

Demand forecast at Tampa Bay Water and how it is being used for long-term supply planning



Agency' Mission

Tampa Bay Water reliably provides clean, safe water to the region now and for future generations

What drives long-range demand forecast?

- **Master water supply contract:**
 - States the agency has unequivocal obligation to supply water

If demand exceed permitted capacity by 75% during any twelve month period, initiate a preparation of permit applications for new supply projects;

If demand exceed permitted capacity by 85% during any twelve month period, file permit application; and

If actual delivery during any 12-month period exceeds 94% of aggregated permitted capacity, it is considered a production failure

“Forecasting is the art of saying what will happen, and then explaining it why it didn’t”

-Anonymous

Forecasting Methodology

Sector Water Use (Q)

=

Average Rate of Use
(q = unit use)

X

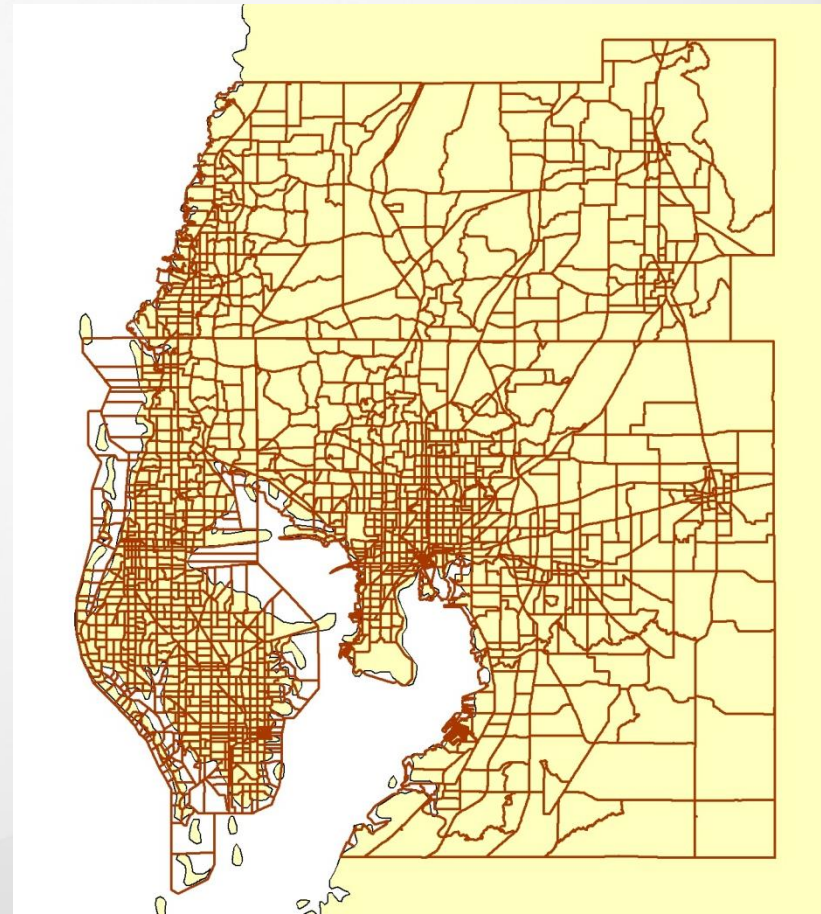
Number of Users
(N = drivers)

- per household
- per employee

- housing units
- employment

- Rate of use reflects monthly average gal/unit/day for each
 - Sector
 - Month/Year
 - Geographic unit
- Total use for each sector, month/year, geographic unit reflects:
 - Average rate of use per unit
 - Number of units

- TAZ geographies
 - Defined: Florida Dept. of Transportation (FDOT)
 - 1800 across region
 - Growth projections available
- TAZ maps to WDPA



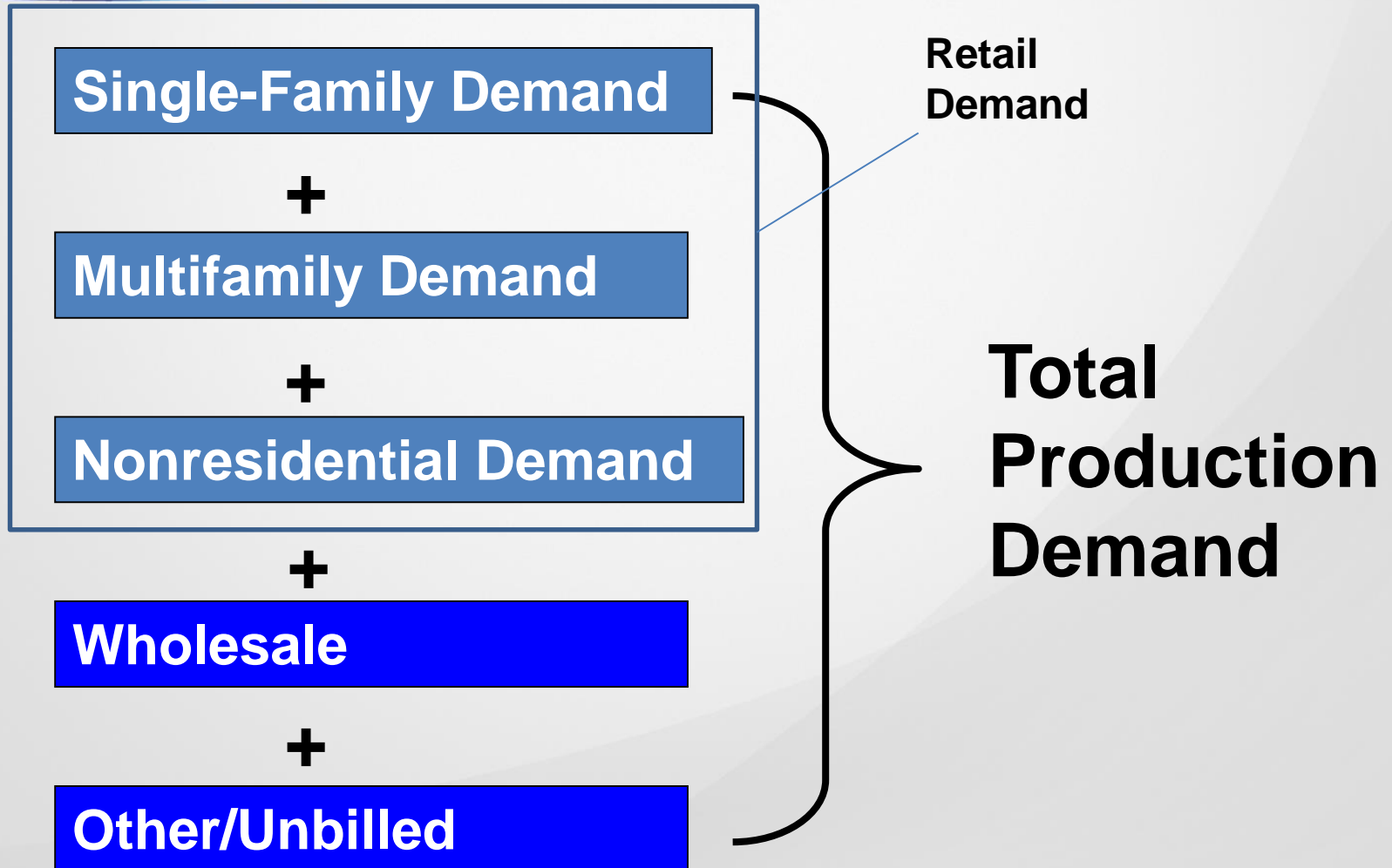
- Observations for water use aggregated/averaged to the Traffic Analysis Zone (TAZ) level
 - Provides large number of geographic cross-sections
 - Rich source for estimating model parameters
- Socioeconomic variables collected at TAZ level
 - Income
 - Housing density
 - Persons per household
 - Housing units
 - Employment and distribution of employment

- Weather variables
 - Data collected from multiple weather reporting stations
 - TAZ-level values derived through distance-weighting
- Data collected from or derived from member data
 - Price of water
 - Fraction of accounts with access to reclaimed water

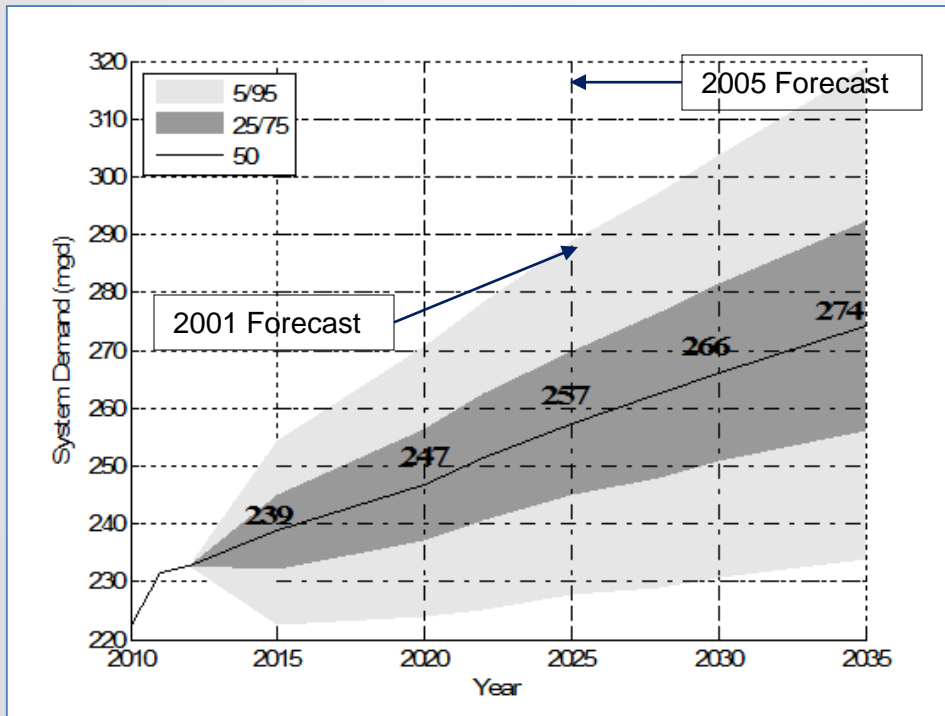
Model Variables/Drivers: Relative Effects on Demand Forecast

<u>VARIABLES/DRIVERS</u>	<u>EFFECT</u>
Housing units (SF&MF)	+++
Total Employment (NR)	++
Fraction of Employment by Major Employment Sector	+
Median household income (SF, MF, NR)	++
Housing density (SF&MF)	-
Persons per household (SF)	+
Marginal price (SF)	--
Temperature departure (SF)	+
Rainfall departure (SF&NR)	-
Rainfall (MF)	-
Number of Rainy Days (SF)	-
Fraction of reclaimed accounts (SF&MF)	-

Aggregation of Sectors

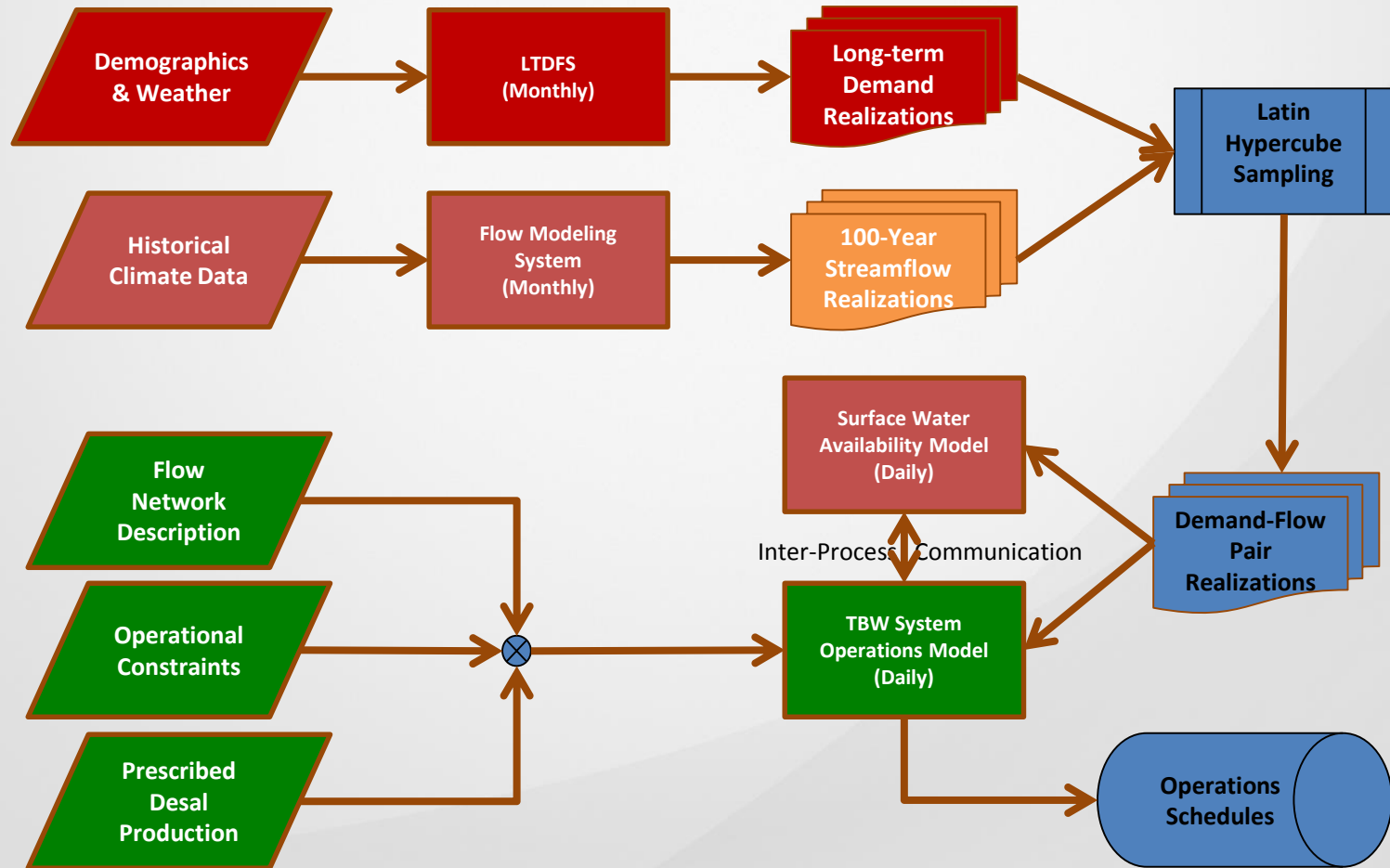


Probabilistic Demand Forecast



- For a given demand slice, e.g., 2030
 - A range of socio-economic factors were used
 - Longterm rainfall and temperature values used

Schematic of Operational Model



Use of long-range forecast

A) Results of Additional Supplies by 2025 Compared Against Existing System

Policy Level	Existing Supply	5 MGD	10 MGD	15 MGD	20 MGD
	Reliability	Reliability	Reliability	Reliability	Reliability
A	42%	54%	65%	72%	79%
B	82%	89%	94%	95%	96%
C	93%	95%	97%	99%	99%
D	96%	98%	99%	99%	99%

B) Results of Additional Supplies by 2030 Compared Against Existing System

Policy Level	Existing Supply	5 MGD	10 MGD	15 MGD	20 MGD
	Reliability	Reliability	Reliability	Reliability	Reliability
A	30%	40%	48%	56%	65%
B	68%	75%	81%	88%	91%
C	81%	87%	90%	93%	95%
D	87%	91%	94%	95%	98%

C) Results of Additional Supplies by 2035 Compared Against Existing System

Policy Level	Existing Supply	5 MGD	10 MGD	15 MGD	20 MGD
	Reliability	Reliability	Reliability	Reliability	Reliability
A	25%	33%	38%	45%	53%
B	54%	61%	70%	78%	81%
C	67%	78%	80%	86%	88%
D	76%	81%	85%	90%	93%

