Evaluating the **ECONOMIC IMPACT** *of* Shared Use Paths *in* North Carolina

DECEMBER 2016

TECHNICAL MEMORANDUM: DUCK TRAIL YEAR TWO

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Acknowledgements

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1. BACKGROUND

Historically, North Carolina has been known as the "Good Roads State," due to the high quality and connectivity of its state roads system. There is a movement stirring to add a new moniker to North Carolina's accolades by positioning itself as the "Great Trails State." This project quantifies the economic contribution that these trails provide through outdoor recreation and transportation options and how these activities may impact local and state economies through tourism, events, urban redevelopment, community improvement, property values, health care savings, jobs, investment, and general consumer spending.

Currently, much of North Carolina's overall mileage of shared use paths (SUPs) remains in planning phases. While construction is occurring, the information gleaned through this project's case studies will assist in the evaluation of these expenditures and may influence decisions for further investment in SUPs for the development of more extensive trails and networked systems across the state. Methodologies developed through this project will assist in easier duplication of research efforts on economic contributions as new trails are opened or expanded, and research products from this project can serve as the basis for studies of these SUPs in the future. Additionally, as similar data are consistently collected and analyzed across the state, this project allows NCDOT to ultimately pull datasets together to compare economic activity from SUPs across regions or understand statewide trends.

Duck Trail in Duck, North Carolina is one of four SUPs under study in this project. It has been selected as one of two trails to apply the study's methodologies to generate a cross-sectional study. The following provides a summary of findings for Duck Trail.

LAND USE OVERVIEW

The Duck Trail is a six-mile shared use path that traverses the entire length of the Town of Duck. The trail is primarily located on the east side of Duck Road as a sidepath. When traveling through the commercial Village of Duck located between Four Seasons Lane and the Duck Post Office, the trail continues on both sides of Duck Road as part of the wide shoulder. Pedestrians, bicyclists, and in-line skaters share the Duck Trail.

2. MEMORANDUM OBJECTIVES

The findings presented in this document are from research that was conducted in Year 2 of the three-year study. Duck Trail is one of two SUPs that are examined in a cross-sectional study using data collected in one year (2016). This memorandum provides summary statistics for behaviors and trail usage on the entire SUP for the following topic areas:

- Transportation: baseline travel behaviors
- Physical Fitness and Health: duration and extent of active behaviors
- Economy: expenditures related to usage of the shared use path

The data collected on these categories will provide inputs for a series of models that will estimate economic benefits (such as benefits resulting from annual trail user expenditures, retail sales tax, capital and operational expenditures, and property values and property taxes), as well as health benefits, and congestion and pollution reduction benefits related to the existence of the shared use path.

Counts and surveys were conducted in June 2016. Bicyclists and pedestrians using the trail were surveyed at two locations distributed across the entire length of the trail.

Information that was gathered included:

- Trail origin and destination points to derive distance and direction of travel on the trail
- Purpose of trip – exercise/recreation/sightseeing, work/school commute, dining/shopping/errands, cultural attraction/entertainment/leisure activity
- Trip mode – mode of arrival at the trail (e.g. auto, bike, foot, bus, other) and mode of travel on the trail (e.g. walk, run, bike, other)
- Physical activity indicators – duration of active travel, quantity of typical monthly active travel by trip purpose
- Economic activity indicators – amount spent on goods or services during trail trip
- Respondents' living status in the area and demographic information

The research team also counted Duck Trail users and noted additional characteristics such as:

- Type of user – bicyclist, runner, walker, other mode
- Direction of travel – north or south
- Age – adult or child
- Gender
- Group size

3. METHODS

The research team conducted counts and intercept surveys in June 2016 during thirteen daylight hours from 6:30AM-7:30PM on two weekdays. Dates were selected to avoid special events and Fridays to remove the potential for variation in typical volumes of non-motorized traffic. No weekend days were selected due to the unique nature of vacation rentals in this beach tourist area, which typically rent from Saturday to Saturday. Data collection was stopped, delayed, or rescheduled as required due to rain events. Figure 1 provides a map of the two locations where counts and intercept surveys were collected. Locations on either end of the commercial Village of Duck were selected for data collection.

USER COUNTS

Manual screenline counts at two locations on the trail allowed the research team to record information needed to obtain user profiles and determine user flows. The data collection form used by the research team to conduct user counts can be found in Appendix A.

INTERCEPT SURVEYS

The research team intercepted users to solicit survey responses at the same two locations along the trail where manual screenline counts were collected. The survey form gathered information about the behavior and demographics of trail users. Survey sites were outfitted with a water cooler and yard signs

TABLE 1: DATA COLLECTION SCHEDULE AND SUMMARY STATISTICS

DAY OF WEEK	DATE	TIME PERIOD	STATION	LOCATION	2016 COUNTS	2016 SURVEYS
Monday	6/20/2016	6:30AM to 7:30PM	1	Duck Trail North	727	109
			2	Duck Trail South	1,400	102
Tuesday	6/21/2016	6:30AM to 7:30PM	1	Duck Trail North	735	163
			2	Duck Trail South	1,477	150
				TOTALS	**4,339**	**524**

on each approach instructing trail users to "slow down" for the "survey ahead" as they approached the site. Only individuals aged 18 years and older were surveyed with one survey distributed per household for household members traveling together on the trail. Appendix B provides an example of the survey form used.

Table 1 summarizes the data collection effort indicating the data collection period, survey/count location on the trail, the raw number of users counted, and the raw number of users intercepted to fill out a survey while using the trail. A total of 4,339 counts were collected during the survey period, and 524 surveys were completed.

4. RESULTS

Results have been compiled for overall use of the trail based on the aggregated data collected at the two survey/count stations. Findings include users' demographics, their usage of the trail, and transportation, economic, and health aspects of trail use. The preliminary findings provided have not been tested for statistical significance. These results will be further evaluated for significance and for comparative analysis once all years of data collection are complete.

TRAIL USER DEMOGRAPHICS

Table 2 shows the **percentages of surveyed trail users and counts by gender and age group** for Duck Trail users and counts overall:

- In general, a greater percentage of females than males used the trail.
- Nearly a third of those surveyed were over the age of 55.

Table 3 provides **additional demographic information for the surveyed trail users**, including education level, annual household income, and race.

- The majority of surveyed trail users (85%) completed college or obtained an advanced degree.

FIGURE 1: MAP OF DATA COLLECTION STATIONS ON DUCK TRAIL

- The majority of surveyed trail users were white (95%) and earned annual household incomes greater than $74,999 (84%).

Survey user type data were compared to manual count user type data to determine if the survey responses could be considered representative of the population of trail users during the data collection period. Count data were adjusted based on the survey responses indicating the percentage of trips that were round trips and the number of survey/count

TABLE 2: SURVEYED TRAIL USER AND COUNT DEMOGRAPHICS – GENDER AND AGE

DEMOGRAPHIC	2016 SURVEYED USERS (N)	2016 COUNTS (N)
Male	45% (229)	48% (2,071)
Female	55% (281)	52% (2,227)
Age 18-25	5% (21)	13% (437)
Age 26-55	64% (295)	62% (2,144)
Age >55	31% (145)	25% (852)

TABLE 3: SURVEYED TRAIL USER DEMOGRAPHICS – EDUCATION, ANNUAL HOUSEHOLD INCOME, AND RACE

DEMOGRAPHIC	2016 SURVEYED USERS (N)
Some High School	0% (0)
Completed High School	6% (29)
Some College	8% (38)
Completed Business/Technical School	1% (7)
Completed College	38% (192)
Advanced Degree	47% (236)
Less than $25,000	1% (5)
$25,000-$34,999	2% (11)
$35,000-$49,999	2% (11)
$50,000-$74,999	10% (48)
$75,000-$99,999	16% (76)
$100,000-$149,999	23% (108)
$150,000-$199,999	19% (92)
$200,000 or more	26% (126)
White	95% (484)
Black	2% (11)
Asian	2% (12)
Native Hawaiian or Pacific Islander	<1% (2)
American Indian	<1% (1)

stations passed according to user reported trail origin, turnaround, and destination points to avoid overestimating or 'double/ multi-counting' unique users of the trail. A summary of the methods used to adjust the counts to unique users can be found in Appendix C.

Table 4 provides the **percentages of Duck Trail surveyed users, counts, and unique users by travel mode on the trail during the survey period**. Comparing data across the columns shows the degree to which those surveyed represent a proportionate sample of all those using the trail. Note that while children less than 18 years of age were counted, they were not surveyed.

- Surveyed user proportions differ from unique user proportions for bicyclists and walkers. The greater unique user proportions on these modes is likely due to a high frequency of users traveling with members of the same household. Only one member per household is surveyed, but all members of the household are counted.
- The proportion of counted bicyclists is much greater than the proportion of surveyed and estimated unique bicyclists. This is likely due to the longer distances traveled by bicyclists on average, which allows an individual cyclist to be surveyed once per data collection day but counted multiple times along the trail.

TABLE 4: ALL TRAIL USERS DURING SURVEY PERIODS – TRAVEL MODE ON TRAIL

MODE	DAY	2016 SURVEYED USERS (N)	2016 COUNTS (N)	2016 UNIQUE USERS (N)
Bike	Mon	34% (91)	46% (985)	44% (447)
	Tues	35% (89)	46% (1,025)	45% (463)
Walk	Mon	38% (102)	35% (740)	37% (371)
	Tues	42% (105)	38% (838)	40% (406)
Jog/Run	Mon	27% (73)	18% (378)	18% (178)
	Tues	23% (58)	15% (323)	15% (151)
All Other Modes	Mon	2% (5)	1% (21)	1% (13)
	Tues	0% (0)	1% (26)	0% (0)

Table 5 provides data separated by travel mode on the trail, gender, and age group for trail users intercepted during the survey period.

TRAIL USER PROFILES

Information was compiled to investigate the travel modes used both to travel to the trail as well as while traveling on the trail, where trail users live in relation to the trail, whether they used the trail for recreational/non-recreational

TABLE 5: COMPARATIVE PERCENTAGES/NUMBERS OF COUNTS AND THOSE SURVEYED, BY TRAVEL MODE ON TRAIL, GENDER, AND AGE

MODE, GENDER, AGE	2016 PERCENTAGE OF SURVEYED USERS (N)	2016 PERCENTAGE OF COUNTS (N)
Bicycle, M, 18-25	1% (3)	3% (97)
Bicycle, M, 26-55	10% (43)	14% (484)
Bicycle, M, >55	7% (30)	6% (206)
All Bicycle, Male	**19% (97)**	**25% (1,081)**
Bicycle, F, 18-25	1% (4)	3% (102)
Bicycle, F, 26-55	11% (50)	12% (415)
Bicycle, F, >55	4% (17)	4% (132)
All Bicycle, Female	**16% (79)**	**22% (914)**
Walker, M, 18-25	<1%% (2)	2% (59)
Walker, M, 26-55	7% (30)	7% (234)
Walker, M, >55	6% (29)	5% (182)
All Walker, Male	**13% (66)**	**14% (591)**
Walker, F, 18-25	<1% (2)	3% (87)
Walker, F, 26-55	17% (78)	14% (481)
Walker, F, >55	11% (51)	7% (246)
All Walker, Female	**27% (136)**	**23% (966)**
Jogger/Runner, M, 18-25	1% (3)	1% (27)
Jogger/Runner, M, 26-55	8% (35)	7% (241)
Jogger/Runner, M, >55	3% (14)	2% (60)
Jogger/Runner, Male	**12% (60)**	**8% (353)**
Jogger/Runner, F, 18-25	1% (4)	1% (49)
Jogger/Runner, F, 26-55	12% (53)	8% (261)
Jogger/Runner, F, >55	<1% (2)	1% (19)
Jogger/Runner, Female	**13% (66)**	**8% (343)**

purposes, the frequency of trail use, and the distance users traveled on the trail.

Table 6 shows information on **"Local" versus "Non-Local" point of trip origin** by travel mode on the trail. "Local" is defined as the zip code area through which Duck Trail passes (27949). "Non-Local" is defined as all other zip code areas.

- In general, more Non-Local people used the trail, with the highest percentage being those who walk on the trail (97%).
- The highest proportion of Local trail users is bicyclists (7%).

Table 7 shows information on living status as reported by surveyed trail users by travel mode. For those surveyed trail users who defined their living status as a visitor to the area, Table 8 summarizes their average stay in days by travel mode.

- The majority of surveyed users reported that they were visitors to the area (84%).
- The highest proportion of visitors is walkers (40%).
- The average stay in days for surveyed visitors is 8 days.

TABLE 6: TRIP POINT OF ORIGIN BY TRAVEL MODE ON TRAIL

MODE	2016 LOCAL (N)	2016 NON-LOCAL (N)
Bike	7% (12)	93% (168)
Walk	3% (7)	97% (200)
Jog/Run	4% (5)	96% (126)
All Modes	5% (24)	95% (499)

TABLE 7: LIVING STATUS BY TRAVEL MODE ON TRAIL

LIVING STATUS AND MODE	PERCENT OF SURVEYED USERS	(N)
Permanent Resident	**6%**	**29**
Bike	52%	15
Walk	24%	7
Run	17%	5
Seasonal Resident	**10%**	**52**
Bike	33%	17
Walk	44%	23
Run	23%	12
Visitor	**84%**	**441**
Bike	34%	148
Walk	40%	176
Run	26%	114
Total	**100%**	**522**

TABLE 8: AVERAGE STAY FOR VISITORS IN DAYS BY TRAVEL MODE ON TRAIL

LIVING STATUS AND MODE	AVERAGE STAY IN DAYS	(N)
Visitor	**8**	**411**
Bike	8	131
Walk	7	169
Run	7	108
Other	7	3

Table 9 provides information on the states that surveyed users were visiting from.

- The majority of surveyed users reported that they were visitors to the area from either Virginia (21%), Pennsylvania (20%), or Maryland (10%).
- Less than 10% of surveyed visitors reported that they were visitors to the area from other places in North Carolina.
- 78% of surveyed users and 91% of surveyed visitors came to the trail from a state other than North Carolina.

TABLE 9: STATES THAT SURVEYED USERS WERE VISITING FROM

STATE OF RESIDENCE	PERCENT OF SURVEYED USERS	PERCENT OF SURVEYED VISITORS	(N)
VA	21%	25%	110
PA	20%	24%	105
MD	10%	12%	52
NC	**7%**	**9%**	**38**
OH	6%	7%	30
NJ	3%	3%	14
CT	2%	2%	9
WV	2%	2%	9
IN	1%	2%	7
NY	1%	2%	7
IL	1%	1%	6
CA	1%	1%	5
DC	1%	1%	5
DE	1%	1%	5
KY	1%	1%	5
TN	1%	1%	5
FL	1%	1%	4
GA	1%	1%	4
MA	1%	1%	4
MI	1%	1%	3
TX	1%	1%	3
MN	0.4%	0.5%	2
SC	0.4%	0.5%	2
CO	0.2%	0.2%	1
MO	0.2%	0.2%	1
NE	0.2%	0.2%	1
NH	0.2%	0.2%	1
NV	0.2%	0.2%	1
WA	0.2%	0.2%	1

Trail users were asked about their **frequency of use** of the trail. The figures shown in Table 10 are averages of the total number of trips taken in the past 14 days as reported by survey respondents. Most of those surveyed used the trail several times during the previous two week period.

- On average, use of the trail during the previous two weeks was similar across all modes, with an average of four trips in the past 14 days for all modes.

Table 11 provides information on the **distance traveled** on Duck Trail by travel mode on the trail and Table 12 provides information on the **distance traveled** on Duck Trail by gender and travel mode on the trail. The figures reported in the table are average trip distances in miles. Cases in which inadequate data was provided to compute trip distance were not included.

- Bicyclists traveled greater distances than those traveling by other modes. Distance traveled varied directly with the relative speed of each mode.
- Male bicyclists traveled the greatest distances on the trail.

TRANSPORTATION IMPACTS

Analysis of transportation-related factors included:

- Mode used to travel on the trail
- Primary trip purpose
- Frequency of round trips versus one-way trips
- Mode used to travel to the trail
- Trail access points

TABLE 10: AVERAGE NUMBER OF TRIPS IN THE PAST 14 DAYS

MODE	AVERAGE NUMBER OF TRIPS	(N)
Bike	5	116
Walk	4	117
Jog/Run	4	78
All Modes	4	314

TABLE 11: AVERAGE TRIP DISTANCE (IN MILES) BY TRAVEL MODE ON TRAIL

MODE	2016 AVERAGE MILES TRAVELED (N)
Bike	5.2 mi (180)
Walk	2.2 mi (204)
Jog/Run	3.5 mi (130)
All Modes	3.5 mi (519)

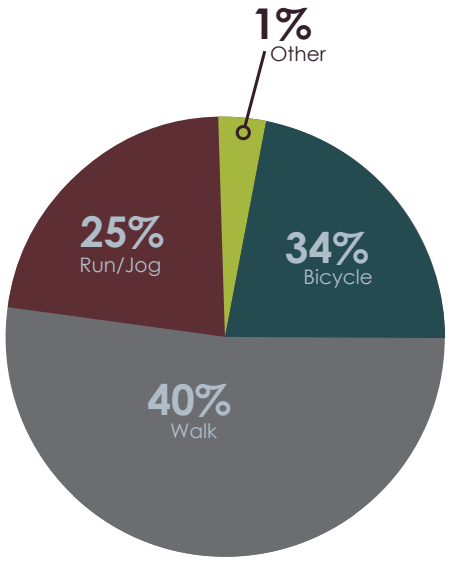
TABLE 12: AVERAGE TRIP DISTANCE (IN MILES) BY GENDER AND TRAVEL MODE ON TRAIL

GENDER	MODE	2016 AVERAGE MILES TRAVELED (N)
Male	Bike	5.5 mi (97)
	Walk	2.3 mi (63)
	Jog/Run	3.5 mi (60)
	All Modes	4.0 mi (225)
Female	Bike	4.7 mi (79)
	Walk	2.1 mi (136)
	Jog/Run	3.5 mi (65)
	All Modes	3.1 mi (280)

Analysis of survey responses found differences in **proportions of users by travel mode on the trail,** as shown in Figure 2.

- The majority of trail users traveled on the trail by foot (65%).

FIGURE 2: TYPE OF USER BY TRAVEL MODE ON TRAIL



Given the relatively high use of the trail for exercise/recreational purposes (74% of trips – see Table 13), it is not surprising that most travel involved a roundtrip, not a one-way trip on the trail, as illustrated in Table 14. However, a quarter of trips were for non-recreational purposes involving travel to/from work, school, dining, shopping, or running errands as their main purpose.

- Across all modes, nearly all trips were roundtrips.

The survey also revealed the **mode by which trail users traveled to the trail.** Table 15 provides information on the access modes used to travel to the trail by all survey respondents, sorted by mode of travel on the trail. The percentages shown are calculated by row to reflect the shares of travel to the trail according to the mode used on the trail.

TABLE 13: PRIMARY TRIP PURPOSE

PRIMARY TRIP PURPOSE	2016 PERCENTAGE OF SURVEYED USERS (N)
For exercise/ recreation/sightseeing	74% (389)
Travel to/from work or school	2% (13)
Travel to/from dining/ shopping/running errands	18% (96)
Travel to/from cultural attraction/entertainment/leisure activity	5% (26)

TABLE 14: TRIP TYPE

MODE	2016 ROUNDTRIP (N)	2016 THROUGHTRIP (N)
Bike	96% (172)	4% (8)
Walk	98% (201)	2% (5)
Jog/Run	98% (128)	2% (3)
All Modes	97% (505)	3% (17)

TABLE 15: MODE TO THE TRAIL BY MODE USED ON TRAIL

MODE ON TRAIL	MODE TO TRAIL		
	2016 by Bicycle (n)	2016 by Car (n)	2016 by Foot (n)
Bike	95% (166)	2% (4)	2% (4)
Walk	0% (0)	<1% (1)	100% (201)
Jog/Run	0% (0)	1% (1)	99% (127)
All Modes	33% (166)	1% (6)	66% (332)

- Two-thirds of those using the trail traveled to the trail by foot. Less than 1% of respondents traveling by foot on the trail and 2% of respondents traveling by bicycle on the trail accessed the trail by car.
- Nearly all respondents traveling by bicycle on the trail accessed the trail by bicycle (95%).
- 99% of respondents used an active mode of transportation to access the Duck Trail.

The survey also provided information on **where trail users were accessing the trail**. Table 16 includes the top five access points on the trail according to where survey respondents accessed the trail.

- The majority of respondents (15%) accessed the trail from the Jaycrest Road intersection.

ECONOMIC IMPACTS

The users of the trail can have an impact on businesses through expenditures on a variety of goods and services. The survey asked trail users to list expenditures on goods or services directly related to their trip on the trail on the day of the survey. If a trail user was traveling with members of their household, estimates represent the total for their household.

The results are shown in Table 17 and include **trail users' expenditures related to their trip on the Duck Trail** categorized by the type of expenditure and separated by user group.

TABLE 16: TOP FIVE ACCESS POINTS ON THE DUCK TRAIL

DUCK TRAIL ACCESS POINT DESCRIPTION	PERCENT SURVEYED (N)
Jaycrest Road	15% (78)
Four Seasons Lane	12% (62)
Scarborough Lane	7% (36)
Tides Drive/East Bias Lane/Charles Jenkins Lane	6% (33)
Plover Drive	5% (25)

TABLE 17: TYPE OF AND AVERAGE EXPENDITURE BY USER GROUP

DUCK USER GROUP	Restaurant			Grocery			Retail			Entertainment			Bike Rental		
	Respondents	% of Respondents	Average Expenses	Respondents	% of Respondents	Average Expenses	Respondents	% of Respondents	Average Expenses	Respondents	% of Respondents	Average Expenses	Respondents	% of Respondents	Average Expenses
Bicycle	179	36%	$35	177	22%	$52	178	12%	$51	179	1%	$150	178	8%	$60
Jog/Run	130	12%	$95	130	11%	$118	130	6%	$133	129	2%	$100	130	1%	$140
Walk	197	38%	$33	198	13%	$28	198	16%	$65	198	2%	$20	198	1%	$50
Total	510	31%	$40	509	16%	$70	510	12%	$68	510	2%	$73	510	3%	$63

- Food-related expenditures were the most common among surveyed trail users. The largest percentage of respondents made purchases at a restaurant. 31% of respondents made a restaurant-related purchase with an average cost of $40, and 16% of respondents made a grocery-related purchase with an average cost of $70.
- 12% of respondents made a retail-related purchase with an average cost of $68, while 2% of respondents made an entertainment-related purchase with an average cost of $73.
- 8% of bicyclists purchased a bike rental with an average cost of $63.

PUBLIC HEALTH IMPACTS

Increasing physical activity among children and adults is a national health objective in the United States. Access to facilities, such as trails, is one of the factors positively associated with physical activity. Information compiled that relates to public health impacts from user of the Duck Trail included:

- The percentage of trail users who indicated exercise as their primary trip purpose
- The mode of activity users engaged in while on the trail
- The average duration of each activity by user type

Table 18 indicates users' **primary trip purpose**. Non-recreational trip purposes included work, school, shopping, restaurant, and entertainment trips. It is important to note that users on the trail whose purpose was not primarily exercise/recreation were still engaging in physical activity while on the trail.

- Overall, 74% of all users on Duck Trail indicated their primary trip purpose as exercise/recreation.
- Over a quarter of all users on Duck Trail indicated their primary trip purpose as non-recreational.

TABLE 18: RECREATIONAL VERSUS NON-RECREATIONAL TRIP PURPOSES

PRIMARY TRIP PURPOSE	2016 PERCENTAGE OF SURVEYED USERS (N)
For exercise/recreation/ sightseeing	74% (389)
Non-recreational (all other trip purposes)	26% (135)

Table 19 indicates the **duration of the active portion of a trail user's trip** (in minutes) by mode traveled on the trail. The total active portion of a trail user's trip was self-reported on the survey and may include time spent actively traveling to or from the trail. This table includes respondents who did not indicate gender so overall totals vary slightly from those reported in Table 18.

- The average duration of the active portion of the trip for all users surveyed on the trail was 54 minutes.
- Bicyclists reported the highest average duration of the active portion of the trip (58 minutes) compared to walkers (52 minutes) and joggers/runners (51 minutes).

TABLE 19: AVERAGE DURATION (IN MINUTES) OF THE ACTIVE PORTION OF USER'S TRIP

MODE	2016 DURATION (N)
Bike	58 min (178)
Walk	52 min (206)
Jog/Run	51 min (128)
All Modes	54 min (517)

Table 20 breaks out the **duration of the active portion of a user's trip by gender and travel mode on the trail**. Respondents that did not indicate gender are excluded from the data in the table.

- Male bicyclists reported a longer duration for the active portion of their trip than females.
- Female respondents spent twelve more minutes on average on their running trips than male respondents.

Table 21 presents information on the **duration of the active portion of a user's trip in relation to annual household income** to assess the activity of users of differing socio-economic status. Duration of the active portion of the trip may include active travel to/from the trail.

- Individuals with household incomes of less than $25,000 reported using the trail for an average of 46 minutes.
- The longest duration of activity on average (61 minutes) was reported by those in the $35,000-$49,999 household income bracket.

Table 22 presents information on the **percentage of exercise met by using the trail over the past 14 days by travel mode on the trail.**

TABLE 20: AVERAGE DURATION (IN MINUTES) OF THE ACTIVE PORTION OF USER'S TRIP BY GENDER AND TRAVEL MODE ON TRAIL

GENDER	MODE	2016 DURATION (N)
Male	Bike	62 min (96)
	Walk	53 min (66)
	Jog/Run	46 min (58)
	All Modes	55 min (225)
Female	Bike	52 min (78)
	Walk	50 min (136)
	Jog/Run	58 min (65)
	All Modes	52 min (279)

TABLE 21: AVERAGE DURATION (IN MINUTES) OF THE ACTIVE PORTION OF USER'S TRIP BY ANNUAL HOUSEHOLD INCOME

HOUSEHOLD INCOME	2016 DURATION (N)
<$25,000	46 min (5)
$25,000-$34,999	43 min (11)
$35,000-$49,999	61 min (11)
$50,000-$74,999	48 min (48)
$75,000-$99,999	50 min (73)
$100,000-$149,999	51 min (108)
$150,000-$199,999	58 min (92)
>$200,000	56 min (123)

TABLE 22: AVERAGE PERCENTAGE OF EXERCISE MET BY USING THE TRAIL OVER THE PAST 14 DAYS BY TRAVEL MODE ON TRAIL

MODE	2016 PERCENT EXERCISE (N)
Bike	47% (163)
Walk	44% (191)
Jog/Run	48% (126)
All Modes	46% (483)

TABLE 23: AVERAGE PERCENTAGE OF EXERCISE MET BY USING THE TRAIL OVER THE PAST 14 DAYS BY TRAVEL MODE ON TRAIL

GENDER	MODE	2016 PERCENT EXERCISE (N)
Male	Bike	41% (88)
	Walk	41% (62)
	Jog/Run	55% (58)
	All Modes	44% (211)
Female	Bike	55% (71)
	Walk	45% (125)
	Jog/Run	42% (63)
	All Modes	47% (259)

- Respondents used the trail to meet 46% of their total exercise on average over the past 14 days.

Table 23 presents information on the **percentage of exercise met by using the trail over the past 14 days by gender and travel mode on the trail.**

- Overall, the average percentage of exercise met by using the trail over the past 14 days was slightly larger for female trail users compared to male trail users; the difference was the greatest for female bicyclists compared to male bicyclists.

TRAVEL ACTIVITY MAPS

The following maps provide a visualization of travel activity on the Duck Trail generated using the user reported trail origin, turnaround, and destination points taken from the surveys.

FIGURE 3: ROUNDTRIP (LEFT) AND THROUGHTRIP (RIGHT) TRAVEL ACTIVITY FOR ALL MODES – *97% OF REPORTED TRIPS WERE ROUNDTRIPS AND 3% OF REPORTED TRIPS WERE THROUGHTRIPS*

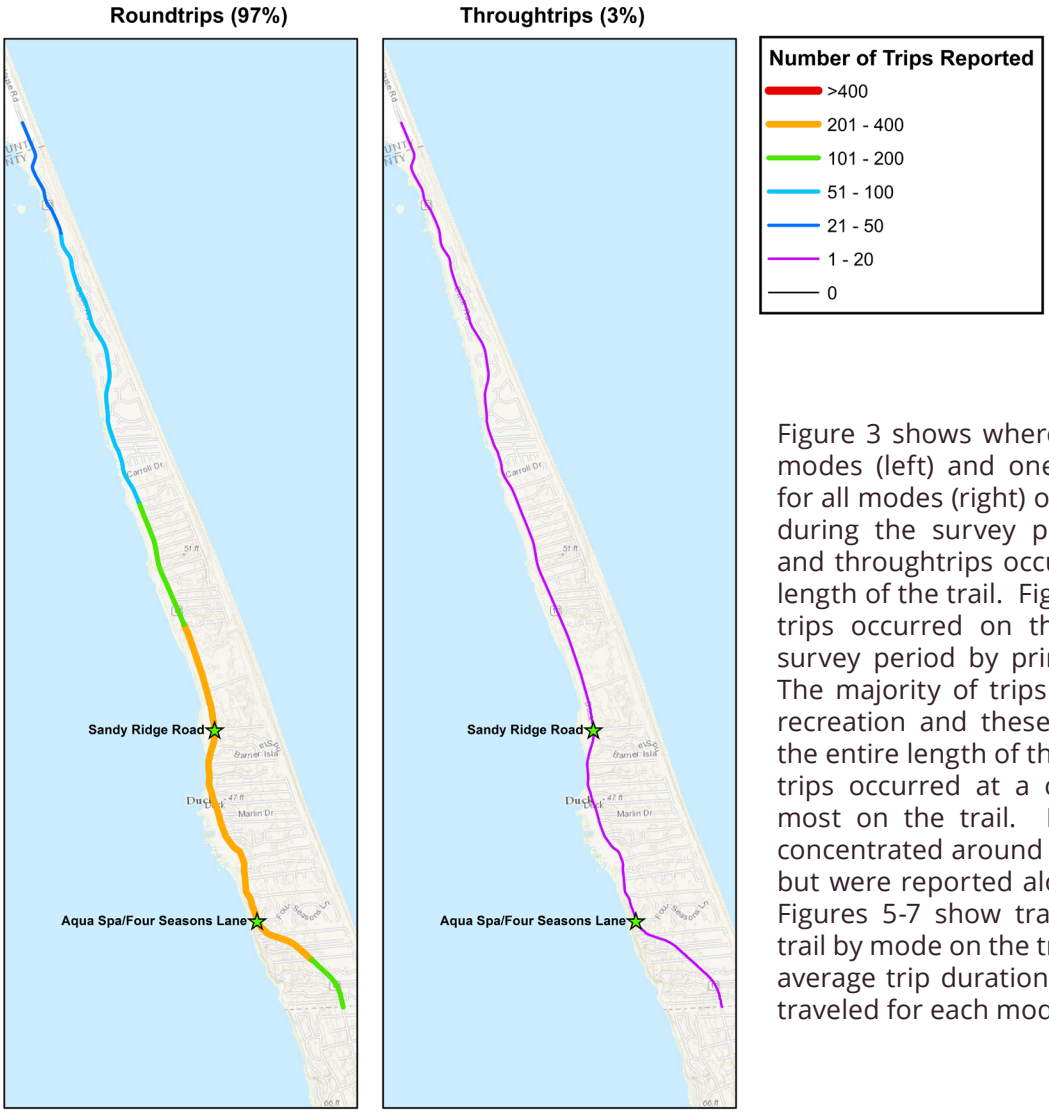


Figure 3 shows where roundtrips for all modes (left) and one-way, throughtrips for all modes (right) occurred on the trail during the survey period. Roundtrips and throughtrips occurred on the entire length of the trail. Figure 4 shows where trips occurred on the trail during the survey period by primary trip purpose. The majority of trips were for exercise/recreation and these trips occurred on the entire length of the trail. Commuting trips occurred at a consistent level on most on the trail. Errands trips were concentrated around the Village of Duck, but were reported along the entire trail. Figures 5-7 show travel activity on the trail by mode on the trail, and include the average trip duration and average miles traveled for each mode.

FIGURE 4: COMMUTE (TOP LEFT), ERRANDS (TOP RIGHT), AND EXERCISE/RECREATION (BOTTOM LEFT) TRAVEL ACTIVITY FOR ALL MODES – *2% OF REPORTED TRIPS WERE COMMUTE TRIPS, 18% OF REPORTED TRIPS WERE ERRANDS TRIPS, AND 74% OF REPORTED TRIPS WERE FOR EXERCISE/RECREATION*

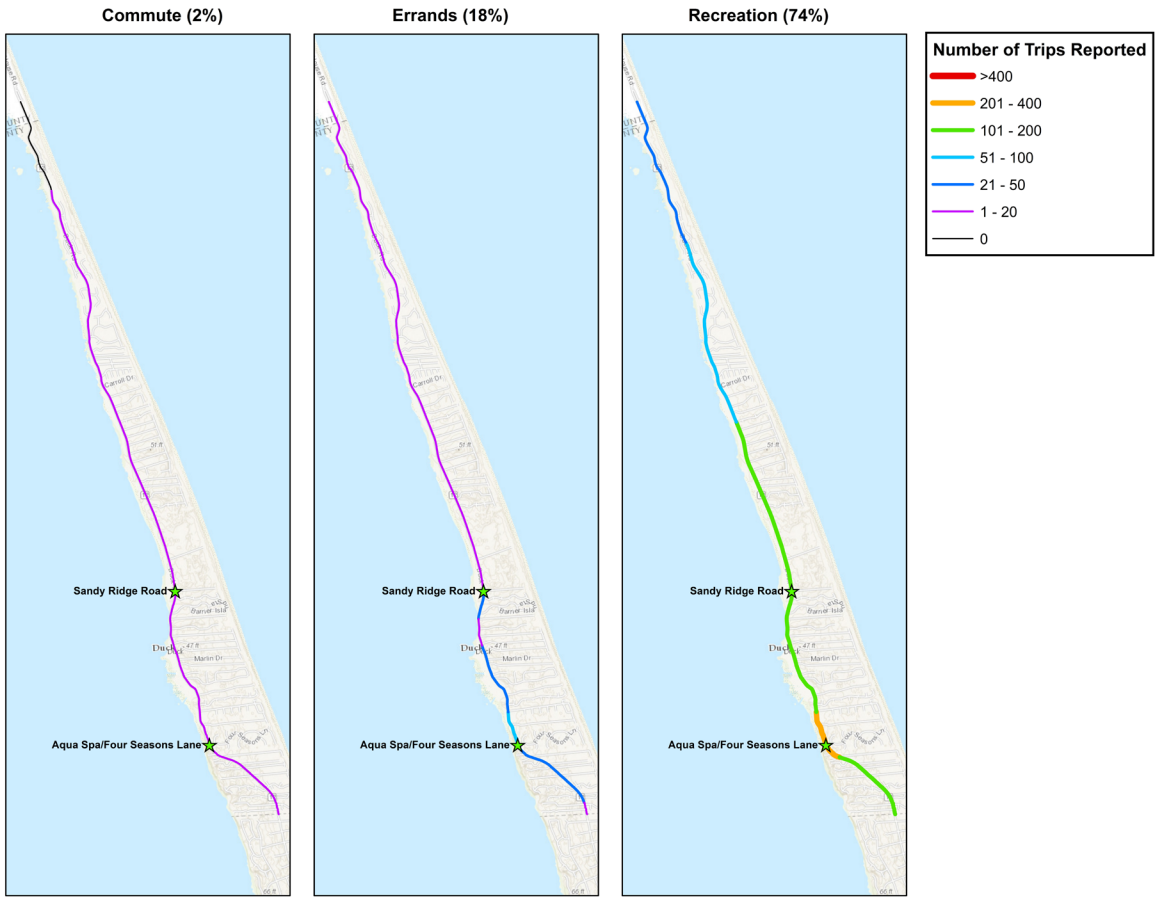


FIGURE 5: ROUNDTRIPS (LEFT) AND THROUGHTRIPS (RIGHT) FOR BICYCLISTS – *96% OF REPORTED BICYCLING TRIPS WERE ROUNDTRIPS AND 4% OF REPORTED BICYCLING TRIPS WERE THROUGHTRIPS; THE AVERAGE TRIP DURATION FOR BICYCLISTS WAS 58 MIN; THE AVERAGE DISTANCE TRAVELED BY BICYCLISTS WAS 5.2 MI*

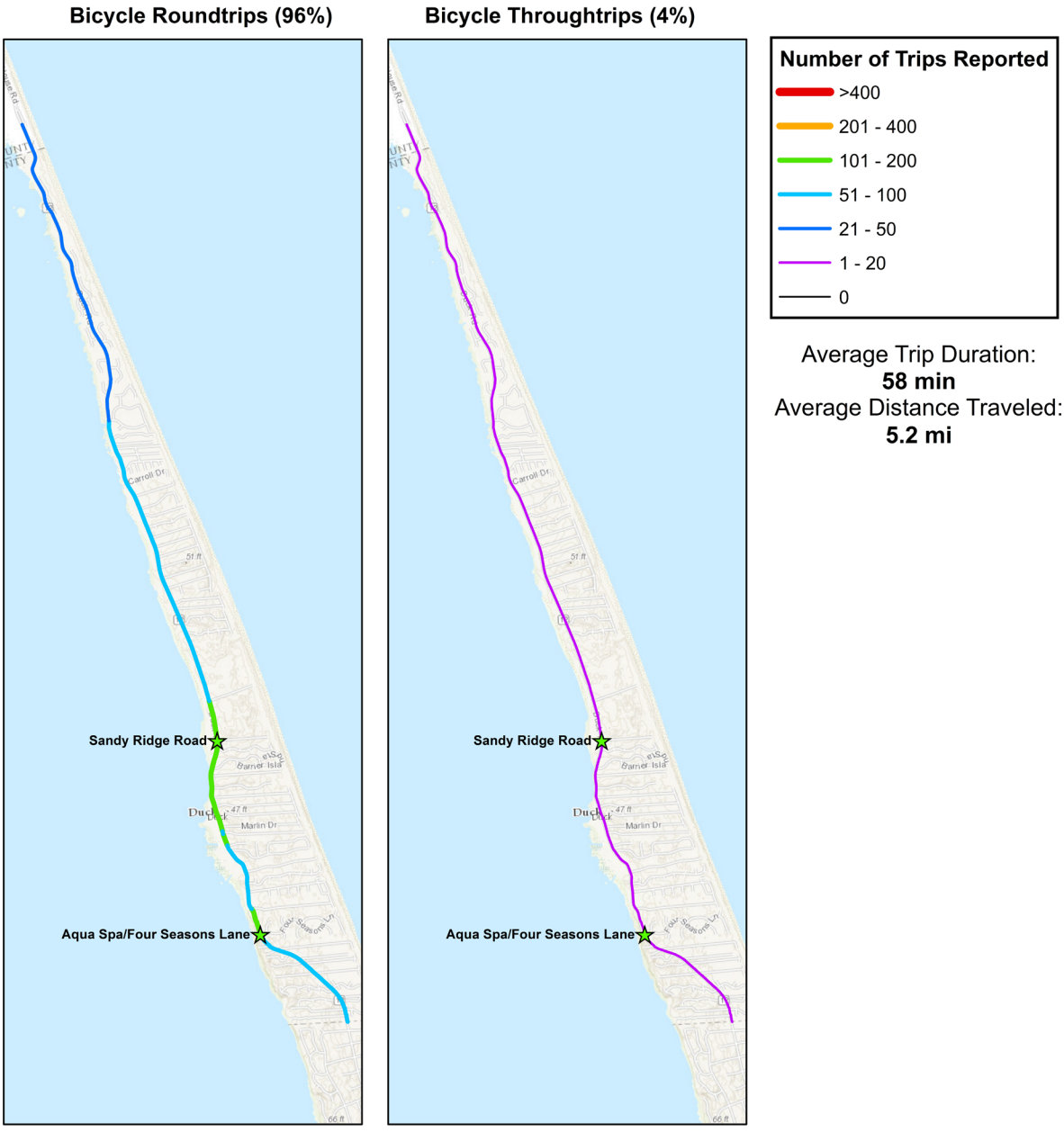


FIGURE 6: ROUNDTRIPS (LEFT) AND THROUGHTRIPS (RIGHT) FOR RUNNERS – *98% OF REPORTED RUNNING TRIPS WERE ROUNDTRIPS AND 2% OF REPORTED RUNNING TRIPS WERE THROUGHTRIPS; THE AVERAGE TRIP DURATION FOR RUNNERS WAS 51 MIN; THE AVERAGE DISTANCE TRAVELED BY RUNNERS WAS 3.5 MI*

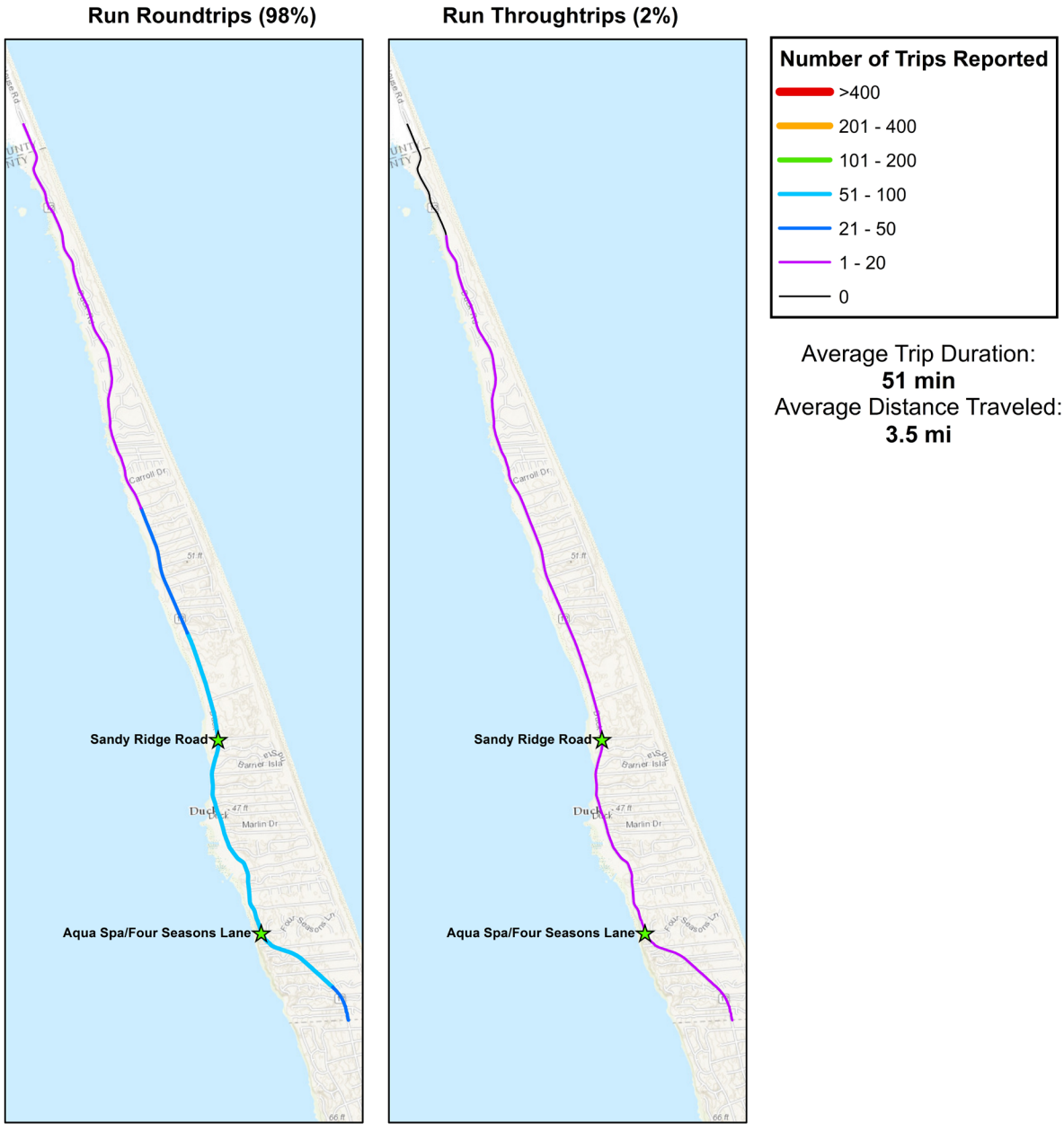
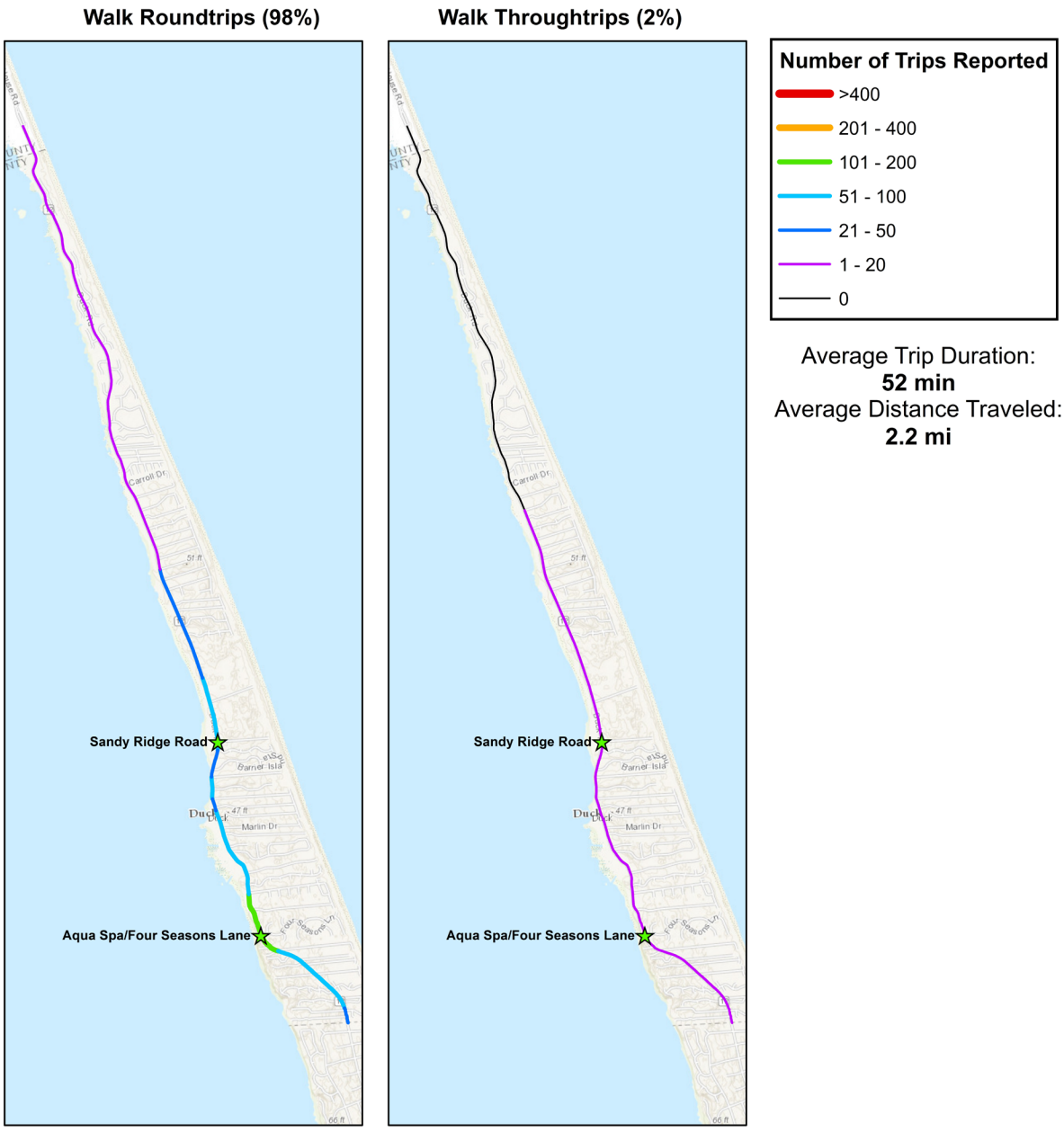


FIGURE 7: ROUNDTRIPS (LEFT) AND THROUGHTRIPS (RIGHT) FOR WALKERS – *98% OF REPORTED WALKING TRIPS WERE ROUNDTRIPS AND 2% OF REPORTED WALKING TRIPS WERE THROUGHTRIPS; THE AVERAGE TRIP DURATION FOR WALKERS WAS 52 MIN; THE AVERAGE DISTANCE TRAVELED BY WALKERS WAS 2.2 MI*



5. NEXT STEPS

This memorandum presents initial findings from an analysis of the data from surveys and manual counts conducted for a cross-sectional study of Duck Trail. Some additional analysis will be required to test for statistical significance of differences among responses in various mode and/or demographic categories.

Preparation is underway to conduct the Year 3 surveys and manual counts in May 2017 on two different trails. Lessons learned from conducting, compiling, and analyzing the data from the Year 2 surveys will be applied to the Year 3 surveys and data analysis. Additional analyses, including economic valuation analyses such as calculation of retail sales tax benefits, property value and property tax benefits, capital and operational expenditures, as well as congestion, pollution reduction, safety, and health benefits, are in progress.

APPENDIX A: COUNT FORM

Trail User Count Form

Name: ______________________ Date: ______________________

Location: ______________________ Time Period: ______________________

User Type / Mode (circle all that apply)	Circle Dots for Group Members	Direction (check for towards Durham)	Gender		Approximate Age				Notes
			M	F	<18	18-25	26-55	>55	
B W R O / C D	▪								
B W R O / C D	▪								
B W R O / C D	▪								
B W R O / C D	▪								
B W R O / C D	▪								
B W R O / C D	▪								
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B W R O / C D	▪								

User Type / Mode

B = Bicycle
W = Walker
R = Runner/Jogger
O = Other (Skater, Scooter, etc.)
If applicable, select D = Dog
C = Child in Stroller

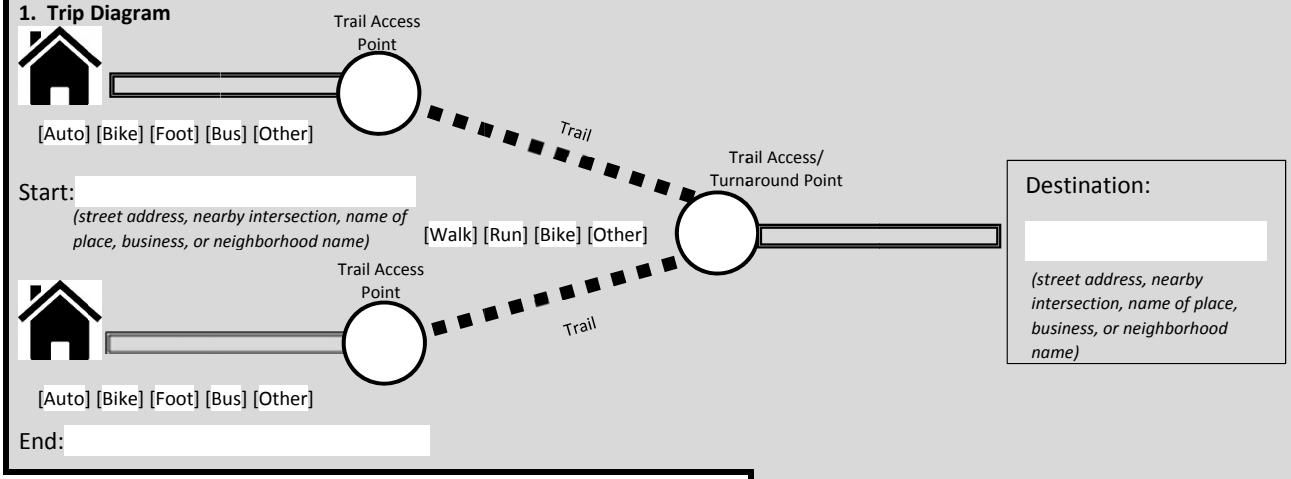
APPENDIX B: SURVEY QUESTIONNAIRE

Site No. _____

Date _____

Shared Use Path User Survey
(to be completed by persons 18 or older – one per household)

1. Trip Diagram



2. How many minutes on this trip will you be walking/running/bicycling/etc?

_____ **Minutes**

3. If this trail were unavailable, which of the following would best describe your course of action for today's trip:

☐ I wouldn't make the trip

☐ I would travel to another trail via:
☐ Auto ☐ Walk/Run/Bicycle ☐ Bus

☐ I would go to my travel destination via:
☐ Auto ☐ Walk/Run/Bicycle ☐ Bus

Trip Purpose	**4. What is the main purpose of <u>today's</u> trip? (check one)**	**5. What is the secondary purpose of <u>today's</u> trip? (check all that apply)**
Travel to/from work or school	☐	☐
Travel to/from dining/shopping/running errands	☐	☐
For exercise/recreation/sightseeing	☐	☐
Travel to/from cultural attraction/entertainment/leisure activity	☐	☐

6. Related to <u>today's</u> trip on the trail, approximately how much did (will) you spend on the following goods or services? If traveling with members of your household, estimates should represent the total for your household.

Expenditure Type	Amount	At what business did (will) you make these purchases?
Restaurant meals and drinks	**$**	
Groceries/convenience items	**$**	
Retail shopping	**$**	
Entertainment/admissions	**$**	
Bike rental	**$**	
Other (specify): _____	**$**	

7. When was the first time you used this trail (month and year)?

_____

8. How many trips have you made on this trail in the last 14 days?

_____

9. Allocate those total trips by the following primary purposes (total should sum to answer in #8):

Primary Purpose	No. of Trips by Purpose
Travel to work or school	
Travel to dining/shopping/running errands	
For exercise/recreation/sightseeing	
Travel to cultural attraction/entertainment/ leisure activity	

10. Over the past 14 days, what percentage of your exercise was met by using this trail?

_____**%**

11. How many people are traveling with you on the trail today?

_____ Check if with you on today's trip: ☐ Stroller ☐ Pet

12. How many people from your household are traveling with you today? (if different from response to # 11)? _____

13. Where is your permanent residence (i.e., where is home)?

City/Town: _____

State/Province: _____ ZIP: _____

14. How do you define your living status in the area?

- ☐ Permanent Resident
- ☐ Seasonal Resident
- ☐ Visitor - If checked, my stay is _____ days

Visitors ONLY: How important was this trail in your decision to visit the area?

- ☐ **Not important**
- ☐ **Somewhat important**
- ☐ **Very important**

Visitors ONLY: How much will your household spend on your entire visit, excluding transportation to/from the area? (include all spending on lodging/hotels, foods, retail items, entertainment, etc.)

$_____

15. Tell us about who is on the trail with you today from your household or those in your responsible care:

	You	Person 2	Person 3	Person 4	Person 5	Person 6	Person 7
Age							
Gender	☐ Male ☐ Female	☐ Male ☐ Female	☐ Male ☐ Female	☐ Male ☐ Female	☐ Male ☐ Female	☐ Male ☐ Female	☐ Male ☐ Female
Travel Mode	☐ Walk ☐ Run/Jog ☐ Bicycle ☐ Other:	☐ Walk ☐ Run/Jog ☐ Bicycle ☐ Other:	☐ Walk ☐ Run/Jog ☐ Bicycle ☐ Other:	☐ Walk ☐ Run/Jog ☐ Bicycle ☐ Other:	☐ Walk ☐ Run/Jog ☐ Bicycle ☐ Other:	☐ Walk ☐ Run/Jog ☐ Bicycle ☐ Other:	☐ Walk ☐ Run/Jog ☐ Bicycle ☐ Other:

16. Household Income:

- ☐ less than $25,000
- ☐ $25,000-$34,999
- ☐ $35,000-$49,999
- ☐ $50,000-$74,999
- ☐ $75,000-$99,999
- ☐ $100,000-$149,999
- ☐ $150,000-$199,999
- ☐ $200,000 and more

17. Education Level:

- ☐ Some high school
- ☐ Completed high school
- ☐ Some college
- ☐ Completed college
- ☐ Completed business/ technical school
- ☐ Advanced degree

18. Race:

- ☐ White
- ☐ Black or African-American
- ☐ American Indian or Alaskan Native
- ☐ Asian
- ☐ Native Hawaiian or Other Pacific Islander

Conducted by:

ITRE Institute for Transportation Research and Education, NC STATE UNIVERSITY; alta PLANNING + DESIGN

On behalf of:

North Carolina Department of Transportation; Division of Bicycle & Pedestrian Transportation, North Carolina Department of Transportation

Thank you for taking the time to fill out this survey!

APPENDIX C: UNIQUE USERS ESTIMATION METHODOLOGY

Because it is uncommon for people to travel the entire length of the Duck Trail in one trip, multiple count locations were used to understand overall trail usage. However, a simple summation of counts from each station would result in double- or multi-counting people who passed more than one station during their trip. When combining raw counts from each count station to develop a comprehensive estimate of trail usage in the study area, survey data were used to help define trip patterns (where respondents entered, exited, and/or turned around on the trail) to reduce the raw count at each station by people who would have been counted at another station. The number of times a user is likely to be over counted increases as the number of survey-and-count stations increases. For the 2016 data collection period, two survey-and-count stations were used in order to provide coverage for the six-mile length of the trail. This means that a single user could be counted up to four times for a roundtrip or two times for a one-way, throughtrip. The amount of times a user is over counted is directly related to trip distance, which is tied to a user's travel mode, i.e. bicyclists tend to travel further distances than joggers/runners and walkers, and joggers/runners tend to travel further distances than walkers.

Because two stations were used for data collection on the Duck Trail, determining the number of unique users involves several calculations based on survey responses and manual count data. The following calculation steps are required for each data collection day by travel mode on the trail to generate the number of unique users by mode for each data collection day:

1. Determine number of stations passed for each intercepted user based on the station where a user was intercepted
2. Determine the number of users by number of stations passed based on the station where a user was intercepted
3. Determine the number of and proportion of roundtrips and throughtrips intercepted at each station
4. Determine the ratio of users by the number of stations passed to the total number of users intercepted at each station for roundtrips and for throughtrips
5. Determine the number of roundtrip and throughtrip counts collected at each station by adjusting by the proportion of roundtrips and throughtrip surveys collected at each station
6. Adjust the number of roundtrip and throughtrip counts collected at each station by the ratio of users by number of stations passed to the total number of users intercepted at each station to generate the number of unique users by number of stations passed

Note that the adjustments for users making roundtrips or those making longer distance trips where they passed more than one survey-and-count location does not result in a true count of individual persons using the trail during the total data collection period – some individuals may have visited the Duck Trail on more than one data collection day, made more than one trip per day, or traced a unique travel pattern on the trail that was not otherwise captured in survey responses for traditional roundtrips or one-way, throughtrips. Unique users can be understood only on a per day basis. For the Monday data collection date in 2016, 447 unique bicyclists and 549 unique pedestrians (178 joggers/runners; 371 walkers) are estimated to have used the trail. For the Tuesday data collection date in 2016, 463 unique bicyclists and 557 unique pedestrians (151 joggers/runners; 406 walkers) are estimated to have used the trail.