] (Williamson et al. 2004). Researchers differentiate frost and freeze events (Perry 2001), but in this publication, we refer to both events as "cold weather."

An example of one practice that saves growers money on production and reduces per-acre water withdrawals is adjusting the cold protection irrigation to match cold

Figure 2. Cold protection at a private blueberry farm in Alachua County, Florida (Source: Thomas Wright, UF/IFAS)

hardiness for different blooming stages. We refer to this practice as the "precision cold protection irrigation scenario" (or just "precision scenario"). In this study, this practice is compared with the "uniform cold protection irrigation scenario" (or just "uniform scenario"), when the irrigation is applied without considering the cold hardiness for various blooming stages. The objective of this study is to estimate the potential savings in diesel costs and water withdrawal volumes associated with precision cold protection as compared with the uniform scenario.

Critical Air Temperatures during Blueberry Blooming

Existing research shows that the critical temperature depends on bud and flowering stages (also referred to as phenological stages of blueberry during bloom; Figure 3). The temperature can also depend on the blueberry cultivar. For example, EDIS publication HS216 [Protecting Blueberries from Freezes in Florida] (Williamson et al. 2004) summarizes past studies (i.e., Gerber and Martsolf 1965; Spiers 1978) and states that for rabbiteye cultivars, the critical temperature ranges from 25°F for swollen flower buds to 28°F and even higher for fully opened flowers. Similarly, Michigan State University (MSU 2012) and Longstroth (2012) discuss bud swell and tight cluster stages as being relatively cold-resistant, and petal fall/green fruit stage being the most cold-sensitive, even though these studies do not specify the blueberry cultivar or the research methods used to establish the critical temperatures.

Figure 3. Stages of blueberry blooming (Source: Elizabeth Conlan, Mercy Olmstead, and Jeffrey Williamson, UF/IFAS)

Given significant need for information to assist Florida producers with frost protection decisions, UF researchers are currently conducting laboratory experiments to evaluate the hardiness of southern highbush blueberry cultivars, which are typically grown in Florida. However, until this research is completed, Williamson et al. (2004), MSU (2012), and Longstroth (2012) are used as the general guidance for precision cold protection irrigation scenario.

Cold Protection Irrigation Practices Used by Growers

Informal discussions with several Florida blueberry growers and Extension experts revealed that growers typically initiate their irrigation systems between air temperatures of 31°F–35°F, especially during full-bloom and green-fruit stages. Turning the irrigation system on at temperatures above freezing can be warranted. For example, there is a brief initial *reduction* in temperature when the cold protection irrigation system is turned on and the plant becomes wet (due to evaporative cooling) (Bucklin and Haman 2013). Also, during cold and calm nights with no clouds, there may be pockets of cold air in lower-lying areas, or cold air may be trapped close to the ground (radiation freeze), potentially cooling the plants to temperatures below the temperatures reported by weather stations. Producers can also turn the irrigation system on at temperatures above 32°F to prevent the irrigation system from freezing later during the cold night. Growers are also aware of different cold tolerances at different blooming and post-blooming stages. However, several blooming stages can be observed on blueberry plants at the same time, making the cold protection irrigation decision more complex. Topography also affects the temperature in different farm locations, and these differences in temperature results in irrigating the whole farm to protect the most susceptible areas.

As can be seen from this discussion, the decision to turn the cold protection irrigation system on is usually based on past experiences of the producers (it is more art than science). There is also one common theme that arises when speaking with growers about their reasons for turning the irrigation systems on at specific temperatures: the risk of losing yield to a cold weather event. Growers would rather initiate their irrigation at a higher temperature to ensure that they will not wait too long and experience an unexpected temperature drop to dangerous levels.

Comparing Uniform and Precison Cold Protection Irrigation

Blueberries in the northern and southern counties of Florida are susceptible to cold weather damage at slightly different calendar periods due to differences in blooming times, but generally, the months of January, February, and March are the most important for cold protection. Most of March typically comprises the post-bloom period when cold protection is needed to protect young fruits. In this study, for the northern counties (Alachua and Marion), January 30th to February 25th are used as the blooming stage, and for the southern counties (Polk and Hillsborough), January 10th to February 5th are used as the blooming stage. These periods are divided into five equal intervals to approximately represent the transition between bud stages (Table 1).

Table 2 summarizes temperatures considered critical for turning on cold protection irrigation. To represent the uniform cold protection irrigation scenario, we consider periods with the average hourly air temperature of less than 33°F (32°F and below) as critical, for all phenological stages of blooming and post-blooming. In turn, while additional

research is needed to provide recommendations given blueberry cultivars and production conditions specific for Florida, the Michigan State University publication is used as a general guidance for the precision cold protection irrigation scenario. Note that the critical temperatures are generally lower for the precision scenario (except post-blooming stage), implying that this strategy can lower water use and pumping costs in comparison with the uniform scenario.

For both precision and uniform scenarios, we assume that cold protection is applied only given a wind speed of less than 10 to 12 miles per hour (Williamson et al. 2004). Finally, once the irrigation system is turned on, we assume that it stays on until the *wet bulb* temperature rises to 33°F (Jackson et al. undated; Harrison et al. 1972).

The air temperatures for each year and each county with significant blueberry acreage were collected from the Florida Automated Weather Network (FAWN) online database (FAWN 2015). For each county, weather information was downloaded for one weather station, and the average hourly air temperature records measured at 60 cm (or approximately 2 feet) height were used. We also examined average hourly wind speed (measured at 10 meters or approximately 33 feet, since this data were readily available from FAWN), and wet-bulb temperature (calculated at 2 meter or 7 feet height).

Fuel Costs and Hourly Water Use

A farm diesel cost of $2.50/gallon was used, based on subtracting the 2015 federal and state taxes ($0.580 for Florida) (EIA 2015b) from the 2015 diesel prices for the lower Atlantic states ($3.08) (EIA 2015a). The cost estimate was verified through discussions with several growers.

The average diesel use per pump was assumed to be 8.5 gallons of diesel per hour. It was also assumed that pumps typically employed by growers have the capacity of pumping approximately 2.7 thousand gallons of water per minute (or 163 thousand gallons per hour, with an application rate of 0.3 inches/hour). Based on these assumptions, the cost of running a water pump is $21.25/hour, or $0.13/thousand gallons of water.

It was assumed that each pump serves approximately 20 acres. The size of blueberry farms varied significantly in Florida; hence, the total costs related to cold protection irrigation varied from farm to farm. We used the area served by one pump (20 acres) as the basis for our estimations. Table 2 summarizes the assumptions made in this study and can be used with weather data from blueberry-producing counties to determine the costs of growers for cold protection irrigation.

Altering Cold Protection Irrigation to Save Costs and Water Use

Duration of Cold Weather Events

When looking at 2010–2015, the number and the duration of cold weather events that required irrigation were significantly higher given the uniform cold protection irrigation as compared with the precision scenario (Table 3). In Alachua and Marion Counties, the number of cold weather protection events reduced from approximately 4 per season, to 2 to 3 per season. The total duration of cold weather events was significantly longer for the uniform scenario as compared with the precision scenario (with the average difference of 14.8 hours per season).

In Hillsborough and Polk Counties, the number of cold weather events per season is relatively small, still the precision scenario is estimated to reduce the number from 1 to 2 per season, to 0 or 1 event. The duration of cold weather protection irrigation shrinks by 8 hours per season on average.

Pumping Costs

For Alachua and Marion Counties, average reduction in cold weather protection irrigation associated with the precision scenario can be translated into $315 reduction in cost per pump per season (recall that we assumed that each pump serves 20 acres, and hence, the reduction is $15.8 / acre). For Hillsborough and Polk Counties, the average reduction in cold protection irrigation was 8 hours that is associated with $170 reduction in pumping costs per pump (or $8.5/acre). Table 4 summarizes estimated cold protection irrigation costs for the precision and uniform scenarios for the four counties examined. Not surprisingly, the cold protection irrigation costs are the highest for Alachua County, and the lowest for Polk County.

The diesel costs shown in Table 4 only account for one pump running at 8.5 gallons of diesel per hour. Many farms run more than one pump. On larger farms, there may be 20 or more pumps to consider. For example, consider a hypothetical farm in Alachua County that has 200 acres of blueberries served by 10 pumps. If the uniform scenario is followed, the average cost would be approximately $6,600 (assuming the cold protection irrigation needs to be turned on about 4 times per season, for the combined duration of 41 hours). In contrast, if the precision cold protection

irrigation scenario is followed, the grower would pay almost 50 percent less, or an average of $3,700 per season (reducing the number of the irrigation events to 2 to 3 times per season, with the total duration of 17 hours). This is a difference of almost $3,000 per season for this large farm. For growers who wish to determine their own pumping costs based on their individual operations, Tables 6 and 6 illustrate the necessary calculations.

Cold Protection Irrigation Water Use

There is also a substantial difference in the volumes of water being pumped for cold protection given precision and uniform scenarios. We assume that cold protection requires 162.9 thousand gallons per hour to protect 20 acres of blueberry, or 8.1 thousand gallons to protect 1 acre for 1 hour (Table 5). Reduction in irrigation duration by 14.8 hours means 120.2 thousand gallon of water use reduction per acre per season for Alachua and Marion Counties. For Polk and Hillsborough counties, 8 hour reduction in cold weather protection duration results in 64.8 thousand gallon reduction in water use per acre per season. Note that in some seasons, the difference can be even higher. If the water is valued at $4 per thousand gallons (which is an estimated average price paid by residential customers using 8 thousand gallons per month, Raftellis Consultants Inc. 2012), then the water use reduction resulting from switching from the uniform to precision strategy would be valued at $481/acre for Alachua and Marion Counties, and $259/acre for Hillsborough and Polk Counties.

Study Limitations

The temperatures for the precision cold protection irrigation scenario used in this study are based on a publication developed by Michigan State University (MSU 2012); these temperatures are similar to the recommendations in Longstroth (2012), and are not developed specifically for Florida. Additional research will allow for a more accurate definition of the critical temperature for blueberry cultivars grown in Florida so that growers can ensure high yields while conserving water and saving money on cold protection irrigation.

Longstroth (2012) acknowledges slight damage in petals or flowers for temperatures close to the recommended temperatures. Not all petal or flower damage translates into yield losses; and neither Longstroth (2012) nor MSU (2012) offers any description of the effect (or the lack of effect) of petal or flower damage on yield.

In our analysis, we made a few assumptions that may oversimplify some cases. Specifically, we considered a fixed time interval for blooming and post-blooming stages; however, the timing of blooming can shift from year to year, depending on weather conditions. Furthermore, we made a set of assumptions to characterize common grower practices and farm setup, while acknowledging some variability in real grower decisions. Finally, in estimating water pumping costs, we accounted for diesel costs only, and we did not consider other possible costs, such as labor and pump depreciation and maintenance.

Conclusions

Growers who follow the research-based critical temperature recommendations for cold protection techniques given different flowering stages can decrease their diesel costs for cold protection irrigation. However, accurate temperature monitoring in blueberry fields is critical and may require several onsite strategically placed weather stations or sheltered thermometers. It is also important to understand the temperature differences between a weather station or sheltered thermometer and actual plant tissue. Depending on the county, growers can expect to reduce the length of cold protection irrigation by up to 41 hours per season, reducing pumping costs by up to $871 per pump per season (or $44 per acre per season). Average reductions are $315 per pump per season in Alachua and Marion Counties (or $15.8 / acre per season) and $170 per pump per season in Polk and Hillsborough Counties (or $8.5/acre). Growers can also expect *significant* reductions in water use for cold protection: averages per season are 120.2 thousand gallons per acre in Marion and Alachua, and 64.8 thousand gallons per acre for Polk and Hillsborough Counties. This water use reduction is valued highly (one of the metrics can be the average price of $4/thousand gallons paid by residential customers for tap water, Raftellins Consulting 2012).

It should be noted that this study does not consider the yields predicted using alternate cold protection strategies, or the possibility of irrigation system freezing if the irrigation system is not turned on. Some strategies may prove to be more effective than others in terms of amount of berries lost versus the amount of berries the grower is able to save and harvest following the cold weather events. More research is needed to determine the best strategies for cold protection that results in the highest yield. When coupled with the savings from adhering to the research-based critical temperatures, a high yield strategy will become even more lucrative for growers.

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Table 1. Florida blueberry bud stages and critical temperatures used in the study

Bud development, blooming, and post-blooming stages	Dates		Critical air temperatures for cold protection irrigation	
	Southern counties (Polk & Hillsborough)	Northern counties (Alachua & Marion)	Precision scenario	Uniform scenario
3–Tight Cluster	Jan 10–Jan 14	Jan 30–Feb 3	23°F (–5.0°C)*	33°F (0.6°C)
4–Early Pink	Jan 15–Jan 19	Feb 4–Feb 8	25°F (–3.9°C)*	33°F (0.6°C)
5–Late Pink	Jan 20–Jan 24	Feb 9–Feb 13	27°F (–2.8°C)*	33°F (0.6°C)
6–Full Bloom	Jan 25–Jan 29	Feb 14–Feb 18	28°F (–2.2°C)*	33°F (0.6°C)
7–Petal Fall	Jan 30–Feb 5	Feb 19–Feb 25	32°F (0.0°C)*	33°F (0.6°C)
8–Post-bloom – young fruit	Feb 6–Mar 15	Feb 26–Mar 31	33°F (0.6°C)**	33°F (0.6°C)

* Source: MSU (2012). ** assumed to be the same as common growers' practice.

Table 2. Assumptions made to characterize blueberry farming practices

Assumption description	Value
Area served by one water pump, acres	20.0
Water pump capacity, thousand gallons of water per minute	2.7
Water application rate for cold protection, inches per hour	0.3
Water pump diesel use, gallons of diesel per hour	8.5
Diesel cost, $/gallon	$2.50
Diesel cost per hour per pump, $/hour	$21.25
Cost of water pumping per acre per hour, $/(hour*acre)	$1.06
Cost of water pumping, $/thousand gallons of water	$0.13

Table 3. Cold weather events per county per year, 2010–2015

County (City)	Year	Number of cold events		Total duration of cold events (hours)		
		Precision cold protection irrigation	Uniform cold protection irrigation	Precision cold protection irrigation	Uniform cold protection irrigation	Difference
Northern Florida						
Alachua County (Alachua)	2010	6	12	40	81	41
	2011	0	5	0	32	32
	2012	2	3	22	34	12
	2013	7	10	48	69	21
	2014	0	1	0	3	3
	2015	5	5	36	46	10
Marion County (Citra)	2010	5	7	32	50	18
	2011	0	2	0	12	12
	2012	2	2	16	22	6
	2013	2	5	17	34	17
	2014	0	0	0	0	0
	2015	2	3	15	21	6
Average for Northern FL		2.4	4.2	17.4	31.1	14.8
Central Florida						
Hillsborough County (Dover)	2010	2	5	10	51	41
	2011	0	3	0	18	18
	2012	1	1	10	10	0
	2013	1	1	4	4	0
	2014	0	0	0	0	0
	2015	1	1	8	8	0
Polk County (Lake Alfred)	2010	1	4	2	37	35
	2011	0	1	0	6	6
	2012	1	1	5	5	0
	2013	1	1	2	2	0
	2014	0	0	0	0	0
	2015	0	0	0	0	0
Average for Central FL		0.6	1.4	3.2	10.5	8.0

Table 4. Estimataed cost and savings *per pump* (serving 20 acres) for cold weather events in four Florida counties, January 2010 – March 2015

Year	Alachua County			Marion County		
	Precision	Uniform	*Savings*	Precision	Uniform	*Savings*
2010	$850.0	$1,721.3	*$871.3*	$680.0	$1,062.5	*$382.5*
2011	$0.0	$680.0	*$680.0*	$0.0	$255.0	*$255.0*
2012	$467.5	$722.5	*$255.0*	$340.0	$467.5	*$127.5*
2013	$1,020.0	$1,466.3	*$446.3*	$361.3	$722.5	*$361.3*
2014	$0.0	$63.8	*$63.8*	$0.0	$0.0	*$0.0*
2015	$765.0	$977.5	*$212.5*	$318.8	$446.3	*$127.5*
Year	Hillsborough County			Polk County		
	Precision	Uniform	*Savings*	Precision	Uniform	*Savings*
2010	$212.5	$1,083.8	*$871.3*	$42.5	$786.3	*$743.8*
2011	$0.0	$382.5	*$382.5*	$0.0	$127.5	*$127.5*
2012	$212.5	$212.5	*$0.0*	$106.3	$106.3	*$0.0*
2013	$85.0	$85.0	*$0.0*	$42.5	$42.5	*$0.0*
2014	$0.0	$0.0	*$0.0*	$0.0	$0.0	*$0.0*
2015	$170.0	$170.0	*$0.0*	$0.0	$0.0	*$0.0*

Table 5. Estimation of diesel cost per gallon of water

Assumptions	
Water application rate:	0.3 inches per hour
Area irrigated by one pump:	20 acres
Farm diesel cost:	$21.25 per pump per hour
Convert water application rate into gallons per hour	
1 acre-inch per hour:	27,154.29 gallons of water
Water application rate per hour per acre by one pump (at 0.3 inches/hour):	27,154.29 gallons*.3 inches per hour = 8,143.59 gallons per acre per hour
Total water application rate per hour for 20 acres served by one pump	8,143.59*20 acres=162,871.74 gallons water per pump per hour
Estimate cost of water pumping	
	$21.25 / 162,871.74 gallons = $0.00013/gallon of water or $0.13/thousand gallons of water

Table 6. Pumping cost estimation

Diesel price ($/gallon):	$2.50
Assumed gallons of diesel used per pump per hour (gallon/hour)	8.5
Diesel cost for one pump per hour ($/hour)	$2.50*8.5= $21.25 of diesel per pump per hour
Diesel cost per hour per farm:	Diesel cost per hour per pump ($21.25) * number of pumps
Diesel cost per hour per acre	Diesel cost per hour per pump/acres served by the pump

UF IFAS Extension UNIVERSITY of FLORIDA

FE1002

Establishment and Production Costs for Southern Highbush Blueberry Orchards in Florida: Enterprise Budget and Profitability Analysis[1]

Ariel Singerman, Marina Burani-Arouca, Jeffrey G. Williamson, and Gary K. England[2]

Introduction

The United States is the world's largest producer of blueberries, with Michigan being the top producing state. In 2014, US blueberry production was estimated at 576 million pounds. That year, Michigan growers produced 99 million pounds of blueberries, while Florida's growers produced 20 million pounds of fruit (USDA/NASS 2015a). Nationwide, Florida's blueberry production represented only 3.54% of total US production and 9% of total US value. The relatively higher value of Florida production is due to the advantage of producing the first crop of domestic blueberries each calendar year, which means growers obtain higher prices during the early market window (Williamson et al. 2015). In fact, the average price received by growers in Florida during the last three years was 2.5 times that of the US average (USDA/NASS 2015b).

The Florida blueberry industry has experienced significant growth in recent years. The number of harvested acres increased from 2,600 in 2007 to 4,300 in 2014, representing a 65% increase (USDA/NASS 2015a). Factors such as increased consumer demand for blueberries and citrus growers looking for alternative crops due to the devastating effect of Huanglongbing (HLB; citrus greening) help to explain the rapid increase in blueberry acreage in Florida.

Credits:. USDA

The southern highbush blueberry is an interspecific hybrid that is primarily grown in Florida, Georgia, and southern California. It is well adapted to Florida's mild winter climate, ripens earlier than other cultivars when market

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prices are highest, and is most suitable for fresh fruit markets (Williamson et al. 2015).

This article, which summarizes the establishment and production costs, as well as the potential profitability of a southern highbush blueberry orchard in Florida, is organized as follows. First, we present a blueberry enterprise budget. Second, we provide estimates of potential revenue and undiscounted cash flows for different combinations of prices and yields. Third, we analyze the investment in a blueberry operation by computing the Net Present Value (NPV) for different discount rates. This information is relevant to current and potential Florida blueberry growers.

Assumptions

Readers are reminded that this economic analysis is based on a number of assumptions, particularly regarding yields, prices and, revenue. We use a combination of production scenarios to generate a range of possible outcomes.

The assumptions used for the economic analysis include the following:

- The land is already owned and any required buildings are onsite.
- Calculations for investment and fixed costs of machinery and irrigation assume a 20-acre operation.
- Plant spacing is 2.5 by 9 feet, resulting in 1,936 plants per acre.
- The time horizon for the analysis is 10 years.
- Production costs are assumed to be constant for years 3 through 10.
- It is assumed that it takes four years for the plants to reach full production.
- Three different yield scenarios are analyzed. In scenarios 1, 2, and 3, the maximum marketable berries are 6, 7, and 8 thousand pounds per acre, respectively, in years 4 through 7 (Table 1).
- Yield is reduced 3% annually after year 7.
- Plant mortality rate is 3% annually, with dead plants replaced every year.
- The assumed packout is 95%.
- The brokerage fee is 8% of market price and includes cost of cooling and handling.
- An interest rate of 5% is applied to obtain the interest on variable costs and capital investment.
- Overhead and management are computed as 10% of the total variable costs.

There are also a few caveats worth noting. First, the quotes for chemicals in our calculations are based on retail prices obtained from vendors, but growers, depending on the size of their operation, may receive up to a 20% discount for volume. Second, the actual investment in machinery and irrigation depends on whether growers start a new operation or whether the equipment is already available to them; for this budget, all equipment was assumed to be new and prices were obtained from machinery dealers. Third, the cultural practices used to build the enterprise budget are based on a combination of recommendations from UF/IFAS Extension personnel and the experience of blueberry growers who provided feedback for this budget.

Estimated Capital Investment, Establishment, and Maintenance Costs Per Acre

Costs are typically divided into variable (or operating) and fixed (or ownership) costs. Variable costs depend on the level of production and arise from the actual operation of the enterprise; they include costs of land preparation, planting, fertilization, weed control, and pest and disease control. Fixed costs are independent of the level of production and arise from owning fixed inputs such as machinery, buildings, or land. For example, fixed costs include asset depreciation, interest, insurance, and taxes.

The required initial investment in machinery for a blueberry operation is $5,488 per acre, and the annual fixed costs associated with the operation are $981 per acre (Table 2). The initial investment in irrigation is $14,110 per acre, and the corresponding annual fixed costs per acre are $1,634 (Table 3). Thus, the total investment in machinery and irrigation required to establish a blueberry operation in Florida is $19,598 per acre. Table 3 also shows that the costs associated with repairs and maintenance for the irrigation system is $304.

Tables 4 through 6 show the estimated establishment and maintenance costs per acre for the 10-year horizon. The budget for the first year includes the cost of land preparation at $5,013 and solid-set planting at $4,840 per acre, respectively. For the first year, total variable costs are $12,458 per acre, and fixed costs are $4,111 per acre. Thus, total variable and fixed costs are $16,568 per acre for year one (Table 4).

For the second year, variable costs are $4,977 per acre, and fixed costs are $3,363 per acre. Fixed costs associated with irrigation account for approximately 49% of the total fixed costs per acre. Also, in the second year, variable and fixed costs combined are $8,340 per acre year (Table 5). Starting in year two, plants start bearing fruit, initiating the costs of harvesting, marketing, and brokerage.

Variable costs for the third year are $5,603 per acre, and fixed costs are $3,425 per acre. Hence, total production cost for year three is $9,028 per acre (Table 6). As mentioned above, annual production costs are assumed to be constant for years 3 through 10. In contrast, the costs of harvesting, marketing, and brokerage change from year 2 onwards due to varying yield and price levels. Figure 1 illustrates variable, fixed, harvesting, and marketing costs for the 10-year horizon under scenario 3, which is the scenario with the highest assumed yield and highest harvesting and marketing costs.

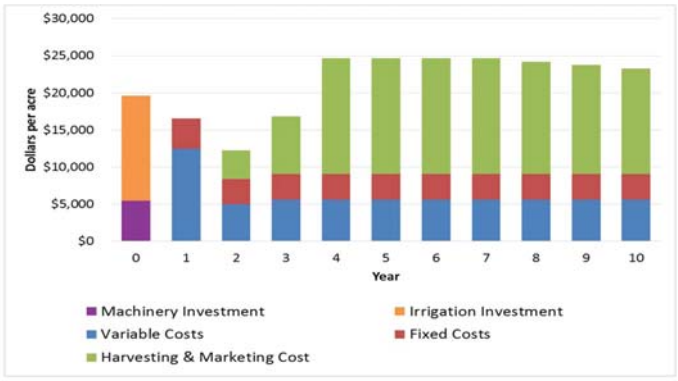

Figure 1. Investment in machinery and irrigation, and variable, fixed, harvesting, and marketing costs per acre under yield scenario 3 for the 10-year investment horizon of a 20-acre operation of southern highbush blueberry in Florida (Yield scenario 3 was the highest yielding scenario of the three scenarios examined in Table 1)

Harvesting and marketing costs are assumed to be $1.00 and $0.05 per pound harvested, respectively. Additionally, there is a charge of $0.85 per marketable pound for custom packing. Cooling, handling, and brokerage are also dependent on yield and price. Therefore, all such costs are computed separately for the different yield scenarios and price levels (Tables 7 through 9). Due to varying maximum yields in years 4 through 7 across all scenarios, harvesting and marketing costs can be as low as $11,732 per acre for scenario 1, and as high as $15,642 per acre for scenario 3. Brokerage costs in years 4 through 7, under the different scenarios, vary from $1,776 to $3,136 per acre (Tables 7 through 9).

Estimated Revenue and Cash Flows

The market prices used for the analysis were obtained by combining USDA/NASS data with feedback from Florida blueberry growers. The underlying assumption is that those prices represent the averages throughout the investment period. Thus, we compute revenue for the following price levels: $3.70, $4.00, $4.30, $4.60, and $4.90 per pound. Tables 10 through 12 show revenue for yield scenarios 1, 2, and 3, respectively. For years 2 and 3, all scenarios attain the same level of revenue for the corresponding prices because yield is assumed to be the same across the scenarios. Therefore, the lowest (highest) level of revenue during years 2 and 3 is $7,400 ($19,600) per acre, which is obtained by multiplying the lowest (highest) price level of $3.70 ($4.90) per pound and yield of 2,000 (4,000) pounds per acre. Revenue varies with different yield scenarios in years 4 through 7, and is estimated to be $22,200; $25,900; and $29,600 per acre in scenarios 1, 2 and 3, respectively, for the lowest price level of $3.70 per pound. In contrast, revenue is estimated to be $29,400; $34,300; and $39,200 per acre in scenarios 1, 2 and 3, respectively, for the highest price level of $4.90 per pound. In terms of production, years 4 through 7 present the highest yields and, consequently, the highest revenues from production. However, in year 10, we also included the revenue from the salvage value of machinery and irrigation equipment.

Production of a perennial crop like blueberries typically requires a number of years before the annual value of production is greater than the annual costs. Therefore, growers endure a few years with negative cash flows. Table 13 shows the undiscounted annual cash flows per acre for yield scenarios 1, 2, and 3 at the different price levels. For all three scenarios, when price is $3.70 per pound, cash flows are positive starting in year 4, whereas when price is $4.00 per pound or higher, cash flows are positive starting in year 3. The lowest undiscounted annual cash flow at year 10 occurs under scenario 1, with $3.70 per pound price at $9,223 per acre. The highest cash flow at year 10 occurs under scenario 3, with the highest price of $4.90 per pound, totaling $19,928 per acre cash flow.

Table 14 shows the undiscounted cumulative cash flows per acre for yield scenarios 1, 2, and 3 at the different price levels. Under yield scenario 1, the cumulative undiscounted cash flow in year 10 is positive starting at a price level of $4.30 per pound, and is $9,642 per acre. Under yield scenario 2, the cumulative undiscounted cash flow in year 10 is positive starting at a price level of $4.00 per pound,

and is $8,456 per acre. Under yield scenario 3, the undiscounted cumulative cash flow in year 10 is positive starting at the lowest price level of $3.70 per pound, and is $3,502 per acre. Under our assumptions, the earliest a grower will receive a positive undiscounted cumulative cash flow in year 6 under the combinations of price at $4.60 per pound combined with yield scenario 3 or price at $4.90 per pound combined with scenarios 2 or 3.

Investment Analysis

To analyze the profitability of the investment in southern highbush blueberries in Florida, we combined the initial cost of investment, the annual net cash flows (receipts minus expenses), and the discount rates to compute the Net Present Value (NPV). We obtained the NPV by summing the discounted cash flows for each year. Typically, when the NPV is positive, the investment is profitable and should be accepted. Conversely, when the NPV is negative, the investment is unprofitable and should not be accepted.

Table 15 summarizes the NPV per acre for different interest rates and price levels under each yield scenario. Under yield scenario 1, the NPV is negative for all prices when the discount rate is 15%. With discount rates of 10% and 5%, the NPV under yield scenario 1 starts being positive when prices are $4.90 and $4.60, respectively. Under yield scenario 2, with a discount rate of 10% (5%), the NPV is $4,526 ($6,929) when the price is $4.90 ($4.30) per pound. Under yield scenario 2, with a discount rate of 15%, the NPV is $1,938 per acre when the price is $4.90 per pound. Under yield scenario 3, with a discount rate of 5%, the NPV is $4,462 per acre when the price is $4.00 per pound. Under yield scenario 3, with a 10% (15%) discount rate, the NPV is $3,487 ($8,798) per acre when the price level is $4.30 ($4.90) per pound.

Conclusions

In this article, we provide a summary of the enterprise budget developed for highbush blueberry production in Florida. The budget represents a typical or average operation and serves as an economic benchmark for growers. An enterprise budget is useful in providing estimates of expenses, and when combined with market prices it can also provide potential estimates of revenue and profit for a crop. Such information should be useful to current and potential blueberry growers for their decision-making processes.

We found the initial investment required for a blueberry operation in Florida to be $19,598 per acre; the expense in land preparation and planting alone in year one is $9,853. Variable and fixed costs in years 2 through 10 range from $8,340 to $9,028 per acre. As an example of profitability, we found that when using a 10% discount rate, an operation yielding 6,000 (8,000) pounds of marketable berries per acre during its most productive years starts obtaining a positive NPV when the average price is $4.90 ($4.30) per pound.

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Table 1. Description of blueberry yield scenarios 1, 2, and 3 for the 10-year investment horizon of a 20-acre operation of southern highbush blueberry in Florida. The three scenarios include total marketable yield of 6, 7, and 8 thousand pounds per acre respectively, in years 4 through 7, with yield reduced 3% annually after year 7 for each scenario.

Scenario / Year	Unit	1	2	3	4	5	6	7	8	9	10
1	lb/plant	0	1.12	2.28	3.47	3.47	3.47	3.47	3.36	3.26	3.17
	lb/acre	0	2,000	4,000	6,000	6,000	6,000	6,000	5,820	5,645	5,476
2	lb/plant	0	1.12	2.28	4.06	4.06	4.06	4.06	3.94	3.82	3.71
	lb/acre	0	2,000	4,000	7,000	7,000	7,000	7,000	6,790	6,586	6,389
3	lb/plant	0	1.12	2.28	4.66	4.66	4.66	4.66	4.52	4.38	4.25
	lb/acre	0	2,000	4,000	8,000	8,000	8,000	8,000	7,760	7,527	7,301

Table 2. Estimated annual fixed machinery costs for establishment of a 20-acre operation in Florida

Item	Total Purchase Price	Salvage Value	Lifespan	Depreciation	Interest at 7.00%	Tax and Insurance at 1.50%	Fixed Costs per Acre
Sprayer, herbicide	$5,795	$1,159	5	$927	$243	$52	$61
Sprayer, air-blast	$9,500	$1,900	5	$1,520	$399	$86	$100
Rotary mower (5')	$7,495	$1,499	7	$857	$315	$68	$62
Wagon (4 units)	$5,200	$1,040	15	$277	$218	$47	$27
Tractor (40-50 HP)	$39,125	$7,825	8	$3,913	$1,643	$352	$295
Hedger handheld (6 units)	$2,376	$475	5	$380	$100	$21	$25
Truck	$28,500	$5,700	5	$4,560	$1,197	$257	$301
Fertilizer spreader	$2,150	$430	10	$172	$90	$19	$14
Harrow	$1,350	$270	10	$108	$57	$12	$9
V blade	$520	$104	10	$42	$22	$5	$3
Golf cart	$7,000	$1,400	5	$1,120	$294	$63	$74
Hand-sprayer (3 units)	$750	$150	4	$150	$32	$7	$9
Total investment	$109,761			$14,025	$4,610	$988	$981
Total investment per acre	$5,488						
Total annual fixed costs	$19,623						
Annual fixed costs per acre	$981						

Table 3. Estimated solid set plus drip irrigation systems costs for establishment of a 20-acre operation in Florida

Item		Total Purchase Price	Lifespan	Depreciation	Interest at 7.00%	Tax and Insurance at 1.50%
Fixed Costs						
	Well 12"	$47,250	25	$1,890	$1,654	$354
	Pump & motor & pump house	$40,950	10	$4,095	$1,433	$307
	Pump discharge & filter station	$15,000	10	$1,500	$525	$113
	Main, sub-main, and tubing	$50,000	20	$2,500	$1,750	$375
	Solid-set sprinkler system 30'x30'	$45,000	10	$4,500	$1,575	$338
	Drip-fertigation system	$30,000	10	$3,000	$1,050	$225
	Miscellaneous	$10,000	10	$1,000	$350	$75
	Installation	$44,000	20	$2,200	$1,540	$330
	Total investment	$282,200		$20,685	$9,877	$2,117
	Total investment per acre	$14,110				
	Total annual fixed costs	$32,679				
	Annual fixed costs per acre	$1,634				
Variable Costs						
	Annual repairs & maintenance per acre	$166				
	Annual fuel cost per acre[1]	$138				
	Variable cost per acre per year	$304				
Total Annual Fixed and Variable Costs per Acre		$1,938				

[1] Assumes 460 annual pumping hours for 20 acres, fuel consumption of 2 gallons/hour, and $3.00 per gallon of diesel.

Table 4. First year estimated establishment and maintenance cost per acre of a 20-acre operation in Florida

Item	Applications / Year	Unit	Quantity	Price / Unit ($)	Total Cost per Acre ($)
Land Preparation					
Rotovate–harrowing & chopping	4	acre	1.00	55.00	220.00
Glyphosate	1	quart	2.00	5.31	10.63
Herbicide application	0.5	acre	1.00	20.00	10.00
Triple super phosphate	1	pound	150.00	0.33	49.50
Bedding	1	acre	1.00	65.00	65.00
Breaking aisles	1	acre	1.00	42.50	42.50
Ditching and drainage	1	acre	1.00	115.00	115.00
Milled pine bark	1	cubic yard	300.00	15.00	4,500.00
Total land preparation					5,012.63
Planting					
Plants (2.5′ x 9′)	1	plant	1,936	2.25	4,356.00
Planting labor	1	plant	1,936	0.25	484.00
Total planting					4,840.00
Fertilization					
Fertilizer ground dry (12-4-8)	7	pound	297.62	0.19	394.12
Tractor-wagon-labor	7	acre	0.50	55.00	192.50
Total fertilization					586.62
Weed Control					
Simazine	1	quart	3.00	8.31	24.93
Surflan	1	quart	3.00	12.46	37.39
Glyphosate XTRA	4	quart	1.50	6.25	37.50
Herbicide application	5	hour	10.00	8.05	402.50
Total weed control		acre	1.00		502.32
Pest and Disease Control					
Insecticides					
Diazinon AG 500	2	pint	0.67	5.93	7.90
Delegate WG	1	ounce	2.00	9.01	18.03
Sevin (carbaryl)	1	pound	0.50	5.01	2.51
Malathion 57EC	1	pint	0.50	5.11	2.55
Fungicides					
Abound	1	ounce	10.80	1.72	18.62
Cabrio	1	ounce	9.33	2.33	21.76
Bravo weather stik	2	pint	2.00	4.63	18.52
Aliette	1	pound	3.33	14.18	47.28
Ridomil gold	2	pint	1.20	92.77	222.65
Air-blast spray application	8	acre	0.25	20.50	41.00
Total pest and disease control		acre	1.00		400.81
Other Costs					
Pruning-labor		hour	15.00	9.43	141.38
Irrigation		acre	1.00	303.95	303.95
Opportunity costs					
Interest on variable costs		dollar	11,787.70	5.00%	589.38
Operator labor charge		hour	10.00	8.05	80.50
Total other costs					1,115.21

Item		Applications / Year	Unit	Quantity	Price / Unit ($)	Total Cost per Acre ($)
Total Variable Costs			acre	1.00		12,457.58
Fixed Costs						
	Interest on capital investment		dollar	5,000	5%	250.00
	Tractor and equipment ($)		acre	1.00	981.16	981.16
	Overhead and management		dollar	12,457.58	10.0%	1,245.76
	Irrigation ($)		acre	1.00	1,633.93	1,633.93
	Total fixed costs		acre	1.00		4,110.84
Total Variable and Fixed Costs						16,568.42
[1] Does not include harvesting and marketing costs, brokerage, cooling, or handling costs						

Table 5. Second year estimated establishment and maintenance cost per acre of a 20-acre operation in Florida

Item	Applications / Year	Unit	Quantity	Price / Unit ($)	Total Cost per Acre ($)
Fertilization					
Fertilizer ground dry (12-4-8)	7	pound	297.62	0.19	394.12
Tractor-wagon-labor	7	acre	0.50	55.00	192.50
Soil amendments	every 3 years	acre	yearly prorated	100.00	100.00
Replace milled pine bark	1	cubic yard	100.00	15.00	1,500.00
Total fertilization					2,186.62
Weed Control					
Simazine	1	quart	3.00	8.31	24.93
Chateau 51 WDG	2	ounce	3.00	5.82	34.90
Glyphosate XTRA	4	quart	1.50	6.25	37.50
Herbicide application	5	hour	8.00	8.05	322.00
Total weed control		acre	1.00		419.33
Pest and Disease Control					
Insecticides					
Diazinon AG 500	2	pint	1.33	5.93	15.80
Brigade 2EC	2	ounce	2.67	0.65	3.44
Delegate WG	1	ounce	4.00	9.01	36.05
Sevin (carbaryl)	1	pound	1.00	5.01	5.01
Malathion 57EC	1	pint	1.00	5.11	5.11
Fungicides					
Abound	1	ounce	10.80	1.72	18.62
Cabrio	1	ounce	18.67	2.33	43.52
Bravo weather stik	2	pint	4.00	4.63	37.04
Aliette	2	pound	6.67	14.18	189.11
Ridomil gold	2	pint	2.40	92.77	445.31
CaptEvate 68 WDG	1	pound	2.67	13.69	36.51
Switch 62.5 WG	1	ounce	8.00	4.81	38.45
Air-blast spray application	9	acre	0.33	20.25	60.75
Hydrogen cyanamide	1	acre	1.50	50.00	75.00
Total pest and disease control		acre	1.00		1,009.72
Other Costs					
Pruning-labor		hour	50.00	9.43	471.25
Irrigation		acre	1.00	303.95	303.95
Bee hives for pollination		hive	2.00	63.75	127.50
Rehab/replant (diseased/dead plants)					
(@ percent of total plants)	3%	acre	58.08	2.50	145.20
Opportunity costs					
Interest on variable costs		acre	4,663.56	5%	233.18
Operator labor charge		hour	10.00	8.05	80.50
Total other costs					1,361.58
Total Variable Costs		acre	1.00		4,977.24
Fixed Costs					
Interest on capital investment		dollar	5,000	5%	250.00
Tractor and equipment ($)		acre	1.00	981.16	981.16

Item	Applications / Year	Unit	Quantity	Price / Unit ($)	Total Cost per Acre ($)
Overhead and management		dollar	4,977.24	10.0%	497.72
Irrigation ($)		acre	1.00	1,633.93	1,633.93
Total fixed costs		acre	1.00	2,074.83	3,362.81
Total Variable and Fixed Costs					8,340.05
[1] Does not include harvesting and marketing costs, brokerage, cooling, or handling costs					

Table 6. Third to tenth year estimated establishment and maintenance cost per acre of a 20-acre operation in Florida

Item	Applications / Year	Unit	Quantity	Price / Unit ($)	Total Cost per Acre ($)
Fertilization					
Fertilizer ground dry (12-4-8)	7	pound	297.62	0.19	394.12
Tractor-wagon-labor	7	acre	0.50	55.00	192.50
Soil amendments	every 3 years	acre	yearly prorated	100.00	100.00
Replace milled pine bark	1	cubic yard	100.00	15.00	1,500.00
Total fertilization					2,186.62
Weed Control					
Simazine	1	quart	3.00	8.31	24.93
Chateau 51 WDG	2	ounce	3.00	5.82	34.90
Glyphosate XTRA	3	quart	1.50	6.25	28.13
Herbicide application	5	hour	8.00	8.05	322.00
Total weed control		acre	1.00		409.96
Pest and Disease Control					
Insecticides					
Diazinon AG 500	2	pint	2.00	5.93	23.70
Brigade 2EC	2	ounce	4.00	0.65	5.16
Delegate WG	1	ounce	6.00	9.01	54.08
Sevin (carbaryl)	1	pound	1.50	5.01	7.52
Malathion 57EC	4	pint	1.50	5.11	30.64
Assail 70WP	2	ounce	2.30	5.88	27.05
Fungicides					
Abound	2	ounce	10.80	1.72	37.23
Cabrio	2	ounce	28.00	2.33	130.57
Bravo weather stik	2	pint	6.00	4.63	55.56
Aliette	2	pound	10.00	14.18	283.67
Ridomil gold	2	pint	3.60	92.77	667.96
CaptEvate 68 WDG	1	pound	4.00	13.69	54.76
Switch 62.5 WG	1	ounce	12.00	4.81	57.68
Air-blast spray application	11	acre	0.50	20.25	111.38
Hydrogen cyanamide	1	acre	1.50	50.00	75.00
Total pest and disease control		acre	1.00		1,621.95
Other Costs					
Pruning-labor		hour	50.00	9.43	471.25
Irrigation		acre	1.00	303.95	303.95
Bee hives for pollination		hive	2.00	63.75	127.50
Rehab/replant (diseased/dead plants)					

		(@ Percent of total plants)	3%	acre	58	2.50	145.00
	Opportunity costs						
		Interest on variable costs		acre	5,121.22	5%	256.06
		Operator labor charge		hours	10.00	8.05	80.50
	Total other costs						1,384.26
	Total variable costs			acre	1.00		5,602.78
Fixed Costs							
	Interest on capital investment			dollar	5,000	5%	250.00
	Tractor and equipment ($)			acre	1.00	981.16	981.16
	Overhead and management			dollar	5,602.78	10.0%	560.28
	Irrigation ($)			acre	1.00	1,633.93	1,633.93
	Total fixed costs			acre	1.00	2,074.83	3,425.36
Total Variable and Fixed Costs							9,028.15
[1] Does not include harvesting and marketing costs, brokerage, cooling, or handling costs							

Table 7. Yield scenario 1: estimated total marketable yield, harvesting and marketing cost, and brokerage cost per acre for a 10-year horizon of a 20-acre operation in Florida. Yield scenario 1 simulates a total marketable yield of 6 thousand pounds per acre in years 4 through 7, with yield reduced 3% annually after year 7.

Year of Analysis	Total Marketable Berries (lb/acre)	Harvesting and Marketing Cost per Acre	Brokerage Costs (pounds per acre x price x 8% of market price)				
			Prices ($/lb)				
			3.70	4.00	4.30	4.60	4.90
1	0	$0	$0	$0	$0	$0	$0
2	2000	$3,911	$592	$640	$688	$736	$784
3	4000	$7,821	$1,184	$1,280	$1,376	$1,472	$1,568
4	6000	$11,732	$1,776	$1,920	$2,064	$2,208	$2,352
5	6000	$11,732	$1,776	$1,920	$2,064	$2,208	$2,352
6	6000	$11,732	$1,776	$1,920	$2,064	$2,208	$2,352
7	6000	$11,732	$1,776	$1,920	$2,064	$2,208	$2,352
8	5820	$11,380	$1,723	$1,862	$2,002	$2,142	$2,281
9	5645	$11,038	$1,671	$1,807	$1,942	$2,078	$2,213
10	5476	$10,707	$1,621	$1,752	$1,884	$2,015	$2,147

Table 8. Yield scenario 2: estimated total marketable yield, harvesting and marketing cost, and brokerage cost per acre for a 10-year horizon of a 20-acre operation in Florida. Yield scenario 2 simulates a total marketable yield of 7 thousand pounds per acre in years 4 through 7, with yield reduced 3% annually after year 7.

Year of Analysis	Total Marketable Berries (lb/acre)	Harvesting and Marketing Cost per Acre	Brokerage Costs (pounds per acre x price x 8% of market price)				
			Prices ($/lb.)				
			3.70	4.00	4.30	4.60	4.90
1	0	$0	$0	$0	$0	$0	$0
2	2000	$3,911	$592	$640	$688	$736	$784
3	4000	$7,821	$1,184	$1,280	$1,376	$1,472	$1,568
4	7000	$13,687	$2,072	$2,240	$2,408	$2,576	$2,744
5	7000	$13,687	$2,072	$2,240	$2,408	$2,576	$2,744
6	7000	$13,687	$2,072	$2,240	$2,408	$2,576	$2,744
7	7000	$13,687	$2,072	$2,240	$2,408	$2,576	$2,744
8	6790	$13,276	$2,010	$2,173	$2,336	$2,499	$2,662
9	6586	$12,878	$1,950	$2,108	$2,266	$2,424	$2,582
10	6389	$12,492	$1,891	$2,044	$2,198	$2,351	$2,505

Table 9. Yield scenario 3: estimated total marketable yield, harvesting and marketing cost, and brokerage cost per acre for a 10-year horizon of a 20-acre operation in Florida. Yield scenario 3 simulates a total marketable yield of 8 thousand pounds per acre in years 4 through 7, with yield reduced 3% annually after year 7.

Year of Analysis	Total Marketable Berries (lb/acre)	Harvesting and Marketing Cost per Acre	Brokerage Costs (pounds per acre x price x 8% of market price)				
			Prices ($/lb)				
			3.70	4.00	4.30	4.60	4.90
1	0	$0	$0	$0	$0	$0	$0
2	2000	$3,911	$592	$640	$688	$736	$784
3	4000	$7,821	$1,184	$1,280	$1,376	$1,472	$1,568
4	8000	$15,642	$2,368	$2,560	$2,752	$2,944	$3,136
5	8000	$15,642	$2,368	$2,560	$2,752	$2,944	$3,136
6	8000	$15,642	$2,368	$2,560	$2,752	$2,944	$3,136
7	8000	$15,642	$2,368	$2,560	$2,752	$2,944	$3,136
8	7760	$15,173	$2,297	$2,483	$2,669	$2,856	$3,042
9	7527	$14,718	$2,228	$2,409	$2,589	$2,770	$2,951
10	7301	$14,276	$2,161	$2,336	$2,512	$2,687	$2,862

Table 10. Yield scenario 1: estimated revenue per acre for different market price levels for a 10-year horizon of a 20-acre operation in Florida. Yield scenario 1 simulates a total marketable yield of 6 thousand pounds per acre in years 4 through 7, with yield reduced 3% annually after year 7.

Year of Analysis	Total Marketable Berries (lb/acre)	Revenue (Marketable yield x Price)				
		Prices ($/lb)				
		3.70	4.00	4.30	4.60	4.90
1	0	$0	$0	$0	$0	$0
2	2000	$7,400	$8,000	$8,600	$9,200	$9,800
3	4000	$14,780	$16,000	$17,200	$18,400	$19,600
4	6000	$22,200	$24,000	$25,800	$27,600	$29,400
5	6000	$22,200	$24,000	$25,800	$27,600	$29,400
6	6000	$22,200	$24,000	$25,800	$27,600	$29,400
7	6000	$22,200	$24,000	$25,800	$27,600	$29,400
8	5820	$21,534	$23,280	$25,026	$26,772	$28,518
9	5645	$20,888	$22,582	$24,275	$25,969	$27,663
10	5476	$24,190	$25,833	$27,476	$29,119	$30,762

Table 11. Yield scenario 2: estimated revenue per acre for different market price levels for a 10-year horizon of a 20-acre operation in Florida. Yield scenario 2 simulates a total marketable yield of 7 thousand pounds per acre in years 4 through 7, with yield reduced 3% annually after year 7.

Year of Analysis	Total Marketable Berries (lb/acre)	Revenue (Marketable yield x Price)				
		Prices ($/lb)				
		3.70	4.00	4.30	4.60	4.90
1	0	$0	$0	$0	$0	$0
2	2000	$7,400	$8,000	$8,600	$9,200	$9,800
3	4000	$14,800	$16,000	$17,200	$18,400	$19,600
4	7000	$25,900	$28,000	$30,100	$32,200	$34,300
5	7000	$25,900	$28,000	$30,100	$32,200	$34,300
6	7000	$25,900	$28,000	$30,100	$32,200	$34,300
7	7000	$25,900	$28,000	$30,100	$32,200	$34,300
8	6790	$25,123	$27,160	$29,197	$31,234	$33,271
9	6586	$24,369	$26,345	$28,321	$30,297	$32,273
10	6389	$27,567	$29,484	$31,400	$33,317	$35,234

Table 12. Yield scenario 3: estimated revenue per acre for different market price levels for a 10-year horizon of a 20-acre operation in Florida. Yield scenario 3 simulates a total marketable yield of 8 thousand pounds per acre in years 4 through 7, with yield reduced 3% annually after year 7.

Year of Analysis	Total Marketable Berries (lb/acre)	Revenue (Marketable yield x Price)				
		Prices ($/lb)				
		3.70	4.00	4.30	4.60	4.90
1	0	$0	$0	$0	$0	$0
2	2000	$7,400	$8,000	$8,600	$9,200	$9,800
3	4000	$14,800	$16,000	$17,200	$18,400	$19,600
4	8000	$29,600	$32,000	$34,400	$36,800	$39,200
5	8000	$29,600	$32,000	$34,400	$36,800	$39,200
6	8000	$29,600	$32,000	$34,400	$36,800	$39,200
7	8000	$29,600	$32,000	$34,400	$36,800	$39,200
8	7760	$28,712	$31,040	$33,368	$35,696	$38,024
9	7527	$27,851	$30,109	$32,367	$34,625	$36,883
10	7301	$30,944	$33,135	$35,325	$37,515	$39,706

Table 13. Undiscounted annual cash flows per acre for different prices (dollars per pound) by yield scenarios[a] for a 10-year horizon of a 20-acre operation in Florida

Price ($/ lb.)	3.70			4.00			4.30			4.60			4.90		
Year / Scenario	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
0	-$19,598	-$19,598	-$19,598	-$19,598	-$19,598	-$19,598	-$19,598	-$19,598	-$19,598	-$19,598	-$19,598	-$19,598	-$19,598	-$19,598	-$19,598
1	-$14,109	-$14,109	-$14,109	-$14,109	-$14,109	-$14,109	-$14,109	-$14,109	-$14,109	-$14,109	-$14,109	-$14,109	-$14,109	-$14,109	-$14,109
2	-$2,983	-$2,983	-$2,983	-$2,431	-$2,431	-$2,431	-$1,879	-$1,879	-$1,879	-$1,327	-$1,327	-$1,327	-$775	-$775	-$775
3	-$773	-$773	-$773	$331	$331	$331	$1,435	$1,435	$1,435	$2,539	$2,539	$2,539	$3,643	$3,643	$3,643
4	$2,124	$3,573	$5,022	$3,780	$5,505	$7,230	$5,436	$7,437	$9,438	$7,092	$9,369	$11,646	$8,748	$11,301	$13,854
5	$2,124	$3,573	$5,022	$3,780	$5,505	$7,230	$5,436	$7,437	$9,438	$7,092	$9,369	$11,646	$8,748	$11,301	$13,854
6	$2,124	$3,573	$5,022	$3,780	$5,505	$7,230	$5,436	$7,437	$9,438	$7,092	$9,369	$11,646	$8,748	$11,301	$13,854
7	$2,124	$3,573	$5,022	$3,780	$5,505	$7,230	$5,436	$7,437	$9,438	$7,092	$9,369	$11,646	$8,748	$11,301	$13,854
8	$1,863	$3,269	$4,674	$3,470	$5,143	$6,816	$5,076	$7,017	$8,957	$6,682	$8,891	$11,099	$8,289	$10,765	$13,241
9	$1,610	$2,974	$4,337	$3,169	$4,791	$6,414	$4,727	$6,609	$8,492	$6,285	$8,427	$10,569	$7,843	$10,245	$12,647
10	$9,223	$10,545	$11,868	$10,735	$12,309	$13,883	$12,246	$14,072	$15,898	$13,757	$15,835	$17,913	$15,269	$17,598	$19,928

[a] Yield scenarios are variations of yield produced at full production. See Table 1 for scenarios description.

Table 14. Undiscounted cumulative annual cash flows per acre for different prices (dollars per pound) by yield scenarios[a] for a 10-year horizon of a 20-acre operation in Florida

Price ($/ lb)	3.70			4.00			4.30			4.60			4.90		
Year / Scenario	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
0	-$19,598	-$19,598	-$19,598	-$19,598	-$19,598	-$19,598	-$19,598	-$19,598	-$19,598	-$19,598	-$19,598	-$19,598	-$19,598	-$19,598	-$19,598
1	-$33,707	-$33,707	-$33,707	-$33,707	-$33,707	-$33,707	-$33,707	-$33,707	-$33,707	-$33,707	-$33,707	-$33,707	-$33,707	-$33,707	-$33,707
2	-$36,689	-$36,689	-$36,689	-$36,137	-$36,137	-$36,137	-$35,585	-$35,585	-$35,585	-$35,033	-$35,033	-$35,033	-$34,481	-$34,481	-$34,481
3	-$37,463	-$37,463	-$37,463	-$35,807	-$35,807	-$35,807	-$34,151	-$34,151	-$34,151	-$32,495	-$32,495	-$32,495	-$30,839	-$30,839	-$30,839
4	-$35,339	-$33,890	-$32,441	-$32,027	-$30,302	-$28,577	-$28,715	-$26,714	-$24,713	-$25,403	-$23,126	-$20,849	-$22,091	-$19,538	-$16,985
5	-$33,214	-$30,317	-$27,419	-$28,246	-$24,797	-$21,347	-$23,278	-$19,277	-$15,275	-$18,310	-$13,757	-$9,203	-$13,342	-$8,237	-$3,131
6	-$31,090	-$26,744	-$22,398	-$24,466	-$19,292	-$14,118	-$17,842	-$11,840	-$5,838	-$11,218	-$4,388	$2,442	-$4,594	$3,064	$10,722
7	-$28,966	-$23,171	-$17,376	-$20,686	-$13,787	-$6,888	-$12,406	-$4,403	$3,600	-$4,126	$4,981	$14,088	$4,154	$14,365	$24,576
8	-$27,103	-$19,902	-$12,702	-$17,216	-$8,644	-$73	-$7,330	$2,614	$12,557	$2,556	$13,872	$25,187	$12,443	$25,130	$37,817
9	-$25,492	-$16,929	-$8,366	-$14,048	-$3,853	$6,342	-$2,603	$9,223	$21,049	$8,841	$22,299	$35,756	$20,285	$35,374	$50,463
10	-$16,269	-$6,384	$3,502	-$3,313	$8,456	$20,224	$9,642	$23,295	$36,947	$22,598	$38,134	$53,669	$35,554	$52,973	$70,392

[a] Yield scenarios are variations of yield produced at full production. See Table 1 for scenarios description.

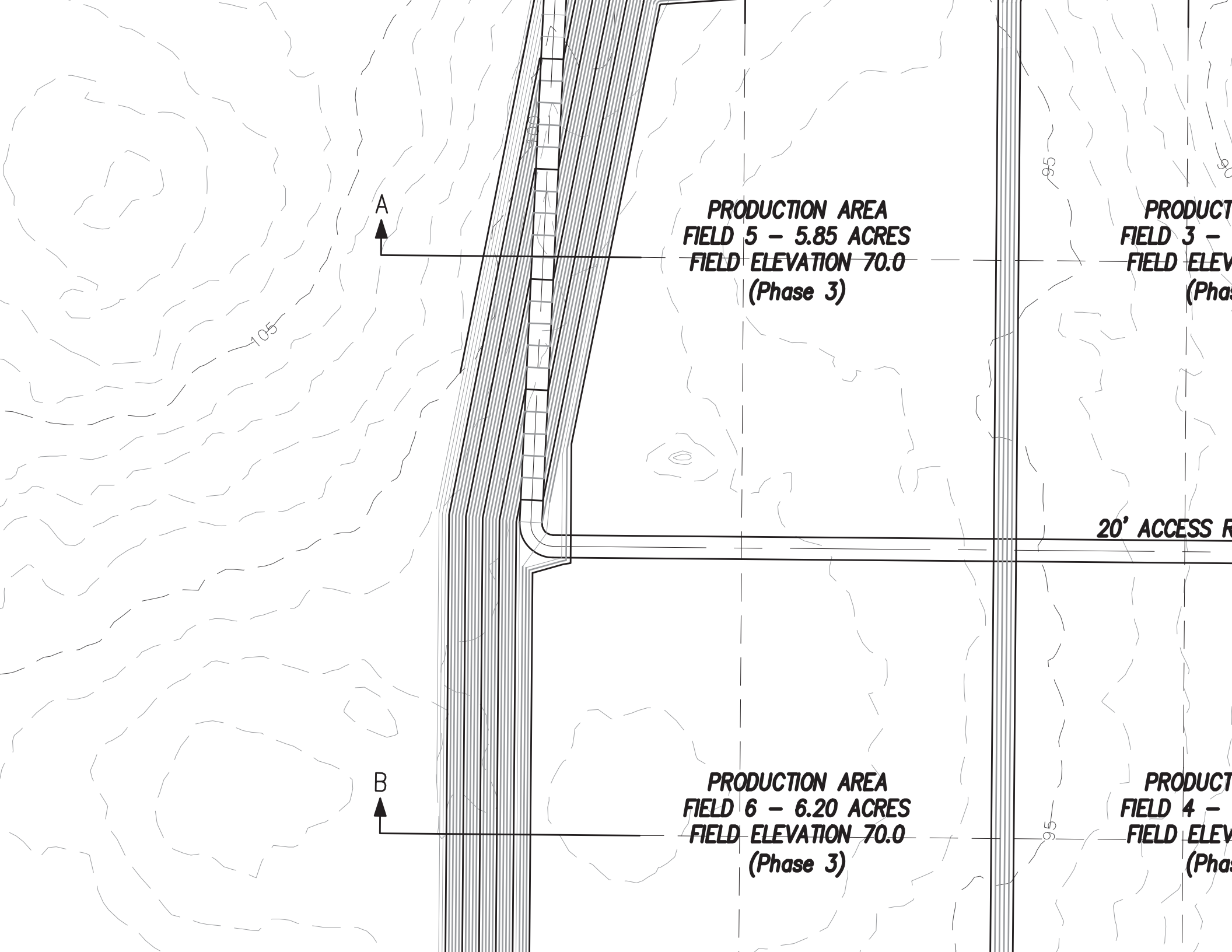
Table 15. Net Present Value per acre for different interest rates and price scenarios[a] for a 10-year horizon of a 20-acre operation in Florida

Price ($/lb) / Scenario	Interest Rate								
	5%			10%			15%		
	1	2	3	1	2	3	1	2	3
3.70	-$21,940	-$14,861	-$7,782	-$25,303	-$20,109	-$14,916	-$27,296	-$23,403	-$19,510
4.00	-$12,394	-$3,966	$4,462	-$18,081	-$11,898	-$5,714	-$21,702	-$17,068	-$12,433
4.30	-$2,847	$6,929	$16,706	-$10,858	-$3,686	$3,487	-$16,109	-$10,732	-$5,356
4.60	$6,699	$17,824	$28,949	-$3,636	$4,526	$12,688	-$10,515	-$4,397	$1,721
4.90	$16,245	$28,719	$41,193	$3,586	$12,738	$21,889	-$4,922	$1,938	$8,798

[a] Yield scenarios are variations of yield produced at full production. See Table 1 for scenarios description.


STAGECOACH TRL
LA PLACE CT
SR 44
VALDERAMA LN
TERRAGONA DR
MARBELLA DR
RIALTO WAY
TUSCANY AVE
GREENWOOD CROSSING
PINEGATE TRL
CR 437
BARRY LN
SITE
DERBY DR
JAMES WAY
SPRINGFIELD RD
CR 46A
WEST HUFF RD
JOHNS LN

NORTH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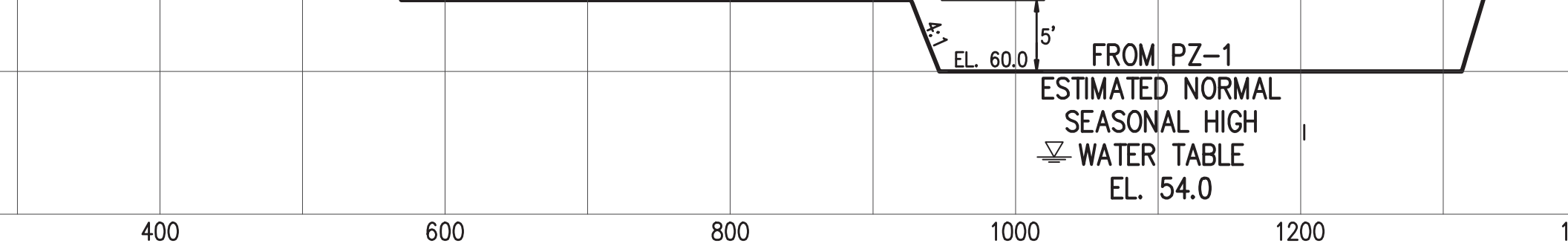
PRODUCTION AREA
FIELD 5 – 5.85 ACRES
FIELD ELEVATION 70.0
(Phase 3)
PRODUCT
FIELD 3 –
FIELD ELEV
(Phas
105
95
20' ACCESS R
B
PRODUCTION AREA
FIELD 6 – 6.20 ACRES
FIELD ELEVATION 70.0
(Phase 3)
PRODUCT
FIELD 4 –
FIELD ELEV
(Phas
95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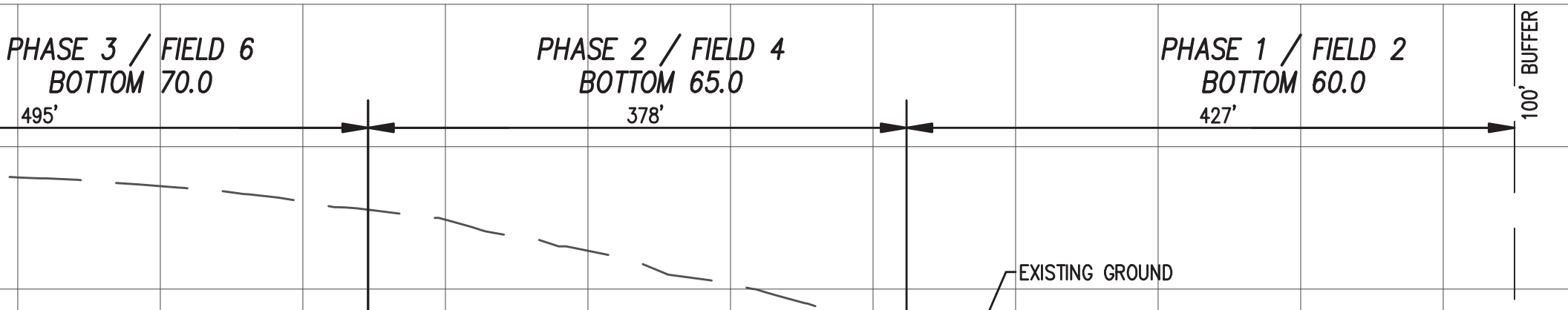
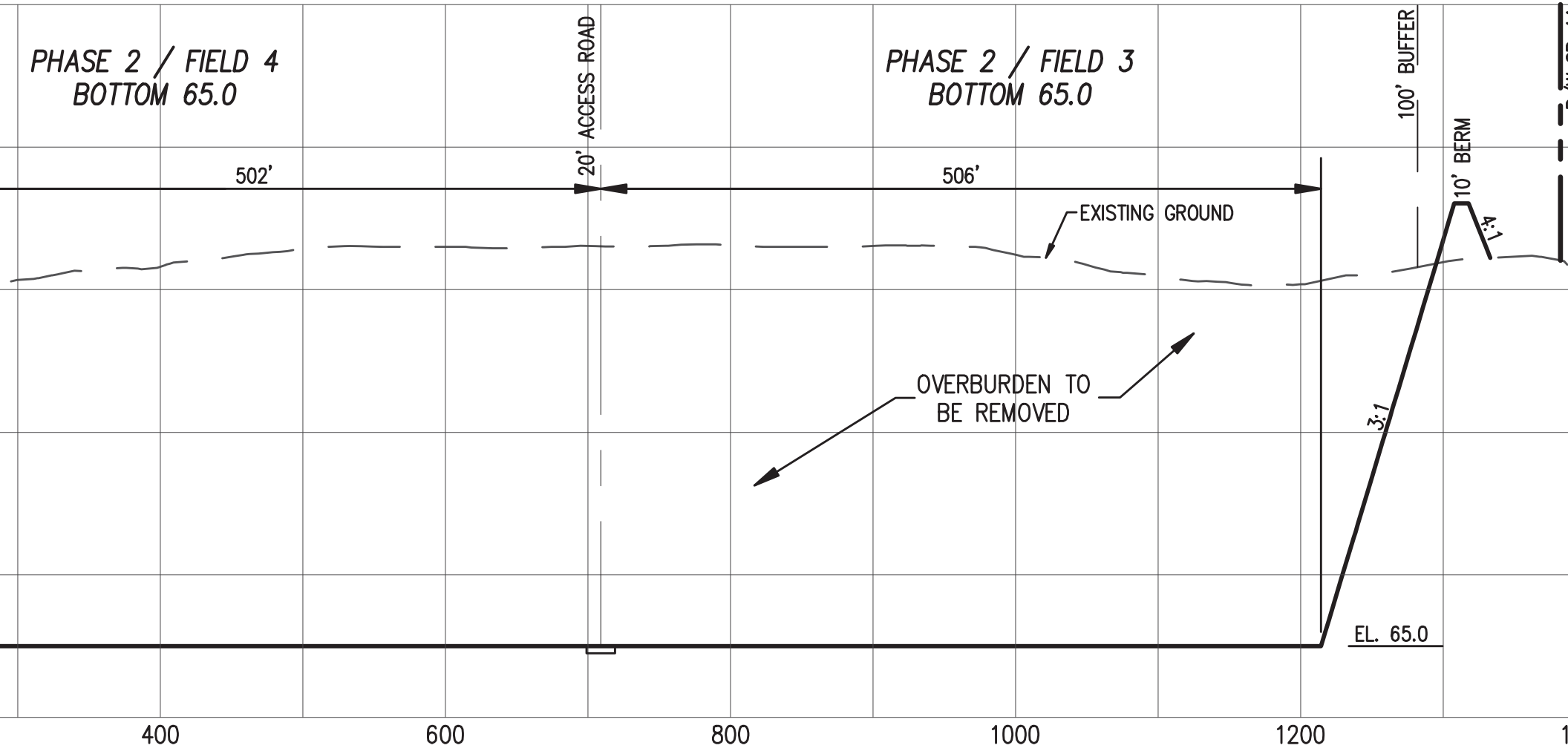
5'
EL. 60.0
FROM PZ-1
ESTIMATED NORMAL
SEASONAL HIGH
WATER TABLE
EL. 54.0
400
600
800
1000
1200

SECTION A-A


PHASE 3 / FIELD 6
BOTTOM 70.0
495'
PHASE 2 / FIELD 4
BOTTOM 65.0
378'
PHASE 1 / FIELD 2
BOTTOM 60.0
427'
100' BUFFER
EXISTING GROUND

SECTION C–C



SECTION D–D

Filing # 106114890 E-Filed 04/10/2020 01:09:07 PM

THE CIRCUIT COURT OF THE FIFTH JUDICIAL CIRCUIT
IN AND FOR LAKE COUNTY, FLORIDA

LAKE COUNTY FLORIDA,

Plaintiff,

vs. CASE NO. 2020-CA-000635

CHRISTOPHER DOUGLAS LEIFFER, as TRUSTEE OF THE C & K FAMILY TRUST DATED JANUARY 31, 2020; and KIRK STEPHEN LEIFFER, as TRUSTEE OF THE C & K FAMILY TRUST DATED JANUARY 31, 2020,

Defendants.
_____/

DEFENDANTS' EMERGENCY MOTION TO DISSOLVE ORDER ON PLAINTIFF'S EMERGENCY PETITION FOR TEMPORARY INJUNCTION AND INCORPORATED MEMORANDUM OF LAW

Defendants, CHRISTOPHER DOUGLAS LEIFFER, as TRUSTEE OF THE C & K FAMILY TRUST DATED JANUARY 31, 2020; and KIRK STEPHEN LEIFFER, as TRUSTEE OF THE C & K FAMILY TRUST DATED JANUARY 31, 2020 (hereinafter collectively referred to as "Owners"), by and through their undersigned counsel, and pursuant to Florida Rule of Civil Procedure 1.610(d), hereby respectfully file their instant *Defendants' Emergency Motion to Dissolve Order on Plaintiff's Emergency Petition for Temporary Injunction and Incorporated Memorandum of Law*. In support hereof, Owners state as follows:

Pertinent Facts and Procedural History

1. Owners are the owners of real property (the "Property") located within Lake County, Florida, which is more particularly described in the Warranty Deed recorded in the

Official Records of Lake County, Florida at O. R. Bk. 5421, Pgs. 394-396, a copy of which is ***attached hereto as Exhibit "A"*** and incorporated herein by reference.

2. The Property consists of approximately eighty (80) acres of vacant land which is currently being excavated consistent with an Agricultural Plan ("Farm Plan") filed with the Lake County Property Appraiser and other appropriate state agencies. In support of the instant Motion, a copy of the Farm Plan is simultaneously being filed herewith.[1]

3. The Farm Plan contains a grading plan which lowers the existing grade of the property, to create a Site Contained Farm and accomplish the agricultural advantages to the Farm including, but not limited, to:

a. Greater efficiency utilizing drip and fixed overhead irrigation
b. Water conservation and reuse
c. Freeze/frost protection
d. Temperature/wind control at different annual crop stages
e. Elimination of any agricultural surface water runoff
f. Noise abatement
g. Significant reduction of "drift" of agricultural chemical application.

See *Farm Plan* (attached to Defendants' Notice of Filing), at Page 4.

4. On or about April 3, 2020, Plaintiff, Lake County Florida (hereinafter may be referred to as "County") filed its *Emergency Petition for Temporary Injunction* [Dkt. No. 3] (the "Petition").

5. Summarized, the Petition seeks an emergency temporary injunction against the Owners premised on the Owners' alleged failure to obtain a development order or development permit from the County prior to commencing the afore-described mining or removal of extractable materials from the Property. See *Petition* at ¶¶ 10 and 11.

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[1] Due to the breadth of the Farm Plan, the document will not be attached as an exhibit to the instant Motion but will be submitted as a separate filing in support of the instant Motion.

6. On or about April 9, 2020, the office of the undersigned counsels filed an Acceptance of Service of the Petition on behalf of the Defendants [Dkt. No. 8].

7. However, even before filing said Acceptance of Service, counsels for the Owners were in contact with counsel(s) for the County and specifically requested that the County not seek the entry of an *ex parte* temporary injunction without notice to the Owners and offered to coordinate with the County to schedule an expedited evidentiary hearing[2]. A copy of pertinent email correspondence between counsel for the parties is ***attached hereto as Exhibit "B"*** and incorporated herein by reference.

8. Moments before Defendants' filed their Acceptance of Service and without any notice to the Owners, the Court entered its *Order on Plaintiff's Emergency Petition for Temporary Injunction* [Dkt. No. 7] (the "Order") on April 9, 2020. For ease of reference, a copy of the Order is ***attached hereto as Exhibit "C".***

9. The Order grants the relief requested by the County in its Petition which necessarily will bring the Owners' efforts on its property, which are consistent with the Farm Plan, to a screeching halt.

10. Germane to the County's Petition is its factual assertion that "[t]he Property is not classified as agricultural land." See *Petition* at ¶ 7.

11. This allegation is not only untrue but merely requires quick resort to records of the Lake County Property Appraiser, which are readily available to the public and certainly known to the County. Contrary to the County's false allegation, said records show that the Property is, in fact, zoned *agricultural*. A true and correct copy of the Property Record Cards for Alternate Key

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[2] Although the Order was issued without notice to Defendants, the undersigned counsels are *not* suggesting nefarious behavior on the part of the County and have purposefully included email correspondence with the County which shows the County's confirmation that such action was not taken by the County.

Nos. 3801481 and 3816197 are ***attached hereto as Exhibit "D"*** and incorporated herein by reference.

12. This fact is critical because in order for the Property to earn the protection from County regulation afforded by Section 823.14, Florida Statutes, the "Florida Right to Farm Act" (as discussed herein below), the Property must have an agricultural tax classification. See Fla. Stat. § 823.14(6). By misrepresenting the Property's agricultural classification, the County misled the Court into a [presumed] finding that the Property could not qualify for the protections offered by the Florida Right to Farm Act.

13. Due to this critical factual error in the Petition and for the legal reasons stated more particularly in the incorporated memorandum, Owners respectfully assert that it is both necessary and proper for the injunction granted by the Order to be dissolved.

14. Pursuant to Fla. R. Civ. Proc. 1.610(d), and in the event the Order is not dissolved without the necessity of a hearing, Owners hereby make demand that the instant motion be heard within five (5) days of the filing of the instant motion.

15. In order to defend themselves against the County's improper Petition, the Defendants have been forced to hire the law firm of Crawford, Modica & Holt to represent them in this action and are obligated to pay said firm its reasonable attorney's fees and cost.

16. As the anticipated prevailing party, Owners hereby make demand for an award of their attorney's fees and costs to be paid to by the County pursuant to Fla. Stat. § 57.112.

WHEREFORE, Defendants, CHRISTOPHER DOUGLAS LEIFFER, as TRUSTEE OF THE C & K FAMILY TRUST DATED JANUARY 31, 2020; and KIRK STEPHEN LEIFFER, as TRUSTEE OF THE C & K FAMILY TRUST DATED JANUARY 31, 2020, respectfully request this Court:

(a) enter an Order dissolving the injunction imposed by this Court's *Order on Plaintiff's Emergency Petition for Temporary Injunction* without the necessity of a hearing;

(b) if the Court is not inclined to dissolve the injunction without hearing, schedule an evidentiary hearing on the instant Motion to occur within five (5) days of the date of filing the instant Motion;

(c) enter an order granting entitlement in favor of the Owners and against the County for an award of County's attorney's fees and costs, reserving the amount of the award to be bifurcated and determined at a later date; and

(d) grant such other and further relief as the Court deems equitable and appropriate.

MEMORANDUM OF LAW

I. Introduction

Pursuant to Fla. R. Civ. Proc. 1.610(d), "[a] party against whom a temporary injunction has been granted may move to dissolve or modify it at any time." In the instant matter, the County's Petition should fail and the Order must be dissolved as the County has not properly complied with Florida Rule of Civil Procedure 1.610. Additionally, the County fails to satisfy, and cannot satisfy, the additional factors necessary to support the issuance of a temporary injunction.

II. The Petition and the Temporary Injunction Fail to Comply with the Requirements of Law

A temporary injunction issued without notice is an *extraordinary* remedy, which should be granted sparingly and *only* after compliance with Florida Rule of Civil Procedure 1.610. *Winter Green at Winter Park Homeowners Assoc. v. Ware*, 264 So. 3d 1143, 1146 (Fla. 5th DCA 2019) (emphasis added). In pertinent part, Fla. R. Civ. Proc. 1.610(a)(1)(A)-(B) provides:

> 1) A temporary injunction may be granted without written or oral notice to the adverse party only if:
>
> > (A) it appears from the specific facts shown by affidavit or verified pleading that immediate and irreparable injury, loss, or damage will result to the movant before the adverse party can be heard in opposition; and
> >
> > (B) the movant's attorney certifies in writing any efforts that have been made to give notice and the reasons why notice should not be required.

Here, the County's Petition is deficient in that it is completely devoid of a written certification or averment regarding the efforts, if any, made by the County to give notice to the Defendants and the reasons why notice should not be required. Indeed, an ex parte temporary injunction fails to the meet the requirements of Florida Rule of Civil 1.610(a) when the "attorney did not certify in writing any efforts made to give notice or any reasons why notice should not be required." *McKeegan v. Ernst*, 84 So. 3d 1229, 1230 (Fla. 4th DCA 2012)(reversing the order granting ex parte temporary injunction). Rule. 1.610(a)(2) *also* requires the court "give the reasons why the order was granted without notice if notice was not given." Likewise, the instant Order does not enumerate the reasons for entry without notice to the Owners. When an order on temporary injunction fails to explicitly state reasons why the order was granted without notice, this omission renders the order invalid under the plain reading of rule 1.610(a)(2). *Bookall v. Sunbelt Rentals*, 995 So. 2d 1116, 1118 (Fla. 4th DCA 2008). For these reasons alone, the temporary injunction must be dissolved.

Moreover, "[c]lear, definite, and unequivocally sufficient factual findings" must support each of these four criteria before the court may enter the injunction. *Aerospace Welding, Inc. v. Southstream Exhaust & Welding, Inc.,* 824 So.2d 226, 227 (Fla. 4th DCA 2002) (citing *City of Jacksonville v. Naegele Outdoor Adver. Co.,* 634 So.2d 750, 754 (Fla. 1st DCA 1994)). The

instant Order contains no factual findings supporting any of the four criteria. This additional defect requires the Order to be dissolved.

III. The Temporary Injunction Must Be Dissolved Because Plaintiff Failed To Establish the Elements Necessary for Injunctive Relief

Even assuming arguendo that the County's Petition was *not* deficient, the County's Petition cannot be sustained as the County has failed to establish the requisite elements to sustain injunctive relief. In addition to the procedural requirements of Fla. R. Civ. Proc. 1.610, a preliminary injunction may only be entered if the movant establishes four elements: (1) the likelihood of irreparable harm; (2) the unavailability of an adequate remedy at law; (3) a substantial likelihood of success on the merits; and (4) consideration of the public interest. *Avalon Legal Info. Services, Inc. v. Keating*, 110 So. 3d 75, 80 (Fla. 5th DCA 2013). For purposes of the instant Motion, Owners will focus on factors three (3) and four (4).

A. The County is Not Likely to Succeed on the Merits of its Claim(s) as the County Has Not Even Alleged any Viable Claim(s) Against the Owners

To rule on a temporary injunction, the trial court must, early in the case, estimate the likelihood of the Plaintiff prevailing on the merits and securing a permanent injunction. *Gold Coast Chemical Corp. v. Goldberg,* 668 So.2d 326, 327 (4th DCA 1996) (citing *Reinhold Constr., Inc. v. City Council of Vero Beach,* 429 So.2d 699 (Fla. 4th DCA 1983)). Applying this requisite analysis to the instant Petition is not even practicable, as the County's Petition fails to allege *any* viable cause of action against the Owners. The Petition merely asks this Court to award temporary injunctive relief. However, said prayer for relief is not tethered to any independent cause of action framed against the Owners. Injunctive relief is a remedy and not an independent stand-alone cause of action. See e. g. *Espinoza v. Countrywide Home Loan Servicing, L. P,* 2014 WL 3845795 at 11 (S. D. Fla. 2014)(citing *Alabama v. U.S. Army Corps of Eng'rs,* 424 F.3d 1117, 1127 (11th

Cir.2005) (holding that "any motion or suit for either a preliminary or permanent injunction must be based upon a cause of action .... There is no such thing as a suit for a traditional injunction in the abstract.") See also *Pronman v. Styles*, 2015 WL 58629 at 11 (S. D. Fla. 2015). As the County has raised no viable claims against Owners, there exists no grounds upon which the County may success on the merits of its claim(s). Due to this this fundamental error, the law commands that the temporary injunction be dissolved.

B. The County is Not Likely to Succeed on the Merits of its Claim(s) Because the Florida Right to Farm Act Prohibits the County's Enforcement of County Regulations Against the Owners

Even if the County had properly lodged a viable cause of action against the Owners, the Petition contains critical errors which prevent the County from carrying its heavy burden of proof.

In pertinent part, the Florida Right to Farm Act provides:

> It is the intent of the Legislature to eliminate duplication of regulatory authority over farm operations as expressed in this subsection. Except as otherwise provided for in this section and s. 487.051(2), and notwithstanding any other provision of law, **a local government may not adopt any ordinance, regulation, rule, or policy to prohibit, restrict, regulate, or otherwise limit an activity of a bona fide farm operation on land classified as agricultural land pursuant to s. 193.461, where such activity is regulated through implemented best management practices or interim measures developed by the Department of Environmental Protection, the Department of Agriculture and Consumer Services, or water management districts and adopted under chapter 120 as part of a statewide or regional program.** When an activity of a farm operation takes place within a wellfield protection area as defined in any wellfield protection ordinance adopted by a local government, and the adopted best management practice or interim measure does not specifically address wellfield protection, a local government may regulate that activity pursuant to such ordinance. This subsection does not limit the powers and duties provided for in s. 373.4592 or limit the powers and duties of any local government to address an emergency as provided for in chapter 252.

Fla. Stat. § 823.14(6). (Emphasis added).

Section 823.14(6), Fla. Stat., prohibits local governments from adopting or enforcing regulations which "... restrict, regulate, or otherwise limit an activity of a bona fide farm operation." See also *Wilson v. Palm Beach County*, 62 So. 3d 1247, 1250 (Fla. 4th DCA 2011), (holding that the plain, unambiguous terms of the Right to Farm Act prevents counties from adopting ordinances relating to agriculture). An opinion from the Florida Attorney General is also instructive which states, "[t]hus, a farming operation that falls within the coverage of section 823.14, Florida Statutes, would by definition, comply with the agricultural zoning classification of the land and would not be subject to county regulations or restrictions that attempt to limit such an operation." See *Florida Atty. Gen. Op. No.* 2009-26 (dated June 15, 2009).

Importantly, the Lake County Attorney has previously opined in writing that the Right to Farm Act prohibits county regulation in an almost identical fact scenario. A copy of the County Attorney's letter (the "Letter") is ***attached hereto as Exhibit "E"*** and incorporated herein by reference. In the Letter, the Lake County Attorney responded in 2016 to Defendants' attorneys' office's request regarding Lake County's ability to regulate the removal of spoil/dirt material from a property being operated as a bona fide agricultural operation. Ms. Melanie Marsh, Lake County Attorney, responded that Section 823.14 "... specifically preempts the County from regulating bona fide farm operations." The property in question in the attached opinion, owned by Rubin Groves of Clermont, LLC, is currently an established hay farm operation and removed over two million yards of dirt from the property pursuant to its farm plan and BMP's – a virtually identical factual scenario and legal precedent to the instant case. The Lake County government website states that the Lake County Attorney " ... provides legal counsel to the Lake County Board of County Commissioners, County Manager, County department and division heads and other governmental subdivisions in all matters of civil law relating to Lake County ...". See *Lake*

County, Florida website https://www.lakecountyfl.gov/offices/county_attorney (last visited April 10, 2020).

It is also important to note that the County (i. e. the Lake County Property Appraiser) attempted in 2018 to reverse its finding that the Rubin Groves property was a bona-fide agricultural operation, due to the large amount of material removed from the site. Lake County attempted to revoke the agricultural classification of the Rubin Groves property, resulting in a hearing before the Lake County Value Adjustment Board Special Magistrate, who found that due to the established Farm Plan, the implementation of which required the removal of the soil material, the Rubin Groves property remained a bona fide agricultural use and retained its agricultural classification. The decision of the Special Magistrate, which explains the legal issues and rationale, and which was confirmed by the Lake County Value Adjustment Board, is ***attached hereto as Exhibit "F"*** and incorporated herein by reference. Because of the nearly identical nature of facts and legal issues, the Value Adjustment Board's decision is of valuable instruction to this Court.

Substantial likelihood of success on the merits which is required for entry of temporary injunction is shown if good reasons for anticipating that result are demonstrated; it is not enough that merely colorable claim is advanced. *City of Jacksonville v. Naegele Outdoor Advertising Co.*, 634 So.2d 750, 753 (Fla. 1st DCA 1994). Prior to issuing a temporary injunction, a trial court must be certain that the petition or other pleadings demonstrate a prima facie, clear legal right to the relief requested. *Id.* Based on the foregoing, not only does the County fail to show a substantial likelihood of success on its "claim", as shown herein, the County has not even presented a colorable claim against the Owners. For these additional reasons, the Owners Motion should be granted and the temporary injunction should be dissolved.

C. The Temporary Injunction Does Not Serve the Public Interest

Including the truckers hauling the material, over one hundred (100) individuals were employed at the Property at or about the time of entry of the Order. In this time of national, state and local emergency and skyrocketing unemployment, keeping workers in Lake County and central Florida employed is vital to the public interest. Intentionally preventing the employment of those people which provides the livelihood for their families is a substantial violation of the public interest.

IV. Bond/Damages

The instant Order does not require the County to post a bond. The purpose of an injunction bond is to provide sufficient funds to cover adverse parties' costs and damages if the injunction is wrongfully issued. See *Metalmax Cutting Tools, Inc. v. Mill-Tech USA, Inc.*, 794 So. 2d 609 (Fla. 2d DCA 2001). Owners are obligated under certain third party agreement(s) to deliver offsite excavated materials. Due to the instant injunction, Owners will be prohibited from performing and Owners will be significantly damaged. Owners anticipates its damages will be well over five (5) million dollars. Justice requires that the crushing damages which will suffered by Owners should be countered by a commensurate bond required of the County. Accordingly, Owners request reconsideration of the bond requirement and, if the Order is not forthwith dissolved, Owners request a hearing to establish the proper amount of the bond.

A party against whom an injunction has been wrongfully issued is entitled to damages resulting therefrom. *Jefferies & Co., Inc. v. Internat'l Assets Holing Corp.,* 830 So.2d 256, 259 (Fla. 5th DCA 2002). The dissolution of a temporary injunction on the merits constitutes an adjudication that it was wrongfully issued. *Id.* (citing *Shea v. Cent. Diagnostic Servs., Inc.,* 552 So.2d 344, 346 (Fla. 5th DCA 1989). "The law is clear that a defendant is entitled to any damages

sustained by him as a result of a wrongfully issued temporary injunction after the trial court, as here, dissolves the temporary injunction based on the claim of wrongful issuance...." *Id.* (citing *Lake Worth Broad. Corp. v. Hispanic Broad., Inc.,* 495 So.2d 1234, 1234 (Fla. 3d DCA 1986)). Even if a bond is not required of the County, the Owners reserve all rights to seek the future entry of an award of damages against the County for the wrongfully-issued temporary injunction.

V. Conclusion

For the reasons stated more fully herein, Owners have shown that they will suffer irreparable harm if the temporary injunction is not dissolved. As the issuance of a temporary injunction is an extraordinary remedy and the County has failed to carry its burden for the issuance of the same, Defendants respectfully request and the interest of justice demand that the Order granting temporary injunction be dissolved.

Respectfully submitted this 10th day of April, 2019.

CRAWFORD, MODICA & HOLT,
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CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a copy hereof was electronically served via the Florida Courts E-Filing Portal on this 10th day of April, 2020.

/s/ Lindsay C. T. Holt
Lindsay C.T. Holt

Chris:

On April 22,2020, I made a site visit to White Water Farms in Lake County. I was joined by Bill Ray, Ray & Associates, and Kirk Leiffer, one of the property owners. The site is located near Sorrento and is comprised of three parcels. Parcel 3801481 to the west is approximately 40 acres. Parcel 3816197 to the east is approximately 40 acres. Parcel 3801484 is mainly the road dividing the other two parcels and is approximately 0.65 acres. The parcels are owned by C & K Family Trust. We spoke about the planned agricultural activities for the site.

During the visit, I observed continuous dirt removal and excavation from the east parcel where blueberries are planned for production. The parcel to the west is planned for hay production and no dirt removal or excavation has occurred or is planned there.

As we talked, I did not observe any active agricultural activities on the site. I explained to Mr. Ray and Mr. Leiffer that current activities would most likely not be considered normal or customary for the proposed blueberries on the east parcel. I explained to Mr. Leiffer that we would not enroll the property until he obtains the appropriate permits from SJRWMD as well as approval from Lake County for that activity on site. Once the permits are obtained and there is agricultural production, hay being grown or blueberries in the ground and active, we will be available to assist with enrollment of those commodities in our BMP program using the appropriate manuals. Mr. Leiffer understood and will proceed in obtaining the proper permits for activities currently underway at the site.