

KEY WEST OCEAN OUTFALL STUDY: SYNOPSIS OF RESULTS AND CONCLUSIONS

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Summary:

The US Environmental Protection Agency, Region 4, directed and conducted a series of studies of the Key West Florida wastewater treatment plant ocean outfall from August 1993 to November 1994. The studies examined local hydrographic conditions, effluent transport and dilution in the receiving waters, geochemical and biological fate of effluent constituents, wastewater contributions to the benthos and to local eutrophication and impacts to macrobenthic communities.

Hydrodynamic conditions in the immediate area around the outfall on the ebb tides tend to transport effluent to the east, roughly parallel to the southern shorelines of the lower Keys and to the north into the Gulf of Mexico on the flood tide. High velocity tidal currents appear to confine the effluent largely to areas east of the Key West navigation channel. Effluent dilution exceeds 90:1 within 750 meters of the outfall and approaches 1000:1 within 2500 meters. Modeling results predict dilutions exceeding 32,000:1 at offshore bank reefs.

Nitrogen and carbon stable isotope studies indicate that outfall particulates are not a major component of particulate matter in benthic environments near the outfall or offshore bank reefs and that seagrass inputs are a primary source of sediment nitrogen in the area. The isotopic dissimilarity between effluent and sediments suggest weak pelagic-benthic coupling in the area, probably due to strong currents and high rates of dilution. Outfall particulates do, however, appear to comprise a major component of the diet of some filter feeding macrobenthic organisms near the outfall, but not a major contributor of nitrogen to marine macrophytes around the outfall.

Coprostanol (fecal sterol) analysis of area sediments indicated sewage contamination of the benthos for several kilometers north and south of the outfall and along the southern shore of Key West. The outfall's relative contribution to sediment contamination cannot be distinguished from that of other likely (live-aboards mooring fields) and potential (ship discharges) sources of domestic wastes.

Benthic infaunal community analysis determined that there is no significant structural differences in macroinfaunal between communities in a sewage contaminated area by wastes and communities in an uncontaminated reference location.

The results of this series of studies indicate that wastewater effluent impacts from the Key West ocean outfall are mainly limited to localized eutrophication and contributions to some sewage contamination of the benthos in the vicinity of the outfall. The probability of transport of any significant amounts of outfall contaminants to offshore bank reefs appears to be low.