GYX HeatRisk Examination

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1. Introduction

- HeatRisk is a color-numeric based index that provides a 7 day forecast of the potential risk level of heat-related impacts likely to occur within a 24 hour window
- Developed in coordination with the CDC and considers how far above/below normal temp is, time of year, duration of unusual heat, overnight relief, etc.

Research Question:

How does the number of HeatRisk days at GYX sites compare to the number of heat headlines issued by NWS Gray?

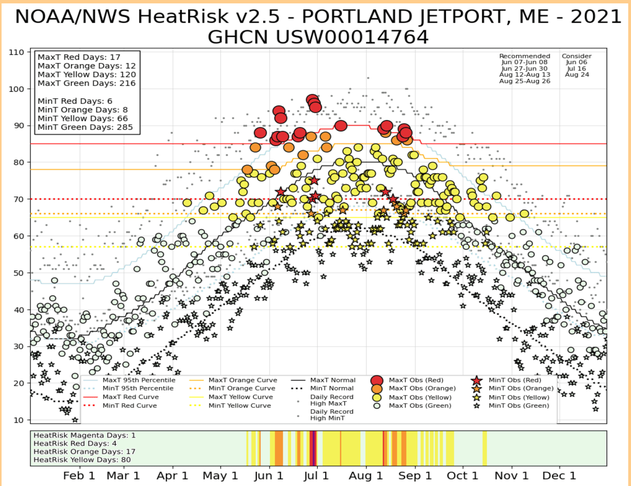


Figure 1: Number of HeatRisk days at Portland Jetport, ME during 2021 with yellow dots being Minor HeatRisk days, orange dots being Moderate HeatRisk days and red dots being Major HeatRisk days.

2. Methodology

- Gathered the number of HeatRisk days for orange and red across all GYX sites for 2014-2023
- Gathered all Heat products issued by NWS Gray at each location (using Iowa State Mesonet)
- Tabulated annual stats on the difference between HeatRisk days and actual products issued by location
- Looked at what it would mean to use HeatRisk as heat headline criteria for NWS Gray
- Case Study from Summer 2024 heat
- Proposed methodologies for HeatRisk incorporation

6. References / Acknowledgements

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-I would also like to thank my advisor Dr. Eric Hoffman for helping me with my thesis work and updating the graphics of this research
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3. Results

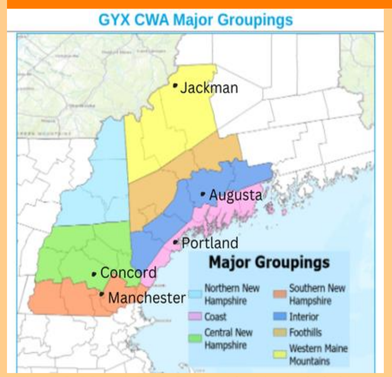


Figure 2: Map of GYX CWA with cities included in this study marked

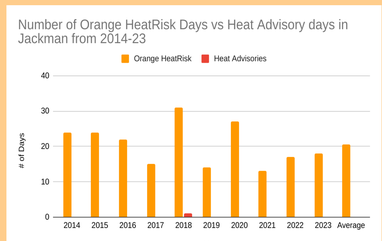


Figure 3: Number of Orange HeatRisk Days vs Heat Advisory Days in Jackman from 2014-23

Figure 8: Number of Red HeatRisk Days vs Excessive Heat Warning Days in Jackman from 2014-23

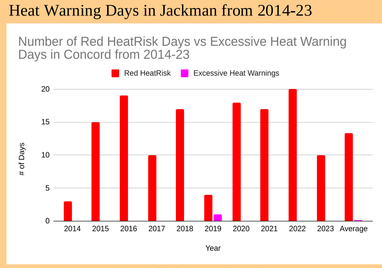


Figure 11: Number of Red HeatRisk Days vs Excessive Heat Warning Days in Concord from 2014-23

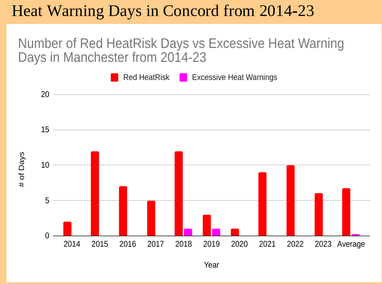


Figure 12: Number of Red HeatRisk Days vs Excessive Heat Warning Days in Manchester from 2014-23

Criteria for Heat Advisories in GYX prior to 2018:
-Maximum heat index of at least 95 dF for 2 days in a row
Criteria for Heat Advisories in GYX since 2018:
-Maximum heat index of at least 95 dF for 2 consecutive hours
Criteria for Excessive Heat Warnings in GYX prior to 2018:
-Maximum heat index of at least 105 dF for 2 days in a row
Criteria for Excessive Heat Warnings in GYX since 2018:
-Maximum heat index of at least 105 dF for 2 consecutive hours

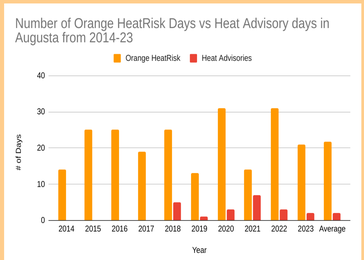


Figure 4: Number of Orange HeatRisk Days vs Heat Advisory Days in Augusta from 2014-23

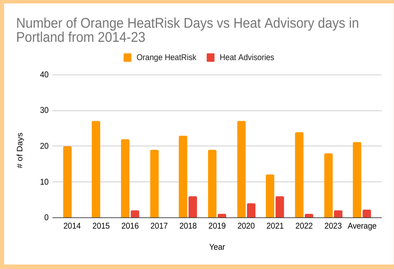


Figure 5: Number of Orange HeatRisk Days vs Heat Advisory Days in Portland from 2014-23

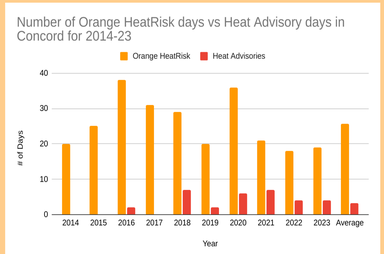


Figure 6: Number of Orange HeatRisk Days vs Heat Advisory Days in Concord from 2014-23

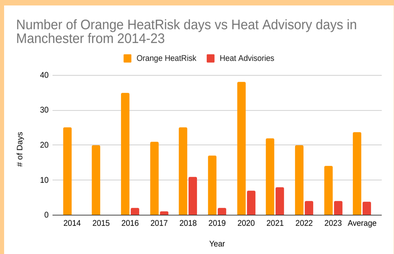


Figure 7: Number of Orange HeatRisk Days vs Heat Advisory Days in Manchester from 2014-23

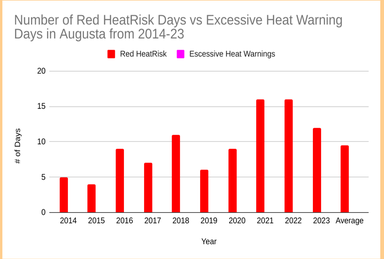


Figure 9: Number of Red HeatRisk Days vs Excessive Heat Warning Days in Augusta from 2014-23

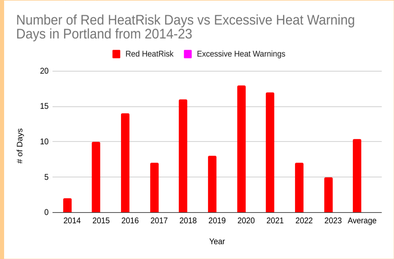


Figure 10: Number of Red HeatRisk Days vs Excessive Heat Warning Days in Portland from 2014-23

- Overall, the number of days with Heat Advisories is significantly less than days with Orange (Moderate) HeatRisk
- The number of days with Excessive Heat Warnings is significantly less than days with Red (Major) HeatRisk

- Manchester had missing data for this data set, so the full picture isn't shown here

Year	Jackman	Augusta	Portland	Concord	Manchester
2014	0	0	0	0	0
2015	0	0	0	0	0
2016	0	0	1300	1800	600
2017	0	0	0	0	400
2018	900	1000	1500	1600	1100
2019	0	500	700	300	200
2020	0	800	1700	1700	M
2021	0	1500	1600	1600	800
2022	0	1500	600	1900	900
2023	0	1100	400	900	500
Average % Increase	780	850	940	1230	570

Table 1: % Increase of Heat Advisories that would be issued if Red HeatRisk days were used as headline criteria

Station	HeatRisk	Day 1	Day 2	Day 3
Jackman	**3 Red**	None	Heat Advisory	None
Augusta	**3 Red**	Heat Advisory	Excessive Heat Warning	Excessive Heat Warning
Portland	**1 Orange, 2 Red**	None	Heat Advisory	Excessive Heat Warning
Concord	**3 Red**	Heat Advisory	Excessive Heat Warning	Excessive Heat Warning
Manchester	**3 Red**	Heat Advisory	Excessive Heat Warning	Excessive Heat Warning
Maine CDC Data	# ED visits due to Heat Illness	20	33	42
	% ED visits due to Heat Illness	0.92	1.73	1.98

Table 2: Case Study of 3 day Heat event in GYX from June18-20, 2024.

HeatRisk days vs actual headlines issued are displayed for 5 sites across GYX. CDC data for the state of Maine is displayed at the bottom shoing the number of ED visits due to heat illness during this event

Station	Orange HeatRisk	Red HeatRisk	Heat Advisories Issued	Excessive Heat Warnings Issued
Jackman	12	0	0	0
Augusta	7	6	2	0
Portland	8	3	3	0
Concord	10	5	4	0
Manchester	9	M	5	0

Table 3: Case study of consistent heat in GYX from July 5-18, 2024

Study confirms # of headlines issued is significantly less than # of HeatRisk days

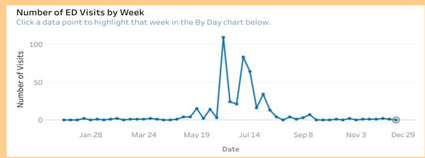


Figure 13: Maine CDC showing ED visits due to heat illness throughout 2024.

A big spike can be seen in June during the first heat event mentioned above. A smaller spike can be seen during the longer event in July

5. Proposed Methodologies ctd / Future Work

- Should HeatRisk be used at all or should our criteria be updated another way
- Does our current criteria even need updating?
- The above are all questions I am considering as part of my Thesis work
- The first step to taking this research forward is to verify all heat headlines issued against criteria, which I am currently working on

4. Conclusions / Proposed Methodologies

- According to HeatRisk, regions areawide are under-warned
- Using HeatRisk as our baseline criteria would lead to a significant increase in heat headlines, leading to over-warning
- The biggest increase in headlines would occur in northern zones
- CDC data shows the adaptability to Heat
- Using HeatRisk as is would not be reasonable
- Could we still use HeatRisk as is but make adjustments such as when the heat index hits x* above the red threshold line, advisories or warnings would be issued
- Should HeatRisk as a whole be adjusted to be more usable for WFO offices and heat headlines