Louisiana Water Quality Trading: Agricultural Community Involvement

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ADAPTATION STRATEGIES

Objectives

Research	• Research agricultural practices utilized in water quality trading in other states
Engage	• Engage Louisiana agricultural community to begin conversation about water quality trading in Louisiana
Identify	• Identify conservation practices conducive to trading
Investigate	• Investigate Nutrient Tracking Tool for usefulness in WQ trading
Run	• Run simulations on NTT for Louisiana
Quantify	• Work toward quantifying load reductions as basis of credits

WQ Trading- Meeting with Ag Representatives, 7/5/18

Met with reps from LDAF, LSU Ag, and NRCS
Areas of concern for trading implementation in Louisiana

USDA NRCS Conservation Practice Physical Effects (CPPE)	Describes the environmental and economic effects of each conservation practice Tools define the conservation practice, practice units, typical land use and a relative cost estimate
Louisiana Master Farmer	About 300 certified in state Could be avenue for participation in trading Discussed if farmer can get credit by practice, by a suite of practices, etc. Practices interrelated.
Sensitive Areas	Erodible soils, highly erodible lands Areas closer to waterbody may have more value Assurance that practices will not impact drainage
Nutrient Tracking Tool (NTT)	USDA supports this tool Calibration for local Louisiana conditions needed May be opportunity for USDA to present the NTT to Louisiana stakeholders as webinar

WQ Trading- Meeting with Ag Representatives, 7/5/18

Areas of concern for trading implementation in Louisiana cont.

Role of local boards and districts

- Local districts could be 3rd party verifier
- Work through them for outreach
- On-the-ground farmer liaison

Practice considerations

- Private implementation & Consideration of practices already in place
- Idle lands/easements; Take marginal/nonproductive land out of production
- Weather may impact practice efficiency
- Effectiveness may be determined by time and distance

Common LA Practices

- Crop Rotation; Cover Crop
- Reduced Till
- Field Borders

Dairy Lagoon Clean-Out Nutrient Scenario

Represents one-time pump out and land application of dairy wastewater from a well-functioning lagoon.

- Assumption- lagoon pumped and cleaned (sludge agitation and application) according to its regular schedule.

Anaerobic Lagoon Capacity= 2,061 m^3 or 544,104 gallons

Lagoon captures wastewater from milking parlor including diluted amounts of manure, milk, and residues of cleaning products

Load reduction is based on withdrawing 360,000 gallons (or roughly 2/3 of volume) for land application.

(Based on "Design and Evaluation of a Sequential Biological Treatment System for Dairy Parlor Wastewater in Southeast Louisiana", Moreira et. al, 2010)

Dairy Lagoon Nutrient Scenario Cont.

Parameter	Unit	Raw Wastewater	Raw Wastewater Load (lbs/gal)	Post- AFL	Post-AFL Load (lbs/gal)	% Conc. Reduction	Load Reduction in lbs (360,000 gal)
TSS	mg/L	733	0.00555303	183.3	0.001388636	75%	1499.18
TDS	mg/L	771	0.005840909	654	0.004954545	15%	319.09
TS	mg/L	1585	0.012007576	892	0.006757576	44%	1890.00
TKN	mg/L	110	0.000833333	89.6	0.000678788	19%	55.64
NH3-N	mg/L	70.8	0.000536364	54.3	0.000411364	23%	45.00
NO3-N	log mg/L	-0.26		-1			
TP	mg/L	24.8	0.000187879	24.2	0.000183333	0%	1.64
NOTES:							
Volume = 360,000 gallons							
*Conversion- mg/L to lbs/gallon = (#/.264)*0.0000022*							

Concentrations shown are for raw wastewater and post-Anaerobic/ Facultative Lagoon (AFL). These are used to calculate load.

Dairy Lagoon Nutrient Scenario Cont.

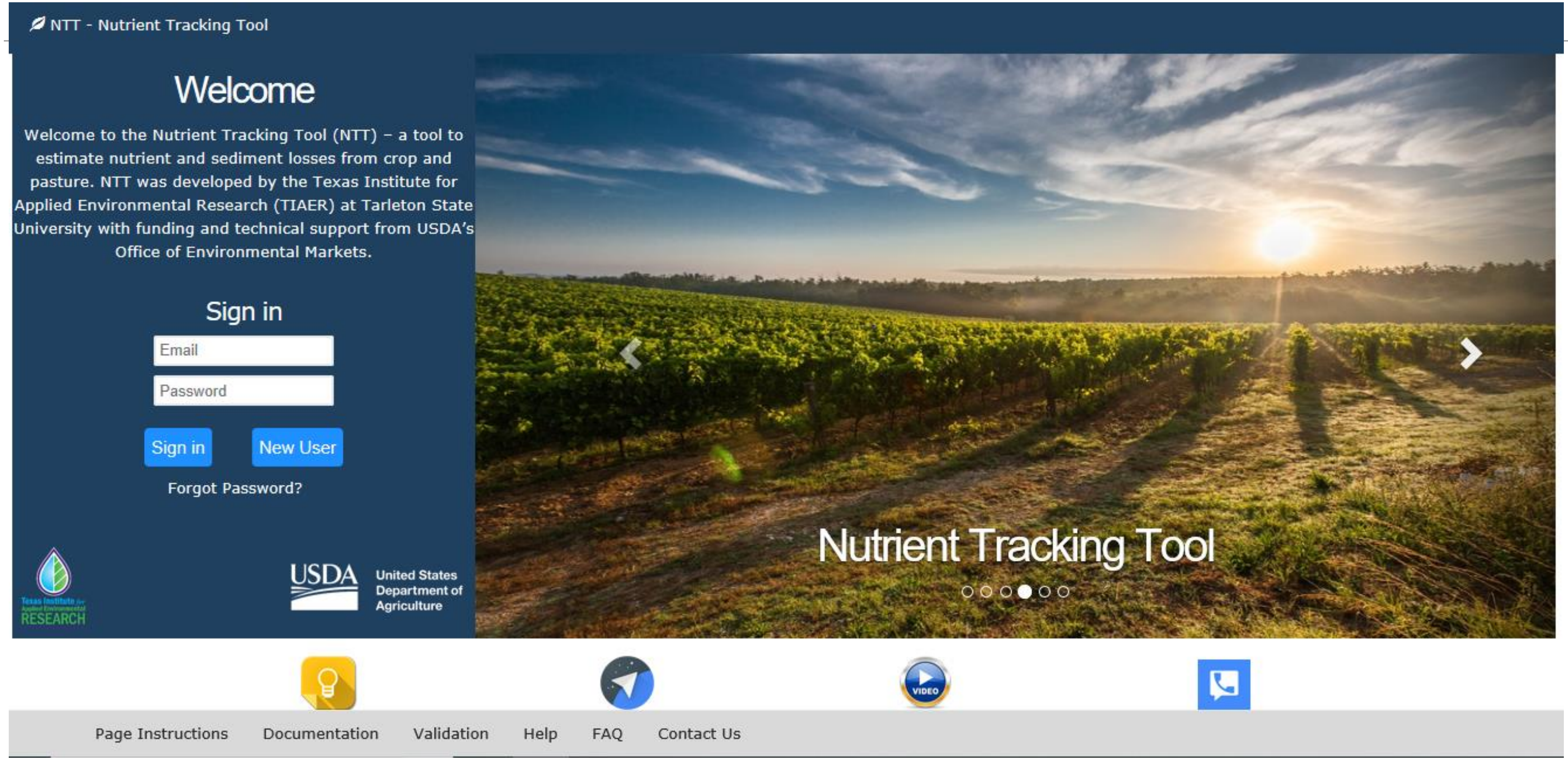
Load Reductions (in lbs, based on 360,000-gallon volume)

- Total Suspended Solids - approximately 1,500 lbs
- Total Dissolved Solids - 319 lbs
- Total Solids - approximately 1,900 lbs
- Total Kjeldahl Nitrogen - 55 lbs
- Nitrate-Nitrogen - 45 lbs
- Total Phosphorus - 1.6 lbs

Cost for One-Time Dairy Lagoon Clean-Out and Land Application- $ 5,000+

(based on "An Economic Analysis of the Dairy Waste Lagoon Clean-out Program in Louisiana", Benedict et. al, 2010 http://www.lsuagcenter.com/portals/communications/publications/agmag/archive/2010/spring/an-economic-analysis-of-the-dairy-waste-lagoon-cleanout-program-in-louisiana)

Nutrient Tracking Tool- USDA



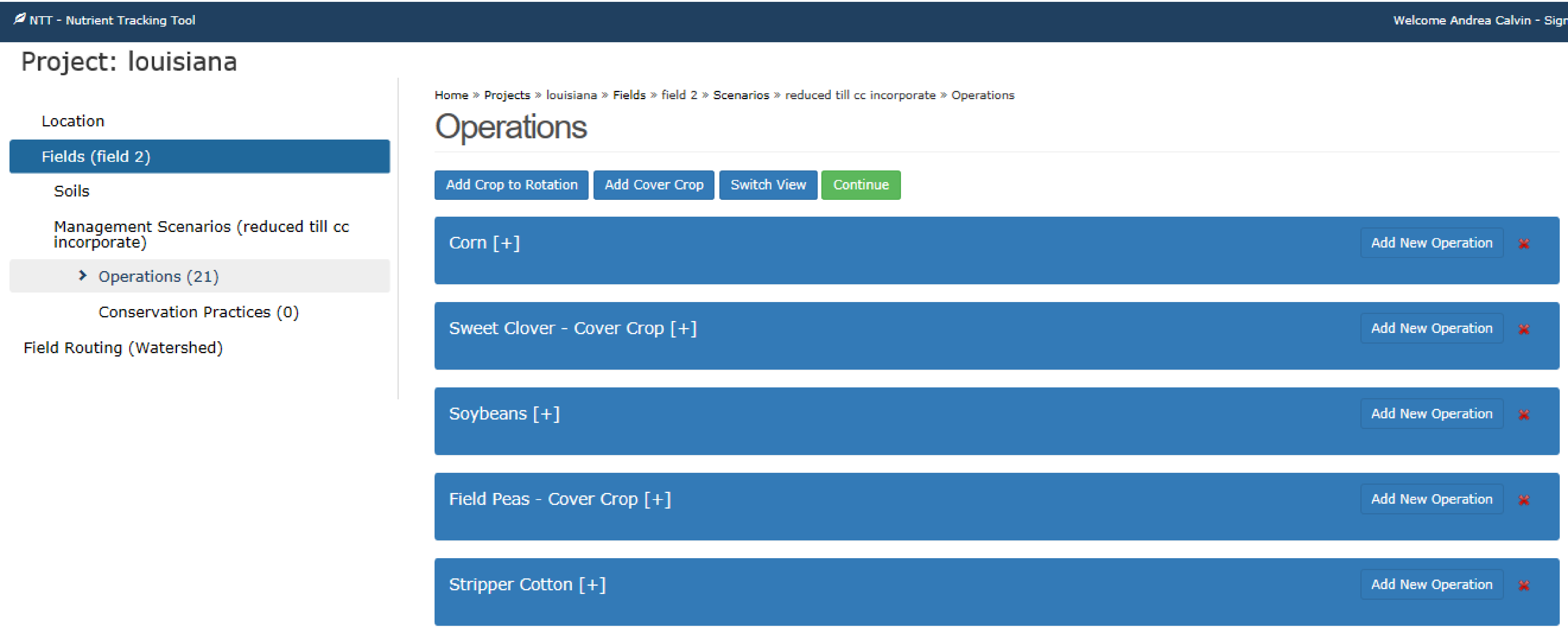
Louisiana In-Field Scenarios (for NTT)

Scenario encountered in LA, as well as the practices recommend (from NRCS):

Corn/Soybean/Cotton rotation. Silt loam soil. 1% slopes. Baseline: Fall and spring tillage and no cover crops. Traditional soil sampling program. Alternatives:

- Remove fall tillage and reduce spring tillage.
- Remove fall tillage, reduce spring tillage, and introduce cover crops 2/3 winters. Do not plant a cover crop between cotton/corn but allow some winter vegetation to grow.
- Remove fall tillage, reduce spring tillage, and introduce cover crops 2/3 winters. Do not plant a cover crop between cotton/corn but allow some winter vegetation to grow. Establish EC Zones and apply nutrients according to soil test levels and prior-year yield monitoring results (N-P-K)
- Complete no-till.
- Complete no-till with cover crops planted all three winters.
- Complete no-till with cover crops planted all three winters. Establish EC Zones and apply nutrients according to soil test levels and prior-year yield monitoring results (N-P-K).

NTT Demonstration Scenario



NTT Demonstration Scenario

Corn [-]

Add New Operation

Planting

Date	Type	Seeding Amount (seeds/sq ft)(optional)	Actions
Year 1, May 5	Regular Planter	0.93	

Add Planting Operation

Fertilizer

Date	Type	Amount Applied	Depth	Actions
Year 1, April 15	Element-N(N)	100.0(lbs/ac)	3.0	
Year 1, April 15	Element-P(P)	60.0(lbs/ac)	3.0	
Year 1, June 15	Element-N(N)	80.0(lbs/ac)	0.0	

Add Fertilizer Operation

Tillage

Date	Type	Actions
Year 1, May 4	Field Cultivator	

Add Tillage Operation

NTT Demonstration Scenario

Results- Scenarios compared to baseline, these results are per acre

Home » Projects » louisiana » Fields » field 2 » Results

Tabular

Select up to 3 scenarios for view

baseline | reduced till | reduced till cc incor | ◉ Unit Area ○ Total Area | View | Download PDF | Download Excel

(±) = Confidence Interval

	baseline	reduced till		reduced till cc incorporate	
Description	Losses(±)	Losses(±)	Change(%)	Losses(±)	Change(%)
Total N (lbs/ac) ☐	21.8 (9.6)	19.4 (8.5)	-2.3 (-10.7)	8.1 (3.8)	-13.7 (-62.8)
Total P (lbs/ac) ☐	4.2 (1.3)	4.0 (1.4)	-0.2 (-5.9)	1.3 (0.6)	-2.9 (-69.4)
Surface/Subsurface/Tile Drain Flow (in) ☐	22.4 (2.6)	21.8 (2.6)	-0.5 (-2.3)	16.6 (2.3)	-5.7 (-25.6)
Total Other Water Info (in) ☐	4.8 (0.9)	5.7 (1.0)	0.8 (16.9)	7.1 (1.0)	2.3 (47.0)
Total Sediment (t/ac) ☐	1.6 (0.7)	1.6 (0.8)	0.0 (2.0)	0.5 (0.3)	-1.1 (-67.0)
Crop Yield ☐					

NTT Demonstration Scenario

Breaks out specific results per parameter, in this case nitrogen

Tabular

Select up to 3 scenarios for view

baseline | reduced till | reduced till cc incoi | ◉ Unit Area ○ Total Area | View | Download PDF | Download Excel

(±) = Confidence Interval

	baseline	reduced till		reduced till cc incorporate	
Description	Losses(±)	Losses(±)	Change(%)	Losses(±)	Change(%)
Total N (lbs/ac) ☑	21.8 (9.6)	19.4 (8.5)	-2.3 (-10.7)	8.1 (3.8)	-13.7 (-62.8)
Org N (lbs/ac)	6.06 (2.6)	7.81 (3.6)	1.75 (28.85)	4.20 (2.7)	-1.86 (-30.76)
Runoff N (lbs/ac)	15.35 (6.9)	11.25 (4.8)	-4.11 (-26.74)	3.37 (1.0)	-11.98 (-78.05)
Subsurface N (lbs/ac)	0.35 (0.1)	0.39 (0.1)	0.04 (10.75)	0.53 (0.1)	0.19 (53.48)
Tile Drain N (lbs/ac)	0.00 (0.0)	0.00 (0.0)	0.00 (NaN)	0.00 (0.0)	0.00 (NaN)
Total P (lbs/ac) ☐	4.2 (1.3)	4.0 (1.4)	-0.2 (-5.9)	1.3 (0.6)	-2.9 (-69.4)
Surface/Subsurface/Tile Drain Flow (in) ☐	22.4 (2.6)	21.8 (2.6)	-0.5 (-2.3)	16.6 (2.3)	-5.7 (-25.6)
Total Other Water Info (in) ☐	4.8 (0.9)	5.7 (1.0)	0.8 (16.9)	7.1 (1.0)	2.3 (47.0)
Total Sediment (t/ac) ☐	1.6 (0.7)	1.6 (0.8)	0.0 (2.0)	0.5 (0.3)	-1.1 (-67.0)

NTT Demonstration Scenario

Parameter may be viewed annually for three scenarios

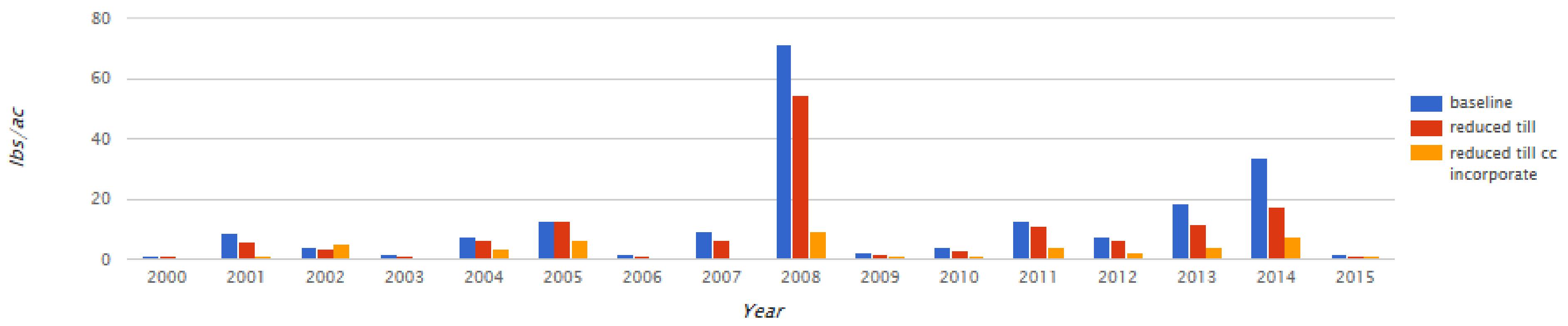
Home » Projects » louisiana » Fields » field 2 » Results

View Annual-Charts

Select up to 3 scenarios for view

Initial Year | Final Year | baseline | reduced till | reduced till cc inco | Nitrogen Losses | Select Type | View

Runoff N



scenario	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
baseline	1.3	8.6	3.8	1.7	7.4	12.9	1.9	9.1	71.5	2.3	3.9	12.9	7.9	18.7	33.9	1.6
reduced till	0.8	5.6	3.4	1.2	6.5	13.0	1.5	6.6	54.9	1.9	3.1	10.7	6.6	11.7	17.4	1.5
reduced till cc incorporate	0.1	1.0	5.2	0.6	3.4	6.3	0.7	0.5	9.2	0.9	1.0	4.5	2.8	3.9	7.7	0.8

NTT Demonstration Scenario

Average by month, over a 35-year period- for Nitrogen Runoff

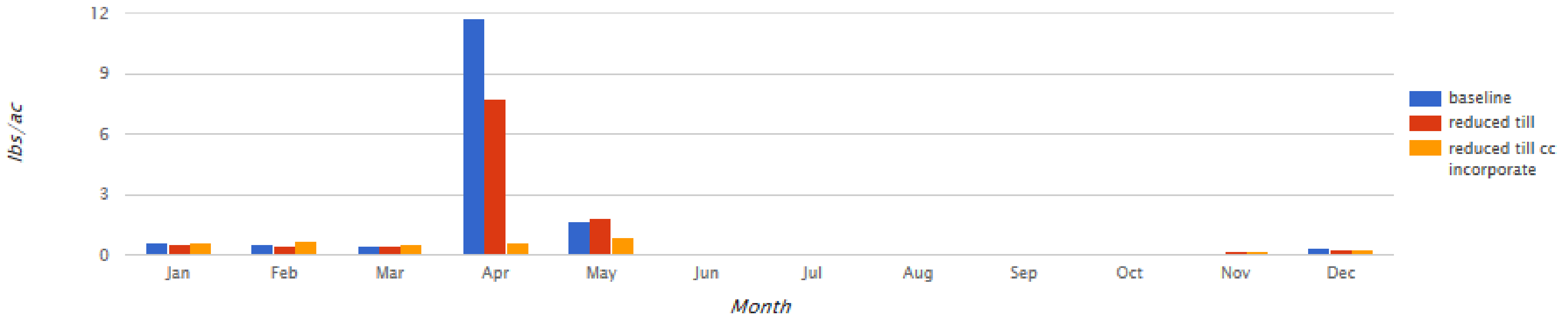
Home » Projects » louisiana » Fields » field 2 » Results

View Monthly-Charts

Select up to 3 scenarios for view

baseline | reduced till | reduced till cc incor | Runoff N | View

Runoff N



scenario	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
baseline	0.6	0.5	0.5	11.7	1.7	0.1	0.0	0.0	0.0	0.1	0.1	0.3
reduced till	0.5	0.5	0.5	7.8	1.8	0.1	0.0	0.0	0.0	0.1	0.1	0.3
reduced till cc incorporate	0.6	0.7	0.5	0.6	0.8	0.1	0.0	0.0	0.1	0.1	0.1	0.3

Nutrient Tracking Tool Next Steps

NTT appears to be the preferred tool of USDA and EPA to track nutrient reductions from conservation practices (as the basis for determining credits).

There is a need to calibrate the NTT for Louisiana specifically. USDA anticipates having this completed by the end of the year.

- Louisiana specific conservation practices need to be incorporated
- Information that Louisiana can provide USDA to fine-tune the model

Additional conversation with USDA is needed to discuss how the results from the NTT translate into credits

Accounting for farms that utilize multiple conservation practices

Verification and validation of conservation practices

Example of Potential Benefit to Farmers

A Water Quality Trading Simulation for Northeast Kansas

Selected Paper prepared for presentation at the American Agricultural Economics Association
Annual Meeting, Providence, Rhode Island, July 24-27, 2005

Farmers could benefit greatly from a water quality trading market as well. Simulation results indicated that a farmer could make over $500/acre on a grass filter strip. Comparing this value with the $14.75/acre average return from 1998-2002 on nonirrigated corn (KFMA Profitcenter Summary 2003), this represents a 33-fold increase in net returns. So, it is plain to see the potential benefits of trading for the farmer.

Conclusions

Louisiana agricultural community effectively utilizes a number of conservation practices specific to our crops produced, soils, and topography

The Nutrient Tracking Tool can provide the mechanism by which to calculate load reductions that will form the basis for credits to be made available.

Water Quality trading could be beneficial to Louisiana farmers

Existing program such as the Louisiana Master Farmer Program would be a good mechanism for early engagement of Louisiana farmers in the trading concept

Concerns include the drivers for trading in Louisiana- Market? Environment? Economic?

Next steps include further engaging with USDA to fine-tune the NTT for Louisiana and gauging farmers' interest in participating in a trading program.