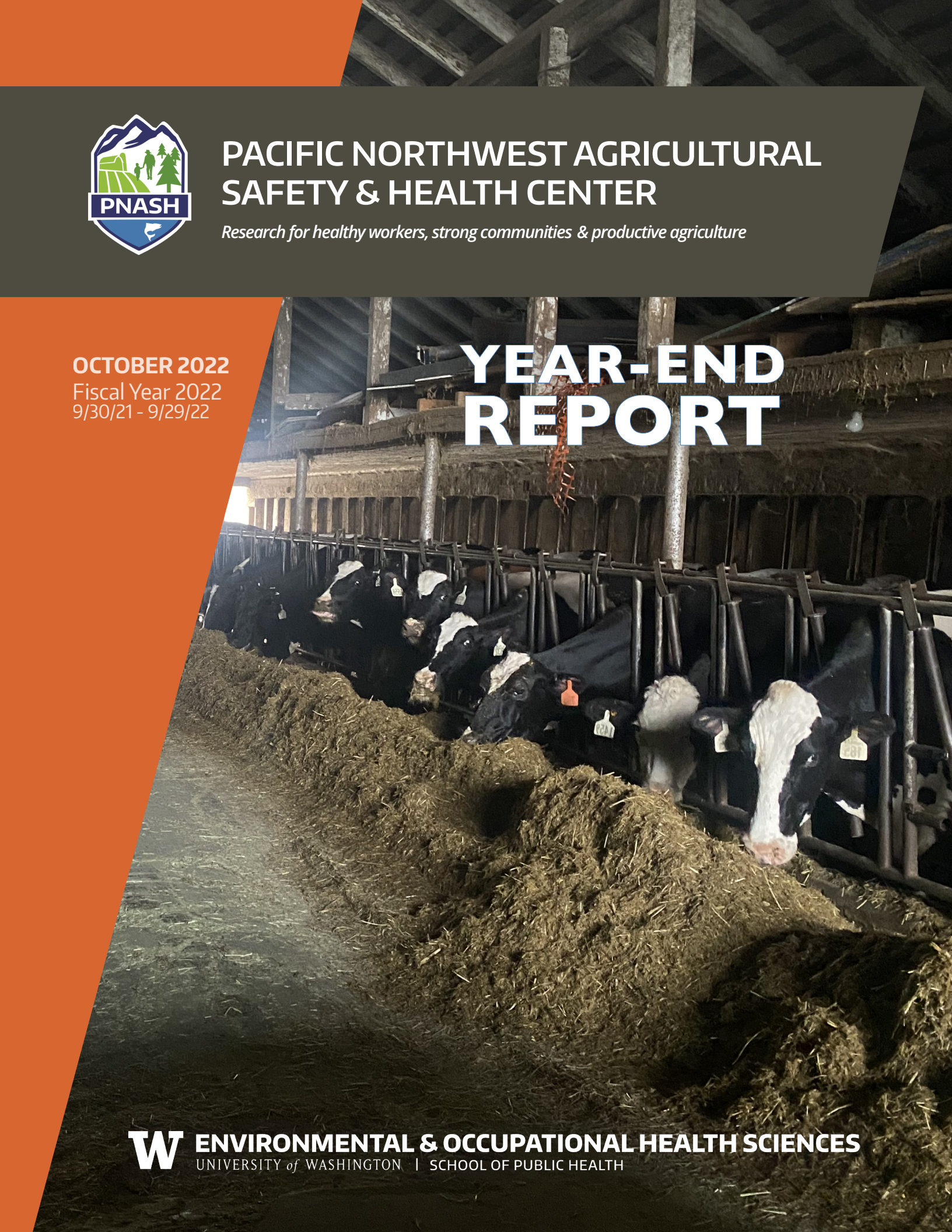
PACIFIC NORTHWEST AGRICULTURAL SAFETY & HEALTH CENTER

Research for healthy workers, strong communities & productive agriculture



OCTOBER 2022
Fiscal Year 2022
9/30/21 - 9/29/22

YEAR-END REPORT

ENVIRONMENTAL & OCCUPATIONAL HEALTH SCIENCES
UNIVERSITY of WASHINGTON | SCHOOL OF PUBLIC HEALTH

PACIFIC NORTHWEST AGRICULTURAL SAFETY & HEALTH CENTER

OUR VISION

The Pacific Northwest Agricultural Safety and Health (PNASH) Center conducts research for healthy workers, strong communities & productive agriculture.

- ✓ PROMOTING SAFE WORKPLACES
- ✓ PARTNERING WITH WORKERS, EMPLOYERS & COMMUNITIES

Cycle 2017-2022 REACH & IMPACT

6 Core Research Projects

14 Pilot Projects

48 Student degree projects and internships

- 8 PhD candidates
- 2 Medical interns
- 15 Master's degree students
- 23 Undergraduate students

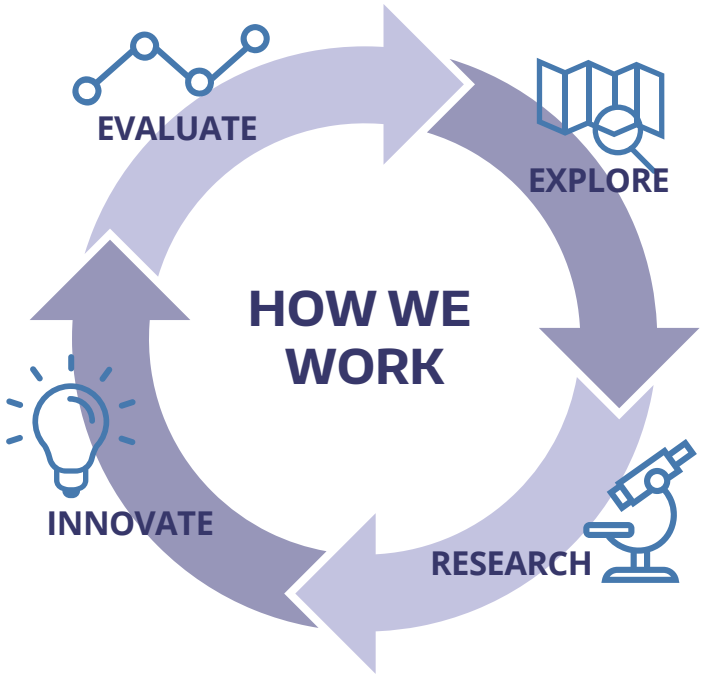
101 Research Publications

20 External Research Project Awards

2021-22 YEAR END REPORT

This report provides an overview of the PNASH Center's progress and preliminary findings in our final year of this program cycle. Over the coming year, we will continue to publish research findings and present at regional events. Contact us if you are interested in sharing these with your networks and communities.

Thank You to our partners, advisors, and research participants. Your collaboration makes our work possible and ensures it is relevant and meaningful for ag communities.



CONTENTS

RESEARCH CORE PROJECTS

FFAST Training for fishermen in Newport, Oregon.
Photo courtesy of Amelia Vaughn.

PREVENTION OF OCCUPATIONAL EXPOSURE TO PESTICIDE DRIFT

YEAR 6 of 6 (2016-2022)
PI: Edward Kasner, PhD, MPH
Assistant Teaching Professor, University of Washington

https://deohs.washington.edu/pnash/prevention-occupational-exposure-pesticide-drift

Challenge

Pesticide drift is a long-standing issue in the Pacific Northwest, especially for the tree fruit industry and workforce. Studies have shown that at least 60% of drift events were linked to wind speed or direction changes. Understanding the role winds play in pesticide drift can prevent unintended exposure for workers and nearby communities.

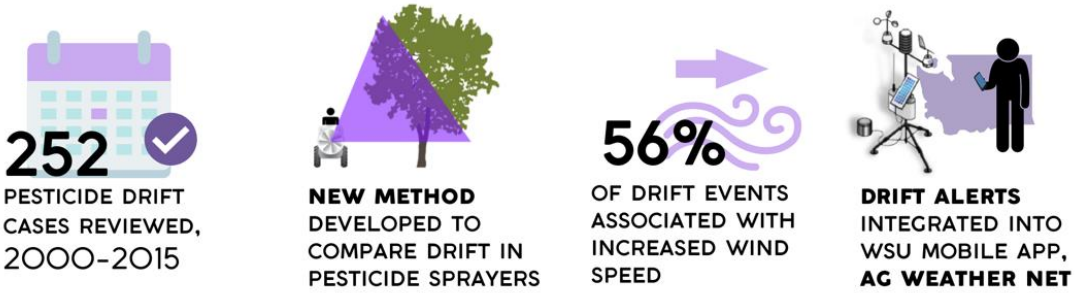
Project Overview

This project aims to minimize the causes of pesticide drift exposure. To accomplish this, we sought to determine how factors such as wind speed and direction affected the likelihood of drift events. Our goal was to develop a statistical model and conduct field studies to validate this model for use in forecasting. This model will assist orchardists to assess risks for conditions when drift is most likely to occur.

> "The tree fruit industry is migrating to low-drift technology. The benefit to growers is better crop protection, less culls, [and]...different regulations that recognize better practices."
>
> - Gwen Hoheisel, WSU Partner
> WSU Research & Extension

Findings to Date

- Linking 2000-2015 data for drift events and weather in Washington (Source):
  - Most pesticide drift events occurred in tree fruit (151/252 = 60%)
  - Drift events primarily occurred during two types of pesticide application: ground spraying (68%) and aerial spraying (23%)
  - Cases of human illness included 69% workers and 31% bystanders
  - Significant wind speed increases or direction changes during applications were found in 56% (32/57) of confirmed drift events with spray records
  - Applicator-recorded wind speed, on average, was 2 mph lower than the nearest weather station
- Compared to conventional airblast sprayers, tower sprayers produced less pesticide drift and lower worker exposure (Source).
- An in-depth analysis of five weather stations in the Lower Yakima Valley demonstrated that wind conditions can vary greatly in a small region and that wind can reliably be forecasted up to 6 hours in advance.



Other Accomplishments

- Established a new approach to study pesticide drift using epidemiological data about pesticide drift illnesses and historical weather data.
- Supported Yoni Rodriguez as he completed his Masters project in 2022: "Exploring Wind Ramping as a Determinant of Pesticide Drift."
- Recommendations to WA Department of Health to increase pesticide illness monitoring and share resources in regions where cases are high during March–July. Staff were trained to link weather data to pesticide illness data and integrate spatial features from GoogleEarthPro into their epidemiological investigations. New standard operating procedures are being developed.
- Integrated experimental wind alerts into a 'smart orchard' and an AgWeatherNet station. We connected with several new agricultural technology startup companies in the tree fruit sector (e.g. Thingy, LLC; Innov8; Harvust) that are using sensors and mobile technology networks to inform precision agriculture and decision support.
- Developed new training content and recommendations for pesticide training led by the WA State Department of Agriculture and Washington State University.
- Ongoing member of the Washington's Pesticide Application Safety Committee (PASCO).

Trade article and video, The Good Fruit Grower, and article by UW.

Next Steps

Our results provide actionable information about drift events in terms of time, space, and wind variability. Messages about exposure prevention can be delivered to managers, supervisors, and workers. We have drafted a second paper on the utility of on-site meteorological stations for applicators to monitor wind conditions throughout a spray period, instead of using a hand-held anemometer only at the beginning of a spray period, as is currently required. In the coming year we are coordinating with PNASH's other pesticide project teams to co-present our results regionally and to disseminate findings through PNASH's pesticide safety partnerships and media outlets.

Training

Integrated modules into WSDA Technical Service and Education Program and WSU Pesticide Education Program: On Farm Assistance, and Spray Drift Surveillance at Pesticide Technical Assistance and Education | Washington State Department of Agriculture

Pesticide Safety Solutions PNASH Online On-Demand Courses | Pacific Northwest Agricultural Safety and Health Center (washington.edu)

Research Papers

Rodriguez Y. Exploring Wind Ramping as a Determinant of Pesticide Drift. 2022 Master's Thesis. Department of Environmental and Occupational Health Sciences, University of Washington, Seattle, Washington. ResearchWorks.

Kasner EJ, Prado J, Yost MG, Fenske RA. Examining the role of wind in human illness due to pesticide drift in Washington state, 2000–2015. Environmental Health. 2021 Mar 15;20(1):26.

Kasner EJ, Fenske RA, Hoheisel GA, Galvin K, Blanco MN, Seto EYW, Yost MG. Spray Drift from Three Airblast Sprayer Technologies in a Modern Orchard Work Environment. Annals of Work Exposures and Health. 2020 Jan 1;64(1) 25-37.

Kasner EJ, Fenske RA, Hoheisel GA, Galvin K, Blanco MN, Seto EYW, Yost MG. Spray Drift from a Conventional Axial Fan Airblast Sprayer in a Modern Orchard Work Environment. Annals of Work Exposures and Health. 2018 Nov 12;62(9) 1134-1146.

Prado JB, Mulay PR, Kasner EJ, Bojes HK, Calvert GM. Acute Pesticide-Related Illness Among Farmworkers: Barriers to Reporting to Public Health Authorities. Journal of Agromedicine. 2017;22(4) 395-405.

THE HEALTHY DAIRY WORKER STUDY

YEAR 6 of 6 (2016-2022)
PI: Peter Rabinowitz, MD, MPH
Professor, University of Washington

https://deohs.washington.edu/pnash/healthy-dairy-worker-study

Challenge

Dairy workers are commonly exposed to microbes and allergens on the job. However, little is known about whether these exposures provide health benefits or contribute to an increased risk of illness. The 'hygiene hypothesis,' suggests that exposure to microbes on farms may have immune benefits.

Project Overview

Our study evaluates the impact of these factors on respiratory and gut health by measuring the nasal and gut bacteria present in the body and comparing it to respiratory function of workers. We will analyze changes in the microbiome and health status for newly hired dairy workers, existing dairy workers, and community members over a two-year period. Our goal is to determine if the quantity and type of bacteria in the microbiome of workers are related to the participant's health or leaving the job.

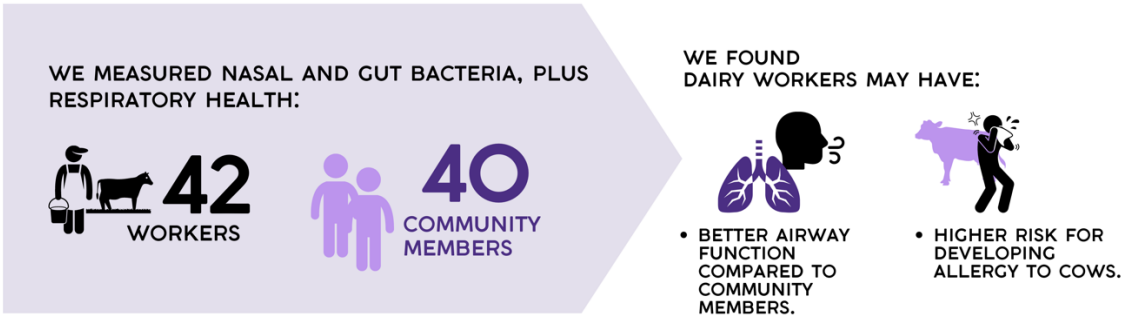
" As the owner of a dairy farm, I am interested in the health of workers and feel that your research could shed light on novel methods of maintaining worker health in this work environment where microbial exposure is unavoidable."

- WA Dairy Owner

Findings to Date

This project completed sample collection in 2022 and has further analysis underway. See 'Next Steps' on the following page.

- Dairy workers performed better on breathing tests and had an abundance of certain 'healthy' bacteria that protect against inflammation, as compared to community members. This benefit may be from the greater contact with cows.
- There appear to be differences between individuals in the amount of gut bacteria associated with inflammation.
- The study found some evidence that some dairy workers were developing an allergy to cow antigens.



Other Accomplishments

- Our sample collection ended in 2022, ending a rigorous 5-year field study of recruitment of four farms and enrollment of 53 farmworker participants for biological sampling.
- Dr. Pauline Trinh's PhD dissertation entitled "From Metagenomics to Pangenomics: Characterization of Dairy Worker Microbiomes and Development of Novel Statistical Methodology."

Next Steps

A manuscript entitled "A Cross Sectional Study of Respiratory and Allergy Status in Dairy Workers" has been accepted pending edits to the Journal of Agromedicine. In 2022-2023, we will look at microbiome differences and whether those are determinants of respiratory function.

We will be publishing the metagenomic analysis into several papers with Dr. Trinh. Additionally, we have recently completed sample DNA extractions and sequencing and are now preparing to do the longitudinal analysis, to be completed in 2022-2023.

Due to challenges recruiting new dairy workers early in the study, we were not previously able to complete a full comparison of the microbiome of new workers and controls. We now have enough samples from new dairy workers for continuing analysis and fill in this gap of knowledge.

In the 2022-2023 academic year, PhD Student Jorge Rivera-Gonzalez will analyze data and support the development of manuscripts on the following topics:
1. Compare microbiome diversity and components between workers and controls,
2. Determine whether microbiome components are associated with health status or early work cessation,
3. Assess the microbiome in asthmatic vs non-asthmatic study participants,
4. Change of microbiome diversity over time, and
5. Determine degree of microbiome sharing between humans and animals.

Based on our experience with the dairy workers, we created a training module for Infection Prevention and Control on Dairy Farms. We will be adapting this for farm audits by the Washington State Dept. of Labor and Industry.

"Este studio me ha dado la oportunidad de placticar con me hija y esposa sobre como puedo mejorar mi salud cuando trabajo con las vacas."

"This study has given me the opportunity to talk with my daughter and wife about how I can improve my health when I work with cows."

-WA Dairy Worker Participant

Resources

Partnership for Dairy Safety and Health | Pacific Northwest Agricultural Safety and Health Center (washington.edu)

Training

Free, Online Training Modules for Infection Prevention and Control (IPC) on Animal Farms | Center for One Health Research (washington.edu)

Research Papers

Trinh P. From Metagenomics to Pangenomics: Characterization of Dairy Worker Microbiomes and Development of Novel Statistical Methodology. 2022 Doctoral Dissertation. Department of Environmental and Occupational Health Sciences, University of Washington, Seattle, Washington. See Abstract. ResearchWorks.

de Marcken MG. 2020. Occupational Dairy Exposure and IgE-mediated Allergic Disease in Yakima, WA. 2020 Master's Thesis. Department of Environmental and Occupational Health Sciences, University of Washington. ResearchWorks.

Carmona JT. The Healthy Dairy Worker Study: A Longitudinal Cohort Study of Dairy Workers' Respiratory Health. 2020 Master's Thesis. Department of Environmental and Occupational Health Sciences, University of Washington. ResearchWorks.

A MULTI-LEVEL APPROACH TO HEAT-RELATED ILLNESS PREVENTION FOR AGRICULTURAL WORKERS

YEAR 6 of 6 (2016-2022)
PI: June Spector, MD, MPH
Associate Professor, University of Washington

https://deohs.washington.edu/pnash/multi-level-approach-heat-related-illness-prevention-agricultural workers

Challenge

Heat risks are preventable, yet are the cause of injury, illness, and death, particularly affecting outdoor workers. Heat events are predicted to be more frequent and occur for longer periods of time, and agricultural communities are looking for solutions. Few studies have examined approaches to heat illness that involve solutions for individuals, workplaces, and communities.

Project Overview

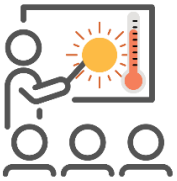
This project is developing and evaluating a multi-level approach to prevent heat illness by providing training tools and resources for employers, supervisors, and workers. The Heat Education & Awareness Tools (HEAT) toolkit was developed in collaboration with agricultural workers, growers, communities, educators, and other stakeholders. Field studies were conducted with workers with multiple farm partners, assessing the HEAT intervention and work, environmental, and housing conditions. Our research recorded workers' heat exposure, tasks, signs of heat illness symptoms and biometrics. Also studied in real-life conditions is the possible association between heat strain during the workday and hot housing conditions.

> "I believe this project will contribute to a reduction in adverse health effects of heat in workers, and that a healthy workforce is critical for sustaining productivity in the agricultural industry"
>
> - A Project Advisor

Findings to Date

- Results from a pre/post knowledge assessment of 83 workers showed that our HEAT training:
  - Improved knowledge scores 4x more than those without the HEAT training.
  - Improved most in the areas of risk factors and treatments.
- Our physiological measures for heat strain (heart rate and core body temperature) showed greater heat strain with high effort and lower heat strain with older age.
- Results from participants self-reporting heat illness symptoms found associations with higher heat exposure, 10+ years agricultural work, not being an H-2A guest worker, and walking > 3 min to get to the toilet at work.
- We found variation in farmworker housing ambient conditions and reduced sleep duration in barrack-type housing.

PNASH's HEAT training.



WORKERS WHO TOOK HEAT TRAINING SCORED HIGHER IN KNOWLEDGE ASSESSMENT

WORKERS IN GROUP HOUSING SLEPT LESS

HIGHER HEART RATE & BODY TEMPERATURE DURING HIGH PHYSICAL ACTIVITY

Accomplishments

- In 2022 we refined heat exposure assessment protocols and collected data on heat exposure in different crops and shade conditions.
- The heat team has responded to community and stakeholder's requests for heat awareness information. Over 600 professionals trained in 6 courses (some in conjunction with AgriSafe, AIHA, NWCOSH, Harry Bridges Center).
- Produced a new radio program with Radio KDNA in Spanish on Heat and Smoke Symptoms with Dr. June Spector as the guest speaker.
- Integrated the HEAT into 4 Washington state grower information systems: AWNFarm WSU AgWeatherNet (8,850 farmers) and Harvust (6,342 farmers).
- Developed Heat-Related Illness eLearning course in conjunction with University of Washington Continuing Education Program.
- Since 2021 launched the Be Heat Smart campaign in collaboration with the WA State Department of Labor and Industries, building on our ongoing campaigns and national partners. In 2021, across all platforms, the campaign resulted in 31,118 impressions and 973 engagements.

HEAT on Ag Weather Net's WA State heat awareness (mobile) decision support.

Next Steps

We are currently evaluating the relationship between ambient conditions during sleep in farmworker housing and sleep duration, and whether hot housing conditions may modify the effect of heat strain when working. As part of this research, activity monitor (sleep) data have been cleaned, the relationship between measured and self-reported sleep duration described, and preliminary analyses conducted. For our 2022 summer field work on shade and heat exposure, we are in the process of analyzing these data to inform best practices. This coming year we will be producing peer-reviewed manuscripts, infographics, and accessible materials in English and Spanish describing these study findings.

Our research team continues to provide technical input during recent Washington and Oregon rulemaking public comment periods. Also, we continue to work with PNASH's Outreach Core to disseminate information on heat illness prevention, results of analyses, and the promotion of the HEAT Toolkit. Priorities for our next step dissemination are finding ways to engage trainers and small farms and expanding our reach to other states. Future research is needed in developing evidence-based best practices for acclimatization and optimal sleeping patterns in group housing.

Resources

Heat Illness Prevention | Pacific Northwest Agricultural Safety and Health Center (washington.edu)

Training

Heat Illness Toolkit | Pacific Northwest Agricultural Safety and Health Center (washington.edu)
Heat-Related Illness Prevention PNASH Online On-Demand Courses | Pacific Northwest Agricultural Safety and Health Center (washington.edu)

Research Papers

Chavez Santos E, Spector JT, Egbert J, Krenz J, Sampson PD, Palmández P, Torres E, Blancas M, Carmona J, Jung J, Flunker JC. The Effect of the Participatory Heat Education and Awareness Tools (HEAT) Intervention on Agricultural Worker Physiological Heat Strain: Results from a Parallel, Comparison, Group Randomized Study. BMC Public Health. 2022 Sep 15;22(1):1746.

Flunker JC, Zuidema C, Jung J, Kasner E, Cohen M, Seto E, Austin E, Spector JT. Potential Impacts of Different Occupational Outdoor Heat Exposure Thresholds among Washington State Crop and Construction Workers and Implications for Other Jurisdictions. Int J of Environ Res Public Health. 2022 Sep 14;19(18):11583.

Egbert J, Krenz J, Sampson PD, Jung J, Calkins M, Zhang K, Palmández P, Faestel P, Spector JT. Accuracy of an Estimated Core Temperature Algorithm for Agricultural Workers. Arch Environ Occup Health. 2022;77(10):809-818.

Marquez D, Krenz JE, Chavez Santos É, Torres E, Palmández P, Sampson PD, Blancas M, Carmona J, Spector JT. The Effect of Participatory Heat Education on Agricultural Worker Knowledge. J Agromedicine. 2022 Apr 17:1-12. Epub ahead of print.

Krenz J, Chavez Santos E, Torres E, Palmández P, Carmona J, Blancas M, Marquez D, Sampson P, Spector JT. The Multi-level Heat Education and Awareness Tools [HEAT] Intervention Study for Farmworkers: Rationale and Methods. Contemp Clin Trials Commun. 2021 Jun 8;22:100795.

INJURY AND ILLNESS PREVENTION FOR THE PACIFIC NW DAIRY INDUSTRY

YEAR 6 of 6 (2016-2022)
PI: Michael Yost, Ph.D., MPH
Professor, University of Washington

https://deohs.washington.edu/pnash/injury-and-illness-prevention-pacific-northwest-dairy-industry

Challenge

Worker's compensation claims data show dairy workers have a higher injury rate than workers in other industries. Industry specific risks include acute injuries from animal assaults, slips and falls on wet surfaces, and chronic injuries from repetitive stress. For many hired diary workers, Spanish is their primary language.

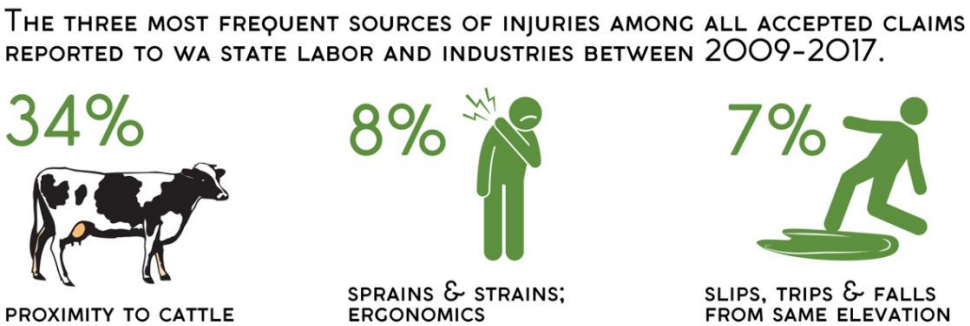
Project Overview

We seek to reduce serious dairy worker injuries by tracking injuries, examining high risk work tasks with farmers and workers, and developing train-the-trainer programs and a best practices guide. The Dairy Safety Kit (DSK) was developed based on training needs identified in a survey of PNW dairy producers. Different safety formats and training approaches are being piloted to determine which have the greatest impact on dairy employee learning and safety. We also worked to establish a system to track dairy worker injuries. An online interactive dashboard was developed to share data visually with dairy stakeholders and partners. We combine expertise from Washington State University (WSU)'s Department of Animal Sciences, Washington State Department of Labor and Injuries (LNI) Safety and Health Assessment and Research for Prevention (SHARP) Program, and the Washington State Dairy Federation.

> "I spent hours researching relevant safety materials to use for training my workers. I wish there was one place I could go to have access to everything I need."
>
> - Dairy Farm Owner

Findings to Date

- Review of Dairy industry workers compensation claims **showed animal handling** and **slips of floors and walkways** as the key injury prevention need and training priority. The Dairy Safety Kit training prioritizes these topics.
- In Washington, we assessed PNASH's interactive in-person training in Spanish (124 participants) compared to our training video (38 participants). Overall, we saw significant improvement in the pre- and post- knowledge scores for both groups with no significant difference between the two formats.



- With the Idaho Dairymen's Association, evaluated their training with 1,338 dairy workers. Results showed improved safety knowledge test scores. Education level was a key determinant of increase in safety knowledge, and therefore, safety training programs and their test questions need to address the needs of Spanish language workers with little or no formal education.
- Findings from our Dairy Practice Survey support the feasibility of a train-the-trainer model to improve safety on dairy farms.

Dairy partnership webpage and video.

Other Accomplishments

- We have expanded our partnerships to Idaho and Oregon states, working with partners to improve their safety training.
- Published The Dairy Safety Kit has been adopted by the Dairy Safety Network and the WA Leaders Enabling Advanced Dairy Safety (LEADS) Train-the-Trainer Program. Participants are manager level and owners of WA state dairies. We currently have 35 enrolled participants representing dairies ranging from one employee to 150 employees.
- This project and partnership served as the foundation for the new WSU-hosted train-the-trainer program, Leaders Enabling Advanced Dairy Safety (LEADS). Last year LEADS workshop trainings took place in Washington and Oregon, with 62 dairy safety leaders completing the course.
- Hosted workshop, using scenario-based training, in partnership with Dr. Progar and the Washington State Dairy Federation.

Next Steps

Currently manuscripts are being prepared for publication on evaluation of our trainings in Washington state. We will continue to work with our partners to develop a sustainable regional training solution for dairy workers, including Spanish language.

Resources

Partnership for Dairy Safety and Health | Pacific Northwest Agricultural Safety and Health Center (washington.edu)

Training

Dairy Safety Toolkit | Pacific Northwest Agricultural Safety and Health Center (washington.edu) ENG/SP

Research Papers

Austin E, Adams-Progar A, Cruz I, Palmandez P, Dilley S, Yost M. Dairy Safety Kit: An Innovative Online Based Training and Outreach Solution. Journal of Agromedicine. 2021-2, 25(3):232.

Benoit M. Efficacy in Occupational Safety and Health Training of Dairy Workers: Predictors of Test Performance on a Dairy Safety Knowledge Test from a Demographic Cohort. 2021 Master's of Public Health Thesis. Department of Environmental and Occupational Health Sciences, University of Washington, Seattle, Washington. ResearchWorks.

Adams-Progar A, Kristula M, Hain MV. Dairy Cattle Handling Extension Programs: Training Workers and Cattle. The Journal of Extension. 2019, 57(4):7.

Certificate recipients at a LEADs dairy safety training

SAFETY SURVEILLANCE FOR PACIFIC NORTHWEST COMMERCIAL FISHING: Risk Information System for Commercial (RISC) Fishing

YEAR 6 of 6 (2016-2022)
PIs: Laurel Kincl, PhD, CSP, Associate Professor
Viktor Bovbjerg, PhD, MPH, Professor
Oregon State University

https://deohs.washington.edu/pnash/fishing-safety

Challenge

Commercial fishing is vital to Pacific Northwest economies and communities. Compared to other industries, it is one of the most hazardous due to higher rates of serious injuries and deaths. There is a need for risk information systems to identify the causal factors of these injuries to better inform and evaluate prevention solutions.

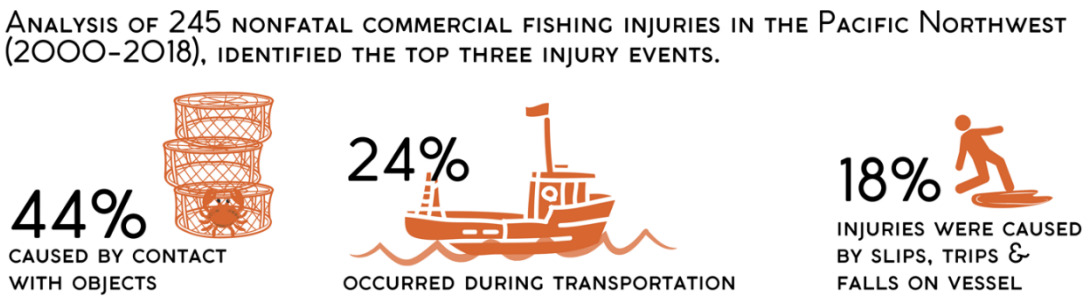
Project Overview

This comprehensive data project, RISC Fishing, used multiple datasets to estimate injury risk and risk factors for Pacific Northwest commercial fishing. Our goal was to work in partnership with fisheries to pinpoint and address hazards. RISC Fishing developed a new Commercial Fishing Incident Database (CFID) to provide routine, accurate, and automated data linkage that is currently in use by NIOSH and industry partners.

> "The redesigned CFID has been instrumental in our ability to be responsive to stakeholders. Since its rollout, we have fulfilled numerous data requests from fishery managers, the US Coast Guard, marine safety trainers, and journalists."
>
> - Samantha Case, NIOSH Western States Division

Findings to Date

- Analysis of 245 nonfatal commercial fishing injuries in the Pacific Northwest (2000-2018), identified the top three injury events:
  Contact with objects (108 events). Fishing gear (40%) was the dominant injury source, most often due to hauling the fishing gear (22%). Handling heavy loads (32%) and contact with unsecured objects (27%) often resulted in injuries.
  Transportation (58 events). Most often occurred in the catcher-vessels (93%) and smaller vessels (< 5 crew) (74%). Vessel casualties (91%) were common and often due to striking rocks/bottom (29%) or fire and explosion (19%). Crew abandoned to water (38%) due to no life raft or raft malfunctions.
  Slip, trip, and fall injuries (43 events) typically happened with onboard traffic (49%). Such events were largely experienced by the catcher-processors (44%) including large vessels with >100 crew (28%).
- Analysis of 93 commercial fishing fatalities found that vessel casualties were the most common incident (67%). Falls overboard (20%) most commonly occurred with deckhands (71%) and in the Dungeness crab fishery (41%). The two main causes were slips and trips (35%) and being knocked by gear or gear entanglements (29%). None of the fall-overboard victims were wearing PFDs.



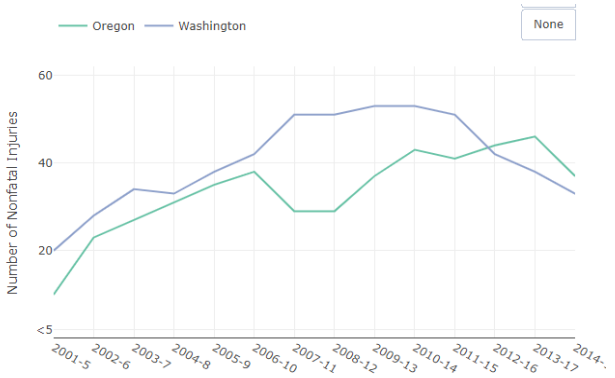
Other Accomplishments

- Successful completion of the CFID 2.0 and continues to be managed by the NIOSH Western States Division.
- 16 outreach products and 3 trade articles. Products included Hazard Sheets, Placemats and RISC Fishing Findings were developed to promote injury prevention.
- A publicly available interactive injury data visualization tool, **RISC Commercial Fishing Injury Data Visualization.** Users can explore trends by state, injury event, source of injury, fishery and gear type.
- In 2022 our 'Fishing Fridays' shared RISC findings and resources for mental health. In total 24 social media posts were developed reaching 814 people.
- The Haddon matrix analyses used were constructive to identify potential nonfatal injury-associated factors.
- An evaluation of state trauma registry data showed that state trauma system data may be of limited utility in identifying commercial fishing injury incidents, but may be more useful in identifying farming or logging incidents.
- RISC Fishing partners with the CDC/NIOSH Commercial Fishing Safety Program and was guided by a Technical Advisory Board (TAB), including the United States Coast Guard, Washington and Oregon fisheries management professionals, the Oregon Health Authority, the National Oceanic and Atmospheric Association, the Alaska Marine Safety Education Association (AMSEA), health and safety professionals, and Sea Grant commercial fishing extension agents. An evaluation of the TAB demonstrated the strength of their contributions toward the project and reciprocal benefits to their programs.

Social media card reporting RISC findings

Next Steps

Dissemination will continue to take place regionally at dockside exams, commodity meetings, first aid and safety training, social media, and through Oregon Sea Grant. Through Dr. Bovbjerg's new 5-year RISC project with PNASH, we will continue CFID's detailed analyses, interpret the result with fishing stakeholders, and continue to improve the system in collaboration with our partners.



Interactive data visualization on website showing 15 years of injuries in Oregon and Washington states. See website.

Resources

RISC – Risk Information System for Commercial Fishing | Oregon State University

Commercial Fishing Injury Data Visualization | RISC Fishing | Oregon State University

Training

FLIPP Resources for Commercial Fishermen | Oregon State University

FFAST – Fishermen First Aid and Safety Training | Oregon State University

Research Papers

Vaughan A, Bovbjerg V, Doza S, Kincl L. Evaluation of a Technical Advisory Board for an Occupational Injury Surveillance Research Project: A Qualitative Study. Health Science Reports. 2022 Aug 8;5(5):e777.

Doza S, Bovbjerg VE, Vaughan A, Nahorniak JS, Case S, Kincl LD. Health-Related Exposures and Conditions among US Fishermen. Journal of Agromedicine. 2022 Jul;27(3):284-291.

Nahorniak J, Bovbjerg V, Case S, Kincl L. Application of data linkage techniques to Pacific Northwest commercial fishing injury and fatality data. Injury Epidemiology. 2021 Jul 5;8(1):26.

PRACTICAL SOLUTIONS FOR PESTICIDE SAFETY

YEAR 6 of 6 (2016-2022)
PI: Kit Galvin, MS, CIH
Senior Research Scientist, University of Washington

https://deohs.washington.edu/pnash/practical_solutions

Challenge

Handheld pesticide application takes place in farming and forestry work, and unintentional exposures can be common. Few evidence-based and practical solutions have been developed and shared across these industries.

Project Overview

PNASH works with farmers, educators, and researchers across the Northwest to test and develop solutions originally developed by growers and workers for themselves. We have expanded from our original airblast application systems, to now include handheld and greenhouse applications. Each solution is assessed for the goals:

1) reduce exposure,
2) are practical, compatible, and convenient,
3) support the requirements and training for state regulations and the revised US EPA Worker Protection Standard.

21 NEW SOLUTIONS

4 AGRICULTURAL INDUSTRIES

56 INTERVIEWS AND 7 SITE VISITS

Findings to Date

- 50% interviewees have story of adoption/use in field.
- Reviewers found the online solutions visually appealing and accurate and the curated solutions useful.

Samples of three new solutions

Accomplishments

- 21 new solutions have been published in English and Spanish on our webpage. Each solution describes how pesticide exposure is reduced and share practices to reduce the exposure including a supply list, tips, photos, setup and use instructions, and links for more WPS information and relevant regulations.
- Developed a new remote approach to engage partners by providing a custom tablet used to gather pictures and conduct live walk-throughs and interviews.
- Completed adoption scenarios. For example, a participant adopted the room access protocol solution, motivated by the use of less pesticide products because they would only need to treat one room instead of several rooms.

- Developed a new PNASH e-learning course, Pesticide Learning Solutions, to demonstrate how to read a pesticide label, discuss pesticide exposure pathways and how to reduce exposure, share best practices for pesticide application, and provide pesticide safety resources from PNASH and regional and national sources.

Next Steps

In the coming year, we will be presenting solutions, developing flashcards for use in training, and evaluating grower interest and use. Our promotion plan includes social media and meetings (remote and in-person). We are partnering with Oregon State University Pesticide Safety Education Program (PSEP) and the national Pesticide Educational Resources Collaborative (PERC). In addition, we will also be participating in agricultural health and safety events in Washington and Oregon to share solutions and resources.

"I like the ease of it, looking at what you want to adopt and tell you the pro/cons."
- Ag Worker

Please reach out to pnash@uw.edu for assistance in sharing these solutions in your trainings.

Resources

Practical Solutions for Pesticide Safety | Pacific Northwest Agricultural Safety and Health Center (washington.edu)

Training

Practical Solutions for Pesticide Safety PNASH Online On-Demand Courses | Pacific Northwest Agricultural Safety and Health Center (washington.edu)

NASD Agricultural Training Series (nasdonline.org) (e-Learning course) Keeping Pesticide on the Farm: Practical Solutions for Minimizing Family Exposure

COMING SOON! Flash cards: Practical Solutions for Pesticide Safety

"I highly recommend this practical solution for greenhouses. All the mixing and loading can be done at the application site. Also, I am able to fit all the supplies and products in transport buckets."
- A Greenhouse Worker

PNASH PILOT PROJECT PROGRAM

CLEAN AIR – I CARE workshop roundtable discussions

Pilot Project Program

The PNASH Center administers a Pilot Project Program (PPP) to support new initiatives in research, intervention, and translation. The goal of the PPP is to stimulate and support new and expanded research, prevention/intervention, and education/translation activities in the area of occupational safety and health in Northwest farming, forestry, and fishing. In the 2016-2021 cycle, The PPP program was administered annually with 2-3 projects funded at $25,000 per project, with increased funding in Year 6.

The program will follow the mechanism previously developed and implemented by the PNASH Center. This is a formal process that includes: 1) release of a request for proposals for Northwest investigators; 2) internal and external review and scoring of proposals; 3) notification of award or request for revision and resubmission; and 4) a record of program process and project results.

Previously funded pilot projects have allowed the Center to address emerging issues, bring in new investigators, and address needs/industries not included in other projects. Over the Center's 23 years, it has funded 56 pilot or feasibility projects, including 14 in the 2016-2021 cycle.

Funding Priorities

This program provides both early stage and experienced investigators with opportunities to:

- Develop preliminary data or expertise to support new proposals,
- Adapt or evaluate proven tools or techniques for new populations, workplaces, or delivery methods,
- Evaluate the merit of new ideas, or new approaches to existing methodologies or datasets,
- Explore new directions in research, prevention/intervention, and education/translation,
- Apply their expertise to the field of agricultural safety and health, and
- Leverage emerging technologies in supporting a healthy, safe, and productive AgFF workplace.

In addition, the PPP, places a special emphasis on supporting meritorious projects that widen PNASH's work in the industries of fishing and forestry, and projects that support early-stage investigators.

In the following pages please find reports for the pilot projects that concluded this year.

DETERMINANTS OF STRESS, FATIGUE, AND INJURY RISK FOR LOGGERS AND LOG TRUCK DRIVERS

YEAR 1 of 1 (2021-2022)
PI: Marissa Baker, PhD
Assistant Professor, University of Washington

https://deohs.washington.edu/pnash/characterizing-determinants-stress-fatigue-and-injury-risk-log-truck-drivers

Challenge

Loggers and log truck drivers are at high risk for fatigue and stress, due to long working hours and high job demands. Few studies have characterized the determinants of fatigue, risks, and solutions for this vital workforce.

Project Overview

In partnership with industry and logging safety leaders, this small project assessed the determinants of stress and fatigue among loggers and log truck drivers to inform potential solutions. This project developed from Idaho industry concerns over a spike in log trucking accidents. We conducted a survey at the Intermountain Logging Conference and followed up with phone interviews. Secondly, we quantitatively analyzed NW log truck accident data, from workers compensation data in Idaho, and for the NW, the Federal Motor Carrier Safety Administration's Motor Carrier Management Information System (MCMIS).

"Because I'm tough enough and I'm going to get that next load. Maybe I didn't get as much sleep as I should have last night, but I'm feeling okay right now, and so I'm going to go get that next load."
- Log Truck Driver

Findings to Date

- Surveyed 46 loggers (52%), log truck drivers (20%). 48% were also owners. Findings on: **sleep & fatigue, work schedules, job demand & support, injury**.
- Generally, respondents reported few life stressors, and good physical health, quality of life, including on-the-job safety support.
- Work Schedules: 49% worked more than 55 hrs/week and 21% had workdays starting between 1:30-4:30am.
- In the last year, 15% received healthcare for work-related pain and 5% had a work-related injury that resulted in time off of work.
- Analysis of data from Associated Loggers Exchange (2011-2021) in Idaho, found the most common accident claims were from overexertion, struck by object, and falls, and the most common injuries from strains, contusions, and factures. Nearly 60% of claims were for log truck drivers age 45-64, and those employed 3 years or less (58%).
- Analysis of MCMIS data revealed that among 647 log truck crashes in WA, OR, ID, MT between 2015-2019:
  - Fatalities were more common on 2-way roads without a barrier.
  - Log truck crashes in Washington or Oregon are less likely to result in injury or fatality relative to those occurring in Idaho or Montana.

At work
- High job satisfaction
- 93% rate work high paced
- 37% take no breaks

Fatigue
- 76% feel sleepy at work
- 67% get 5-7 hours of sleep; 9% < 5 hours

Next Steps

This is a report of preliminary results that will be shared back to industry partners to refine interpretation of results and discuss solutions. Future work could include uses of MCMIS data, and fatigue awareness and prevention strategies. The study team will be publishing these findings in 2 papers and reporting back results to our participants at the 2023 Intermountain Logging Conference.

[A] group of truckers that were delivering one of the sawmills were able to collaborate together, cooperate together, and basically ease up enough. And all the guys did it together. And so the sawmill was like, "Okay, we need to pay more to get our logs to our mill." - Log Truck Driver

CLEAN AIR – I CARE
STRESSORS OF BALANCING CHILDCARE, WORK, AND CONCERN OF WILDFIRE SMOKE EXPOSURES FOR FARMWORKER PARENTS

YEAR 6 of 6 (2021-2022)
PI: Savannah D'Evelyn, PhD
Postdoctoral Fellow, University of Washington

CLEAN AIR–I CARE: BALANCING CHILDCARE, WORK & WILDFIRE SMOKE FOR FARMWORKER PARENTS | Pacific Northwest Agricultural Safety and Health Center

Challenge

Working outside in the heat and wildfire smoke makes summer farm work grueling. But for parents, these challenges are compounded by the pressure of balancing work and childcare, and concerns about their children's health in the smoke. Farmworkers also have few wildfire and smoke information sources that are non-written or in Spanish.

Project Overview

This community-academic project sought to describe the impact of wildfire smoke has on agricultural families' ability to balance work, childcare, and concerns about smoke exposure. Our purpose was to identify community needs, priorities during wildfire season, and propose solutions to support the health and well-being of farmworker families. In collaboration with Wenatchee-based nonprofit Community for the Advancement of Family Education (CAFÉ), 20 agricultural families were recruited for interviews to share their experiences and concerns during wildfire season. Two 'Clean Air – I Care' Community Discussions were organized, in Wenatchee and Okanogan, with 80 participants. During these events, findings from the interviews were shared, roundtable discussions were facilitated, and resources were shared with participants in Spanish. "The events were focused on hearing from farmworkers," said Savannah D'Evelyn, who co-led the project with Laura Rivera of Wenatchee CAFÉ. Community partners including Clean Air Methow, Northwest Justice Project, and other local organizations also provided resources.

Findings to Date

- Six major themes identified core needs in: Preparing homes for smoke events, worksite resources for smoke events, worksite response, more accessible summer childcare, family stress, and resources for parents.
- During smoke events, farmworkers often worry about how their families are doing while they are at work, and about keeping kids inside.
- Parents emphasized their need for more reliable, affordable, and accessible childcare during the growing season.
- There is a need for more smoke-related safety information, and a need to find ways to help families cope with large smoke events.
- There were concerns about smoke exposure for kids, who are especially vulnerable, such as those with asthma.
- More resources are needed to make homes a clean air space during wildfires.
- During the community discussions, farmworkers shared that evacuation notices and smoke information were not widely shared in their communities.

"Picking up your kids in a car that is full of ash does not feel safe—on top of the uncertainty of not knowing exactly what the health impacts are."

"information about smoke or fire is posted at my jobsite, but it is not always in Spanish, and not everyone sees it."

- Farmworker Participants

Other Accomplishments

- Established new partnerships and a model for farmworker engagement.
- Participants found the sessions were useful and, in a format, accessible for Spanish speakers and those who cannot read.

Next Steps

The Clean Air – I Care team is preparing a report highlighting farmworkers' comments for sharing with community organizations, i.e. childcare and health care providers. Recommendations and resources will be presented back to community organizations.

Resources

Supporting farmworker families through smoke season | Environmental & Occupational Health Sciences
Chelan County, WA - Wildfire Smoke Resources for Agricultural Families | Environmental & Occupational Health Sciences
Okanogan County, WA - Wildfire Smoke Resources for Agricultural Families| Environmental & Occupational Health Sciences

Training

Home - Washington Fire Adapted Communities Learning Network

"We now know more about tools that could help provide peace of mind and solidarity to a vulnerable yet important community. I am very grateful for the opportunity to engage and learn from the farmworkers."

- Laura Rivera, Wenatchee CAFÉ

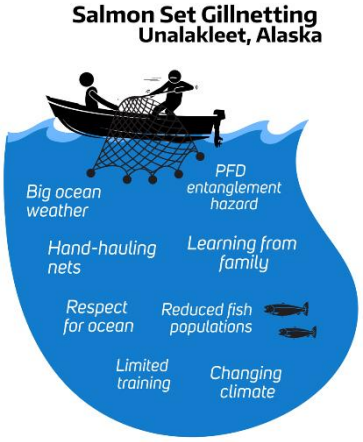
IMPROVING COMMERCIAL FISHING SAFETY IN NORTON SOUND: Knowledge from Alaska Native Salmon Set Gillnetters

YEAR 1 of 1 (2021-2022)
PI: Leann Fay, PhD
Researcher, Alaska Marine Safety Education Association (AMSEA)

https://deohs.washington.edu/pnash/improving-commercial-fishing-safety-norton-sound-knowledge-alaska-native-salmon-set-gillnetters

Challenge

The salmon set gillnet fishery has the highest fatalities in Alaska and fatalities for Alaska Native workers are on the rise. Ten out of fifteen fatalities from commercial fishing vessel disasters in Alaska from 2010-2014 occurred in open skiffs, the type of vessel used in salmon set gillnetting. Emergency equipment such as CO2 cartridges in inflatable PFDs cannot be easily or affordably shipped to remote fishing villages in Norton Sound and commercial fishing safety training there has not been tailored for open skiff fishing or for the unique needs and knowledge of fishermen there.



Project Overview

This community participatory project in Unalakleet, an Alaska Native salmon fishing community, aimed to understand factors that influence safety for salmon set gillnetters in Norton Sound. Ten semi-structured interviews were conducted to understand factors that influence safety. The interviews covered questions on how they learned to fish, crew dynamics, boats, equipment, preparation, training, weather, experiences that felt unsafe, challenges, and lessons, stories, or knowledge they wanted share.

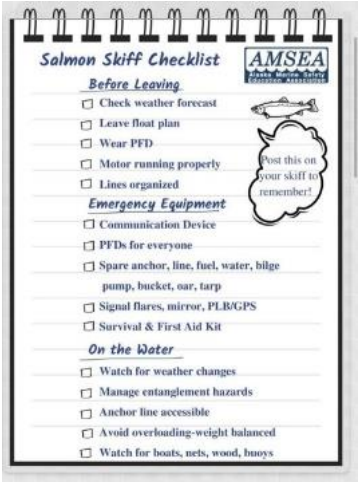
Findings to Date

- Most participants learned to fish young from family and safety attitudes and lessons are passed on by family. Fishing is a lifestyle as well as their livelihood.
- Setnetters use open skiffs in the 20s-foot range and need to know how to maneuver a small boat in big waves when weather is rough.
- PFDs are often taken off because the type III vests that are accessible and affordable are uncomfortable, hot, and pose a major entanglement hazard when working with the net.
- Commercial fishing safety training is limited in remote communities and most participants learn safety practices primarily by personal experience and from family knowledge.
- Participants reported health benefits such as maintaining good physical shape, but also negative effects such as joint aches, arthritis, financial stress, and difficulty fishing as they age.
- Respect of the ocean and awareness of weather and surroundings was reported as the most important strategy to stay safe on the water.
- Stories were shared of falls overboard, capsizing, and fatalities and hazards such as being overloaded with fish, entanglement, remoteness, and maneuvering a small boat in big waves. Dangers included changes in climate such as stronger winds and changes in weather patterns and wind direction.

> "To be educated in marine safety is essential to fishermen as awareness can make all the difference in the world. Out on the ocean, anything can happen, even with the most experienced fishermen. Being prepared in any given situation is crucial and is a matter of life and death. To share this knowledge through awareness and training is a wonderful start."
>
> - Melanie 'Mayugiaq' Sagoonick, community research partner and commercial salmon setnetter in Unalakleet for over 30 years

Next Steps

AMSEA is in the process of developing a training to be held in Unalakleet, sharing research findings, and distributing 30 inflatable PFDs with training and an assessment of PFD preferences. Research findings and next steps for future education, training, resources, and research will be discussed at the training. Findings will be used in the future to improve awareness, promote solutions, and develop tailored training programs for this population and fishery.



Safety checklist for salmon skiffs.

Resources

AMSEA Conducts Marine Safety Research with Unalakleet Setnet Fleet

Training

Integrated in AMSEA Training, AMSEA - Alaska Marine Safety Education Association

COMING SOON! Stickers and phone bags with checklists for:

- Pre-departure steps
- Emergency equipment
- Hazards to avoid

COMING SOON! Strait Science Series lecture to broadcast for Norton Sound residents in collaboration with UAF and Alaska Sea Grant on January 12, 2023. Strait Science | Northwest Campus (uaf.edu)

PESTICIDE EXPOSURES AND RISK PERCEPTIONS AMONG MALE AND FEMALE LATINX FARMWORKERS IN IDAHO

YEAR 1 of 1 (2021-2022)
PI: Carly Hyland, PhD
Postdoctoral Scholar, Boise State University

https://deohs.washington.edu/pnash/pesticide-exposures-and-risk-perceptions-among-male-and-female-latinx-farmers-idaho

Challenge

Previous studies have documented high levels of pesticide exposure among Latinx farmworkers. However, most research has focused almost exclusively on men, despite women representing an increasing proportion of the agricultural workforce. Some studies have indicated that women farmworkers experience Acute Pesticide Poisonings (APPs) at significantly higher rates than their male counterparts.

Project Overview

Our goal was to examine pesticide exposure and perceptions of pesticide risk, to assess determinants of pesticide exposure among men and women Latinx farmworkers in Idaho. We used a combination of urinary biomonitoring for common insecticides and herbicides, questionnaires, and open-ended qualitative interviews. We recruited 62 participants through partnerships with trusted community organizations during the pesticide spray season from April-July 2022. We conducted a second visit with 57 of those participants.

"I like to work in the fields… all the time working outside… and I feel that I am contributing to something bigger, and that's important."
- Study participant

Results to Date

These are preliminary results with health risks and recommendations in-development.

For all participants (30 men and 32 women):

- The most common crops included wheat, corn, onions, alfalfa, and carrots.
- Participants who worked with wheat had higher concentrations of 2,4D and Dicamba (herbicides) and MDA, representing the insecticide malathion.
- Those who didn't wear gloves while working had higher concentrations of 2,4D (herbicide) and TCPy, representing the insecticide chlorpyrifos.
- With the COVID-19 pandemic, some farmworkers started washing their hands with hand sanitizer instead of soap and water, which is less likely to remove pesticides.
- The majority correctly believed washing hands, wearing protective equipment, changing clothes, and showering reduced their exposure to pesticides.
- More than 60% felt their health is harmed by pesticides, and more than 80% said that they think other farmworkers' health is harmed by pesticides. Women were slightly more likely to report that their and others' health may be harmed.

For pesticide applicators (10 men, 2 women):

- 50% reported wearing a respirator 'rarely' or 'sometimes' while applying pesticides.
- Reasons PPE was not worn include: that participants felt the pesticides they use are not dangerous, because it was not provided by their employer, or because it was too hot or uncomfortable.

"What worries me the most is that we are going to be poisoned from pesticides… we don't wear masks because of the temperatures and the sun."
- Study participant

Next Steps

We are currently conducting data analysis to examine predictors of pesticide exposure, including differences by gender, and preparing manuscripts for publication. We are working with PNASH and other science translation teams to interpret these results and disseminate our findings to participants and community partners.

PNASH CORES

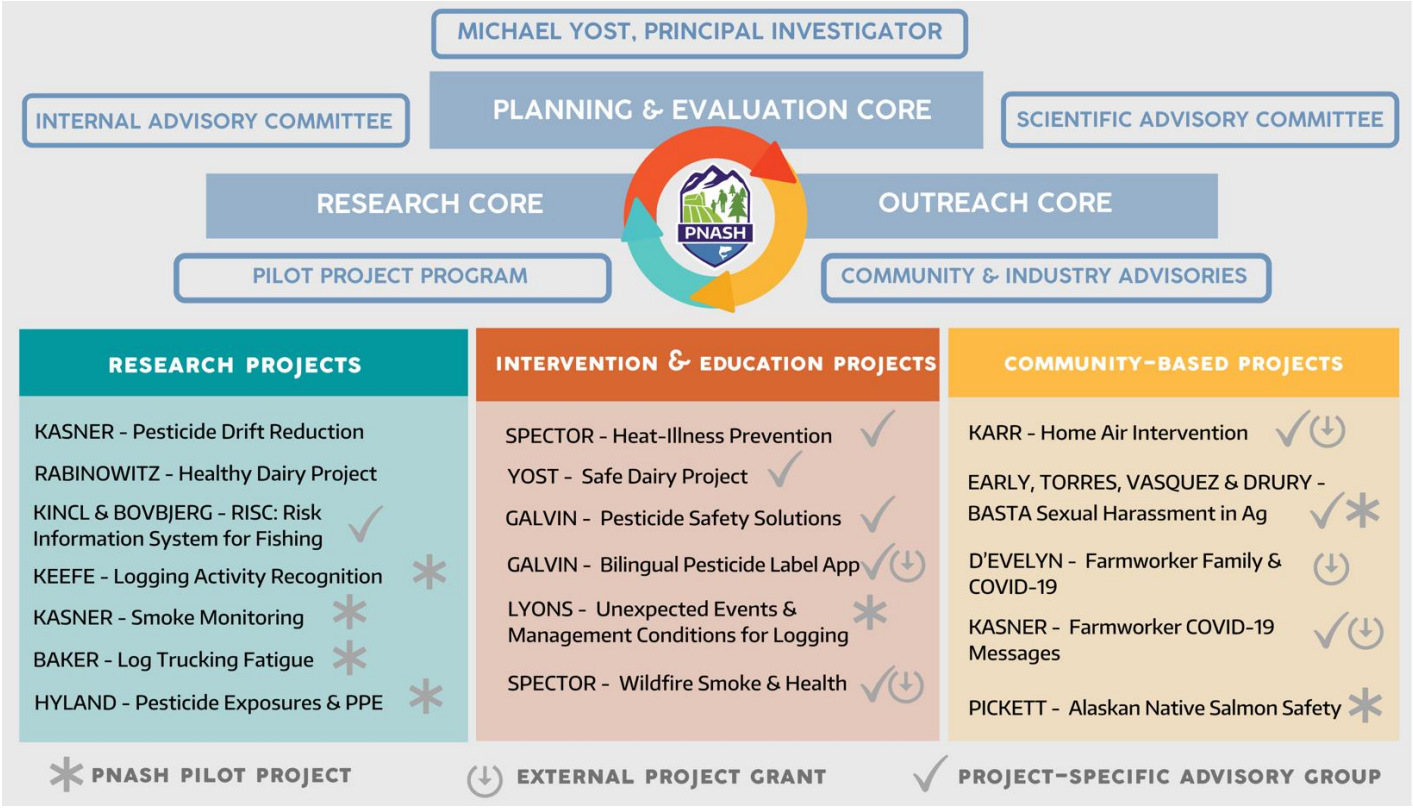
Certificate recipients at the Dairy Safety Training.
Photo courtesy of Idanis Cruz.

Planning and Evaluation Core

The Planning and Evaluation Core provides the infrastructure and support for the entire Center, conducts strategic planning, and assists in the implementation and evaluation of individual project and program objectives. Our cycle closed in September 2022, completing a 6-year cycle of research activities and engagement across all three AgFF industries. We also successfully competed with a new portfolio of project proposals for our next 5-year program cycle. Read [New federal grant to improve Northwest agricultural safety and health | Pacific Northwest Agricultural Safety and Health Center].

Organization & Advisories

PNASH Center 2016-2022 Organizational Chart and Year 6 Pilot Projects



PNASH Leadership

In 2022, Dr. Laurel Kincl was honored with a new position as Associate Dean for Academic and Faculty Affairs Professor at Oregon State University's School of Biological and Population Health Sciences. Dr. Kincl continues to serve as a leader for PNASH and the nation in commercial fishing safety research.

Dr. Edward Kasner, received a new position as Assistant Teaching Professor at the University of Washington's Department of Environmental and Occupational Health Sciences, School of Public Health. Dr. Kasner continues to serve as Outreach Director for PNASH and a leader in pesticides exposure research.

Kit Galvin, Senior Scientist, retired in 2022 after fifteen years of service to PNASH and Northwest agricultural workers safety. In addition to her technical expertise, she championed the involvement of workers and growers in the design of 'practical solutions,' and built resources that were bilingual and in plain language. Ms. Galvin continues to serve as an advisor to PNASH.

Strategic Planning

Our concluding year of the 2016-2022 award cycle, PNASH engaged in strategic planning, including:

- Personal interviews with stakeholder advisors conducted by the PNASH Internal Advisory Committee members.
- Stakeholder advisory activities are shared under the Outreach Core and each project. Each met this last year, following up on progress and engaging our stakeholders in future planning.
- The Scientific Advisory Committee met in Year 6, providing valuable feedback that shaped our next 5-year cycle's priorities. Current members Linda McCauley, Kent Anger, and Howard Kipen were asked to continue in their roles. All accepted.

These activities in combination with the Internal Advisory Committee's advice resulted in:

Reaffirming PNASH Mission and Vision

VISION Research for healthy workers, strong communities & productive agriculture

MISSION The Pacific Northwest Agricultural Safety and Health Center conducts research and promotes best safety and health practices for Northwest producers, workers, and communities in farming, fishing, and forestry.

NEW CYCLE THEME Growing agricultural safety and health with technology

Refreshed Strategic Plan

Our Strategic Plan for 2018 was refreshed with explicitly stated research priority topics (see below).

Other additions last year to our Strategic Plan included:

- Intervention technology section added with an emphasis on: Communication, geolocation, biomonitoring, robotics, sensors, AI, and engineering controls.
- Core principle modified to, 'Embody scientific integrity, transparency, and the principles of cultural humility, equity, inclusion, and justice in our work. Continuous improvement in culture-centered, antiracism practice at PNASH.'

PNASH projects are competitively reviewed and funded. Topics we propose:

- Address hazards that are the most serious, affect the greatest number of workers, and where that research will make a difference.
- Meet the needs of Northwest employers, workers, and service providers.

Research & Intervention Priorities

FARMING
Animal handling injuries
Wildfire smoke exposure & heat-related illness
Machine - ATV, tractors, PTOs
Pesticide exposure
Respiratory
Sexual harassment
Slips & falls – milk barn, orchard ladder

FORESTRY
Injuries - lacerations, fractures, head
Machine – Chainsaw, harvesters, skidder, winches
Site planning (eg, in-the-clear)
Slips & falls – forest terrain
Strains – back
Struck-bys
Transportation – crew crummy, log trucking/hauling

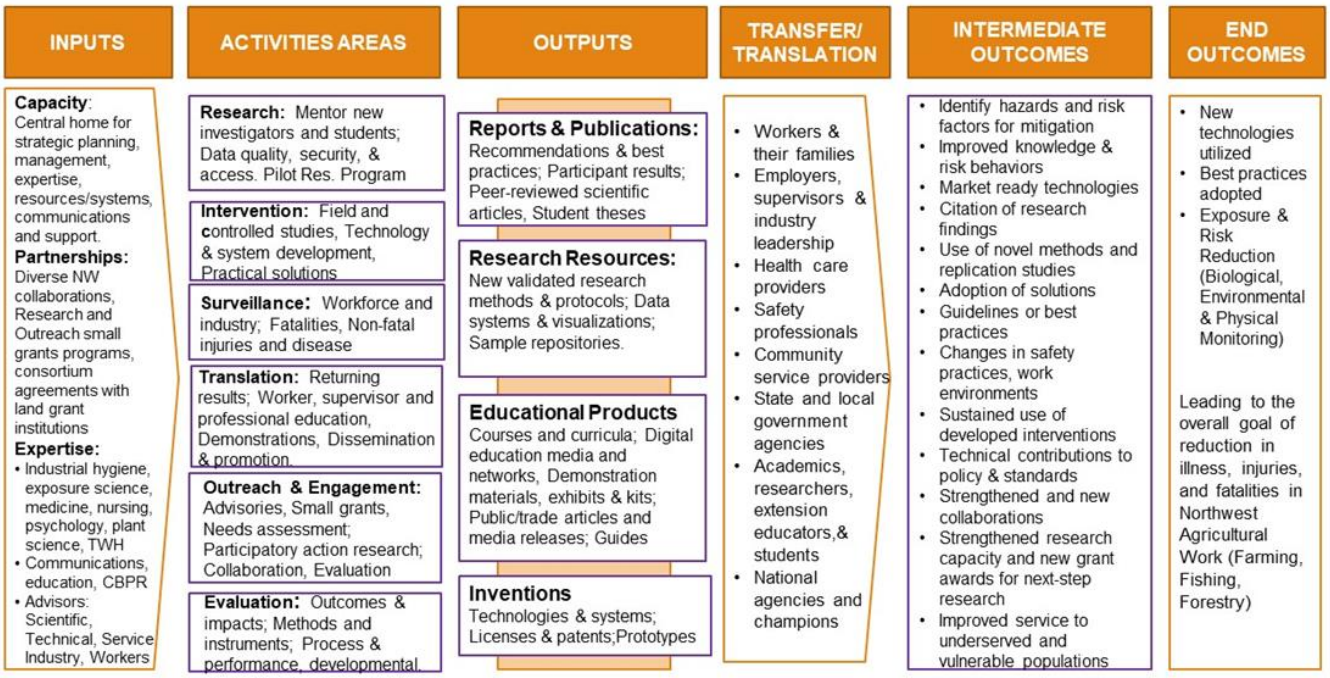
FISHING
Injuries – crushing, fractures, sprains & strains
Gear/Equipment – struck by, pot-launch, blocks/winches
Slips & falls – deck, stairs, fish holds
Falls overboard
Vessel disasters

CROSSCUTTING Emergency preparedness/response – communications, first aid, life-saving equipment

Fatigue
Wildfire smoke exposure & eat-related Illness
Communicable disease
Mental Health
Musculoskeletal - repetitive motion, vibration, cumulative trauma
Noise-induced hearing loss
Vulnerable Populations – contract, migrant/seasonal, older, pediatric, tribes

Refreshed PNASH Logic Model

Likewise, our strategic planning renewal included and refreshed PNASH Logic Model. This model served as framework for each new proposed PNASH project.



Evaluation Program

PNASH's evaluation program ensures that our efforts are relevant, feasible, and sustainable; that they reflect the best science and practice; and that they are consistent with our ultimate goal of reducing exposures, injuries, and illness.

Ag Health Indicators. Our Ag Health Indicators program conducted regular surveillance activities, while also building new data repositories and visualization systems. Ag Health Indicators successfully expanded from its PNASH Center Evaluation home into new projects led by Dr. Elena Austin (e.g. Commercial Fishing Injury Data Visualization | RISC Fishing | College of Public Health and Human Sciences | Oregon State University). Drs. Austin and Kasner mentor our faculty and students in data indicators and visualizations and have hosted internal data workshops on the utility of R and R-Studio for data analysis and visualization, including engagement with partners and stakeholders with this data We found there was an interest in regular investigator training and Open Data Kit systems. Our overarching PNASH goal is to modernize our data management system to support replication and transparency.

Performance, Developmental, and Outcome Evaluation. PNASH's evaluation program moves beyond traditional program monitoring, using a developmental approach to assist project teams in improving efficacy and outcomes. PNASH's 21-22 evaluation accomplishments include an update to our program and outcome monitoring tools: PNASH's custom "HARVEST" database for PI reporting; Logic Model Template, Outcomes Table, and PNASH Evaluation Guide. This suite of tools was completed to harmonize with the new objectives and tools drafted by NIOSH in Burden, Need, and Impact and Contribution Analysis. Biannually, PNASH internally assessed progress and impacts. We used a logic model framework in project and program dissemination evaluation plans in conjunction with the Outreach Core and project teams. In these sessions, we specifically assessed impact opportunities, which are areas where there is an emerging need and a target audience for a health or safety intervention shows interest and acceptance in the intervention. In addition, Year 6 saw the launch of a new elearning platform. This platform was developed with an outcome evaluation component of live and asynchronous sessions through personal interviews.

Contribution Analysis Capacity Building & Pilot of Heat-related Illness Multi-site Analysis. PNASH joined NIOSH evaluators and a multi-center evaluation team in contribution analysis, with Ms. Harrington serving as Chair of the pilot on Heat-related Illness research and education. Our resulting analysis, including the logic model and evidence table, was used by NIOSH Evaluators as examples in their training and to inform NIOSH's development of future guidance and common tools.

Academic Collaboration

We recognize that collaboration in academia happens through the creation of space and platforms for our faculty and students to come together and foster new ideas. This past year, the PNASH Center was involved in conferences that served as space for collaboration, presentation, and discussion.

Coordinating Center for AFF Center Directors. PNASH served a two-year term as the coordinating center for the NIOSH AgFF Directors, with this term ending in July 2022. This group of 42 leaders of NIOSH AFF and Ag Centers coordinate on national issues and cross-center initiatives. Meetings took place monthly by video conferencing. In FY21-22 we wrote a NIOSH blog on the history of the Ag Center program, coordinated Ag Center legislative communications, and provided a forum for shared planning for the Center program renewal.

Association of University Programs in Occupational Health Sciences (AUPOHS). Dr. Michael Yost served a term as President of the Association of University Programs in Occupational Health & Safety (AUPOHS). This umbrella organization is representative of the membership of the National Education and Research Centers, Agricultural Safety and Health Centers, and the Total Worker Health Centers, sponsored by NIOSH. It serves to coordinate priorities and communications between these Center programs. AUPOHS meets remotely and in-person annually.

International Society for Agricultural Safety and Health (ISASH). PNASH participated and sponsored the June 2022 conference. ISASH is the key professional organization with active workgroups in our field, and is open to extension into forestry and fishing fields as well. Our participation includes attending meetings of Ag Center Evaluators, Coordinators, and Outreach groups, and the Children's Agricultural Safety and Health Network.

Agricultural Center Evaluation, Communication, and Outreach (ECO) group. The ECO group coordinates cross-center activities and public information sharing. We have developed common indicators for social media campaign evaluation; and served as a launching ground for COVID-19, mental health, and contribution analysis of multi-site projects.

Ag Injury News Clippings Database. Ms. Harrington serves on the project Steering Committee and PNASH is contributing member for northwest injury reporting. http://www.marshfieldresearch.org/nfmc/aginjurynews.

Ag Center Surveillance Working Group. PNASH investigators Drs. Bovbjerg and Kasner were active in this workgroup, whose purpose was planning future surveillance best practices. Erica Scott of the NEC Center organized this group.

New PNASH-related Awards

Elena Austin, PhD, MS, Assistant Professor, University of Washington. **US EPA**. **School Resilience to Wildland Smoke and Outdoor sources of Fine & Ultrafine Particles.** See article, New grants promote cleaner classroom air | Environmental & Occupational Health Sciences (washington.edu)

Edward Kasner, PhD, Assistant Teaching Professor, University of Washington. **Subcontract award flowed through WSA, Washington State Safety and Health Improvement Program. Integrating Air Quality Sensors in AgWeatherNet.** This project aims to improve the air quality monitoring for worker safety through integration of particulate matter (PM)2.5, PM10, O3 and CO2 sensors on WSU AgWeatherNet (AWN) managed weather stations.

Emerging Issue Fund

Through PNASH's Emerging Issues Fund, we took rapid action to address an emergent issue or cultivate a developing partnership. The Fund allocated up to $50,000 direct costs per year. Awards are available to active investigators within PNASH's Northwest network. Project awarded in Year 6 included:

John Flunker, Postdoctoral Scholar, University of Washington - **Identifying Emerging Occupational Safety and Health Issues among Agriculture, Fishing, and Forestry Workers in the Pacific Northwest Region**

This work follows two themes: 1) summarize and communicate injury and fatality rates in the Pacific Northwest region; and 2) elucidate factors related to the risk of workers experiencing occupational illness and injury, specifically from heat and wildfire smoke exposures. For theme 1) we focused on summarizing publicly available worker numerator and denominator estimates for injuries and fatalities, highlighting gaps in information, and producing products to disseminate these data, such as a PNASH fatalities dashboard and a GitHub page, both for stakeholders and researchers to examine available data and occupational group summaries. For theme 2) we focused on factors related to the risk of occupational heat and wildfire smoke exposure, injury, and prevention among impacted outdoor workers. Specifically, we published two manuscripts on occupational heat exposure and illness, conducted field work measuring heat exposure, generated research relevant to the WA heat and wildfire smoke rulemaking process, developed methods for assessing wildfire smoke exposure among WA crop workers, and presented on heat and wildfire smoke exposure among crop workers at an international webinar.

Jennifer Otten, Associate Professor, University of Washington -

Review of Food Security and Agricultural Total Worker Health

This project's purpose was to review food security as a component of Total Worker Health. We examined the literature to assess how food insecurity measures have been related to total worker health in the past in the following areas: (1) What is the relevance/importance of food insecurity for worker health? Who among the working population experiences food insecurity? How and to what extent is food insecurity a determinant of health, safety, and productivity? (2) In what ways does food insecurity aligns with the Total Worker Health framework? How and to what extent has Total Worker Health focused on food security to date? How does food security relate to currently identified TWH issues of importance? How could TWH be applied to address food security going forward? (3) How and to what extent has food security been addressed in the workplace? How have workplace/workforce interventions been designed to address food insecurity for workers to date? The literature review is complete, a manuscript has been fully drafted, next steps are to circulate the manuscript to a handful of TWH reviewers and then submit the manuscript for peer-review and publication.

Elena Austin, Assistant Professor, University of Washington -

Mental Health Stressors Impacting PNW Spanish Speaking Agricultural Workers

This one-year project focused on the Latino farmworker - identifying workplace stressors contributing to mental health burden and develop a common language framework to enhance discussion of mental health, particularly between workers and employers. This project demonstrated there is a lack of resources for Spanish speakers and their mental health. End products include the development a new mental health questionnaire for Latino agricultural workers, key language and messages for this audience, and a website of resources. See Farmworker Stress and Anxiety Resources | Pacific Northwest Agricultural Safety and Health Center (washington.edu).

Supporting Students

Every year, the PNASH Center is fortunate to have talented and passionate students involved in our research. We would like to express our gratitude to these students and recognize their academic achievements, inspiring stories, and professional accomplishments. PNASH coordinates with multiple training and pathway programs for student support and research funding to work with PNASH projects. This included Undergraduate Research Experiences in Environmental Health (SURE-EH). Through a NIEHS training grant and other UW support, we can provide meaningful student internships with PNASH. NIOSH's Education and Research Center (ERC) offers training grant support, including the Occupational Health at the Human-Animal Interface OHHAI training program.

Our 2021-2022 Students

Allison Clonch
PhD Student, Environmental and Occupational Health
Determinants of Stress, Fatigue, and Injury Risk in Loggers

Emelin Delgado
BS Student, Medical Anthropology & Global Health, UW SURE EH Student
Heat Illness Prevention Among Agricultural Workers

Aarti Tandon
BS Graduate 2022, Food Systems, Nutrition, and Health, UW
SURE EH Student; Bilingual Pesticide Safety Project

Nicole Briggs
MPH Student, Epidemiology, UW
Heat Illness Prevention Among Agricultural Workers

Dennise Drury
MPH Graduate 2022, Environmental and Occupational Health,
Sexual Harassment Prevention for Farmworkers

Dorian Kenleigh, MD, MS
Occupational and Evironmental Resident, UW.
Cannabis worker respiratory health.

Judy Lysiak
Integrated Social Science
BS Graduate 2022
PNASH Program Assistant

Diana Marquez
MS Student, Industrial Hygiene, Class of 2021
Heat Illness Prevention Among Agricultural Workers

Elizabeth Rott
BS Graduate 2022, Environmental Toxicology, UW
Bilingual Labels Project

Miriam Flores
PhD Student, Epidemiology, UW
Heat Illness Prevention Among Agricultural Workers

Solaiman (Abeer) Doza
PhD Student, Environmental and Occupational Health, Oregon State University
Risk Information System for Commercial Fishing

Yoni Rodriguez
MS Graduate 2022, Occupational Hygiene, UW
Exploring Wind Ramping as a Determinant of Pesticide Drift

Pauline Trinh
PhD Graduate 2022, Environmental and Occupational Hygiene, UW
Metagenomics Investigation into the Healthy Dairy Worker Cohort

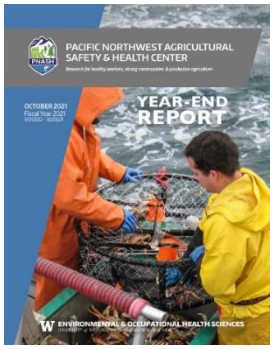
Eloise Zimbelman
PhD Graduate 2022, Forest, Rangeland and Fire Sciences, University of Idaho, **Evaluation of Wearable-based Activity Recognition Modeling Applications for Logging Safety**

Professional Development

UW PNASH Center supports professional development of our faculty, staff, and students. We offer training through our UW Professional Development Office, Northwest Occupational Safety and Health Center (ERC), and the professional associations that our personnel participate in (e.g., ISASH, AIHA, ISES). Staff are encouraged to pursue specialized training and benefit from tuition exemption from the University of Washington.

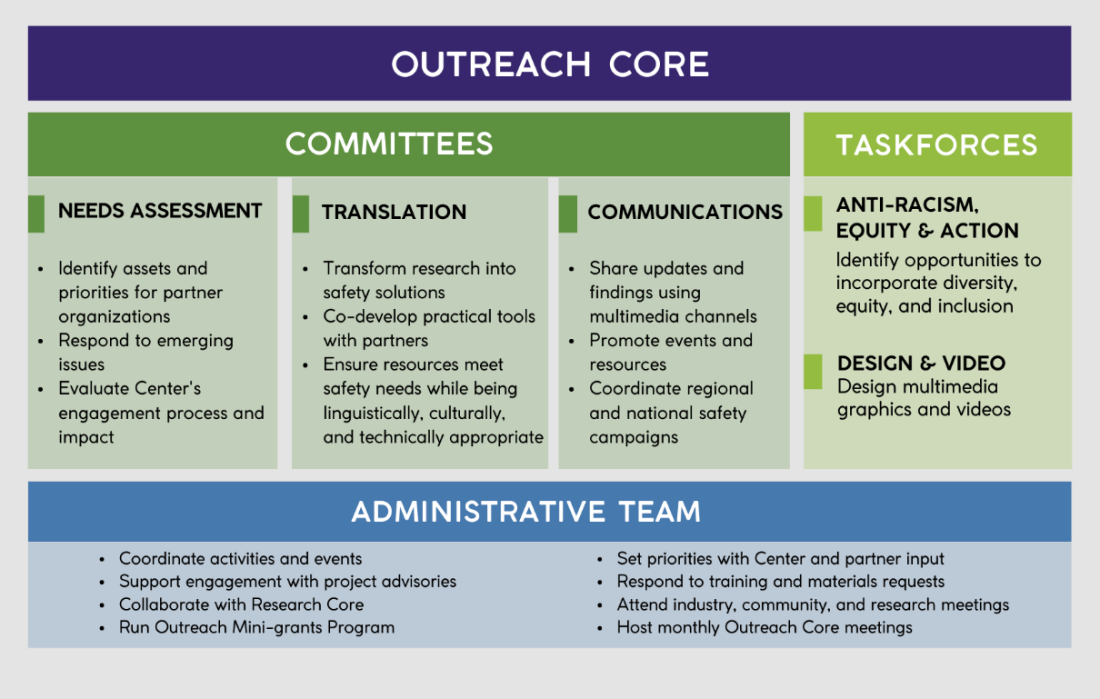
Resources

- 2020-21_Yost_PNASH Year-end Report (washington.edu)
- 30 Years of the NIOSH Agriculture, Forestry and Fishing Program | Blogs | CDC
- Evaluation Tool: Harvest Program Monitoring Database, v. 3.0 (available on request)
- Repository for PNW Agricultural Health Indicator Program: Data sources and analysis code



Outreach and Education Core

The Outreach and Education Core builds relationships and shares information with agricultural communities. To help meet our goals, the Core is organized into four committees shown in graphic below. In Year 6, the Outreach Core: 1) collaborated with individual PNASH Projects to promote resources through coordinated campaigns, 2) developed new resources in response to emerging needs resources through such as wildfire smoke and heat; and 3) established new funding opportunities to foster new partnerships with industry and community partners to expand the reach of PNASH resources in agricultural communities.



Identifying Regional Needs

The Outreach Core works in partnership with agricultural stakeholders and research teams to identify and respond to regional health and safety needs. The Needs Assessment Committee leads the engagement in regional advisories with agricultural workers and employers, community organizations, academics, and agencies.

Advisories

Partnership for Ag Safety and Health

This partnership was established to identify educational needs of agricultural workers and collaborate to develop resources. The group meets bi-weekly and includes participation from: the WA Department of Labor and Industries (WA L&I), WA Department of Health, WA Grower's League, Yakima Health District, UW Health Promotion Research Center, UW Center for One Health Research, El Proyecto Bienestar, and Radio KDNA. In Year 6, WA L&I reached out to us for help communicating the WA workplace requirement for outdoor heat exposure, wildfire smoke exposure, and temporary worker housing requirements for COVID-19. We worked together to develop resources, translating the rules into accessible and visual resources for Spanish agricultural workers.

COVID-19 Farmworker Study (COFS) Collaborative

This group was established to assess the impact of the COVID-19 pandemic on farmworker families and included 20 farmworker organizations in WA, OR, ID, and CA. The PNASH Center provided support with data collection and analysis, and the community-based organizations to lead the development of policy recommendations. Both OR and WA administered surveys and conducted interviews to gather information from farmworkers about their working conditions and access to health and social services during the COVID-19 pandemic. However, each state used different approaches to disseminate the results. OR released findings in 2021 and shared results in webinars, and WA released findings in an interactive data visualization tool released in 2022. Findings from WA and OR showed most workers closely followed safety precautions and highlight how the COVID-19 pandemic created challenges that negatively impacted farmworkers' workplace health and safety, access to healthcare, and financial security. Some key policy recommendations include enhancing the social safety net, housing opportunities, and workplace benefits. Learn more about these research findings: from Oregon and Washington.

Ag Safety Days Planning Committee

This group brings together industry, agency, and academic partners to plan Ag Safety Days. They organize sessions responsive to current health and safety needs in farming. WA L&I facilitates the group and participants come from different agencies, organizations and individuals like the WA Dept. of Agriculture, WA Farm Bureau, WA Potato Commission, Yakima Valley OIC, Food Alliance, and local growers. During this funding cycle and in response to request from the Ag industry, the Committee delivered presentations on infection prevention and control, and pesticide safety.

El Proyecto Bienestar – Farmworker Advisory Group

This long-standing community-based partnership focuses on agricultural workers environmental and occupational health issues. Partners include: the PNASH Center, Northwest Communities Education Center/Radio KDNA, Heritage University, and the Yakima Valley Farm Workers Clinic. Activities are guided by the Community Advisory Board comprised of local community members and agricultural workers. During Year 6, the activities focused on co-developing and disseminating Spanish-language radio programming targeted at heat-illness prevention and wildfire smoke safety education.

Risk Information System for Commercial Fishing Technical Advisory Board (RISC TAB)

The RISC TAB was formed to provide advice and recommendations to the RISC Fishing (P.I. Kincl, NIOSH 2016-2022) study team and propose the development and use of the safety surveillance system. RISC TAB stakeholders include national and state agencies, commercial fishers, public health surveillance practitioners, occupational safety and health researchers, and practitioners in the states of Alaska, Oregon and Washington. In Year 6, a research paper was published to evaluate the advisory board activities. This qualitative study revealed the advisory influenced the direction of the project, TAB members reported positive experiences in participating, which in turn had beneficial implications on their work.

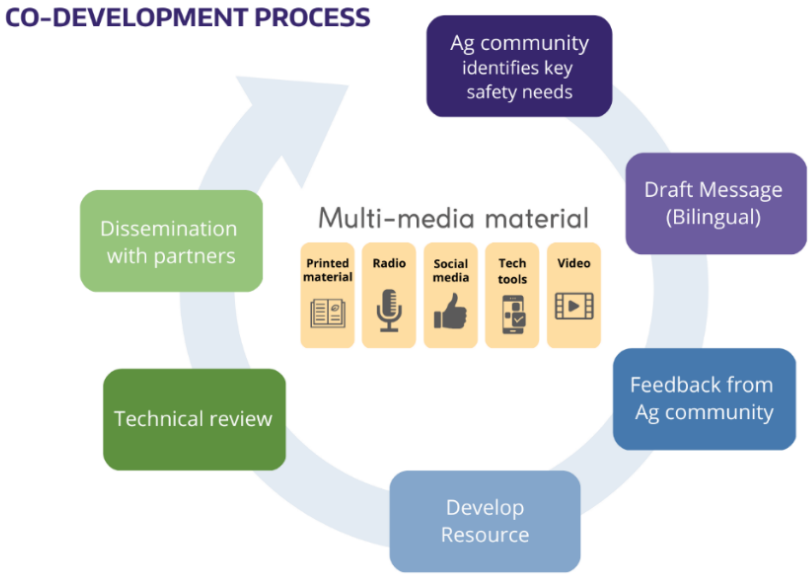
Forestry Working Group

In 2022, we formed the Forestry Working Group (FWG), a standing advisory with a goal to develop new project directions and resources for the Northwest related to logging and forestry services. This team brings a deep understanding of forestry and best forestry practices. Their goals include initiating small education projects and conducting needs assessments. PNASH FWG is facilitated by Ms. Harrington and includes:

Ernesto Alvarado, Professor, UW School of Forestry
Steve Barham, Safety Specialist, Associated Contract Loggers of Idaho
Fransisca Belart, Extension Specialist, OSU School of Forestry
Edward Boulch, Manger, Logging Safety Initiative, Washington State Dept. of Labor and Industries
Jacob Delbridge, Policy Advisory, Washington State Dept. of Natural Resources
Jim Galshdorf, President, Galshdorf Logging, Oregon
John Garland, PNASH Affiliate Professor and OSU Professor Emeritus, Garland and Associates
Rob Keefe, Associate Professor, UI College of Forest and Rangeland Sciences

Co-developing Resources with Agricultural Communities

The Outreach Core in collaboration with agricultural stakeholders co-develop, disseminate, and evaluate resources, tools, and solutions for the agricultural community. The Translation Committee leads these activities by leveraging existing partnerships with state agencies, health and safety trainers, industry groups, and community-based organizations to share the latest resources for best practices for engaging our communities.



PNASH Online On-demand Courses

In Year 6, PNASH launched a new 4-part e-Learning series, PNASH Online, On-demand Courses. This 4-part series focuses on worker health and safety resources for agricultural and community stakeholders in both English and Spanish. The sessions are facilitated by PNASH and community partners to share research findings, lessons, learned, and resources for understanding and prevention injuries on the farm. These courses will be accompanied by a digital learning platform and integrate the latest findings and resources from the NIOSH 2016-2022 research projects.

Online, On-demand courses include:

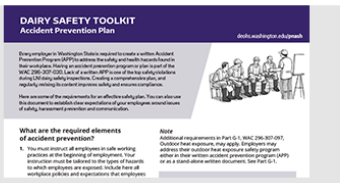
- Training videos
- Posters
- Checklists
- Case studies

Modules include:

- Heat-illness prevention
- Pesticide safety solutions
- Injury prevention on dairy farms
- Sexual harassment prevention

Dairy Safety Toolkit Modules

The Dairy Safety Toolkit features dairy materials such as training and resources for dairy producers, workers, and supervisors. In Year 6, 10 modules were organized by topic and published on the PNASH website to increase accessibility for sharing during monthly safety meetings.



Accident Prevention Plan

A safety meeting is an opportunity to discuss a specific safety and health topic in an informal setting. It's intended to be participatory, encouraging discussion and drawing on workers' experience.

DOWNLOAD ›

Conducting a Safety Meeting

A safety meeting is an opportunity to discuss a specific safety and health topic in an informal setting. It's intended to be participatory, encouraging discussion and drawing on workers' experience.

DOWNLOAD ›

Mapping Activity: Identifying Hazards

The dairy farm hazard mapping activity provides a hands-on and engaging activity for workers to engage in discussion about where workplace hazards are located.

DOWNLOAD ›

Fishermen Lead Injury Prevention Program (FLIPP)

The major effort to engage fishermen has been through Oregon State University's Fishermen Led Injury Prevention Program (FLIPP) led by Laurel Kincl and Amelia Vaughan. This program aids fishermen in identifying high-risk tasks, safety perceptions and injury prevention opportunities. In response to requests from West Coast fishermen, FLIPP created a highly tailored two-day first aid and CPR targeted at West Coast fishermen working conditions, including being many hours if not days away from care. The team continues to engage fishermen in the research activities and the development of resources to ensure they are relevant to the needs of the industry.

New PNASH Products

Visit the PNASH resources page to search our database by topic, industry, or resource type.

Industry:
- Farming
- Fishing
- Forestry

Resource Type:
- Videos
- Training Guides
- Checklists
- Posters
- Mobile Apps

Search By Topic:
- Pesticide Safety
- Heat Illness
- Dairy Safety
- Sexual Harassment
- And more!

Research

Translation for Regional NIOSH-Funded Pilot Projects

In Year 6, the Outreach Core supported PNASH Pilot Projects with outreach and engagement activities. Activities included:

- Designing stickers, phone cases, and printed resources to promote findings.
- Supporting event planning & promotion, and community engagement activities.
- Providing consultation for social media messaging and engagement to share project findings.

PNASH Outreach Supplements

PNASH Pilot Project Program's Outreach Supplement grants provides an additional funding opportunity for new pilot projects seeking to develop and disseminate new project results through community partnerships.

Name	Institution	Project Title
Savannah D'Evelyn	University of Washington	CLEAN AIR – I CARE: Stressors of balancing childcare, work, and concern of wildfire smoke exposures for farmworker parents
Carly Hyland and Cynthia Curl	Washington State University	Pesticide exposures & risk perceptions among male & female Idaho Latinx farmworker
Leann Fay and Jerry Dzugen	Alaska Marine Safety Education Association	Improving commercial fishing safety in Norton Sound: Knowledge from Alaska Native Salmon Set Gillnetters

Northwest Center for Occupational Health and Safety (NWCOHS) - Professional Training Opportunities Program (PTOP)

This past year, four grants funded through the NWCOHS PTOP program proposed to conduct research with workers in AgFF. In the coming year, the Core will provide consultation and support with the proposed activities.

Name	Institution	Project Title
Solaiman Doza	Oregon State University	Evaluating work-associated injuries among self-employed and wage-salaried agriculture, forestry, and fishing workers to identify injury burden and prevention opportunities
Molly Parker	Washington State University	Employer Perspectives on Wildfire Smoke Hazards in the Agricultural Workplace
Carly Hyland	Boise State University	Examination of Glyphosate Exposure Among Latinx Farmworkers in Idaho
Gabriel Gutierrez	Fair Work Center	Measuring Safety and Health Risks at Yakima Valley Packing Houses

Engaging with Agricultural Stakeholders

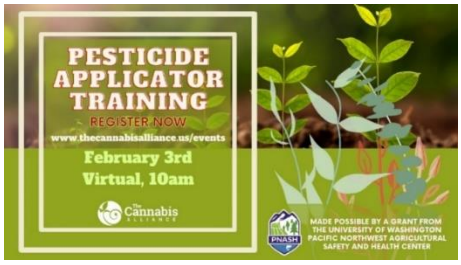
The Outlook Core enhances PNASH's presence by participating in events, meetings, and conferences throughout the Pacific Northwest and nationally. The Administrative Committee plans engagement activities, disseminate PNASH resources, and promote events and conferences.

Outreach Mini-Grant Program

This program was established to provide a new funding opportunity to build new partnerships and expand the reach of PNASH resources among underserved communities. The opportunity was extended to community-based organizations, employers, cooperative extension agents, commodity groups, and health and safety educators. In Year 6, two applicants were funded in the amount of $7,500 each.

Wildfire Smoke Safety

Harvust Inc. provides a mobile app and platform to help employers communicate and share resources with farmworkers. They received a mini-grant to promote wildfire safety resources their Air Quality Communication (AQC) tool which shares local air quality data and wildfire resources with workers (including PNASH Wildfire Safety resources), and 2) acquiring data to improve the air quality information shared through for farmworkers provided by their AQC tool. As of July 2022, Harvust has disseminated wildfire resources with 6,342 farmworkers during 416 safety meetings on 67 farms in Washington State.



Pest Management in Cannabis: A Practical Workshop

The Cannabis Alliance was funded to develop the State of Cannabis Pest Management in WA for pesticide applicators with safety tips from the PNASH Practical Solutions for Pesticide Safety. The workshop provided guidance on pesticide mixing and decontamination techniques tailored to the cannabis industry. In addition, they disseminated PNASH resources for cannabis safety with UV and practical solutions for pesticide warning signs, work-to-home exposure, mixing, hose reels, respirators, and glove racks.

Events

WA State Tree Fruit Association Meeting, December 5-7, 2021. The WA State Tree Fruit Association (WSTFA) Meeting is the largest tree fruit gathering in the country and draws agricultural stakeholders from around the nation and the world. In Year 6, PNASH hosted an exhibit to promote the Heat Toolkit and the PestiSeguro mobile app.

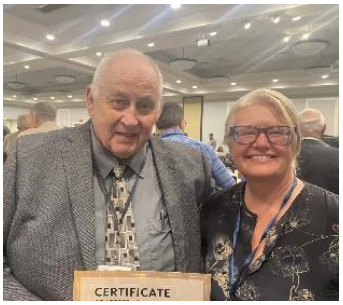
WA Dairy Conference, December 5-7, 2021. Each year the WA Dairy Federation hosts the annual WA Dairy Conference to share updates about crucial issues facing the dairy community and provide training. During Year 6, PNASH exhibited to disseminated materials from the Dairy Safety Toolkit and facilitated discussions for dairy farmers to share safety strategies for enhancing safety approaches for animal handling, safety meetings, leadership development.

WA Governor's Ag Safety and Health Conferences, February 1 and 22, 2022

Ag Safety Days are the largest training event in WA State, bringing together 600 farm employers, supervisors, and workers. PNASH serves on the Planning Committee and plays an active role in the training sessions. In Year 6, PNASH hosted workshops in English and Spanish on pesticide safety which shared PestiSafe™ App and practical solutions and Infection Prevention and Control to prevent the spread of COVID-19.

Clean Air, I Care Community Discussion, August 20 and 21, 2022

Two workshops were organized, one in Wenatchee and one in Okanogan to share the findings of the Clean Air, I Care study. The two events brought together over 80 agricultural families and childcare workers to discuss the wildfire smoke needs and challenges and share resources in Spanish. The events were organized by facilitated by community partner, Wenatchee CAFÉ. PNASH facilitated discussions and hosted an exhibit to promote heat, smoke, and sexual harassment prevention resources. Community members shared need for affordable childcare, emergency communications, and workplace preparedness. See page 20 for a full report on this project (P.I. D'Evelyn, PNASH Pilot 2021-22).



Council on Forest Engineering (COFE) International Conference, October 4-7, 2022
COFE is the largest international meeting dedicated to sharing cutting-edge scientific research and innovative practices in forest operations and engineering. PNASH-affiliated presenters included: Kevin Lyons, Keynote speaker on training with logging simulation (P.I. Lyons, PNASH Pilot 2019-21), Robert Keefe, sharing methods developed for real-time positioning systems to increase the safety and efficiency of harvesting (P.I. Keefe, PNASH Pilot 2019-21), Outreach planning took place with regional partners for training programs and technology developments. In addition, John Garland was honored during the event for being one of the founding members of COFE over 44 years.

Communicating with Agricultural Stakeholders

The Outreach Core develops key messages and communication strategies for workers in farming, fishing, and forestry in English and Spanish. The Communications Committee designs multimedia communications and accessible graphics using various dissemination channels and networks.

Website

In Year 6, the Core focused on developing and promoting resources, toolkits and online learning courses for workers, supervisors, employers, and safety professionals in English and Spanish. New webpages were created for five NIOSH-funded projects funded for the 2022-2027 cycle (NIOSH 2022-2027), and five PNASH Pilot Projects (PNASH Pilots 2021-2022). In addition, the Farmworker Stress and Anxiety webpage was created to share local and national mental health resources with Spanish-speaking agricultural workers. PNASH published five blogs to highlight events and research activities.

New webpages:

- On-demand Learning Courses page
- Dairy Safety Toolkit page
- Farmworker Stress & Anxiety page
- 5 NIOSH 2022-2027 projects page
- 5 PNASH Pilots 2021-2022 page

New Blogs:

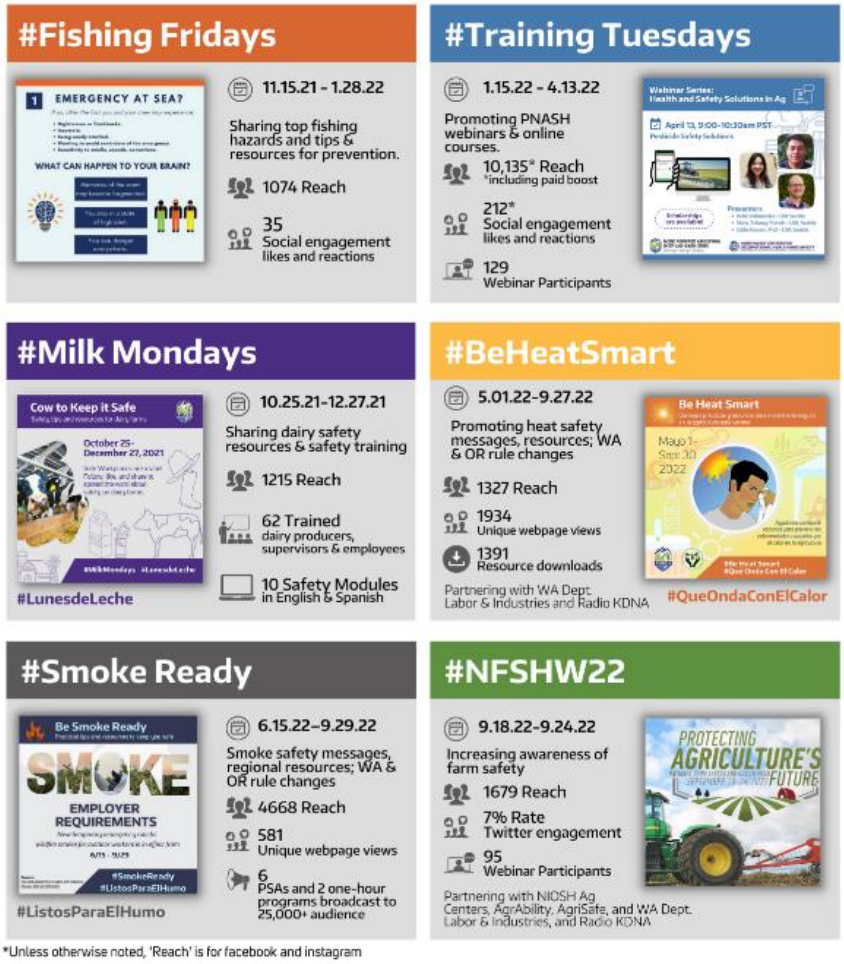
- New federal grant to improve NW Ag safety & health blog
- Supporting farmworker families smoke season blog
- Connecting Users with Pesticide Safety blog
- Co-creating COVID-19 messages for farmworkers blog
- Introducing PNASH Print and Ship blog

Radio

Through the Partnership for Ag Safety and Health, Spanish-language radio programming and public services announcements were developed to share resources, promote campaigns, and provide updates in WA workplace requirements with agricultural communities. June Spector and Maria Blancas hosted radio programming on heat-illness prevention. Idanis Cruz and Laura Rivera from Wenatchee Café hosted radio programming on wildfire smoke safety. Since 2020, the Core has developed 30 one-hour radio programs and 13 public service announcements, each broadcast reaching 25,000 in the Yakima Valley.

Social Media

During Year 6, the Core worked in coordination with regional partners to develop safety campaigns in collaboration to promote safety messages and resources with agricultural workers, supervisors, and employers in English and Spanish. Social media messages and media kits were co-developed with partners and disseminated to enhance social media reach and build capacity within our communities to promote health and safety messages for workers in farming, fishing, and the dairy industry.



*Unless otherwise noted, 'Reach' is for facebook and instagram

Additional Outreach Activities

November 18-20. Pacific Marine Expo: PNASH Participation: Eddie Kasner and Sarah Fish.

November 19-20. ¡Basta! Prevent Sexual Harassment in Agriculture Training and Evaluation. PNASH Presenters: Elizabeth Torres and Dennise Drury.

December 15. Washington Logging Safety Initiative Annual Training. PNASH Presenter: John Garland.

January. GSL Grower's Meeting. PNASH Participation: Pablo Palmandez.

January 26. PNASH Health and Safety Solution in Agriculture Webinar Series: Sexual Harassment Prevention in Agriculture: PNASH Presenters: Jody Early, Elizabeth Torres, and Dennise Drury.

March 3. PNASH Health and Safety Solution in Agriculture Webinar Series: Heat-Related Illness Prevention. PNASH Presenters: June Spector, Maria Blancas, and Pablo Palmandez.

March 29. PNASH Health and Safety Solution in Agriculture Webinar Series: Injury Prevention on Dairy Farms. PNASH Preventers: Amber Adams-Progar, Elena Austin, and Scott Dilley.

March 28-30. Agricultural Safety and Health Council of America Annual Meeting. PNASH Presenter: Amber Adams-Progar.

April 8. AgriSafe webinar: Practical Solutions for Heat-Related Illness Prevention for Agriculture. PNASH Presenters: June Spector and Roxana Chicas.

March 29. PNASH Health and Safety Solution in Agriculture Webinar Series: Pesticide Safety Solutions. PNASH Presenters: Edward Kasner, Maria Tchong-French, and Pablo Palmandez.

June 6. COVID-19 Supporting Farmworker Calls: Co-developing Resources for Wildfire Smoke and Heat-Illness Prevention. PNASH Presenters: Edward Kasner, Idanis Cruz, Dennise Drury.

June 7. Western Center for Agricultural Safety and Health Seminar: Heat-related Illness and Injuries, Climate, and Practical Solutions for Agricultural Workers. PNASH Presenter: June Spector.

June 12-16. International Society for Agricultural Safety and Health (ISASH) Annual Conference. PNASH Participation: Amber Adams-Progar, Sarah Fish, and Idanis Cruz.

June 17. AgriSafe Webinar: Wildfire Health Threats: Risk Factors for Farmers and Ranchers. PNASH Presenters: Edward Kasner and Elena Austin.

July 26. Radio KDNA Interview: Smoke Exposure Health Impacts and Resources for Agricultural Workers. PNASH Presenters: Idanis Cruz, Dennise Drury, and Laura Rivera (Wenatchee Café).
August 11. Quincy Community Health Back to School Fair. PNASH Participation: Idanis Cruz.
August 30. Radio KDNA Interview: Heat and Smoke Exposure Risks and Solutions for Agricultural Workers. PNASH Presenters: June Spector and Maria Blancas.
September 2. Columbia Reach: ¡Basta! Prevent Sexual Harassment in Agriculture Workplace Training. PNASH Participation: Elizabeth Torres and Dennise Drury.
September 20. AgriSafe Webinar: National Farm Safety & Health Week. Heat and Wildfire Smoke Exposure Among Agricultural Workers: Examining Exposure Risk and Potential Strategies to Protect Workers. PNASH Presenters: John Flunker, Elizabeth Torres, and Maria Blancas.
September 23. AgriSafe Webinar: National Farm Safety & Health Week. Safety in the Field: ¡Basta! Working Together to Prevent Sexual Harassment in the Agricultural Workplace. PNASH Presenters: Jody Early and Dennise Drury.
October 6. EPA Let's Talk about Heat Winners Webinar. PNASH Presenter: Edward Kasner.
November 1-2. Agricultural Safety Council of America: Risk Management Certificate Program. PNASH Presenters: Amber Adams-Progar.

Externally Funded Outreach Projects and Awards

PestiSeguro™/PestiSafe™ App and Service
Sponsors: WSDA Crop Block Grant Program, WA Safety and Health Improvement Program, University of Washington CoMotion and PNASH Emerging Issues Fund
Principal Investigators: Pablo Palmandez, Michael Yost, and Kit Galvin.
Partners: WSDA Technical Service & Education Program, WSU Pesticide Information Center Online, WA Tree Fruit Association, WA Potato Commission, Hop Growers of WA, WA Grower's League, and WA Wine Industry Foundation

This project developed mobile device apps with health, safety, and environment information from EPA agricultural pesticide labels in English with contextual Spanish translations. This project addresses the inherent language disparity that can compromise farmworker health and safety, and is central to our work developing safety solutions designed for a Spanish-speaking audience. The mobile app contains 40 pesticide information from the label in labels in English and Spanish for products commonly used on these crops. In September 2022, the team completed an additional subscription service with access to an additional 300 pesticides for WA State Specialty crops including: apples, pears, cherries, hops, grapes, blueberries, potatoes, asparagus, and other tree fruit. The team conducted a survey of users to evaluate, user experience, and have insight into app improvement. In fall 2022, a survey of agricultural industry leadership to value the interest and gather recommendations for potential cost of subscription to the app. The app features can be accessed two ways: 1) for free by downloading the app on Apple or Google, or 2) through subscription to the service. Learn more about this project through PNASH's Pesticide Safety webpage.

Let's Talk about Heat Challenge! Heat Education and Awareness Tools (HEAT Toolkit)
Sponsors: Environmental Protection Agency
Principal Investigators: June Spector and Maria Blancas
PNASH won the 2022 Let's Talk about Heat Challenge sponsored by the United States Environmental Protection Agency. This award was received for the collaborative and innovative approach the Center utilized to develop and disseminate the heat-illness prevention messages developed from the Heat Toolkit in agricultural communities. The Heat Toolkit was developed in collaboration with agricultural workers, educators, promotors, and other stakeholders. It features a facilitator's guide, heat awareness mobile application (partner system with WSU Ag Weather Net), worksite posters, interactive educational materials for workers in English and Spanish. In the Pacific Northwest, agricultural workers are largely Spanish-speaking, seasonal, and immigrants from Mexico. These workers can experience barriers to accessing information and healthcare. Launched in Summer 2021, #BeHeatSmart campaign was developed to reach remote and isolated communities. The media kit was designed promote heat-illness prevention messages and includes a press release, 124 customizable social graphics, 7 public service announcements, and 3 radio programs. The media kits also include workplace requirements, guidance for employers, and tips for workers. To learn more about the research project that developed these resources, see the Multi-Level Approach to Heat-Related Illness Prevention in Agricultural Workers (P.I. June Spector, NIOSH 2016-2022) webpage.

PNASH-RELATED RESEARCH PUBLICATIONS, 2016-2022

CANNABIS

Ehrlich T, Simpson C, Busch Isaksen T. Sociopolitical Externalities Impacting Worker Health in Washington State's Cannabis Industry. Annals of Work Exposures and Health. 2020 Aug 6;64(7):683-692. doi: 10.1093/annweh/wxz083. PMID: 31785200.

Ghodsian N. Health Effects of Exposure to Cannabis in Workers in an Indoor Growing Facility. 2019 Master's Thesis. Department of Environmental and Occupational Health Sciences, University of Washington, Seattle, Washington. ResearchWorks.

Sack C, Ghodsian N, Jansen K, Silvey B, Simpson CD. Allergic and Respiratory Symptoms in Employees of Indoor Cannabis Grow Facilities. Annals of Work Exposures and Health. 2020 Aug 6;64(7):754-764. doi: 10.1093/annweh/wxaa050. PMID: 32459852; PMCID: PMC7407609.

Simpson C. Occupational Health and Safety in the Cannabis Industry. Annals of Work Exposures and Health. 2020 Aug 6;64(7):677-678. doi: 10.1093/annweh/wxaa068. PMID: 32696046.

Silvey B. Characterization of Occupational Exposure to Airborne Contaminants in an Indoor Cannabis Production Facility. 2019 Master's Thesis. Department of Environmental and Occupational Health Sciences, University of Washington, Seattle, Washington. ResearchWorks.

Silvey B, Seto E, Gipe A, Ghodsian N, Simpson CD. Occupational Exposure to Particulate Matter and Volatile Organic Compounds in Two Indoor Cannabis Production Facilities. Annals of Work Exposures and Health. 2020 Aug 6;64(7):715-727. doi: 10.1093/annweh/wxaa067. PMID: 32696065; PMCID: PMC7407603.

Simpson C. Something Old, Something New: Potential Occupational Hygiene Concerns in the Cannabis Industry. International Society of Exposure Sciences Newsletter, Nov 2017, issue 3, pp. 11-14.

Simpson C. Occupational Health and Safety in the Cannabis Industry. Annals of Work Exposures and Health. 2020 Aug 6;64(7):677-678. doi: 10.1093/annweh/wxaa068. PMID: 32696046.

DATA SURVIELLANCE

Nahorniak J, Bovbjerg V, Case S, Kincl L. Application of Data Linkage Techniques to Pacific Northwest Commercial Fishing Injury and Fatality Data. Injury Epidemiology. 2021 Jul 5;8(1):26. doi: 10.1186/s40621-021-00323-z. PMID: 34218819; PMCID: PMC8256577.

Yang L, Branscum A, Kincl L. Understanding Occupational Safety and Health Surveillance: Expert Consensus on Components, Attributes and Example Measures for an Evaluation Framework. BMC Public Health. 2022 Mar 14;22(1):498. doi: 10.1186/s12889-022-12895-6. PMID: 35287647; PMCID: PMC8922762.

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