

# Florida Statewide Intermodal Truck Freight Model

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*presented to*

*NATMEC Conference*

*presented by*

Cambridge Systematics  
for the Florida DOT Systems Planning Office

*May 13, 2002*

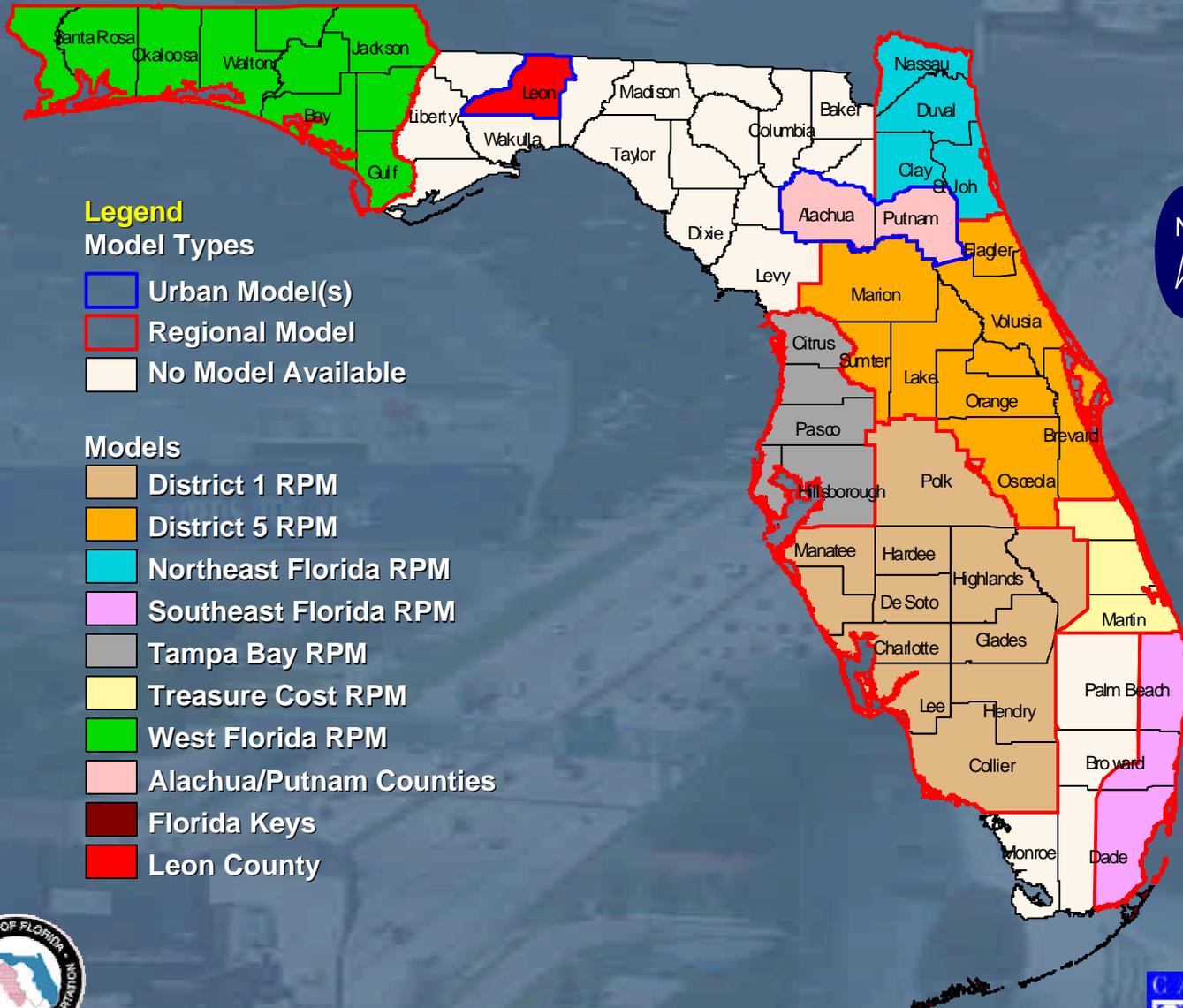


# Freight Model Status Background

- Coordinated with other studies
  - Updated statewide model
  - Urban freight model
  - Various local intermodal studies (water port, airports, rail)
  
- Uses for the model
  - Decision support system
  - Rail subsidies
  - Intermodal facility planning
  - Economic impacts
  - Regional and urban models



# Existing Regional and Urban Models



## Legend

### Model Types

- Urban Model(s)
- Regional Model
- No Model Available

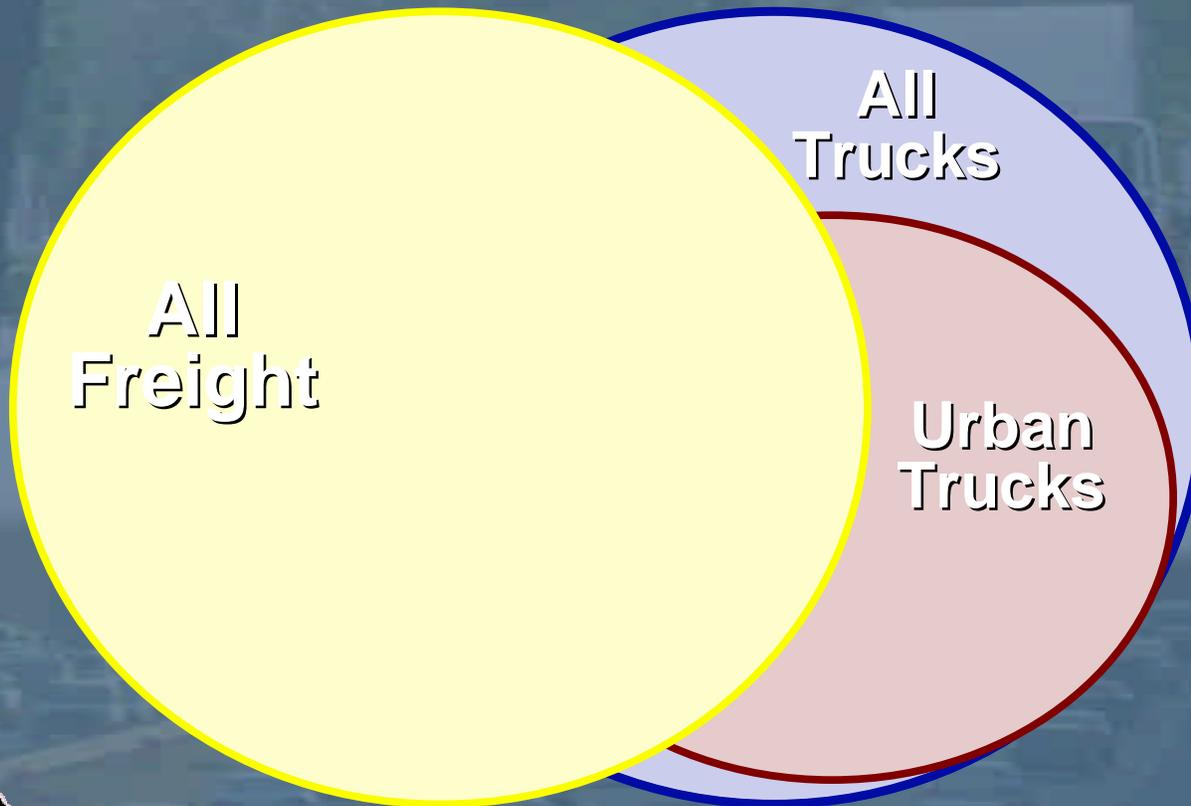
### Models

- District 1 RPM
- District 5 RPM
- Northeast Florida RPM
- Southeast Florida RPM
- Tampa Bay RPM
- Treasure Cost RPM
- West Florida RPM
- Alachua/Putnam Counties
- Florida Keys
- Leon County

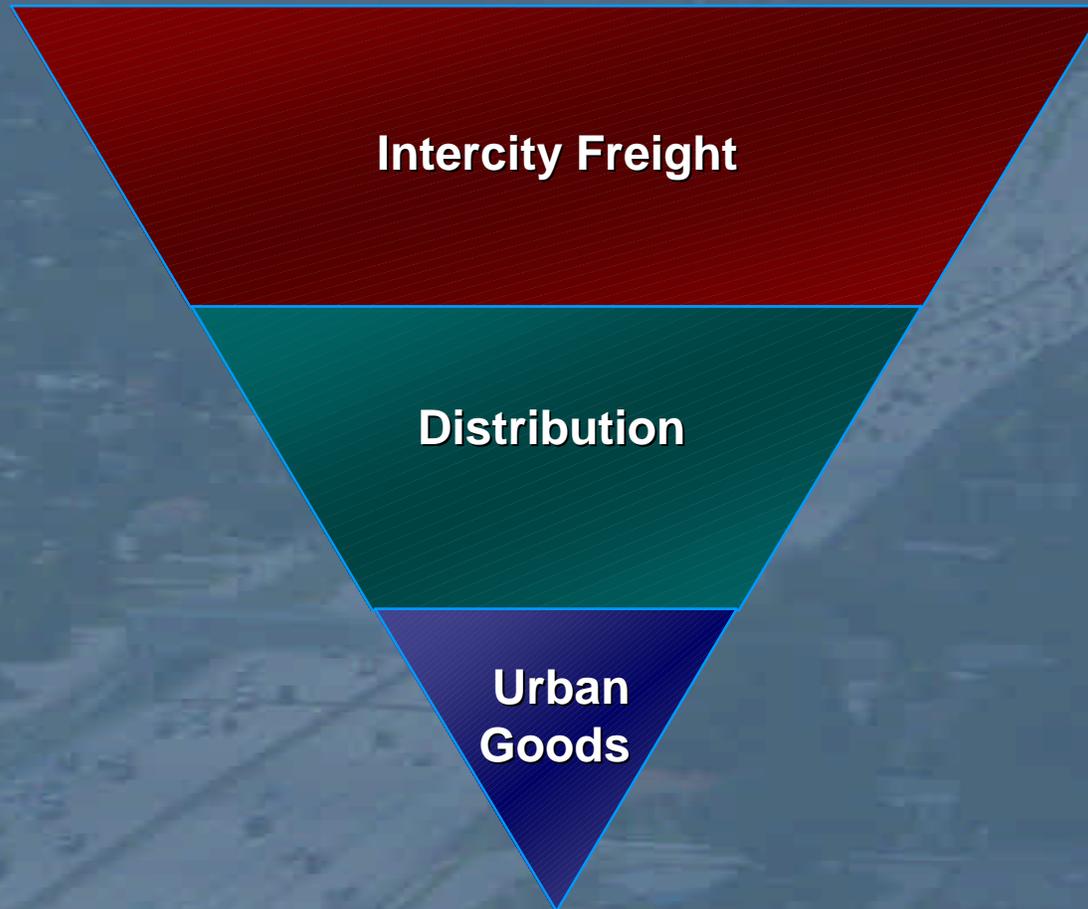


# Freight Model Status

## All Freight Versus Freight Trucks Versus Urban Trucks



# Role of Statewide Intercity Freight Forecasting



# Freight Model Summary

- Long haul freight focus
- Commodity based
- Traditional modeling process
- Existing model socioeconomic data and network



# Freight Model Summary

## Expected Outcomes

- Model's truck traffic should match intercity interstate counts
- Should match observed travel patterns
- Should represent a significant portion of truck travel



# Freight Model Status

- Model design
- Implementation in Florida's Urban Transportation Model Structure (FSUTMS)
- Model validation



# Model Specification

## Data Structure

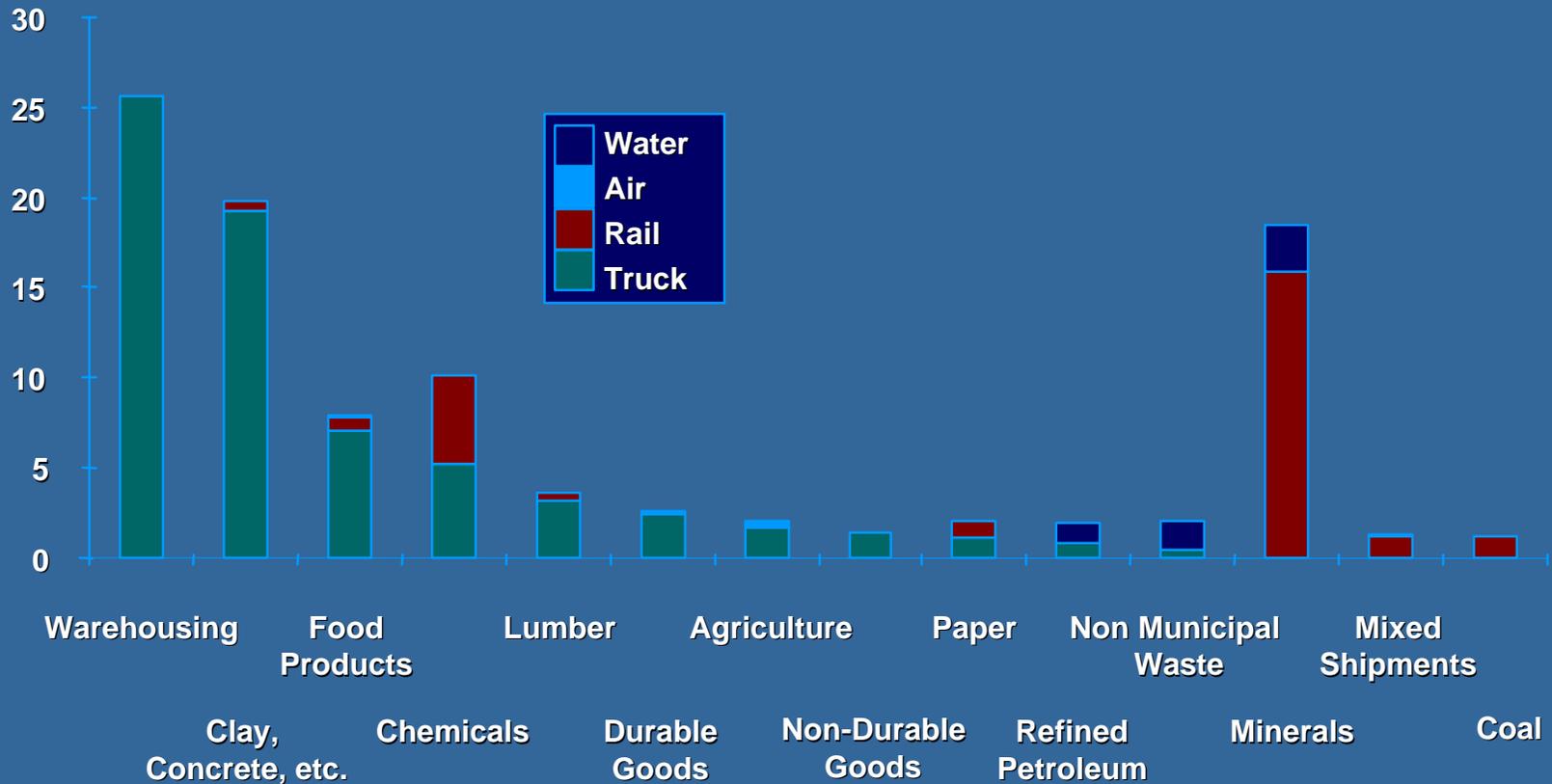
- Commodity groups
- Zone structure
- Highway network
- Employment and population data
- Terminals



# Model Specification

## Commodity Groups

Percent Annual Tonnage



# Model Specification

## Zone Structure

- 508 Florida zones – aggregations of regional zones
- 34 external freight zones
- 16 special freight terminal zones



# Model Specification

## Trip Generation – Production Equations

Name	Production Equation
Agricultural	45.96 * Farm Employment
Coal	No production employment
Minerals	6977.77 * Mining Employment
Food	245.46 * Food Processing Employment
Non-Durable Manufacturing	18.02 * Other Non Durable Employment
Lumber	245.46 * Lumber Employment
Chemicals	678.58 * Chemical Employment
Paper	190.81 * Paper Employment
Petroleum Products	795.12 * Petroleum Employment
Other Durable Manufacturing	23.58 * Other Durable Employment
Clay, Concrete, Etc.	1498.50 * Concrete and Stone Employment
Waste	0.50 * Total Employment
Mixed Freight	0.60 * Misc. Freight Transp. Employment
Warehousing	157.43 * Warehousing Employment



# Model Specification

## Trip Distribution

- Use standard trip distribution program (Gravity Model)
- Friction factors from deterrence function,  $F = e^{-ut}$ ,
- The coefficients,  $u$ , of the deterrence function were estimated for each commodity group to match the trip lengths from the Reebie database



# Model Specification

## Trip Length Frequency Distribution – Food



# Model Specification

## Mode Split

- Existing percentages used by each modes as a starting point
- Modifies the percentage based on change in a modes time and cost
- Average existing percentage by trucks is 95 percent



# Model Specification

## Tons Per Truck

Commodity Group	<50 miles	50-100 miles	100-200 miles	200-500 miles	500+ miles
Agricultural	13.6	16.0	18.9	22.3	26.3
Minerals	19.4	20.9	22.6	24.5	26.5
Coal	19.4	20.9	22.6	24.5	26.5
Food Products	12.2	14.9	18.3	22.4	27.4
Non-Durable Manufactured	3.9	5.8	8.5	12.5	18.4
Lumber	10.8	14.1	18.5	21.1	31.6
Paper	15.5	18.0	20.9	24.2	28.0
Chemicals	10.9	13.3	16.2	19.6	23.9
Petroleum	24.6	25.0	25.4	25.8	26.2
Durable Manufactured	6.3	8.9	12.6	17.8	25.1
Concrete, Clay, Glass, Stone	19.6	21.3	23.2	25.2	27.4
Waste	12.5	15.0	18.1	21.8	26.2
Misc. Freight	7.8	10.5	14.1	19.0	25.6



# Model Specification

## Assignment

- Load truck trips to statewide highway network
- Routes chosen by uncongested travel times
- Trucks all loaded to shortest route



# FSUTMS Integration

- Works directly in existing Florida model structure
- Uses existing statewide model and can use planned updates
- Produces standard outputs, reports, matrices, and networks



# Model Validation

## Assignment Aggregate

- Intercity freeways (240 counts)
  - Model volumes/observed trucks = 1.00
- Statistically matches observed trucks
  - RMSE for intercity freeways = 34.83 percent
    - *>5k trucks = 17.60 percent*
    - *<5k trucks = 37.98 percent*
- Total daily freight truck trips = 72,400



# Model Validation

## Assignment Corridor and Cutline

	Florida State Line		
	Model	Observed	Model/Observed
I-75	10,175	9,600	1.06
I-95	4,125	4,350	0.95
I-10	4,062	4,450	0.91
Subtotal	18,362	18,400	1.00



# Model Validation

## Other Key Screenlines

Screenline	Model	Observed	V/C
N. Central Statewide	26,559	30,016	0.88
Southeast Statewide	24,724	24,696	1.00

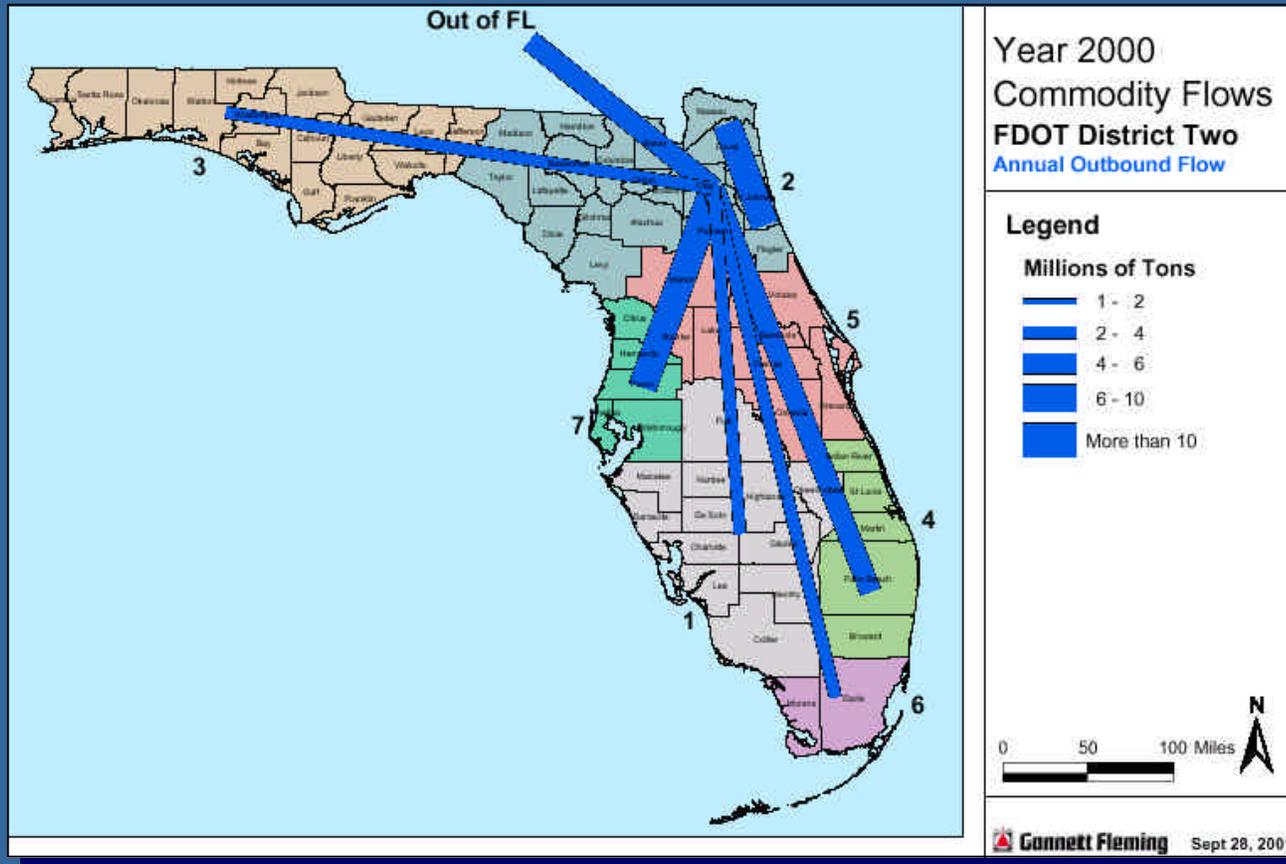


# Uses for the Statewide Freight Model



# Model Outputs

## Freight Between Districts



# Model Outputs

## Forecast Volumes



# Major Freight Model Applications

- More accurate truck forecasts
- Allocation of resources
- Prioritization of projects



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