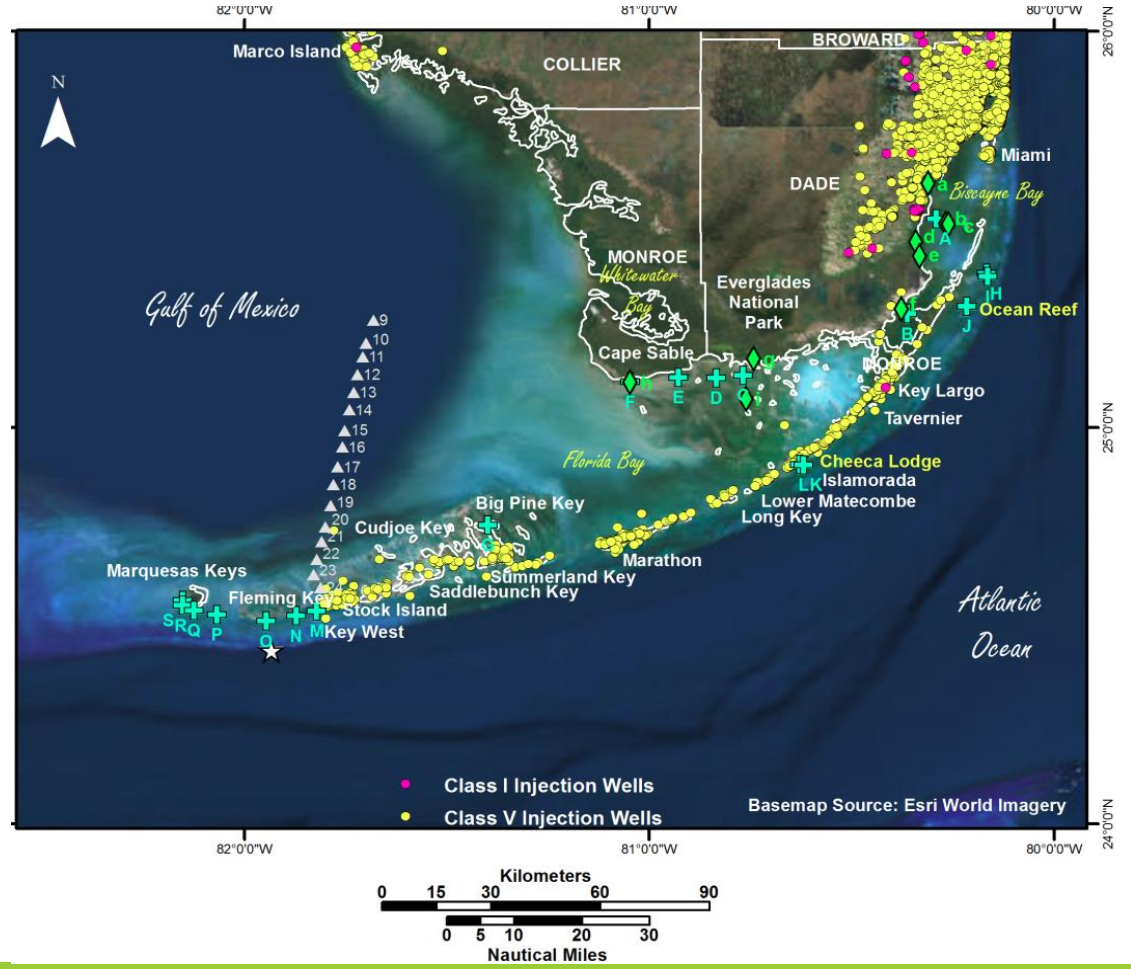
PROTECT SANCTUARY WATERS FROM AWT DISCHARGE CONTAINING NUTRIENTS AND PHARMACEUTICALS

Jan M. Edelstein

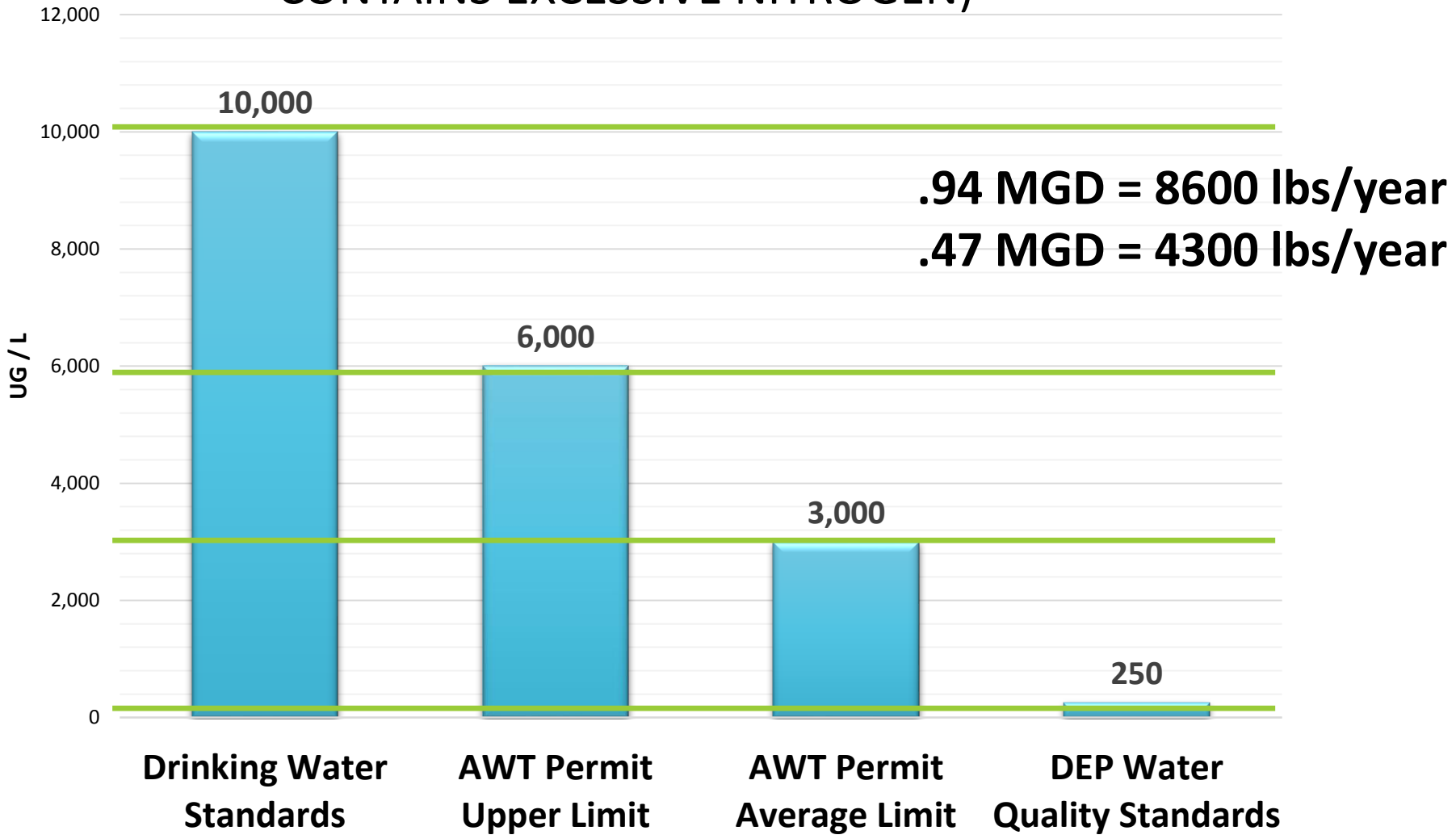
March 2, 2016

FKNMS WQPP



AWT WASTEWATER IS HARMFUL TO SANCTUARY WATERS

CONTAINS EXCESSIVE NITROGEN)

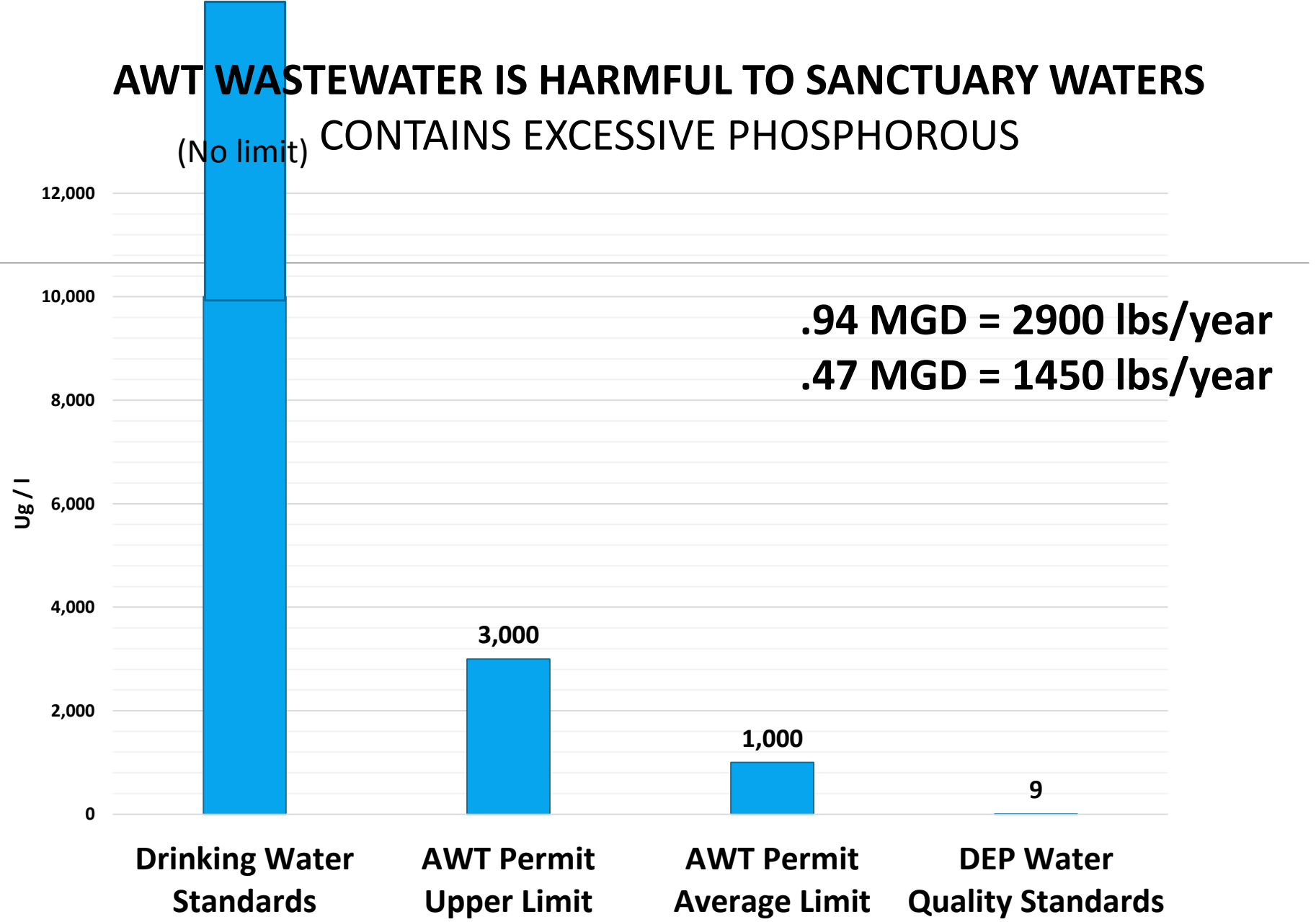


.94 MGD = 8600 lbs/year

.47 MGD = 4300 lbs/year

AWT WASTEWATER IS HARMFUL TO SANCTUARY WATERS

CONTAINS EXCESSIVE PHOSPHOROUS



.94 MGD = 2900 lbs/year

.47 MGD = 1450 lbs/year

AWT WASTEWATER IS HARMFUL TO SANCTUARY WATERS
Dilution is No Solution: Impact is Cumulative

- **The addition of even small amounts of phosphorus will send the ecosystem further out of balance** leading to faster-growing seagrasses, then to seaweeds, then to microscopic algae…
- **The impact of a single addition of phosphorous on the ecosystem can last for decades**…

Jim Fourqurean, Ph.D.,
Principal Investigator
Benthic Community,
FKNMS

AWT WASTEWATER IS HARMFUL TO SANCTUARY WATERS
Contains Pharmaceuticals and Personal Care Products

Pharmaceuticals in Coastal Waters (NOAA)

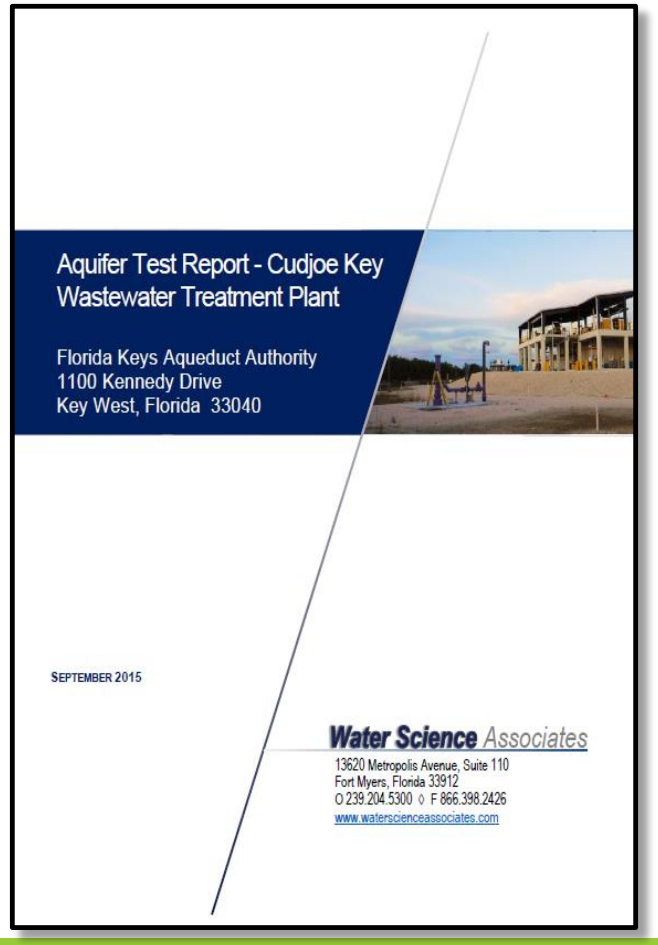
"Wastewater typically contains any number of medications and hormones that people have either used or discarded. Many of these chemical compounds remain biologically active. And some of them, ***especially hormones such as estrogen, appear to significantly alter aquatic organisms*.**

"***Antibiotic resistant bacteria***, which may be an indicator of long-term environmental exposure to anitbiotics***, were found in coastal waters and bottlenose dolphins***. These and other studies will help describe the extent of pharmaceutical pollution in coastal waters."

"Effluent ***…. used for irrigation on golf courses***….(R)esearch to determine if pharmaceuticals present in this wastewater persist long enough to ***reach coastal ecosystems***."

http://www.noaa.gov/features/protecting_1208/pharmaceuticals.html

ASSUMPTION: THERE ARE CONFINING LAYERS WHICH PROTECT THE SANCTUARY WATERS



ASSUMPTION: THERE ARE CONFINING LAYERS WHICH PROTECT THE SANCTUARY WATERS

Photograph 1 – Core box 13 -23 ft. Miami Limestone, oolite facies.

Photograph 5 – Core box 38 – 48 ft. Key Largo Limestone.

Photograph 8 – Core box 58 – 68 ft. Key Largo Limestone.

Photograph 9 – Core box 58 – 68 ft. with close up of hard zone at 62 – 63 ft. Note that the sample was washed to show the burrows that had been filled with soft carbonate.

ASSUMPTION: THERE ARE CONFINING LAYERS WHICH PROTECT THE SANCTUARY WATERS

Photograph 11 – Core box 68 – 78 ft. with close up of hard zone.

Photograph 12 – Core box 78 – 88 ft. Key Largo Limestone.

Photograph 14 – Core box 98 – 108 ft. Key Largo Limestone.

Photograph 15 – Core box 103 – 118 ft. Key Largo Limestone very poor to no recovery.

ASSUMPTION: THERE ARE CONFINING LAYERS WHICH PROTECT THE SANCTUARY WATERS

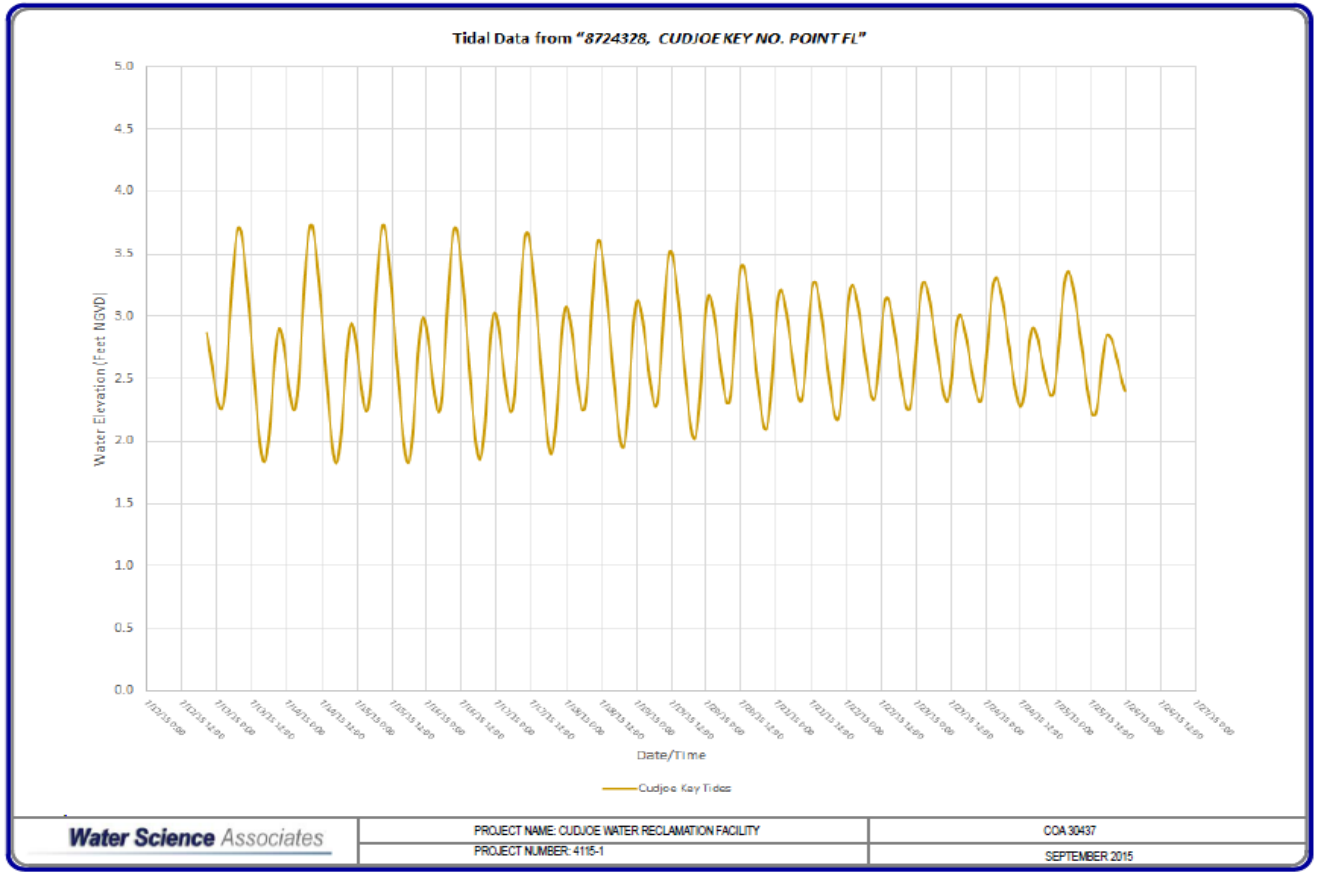


FIGURE 7. HYDROGRAPH OF TIDAL WATER ELEVATIONS FROM CUDJOE KEY TIDAL STATION

ASSUMPTION: THERE ARE CONFINING LAYERS WHICH PROTECT THE SANCTUARY WATERS

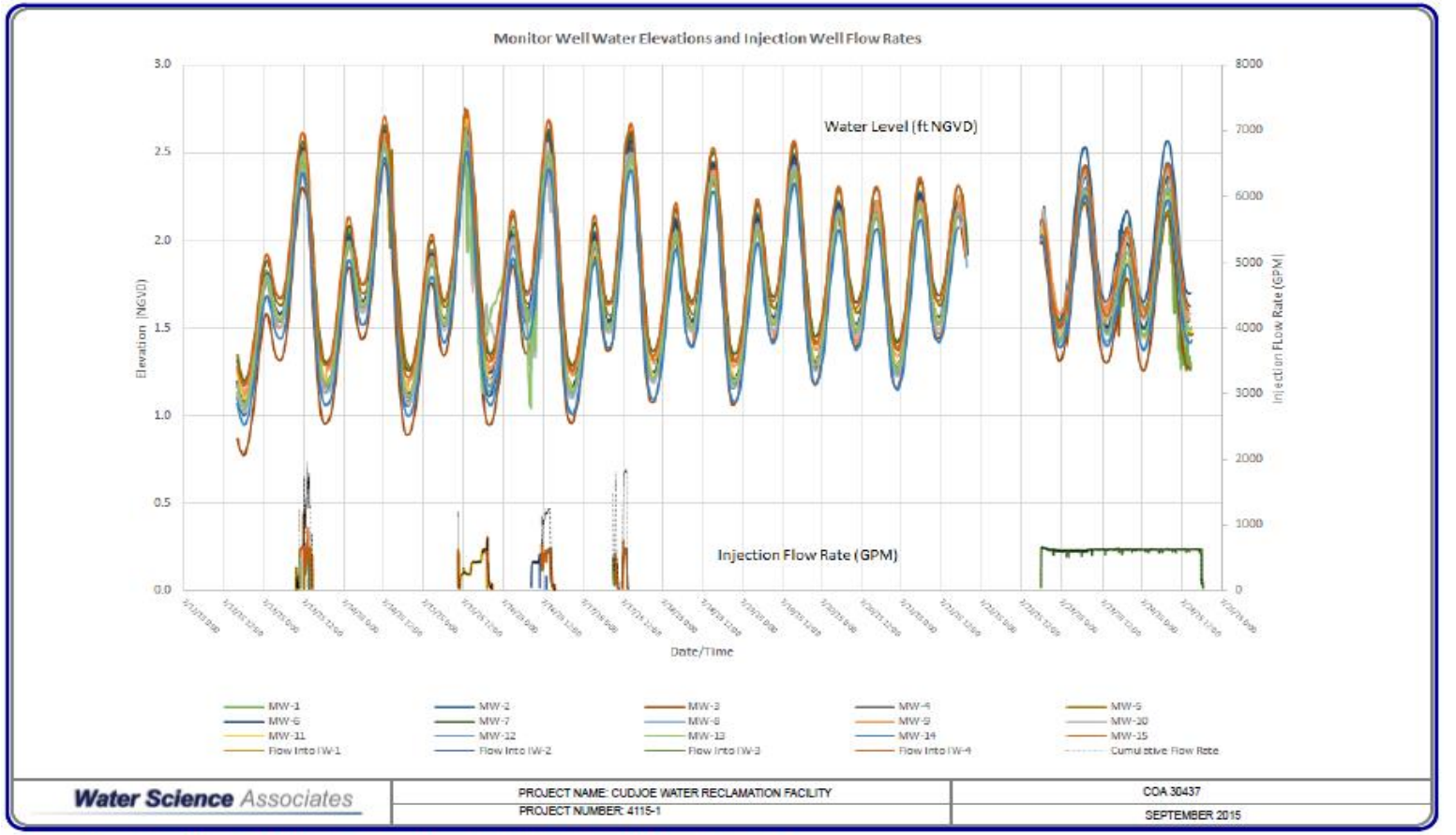


FIGURE 8. WATER ELEVATIONS IN MONITOR WELLS AND INJECTION RATES BETWEEN JULY 12 AND 23, 2015

ASSUMPTION: THERE ARE CONFINING LAYERS WHICH PROTECT SANCTUARY WATERS

Furthermore, it is not only that our results confirm previous findings, but **our [Briceno and Shinn] findings regarding connectivity were later substantiated by the results of Water Science Associates work for the FKAA entitled "Aquifer Test Report - Cudjoe Key Wastewater Treatment Plant" as shown on their Figure 8**. Their water elevation curves in ALL monitoring wells are parallel, with practically the same wavelength and the same amplitude, and without any lag. In other words, their "deep-aquifer" wells MW-1, MW-2 and MW-3 behave synchronously and exactly as the shallow-aquifer wells MW-4 to MW-15. That behavior is ONLY possible if ALL those wells are interconnected, readily connected. **In summary, as we [Briceno and Shinn] affirmed in our May 25th report to de (sic) FKAA, there is an undeniable and expedite (sic) connection between the injection depth (80' to 120') and surface waters.**

Dr. Henry Briceno to Brian Powell (US F&WS) and Phil Frank (FKAA); email dated Nov. 24, 2015

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