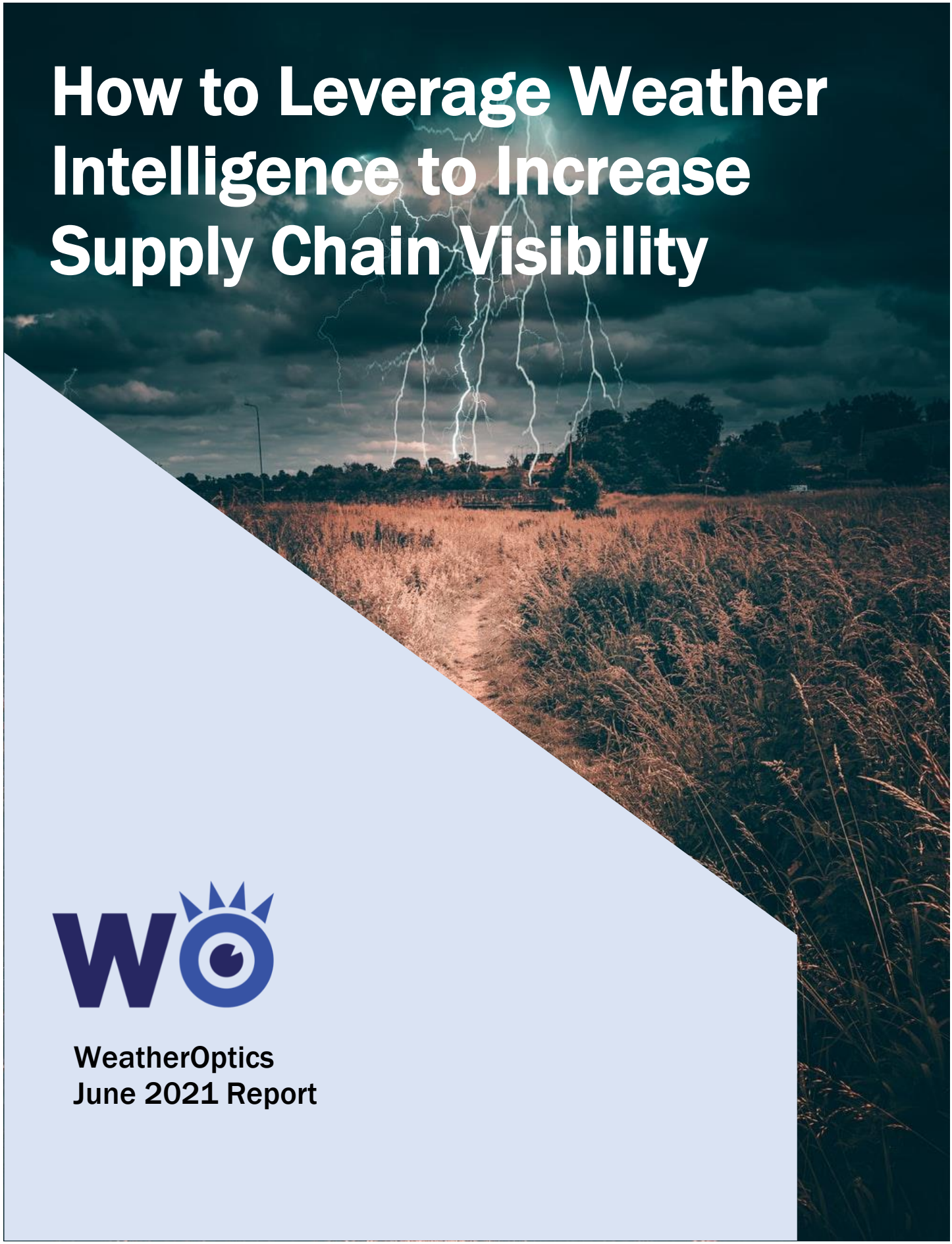
How to Leverage Weather Intelligence to Increase Supply Chain Visibility



WeatherOptics
June 2021 Report

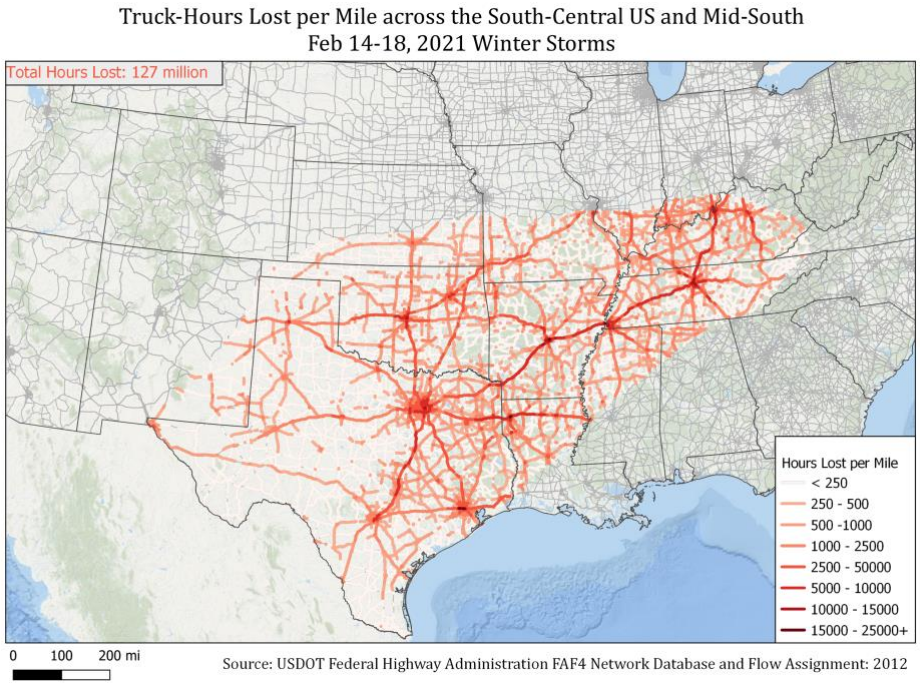
Weather's role in supply chain visibility

Weather has become an important topic of conversation in the transportation and logistics industry, and for good reason.

It plays a crucial role in the entire supply chain process, from demand forecasting, to manufacturing, to final mile delivery. High impact weather events like snowstorms and hurricanes significantly disrupt the flow of goods via shipment delays and road closures. Weather also impacts the industry in more subtle ways by altering trucking capacity, changing freight rates, and creating unexpected surges in demand.

The growth of weather data in supply chain and logistics is likely related to a significant uptick in severe weather events over the last 5 years, alongside the rapid evolution of total end to end supply chain visibility software solutions. In order for companies to have true visibility into their supply chain, weather data is a must.

Most companies are interested in weather data, but unsure of how to integrate it with existing software to create value. Enter weather intelligence —- data that is more compatible with complicated software like TMS.



Estimated total trucking hours lost during deep south winter storm

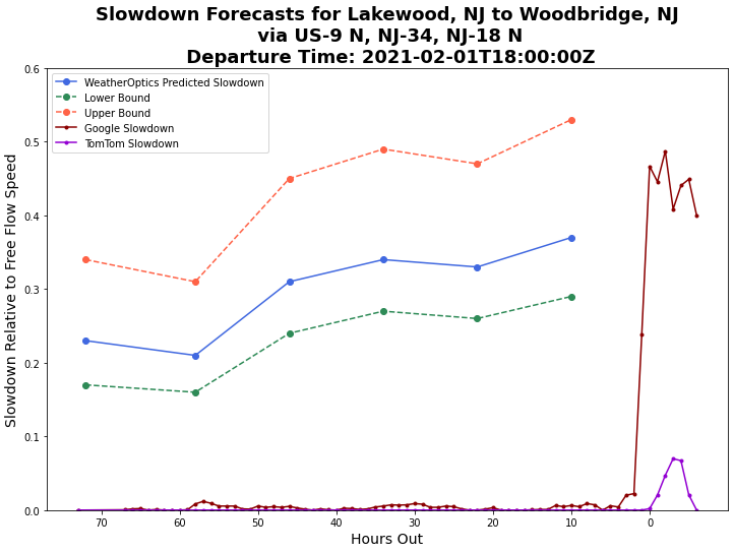
ETA accuracy, route optimization, and capacity sourcing

Weather accounts for a whopping 25% of all trucking delays, with 32 billion lost vehicle hours each year and an estimated annual cost of more than $9 billion.

In the last 5 years, technology companies have significantly improved dynamic ETA's for over the road transportation, with industry leaders such as HERE, FourKites, and Project44 drastically improving the accuracy of arrival times.

Despite these improvements, many technology companies struggle to account for severe weather.

In working with transportation leaders such as Geotab and Otonomo, we found that top routing provider ETAs are off by more than 15% of the observed travel time more than 80% of the time during disruptive and severe weather conditions.



RightRoute ETA forecast vs. Google and TomTom 72 hours prior to a blizzard in New Jersey

During large scale events like snowstorms and hurricanes, poor ETA's can lead to significant losses:

- Disruptions to work shifts and hours of unloading personnel
- Spoiling of time and temperature sensitive products
- Additional fuel, oil and truck operational costs
- Extra in transit inventory holding costs
- Interrupted work flows at unloading bays
- Disturbed production schedule and lower overall productivity
- Late fees and lost customer retention

While raw weather data can help alert for issues, it does not provide the precision needed to improve ETA's and visibility. When calculating arrival times, there are an exceedingly high number of moving pieces and forecasts to account for, and just analyzing raw weather leaves customers with more questions than answers.

Solutions for truckload and long haul

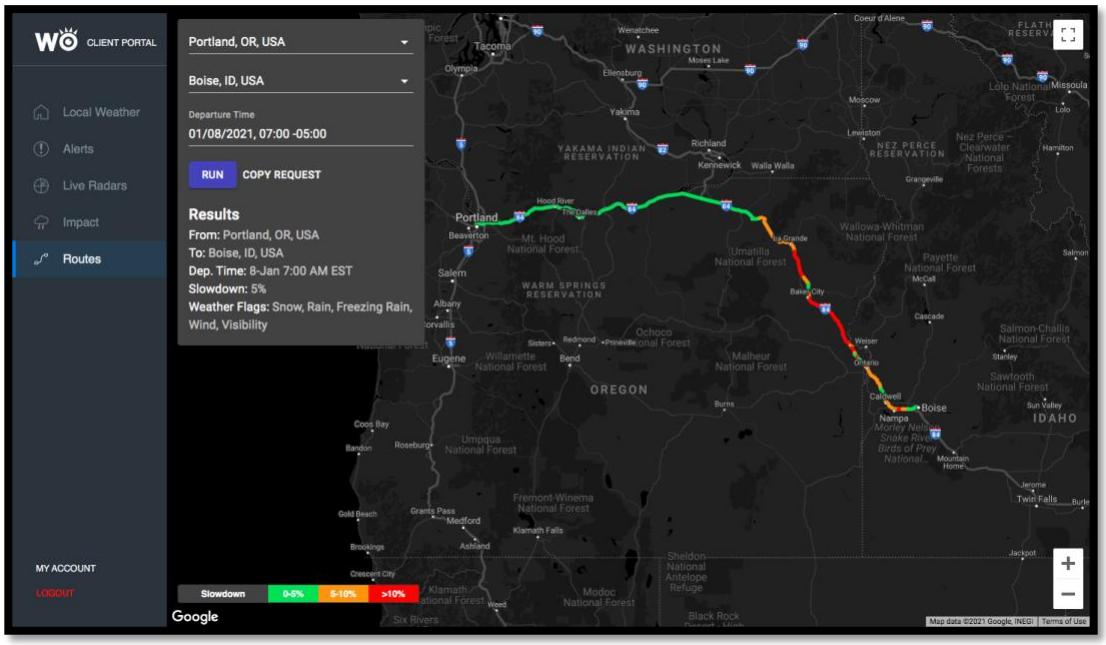
RightRoute, the first weather-based dynamic ETA API, uses origin, destination, and departure time to forecast the % slowdown that a shipment will experience due to weather. RightRoute also identifies the likelihood of accidents or road closures and compares different routing options up to 7 days in advance. Companies can integrate RightRoute with any existing ETA software to improve accuracy by up to 40% during disruptive weather.

RightRoute is a great solution for truckload routes that have fewer stops and are more than 25 miles long.

Solutions for less-than-truckload and final mile

The WeatherOptics Impact API forecasts weather-based impact at a single location or region rather than a route. The impact API takes a latitude/longitude or zip code and delivers hourly impact forecasts for the next 7 days. Like RightRoute, the WeatherOptics Speed Reduction Index forecasts the % slowdown of traffic due to weather and can easily integrate that with any existing ETA.

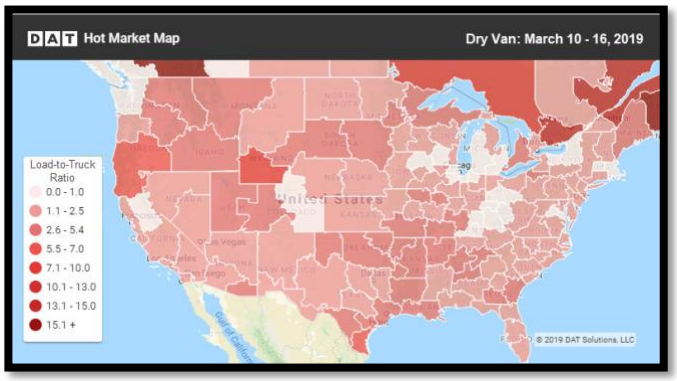
There's a host of other metrics to choose from including our Road Conditions Index, Power Outage Index, Business Disruption Index, and Flood Index.



RightRoute ETA forecast for an Oregon/Idaho winter storm in January 2021

Predictive freight rates and pricing

Spot rates are a direct result of the supply and demand across freight markets. When freight is in high demand and there is a low supply of trucks, rates go up for shippers to move goods. When freight demand is low and there is a high supply of trucks, rates go down.



Van load-to-truck ration declined in March 2019 due to severe weather (Source: DAT)

During large-scale weather events like hurricanes, transportation companies may look to clear their trucks out of a given region, lowering prices for shippers. After the event, there might be a backup of goods that need to be shipped and prices may increase once again.

It's a delicate balance, with many marketplaces and third-party logistics companies offering brokerage and predictive freight rate solutions to help all parties manage their business.

Accounting for weather-influenced freight volatility is difficult, and unexpected spikes or drops in rates can lead to lost revenue for shippers and carriers alike.

Accounting for weather in dynamic freight rates is not as simple as looking at rain and snowfall forecasts. Weather impacts each location around the world differently. For example, an inch of snow in Boston and an inch of snow in Atlanta have completely different ramifications on vehicle performance, traffic, and consumer demands.

Solutions for freight brokers and marketplaces

Our Impact API is based on location-specific attributes such as NWS warning criteria, distance from river, latitude and longitude, tree density, and many other factors. This allows us to deliver a better impact signal.

Freight brokers and marketplaces use our Road Conditions Index and Business Disruption Index to better predict changes in freight rates. Our Impact pipeline also rolls zip codes up to the zip3 level to hone in on individual freight markets.



WeatherOptics Road Conditions Index for a winter storm in Colorado

Warehouse facility risk resilience

In the United States alone there are nearly 20,000 warehouse facilities, and many of them are located near key logistics hubs in the Midwest or South. Not only are warehouses and distribution centers at risk of power outages and structural damage from high impact weather events, but shippers and carriers who rely on these facilities can be at risk of extra inventory holding costs, issues at unloading bays, and an overall disturbed production schedule.

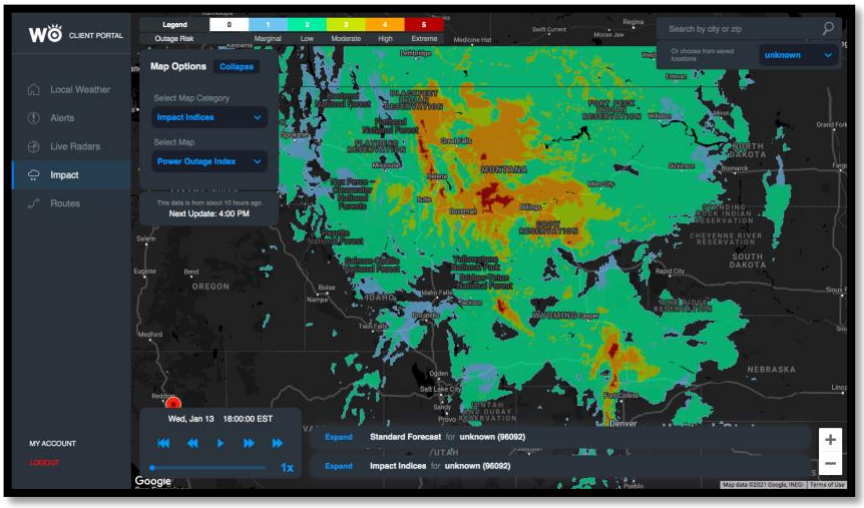
Solutions for warehouse management and transportation companies

RightRoute can also be used to help deduce when disruption might occur at distribution centers and warehouse facilities. Getting an accurate estimate of arrival times during severe weather can eliminate issues at unloading bays, improve productivity, and reduce the need for workers to be paid overtime. Similarly, these weather disruption insights can increase visibility for shippers and carriers who need to know what bottlenecks lay ahead.

Our Impact API is designed specifically to give advance notice for operational teams to react appropriately. The WeatherOptics Power Outage Index uses ground truth power outage data and real environmental factors like tree canopy and elevation to make accurate power outage predictions for all of North America and Europe.

An astonishing 50% of power and utility companies don't use predictive power outage forecasts, leaving distribution centers and transportation companies to take it upon themselves to be informed.

WeatherOptics Impact Indices like our Life and Property Index and Flood Index can also alert for disruptions at facilities that could have more significant consequences.

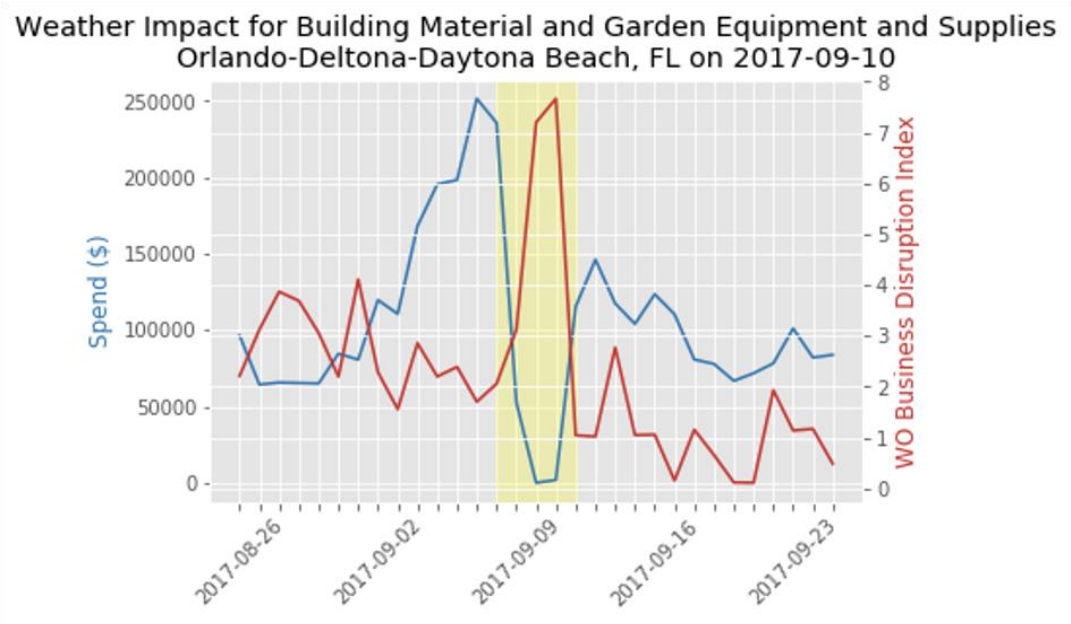


WeatherOptics Power Outage Index during January Winter Storm

Consumer demand forecasting

Forecasting consumer demand is a crucial part of supply chain management, allowing insight into transportation and delivery needs while giving retailers and investors alike an understanding of company performance.

Small changes in the weather, for example days with above average temperatures and sunshine, boosts demand for certain products, while rainy days can cause losses for entire industries. Severe weather can drastically increase sales at supermarkets and home improvement stores both before and after the event.



WeatherOptics Disruption Index vs. consumer spending (Source: Consumer Edge)

During Hurricane Irma in 2017, Publix Super Markets experienced a $250 million increase in sales during the third quarter as consumers across Florida stocked up ahead of the event. Sales were up 4.3% for the quarter, with 3.1% attributed to Irma's impact.

Raw weather data alone is inadequate for companies who need to get a handle on current and future demand. Consumers and businesses react differently to different types of weather in different parts of the world based on many factors besides the weather itself.

For example, a snowstorm in New England may cause a moderate boost in grocery store demand, whereas a snowstorm impacting the Southeast may clear grocery store shelves and have longer lasting effects in the days and weeks following the event.

Solutions for demand forecasting

The WeatherOptics Business Disruption Index uses a location-specific and dynamically weighted algorithm, giving a clear signal of overall business disruption.

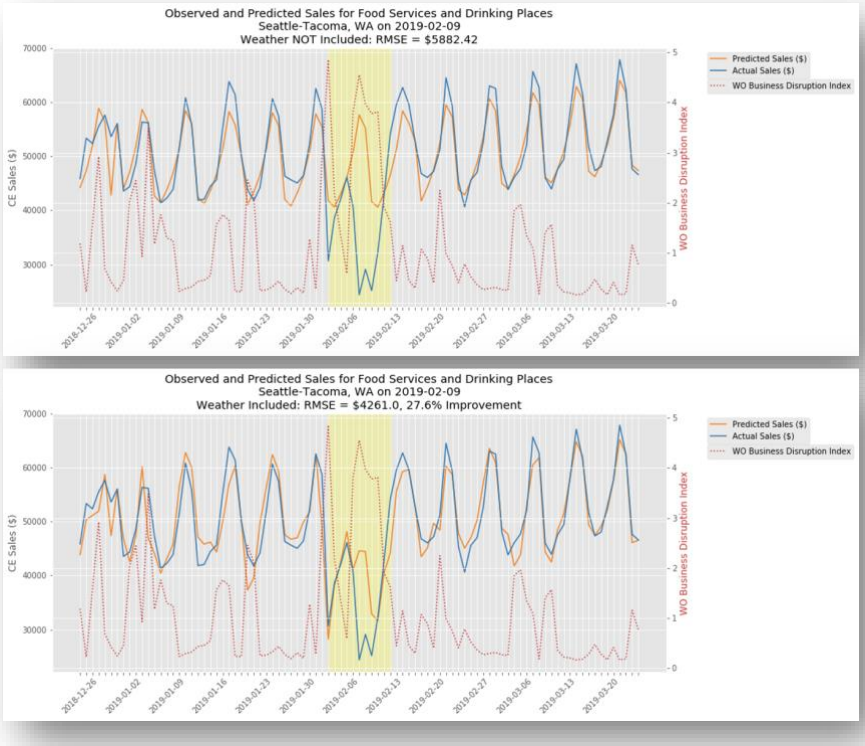
NAICS Description	Percent (%)
General Merchandise Stores	94.7
Food Services and Drinking Places	89.0
Building Material and Garden Equipment and Supplies	80.8
Food and Beverage Stores	74.0
Health and Personal Care Stores	73.2
Motor Vehicle and Parts Dealers	65.6
Clothing and Clothing Accessories Stores	62.3
Miscellaneous Store Retailers	61.4
Sporting Goods, Hobby, Musical Instrument, and Book	46.9
Performing Arts, Spectator Sports, and Related Industries	40.0
Motion Picture and Sound Recording Industries	33.3
Furniture and Home Furnishings Stores	31.4
Electronics and Appliance Stores	27.9
Personal and Laundry Services	21.4
Amusement, Gambling, and Recreation Industries	16.7
Accommodation	13.2
Telecommunications	7.4
Rental and Leasing Services	2.0
Professional, Scientific, and Technical Services	0.0
Publishing Industries (except Internet)	0.0

Percent of US Combined Statistical Areas where the WeatherOptics Business Disruption Index improved consumer spend model (Source: Consumer Edge)

With the Business Disruption Index, there's no need to wrestle with raw weather forecasts to improve demand forecasting and predict consumer sales.

Using 6+ years of consumer spending data alongside the WeatherOptics Business Disruption Index, our partner Consumer Edge analyzed which industries are affected by the weather. General merchandise, bars and restaurants, and home improvement saw the most widespread impacts.

After identifying the correlation between the WeatherOptics Business Disruption Index, Temperature Seasonality Score, and consumer sales data, Consumer Edge now breaks out weather-specific impacts for investors.



Without the WeatherOptics Business Disruption Index, the model assumed a normal sales cycle. After the Index was included, the model improved by nearly 30% and was able to capture the significant sales dip caused by this unusual snow event (Source: Consumer Edge)

Conclusion

Regardless of where your business fits in the supply chain process, weather intelligence can save costs and improve overall operational efficiency.

As demand for total end-to-end visibility increases and technology improves, weather data will become an increasingly important asset allowing businesses to better control the goods they move around the world.

If you're looking for a weather solution but feel you don't have the resources, capacity, or knowledge to take full advantage of weather data, our products are built for you.

You can learn more about our solutions at https://www.weatheroptics.co/api or contact us at info@weatheroptics.co.

