

Cypress Island Spoil Bank Removal and Natural Detention Project (Phase 1 of the Major Coulees and Bayou Vermilion Flood Mitigation Plan)

1/14/2020

A Cooperative Effort of the Acadian Group Sierra Club and
Dredge the Vermilion, Inc.

<https://dredgethevermilion.org>

<https://lafayettesierraclub.org/>

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Detention Project**

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Cypress Island Spoil Bank Removal and Natural Detention Project

Executive Summary

Two of the largest contributors to major flooding risks in Lafayette and Vermilion parishes are the 2 largest parish coulees and their associated laterals– coulees Ill des Cannes and Mine.

Both parishes have been designated as a HUD MID parish and St. Martin parish has been designated as a LA MID parish. All the parishes are in LWI Region 5 and are located in the Teche-Vermilion Watershed.

The project proposed below also qualifies as an Urgent Need Mitigation (UNM) as the risk of future flood events has increased. This is noted by the dramatic increase in flood events measured at the USGS Bayou Vermillion Surrey Street gauge with 11-12' events from 1940-1980 and 5-12' events since Jan 1, 2019 recorded.

Dredge the Vermilion, Inc (DTV) is an NGO a non-profit 501c 3 dedicated to solving Teche-Vermilion Watershed Drainage issues. DTV has spent a significant amount of time and resources researching possible contributors to the flooding in Lafayette and surrounding parishes as well as potential project solutions to reduce future flood risk. Based on the data collected and analyzed each large coulee contribute flood flows to the Bayou Vermilion and Cypress Island that exceed what the Bayou can handle.

Our research shows that flood risk reduction is achievable with the implementation of the four phased project plan as described below:

Phase 1 - Remove spoil bank obstructions in Cypress Island that are acting like levees inhibiting flood flow dispersion into the Cypress Island swamp which is the bayou's natural floodplain. Phase 1 of this project is low risk, high impact, and low cost.

Phase 2- Remove extensive shoaling in the Bayou Vermilion both north and south of coulee Mine – dredging.

Phase 3- Establishing retention – detention along both coulees and associated laterals.

Phase 4- Evaluate, and if necessary, establish the use of weirs in these coulees and their laterals to slow water velocities entering the bayou during flood events.

Phase 1 Project Background

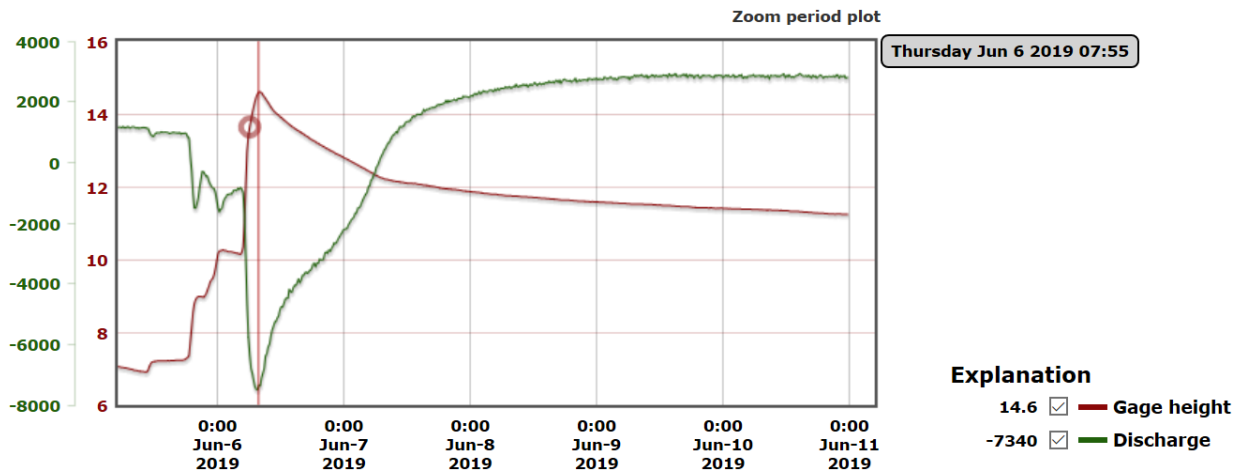
Preliminary models developed by ULL illustrate peak **in phase** flows from coulees IIs des Cannes and Mine that **align with(in phase with) the Bayou Vermilion's maximum flow north to Cypress Island** indicating that most of these coulees peak flows go north to Cypress Island vs. south to the Gulf of Mexico (GOM). The models the maximum flow rates of these coulees are **each equal to the bayou's maximum flow rate south to the GOM** illustrating the significant flow of water that each of these coulees convey to the bayou.

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Project Objectives

The below data illustrates the importance of **efficiently** moving the flood flows to Cypress Island and **dispersing** the flood into the swamp reducing peak water levels in the river. Note the **peak flows** for the **bayou north** are **in-phase** with the **highest crest** measured during this June 6th, 2019 flood event. The objective of Phase 1 project is to **reduce the crest** by enhancing the dispersion of the north (and south) flood flows into the swamp by removing spoil banks that are acting like levees. Also note that the duration of the >14' flood crest is very short. For the recent June 6th 2019 14.6' flood event the following measurements were made:

1. The bayou crested at 14.6 ft and remained greater than 14 ft for approximately 4 hours and 45 minutes.
2. The bayou flowed 2563 Acre-feet northward into Cypress Island during this cresting period
3. The bayou flowed northward for a total of 36 hours and 8400 acre-feet
4. Mean water velocities north peaked at 4.31 feet per second or 2.93 MPH
5. Peak water levels measured on gauge on bridge at LA Hwy 353 was 10.82' above NAVD88
6. Maximum transient at Surrey was 7.68ft and at Hwy 353 6.24ft offset by 2 Hours 15 minutes



June 6 2019 Surrey Street Gauge Peak Flow and Crest Graph(USGS Data)

NOAA's description of a 14.6 flood event on the Bayou Vermilion at Surrey is as follows:

"14.6 Widespread moderate flooding will occur with a few homes flooded near the bayou or from backwater flooding of the coulees and bayou that intersect the Bayou Vermilion. "

Given some people have experienced flooding of their properties again along the coulees as recently as this June 6, 2019 event this project need to be commissioned ASAP.

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Project Background

Phase 1 of this the overall plan is low risk, high impact, and low cost. This project qualifies as an eligible project in the LWI category “Floodplain Restoration and Preservation” as defined in the LWI Project Round 1 Program Policies and Procedures.

Cypress Island Overflow Swamp

The Cypress Island swamp area is located in both Lafayette and St. Martin Parishes. The swamp is approximately 25,000 acres overall with 9500 acres owned by the Nature Conservancy of Louisiana. Much of the swamp is very low land approximately 5-6 feet above sea level. This swamp acts as a natural floodplain for the Bayou Vermilion. Flood flows enter the swamp from both the north and the south. Flood flows north on the bayou are frequent when heavy rain events occur with 10 measured events during 2019 alone. The flood event on June 6, 2019 measured a peak flow north of approximately 7340 CFS into the swamp while the peak flow south measured only 2900 CFS.

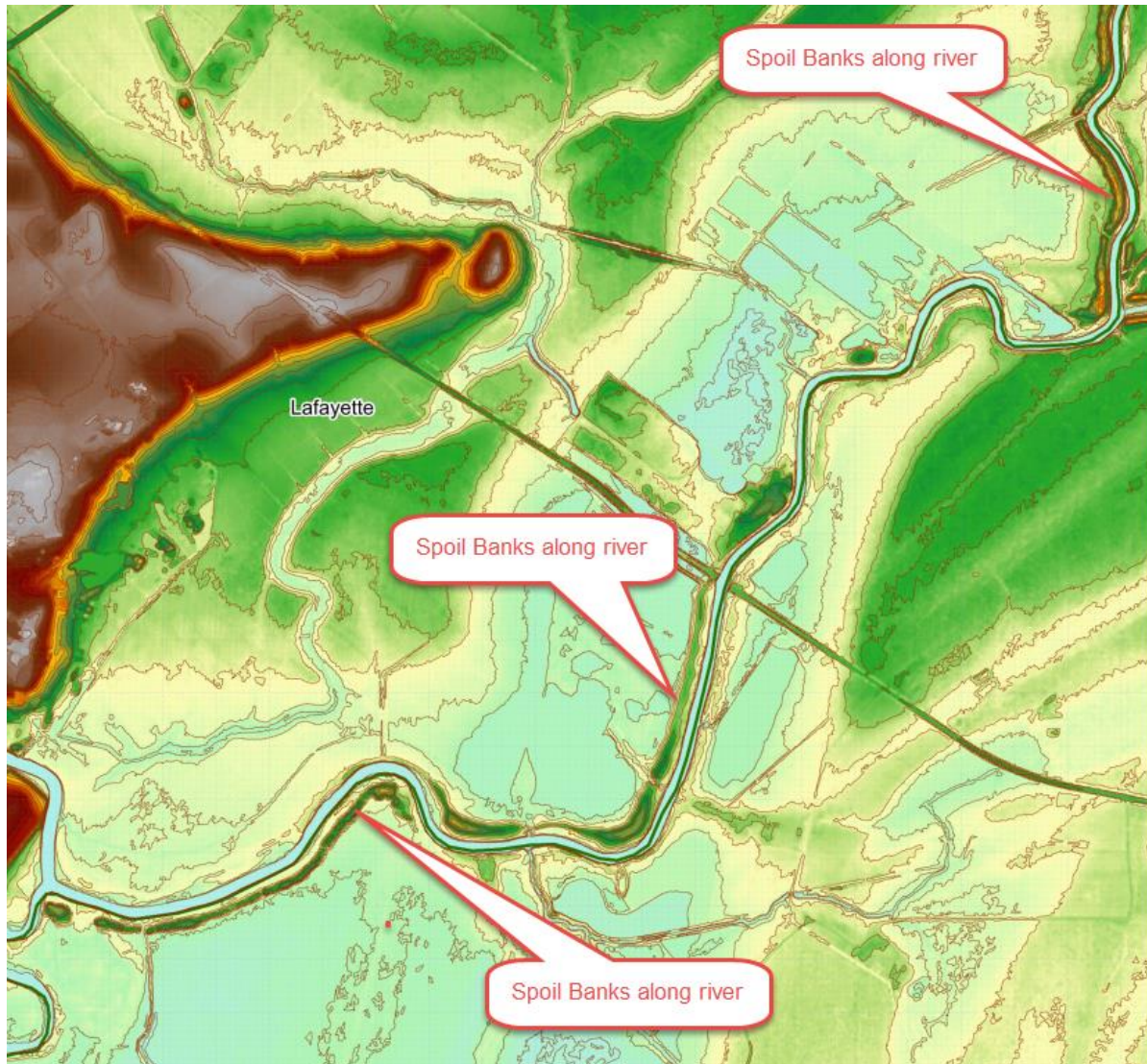
The swamp area has some spoil banks between the bayou and the swamp and the Ruth Canal and the swamp that restrict flood flows from dispersing rapidly into the swamp. These spoil banks are a result of dredging the river in the 1950’s and the excavation of the Ruth Canal nearly 100 years ago.

A boat survey made on Oct 20, 2019 identified several spoil banks but undergrowth and trees obstructed views as well as position of the spoil made it difficult to determine if adequate cuts were left open. Additionally, there appears to be severely inadequate drains under LA353 inhibiting hydrological communications between the north and south areas of the swamp. See the below image.



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The image below is based on the State of Louisiana LIDOR data (2004). The LIDOR data clearly illustrates the presence of spoil banks that act as a levee and obstruction to dispersion of flood flows entering the swamp when the bayou flows north from Lafayette as well as south from Carencro. Removal of these obstructions should reduce overall bayou levels experienced during major rain events.



LIDOR data illustrating presence of spoil banks

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Typical Spoil Elevations

The elevation of the spoil banks on the bayou near the airport illustrated below identify some of the spoil that will enhance dispersion of flood flows into the swamp by it's removal. The spoil elevations range from 7 ft to 12 ft for approximately 5000' feet along the bayou bank while the swamp to the immediate south elevations range from 4 to 6 feet. The removal of this spoil will provide 1000's square feet of additional overflow channel to the bayou-swamp communication.



Example Spoil Bank observed at pipeline crossing along river during boat survey made in Oct 2019.

Project Disposition of Spoil

In order to avoid wetland mitigation issues as much as possible designated areas spoil banks will be leveled to natural ground level. Excess spoil will be moved to cap certain spoil areas that will not hinder dispersion of flood flows. These raised areas will provide high land for wildlife during flood events.

Spoil bank areas cleared during leveling operations are to be replanted in native trees common to the surrounding swamp.

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Project Risk to Residential or Commercial Interests

Again, the objective of the project is to reduce the Bayou Vermilion's crest that causes flooding on the river and backwater flooding on its associated coulees. Additionally, as the duration of the crest is typically measured in only hours as the flood waters seek entry to the low areas of the swamp this project only enhances the hydrologic exchange between the bayou and the natural flood plain in Cypress Island. We note before the original dredging of the bayou that resulted in these spoil banks this natural hydraulic exchange existed, and all this project does is restore that natural process.

Project Maintenance and Operation after Completion

No maintenance or operational activities will be required after completion of this project.

Project Summary and Recommendations

This Project recommends removal by leveling or creating adequate openings of any spoil banks along the river and the Ruth Canal.

As this project restores the natural state of the flood plain we believe sufficient evidence is provided in this project proposal and the supporting risk analysis document to proceed with approval of this project for funding in LWI Round 1.

Project Sponsoring Governmental Entities

The sponsoring governmental entities are:

Lafayette Parish

Project Cost estimates

Construction cost estimates for this project are approximately \$1.4M with total project costs totaling about \$1,682,690.

Further supporting details, supplemental data, and analysis regarding Phase 2, 3, and 4 for the overall project may be found in a supplemental the paper "Lafayette and Vermilion Parish Major Coulees Flood Risk Analysis".