


United States Nuclear Regulatory Commission Official Hearing Exhibit	
In the Matter of:	Progress Energy Florida, Inc. (Levy County Nuclear Power Plant, Units 1 and 2)
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**UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION**

Before the Atomic Safety and Licensing Board

In the Matter of)		
)	Docket Nos.	52-029-COL
Progress Energy Florida, Inc.)		52-030-COL
)		
(Combined License Application for)		
Levy County Nuclear Plant, Units 1 and 2))	ASLBP No.	09-879-04-COL

PRE-FILED REBUTTAL TESTIMONY OF
WILLIAM J. DUNN, PH.D.
ADDRESSING INTERVENORS' DIRECT TESTIMONY REGARDING ACTIVE DEWATERING
DURING CONSTRUCTION AND OPERATION OF LEVY NUCLEAR PLANT, UNITS 1 & 2

I. BACKGROUND

- Q1. Please state your name and business address.
 - A1. My name is Dr. William J. Dunn. My business address is 3731 NW 23rd Place, Gainesville, Florida.

- Q2. Please state your employer and position.
 - A2. I am a founder and partner with Dunn, Salsano & Vergara Consulting, LLC. I am the firm's principal scientist.

- Q3. Have you previously prepared testimony in this proceeding?
 - A3. Yes. I prepared pre-filed direct testimony in this proceeding regarding the environmental impacts from active dewatering during construction and operation of the Levy County Nuclear Power Plant, Units 1 and 2 (LNP)¹. PEF300.

- Q4. What is the purpose of your rebuttal testimony?

¹ PEF316 is a list of acronyms used in my rebuttal testimony.

A4. The purpose of my rebuttal testimony is to respond to certain issues raised by the initial pre-filed testimonies of Dr. Sydney Bacchus (INT301R), Dr. Tim Hazlett (INT101R) and Mr. David Still (INT201R) concerning issues related to active dewatering during construction and operation of the LNP.

II. HYDROPERIODS AND DROUGHT

Q5. Do you agree with the assertion of Dr. Bacchus on page 9 of her testimony (INT301R) that “irreversible adverse impacts to the natural hydroperiods on the proposed LNP site and surrounding vicinity would occur from dewatering and other alterations that would be caused by construction and operation” of the LNP, and that the “[i]rreversible adverse impacts to the natural hydroperiods will result in adverse impacts to both plants and animals in wetland, upland, aquatic and coastal habitats on the proposed LNP site and surrounding vicinity”?

A5. This assertion is simply a restatement of the original contention that dewatering from construction and operation of the LNP will cause unacceptable adverse impacts to wetlands, floodplains, special aquatic sites, and other waters on and in the vicinity of the LNP site. I have already explained in my direct testimony (PEF300) that I strongly disagree with this assertion. The only nuance added by Dr. Bacchus in this version of the assertion is her addition of the term “natural hydroperiods.” As explained in detail below, this change to the original assertion adds nothing of substance as hydroperiods and the overall hydrologic regime of the wetlands and aquatic ecosystems are adequately covered in the Final Environmental Impact Statement (FEIS) (NRC001), in the review of the Southwest Florida Water Management District (SWFWMD), and in the Conditions of Certification (COC) (PEF005) issued to Progress Energy Florida, Inc. (PEF) for the LNP pursuant to the Florida Electrical Power Plant Siting Act. Therefore my conclusions remain as stated in my direct testimony—that the proposed active dewatering will not result in any impacts that are greater than SMALL on the wetlands and aquatic ecosystems and their underlying aquifers on and in the vicinity of the LNP site, and that the groundwater testing, environmental monitoring, and alternative water supply plan required by the COC will ensure that unacceptable adverse impacts to wetlands and aquatic ecosystems will not occur.

PEF300 at pp. 6 to 7. The NRC Staff similarly concluded in the FEIS that such potential impacts would be, at most, SMALL to MODERATE. *Id.* (citing NRC001 at pp. 5-8, 5-47). This conclusion is further supported by the NRC Staff in their submitted Initial Statement of Position and the pre-filed NRC Staff testimony (NRCTEST).

Dr. Bacchus provides an explanation of what she means by “hydroperiod” on page 12 of her testimony: “Ecological systems such as wetlands depend on natural fluctuations of the water table – the surficial aquifer – to maintain their essential functions. These fluctuations of the water table are known as the ‘hydroperiod.’ Three important aspects of a wetland hydroperiod are: (1) the depth or stage of fluctuating ground and surface water; (2) the duration of the water level at a given depth or stage; and (3) the periodicity or seasonality of the water level fluctuations.” INT301R. She then states that “[d]isruption of any one of these three aspects can lead to the degradation and ultimate destruction of the wetland and the biota it supports.” *Id.*²

This hydroperiod approach to the characterization of the hydrology of wetlands and aquatic ecosystems is a relatively static snapshot of what is a very dynamic regime of high, moderate, low and very low (drought) water levels. The SWFWMD and the St. Johns River Water Management District (SJRWMD) have largely moved away from use of the simplistic hydroperiod concept of wetland hydrology to the more informative and dynamic concept of multiple level/flow hydrologic regimes. This approach has been the focus of the research and regulatory efforts by the two water management districts over the last 20 years. The approach recognizes that wetland and aquatic ecosystems are adapted to a range of natural inundation and dewatering conditions and that both types of conditions are needed to maintain the structure, functions and species assemblag-

² However, Dr. Bacchus provides no threshold of change for triggering adverse impact to the wetland for any of the three components. Without defining what an adverse impact is, or how it occurs, it is hard to imagine how she can reach any conclusion. She does, however, imply that any, even a slight, change in either the depth, or duration, or seasonality of inundation will result in degradation and/or ultimate destruction of a wetland. Her implication is overly simplistic and at odds with the state of knowledge of wetland ecology and hydrology, especially in regard to studies of Florida wetlands conducted over the last several decades.

es of the wetlands and aquatic ecosystems. This range of conditions can be defined by hydrologic statistics using cumulative frequency analysis of water level records. When there is sufficient data for both water levels through time and measures of ecological health, then this approach can be extended to define very specific protective hydrologic events, composed of a magnitude for water level or flow, a duration of time (days), and a return interval. Specific statistics can be developed for the inundation and dewatering events needed to maintain the type of wetland or aquatic ecosystem. From a resource protection standpoint, the goal is not to have too few flooding or inundation events or too many dewatering or drawdown events than that which will maintain/sustain the community. The SWFWMD and SJRWMD use such hydrologic statistics in making permitting decisions regarding potential impacts of a proposed water use and when setting a minimum flow and level (MFL) for a water body, such as the cypress wetland MFL, which is a drawdown limit established by the SWFWMD for cypress swamps that I discuss on page 18 of my direct testimony. PEF300.

This statistical hydrology approach is embedded in the SWFWMD review of PEF's requested water use, and thus also in the protective conditions of the COC. In comparison to a more limited and static classic hydroperiod approach to wetland hydrology, this frequency-based statistics approach recognizes: monitoring data is essential, links between hydrology and ecological health can be established, and then protective criteria and/or thresholds can be developed to prevent adverse impacts from occurring. When an adequate period of record is available, then the seasonal effects of rainfall and longer patterns in rainfall cycles are captured and are thus embedded in the record.

Importantly, the wetlands in the vicinity of the LNP site have been altered by silviculture activities (PEF300 at p. 10) such that a reference to their "natural hydroperiod" is largely inapplicable. The seasonal effects of rainfall and longer patterns in rainfall cycles have been captured in part by the groundwater modeling conducted for PEF by CH2M Hill for water use authorization from the SWFWMD and as requested by the NRC for the FEIS. As described in the pre-filed rebuttal testimony of Mr. Jeffrey Lehnen, the District Wide Regulation Model, Version 2 (DWRM2) regional groundwater model that was the basis for CH2M Hill's groundwater modeling is the product of a transient calibration

against monthly data (including recharge from precipitation) taken from over 1,000 measuring points over an eight-year time period (1995 – 2002). PEF218 at p. 9. This calibration was relied on in both the groundwater model for the SWFWMD and the revised model for the NRC. Id. In evaluating groundwater modeling results and making a water use permitting decision, the SWFWMD typically applies a 0.5 foot (ft) drawdown as the threshold of concern for wetlands, as described on page 19 of my direct testimony. PEF300. This 0.5 ft threshold arises from the cypress wetland MFL described above, and is consistent with the hydrologic statistics approach used in the regional water supply management initiative known as the Central Florida Water Initiative, described on pages 19 to 20 of my direct testimony. Id. In determining that the conditions for issuance of a water use permit (or, in the case of the LNP, for recommendation of certification under the Florida Electrical Power Plant Siting Act) have been met, the SWFWMD must make a determination that, among other things, the performance standards for wetlands in Section 4.2 of the SWFWMD Water Use Permit Information Manual, Part B, Basis of Review have been met. Id. at pp. 26 to 27. The performance standards dictate that: (1) “[w]et season water levels shall not deviate from their normal range;” (2) “[w]etland hydroperiods shall not deviate from their normal range and duration to the extent that wetland plant species composition and community zonation are adversely impacted;” (3) “[w]etland habitat functions, such as providing cover, breeding, and feeding areas for obligate and facultative wetland animals shall be *temporally and spatially maintained*, and not adversely impacted as a result of withdrawals;” and (4) “[h]abitat for threatened or endangered species shall not be altered to the extent that utilization by those species is impaired.” PEF313 at p. B4-2 (emphasis added). Therefore, the SWFWMD considered impacts on hydroperiods and hydrologic regimes in the permitting review.

Additionally, the SWFWMD and the Florida Department of Environmental Protection (FDEP) imposed additional requirements through the COC to confirm the results of the groundwater modeling and ensure that there will be no unacceptable adverse impacts to wetlands and aquatic ecosystems at and in the vicinity of the LNP. As described in pages 27 to 36 of my direct testimony (PEF300), PEF is required by the COC to implement two testing and monitoring plans:

- The Aquifer Performance Testing (APT) Plan is a site-specific groundwater testing exercise to provide direct estimates of the aquifer's characteristic hydraulic parameters, such as hydraulic conductivity and transmissivity. Completing the analysis and interpretation of the results of the APT will ensure that the aquifer parameters used in the groundwater model best reflect site-specific conditions

- The Environmental Monitoring Plan (EMP) will provide the framework for monitoring the hydrology and ecology of wetlands at and in the vicinity of the LNP site that could be affected by operation of the LNP raw water wellfield. It is my professional opinion that the monitoring approach in the EMP is based on accepted protocols that conform to decades of wetland studies and regulatory program development by the SWFWMD. The EMP is designed to: (1) detect trends toward an unacceptable level of hydrologic changes as defined by hydrologic statistics; (2) define an action plan if adverse impacts occur, or are predicted to occur; and (3) prevent adverse impacts to wetland communities due to the operation of the wellfield. The EMP will specifically examine hydroperiods in gathering data to answer the following questions:
 - o What are the baseline ranges of wetland hydroperiods for the systems potentially affected by well field pumpage?
 - o Is wellfield pumping affecting wetland water levels or hydroperiods?
 - o Are shifts in vegetation occurring and are these changes due to observed changes in hydroperiod stage and duration?
 - o Has there been any evidence of subsidence (sinking of levels) in wetlands attributable to operation of the LNP's raw water wellfield?
 - o Is the LNP's wellfield pumping adversely impacting wetlands?

Id. at p. 31. Given the limited historical quantitative data available for the wetlands at issue, site-specific and reference site data will be gathered to build a longer period of record. The EMP measures will be timely to detect and prevent

harm to wetlands, since change in the hydrologic regime of a wetland sufficient in magnitude to induce long-term harm will be detectable well before the wetland actually exhibits the indicators of harm, or is subject to loss of structures, species or functions.

Last, as described in pages 36 to 37 of my direct testimony, if unacceptable adverse impacts are predicted to occur through the APT Plan or the EMP, PEF must either mitigate the adverse impact or implement an Alternative Water Supply (AWS). PEF300. The COC therefore will ensure that “irreversible adverse impacts to the natural hydroperiods” will not occur, nor result in “adverse impacts to both plants and animals,” contrary to Dr. Bacchus’s assertions. INT301R at p. 9.

Q6. Do you agree with the assertions throughout the direct testimony of Dr. Bacchus that the FEIS fails to consider impacts to natural hydroperiods of wetlands from dewatering during construction and operation of the LNP? (See, e.g., INT301R at pp. 9, 15 to 20, 24 to 25).

A6. I disagree with Dr. Bacchus’s assertions. I have already discussed my rejection of this assertion in A5 above, and to that I add the following support. Although the FEIS does not contain an in-depth discussion of hydroperiods *per se*, consideration of impacts to hydroperiods is embedded in the FEIS, particularly through the FEIS’s consideration of the dewatering analyses performed by the SWFWMD and the NRC Staff, and the requirements established by the COC, including the EMP. As described in the NRC Staff Testimony, potential impacts on wetlands and other terrestrial ecosystems from active and passive dewatering during construction of the LNP are addressed in Section 4.3.1.1 of the FEIS (NRC001 at pp. 4-31 to 4-35), such potential impacts during operation of the LNP are addressed in Section 5.3.1.1 (including the SWFWMD’s performance standards, the EMP and other COC requirements) (*Id.* at pp. 5-26 to 5-31), and the dewatering impacts on wetlands are considered in the evaluation of cumulative impacts on terrestrial ecological resources in Section 7.3.1 (*Id.* at pp. 7-20 to 7-29). NRCTEST at p. 87. The NRC Staff provides additional clarification of their extensive efforts to assess the possible effects of active dewatering on wetlands in pages 88 to 99 of their testimony. *Id.*

Q7. Do you agree with Dr. Bacchus's assertion on page 10 of her testimony (INT301R) that most environmental impacts from dewatering during construction and operation of the LNP will occur because PEF proposes removing significant amounts of water from an ecosystem already stressed from alterations in natural hydroperiods?

A7. No, I do not agree with this assertion. In the context of her A.12, Dr. Bacchus's assertion is completely unsubstantiated, and thus groundless. INT301R at pp. 10 to 12. First, Dr. Bacchus offers no explanation for her assertion that ecosystems are already stressed from alteration of natural hydroperiods. She provides no evidence or documentation, no specific locations, no acreage estimates, and no description of change to any of her three components of hydroperiod. Second, as I describe in A5 above, I do not agree that dewatering activities due to construction and operation of the LNP will lead to significant alteration of natural hydroperiods of or unacceptable adverse impacts on wetlands and aquatic ecosystems on and in the vicinity of the LNP site

Q8. Do you agree with the assertions of Dr. Bacchus throughout her testimony that the presence of karst features provides preferential flow paths at and in the vicinity of the LNP site that affect natural hydroperiods? (See, e.g., INT301R at pp. 10 to 11, 24 to 27, 59 to 62).

A8. No. I do not agree with these assertions as stated by Dr. Bacchus. Dr. Bacchus implies that most or all wetlands at and in the vicinity of the LNP site are karst features that are in direct hydraulic connection to preferential flow paths in the underlying aquifer. Dr. Bacchus provides no evidence to support this. In his pre-filed rebuttal testimony, Dr. Paul Rizzo explains that at the LNP site, "preferential flow paths, called conduits by some in the profession, were not found in spite of a diligent and comprehensive investigation of vertical fractures and overall fracture patterns at the LNP site and off-site in quarries, stream banks and road cuts." PEF700 at p. 14. Without evidence of these preferential flow paths, Dr. Bacchus's assertions regarding the impacts on hydroperiods are not supported by her own testimony and thus are baseless.

Q9. Do you agree with Dr. Bacchus's assertion on page 19 of her testimony (INT301R) that a reduction of 400,000 gallons per day (gpd) to the lower Withlacoochee River and Lake

Rousseau watersheds due to active dewatering during operation of the LNP would result in LARGE adverse impacts to natural hydroperiods?

A9. In this assertion, Dr. Bacchus fails to state what areas will suffer LARGE adverse impacts to natural hydroperiods. Beyond this failure to define the actual area she alleges will likely suffer adverse impact, two lines of evidence rebut Dr. Bacchus's assertions. First, I addressed the effect of the 400,000 gpd reduction in groundwater flow to the Withlacoochee River and Lake Rousseau watersheds in my direct testimony. I concluded that the simulated reductions of groundwater flow to the lower Withlacoochee River and Lake Rousseau of 400,000 gpd is insignificant in comparison to the 37-year recorded average daily discharge to the lower Withlacoochee of 687 million gallons per day (mgd). PEF300 at p. 24. The second line of evidence is that the COC include several safeguards that will protect the natural hydroperiods of wetlands and aquatic ecosystems on and in the vicinity of the LNP site, including the Withlacoochee River and Lake Rousseau watersheds. As discussed above, the APT Plan and EMP, as well as an AWS if needed, will prevent harm to wetlands and aquatic ecosystems on and in the vicinity of the LNP site.

Q10. Do you agree with Dr. Bacchus's assertion on page 27 of her testimony (INT301R) that the FEIS does not account for the annual dry seasons and periods of drought, when both natural vegetation and wildlife are most sensitive to altered hydroperiods?

A10. No, I do not agree with this assertion. As noted in A5 above, Dr. Bacchus is simply adding hydroperiod considerations, including drought, to the original contention that dewatering associated with construction and operation of the LNP will result in unacceptable adverse impacts to wetlands and aquatic ecosystems on and in the vicinity of the LNP site. As I stated, I do not agree that dewatering activities due to construction and operation of the LNP will lead to significant alteration of natural hydroperiods or unacceptable adverse impacts on wetlands and aquatic ecosystems on and in the vicinity of the LNP site. The issues of annual rainfall, longer term drought cycles and their effect on hydroperiods, the overall hydrology, and health of wetlands and aquatic systems are adequately covered in the FEIS. Since the SWFWMD developed its wetland protection drawdown criteria based on studies of wetlands and aquatic ecosystems with 6 to

30+ years of hydrology monitoring data, drought effects are embedded and accounted for in the period of record. Thus the SWFWMD's water use permitting process accounts for annual and inter-annual rainfall fluctuations, and by direct extension so do the monitoring requirements and protective conditions of the COC.

In pages 21 to 23 of my direct testimony, I describe why there is no concern regarding the impacts to wetlands and aquatic ecosystems from active dewatering during dry or drought periods. PEF300. I explain that the wetlands and aquatic ecosystems and their underlying aquifers on and in the vicinity of the LNP site are robustly adapted to annual wet and dry periods, as well as short, intermediate and long term drought cycles.

Q11. Do you agree with Dr. Bacchus's assertion on page 54 of her testimony (INT301R) that there are no permit requirements applicable to the LNP to halt or reduce groundwater withdrawals during times of drought and that without such restrictions, LNP could withdraw the maximum amount of water allowed during those times when both plants and animals in the surrounding ecosystems are most reliant on natural groundwater contributions?

A11. I do not agree with this assertion. Dr. Bacchus fails to recognize that the COC will prevent unacceptable adverse impacts to wetlands and aquatic ecosystems from occurring through the monitoring requirements of the EMP and, if necessary, the use of an AWS. In A10 above, I demonstrate that Dr. Bacchus fails to recognize that drought effects are embedded in the dewatering impact analysis performed by the SWFWMD in development of the monitoring requirements and protective criteria of the COC.

Q12. Do you agree with the assertion of Dr. Bacchus on page 65 of her testimony (INT301R) that even if the 8-foot variability in groundwater levels observed in the vicinity of the proposed LNP site is normal seasonal variability in groundwater levels, an additional 0.5-foot alteration of that seasonal variability could prove fatal to the ecosystems and associated organisms in the 3-mile drawdown predicted in the vicinity of the LNP during the normal dry season and during periods of drought?

A12. There is a long history behind the development of the SWFWMD's 0.5 draw-down impact threshold, and this is discussed in some detail in pages 16 to 20 of my direct testimony. PEF300. The FEIS recognizes that Surficial Aquifer System (SAS) drawdowns in excess of this amount may contribute to unacceptable impacts to wetlands. This concern is also recognized by the SWFWMD in the monitoring requirements and protective conditions of the COC, which together will ensure that adverse impacts to wetlands due to active dewatering during operation will not occur. As I stated in my direct testimony, I agree with the FEIS's assessment that the testing, monitoring, and mitigation requirements of the COC, specifically the APT Plan, the EMP, and the potential implementation of an AWS, ensure that active dewatering during operation of the LNP will not have greater than SMALL impacts on wetlands, or on aquatic ecosystems or their underlying aquifers. Id. at pp. 37 to 38 (citing NRC001 at p. 9-250). The NRC Staff concluded, and I concur, that additional mitigation measures beyond those in the COC are not warranted. Id. at p. 38 (citing NRC001 at p. 5-47).

III. SINKHOLES

Q13. Do you agree with the assertions in the testimony of Dr. Bacchus that the depressional wetlands within the LNP site and the surrounding area are formed from relict sinkholes? (See, e.g., INT301R at pp. 11 to 12, 18, 26 to 27).

A13. No, I do not agree with the assertion that the wetlands at the LNP site and in the surrounding area are formed from relict sinkholes. While I agree that some depressional wetlands may be associated with relict sinkholes, Dr. Bacchus implies that all depressional wetlands at the LNP site and in the surrounding area are formed from relict sinkholes, which is incorrect. Types of wetlands in the area that clearly do not owe their origins to sinkholes are the massively extensive hydric flatwoods and hydric hammocks of the Gulf Hammock region. Other locally common aquatic habitat types that are not intimately associated with sinkholes are: shallow, intermittent flow-through systems such as sloughs; wetlands in erosional depressions associated with creek and riverine floodplains; spring run systems such as Big and Little King; seepage-fed wetland systems; and wetlands formed in interdune swales between old beach ridges, such as the Brooksville Ridge and the other remnant coastal ridge systems in the area. Furthermore, the

rebuttal testimony of Mr. Lehnen explains that Dr. Bacchus's allegations regarding the presence of relict sinkholes at the LNP site and in the surrounding area are unsupported and contrary to the opinions of licensed professional engineers and geologists on the topic. PEF218 at pp. 8 to 9.

IV. SPECIES

Q14. Do you agree with the assertions of Dr. Bacchus in her testimony that the FEIS fails to adequately assess the impacts on Federally listed species, including their habitat? (See, e.g., INT301R at pp. 4, 24, 36 to 37, 47 to 52, 55 to 58, 67 to 68).

A14. Impacts to Federally listed species are raised by Part C.2 of Contention 4A. I have already addressed the merit of Contention 4A, Part C, including Part C.2, in my direct testimony, and I concluded that Part C is without merit. PEF300 at pp. 43 to 47. As I stated, in order for Contention 4A, Part C to have merit, the contention, by its terms, requires an initial determination that the FEIS fails to specifically and adequately address, and inappropriately characterizes as SMALL, direct, indirect, and cumulative impacts, onsite and offsite, to wetlands, floodplains, special aquatic sites, and other waters, associated with (1) dewatering caused by the LNP (Contention 4A, Part A); and/or (2) salt drift and salt deposition from the LNP cooling towers (Contention 4A, Part B). It does not. Id. at p. 43.

Even if it were necessary to reach the substance of the allegations of Contention 4A, Part C, I concluded in my direct testimony that the FEIS adequately identifies and appropriately characterizes as SMALL the proposed project's zone of environmental impacts, and therefore also adequately identified and appropriately characterizes the proposed project's zone of impact on Federally listed environmental species. Id. at pp. 44 to 45.

Additionally, contrary to Dr. Bacchus's assertions, the FEIS takes a hard look at potential impacts of construction and operation of the LNP to Federally listed species, including their habitat. I have reviewed in detail the species impact evaluation in the FEIS. In my direct testimony, I state my opinion that impacts on Federally listed species, including the zone of such impacts, have been adequately identified and appropriately characterized in the FEIS as SMALL to MOD-

ERATE. Id. at p. 47. The impacts of construction activities for the LNP on Federally listed terrestrial species are addressed in Section 4.3.1.3 of the FEIS (NRC001 at pp. 4-47 to 4-58), while impacts on Federally listed aquatic species are covered in Section 4.3.2.3 (NRC001 at pp. 4-76 to 4-78). The impacts of operating the LNP on Federally listed terrestrial species are addressed in Section 5.3.1.3 of the FEIS (NRC001 at pp. 5-38 to 5-42), and impacts on Federally listed aquatic species are covered in Section 5.3.2.3 (NRC001 at pp. 5-60). Potential cumulative impacts of the LNP project are addressed in Sections 7.3.1 and 7.3.2 of the FEIS for terrestrial and aquatic species, respectively. (NRC001 at pp. 7-20 to 7-29, 7-29 to 7-34). Impacts to Federally listed species are also discussed in two Biological Assessments (BAs) (one for the U.S. Fish and Wildlife Service (USFWS) and one for the National Marine Fisheries Service (NMFS)) and a Biological Opinion (BO) by the USFWS that are in Appendix F to the FEIS. NRC001.

Additionally, pages 57 through 60 of the NRC Staff's Initial Statement of Position summarize the Staff's analysis of impacts to Federally listed species. The Statement notes that: (1) the Staff's analysis was systematic and thorough, and followed its guidance in NUREG-1555, Environmental Standard Review Plan – Standard Review Plans for Environmental Reviews for Nuclear Power Plants (ESRP); (2) the Staff closely coordinated its review with the NMFS and USFWS; and (3) the NMFS and USFWS supported the Staff's conclusions regarding impacts to Federally listed species. Id. at p. 57. I concur with these three findings.

The NRC Staff's testimony also provides a very detailed description as to how these potential impacts were evaluated by the Staff in the FEIS. Section IV.B of that testimony specifically addresses Contention 4A, Part C.2. In A237 through A246, the NRC Staff addresses impacts to Federally listed terrestrial species, including their habitat (NRCTEST at pp. 181 to 187), while in A247 through A257, the NRC Staff addresses Federally listed aquatic species and their habitat (id. at pp. 187 to 193). The testimony further documents that the Staff's conclusions are those confirmed by the USFWS in Table 1 of the BO (NRC001 at pp. F-196 to F-198). The BO provides that for listed terrestrial species of interest, the LNP project "may affect and is likely to adversely affect" only the Florida scrub-jay. Id.

at p. F-196. The adverse effects to the Florida scrub-jay, however, are not attributable to dewatering or salt drift, the subjects of Contention 4A, but to clearing of specialized upland habitat to build portions of the transmission lines. NRCTEST at pp. 186 to 187.³ The BO documents the USFWS's determination of "may affect, not likely to adversely affect" for the following species identified as being at issue by Dr. Bacchus in her testimony (INT301R at p. 47): eastern indigo snake, the Florida manatee, red-cockaded woodpeckers, and wood storks. In regard to the Federally listed aquatic species identified as being impacted by Dr. Bacchus in her testimony (Id.), the NMFS agreed with the NRC Staff that there would be no effect on the leatherback turtle, and agreed with the Staff's determination of "may affect, not likely to adversely affect" for the loggerhead, green, hawksbill, and Kemp's ridley sea turtles, as well as the smalltooth sawfish. NRCTEST at p. 193.

V. CUMULATIVE IMPACTS

Q15. Do you agree with the assertions in the testimony of Dr. Bacchus (INT301R at pp. 33 to 36, 66 to 67), Dr. Hazlett (INT101R at pp. 9 to 10), and Mr. Still (INT201R at p. 20) that the FEIS fails to account for, or adequately account for, the cumulative impacts from the proposed Tarmac Mine, the Adena Ranch, and the proposed Knight Farm Sand Mine?

A15. No. The NRC Staff specifically included the Tarmac Mine in its consideration of cumulative impacts from LNP dewatering. NRC001 at pp. 4-22 to 4-24, 7-14 to 7-15. In my direct testimony, I addressed the impact of water use by the Tarmac Mine and referred to the pre-filed direct testimony of Mr. Lehnen (PEF200 at pp. 17 to 18). PEF300 at pp. 42 to 43. The withdrawal amounts permitted by the SWFWMD for the Tarmac Mine are below the 1 mgd assumed by the NRC Staff in the FEIS. NRC001 at pp. 4-24, 7-15. I provided my professional opinion that the groundwater use associated with the Tarmac Mine does not change the characterization within the FEIS that the direct, indirect and cumulative impacts on

³ The BO found that limited mortality of the Florida scrub-jay could occur from this habitat loss, but that the losses were not expected to appreciably affect the overall survival of the species; therefore, the USFWS issued an incidental take statement for the Florida scrub-jay in the BO. NRC001 at pp. F-214 to F-216.

water resources from active dewatering during construction and operation of the LNP are SMALL. PEF300 at p. 43.

The Adena Ranch is in Marion County, nearly 40 miles to the northeast of the LNP site. It lies across the groundwater and surface water divide between the SWFWMD and the SJRWMD. The ranch has applied to the SJRWMD for a consumptive use permit (CUP) to withdraw water from the Upper Floridan Aquifer (UFA) for seasonal irrigation of pasture. The ranch's requested use is currently being evaluated by the SJRWMD. PEF221 and PEF222 depict the modeled drawdown in the SAS and UFA respectively from the proposed Adena Ranch groundwater withdrawal. Since the LNP site lies more than 30 miles southwest of the 0.1 ft drawdown contours, the Adena Ranch project as proposed will have no measureable impact on water levels in the SAS or UFA at the LNP. It should also be noted that the Adena Ranch CUP application is still under review and no decision regarding issuance has been made as of yet by the SJRWMD. Accordingly, in my professional opinion, it is reasonable that the FEIS did not include the Adena Ranch in its evaluation of cumulative impacts associated with the construction and operation of the LNP.

The Knight Farm Sand Mine is a 380 acre surface mine project. The existing wetlands on the property will be excluded from the mining areas, and will be protected with the addition of a 100 ft buffer of uplands (INT435). The Levy County permit provided as an exhibit by Dr. Bacchus indicates that the mine operation will not be using pumped groundwater. INT434 at p. 15. Therefore, the project will not contribute incrementally to the cumulative regional groundwater drawdown by active dewatering. Accordingly, in my professional opinion, it is reasonable that the FEIS did not include the Knight Farm Sand Mine in its evaluation of cumulative impacts associated with the construction and operation of the LNP.

Mr. Lehnen also addresses the assertions of Dr. Bacchus, Dr. Hazlett and Mr. Still that the FEIS did not adequately address the cumulative impacts of the Tarmac Mine, the proposed Adena Ranch, and the proposed Knight Farm Sand Mine in pages 10 to 13 of his rebuttal testimony. PEF218. Mr. Lehnen reaches the same conclusions as I do.

Finally, I note that the regional, cumulative effect of the LNP and other permitted projects on hydrologic conditions in wetlands and aquatic ecosystems on and in the vicinity of the LNP site will be measured, and thus captured by the monitoring activities outlined in the COC requirements for the APT and EMP. This will be true even for projects that start up after commencement of PEF's required monitoring. As the NRC Staff points out in their testimony, "the monitoring [will] detect overall drawdown near the wells but [will] not be capable of distinguishing drawdown caused by the wells from drawdown caused by other nearby activities." NRCTEST at p. 98. Therefore, the monitoring requirements and protective conditions of the COC will ensure that the cumulative effects of dewatering due to groundwater pumping in the area do not cause unacceptable adverse impacts to wetlands and aquatic ecosystems at and in the vicinity of the LNP site.

Q16. Do you agree with the assertion on page 34 of the testimony of Dr. Bacchus (INT301R) that the FEIS fails to provide an accurate evaluation of the cumulative water quality impacts that will ensue in the coastal estuary system, including Withlacoochee Bay and Withlacoochee and Waccasassa Rivers, due to the LNP's proposed withdrawals of substantial freshwater and groundwater currently flowing into them?

A16. I disagree with this assertion. The FEIS addresses water quality impacts from construction of the LNP in Section 4.2.3, from operation of the LNP in Section 5.2.3 and in association with cumulative impacts in Section 7.2.2. NRC001 at pp. 4-25 to 4-27, 5-8 to 5-16, 7-15 to 7-20. The key to assessing the potential impact here to the coastal estuary system is the level of change in the flux of freshwater moving from the UFA to surface and coastal waters. As described in the FEIS, the average LNP operational usage of 1.58 mgd represents only 0.8% of the average annual groundwater flow in the UFA of 208 mgd. Id. at p. 5-8. This withdrawal is predicted to decrease the SAS and UFA discharge to surface water bodies, including Lake Rousseau and the lower Withlacoochee River, by 400,000 gpd, which represents only 2% of the total simulated discharge to surface waters. Id. This reduction is insignificant in comparison to the 37-year recorded daily discharge of 687 mgd through the bypass channel to the lower Withlacoochee River. Id. I discuss the changes in the flow regime in the UFA from active dewatering and the changes in flows from the UFA system into adjacent surface waters in my direct testimony and conclude that the impacts will not be greater

than SMALL (PEF300 at pp. 14 to 15, 23 to 24), which is consistent with the conclusion of the NRC Staff in the FEIS (NRC001 at p. 5-8).⁴ Given that the flow reduction to the coastal estuarine system is extremely small, it is my professional opinion that the effect on water quality in these surface water bodies will also be extremely small.

Q17. Do you agree with Dr. Bacchus's assertion on pages 41 to 42 of her testimony (INT301R) that "the LARGE adverse impacts from the induced recharge that would result from the proposed LNP supply wells also would result in cumulative adverse impacts from this salt deposition pattern [to the southwest of the cooling towers and therefore near the supply wells to the south of the LNP]. Thus, the induced recharge with more saline water also would increase groundwater contamination and groundwater discharge of this salt-contaminated water in the [Cross Florida Barge Canal (CFBC)], Withlacoochee River, Withlacoochee Bay, Gulf Hammock Wildlife Management Area and Waccasassa Bay State Park"?

A17. On page 25 of her testimony, Dr. Bacchus defines "induced recharge" as the dewatering associated with groundwater pumping. INT301R. As I explain in my direct testimony, it is my professional opinion that the proposed active dewatering will not result in any impacts that are greater than SMALL on the wetlands and aquatic ecosystems and their underlying aquifers on and in the vicinity of the LNP site, contrary to Dr. Bacchus's assertions of LARGE impacts. PEF300 at p. 7. In his pre-filed rebuttal testimony, Dr. Eldon Blancher responds to this assertion by Dr. Bacchus by explaining that "as demonstrated by the analysis in my direct testimony and in the FEIS, the salinities that would accumulate due to salt drift are so low that they would not contribute to a measurable cumulative impact, even when combined with induced recharge . . . from the LNP supply wells." PEF608 at p. 7. Given Dr. Blancher's explanation of the very low impacts from salt drift in his direct testimony (PEF600) and rebuttal testimony (PEF608)

⁴ I explain in my direct testimony that the Waccasassa River is cross-gradient to the LNP site and thus would not be impacted by active dewatering for the LNP. PEF300 at pp. 23 to 24. The FEIS states that the LNP site is not hydrologically connected with the Waccasassa River and that operations of the LNP would not alter its surface-water hydrology. NRC001 at p. 5-4.

and my analysis of the impacts of dewatering, it is my professional opinion that the cumulative impacts of active dewatering combined with salt drift on the wetlands and aquatic ecosystems on and in the vicinity of the LNP site, including the riverine and estuarine systems of the Withlacoochee River, Withlacoochee Bay, Gulf Hammock Wildlife Management Area and Waccasassa Bay State Park, would be no greater than SMALL.

Q18. Do you agree with the assertion on page 44 of Dr. Bacchus's testimony (INT301R) that the FEIS "fails to consider the vulnerability of the aquifer, and the resulting cumulative damage to wetlands from the synergistic effects resulting from drought *combined* with anthropogenic (man-made) changes in the natural hydroperiods and *additional* anthropogenic stress from salt drift from the proposed LNP"?

A18. No, I disagree with Dr. Bacchus's assertion. In A17 above, I discuss why the cumulative impact of dewatering in combination with salt drift will still only be SMALL. Dr. Bacchus is simply adding drought to the assertion addressed in A17.

On pages 3 to 4 of his rebuttal testimony, Dr. Blancher explains that the FEIS took normal dry seasons and drought conditions into account when analyzing salt drift impacts. PEF608. He explains that his analysis set forth in his direct testimony, which confirmed the NRC Staff's results, explicitly included estimation of resulting salinities for worst case drought conditions and maximum cumulative depositions, and shows that salt drift will not result in levels of salt injurious to fauna or flora onsite or offsite at the LNP. Id.

In A10 above, I explain how the FEIS accounts for annual dry seasons and periods of drought in assessing the impacts to wetlands and aquatic ecosystems from active dewatering. It is my opinion that the proposed active dewatering will not result in any impacts that are greater than SMALL on the wetlands and aquatic ecosystems and their underlying aquifers on and in the vicinity of the LNP site, even during drought conditions. I agree with Dr. Blancher that, given the small amount of projected salt deposition from the LNP's cooling towers and its dilution by rain and/or water bodies, salt deposition's contribution to such cumulative impacts from LNP dewatering will be negligible.

Q19. Do you agree with the assertion on pages 46 to 47 of the testimony of Dr. Bacchus (INT301R) that “[i]t is also possible that salt drift considered cumulatively with dewatering, could affect wildlife as well. For instance, the effects of salt drift on amphibians are discussed on page 5-25 paragraph 2 of the FEIS, again without regard to impacts on seasonal or any other hydroperiod components”?

A19. No, I do not agree with this assertion. FEIS Section 5.3.1.1 evaluates potential impacts to terrestrial and aquatic wildlife species from cooling tower operations. NRC001 at pp. 5-19 to 5-26. The NRC Staff concluded that the projected salt deposition from the LNP’s cooling towers would be expected to have little impact on amphibians, which are more susceptible to salt than other wildlife. *Id.* at p. 5-25. As described in his direct testimony, Dr. Blancher also analyzed the potential salt drift impacts on fauna and determined that the salinity concentrations predicted by worst case conditions of maximum deposition and worst case drought were well within the tolerance levels of most sensitive freshwater organisms, including sensitive invertebrates and vertebrates such as amphibians and salamanders. PEF600 at p. 9.

Dr. Blancher responds to Dr. Bacchus’s assertion in his rebuttal testimony by pointing out that the FEIS and his direct testimony show that the impacts from salt drift are small, especially in the habitats of Florida where the LNP will be located and that the “assertions regarding cumulative impacts presented by Dr. Bacchus are purely speculative and without foundation.” PEF608 at p. 7. I have already provided my professional opinion that the cumulative impacts of active dewatering combined with salt drift on the wetlands and aquatic ecosystems on and in the vicinity of the LNP site would be no greater than SMALL. My opinion remains the same when wildlife in general, and amphibians in particular, are considered.

Q20. On page 5 of her testimony (INT301R), Dr. Bacchus asserts that “the FEIS fails to examine the cumulative effects of dewatering and other hydroperiod alterations when combined with deposition and drift of salt from the LPN [sic] cooling towers and fires that are essential in maintaining important ecosystems in the vicinity of the proposed LNP but will become destructive wildfires because of the dewatering and other hydroperiod alterations associated with the proposed LNP.” What is your response to this assertion?

A20. Dr. Kevin Robertson reviewed the Intervenor's claims regarding wildfires and concluded in his direct testimony that there will be no increase in wildfire frequency attributable to dewatering for construction and operation of the LNP and that although fire severity could be increased under limited circumstances, there would be no resulting increased nutrient concentrations in water resources. PEF400 at p. 12. Therefore, wildfires would have only a negligible contribution to the SMALL cumulative impacts of dewatering and salt drift that I discuss in A17 above.

VI. NUTRIENTS

Q21. Do you agree with the assertions of Dr. Bacchus on pages 37 to 38 of her direct testimony (INT301R) that "harmful increases in nutrient levels, known as eutrophication," will result from the LNP's withdrawal of large quantities of water from the CFBC and from the aquifer "because the proposed LNP withdrawals will concentrate the existing nutrient pollution in the remaining, flow-depleted waters," and that the proposed withdrawals from the CFBC and aquifer, combined with the proposed stormwater ponds, would result in LARGE adverse impacts to water quality and increase the harm from existing concentrations of nutrients in the water by decreasing the volume of water available to dilute nutrient contaminants in the surface waters in the vicinity of the LNP?

A21. First, as an initial matter, Contention 4A, Part A is limited to the impacts from dewatering, and does not pertain to withdrawals of cooling water from the CFBC as Dr. Bacchus has included in her testimony. Second, I have already addressed Dr. Bacchus's assertions regarding the potential for increases in nutrient levels in wetlands and aquatic ecosystems and their underlying aquifers as the result of operation of the LNP in my direct testimony. PEF300 at pp. 41 to 42. As I explain in my direct testimony, without a new external source of nutrients being deposited at or in the vicinity of the LNP site, the effect of water use on nutrient concentrations in either surface water or groundwater on and in the vicinity of the LNP site will be quite small. Dr. Bacchus has not identified a new external source of nutrients. I confirm my earlier conclusion that there will be no measurable alterations or increases in nutrient concentrations caused by active dewatering during construction and operation of the LNP.

VII. STATE WATER PERMITTING

Q22. Do you agree with the assertions of Mr. Still on pages 10 to 13 of his direct testimony (INT201R) that is not reasonable for the FEIS to rely upon the COC to prevent LARGE impacts to water resources from active dewatering?

A22. I strongly disagree with this assertion by Mr. Still. As discussed above, I have already concluded that the COC provide a detailed plan for preventing unacceptable adverse impacts from occurring. The FEIS concludes that operational impacts on terrestrial ecological resources (including wetland and listed species) would be SMALL to MODERATE due to the uncertainty that exists regarding the potential effects of groundwater withdrawal on wetlands and associated biota (NRC001 at p. 5-47), but goes on to clarify that “the review team determined that the wells used to supply freshwater during operation could have a SMALL impact on wetlands, but could have a MODERATE impact on wetlands without timely monitoring and mitigation.” *Id.* at p. 9-250. Therefore, the NRC Staff made a determination of the impacts on water resources from dewatering in the absence of the COC and determined that such impacts would be at most MODERATE, not LARGE as Mr. Still asserts. Furthermore, the FEIS clearly states that the COCs are not the only basis that the NRC relied upon in making an impact determination. The NRC Staff conclusion regarding the operation impacts on terrestrial ecological resources is based on “the review team’s independent evaluation of the LNP project, including the ER [Environmental Report], the Site Certification Application [SCA], PEF’s responses to the review team’s RAIs [Requests for Additional Information], interactions with State and Federal agencies, the public scoping process, and the identified mitigation measures and BMPs [Best Management Practices] . . .” *Id.* at p. 5-47. Similarly, the FEIS conclusion regarding the impacts of construction and preconstruction activities to terrestrial ecological resources is based on “the review team’s independent evaluation of the LNP project, including the ER, the SCA, FDEP Conditions of Certification, PEF’s responses to NRC’s and USACE’s [U.S. Army Corps of Engineers] Requests for Additional Information, the identified mitigation measures and BMPs, and consultation with other Federal and State regulatory agencies. . .” *Id.* at p. 4-71. The groundwater modeling was included in the NRC’s basis for its conclusions.

Q23. Please respond to Mr. Still's criticisms regarding the SWFWMD's failure to establish MFLs, minimum aquifer levels, and a Groundwater Basin Resource Availability Inventory. INT201R at pp. 17, 19.

A23. The SWFWMD is not required to set MFLs in every county within its jurisdiction. (The MFL for an aquifer would be a minimum aquifer level.) The SWFWMD follows a statutorily mandated process for prioritizing MFLs to be developed. This work is summarized in an annual report that is submitted to the FDEP for its review and approval. The SWFWMD adds new water bodies to its MFL priority list if there is an expectation that surface or groundwater resources will be at risk for harm due to some current or expected level of consumptive use. In practice, potential new MFL sites are identified by the SWFWMD during the 5-year cycles for updating its 20-year regional water supply plan. During this planning process, the SWFWMD projects the 20-year expected changes in water use. These changes in demands are included with the current demands to project the likely cumulative effect on the surface and groundwater resources, the water dependent ecosystems, and the human uses supported by the resources. Part of this analysis is an assessment of areas where the projected cumulative water use cannot be met without causing unacceptable levels of harm to the dependent natural systems and/or associated human uses. It is this analysis that broadly identifies areas within the SWFWMD that may need additional MFLs established. In its last three 5-year planning cycles (2000, 2005, and 2010), the SWFWMD has not identified the region north of the Withlacoochee River, which includes Levy County, as an area of concern.

Section 373.0395, Florida Statutes, which was enacted in the 1980s, required that the water management districts develop a groundwater basin resource availability inventory and disseminate the inventory to local governments and regional agencies for use in the comprehensive planning process. Each inventory was to include at least the following information:

- A hydrologic study to define the groundwater basin and its associated recharge area;

- Site-specific areas in the basin deemed prone to contamination or overdraft resulting from current or projected development;
- Prime groundwater recharge areas;
- Criteria to establish minimum seasonal surface and ground water levels;
- Areas suitable for future water resource development within the groundwater basin;
- Existing sources of waste water discharge suitable for reuse as well as the feasibility of integrating coastal wellfields; and
- Potential quantities of water available for consumptive uses

The SWFWMD developed this inventory by county for 13 of the 16 counties, all or part of which are within its jurisdiction. The SWFWMD did not develop an inventory document for the portion of Levy County located within the SWFWMD because only a small part of Levy County is within the SWFWMD. (The majority of Levy County is within the Suwannee River Water Management District).

Subsequent to the enactment of regional water supply planning requirements in 1997, Section 373.0395 was repealed in 2005. This repeal occurred largely because the new requirements for district-wide water supply assessments and regional water supply plans resulted in far better support for Florida's comprehensive planning process than had been provided by the groundwater basin resource availability inventories. These assessments and plans are updated on 5-year cycles. There was no similar requirement for updating groundwater basin resource availability inventories.

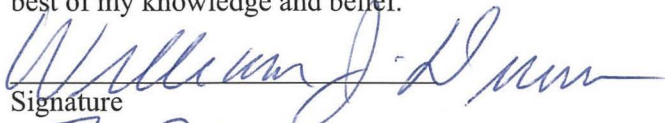
The SWFWMD's lack of a groundwater basin resource availability inventory for the portion of Levy County within its jurisdiction likely had little, if any, effect on comprehensive planning in the area. This rural area has not experienced significant development pressure that would require such planning. In my professional opinion, the lack of an MFL for the aquifers in Levy County also has no impact on the SWFWMD's authorization of water use for the LNP. The

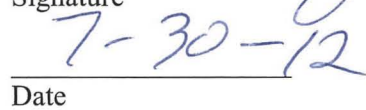
SWFWMD permitting process (or, in the case of the LNP, the certification of water use process) results in a site-specific water use decision that is more protective than the generic application of an aquifer MFL.

Q24. Does this conclude your rebuttal testimony?

A24. Yes.

I, William J. Dunn, swear under penalties of perjury that the foregoing testimony is true and correct to the best of my knowledge and belief.


Signature


Date