

Rural Woodsmoke Citizen Science Project

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Background:

- Keene, NH is a small city that sits in a wide valley in the rural SW corner of New Hampshire, pop. ~23,000.
- After NHDES switched to BAM hourly monitoring, elevated wintertime $PM_{2.5}$ concentrations were observed, leading to a 2009/2010 Woodstove Changeout program.
- Since then, local organizations including Keene State College faculty and students have conducted public workshops, outreach, mobile monitoring, and deployed a citizen science community sensor network.
- This past heating season, NESCAUM and Keene State students have tapped into existing partnerships with local high schools on a STEM project to better understand local, “on the ground” wood storage, wood moisture content, and stove operator behaviors.



Dr. Nora Traviss and Jakob Rupp demonstrating at Keene High School, 27 Feb, 2023

Community Wide PA Sensor Network,

www.keenecleanair.org

Keene State College / EPA Keene Woodsmoke Community Awareness Project



Particulate Matter 2.5 Micron Map produced: 2/1/2019 1:08 AM

See "Facebook.com/KeeneCleanAir"

Dillant-Hopkins Airport METAR Weather:
Temperature Celcius: -20.0
Humidity: 75.0
Wind Direction: 160
Wind Speed/Gust: 3/

Air Quality:
Green: Good
Yellow: Moderate
Red: Poor

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GIS CENTER

Department of Geography, Outdoor Recreation, and Planning
Department of Environmental Studies

Keene State College / EPA Keene Woodsmoke Community Awareness Project



Particulate Matter 2.5 Micron Map produced: 2/1/2019 9:01 AM

See "Facebook.com/KeeneCleanAir"

Dillant-Hopkins Airport METAR Weather:
Temperature Celcius: -14.4
Humidity: 52.0
Wind Direction: 200
Wind Speed/Gust: 5/

Air Quality:
Green: Good
Yellow: Moderate
Red: Poor

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Current project: STEM workshop with local high schools in Cheshire County to measure moisture content of wood.

Targeted 4 high schools for participation. Succeeded with 2.

KSC students (orange sticker) teaching moisture meter use at Keene High School (regional high school for Keene and 6 rural towns)



KSC student Sam Crotty at Keene High School, 27 Feb, 2023

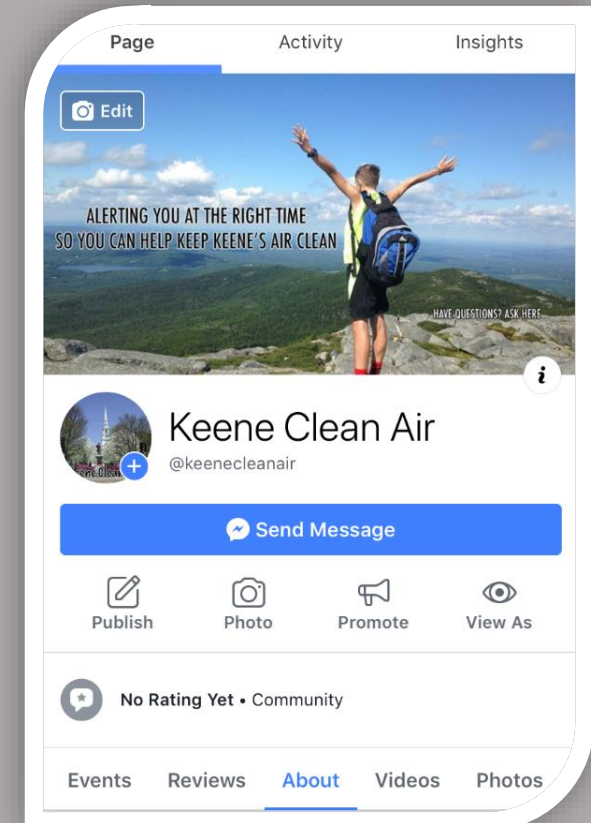
Project Evolution:

1. MC measurements only, paper forms
2. MC data plus online survey
3. Survey only on social media (Keene Clean Air)

New Hampshire Wood Storage & Moisture Content #STEM Project

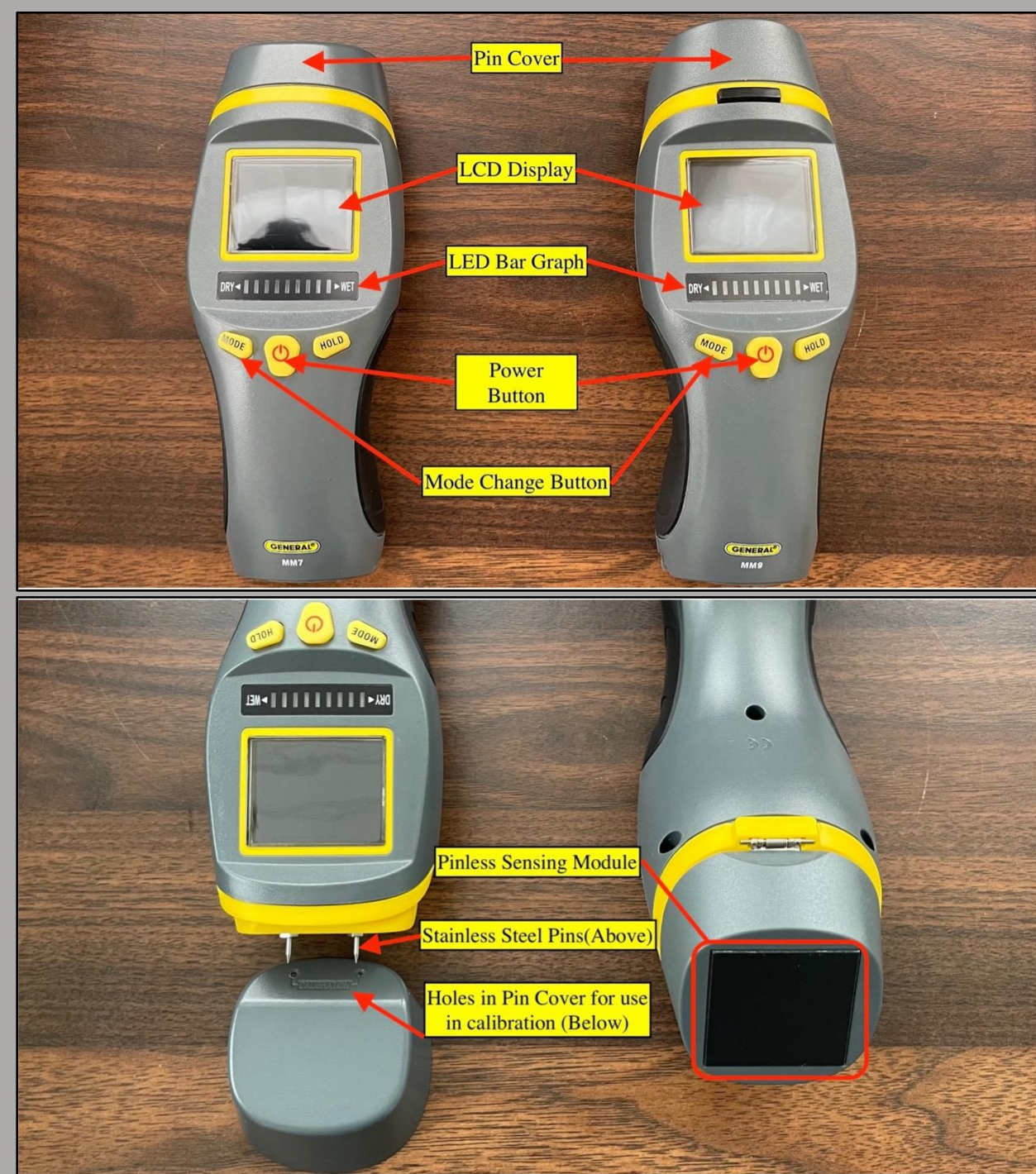


NESCAUM (Northeast States Coordinated Air Use Management) &
Keene State College
Dr. Nora Triviss
Nathan Williams



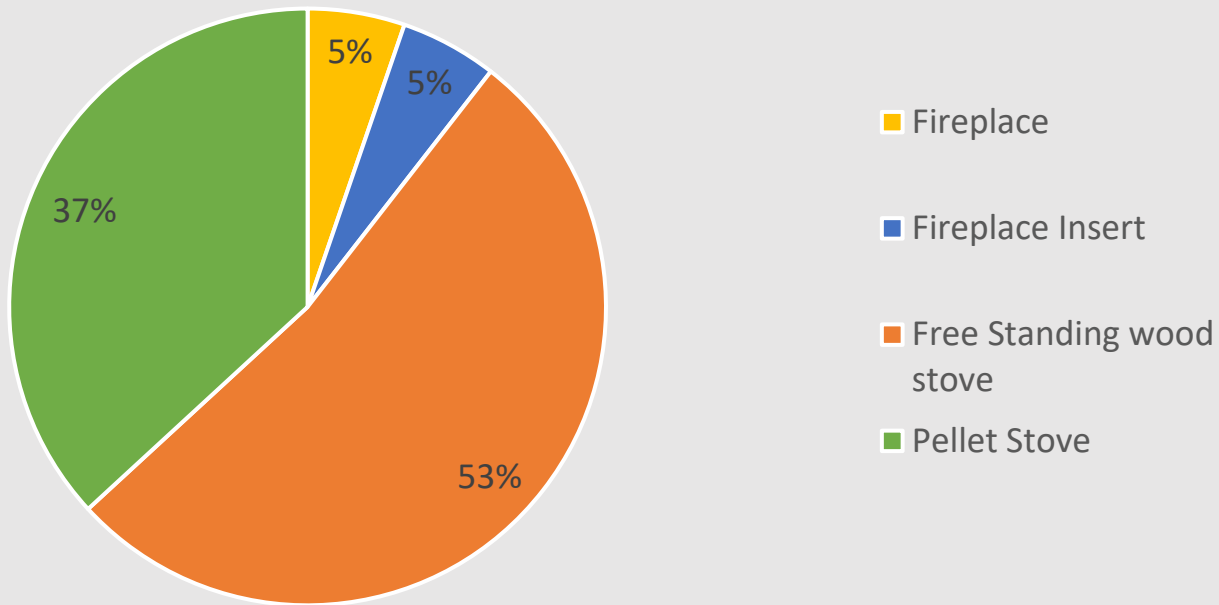
Moisture Meters:

- General Tools MM7 & MM9
 - Low cost- under \$37
 - Available at Home Depot
 - Replaceable pins
- Range 5%-50% WME
- Accuracy: $\pm 2\%$
- Resolution: 0.1%

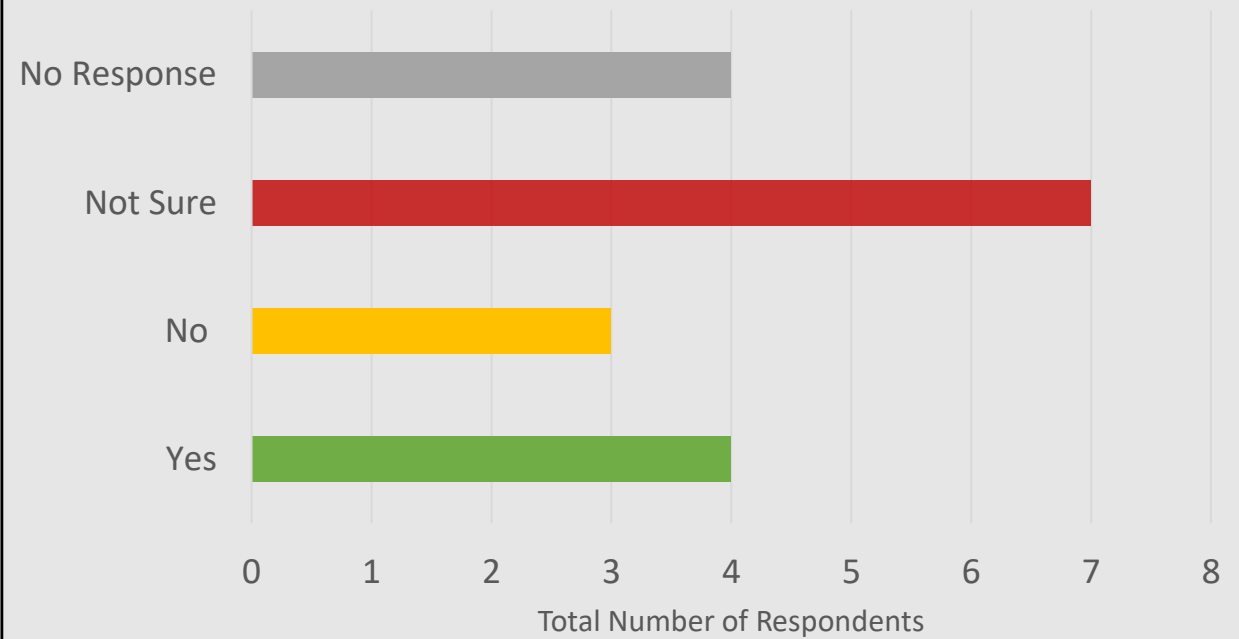


Preliminary Data:

What Type of Appliance is Used?

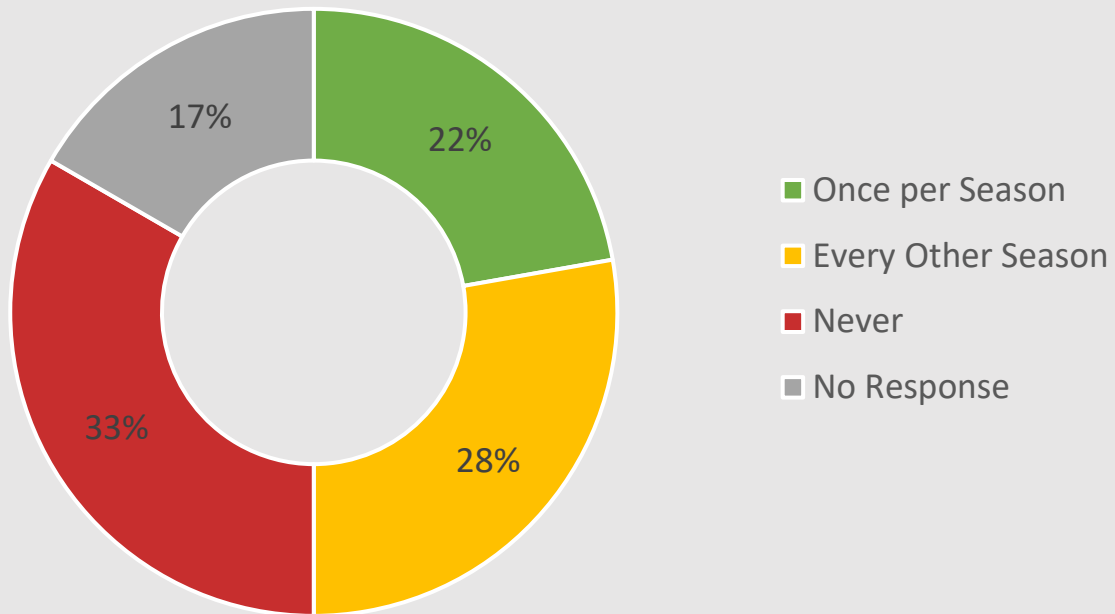


Is the Appliance Catalytic?

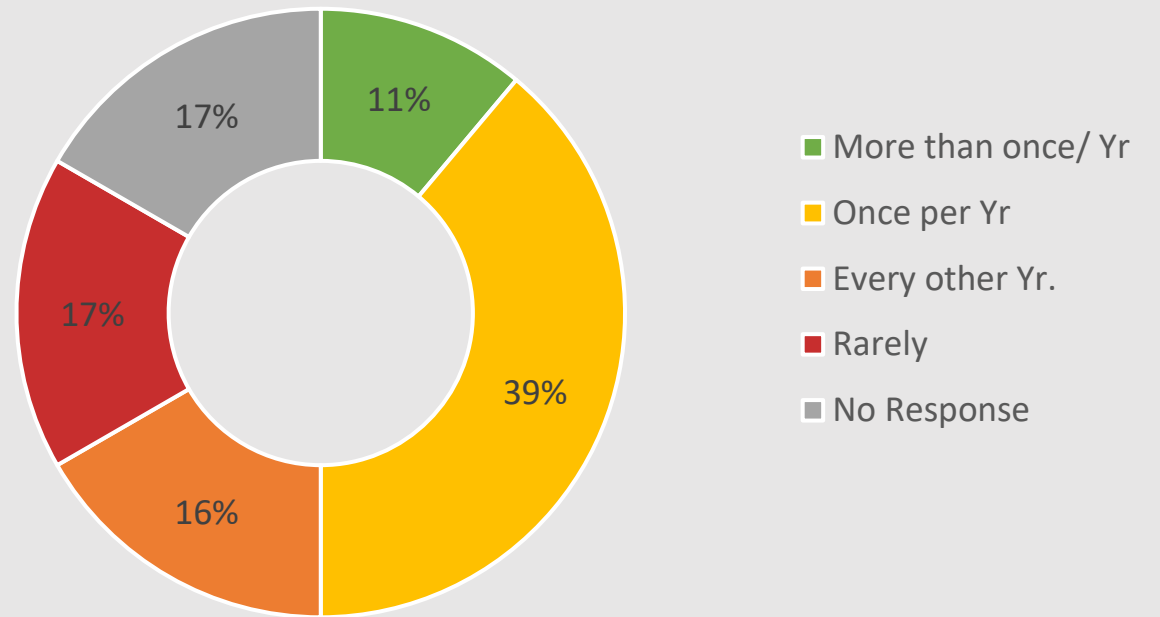


Preliminary Data:

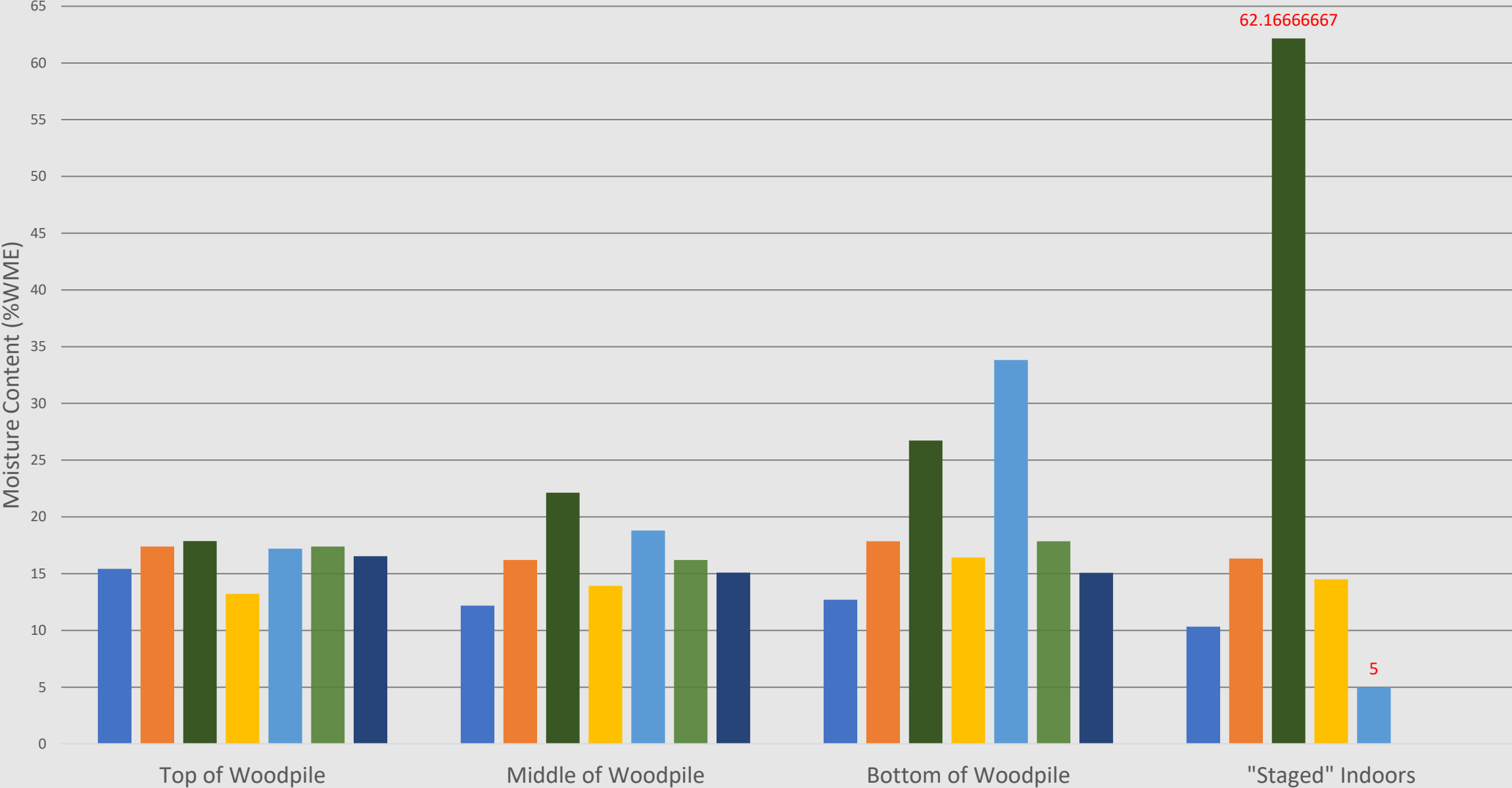
How Often is the Appliance Inspected?



How Often is the Chimney Swept?



Wood Moisture Content



Lessons Learned:

- Respondents appear to have cordwood staging protocols (outside -->inside-->stove)
 - MC was <20% BUT...we are not sure if respondents split the log
- Most respondents don't have their appliance serviced regularly by a professional
 - Over 33% reported never cleaning their chimney
- Online survey was easiest to implement BUT most respondents did not upload photos
- "No response"--> Need to rework some questions
- Relationships are very important to work with local schools
- Self-selection bias?
 - Keene has a long history of many outreach programs incorporating Burn Wise

Materials Available:

- Interested in joining the effort?
 - PowerPoint Slides
 - Background documents
 - Moisture Meter instructions & SOP
 - Survey
 - Paper copy
 - Online
 - Background documents
 - Educational materials
 - Sources & References



KSC Student/NESCAUM intern Nate Williams at Keene High School, 27 Feb, 2023

QUESTIONS?

- Thank you!
- Contact ntraviss@nescaum.org for more information or materials

Acknowledgements:

- NESCAUM
- Keene State College
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