

# Promoting Sustainability & Improving Student Involvement: The UMD Green Terp Program

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01

# Meet the Team



# Team 53



Hibah Beg  
OMBA & SCM  
(Spring 2024)



Gabriella Chiericoni  
IS & OMBA  
(Spring 2024)



02

# Introduction to GreenTerp



# What is GreenTerp?



- A partnership between Department of Resident Life and Office of Sustainability
- Promoting environmental friendly practices in day-to-day life
  - i.e. in classes, student groups, professional opportunities, etc.
- They have given students the opportunity to register and eventually become certified through the program if they better their sustainability practices
- Was offered between Fall of 2018 - Spring of 2023
  - On pause for iteration and benchmarking
    - **This is where we come in!**



03

# What Are We Answering?



# The Questions

1. What is the conversion rate from registration to certification?
2. Are there any trends in the data?

## Team-Identified Questions:

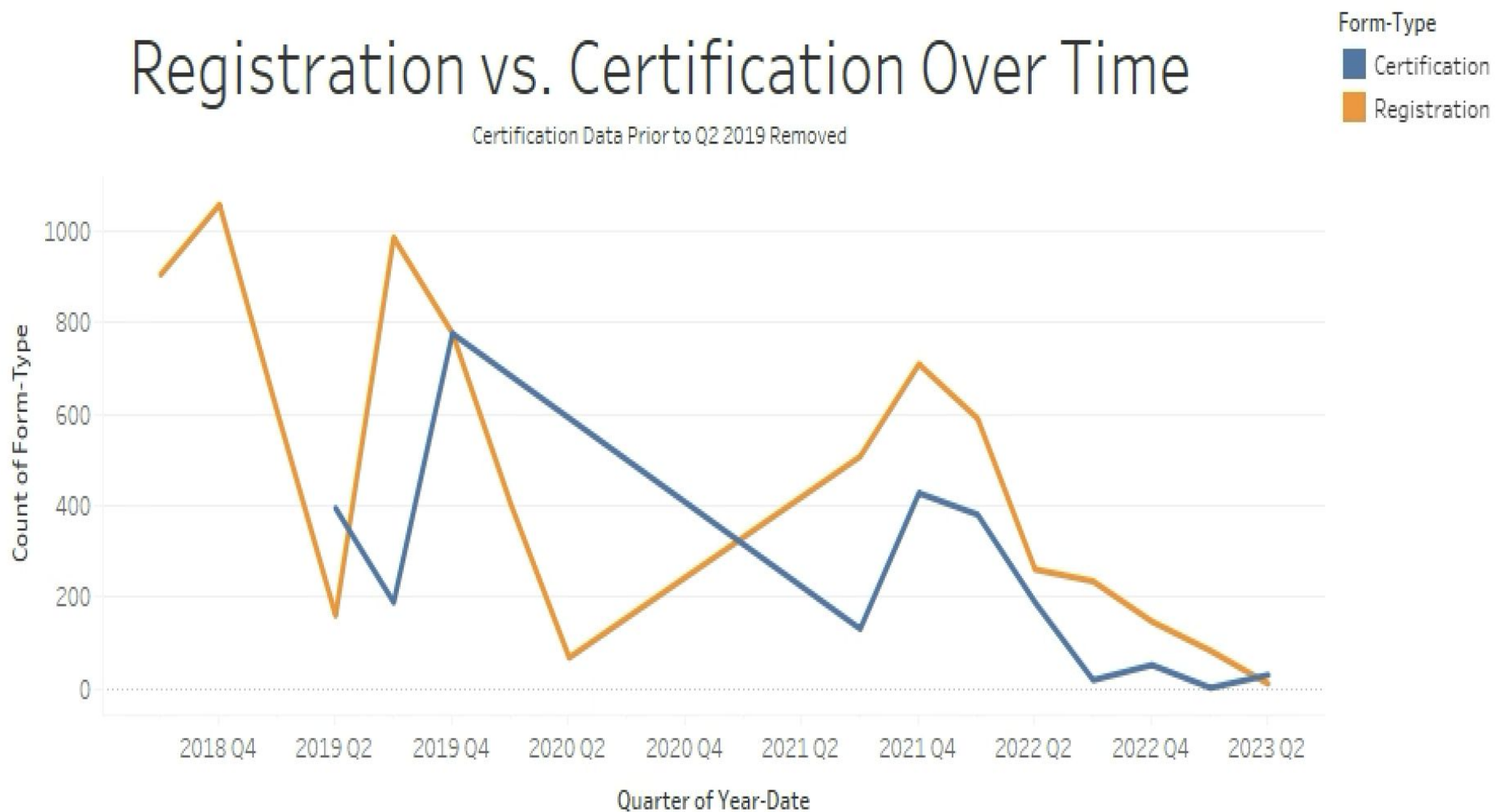
1. Does age “grade year” make a significant impact on whether or not students will be certified or not? Why?
2. Does ‘Registration’ and ‘Conversion’ stay consistent over time?
3. Does housing make an impact on conversion rate?



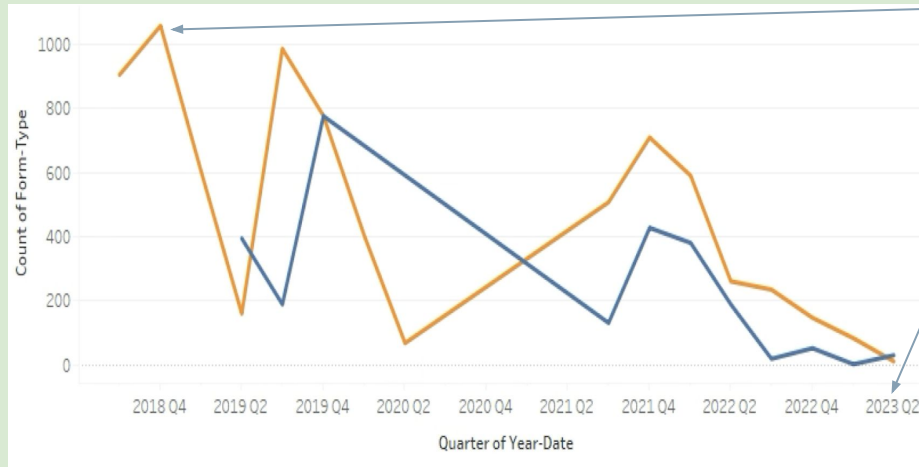


# Registration vs. Certification Over Time

Certification Data Prior to Q2 2019 Removed



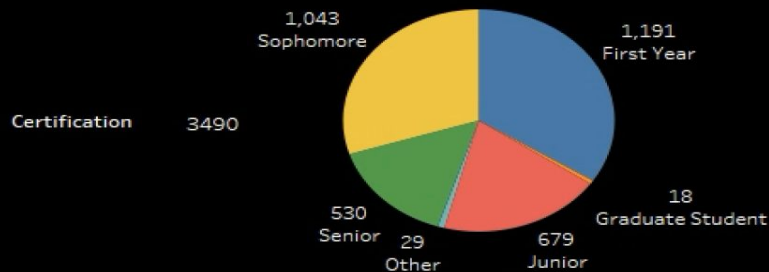
# Registration vs. Certification **Form Status Over Time**



- **Peak** for Student Registration:
  - **2018**
- **Lowest** Program Involvement:
  - **2023** (Prior to pause)
- Why could this be/what changed?
  - Excitement around the program
  - Lack of partnerships

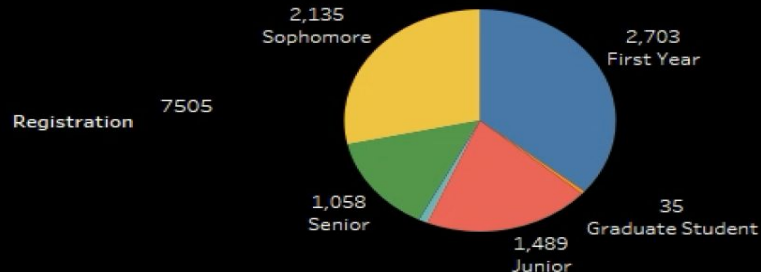
## Certification Distribution by Grade Level

Form-Type



## Registration Distribution by Grade Level

Form-Type

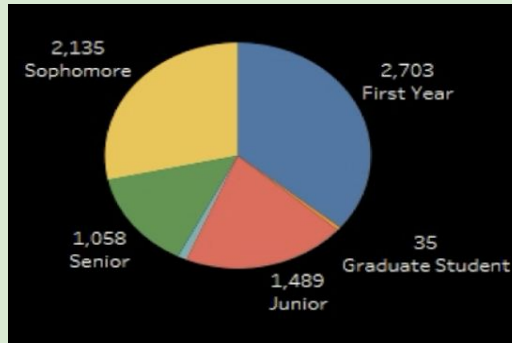


# Conversion Rate by Grade Level:

**Overall Conversion Rate: 46.50%**  
**First Year** Conversion Rate: **44.06%**  
**Sophomore** Conversion Rate: **48.85%**  
**Junior** Conversion Rate: **45.60%**  
**Senior** Conversion Rate: **50.09%**  
**Graduate** Conversion Rate: **51.43%**  
**"Other"** Conversion Rate: **34.12%**

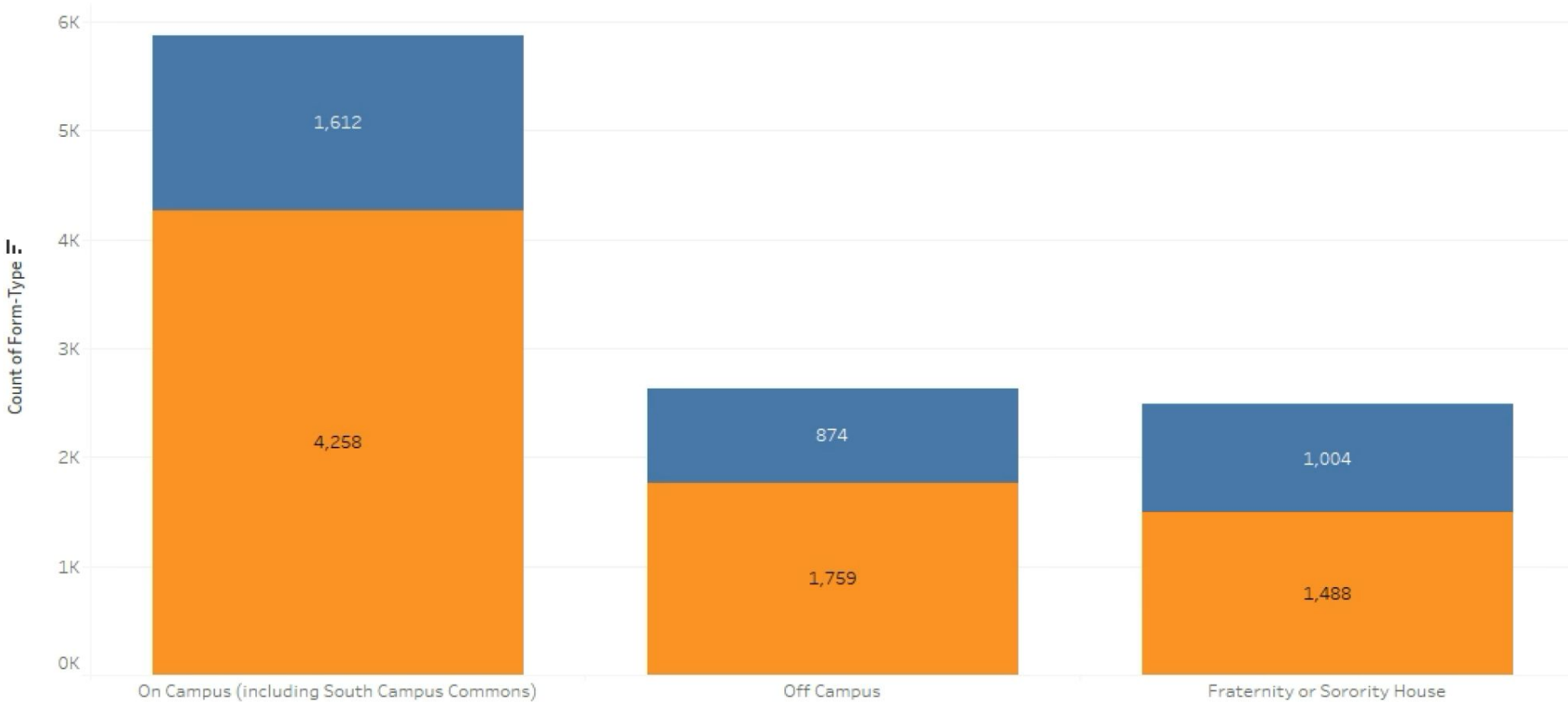
# Conversion Rate By Grade Level

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Sophomore Conversion Rate: 48.85%  
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Senior Conversion Rate: 50.09%  
Graduate Conversion Rate: 51.43%  
"Other" Conversion Rate: 34.12%



- Grade level does not play a significant role in whether or not students will be certified or not.
  - Fairly consistent conversion rate by grade.
    - Influx of first year students registering does not equate to first year students being more likely to certify.
  - This simply means they are more likely to register.

# Comparing Registration Count to Certification Count by Student Housing Type



# Registration vs. Certification **Form** **Status By Student Housing Type**

67.75% Conversion Rate for Greek Life  
Housing

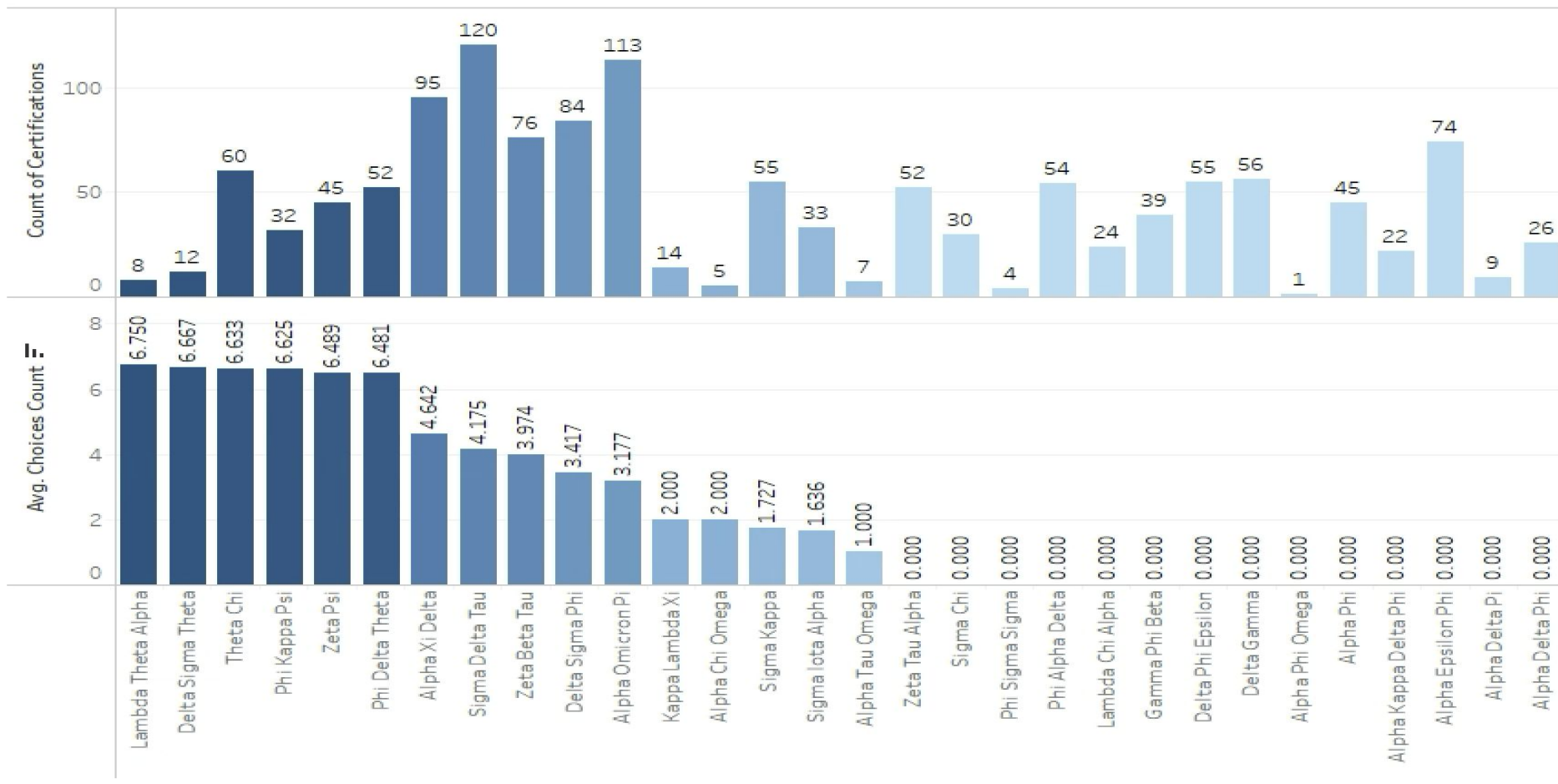


- Most Popular Housing Type (Registration):
  - **On-Campus Housing**
- Highest Conversion Rate Per Housing Type:
  - **Fraternity/Sorority Housing**
- Why Could This Be?
  - Incentive and Encouragement.
  - Advertisement.

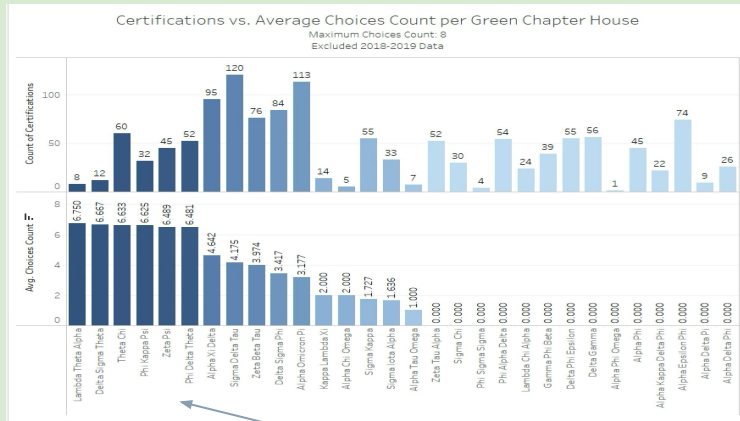
# Certifications vs. Average Choices Count per Green Chapter House

Maximum Choices Count: 8

Excluded 2018-2019 Data



# Certifications vs. Count of Choices Selected for the *Housing Type with the Highest Conversion Rate*



What are the choices and what do they represent?

1. Reduce
2. Products
3. Commute
4. Dine
5. Energy
6. Water
7. Choices
8. Awareness

The choices represent students making “**I will statements**” when registering. Binary response variables.

By definition: Respondent error is when respondents provide **incorrect** or incomplete data.

Is count of choices selected a good indication of whether or not a student will certify?

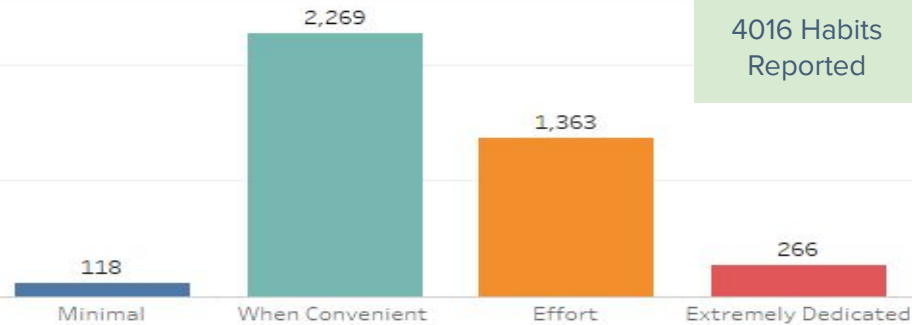
- **No!**
- Why?



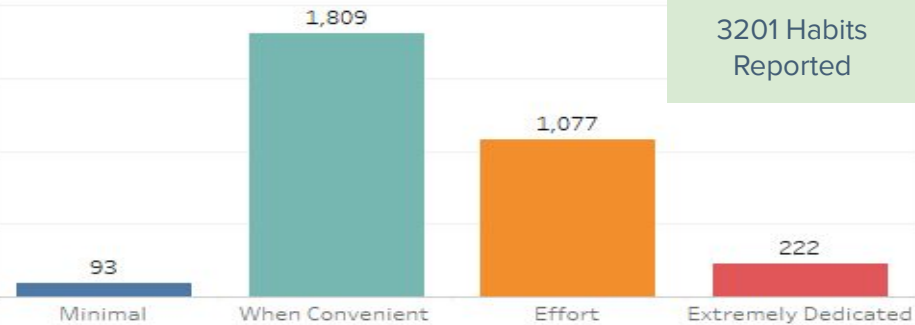
# Count of Habits Reported by Survey Year

Excluded 2022-2023 Data

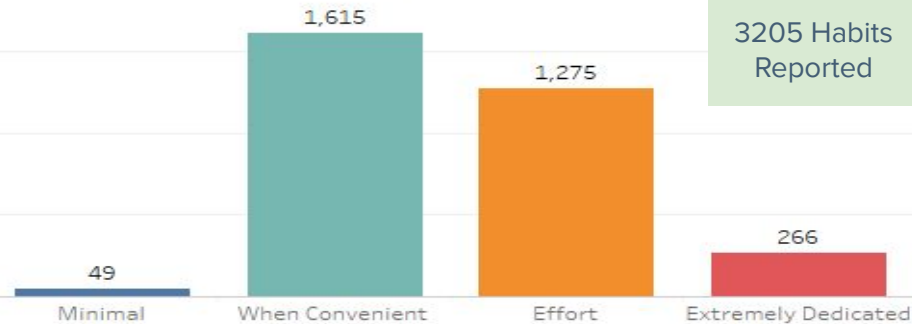
AY / Habits  
2018-2019



AY / Habits  
2019-2020



AY / Habits  
2021-2022



# Trends Uncovered by Reported Habits

By the numbers:

## 2018-2019

- 3% Minimal
- 56.5% When Convenient
- 33.9% Put in Effort
- 6% Extremely Dedicated

## 2019-2020

- 2.9% Minimal
- 56.5% When Convenient
- 33.6% Put in Effort
- 6.9% Extremely Dedicated

## 2021-2022

- 1.5% Minimal
- 50.4% When Convenient
- 39.8% Put in Effort
- 8.3% Extremely Dedicated

1. More students are passionate about sustainability.
  - a. Attributed to sustainability practices taking a higher importance in recent societies and not program success (given falling registration numbers).
2. Less students reported having minimal sustainable habits.

# Reasoning Behind Our R Model

## Mode of Selection

- Opted for forward selection.
- Backwards elimination?
  - **No.**
    - Too many variables
    - Too much data!

## Possible Significant Variables

- From filtering data and making visualizations in Tableau -> we determined which variables would be ideal to include:
  - AY (academic year)
  - Housing



# Our Model in R

```
> data_filtered$Certification_Binary <- ifelse(data_filtered$'Form-Type' == "Certification", 1, 0)
> model <- glm(Certification_Binary ~ AY + Housing, data = data_filtered, family = binomial)
> summary(model)
```

Call:

```
glm(formula = Certification_Binary ~ AY + Housing, family = binomial,
     data = data_filtered)
```

Coefficients:

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	-0.40944	0.04562	-8.974	< 2e-16 ***
AY2019-2020	-0.05416	0.05235	-1.035	0.300834
AY2021-2022	0.19752	0.05322	3.711	0.000206 ***
AY2022-2023	-0.67990	0.11709	-5.806	6.38e-09 ***
HousingOff Campus	-0.31744	0.06204	-5.116	3.11e-07 ***
HousingOn Campus (including South Campus Commons)	-0.56873	0.05110	-11.130	< 2e-16 ***

---

Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

# Interpreting Our Model

## Response and Decision Variables

Response: Form-Type

- (binary)
- 'Form-Type' == 'Certification'

Decision Variables:

- Housing and AY

**Adding additional decision variables decreased the accuracy of our model.**

## Predictions

- 1. AY = '2018-2019'
- Housing = 'Fraternity or Sorority Housing'
- Response = 0.3990466

Vs.

- 2. AY = '2022-2023'
- Housing = 'Off Campus'
- Response = 0.1967413



# Predictions Continued

## Prediction 1

```
> new_data_filtered <- Data_Level3_GreenTerp %>%  
+   filter(AY == '2018-2019', Housing == 'Fraternity or Sorority House')  
>  
> predicted_certification <- ifelse(predictions >= 0.5, 1, 0)  
Error: object 'predictions' not found  
> predictions <- predict(model, newdata = new_data_filtered, type = 'response')  
> print(predictions)
```

1	2	3	4	5	6	7	8
0.3990466	0.3990466	0.3990466	0.3990466	0.3990466	0.3990466	0.3990466	0.3990466

## Prediction 2

```
> predicted_certification2 <- ifelse(predictions >= 0.5, 1, 0)  
> new_data_filtered2 <- Data_Level3_GreenTerp %>%  
+   filter(AY == '2022-2023', Housing == 'Off Campus')  
> predictions <- predict(model, newdata = new_data_filtered2, type = 'response')  
> print(predictions)
```

1	2	3	4	5	6	7	8
0.1967413	0.1967413	0.1967413	0.1967413	0.1967413	0.1967413	0.1967413	0.1967413



# Model with Additional Variables

*This Model Was **NOT** Selected.*

```
glm(formula = Certification_Binary ~ AY + Housing, family = binomial,  
     data = data_filtered, weights = Choices_Count)
```

Coefficients:

	Estimate	Std. Error	z value	Pr(> z )
(Intercept)	-6.355e+08	1.085e+12	-0.001	1
AY2019-2020	6.355e+08	1.085e+12	0.001	1
AY2021-2022	6.355e+08	1.085e+12	0.001	1
AY2022-2023	6.355e+08	1.085e+12	0.001	1
HousingOff Campus	-2.017e-01	4.399e-02	-4.586	4.52e-06 ***
HousingOn Campus (including South Campus Commons)	-2.476e-01	3.747e-02	-6.607	3.93e-11 ***

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

Null deviance: 33978 on 5746 degrees of freedom  
Residual deviance: 25509 on 5741 degrees of freedom  
AIC: 25521

# Our Recommendations

## Create a New Certification Process

- Offering a prize can cause data to be highly biased due to dishonesty
- Partner with clubs and businesses at UMD and host outreach events on and off campus
  - Will get more students who are interested involved with the program and help spread the purpose in a more meaningful manner.

## However, If It Is Preferred to Reissue the Current Certification Process..

- Reformat the form to make it hard to be dishonest
  - May lead to less people registering
    - Respondents are less likely to fib when they are presented with forced-choice questions and ensured there is no negative consequences for their responses
- People who are serious about getting certified and sustainability would be the most likely to fill out the new form





# Resources

- Tableau: Graphics
- R Studio: Creating Our Model
- ChatGPT: Troubleshooting Errors in R
- <https://www.pewresearch.org/our-methods/u-s-surveys/writing-survey-questions/> : Survey respondents factoid
- [Data\\_Level3\\_GreenTerp: Data \(Provided by the UMD Office of Sustainability\)](#).





# Thanks!

Do you have any questions?

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