

**SUBJECT:** Supplementary Information for U. S. Fish & Wildlife Service (FWS) for Turkey Point Units 6 and 7

As you requested at the meeting between FWS and NRC staff in August 2015, additional information addressing four separate issues for effects on terrestrial and aquatic listed species has been prepared.

**Issue 1: FWS Requests Information about the Miami Tiger Beetle (*Cicindela floridana*)**

**Status:** The Miami tiger beetle is currently a Proposed Endangered species under the Endangered Species Act. It was not listed under the Act as of August 2015 when NRC staff and FWS met to discuss Turkey Point Endangered Species Act issues. However, it had been the subject of an emergency petition for listing submitted to the FWS by the Center for Biological Diversity and other co-petitioners on December 11, 2014 (Center for Biological Diversity et al. 2014). The FWS published a proposed rule to list the Miami tiger beetle on December 22, 2015 (80 FR 79533). The proposed rule does not include proposed critical habitat, but it does indicate that the designation of critical habitat may be beneficial and that the FWS is continuing to evaluate possible critical habitat for future designation. The public comment acceptance period closed on February 22, 2016; the FWS has not yet taken a final action on the proposal.

**Species Description:** The Miami tiger beetle is a small, elongate beetle less than 0.4 in in length that has an oval shape and bulging eyes (80 FR 79537). Adults are active diurnal predators that most commonly feed on small arthropods, especially ants. The species was initially documented from collections made in 1934 in a restricted range on the northern end of the Miami Rock Ridge in a region known as the Northern Biscayne Pinelands (80 FR 79537). The Miami tiger beetle was thought to be extinct until its rediscovery in 2007 (Brzoska et al. 2011). It is very habitat specific; individuals have been found to occur only in pine rockland areas containing pockets of open quartz sand microhabitat. The historic distribution is thought to have been restricted to the Miami Rock Ridge. The only pine rocklands that include pockets of open, sandy microhabitat occur in the northern extent of the Miami Rock Ridge extending roughly from the city of North Miami south to SW 216th Street (80 FR 79537). Currently, Miami tiger beetles are known to occur only in two locations, both within or near the Richmond Pine Rocklands complex; and the overall population size is exceptionally small (80 FR 79537). The Richmond Pine Rocklands complex consists of multiple small patches of pine rocklands just south of SW 152nd Street in an urbanizing area adjoining the Miami Zoo.

**Potential Effects:** The only part of the Florida Power & Light (FPL) Turkey Point Units 6 and 7 project proposed for development close to pine rocklands is the associated electric transmission lines. No other project elements have the potential to affect the Miami tiger beetle or its pine rockland habitat.

*East Transmission Line Corridor:* The Richmond Pine Rocklands complex lies adjacent to a 0.46 mi portion of FPL's proposed East transmission line corridor. However, no pine rockland habitat would be directly altered to build the new transmission lines, because the existing corridor has enough space to accommodate the new transmission lines without requiring permanent or temporary encroachment into pine rocklands or other natural habitats outside of the existing corridor. There would be no need for encroachment into pine rockland habitat by construction workers or equipment. Building the new transmission lines in the East transmission line corridor is therefore unlikely to affect the Miami tiger beetle.

Once the new transmission lines are built, FPL can be expected to continue to maintain the corridor in a manner generally similar to how they currently maintain it. FPL uses a site-specific approach to manage vegetation within transmission corridors (FPL 2014). Methods used would depend on location. The presence of listed species would be considered during maintenance, which could include hand clearing and use of herbicides and plant growth regulators. The presence of urban areas in the surrounding landscape would likely continue to preclude the need for or use of aerial application of herbicides. Therefore, the construction and operation of the new transmission lines in the East transmission line corridor is not likely to affect the Miami tiger beetle.

*West Transmission Line Corridor:* FPL's proposed West transmission line corridor would be built within an existing transmission line corridor that traverses the King's Highway Pineland Natural Forest Community. The Kings Highway Pineland Natural Forest Community has not been surveyed for the Miami tiger beetle. The Community may never have harbored the Miami tiger beetles. The tract is situated south of the former extent of the Northern Biscayne Pinelands where, according to the proposal to list the species (80 FR 79533), the Miami tiger beetle was historically collected in the 1930s. That area, generally extending from the present city of North Miami to what is now SW 216th Street, was characterized by extensive sandy pockets of quartz sand thought to be required by the Miami tiger beetle. According to the FWS, surveys and observations conducted in the pine rocklands on Long Pine Key within Everglades National Park, near the southern extent of the remaining pine rocklands on the Florida peninsula (exclusive of the Keys), have not detected the species. The Kings Highway tract is situated in an agricultural landscape medial to Long Pine Key and the former extent of the Northern Biscayne Pinelands.

Even if the Kings Highway tract did once harbor individuals of the Miami tiger beetle, encroachment by invasive species around the perimeter of the tract, as evidenced by the photosignatures in current aerial photography, has likely limited occurrence of the species to the interior portions of the tract, away from the existing transmission corridor within which the new transmission lines would be built. In addition, the small size and isolation of the King's Highway tract within a predominantly open agricultural landscape has likely prevented the movement of individual Miami tiger beetles into the tract from other larger areas of pine rocklands. Any individuals remaining within the tract would be unlikely to exchange genetic information with other populations.

If one assumed, however, that the Kings Highway tract could potentially still harbor individuals of the Miami tiger beetle, construction of the new transmission lines would disturb only about 0.84 ac within the roughly 31-ac tract. Miami tiger beetle individuals, especially immobile instars such as eggs and larvae but also some adults, within that 0.84 ac could be crushed and killed. Compacted soils also could be less conducive to the species once construction equipment departs. However, planned construction constitutes disturbance to less than 3 percent of the tract. Furthermore, all of the disturbance would occur at the western edge of the tract and mostly within areas already altered by exotic vegetation. The remainder of the tract would remain undisturbed and unfragmented. In addition, FPL's Conditions of Certification require FPL to conduct pre-clearing surveys and use restrictive clearing techniques such as hand removal or use of chain saws where necessary to clear vegetation in the rocklands, to use herbicides in compliance with all applicable regulations, and to take care to retain a cover by compatible native plant species within the rocklands (FPL 2015). The Conditions of Certification

also require FPL to “eradicate or remove prohibited and controlled plant species” from the transmission line right-of-way where it crosses the King’s Highway Pine Rocklands (King’s Highway Pineland Natural Forest Community) and to manage the right-of-way to “facilitate the regeneration of pine rockland plant species” and to discourage “non-pine rockland plant species including hardwood hammock species and exotic species to the extent practicable” (FPL 2015).

If the tract indeed does still support a population of Miami tiger beetles, it likely would continue to do so after construction of the transmission line. Building the new transmission lines within the West transmission line corridor therefore may affect, but is not likely to adversely affect, the Miami tiger beetle.

Once the new transmission lines are built, FPL can be expected to continue to maintain the corridor in a manner generally similar to how they currently maintain it. FPL uses a site-specific approach to manage vegetation within transmission corridors (FPL 2014). Methods used would depend on location. The presence of listed species would be considered during maintenance, which could include hand clearing and use of herbicides and plant growth regulators. The length of the corridor traversing naturally vegetated areas within a predominantly high-intensity agricultural landscape suggests that aerial application of herbicides would be unlikely. FPL’s requirement to manage exotic vegetation in the corridor would continue throughout the operational life of the new transmission lines. Therefore, the operation and maintenance of the corridor, while possibly affecting the Miami tiger beetle, is not likely to adversely affect the species.

**Cumulative Effects:** Habitat loss and degradation threaten the continued existence of the Miami tiger beetle, whose known range is limited to a predominantly urban and agricultural portion of Miami-Dade County. Past agricultural and urban development in South Florida has resulted in the loss of approximately 99 percent of the Miami Rock Ridge pine rockland habitat thought to constitute the historic range of the Miami tiger beetle.

Although the East transmission corridor passes close to the edge of the Richmond Pine Rocklands where the Miami tiger beetle is known to occur, disturbance would be limited to areas outside of the rockland habitat. Commercial and residential development has been proposed within portions of the Richmond Pine Rockland complex and it is unclear how that development might affect the existing beetles known to occur there. A habitat conservation plan has been drafted for one of the proposed developments called Coral Reef Commons. The plan calls for preserving and managing approximately 52 ac of pine rockland habitat amid the new residential and commercial development elements (Johnson Engineering 2015). Most of the development would be directed to areas without pine rockland vegetation or with only degraded pine rockland vegetation. The plan is under review at this time. The new transmission line, which would pass alongside but not encroach into the subject area of pine rockland habitat, would not influence the effects of the proposed commercial and residential development. The transmission lines are unlikely to make a significant incremental contribution to cumulative effects.

With respect to the West transmission corridor, the small size and isolation of the Kings Highway Pineland Natural Forest Community makes any impacts there essentially independent of impacts on larger tracts known to harbor the Miami tiger beetle. No cumulative effects are therefore anticipated.

**Conclusions:** The information summarized above suggests that the proposed Units 6 and 7 project, and specifically the transmission lines, may affect but would not likely adversely affect the Miami tiger beetle. The transmission lines are the only project element that would occur close to potential habitat for this species.

**References:**

80 FR 79533. 2015. Endangered and Threatened Wildlife and Plants; 90-Day and 12-Month Findings on a Petition to List the Miami Tiger Beetle as an Endangered or Threatened Species; Proposed Endangered Species Status for the Miami Tiger Beetle, U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C., 22 pp.

Brzoska, D., C.B. Knisley, and J. Slotten. 2011. Rediscovery of *Cicendela scabrosa floridana* Cartwright (Coleoptera: Cicindelidae) and its elevation to species level. *Insecta Mundi* 0162:1-7.

Center for Biological Diversity, Miami Blue Chapter of the North American Butterfly Association, South Florida Wildlands Association, Tropical Audubon Society, Sandi Koi, Al Sunshine, and Chris Wirth. 2014. Emergency Petition to List the Miami Tiger Beetle, submitted December 11, 2014, 42 pp.

FPL (Florida Power & Light Company). 2014. *Turkey Point Plant, Units 6 and 7 COL Application – Part 3: Environmental Report*. Revision 6, Juno Beach, Florida. Accession No. ML14342A011.

Johnson Engineering, Inc. 2015. Coral Reef Commons Habitat Conservation Plan, prepared for Coral Reef Retail LLC, Coral Reef Resi PH I LLC, and Ramdev LLC, Palm Beach Gardens, FL, May 2015, 173 pp. plus appendices.

**Issue 2: FWS asked what measures FPL was taking to avoid and minimize impacts on the King's Highway Pine Rocklands.**

**Background:** The King's Highway Pine Rocklands (King's Highway Pineland Natural Forest Community) is a roughly rectangular patch of pine rocklands encompassing approximately 31 ac near the intersection of SW 304th Street and SW 202nd Avenue that is privately owned but targeted for acquisition by Miami-Dade County under the Environmentally Endangered Lands Program (Cuevas 2011). The feature is located in a predominantly agricultural landscape and is surrounded by agricultural land. The only feature of the Units 6 and 7 project that could potentially affect the King's Highway Pine Rocklands and surrounding area is the proposed construction of new transmission lines within the West transmission line corridor. At this location, the new transmission lines would be built within an existing transmission line corridor that already crosses the pine rockland feature.

**Action:** In response to FWS's concerns, NRC staff developed a Request for Additional Information (RAI, specifically eRAI 8376, Item TE-Q4) that asked FPL to:

Please provide a description of specific measures (i.e., best management practices) that would be employed during the construction and operation of the West transmission line to minimize impacts on Federally listed species and their habitats within the King's Highway Rockland.

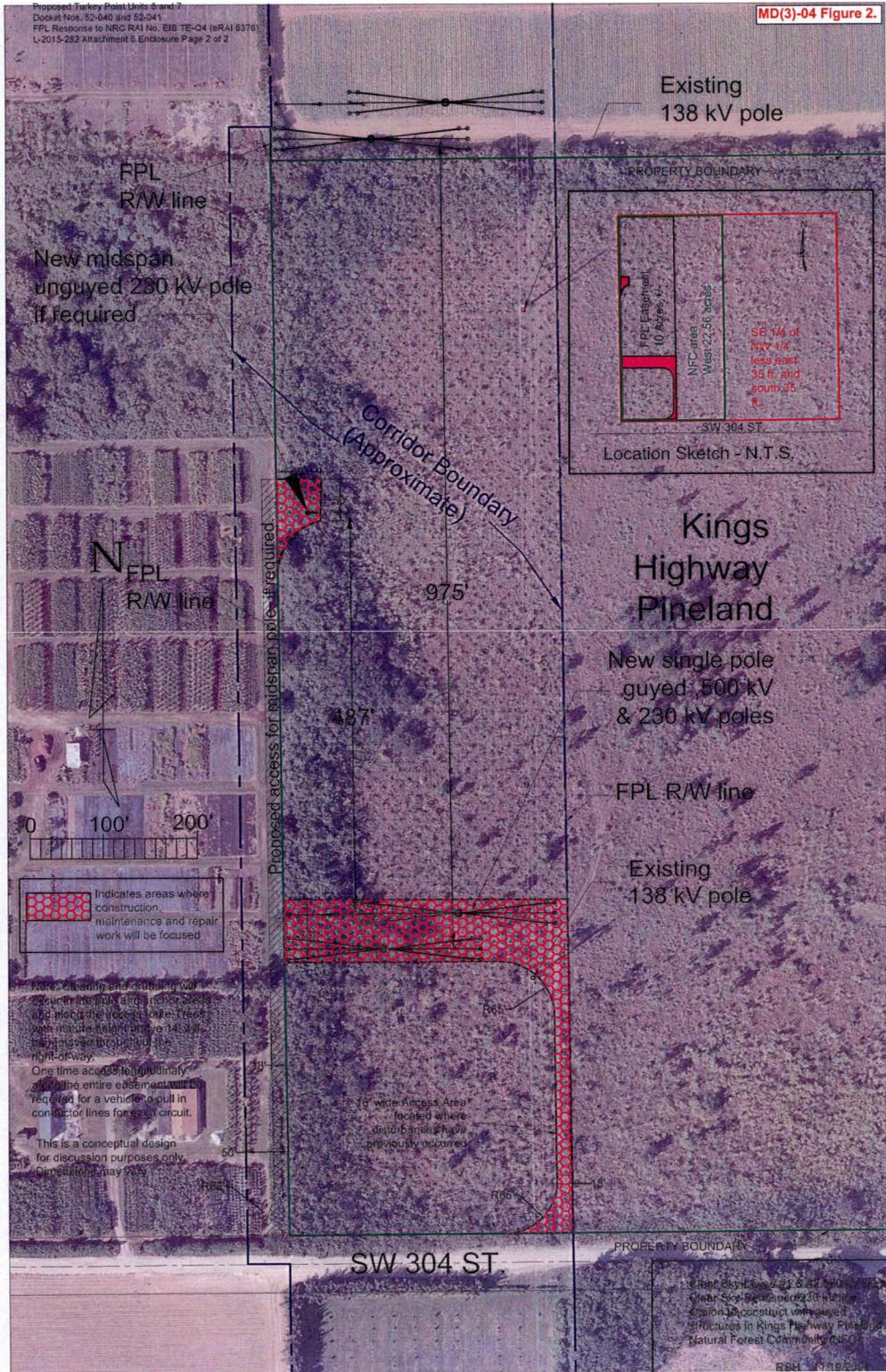
FPL responded that their plan calls for limiting disturbance within the King's Highway Pine Rocklands to only 0.84 ac by using previously disturbed areas to the greatest extent practicable. FPL's Conditions of Certification require FPL to relocate "rare, endangered, threatened, or potentially endangered" native plants in areas of physical disturbance within the rockland, to use restrictive clearing techniques such as hand removal or use of chain saws where necessary to clear vegetation in the rockland, to use herbicides in compliance with all applicable regulations, and to take care to retain a cover by compatible native plant species within the rockland (FPL 2015). The Conditions of Certification also require FPL to "eradicate or remove prohibited and controlled plant species" from the transmission line right-of-way where it crosses the King's Highway Pine Rocklands and to manage the right-of-way to "facilitate the regeneration of pine rockland plant species" and to discourage "non-pine rockland plant species including hardwood hammock species and exotic species to the extent practicable" (FPL 2015).

**Conclusions:** The NRC staff interprets FPL's response summarized above as indicative that any effects on listed species occurring in the King's Highway Pine Rocklands would be minimal. Although FPL would be building new transmission lines within the rocklands, it would be using an existing corridor already managed for operation of transmission lines. Furthermore, the NRC's staff's review of FPL's aerial photograph (see Attachment 1, below) combined with informal field observations in 2010 suggest that much of the affected portion of the rocklands within the transmission corridor is dominated by exotic vegetation. This is evidenced by a dense, non-descript photosignature that contrasts with the more distinct photosignature indicative of a sparse tree (pine) canopy overlaying shrubs in the interior part of the rocklands. The NRC staff therefore believes that the vegetation management requirements imposed on FPL by the Conditions of Certification, especially the requirement to manage the right-of-way for exotic vegetation, would lead to a net beneficial effect rather than adverse effect on the rocklands.

**References:**

Cuevas, R.A. 2011. Memorandum dated October 4, 2011 from R.A. Cuevas, County Attorney to Chairman J.A. Martinez and Board of County Commissioners. Subject: Resolution approving the Environmentally Endangered Land (EEL) Acquisition List with one addition to the list.

FPL (Florida Power & Light Company). 2015. Letter from W. Maher to NRC, dated December 9, 2015, regarding "Florida Power & Light Company Proposed Turkey Point Units 6 and 7, Docket Nos. 52-040 and 52-041, Response to NRC Environmental Request for Additional Information Letter 150211 (eRAI 8374, 8376) Related to Aquatic and Terrestrial Ecology." L-2015-0282, Juno Beach, Florida. Accession No. ML15348A405.



Attachment 1  
 Aerial Photograph Showing where the West Transmission Line Corridor  
 Crosses King's Highway Pineland Natural Forest Community  
 Source: FPL 2015

**Issue 3: FWS asked for additional information about the effects of muck placement on the cooling canal berms on cooling canal habitat and nearshore Biscayne Bay habitat for the American crocodile (*Crocodylus acutus*).**

Excavated muck from the construction of the nuclear island would be placed on industrial wastewater facility (IWF) berms as described in Section 4.3.2.1 of the environmental impact statement (EIS). FPL plans to stabilize the addition of material to the berms by using best management practices and control measures such as silt fences and/or gravel filters to prevent muck and runoff from entering the canals (FPL 2015). The muck disposal locations would not be in preferred crocodile nesting areas, as determined from historic nesting locations.

Therefore, the permanent storage of excavated muck on the IWF berms is expected to have a negligible effect on aquatic resources within the canal system, including the American crocodile. Rainfall and runoff from the site could cause leaching of nutrients such as nitrogen and phosphorus from the stored muck into the IWF. As described in Sections 5.2.1.4 and 5.2.3.1 of the EIS, a conservative analysis was used to determine the maximum incremental increase in concentrations of these leached nutrients in the IWF (i.e., if all the muck was washed into the cooling canals by a storm). The estimated maximum concentration for total Kjeldahl nitrogen (TKN) was 32 µg/L and for total phosphorus (TP) it was 16 µg/L, even though phosphorus was not detected in muck leachate samples. Nutrient concentrations from the muck leachate that may reach Card Sound were estimated to be  $1.11 \times 10^{-6}$  mg/L for TKN and  $7.67 \times 10^{-7}$  mg/L for TP. The latter amount is almost 4 orders of magnitude less than the TP observed in water samples from Card Sound between 2006 and 2008. Given this conservative estimate and the additional dilution of tidal exchange in Card Sound and Biscayne Bay, the addition of TKN and TP to the environment from muck leachate would be negligible, and would not adversely affect the American crocodile.

**Reference:**

FPL (Florida Power & Light Company). 2015. Letter from W. Maher to NRC, dated December 9, 2015, regarding "Florida Power & Light Company Proposed Turkey Point Units 6 and 7, Docket Nos. 52-040 and 52-041, Response to NRC Environmental Request for Additional Information Letter 150211 (eRAI 8374, 8376) Related to Aquatic and Terrestrial Ecology." L-2015-0282, Juno Beach, Florida. Accession No. ML15348A405.

**Issue 4: FWS requested updated information about the effect of the deposition of reclaimed water drift on American crocodile habitat.**

The use of reclaimed water as a cooling source eliminates the potential for changes in Biscayne Bay salinity values and impingement or entrainment of protected aquatic species. However, it may result in adverse effects from cooling-tower drift deposition of chemicals present in Miami-Dade reclaimed water after final treatment. Because cooling-tower drift deposition is expected to be confined primarily to the IWF, potential effects on the threatened American crocodile could occur if chemical loading is sufficient to directly affect adults or juveniles, or indirectly affect this species through alteration of the food web present in the IWF. The reclaimed water used for cooling would receive high-level disinfection at the South District Wastewater Treatment Plant (SDWWTP) prior to entering the Turkey Point reclaimed-water-treatment facility (RWTF). This level of disinfection is greater than the secondary treatment required for reclaimed water used

for irrigation for public and private use (Fla. Admin. Code 62-610). The reclaimed water would be further treated at the RWTF. The additional treatment to be employed by FPL at the RWTF during operation using reclaimed water has not been finalized, but would likely involve dechlorination, nutrient removal, pH adjustment, filtration, and disinfection (FPL 2012a; FPL 2014). The combined treatment of reclaimed water may remove or reduce concentrations of many chemical/contaminant of emerging concern (CECs). Hence, the NRC staff performed a conservative screening-level assessment that compared the expected concentrations of priority pollutants and CECs in reclaimed water to appropriate toxicological data if numerical criteria were unavailable. The screening-level assessment included organic compounds, metals, and CECs. A number of sources of information were used to determine the potential concentrations in reclaimed water (FPL 2012b; Lietz and Meyer 2006; Miami-Dade County 2011). Expected chemical concentrations derived from these sources of information were compared to Federal water-quality criteria (EPA 2014) or to toxicological effects available from the U.S. Environmental Protection Agency's (EPA's) Ecotoxicology (ECOTOX) database (EPA 2012). Recent work by Brausch and Rand (2011) was also used to assess the toxicological effects of CECs, because water-quality criteria have not been established for many of these chemicals. When toxicological benchmarks were used, no-observed effect concentration levels were chosen for sensitive, representative aquatic species to provide a conservative assessment.

Based on fate and effects modeling results summarized in **Error! Reference source not found.** of the EIS, adverse effects on IWF species (including the threatened American crocodile) are highly unlikely. This is because many predicted contaminant concentrations in IWF water are orders of magnitude (less than one in several hundred to several thousand) below current analytical method detection limits, and they are much lower (4 to 40,000 times) than the toxicological benchmarks used in the screening assessment. The NRC staff acknowledges that the list of CECs assessed is not exhaustive, but is representative of different chemical classes that are known to occur in the reclaimed water from the SDWWTP (FPL 2012b; Lietz and Meyer 2006; Miami-Dade County 2011). In addition, the toxicological benchmarks described here are assessed for single chemical exposures, often under laboratory-controlled conditions, where they do not combine with other organic or inorganic substances or may become less bioavailable through sedimentation. There is a growing research area in assessing combinatorial exposure effects of contaminants by measuring adverse outcome pathways (Knapen et al. 2015), or effects-directed analysis (Brack et al. 2016). Even so, a general acknowledgement that real-world conditions where exposures to hundreds of natural and anthropogenic compounds occur under varying water-quality conditions, even in known contaminated areas, will require reliance on observable adverse outcomes through monitoring.

#### **References:**

Brack, W., S. Ait-Aissa, R.M. Burgess, W. Busch, N. Creusot, C. DiPaolo, B.I. Esher, L.M. Hewitt, K. Hilscherova, J. Hollender, H. Hollert, W. Jonker, J. Kool, M. Lamoree, M. Muschket, S. Neumann, P. Rostkowski, C. Ruttkies, J. Schollee, E.L. Schymanski, T. Schulze, T. Seiler, A.J. Tindall, G. Umbuzeiro, B. Vrana, and M. Krauss. 2016. "Effect-Directed Analysis Supporting Monitoring of Aquatic Environments—An In-Depth Overview." *Science of the Total Environment* 544:1073-1118.

Brausch, J.M. and G.M. Rand. 2011. "A Review of Personal Care Products in the Aquatic Environment: Environmental Concentrations and Toxicity." *Chemosphere* 82:1518–1532, New York, New York

EPA (U.S. Environmental Protection Agency). 2014. "National Recommended Water Quality Criteria." Washington, D.C. Accession No. ML14309A072

Fla. Admin. Code (FAC) 62-610. 2012. Chapter 62-610, "Reuse of Reclaimed Water and Land Application." *Florida Administrative Code Annotated*, Tallahassee, Florida.

FPL (Florida Power & Light Company). 2012a. Letter from W. Maher to NRC, dated May 21, 2012, regarding "Response to NRC Request for Additional Information Letter 120403 (RAI 6350 Rev. 1) Related to ESRP Section 5.8.1 – Etiological Agents." L-2012-225, Juno Beach, Florida. Accession No. ML12143A356.

FPL (Florida Power & Light Company). 2012b. Letter from W. Maher to NRC, dated March 7, 2012, regarding "Response to NRC Request for Additional Information Letter 1112081 (RAI 5765) ESRP Section 4.2—Water-Related Impacts." L-2012-101, Juno Beach, Florida. Accession No. ML12074A041.

FPL (Florida Power & Light Company). 2014. *Turkey Point Plant, Units 6 and 7 COL Application – Part 3: Environmental Report*. Revision 6, Juno Beach, Florida. Accession No. ML14342A011.

Knapen, D., L. Vergauwen, D.L. Villeneuve, and G.T. Ankley. 2015. "The Potential of AOP Networks for Reproductive and Developmental Toxicity Assay Development." *Reproductive Toxicology* 56:52-55.

Lietz, A.C. and M.T. Meyer. 2006. *Evaluation of Emerging Contaminants of Concern at the South District Wastewater Treatment Plant Based on Seasonal Sampling Events, Miami-Dade County, Florida, 2004*. Scientific Investigations Report 2006–5240, U.S. Geological Survey, Reston, Virginia.

Miami-Dade County. 2011. *Biscayne Bay Coastal Wetlands Rehydration Pilot Project Pilot Plant Closeout Report*. Miami-Dade County Water and Sewer Department, Miami, Florida. Accession No. ML12269A237.