VERMONT

DEPARTMENT OF FINANCIAL REGULATION

The Impact of Climate Change on Vermont's Insurance Industry

June 2021

Presented by the Vermont Department of Financial Regulation,
in coordination with Northview Weather, LLC

Contents

Background – Insurance and Climate Risks

Global climate change is a fundamental threat to Vermont's economy, environment, and way of life. Over the last 40 years, there have been large-scale shifts in weather patterns, including a measurable increase in catastrophic weather events, both locally and globally. During this time, our state has become both warmer and wetter, and this in turn has led to increasingly frequent and severe damaging weather events. And although climate action and the work needed to reduce greenhouse gas (GHG) emissions is accelerating, it is expected—given the emissions that have already occurred—that these patterns of warming temperatures and increasing precipitation will continue for many years.

Climate change therefore presents unique challenges for the property and casualty insurance industry. Escalating severe weather events and weather extremes (i.e., record high temperatures, record rainfall events, etc.) have resulted and will continue to result in increased residential and commercial property losses, including for structural damage, relocation expenses, and loss of income. A recent article by McKinsey highlights some of the potential insurance impacts of this trend as follows: "The projected escalation of climate risk, such as the occurrence of more floods and wildfires, may lead to underinsurance—or to no insurance at all. The result, substantial market dislocation, will include premium loss, higher rates of self-insurance, and an increased demand for disaster relief from the public sector."[1]

Responding to climate change will surely challenge insurers, but it may also give rise to opportunities. Individuals and businesses are increasingly relying on renewable energy sources, which has produced new markets and products to insure. In addition, insurers are uniquely positioned to take advantage of circumstances to help manage and mitigate the impacts of global warming. Insurers can and should incentivize businesses, farms, and consumers to utilize energy efficient building methods in both new construction and retrofitting existing structure, install energy efficient appliances and air handling systems, and transition to renewable energy. Several Vermont insurers are already taking steps in this direction – for example, by providing higher replacement value for "green" building materials under homeowner and farm policies. They can also help develop and market innovative products and services that support a reduction in greenhouse gas emissions, and partner with municipal, state, and federal agencies on policy matters such as improving building standards.

[1] https://www.mckinsey.com/industries/financial-services/our-insights/climate-change-and-p-and-c-insurance-the-threat-and-opportunity

The Northview Report

To better understand the potential impacts of climate change on Vermont insurance companies and insurance consumers, the Department engaged Northview Weather, LLC, a Vermont firm with expertise in weather forecasting and modeling. Northview utilized its proprietary artificial intelligence-based technology and a decade's worth of anonymized daily claims information provided by three domestic insurance companies to investigate historical relationships between weather and insured losses and to model future insurance risks and losses in Vermont due to climate change.

The Northview report demonstrates that, in the past decade, severe storms have driven a large portion of insurance losses. Vermont's weather has trended warmer and wetter in the past 40 years, which has caused an increase in aggregated weather peril risk, and Northview projects that this trend will continue as the climate continues to warm. The full report follows.

Regulatory Actions

The Department regards climate change as a critical issue that requires immediate action by individuals, businesses, and government alike to reduce GHG emissions and climate-related vulnerabilities and improve resilience. An area of particular concern to the Department is the financial impact of climate change. It is crucial that Vermont insurance companies adequately assess climate-related risk and take the appropriate steps to ensure their continuing ability to cover claims and remain solvent. To prudently manage their reserves, insurers must evaluate the implications of climate-related trends for the companies and sectors in which they invest, including recent shifts from fossil fuels and coal to more renewable sources of energy.

The federal government has recognized the urgent need to mitigate the impacts of climate change on financial assets and economic growth. On May 20, 2021, President Biden issued an Executive Order on Climate-Related Financial Risk, which mandates the development of a government-wide system of financial disclosure related to climate change. In the Order, President Biden directs the Secretary of the Treasury to:

> direct the Federal Insurance Office to assess climate-related issues or gaps in the supervision and regulation of insurers, including as part of the FSOC's analysis of financial stability, and to further assess, in consultation with States, the potential for major disruptions of private insurance coverage in regions of the country particularly vulnerable to climate change impacts.[2]

The Department looks forward to providing information and assistance to the Federal Insurance Office, as needed, and reviewing the results of this nationwide assessment.

Some states have also taken steps to address climate-related financial risk in insurance markets.

[2] https://www.whitehouse.gov/briefing-room/presidential-actions/2021/05/20/executive-order-on-climate-related-financial-risk/

In 2016, the California Department of Insurance instituted a requirement for insurance companies to publicly disclose carbon-related investments.[3] The New York Department of Financial Services (NYDFS) issued Insurance Circular Letter No. 15 on September 22, 2020, which it considers to be a first step toward adopting international best practices on climate-related financial supervision. In the letter, NYDFS sets forth its expectation that all regulated insurers "start integrating the consideration of the financial risks from climate change into their governance frameworks, risk management processes, and business strategies."[4]

Commissioner Pieciak intends to join President Biden, New York Insurance Commissioner Lacewell, and the California Department of Insurance in taking bold action to address the financial impacts of climate change. The Department has committed to taking the following actions in 2021 as initial steps to helping reduce and mitigate the impact of climate change:

- Apply to join the Sustainable Insurance Forum, an international group of insurance regulators "working together to strengthen understanding and responses to sustainability issues" related to climate change;[5]
- Continue to advocate to the U.S. Securities & Exchange Commission in support of mandatory climate risk disclosures for publicly traded companies, which will assist traditional insurers in prudent reserve management and assist the Department in regulating captive-insurance entities;[6]
- Annually administer the Insurer Climate Risk Disclosure Survey (developed by the National Association of Insurance Commissioners) to its domestic insurance companies to help assess the systemic risk presented by climate change;
- Develop guidance to address climate-related financial risks. In its guidance, the Department expects to encourage or require regulated insurance companies to evaluate potential climate-related financial exposure by conducting stress tests and scenario analyses, incorporate climate change into enterprise risk management processes, and assess and manage climate risk exposure in investments. In addition, the Department expects to encourage companies to assess their investments in carbon-intensive sectors and to evaluate whether such investments are consistent with their risk management goals;
- Support the development and marketing of innovative insurance products and services that support a reduction in greenhouse gas emissions;
- Encourage and promote the use of incentives for businesses, farms, and consumers to utilize energy efficient building methods in both new construction and retrofitting

[3] In 2016, the California Department of Insurance instituted a requirement for insurance companies to publicly disclose carbon-related investments and encouraged insurers to voluntarily divest from thermal coal. http://www.insurance.ca.gov/0400-news/0100-press-releases/archives/statement010-16.cfm
[4] https://www.dfs.ny.gov/industry_guidance/circular_letters/cl2020_15
[5] https://www.sustainableinsuranceforum.org/
[6] The Department's June 14, 2021 comment letter to the SEC is attached as Exhibit B.

existing structures, install energy-efficient appliances and air-handling systems, and transition to renewable energy; and

- Provide written and electronic resources to Vermont consumers on climate-related risks and insurance policy limitations (e.g., common exclusions).

The Department invites feedback from Vermont insurance companies on the Department's proposed actions, as well as more broadly on climate-related risks and opportunities and additional measures to combat climate change.

Exhibit A:

Climate Change Report

An Examination of Weather Perils and Insured Losses in Vermont

For: State of Vermont Department of Financial Regulation
Point of Contact: Jill Rickard: Jill.Rickard@vermont.gov

Contract #: 39983

Mar 25, 2021

Prepared by: Northview Weather LLC
Authors: Jason Shafer and Kevin Cronin
Contact: Dr. Jason Shafer: jason.shafer@northviewweather.com

Executive Summary: This work presents a comprehensive analysis investigating various relationships between weather and insured losses across Vermont. This report uses 10 years (2010-2019) of insurance data (15,000+ claims, $67MM in losses) and, by using historic weather data and AI models claim and loss activity back to 1980. A variety of summary analytics are presented, including the seasonality of weather perils and claim activity, the attribution of claims and losses to weather perils, and long-term extreme weather trends. Results show that a wide variety of weather perils cause losses throughout different times of the year. The most significant weather peril in terms of losses was hail, whereas large-scale or gradient wind storms produced the highest number of claims. Catastrophic or the most severe storms appear to drive a fairly large portion of overall losses. Long-term trends show that there has been a small increase of a few percent in aggregated weather peril risks as storm systems have trended warmer and wetter from 1980 to 2019. As the climate continues to warm, changes in aggregated weather peril risk are projected to increase at a similar rate to historic trends in the next 20-30 years as a result of storm systems generally becoming more intense.

1. Introduction

Vermont's climate features significant seasonal variability to its weather perils, from heavy winter snowfalls and cold air outbreaks to summertime thunderstorms (wind, hail, lightning). Extreme weather causes significant insured losses - based on data provided within this project, in excess of $67MM across Vermont from 2010-2019 from approximately 12% of all statewide personal auto, homeowners, and farmowners policyholders. It has not been well established how different weather perils contribute to insured risk exposures. Further, no clear baselines have been established on the relationship between long-term climate changes and the resulting effects on weather variability as this relates to insurable losses.

Vermont's climate is getting warmer and wetter. Vermont's average annual temperature has increased nearly 1°F over the last 40 years, with the greatest warming occurring in the fall. Vermont's precipitation is also increasing, with annual precipitation increasing approximately 1% decade. The greatest precipitation increases have occurred during the winter, which has seen a 2-3% increase in annual precipitation per decade. Warmer and wetter winter storms result in more mixed-phase precipitation (storms that feature at least two of the following: rain, snow, freezing rain or sleet). Extreme rainfall events[1] are increasing at nearly double the rate of the long-term annual averages (7% frequency increase from 1980-2019). These changing weather-climate relationships present unique changes to the overall weather peril risks assessment.

The purpose of this report is to conduct an analysis of the following. One, quantify extreme weather variability and its salient characteristics (e.g., seasonality). Two, establish general weather risk exposures to historic claim activity. Three, demonstrate long-term extreme weather-claim relationships and infer climatic trends as they may affect future claim activity. Results from this report may be used to guide regulatory actions in a non-stationary climate regime.

2. Data and Methods

Weather data sources: In order to present a continuous data set through space and time across the entire State of Vermont, the gridded ERA5 reanalysis dataset was used. The ERA5 dataset was downloaded at its native 30-km resolution for all precipitation perils (rain, snow, ice). Large-scale or gradient wind storms were also identified using the ERA5 reanalysis, but these were dynamically downscaled to a higher resolution (5-km). In addition, approximately twenty point locations were employed for local cross-validation of temperature and precipitation (not shown). For thunderstorm and hail perils, the National Weather Service Storm Prediction Center historic storm dataset was downloaded to examine severe thunderstorm wind and hail frequency. Historic drought information was downloaded from the US Drought monitor.

Claim data sources: The client requested information from insurance carriers for claim activity that was weather dependent for a 10-year period on a daily basis. The primary insurance line was homeowner's but also included personal auto, business owners package, farm policy, mini farm, and mobile home.Three companies provided claim activity, and from 2010-2019 the three companies collectively had a total of 15,867 claims with $67,031,183 in losses that were reported with weather as the primary cause. These three companies represented approximately 12% of all personal auto, homeowners, and farmowers policyholders statewide.

Time scale: The ERA5 reanalysis dataset was downloaded from 1980-2019, and used hourly observations to aggregate precipitation on 24-hr time periods. Hourly aggregation allowed for precipitation phases to be broken down in order to isolate different precipitation types. In order to capture a full precipitation event or storm, 48-hr duration accumulations were also derived, but this work ended up relying primarily on a 24-hr accumulation period. Wind observations were available hourly, but then aggregated on a 24-hr period to identify peak wind gusts. The seasons are defined following standard meteorological conventions as follows.

Winter	Dec, Jan, Feb
Spring	Mar, Apr, May
Summer	Jun, Jul, Aug
Fall	Sep, Oct, Nov

Spatial scale: In order to represent regional statewide variability, a county-wide analysis was conducted for each of Vermont's 14 counties. This allowed for regional storm variability to be identified. Spatial averaging of precipitation, temperature, and wind was conducted using ERA5. It was found that such spatial averaging was effective in identifying storm signatures and extreme weather perils. Insurance claims were also aggregated on a daily and county-level.

Weather analysis methods: In order to best quantify large-scale or gradient wind storms, the ERA5 reanalysis was dynamically downscaled to a higher resolution (5-km). This was accomplished by running the WRF model that was optimized for midlatitude winter performance. It was found that this dynamical downscaling did not improve precipitation event identification; thus, the native ERA5 dataset was relied upon for precipitation. Methods used to derive dynamical climatic projections will be described in a later document.

Claim analysis aggregation methods: This work explored the efficacy of regionalizing results across different Vermont climate zones, but it was found that the data size was too small to draw significant results. Consequently, a statewide aggregation was performed that blended weather observations and claim activity. In order to weigh weather analysis based on policyholders exposed to weather perils, county-wide 24-hr observations were multiplied by a policyholder weight factor based on the total number of customers in each county for the three carriers who provided data (Table 1). This weight was then multiplied by the county-level 24-hr weather attribute to derive a proper weather-weighted value on a statewide basis. Data analysis was then applied to the statewide aggregated weather and claim data.

County	Policyholder Sum	Policyholder Weight
ADDISON	8458	0.09
BENNINGTON	4336	0.05
CALEDONIA	6106	0.06
CHITTENDEN	13407	0.14
ESSEX	1767	0.02
FRANKLIN	7510	0.08
GRAND ISLE	2240	0.02
LAMOILLE	3907	0.04
ORANGE	6682	0.07
ORLEANS	6508	0.07
RUTLAND	8234	0.09
WASHINGTON	8254	0.09
WINDHAM	8306	0.09
WINDSOR	9286	0.10

Table 1. Total policyholders for personal auto, homeowners, and farmowners for each county from data provided by three carriers and subsequent weighting of total policyholders.

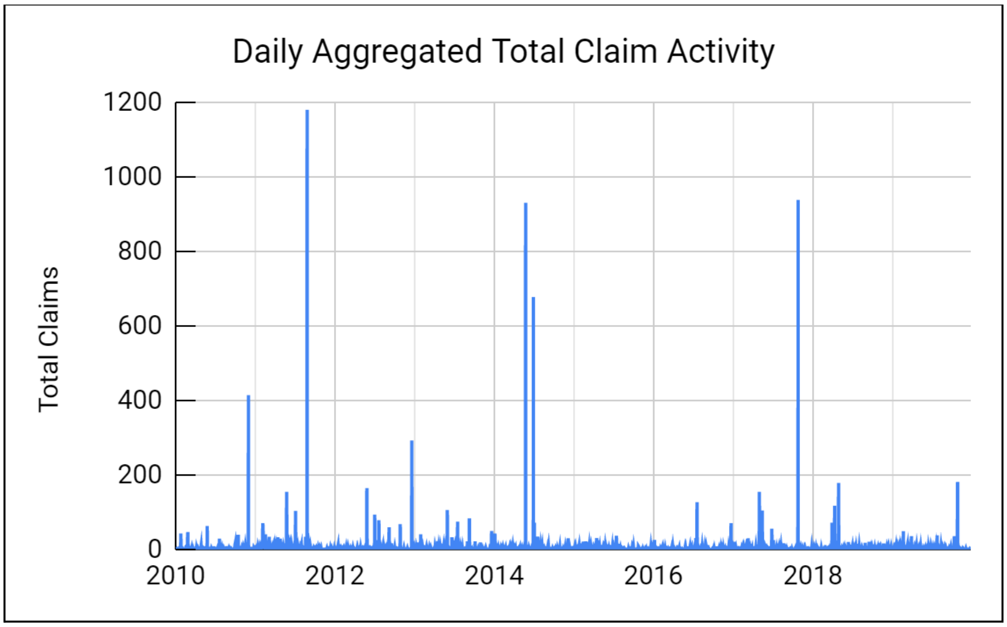
Claim attribution methods: Attributing different classes of weather perils to each claim was challenging. In the official data request to insurance carriers, a table summarizing the requested perils was provided, but it was also stated that the insurer should provide all weather-caused perils. Each carrier ostensibly interpreted this request to simply include all weather-caused perils. However, there was a high degree of self-reported weather peril causation to claims between the three carriers. In order to synthesize and standardize results, the causation was analyzed with weather data manually. Manual analysis could not be completed for every claim, so a smaller but representative subset was analyzed to understand the primary weather peril. Perils were assumed to occur synchronously with weather activity. It should be noted that some perils may be asynchronous in nature (e.g., thawing and ice dams) and have more than one contributing weather factor, but assessing these complexities was beyond the capabilities of this project.

Historic claim and loss model methods: In order to model a longer estimate of claim activity and losses, two machine-learning models were developed from the aggregated claim and loss activity on a statewide basis. Using the following methods and ten years of claims and loss data (2010-2019), this work was able to generate modeled historic claims and losses for a 40-year period. These models were constructed using a deep learning model that included a neural network with weather-sensitive features (precipitation, rain, snow, ice thickness, peak wind speed, peak wind direction, soil moisture, temperature, dewpoint, and sea-level pressure). This model was unable to simulate thunderstorm-caused perils as hail and local convective wind gusts and any claims related to drought. The primary intention of this model was to understand long-term decadal and climatic variability.

3. Results

a. Claim and Loss Distribution Analysis

The distributions of claim and loss data illustrate that the majority of days have little to no activity in extreme weather-claim and loss (Figure 1). There are several large storm events as seen on the spikes in Figure 1, but there are differences between the total claims and total losses, indicating storm severity variability.



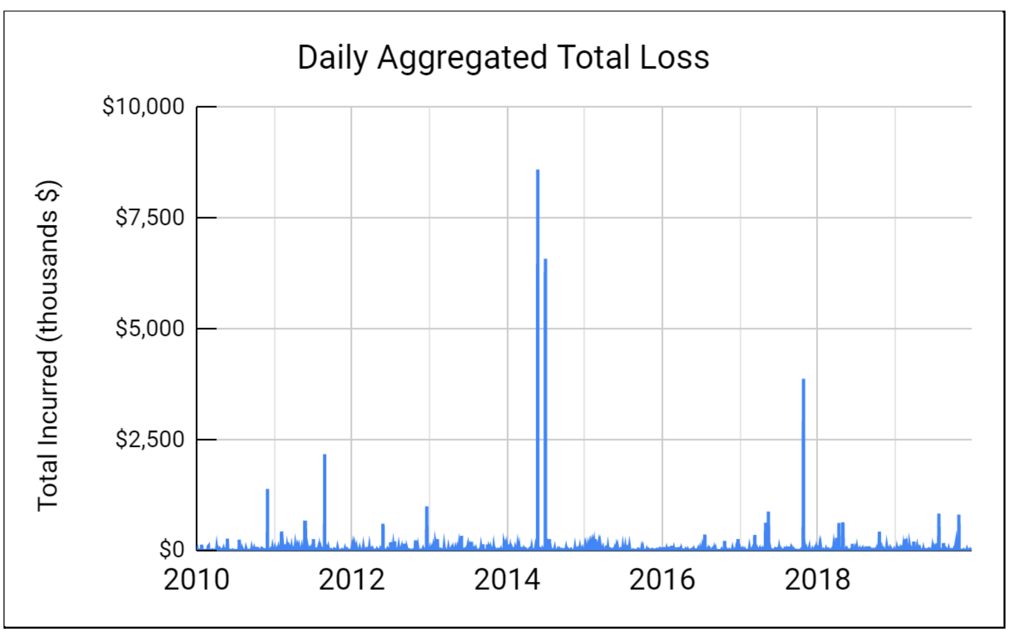
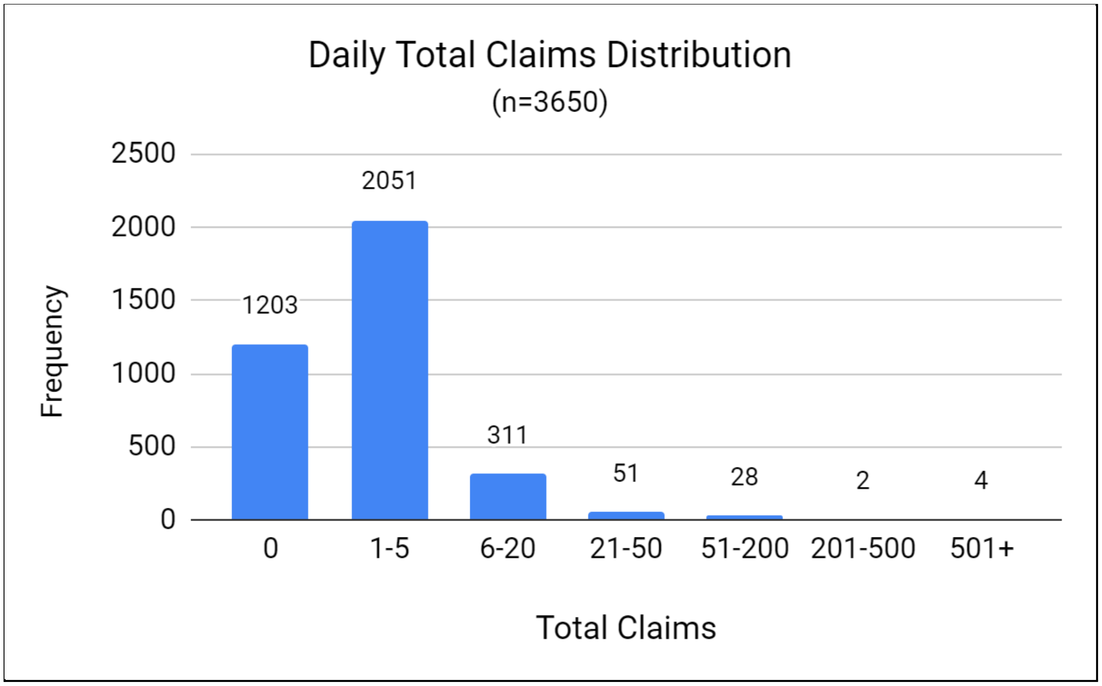


Figure 1. Daily claim (top) and total incurred losses (bottom) time series from 2010-2019.

The distribution of claim activity shows that the majority of days have little to no claim activity (blue sky weather days). By contrast, dark-sky weather days (51 claims or higher) represent less than 1% of all days (Figure 2). Incurred losses follow a similar pattern with loss days of $250,000 or higher on approximately 1% of all days (Figure 2).



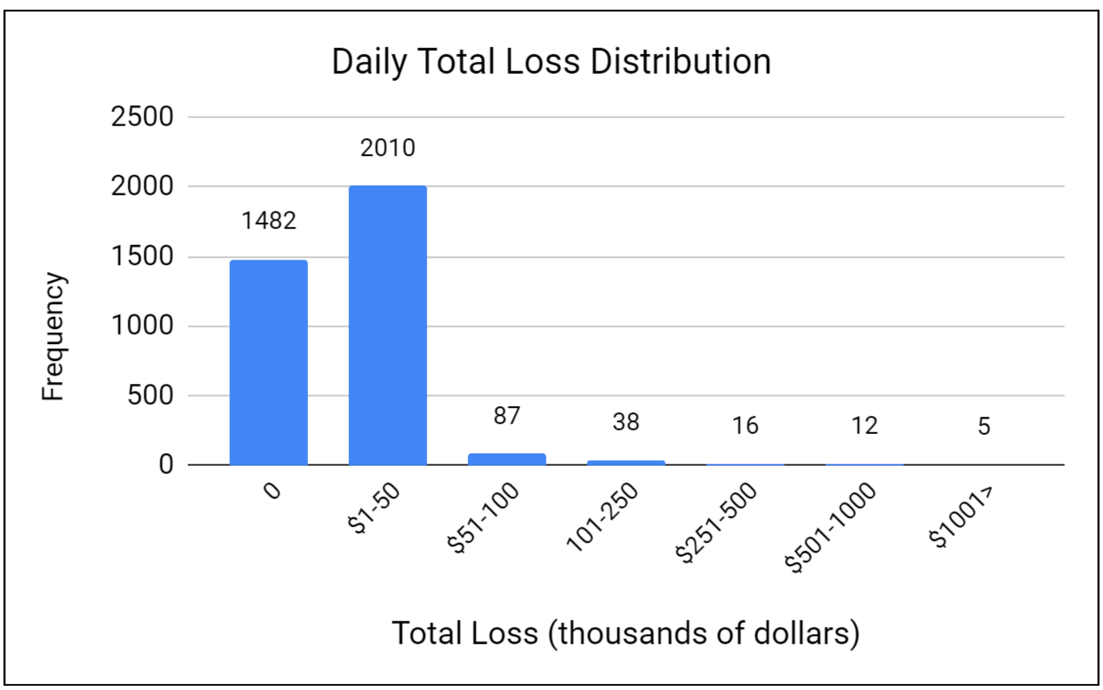


Figure 2. Distribution of total daily claims (top) and losses (bottom) from 2010-2019.

In terms of the contribution of extreme dark-sky weather days to overall losses, there appears a fairly steady contribution of losses at different classes (Figure 3). However, for the storm event day with incurred losses above $1MM, nearly 35% of all losses were due to these days; this represented only 5 unique storm days. These five storm events with the highest incurred losses included Tropical Storm Irene (Aug 27, 2011), large-scale or gradient wind storms (Dec 1, 2010 and Oct 30, 2017), and two hail events (May 27, 2014 and July 3, 2014). Outside of the most extreme storms there were still a fair number of nuisance or moderate impact storm events, with nearly 40% of all losses occurring on days with $100K or less of incurred losses (Figure 3).

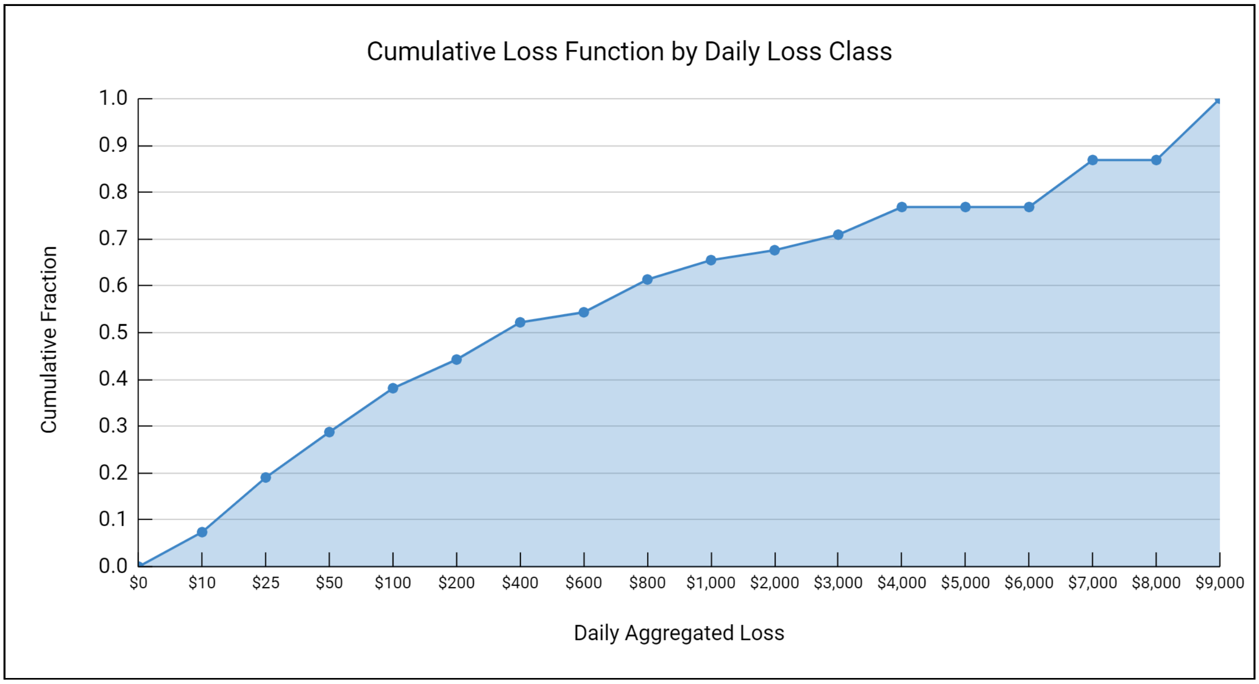
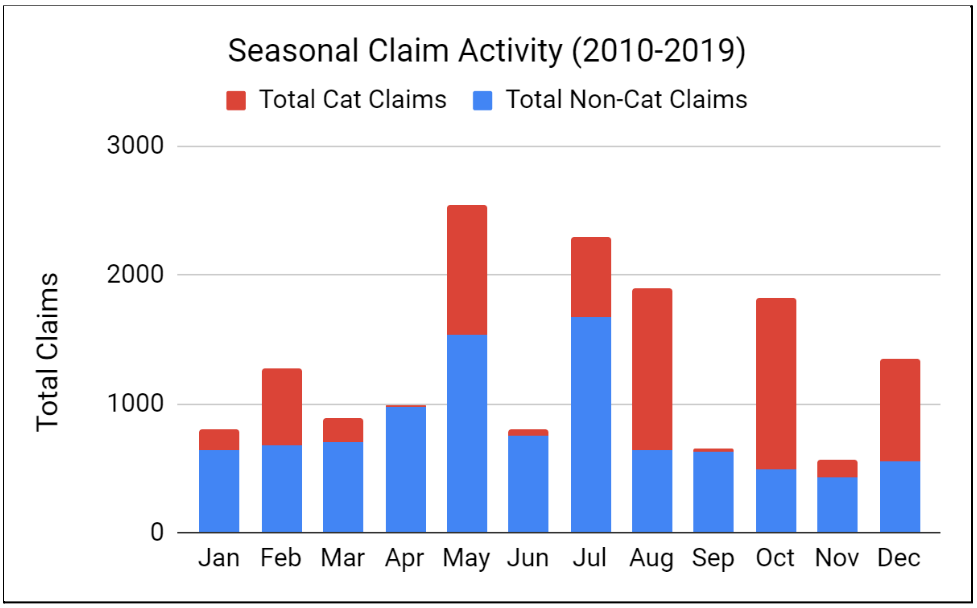


Figure 3. Cumulative distribution of daily losses to overall incurred losses (in thousands of dollars). Total overall incurred losses were just over $67MM from 2010-2019.

b. Catastrophic vs Non-Catastrophic Analysis

Overall non-catastrophic claims represented 61% of all claims, with catastrophic claims representing the additional 39%. Overall non-catastrophic incurred losses represented 58% of all losses, with catastrophic losses at 42%. Given the relatively small sample size, there is a fair amount of month-to-month variability with peak overall claim activity in May, June, and August (Figure 4). The months with the highest catastrophic claims were May, August, and October. Several large storm events are likely driving this month-to-month signal. May saw the highest losses primarily from hail events, followed by July and then October.



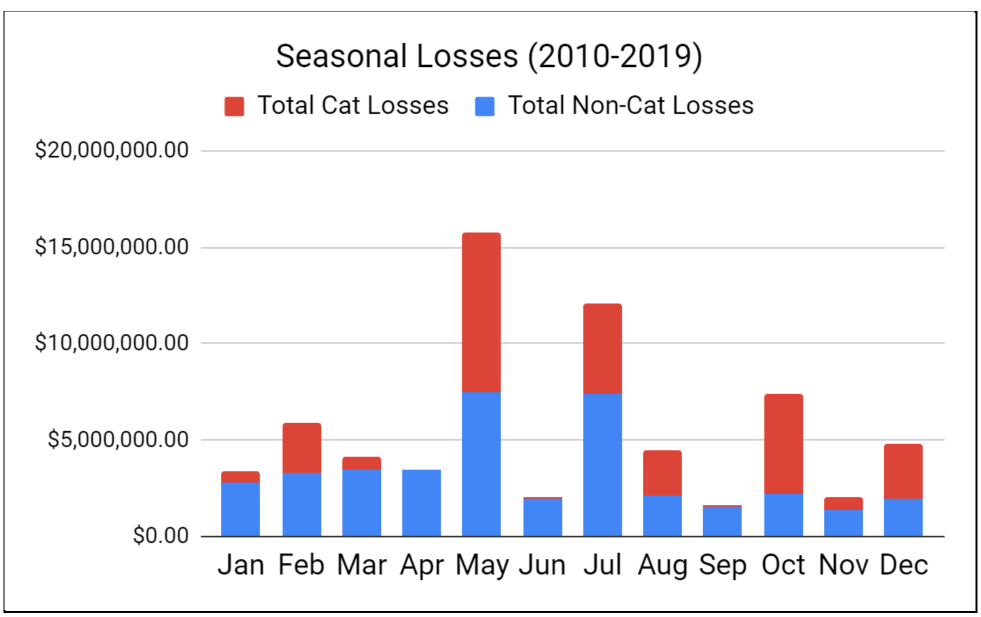


Figure 4. Seasonality of catastrophic and non-cat claim (top) and loss activity (bottom).

When examining the seasonal frequency of catastrophic vs. non-catastrophic claims and losses, there aren't significant differences across seasons. Winter and fall tended to have a higher ratio of catastrophic claims, with fall featuring the largest differences between catastrophic losses and non-catastrophic claims (Figure 5). This suggests that storm systems during the fall produce more severe widespread damage, whereas spring and summer storm systems may be more localized.

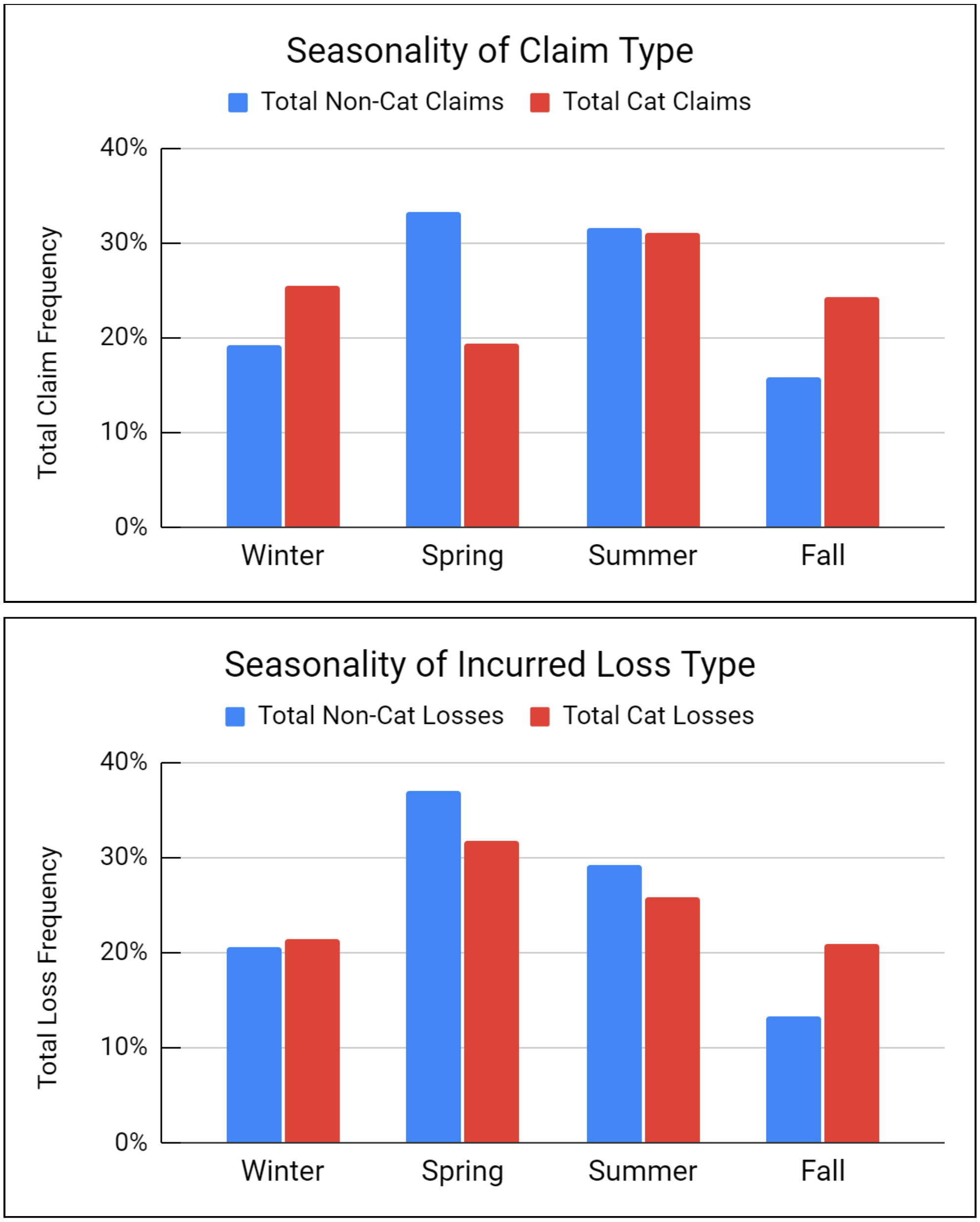


Figure 5. Seasonal summary of catastrophic and non-cat claim (top) and losses (bottom).

c. Causation Analysis

Given the wide-variability in self reporting of peril causation by the three carriers, a smaller subset of data was manually analyzed to determine the primary weather peril responsible for losses. This was also conducted to synchronize the claim and loss data to the weather dataset. The top 202 claim days were subsetted (top 5th percentile - those with 10 or more claims on a day); this included approximately 68% of all claims and 65% of all losses.

Upon examination of these days, another peril class was identified as extreme cold days when there was no precipitation and the winds were light. A variety of losses (e.g., pipe freezes) may have occurred from extreme cold, but these were not specifically reported in the claim data. For many events there was likely more than one contributing weather peril, but the primary peril was identified for this analysis. An example of this would be days with severe thunderstorms that can produce both local convective wind gusts and severe hail (1” or larger).

Results show that there is a fairly wide variety of weather perils, with large-scale or gradient winds responsible for nearly 36% of all claims (Figure 6). Hail and Thunderstorm wind gusts were collectively responsible for nearly 38% of all claims. Hail appears to result in a much larger overall risk than previously reported.

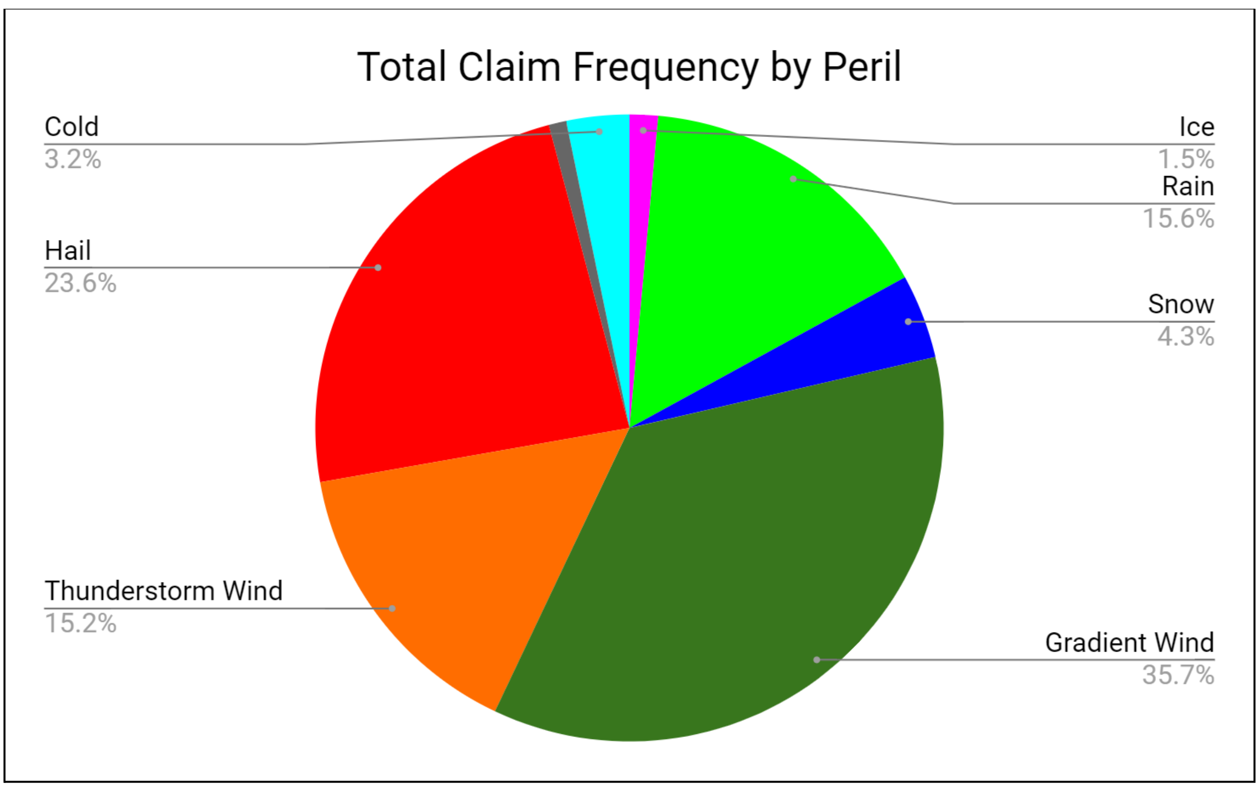


Figure 6. Claim frequency by peril class for major storm days (10 or more greater claims, n=10,317 from 2010-2019). Lightning is not labeled (less than 1%).

In order to determine the overall severity of each peril, the losses were analyzed by peril class. This analysis shows that hail represented a much larger overall risk with nearly 40% of all losses associated with hail. Losses associated with heavy rain were also reduced compared to claim activity. Approximately 44% of all losses were associated with a type of wind event (gradient or thunderstorm), whereas 51% of all losses were associated with a type of precipitation (hail, snow, rain, ice).

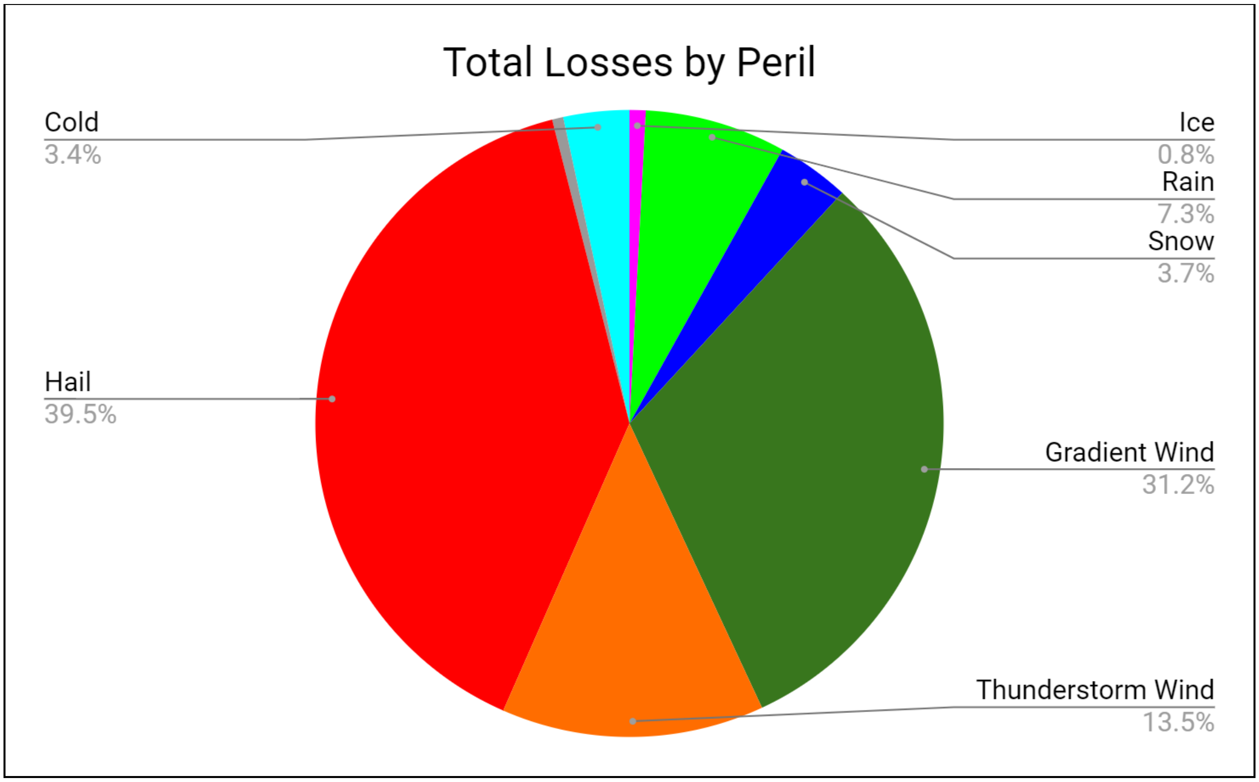


Figure 7. Cumulative incurred losses by peril class for major storm days (10 or more greater claims, n=10,317 from 2010-2019). Lightning is not labeled (less than 1%). Drought was not able to be determined as a primary cause.

When subsetting the perils by month, a fairly expected pattern emerges with warm and cold season perils. The fall and early winter appears to be the greatest for gradient winds (Oct and Dec), with hail peaking in May (Tables 2 & 3). Given the relatively small sample set, a few large storm events are likely driving some of these signals.

Seasonal Claim Frequency by Peril for Major Weather Days (10+ claims)								
	Gradient Wind	T-Storm Wind	Hail	Lightning	Rain	Snow	Ice	Cold
Jan	5%	0%	0%	0%	0%	0%	28%	25%
Feb	8%	0%	0%	0%	3%	46%	0%	68%
Mar	4%	0%	0%	0%	1%	20%	13%	7%
Apr	13%	0%	0%	0%	2%	2%	0%	0%
May	7%	18%	60%	14%	2%	0%	0%	0%
Jun	0%	14%	2%	11%	0%	0%	0%	0%
Jul	0%	51%	34%	52%	1%	0%	0%	0%
Aug	2%	8%	1%	0%	76%	0%	0%	0%
Sep	2%	8%	3%	24%	1%	0%	0%	0%
Oct	34%	0%	0%	0%	13%	3%	0%	0%
Nov	1%	0%	0%	0%	1%	6%	0%	0%
Dec	24%	0%	0%	0%	0%	23%	58%	0%

Table 2. Claim frequency by peril class for major weather days from 2010-2019. Percentage indicates the total monthly fraction of each peril.

Seasonal Loss Aggregation by Peril for Major Weather Days (10+ claims)								
	Gradient Wind	T-Storm Wind	Hail	Lightning	Rain	Snow	Ice	Cold
Jan	4%	0%	0%	0%	0%	0%	27%	22%
Feb	10%	0%	0%	0%	3%	48%	0%	74%
Mar	6%	0%	0%	0%	1%	22%	19%	4%
Apr	13%	0%	0%	0%	2%	1%	0%	0%
May	10%	23%	61%	8%	2%	0%	0%	0%
Jun	0%	10%	1%	14%	0%	0%	0%	0%
Jul	0%	51%	38%	63%	1%	0%	0%	0%
Aug	2%	9%	0%	0%	66%	0%	0%	0%
Sep	1%	7%	1%	15%	0%	0%	0%	0%
Oct	33%	0%	0%	0%	23%	2%	0%	0%
Nov	0%	0%	0%	0%	2%	5%	0%	0%
Dec	21%	0%	0%	0%	0%	22%	54%	0%

Table 3. Losses by peril and month for major weather days from 2010 to 2019. Percentage indicates the total monthly fraction of each peril.

d. Historic Claim and Loss Trend Analysis

It is difficult to infer claim and loss trends with only 10 years of data. In order to understand long-term weather variability a deep learning model was developed. A deep-learning model was trained on the 10 years of loss and claim data and then applied to the 40 years of weather data. Due to the difficulty with understanding convective systems (thunderstorms) this model was not trained directly to include hail, thunderstorm wind gusts or lightning, thus the analysis likely under-detects these perils. Nonetheless, the variability of large-scale weather systems and their perils can be generally captured in a long-term sense using this method. Results don't show a significant decadal variability, with the 2010s having the greatest claims and losses (Figure 8).

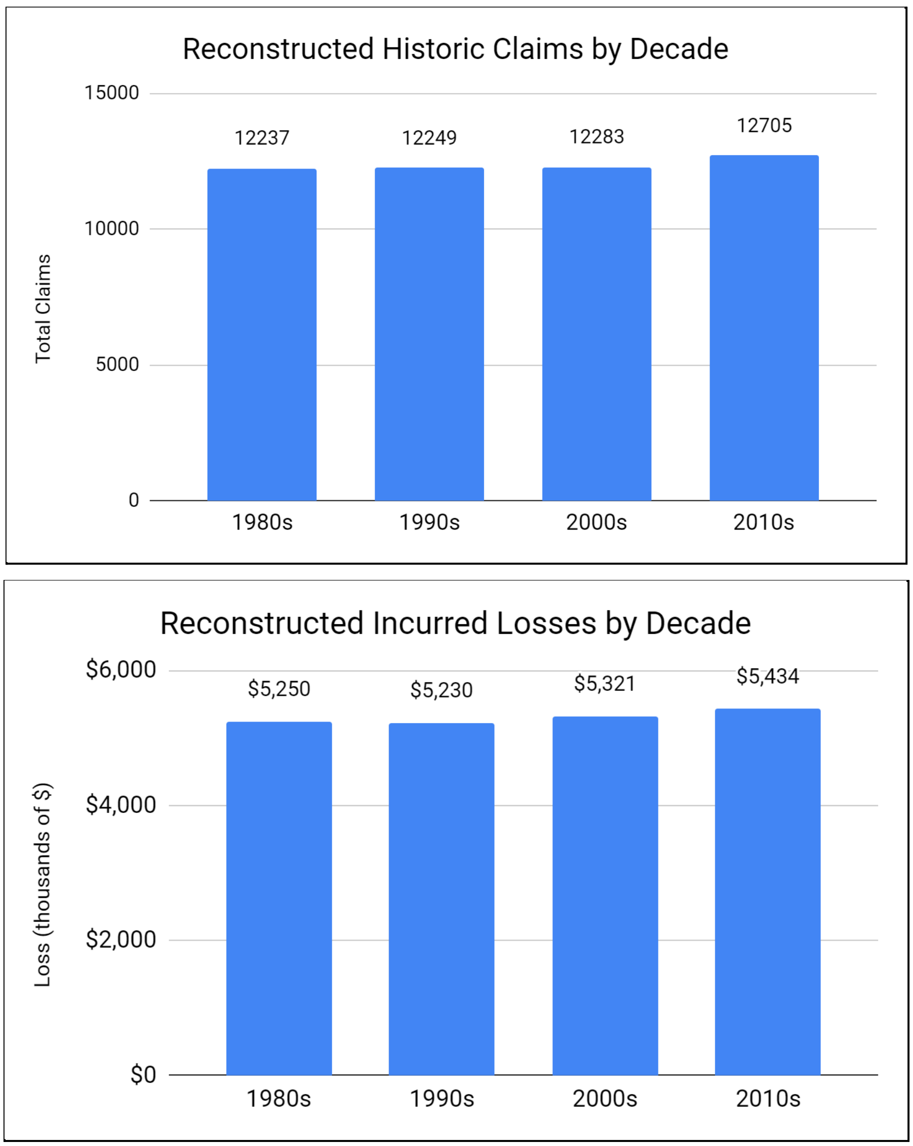


Figure 8. Modeled claims (top) and losses (bottom) by decade. Modeling was performed using a deep learning model trained on claim and loss data and weather observations from 2010-2019.

The long-term trends show an increase in both the claims and losses, with claims increasing approximately 2.0% and losses 2.6%. These results suggest that the severity of weather perils has increased slightly during this period. The simulation models are unable to determine the primary perils responsible for these increases. However, these two deep learning models are generally effective at capturing large-scale or gradient wind events and perils related to precipitation. Perils related to thunderstorms (convective wind gusts, hail, lightning) are not well captured by the deep learning models given their smaller spatial scale. Nonetheless, these results are able to show the aggregated weather risk long-term changes as well as any other documented method.

1980 to 2019 20 Year Trend	
Losses	+2.6%
Claims	+2.0%

Table 4. Long-term modeled trends in losses and claim activity. The 20-year trend is derived by examining the two periods 1980-1999 vs 2000-2019.

4. Climatic Trends and Projections

Weather perils have had an overall frequency increase between 1980 and 2019 with the exception for extreme cold (Table 5). These trends are generally expected to continue although smaller scale events such as thunderstorm wind gusts, hail and lightning cannot be determined due to limitations of the science. The relationship between wetter and warmer storms and wind remains unclear, but it is generally thought that warmer and wetter storms have a greater potential to be stronger given dynamical relationships between moisture and storm intensity (Sinclair et al 2020).

	1980-2019 Trend	2021-2050 Projection
High gradient wind events	+1%	+1% to +2%
Heavy rainfall events	+7%	+5% to +10%
Heavy snowfall events	+4%	+2% to +3%
Ice (light events)	+6%	+1% to +3%
Ice (major ice storms)	0%	0%
Extreme cold	-10%	-10% to 0%
Thunderstorm wind	Inconclusive	beyond current science
Hail	Inconclusive	
Lightning	Inconclusive	
Overall Aggregated Weather Peril Risk	+2% to + 3%	+2% to +4%

Table 5. Climate trends and projections for different perils across Vermont. Projections are based on a combination of following current trends and published literature. Projected increases are based on a 30-year change 1990-2019 to 2021-2050.

Gradient Winds

Gradient wind events are defined as widespread wind events typically covering large spatial regions as from midlatitude storm systems or tropical systems (hurricanes/tropical storms). Gradient wind events or large-scale wind events are associated with two principal storm tracks in Vermont. One, those that track to the west or south of Vermont and bring south to east winds (e.g., Nov 1, 2017), and those that track to the north of Vermont and bring strong westerly winds behind them (e.g, Oct 30, 2019). The frequency of gradient wind events has increased slightly over the past 40 years (Table 5), and has been shown to increase with climate change in the region (Cheng et al. 2014). A common aggravating factor to causing losses is the presence of heavy precipitation (usually rainfall) ahead of or during the strongest winds. Exceptionally wet and windy fall storms are also likely to produce widespread power outages.

Heavy Rainfall Events

Heavy rainfall events are increasing at a rate nearly double the base annual precipitation, around 7% more events from 1980-2019 (Table 5). These events are defined as exceeding 1.00" or more of precipitation over a 24 hr period across the size of a Vermont county. It has been well documented that increasing temperatures during storms increases the potential for more water vapor, which then leads to heavy precipitation (Trenberth 2011). Other studies have examined the most extreme or catastrophic rainfall events to show significant increases in extreme precipitation events across the Northeast, primary as a result of tropical storm systems (tropical storms/hurricanes) interacting with midlatitude storm systems (Howarth et al. 2019). As the climate continues to warm such heavy rainfall events are likely to continue to increase, especially during the fall season. It should be noted that increases in heavy rainfall events can still result in dry periods between storm systems.

Heavy Snowfall

As winter temperatures and precipitation increase, one would expect an increase in heavy snowfall events (as long as the storm temperatures are cold enough to support snow). Vermont's climate is cold enough to support snow, as an increase of 4% of heavy snowfall events was observed (Table 5). The heaviest winter snow storms result from nor'easter-type storms or those that track near the New England coastline (e.g., Feb 14, 2007). There is low confidence on how nor'easter type storms will change their tracks under climate change (Colle et al. 2013; Easterling 2017). The amount of snowfall is closely tied to winter temperature changes. If the climate substantially warms the likely decrease in extreme snowfall is not going to be as great as mean annual snowfall declines (O'Gorman 2014). The rate of winter temperature increases is not currently significant enough to prohibit snowfall, thus this work concludes that modest increases in extreme snowfall events are most likely.

Ice

Ice accretion results from freezing rain within weather systems generally when a shallow layer of cold air exists at the surface with above-freezing temperatures above this layer. This work examines two types of icing events - light and heavy. Light icing events may result in a higher frequency of car accidents or slip and falls, whereas heavy icing events may bring down trees. Both types of events are relatively infrequent compared to snow and rain, adding difficulty to trend determination. Shorter-duration or light icing events have increased by approximately 6% from 1980-2019 (Table 5), most likely as a result of warmer and wetter winter storms. Long-duration or heavy ice events are comparatively rare, and have shown no detectable long-term changes (e.g., Groisman et al. 2016). The environmental conditions that produce ice accretion are fairly particular, requiring a multitude of environmental factors (McCray et al. 2019). These factors are difficult to assess collectively in climate simulations. Given the strong trend for warmer and wetter storms, this work concludes that light icing events will generally increase while there is no clear signal for heavy ice events. Major ice storms may still occur in the next 20-30 years, but there is no tendency for them to become more frequent.

Extreme cold

Extreme cold temperatures are associated with cold-air outbreaks that originate in Canada and often involve high-latitude displacement of the coldest arctic air or the polar vortex (e.g., Biernat et al. 2020). Cold air masses require a long residence time to develop over ice-covered or snow-covered surfaces under clear-sky conditions. As the arctic region warms and loses ice cover the conditions to produce extreme cold temperatures are becoming less favorable. The result is that the frequency of extreme or arctic air outbreaks has declined from 1980-2019 (Table 5). As the arctic climate continues to warm rapidly, these conditions become less favorable for brewing the coldest arctic air. Continental weather patterns, however, will continue to displace extreme arctic air (i.e, the polar vortex), but the general intensity of cold air outbreaks is not expected to increase.

Thunderstorm Winds

Wind gusts from different types of thunderstorms can produce locally damaging winds when a complex set of processes come together that enable strong winds aloft within thunderstorms to come to the surface. Observational datasets on convective wind reports are not of sufficient quality to determine any notable trends in such wind gusts in Vermont (Table 5). However, a study by Murley et al. 2020 suggests that such convective wind events have not increased recently. The environmental factors that produce severe thunderstorms need to be examined at a scale beyond the scope of this work in order to draw more significant conclusions. While a warming climate does potentially provide more instability or energy for thunderstorm development, the effects of wind shear and transient weather systems to trigger, organize, and maintain convection need to be considered. While the science is unable to provide a strong direction on damaging winds from thunderstorm activity, it is likely that thunderstorm wind risks will at least maintain a similar risk profile as a warmer climate supports heat and humidity that can subsequently produce thunderstorms that may produce local straightline wind damage (e.g., microburst, derecho).

.

Hail

Hail was surprisingly the peril that produced the most losses in this study. Hail events happen at a very local scale, so there was a bit of bad luck and random chance in the track of the major damaging hail swaths. Like thunderstorm wind gusts it is difficult to determine a trend because there are incomplete observations and radar observations have difficulty differentiating between small and large hail sizes (Tang et al 2019). Environmental conditions that are favorable for hail include an accompanying thunderstorm that forms in an environment with steep mid-level lapse rates - this helps to produce strong updrafts. A lower freezing level is another risk factor that can produce more hail within a storm - this is seen with a peak hail frequency of May in Vermont. Tang et al. 2019 studied the environments conducive for hail over the US and found for the northeastern US the environments are becoming more favorable for significant hail. However, this work did not analyze transient weather systems that act to trigger, organize, and maintain parent hail-producing thunderstorms. While the science is unable to provide a strong direction on future hail risk, it is likely that hail risks will at least maintain a similar risk profile as a warmer climate will produce higher values of heat and humidity that can support thunderstorms that may produce hail.

Lightning

Lightning is a hazard associated with convective storms or thunderstorms producing light energy as lightning and sound energy as thunder as a result of a large electric discharge heating air molecules quickly. Cloud-to-ground lightning strikes, which only represent approximately 10% of all lightning strikes (Kohler 2020; Taszarek et. al 2020), may be responsible for causing structural damage and/or fires to homes and properties. Lightning activity is generally more strongly correlated with the intensity of thunderstorms and how much instability is present - hot and humid conditions generally produce thunderstorms with more lightning activity. Given the proprietary nature of lightning strike data and relatively small risk, this work was not able to determine any observed long-term trends. However, it stands to reason that more thunderstorm activity would result in a greater frequency of lightning. While the science is unable to provide a clear direction on future lightning risk, it is likely that lightning risks will at least maintain a similar risk profile as a warmer climate will produce higher values of heat and humidity that can support thunderstorms that may produce cloud-to-ground lightning.

5. Summary and Conclusions

This work analyzed 40 years of weather peril data (1980-2019),10 years of claim and incurred loss data across Vermont in order to understand the relationships between insured losses and weather perils. Results show that wide-varying weather perils may occur at different times of the year; this result was contrary to some institutional knowledge of winter being the greatest risk season. There appears to be equal weather peril risks spread throughout the year.

There is a strong signal of storm systems becoming warmer associated with climate change. This warming is expressed in storms having more moisture resulting generally in heavier precipitation. Heavy precipitation events are increasing at nearly double the rate of annual precipitation increases, with the winter season featuring the greatest overall precipitation increases, while the fall season features the greatest increases in heavy widespread precipitation events. As the climate continues to warm these seasonal trends will continue to feature storms that have more intense precipitation accumulations.

Large-scale or gradient wind storms are a significant weather peril, producing the highest number of claims (36%) and second with total incurred losses (30%). These storm systems include both mid-latitude and tropical (tropical storms or hurricanes) storm systems. As storm systems continue to get wetter, the potential for their intensification also increases. More intense storm systems will generally have a greater pressure gradient that results in stronger winds. This signal was observed, but increases from gradient wind risk exposure was fairly small (around +1%). Dependencies on storm tracks and other concurrent weather perils as heavy rainfall affect the ability of winds to cause damage. Nonetheless, this slight upward trend in risk exposure is expected to continue, more as a result of an increase in storm intensity vs. frequency. Catastrophic losses from large-scale wind storms as tropical storms (e.g., Tropical Storm Irene) are too infrequent to draw significant trends from. However, like midlatitude storm systems, a warmer climate does tend to increase the intensity potential of tropical storms and hurricanes.

Catastrophic events drive a fair amount of the overall weather risk signal, with catastrophic events reported as 39% of claims and 42% of incurred losses. The top 5% of all days represented nearly 70% of all claim and loss activity. This suggests that the overall weather risk distribution is spread across a relatively small subset of weather events. While the highest-end storms produced a fairly large fraction of losses, there were a number of moderate-impact or nuisance event days. The frequency of such moderate-impact days will likely increase as the seasons continue to blur together more with warming. Such blurring is occurring most rapidly with the fall into the winter season, with falls warming the fastest and winter onset being more delayed. The fall season appears to feature the greatest potential risk increases for heavy rainfall events and gradient wind storms.

Hail was surprisingly the top weather peril in terms of all incurred losses (40%), and second with claims (24%). Hail swaths should be seen as a fairly random event, with a complex set of convective processes that must come together. Current trends and future projections are inconclusive due to limited observations and the complexity of convection (initiation of thunderstorms, their maintenance, and storm modes). Perils from thunderstorm winds and lightning are also inconclusive. A warmer and wetter climate doesn’t necessarily mean that thunderstorms will be more severe. Thunderstorms and their resultant perils (wind, hail, lightning) will likely at least maintain a similar risk profile in the next 30 years. A widening of the warm season may increase thunderstorm-related risks slightly through frequency increases. Further work could elaborate on understanding these thunderstorm risks in more detail, but this would require new datasets and different methods.

Based on a modeling of weather risk the overall weather peril risk increased 2% on claim activity and nearly 3% on incurred losses over the last 40 years (1980-2019). This increase was driven primarily by intensity increases with large-scale gradient wind storms and heavy precipitation events. Trends in warm-season perils from thunderstorms (hail, convective winds, and lightning) were not able to be determined. Looking forward, the overall weather risk exposure is projected to increase as storm systems generally have a tendency to be more intense, on the order of +2% to +4% through the next 30 years (2021-2050).

References

Biernat, K. A., L. F. Bosart, and D. Keyser, 2020: A climatological analysis of the linkages between tropopause polar vortices, cold pools, and cold air outbreaks over the central and eastern United States. Monthly Weather Review, 1–55, https://doi.org/10.1175/mwr-d-20-0191.1 .

Booth, J. F., H. E. Rieder, D. E. Lee, and Y. Kushnir, 2015: The Paths of Extratropical Cyclones Associated with Wintertime High-Wind Events in the Northeastern United States. Journal of Applied Meteorology and Climatology, 54, 1871–1885, https://doi.org/10.1175/jamc-d-14-0320.1 .

Colle, B. A., Z. Zhang, K. A. Lombardo, E. Chang, P. Liu, and M. Zhang, 2013: Historical evaluation and future prediction of eastern North American and western Atlantic extratropical cyclones in the CMIP5 models during the cool season. Journal of Climate, 26, 6882–6903, doi:10.1175/JCLI-D-12-00498.1.

Cheng, C. S., Lopes, E., Fu, C., & Huang, Z. (2014). Possible Impacts of Climate Change on Wind Gusts under Downscaled Future Climate Conditions: Updated for Canada. Journal of Climate, 27(3), 1255–1270. https://doi.org/10.1175/jcli-d-13-00020.1

Easterling, D. R., J. R. Arnold, T. Knutson, K. E. Kunkel, A. N. LeGrande, L. R. Leung, R. S. Vose, D. E. Waliser, and M. F. Wehner, 2017: Precipitation Change in the United States. Climate Science Special Report: Fourth National Climate Assessment, Volume I. Wuebbles, D. J., D. W. Fahey, K. A. Hibbard, D. J. Dokken, B. C. Stewart, and T. K. Maycock, Eds., U.S. Global Change Research Program, Washington, DC, USA, 207–230. doi:10.7930/J0H993CC

Groisman, P. Y., O. N. Bulygina, X. Yin, R. S. Vose, S. K. Gulev, I. Hanssen-Bauer, and E. Førland, 2016: Recent changes in the frequency of freezing precipitation in North America and Northern Eurasia. Environ. Res. Lett., 11, 045007, https://doi.org/10.1088/1748-9326/11/4/045007 .

Howarth, M. E., Thorncroft, C. D., & Bosart, L. F. (2019). Changes in Extreme Precipitation in the Northeast United States: 1979–2014. Journal of Hydrometeorology, 20(4), 673–689. https://doi.org/10.1175/JHM-D-18-0155.1

Koehler, T. L., 2020: Cloud-to-Ground Lightning Flash Density and Thunderstorm Day Distributions over the Contiguous United States Derived from NLDN Measurements: 1993–2018. Monthly Weather Review. https://doi.org/10.1175/MWR-D-19-0211.1 .

McCray, C. D., E. H. Atallah, and J. R. Gyakum, 2019: Long-Duration Freezing Rain Events over North America: Regional Climatology and Thermodynamic Evolution. Weather and Forecasting, 34, 665–681, https://doi.org/10.1175/waf-d-18-0154.1 .

Murley, V. A., J. D. Durkee, J. M. Gilliland, and A. W. Black, 2020: A climatology of convective and non-convective high-wind events across the eastern United States during 1973–2015. Int J Climatol, https://doi.org/10.1002/joc.6690 .

O'Gorman, P. A. (2014). Contrasting responses of mean and extreme snowfall to climate change. Nature, 512(7515), 416–418. https://doi.org/10.1038/nature13625

Sinclair, V. A., Rantanen, M., Haapanala, P., Räisänen, J., & Järvinen, H. (2020). The characteristics and structure of extra-tropical cyclones in a warmer climate. Weather and Climate Dynamics, 1(1), 1–25. https://doi.org/10.5194/wcd-1-1-2020 .

Tang, B. H., V. A. Gensini, and C. R. Homeyer, 2019: Trends in United States large hail environments and observations. Clim Atmos Sci, 2, https://doi.org/10.1038/s41612-019-0103-7 .

Taszarek, M., J. T. Allen, P. Groenemeijer, R. Edwards, H. E. Brooks, V. Chmielewski, and S.-E. Enno, 2020: Severe Convective Storms across Europe and the United States. Part I: Climatology of Lightning, Large Hail, Severe Wind, and Tornadoes. Journal of Climate, 33, 10239–10261, https://doi.org/10.1175/jcli-d-20-0345.1 .

Trenberth, K., 2011: Changes in precipitation with climate change. Clim. Res., 47, 123–138, https://doi.org/10.3354/cr00953.Trenberth, K., 2011: Changes in precipitation with climate change. Clim. Res., 47, 123–138, https://doi.org/10.3354/cr00953 .

Exhibit B:

Comment Letter to the SEC on Climate Disclosures

State of Vermont
Department of Financial Regulation
89 Main Street
Montpelier, VT 05620-3101
www.dfr.vermont.gov

For consumer assistance:
[Banking] 888-568-4547
[Insurance] 800-964- 1784
[Securities] 877-550-3907

June 14, 2021

Hon. Gary Gensler
Chair
Securities and Exchange Commission
100 F St. NE
Washington, DC 20549

Re: Public Input on Climate Change Disclosures

Dear Chair Gensler,

On behalf of the Vermont Department of Financial Regulation (the "Department"), thank you for the opportunity to comment on the Securities and Exchange Commission's (the "Commission") March 15, 2021 request for public input on climate change disclosures.

Vermont's climate has changed substantially in the last fifty years. As greenhouse gas emissions drive the planet's climate warmer, continuing change is certain. Climate change creates material financial risks for key sectors of the Vermont economy. Warmer and shorter winters will adversely affect our ski and tourism industries. Our agriculture sector will be impacted by more frequent droughts, shifts in growing seasons, increasing weather extremes, and reduced productivity of sugar maples and dairy cows. And our energy-intensive manufacturing and transportation sectors will be impacted by transition and regulatory risks from the inevitable shift to a lower-carbon economy. More broadly, Vermont's river-valley settlement patterns leave many Vermonters and their homes and businesses vulnerable to increased risk of flooding and flood-related erosion, as was famously seen during Tropical Storm Irene in 2011.

As the state regulator of the Securities, Insurance, Captive Insurance and Banking Industries in Vermont, the Department is keenly aware of the risks that climate change poses to the companies and institutions we regulate. We are developing guidance for our regulated insurance companies to address climate-related financial risks, in which we expect to encourage or require such companies to evaluate climate-related financial exposure by conducting stress tests and scenario analyses, incorporate climate change into enterprise risk management processes, and assess and manage climate risk exposure in investments. Standardized, mandatory disclosure of material climate and environmental, social and governance ("ESG") information by registrants will assist these entities in fulfilling their statutory and fiduciary obligations to prudently manage risk and make informed investment decisions.

Similarly, Vermont's public pensions, college endowments, and philanthropic foundations manage billions of dollars of assets that are critical to Vermonters' well-being and the State's vitality. These entities also need to assess and manage climate-related risks and opportunities in their portfolios. And many already have a policy of considering ESG factors in their investment decisions. The same is true for a growing number of broker-dealers, investment advisers, and individual Vermont investors. To make informed investment decisions, these investors and securities professionals need comparable, consistent, and decision-useful climate-related information that is relevant to their investments.

The Department encourages the Commission to adopt mandatory disclosure requirements regarding climate-related financial risks. We further encourage the Commission to consider similar disclosure requirements regarding other financially material ESG issues in the future.

This letter sets forth the Department's views on Questions 1, 2, 4, 5, 9, 11, and 12 in the Commission's request for Comment.

<u>Question 1</u>: ***How can the Commission best regulate, monitor, review, and guide climate change disclosures in order to provide more consistent, comparable, and reliable information for investors while also providing greater clarity to registrants as to what is expected of them? Where and how should such disclosures be provided? Should any such disclosures be included in annual reports, other periodic filings, or otherwise be furnished?***

The Commission should require mandatory climate change disclosures by registrants, subject to any applicable tiers based on the size and/or type of registrant (discussed under Question 2 below). Such disclosures should address both risks related to the physical impacts of climate changes and risks related to the transition to a lower-carbon economy.

Climate-related disclosures should be included or otherwise incorporated into an issuer's registration statement and made at least annually thereafter, primarily in a registrants' annual report or such other periodic filings as the Commission deems appropriate.

To the extent that the Commission requires disclosures of climate-related governance codes or committee charters, the Department would not object to structuring in a manner similar to the existing disclosure requirements for executive codes of ethics and audit committee charters.

<u>Question 2</u>: ***What information related to climate risks can be quantified and measured? … Are there specific metrics on which all registrants should report (such as, for example, scopes 1, 2, and 3 greenhouse gas emissions, and greenhouse gas reduction goals)? What quantified and measured information or metrics should be disclosed because it may be material to an investment***

or voting decision? Should disclosures be tiered or scaled based on the size and/or type of registrant)? If so, how? Should disclosures be phased in over time? If so, how?

Information regarding Scopes 1, 2, and 3 greenhouse gas emissions[1] and greenhouse gas reduction goals and progress can be quantified and measured. This information provides investors with useful quantitative metrics by which to assess a filer's climate-related transition risks, as well as the scale and effectiveness of its efforts to manage and mitigate such risks.

The Department would not object if the Commission deems it appropriate for emissions disclosures to be tiered or scaled based on the size and/or type of registrant or phased in over time. A majority of public companies already voluntarily disclose their Scope 1 and 2 emissions using existing emissions frameworks. But calculation and reporting of Scope 3 emissions will likely be more costly and complex. It is appropriate for the Commission to weigh the costs and burdens of Scope 3 reporting requirements against the materiality of the required information, but it should do so based on the size and type of the registrant. For example, for financial firms, Scope 3 emissions include financed emissions, which is particularly material to understanding such firms' climate-related risks. It may be appropriate to prioritize full emissions disclosure requirements for the largest filers, filers in industries with the highest levels of transition risks, and industries for which Scope 3 emissions data is most material.

Question 4: ***What are the advantages and disadvantages of establishing different climate change reporting standards for different industries, such as the financial sector, oil and gas, transportation, etc.? How should any such industry-focused standards be developed and implemented?***

Establishing different climate change reporting standards for different industries may be appropriate. We encourage the Commission to consider and evaluate the frameworks for incorporating industry specific standards, such as those developed by the Task Force on Climate-Related Financial Disclosures ("TCFD").

Question 5: ***What are the advantages and disadvantages of rules that incorporate or draw on existing frameworks, such as, for example, those developed by the Task Force on Climate-Related Financial Disclosures (TCFD), the Sustainability Accounting Standards Board***

[1] Scope 1 refers to direct greenhouse gas (GHG) emissions. Scope 2 refers to indirect GHG emissions from consumption of purchased electricity, heat, or steam. Scope 3 refers to other indirect emissions not covered in Scope 2 that occur in the value chain of the reporting company, including both upstream and downstream emissions. Scope 3 emissions could include: the extraction and production of purchased materials and fuels, transport-related activities in vehicles not owned or controlled by the reporting entity, electricity-related activities (e.g., transmission and distribution losses), outsourced activities, and waste disposal. Task Force on Climate-Related Financial Disclosures, *Final Report - Recommendations of Task Force on Climate-Related Financial Disclosures*, pg. 63 (June 15, 2017), *available at* https://assets.bbhub.io/company/sites/60/2020/10/FINAL-2017-TCFD-Report-11052018.pdf .

(SASB), and the Climate Disclosure Standards Board (CDSB)? Are there any specific frameworks that the Commission should consider? If so, which frameworks and why?

Many filers already voluntarily disclose climate-related information under a variety of existing frameworks and standards. Reporting under varying frameworks and standards is confusing and may render such information less useful to investors. The Commission should standardize reporting requirements. But it should strive to do so in a manner consistent with the existing voluntary frameworks and standards already widely in use, such as TCFD and the Sustainability Accounting Standards Board ("SASB"). We believe this will reduce the regulatory burden on filers and increase the speed with which filers can implement new reporting requirements. More important, it will make the information more useful to the public.

Question 9: ***What are the advantages and disadvantages of developing a single set of global standards applicable to companies around the world, including registrants under the Commission's rules, versus multiple standard setters and standards? There is a lot of value in global standards. Many public companies have global operations, supply chains, and subcontractors. If there were to be a single standard setter and set of standards, which one should it be? What are the advantages and disadvantages of establishing a minimum global set of standards as a baseline that individual jurisdictions could build on versus a comprehensive set of standards?***

We encourage the Commission to continue working and coordinating with regulators through the International Organization of Securities Commissions and other groups to develop global standards. We agree that there is much value in global standards, given the global operations, supply chains, and subcontractors of most large filers. The Commission should seek to maximize compatibility with global standards, to the extent it can do so without unduly delaying the promulgation of standards.

Question 11: ***Should the Commission consider other measures to ensure the reliability of climate-related disclosures? Should the Commission, for example, consider whether management's annual report on internal control over financial reporting and related requirements should be updated to ensure sufficient analysis of controls around climate reporting? Should the Commission consider requiring a certification by the CEO, CFO, or other corporate officer relating to climate disclosures?***

The Commission should consider requiring a certification by the CEO, CFO, or other corporate officer relating to climate disclosures, as it does for other financial disclosures. Management's annual report on internal control over financial reporting and related requirements should be updated to include climate-related reporting controls and procedures.

We also encourage the Commission to evaluate the costs, benefits, and viability of independent assurance requirements. As implied by our comments above, an independent assurance requirement will likely be easier and less costly to implement if Commission-imposed standards are consistent with other existing regimes or developing international standards.

<u>Question 12</u>: ***What are the advantages and disadvantages of a "comply or explain" framework for climate change that would permit registrants to either comply with, or if they do not comply, explain why they have not complied with the disclosure rules? How should this work? Should "comply or explain" apply to all climate change disclosures or just select ones, and why?***

Emissions disclosures should ultimately be mandatory, but a "comply or explain" framework may be appropriate during any lengthy transition periods or to the extent the Commission pursues a phased approach based on filer size, for example.

To the extent that the Commission requires disclosures of climate-related governance codes or committee charters, the Department would not object to a "comply or explain" framework similar to the existing disclosure framework for executive codes of ethics.

<u>CONCLUSION</u>

As a small state vulnerable to climate risks largely arising from activities outside its borders, Vermont has a critical interest in climate change and climate-related financial risks. Information about registrants' climate-related financial risk is material to many Vermont investors, and is already being considered in investment decisions. Investors will be able to make more informed investment decisions if provided with comparable, consistent, and decision-useful climate-related information. We applaud and support the Commission's efforts to develop climate-related disclosure standards, and encourage future efforts regarding other environmental, social, and governance information material to investors.

Thank you for the opportunity to comment on this important initiative.

Sincerely,

Michael S. Pieciak
Commissioner of Financial Regulation
State of Vermont