



# BPA Wind Integration Team (WIT) Wind Forecasting Project General Overview

Slides by Matt Neel, Project Manager

# Overall Goals and Processes

*This project will improve BPA's ability to forecast wind power generation and develop and deploy tools for transmission dispatch and hydro duty schedulers to understand and predict wind generation patterns and manage operational risks.*

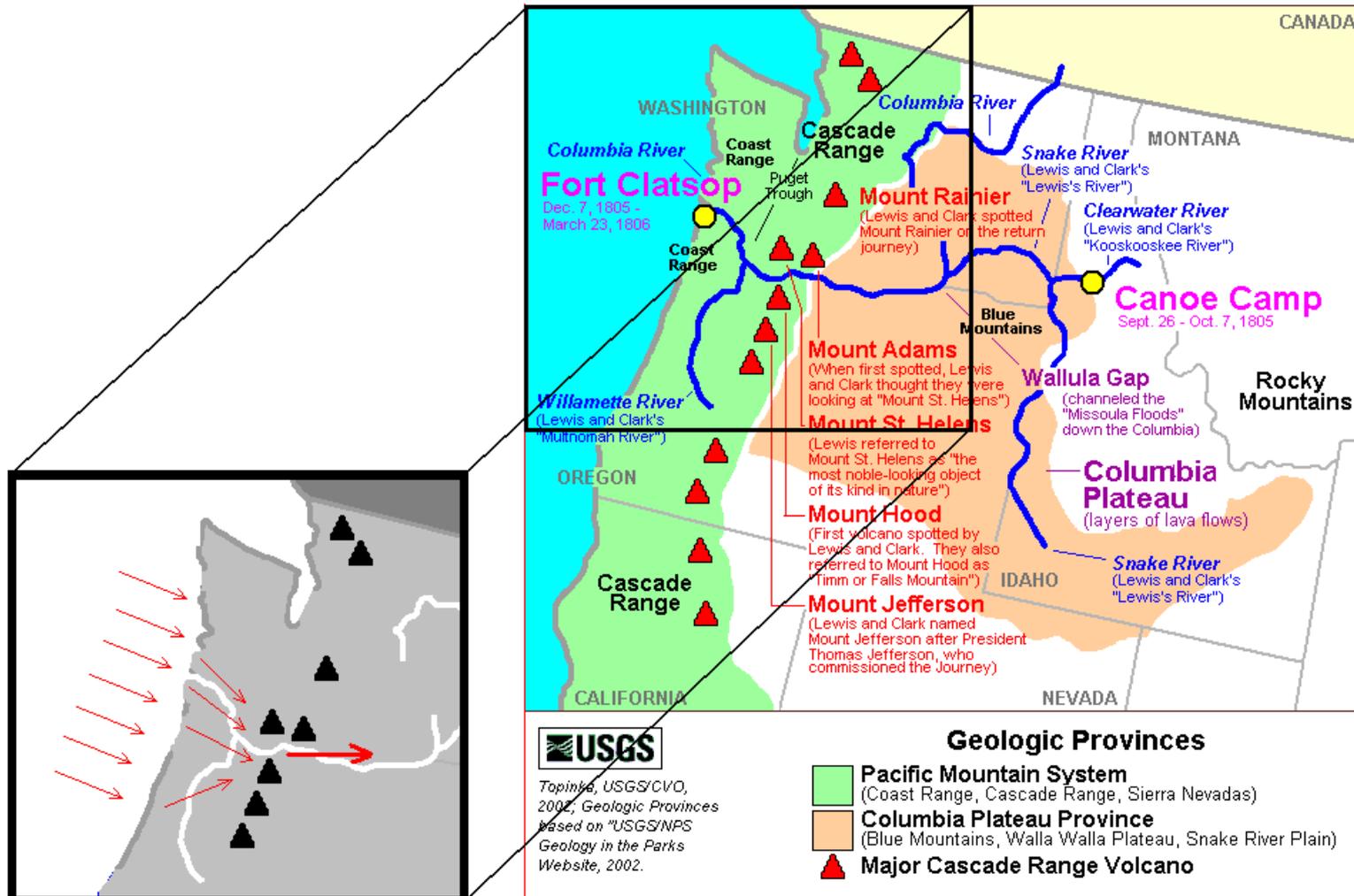
General Steps to Achieve This Goal:

1. Develop and Manage Data Sources
2. Develop a Meteorological Model to Use the Data
3. Implement the Model to Generate Forecasts

# Problem Description

- Wind speeds at individual wind power plants are variable, creating variable energy output.
- This leads to a greater potential for sudden changes in wind energy as the wind increases and decreases.
- As the wind fleet in BPA's transmission balancing authority area expands (wind generation capacity increases), these sudden changes become greater
- To maintain reliability and stability of the power grid, BPA must hold increasing (INC) and decreasing (DEC) power reserves in case the wind suddenly dies or picks up, respectively.
- A wind energy forecast will assist in managing these reserves and will allow power grid operators to anticipate and possibly plan for large changes in wind generation.

Northwest wind turbines are clustered east of the Columbia River Gorge. A common weather pattern funnels effect of winds from the ocean (marine push) into the gap (the Columbia Gorge) in the Cascades mountain range. A data void in the Pacific Ocean increases the difficulty of predicting incoming fronts.



# Anticipated Forecast Benefits

## **Forecast our wind serving BPA Load**

Better planning of the hydro system

- Greater flexibility and secondary marketing (purchases & sales)
- Ensure that we can accommodate pinch-points

## **Energy**

Better planning for wind energy storage and balancing energy consumption

## **Capacity**

Predicting within-hour ramp events and better management of our fish spill programs

## **Direction of Deployment**

Predicting positive or negative reserve deployment

## **Forecasting Ramping Events**

## **Forecasting Reserves**

## **Better Management of Transmission Congestion**

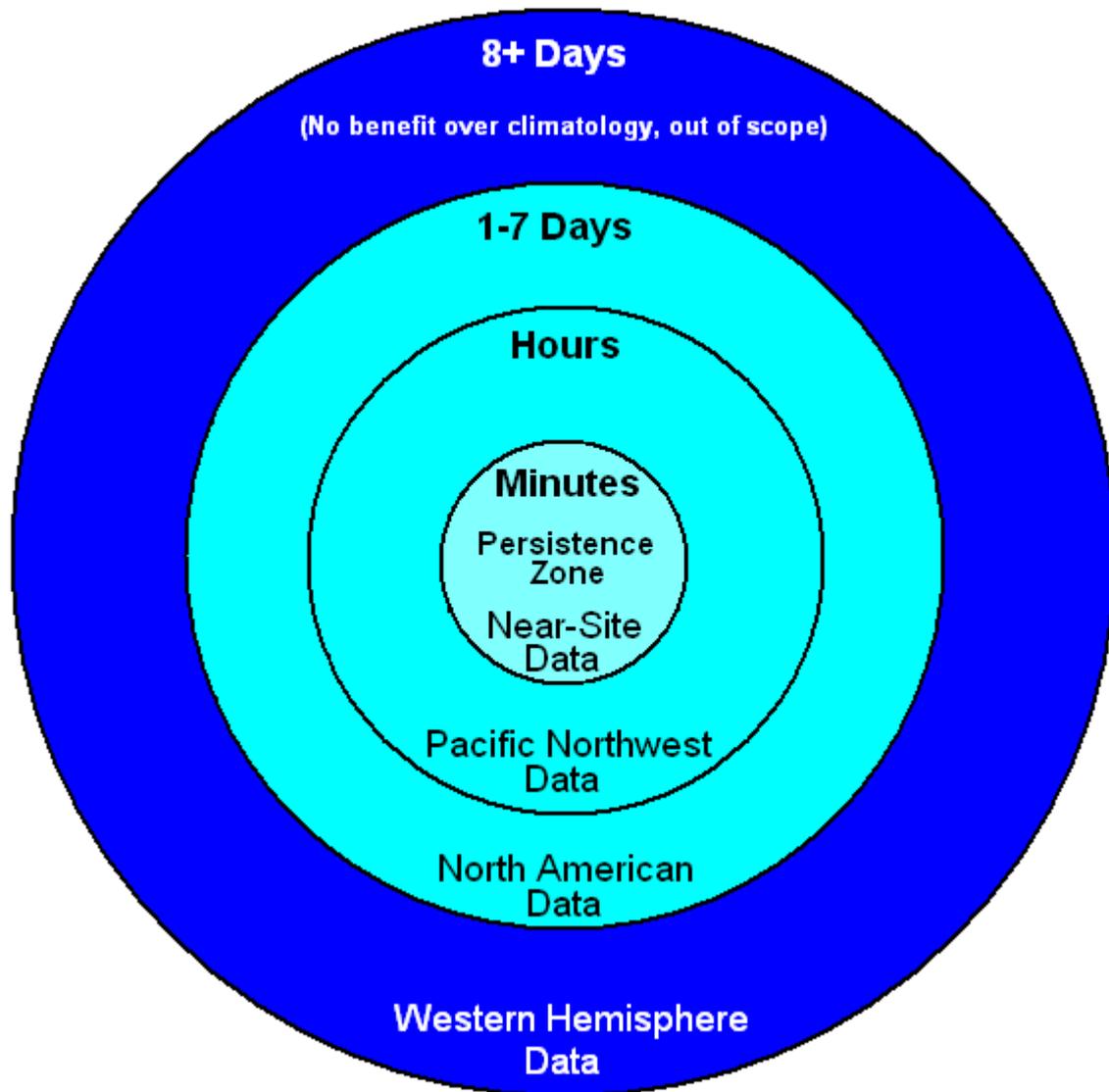
# Atmospheric Data, Time of Flight and Update Importance

Wind forecasting relies on many different kinds of data sets to make accurate predictions.

In general, shorter-term forecasts require more local data and longer-term rely on more distant data.

Not all data is updated at the same rate and not every region has data available.

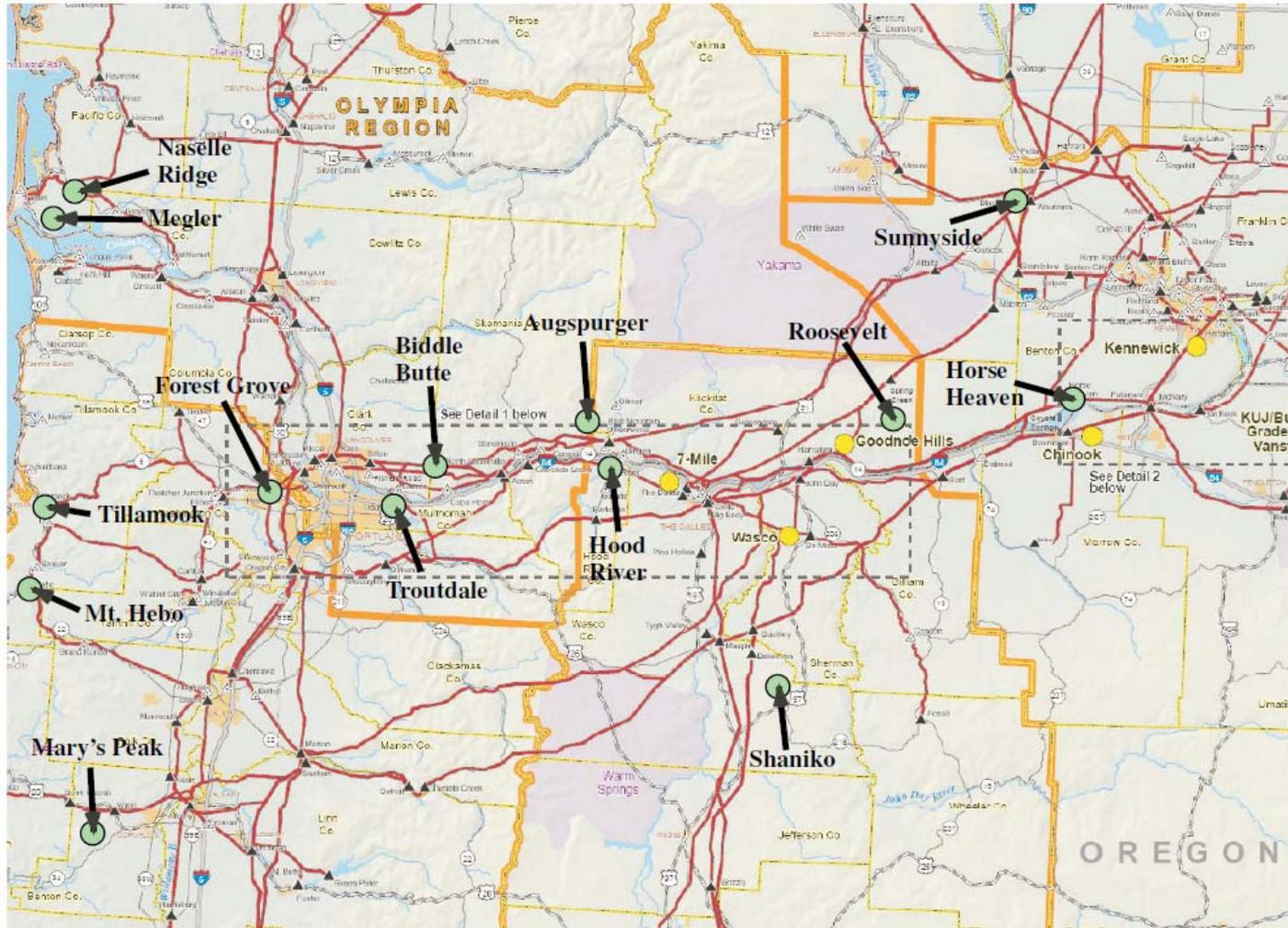
Improving the accuracy of short-term forecasts will help dispatchers most; that's where existing data is most scarce.



# Project Components

- Develop Source Data – BPA will install meteorological sensors at various sites throughout the Pacific Northwest region to increase the pool of weather data needed to support a forecasting system
- Develop Forecasting System – BPA will review all feasible options for a forecasting system that will, under acceptable accuracy metrics, provide wind energy generation predictions several hours to several days ahead as well as provide some form of wind ramp warning for severe events.

# Forecasting – Met Sites



14 New Met Sites (shown in green)

This year, BPA installed meteorological instruments on its transmission equipment at 14 locations. The data provided by these instruments includes wind speed, wind direction, barometric pressure, temperature and humidity.

# Forecasting Milestone Dates

## Timeline:

- BPA installed meteorological equipment on 14 BPA facilities by **October 1, 2009**.
- Data feeds from Met Sites is scheduled to begin by **January 8<sup>th</sup>, 2009** for internal users and public release.
- BPA will install an internal prototype forecasting system by **January 2010**.
- A buy vs. build decision for review and improvement of the wind forecasting system is scheduled for **March 2010**.
- Dispatchers and duty schedulers will be working with wind generation and forecast displays by **October 1, 2010**. The displays will continue to develop as needs change.

Thank you!