



## **“PULSED” LAND-BUILDING SEDIMENT DIVERSIONS: NEXT-GENERATION RESTORATION BASED ON SCIENCE**

Many people think of river diversions as freshwater delivery systems that run constantly at a certain rate to control salinity. A **“pulsed” sediment diversion may run only occasionally and uses scientific information to operate in a manner that delivers sediment as efficiently as possible to sediment-starved wetland basins.**

**PULSES** are potentially large and brief increases in the amount of water and sediment flowing through a diversion structure —perhaps as short as two weeks. By pulsing (opening) diversions during times of the year when water and sediment are high, **we can maximize the amount of sediment delivered to the wetlands over just a few weeks.** During the rest of the year, the diversion might run at a very low level, or be shut off altogether.

**PULSING TAKES ADVANTAGE OF THE RIVER’S POWER** Recent measurements by leading river scientists show that **during times of the year when the river is high, the amount of sediment suspended in the water can be more than 50 times higher than normal.** A pulsed diversion can take advantage of this to deliver more sediment with less water.<sup>1</sup>

**PULSING MAXIMIZES SEDIMENT DELIVERY** Recent data from the Caernarvon diversion indicates that we can effectively time pulses by carefully monitoring river stage and suspended sediment. **In some cases, opening a sediment diversion for a two-week “pulse” could deliver as much sediment as a smaller freshwater diversion might deliver in a year at a normal flow rate.**



Most of the river diversions in coastal Louisiana are small and do not carry much sediment. The Davis Pond and Caernarvon freshwater diversions are illustrated above. The Bonnet Carre spillway is only opened for flood control - but also provides an unintended example of pulsed operation. Pulsed sediment diversions will help capture the **millions of tons of sediment that are lost** from the mouth of the Mississippi River to the Gulf of Mexico.

**PULSING COMBINES BENEFITS FOR WETLANDS AND FISHERIES** By monitoring water temperature along with river stage and sediment load, **a pulsed diversion can be operated to mimic natural flooding and freshening of the receiving basin with water from the spring flood.** As water temperatures and sediment loads change, the diversion can be reduced to minimize fisheries impacts and allow salinity to rebound.<sup>3</sup>

**PULSED SEDIMENT DIVERSIONS CAN MAXIMIZE SEDIMENT DELIVERY AND BUILD LAND** Effective “pulsed” sediment diversions are a key tool for building land and sustaining our coastal landscape. **Reconnecting the Mississippi River to the wetlands in this way mimics natural processes and restores the river’s capacity to build land.** To make pulsed sediment diversions effective, planners must consider the concentration of sediment in the river, the location of the diversion, size and pulsing capacity, type of diversion structure, and how the diversion is operated.

<sup>1</sup> Allison, M.A., and Meselhe, E.A., 2010. *The use of large water and sediment diversions in the lower Mississippi River (Louisiana) for coastal restoration.* Journal of Hydrology 387, 346-360.

<sup>2</sup> Lopez, J, and Baker, A., 2010. *Caernarvon Diversion & Caernarvon Delta Overview and Recommendations* [PowerPoint Slides]. Lake Pontchartrain Basin Foundation. New Orleans.

<sup>3</sup> Melancon, E.J., 2010. *Oyster Biology & Ecology Relevant to the Louisiana Oyster Industry & Estuarine-Dependent Fisheries* [PowerPoint Slides]. Nicholls State University: Thibodaux.