

Lafayette and Vermilion Parishes Major Coulees and Vermilion River

Flood Mitigation Project

Risk Analysis of Major Coulees Ile des Cannes Mine

Impact on Vermilion River Levels

12/19/2019

**Analysis of Ile des Cannes Impact on Vermilion River Levels
A Cooperative Effort of the Acadian Group Sierra Club and
Dredge the Vermilion, Inc.**

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Oct 24, 2019

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Executive Summary

Dredge the Vermilion, Inc (DTV) is a non-profit 501c 3 an NGO dedicated to solving Teche-Vermilion Watershed Drainage issues. DTV has researched the causation of the 2016 major flooding event and a summary of our findings are below..

Based on our research we have identified the biggest contributor to major flooding risks in Lafayette and Vermilion are the 2 largest parish coulees and their associated laterals– coulees Ill des Cannes and Mine.

Based on the data collected and analyzed each coulee contributes flood flows to the river and north to the river’s floodplain at Cypress Island that are too intense overwhelming the river.

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Based on successfully executing mitigation efforts the problem is fixable. The below identified projects should be evaluated by qualified engineering professionals with experience in designing and installing flood mitigation projects and systems. We recommend the following projects should be evaluated in an overall four phase project that addresses the risks identified in this paper:

Phase 1- Remove spoil bank obstructions in Cypress Island that are acting like levees inhibiting flood flow dispersion into the swamp

Phase 2 -Remove extensive shoaling in the river both north and south of coulee Mine - dredging

Phase 3 – Establish needed retention – detention along both coulees and associated laterals

Phase 4 - Establish the use of weirs in these coulees and their laterals to slow water velocities entering the river during flood events

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 this example >14' flood crest is very short, in this case approximately 5 hours.

Based on our analysis of the data collected and documented in this paper executing Phases 2,3, and 4 provide an opportunity to further reduce crest levels in the river during flood events.

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Additionally, we recommend:

1. That Lafayette, St. Martin, and Vermilion parishes work with adjacent parishes supporting their projects that divert water away from the river
2. Establish and support a citizens committee dedicated to Parish and Teche Vermilion watershed drainage issues
3. That Regional Parish governmental officials engage, encourage, and lead the Teche-Vermilion watershed Parish Governments to cooperate on identifying, prioritizing, funding, and executing project solutions that address the watershed's flooding risks.
4. That as many funding sources are available the parishes engage experienced personnel that are knowledgeable in dealing with Federal and State funding mechanisms and related application processes. The State has just received \$1.2B from HUD for flood mitigation projects administrated by the newly created Louisiana Watershed Initiative (LWI). \$100M will be available in Round 1 available in the 1st quarter 2020 statewide. We recommend the parishes move quickly to identify and qualify these available funding sources LWI – CPRA - HUD – FEMA – USACE and match those sources to each identified project.

For example, in early Oct 2019 DTV learned that CPRA had available funding for projects in the Atchafalaya Basin with applications due Nov 1st. Working with St. Martin, St Landry and Avoyelles Parishes DTV developed a project plan and have submitted the plan to CPRA. Our application was accepted for potential 2019 CPRA Basin Program funding. We expect this project to be approved and with funds available in June 2020 as CPRA advised that no other applicants have submitted a 2019 project proposal.

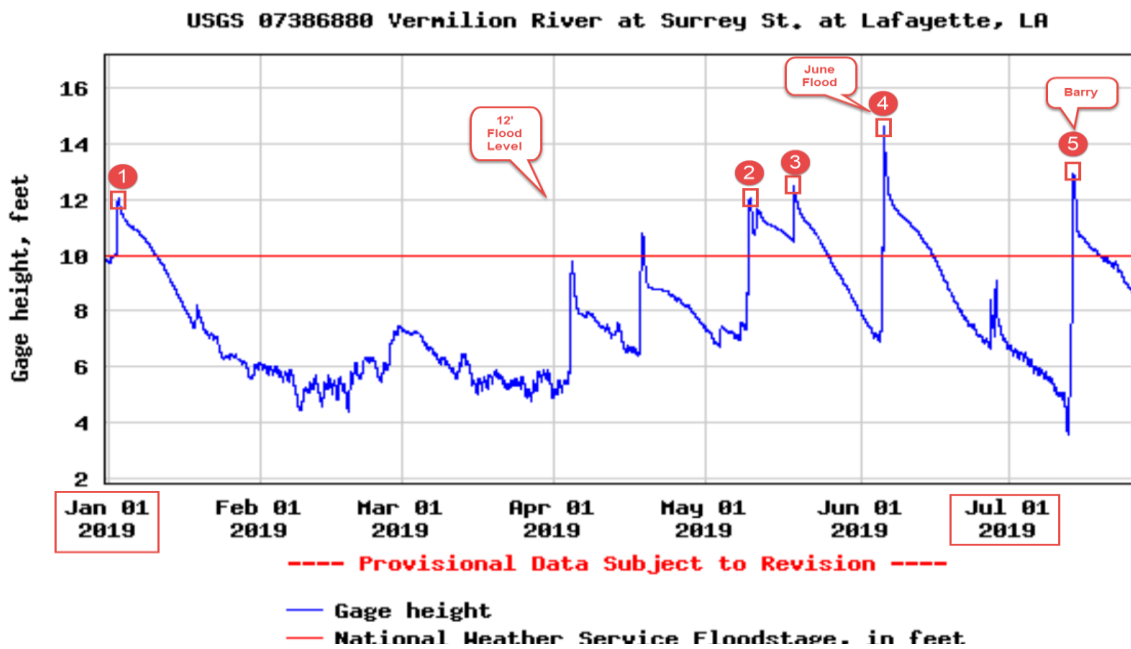
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The Current Flood Risk

Vermilion River 12' Flood Events YTD 2019 are illustrated in the below graph. The event for Hurricane Barry marked a total of 5-12' flood events since Jan 1 2019. These 5 events compare historically with a total of 11-12' flood events recorded from 1940 to 1980 or 40 years. This indicates the frequency of flood events on the Vermilion illustrate the inability of the river to safely handle flood inflows. During the decade of the 40's the river experienced 3 major flood events. After those flood events several flood mitigation projects were undertaken including dredging the river and some flood gates on Bayou Courtableau in St. Landry Parish.

Gage height, feet

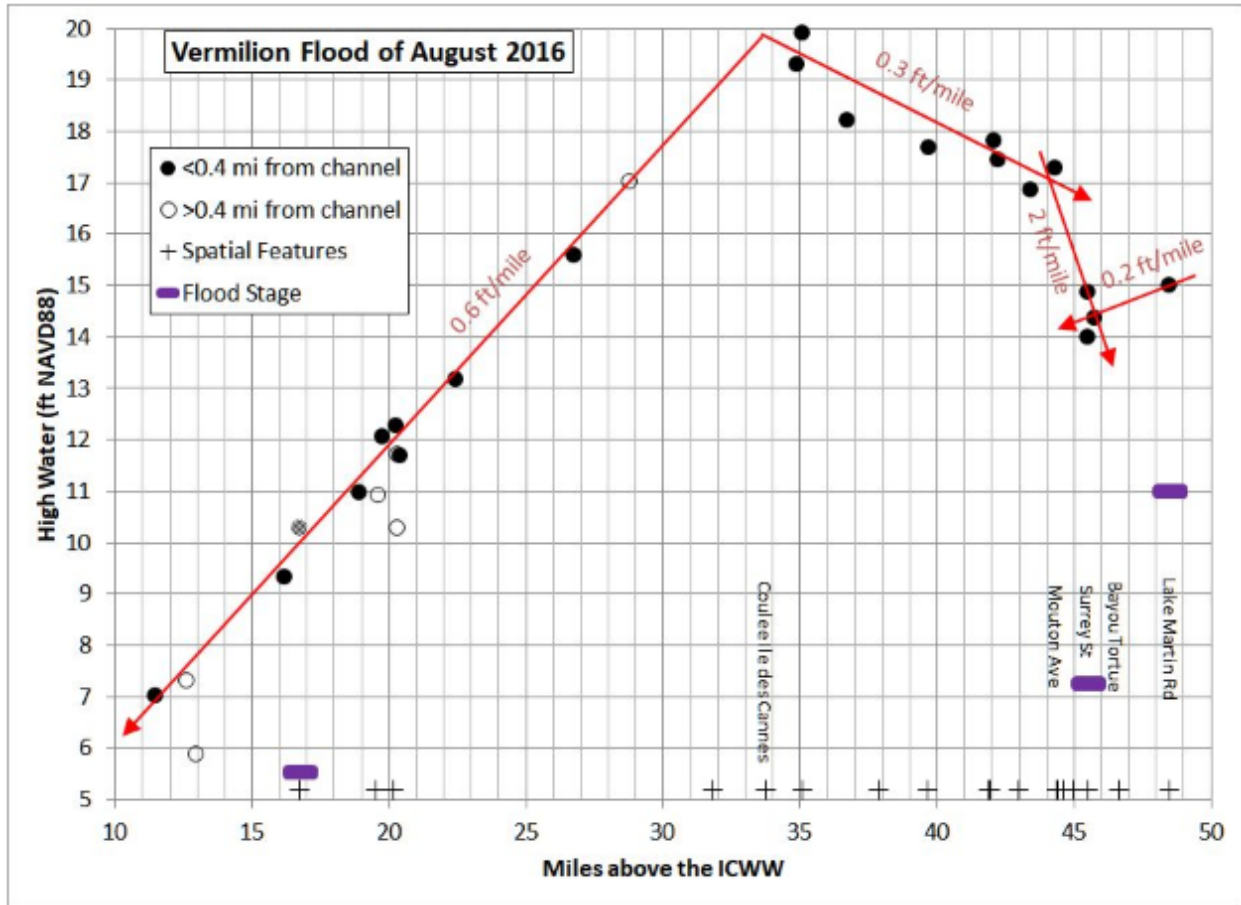
Most recent instantaneous value: 8.65 07-26-2019 12:15 CDT



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Analysis of High-Water Measurements during the August 2016 flood

During many large rain events the water entering the river at the confluence of coulees Mine and Ile des Cannes is overwhelming the river. For example, we submit the following evidence regarding coulee Ill des Cannes below:

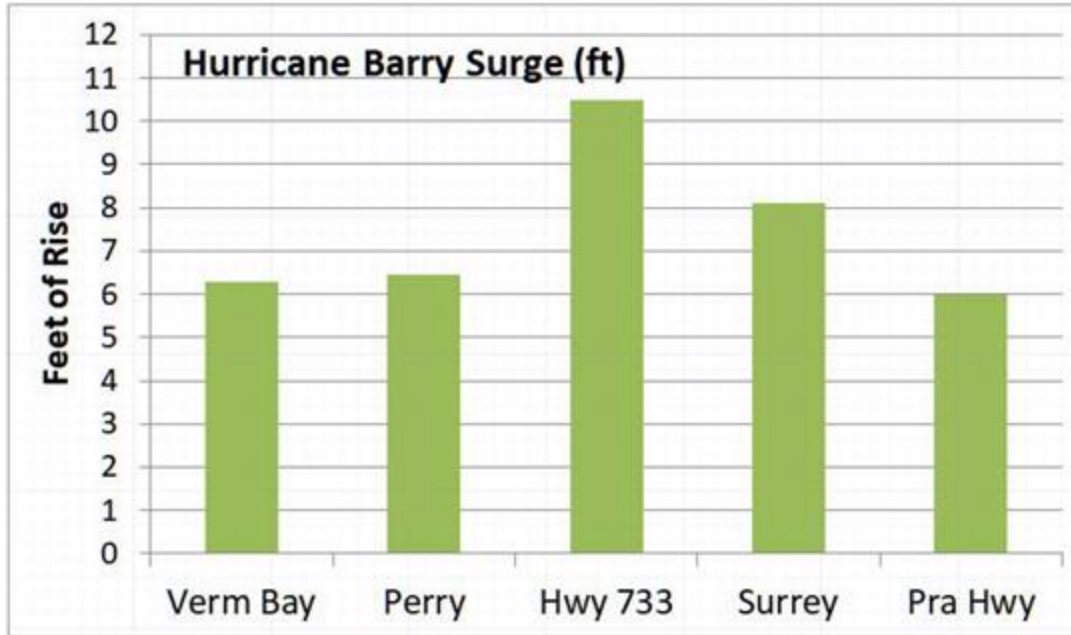


This analysis was developed by Dr. Mike Waldon a retired hydrology engineering professor at ULL. Some source data was taken from a USGS High Water Mark Survey conducted after the flood event.

This graph clearly shows the highest water elevations measured during the 2016 event were at or near the confluence of the coulee and the river.

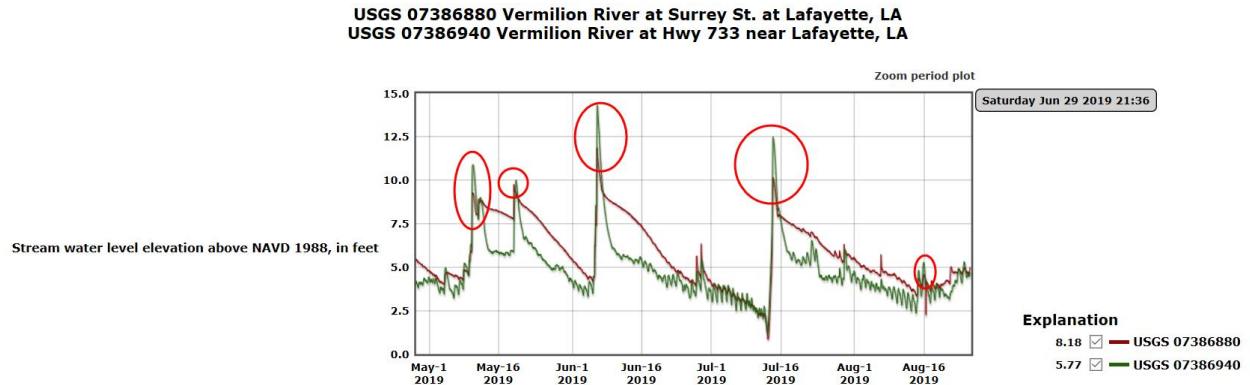
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Hurricane Barry



This analysis was also developed by Dr. Mike Waldon. Both Ile des Cannes and Isaac Verot coulees enter into the river immediately south of LA733 (E. Broussard Road). These measurement readings had contributions from the coulees as well as the storm surge again indicating coulee Ile des Cannes is overwhelming the river.

Historical Data



The above graph shows the stream water elevation in the river at LA733 frequently exceeds the stream water elevation at Surrey Street.

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Observations

Residents that live along the river approximately 0.6 miles north of the confluence have observed the river flowing north after large rain events. This condition has been observed for a number of years well before the August 2016 event and before any channel improvement projects on either Ile des Cannes or Issac Verot coulees were undertaken.

Additionally, a resident that took a boat down the river during the 2016 event observed “Rocky Mountain type whitewater rapids” at the confluence of Ile des Cannes and the river.

On Oct 31 some flow measurements were observed on USGS gauges at both Surrey Street in Lafayette Parish and at Perry in Vermilion Parish. Additionally, measurements were made at the parish line bridge on Robley/Kirk road and at Johnston Street at Moncus Park. Weather conditions were shortly after a significant rainfall event and the measurements were made approximately 6 hours after flow south at Surrey decreased to about 100 CFM. The river at Surrey crested approximately at 8.6 gage height.

Observations (North to South) around 1pm Oct 31:

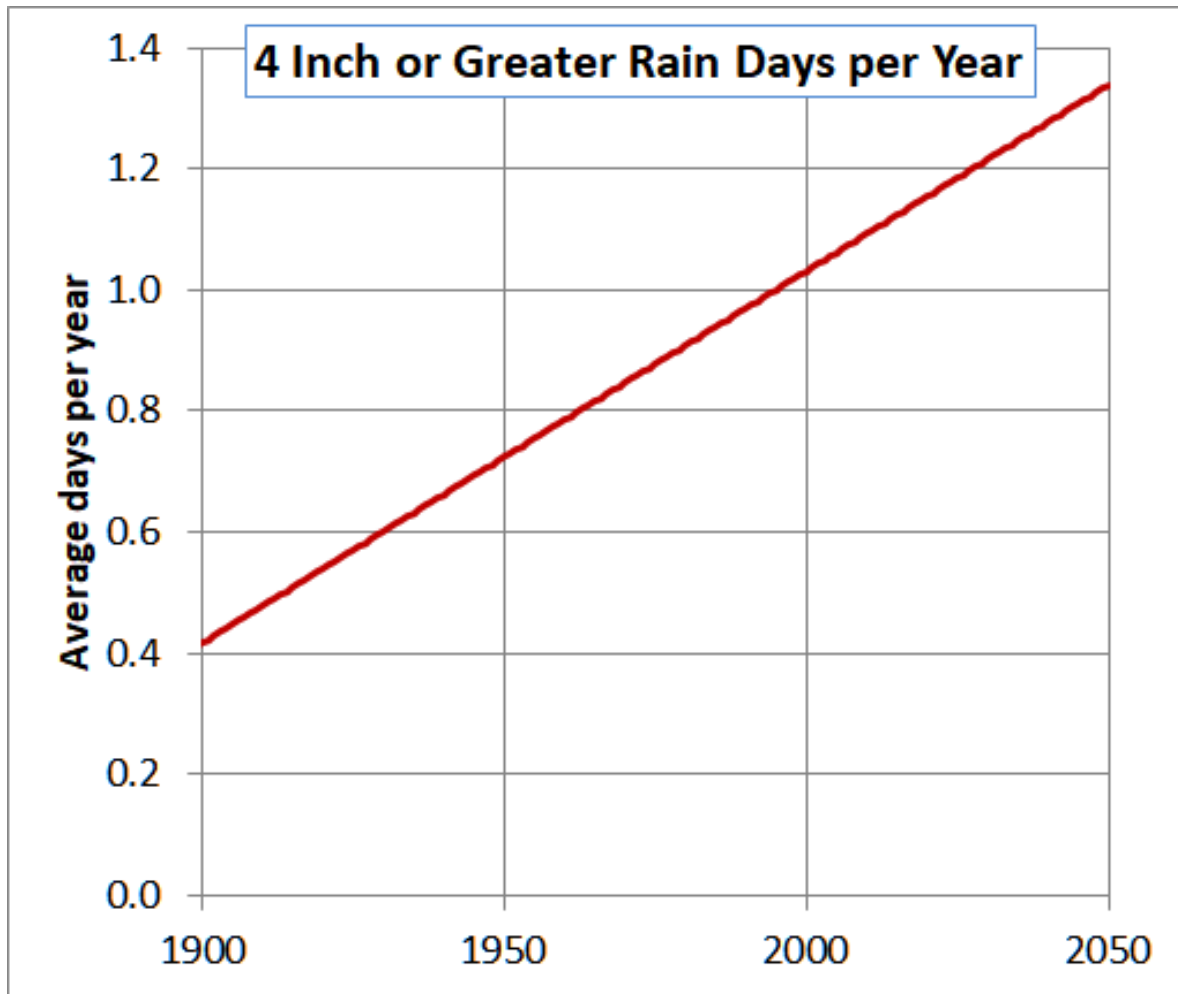
- Surrey flow 702 CFS (USGS gage data)
- Coulee Mine flow ~900 CFS (manual flow measurement)
- Coulee Ill des Cannes flow ~1850 CFS (manual flow measurement)
- Perry flow 4380 CFS (USGS gage data)

It was noted that the Ill des Cannes channel at the parish line bridge on Robley/Kirk road measured approximately 120 ft wide vs the USGS measurement of 81 ft made in 1988 at the same location. This indicates the coulee’s channel size may have increased nearly 50% during the last 30 years.

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Significant Rainfall Event Days Per Year

The following graph was developed by Dr. Mike Waldon after an analysis of 119 years for rainfall data. The analysis proved that while the rainfall annual totals trend is relatively flat the number of intense rainfall days annually is increasing. These intense rainfalls can overwhelm local drainage which in turn can overwhelm the river. See the below trend. Having an intense rainfall day when the river is significantly above normal levels (5.5-6.0 at Surrey) can cause a problem. One such event happened on Jun 5 2019 when the river was gauged at 7.0. An 8" rainfall resulted in a crest on the river of 14.6 flooding some homes.



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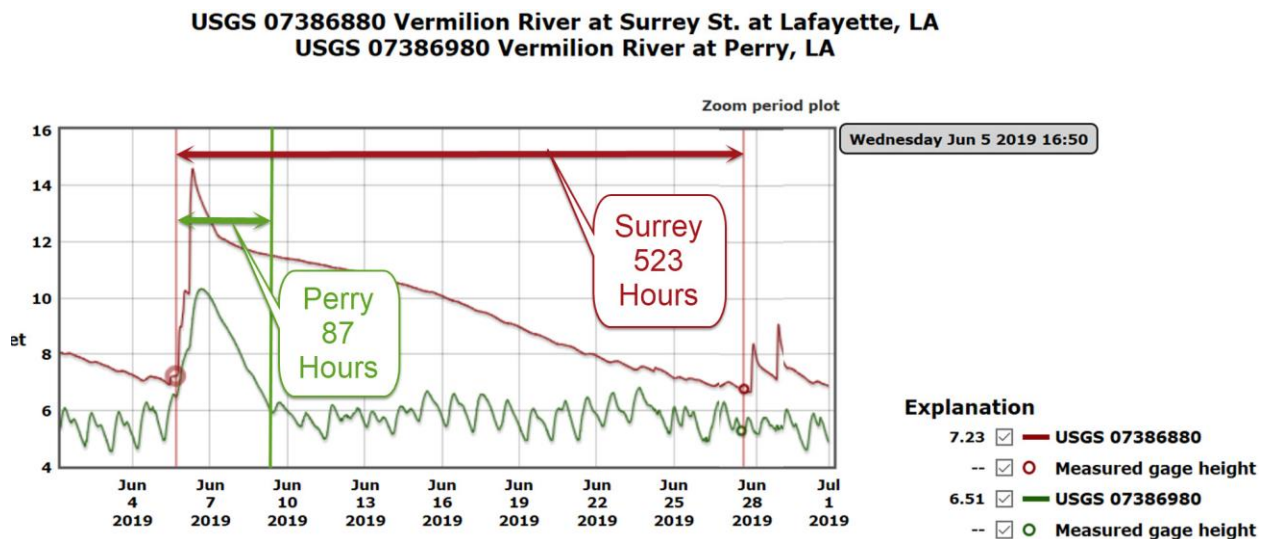
River Recession Rate

One significant risk factor is the slow recession rate of the river after a flood event. The below graph illustrates this issue. As both Surrey and Perry gauges are tidal during low water the graph illustrates how long it takes Surrey to return to tidal vs. Perry. Due to extensive shoaling in the river the river’s excessive recession rate adds risk of a second flood event causing further repeated flooding before flood waters from the first event can drain to the Gulf. The June 6th, 2019 event is a perfect example how slow drainage in the river can cause a problem if a large rainfall event happens when the river is already above normal stages.

Hurricane Barry proved this point of restoring the river to normal or lower levels quickly after a high water event. During Barry the river started with a very low level (3.7 at Surrey) and we had no problem with a crest of 12.6 vs. a predicted crest of 15.

We attribute the slow recession rate at Surrey to extensive shoaling in the river especially at the river-coulee Mine confluence. The USACE August 2019 river survey indicated 0 cf of authorized channel due to shoals both north and south of the river-coulee Mine confluence.

Please see the below graph illustrating the excessive recession rate after the June 2019 14.6’ flood event. The graph compares how long the river takes to return to tidal at Perry LA vs. at Surrey Street in Lafayette LA, where there is approximately 30 river miles between these gauges.



We also present the following data measured after the August 2016 event as follows:

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Overview of the Ile des Cannes Watershed

The Coulee Ile des Cannes watershed in western Lafayette Parish is approximately 44.3 square miles. The coulee begins west of Scott LA and north of I10 and drains along an approximately 12.8-mile path to the Vermilion River at the Lafayette Parish and Vermilion Parish line just north of Maurice LA. Straight line the path is approximately 7.5 miles with a high bank elevation change of about 14-15 feet. The coulee also has several laterals that drain into the main coulee.

Size of the Ile des Cannes coulee channel vs. The Vermilion river channel

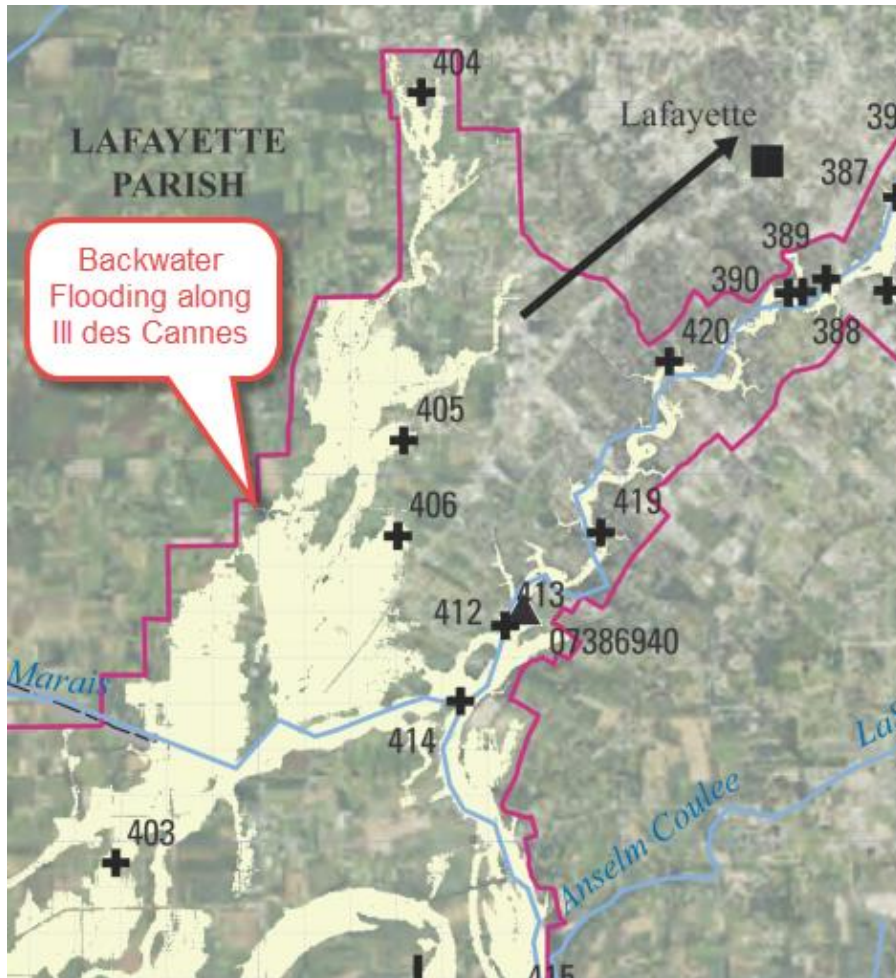
As per the USGS survey of 1988 the channel of the coulee at the river was approximately 461sf and the channel of the river at the nearest point at Hwy 733 1.35 miles upstream is approximately 1160sf making the coulee about 39.74% as large as the river. However, since the river is extensively shoaled up the channel is much diminished in the river and evidence of erosion on the coulee banks has changed this coulee to river size ratio significantly. A survey of the river channel taken by the USACE on 7/8/2019 indicates the river ~275ft north of the coulee's confluence upstream has only 740sf channel remaining changing coulee to river size ratio to 62.3% or greater. This survey of the river channel also indicates the river ~250ft south of the coulee's confluence downstream has 920sf channel remaining.

Additionally, see the Section **Observations** which details measurements that the coulee's channel size may have increased as much as 50% since 1988 due to erosion. If in fact this is the case the channel in the coulee may be nearly as large as the currently measured channel in the river at the coulee-river confluence.

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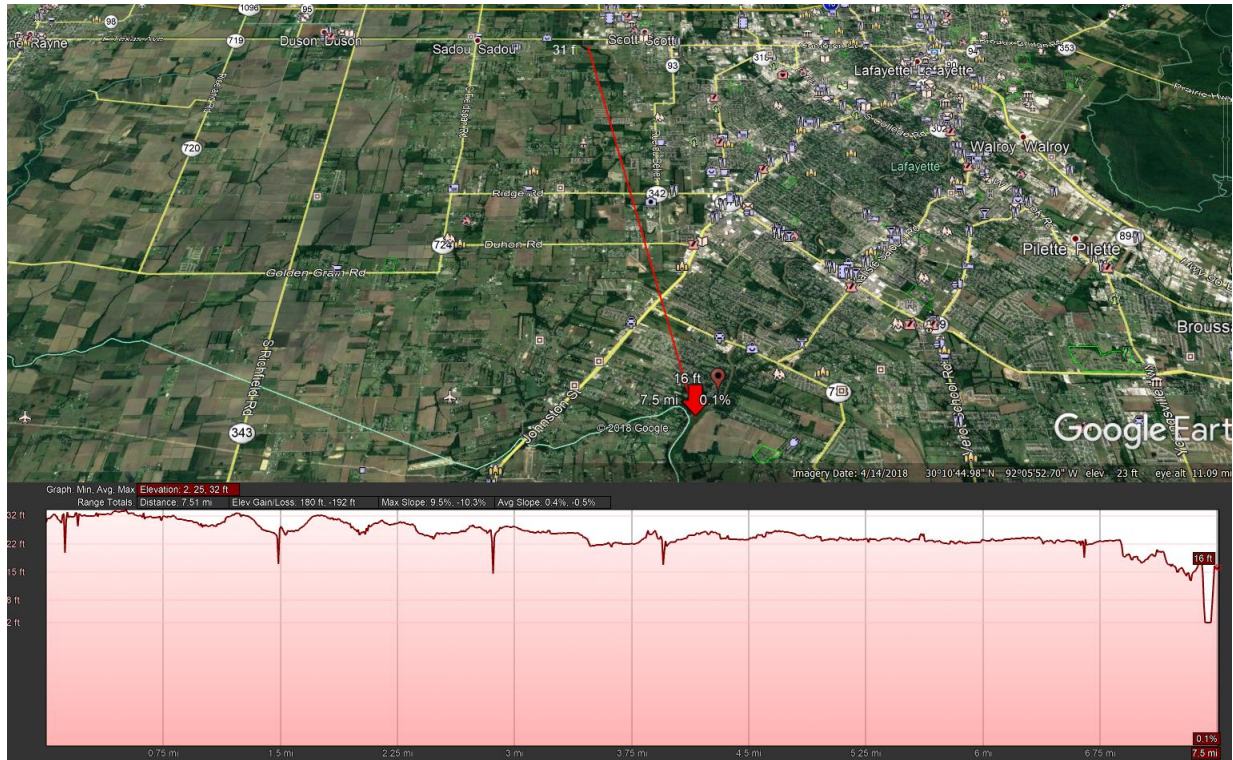
Backwater Flooding along Ile des Cannes

Areas adjacent to the coulee experienced significant backwater flooding during the August 2016 event. This is illustrated in the below USGS map published after their high-water mark survey of the 2016 event.



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Elevation Profile Ile des Cannes



The above is an elevation profile that exhibits the top bank elevations from near the coulee's head waters near I10 west of Scott to where the coulee enters the river north of Maurice. The approximate elevation change north-south is about 15 ft.

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Current Projects

Several projects related to Ile des Cannes have recently been completed, under construction, or awaiting project commencement. The intent of these projects include main channel improvements, lateral channel improvements and some retention areas. While significant channel improvements have been completed or underway no evidence of any detention/retention projects have been started.

The LCG Public Works dashboard indicates 4 projects related to Ile des Cannes. It appears all project mainly involve cleaning. The projects and status as of August 26, 2019 are as follows: Lateral 4(Design), Lateral 7(Design), Lateral 8B (Complete) and Lateral 8C(Design).

The APC FEMA Project #4 indicated construction of 2 retention ponds totaling 10.5 acres. Project #5 indicated a 109-acre pond was planned. It is noted that with a watershed of 44.3 square miles it would require approximately 788 acres of ponds assuming a 6' working effective depth to handle 2" of rainfall.

As of Sept 30th there is only approximately 0.50 mile of channel improvement remaining immediately south of Fenetre road until Dulles Drive for the channel to be improved all the way from the Old Spanish Trail bridge 0.16 miles south of US190 and 1.2 miles south of I10.

On Feb 14 2018 APC released a project list that competed for the \$25M FEMA grant the governor released to APC. Project #4 - Applicant City of Scott- - Coulee ill des Cannes - Lateral L8C Regional Detention identified 2 ponds 1-8 acre and 1-2.5-acre pond.

APC Project #5 called Coulee Ill des Cannes Flood Control Project includes 0.50 miles of channel improvements between Dulles Drive and Fenetre road and also calls for a 109-acre detention pond. This appears to be the uncompleted channel improvement mentioned above.

No evidence of any obvious regional detention-retention construction activity was noted.

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Developments near Ile des Cannes in Scott

However, there is a large pile of spoil near a 143 acre mixed use subdivision development West Village by Cottage Developers adjacent to the Apollo Road extension which shows some retention for the development. See below conceptual diagram of the development.



Conceptual Diagram of the West Village Development

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Field Trip Observations

On a field trip up to Scott we made some measurements on the Iles Des Cannes coulee both before and after the channel improvements.

The original channel north of Old Spanish Trail was approximately 25 ft wide at top 15 ft at bottom and about 6 ft deep from top bank.



Ile Des Cannes prior to Channel Improvements (North of Old Spanish Trail)

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The new channel is approximately 90-100 wide at top 25-30 feet at bottom and about 15ft deep from top bank. We were able to measure from a bridge 16.5ft from bridge deck to bottom of coulee. This is a channel size increase of approximately 780%



Ile Des Cannes after to Channel Improvements (South of Old Spanish Trail)

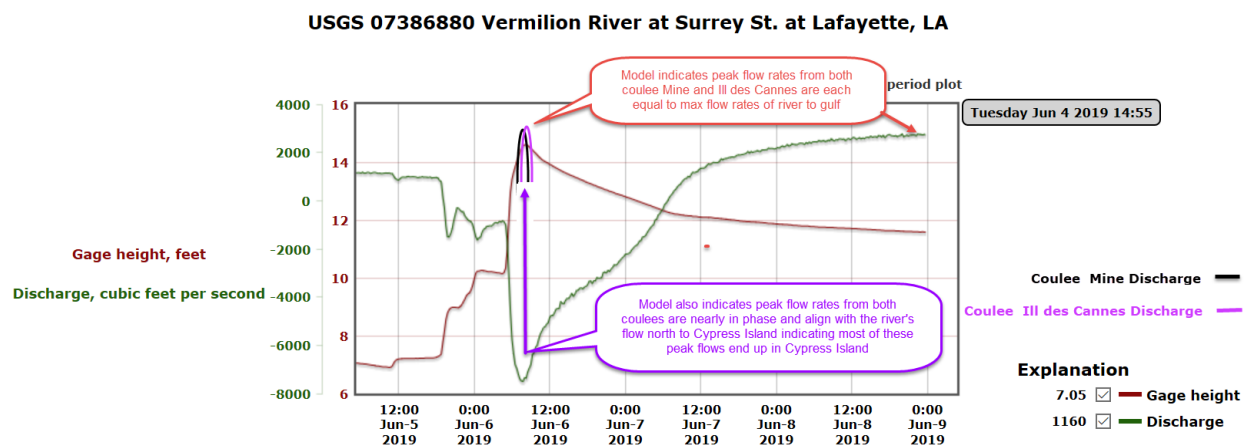
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Model Analysis

Preliminary models developed by ULL illustrate peak **in phase** flows from coulees IIs des Cannes and Mine that **align with the rivers maximum flow north to Cypress Island** indicating that most of these coulees peak flows go to Cypress Island vs. south to the GOM. As per the models the maximum flow rates of each of these coulees **equal to the river’s maximum flow rate south to the GOM** illustrating how much water these coulees convey to the river. These models shed some light on how some detention could really help. The question is where and how big. Given some people have experienced some flooding of their properties again along the coulees as recently as June 2019 these questions need answers and projects need to be commissioned ASAP.

USGS Gauge data also 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. In the recent June 6th 2019 14.6’ flood event the following measurements were made:

1. The river crested at 14.6 ft and remained greater than 14 ft for approximately 4 hours and 45 minutes. The 14.6 level is noted by NOAA as to when “Widespread moderate flooding will occur with a few homes flooded near the river or from backwater flooding of the coulees and bayou that intersect the river.”
2. The river flowed 2563 Acre-feet northward into Cypress Island during this cresting period
3. The river 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



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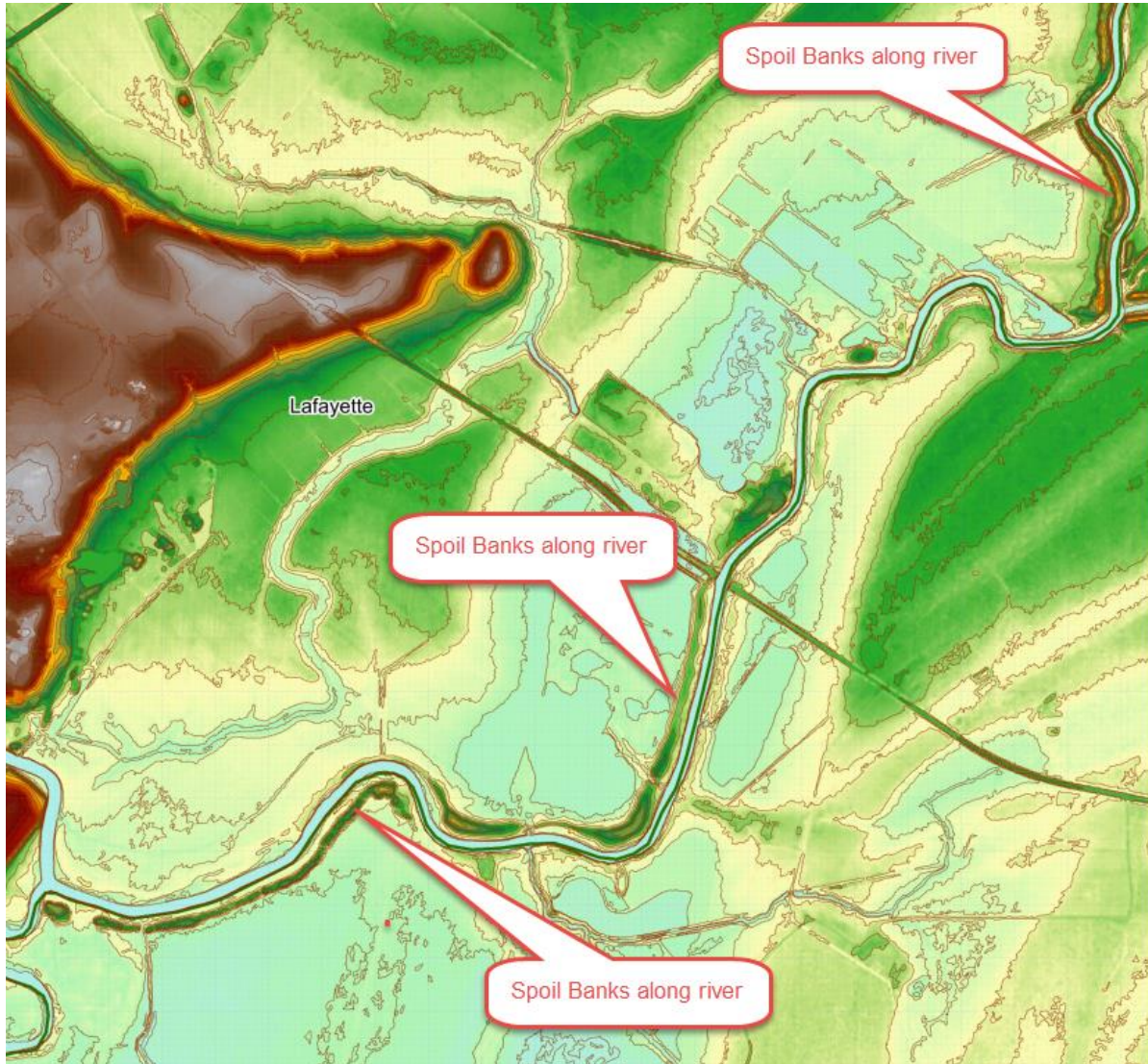
Cypress Island Overflow Swamp

In addition to detention-retention on the coulees a through survey and investigation of any impediments in moving flood flows from the river into the Cypress Island Swamp and dispersing the flood into the swamp as efficiently as possible. The swamp area has some spoil banks between the river and the swamp and the Ruth Canal and the swamp that potentially restrict flood flows from dispersing into the swamp. These restrictions need further investigation and analysis. A boat survey made on Oct 20 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 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 presence of spoil banks that act as a levee and obstruction to dispersion of flood flows entering the swamp when the river flows north from Lafayette as well as south from Carencro. Removal of these obstructions may reduce overall river levels experienced in the river in Lafayette.



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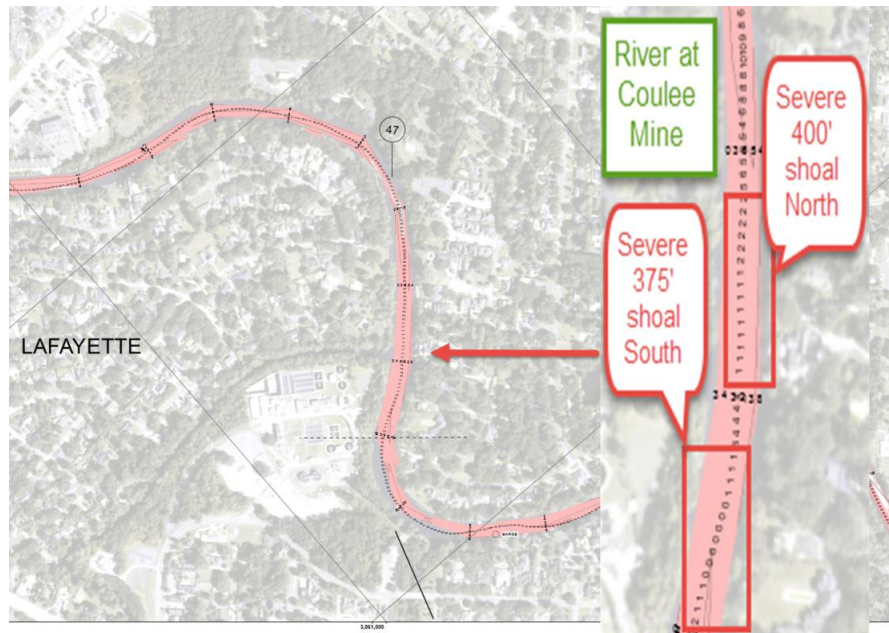
Example Spoil Bank observed at pipeline crossing along river during boat survey made in Oct 2019.



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Also, we need to investigate restrictions related to the river channel. Dr. Waldon's work illustrated above on page 4 identified severe restrictions (2ft drop/mile) he attributed to the restrictions of bridge structures in the river beginning at the bridge on General Mouton.

The USACE survey of the river indicated severe shoaling of the river just north of the river-coulee Mine confluence. See below diagram.



Summary and Recommendations

We recommend based on this data and analysis that channel improvements on coulee Ile des Cannes and its laterals be delayed until adequate detention-retention is constructed, and a flood mitigation study is completed on the existing coulee and planned improvements.

Concerning dredging the river we recommend at a minimum removal of extensive shoaling in the river both north and south of the river-coulee Mine confluence.

We also recommended that a detailed survey of any restrictions in Cypress Island that may impede efficient flood flows into the overflow swamp be made and these obstructions be removed to facilitate efficient dispersion of flood flows during a flood event.

For More Information Contact the Authors

Harold Schoeffler 337.417.1550 cadistyle@aol.com

Dave Dixon 337.739.9331 daveralphdixon@gmail.com