Nowcasting in Seattle

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University of Washington

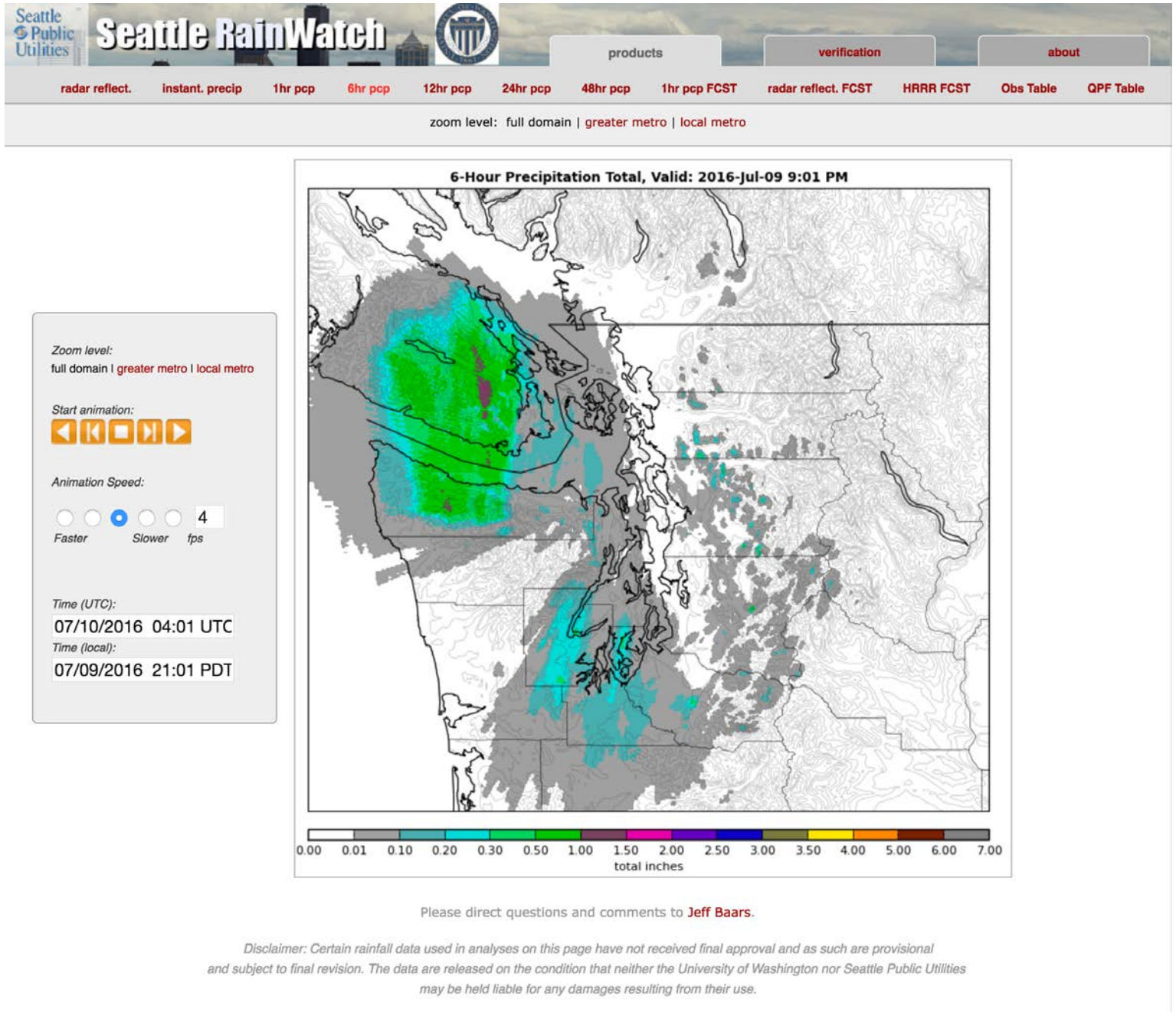
Seattle, Washington

Can a major city save money and lives using nowcasting?

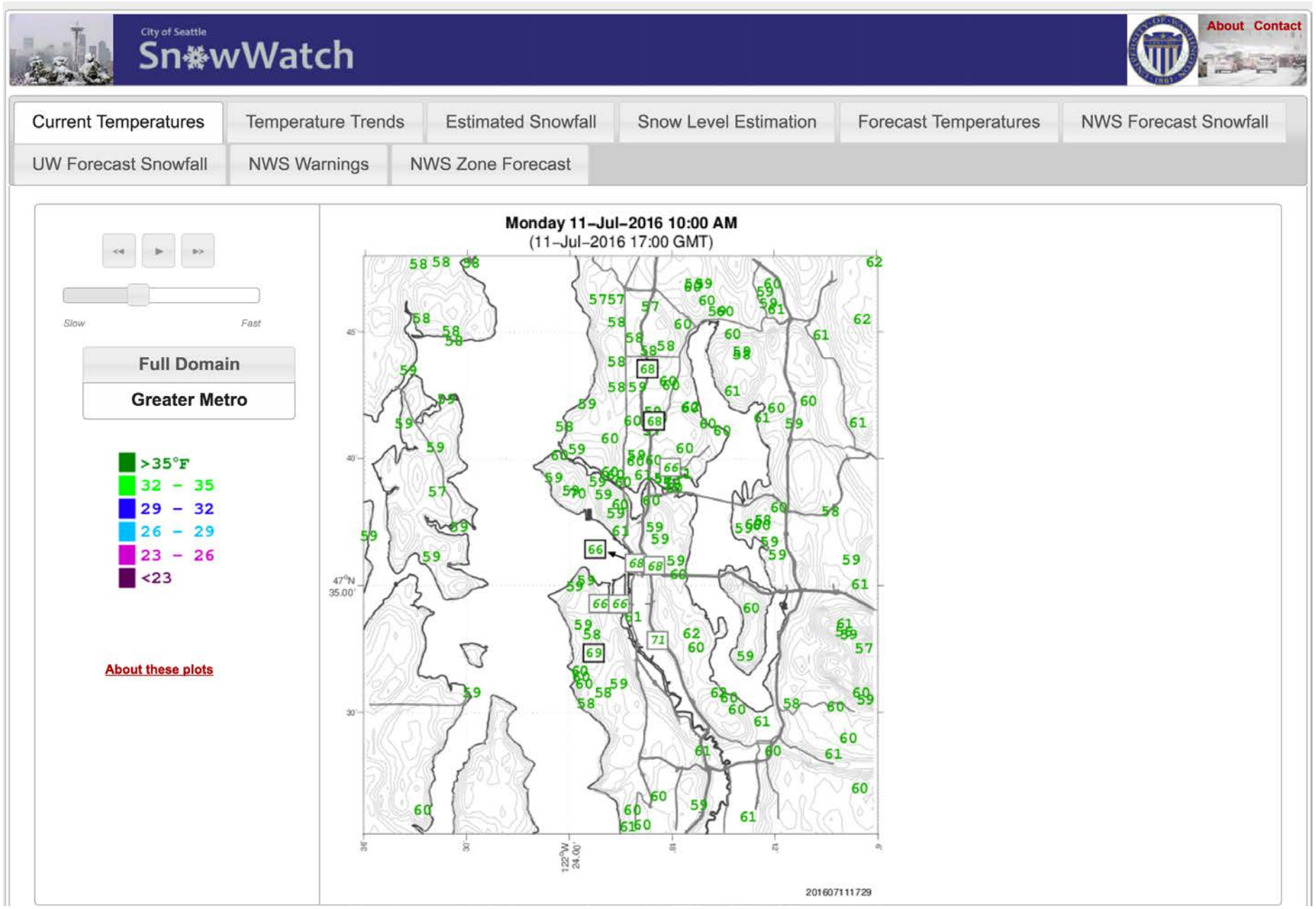
- **Prepare for and respond to windstorms**
- **Prepare for and respond to snow and ice events**
- **Warning and responding to heavy precipitation events**

The City of Seattle Has Invested in Three Nowcasting Applications

RainWatch


Seattle Public Utilities
Seattle RainWatch
products
verification
about
radar reflect.
instant. precip
1hr pcp
6hr pcp
12hr pcp
24hr pcp
48hr pcp
1hr pcp FCST
radar reflect. FCST
HRRR FCST
Obs Table
QPF Table
zoom level: full domain | greater metro | local metro
Zoom level:
full domain | greater metro | local metro
Start animation:
Animation Speed:
Faster
Slower
fps
4
Time (UTC):
07/10/2016 04:01 UTC
Time (local):
07/09/2016 21:01 PDT
6-Hour Precipitation Total, Valid: 2016-Jul-09 9:01 PM
0.00 0.01 0.10 0.20 0.30 0.50 1.00 1.50 2.00 2.50 3.00 3.50 4.00 5.00 6.00 7.00
total inches
Please direct questions and comments to Jeff Baars.
Disclaimer: Certain rainfall data used in analyses on this page have not received final approval and as such are provisional and subject to final revision. The data are released on the condition that neither the University of Washington nor Seattle Public Utilities may be held liable for any damages resulting from their use.

SnowWatch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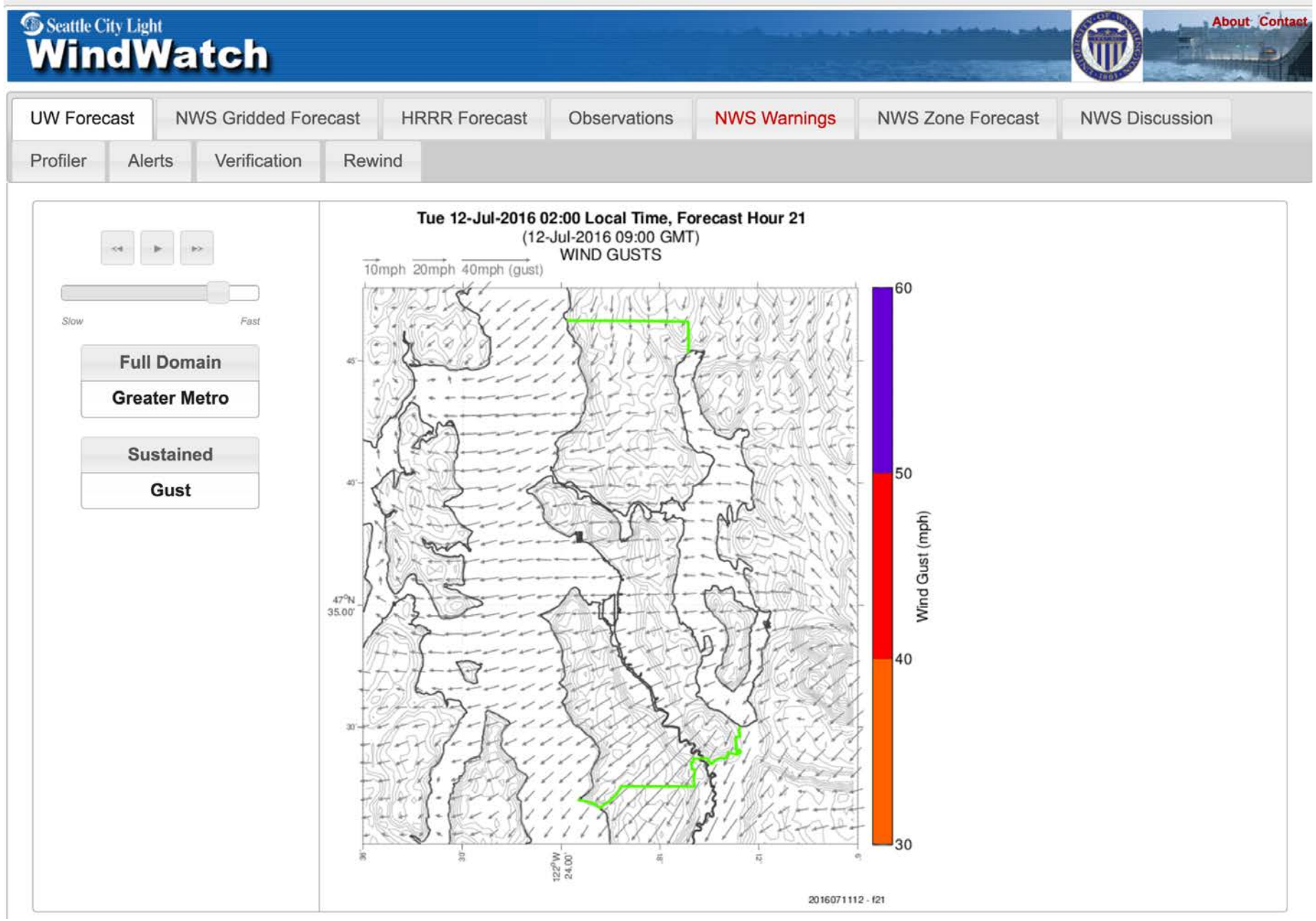
Current Temperatures
Temperature Trends
Estimated Snowfall
Snow Level Estimation
Forecast Temperatures
NWS Forecast Snowfall
UW Forecast Snowfall
NWS Warnings
NWS Zone Forecast
Slow
Fast
Full Domain
Greater Metro
>35°F
32 - 35
29 - 32
26 - 29
23 - 26
<23
About these plots
Monday 11–Jul–2016 10:00 AM
(11–Jul–2016 17:00 GMT)
47°N
35.00'
122°W
24.00'
201607111729

WindWatch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HRRR Forecast
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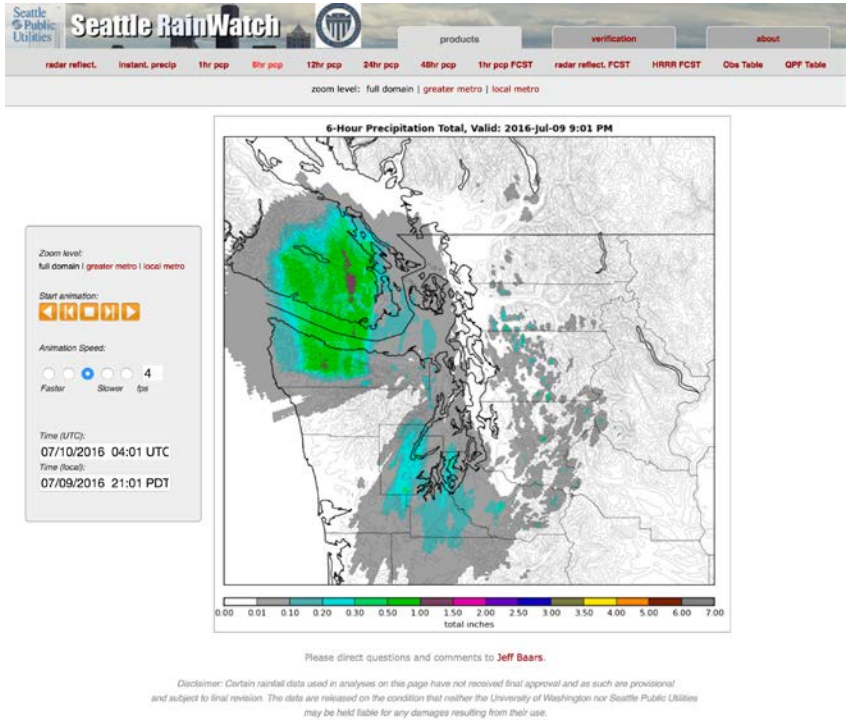
NWS Discussion
Profiler
Alerts
Verification
Rewind
Slow
Fast
Full Domain
Greater Metro
Sustained
Gust
Tue 12-Jul-2016 02:00 Local Time, Forecast Hour 21
(12-Jul-2016 09:00 GMT)
WIND GUSTS
10mph 20mph 40mph (gust)
60
50
40
30
Wind Gust (mph)
47°N
35.00'
122°W
24.00'
2016071112 - f21

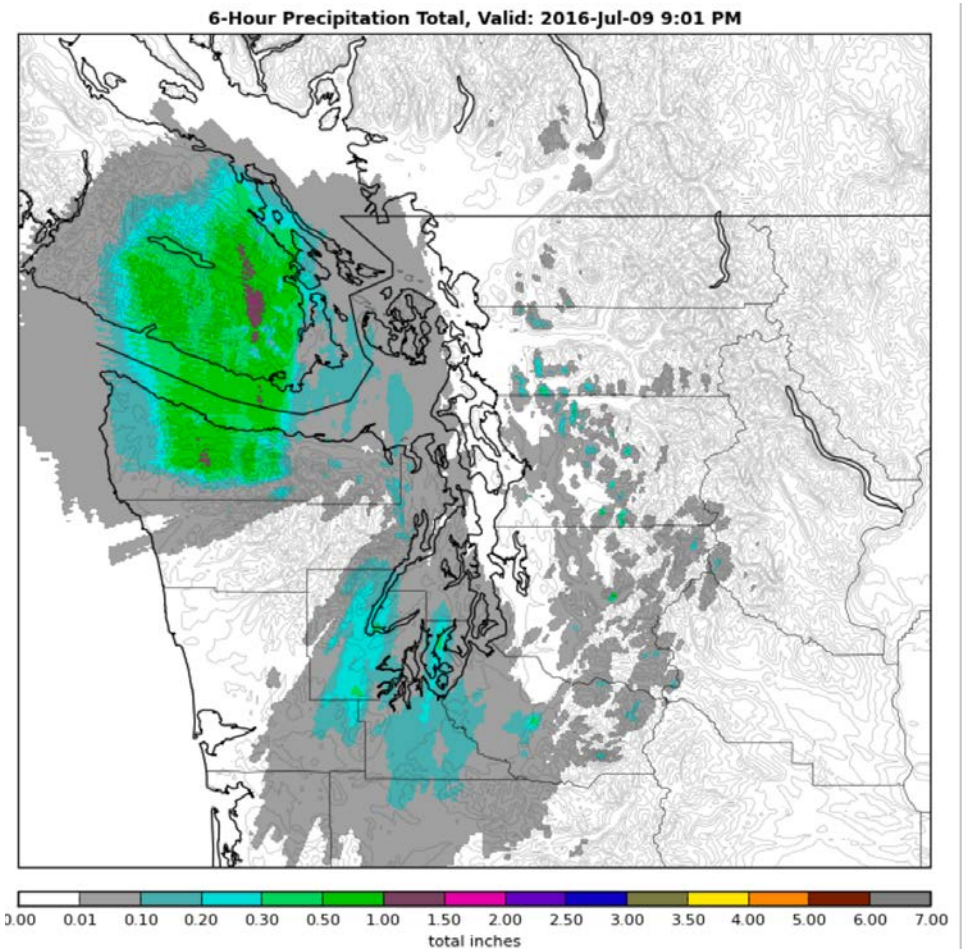
RainWatch was built after heavy rain flooded parts of Seattle and a woman died in her basement



Short-Term Warnings Allow the City To Intervene

RainWatch Capabilities

- Calibrates radar estimates of precipitation using local rain gauges
- Calculates 1-hr, 6-hr, 24-h, and 48-h totals.
- Provides a 1-h precipitation forecast based on radar extrapolation
- Also provides the NOAA HRRR (High Resolution Rapid Refresh Forecast) for the near future.
- Warns Seattle officials when observed or forecast precipitation amounts exceed pre-determined values.
- Available at http://www.atmos.washington.edu/SPU/



SnowWatch

Seattle is crippled by even light amounts of snow

In December of 2008 a series of modest snowstorms brought the city to a standstill for 2 weeks, with costs of hundreds of millions of dollars

Needed better forecasting/ nowcasting of snow to prepare and clear roads

City of Seattle

SnowWatch

About Contact

Current Temperatures | Temperature Trends | Estimated Snowfall | Snow Level Estimation | Forecast Temperatures | NWS Forecast Snowfall

UW Forecast Snowfall | NWS Warnings | NWS Zone Forecast

Slow Fast

Full Domain

Greater Metro

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About these plots

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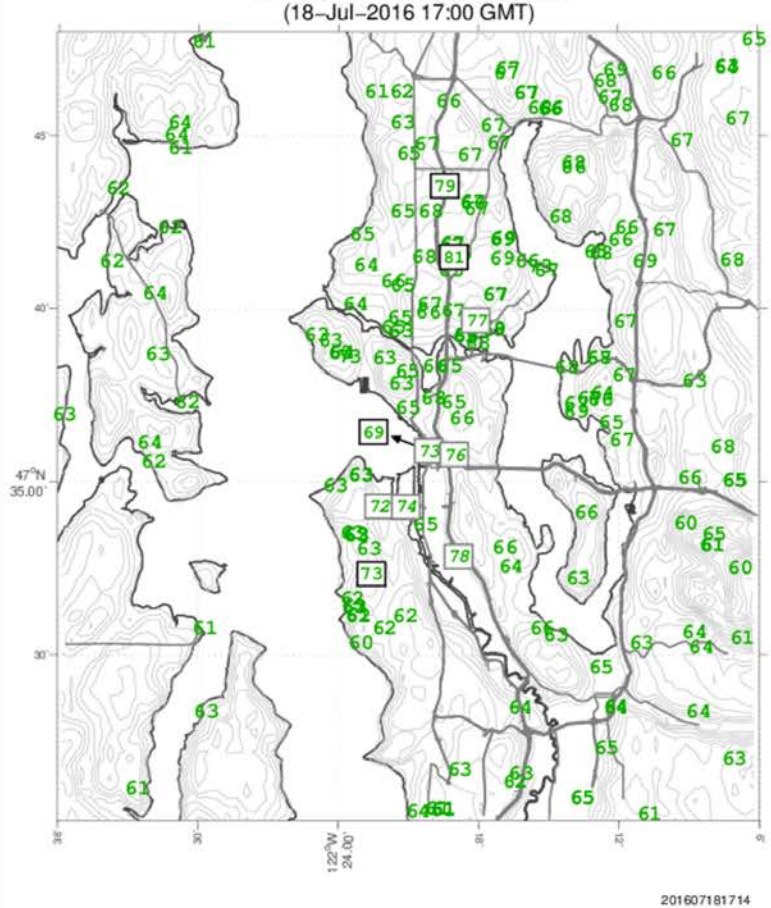
(18–Jul–2016 17:00 GMT)



SnowWatch

- Monitors both high-resolution model forecasts AND the National Weather Service gridded snow forecasts.
- Sends warnings to Seattle Department of Transportation personnel when a snow or ice threat exists, including road surface temps <+34°F

From Jeff Baars

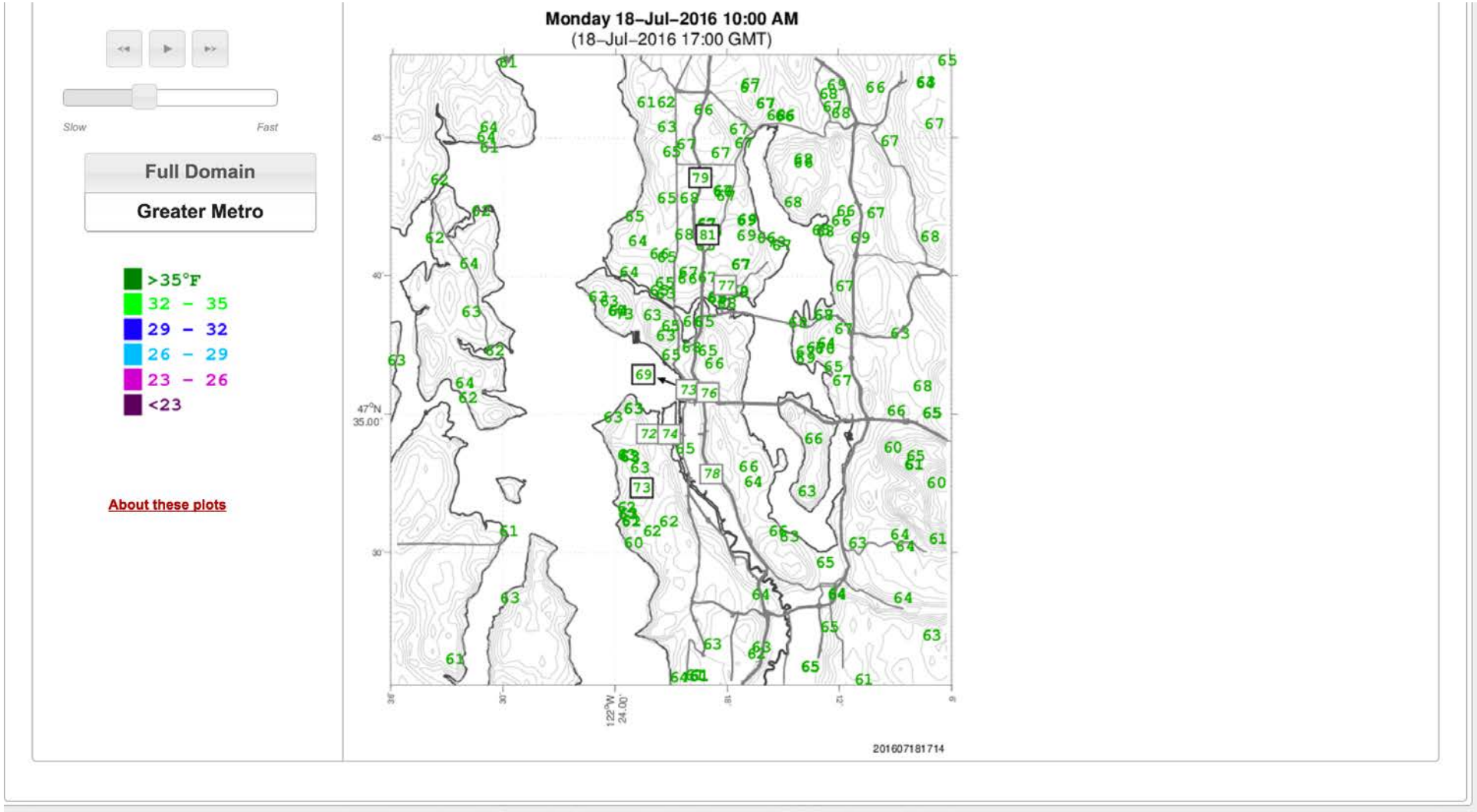
Subject **Snowwatch Alert! Area road-surface temperature <= 34 deg F**

To cliff Mass

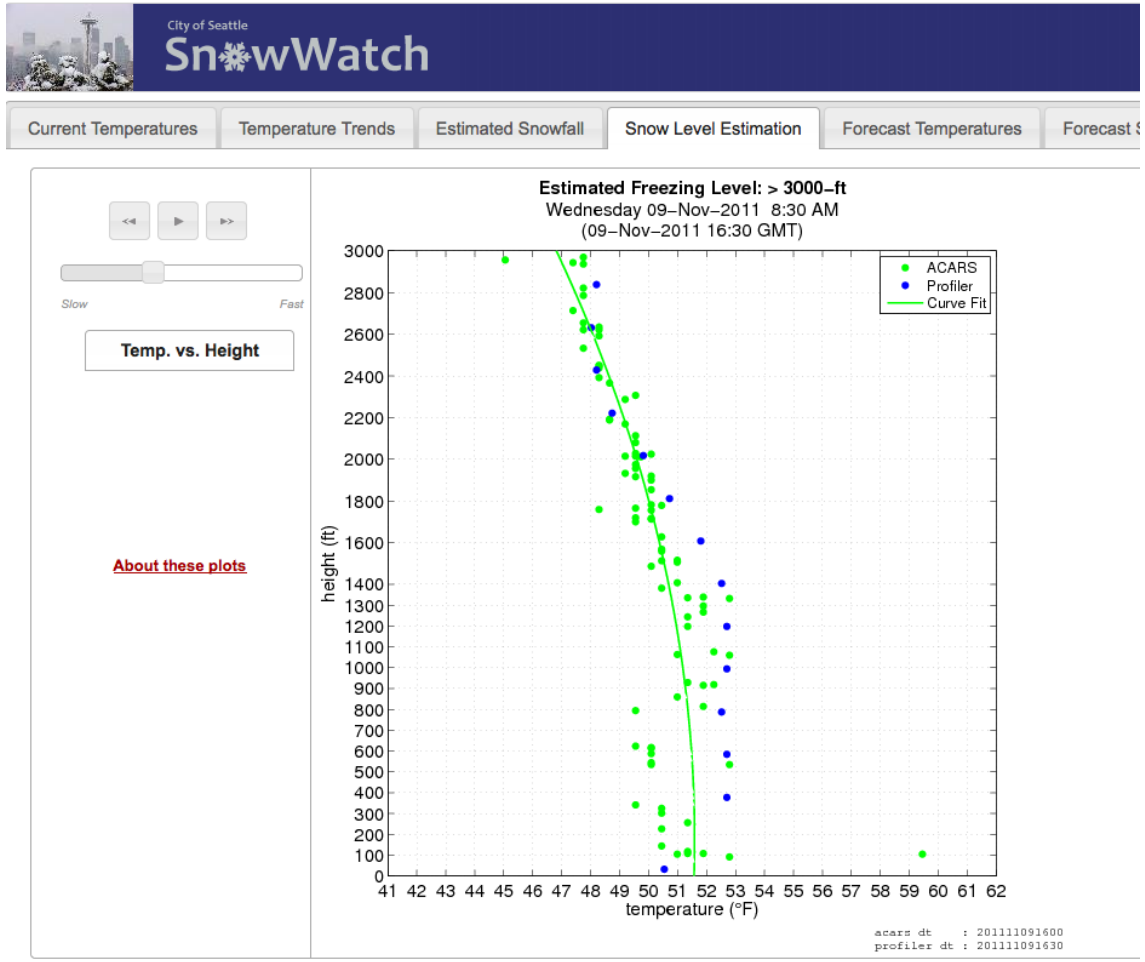
A road-surface temperature <= 34 deg F was found within the last 2 hours at the stations listed below. See http://atmos.washington.e

Station:
N. Seattle WSDOT T130T station near I-5 & NE 130 St
(47.726 -122.324, 354 ft elevation)

Shows current 2-m air temperatures and roadway temperatures, as well as temperature change



And much more, such as determining the freezing level using vertical sounders and aircraft ascents/descents



Seattle has had far better response to ice and snow after SnowWatch

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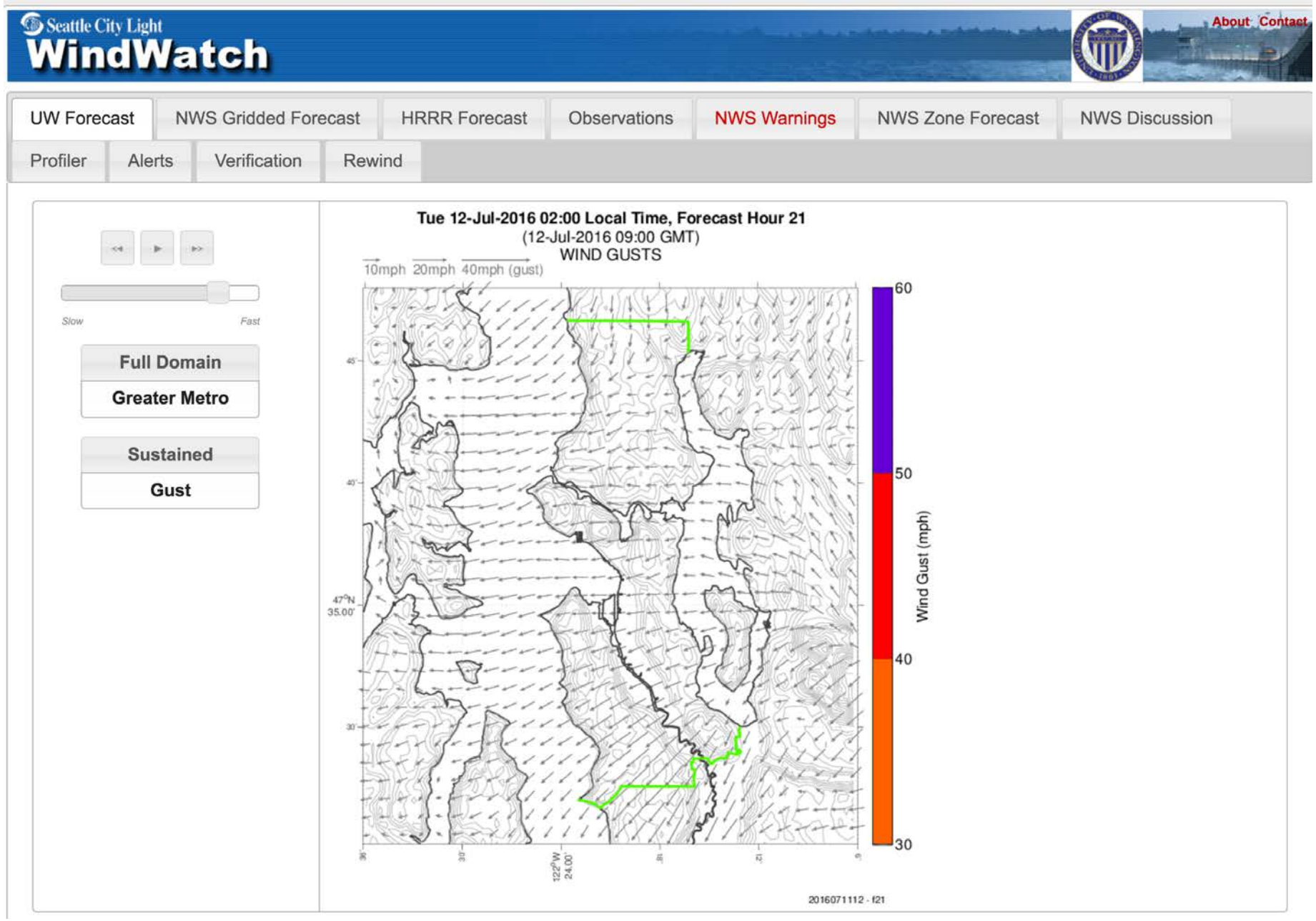
Seattle Mayor Mike McGinn takes his snow test seriously

Originally published January 18, 2012 at 8:46 pm | *Updated January 19, 2012 at 8:49 am*

Seattle Mayor Mike McGinn talks to a reporter in the city's Emergency Operations Center on Wednesday as the city tried to cope with snow.

WindWatch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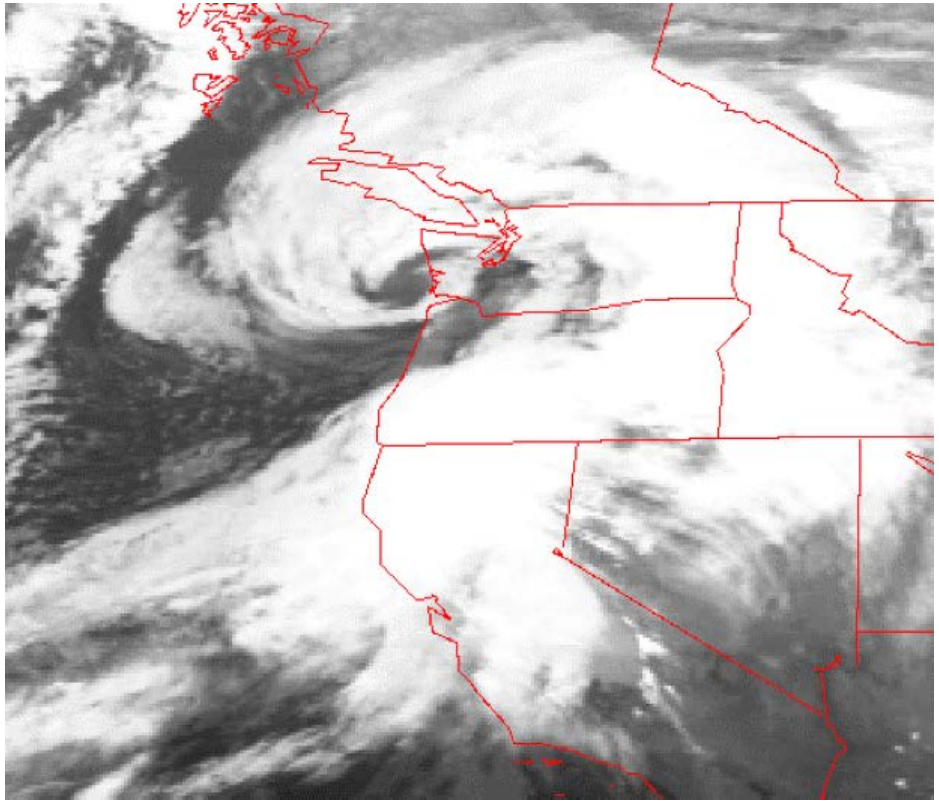
The Pacific Northwest Is Hit By Pacific Cyclones with Winds Equivalent to Category 2 Hurricanes



Why Wind Nowcasting for Utilities?

- Mobilize enough personnel to deal with damage
- Secure resources (e.g., replacement parts)
- Stage equipment and personnel in correct parts of service area.
- Warn public to prepare (e.g., secure batteries, keep away from trees)

Seattle City Light Wanted a Capable Nowcasting System: WindWatch

- Monitors high resolution forecasts:
  - University of Washington WRF forecasts (12-4-1.3 km grid spacing)
  - NOAA/NWS High Resolution Rapid Refresh (HRRR)
- Monitors observed wind speed at all local mesonet stations
- WARNS via email when a threat exists.

From Jeff Baars

Subject **WINDWATCH : ALERT (hires)**

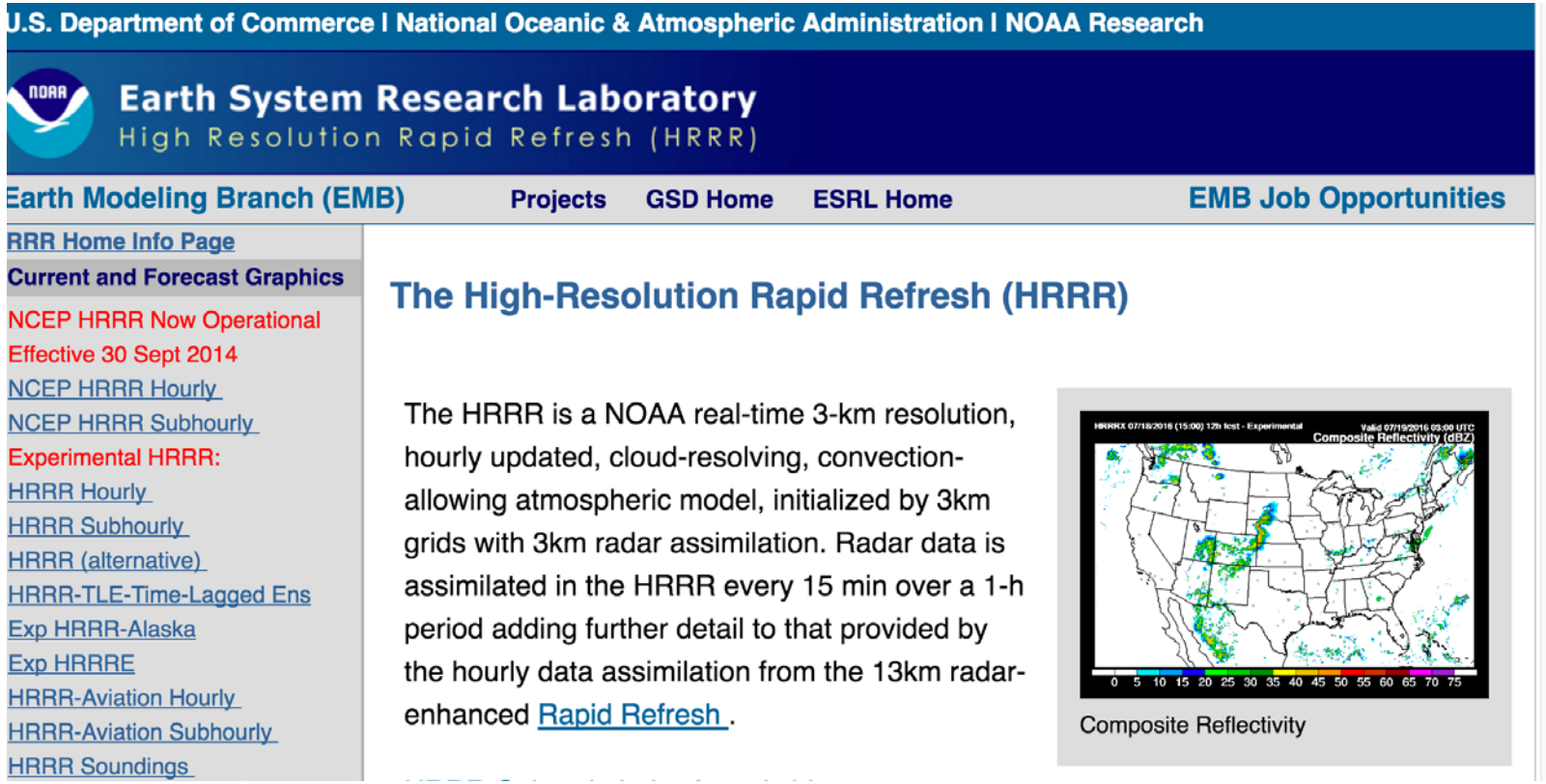
Windwatch Strong Wind Notice

A Maximum Gust windspeed exceding 30.0 mph is being forecast by the UW WRF Model.

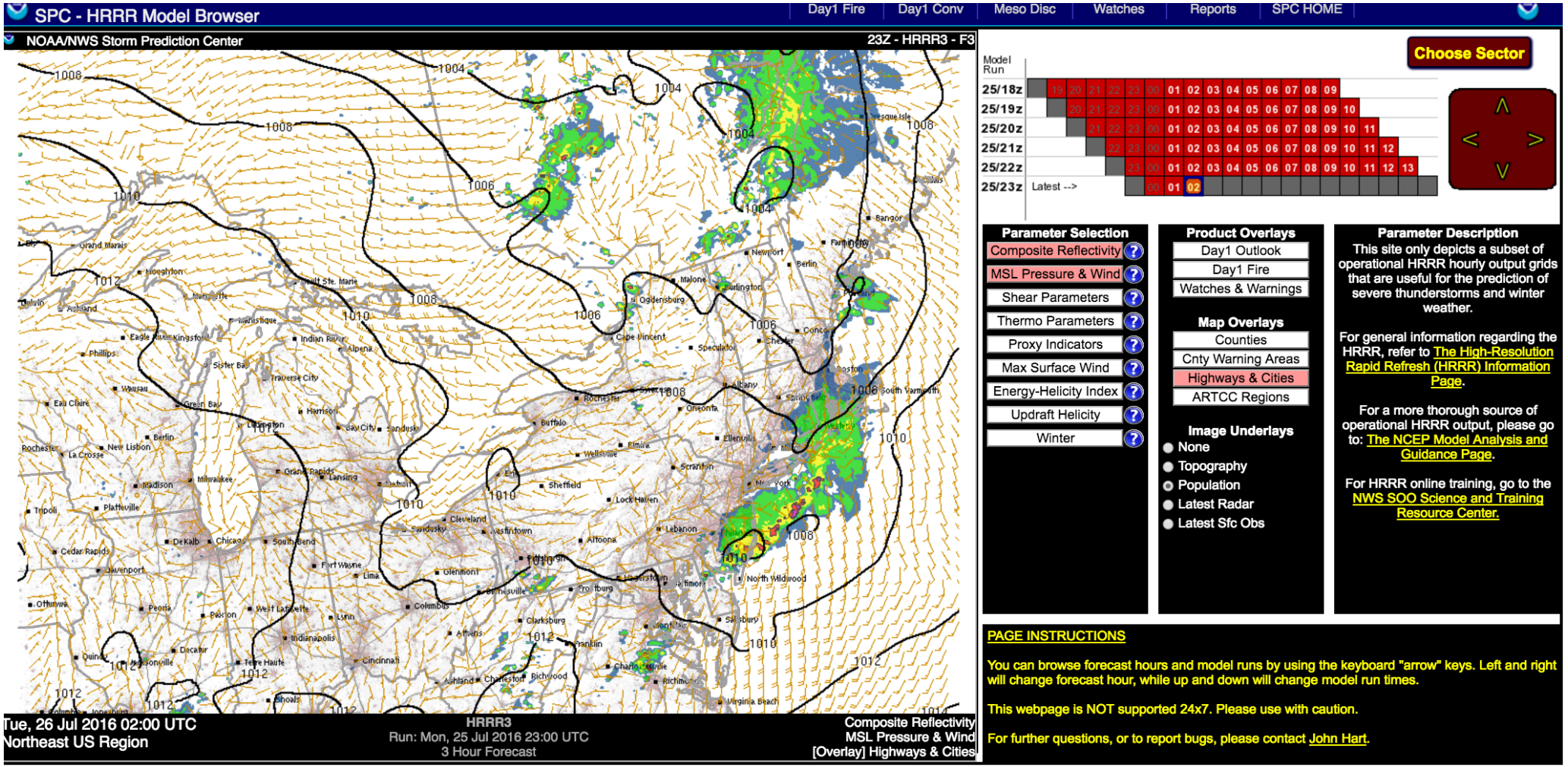
Time of the forecast high wind event: Friday 15-Jul-2016 22:00 PST
Wind Map: http://www.atmos.washington.edu/SCL/plots_hires/WRF_scld2_2016071500_f29_gust.gif

Major Nowcasting Game Changer: HRRR (High Resolution Rapid Refresh)

- Initialized every hour, with 15 hour forecasts
- Uses all available mesoscale information.
- 3-km grid spacing
- Added to WindWatch

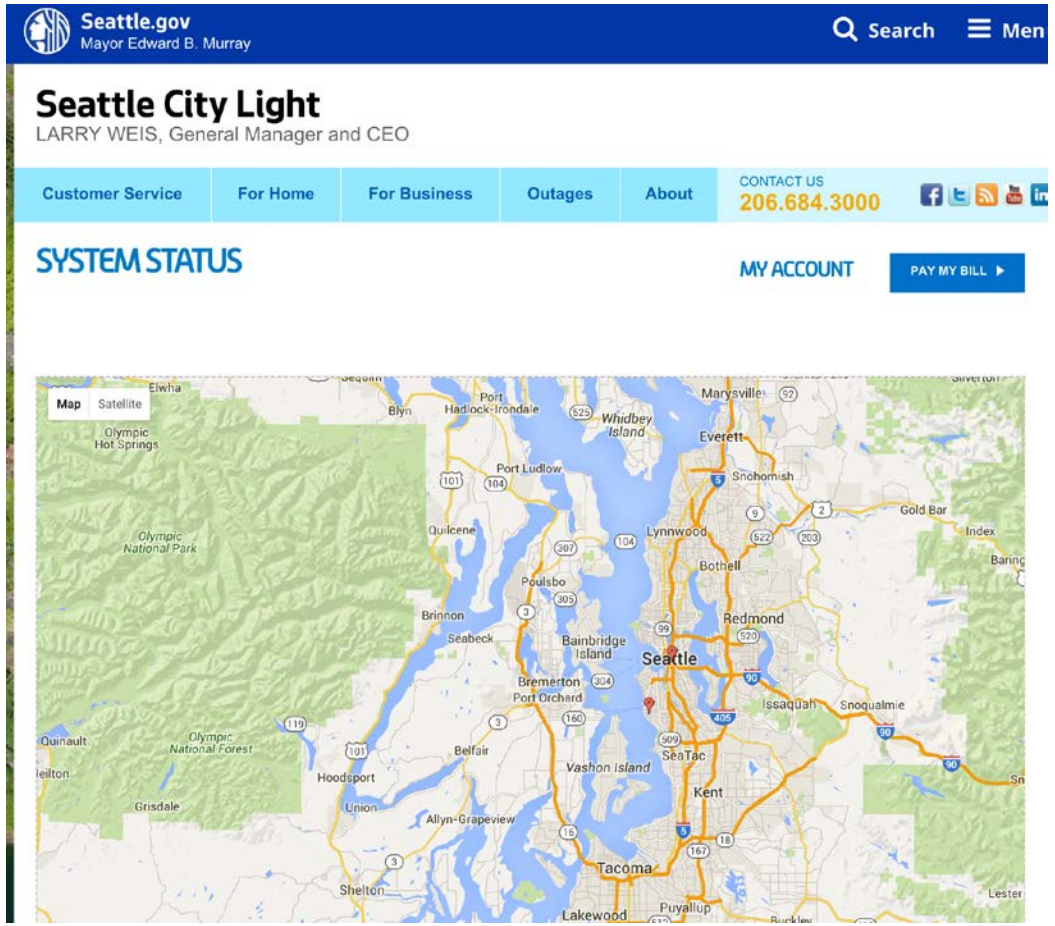


HRRR has radically changed nowcasting in the U.S.



WindWatch Implications

- Has greatly enhanced Seattle City Light's ability to deal with windstorms
- Power is restored more quickly than neighboring utilities



Nowcasting apps also have relevance to global warming resilience

As the earth warms and the climate becomes more extreme in some locations, state-of-science nowcasting can provide the last line of defense for climate-related extreme weather.

The End