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**CESU Final Report Summary for Integration of Adaptive Hydraulics Model
with Ecopath and Ecosim**
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Purpose: Main objective is to integrate the Adaptive Hydraulics Model (ADH) with Ecopath with Ecosim to assess the effects of several hydrological regimes of the Caernarvon Freshwater Diversion. Current methods to restore Louisiana's estuaries include the reintroduction of Mississippi River water through freshwater diversions to wetlands that are hydrologically isolated from the main channel. The reduced salinities associated with freshwater input are likely affecting estuarine nekton, but these effects are poorly described. Ecopath with Ecosim was used to simulate the effects of salinity changes caused by the Caernarvon freshwater diversion on species biomass distributions of estuarine nekton.

Location: Nekton community in Breton Sound, Louisiana.

Methods: Improve Ecopath base model. Create time dynamic simulations in Ecosim. Use ADH salinity output as forcing function in Ecosim. Test flow regime scenarios and provide nekton species biomass distributions output. A base model was first created in Ecopath from 5 years of monitoring data collected prior to the opening of the diversion (1986–1990). The effects of freshwater discharge on food web dynamics and community composition were simulated using a novel application of Ecosim that allows the input of salinity as a forcing function coupled with user-specified salinity tolerance ranges for each biomass pool.

Results: Reports containing technical information on how to perform the 4 objectives above, along with biomass distributions of the modeled nekton species with each simulation scenario. The salinity function in Ecosim not only reveals the direct effects of salinity (i.e., increases in species biomass at their optimum salinity and decreases outside the optimal range) but also the indirect effects resulting from trophic interactions. Through multivariate analyses we determined that the simulated species biomass distributions in the estuary change significantly with distance from the diversion. However, the simulations do not show a significant difference estuary wide between the modeled distributions (with pooling of the data from different distances) before and after the opening of the diversion. This indicates a redistribution of species in the estuary rather than the replacement of species within the estuarine nekton community. The salinity function is a useful addition to the Ecopath with Ecosim software for estuarine ecologists and fisheries managers.

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