



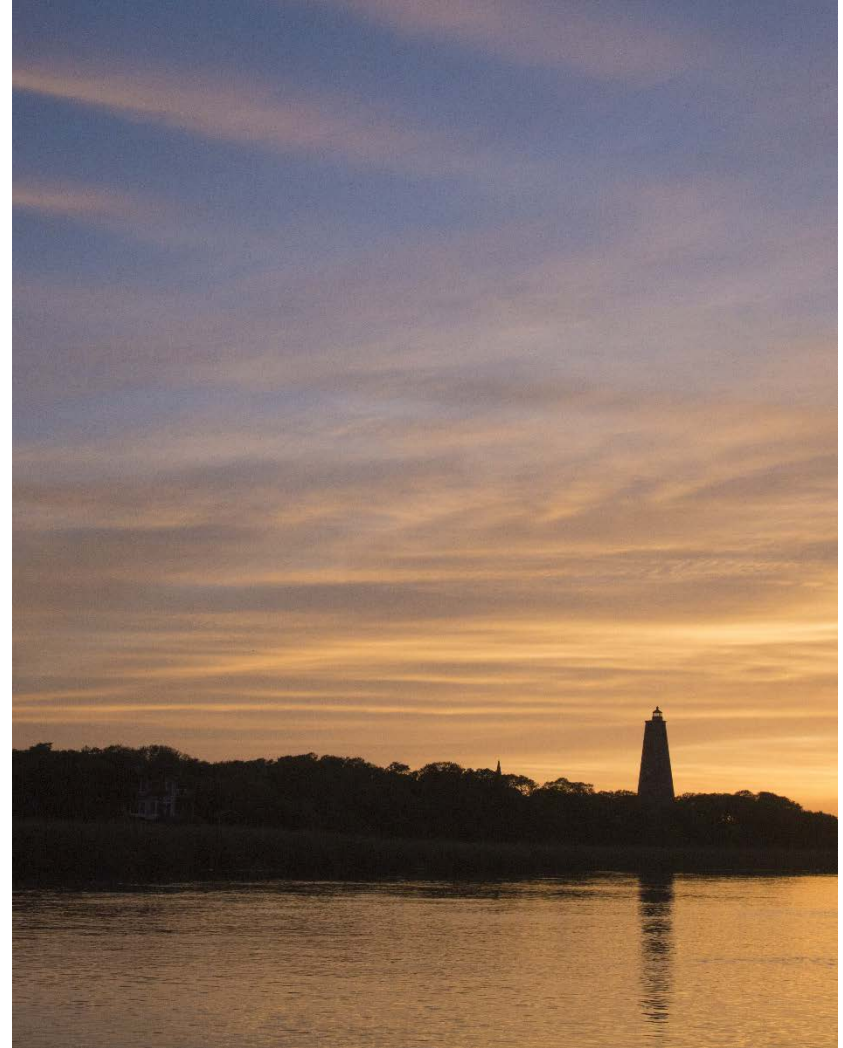
NCAMPO 2016 Conference

*Consideration of Tourism Impacts
in Long-Range Planning*

Kent Taylor, PE; Leta F. Huntsinger, PhD, PE;
Matt Quesenberry; Kerry Morrow, Pam R. Cook, PE



*From our mountains to our beaches and all the
places in between*



Tourism in North Carolina

FAST FACTS 2014 Impact of Visitor Spending

- Tourism is one of North Carolina's largest industries. In 2014, **domestic travelers spent \$21.3 billion** across the state, a 5.4% increase from 2013, and a record high visitor spending figure.*
- North Carolina ranks **sixth** in total person-trip volume by state behind California, Florida, Texas, New York, and Pennsylvania
- Domestic tourism expenditures directly supported **204,832 jobs** for North Carolina residents, up 3% from 2013 and a record high employment figure.*
- The tourism industry contributed **\$4.9 billion** to the state's payroll in 2014.*
- Traveler spending generated over **\$3.2 billion** in tax receipts: * \$1.5 billion in federal, \$1.1 billion in state and \$636.1 million in local tax revenue.

Sources: TNS TravelsAmerica, 2015 The 2014 Economic Impact of Travel on North Carolina Counties, US Travel Association, 2015*



Direct Level of Visitor Spending in NC

<http://partners.visitnc.com/research-3/economic-impact/teim.html>

County	Expenditures	Payroll	Employment	State Tax Receipts	Local Tax Receipts	Savings
	\$(millions)	\$(millions)	(thousands)	\$(millions)	\$(millions)	\$(millions)
MECKLENBURG	\$4,891.86	\$1,615.29	48.33	\$223.27	\$117.85	\$336.65
WAKE	\$2,006.23	\$616.87	21.14	\$93.24	\$52.65	\$148.06
GUILFORD	\$1,263.64	\$306.87	12.76	\$63.24	\$28.26	\$178.60
DARE	\$1,019.30	\$207.24	12.3	\$47.06	\$45.15	\$2,606.54
BUNCOMBE	\$963.00	\$204.66	10.23	\$47.27	\$30.86	\$310.97
FORSYTH	\$785.26	\$131.12	6.38	\$44.87	\$14.19	\$162.12
DURHAM	\$699.76	\$141.16	7.97	\$36.10	\$23.16	\$202.83
NEW HANOVER	\$507.90	\$113.27	5.68	\$23.82	\$20.11	\$202.45
BRUNSWICK	\$496.32	\$91.36	5.19	\$22.19	\$29.75	\$440.72
CUMBERLAND	\$490.18	\$89.15	4.29	\$25.48	\$10.22	\$108.39
MOORE	\$438.92	\$96.76	5.39	\$21.66	\$12.83	\$370.63
CABARRUS	\$400.03	\$87.06	4.19	\$22.03	\$6.92	\$151.52
CARTERET	\$324.72	\$57.21	3.2	\$14.12	\$18.84	\$475.08
NASH	\$265.32	\$50.58	2.86	\$13.46	\$7.12	\$217.72
HENDERSON	\$246.41	\$43.27	2.12	\$10.79	\$10.41	\$191.16
CATAWBA	\$241.87	\$43.00	2.19	\$12.88	\$7.09	\$128.15
GASTON	\$234.24	\$36.42	1.82	\$12.94	\$3.80	\$79.46
IREDELL	\$226.54	\$34.50	1.76	\$12.05	\$6.83	\$112.96
WATAUGA	\$225.77	\$48.90	2.57	\$10.90	\$8.73	\$370.95
ONSLow	\$217.29	\$39.40	1.75	\$11.02	\$8.11	\$99.01
JOHNSTON	\$214.94	\$32.24	1.71	\$11.63	\$5.33	\$94.17
PITT	\$213.91	\$41.34	2.01	\$10.76	\$4.67	\$88.50
SWAIN	\$186.93	\$52.00	2.05	\$11.25	\$4.07	\$1,033.52
ORANGE	\$181.65	\$33.55	1.79	\$9.46	\$3.88	\$95.31
JACKSON	\$171.16	\$38.78	1.66	\$9.17	\$7.75	\$412.53
ALAMANCE	\$169.57	\$26.50	1.33	\$9.62	\$2.92	\$80.47
HAYWOOD	\$161.59	\$33.09	1.64	\$8.63	\$5.97	\$243.54
RUTHERFORD	\$157.59	\$21.94	1.17	\$9.13	\$4.69	\$204.47
ROWAN	\$153.83	\$24.68	1.3	\$7.89	\$4.89	\$92.19
WAYNE	\$151.26	\$19.76	0.99	\$9.13	\$2.29	\$90.86
DAVIDSON	\$149.81	\$20.65	0.97	\$8.11	\$4.81	\$78.56
MACON	\$148.78	\$25.26	1.22	\$6.45	\$11.68	\$526.74
CURRITUCK	\$144.18	\$26.53	1.54	\$5.96	\$6.60	\$503.53
ROBESON	\$133.27	\$19.52	1.07	\$7.49	\$2.62	\$75.64
RANDOLPH	\$128.39	\$19.25	0.93	\$7.54	\$2.06	\$67.08
CRAVEN	\$127.33	\$23.76	1.07	\$6.74	\$2.74	\$90.64
UNION	\$120.50	\$18.47	0.95	\$6.45	\$2.13	\$39.73
SURRY	\$113.50	\$16.10	0.79	\$6.10	\$2.41	\$115.20
AVERY	\$110.64	\$24.84	1.22	\$5.34	\$4.82	\$567.62
WILSON	\$106.96	\$15.41	0.8	\$6.11	\$2.03	\$99.94

What this session includes

- Recreational Travel Patterns in North Carolina

- Case studies of CTPs
in Avery County
and
Dare County



- Example of travel behavior data from the French Broad River travel demand model



Recreational Travel Patterns in North Carolina

NCAMPO Conference 2016

Basic Statistics

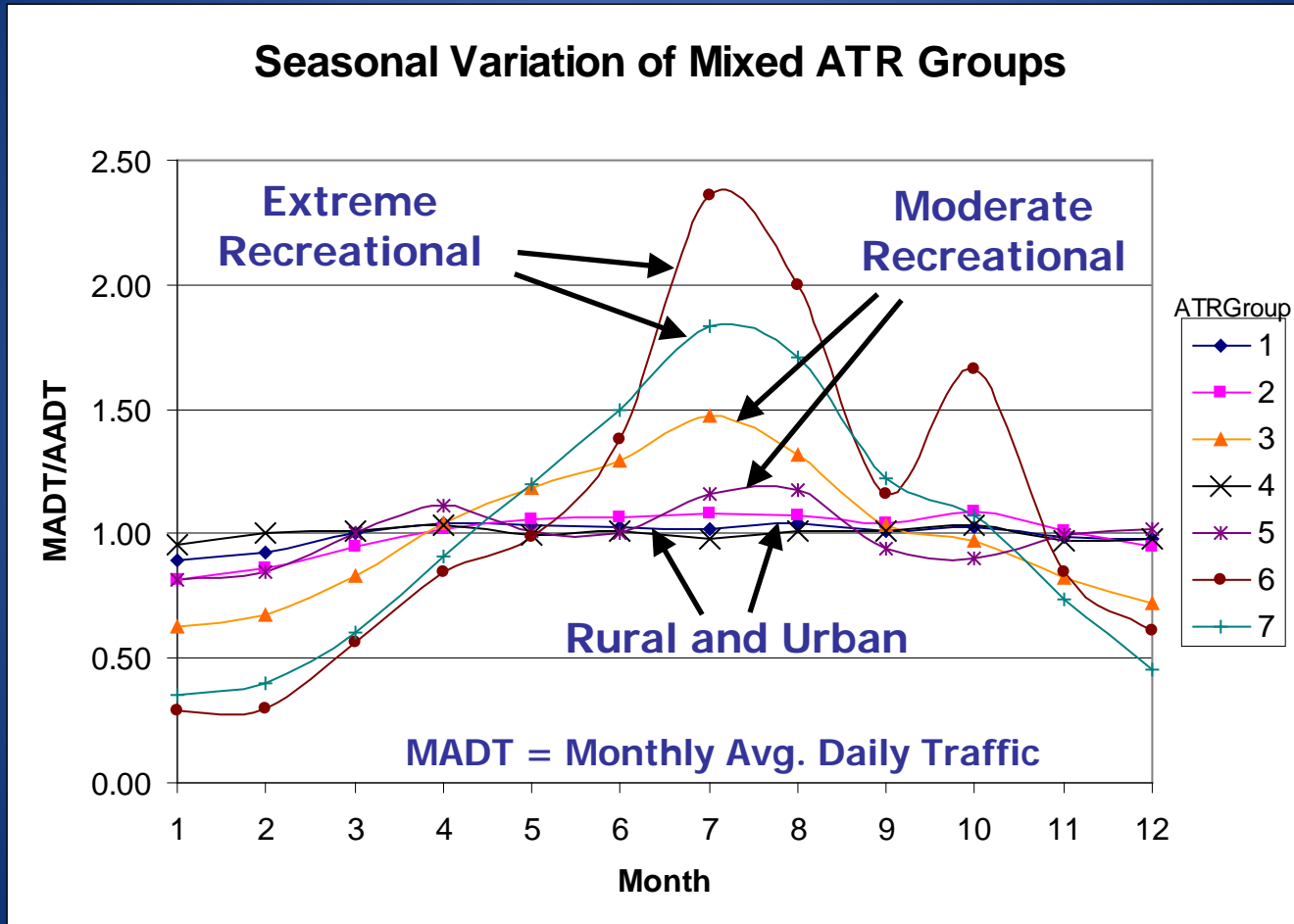
Statistics for characterizing traffic:

- AADT – level of average daily traffic that accounts for all conditions during a year
- PADT – estimate of the average daily traffic during the peak month

These statistics support estimating travel and are used for comparisons

Recreational Travel Patterns

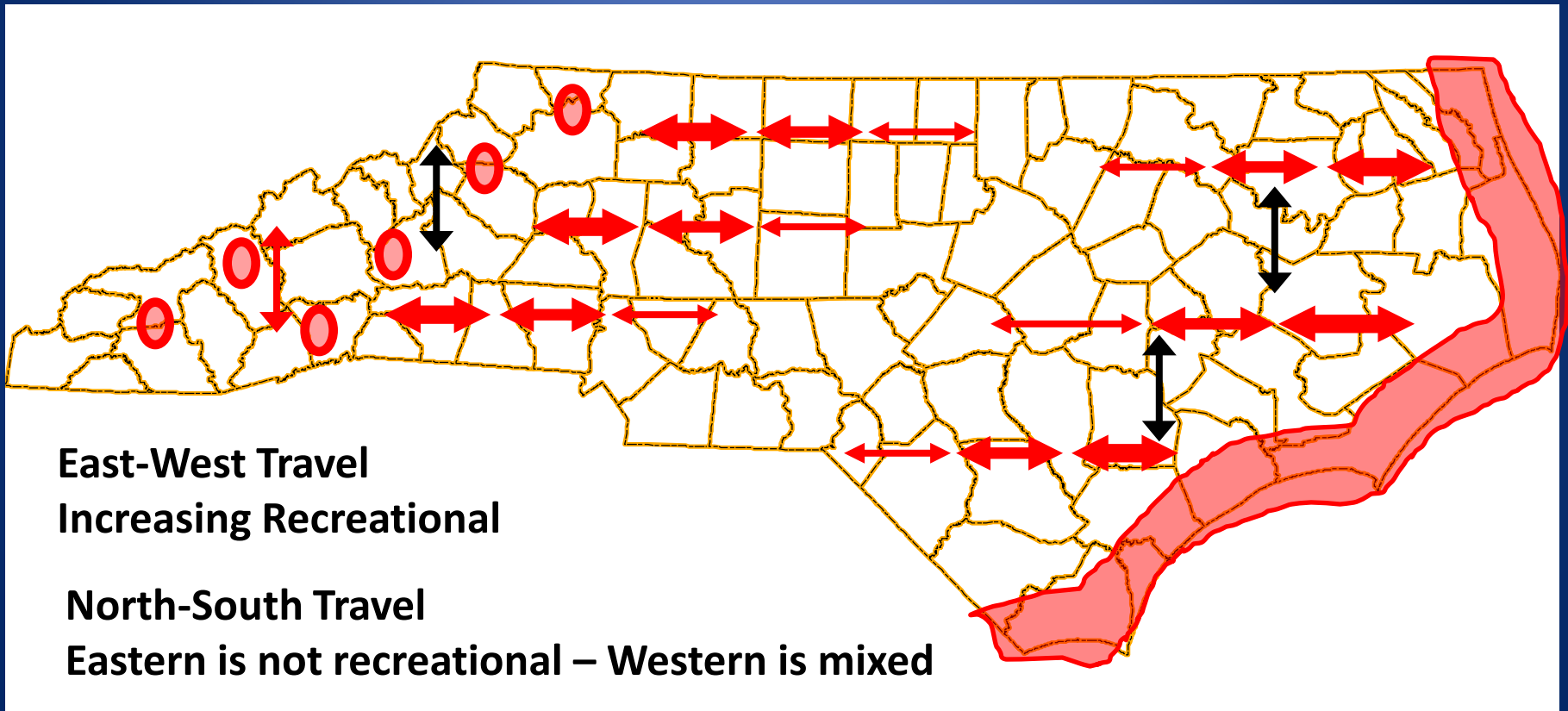
Seasonal Travel Patterns



Extreme recreational used on a limited basis

Regional Recreational Travel

The funneling effect:

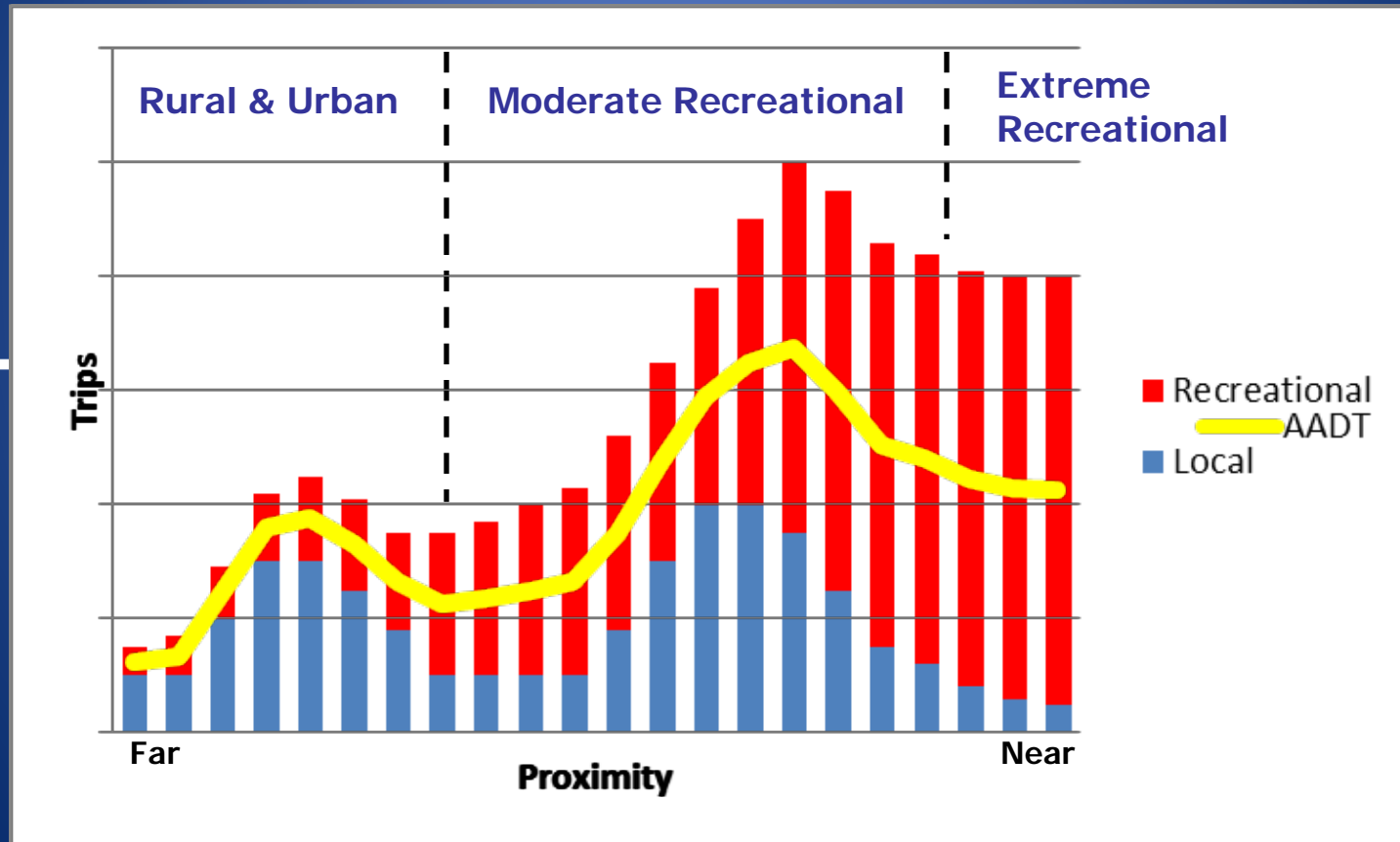


Funneling is not making funnel cakes!

Recreational Travel Patterns

Regional Recreational Travel

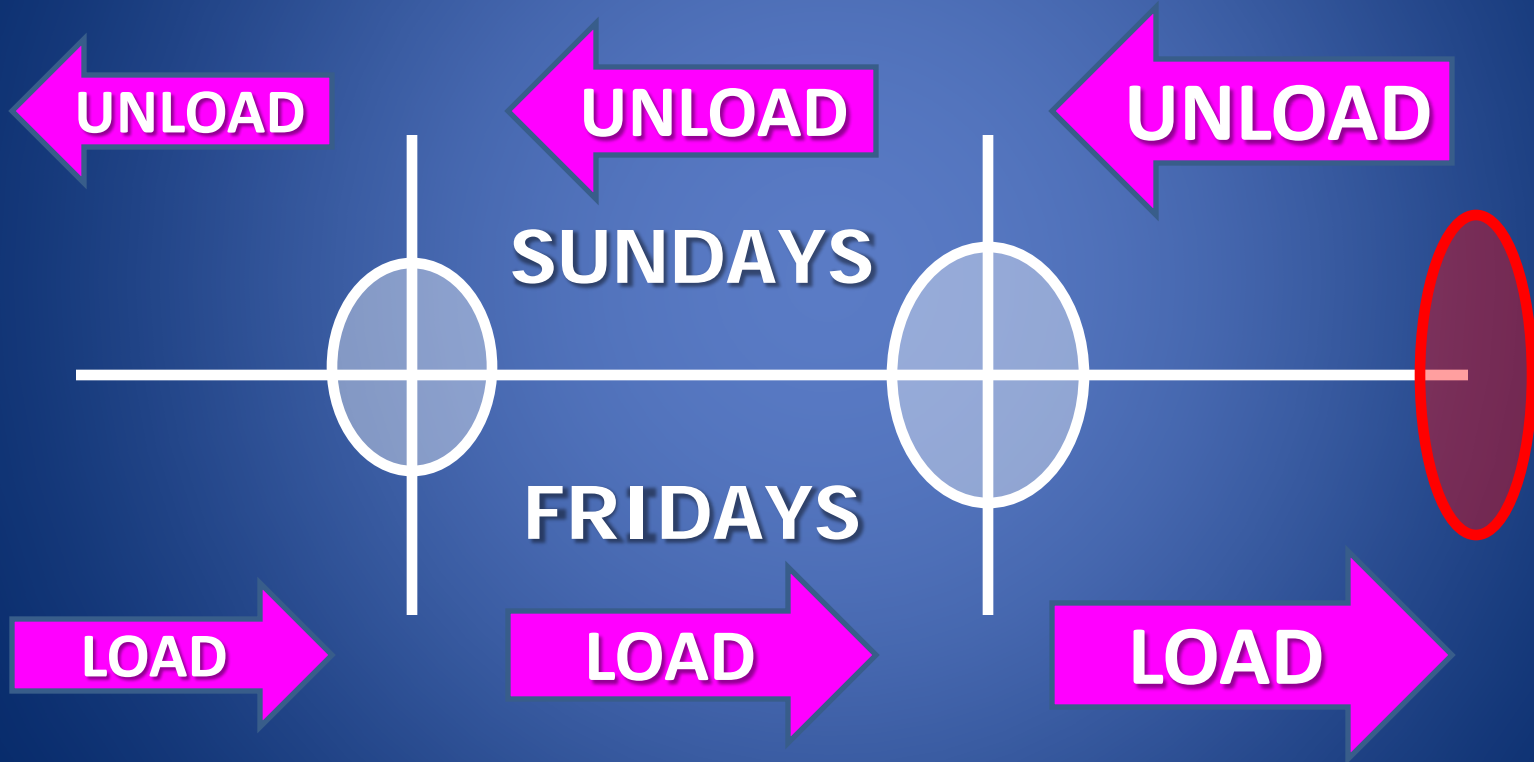
The mixing effect:



In the off-peak season, the peak season conditions are reversed

Regional Recreational Travel

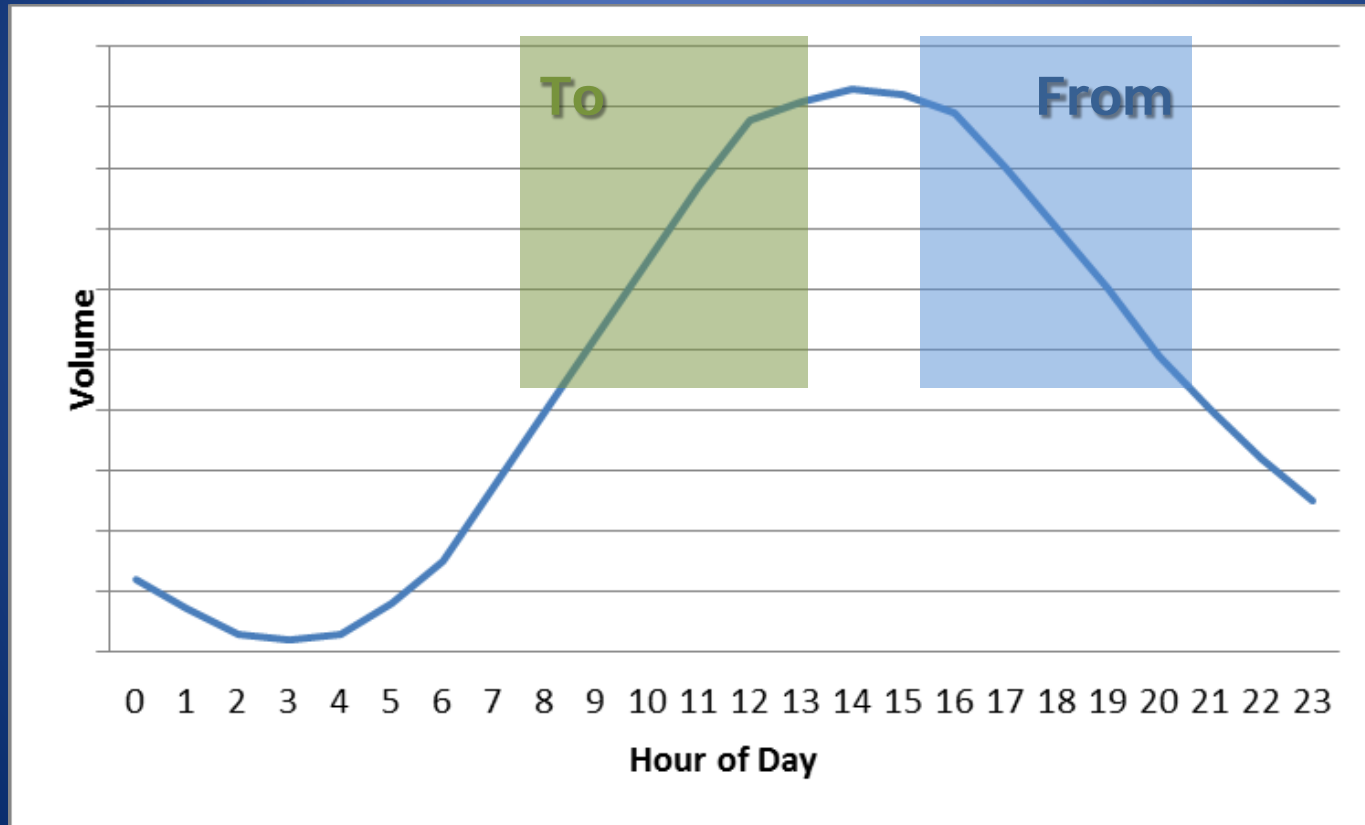
The loading effect > day of week:



Daily volumes peak directionally on different days

Regional Recreational Travel

The loading effect > time of day:



Middle of the day peak for many attractions

Data Resources

Seasonal traffic data resources:

- Continuous Counts: Very limited; about 90 stations; adding more now
- Seasonal Counts: About 2700 stations in 84 counties; 4 or 5 sets of counts in different months; 5 days including weekday and weekends; daily volumes

Collecting seasonal counts on interstates in 2016

Studying Seasonal Patterns

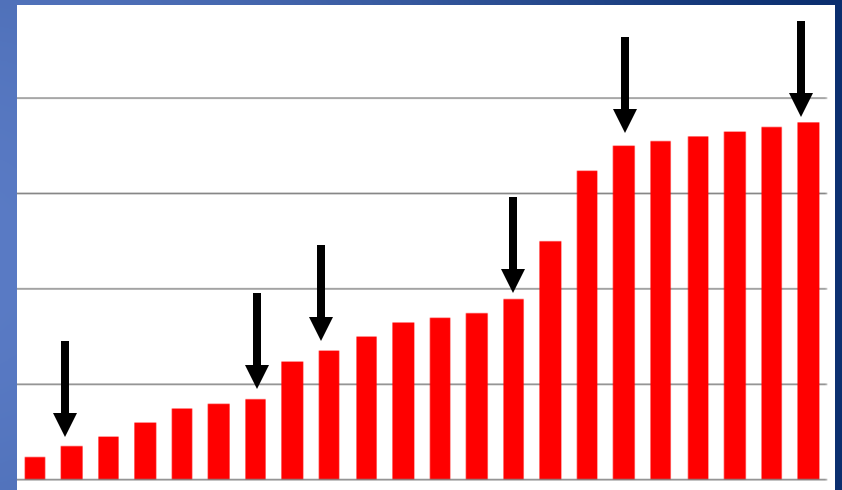
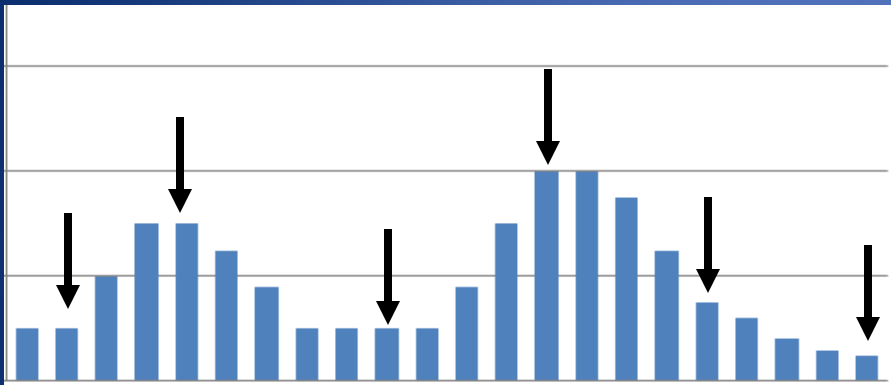
Recommend sampling 3 periods:

- Off Peak: Count when there is the least amount of recreational travel; this will provide the local travel measure
- Mixed: The most common condition
- Peak: Maximum recreational travel

Collect 7 day directional hourly volume counts for each of these periods at each station

Studying Seasonal Patterns

Where do you count?



- Outline the profiles
- You can connect the dots to generate the profiles
- Count the intersecting routes with recreational travel

Not all routes in recreational areas have recreational travel

Studying Seasonal Patterns

Recreational = Peak – Off Peak



← Peak

Calculate ADT = Avg. of 7 Days

Calculate Recreational ADT

Calculate Recreational by DOW

Calculate Recreational by Hour

Identify loading days/hours/direction

← Off Peak

Provides the pattern of travel at a location

Summary

Stats: AADT > PADT

Factors: Urban-Rural-Moderate Rec-Extreme Rec

Effects: Funneling, Mixing, Loading

Resources: Continuous, Seasonal

Studies:

- Count – 7 Day Directional Hourly Volume
- When – Off Peak, Mixed, Peak
- Where – Outline the profiles, Xing rec routes

Calcs: ADT, DOW, Hour, Loading

Rec Travel > Attractions, Land Uses, Access

Recreational Travel Patterns



Kent Taylor

State Traffic Survey Engineer
NCDOT

ktaylor@ncdot.gov
(919) 771-2520



NCAMPO Conference

May 12, 2016



Considering Tourism in Transportation Planning
Two case studies: Dare County and Avery County

Matt Quesenberry and Kerry Morrow

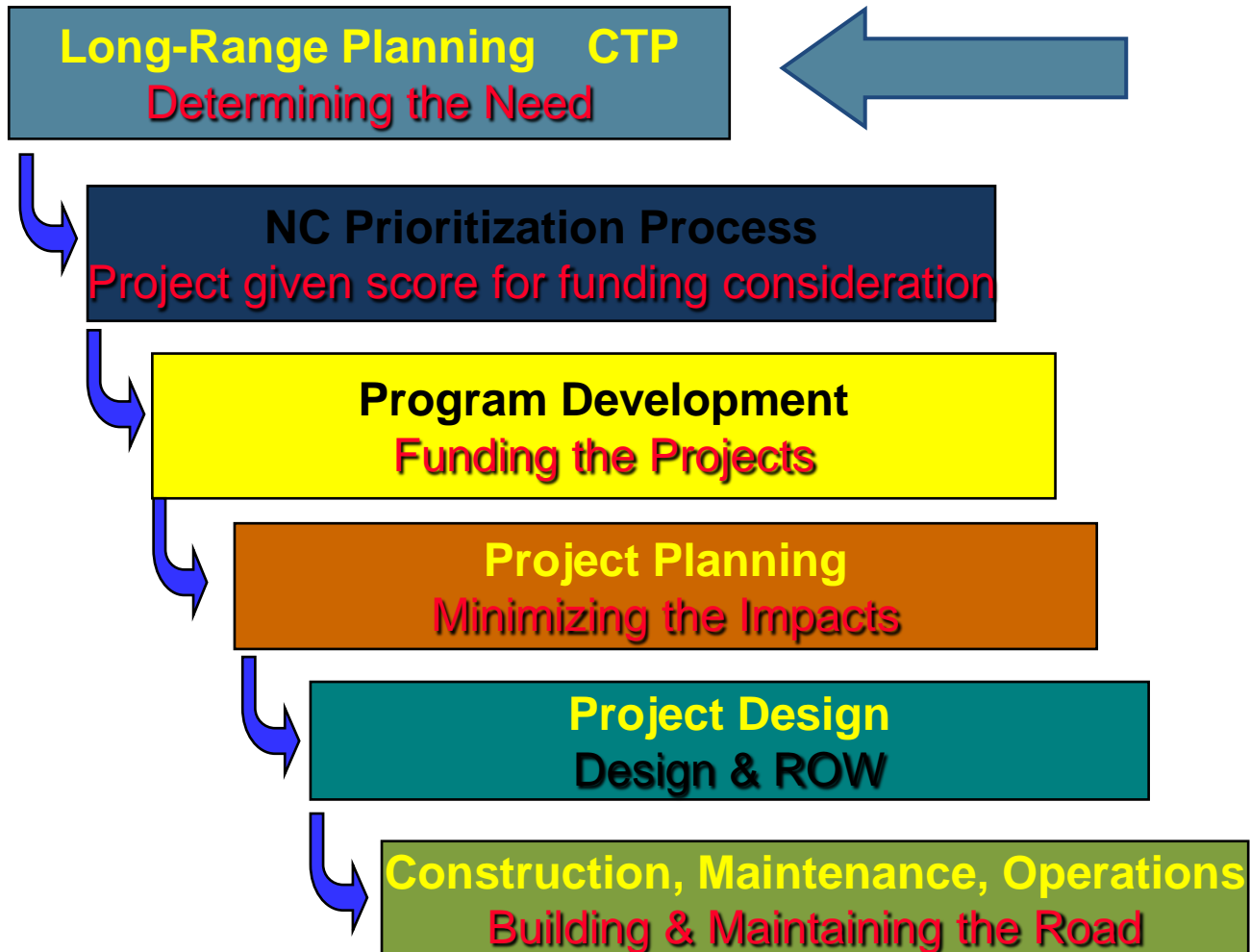


What is a CTP?

- Comprehensive Transportation Plan
- Long-range, multi-modal transportation plan
 - 25 to 30 year planning period
 - Vision plan
- Developed cooperatively among local stakeholders, Rural Planning Organization (RPO), and NCDOT
- Incorporates Land Use plans, community & statewide goals



Where does the CTP fit into the “Big Picture”?



Why is a CTP Needed?

§ G.S. 136-66.2 – Development of a coordinated transportation system and provisions for streets and highways in and around municipalities¹.

First Part of (a):

Each municipality, not located within a metropolitan planning organization (MPO) as recognized in G.S. 136-200.1, with the cooperation of the Department of Transportation, shall develop a comprehensive transportation plan that will serve present and anticipated travel demand in and around the municipality.

¹http://www.ncleg.net/EnactedLegislation/Statutes/HTML/BySection/Chapter_136/GS_136-66.2.html



Why is a CTP Needed?

- Improvement projects should be on an adopted CTP to be considered for inclusion in the Transportation Improvement Program (TIP)
- CTP recommendations are concepts, and any project will go through a rigorous environmental process before final alignments or designs can be determined



Typical CTP Analysis Tools

- Trend Line
- Hand Allocation
- Travel Demand Model
 - Small Urban Models
 - MPO Models
 - Regional Model
 - Statewide Model



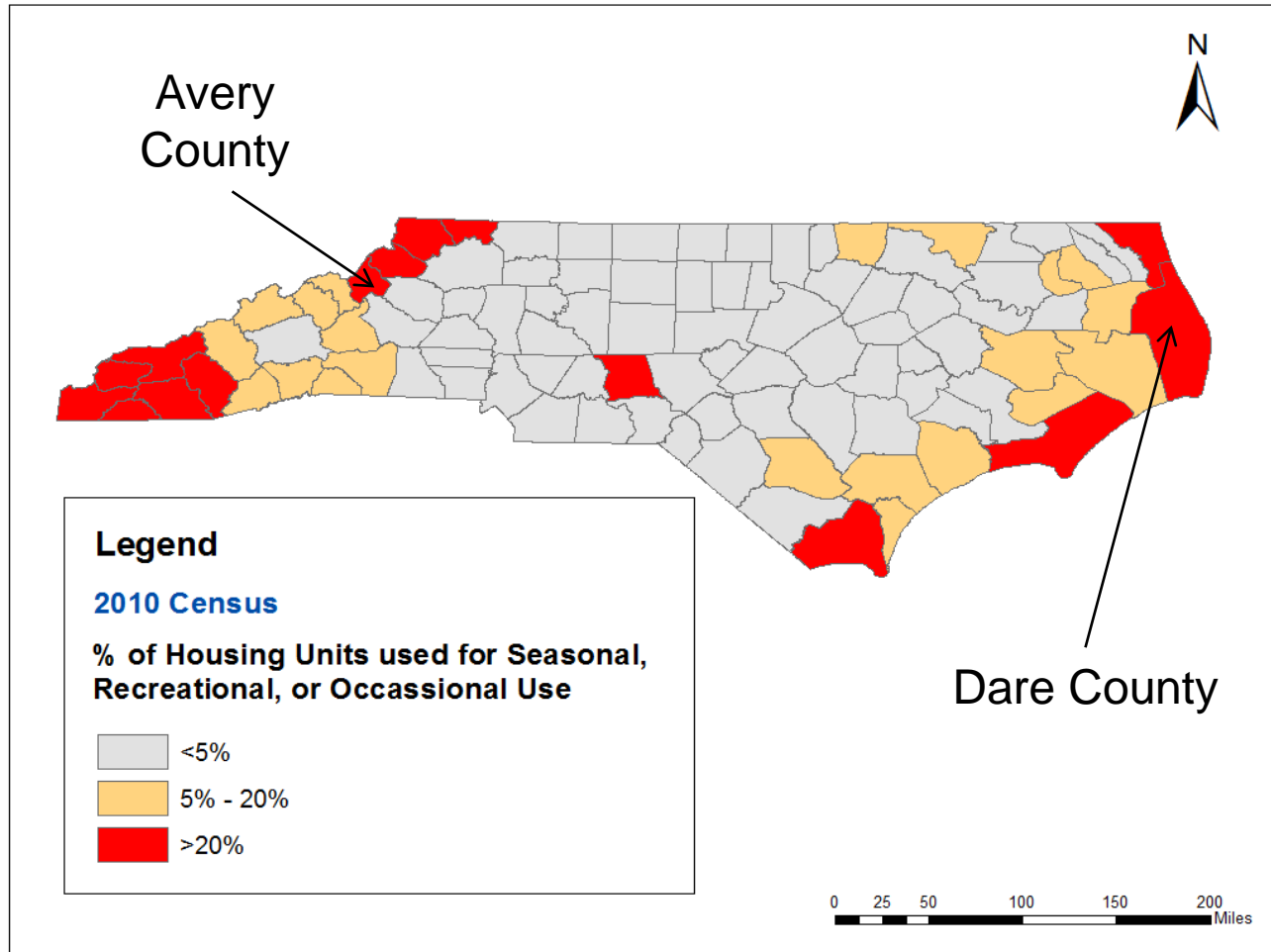
Typical CTP Analysis Tools

- Trend Line – **Based on Annual Average Daily Traffic (AADT)**
- Hand Allocation – **Based on AADT**
- Travel Demand Model – **Primarily urban areas**
 - Small Urban Models
 - MPO Models
 - Regional Model
 - Statewide Model

What to do in rural areas with no model, limited AADT data, and seasonal traffic fluctuations as a result of tourism?



NC Counties - Percentage of Seasonally Used Housing Units



Source:
US Census Bureau,
<https://www.census.gov/geo/maps-data/data/tiger-data.html>



NC Counties - Percentage of Seasonally Used Housing Units

Top 5 NC Counties with % of Total Housing Units used for Seasonal, Recreational, or Occasional Use (2010 Census):

County	Total Housing Units	Housing Units for Seasonal, recreational, or occasional use	% of Total Housing Units for Seasonal, recreational, or occasional use
Dare	33,492	14,742	44.0%
Avery	13,890	6,004	43.2%
Macon	25,245	8,159	32.3%
Carteret	48,179	15,402	32.0%
Currituck	14,453	4,591	31.8%

Source:

US Census Bureau,

<https://www.census.gov/geo/maps-data/data/tiger-data.html>



Overview: Dare County Comprehensive Transportation Plan

- CTP adopted by NCDOT Board of Transportation in March 2015
- Developed in cooperation with Dare County, Town of Duck, Town of Southern Shores, Town of Kitty Hawk, Town of Kill Devil Hills, Town of Nags Head, Town of Manteo, and Albemarle Rural Planning Organization
- Other steering committee representation: Outer Banks Chamber of Commerce, Outer Banks Association of Realtors, Dare County Health Department, US Fish and Wildlife, National Parks Service



Nothing Compares



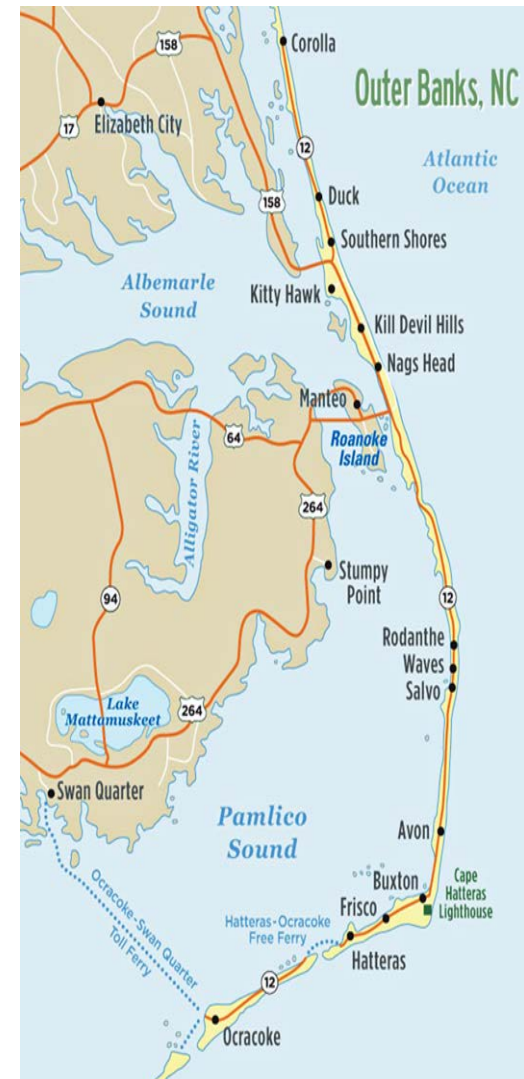
Dare County: Home of the NC Outer Banks

- 110 miles of Outer Banks shoreline from Town of Duck to Hatteras
- Permanent population of 33,000, peak season population (June to August) estimated at 300,000
- Attractions: Beaches, Wrights Brothers Memorial, 5 lighthouses, Cape Hatteras National Seashore, Graveyard of the Atlantic Museum, Fort Raleigh National Historic Site, NC Aquarium, and much more
- Ranked #4 in travel impact among NC counties in 2013



Considering Tourism in CTP: Challenges

- 3 major highways carry most traffic in Dare County: US 64, US 158 and NC 12
- US 158 serves as gateway to the Outer Banks for tourists travelling from the north
- Dare County CTP steering committee unsatisfied with using AADT volumes to project future V/C
- Congestion factors specific to Dare County:
 - Weekend tenancy changes
 - Unfamiliar visitors
 - Weather conditions
 - Rainy day activities
 - Evacuation

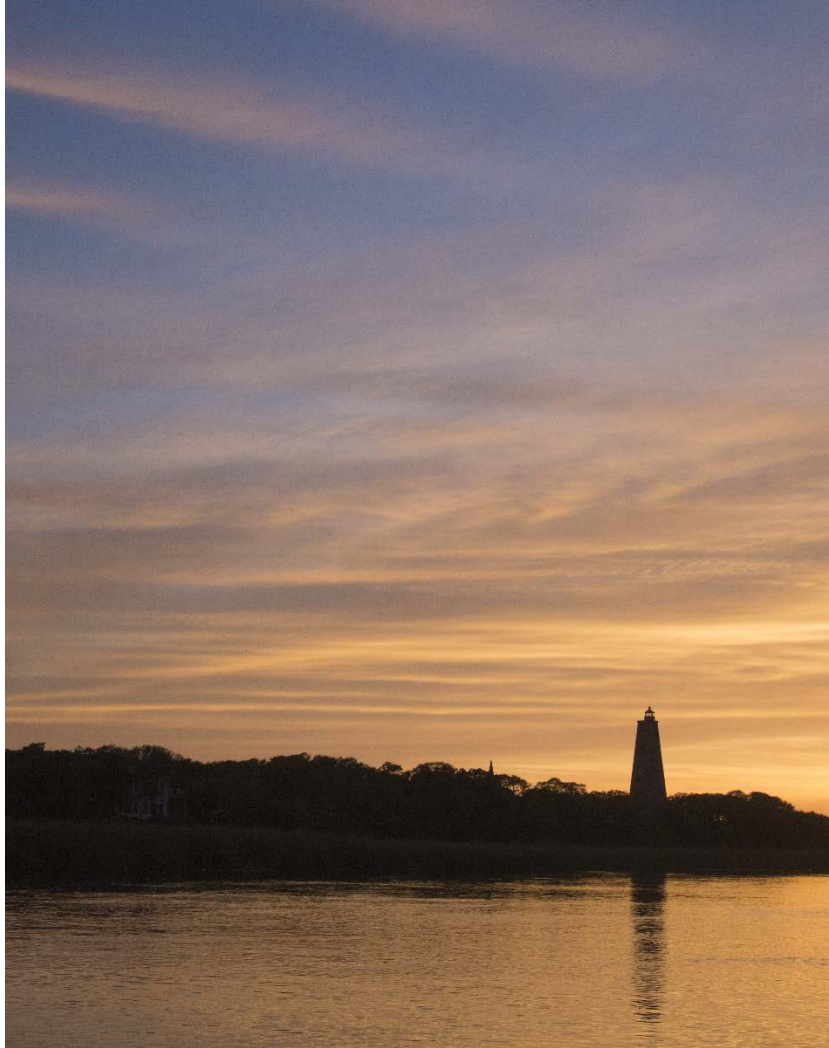


Considering Tourism in CTP: Challenges (continued)

- Safety and congestion during peak season a large factor in return visitors
- Local concerns over adding a median due to access to businesses
- Bicycle and Pedestrian challenges:
 - Documented safety concern, particularly along US 158
 - International work exchange program created need for safe bicycle and pedestrian transportation to work
 - Recreational bicycle and pedestrian trails are imperative due to high volumes of tourists



Considering Tourism in CTP: Solutions



- Applying seasonal factors to project future year June weekday traffic volumes; deficiencies still based on LOS D
- Bicycle-pedestrian subcommittee to focus on and refine bike and pedestrian recommendations

Dare County CTP - Seasonal Counts

				March	April	May	June	July	August	September
Facility	Section (From - To)	Existing Capacity	Estimated 2012	Estimated 2012	Estimated 2012	Estimated 2012	Estimated 2012	Estimated 2012	Estimated 2012	Estimated 2012
		(vpd)	AADT	Volume	Volume	Volume	Volume	Volume	Volume	Volume
US 158	US 64 to Cape Hatteras National Park Rd (SR 1543)	32650	17300	12628	16019	18804	20843	23378	20595	17129
US 158	Cape Hatteras National Park Rd (SR 1543) to E Gull St	32650	17300	12628	16019	18804	20843	23378	20595	17129
US 158	E Gull St to S Seachase Dr	32650	17300	12628	16019	18804	20843	23378	20595	17129
US 158	S Seachase Dr to E Driftwood St	32650	17300	12628	16019	18804	20843	23378	20595	17129
US 158	E Driftwood St to 8th Street	29900	28600	20876	26481	31087	34458	38649	34048	28317
US 158	8th St to Ocean Bay Blvd (SR 1217)	29900	28600	20876	26481	31087	34458	38649	34048	28317
US 158	Ocean Bay Blvd (SR 1217) to 5th Street	29900	24500	17883	22685	26630	29518	33108	29167	24257
US 158	5th Street to Kitty Hawk Town Limit	32650	24500	17883	22685	26630	29518	33108	29167	24257
US 158	Kill Devil Hills Town Limit to Kitty Hawk Rd (SR 1206)	32650	24500	17883	22685	26630	29518	33108	29167	24257
US 158	Kitty Hawk Rd (SR 1206) to SR 1493	32650	21400	15620	19815	23261	25783	28919	25476	21188
US 158	SR 1493 to SR 1418	32650	21400	15620	19815	23261	25783	28919	25476	21188
US 64 / US 264	Etheridge Rd (SR 1117) to Mother Vineyard Rd (SR 1120)	14600	6800	4964	6296	7391	8193	9189	8095	6733
US 64 / US 264	Mother Vineyard Rd (SR 1120) to Harriet St (SR 1118)	13800	16300	11898	15093	17717	19639	22027	19405	16139
US 64 / US 264	Harriet St (SR 1118) to Burnside Rd (SR 1123)	14000	16300	11898	15093	17717	19639	22027	19405	16139
US 64 / US 264	Burnside Rd (SR 1123) to NC 400 (Fernando St)	14000	16300	11898	15093	17717	19639	22027	19405	16139
US 64 / US 264	Fernando St to Bowserstown Rd (SR 1129)	14000	16300	11898	15093	17717	19639	22027	19405	16139
US 64 / US 264	Bowserstown Rd (SR 1129) to Patty Ln	14000	16300	11898	15093	17717	19639	22027	19405	16139
US 64 / US 264	Patty Ln to Marshall C Collins Dr	14900	17500	12774	16204	19022	21084	23649	20833	17327
US 64 / US 264	Marshall C Collins Dr to NC 345	29900	17500	12774	16204	19022	21084	23649	20833	17327
NC 12	Southern end of NC 12 to Eagle Pass Rd (SR 1241)	15800	2800	1718	2333	2857	4000	4308	4118	3111
NC 12	Western end of Eagle Pass Rd (SR 1241) to Fulcher Ln (SR 1258)	15800	3500	2147	2917	3571	5000	5385	5147	3889
NC 12	Fulcher Ln (SR 1258) to Kohler Rd	15800	3500	2147	2917	3571	5000	5385	5147	3889
NC 12	Kohler Dr (SR 1237) to Eastern end of Eagle Pass Rd (SR 1241)	15800	3500	2147	2917	3571	5000	5385	5147	3889
NC 12	Eastern end of Eagle Pass Rd (SR 1241) to C Deering Ridge Rd (SR 1236)	15800	3700	2270	3083	3776	5286	5692	5441	4111
NC 12	C Deering Ridge Rd (SR 1236) to Austin Rd (SR 1246)	16400	3700	2270	3083	3776	5286	5692	5441	4111
NC 12	Austin Rd (SR 1246) to Sandpiper Dr	15800	3700	2270	3083	3776	5286	5692	5441	4111
NC 12	Sandpiper Dr to Park Rd	15800	3700	2270	3083	3776	5286	5692	5441	4111
NC 12	Park Rd to Old Doctors Rd	16400	3700	2270	3083	3776	5286	5692	5441	4111

Considering Tourism in CTP: Solutions (continued)

- Heavy public involvement, including:
 - Round of informational open houses to get advance feedback on local transportation concerns
 - 2 goals and objectives surveys: one for residents, one for visitors
 - Reached out to OBX Chamber of Commerce for education on access management
 - Use of visualization tools



Overview: Avery County Comprehensive Transportation Plan

- CTP adopted by NCDOT Board of Transportation in January 2015
- Developed in cooperation with:
 - Avery County
 - Town of Banner Elk
 - Town of Beech Mountain
 - Town of Crossnore
 - Town of Elk Park
 - Town of Newland
 - Town of Seven Devils
 - Town of Sugar Mountain
 - High Country Rural Planning Organization



Nothing Compares



Avery County Popular Destinations



- Blue Ridge Parkway
- Grandfather Mountain
- Beech Mountain Ski Resort
- Sugar Mountain Ski Resort
- Hawksnest Ski Resort
- Linville Gorge Wilderness Area



Avery County Tourism Facts

- Domestic tourism generated an economic impact of \$104.97 million in 2013.
- In 2013, Avery County ranked 39 in travel impact among North Carolina's 100 counties
- Travel generated a \$23.32 million payroll in 2013
- Population Estimate \approx 17,800 (2014)

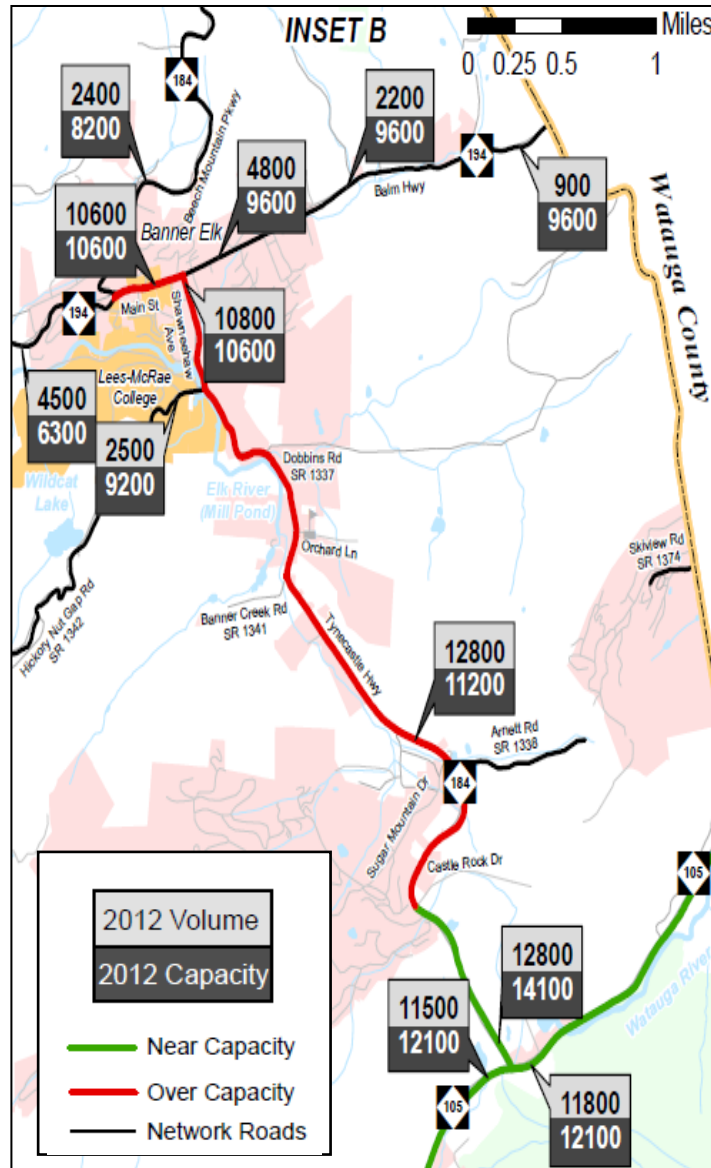
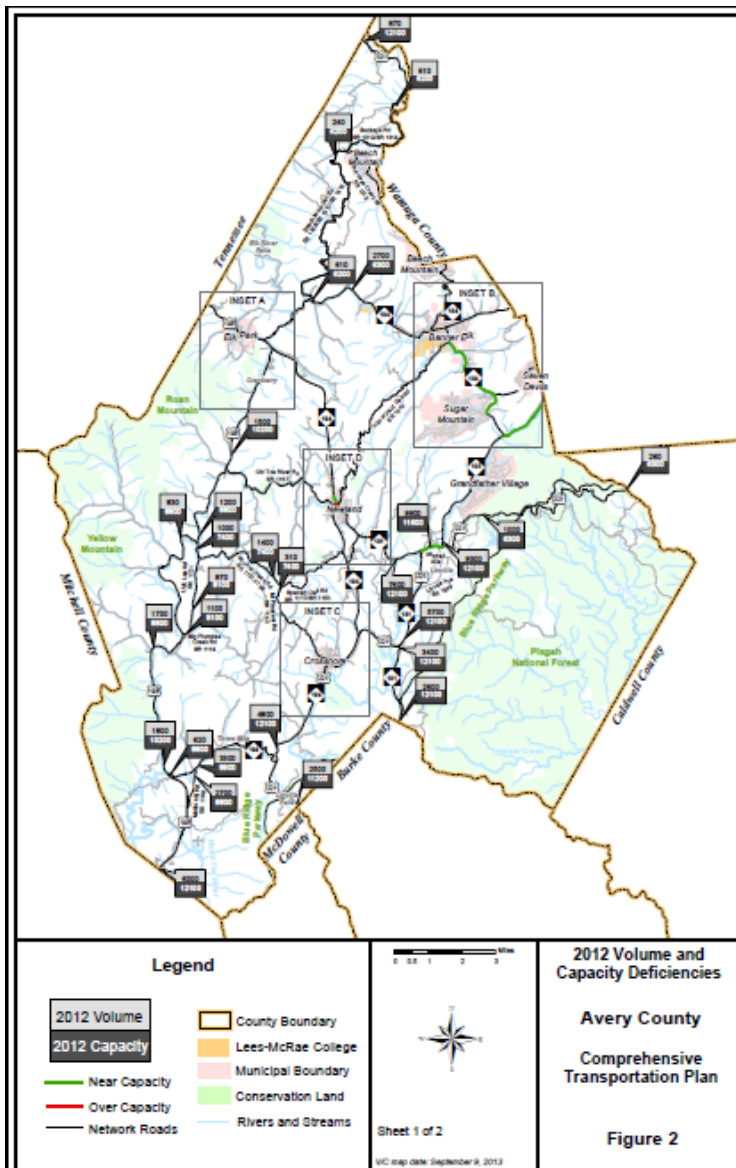
Sources: NC Tourism Commerce, <https://www.nccommerce.com/tourism/research/economic-impact/teim>
US Census Bureau, <http://www.census.gov/quickfacts/table/PST045215/37011,37>



Avery County CTP Steering Committee's Focus on Seasonal Traffic

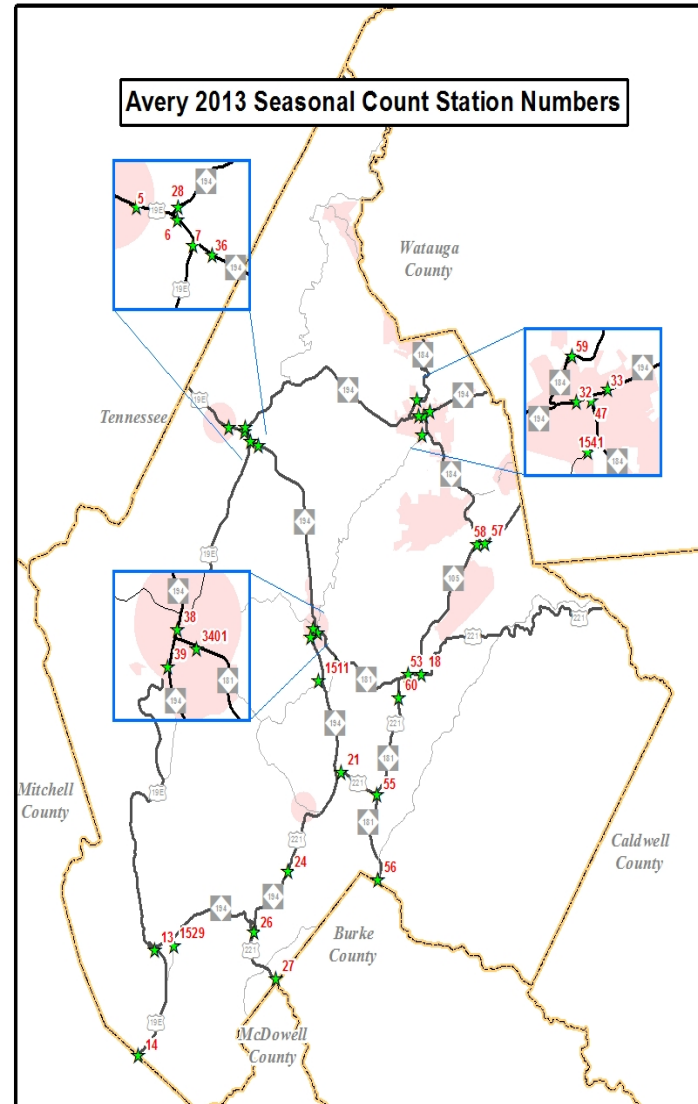
- Avery County Steering Committee was comprised of primarily local town and county officials who distrusted NCDOT
- The Committee did not believe AADT provided an accurate representation of traffic in their area
- Garnered buy-in from the Committee by preparing a CTP using a combination of official AADT and monthly seasonal traffic count volumes that would be collected during CTP development

Typical CTP AADT Volume / Capacity Maps



Seasonal Count Locations

GENERAL LOCATION	ROUTE	LOCATION
Altamont	US 221	S of NC 194
Altamont	US 221/NC 194	N of Stamey Branch Rd
Banner Elk	Hickory Nut Gap Rd (SR 1342)	W of NC 184
Banner Elk	NC 184	S of NC 194/Main St
Banner Elk	NC 184 (Beech Mountain Pkwy)	N of Valley Haven Baptist Church
Banner Elk	NC 184-194/Main St	W of NC 184/Shawneehaw Ave
Banner Elk	NC 194	E of Park Ave
Crossnore	US 221	E of Millers Gap Hwy
Elk Park	NC 194	E of US 19 E
Elk Park	NC 194	E of Blevins Creek Rd (West End)
Elk Park	US 19 E	E of Davis St
Elk Park	US 19 E	N of Cranberry Middle School
Elk Park	US 19 E/NC 194	S of NC 194
Ingalls	US 19 E	S of Three Mile Rd
Linville	US 221	E of NC 105
Linville	US 221	E of NC 181
Linville	US 221/NC 181	N of Linville Avenue
Linville Falls	US 221	S of Blue Ridge Pkwy
Newland	Avery High School Rd (SR 1370)	S of NC 181
Newland	NC 181	E of NC 194
Newland	NC 194	N of NC 181
Newland	NC 194	N of Old Cranberry Rd
Newland	Spanish Oak Rd (SR 1153)	W of NC 194
Pineola	NC 181	S of US 221
Pineola	NC 181	S of Blue Ridge Pkwy
Spruce Pine	US 19 E	N of Mayland Community College
Sugar Mountain	NC 105	E of NC 184
Sugar Mountain	NC 105	W of NC 184
Three Mile	Mullin Hill Rd (SR 1106)	S of NC 194



NC 105 Monthly Capacities - 2013

NC 105 Monthly 2013 Count Capacities

Count Station	Route ID	Location	NC 105 Monthly 2013 Counts - Capacity Status					2013 AADT - Capacity Status
			Feb	Apr	Jun	Aug	Oct	
57	NC 105	N OF NC 184	Over	Over	Near	Over	Near	Near
58	NC 105	S OF NC 184	-	-	Near	Near	Over	Near

Notes:

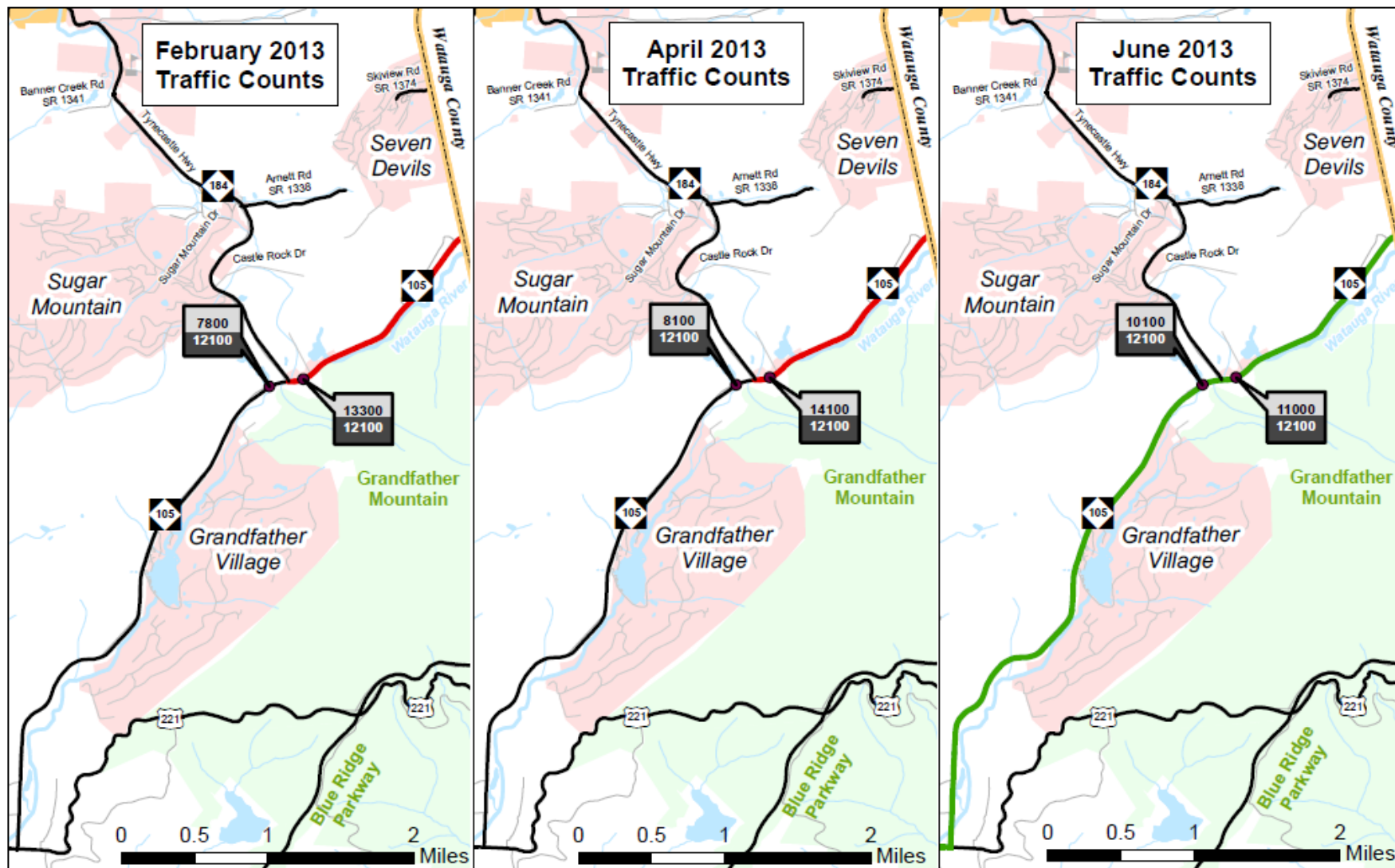
Over Capacity - Volume/Capacity Ratio \geq 100%

Near Capacity - Volume/Capacity Ratio \geq 80%

Dash = No Capacity Issue (Volume/Capacity Ratio $<$ 80%)



NC 105 Monthly V/C Ratios - 2013

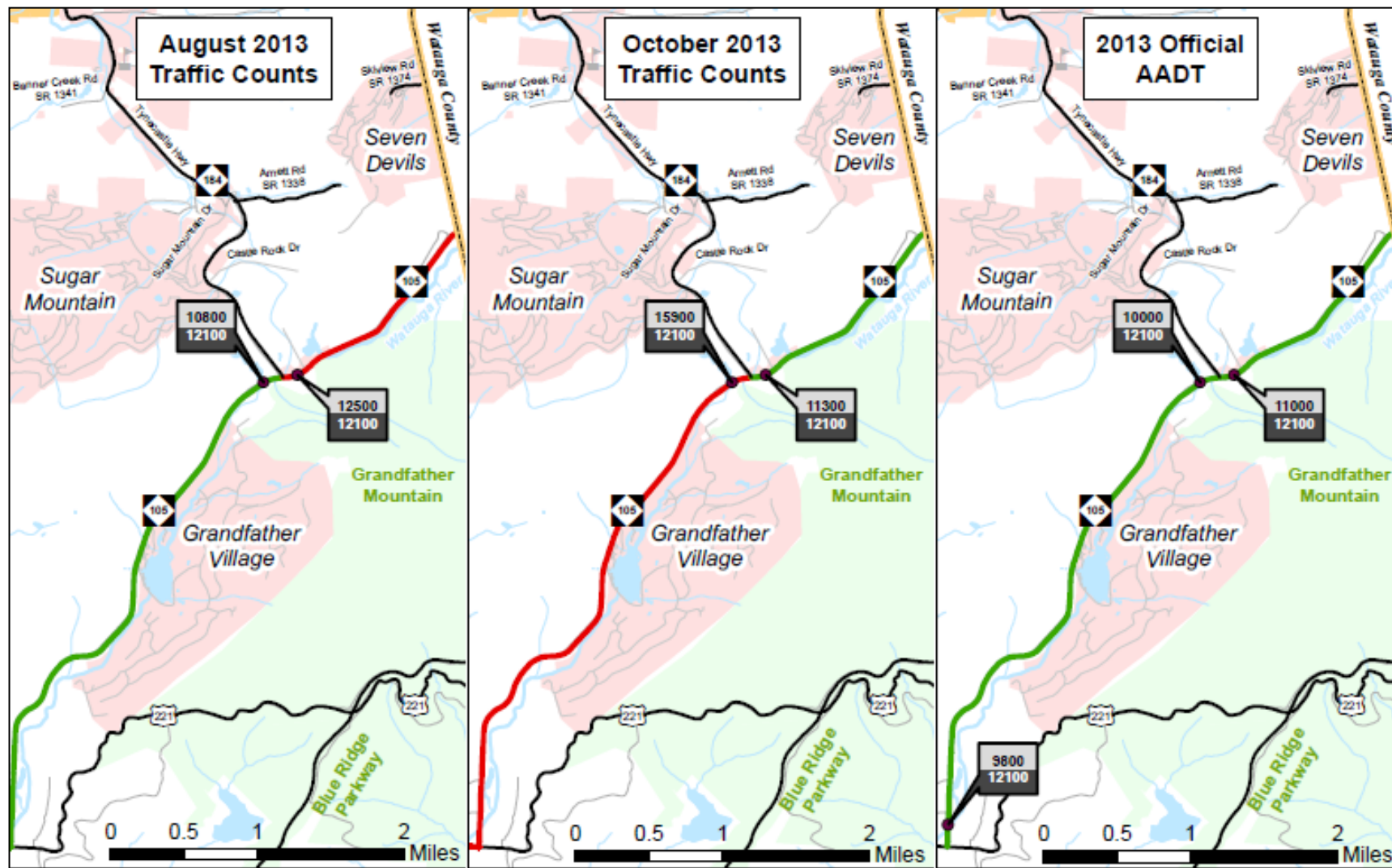


2013 Volume
2012 Capacity

— Near Capacity
— Over Capacity
— Network Roads



NC 105 Monthly V/C Ratios - 2013



2013 Volume
2012 Capacity

- Near Capacity
- Over Capacity
- Network Roads



2013 to Monthly to official 2013 AADT Comparison

Count Station	Route ID	Location	2013 Total Average Vehicle Count					2013 Official AADT
			Feb	Apr	Jun	Aug	Oct	
5	US 19-E	E OF SR 1170	6,300	6,700	7,700	7,100	7,100	7,000
6	US 19-E / NC 194	S OF SR 1323	-	6,200	6,700	5,600	6,000	6,200
7	US 19-E	S OF NC 194	2,400	2,700	2,800	2,500	2,800	2,500
13	US 19-E	S OF SR 1198	1,800	2,000	2,200	2,200	2,100	2,100
14	US 19-E	W OF SR 1196	6,200	6,500	6,400	6,400	6,400	6,300
18	US 221	E OF NC 105	800	1,200	1,500	1,700	2,000	1,300
21	US 221	E OF SR 1524	-	4,500	5,300	5,400	5,300	5,100
24	US 221 / NC 194	N OF SR 1114	4,800	5,000	5,300	5,700	5,300	5,000
26	US 221	S OF NC 194	2,500	2,800	3,100	3,500	3,400	2,900
27	US 221	S OF SR 1100	2,400	2,600	2,900	3,400	3,500	2,700
28	NC 194	E OF US 19-E	2,800	2,800	3,300	3,500	3,100	3,100
32	NC 184-194	W OF NC 184	6,000	5,500	6,900	8,000	6,900	6,900
33	NC 194	E OF NC 184	3,100	3,300	4,100	4,600	3,700	4,300
36	NC 194	E OF SR 1361	4,300	5,300	5,800	-	5,100	5,500
38	NC 194	N OF NC 181	14,000	13,400	13,800	10,200	13,200	11,000
39	NC 194	N OF SR 1156	6,800	7,100	7,600	7,300	7,000	7,500
47	NC 184	S OF NC 194	6,700	6,200	7,900	9,300	7,500	8,000
53	US 221	E OF NC 181	8,000	8,300	10,200	10,600	15,900	10,000
55	NC 181	S OF US 221	2,800	3,100	3,700	3,900	3,600	3,500
56	NC 181	S OF SR 1521	2,300	2,500	2,700	2,900	3,000	2,500
57	NC 105	N OF NC 184	13,300	14,100	11,000	12,500	11,300	11,000
58	NC 105	S OF NC 184	7,800	8,100	10,100	10,800	15,900	10,000
59	NC 184	E OF SR 1363	2,500	1,500	2,500	3,100	2,500	2,600
60	US 221 / NC 181	N OF SR 1545	4,300	4,500	5,500	5,900	5,500	5,400
1510	SR 1370	S OF NC 181	2,000	2,200	2,400	2,100	2,200	-
1511	SR 1153	W OF NC 194	1,900	2,000	2,100	2,200	2,100	-
1529	SR 1106	S OF NC 194	2,500	2,500	2,700	2,700	2,600	2,700
1541	SR 1342	W OF NC 184	1,600	1,800	1,700	1,800	1,900	1,900
3401	NC 181	E OF NC 194	-	6,400	7,300	7,100	6,400	7,800

2040 Total Vehicle Count = (2013 Count)*(((1+CAGR)^Number Years)

*If dash shown in table, then count considered questionable or just not provided



2013 Monthly Counts Grown to 2040

Count Station	Route ID	Location	2013 Total Average Vehicle Count					2013 Official AADT	CAGR Used	2040 Total Average Vehicle Count					2040 AADT**
			Feb	Apr	Jun	Aug	Oct			Feb	Apr	Jun	Aug	Oct	
5	US 19-E	E OF SR 1170	6,300	6,700	7,700	7,100	7,100	7,000	0.7%	7,600	8,000	9,300	8,600	8,500	8,500
6	US 19-E / NC 194	S OF SR 1323	-	6,200	6,700	5,600	6,000	6,200	0.7%	-	7,400	8,100	6,700	7,300	7,500
7	US 19-E	S OF NC 194	2,400	2,700	2,800	2,500	2,800	2,500	1.0%	3,100	3,600	3,700	3,300	3,600	3,300
13	US 19-E	S OF SR 1198	1,800	2,000	2,200	2,200	2,100	2,100	0.7%	2,200	2,400	2,600	2,700	2,600	2,500
14	US 19-E	W OF SR 1196	6,200	6,500	6,400	6,400	6,400	6,300	0.7%	7,500	7,900	7,800	7,700	7,800	7,600
18	US 221	E OF NC 105	800	1,200	1,500	1,700	2,000	1,300	0.7%	900	1,500	1,800	2,100	2,400	1,600
21	US 221	E OF SR 1524	-	4,500	5,300	5,400	5,300	5,100	1.0%	-	5,900	6,900	7,100	6,900	6,700
24	US 221 / NC 194	N OF SR 1114	4,800	5,000	5,300	5,700	5,300	5,000	1.0%	6,300	6,500	6,900	7,400	6,900	6,500
26	US 221	S OF NC 194	2,500	2,800	3,100	3,500	3,400	2,900	1.0%	3,300	3,600	4,000	4,600	4,500	3,800
27	US 221	S OF SR 1100	2,400	2,600	2,900	3,400	3,500	2,700	0.7%	2,900	3,100	3,500	4,100	4,200	3,300
28	NC 194	E OF US 19-E	2,800	2,800	3,300	3,500	3,100	3,100	0.7%	3,400	3,400	4,000	4,200	3,800	3,700
32	NC 184-194	W OF NC 184	6,000	5,500	6,900	8,000	6,900	6,900	1.0%	7,900	7,200	9,100	10,500	9,000	9,000
33	NC 194	E OF NC 184	3,100	3,300	4,100	4,600	3,700	4,300	1.0%	4,100	4,400	5,400	6,000	4,800	5,600
36	NC 194	E OF SR 1361	4,300	5,300	5,800	-	5,100	5,500	1.0%	5,700	6,900	7,500	-	6,600	7,200
38	NC 194	N OF NC 181	14,000	13,400	13,800	10,200	13,200	11,000	1.0%	18,400	17,500	18,000	13,300	17,200	14,400
39	NC 194	N OF SR 1156	6,800	7,100	7,600	7,300	7,000	7,500	1.0%	8,900	9,300	9,900	9,600	9,200	9,800
47	NC 184	S OF NC 194	6,700	6,200	7,900	9,300	7,500	8,000	1.0%	8,800	8,100	10,300	12,200	9,800	10,500
53	US 221	E OF NC 181	8,000	8,300	10,200	10,600	15,900	10,000	0.7%	9,700	10,000	12,400	12,800	19,200	12,100
55	NC 181	S OF US 221	2,800	3,100	3,700	3,900	3,600	3,500	0.7%	3,400	3,800	4,400	4,700	4,400	4,200
56	NC 181	S OF SR 1521	2,300	2,500	2,700	2,900	3,000	2,500	0.7%	2,800	3,000	3,300	3,500	3,600	3,000
57	NC 105	N OF NC 184	13,300	14,100	11,000	12,500	11,300	11,000	0.7%	16,100	17,000	13,300	15,100	13,600	13,300
58	NC 105	S OF NC 184	7,800	8,100	10,100	10,800	15,900	10,000	0.7%	9,500	9,800	12,200	13,100	19,200	12,100
59	NC 184	E OF SR 1363	2,500	1,500	2,500	3,100	2,500	2,600	1.0%	3,300	1,900	3,300	4,100	3,300	3,400
60	US 221 / NC 181	N OF SR 1545	4,300	4,500	5,500	5,900	5,500	5,400	0.7%	5,200	5,500	6,600	7,100	6,600	6,500
1510	SR 1370	S OF NC 181	2,000	2,200	2,400	2,100	2,200	-	1.0%	2,700	2,900	3,100	2,800	2,900	-
1511	SR 1153	W OF NC 194	1,900	2,000	2,100	2,200	2,100	-	1.0%	2,400	2,600	2,700	2,900	2,700	-
1529	SR 1106	S OF NC 194	2,500	2,500	2,700	2,700	2,600	2,700	0.7%	3,100	3,100	3,200	3,300	3,200	3,300
1541	SR 1342	W OF NC 184	1,600	1,800	1,700	1,800	1,900	1,900	1.0%	2,000	2,300	2,200	2,400	2,500	2,500
3401	NC 181	E OF NC 194	-	6,400	7,300	7,100	6,400	7,800	1.0%	-	8,300	9,500	9,300	8,400	10,200

2040 Total Vehicle Count = (2013 Count)*((1+CAGR)^Number Years)

*If dash shown in table, then count considered questionable or just not provided

**2040 AADT projected off of 2013 AADT for comparison by using same formula for 2040 Total Vehicle Count

NC 105 Monthly Capacities - 2040

NC 105 Monthly 2040 Count Capacities

Count Station	Route ID	Location	NC 105 Monthly 2040 Counts - Capacity Status					2040 AADT - Capacity Status
			Feb	Apr	Jun	Aug	Oct	
57	NC 105	N OF NC 184	Over	Over	Over	Over	Over	Over
58	NC 105	S OF NC 184	-	Near	Over	Over	Over	Partially Over/Under

Notes:

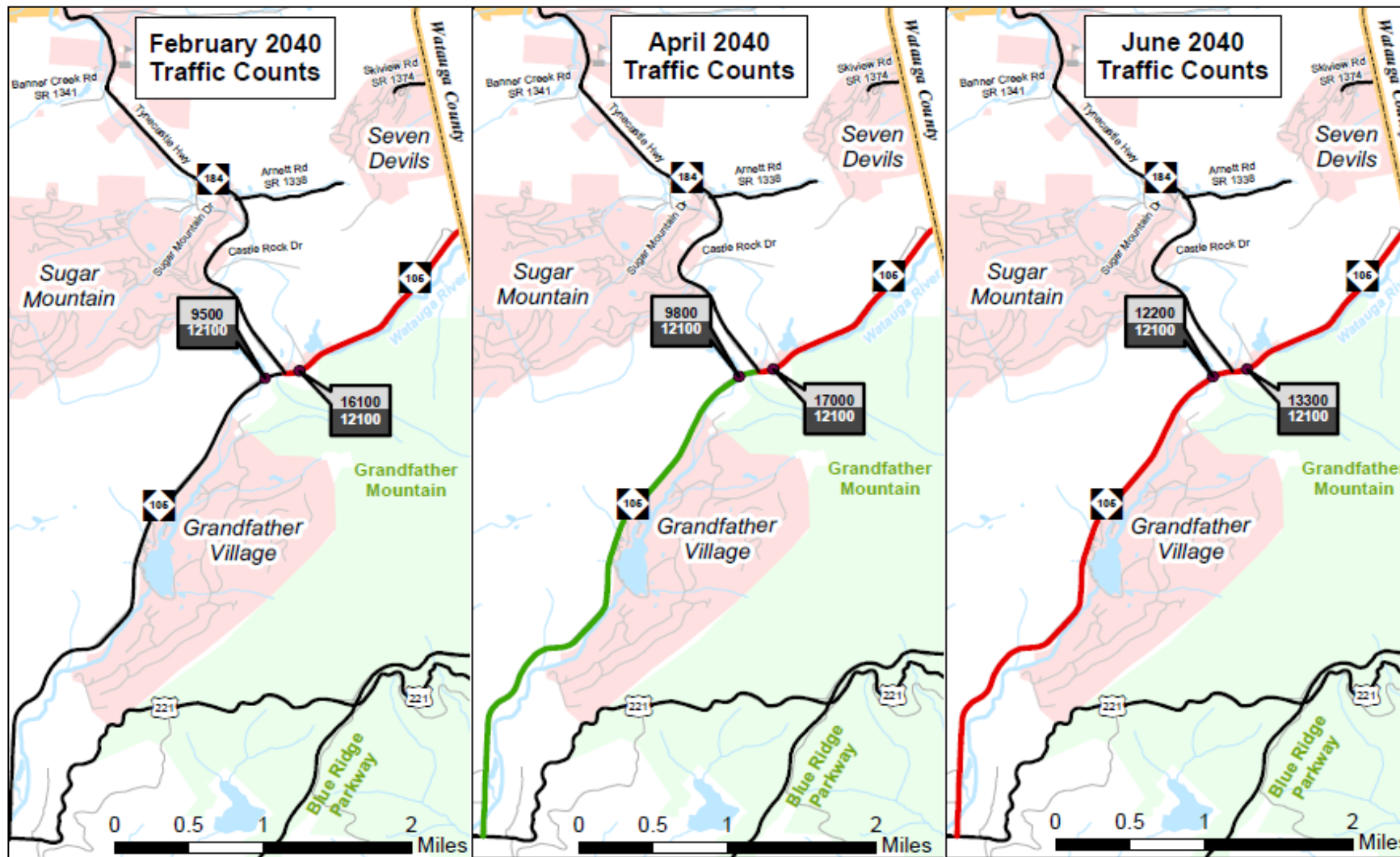
Over Capacity - Volume/Capacity Ratio \geq 100%

Near Capacity - Volume/Capacity Ratio \geq 80%

Dash = No Capacity Issue (Volume/Capacity Ratio $<$ 80%)



NC 105 Monthly V/C Ratios - 2013

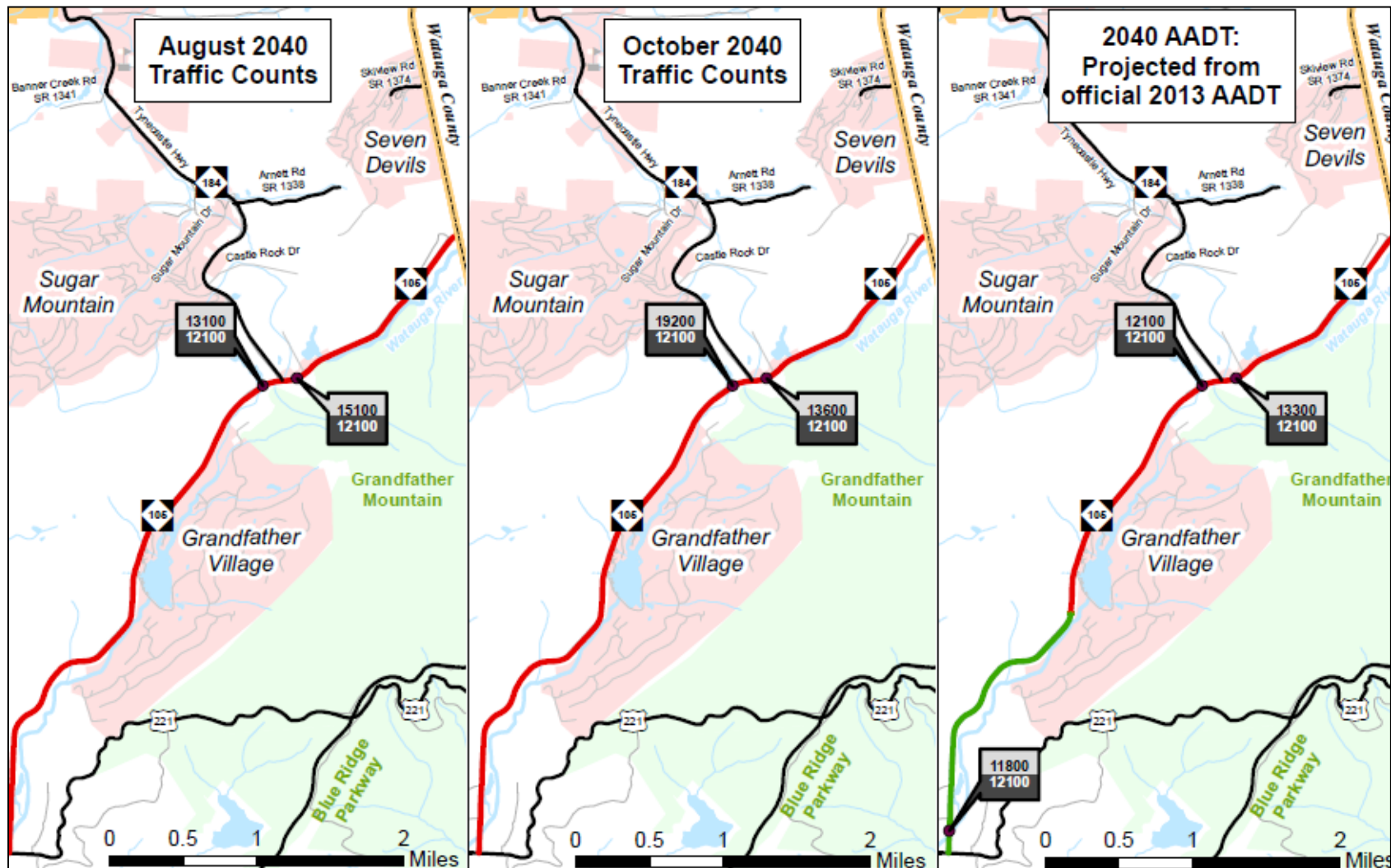


2040 Volume
2012 Capacity

— Near Capacity
— Over Capacity
— Network Roads



NC 105 Monthly V/C Ratios - 2013



2040 Volume
2012 Capacity

— Near Capacity
— Over Capacity
— Network Roads



2013 Monthly Seasonal Count Volumes / Capacities

Count Station	Route ID	Location	2012 AADT	2013 Monthly Vehicle Counts					2013 AADT	2040 AADT*	2040 Monthly Vehicle Counts					2040 AADT**	Road Capacity
				Feb	Apr	Jun	Aug	Oct			Feb	Apr	Jun	Aug	Oct		
5	US 19-E	E OF SR 1170	-	-	-	-	-	-	-	-	-	-	Near	Near	-	-	10,800
6	US 19-E / NC 194	S OF SR 1323	-	N/A	-	-	-	-	-	-	N/A	-	-	-	-	-	12,100
7	US 19-E	S OF NC 194	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11,600
13	US 19-E	S OF SR 1198	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10,200
14	US 19-E	W OF SR 1196	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12,100
18	US 221	E OF NC 105	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6,300
21	US 221	E OF SR 1524	-	N/A	-	-	-	-	-	-	N/A	-	-	-	-	-	12,100
24	US 221 / NC 194	N OF SR 1114	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12,100
26	US 221	S OF NC 194	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12,100
27	US 221	S OF SR 1100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11,200
28	NC 194	E OF US 19-E	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6,300
32	NC 184-194	W OF NC 184	-	-	-	-	-	-	-	Over	-	-	Near	Near	Near	Near	10,600
33	NC 194	E OF NC 184	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9,600
36	NC 194	E OF SR 1361	-	-	-	-	N/A	-	-	-	-	-	-	N/A	-	-	18,200
38	NC 194	N OF NC 181	Over	Over	Over	Over	Near	Over	Over	Over	Over	Over	Over	Over	Over	Over	11,000
39	NC 194	N OF SR 1156	-	-	-	-	-	-	-	Near	Near	Near	Near	Near	Near	Near	11,000
47	NC 184	S OF NC 194	-	-	-	-	Near	-	-	Over	Near	-	Near	Over	Near	Near	10,600
53	US 221	E OF NC 181	Near	-	-	Near	Near	Over	Near	Over	Near	Near	Over	Over	Over	Over	11,600
55	NC 181	S OF US 221	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12,100
56	NC 181	S OF SR 1521	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12,100
57	NC 105	N OF NC 184	Near	Over	Over	Near	Over	Near	Near	Near	Over	Over	Over	Over	Over	Over	12100
58	NC 105	S OF NC 184	-	-	-	Near	Near	Over	Near	Near	-	Near	Over	Over	Over	Over	12100
59	NC 184	E OF SR 1363	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8,200
60	US 221 / NC 181	N OF SR 1545	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12,100
1510	SR 1370	S OF NC 181	-	-	-	-	-	-	N/A	-	-	-	-	-	-	N/A	9,500
1511	SR 1153	W OF NC 194	-	-	-	-	-	-	N/A	-	-	-	-	-	-	N/A	7,400
1529	SR 1106	S OF NC 194	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8,800
1541	SR 1342	W OF NC 184	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9,200
3401	NC 181	E OF NC 194	-	N/A	-	-	-	-	-	-	N/A	-	-	-	-	-	23,500

*2040 AADT projected from 2012 AADT

**2040 AADT projected from 2013 AADT

Road Capacity = HCM 2000 LOS D Capacity of road in 2012

Dash = No Capacity Issue (Volume/Capacity Ratio < 80%)

Near = Near Capacity (Volume/Capacity >= 80%)

Over = Over Capacity (Volume/Capacity >= 100%)

Lessons Learned

- Before beginning the development of a transportation plan for an area, stop and consider if providing seasonally varied counts would have a benefit to the area
 - For areas with known seasonal variance, see what options are available for having monthly seasonal counts taken (e.g. Avery County)
 - For areas where additional data collection is not feasible/practical, consider providing monthly seasonally adjusted volumes based on AADT (e.g. Dare County)
- Gain trust and buy-in from local stakeholders – show them that you are listening
- Consider TIP projects that would benefit from additional seasonal data and coordinate with the TIP project engineer well in advance



Questions?

Kerry Morrow
Statewide Plan Engineer
kmorrow@ncdot.gov
(919) 707-0924

Matt Quesenberry, EI
HNTB Transportation Engineer
mquesenberry@hntb.com
(919) 424-0449



CONSIDERING TOURISM IN LONG-RANGE PLANNING

UNDERSTANDING THE TRAVEL PATTERNS OF VISITORS TO RV
PARKS IN THE ASHEVILLE REGION: A LOW COST SOLUTION

Leta F. Huntsinger, PhD, PE

TOURISM IN THE FBRMPO REGION

- FBRMPO
 - Western, NC
 - Blue Ridge Mountains
- Asheville
 - Culinary cool
 - Beer scene
 - Artist community
 - Biltmore Estates
 - Blue Ridge Parkway
 - And the list goes on...



www.benrsmith.com



www.ashevollenc.com

2012 TOURISM STATISTICS BUNCOMBE COUNTY

- 9.1 million visitors
- 3.1 million overnight guests
- Impact:
 - Spent 1.5 billion
 - Generated \$2.3 billion in economic impact
 - Supported ~23,000
- Tourism generates \$58.6 million in state and local taxes
- Without tourism, the unemployment rate in Buncombe County would be 18%

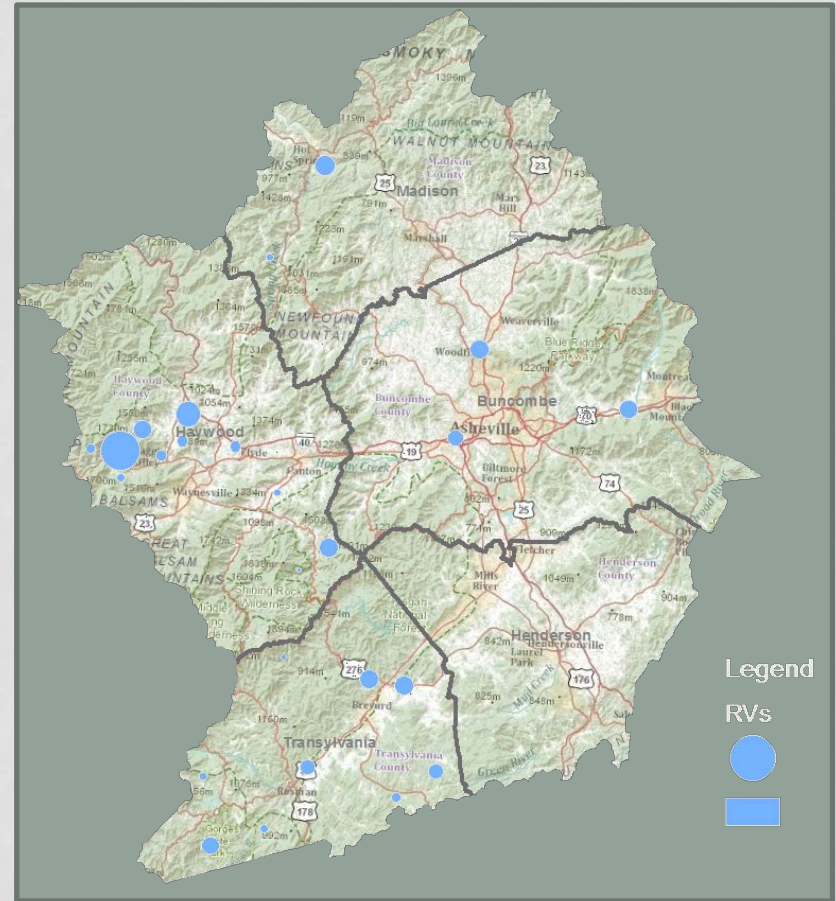
<http://www.ashevillecvb.com/economic-impact/>



RV PARKS IN ASHEVILLE REGION

- 32 parks
- 3,000 sites
- Over 6,000 additional people

MPO wanted to better understand the impacts of RV park visitors on the transportation system in the region



SURVEY DESIGN AND DATA COLLECTION



SURVEY BASICS

- Retrospective small sample survey
- Mix of long- and short-term visitors
- Simple paper questionnaire
- Administered to one member of the party
- Face to face interviews

*Key Question: Is
travel from RV
households
different from
retired households*

SAMPLE

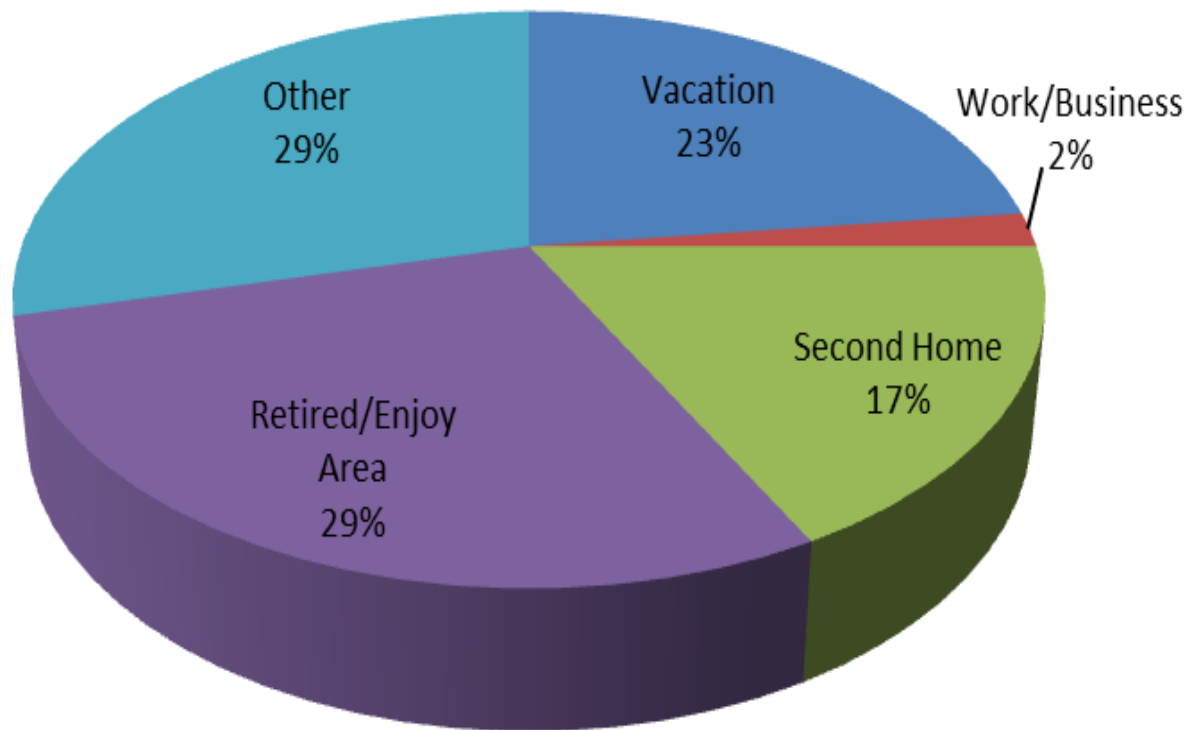
- Non-probability sample
- Drawn from RV Parks provided by MPO
- Sample/Results:
 - 7 RV parks
 - 200 sampled RV households
 - 70 interviews completed
 - 43 long-term
 - 25 short-term
 - 2 undetermined

SURVEY INSTRUMENT

- Primary trip characteristics
 - Date of arrival
 - Length of stay
 - Frequency and purpose of travel to region
 - Number of people in travel party
- Household characteristics:
 - Age
 - Income
 - Employment
 - Home state
 - Reason for visit
 - Length of stay
- Trip characteristics:
 - Start location
 - End location
 - Start time
 - End time
 - Trip purpose
 - Mode
 - Party size

DATA ANALYSIS

PURPOSE OF TRAVEL



RESPONDENT STATS

- 69 percent long-term visitors
- 90 percent retired
- 83 percent 65 years or older
- 54 percent had income greater than \$60,000
 - 15 percent non-response rate

TRIP STATS

- 22 percent did not travel on travel day
- 5.05 average daily trips
 - Shopping: 1.71
 - Non-home based: 1.82
- Vacationers vs. Other:
 - 5.63 trips/day for vacationers
 - 4.26 trips/day for others
- Long- vs. Short-term
 - 5.60 trips/day for long-term
 - 4.26 trips/day for short-term

TRIP RATES BY HH TYPE

Household Type	HBW	HBSHOP	HBO	NHB	Total
RV	-	1.71	1.52	1.82	5.05
Retired	0.25	0.95	3.23	2.49	6.93
Part-Time Residents	0.49	0.96	2.93	2.86	7.23

TRIP LENGTH BY HH TYPE

Household Type	HBW	HBSHOP	HBO	NHB	Total
RV (n=67)	NA	10.90	11.18	4.71	8.70
Retired (n=707)	7.33	6.67	7.00	6.79	6.89
Part-Time Residents (n=69)	8.12	8.91	10.89	6.72	8.79

SUMMARY AND RESULTS

BENEFITS

- Used to develop a RV visitor model
 - 8,200 Daily Person Trips
 - 6,000 Daily Vehicle Trips
 - Ability to Adjust Seasonal Factors
- 0.4% of daily trips (peak season > 1%)
- Not much?
 - Transit share in Asheville 0.3%
 - Transit share in Triangle Region 1.2%
- In localized areas, impossible to “get it right” without these models.
- Provides improved scenario testing

ACKNOWLEDGEMENTS

- French Broad River MPO staff
- Pam Cook, NCDOT
- Westat, Inc.

Conclusions



In Conclusion - What should we plan for?



← This...

or this ↓



Or something in between?

What should we plan for, and how should we plan for it?

- July 4th or February 12th or somewhere in between?
- Each area is unique – What is the seasonality impact in the area?
- Gather DATA, DATA, DATA: Traffic counts (request counts over a year if critical to decision process), hotel occupancy rates, variance in traffic volumes, number of weeks/year a facility is over capacity, # of seasonal housing units, seasonal employment rates, number of attendees/week or month to local tourist attractions...

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Monthly Avg.
2013	34%	32%	60%	82%	114%	170%	180%	133%	136%	109%	88%	63%	779,558
2012	33%	44%	76%	92%	99%	149%	172%	134%	122%	142%	77%	60%	807,152
2011	29%	42%	67%	92%	97%	149%	179%	134%	113%	148%	81%	63%	750,736

Figure 6.7. Percent of Average Monthly Recreation Visitors by Month, 2011-2013, Great Smoky Mountains National Park;
Source: National Park Service, Recreation Visitors by Month. Great Smoky Mountains National Park. Accessed March 2014.

- Using the data, develop a baseline and then decide what level of congestion to plan for – Should be part of your Vision, Goals and Objectives discussions during the CTP/MTP process
- Engage your local officials, residents, and visitors



Possible Data Resources

- <https://www.nccommerce.com/tourism>
- <http://partners.visitnc.com/research-3/tourism-research.html>
- NCDOT - Traffic Surveys Group for count data / Speed Data
- Local tourism office
- Hotels/motels for occupancy rates/month
- Seasonal businesses - # employees/month
- National parks / State parks in your area for # of attendees
- Local data surveys e.g. the RV survey done in the Asheville area



Questions?

Pam R. Cook, PE
NCDOT TPB Western Unit Staff Engineer
prcook@ncdot.gov
919-707-0975

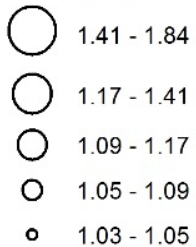


NCDOT Prioritization uses Peak ADT

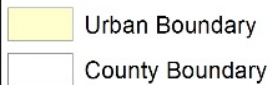
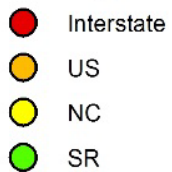
- $PADT = AADT \times PADT \text{ Factor}$
- $PADT \text{ factor} = \text{Highest monthly volume} / \text{Average Annual Daily Traffic}$
- Primary Routes – factor based on continuous counts and coverage counts
- Secondary Routes – factor based on default values
- PADT to be used in the following:
 - Congestion (volume/capacity and volume)
 - Freight (volume/capacity)
 - Multi-modal (volume/capacity)
- P5.0+ → Explore expanding coverage counts to provide a more accurate PADT for additional locations

Continuous Count Stations

All Active Count Stations Fac_Month

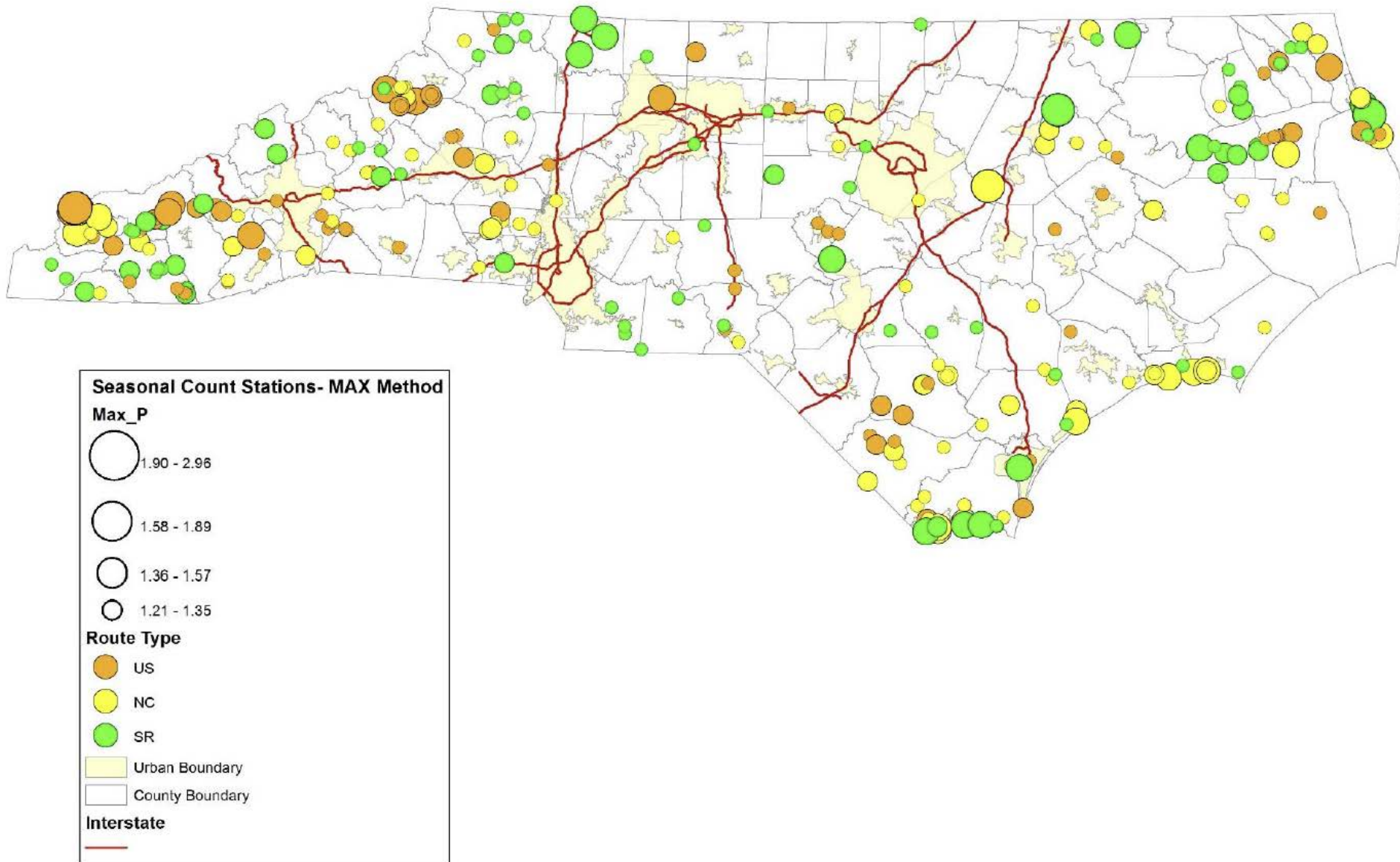


Route Type

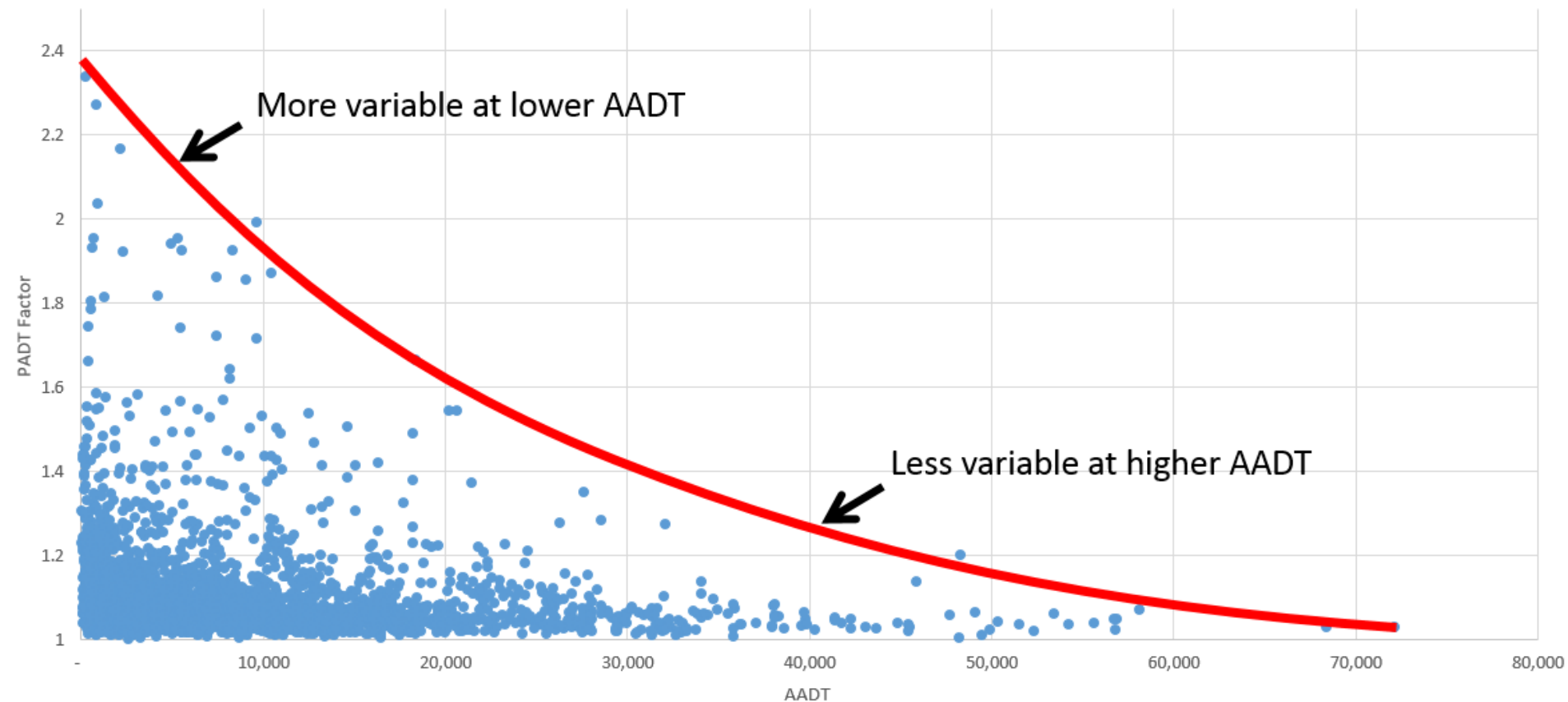


Data provided by NCDOT. 71/71 active count stations in NC have PADT factors assigned.

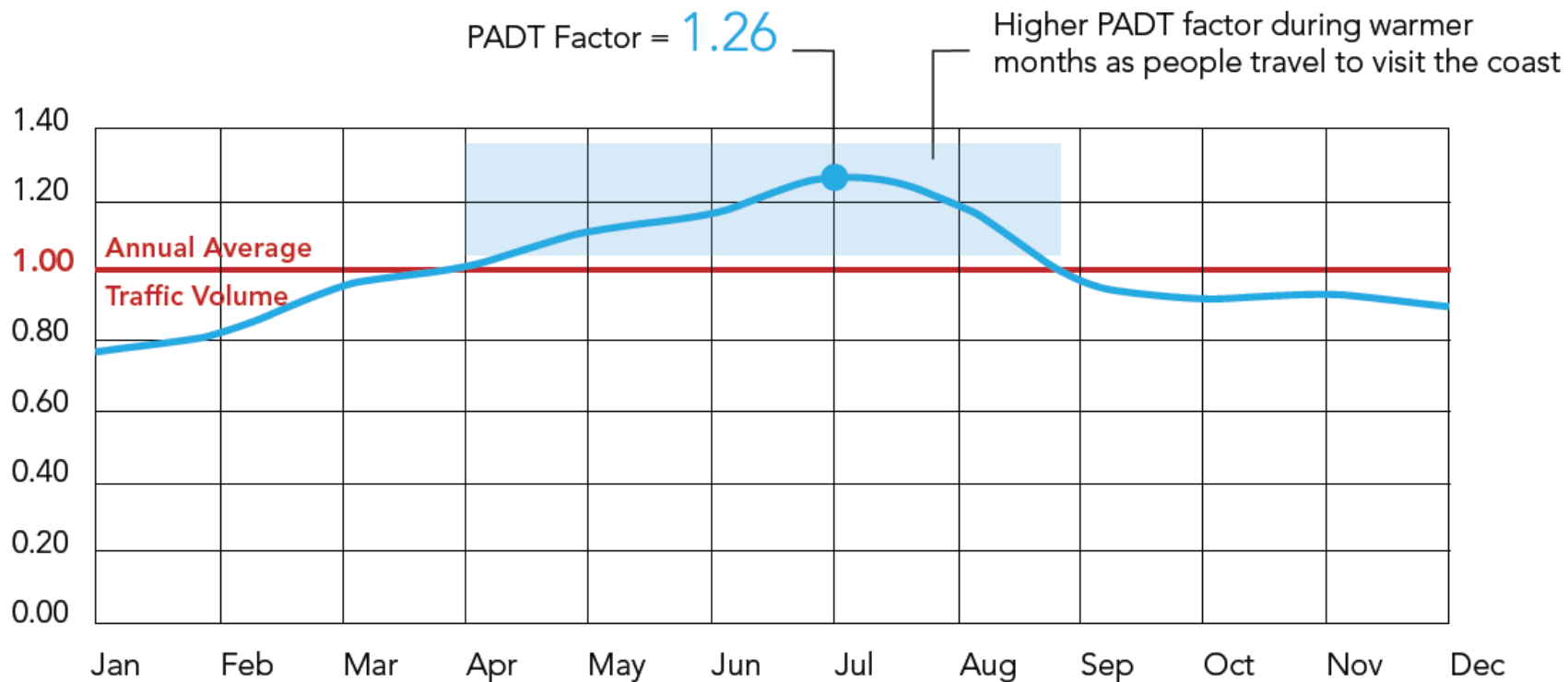
Coverage Count Stations with Peak ADT Factor >1.2



PADT Factor and AADT



◆ An example for I-40 near Wilmington:



NCDOT Research Contract 2015-26:
Research and Technical Support for NCDOT Strategic Prioritization



Highway – Congestion

<u>Funding Category</u>	<u>Criteria Weight</u>
Statewide Mobility	30%
Regional Impact	20%
Division Needs	15%

Purpose – Measure existing level of mobility along roadways by indicating congested locations and bottlenecks

Statewide Mobility	60% - Existing Volume/Capacity Ratio 40% - Existing Volume
Regional Impact	80% - Existing Volume/Capacity Ratio 20% - Existing Volume
Division Needs	100% - Existing Volume/Capacity Ratio

Peak ADT will be used as the Existing Volume

Highway – Freight [+ Military]

<u>Funding Category</u>	<u>Criteria Weight</u>
Statewide Mobility	15%
Regional Impact	10%
Division Needs	5%

Purpose – measure congestion along routes that provide connection to freight intermodal terminals and that have high truck volumes

50% - Truck volumes along route

30% - Volume [Peak ADT] /capacity if project is on non-Interstate STRAHNET route or designated future Interstate

20% - (20 miles – distance project is to nearest freight intermodal terminal)

Freight terminals (includes facilities within 20 miles of NC):

- Public freight intermodal terminals (truck/rail/pipeline) – as defined in NHS
- Seaports and inland ports
- Statewide Mobility eligible airports which handle large movement of freight (CLT, RDU, GSO)
- Major military bases
- Major ferry terminals
- Large private freight intermodal terminals (truck to rail)

Highway – Multimodal [+ Military]

<u>Funding Category</u>	<u>Criteria Weight</u>
Statewide Mobility	5%
Regional Impact	-
Division Needs	-

Purpose – measure congestion along routes that provide a connection to multimodal passenger terminals

40% - Volume [Peak ADT] / Capacity ratio along route if project is within 5 miles of a multimodal passenger terminal

60% - (5 miles – distance project is to nearest multimodal passenger terminal)

Multimodal passenger terminals:

- Amtrak stations (bus and rail stations run by Amtrak)
- Major transit terminals
- Commercial service airports
- Red & blue general aviation airports
- Major military bases
- Ferry terminals

ATR Groups Definitions

Non-Interstate ATR Groups									
Group 1:	The most dominant group in the State. Mostly rural in nature and is predominantly used for count locations on nonurban primary routes and all rural and most urban secondary roads.								
Group 2:	This group is generally applied to count locations on primary routes (US and NC routes) that provide regional access to recreational areas. These facilities are typically located in the eastern and western areas of the State.								
Group 3:	Generally assigned to roads in the coastal and mountain regions. This group is characterized by recreational land use and areas subject to greater seasonal variation. Factors from this group are predominantly applied to primary routes (US and NC routes) located at or within recreational areas. Some local routes located in the mountain region have this group assignment.								
Group 4:	Predominantly found in areas where land use is characterized as urban, with dense, mixed development. Factors from this group are predominantly applied to urban primary routes and higher volume secondary and local routes in large urban areas.								
Group 5:	Primarily confined to the I-95 corridor and routes directly influenced by I-95 traffic.								
Group 6:	Primarily found in the mountain region of the state. Used at locations strongly influenced by recreational land uses with high seasonal variation.								
Group 7:	Limited to the extreme eastern coastal routes (Outer Banks). Characterized by very high seasonal variation.								
Interstate ATR Groups									
Group 11:	Applies to urban interstate and some rural locations strongly influenced by nearby large urban areas.								
Group 12:	The most prominent interstate group in the State. Rural in nature and is predominantly used for nonurban locations not affected by recreational travel.								
Group 13:	Applied to the I-95 corridor due to it's unique seasonal pattern.								
Group 14:	Applied to I-77 north of I-40 and the northern end of I-85. Somewhat similar to the I-95 pattern but much more extreme due to the low volumes experienced on those interstate locations.								

