

## —FINAL DRAFT—

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## Alligator Hunters, Pelt Traders, and Runaway Consumption of Gulf Coast Marshes

A TROPHIC CASCADE PERSPECTIVE ON COASTAL WETLAND LOSSES

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*The rate of loss of Gulf Coast marshes in general, and the Louisiana coastline in particular, is now a national issue, particularly following the 2005 hurricanes in the region. We suggest that current management paradigms for marsh restoration may focus too exclusively on plants and sediment, with a bottom-up view of coastal wetlands. Top-down processes also merit consideration and may expand the array of potential tools for coastal management and restoration. Here we propose an alligator trophic cascade hypothesis incorporating a top-down approach: that alligator hunting, by reducing the density and mean size of alligators, removes a natural control on the primary herbivores in wetlands, enabling the runaway consumption of coastal marshes. We present current evidence to support this hypothesis. Mammalian grazing can directly remove plant biomass and make plants less tolerant to flooding and salinity, therefore increasing erosion of sediments. Both muskrat and nutria have been implicated in this process, with the larger, nonnative nutria of greater current concern. Annual aerial surveys beginning in 1998 indicated that 321 to 415 square kilometers of Louisiana's 14,164 square kilometers of coastal wetlands were severely damaged by nutria. Adult alligators eat muskrat and nutria, but the role of alligators as potential controllers of mammal populations, and thus as controllers of marsh damage, has received minimal consideration. Our hypothesis cannot be tested with existing data because almost no numbers exist for nutria populations, and data on marsh integrity, plants, nutria, and alligator densities are not being collected in a systematic way across multiple sites. However, we explore these relationships with a modeling exercise and propose several different ways to test these relationships empirically. If the hypothesis is supported, reducing the alligator harvest or closely controlling the size of the animals being harvested may prove a valuable management tool in conserving coastal wetlands. Adopting multiple working hypotheses, including a top-down approach, may be crucial to adequately managing and restoring coastal areas.*

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