Impacts of Smoke Particulate Matter on Health in Oakridge

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Overview

► Oakridge and Westfir have consistently been among the worst airsheds in the United States for elevated fine particulate levels ($PM_{2.5}$)

- primarily due to smoke from residential wood burning and wildfires

- air quality due to winter wood smoke has improved in recent years due to successful implementation strategies

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Project Evolution

▶ 2017 Oregon Solutions project – wildfire smoke intrusion – local clinic and fire/ER data.

▶ 2018 Oregon Health Authority assisted on school absenteeism data for Oakridge (limited data – inconclusive).

▶ 2019 Coordination with Trillium CCO on initial data for health outcomes.

▶ 2019 Connection to Carol Trenga at OHA and coordination with Oregon DEQ on health data analysis.

▶ 2019 Acquisition of EPA Targeted Airshed Grant.

▶ 2020 Oregon DEQ funded Smoke Safety Plan to sponsor health data analysis.

▶ 2020 OSU Data Analysis for the Public Good and LCOG support for health data analysis in summer 2020.

▶ 2021 Use OHA All Payer All Claims data for health data analysis

City of Oakridge
Smoke Safety Plan
Oakridge Smoke Sensitive Receptor Area
May 2021

Oakridge
Mountain Biking Capital of the Northwest

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Primary Question

▶ Since 2015, how has public health been impacted by $PM_{2.5}$ exposure from winter woodsmoke and significant wildfire events in the Oakridge/Westfir airshed?

▶ Measured by:

    ▶ Medical and pharmaceutical claims (2015-2019) for respiratory/cardiac health conditions
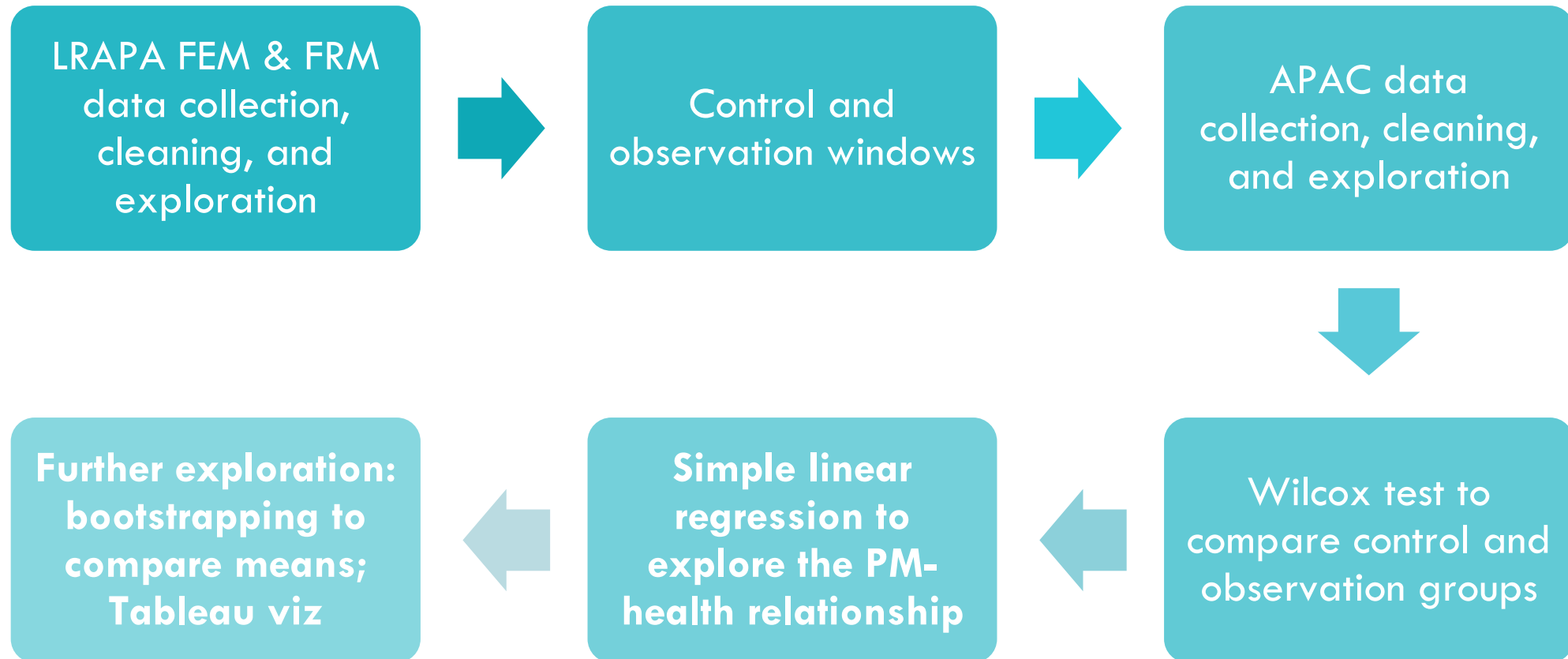
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Learning Objectives

▶ Determine whether smoke from winter wood smoke and wildfire events contribute to health impacts in a small rural Oregon community.

▶ Define challenges and opportunities with sub-county claims and health outcomes analyses related to particulate air pollution.

▶ Explain how this type of analysis can be used over time to determine if greater or fewer health impacts are occurring due to changing conditions (e.g., improvements to winter wood smoke and/or increases in wildfire events).

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Methods

▶ Health impacts were measured by respiratory and cardiovascular medical and pharmaceutical claims from Oregon Health Authority's All Payer All Claims (APAC) database.

▶ APAC data and $PM_{2.5}$ levels were evaluated for the winter heating season (mid-fall to early spring) and wildfire (late spring to mid-fall).

▶ Smoke days were defined as days with $PM_{2.5}$ at or above 20 µg/m3.

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Data Analysis Steps

LRAPA FEM & FRM data collection, cleaning, and exploration

→

Control and observation windows

→

APAC data collection, cleaning, and exploration

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Further exploration: bootstrapping to compare means; Tableau viz

←

Simple linear regression to explore the PM-health relationship

←

Wilcox test to compare control and observation groups

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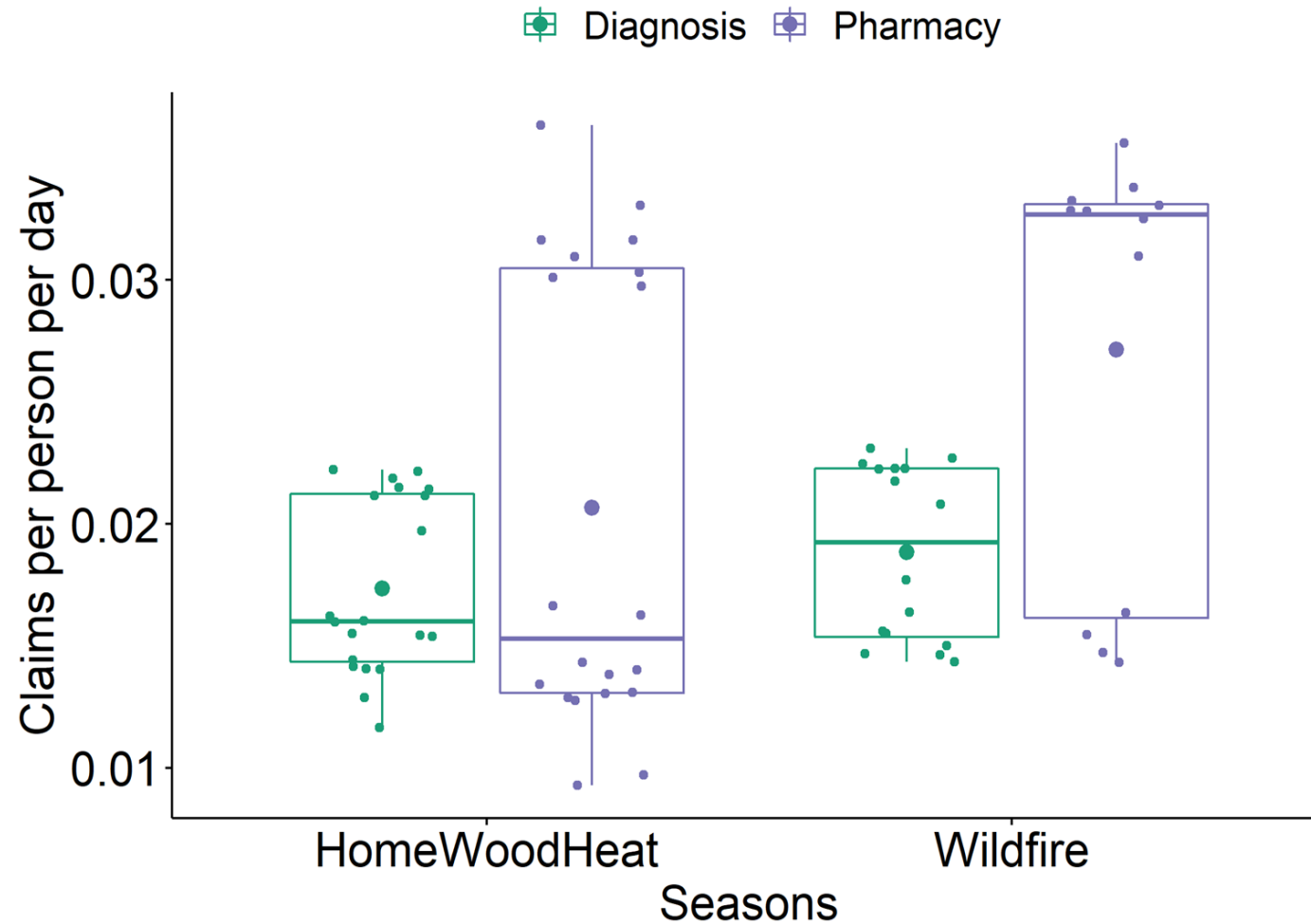# Control vs Observation in Summer & Winter Claims

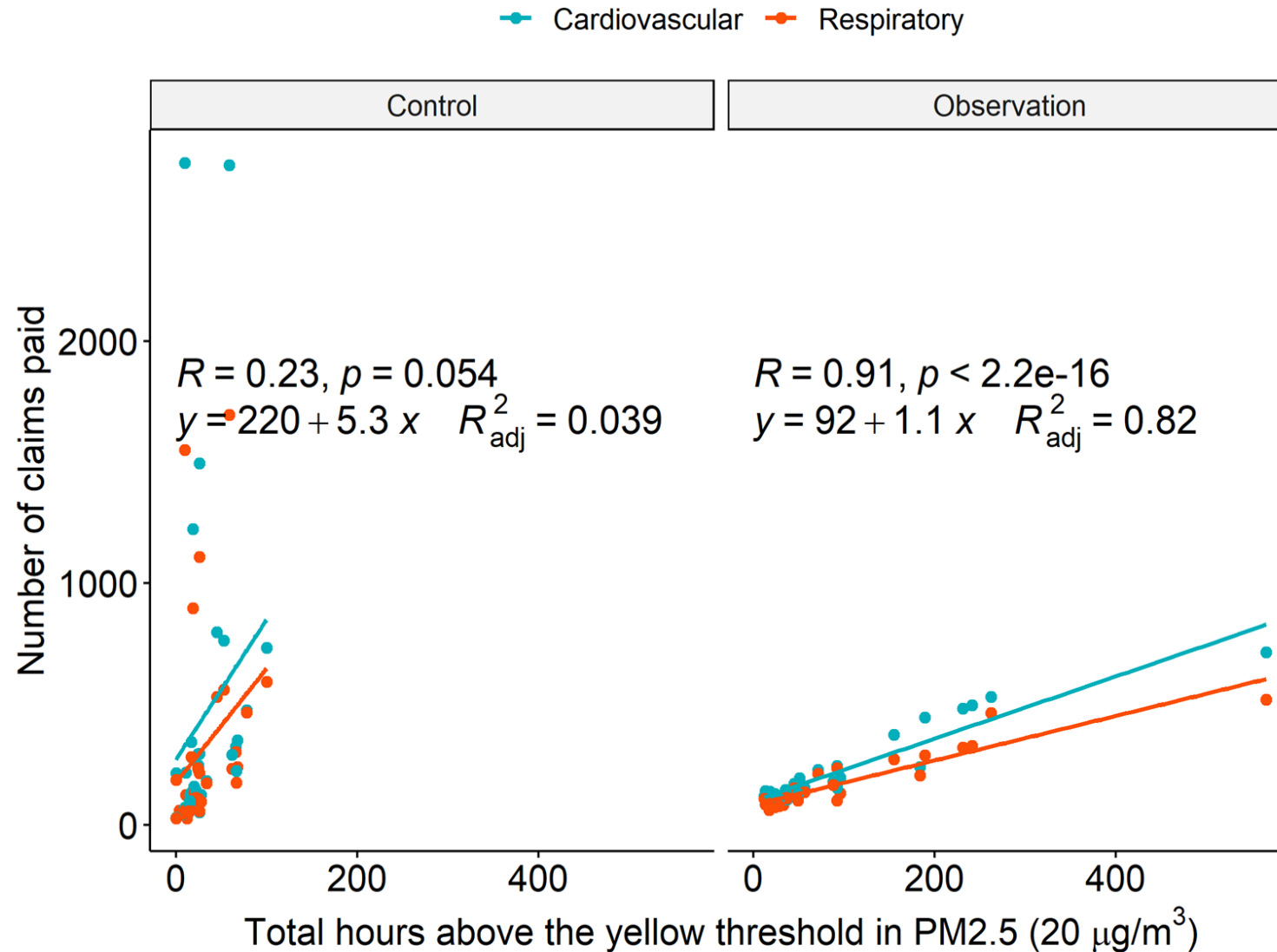Wilcoxon test, W = 27288.5, p = 0.034, n = 500

Summer   Winter
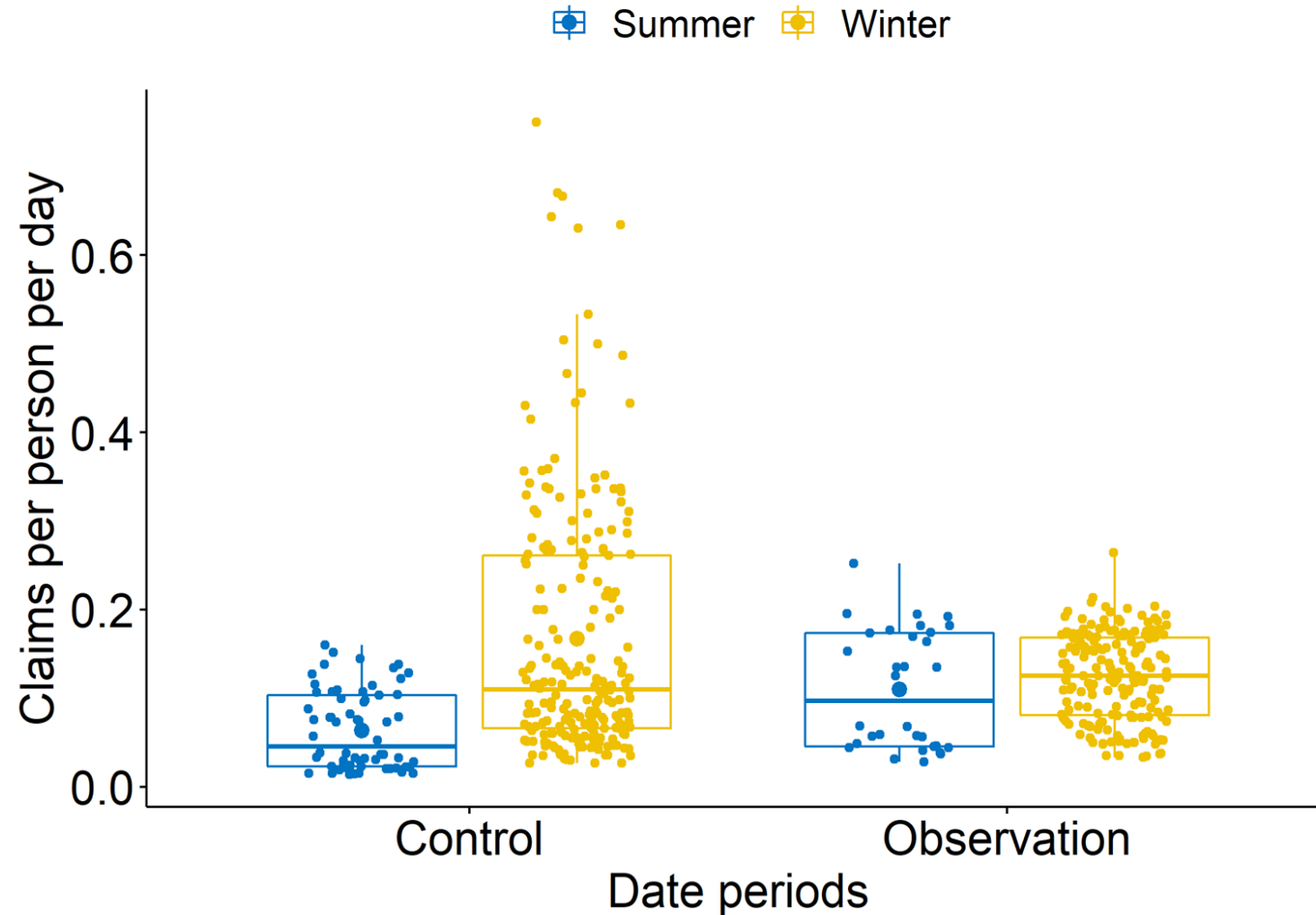
Differences Woodsmoke vs. Wildfire

Wilcoxon test, $W = 351$, $p = 0.0087$, $n = 68$

Correlation and Regression

Findings Summary

▶ Overall claims per person per day between observation and control periods differ significantly in both seasons (Wilcoxon test p < 0.05).

▶ Wildfire seasons have significantly higher claims per person per day than home wood heat seasons (Wilcoxon test p < 0.01).

▶ The number of claims per person per day is significantly higher during observation date periods, particularly during summertime, compared with control date periods.

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Limitations

▶ There are many possible factors that could have contributed to changes in the APAC claims observed.

▶ Although a strong correlation between PM2.5 and claims was observed, this does not confirm causality.

▶ Oakridge-Westfir area has a small population and relatively few claims.

▶ APAC data in this analysis did not include Centers for Medicare and Medicaid Services (CMS) data.

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Summary

▶ There is a strong and positive correlation between $PM_{2.5}$ and APAC claims during observation (smoke) periods while the $PM_{2.5}$ -claims correlation during control periods is not significant.

▶ This analysis presents evidence to support that $PM_{2.5}$ from smoke negatively impacts public health.

▶ These results will inform public health communications and community discussions related to wood burning and wildfire smoke exposure in the Oakridge community.

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Continuing Partnerships

▶ Additional analysis by OHA to include CMS APAC data.

▶ Hospitalization and ED analyses, **including demographics.**

▶ **Engagement** with other rural and urban communities to explore opportunities to replicate analyses.

▶ U of O and OSU research in Oakridge to understand indoor air quality impacts to health and improvements given interventions (air purifiers, weatherization, certified wood stoves and ductless heat pumps)

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Thank You Project Collaborators

▶ Justin Overdevest, Oakridge Air / Good Company

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▶ Mary Ann Evans and Amy Clark, Oregon All Payer All Claims Reporting Program (APAC)

▶ Southern Willamette Forest Collaborative: Sarah Altemus-Pope, Guen DiGioia