



Florida Department of
TRANSPORTATION



Turnpike State Model Next Generation (TSM NextGen)

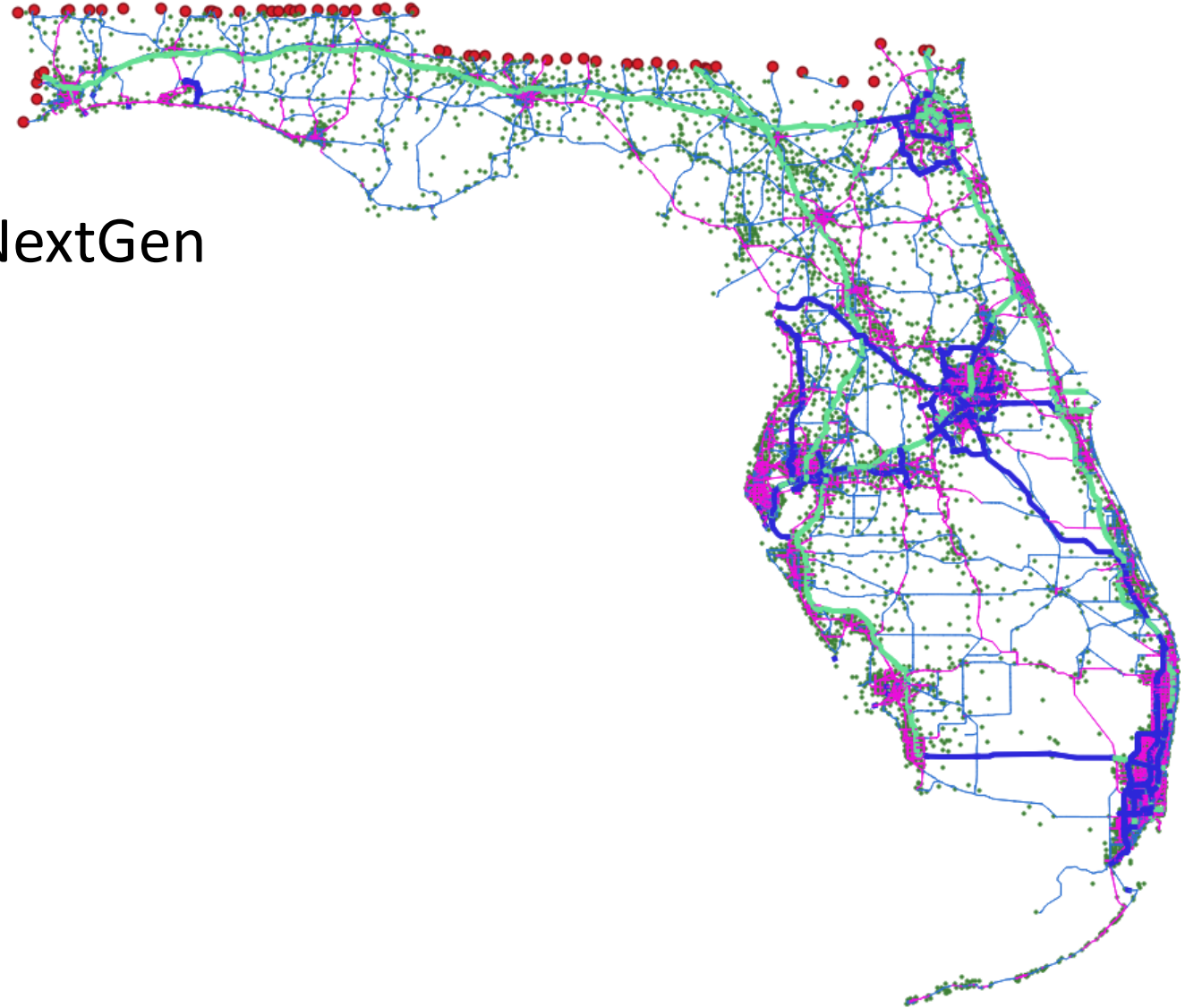
Collaborative Data Inputs

Presented by
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Presented to
Model Task Force
November 08, 2023

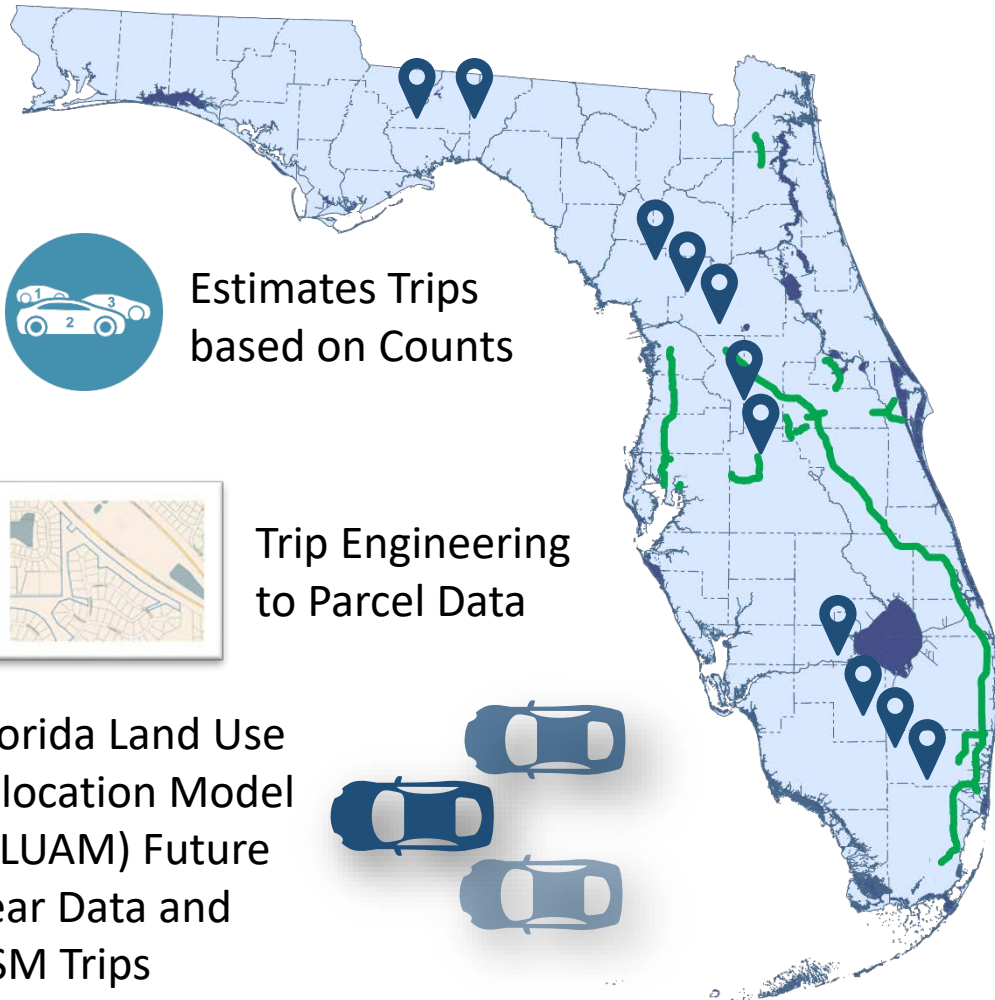
Agenda

- What is the product?
 - A brief introduction to the TSM NextGen
 - Primary purposes
- Data collaboration needs
 - Scrambling for data
- Lessons learned
 - Organized data sharing

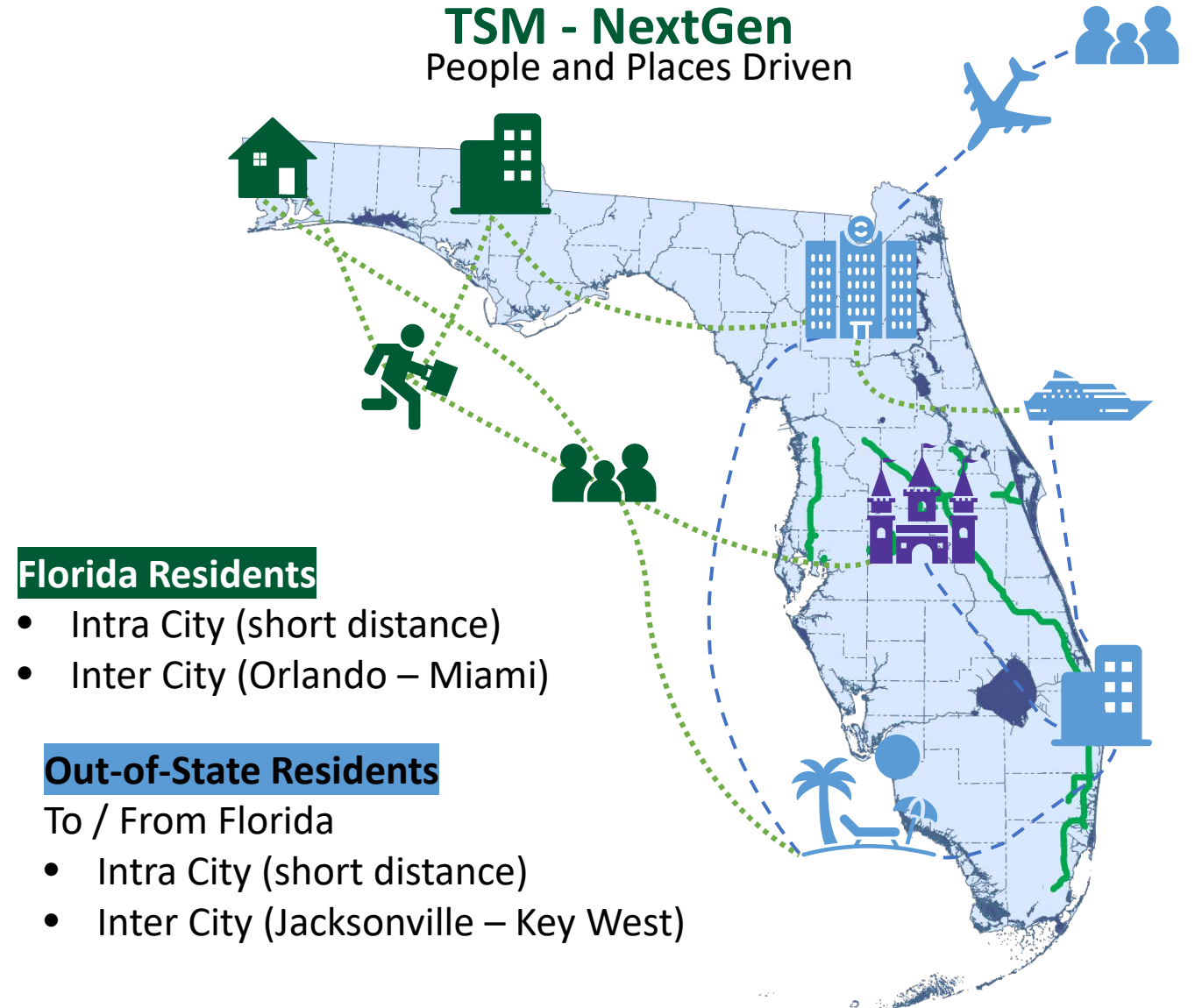


What are we talking about: TSM Evolution

TSM – Legacy Counts Driven



TSM - NextGen People and Places Driven



TSM NextGen Overview

Database : Scenario Manager

Scenario
Manager
(R & C++)

- Master Database to Scenario Specific Network
- Free-Flow Model
- Network -1: Network attributes to support Demand modeling (static time of day skimming)
- Network -2: Attributes to support Macro DTA assignment

Land-use Model: Synthetic Population

Land Use
Development
(PostgreSQL, ArcGIS)

- MPO Land Use: Compiled from MPO Base year (2015) and Future year (2045)
- FLUAM Land Use: Compiled from FLUAM incremental 5 years for Counties with no MPO model data
- Interim Years: Interpolated and scaled to match BEBR by County

Synthetic
Population
(Python)

- Florida synthesized household and person files
- Out of state synthesized household and person file

Demand Model: Tour-Based Model

Auto
Ownership
Model
(JAVA)

- Run model for Florida
- Run model for rest of U.S.

Value of
Travel Time
Model
(JAVA)

- Mixed Multinomial Logit Model (MMNL)
- Distributed Curves as a function of Resident Status, Income, Purpose (Work & Non-work tours).

Long Distance
Model
(PASCAL)

- FL Residents: Out-of-State Tours (IE)
- FL Residents: In-State Tours (II)
- Out-of-State Residents: National long-distance Tours to FL (EI)
- Joint Destination Choice / Mode Choice Model

Short
Distance
Model
(JAVA)

- Level of Service Skims
- Resident Tours
- Visitor Tours

Level of
Service
Matrices
(PTV & OMX)

- Free-flow (Loop 1)
- Congested Skims (Loop 2 & 3)

Network Model: Hourly Route Choice Macro DTA

Commercial
Vehicles
(R & Python)

- Synthetic O-D trip tables.
- Vehicle Class Frequency Distribution

Macro DTA
Assignment
(C++)

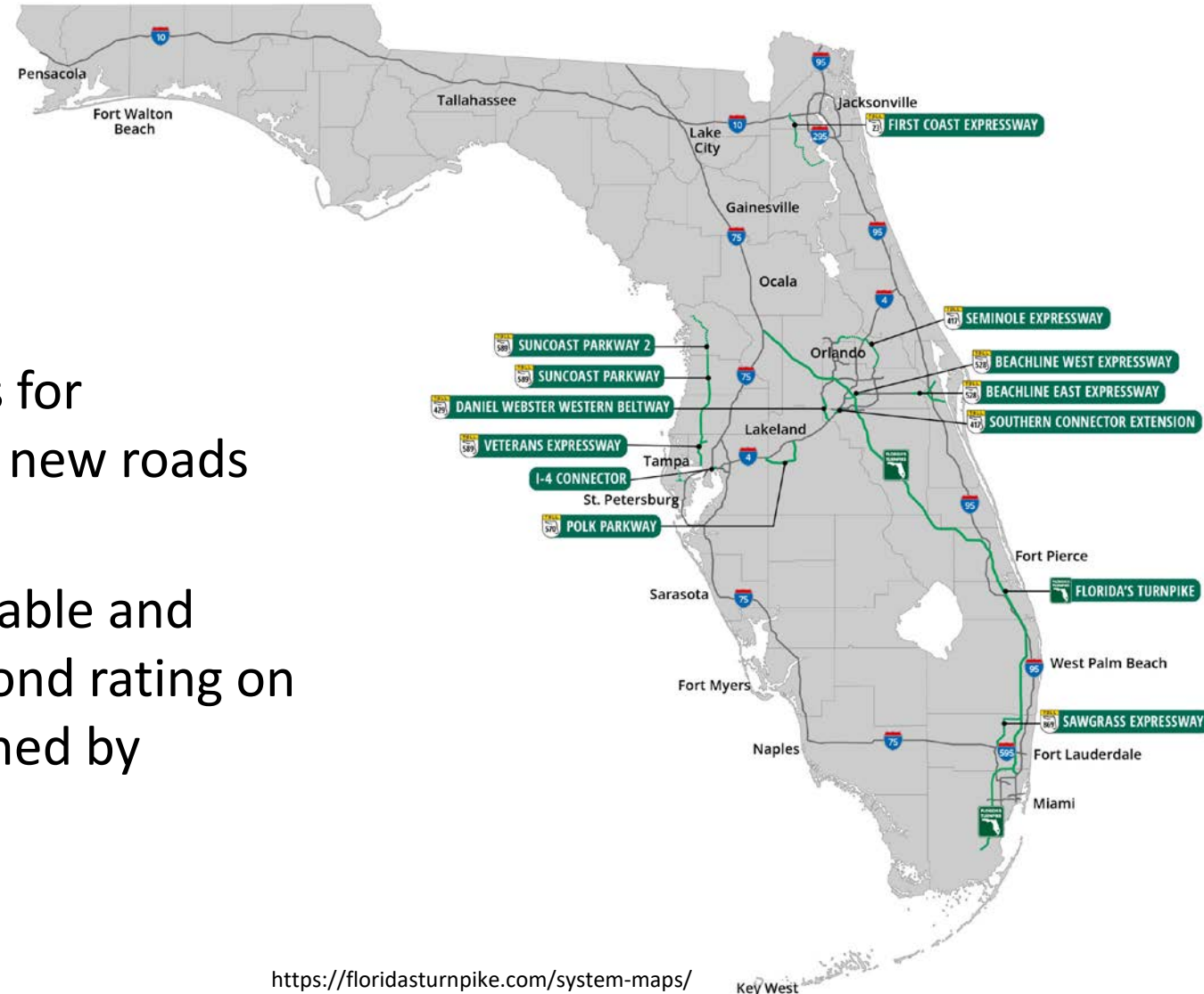
- Hourly Time of Day Model
- Aggregate Tour list to Trip list by O-D- HOUR-MODE
- MODE: Value of Time Segmentation by Market
- Aggregate Daily Volumes

Who needs it?

TSM is used for statewide toll road forecasting

Primary Purpose

- Traffic forecast: Provides estimates for planning, evaluation and design of new roads and alternative alignments
- Revenue forecast: Provides reasonable and defensible revenue forecasts for bond rating on all projects owned and/or maintained by **Florida Turnpike Enterprise (FTE)**





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Data Consistency & Efficiency (TSM NextGen)



Quick Overview of Data and Sources

Demand

Resident

Demographic Data: Population & Households
Employment Data: by NAICS categories (Info USA)

Visitor

Origin Info: Airport, Seaport, External Stations, Hotels
Attractions Info: Malls, Theme Parks, Beaches
Visitor Places: 8 Regions

Surveys

Estimation : HTS, NHTS
Calibration : Expanded data
Other: OD data, Stated Preference, Service Plaza Surveys

Validation

Validation: Counts, Tolls
CAFR: Airport and Seaport Annual Forecasts, Long distance trip shares

Supply

US Network

Multi-modal: Road, Air, Rail Networks

FL Network

Base : Navteq
Future : Base + E+C + LRTPs

Work Program

5 Year Increments

MPO Networks

Multi-Resolution

Household Travel Surveys

North Florida Household Travel Survey (NF)

- **Agency:** North Florida Transportation Planning Organization (NFTI)
- **Year:** 2017
- **Data Collection Method:** Web-based travel diary, single day

Southeast Florida Household Travel Survey (SF)

- **Agency:** Miami-Dade Transportation Planning Organization
- **Year:** 2016/2017
- **Data Collection Method:** Web-based travel diary, multiday

Treasure Coast Regional Household Travel Survey (TC)

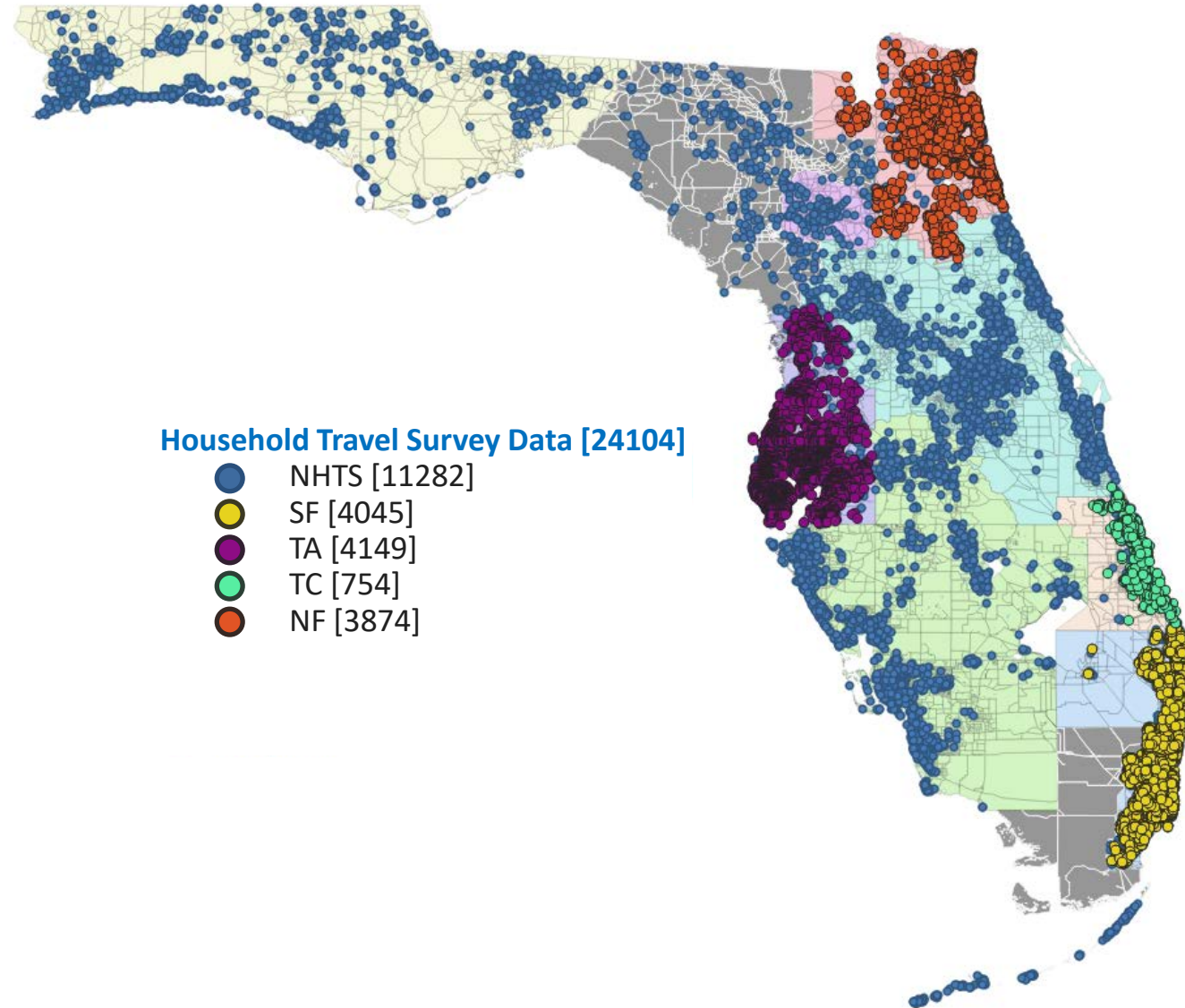
- **Agency:** Florida Department of Transportation
- **Year:** 2016-2018
- **Data Collection Method:** mail, phone, web, smartphone, single day

Tampa Bay Regional Travel Survey (TA)

- **Agency:** Florida Department of Transportation (FDOT) District 7 (L)
- **Year:** 2019
- **Data Collection Method:** rMove, online

National Household Travel Survey (NHTS)

- **Agency:** Florida Department of Transportation
- **Year:** 2009
- **Data Collection Method:** telephone, single day



Socioeconomic Databases

Population

Employment

Households

1. Size: 1, 2, 3, 4+
2. Worker: 0, 1, 2, 3+
3. Income: 4-5 bins
4. Children: 0, 1+
5. Type: Single, Multi

Persons

1. Gender: M, F
Age: Categories
2. Type: Work, Student,...

Group Quarter

1. Institution
College,
2. Military
3. Other

NAICS Sectors

1. Management, Business, Science, and Arts
2. White Collar Service
3. Blue Collar Service
4. Sales and Office Support
5. Natural Resource, Construction
6. Products, Transportation, Material Moving
7. Military

Enrollment

1. School
2. College
3. University

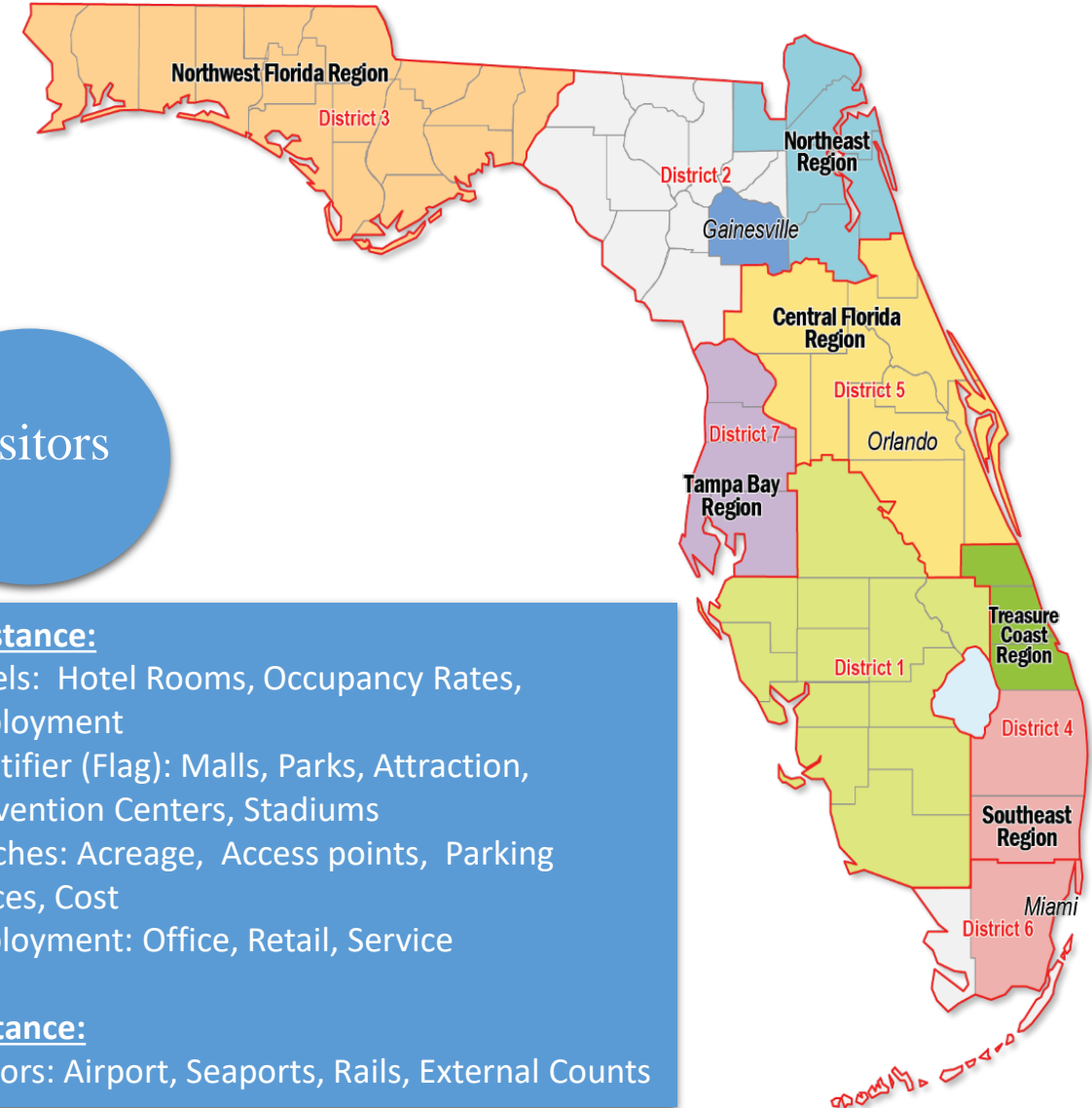
Visitors

Short Distance:

1. Hotels: Hotel Rooms, Occupancy Rates, Employment
2. Identifier (Flag): Malls, Parks, Attraction, Convention Centers, Stadiums
3. Beaches: Acreage, Access points, Parking Spaces, Cost
4. Employment: Office, Retail, Service

Long Distance:

1. Visitors: Airport, Seaports, Rails, External Counts

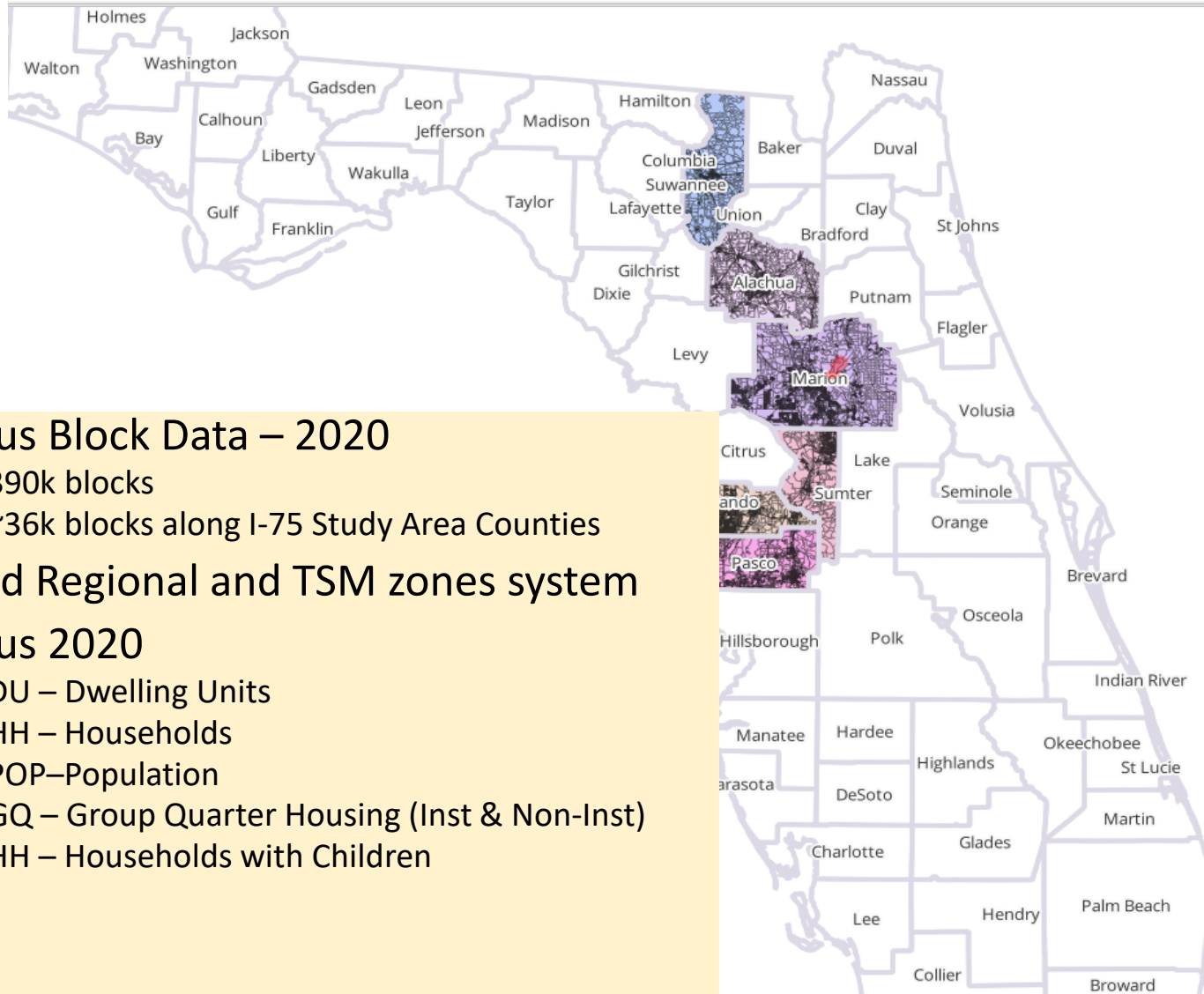


FLUAM

FDOT

MPO

Census 2020 Data



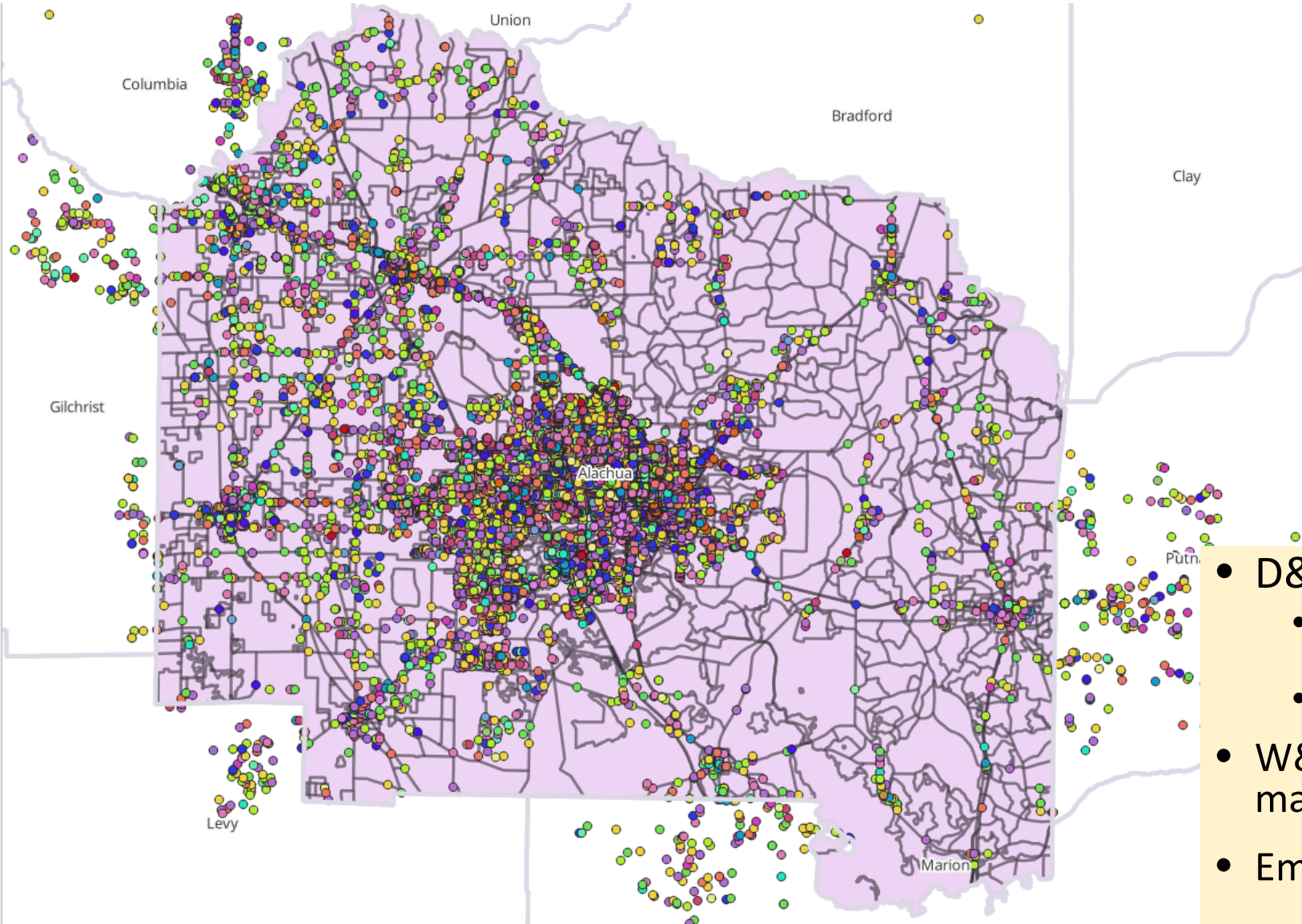
Identify Results

Feature	Value
▼ Census_Block_SEdata_TSM	
NAME20	Block 3000
▶ (Derived)	
▶ (Actions)	
id	194319
fid	194319
GEOID20	120830013023000
STATEFP20	12
COUNTYFP20	083
TRACTCE20	001302
BLOCKCE20	3000
NAME20	Block 3000
MTFCC20	G5040
UR20	NULL
UACE20	NULL
UATYPE20	NULL
FUNCSTAT20	S
ALAND20	26186239
AWATER20	0
INTPTLAT20	+29.2608658
INTPTLON20	-081.9702763
TAZ_REG	2558
TSM_NG	6086
Model	Centra
County	Marion
IDv31	7374
IDv35	6086
DU20	22
POP20	44
HH20	14
GQInst	0
GQnonInst	0
Child	8

Mode: Layer Selection
View: Tree

- Census Block Data – 2020
 - 390k blocks
 - ~36k blocks along I-75 Study Area Counties
- Coded Regional and TSM zones system
- Census 2020
 - DU – Dwelling Units
 - HH – Households
 - POP–Population
 - GQ – Group Quarter Housing (Inst & Non-Inst)
 - HH – Households with Children

Employment 2020



Identify Results

Feature	Value
DB_2020_tagged_tsm_v35	
StreetAddr	2105 NW 102nd PI
(Derived)	
(Actions)	
id	1294009
fid	218368
Field1	10871
DUNSNUMBER	14732037
LATITUDE	29.748628
LONGITUDE	-82.35198
Company	Southern Air Sales & Service LLC
COUNTY_NAM	Alachua
DISTRICT	2
Employment	5
LocationTy	Single Location
PrimaryNAI	561990
StreetAddr	2105 NW 102nd PI
StreetCity	Gainesville
StreetStat	FL
StreetZip	326095872
TRADESTYLE	NULL
NAICS	56
TAZ_REG	273
TSM_NG	6425
Model	Gainesville
County	Alachua

- D&B (2020) :
 - Location data with NAICS codes & employees
 - Coded MPO & TSM zones
- W&P / BEA 2020 County marginals
- Employment vs Jobs

Parcel Data 2020-2022

Layers

- Florida_Counties
- alachua [115790]
- Census_Block_SEdata_TSM [5897]
- Google Maps

Identify Results

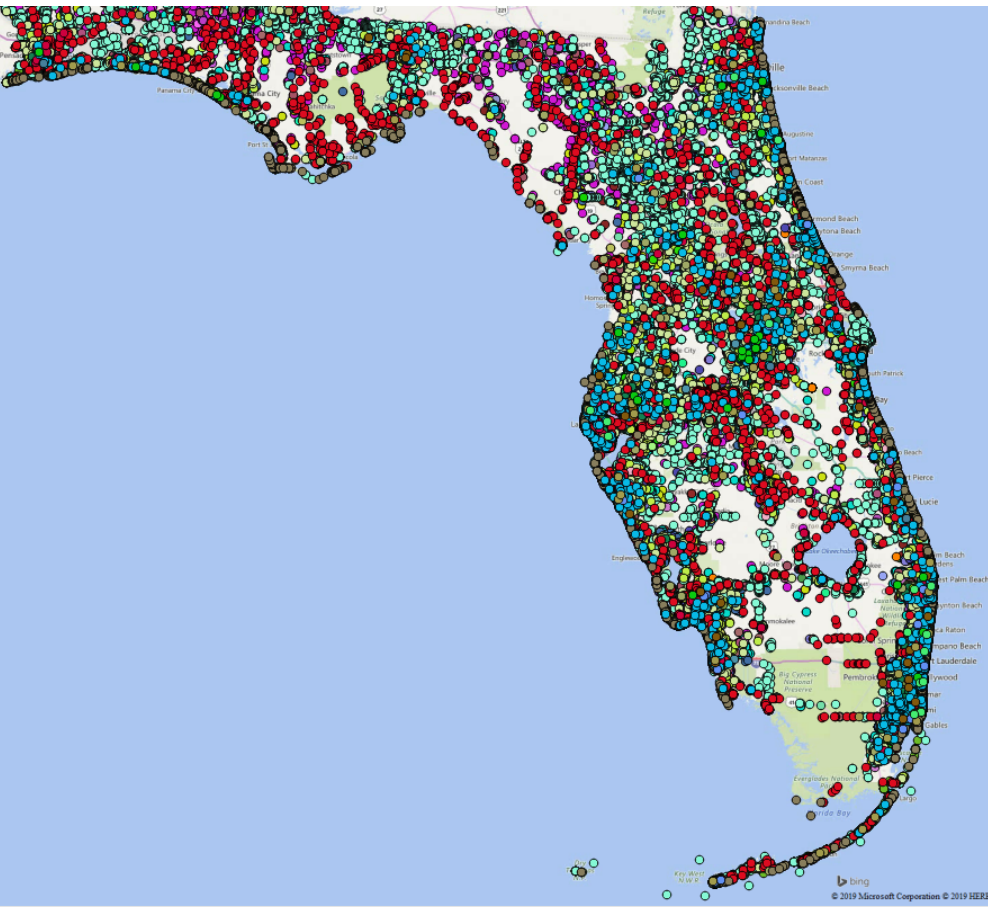
Feature	Value
distr_yr	0
lnd_val	94000
lnd_unts_c	1
no_lnd_unt	32383
lnd_sqfoot	14106035
dt_last_in	122
imp_qual	3
const_clas	0
eff_yr_blt	2021
act_yr_blt	2021
tot_lvlg_ar	1120
no_buldnng	1
no_res_unt	1
spec_feat	0
m_par_sal1	NULL
qual_cd1	NULL
vi_cd1	NULL
sale_prc1	0
sale_yr1	0
sale_mo1	NULL
or_book1	NULL
or_page1	NULL
clerk_no1	NULL
s_chng_cd1	0
m_par_sal2	NULL
qual_cd2	NULL
vi_cd2	NULL
sale_prc2	0
sale_yr2	0
sale_mo2	NULL
or_book2	NULL
or_page2	NULL
clerk_no2	NULL
s_chng_cd2	0
own_name	SENDZIMIR JAN PETER
own_addr1	VIENNA 1090
own_addr2	Austria
own_city	NULL
own_state	Austria
own_zipcd	0
own_state_	FC
fidu_name	NULL
fidu_addr1	NULL
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fidu_city	NULL

Mode: Layer Selection
View: Tree

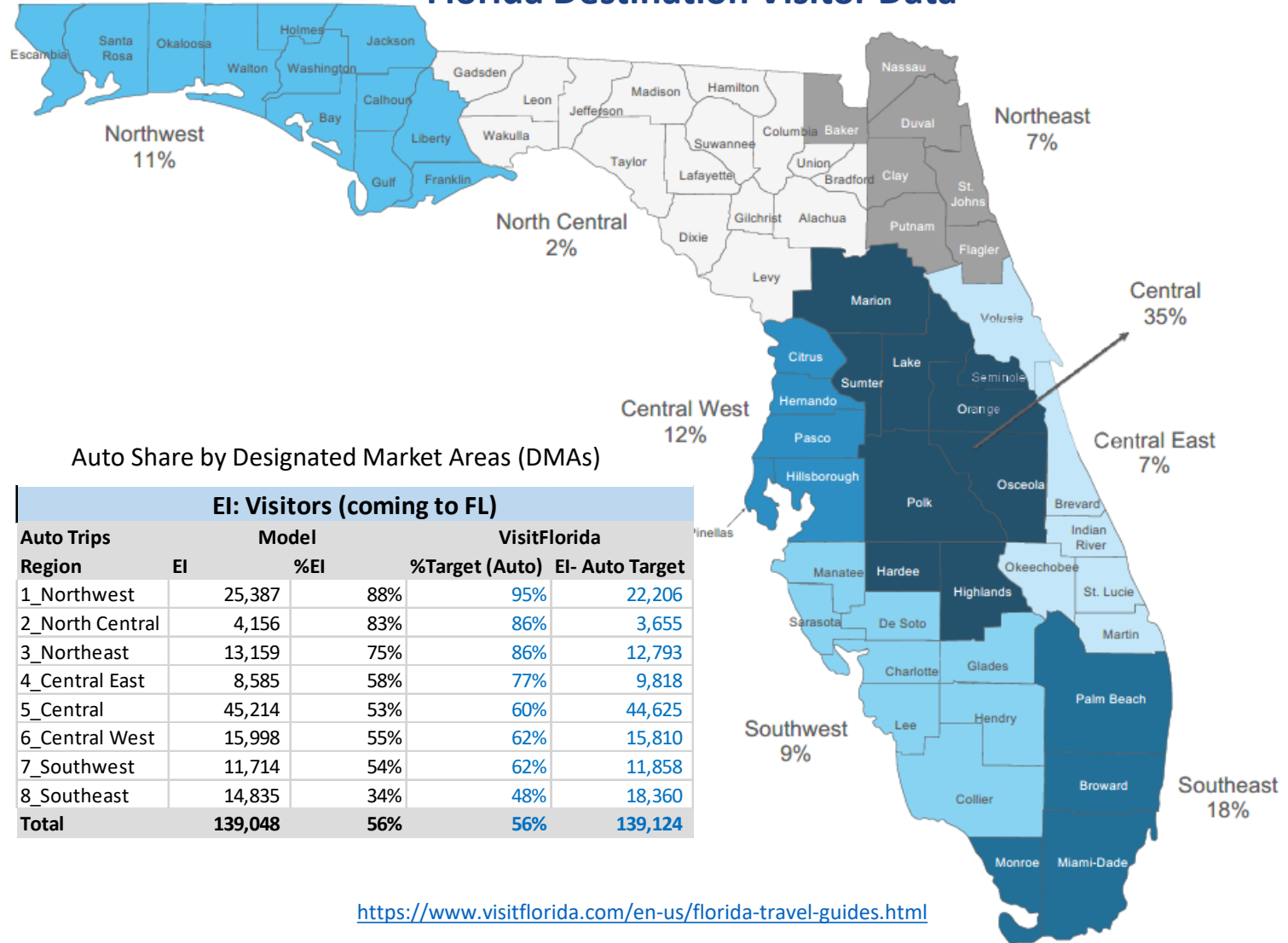
- Parcel Data – 2020 & 2022
 - ~11 Million Parcels in 2022
 - 169k parcels identified “New Dwelling Units” between 2020 & 2022
 - Coded Regional and TSM zones system
- Example: Alachua County
 - ~6000 Census Block
 - ~115k parcels
 - ~1,100 parcels are new properties.

Visitor Data

Florida Visitor Discrete Origins and Destination



Florida Destination Visitor Data



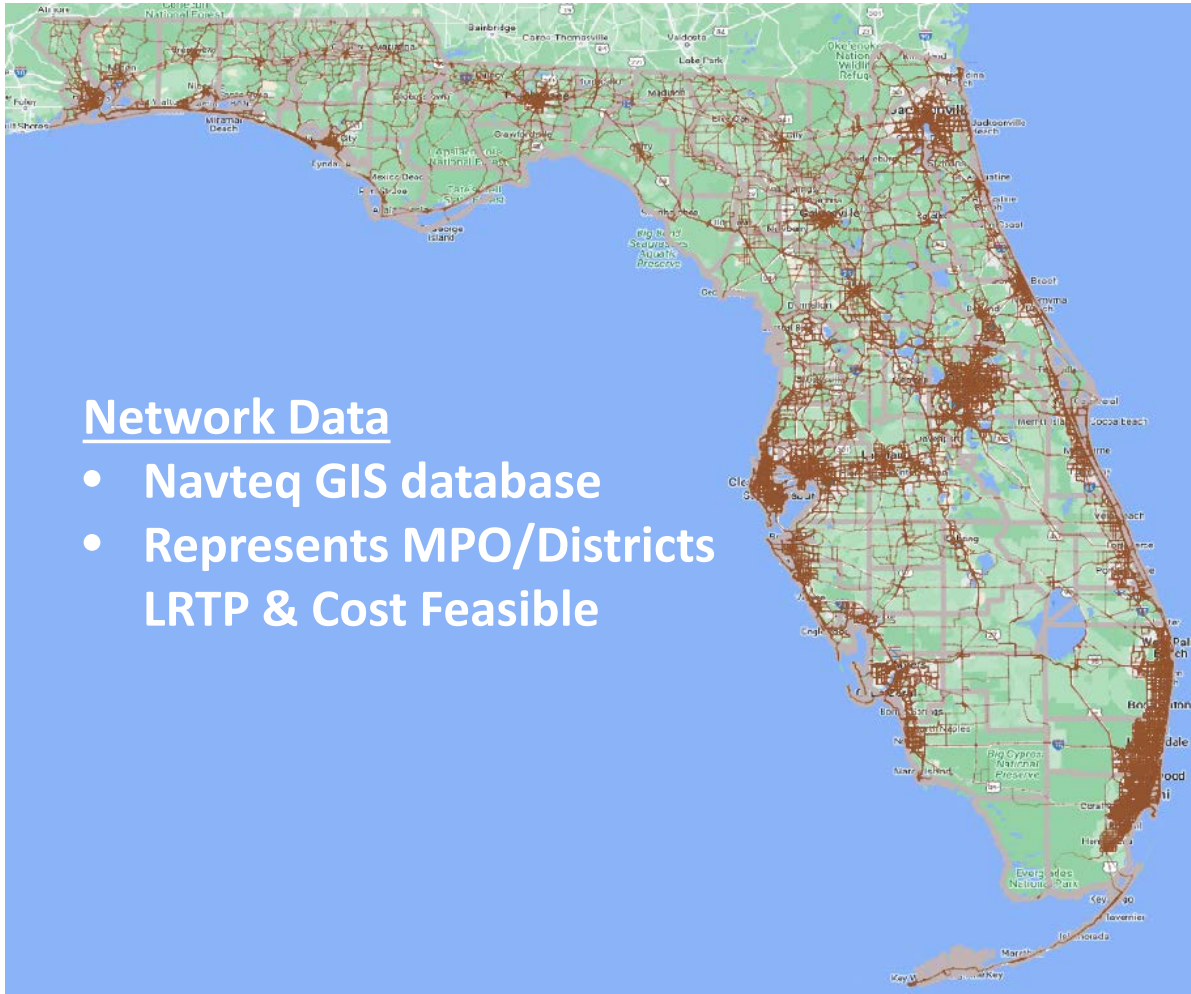
Auto Share by Designated Market Areas (DMAs)

EI: Visitors (coming to FL)					
Auto Trips	Model		VisitFlorida		
Region	EI	%EI	%Target (Auto)	EI- Auto	Target
1_Northwest	25,387	88%	95%	22,206	
2_North Central	4,156	83%	86%	3,655	
3_Northeast	13,159	75%	86%	12,793	
4_Central East	8,585	58%	77%	9,818	
5_Central	45,214	53%	60%	44,625	
6_Central West	15,998	55%	62%	15,810	
7_Southwest	11,714	54%	62%	11,858	
8_Southeast	14,835	34%	48%	18,360	
Total	139,048	56%	56%	139,124	

<https://www.visitflorida.com/en-us/florida-travel-guides.html>

Network Manager

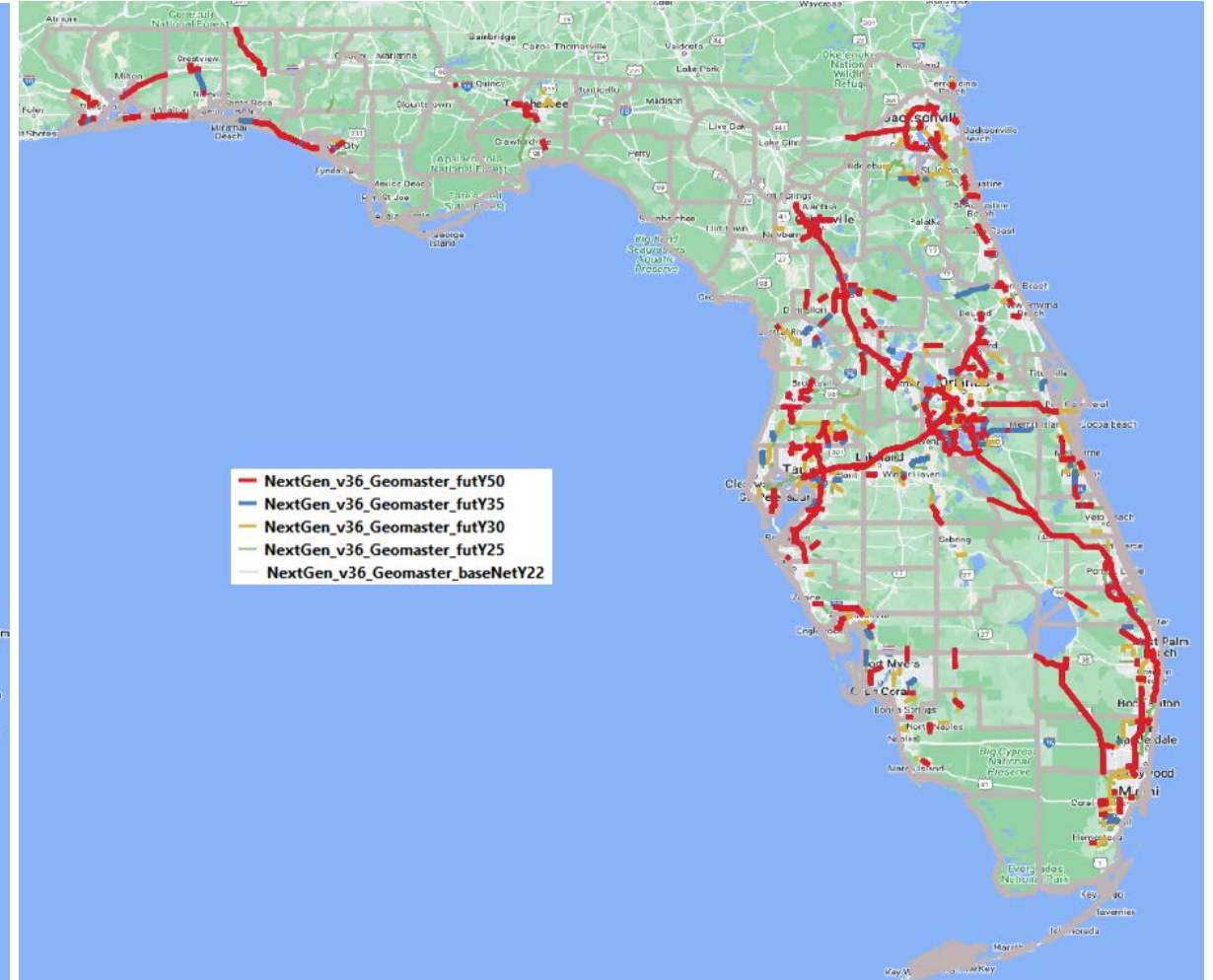
Statewide Network – Year 2022



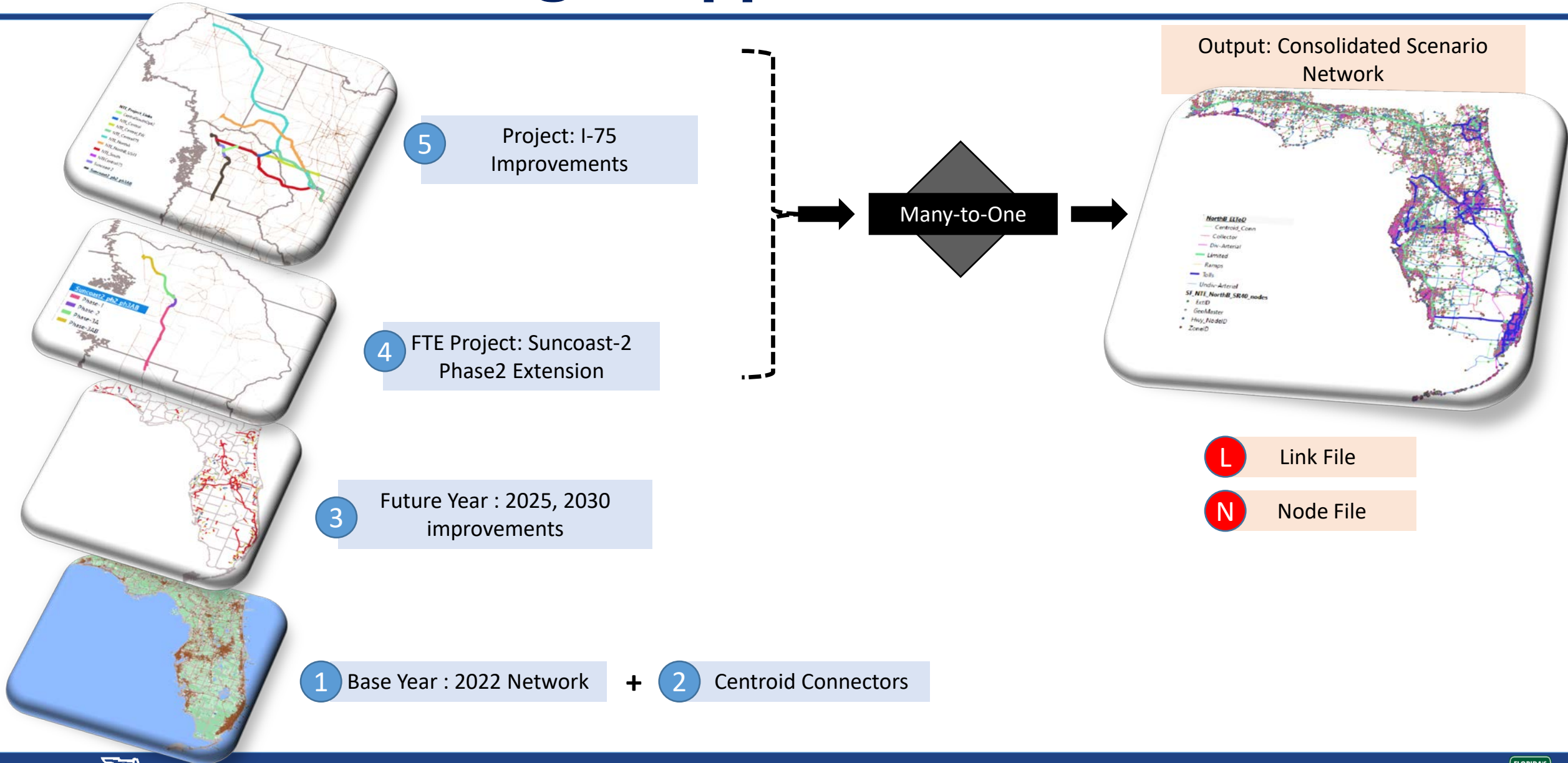
Network Data

- Navteq GIS database
- Represents MPO/Districts L RTP & Cost Feasible

Future Year Improvements – Years 2025: 2050



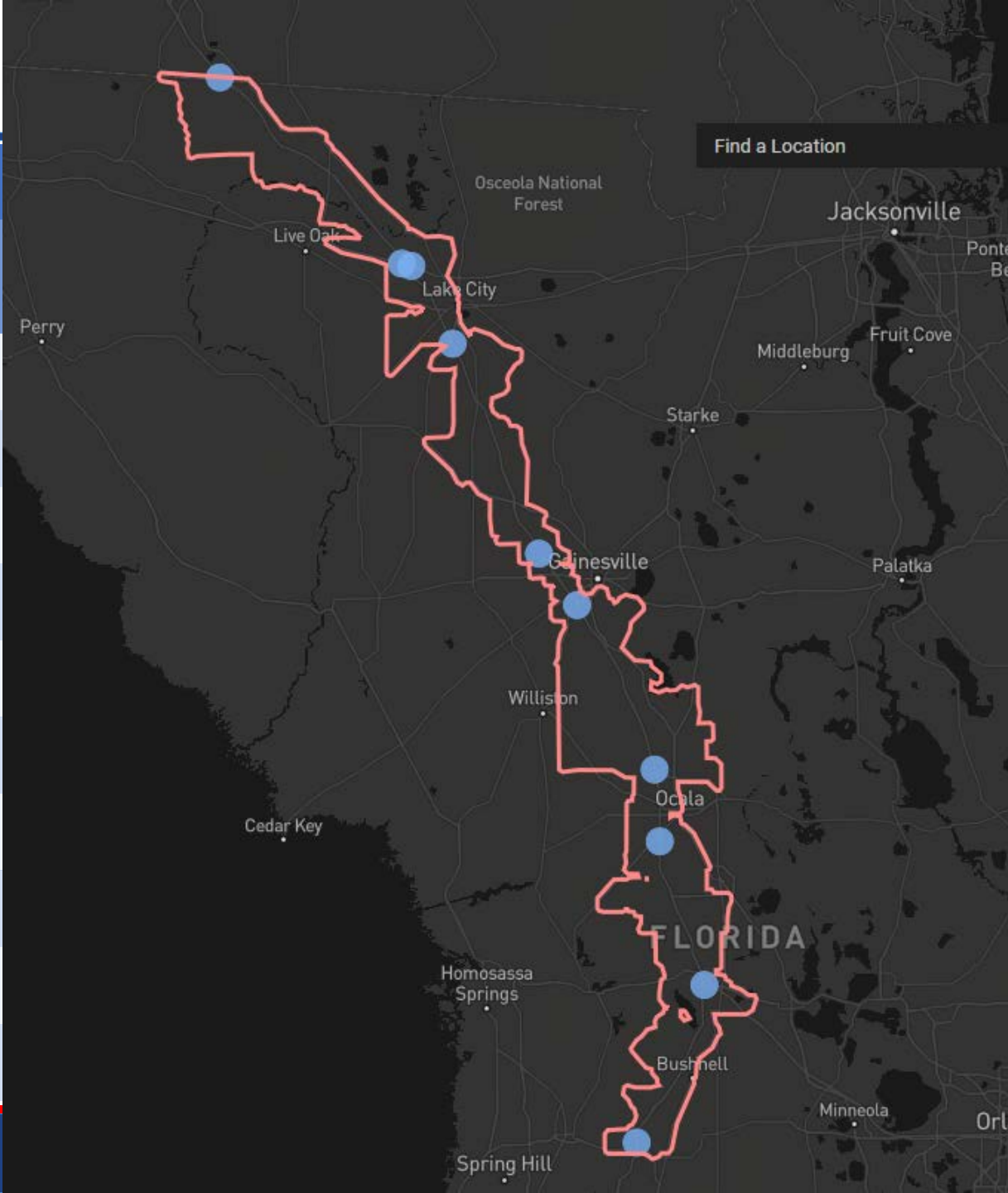
Network Manager Application



O-D Data

Weekday (Mon-Thur)

O-D	State Border	I-10 East	I-10 West	Lake City South	Gainesville North	Gainesville South	Ocala North	Ocala South	Turnpike	I-75	Total
State Border	0%	14%	0%	0%	31%	25%	0%	18%	7%	6%	100%
I-10 East	38%	0%	56%	0%	2%	2%	0%	1%	0%	1%	100%
I-10 West	0%	26%	0%	0%	26%	21%	0%	15%	8%	4%	100%
Gainesville North	60%	2%	39%	0%	0%	0%	0%	0%	0%	0%	100%
Gainesville South	11%	0%	7%	25%	0%	24%	0%	18%	8%	6%	100%
Lake City South	9%	0%	6%	19%	24%	0%	0%	24%	10%	8%	100%
Ocala North	9%	0%	6%	20%	26%	39%	0%	0%	0%	0%	100%
75	5%	0%	3%	10%	14%	19%	22%	0%	13%	13%	100%
Turnpike	4%	0%	3%	10%	13%	18%	21%	30%	0%	0%	100%
I-75 South	4%	0%	2%	9%	12%	16%	20%	36%	0%	0%	100%



Lessons Learned

- Significant amount of data is already available
- Sometimes data is collected for very different reasons
- Available data needs re-processing
- Aggregation/disaggregation of raw data is important
- Data sharing and institutional collaboration needs rules





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Questions?

Further questions, comments please contact:

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