

USING PHYSICAL MODELS TO MANAGE UNCERTAINTY: PART TWO

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WHY BUILD A PHYSICAL MODEL?

Complex natural and managed physical, biological and chemical processes create non-linear response surfaces that cannot be easily separated into cause and effect relationships.

WHAT IS A PHYSICAL MODEL?

A physical model is a multi-functional, highly structured, macro-scale physical representation of a process, organism, community or landscape.

BIRD'S POINT HYDRAULIC MODEL AT THE WATERWAYS EXPERIMENT STATION IN 1931



Model of Birds Point-New Madrid floodway under test

Engineers Clarence Bardsley and Herbert D. Vogel (left to right) viewing the hydraulic model of Bird's Point-New Madrid floodway



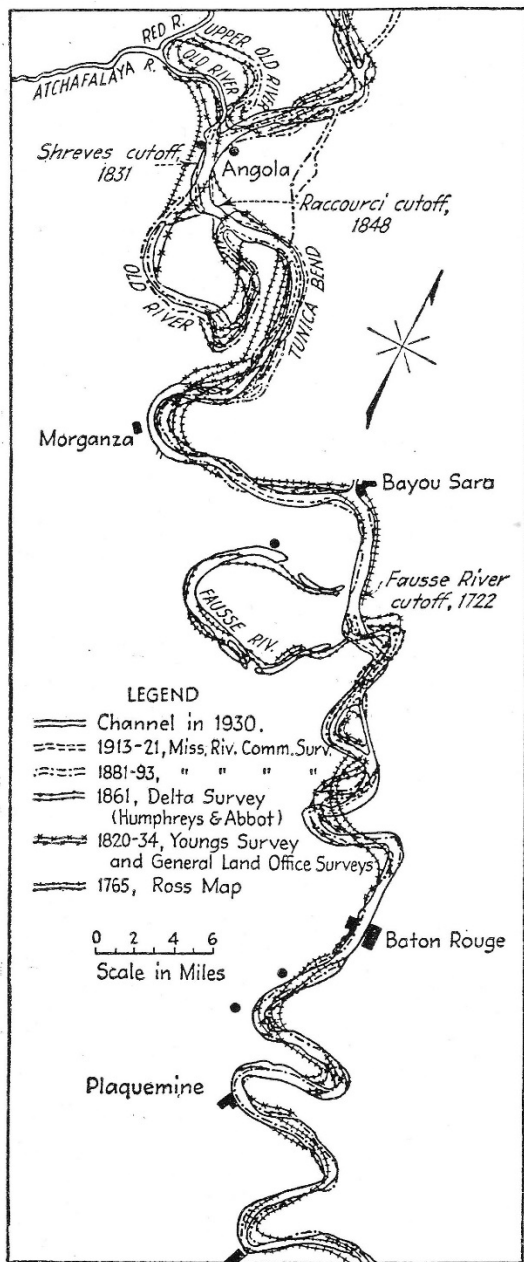


Fig. 5—Records of 165 years of channel changes below Baton Rouge reflect a high degree of stability. Compare with Fig. 4, which is typical above Red River.

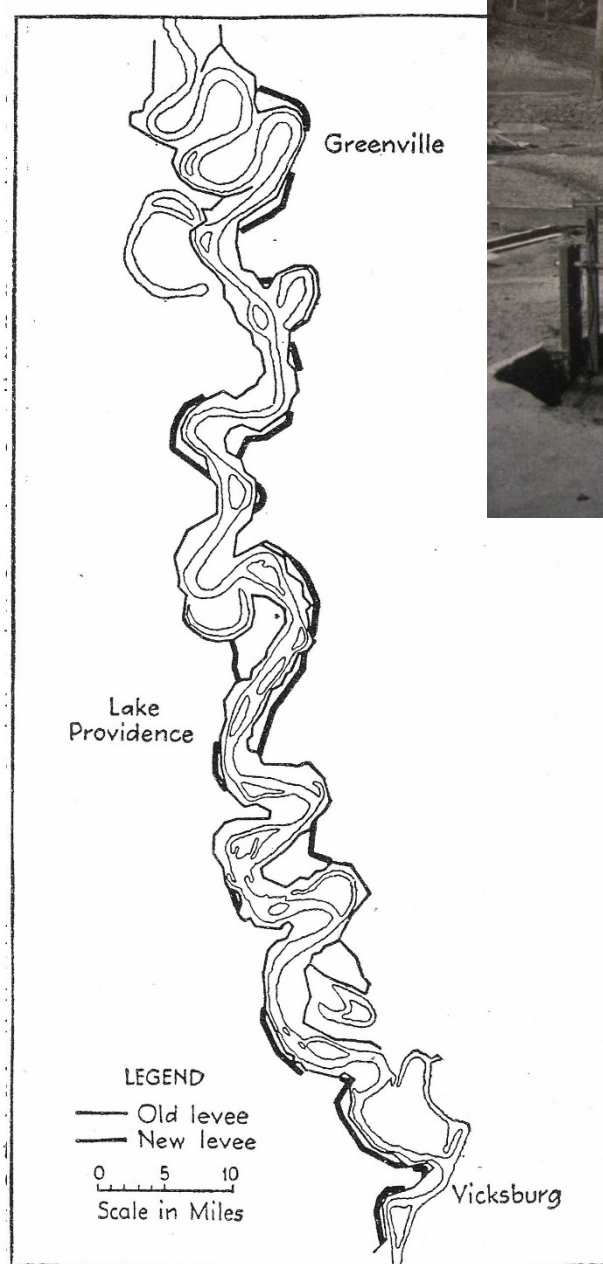
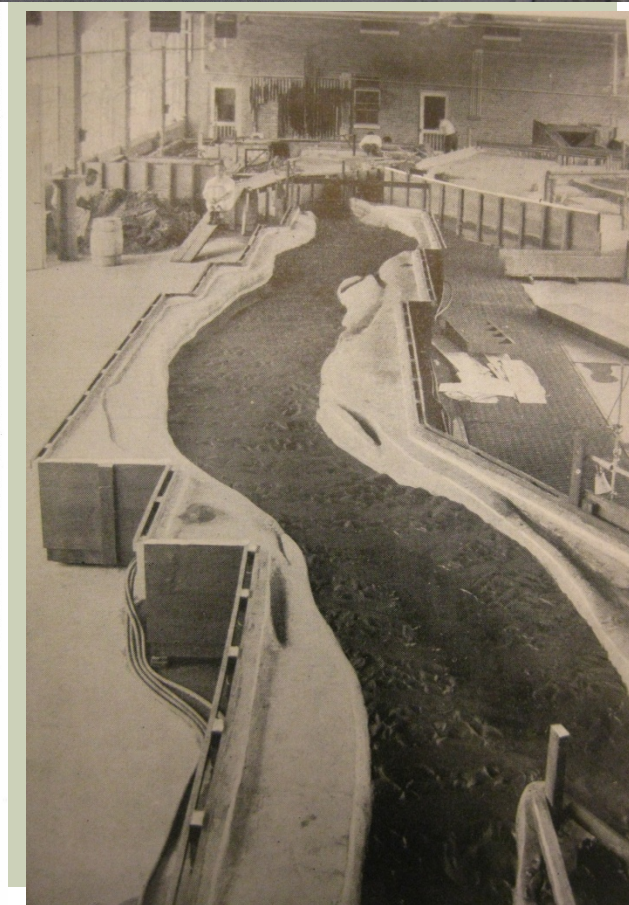
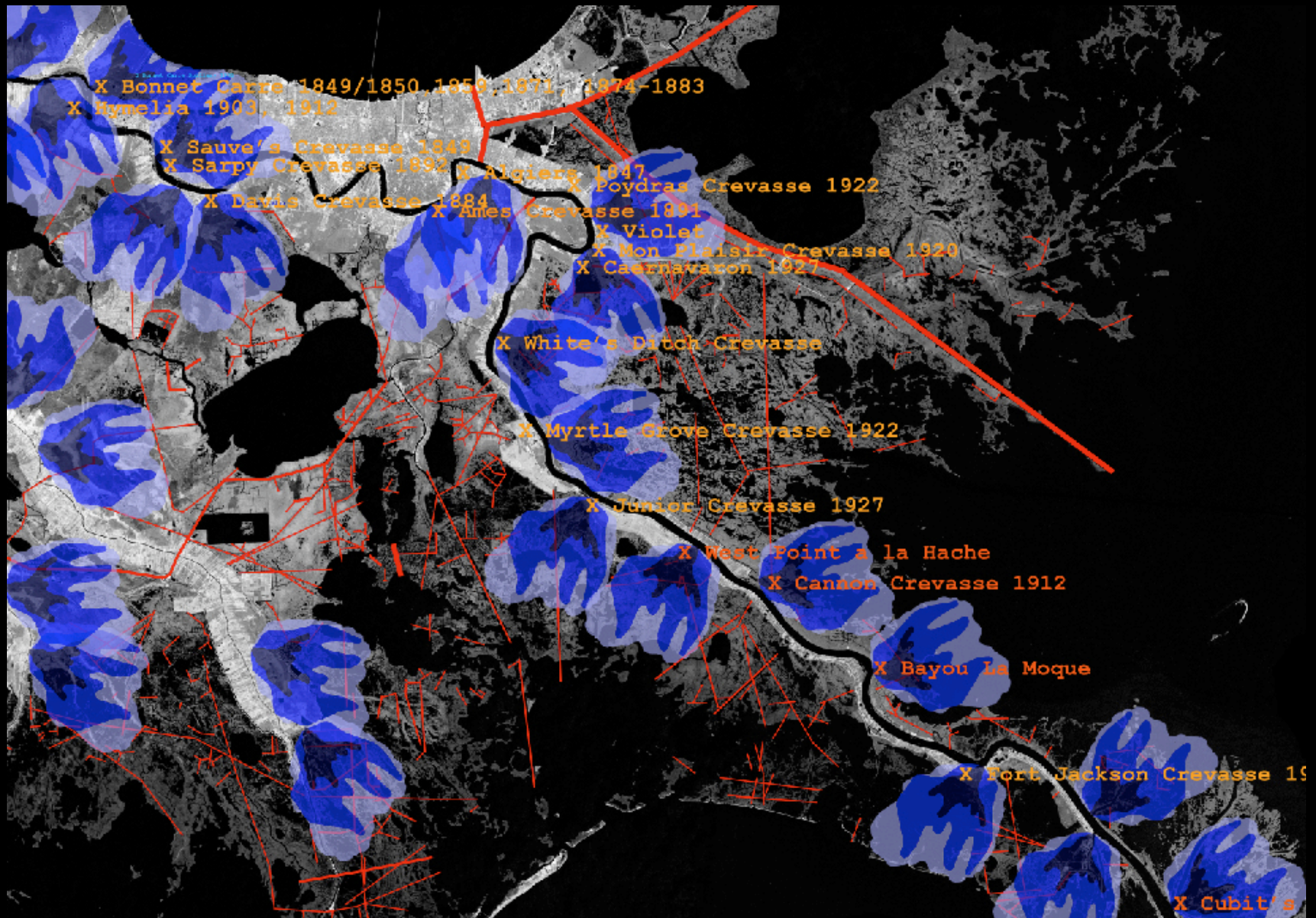


Fig. 6—Much rectification of the high-water channel has been accomplished by setting back the levee line at projecting points, as shown in this stretch between Greenville and Vicksburg.



Major crevasse splays along lower Mississippi River channel (from Twilley)



THE VALUE OF A PHYSICAL MODEL

- 1. It can focus on key questions and uncertainties.**
- 2. Reduces the risk of moving forward with restoration.**
- 3. Provides planning and design guidance.**
- 4. A powerful tool for communication and education.**

GOALS AND LIMITATIONS OF A PHYSICAL MODEL MUST BE CLEAR

- **Avoid complexity:** If your physical model is too complex, you might as well measure and work with the “real” system.
- **Have a Clear Vision:** Do not assume that your funding agency or your client understands the concept of a physical model.



- **For Example: The Zoolander Center for Kids Who Can't Read Good**

<http://youtu.be/mBNom46c4tQ>

PHYSICAL MODELS SESSION 30

NCER 2016

- 1. Duncan Bryant, USACOE: Simulating wave attenuation.**
- 2. Walter Wilcox, SFWMD: Hydraulic pulsing in a treatment wetland.**
- 3. Ehab Meselhe, Water Institute of the Gulf: Mississippi River diversions (super physical models).**
- 4. Fred Sklar, SFWMD: Building a “miniature” Everglades.**