A Decision Framework for Understanding Change in Salinity Distributions in Three Florida Rivers near Tampa Bay

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Abstract:

The variability of freshwater inflow to an estuary is influenced by the presence of man-made structures associated with river systems, perhaps resulting in a delayed inflow of freshwater after a rain event as reservoirs are first replenished. An understanding of the distribution patterns of salinity of tidal rivers and their relationship with the local ecology is important for managing these systems. Different methods are used in managing freshwater inflows in estuaries. These approaches may be resource-based (where inflows are managed to ensure the sustainability of a local resource such as a commercially important fish), inflow-based (where the natural flow regime is maintained to support complex estuarine interactions), or a combination. The complexity of the different methods used in managing freshwater inflow may therefore be important since it needs to be clear to all parties involved. The purpose of this paper is to propose a simple decision framework to better understand the relationship between freshwater inflow and salinity. The emphasis is on understanding when high salinity values are a result of low flow or some other natural or anthropogenic phenomenon. This tool is developed such that it can be presented to politicians and the general public. The decision framework is an effective tool to show when ambient salinity distributions are greater than expected, and whether these exceedances are due to lower than expected freshwater inflows. If salinity exceedances are detected during seasons when the flows are as expected or higher, reasons other than inflow should be investigated. Aside from being a scientifically defensible method, the decision framework is a simple and effective tool that can be used to assist politicians and citizens in understanding management options. These groups are an important part of this process and appropriate tools are needed to gain the support of all actors involved.