

Mandeville Wetland Assimilation Monitoring Report

July-September 2018



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Mandeville Wetland Assimilation Monitoring Report

Summary of Activities: July-September 2018

Site visits

July 9, 2018: Comite Resources biologist Jason Day and Joel Mancuso visited the Mandeville and Tchefuncta Marsh assimilation wetlands to carry out monthly monitoring. Leaf Litter biomass was collected from each forested site (M-Tmt, M-Mid, M-Ref & TM-Tmt). Dissolved oxygen, conductivity, temperature, salinity and pH were measured at all sites except Mand Ref and TM-Ref where there was no standing water (see data below). Discharge was at TM-TMT. A free chlorine measurements were made along the canal north of the Tchefuncta marsh where 2.92 ppm was recorded. A package plant discharges into this canal that leads out to the Mandeville Tchefuncta Marsh assimilation wetland.

Discrete water quality data from the Mandeville and Tchefuncta Marsh assimilation wetlands on July 9, 2018.

	DO (mg/l)	Cond (mS)	Temp. (°C)	Sal (PSU)	pH	Water Level (cm)
M-PIPE	3.2	420.2	26.7	0.2	6.9	.
M-TMT	1.7	179.9	26.4	0.1	7.0	25.7
M-MID	1.0	198.5	26.0	0.1	7.6	2.6
M-OUT	1.8	243.2	26.1	0.1	7.2	2.8
M-REF	1.8	131.2	25.8	0.1	7.2	.
TM-TMT	2.3	364.3	27.1	0.2	7.1	19.1
TM-MID	0.5	791.0	27.3	0.4	6.9	3.3
TM-OUT	1.2	832.9	26.7	0.4	7.0	1.8
TM-REF	2.3	613.2	28.1	0.3	7.0	.

August 21, 2018: Comite field crew Jason Day and Joel Mancuso carried out monitoring at the Bayou Chinchuba and Tchefuncta Marsh assimilation wetlands. Leaf Litter biomass was collected from each forested site (M-Tmt, M-Mid, M-Ref & TM-Tmt). Dissolved oxygen, conductivity, temperature, salinity and pH were measured at all sites. TM-T discharge is off. Water nutrient and water metals samples were taken at all sites TM-Out. Water nutrients were delivered to Curtis Environmental in LaPlace, LA. Free chlorine measurements were made at the package plant that discharges into a canal that leads out to the Mandeville TM assimilation wetland. Measurements were made at the package plant discharge pipe (0.2 ppm) and where the canal meets the wetland (0.0 ppm). Vegetation percent cover estimates were done at all sites. Accretion measurements were taken at the TM-T site. The TM-Mid site was not visited due to land access issues.



Jason Day at the TM-Ref site on August 21, 2018.

Discrete water quality data from the Mandeville and Tchefuncta Marsh assimilation wetlands on August 21, 2018.

	DO (mg/l)	Cond (mS)	Temp. (°C)	Sal (PSU)	pH	Water Level (cm)
M-PIPE	5.7	577.1	28.9	0.3	7.1	.
M-TMT	2.9	301.5	28.6	0.2	7.1	37.8
M-MID	1.3	175.2	29.1	0.1	6.9	2.5
M-OUT	2.1	240.4	29.6	0.1	6.7	1.8
M-REF	1.6	166.5	28.4	0.1	6.8	.
TM-TMT	2.0	386.2	28.4	0.2	6.9	38.3
TM-MID						
TM-OUT	2.0	602.0	27.7	0.3	7.4	1.3
TM-REF	3.1	361.5	28.6	0.2	7.1	.

September 19 & 27, 2018: Comite Resources biologist Jason Day and Joel Mancuso visited the Mandeville and Tchefuncta Marsh assimilation wetlands to carry out monthly monitoring. Leaf Litter biomass was collected from each forested site (M-Tmt, M-Mid, M-Ref & TM-Tmt). Dissolved oxygen, conductivity, temperature, salinity and pH were measured at all sites including the discharge pipe (see data below). TM-T discharge was on. End-of-season-live (EOSL) samples were taken at the M-Out, TM-Out and TM-Ref sites. EOSL samples were taken to the Comite Resources lab for processing and analysis. Free chlorine measurements were taken along the canal north of the Tchefuncta marsh. The package plant chlorine concentration was 2.30 ppm while at the receiving wetland was undetectable. Probe measurements, EOSL and water levels were not taken at the TM-Mid site due to access issues. An airboat is required to access site due to high floating aquatic vegetation growth in the canal.

Discrete water quality data from the Mandeville and Tchefuncta Marsh assimilation wetlands on September 19 and 27, 2018.

	DO (mg/l)	Cond (mS)	Temp. (°C)	Sal (PSU)	pH	Water Level (cm)
M-PIPE	1.8	501.1	27.0	0.2	6.9	
M-TMT	0.3	253.9	27.7	0.1	6.6	31.2
M-MID	1.2	343.2	26.4	0.2	6.6	6.3
M-OUT	0.4	183.0	26.0	0.1	7.1	2.5
M-REF	2.0	316.1	26.4	0.1	6.8	3.5
TM-TMT	2.8	648.0	26.5	0.3	6.3	33.5
TM-MID
TM-OUT	0.8	2848.1	26.0	1.5	6.9	5.6
TM-REF	1.8	1491.6	26.6	0.7	7.0	7.2



Joel Mancuso at the TM-Ref site on September 27, 2018.

Annual Report

Comite Staff wrote and submitted the 2017 Annual report to be submitted to LDEQ. An abbreviated version of the report has been appended to this document.

**LOUISIANA POLLUTANT DISCHARGE
ELIMINATION SYSTEM
(LPDES)**

Wetland System Monitoring Requirement

for

**City of Mandeville
Wetland Assimilation Project
Permit Number: LA0038288
Agency Interest Number: AI 19420
Activity Number: PER20010001**



Comite Resources

**2017 Annual Wetland Monitoring & Reporting
Requirements
Due one year from the effective date of the permit**

Permit Year: 1 2 3 4 5 (circle one)

Date: August 23, 2018

ANNUAL WETLAND MONITORING & REPORTING REQUIREMENTS

Summary Sheet
Due each year on the effective day of the permit

City of Mandeville
 Chinchuba Swamp & East Tchefuncte Marsh
 Wetland Assimilation Project
 3101 East Causeway Approach
 Mandeville, Louisiana 70448

PERMIT NUMBER: LA0038288
 AGENCY INTEREST NUMBER:
AI19420
 ACTIVITY NUMBER: PER20080001

GROWTH STUDIES ~ WOODY BIOMASS (Flora)

PARAMETER	GROWTH STUDIES ~ Woody Biomass (Flora)					
	Wastewater Management Area (g/m ² /yr)			Reference Area (g/m ² /yr)		
	UAA Overall Average	Current Overall Average	Difference ¹	UAA Overall Average	Current Overall Average	Difference ¹
BC ² Treatment	ND ³	588.7±131.9	ND			
BC Mid	ND	359.0±66.6	ND			
TM ⁴ Treatment	234.6±64.9	323.2±46.2	1			
Forested Reference				ND	623.4±131.6	ND

¹ The difference in the UAA value and the Current value shall be indicated by **NO INCREASE = 0, INCREASE = 1, or DECREASE = 2.**

²BC = Bayou Chinchuba.

³Not determined.

⁴TM = Tchefuncte Marsh

ANALYSIS OF VARIANCE (ANOVA)

Was there a significant difference (p=0.05) between stem growth (flora) in the control and the treatment area?

YES NO

If yes, please explain the significance between the control and the treatment areas and outline any corrective actions taken, if needed.

No difference in woody biomass among sites was detected [F(3,8)=2.3082, p=0.1531].

Additional Information: Over one hundred baldcypress seedlings were planted in 2011 at the Tchefuncte Marsh assimilation wetland on the western side of the area receiving discharge. Although these seedlings were less than 10 cm dbh (mean dbh was 6.5 cm), we measured dbh at three 20 m x 20m plots delineated within the planted area in 2016 and 2017. Mean stem growth for seedlings in the three plots was 24.3±1.1 g/m²/yr. (Note: In the 2016 annual report, mean stem growth for seedlings was erroneously reported. Actual mean stem growth was 9.5±0.5 g/m²/yr.)

GROWTH STUDIES ~ LITTER FALL (Flora)

PARAMETER	GROWTH STUDIES ~ LITTER FALL (Flora)					
	Wastewater Management Area (g/m ² /yr)			Reference Area (g/m ² /yr)		
	UAA Total Dry Weight	Current Total Dry Weight	Difference ¹	UAA Total Dry Weight	Current Total Dry Weight	Difference ¹
BC² Treatment	ND ³	942.7±97.5	ND			
BC Mid	ND	714.7±49.0	ND			
TM⁴ Treatment	274.6±15.9	675.2±29.1	1			
Forested Reference				ND	1045.3±23.0	ND

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²BC = Bayou Chinchuba.

³Not determined.

⁴TM = Tchefuncte Marsh

ANALYSIS OF VARIANCE (ANOVA)

Has there been a significant difference (p=0.05) between the Litter Fall (Flora) in the control and the treatment area?

YES NO

If yes, please explain the significance between the control and the treatment areas and outline any corrective actions taken, if needed.

Mean leaf litter was significantly higher in the BC Treatment (942.7±97.5 g/m²/yr) and Forested Control (1045.3±23.0 g/m²/yr) sites than in the BC Mid (714.7±49.0 g/m²/yr) or TM Treatment sites (675.2±29.1 g/m²/yr) [F(3,19)=8.8209, p=0.0007].

GROWTH STUDIES ~ Marsh Productivity

PARAMETER	GROWTH STUDIES ~ Marsh Productivity					
	Wastewater Management Area (g/m ² /yr)			Reference Area (g/m ² /yr)		
	UAA Total Dry Weight	Current Total Dry Weight	Difference ¹	UAA Total Dry Weight	Current Total Dry Weight	Difference ¹
BC² OUT	660.0±358.5	195.1±8.1	0			
TM³ Mid	3779.9±557.6	265.4±30.4	2			
TM Out	2041.2±341.5	290.4±33.6	2			
Marsh Reference				ND ⁴	131.3±19.9	ND

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²BC = Bayou Chinchuba.

³TM = Tchefuncte Marsh.

⁴Not determined.

ANALYSIS OF VARIANCE (ANOVA)

Has there been a significant difference (p=0.05) between the productivity (Flora) in the control and the Out site?

YES NO

If yes, please explain the significance between the control and the treatment areas and outline any corrective actions taken, if needed.

Mean EOSL was higher at the TM Mid (265.4±30.4 g/m²/yr) and TM Out (290.4±33.6 g/m²/yr) sites than at the Marsh Reference (131.3±19.9 g/m²/yr) site, but no other differences were detected [F(3,12)=8.2049, p=0.0031].

WATER STAGES (Surface Water)

Water height above the soil surface was recorded at ten locations in the Treatment, Mid, and Out sites of both Bayou Chinchuba (BC) and Tchefucnta Marsh (TM) as well as the Marsh Reference and Forested Reference sites.

Water height (cm) above soil surface.

Site	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
BC Treatment	22.1	0.0	22.6	34.3	28.9	44.3	23.5	22.3	17.6	44.9	19.9	29.1
BC Mid	0.0	0.0	6.8	0.0	0.5	19.7	0.0	2.4	0.0	30.5	3.5	29.7
BC Out	0.0	0.0	5.3	0.0	- ¹	6.1	0.0	3.3	0.0	26.0	0.0	0.0
TM Treatment	30.1	0.0	32.8	37.0	28.8	34.5	27.0	0.0	37.7	32.5	40.8	71.3
TM Mid	0.0	0.0	1.3	1.6	- ¹	9.4	0.0	0.0	0.6	27.2	0.0	7.8
TM Out	0.0	0.0	1.3	0.0	- ¹	18.2	0.0	0.0	0.0	30.8	0.0	0.0
Forested Ref	0.0	0.0	7.4	4.4	0.0	8.2	0.0	0.0	0.4	30.7	0.0	16.2
Marsh Ref	0.0	0.0	7.0	0.0	- ¹	9.5	0.0	0.0	1.0	31.3	0.0	0.0

¹Unable to measure water levels because the field crew could not launch the boat due to high winds and choppy water.

NUTRIENT ANALYSIS I (Surface Water)

Bayou Chinchuba Assimilation Wetland

PARAMETER	NUTRIENT ANALYSIS I (Surface Water)											
	Wastewater Treatment Area							Reference Area			ANOVA Significant Difference ² (p=0.05) YES or NO	
	UAA Average (mg/L)			Current Average (mg/L)				Difference ¹	UAA Average (mg/L)	Current Average (mg/L)		Difference ¹
	Treatment Area			Treatment Area					Reference Area	Reference Area		
	TMT	MID	OUT	TMT	MID	OUT						
Total Kjeldahl Nitrogen (TKN)	0.22±0.06	0.35±0.09	0.20±0.06	8.83±2.94	4.13±2.56	2.38±0.47	1,0,0		0.28±0.07 ³ 0.59±0.34 ⁴	1.32±0.19 1.22±0.16		
Total Phosphorus (TP)	1.19±0.30	0.63±0.11	0.40±0.16	1.89±0.63	1.30±0.79	0.84±0.25	0,0,0	0.33±0.10 0.08±0.03	0.60±0.25 0.15±0.04	0 0	N,N N	

¹The difference in the UAA value and the current value shall be indicated by **NO INCREASE=0, INCREASE=1, and DECREASE=2.**

²Analysis of Variance (ANOVA), a significant difference (p=0.05) between the wastewater treatment area and the control area shall be indicated by YES or NO.

³Bayou Castine Forested Reference site (for Treatment and Mid site comparison).

⁴Tchefuncte Marsh Reference site (for Out site comparison).

ANNUAL WETLAND MONITORING & REPORTING REQUIREMENTS
City of Mandeville ~ Chinchuba Swamp & East Tchefuncte Marsh
Wetland Assimilation Project
LA0038288; AI19420; PER20010001

Tchefuncte Marsh Assimilation Wetland

PARAMETER	NUTRIENT ANALYSIS I (Surface Water)											
	Wastewater Treatment Area							Reference Area			ANOVA Significant Difference ² (p=0.05) YES or NO	
	UAA Average (mg/L)			Current Average (mg/L)				Difference ¹	UAA Average (mg/L)	Current Average (mg/L)		Difference ¹
	Treatment Area			Treatment Area					Reference Area	Reference Area		
	TMT	MID	OUT	TMT	MID	OUT						
Total Kjeldahl Nitrogen (TKN)	2.33±0.66	1.67±0.41	0.99±0.44	10.37±8.77	1.64±0.54	1.12±0.17	0,0,0	0.28±0.07 ³ 0.64±0.20 ⁴	1.32±0.19 1.22±0.16	1 0		N N,N
Total Phosphorus (TP)	1.34±0.69	0.25±0.02	0.28±0.23	3.33±0.98	0.58±0.31	0.25±0.02	1,0,0	0.33±0.10 0.07±0.02	0.60±0.25 0.15±0.04	0 0	N N,N	

¹The difference in the UAA value and the current value shall be indicated by **NO INCREASE=0, INCREASE=1, and DECREASE=2.**

²Analysis of Variance (ANOVA), a significant difference (p=0.05) between the wastewater treatment area and the control area shall be indicated by YES or NO.

³Bayou Castine Forested Reference site (for Treatment site comparison).

⁴Tchefuncte Marsh Reference site (for Mid and Out site comparison).

NUTRIENT ANALYSIS II (Surface Water)

Bayou Chinchuba Assimilation Wetland

NUTRIENT ANALYSIS II (Surface Water)												
PARAMETER	Wastewater Treatment Area							Reference Area			ANOVA Significant Difference ² (p=0.05) YES or NO	
	UAA Average (mg/L)			Current Average (mg/L)				Difference ¹	UAA Average (mg/L)	Current Average (mg/L)		Difference ¹
	Treatment Area			Treatment Area					Reference Area	Reference Area		
	TMT	MID	OUT	TMT	MID	OUT						
Ammonia (NH ₃ -N)	1.73±0.54	1.26±0.33	0.49±0.16	5.70±1.48	2.28±1.61	0.84±0.29	1,0,0	0.91±0.47 ⁴ 0.10±0.06 ⁵	0.07±0.02 0.08±0.03	0 0	Y,N Y	
Nitrate+ Nitrite-N (NO ₃ +NO ₂ -N)	1.16±0.37	0.64±0.15	0.20±0.05	7.85±4.42	0.05±0.01	0.04±0.01	0,0,0	0.21±0.09 0.10±0.00	0.50±0.32 0.04±0.01	0 2	N,N, N	
Phosphate (PO ₄ -P)	ND ³	ND	ND	1.66±0.59	1.31±0.82	0.80±0.45	ND	ND 0.04±0.02	0.89±0.52 0.10±0.03	- 0	N,N N	

¹ The difference in the UAA value and the current value shall be indicated by **NO INCREASE=0, INCREASE=1, DECREASE=2**.

² Analysis of Variance (ANOVA), a significant difference (p=0.05) between the wastewater treatment area and the control area shall be indicated by YES or NO.

³Not determined.

⁴Bayou Castine Forested Reference site (for Treatment and Mid site comparison).

⁵Tchefuncte Marsh Reference site (for Out site comparison).

Tchefuncte Marsh Assimilation Wetland

PARAMETER	NUTRIENT ANALYSIS II (Surface Water)										
	Wastewater Treatment Area							Difference ¹	Reference Area		ANOVA Significant Difference ² (p=0.05) YES or NO
	UAA Average (mg/L)			Current Average (mg/L)			UAA Average (mg/L)		Current Average (mg/L)	Difference ¹	
	Treatment Area			Treatment Area			Reference Area		Reference Area		
	TMT	MID	OUT	TMT	MID	OUT	Reference Area	Reference Area			
Ammonia (NH₃-N)	0.07±0.03	0.31±0.24	0.06±0.02	4.12±3.94	0.11±0.05	0.11±0.04	1,0,0	0.91±0.47 ³ 0.10±0.06 ⁴	0.07±0.02 0.08±0.03	0 0	N N,N
Nitrate + Nitrite-N (NO₃+NO₂-N)	0.25±0.15	0.10±0.00	0.10±0.00	7.85±4.42	0.05±0.01	0.04±0.01	0,0,0	0.21±0.09 0.10±0.00	0.50±0.32 0.04±0.01	0 0	N N,N
Phosphate (PO₄-P)	0.89±0.36	0.22±0.02	0.06±0.02	3.03±1.01	0.42±0.30	0.13±0.03	1,0,0	ND ⁵ 0.04±0.02	0.89±0.52 0.10±0.03	- 0	N N,N

¹ The difference in the UAA value and the current value shall be indicated by **NO INCREASE=0, INCREASE=1, DECREASE=2**.

² Analysis of Variance (ANOVA), a significant difference (p=0.05) between the wastewater treatment area and the control area shall be indicated by YES or NO.

³ Bayou Castine Forested Reference site (for Treatment site comparison).

⁴ Tchefuncte Marsh Reference site (for Mid and Out site comparison).

⁵ Not determined.