

LEVERAGING LARGE SCALE WATERSHED MODELS FOR USE IN SMALLER SCALE PROJECT LEVEL ANALYSIS

State of the Coast 2025

By: Justin West P.E., CFM, Afaq Ahmad Durrani E.I., CFM, MSc, Tanveer Ahmed MSc

Michael Baker
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We Make a Difference



What's the Big Deal?

Imagine after months of hard work and commitment on a project it was never used again.

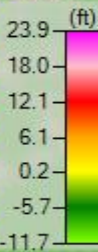
- **Many** projects fail to deliver their intended outcome.
 - Time
 - Money
- Project features are rarely or never used again.
 - Too complex for another professional.
 - Doesn't meet the exact needs of future projects.
 - Professionals have not heard of the feature.
- **Millions** of dollars have been spent on largescale watershed modeling by national and state governments.
 - Mississippi River Model
 - Coastal Slam Model
 - Louisiana Watershed Initiatives HUC8 sized models
- Using These Models Can Save Valuable **Time** and **Money**.



Why Does This Matter?

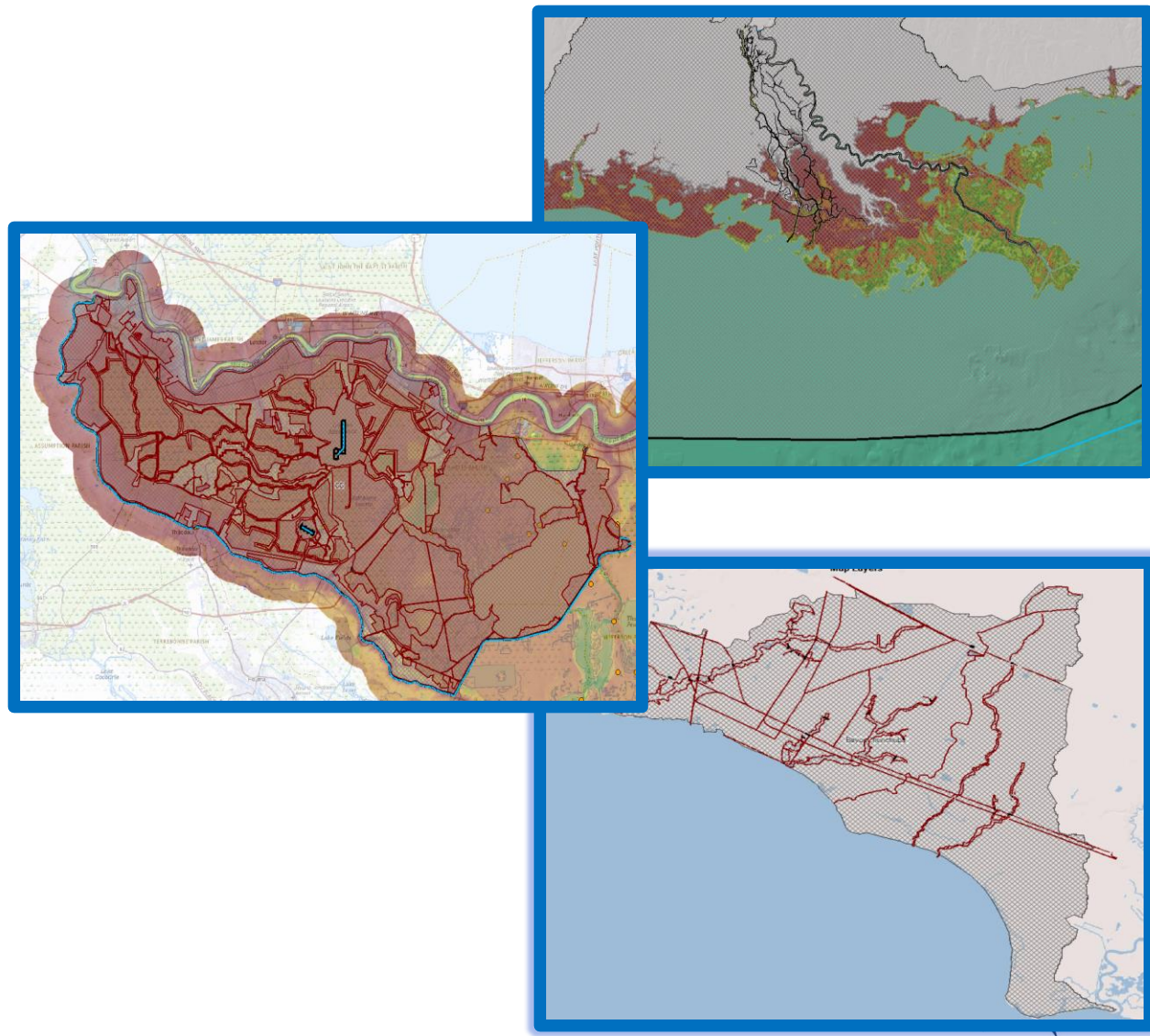
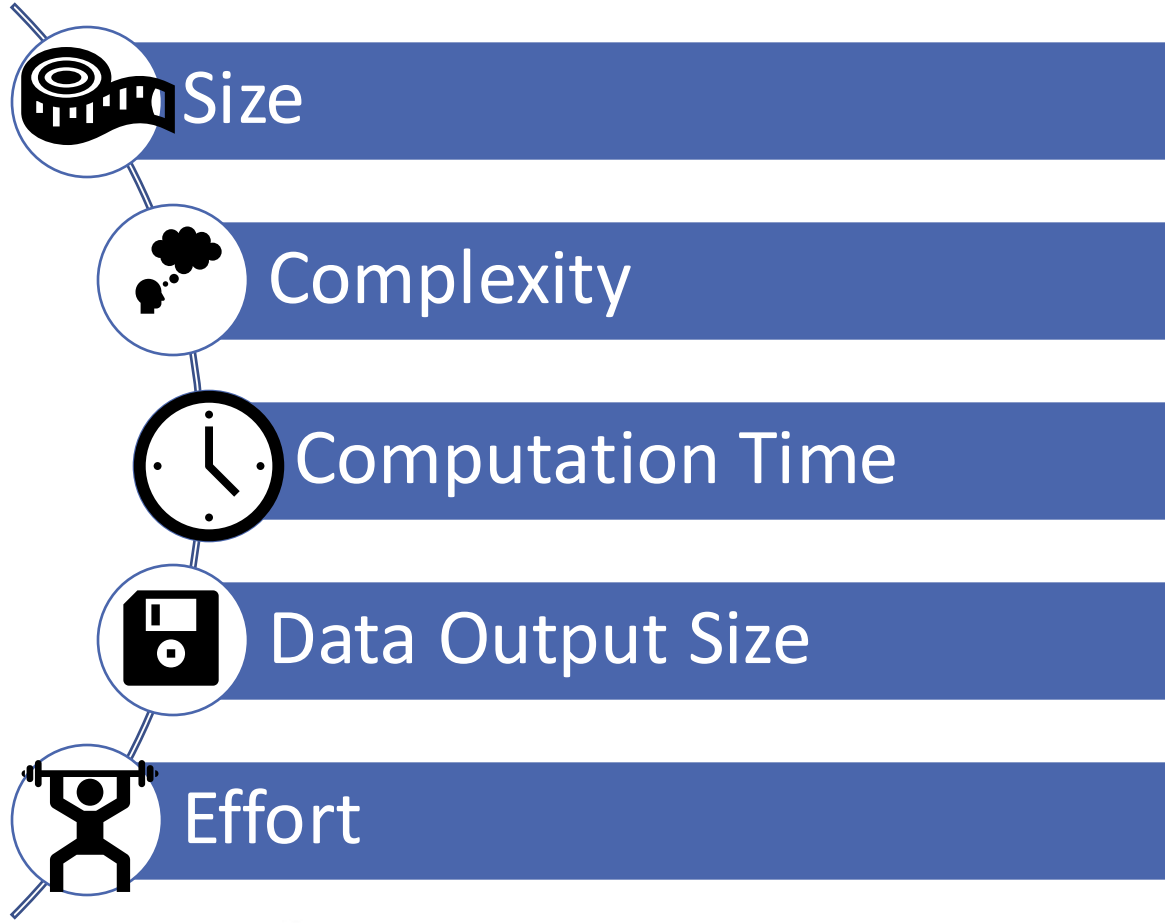
With the increasing computational capabilities of hydraulic modeling programs, largescale watershed modeling has become more and more popular.

- You have an established starting point.
- You have an already calibrated model to refer to.
- Established models already have survey and structures.
- Inflows and outflows are already provided.
- It saves the client time, and It saves money!



What's The Difference?

Pro's and Con's Of a Large Model vs. a Small Model





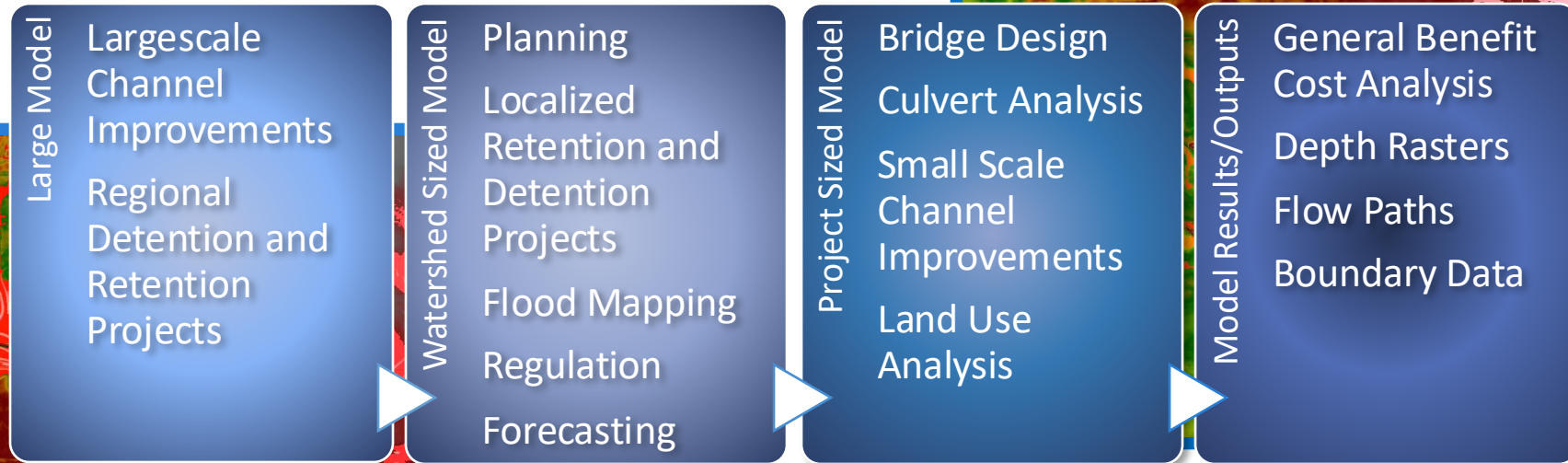
Small Watershed Sized Model



Large Coastal Model



Magnitude Matters?



St. Tammany Comprehensive Drainage Plan

- Hydraulic Models Spanning the whole Parish
- Ease of use for future Professionals
- Multi Use Models
- Run Times are Manageable
- Models can be used to establish the Community Improvement Plan

Little Bogue Falaya Detention

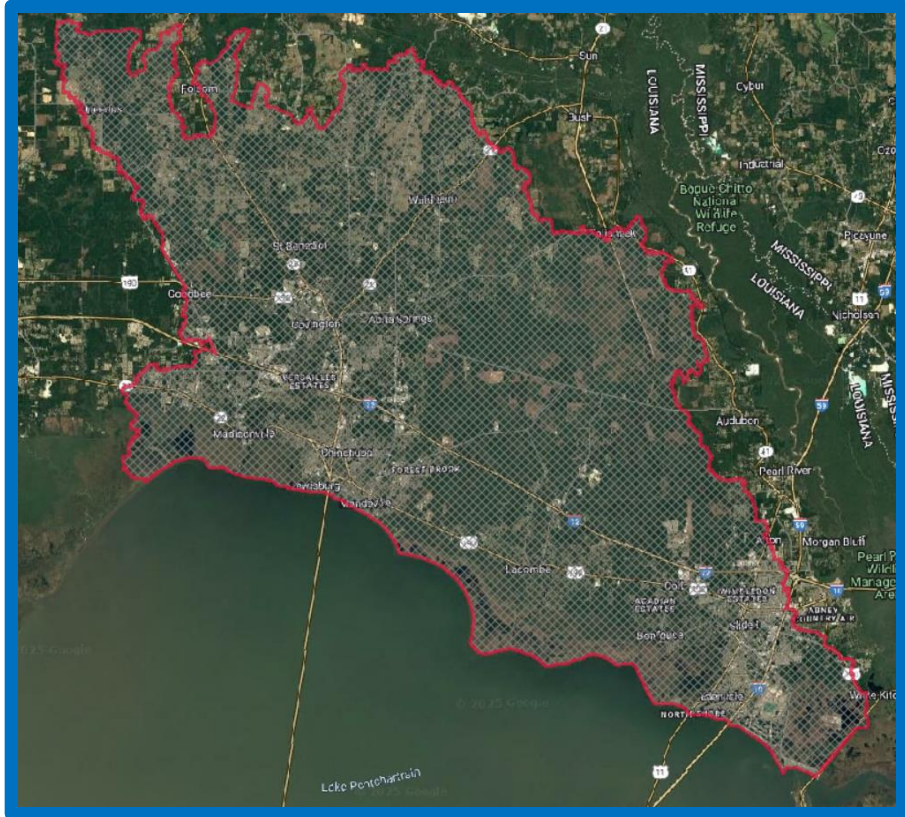
- Small Scale Local Project
- Multiple alternatives were requested
- Benefit Cost Analysis based off alternative results
- Design Based Model

• Questions

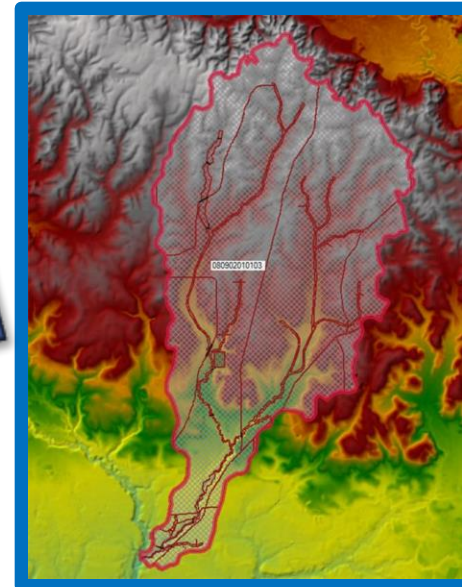
- What Type of Model?
- How Large?
- Data Gap?
- What is the product?



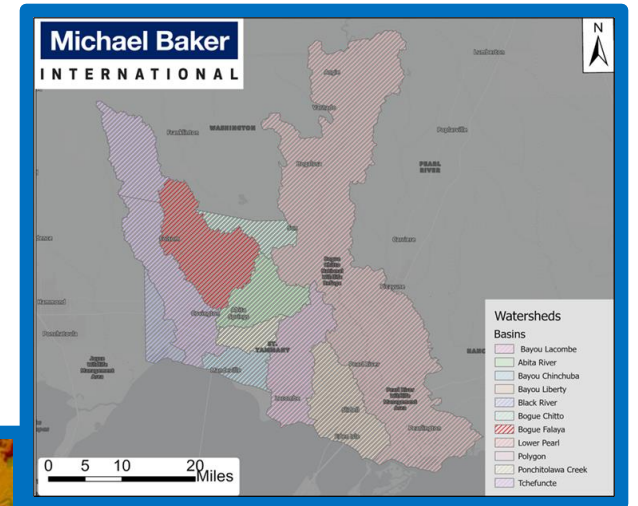
Example Project Boundaries



HUC8 Tchefuncte Model



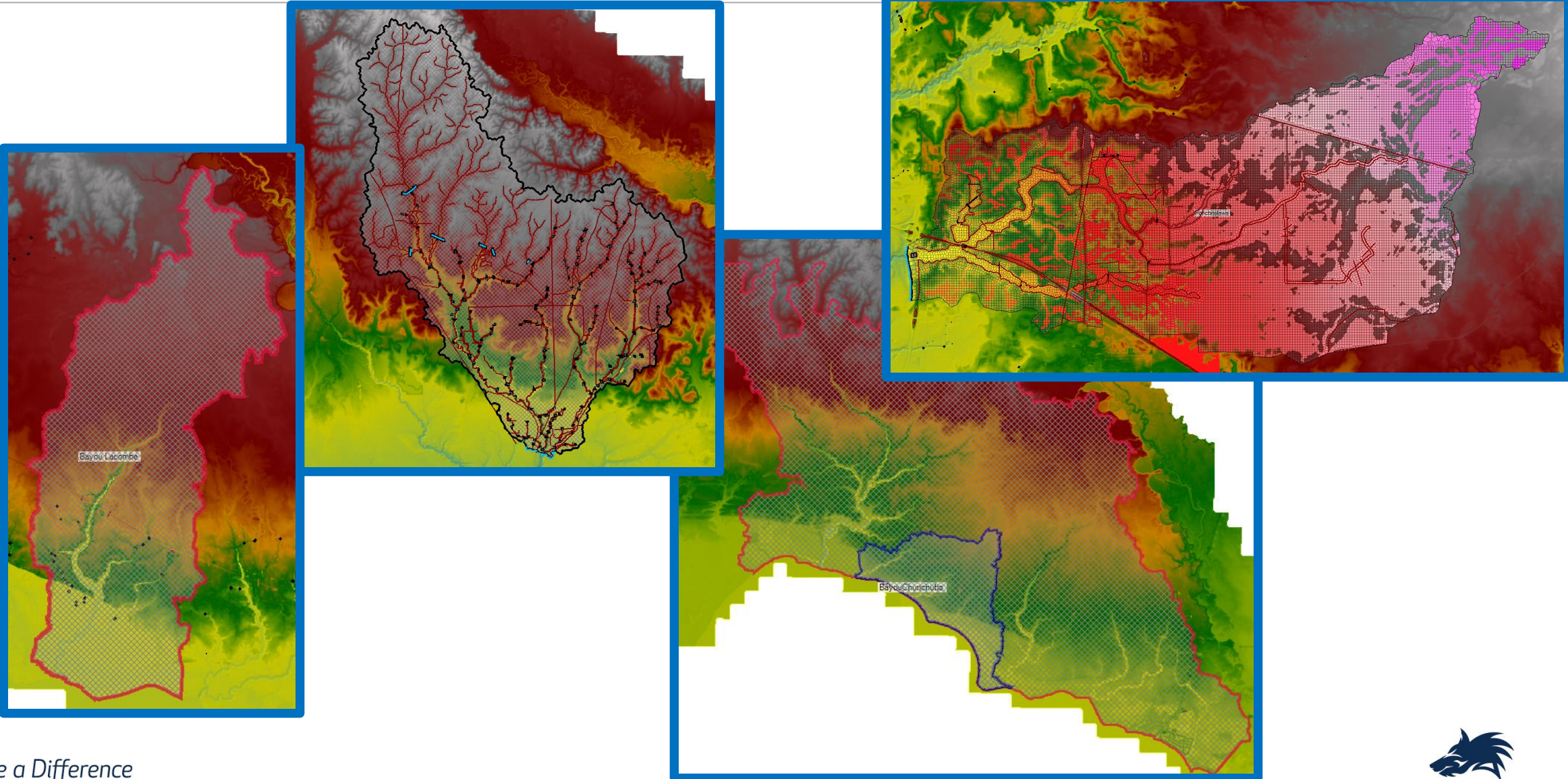
Project Level Model



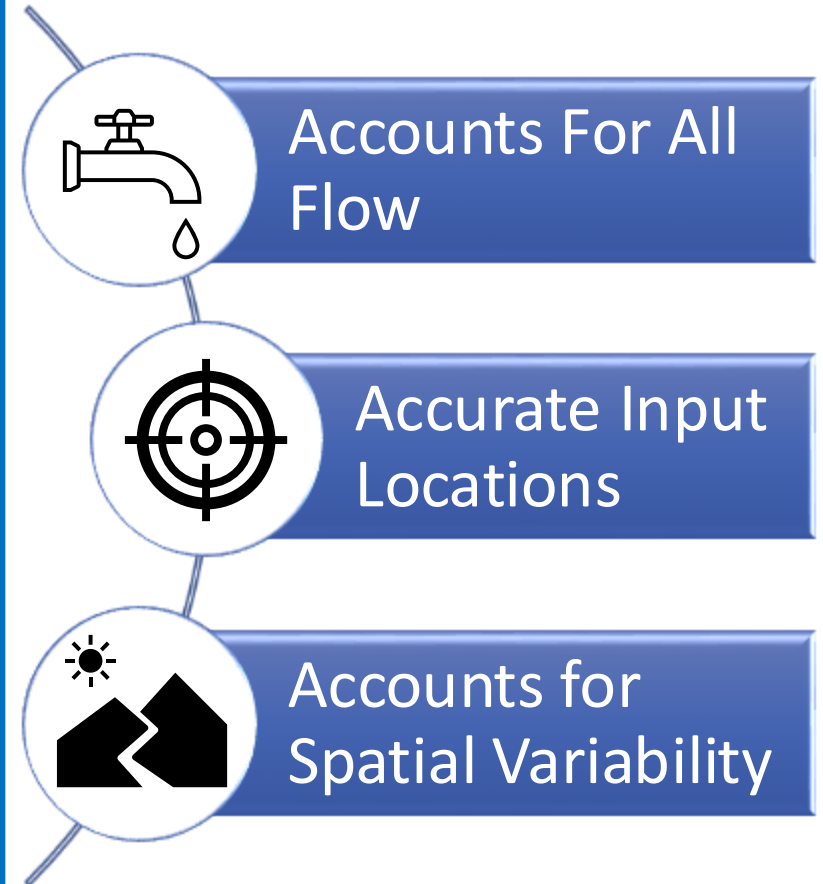
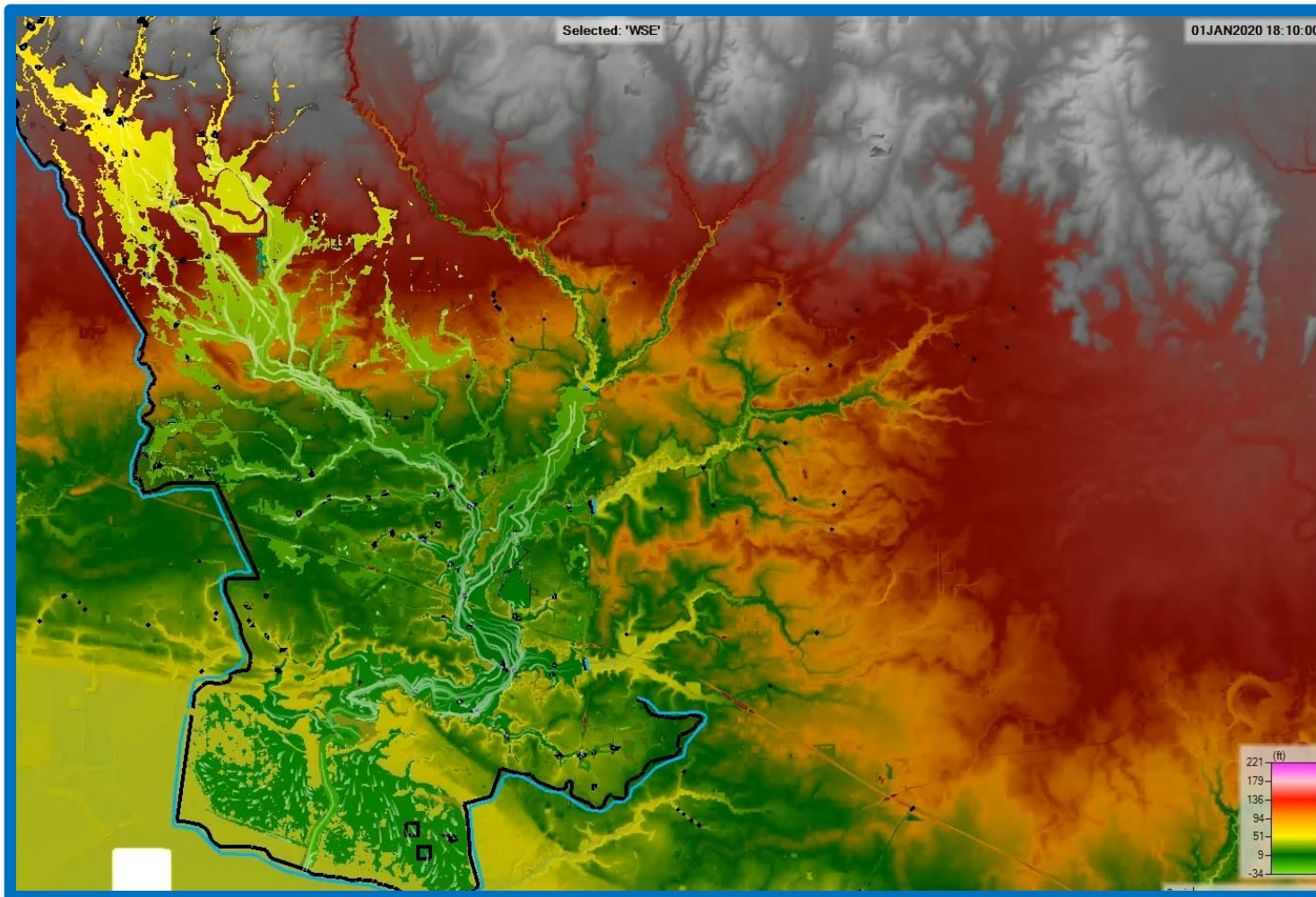
Multiple HUC12 Watershed Models



Challenges and Tips



Boundaries



Statistical Analysis Based on the August 2016 Event

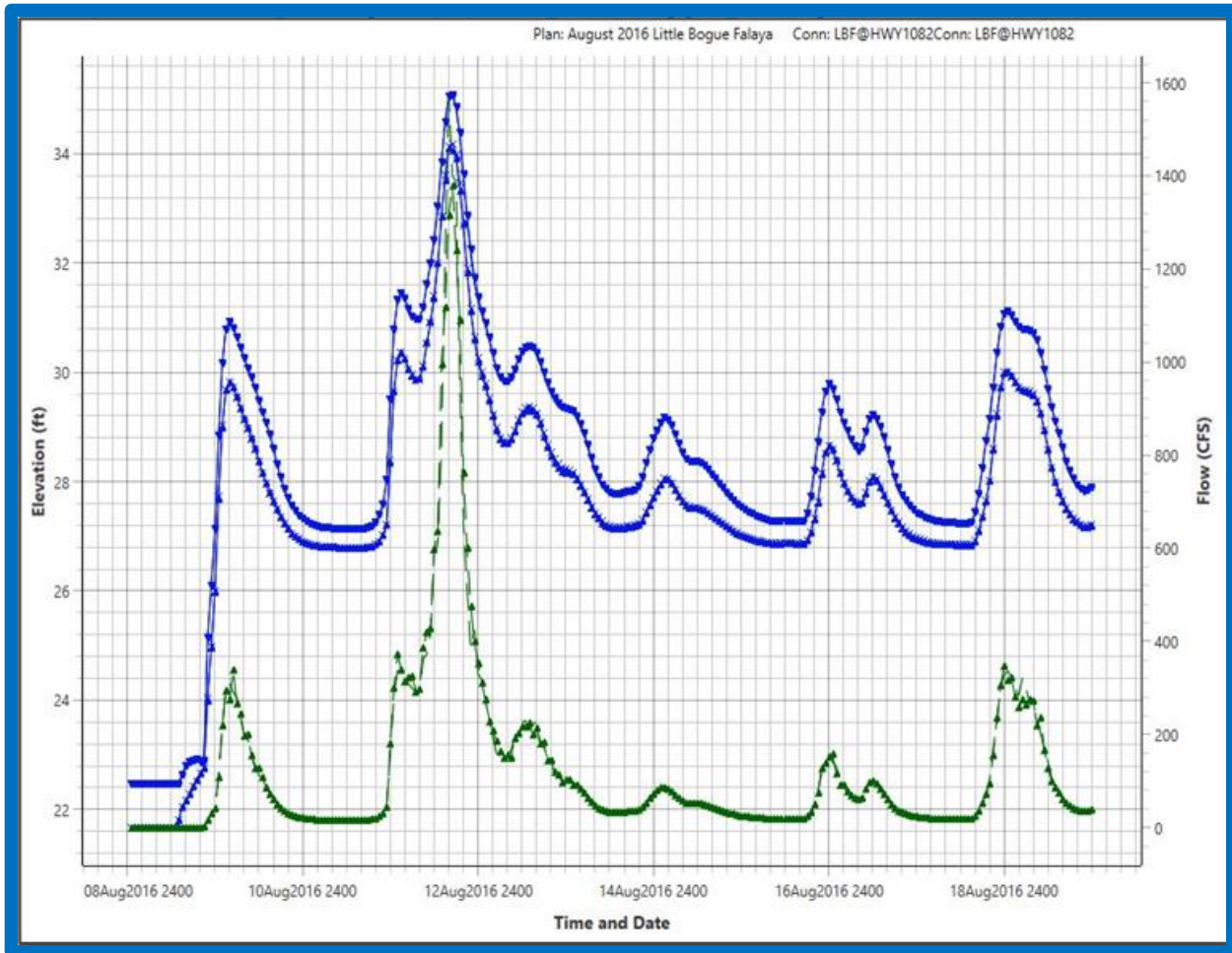
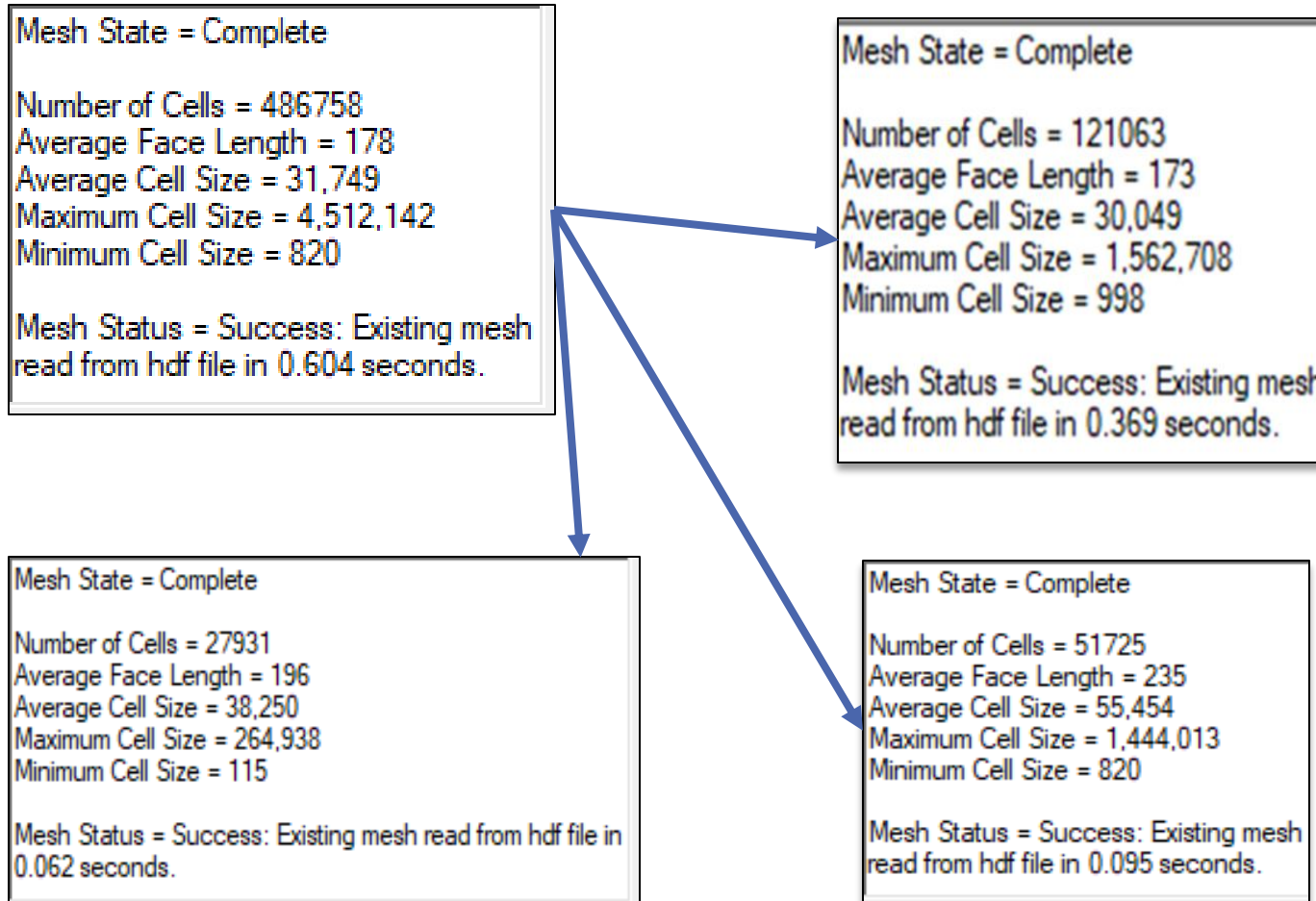


Table 2-2. Calibration Statistics for August 2016 Storm

Structure	Location	RMSE Head Water	RMSE Tail Water
1	BF@BenKing	0.00	0.00
2	BF@FairHaven	0.0012	0.00
3	BF@HWY40(1)	0.005	0.00
4	BF@Woodland	0.018	0.0061
5	LBF@HWY1081	0.089	0.014
6	LBF@HWY1082	0.026	0.024
7	LBF@Johnsen	0.051	0.05
8	LBF@SmithRd	0.053	0.049
9	LBFT@LA21	0.006	0.001



Size Difference



	Break Lines	Cells	Percent Decrease Cells	Percent Decrease Breaklines
Existing	1393	486700	0%	0%
Bayou Lacombe	222	51000	84%	90%
Tchfuncta	349	121000	75%	75%
Bogue Falaya	297	101000	79%	79%
Bayou Chinchuba	137	29337	90%	94%
Bayou Liberty	321	159185	77%	67%
Abita River	174	55871	88%	89%



How Do Run Times Change?

Run Time Examples (Min)			
	25-Year	50-Year	100-Year
Abita River	42	43	41
Bayou Liberty	98	92	92
Bayou Chinchuba	31	34	42
Tchfuncta	88	82	90
Ponchitolawa	14	15	15

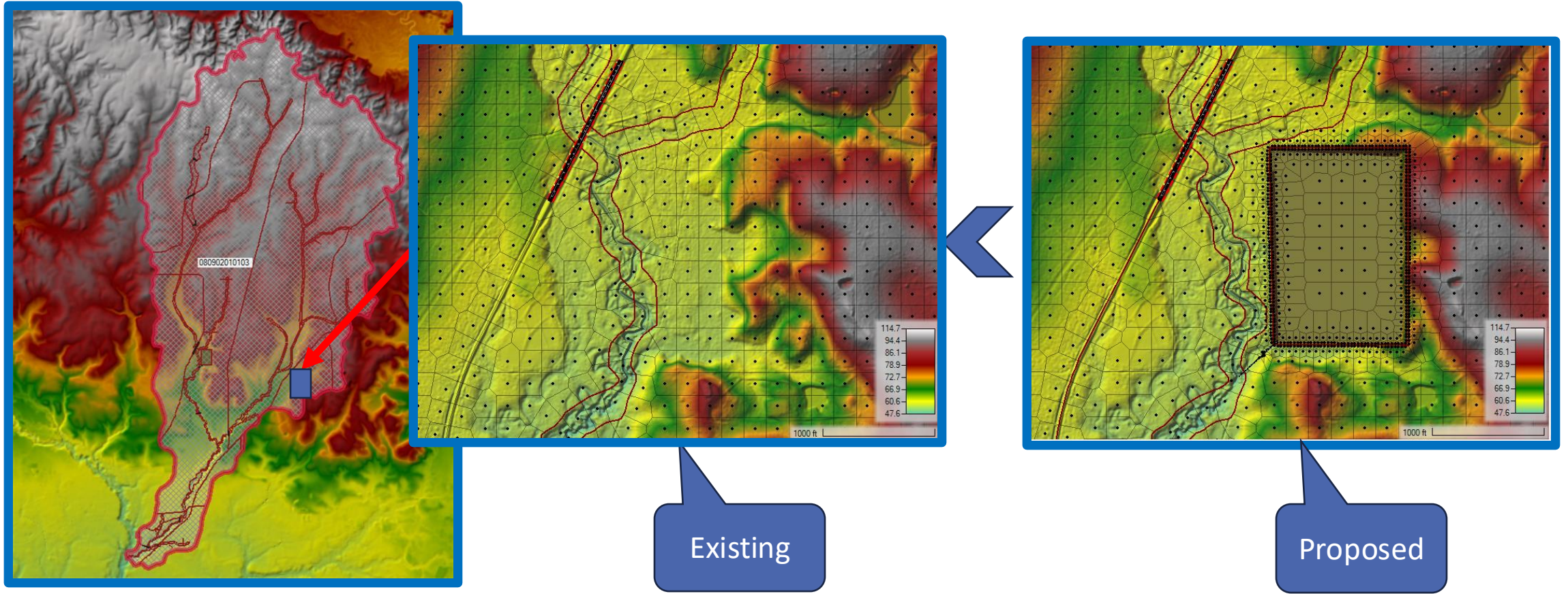
Computation Task	Time(hh:mm:ss)	Time(hh:mm:ss)	Time(hh:mm:ss)
Completing Geometry, Flow and Plan	29:38	23:36	24:40
Preprocessing Geometry	3	1	59:42
Unsteady Flow Computations	57:21:37	81:54:42	48:06:39
Completions	57:51:21	82:18:24	49:31:03



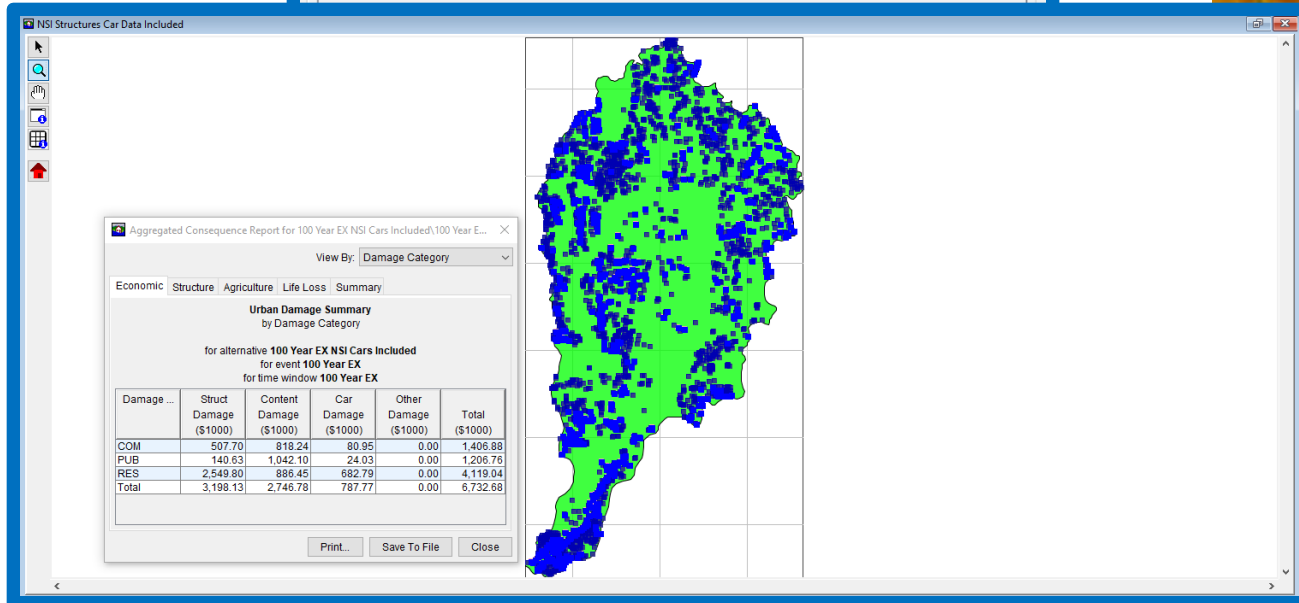
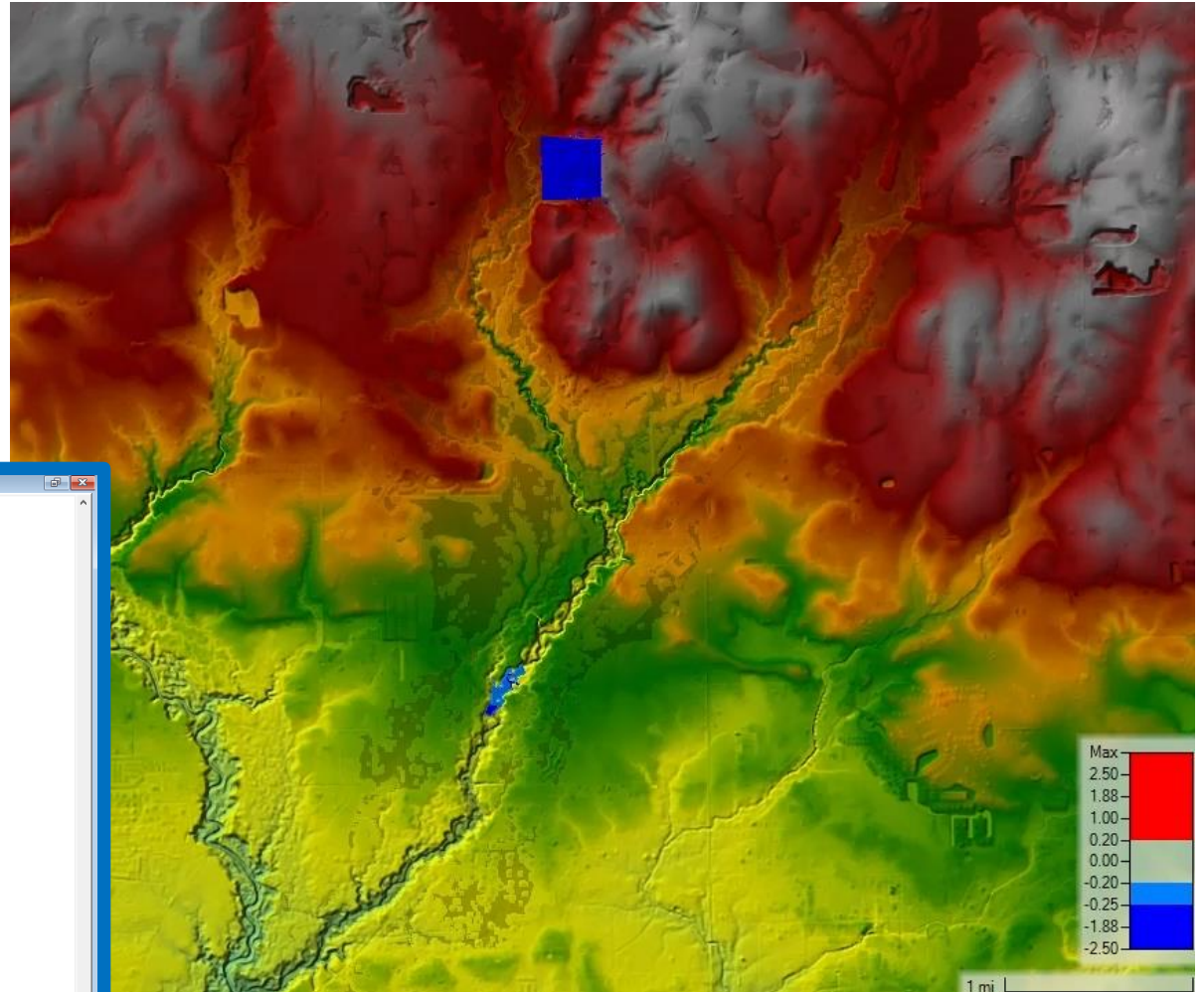
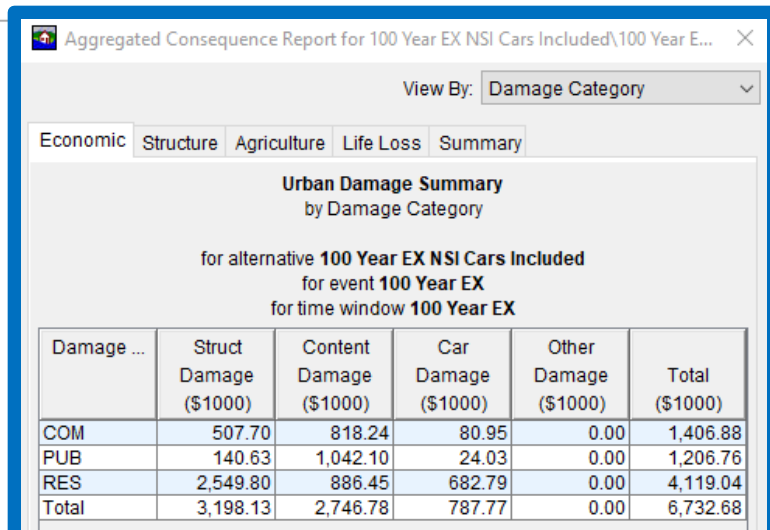
Computation Task	Time(hh:mm:ss)	Time(hh:mm:ss)	Time(hh:mm:ss)
Completing Geometry, Flow and Plan	2:31	2	2
Preprocessing Geometry	1	<1	<1
Unsteady Flow Computations	31:42	14:11	30:33
Completions	34:17	14:14	30:35



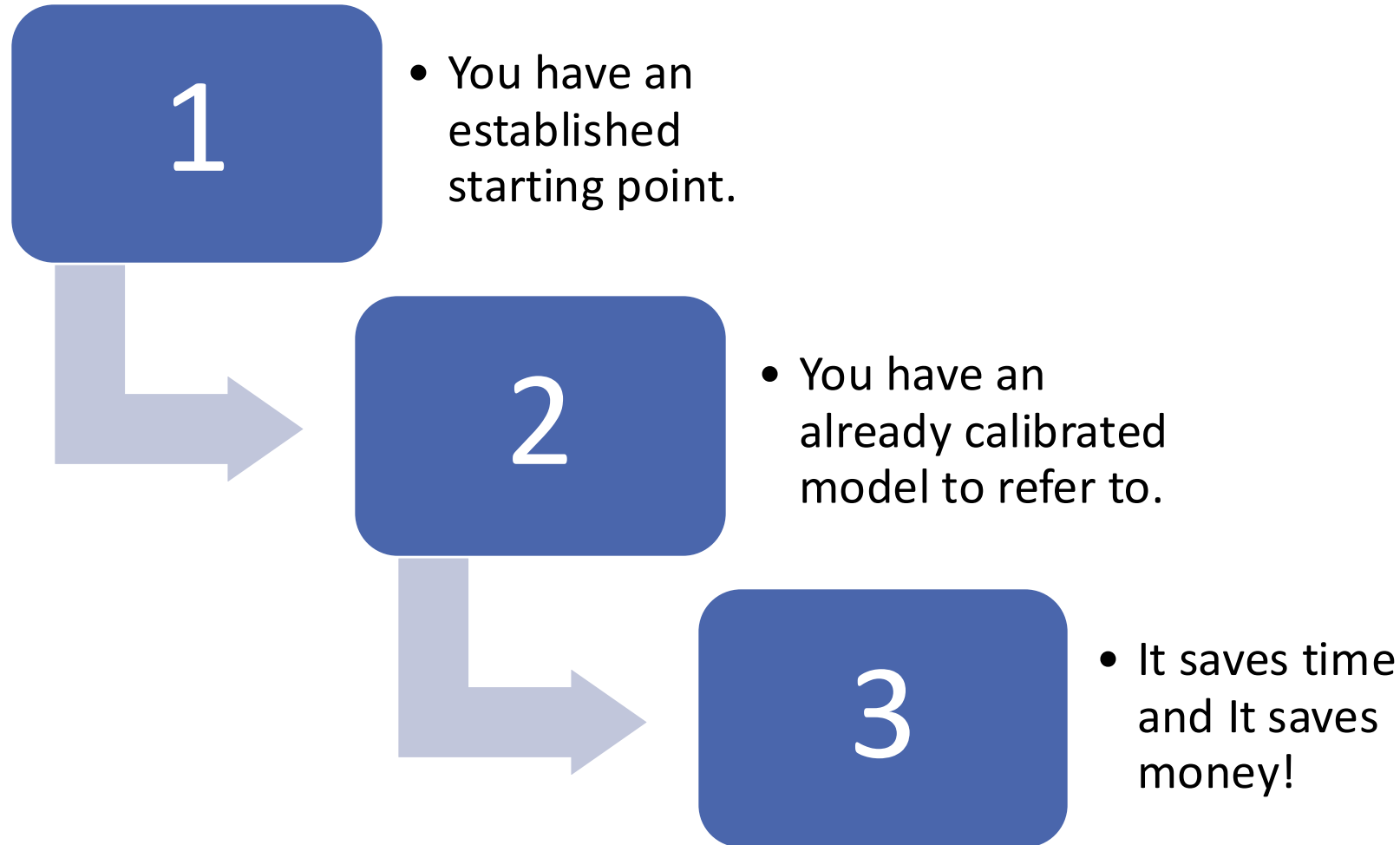
Making Changes for Proposed Models



How Can we Use the Results



Conclusion: Easy as 1,2,3



Thank You To:

St. Tammany Parish Government

La DOTD

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