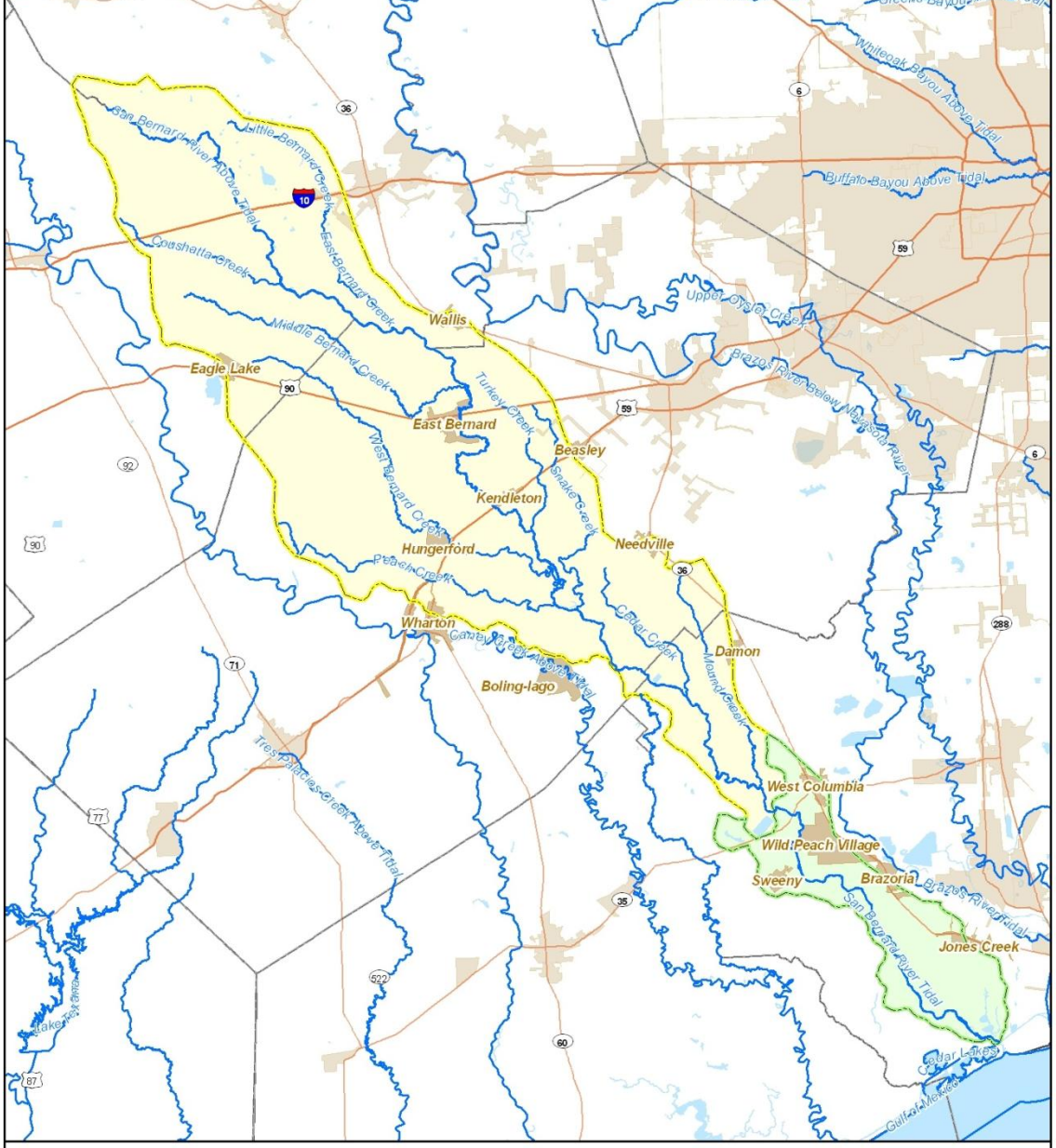
Tina Petersen, Ph.D., P.E.

San Bernard River

Watershed Protection Plan Water Quality Modeling

June 16, 2011

CDM



Legend

- Major Stream
- San Bernard River Watershed - Above Tidal
- San Bernard River Watershed - Tidal
- Urban Area

0 5 10 Miles

1 in = 10 miles

Data Sources: HGAC, TCOON, TNRIS (Strat Map)

Figure 3-1
San Bernard River Watershed Overview

May 2011

CDM

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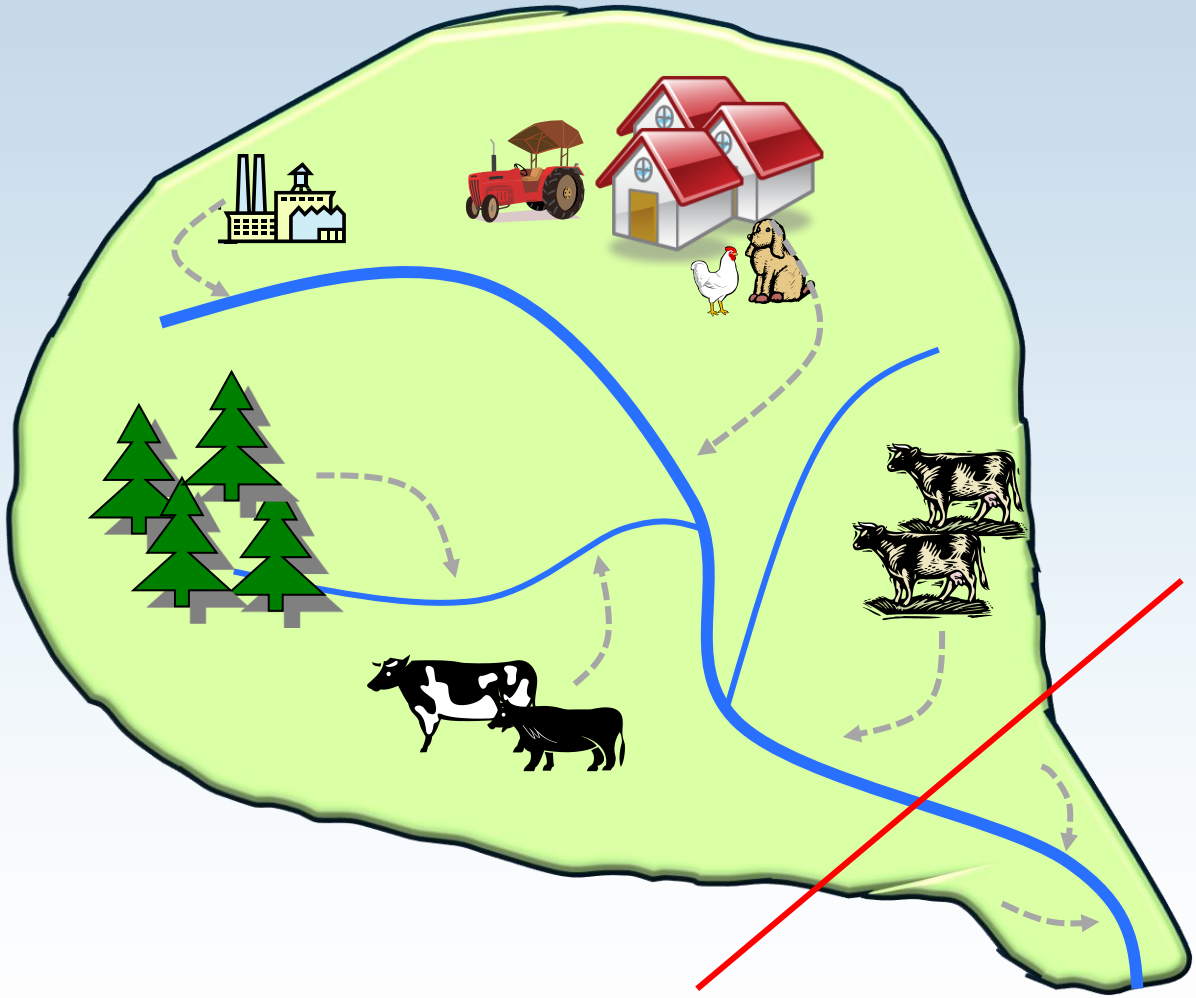
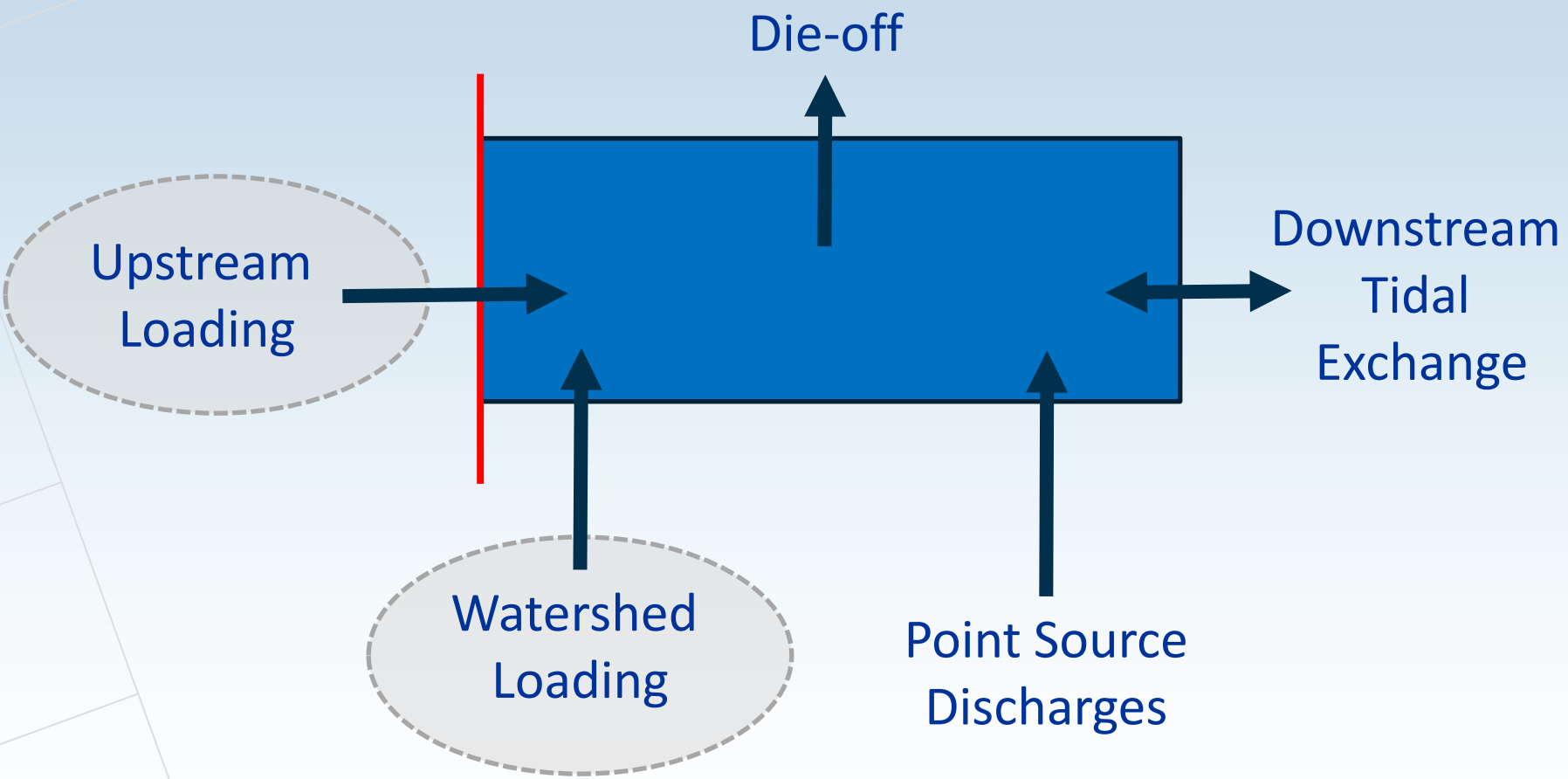
Modeling Approach – Watershed Model



Modeling Approach – Receiving Water Model



MODEL SELECTION

Watershed Models

- HSPF
- SWAT
- SWMM
- WAMView
- WARMF

Receiving Water Models

- EPD-RIV1
- Tidal Prism
- WASP
- EFDC

Model Screening Criteria

- Simulation of bacteria as a water quality parameter
- Application to tidal flow patterns
- Model source code availability
- Model Cost
- Demonstrable Bacteria Applications
- BMP Capabilities

Model Screening and Evaluation

Model	Model Type	Screening Criteria							Score	Rank
		Bacteria as WQ Parameter[1]	Tidal Simu-lation[1]	Source Code Availability[1]	Cost[2]	Bacteria Appli-cations[1]	BMP Evaluation Capabilities[1]	Other Factors[3]		
HSPF	Watershed	HIGH	N/A	HIGH	HIGH	HIGH	MED	-	19	2
SWAT	Watershed	HIGH	N/A	HIGH	HIGH	HIGH	HIGH	-	21	1
SWMM	Watershed	HIGH	N/A	HIGH	HIGH	HIGH	MED	-	19	2
WAM View	Watershed	HIGH	N/A	LOW	MED	LOW	LOW	-	11	5
WARMF	Watershed	HIGH	N/A	LOW	MED	LOW	HIGH	-	15	4
EPD Riv-1	Receiving Water	HIGH	HIGH	LOW	HIGH	MED	N/A	(a)	12	3
Tidal Prism	Receiving Water	HIGH	HIGH	HIGH[4]	MED	HIGH	N/A	-	18	1
WASP/ DYNHYD	Receiving Water	HIGH	HIGH	HIGH	HIGH	HIGH	N/A	(b)	16	2
EFDC	Receiving Water	HIGH	HIGH	HIGH	HIGH	HIGH	N/A	-	16	2

Notes: Highlighted cells indicate models selected application in the San Bernard River Watershed

[1] Scores assigned as HIGH = 5 points; MED = 3 points; LOW = 1 point; [2] Scores assigned as HIGH = 1 point; MED = 3 points; LOW = 5 point

[3] Other factors regarding the models are as follows: (a) EPD-RIV1 has a serious limitation because dry streams cannot be simulated; (b) Use of WASP for water quality would still require development of a hydrodynamic model to simulate tidal flushing

[4] No software available will be programmed for San Bernard specifically. Source code and/or programming will be made available for future reference. Therefore, this criterion ranked HIGH.

SWAT Model

- Soil and Water Assessment Tool (SWAT)
- Developed by Texas A&M and focuses on runoff and loadings from rural and agriculture-dominated watersheds
- Continuous model that simulates the effects of land management practices on water, sediment and agricultural chemical yields for large-scale complex watersheds or river basins
- ArcView interface capabilities
- Extensive BMP evaluation module that simulates several very specific applications relevant to rural watersheds

Tidal Prism Model

- One-dimensional receiving water models
- Utilize the concept of “tidal flushing” to simulate the physical transport of pollutants in a tidal basin over time
- Perform simulations on a tidal cycle time scale

NEXT STEPS

San Bernard River Modeling Tasks

- QAPP Review & Approval
- Model Development (SWAT & Tidal Prism)
- Evaluation of Bacteria Conditions
- Stakeholder Support

QUESTIONS

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