



United States Department of the Interior



FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

March 12, 2015

Kirk C. Zuelch
Executive Director
Florida Keys Aqueduct Authority
1100 Kennedy Drive
Key West, Florida 33040

Service Consultation Code: 2014-TA-0122
Applicant: Florida Keys Aqueduct Authority
Project: Cudjoe Regional Water Quality
Improvement Project
County: Monroe

Dear Mr. Zuelch:

The Florida Keys Aqueduct Authority (FKAA) has indicated to the U.S. Fish and Wildlife Service (Service) that the Cudjoe Regional Wastewater System (CRWS) is a design build project; and consequently, FKAA has been unable to provide details of the full project for an overall evaluation by the Service of effects to species listed under the Endangered Species Act of 1973, as amended (Act) (16 U.S.C. 1531 et seq.). As a result, the Service has received information on the CRWS project on an irregular basis, as it has become available or when requested. Recently, the Service was made aware of the planned disposal method for the environmental recycling of advanced tertiary treated effluent at the Advanced Treatment Wastewater Facility (AWTF) on Cudjoe Key. As was indicated during a telephone conversation with Ashleigh Blackford (Service) and Tom Walker (FKAA) and yourself, the Service is concerned the AWTF, as currently proposed, may result in impacts to habitats within the adjacent Great White Heron National Wildlife Refuge (Refuge) and federally protected wildlife species. Due to our concerns, the Service requested FKAA to demonstrate that: (1) the waste water injected into the proposed shallow wells will not cause groundwater/surface water to come in contact with any contaminants associated with the adjacent solid waste disposal site and leach into surface waters and (2) the injection of waste water will not change the water chemistry of the adjacent area to a degree that it would negatively impact the existing habitats and associated species protected under the Act.

In an effort to gather additional information about our concerns, the Service contacted the Florida Department of Environmental Protection (DEP) to inquire about the permit that was issued to FKAA for the shallow well injection of treated effluent at AWTF. DEP informed us that they did not believe that there was a probability for the injected effluent to reach the surface in the immediate vicinity of the landfill site based on the design of the injection well. Their position is based on the fact that the well is cased (*i.e.*, lined) to a depth that would preclude the

injected effluent from flowing directly back to the surface in proximity to the injection point (e.g., under the solid waste disposal site). However, DEP indicated it was certain the injected effluent would reach the surface albeit at an unknown distance and time from the injection site. In addition, DEP indicated the chemistry of the effluent would be significantly different when it reached the surface than when it was injected as a result of mixing with the existing groundwater. A detailed geological evaluation of the hydraulic conductivity between the shallow injection wells and adjacent surface waters it is not currently available; therefore, at this time it is not possible to accurately estimate what the chemistry of the effluent discharge will be when it reaches the surface water and consequently, any associated effects.

To date the only information the Service has received from FCAA to address the Service's concerns about the impacts to the Refuge outlined above is a proposed dye tracer study, "Design and implementation of dye-tracer injection test, Cudjoe Key, Florida Keys" (study). The Service has reviewed the study to assess the proposed shallow well injection and wastewater treatment impacts to our trust resources. The Service finds the study you provided lacks details we believe are important to ensure you are conducting a study that would provide sufficient evidence that wastewater activities will not result in impacts to habitats in the vicinity and adversely affect federally listed species. The authors of the proposal themselves identified many unknowns and imply this study may only provide provisional or preliminary information. The following comments are offered to clarify our concerns on the adequacy of this study.

As stated on page 6, the karst features of the area can lead to upward movement of groundwater and lateral transfer to surface waters within a wide range of flow rates. While some areas may have impermeable barriers to upward groundwater flow, others may not and Cudjoe has not been the subject of any study that would characterize this hydrogeology. We are concerned that the design of this study will not be sufficient to fully characterize this issue and that while some confining layers may exist, the volume of water/dye injected will not be a good representation of the actual operational levels that will be realized. Thus, this study would underestimate any issue with transport of nutrients or other pollutants and freshwater discharge to surface waters.

Page 8 clearly articulates this concern stating, "In summary, there is technical information documenting both, expedite communication between shallow injection wells (up to 90' deep) and surface waters in some localities, and the existence of impervious layers within the rock pile which drive horizontal flow and could impede injected waters to reach nearby surface water bodies" and further states that "it is not possible to extrapolate ground conditions from different localities, and hydraulic properties must be determined at each site." We do not believe this study will achieve its objective as currently design. The study design cannot verify that there is a confining layer to prevent transmission of the wastewater to surface water within the boundary of the Refuge. We do agree the study can identify if there is hydrologic connectivity locally; however, that does not address the concern of the fate and transport of the wastewater to the environment on the scale proposed for shallow well injection. The study should be modified to:

- (1) fully identify where connectivity is and to what extent the groundwater would surface and
- (2) at what concentrations wastewater constituents would discharge (*i.e.*, contaminants and freshwater).

Page 11 and 16 state you will use the Environmental Protection Agency's (EPA) developed software to address uncertainties (the Efficient Hydrologic Tracer-test Design software, EHTD; EPA 2003) but does not specify the assumptions you will use. We would like to review those assumptions.

Page 12 discusses establishing baseline. We are concerned a 3-day study is not sufficient to establish a baseline given the variability in marine systems. It is not clear from the study the timing of the actual "lake" baseline but that should occur over a range of days and conditions. We also suggest monitoring outside the "lake" area as confining layers may be complete in the near shore but connectivity may still exist at greater distances. We request additional information on why a decision was made to limit monitoring to areas directly adjacent to near shore, especially given that so little is known about the geology of the area. Please provide a list of parameters that will be monitored including locations and frequency.

Page 16 states a "specific volume of chaser water to force the dye into the aquifer" will be used. We request additional information on how this volume was determined and how it will accurately represent the proposed 0.96 million gallons per day injection rate. Please disclose how you are relating the differences in volume and the assumptions used to address that difference.

The proposal indicates on page 17 that "...the final duration of the test is at this time unpredictable given the wide range of hydraulic conductivities reported for the Florida Keys, which span from a fraction of centimeter to hundreds of meters per day." Yet the study period for this study only covers a 1 month period. Given the uncertainty of the conductivity rates and the locations of potential connections, we are concerned this is a relatively short time frame to assess the risks.

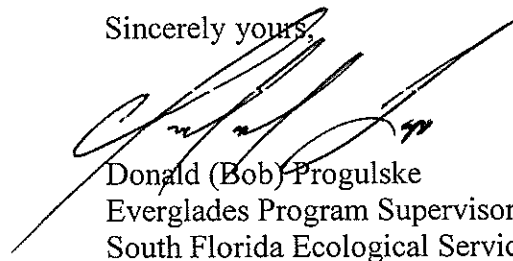
The study does not provide sufficient information about the location of the monitoring wells and how those locations were selected. Best information available indicates groundwater would be moving towards the coast (*i.e.*, towards the upper left corner of your figure 5, we believe that appears to be NW). Although there is monitoring proposed in the "lakes" area, if water moves under a confining layer and beyond the "lakes", it does not appear that any wells will be positioned to detect this movement. We recommend additional observation wells are placed to capture this movement. In addition, the area encompassed by the "lakes" is not very large and injected materials may travel a much greater distance. Please provide information on how this will be captured spatially and temporally and whether there will be additional efforts beyond the term of this study.

Given the FKAA wastewater system is currently not operating, the Service is concerned whether sufficient water is available to perform the proposed study and whether the amounts used will be adequate to represent operational flow. Since the flow available from water systems is on the scale of less than one half that proposed for injection, we do not believe this study will be an accurate representation of the operational injection rates and volumes. Additionally, there is no discussion within the proposal to address how the investigator will determine whether they have injected enough water volume in the well to exceed a stasis condition in the well. If the well volume remains in stasis, the tracer will not move. Please provide your methods to determine transport is likely to occur (*i.e.*, water elevation change with injection).

Finally, page 9 states “The final objective of this test is to either confirm or rule-out the existence of hydraulic connection between the shallow injection well discharge and surface waters at Cudjoe Key.” As designed, the study cannot achieve the stated objective. It can only show whether there is hydrologic connectivity in the local areas under the conditions tested. The test conditions do not represent the operational design capacity at peak injection and does not consider wet season conditions. While the emphasis of this study is to conduct a basic test of the potential for connectivity in close proximity to the injection site, due to the uncertainties implied in the proposed dye tracer study and the hydraulic conductivity of the subsurface geologic layers, the Service recommends FKAA work cooperatively with Anthony Sowers and Brian Powell of our office to develop a monitoring program that will effectively characterize water quality changes and the resultant biological responses to identify potential ecological impacts as a result of the injected effluent. The monitoring program should focus on the ecological risks to the environment and effects to listed species from increased freshwater being introduced to the adjacent wetlands and within the marine system.

Lastly, the Service has been provided the “Keys Wastewater Plan” prepared by Monroe County Engineering Division in November 2007, which identified Federal grants as a funding source for wastewater projects including Middle Lower Keys Regional Wastewater Treatment System. It is unclear to the Service whether this document and associated funding are relevant to the CRWS. We realize in previous conversations you have stated the CRWS project has not received Federal funding; however, this funding may have occurred through a multi-tiered grant that was provided to FKAA via a State agency and was therefore not readily apparent to FKAA. We recommend you verify the funding sources at all levels. If we can determine there was Federal funding, the Service will work with FKAA to contact the appropriate Federal agency and initiate consultation under section 7 of the Act. If you have any questions regarding our concerns about the AWTF or our questions regarding the study, please contact Brian Powell at 772-469-4315.

Sincerely yours,



Donald (Bob) Progulsk
Everglades Program Supervisor
South Florida Ecological Services Office

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cc: electronic only

DEP, West Palm Beach, Florida (Jennifer Smith)

FKAA, Key West, Florida (Tom Walker)

Monroe County, Marathon, Florida (Christine Hurley, Michael Roberts)

NOAA Fisheries, Fort Lauderdale, Florida (Audra Livergood)

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Service, Big Pine Key, Florida (Nancy Finley)

Service, Vero Beach, Florida (Brian Powell, Ashleigh Blackford)

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bcc:Reading

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