

SERPM Commodity Flow Disaggregate (CFD) Tool

Disaggregation of Florida Statewide Freight Model Commodity Breakdown

presented to

Southeast Florida FSUTMS Users Group

presented by

Cambridge Systematics, Inc.

**Rob Schiffer, AICP, Quan Yuan, P.E.,
Dan Beagan, P.E., Sheldon Harrison**

November 15, 2013

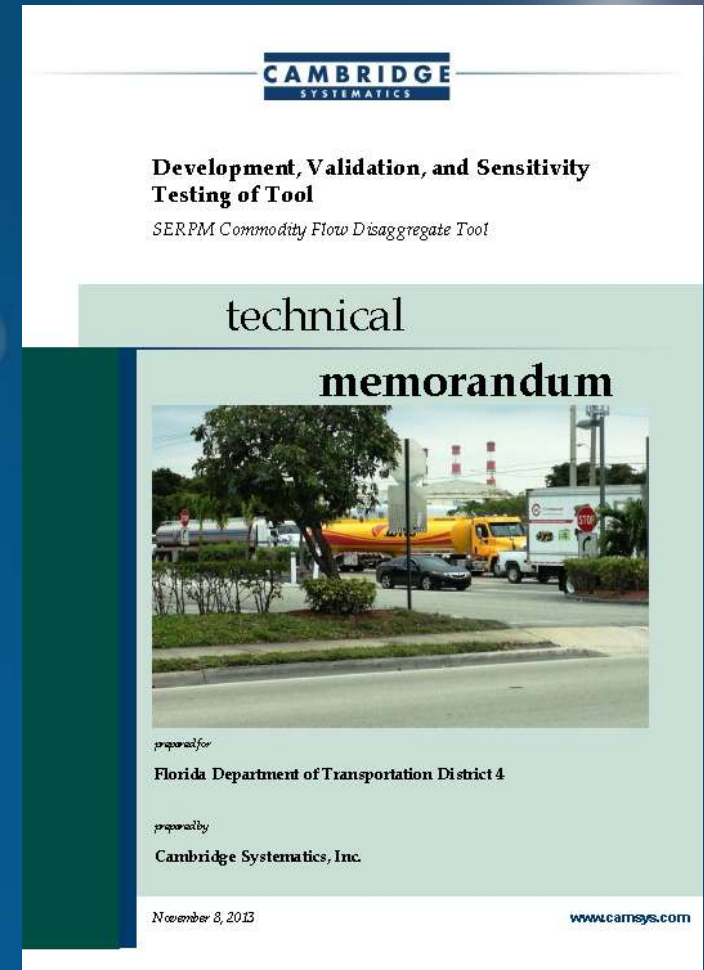
Transportation leadership you can trust.



SERPM Commodity Flow Disaggregate (CFD) Tool

Presentation Overview

- Identify preferred approach
- Develop disaggregation tool
 - » Window statewide trip tables
 - » Develop NAICS3 employment
 - » Develop model crosswalk
 - » Convert special generators
 - » Convert truck CG Ps and As
 - » Trip table expansion
 - » Assign trip tables
 - » Model validation and future year sensitivity
- Variations and potential refinements to approach



SERPM Commodity Flow Disaggregate (CFD) Tool

Identify preferred approach

- Conducted SE FL Freight Forecast Needs Assessment Workshop
 - » SE FL Freight stakeholders and transportation planners
 - » Agenda:

Southeast Florida Freight Forecast Needs Assessment

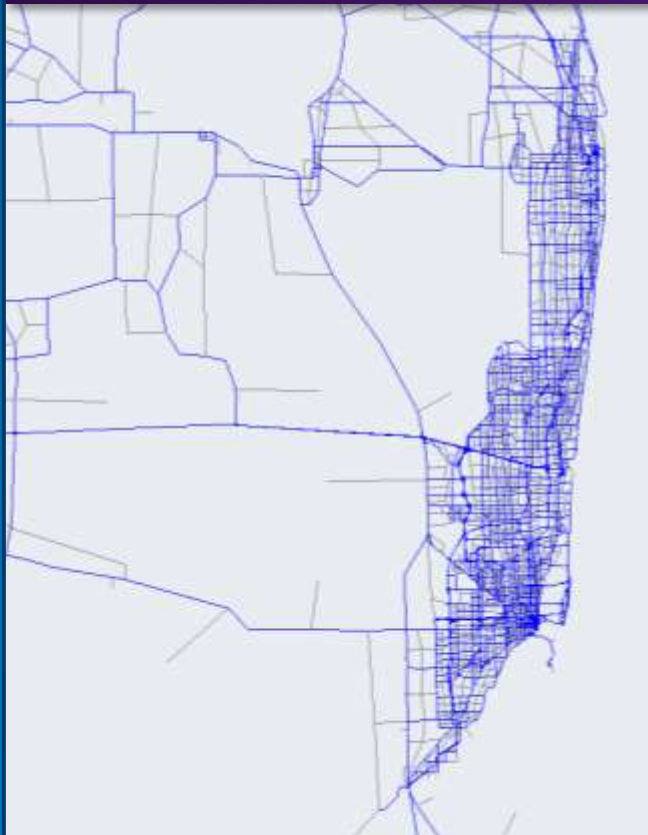


Item	Begin	End	Time (minutes)	Description
1	9:00 AM	9:10 AM	10	Welcome
2	9:10 AM	9:30 AM	20	Self Introductions
3	9:30 AM	9:45 AM	15	Background: Why Study Freight?
4	9:45 AM	9:50 AM	5	What projects and policies need to be studied in SE FL
5	9:50 AM	10:15 AM	25	Needs listed by audience
6	10:15 AM	10:30 AM	15	Break
7	10:30 AM	10:35 AM	5	What Performance Measures (PMs) would be needed to evaluate those Needs
8	10:35 AM	11:00 AM	25	PMs listed by audience for each need listed in Item 5
9	11:00 AM	11:05 AM	5	What models are available to provide the outputs to quantify those PMs
10	11:05 AM	11:30 AM	25	What Models and Data could develop the PMs listed in Item 7
11	11:30 AM	12:00 PM	30	Wrap up: Summary and Next Steps

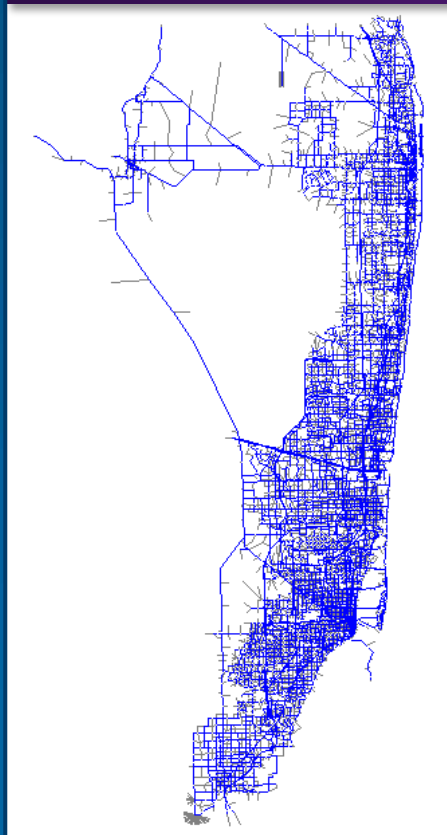
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Window Subarea Network

FLSWM Network in South Florida



SERPM Network



Extracted FLSWM Network Coverage

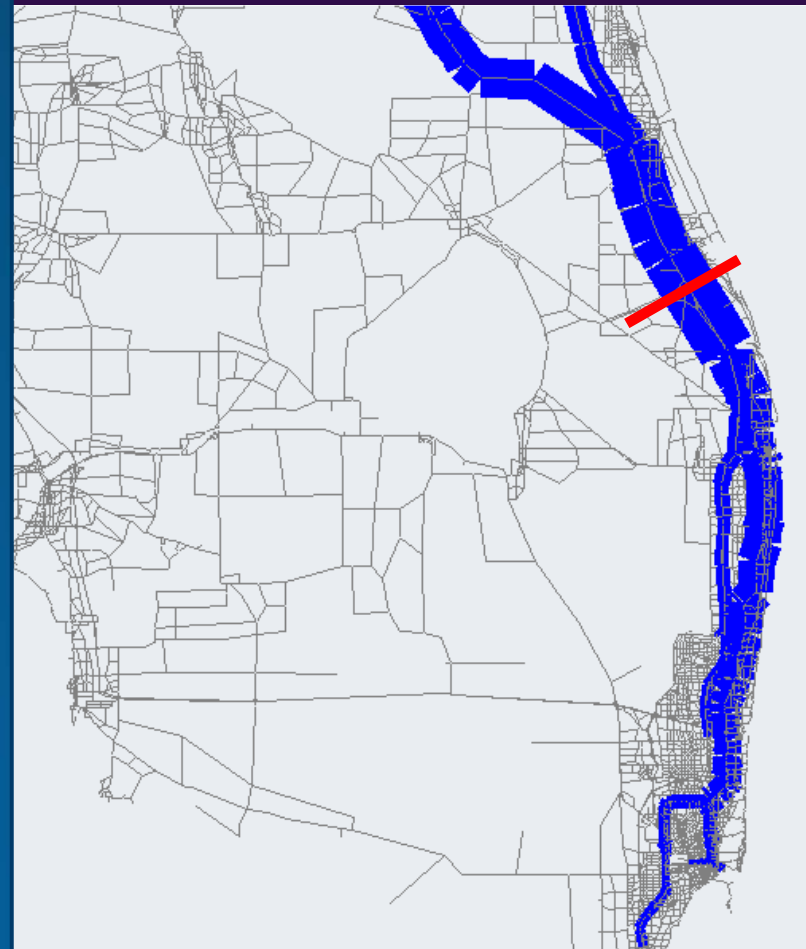


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Window Subarea Truck Trip Table

- Original FLSWM truck trip tables dimension is 6,242 x 6,242 while subarea extracted FLSWM trip table dimension is 925 x 925 (*910 internal TAZs and 15 external TAZs*)
- Refinements needed for one-way links at external stations
- Subarea extracted network has renumbered TAZs
- All truck trips entering into SERPM regions via the same roads are merged into new external station trips

FLSWM Truck Bandwidth Volume Entering via Turnpike and I-95



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Examine Subarea Truck Trip Table

QA/QC subarea extracted trip table consistent with original trip table within SERPM area

Commodity Group	Commodity Group Category	FLSWM Trip Table Total	Subarea Trip Table Total	Percent in SE FL
CG 1	Agriculture	11,183	3,000	26.8%
CG 2	Nonmetallic Minerals	-	-	
CG 3	Coal - No Production in FL	-	-	
CG 4	Food	7,972	3,687	46.2%
CG 5	Non-Durable manufacture	11,580	4,605	39.8%
CG 6	Lumber	3,675	1,128	30.7%
CG 7	Chemicals	16,538	3,343	20.2%
CG 8	Other Durable Manufacture	6,489	961	14.8%
CG 9	Paper	3,114	1,747	56.1%
CG 10	Petroleum products	12,907	6,228	48.3%
CG 11	Clay, Concrete, Glass	16,806	8,202	48.8%
CG 12	Waste	4,729	1,986	42.0%
CG 13	Miscellaneous Freight	-	-	
CG 14	Warehousing	50,848	28,209	55.5%
Total GC 1-15	Total Freight Truck	145,846	63,101	43.3%
	Heavy Truck Non-Freight	272,017	126,678	46.6%

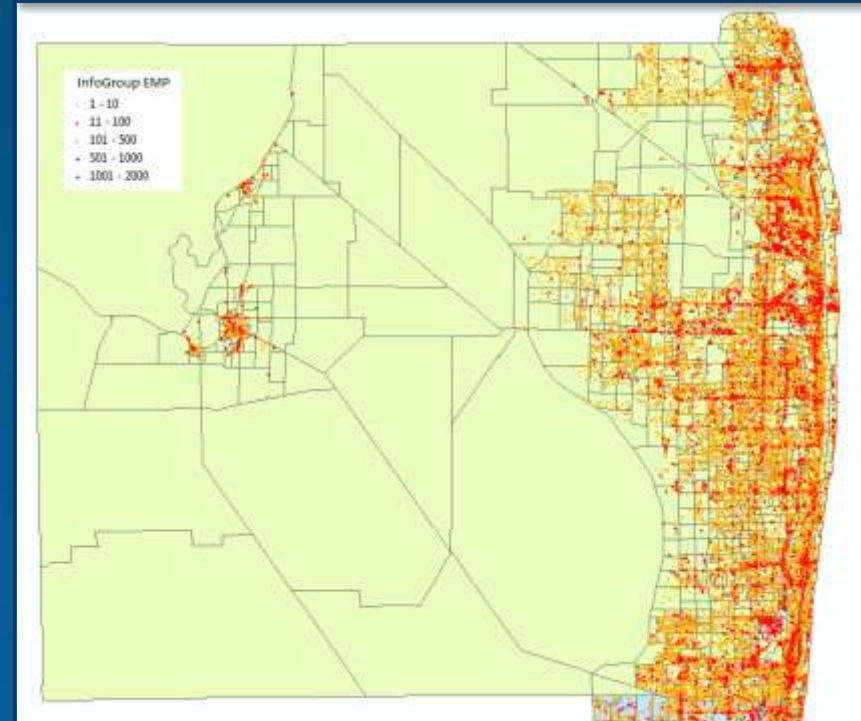
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Develop NAICS3 Employment

Overview

- InfoGroup 2010 Employment Data contains NAICS code classifications
- InfoGroup 2010 Employment Data is converted into a point layer
- Point layer overlaid with SERPM TAZ layer to transfer the employment information to SERPM zonal level

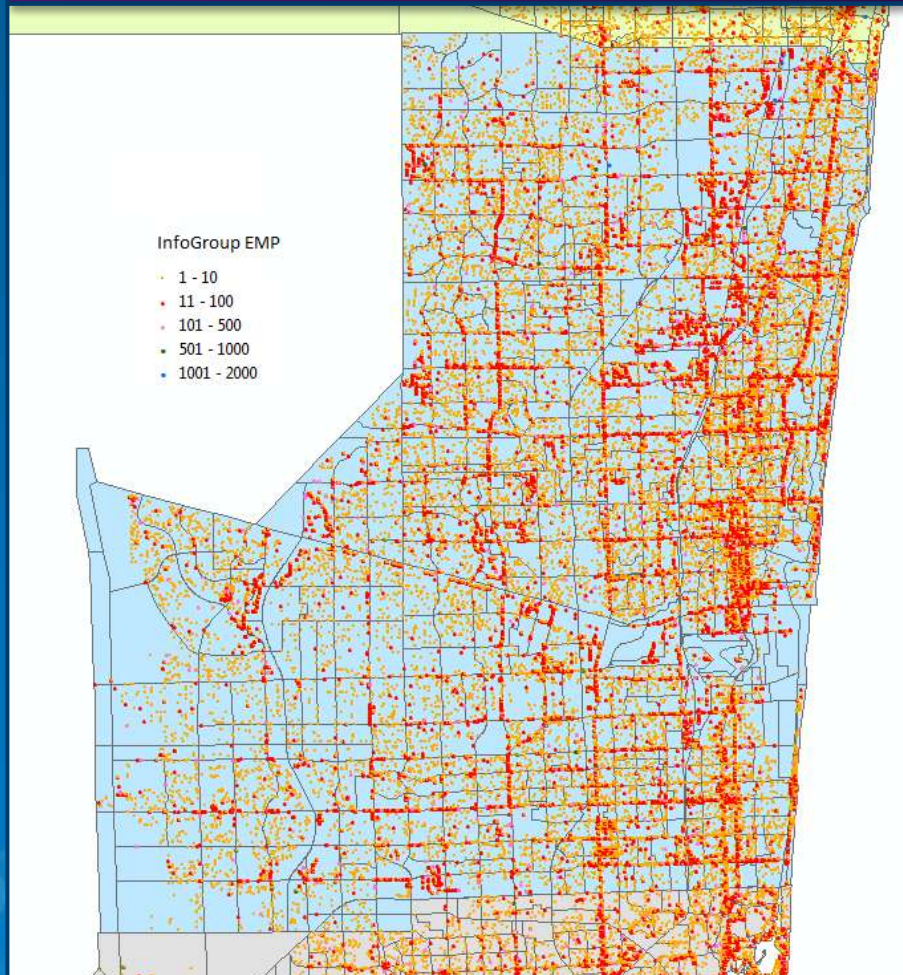
Palm Beach County



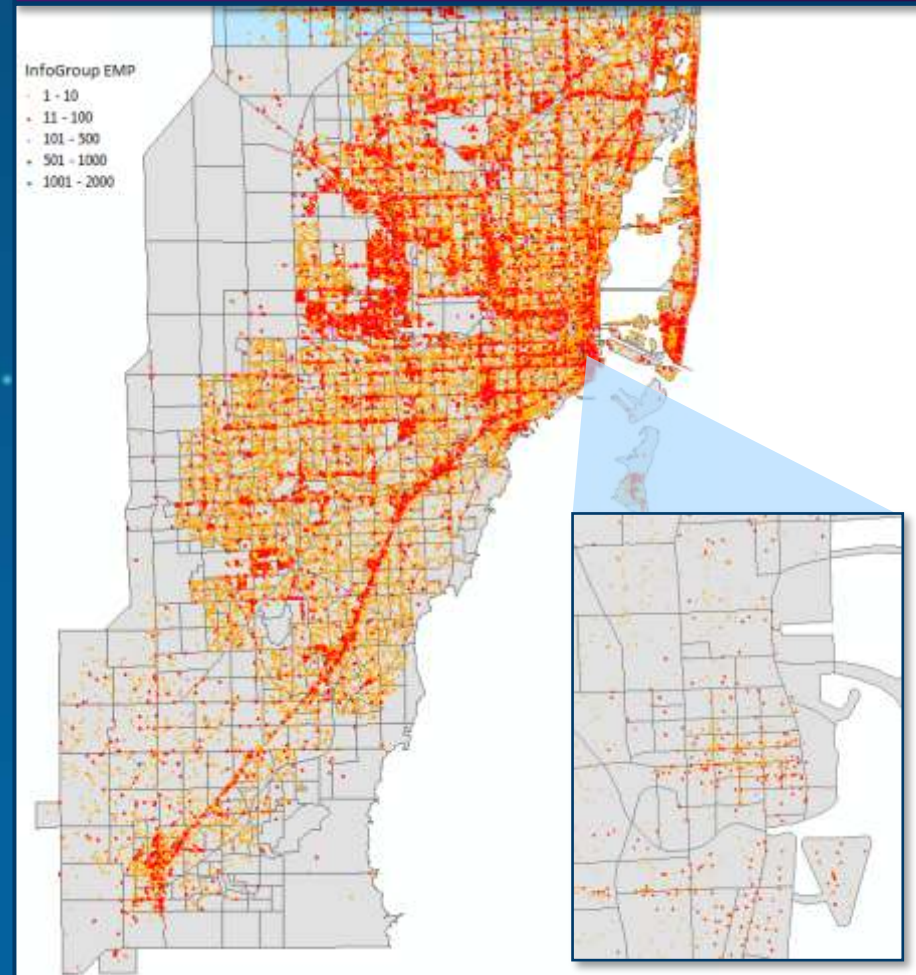
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Develop NAICS3 Employment (continued)

Broward County





Miami Dade County

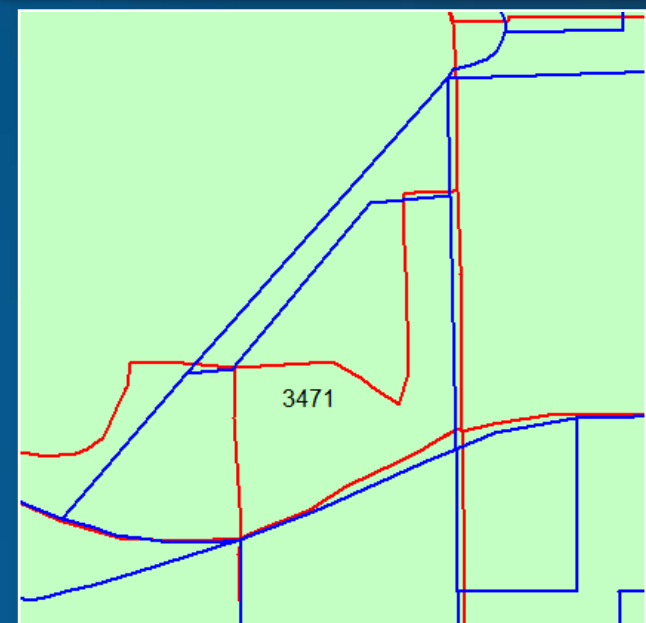
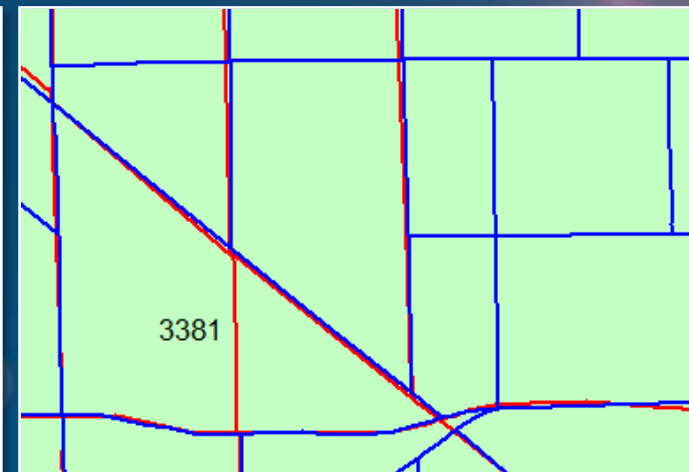


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Develop NAICS3 Employment (continued)

SWTAZ	NAME	Count
2502	2526	2
2505	2526	2
2779	2930	2
2785	2930	2
3759	2984	2
4400	2984	2
2515	3039	2
2517	3039	2
2776	3073	2
2781	3073	2
3526	3206	2
3527	3206	2
4684	3208	2
5004	3208	2
2553	3278	3
3538	3278	3
3541	3278	3
4980	3299	2
4981	3299	2
4996	3323	4
4997	3323	4
4998	3323	4
4999	3323	4
1767	3381	2
3573	3381	2
2541	3446	2
3989	3446	2
2455	3471	2
2560	3471	2

 SERPM TAZ
 FLSWM TAZ



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Develop NAICS3 Employment (continued)

InfoGroup Employment Attached into SERPM TAZ Table (example)

SERPM TAZ	ID2	NAICS code	EMP	FID_INFORG
114	0114333	333	15	87377
114	0114561	561	3	87147
114	0114561	561	1	86501
114	0114813	813	2	87458
114	0114541	541	1	86648
114	0114493	493	3	98111
114	0114811	811	1	86675
114	0114445	445	3	86679
114	0114811	811	2	87155
114	0114811	811	2	87537
114	0114812	812	2	86816
114	0114441	441	5	96115
114	0114444	444	9	86750
114	0114811	811	4	96253
114	0114531	531	3	97090
114	0114423	423	7	97486
114	0114423	423	7	97487
114	0114722	722	3	97866
114	0114327	327	10	86476
114	0114517	517	2	87262
114	0114517	517	50	87955
114	0114722	722	20	86674
114	0114522	522	1	96492
114	0114811	811	2	86507
114	0114811	811	1	86895
114	0114811	811	5	86923
114	0114339	339	2	87722
114	0114811	811	2	87825

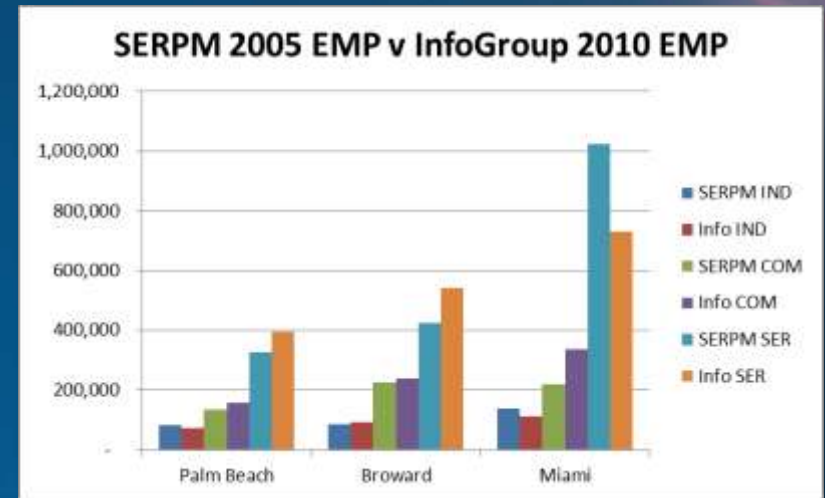
Processed SERPM TAZ with NAICS Classified Employment (example)

TAZ	NAIC S 111	NAIC S 212	NAIC S 311	NAIC S 312	NAIC S 313	NAIC S 314	NAIC S 315	NAIC S 316	NAIC S 321	NAIC S 322	NAIC S 323	NAIC S 324	NAIC S 325
113	0	6	1	550	0	6	4	0	45	21	7	0	37
114	0	0	0	0	0	0	0	0	0	0	0	0	0
115	0	0	0	0	0	0	0	0	0	25	0	0	0
116	0	0	0	0	0	0	0	0	0	0	0	0	0
117	0	0	0	0	0	0	0	0	0	0	0	0	0
118	0	0	0	0	0	0	0	0	0	0	0	0	0
119	0	0	0	0	0	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0	0	0	0	0	3
121	0	0	0	0	0	0	0	0	0	0	0	0	0
122	0	0	0	0	0	0	0	0	0	0	0	0	0
123	0	0	0	0	0	0	0	0	0	0	0	0	0
124	0	0	0	0	0	0	0	0	0	0	2	0	0
125	0	0	1	0	0	0	0	0	0	0	15	0	0
126	0	0	0	0	0	0	0	0	0	0	9	0	0
127	0	0	0	0	0	0	0	0	0	0	0	0	0
128	0	0	0	0	0	0	0	0	0	0	0	0	0
129	0	0	0	0	0	0	0	0	0	0	0	0	0
130	0	0	0	0	0	6	11	0	0	0	28	0	0
131	0	0	0	0	0	0	0	0	0	0	0	0	0
132	0	0	0	0	0	0	0	0	0	0	0	0	0
133	0	0	0	0	0	0	0	0	0	0	0	0	0
134	0	0	0	0	0	0	0	0	0	0	0	0	200
135	0	0	52	0	0	0	0	0	50	0	0	0	0
136	0	0	205	0	0	5	0	0	0	9	25	0	60

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Examine NAICS3 Employment (continued)

County		Industrial EMP	Commercial EMP	Service EMP	Total EMP
Palm Beach	2005 SERPM	82,224	134,043	328,069	544,336
	2010 InfoGrp	73,125	157,689	395,014	625,828
Broward	2005 SERPM	85,577	227,239	422,934	735,750
	2010 InfoGrp	93,291	240,061	541,552	874,904
Miami	2005 SERPM	138,809	219,474	1,021,843	1,380,126
	2010 InfoGrp	113,499	335,325	730,845	1,179,669



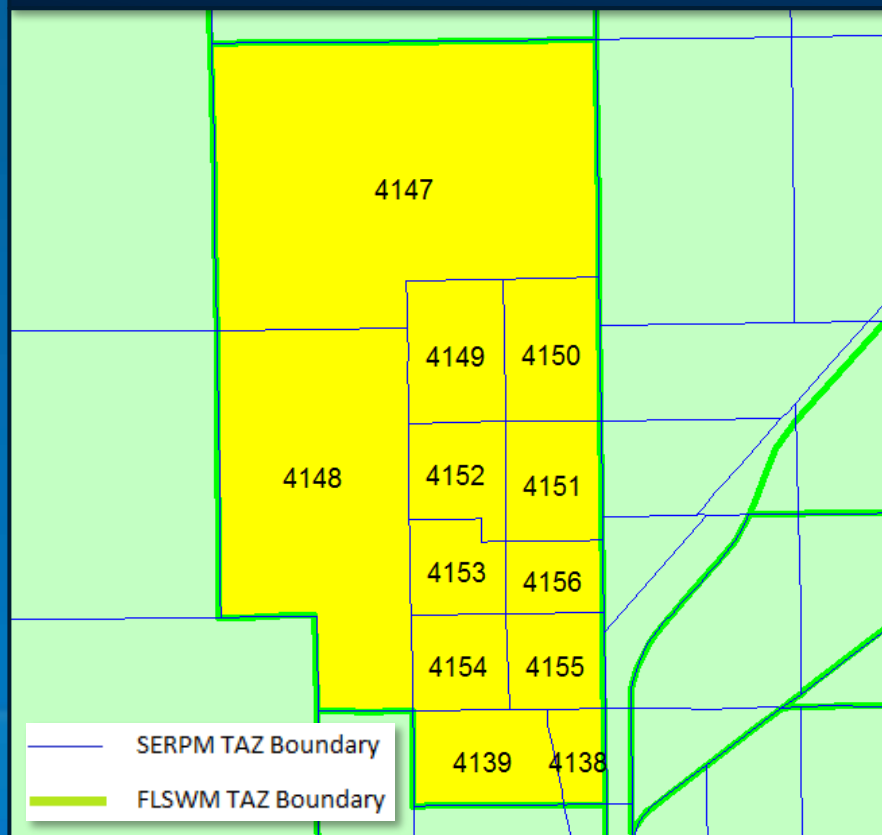
- Miami-Dade service employment variation could be due to
 - » The service sector includes much uncovered (by ES202) employment, particularly government, part-time, and sole proprietor employees. This employment is likely in SERPM but not in InfoGroup
 - » Recent economic downturn
- Since employees are only used to develop SHARES of SERPM TAZ to FLSWM TAZ, it is reasonable to think these shares are close enough

SERPM Commodity Flow Disaggregate (CFD) Tool

Develop Model Crosswalk

Allocation by Area Percentage Equivalence

FLSWM TAZ 4449 Overlaps with a Total of 12 SERPM TAZs



SERPM TAZ and FLSWM TAZ Geo-relationship Table

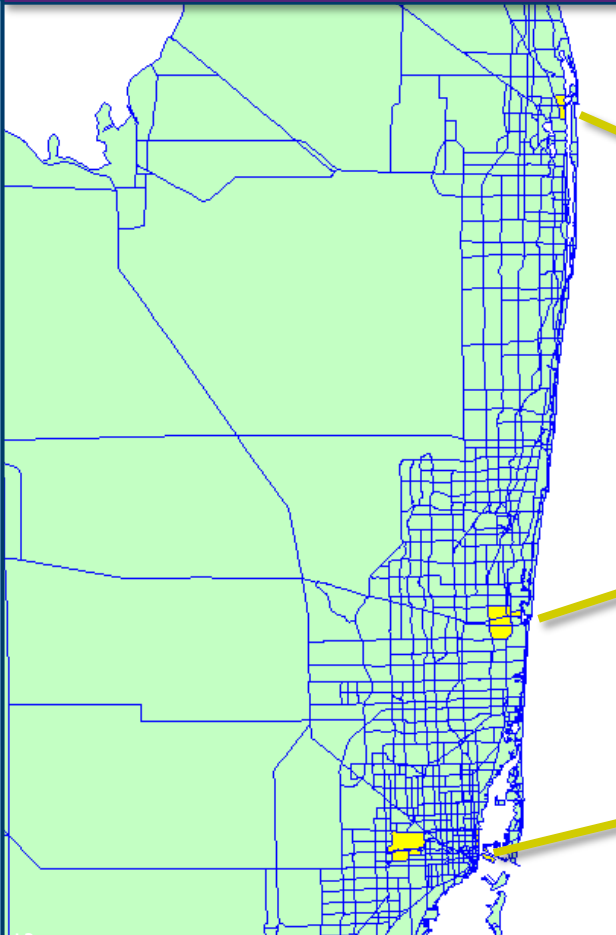
SERPM TAZ	SWM TAZ
4138	4449
4139	4449
4140	4765
4141	4765
4142	4442
4143	4442
4144	4442
4145	4442
4146	4448
4147	4449
4148	4449
4149	4449
4150	4449
4151	4449
4152	4449
4153	4449
4154	4449
4155	4449
4156	4449

SERPM Commodity Flow Disaggregate (CFD) Tool

Convert Special Generators

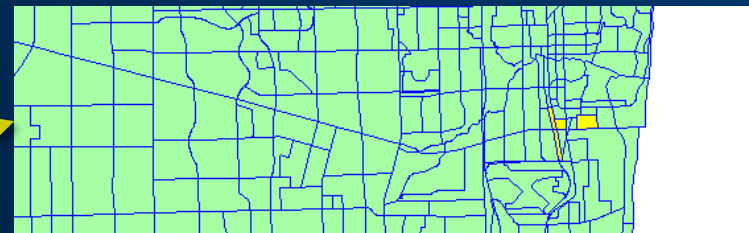
Transfer Special Generators from FSWFM TAZs to SERPM TAZs

**FLSWM Special
Generator TAZs**



**SERPM Special
Generator TAZs**

Special generator TAZs are manually matched to the most likely cargo facility TAZs



SERPM Commodity Flow Disaggregate (CFD) Tool

Extrapolate 2010 SG Tonnage

Extrapolated 2010 Special Generator Tonnages

SWM TAZ	SERPM TAZ	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14
1298	147	80055.6	4184.8	0	1175311	34419.2	15138.6	14576	39404	5920.8	50361.4	212676	0	8139.2	156864.8
1256	148	23362.4	1221.6	0	342982.6	10044.4	4417.8	4253.4	11498.8	1727.6	14696.2	62063.2	0	2375	45777
5037	2121	46338.8	485234.8	1838	181106.6	143113.4	30914.4	90650	88381.4	182315.8	346933.6	1389089	14334.2	38295.2	1051500
2820	2125	31.2	0	0	21	191.2	0	40	14.8	6.6	577.6	0	0	739.2	1262.8
3561	2126	2616.8	27400	103.8	10226.6	8081.2	1745.6	5118.8	4990.6	10294.8	19590.4	78438	809.4	2162.4	59375.4
2821	2381	2777	0	0	1844.6	17039.6	0	3564.8	1323.6	614.2	51474.4	0	0	65868.8	112477
5038	2633	2600.4	27229	102.8	10162.4	8030.8	1734.4	5087	4959.2	10230.6	19467.6	77947.6	804.6	2148.8	59004.2
4683	3207	31809	890.8	0	83956.6	38402.4	6780.8	6030.6	14270.2	27893.8	51695.4	15024.6	0	10582.8	21119.8
5000	3210	37670.2	26951.2	573	152629.4	69025	12283.4	47716	54859.2	203127.2	190693.8	224275	3964.2	28193.2	774693.2
5001	3221	104373.8	74674	1589.2	422896.6	191250.2	34034.2	132209.8	152001.4	562813.4	528363	621406.6	10982.6	78116.6	2146471
4360	3400	16634.6	0	0	44530.6	131950.6	0	21359.2	59061.4	7422	422657.6	0	0	420045.8	802753.6
2560	3471	256.4	0	0	687	2036.6	0	329.6	911.8	114.8	6523.8	0	0	6484	12390.8
2454	3473	1107.4	0	0	2965	8786.6	0	1422.6	3933	494	28144.6	0	0	27970.6	53455.8
3895	3489	2911.6	0	0	7794.2	23094.6	0	3738	10336.6	1298.6	73974.4	0	0	73517.4	140499.4
2453	3499	309.8	0	0	829.2	2457.8	0	397.8	1099.8	138.2	7872.2	0	0	7823.2	14951.2

SWM TAZ	SERPM TAZ	A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14
1298	147	3857.8	4184.8	0	67039.4	34419.2	0	0	43595.6	1046270	7951.8	212676	0	8139.2	1409265
1256	148	1126.2	1221.6	0	19563.6	10044.4	0	0	12722.4	305325.2	2320.4	62063.2	0	2375	411255.6
5037	2121	44174.6	484804.8	1838	406912	231931.4	35581	13634.6	44804.4	9447255	274463.2	1381767	14334.2	38295.2	904720.4
2820	2125	31.4	0	0	21.4	194.2	0	41.6	14.2	7.4	591	0	0	744.6	1240
3561	2126	2494.4	27375.6	103.8	22977.2	13096.6	2009.2	770	2530	533460.6	15498.2	78024.6	809.4	2162.4	51087
2821	2381	2803.6	0	0	1874	17320.2	0	3710.4	1271.8	623.2	52635	0	0	66299.6	110444.6
5038	2633	2479	27204.6	102.8	22833.6	13015	1996.8	764.8	2513.8	530126.8	15401.2	77537.2	804.6	2148.8	50768
4683	3207	4104.4	890.8	0	0	16075.2	0	0	0	3599.2	940.4	15024.6	0	10582.8	232943.2
5000	3210	33374.2	26951.2	573	283745.4	128847	22110	26909.4	33317.6	332074.2	246388.8	224275	3964.2	28193.2	564877.2
5001	3221	92471.8	74674	1589.2	786184.8	357000	61261.6	74560.4	92315	920091.2	682678.2	621406.6	10982.6	78116.6	1565129
4360	3400	324379.2	0	0	155855.6	230913.4	0	4272	6644.2	0	80689.2	0	0	420045.8	696193.4
2560	3471	5007.4	0	0	2405.4	3564.6	0	65.8	102.2	0	1245.4	0	0	6484	10746
2454	3473	21600.6	0	0	10378.6	15376.8	0	284.6	442.4	0	5373.2	0	0	27970.6	46360
3895	3489	56774	0	0	27278.4	40415	0	748	1162.6	0	14122.4	0	0	73517.4	121849.4
2453	3499	6041.4	0	0	2903	4301.2	0	79.8	123.8	0	1503	0	0	7823.2	12966.6

SERPM Commodity Flow Disaggregate (CFD) Tool

Convert Truck CG Ps and As

SERPM Zonal Production/Attraction Calculation

Example Formulas to Calculate P/A by 14 Commodity Groups

```
p[1]=993.05*(WORKGT150*GFAC) ;Agricultural
p[2]=6994.33*(NAICS212*GFAC) ;Nonmetallic Minerals
p[3]=0 ;Coal-No Production in Florida
p[4]=(314.18*(NAICS311*GFAC))+(1357.94*(NAICS312*GFAC))
p[5]=(42.91*((NAICS321+NAICS322+NAICS323+NAICS324+NAICS325)*GFAC))
p[6]=562.93*(NAICS321*GFAC) ;Lumber
p[7]=(542.78*(NAICS325*GFAC))+(2073.03*(NAICS321*GFAC))
p[8]=(266.31*(NAICS322*GFAC))+(396.15*(NAICS321*GFAC))
p[9]=(5037.30*(NAICS324*GFAC))+(252.53*(NAICS325*GFAC))
p[10]=(62.00*((NAICS331+NAICS332+NAICS333+NAICS334+NAICS335)*GFAC))
p[11]=3636.98*(NAICS327*GFAC) ;Clay, Concrete, Glass
p[12]=1.43*ZI.2.TOT_EMP ;Waste
p[13]=224.32*((NAICS481+NAICS483+NAICS484)*GFAC) ;Miscellaneous
p[14]=247.40*((NAICS423+NAICS424)*GFAC) ;Warehousing
```

SERPM TAZ Productions by Commodity Group Tonnage

TAZ	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12
1	0	0	0	0	0	0	0	0	0	310	0	129
2	0	0	0	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0	0	0	177
4	0	0	0	0	0	0	0	0	0	0	0	143
5	0	0	0	0	0	0	0	0	0	0	0	729
6	0	0	0	0	0	0	0	0	0	6	0	295
7	0	0	0	0	0	6	0	0	0	4	0	722
8	0	0	0	0	0	0	0	0	0	1	0	535
9	0	0	0	0	0	0	0	0	0	0	0	236
10	0	0	0	0	0	0	0	0	0	0	0	63
11	0	0	0	0	0	0	0	0	0	0	0	14
12	0	0	0	0	0	0	0	0	0	0	0	14
13	0	0	0	0	0	0	0	0	0	20	0	1085
14	0	0	0	0	0	0	0	0	0	0	0	220
15	0	0	0	0	0	0	0	0	0	0	0	235
16	0	0	0	0	0	0	0	0	0	0	0	14
17	0	0	0	0	0	0	0	0	0	36	0	196
18	0	0	0	0	0	0	0	0	0	0	0	31
19	0	0	0	0	0	0	0	0	0	0	0	255
20	3972	0	0	19	43	6	23	9	0	69	31	2198
21	0	0	0	0	14	0	0	0	0	5	0	553
22	0	0	0	0	0	0	0	0	0	0	0	440
23	0	0	0	4	0	0	0	0	0	0	0	203
24	0	0	0	0	8	0	0	0	0	4	0	96
25	0	0	0	0	2	0	0	0	0	2	0	202
26	0	0	0	0	0	0	0	0	0	1	0	43
27	0	0	0	0	0	0	0	0	0	0	0	240
28	0	0	0	0	0	0	0	0	0	0	0	4
29	0	0	0	0	0	0	0	0	0	0	0	1
30	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	216

+ Freight special generators

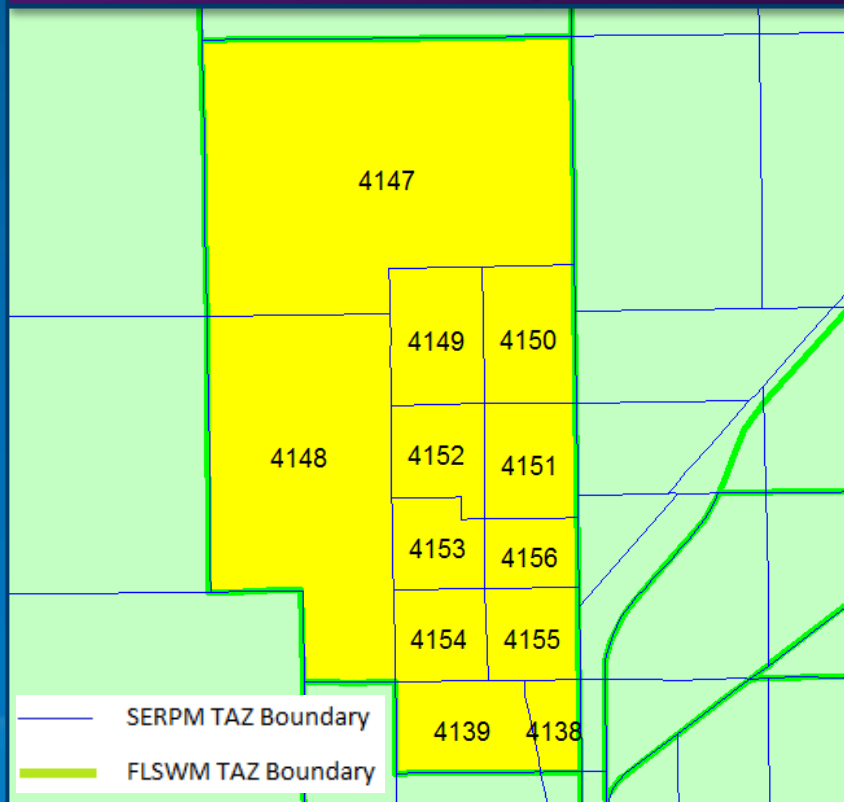
Develop P/A total for all SERPM TAZs by 14 Commodity Groups

SERPM Commodity Flow Disaggregate (CFD) Tool

Convert Truck CG Ps and As

Allocation by P/A Percentage Equivalence

Combined with the Geo-relationship Table



Example of Allocating by Commodity Group I Production Equivalency

SERPM TAZ	FLSWM TAZ	Zonal Production of Commodity Group I (ton)	FLSWM TAZ Production Percentage to SERPM
4138	4449	0	0.00%
4139	4449	0	0.00%
4147	4449	23833	33.80%
4148	4449	5958	8.45%
4149	4449	0	0.00%
4150	4449	0	0.00%
4151	4449	0	0.00%
4152	4449	1986	2.82%
4153	4449	29791	42.25%
4154	4449	8937	12.68%
4155	4449	0	0.00%
4156	4449	0	0.00%
Total		70506	100%

SERPM Commodity Flow Disaggregate (CFD) Tool

Trip Table Expansion

Using the P/A percentage allocation between FLSWM TAZ and SERPM TAZ to expand the trip table, per example below

	A	B
A	7	11
B	11	31

	P %	A %
1	10%	15%
2	20%	15%
3	30%	30%
4	40%	40%
5	35%	40%
6	65%	60%

SWM TAZ	SERPM TAZ
A	1
A	2
A	3
A	4
B	5
B	6

	A %	15%	15%	30%	40%	40%	60%
P %		1	2	3	4	5	6
10%	1	7*15%*10%	7*15%*10%	7*30%*10%	7*40%*10%	11*40%*10%	11*60%*10%
20%	2	7*15%*20%	7*15%*20%	7*30%*20%	7*40%*20%	11*40%*20%	11*60%*20%
30%	3	7*15%*30%	7*15%*30%	7*30%*30%	7*40%*30%	11*40%*30%	11*60%*30%
40%	4	7*15%*40%	7*15%*40%	7*30%*40%	7*40%*40%	11*40%*40%	11*60%*40%
35%	5	11*15%*35%	11*15%*35%	11*30%*35%	11*40%*35%	31*40%*35%	31*60%*35%
65%	6	11*15%*65%	11*15%*65%	11*30%*65%	11*40%*65%	31*40%*65%	31*60%*65%

	A %	15%	15%	30%	40%	40%	60%
P %		1	2	3	4	5	6
10%	1	0.11	0.11	0.21	0.28	0.44	0.66
20%	2	0.21	0.21	0.42	0.56	0.88	1.32
30%	3	0.32	0.32	0.63	0.84	1.32	1.98
40%	4	0.42	0.42	0.84	1.12	1.76	2.64
35%	5	0.58	0.58	1.16	1.54	4.34	6.51
65%	6	1.07	1.07	2.15	2.86	8.06	12.09

SERPM Commodity Flow Disaggregate (CFD) Tool

Trip Table Expansion (continued)

Initial Subarea Trip Table
Dimension 964 x 964

**910 TAZs, 15 External
Stations, 39 Dummy Zones**

**Merged Smaller
SWM TAZs and
Combined
External Stations**

Refined Subarea Trip Table
Shrunk to Dimension
911 x 911

**894 TAZs, 12 External
Stations, 5 Dummy Zones**

**With P/A split
percentage to expand
trip table**

Expand to SERPM Trip Table
Dimension 4,284 x 4,284

- During each matrix equivalence processing step, main challenge is to ensure that one not create or remove TAZ index
- Trip table total must always remain the same

SERPM Commodity Flow Disaggregate (CFD) Tool

Trip Table Expansion (continued)

Trip Totals Retained After Manipulation

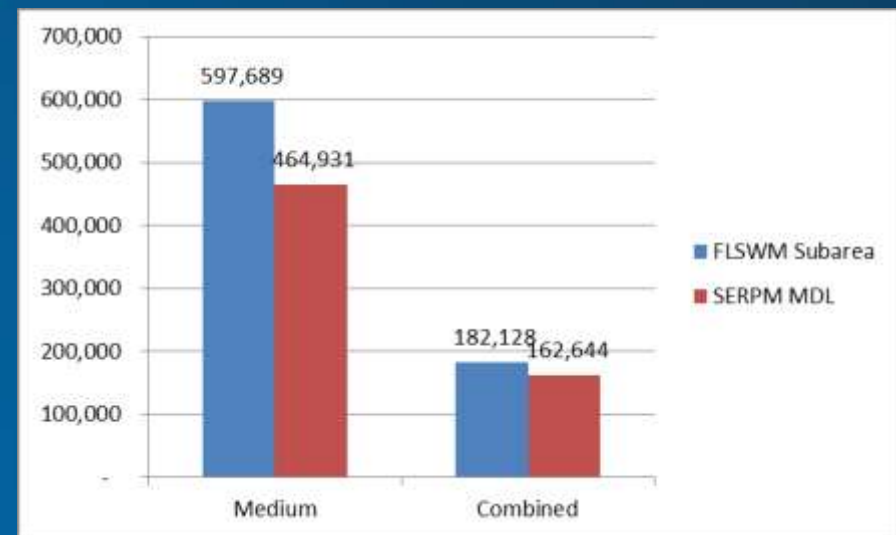
Trip Table	Commodity Group Category	Subarea (SWM)	Expanded (SERPM)	Percent
CG1	Agriculture	3000	2996	99.88%
CG2	Nonmetallic Minerals	0	0	
CG3	Coal - No Production in FL	0	0	
CG4	Food	3687	3677	99.73%
CG5	Non-Durable Manufacture	4605	4599	99.86%
CG6	Lumber	1127	1123	99.61%
CG7	Chemicals	3340	3338	99.95%
CG8	Other Durable Manufacture	961	956	99.50%
CG9	Paper	1747	1733	99.20%
CG10	Petroleum products	6225	6183	99.32%
CG11	Clay, Concrete, Glass	8200	8072	98.43%
CG12	Waste	1986	1964	98.90%
CG13	Miscellaneous Freight	0	0	
CG14	Warehousing	28208	27941	99.05%
All CGs	All Freight Trucks	63091	62587	99.20%
Heavy		126676	119540	94.37%

SERPM Commodity Flow Disaggregate (CFD) Tool

Trip Table Expansion (continued)

- Extracted subarea raw trip table and SERPM daily truck trip table comparison
- FSWFM classified trucks into light, medium, heavy and freight
- SERPM classified trucks into four-tire, single unit, and combo
- FSWFM Heavy + freight truck is equivalent to SERPM combo truck

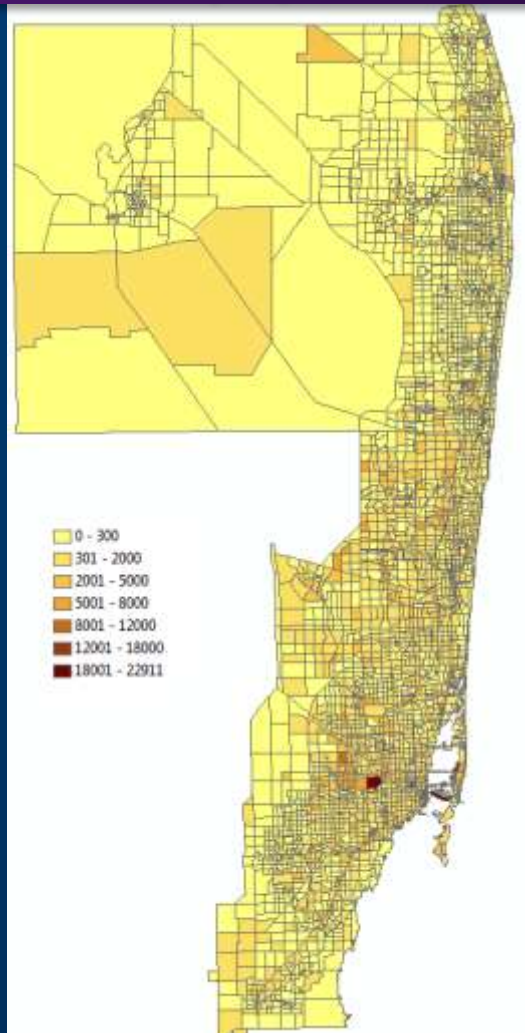
FLSWM Subarea Trips		SERPM MDL Trips	
Light	3,601,773		
Medium	597,689	4 Tire Trk	228,046
Heavy	119,541	Single Unit	464,931
Freight	2,587	Combo	162,644
Heav + Frei	182,128		



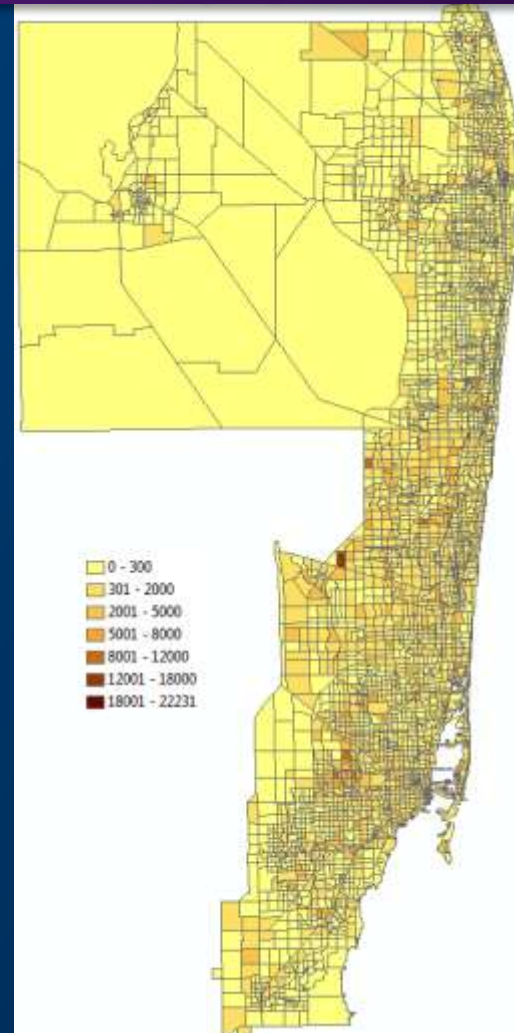
SERPM Commodity Flow Disaggregate (CFD) Tool

Trip Table Expansion (continued)

**SERPM Year 2005 Total
Employment**



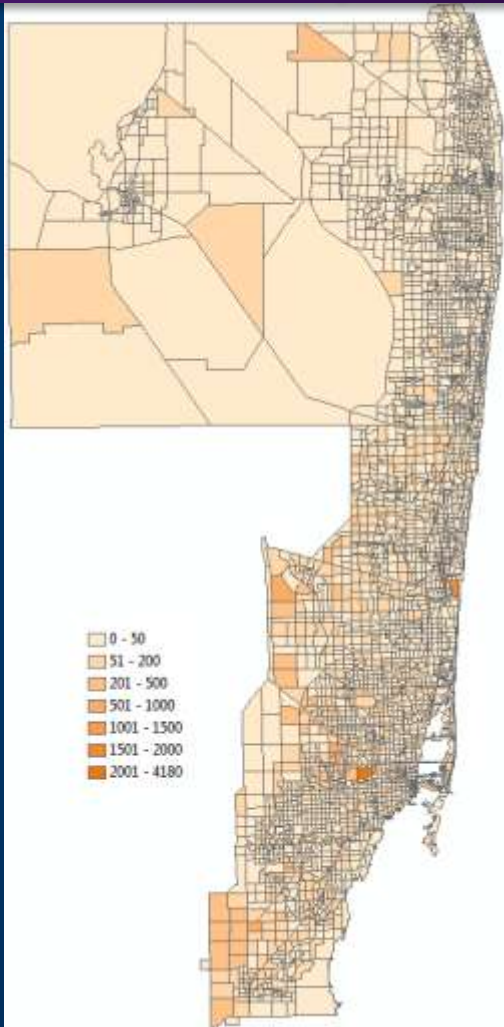
**InfoGroup Year 2010 Total
Employment**



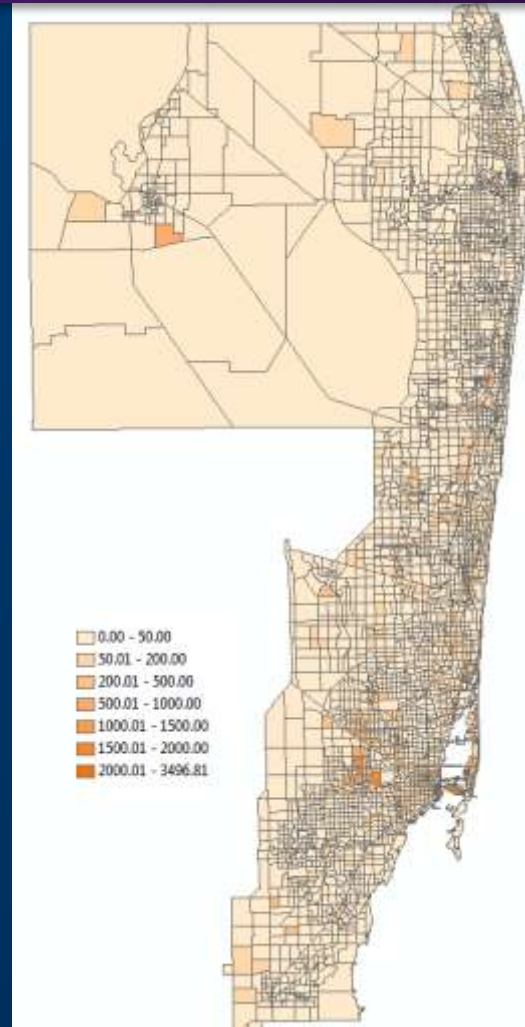
SERPM Commodity Flow Disaggregate (CFD) Tool

Trip Table Expansion (continued)

SERPM Combo Truck Trips



Subarea Extracted Freight + Heavy Truck Trips



SERPM Commodity Flow Disaggregate (CFD) Tool

Trip Table Expansion (continued)

- Merge subarea trip tables by TAZ if
 - » Single SERPM TAZ has more than one FLSWM TAZ
 - » Freeways entering and leaving external nodes merged as a single external station
- Expanded trip table has the same dimension as SERPM trip table
- Each table total trips remain the same before and after conversion
- Replaced the SERPM Combo truck table with the freight truck and heavy truck total 15 trip table, keeping the original SERPM medium and light truck trip table “as is”

SERPM Commodity Flow Disaggregate (CFD) Tool

Base Year Model Validation

SERPM 6.5.2E Base Year Validation Using SERPM 6.5.2.E Truck Counts

Group	Links Total	Volume Group	Allowable	RMSE
1	291	1- 500	60 - 160%	41.679%
2	453	500- 1,250	50 - 140%	27.453%
3	205	1,250- 2,500	44 - 94%	24.738%
4	151	2,500- 5,000	38 - 60%	15.344%
5	177	5,000- 10,000	32 - 42%	13.302%
6	4	10,000- 20,000	27 - 35%	6.272%
All	1,281	1-500,000	35 - 50%	22.040%

FTYPE	Links Total	Total Volume	Traffic Count	Vol/Cnt
FT= 1	213	1,392,733	1,331,669	1.05
FT= 2	48	43,142	41,440	1.04
FT= 4	761	761,417	707,521	1.08
FT= 6	102	63,796	59,085	1.08
FT= 7	14	9,285	16,367	0.57
FT= 8	14	36,200	22,164	1.63
FT= 9	129	503,587	460,774	1.09
FT=100	1,281	2,810,160	2,639,020	1.06

ATYPE	Links Total	Total Volume	Traffic Count	Vol/Cnt
AT= 1	40	36,369	37,317	0.97
AT= 2	95	212,985	223,800	0.95
AT= 3	455	1,013,993	966,086	1.05
AT= 4	616	1,444,534	1,314,656	1.10
AT= 5	75	102,279	97,161	1.05
AT=100	1,281	2,810,160	2,639,020	1.06

SERPM 6.5.2E Base Year Validation Using FTI Truck Counts

Combination	Links Total	Volume Group	Allowable	RMSE
1	783	1-500	60-160%	86.81%
2	113	500-1,250	50-140%	51.38%
3	17	1,250-2,500	44-94%	66.49%
4	2	2,500-5,000	38-60%	17.95%
5				
All	915	1-500,000	35-50%	85.76%

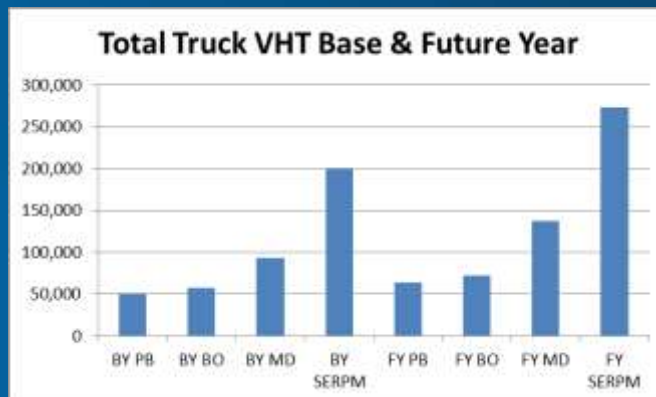
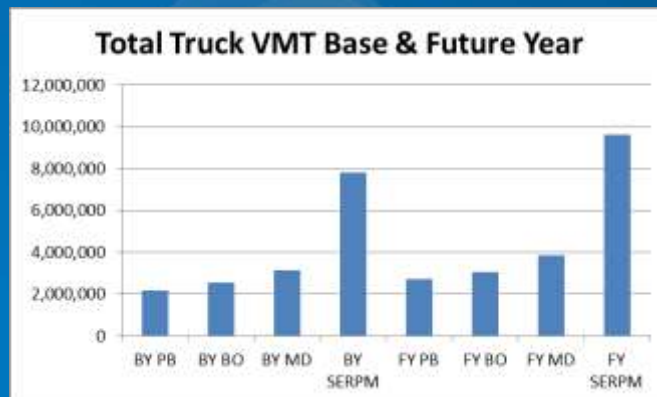
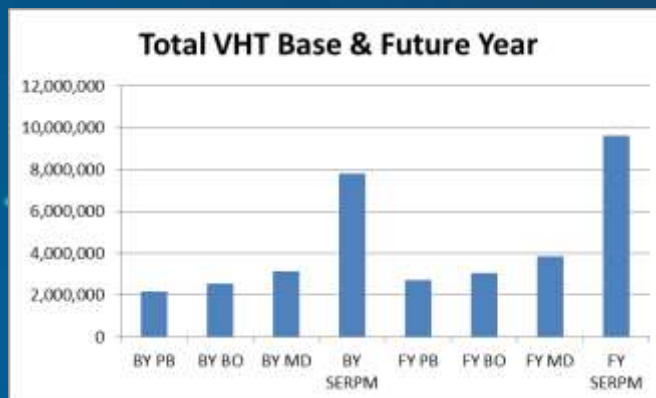
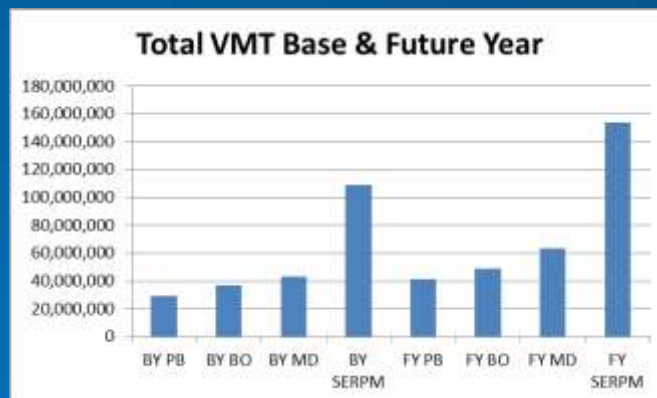
FTYPE	Links Total	Combination Truck Volume	Combination Truck Count	Vol/Cnt
FT= 1	7	10,069	14,492	0.69
FT= 2	64	21,130	30,228	0.70
FT= 4	764	214,259	204,201	1.05
FT= 6	78	12,664	10,804	1.17
FT= 8				
FT= 9	2	471	2,264	0.21
FT= 100	915	258,593	261,988	0.99

SERPM Commodity Flow Disaggregate (CFD) Tool

Growth in Trucks (2005-2035)

All Vehicle Statistics	SERPM 6.5.2 E Base Year				SERPM 6.5.2 E Future-Year Baseline			
	Palm Beach	Broward	Miami Dade	All Area	Palm Beach	Broward	Miami Dade	All Area
Average (Directional) Volumes of All Links	10,879	15,665	13,349	13,173	14,147	20,172	18,360	17,526
Total VMT All Links	29,057,883	36,899,602	43,246,999	109,204,485	41,306,851	49,233,948	63,465,358	154,006,157
Total VHT All Links	725,919	929,973	1,318,028	2,973,920	1,031,882	1,274,494	2,398,423	4,704,800

Truck Statistics	SERPM 6.5.2 E Base Year				SERPM 6.5.2 E Future-Year Baseline			
	Palm Beach	Broward	Miami Dade	All Area	Palm Beach	Broward	Miami Dade	All Area
Average (Directional) Volumes of All Links	716	1,005	942	889	865	1,193	1,069	1,038
Total VMT All Links	2,156,792	2,527,620	3,121,593	7,806,005	2,733,368	3,071,631	3,832,956	9,637,956
Total VHT All Links	49,414	57,136	93,096	199,646	63,602	71,936	137,715	273,253



SERPM Commodity Flow Disaggregate (CFD) Tool

Assign SERPM Truck Trips

- Original SERPM combination truck trip table was disaggregated into 15 trip tables
 - » 14 commodity groups and 1 non-freight truck trip table (SU)
- Use disaggregated trip table in SERPM to run assignment step
- *Due to a Cube limitation of 20 assignment classes, select link analysis cannot report all CG trucks in a single assignment run*

**Base Year 2005
Heavy Trucks**



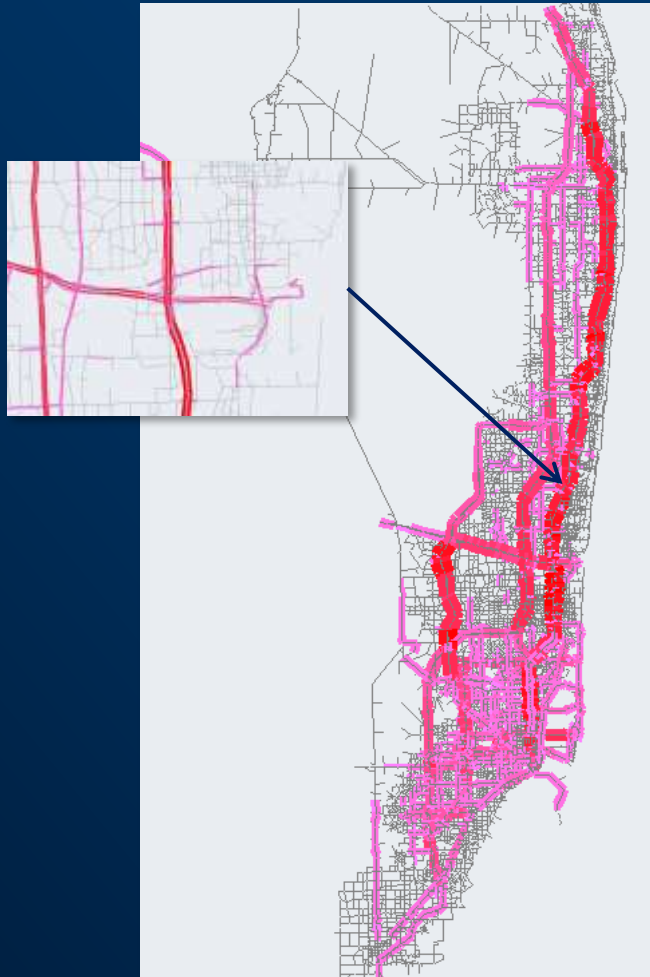
**Future Year 2035
Heavy Trucks**



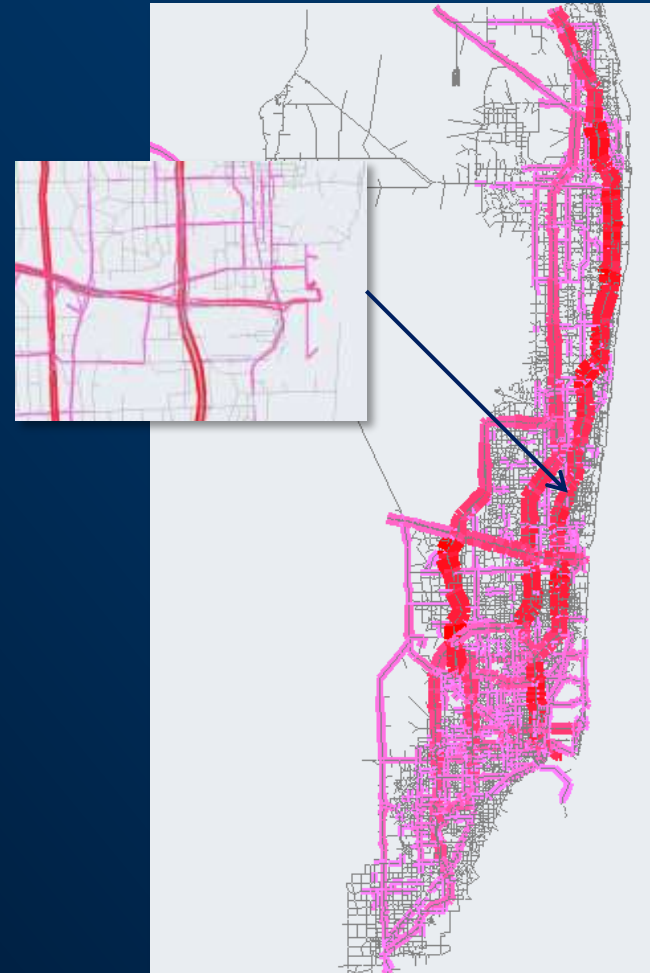
SERPM Commodity Flow Disaggregate (CFD) Tool

Total Truck Comparison (2005-2035)

Year 2005 Truck Volume



Year 2035 Truck Volume



SERPM Commodity Flow Disaggregate (CFD) Tool

Single Unit Trucks (2005-2035)

Base Year



Future Year



Southeast Florida Statewide Freight Model Disaggregation

Growth in Warehousing Trucks

Base Year



Future Year



SERPM Commodity Flow Disaggregate (CFD) Tool

Future Year Sensitivity Test

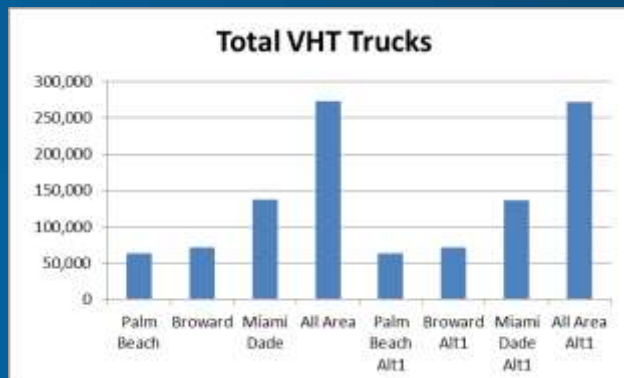
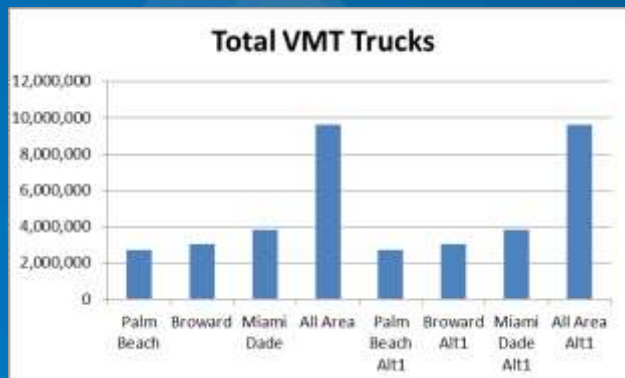
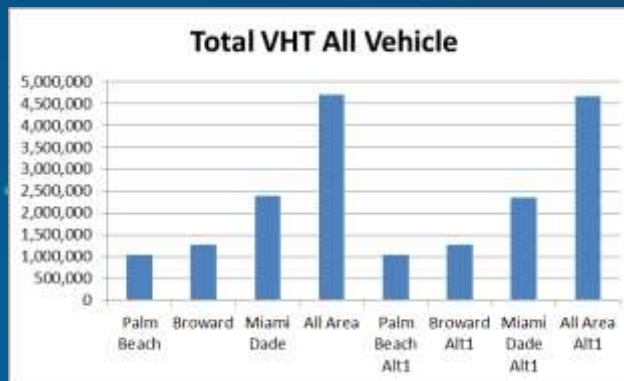
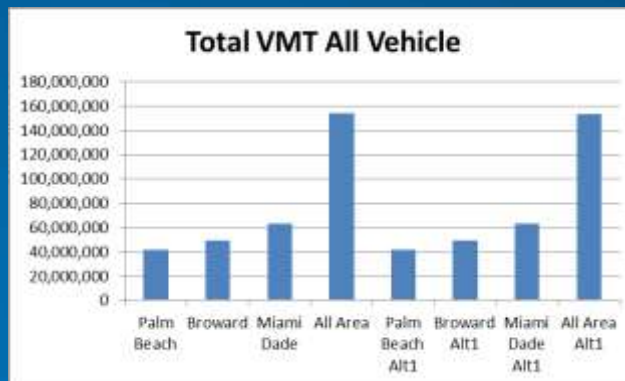
- Doubling employment at Port Everglades (TAZ 2419)
 - » Doubling employment at TAZ 2419
 - » Doubled zonal employment:
 - Industrial = from 164 to 328
 - Commercial = from 195 to 390,
 - Service = from 1,723 to 3,446
 - » Change by commodity group in bandwidth map hard to distinguish; *prefer display of total truck volume difference map*
- Countywide statistics not significantly changed
 - » Change too small for difference in truck trips at county level
 - » Increase is visible at zonal level from network comparison

SERPM Commodity Flow Disaggregate (CFD) Tool

Future Year Sensivity Test (continued)

All Vehicle Statistics	SERPM 6.5.2 E Future-Year Baseline				Future-Year Alt by Doubling Port of Everglades Employment			
	Palm Beach	Broward	Miami Dade	All Area	Palm Beach	Broward	Miami Dade	All Area
Average (Directional) Volumes of All Links	14,147	20,172	18,360	17,526	14,145	20,184	18,259	17,483
Total VMT All Links	41,306,851	49,233,948	63,465,358	154,006,157	41,306,221	49,263,710	63,137,119	153,707,050
Total VHT All Links	1,031,882	1,274,494	2,398,423	4,704,800	1,031,401	1,275,593	2,349,209	4,656,203

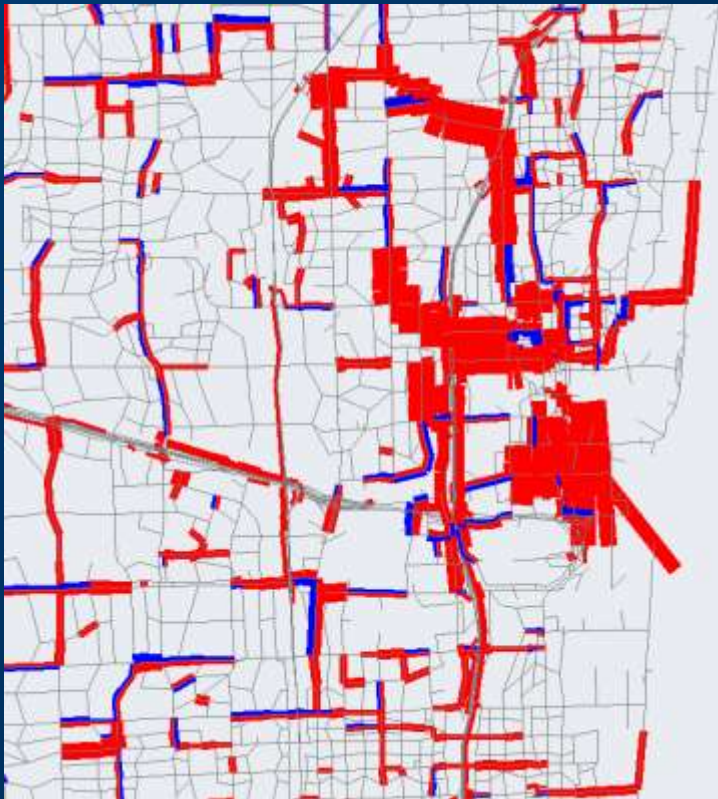
Truck Statistics	SERPM 6.5.2 E Future-Year Baseline				Future-Year Alt by Doubling Port of Everglades Employment			
	Palm Beach	Broward	Miami Dade	All Area	Palm Beach	Broward	Miami Dade	All Area
Average (Directional) Volumes of All Links	865	1,193	1,069	1,038	865	1,193	1,066	1,036
Total VMT All Links	2,733,368	3,071,631	3,832,956	9,637,956	2,733,392	3,070,031	3,822,910	9,626,333
Total VHT All Links	63,602	71,936	137,715	273,253	63,597	71,964	135,910	271,471



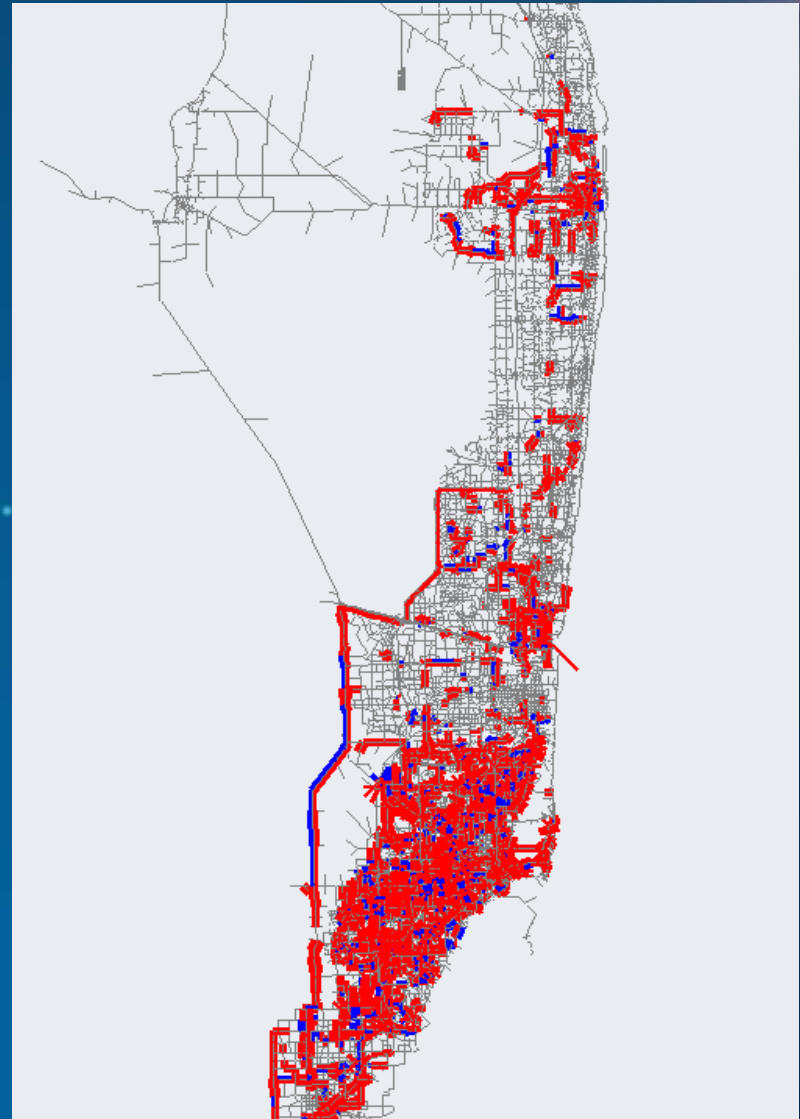
SERPM Commodity Flow Disaggregate (CFD) Tool

Future Year Sensitivity Test (continued)

2035 Baseline versus Alternative Sensitivity Test (Port Everglades)



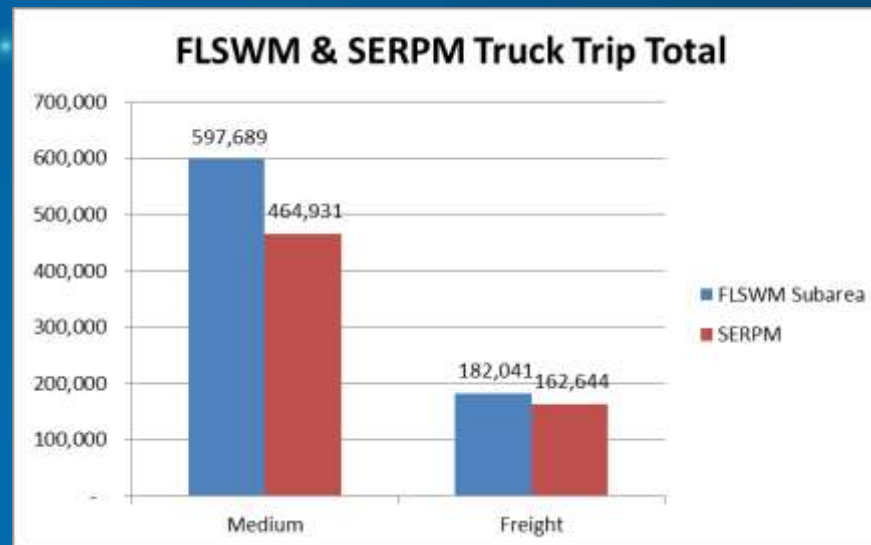
Blue is decrease; Red is increase



SERPM Commodity Flow Disaggregate (CFD) Tool

Variations on Disaggregation Approach

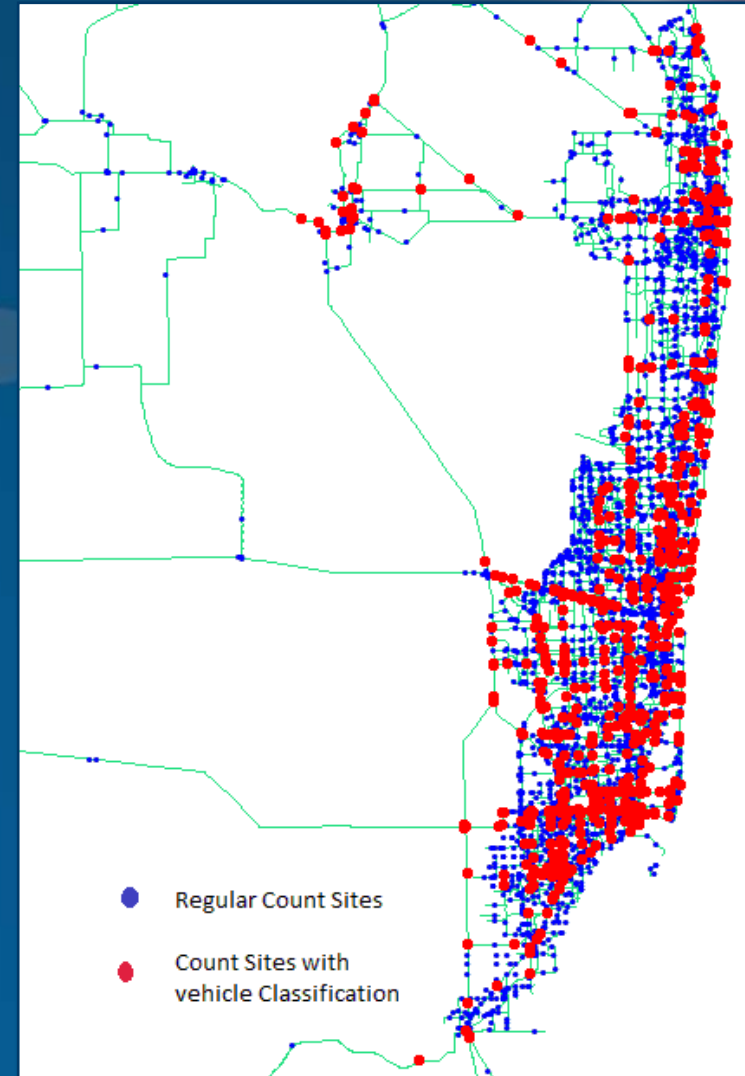
- Disaggregation of statewide model truck trip tables rather than SWM commodity proportions in regional models
 - » Result would be fixed trip tables for base and future conditions
 - » SWM would have to be executed for changing conditions
 - » Disaggregation would have to be redone for new trip tables
- Stick with commodity disaggregation and apply adjustment factors to improve truck assignments relative to counts



SERPM Commodity Flow Disaggregate (CFD) Tool

Potential Refinements to Approach

- Use statewide freight model trip rates in regional model
 - » Would require additional truck trip purposes in regional model
 - » Would require additional categories of SERPM NAICs employment data
 - » Consider adding statewide network to regional model; achieve dynamic external forecasts
- Cube assignment refinements to simultaneously run 20+ “purposes”?
- Additional validation of truck loadings against truck GPS or other observed origin/destination database
- More truck classification counts



Questions and Discussion

