

STRWG Data Analytics

Final Draft for STRWG Review

May 15th, 2023

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Project Context

The Town of Nantucket hired Process First to support the Short Term Rental Working Group (STRWG) with data analysis.

Process First is a consulting firm focused on system problems requiring expertise in operations, software development and data analytics. Over the past few years we have worked with many island organizations on other data and technology problems.

The analysis is designed to provide insight to the Short Term Rental (STR) market - generally seeking to understand the characteristics and quantities of listings and contracts (terms defined on page 7).

The work used 6 main data sets with 3 major integrations to answer questions driven by the STRWG.

This work began with data collection on March 13, 2023. We are providing this document as a final draft on May 15th, 2023.

Our remaining plan is to:

1. Continue to support the working group at meetings and with questions about the current analysis
2. Provide a simplified, accessible version of this report to be distributed as a "leave behind" at the public meeting.
3. Dive deep into a few key questions related that we have heard from the group.

To achieve this, we are requesting an extension of our work for #1 and #2, as well as a proposal for additional work to address #3. With approval from the town, we would commit to supporting the STRWG in meetings and communications through November.



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About the data





Preface

To the Short Term Rental Working Group,

This topic is one that brings together many perspectives, traditions, and impacts for both individuals and the island as a whole. As my team has further explored the data, we have been careful to deliver the analysis within the bounds of what can be confidently reported and have been mindful to avoid drawing conclusions where there is uncertainty.

To that end, how you use the data to inform policy is up to you, but we will be available to help answer questions or ensure best interpretation of the data. Ideally we can further this work with additional analysis. However in this report, my team does go further with regard to technical recommendations that would make this work easier and more effective for the town in the future with regards to compliance and evaluation of STRs.

After handing over this presentation, we hope be approved to continue our support of the STRWG for the duration of its charter, including the items listed on the Project Context Slide (Page 2).

With appreciation for the challenge of your work, I am grateful to be a part of this community effort to support the island.

Matt Haffenreffer

Principal, Process First



These are the data sources we used

(Publicly and privately available data sets)

Data Sources:

- Town of Nantucket - Assessor's Office
- Town of Nantucket - Clerk's Office
- Town of Nantucket - GIS Office
- MA DOR - Public Registry of Lodging Operators (STR Registry)
- Opencorporates - API Data Access
- AirDNA - Enterprise Data Package

Details and Notes:

- These 6 unique data sources were combined and analyzed to create this report
- The questions we answered were initially defined by the request for proposal. The questions were adjusted to be more comprehensive and align with areas of needed clarity for policy direction.
- A more ideal data set will be available after after the implementation of Nantucket Health Department's registry. It is our suggestion that the STRWG's policy defines the data it wants included in the town registry.



Definitions

Term	Definitions & Notes
Listing	A specific STR. This is used to reference the entry in a platform or database. The term STR and Listing are used interchangeably in this work.
Contract	A contract between a renter and a STR owner for a defined period.
Owner Occupied	References in this document use state data, defined below: <ul style="list-style-type: none">• State Residential Exemption - 6 month• Alternate definition: Town of Nantucket Zoning Bylaw - 3 month
STR "Use"	Relates to zoning bylaws, not STR listings or contracts
STR Operations	Relates to general bylaws.
Natural Person	A person that is an individual human being, distinguished from the broader category of a legal person, which may be a private or public organization.
AirDNA	A company that aggregates data from VRBO and AirBNB.





NAREB - Listings and Contract Data

A majority of the registered listings on Nantucket are available through Nantucket Association of Real Estate Brokers (NAREB) member real estate offices. NAREB has hired an organization to compile, anonymize and aggregate data about their member office's listings.

Process First has been in contact with Penny Dey (NAREB President) and Rod Motamedi (Project Lead at The Donahue Institute) throughout this process. We do not yet have access to the final shareable data from their work, but we have been working with Penny and Rod to gain insights to inform our work as they have become available.

In the weeks that follow, we hope to gain more complete data that will provide additional information about the STR market. Whether or not it stands alone, or can be paired with this work, depends on the data structures, definitions and metrics that are used.

The addition of NAREB Data will provide increased levels of clarity and confidence on different aspects of the STR market.

Throughout this presentation, comments with this particular formatting will be used to provide insight as to how the additional NAREB listing data will likely change the completed data set.



How many are there?

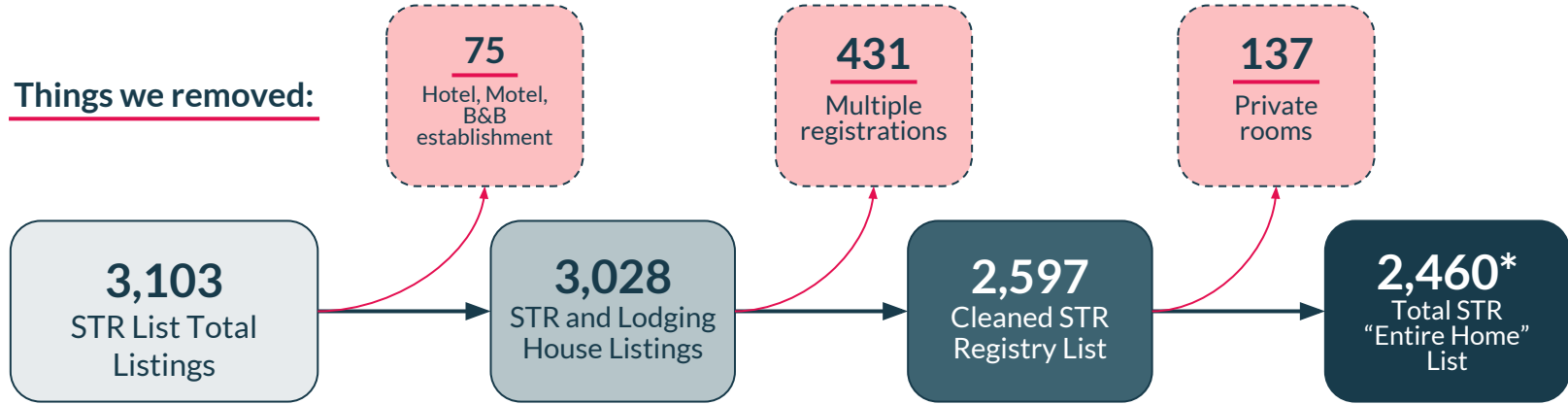
Initial total count based on a cleaned MA DOR Registry of Lodging Operators





Total Listings

Things we removed:



Details and Notes:

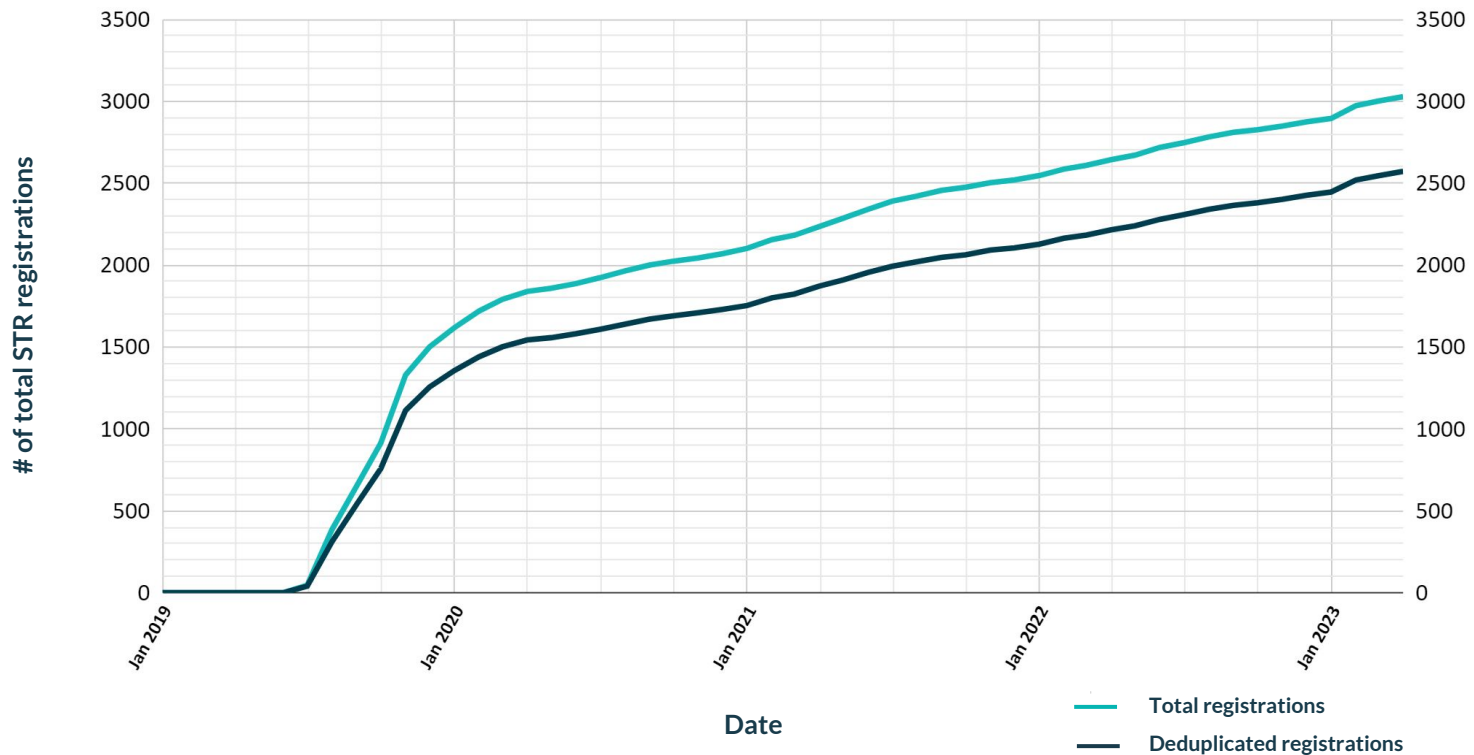
- 3,103 is the total number of listings in the DOR Registry at the time we received the data.
- The Registry is "Add Only", so we removed any STRs that appear to be the same listing, registered multiple times.
- Assuming compliance, AirDNA is a subset of STR registry

*Limitations of current deduplication:

- STRs w/ same owner no longer being rented (AirDNA & NAREB)
- STRs that have been sold and are no longer being listed

Total Registered STRs Over Time

Plotted Over Time (Includes Private Rooms)





Where are they listed

AirDNA and NAREB (2022 Data)

Quantity listed by source:

2,460

Total STR “Entire Home” List

2,053

Listings available through NAREB offices

1,160

Listings available on VRBO and AirBNB

?

Unlisted

Note:

The AirDNA data was delivered de-duplicated by AirDNA.



Where are they listed

AirDNA and NAREB (2022 Data)

2,460

Total STR “Entire Home” List

2,053

NAREB

1,160

AirDNA

893-1,300
NAREB only

753-1,160
Listed with NAREB
& Platform

0-407
Platform
only

0-407
Unlisted

Note:

This shows the range of overlap between sources. **Diagram is not to scale.**

How many are there?

Bed and Occupancy Analysis using the AirDNA dataset
(AirBNB and VRBO)



How many are there?

Summary Points

- In 2022 there were **1,160** active whole home/apartment rentals on AirDNA.
 - This is 16% lower than before the pandemic.
 - The mean bedroom count is 3.57, and the median is 4.
 - The mean occupancy limit is 7.75, and the median is 8.
- These figures did not change significantly over time (2017-2022)

Details and Notes:

- 2017-2019 data was averaged and used as a pre-pandemic baseline measure vs 2022.
- In this section, we have removed “Private Room” listings.
- Integration with NAREB data would partially overlap with the AirDNA listing count.
- We expect NAREB listings to be on average somewhat larger (bedroom and occupancy) than AirDNA listings.



Count of STRs

Whole Home / Apt, active on AirDNA in 2017-2019 avg and 2022.

STRs on AirDNA	Count
2017-2019 avg	1,379
2022	1,160
Change	-16%

Details and Notes:

Private rooms are listed predominantly on AirBNB. The definition can vary, but simply put, it is a room in a home with limited access to other amenities.

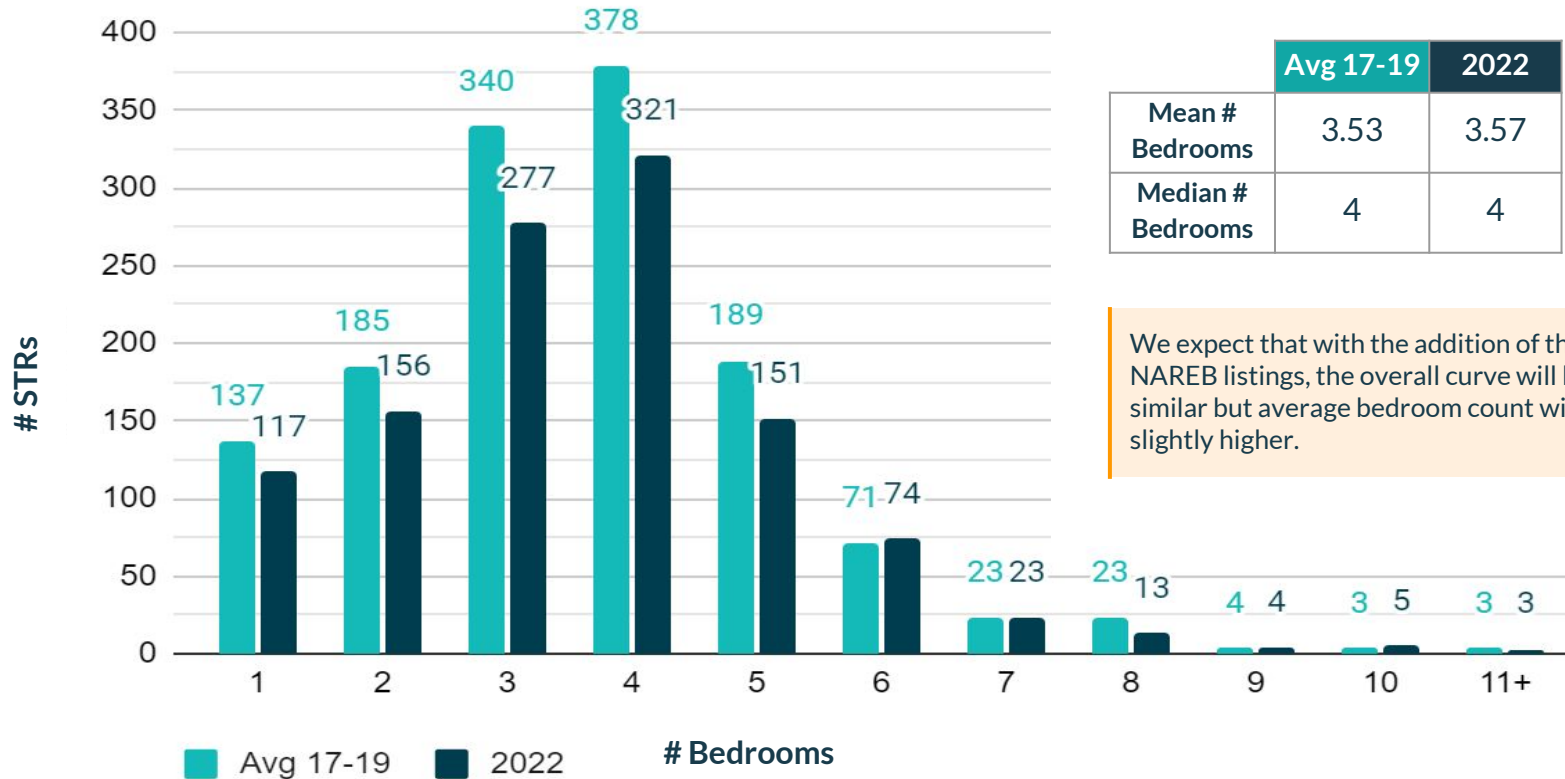
We have removed private rooms from the data to create a clearer picture of the majority of STR's which are whole home.

10% of AirDNA rentals were private rooms in 2022.



Count of STRs by Number of Bedrooms

AirDNA (Whole House/Apt)



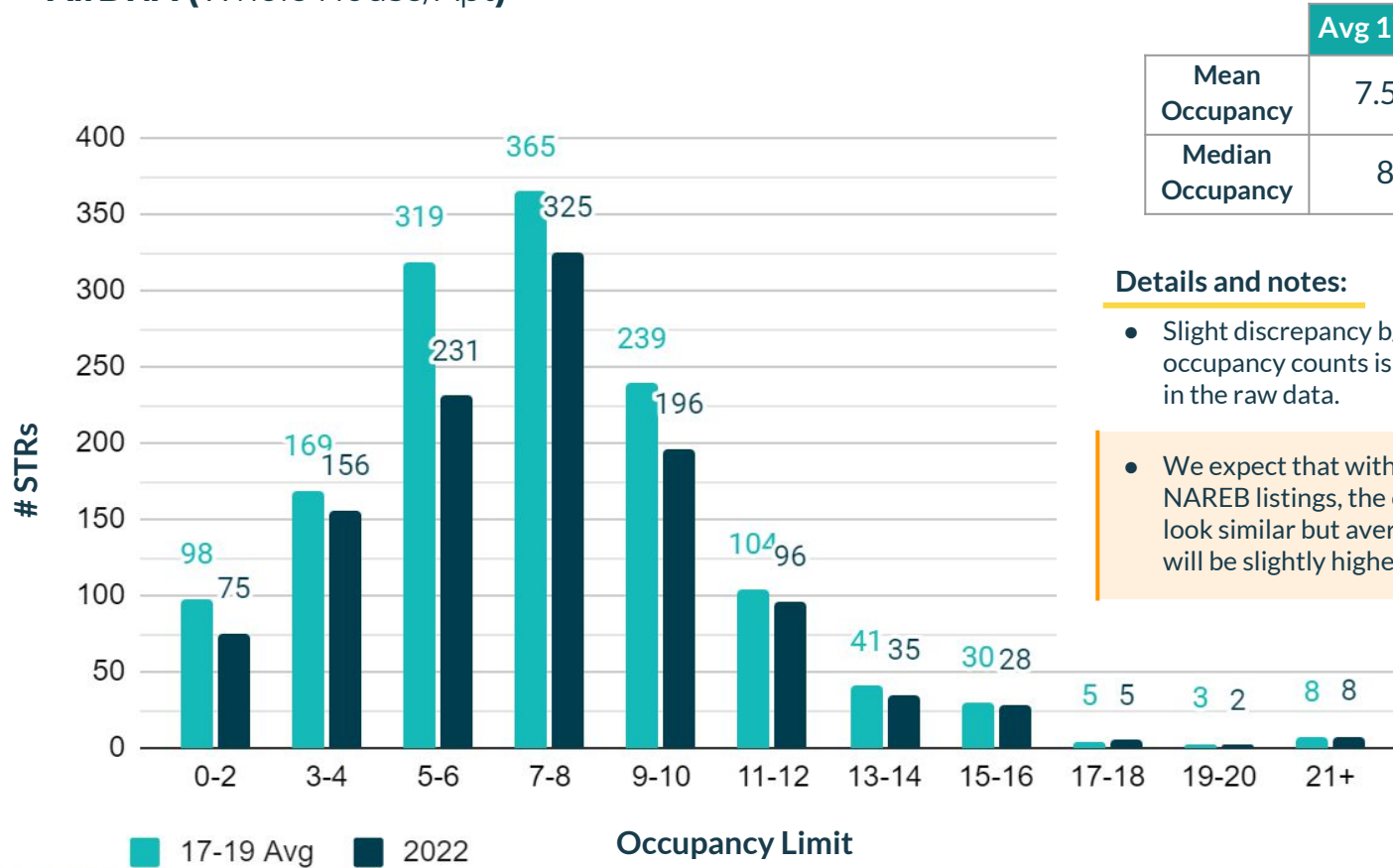
	Avg 17-19	2022
Mean # Bedrooms	3.53	3.57
Median # Bedrooms	4	4

We expect that with the addition of the NAREB listings, the overall curve will look similar but average bedroom count will be slightly higher.



Count of STRs by Occupancy Limit

AirDNA (Whole House/Apt)



	Avg 17-19	2022
Mean Occupancy	7.56	7.75
Median Occupancy	8	8

Details and notes:

- Slight discrepancy b/w bedroom and occupancy counts is due to blank fields in the raw data.
- We expect that with the addition of the NAREB listings, the overall curve will look similar but average occupancy limit will be slightly higher.

Where are they?

Analysis using AirDNA data (AirBNB and VRBO)



Mapping Information

Summary Points

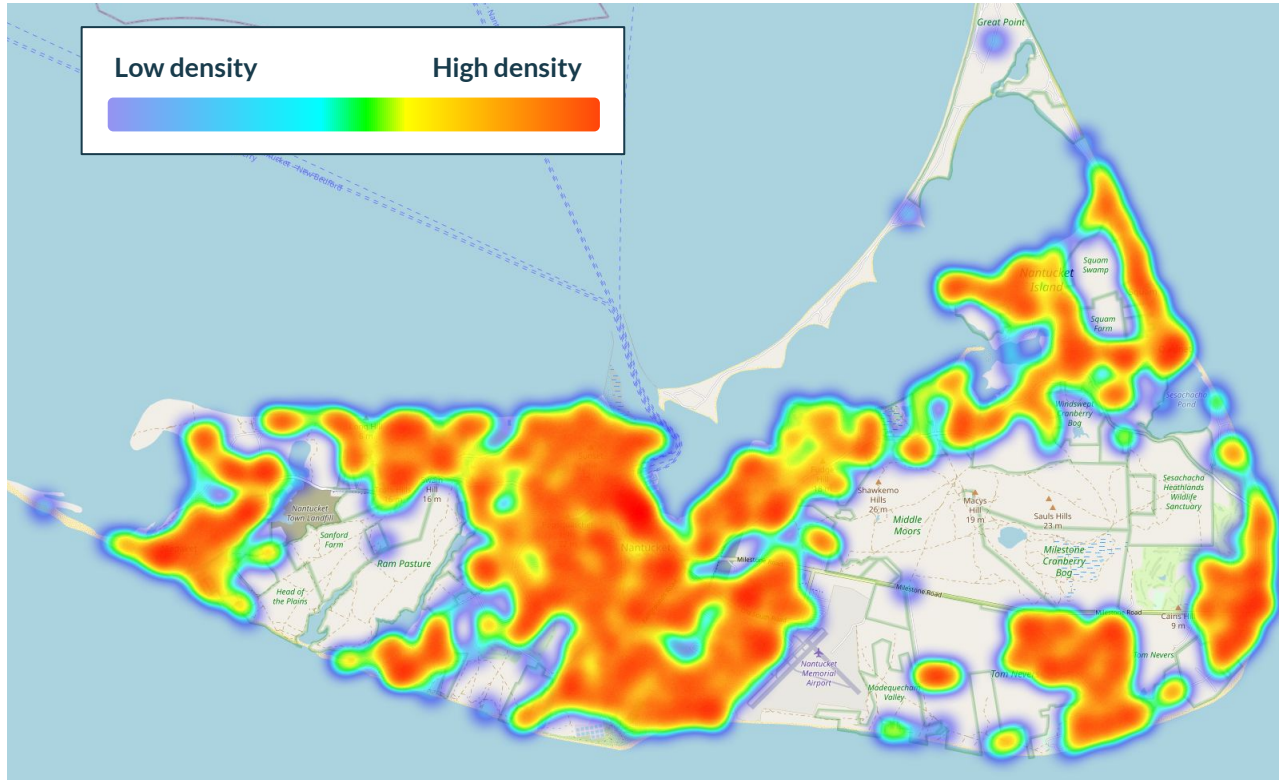
- STRs exist in most places that there are buildings on the island. The density of registered STRs ranges from near zero in certain stretches of beach, to a strong majority percentage of buildings in many areas.

Details and Notes:

- Listing location from the total STR list can not be displayed as it would identify private data.

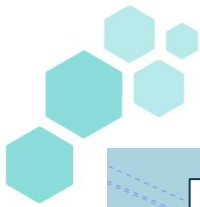
Where are all buildings?

Assessor List (Total dwellings)



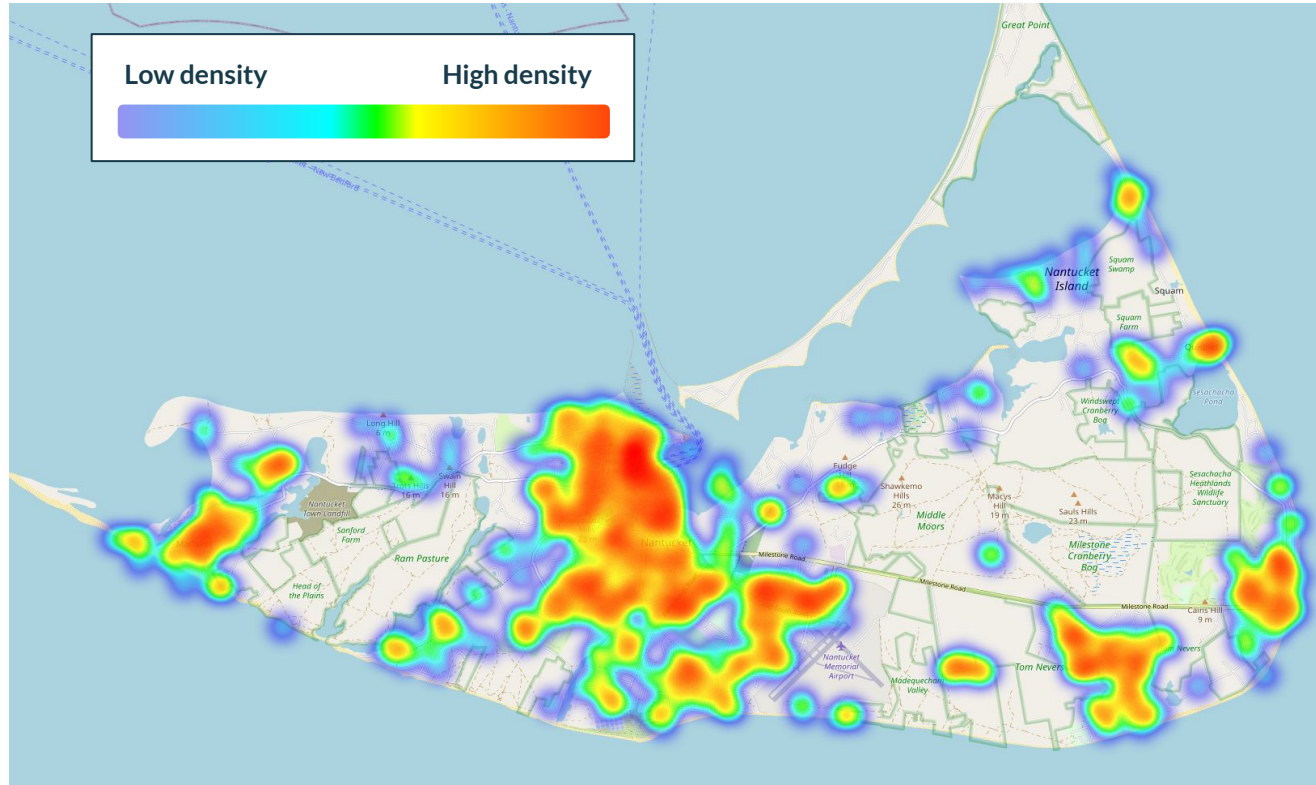
Details and notes:

- Begin by viewing where all buildings are.
- This helps to show on the next map, where blank space is primarily conserved or undeveloped land, as opposed to “not STRs”.



Where are rentals?

AirDNA (Based on latest active listings)



Details and notes:

- We use this chart to show general location of listings.
- We have not included a density scale. The anonymization radius limits the usefulness of exact measures for the viewer.



How are they leased?

Analysis using AirDNA dataset (AirBNB and VRBO)



Contract Information

(source: AirDNA, Whole Home/Apt Only)

Summary Points

- From the baseline to 2022, there was a **79% increase** in the number of contracts, which is in contrast to the 16% fewer listings on AirDNA.
- These contracts became shorter on average over the time period studied, especially in Peak season with an average length of **5.2 nights** (down from 6.7 over '17-'19).
- Only **14%** of Shoulder and Off Season contracts were 7+ days, compared to **41%** of Peak Season contracts.
- There was a **39% increase** in total nights booked, however most of that growth can be attributed to the off-season (**+170%**)
- Approximately **~\$100,000,000** worth of STR contracts were executed in 2022 on AirBNB and VRBO.

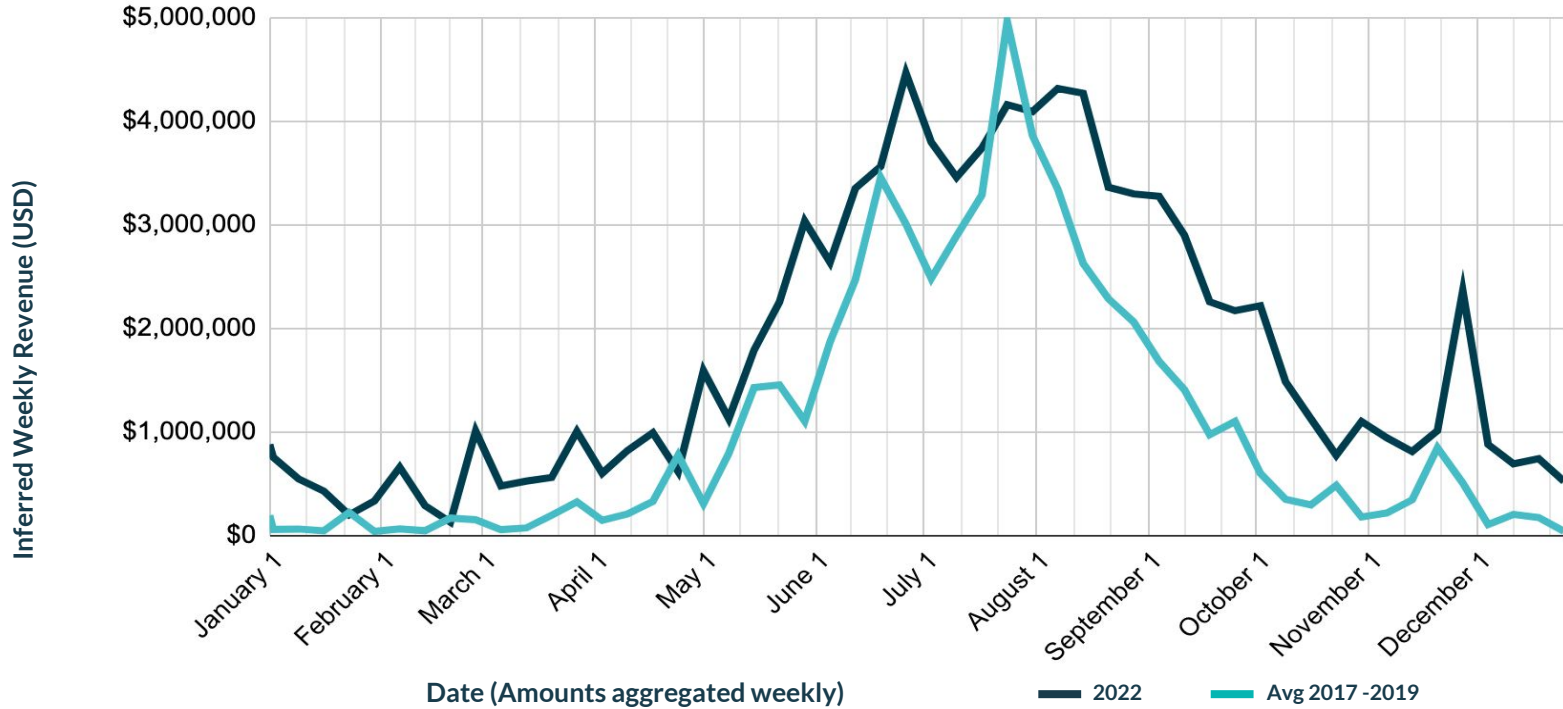
Details and Notes:

- 2017-2019 data was averaged and used as a pre-pandemic baseline measure vs 2022.
- Contracts are attributed to the week the contract originates
- AirDNA infers revenue from listed prices
- Contracts >30 days were removed as they are not considered to be Short Term Rentals.
- Season definitions from STRWG by month:
 - Off Season - November through April
 - Shoulder Season - May, June, September, October
 - Peak Season - July and August



STR Revenue by Week

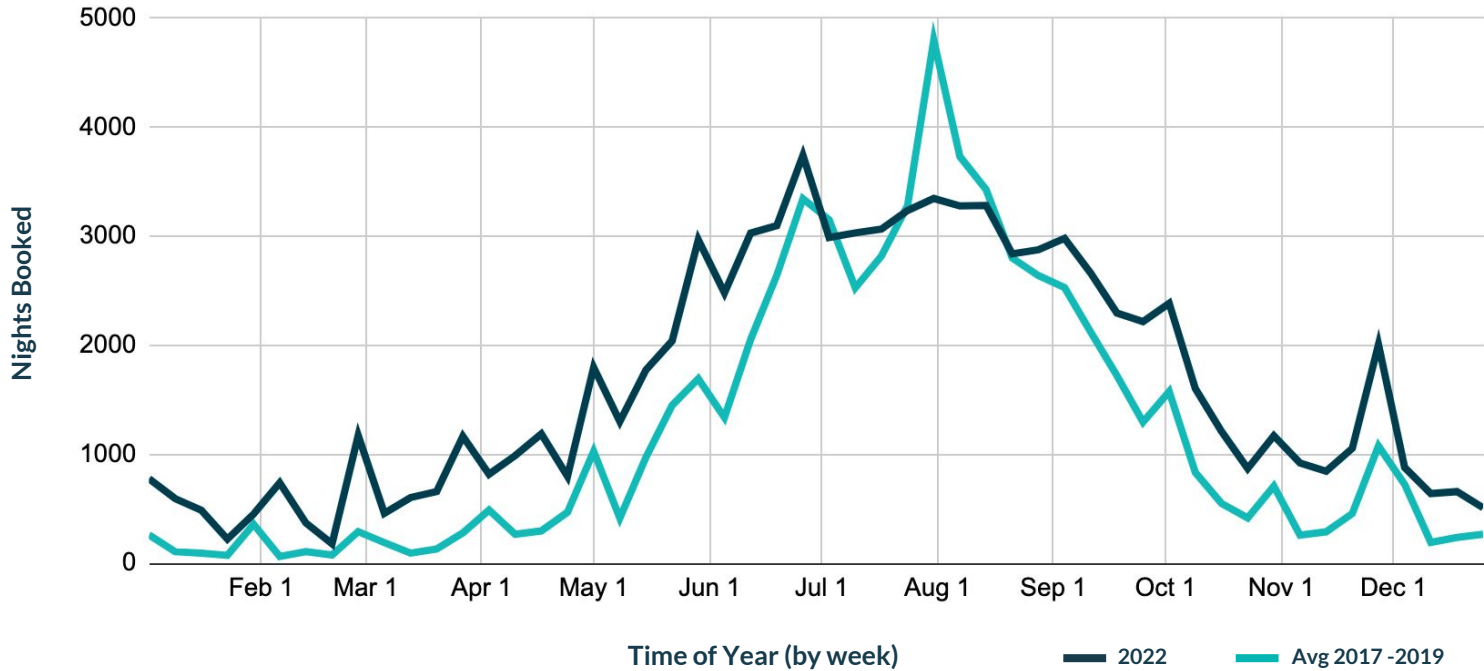
AirDNA (Entire home/apt)



With the addition of NAREB listings, we expect: Peak season will be significantly higher, Shoulder seasons to be moderately higher, and Off season to be relatively the same.

STR Total Nights by Week

AirDNA (Entire home/apt)



With the addition of NAREB listings, we expect: Peak season will be significantly higher, Shoulder seasons to be moderately higher, and Off season to be relatively the same.



Mean Contract Length (Nights)

AirDNA (Entire home/apt)

Entire Home/apt	Off season (Nov - Apr)	Shoulder season (May - June & Sep - Oct)	Peak season (Jul - Aug)
2017-2019 avg	4.5	4.4	6.7
2022	3.7	3.7	5.2
Change	-0.8	-0.7	-1.5

Details and Notes:

- Average contract length has dropped across the board, but especially in peak season for entire homes/apartments (-1.5 days).
- With the addition of NAREB listings, we expect Peak season will be closer to 7 days given that vast majority of their contracts are 7 nights or more. We also expect shoulder seasons to be slightly higher.



% of Contracts = 7 Nights or More

AirDNA (Entire home/apt)

Entire Home/apt	Off season (Nov - Apr)	Shoulder season (May - June & Sep - Oct)	Peak season (Jul - Aug)
2017-2019 avg	16%	20%	46%
2022	14%	14%	41%
Change	-2%	-6%	-5%

Details and Notes:

- Percentage of contracts over 7 days dropped across the board, most notably in shoulder season and peak season for entire homes/apartments (-7%).
- Note that change is calculated as follows: [17/19 avg] - [2022] = Change
 - As opposed to % difference.
- With the addition of NAREB listings, we expect Peak season will be significantly higher given that the vast majority of their contracts are 7 nights or more. We also expect shoulder seasons to be slightly higher.



Number of Contracts per Year

AirDNA (Entire home/apt)

Contracts for Entire Home/apt	All Year (Jan - Dec)	Off season (Nov - Apr)		Shoulder season (May - June & Sep - Oct)		Peak season (Jul - Aug)	
	Total	Total	Per Month	Total	Per Month	Total	Per Month
2017-2019 avg	12,012	1,708	285	6,092	1,523	4,212	2,106
2022	21,492	5,660	943	10,317	2,579	5,515	2,758
Change	+79%	+231%		+69%		+31%	

Details and Notes:

- Number of contracts dramatically increased (+79%), most notably during the off season (+231%).
- With the addition of NAREB listings, we expect Peak season will have a significantly higher number of contracts and a moderately higher number in the Shoulder season.



Number of Nights Booked per Year

AirDNA (Entire home/apt)

Contracts for Entire Home/apt	All Year (Jan - Dec)	Off season (Nov - Apr)		Shoulder season (May - June & Sep - Oct)		Peak season (Jul - Aug)	
	Total	Total	Per Month	Total	Per Month	Total	Per Month
2017-2019 avg	63,006	7,739	1,290	26,934	6,734	28,333	14,167
2022	87,518	20,884	3,481	38,033	9,508	28,601	14,301
Change	+39%	+170%		+41%		+1%	

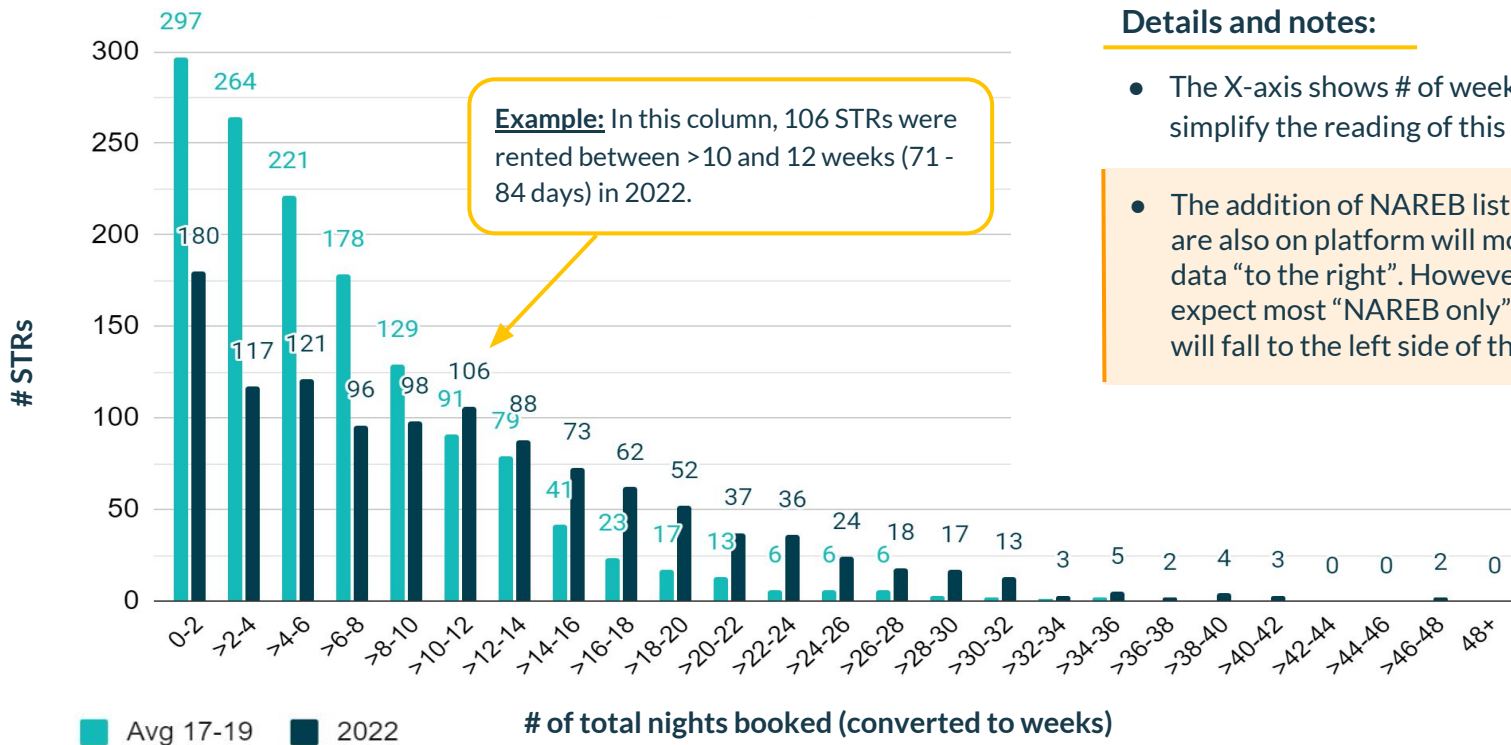
Details and Notes:

- There was a 39% increase in total nights booked, however most of that growth can be attributed to the off-season (+170%).
- With the addition of NAREB listings, we expect Peak season will have a significantly higher number of nights booked and a moderately higher number in the Shoulder season.



Count of STRs based on total nights booked

AirDNA (Entire home/apt)



Details and notes:

- The X-axis shows # of weeks, to simplify the reading of this chart.
- The addition of NAREB listings that are also on platform will move the data “to the right”. However, we expect most “NAREB only” listings will fall to the left side of the graph.



Weekly lease data

AirDNA (Entire home/apt)

[Link to Spreadsheet](#)

Details and notes:

- Darker colors indicate a higher value.
 - Each column has its own color scale.
- The linked tables are view only.
- These are provided for those who prefer to see weekly numbers.
- If you would like to edit the sheet, you will need to create your own copy or export to excel.

How are they owned?

Analysis using the MA DOR Registry of Lodging Operators



Ownership

Summary Points

- At Least 20% of STRs (540) are owned by someone who owns multiple STRs.
- Of those 540 STRs, at least 455 are not owner occupied.

Details and Notes:

- This number is likely higher due to individual names that did not match after cleaning, and entities that shielded names.
- However, after significant effort to understand how to determine how many people own X# of homes, which aligns with a policy inquiry, we do not feel that this is the place to extrapolate beyond what we were able to concretely determine.



Community Impact Fee Questions

MA DOR Registry of Lodging Operators (STRs Only)

% of Listings	Owner Occ. Question 1: Is this short-term rental property in an owner occupied 2 or 3 family dwelling?	Owner Occ. Question 2: Is this short-term rental property 1 of 2 or more in the same city or town and NOT owner occupied?	Result Interpretation
5.2%	TRUE	FALSE	Owner occupied 2 or 3 family dwelling. Multi family or multi building lot.
15.1%	FALSE	TRUE	Owner has 2 or more STR in the town. Not owner occupied.
79.8%	FALSE	FALSE	Other

Details and Notes:

- Results are from STR only, with no Lodging Houses (they do not include the Owner Occupancy Questions).
- “TRUE/TRUE” is not an allowed response
- Third case encompasses other properties (e.g., single family):
 - Owner has 1 STR, but this is not an owner occupied multi-family.
 - Owner has multiple STRs and this is an owner occupied single family.



Ownership by Category

STR Combined Listing Data (STRs only)

Summary Points

- Determining ownership was one of the more challenging tasks we looked at.
- This was largely due to the lack of clarity behind LLCs.
- We have opted to not share specific numbers at this time, as the lack of clarity led us to prioritize the other more quantifiable analysis.

Details and Notes:

- The exact numbers are unclear and imperfect to interpret due to multiple owners, LLCs, trusts and partnerships protecting identities, and imperfect name matching.

Informing design of the town registry

Data collection, management, and reporting considerations





Informing data collection

Areas of data collection (1 of 3)

- **Listing Types**

- Consider how to remove uncertainty of MA DOR's "Lodging House"
- Determine if you are registering "Private Rooms"
 - E.g. Savannah, Georgia considers Private Rooms to be a "Bed and Breakfast Homestay"

- **Ownership**

- If natural person is a desired requirement for a listing, ensure that collection allows for accurate reporting of legal structure AND the natural person(s)
- Consider how you will manage the list of natural persons to pair variations of the same name and simplify data cleaning.
- Consider how homes owned by multiple people would be counted against limits.

- **Owner Occupied**

- Owner occupancy defined by Town Zoning Bylaw is 3 months. If this metric is important, make the definition clear, and understand if this is self-attested or validated from another data source. Someone will have to manage those or cross check them when registrations are submitted.





Informing data collection

Areas of data collection (2 of 3)

- **Reporting dates**
 - Consider the differences between Vacation year vs Tax Year vs Town Fiscal Year
 - When does the data get reported and can it be easily interpreted across the two different calendars
- **Performance Data**
 - Without integration or process design, it may become burdensome for individuals to report on revenue, contracts, etc. Determine which metrics are going to be used, in what format, and focus on those.
 - Consider that future policy may want to include economic impacts of STRs. This would require different data points depending on what you want to calculate
 - E.g. if the goal is to ensure that changes to policy account for a certain visitor count, consider knowing the number of contracts, bed count, and timing.



Informing data collection

Areas of data collection (3 of 3)

- **Buildings, lots, units, listings**
 - Ensure that any person filling out the registry form has clear fields to designate the info with regard to building, lot, unit, listings. These are often the same, but many cases on Nantucket are complicated combinations.
 - Ensure data collected accounts for multiple units/dwellings within a building
 - Ensure data collected accounts for multiple buildings on same lot
 - Ensure that data is collected in a way that it can be “joined” with other datasets for analysis (PLUS, GIS, Assessor, Registrar, etc) and that it can be validated. Consider embedding a validation tool on the registration page.
- **Listing Characteristics**
 - Platform based listings and Assessor data do not always match 1:1. If this data is important, consider what is considered to be the source of truth and either make that clear, or constrain that variability by using Assessor data managed by the town.



Informing data collection

Compliance and Reporting

Compliance and Data Accuracy

- Make it easy for users to enter accurate information without confusion
- Remove “old” registrations
- Consider how to define and determine “active”
- Define STR to avoid confusion with other lodging categories
- Compare data entries with “source of truth” data sources

Reporting

- Consider disclosing what data will be publicly reported to avoid complexities of managing mixed data privacy requirements





Informing data collection

Metrics and Analysis

Metrics

- STRs as a % of available lodging accommodations
- STRs as an active % of lodging accommodations
- Year round dwellings that have been converted to commercial STRs
- Incidents that negatively impact neighborhoods

Analysis that are important to the STRWG include:

- STRs impact on economic activity and island visitors
- Understanding corporate investment into STRs
- Commercialization of year round neighborhoods
- Sale of year round homes followed by construction for full time STRs





Informing data collection

Integration with Listing Offices and Platforms

Consider if contract data can be collected and shared by offices or platforms

- Integrating contract data from private office and platforms would allow for better data and fewer interactions
- To improve usefulness of data:
 - Have centralized and standardized contract data collection requirements
 - Determine data points that inform key metrics to inform future policy.
 - Minimize data collection requirements
- Considerations to this path:
 - Challenges to integration between platforms and private offices.
 - Determination of reasonable extent of data sharing
 - Willingness and ability to comply with data sharing

Additional analysis opportunities

Data analysis and visuals that are possible with additional scope





Opportunities for additional analysis

Background on how we would proceed

The proposed analysis are a combinations of opportunities we saw while working on the data, or things we heard directly from the group. Some of these were not pursued up until now due to time constraints, limitations of the connected data sets at the time of the request, or lack of certainty of the initial results.

We would like to propose that if any of the following are critical to inform the STRWG or the public, we can define the effort it would take to complete these analysis and proceed with appropriate contracts in place. We have listed them as we believe desired by the group, with the expectation that most of the proposed questions can be answered, and a few remain uncertain depending on the assumptions we place on the data.





What do STRs look like with NAREB Data?

Combining with the AirDNA data to improve market understanding

Integrating NAREB data would allow us to update:

- Bedroom count and occupancy limit
- Revenue and nights booked
- Contract count and length
- Update STR Count by nights booked

This could lead to additional analysis to determine:

- The total number of actively rented STRs on the island
- Total visitor impact of the STR market by time of year



Where are they?

Further exploration of where homes are by location and type of neighborhood

How does the STR housing stock compare to the overall housing stock?

- What percent of buildings are STRs by location

Are they in year round neighborhoods?

- Identify where residents live (account for residential density and dwelling density)
- Compare where STRs are in relation to above
- Determine if STRs in residential neighborhoods are owner occupied



How have they changed?

Measure the development of STRs and the neighborhoods they are in

Changes over time

- Look at the count of STRs by location over time
- Look at STRs in Year round neighborhoods that
 - Registered
 - Sold then registered
 - Sold, constructed then registered

Comparisons of STR vs non-STR

- Compare building characteristics of STRs with non-STR
- Compare pre and post construction characteristics of STRs
- Compare STR vs non-STR for pre and post construction characteristics





Who owns them?

With more time we can have more confidence in measures of ownership

Type of ownership

- Breakdown of ownership type accounting for assessor and registry data
 - Determining Corporations is feasible, as well as LLCs.
 - Getting beyond the initial LLC level to a clear understanding of what is behind the LLC is unlikely. If there is a “level 1” question you would like to know, we can do that.

Number of Ownership

- Define terms and assumptions to have clear measures of multiple ownership
- Define number people who own X# of STRs.





What is the contribution of STR to the economy

Further exploration of how STRs impact overall visitor lodging

Island visitor lodging capacity and utilization

- How do STRs contribute to the total possible beds for visitors?
- How do STRs contribute to the actual number of visitors?
- How much of the island's total lodging do STRs account for?
- How much of the island's daily population do STRs account for?
- How does STRWG policy proposals impact tax revenue?
- How does STRWG policy proposals impact the number of visitors?





PROCESS FIRST

