

PACIFIC NORTHWEST AGRICULTURAL SAFETY AND HEALTH (PNASH) CENTER

RESEARCH FOR

Healthy Workers, Strong Communities & Productive Agriculture

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YEAR END REPORT

Fiscal Year 2015

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DEPARTMENT OF ENVIRONMENTAL AND OCCUPATIONAL HEALTH SCIENCES

UNIVERSITY of WASHINGTON

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PNASH researchers combat heat illness ...conducting heat related illness surveys in the field



PNASH featured in video produced by American Public Health Association

OVERVIEW

The Pacific Northwest Agricultural Safety and Health (PNASH) Center, established in 1996, conducts research and promotes best occupational health and safety practices for Northwest farming, fishing and forestry industries. Our goal is to prevent or reduce injury and illness for producers, workers, and their families. One of ten regional centers, PNASH works throughout the Northwest integrating expertise from multiple disciplines, institutions and community partners. We are housed in the UW Department of Environmental and Occupational Health Sciences, School of Public Health and have formal affiliations with multiple UW programs, Washington State University (WSU), and Oregon State University, among others. Our faculty, staff, and students bring expertise to our agricultural industries in the fields of medicine, nursing, industrial hygiene, epidemiology, engineering, and education.

Principal funding of the PNASH Center is granted through the Agricultural, Forestry and Fishing (AFF) Program at the National Institute for Occupational Safety and Health (NIOSH)/Centers for Disease Control and Prevention. The NIOSH AFF program is a non-regulatory approach that addresses region- and industry-specific complexities. PNASH is also competitively awarded project grants from other federal, state, and non-profit organizations.

RELEVANCE

The agricultural industries (farming, fishing, and forestry) consistently rank among the most dangerous jobs, with fatality rates 7-8 times that of the all-industry average for the US. Commercial fishing fatality rates exceed national averages for all occupations 36-fold, and logging fatality rates exceed the national average by 30 times. Farming is a unique workplace in that families frequently live on site. Each year 14,000 children are injured and 100 are killed on US farms.

The Census of Fatal Occupational Injuries showed AFF fatalities were 14 percent higher in 2014 at 568 compared to 500 in 2013, a slight rise after three straight years of decline. Fatal work injuries in forestry and logging rose to 92 in 2014 from 81 in 2013, the highest number since 2008. Overall, AFF still recorded the highest fatal injury rate of any industry sector at 24.9 fatal injuries per 100,000 FTE workers in 2014.

Agricultural injury statistics generally do not include the men, women, and youths at operations with fewer than 11 full-time employees. Nearly 78% of employers fall into this category, even though the AFF industry as a whole constitutes one of the largest industry sectors in the US. In addition to injuries and fatalities, agricultural, forestry and fishing workers are also at high risk for illnesses such as lung diseases, hearing loss, heat related illness, skin diseases and certain cancers associated with chemical use and prolonged sun exposure. The economic burden in a single year is assessed at 8.3 billion loss in medical costs and lost productivity.

FOURTH YEAR (FY 2015) ACTIVITIES

This report focuses on high impact activities and accomplishments for PNASH's Year 4 of its 5-year program cycle. Our third year saw progress across all projects, the conclusion of two pilot/feasibility projects, increased regional awareness and training events, and the funding of three new small projects in emerging areas.

PNASH INTERNAL ADVISORY COMMITTEE

Name	Role	Phone	Email
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PNASH SCIENTIFIC ADVISORY COMMITTEE

Name	Role
Doug Brock	Associate Professor
Jennifer Lincoln	Director NIOSH Alaska
Howard Kipen	Professor and Chair of Environmental & Occupational Medicine Rutgers University
Linda McCauley	Dean and Professor Nell Hodgson Woodruff School of Nursing

LISTING OF ALL ACTIVE PROJECTS

The Pacific Northwest Agricultural Safety and Health (PNASH) Center is dedicated to the prevention of illness and injury among agricultural producers, workers and their families. We work toward this goal through partnerships in the Northwest (Alaska, Idaho, Oregon, and Washington). Agricultural businesses, workers, and communities are the foundation of a strong agricultural industry. With this in mind, we partner with industry, health care, government, academic, and community groups to address key hazards and promote safe and sustainable workplaces.

RESEARCH FOR

Healthy Workers, Strong Communities & Productive Agriculture

RESEARCH

- Heat Exposure, Injury Risk, and Productivity in Agricultural Workers (NIOSH 2014-2017)
- Farmworker OP Exposure through Protein Adducts (NIOSH 2011-2016)
- Using IPM to Reduce Pyrethroid Pesticide Exposures in Dairy Workers (NIOSH 2011-2016)
- Feasibility 5: Transmission of Microorganisms in Dairy Farms (PNASH Small Grant 2013-2015)
- Feasibility 9: Non-Fatal Injuries among Commercial Fishing Workers in Alaska, Washington, and Oregon (PNASH Small Grant 2014-2016)
- Feasibility 11: Injury and Illness Surveillance in the Pacific Northwest for the Dairy Industry (PNASH Small Grant 2015-2016)

PREVENTION AND INTERVENTION

- Safety and Health of Latino Immigrant Forestry Services Workers in the Pacific Northwest (NIOSH 2014-2017)
- Reducing Agricultural Worker Risks through New and Emerging Technologies (NIOSH 2011-2016, MAAF 2012-2013)
- Ergonomic Evaluation and Development of Best Practices for the Use of Mobile Work Platform Technology in Orchards (NIOSH 2011-2016, MAAF 2009-2011)
- Impact of Workplace Stress on Health in Farmworker Families (NIOSH 2014-2016)
- Feasibility 8: Total Worker Health in Salmon Fishermen from Cordova, AK (PNASH Small Grant 2014-2015)

EDUCATION

- Pesticide Safety in Tree Fruit: Translating Research, Overcoming Barriers (NIOSH 2011-2016)
- Feasibility 7: GRAS²P Food Safety Video (PNASH Small Grant 2013-2016)
- Feasibility 10: Agricultural Medicine eLearning Series for Mid-Level Health Care Providers (PNASH Small Grant 2015-2016)

COMMUNITY-BASED PARTICIPATORY RESEARCH

- El Proyecto Bienestar (or, Well Being Project), is a long standing community health intervention effort guided by a Yakima Valley community advisory board and a partnership of: UW PNASH; Northwest Communities Education Center/Radio KDNA; Heritage University; and the Yakima Valley Farm Workers Clinic. Our current projects:
- Home Air in Agriculture - Pediatric Intervention (HAPI) Trial (NIEHS 2014-2019)
 - Health & Safety of Women Ag Workers (MAAF 2013-2015)



2015 PNASH Oregon Partner Meeting

ADMINISTRATIVE AND PLANNING CORE

The Administrative and Planning Core provides an infrastructure for the Center and assists in the implementation of individual project and program objectives. Core programs ensure that activities are well coordinated and integrated within the center, are of high scientific quality, meet their objectives, and work in coordination with community and industry partners to move results into practice.

PNASH PEOPLE

This has been a stellar year for recognitions and honors to PNASH faculty, students (and alumni) and staff. **Dr. Mike Yost**, PNASH Associate Director, became chair of the UW [Department of Environmental and Occupational Health Sciences](#). PNASH's Director of Community Engagement and Education, [Dr. Vicky Breckwich Vásquez](#) accepted an appointment as assistant professor in the School of Nursing & Health at UW Bothell. Three of PNASH's lead researchers have been promoted to professor, including Drs. [Chris Simpson](#), [Peter Johnson](#), and [Scott Meschke](#). Graphic Designer and Media Specialist, [Stacey Holland](#) was elected to the UW Professional Staff Organization (PSO), Board of Directors. Center Manager, [Marcy Harrington](#) received the PSO's Standing Ovation Award.



We have welcomed some strong additions to the PNASH Team. **Jose Carmona**, was a 2015 graduate of the UW School of Public Health. Mr. Carmona brings a wealth of experience and perspective as a former PNASH Intern who was raised in a farmworking family in Yakima, Washington. **Bev Kerlin**, Fiscal Analyst, is also a native of the Northwest who brings 10+ years grants management experience in health research.

STUDENTS

Miriam Calkins, PhD Student, UW – Heat Exposure, Injury Risk, and Productivity in Agricultural Workers

Eddie Kasner, PhD Student, UW - Reducing Agricultural Worker Risks through New and Emerging Technologies

Maggie Hughes, PhD Student, UW – Ergonomic Evaluation of Emerging Technologies in the Tree Fruit Industry

Carly Miller, PhD Student, UW - Total Worker Health in Salmon Fishermen from Cordova, AK

Jane Pouzou, PhD Candidate, UW – Reducing Agricultural Worker Risks through New and Emerging Technologies

Omwipa Thamsuwan, PhD Student, UW – Farmworker OP Exposure through Protein Adducts

Ryan Babadi, PhD Student, UW - Pesticide Safety in Tree Fruit: Translating Research, Overcoming Barriers

Samantha Case, PhD Student, Oregon State University - Non-Fatal Injuries among Commercial Fishing Workers in Alaska, Washington, and Oregon

Katherine Gregersen, MPH Student, UW – Ergonomic Evaluation of Emerging Technologies in the Tree Fruit Industry
Dan Grinnell, MS Student, UW –Using IPM to Reduce Pyrethroid Pesticide Exposure in Dairy Workers
Laura Syron, MPH Student, Oregon State University - Non-Fatal Injuries among Commercial Fishing Workers in Alaska, Washington, and Oregon
Anna Contreras, Undergraduate Intern, UW – Administrative and Planning
Bianca Irimia, Undergraduate Intern, UW – Transmission of Microorganisms in Dairy Farm
Nicole Davis, Undergraduate Intern, UW – Sexual Harassment
Sam Mar, Undergraduate Intern, UW - Using IPM to Reduce Pyrethroid Pesticide Exposure in Dairy Workers
Jessica Martinez, Undergraduate Intern, UW - Using IPM to Reduce Pyrethroid Pesticide Exposure in Dairy Workers
Anais Munoz, Undergraduate Intern, UW – Sexual Harassment
John Yang, Undergraduate Intern, UW – Using IPM to Reduce Pyrethroid Pesticide Exposure in Dairy Workers

NEW PROJECT GRANT AWARDS

Each year, thanks to the nucleus of research expertise and support formed by the Center, our faculty and staff researchers successfully procure additional project grants to help advance the goals and priorities of the PNASH Center. In FY2015 the following projects addressing PNASH’s mission were awarded:

Prevention of Occupational Exposures to Pesticide Drift (WA State Medical Aid and Accident Fund 2015 – 2017)

PI: Richard Fenske, Professor, UW DEOHS

We are working with the Washington State Department of Health to link historical weather and landuse data to 283 reported drift events (762 cases) between 2000 and 2015. We will characterize the risk of occupational drift exposure, expand epidemiological surveillance, and test novel drift exposure measurements. This study marks the first time that occupational health drift incident data will be paired with historical weather and land use data over a large period of years. Study findings will impact state partner data collection techniques, enhance exposure prevention training, and contribute to understanding and preventing drift exposure—a major reason for pesticide-related illnesses among Washington agricultural workers.

Sexual Harassment Prevention Training Video (Oxfam of America and the Equitable Food Initiative 2015–2016)

PI: Victoria Breckwich Vásquez, Assistant Professor, UW Nursing and Health Studies

This small award augments the PNASH small grant award (see below). PNASH is working with regional and national partners to reduce sexual violence in agriculture and improve knowledge and resources. The number of Latina women and girls entering agriculture (as migrant and seasonal workers) is increasing in Washington and the nation. The problem is timely, urgent, and in need of a sustained response.

Forestry Glossary of Terms (Oregon OSHA 2015–2016)

PI: John Garland, Professor Emeritus, Oregon State University and Affiliate Professor, UW

This small project will develop an educational tool for forestry services workers and employers in Spanish and English, providing forest service activities terminology. Graphical reference cards provide the translated terminology as well as explanations of the underlying forest management goals and practice.

SMALL GRANT (PILOT/FEASIBILITY) & EMERGING ISSUES PROGRAM

Every year PNASH sends out a call to Northwest investigators for pilot research or small projects in agricultural safety and health. We are pleased to announce this year's awards for small grants for 2015-2016:

Agricultural Medicine eLearning Series for Mid-Level Health Care Providers

PI: Nancy Simcox, Director, UW DEOHS Continuing Education

This one-year project will pilot an eLearning series that focuses on unique Occupational and Environmental Medicine (OEM) agricultural issues in the northwest, increasing competency among mid-level providers (MLPs) to recognize, diagnose, treat, prevent and provide patient education pertaining to occupational injuries and illnesses in the region. To meet the wide-ranging needs of agricultural workers, healthcare providers require a broad base of knowledge along with skills in risk assessment and health promotion related to a unique array of activities and potential exposures. The roles of MLPs, (e.g. physician assistants and nurse practitioners) are increasing in rural areas, and training programs are expanding to meet their needs but require better integration of occupational health into their curricula. PNASH is targeting some of these issues through its research and outreach efforts, and this project will enhance the reach of this work to the health care community.

Injury and Illness Surveillance in the Pacific Northwest for the Dairy Industry

PI: Mike Yost, Professor and Chair, UW DEOHS

This project will lay the foundations for an ongoing effort to conduct surveillance of injuries and compensation claims in the WA dairy industry. Currently the dairy industry has a high rate of injury claims, leading to adverse impacts on compensation insurance costs. The project will build on existing PNASH collaborations with the WA Department of Labor and Industries SHARP program, to obtain access to worker's compensation claims data as the primary analysis source. Secondary data sources, such as the WA CHARS data and OSHA 300 logs will be examined as additional sources of information that may complement the claims data. Successful completion of this project will provide a rich preliminary data set and create established methods for continued surveillance across agricultural sectors.

Sexual Harassment Prevention Training Video

PI: Victoria Breckwich Vásquez, Assistant Professor, UW Nursing and Health Studies

This video product is one more step towards a more comprehensive effort to address workplace sexual harassment (WSH) in agriculture. PNASH is working with regional and national partners to reduce sexual violence in agriculture and improve knowledge and resources. The problem is timely, urgent, and in need of a sustained response. This project produces a sexual harassment prevention training video specifically for agricultural growers and workers. We will also develop a dissemination plan and evaluation instruments to measure knowledge gain and impacts. By involving multiple stakeholders in this process, we aim to reduce sexual harassment as an agricultural occupational health hazard.

The number of Latina women and girls entering agriculture (as migrant and seasonal workers) is increasing in Washington and the nation. In the U.S., an estimated 24% of the 1-1.4 million farmworkers are women. Women farmworkers are an underserved minority in the agriculture industry. Because they are largely low-income, Spanish-speaking, and work in male dominated environments, they are at higher risk of WSH. Previous work at PNASH employed a community-engaged research-to-action approach. A community advisory group in the Yakima Valley guided the project, conducted interviews with farmworker women, and developed a comprehensive community-level awareness campaign that incorporated our research findings. Two manuscripts are currently underway describing this work. Since this project, the agricultural industry and legal community have shared their concerns about the dearth of culturally-appropriate educational materials to train workers and prevent WSH.

Emerging Issues Fund

An emerging issues fund of 10,000 direct costs allows PNASH to respond to emerged needs across the year. In FY2015 funds were awarded to Victoria Breckwich Vásquez to complete sexual harassment education products; and Richard Fenske to support a student summer intern's work in pesticide safety education and field work in support of the New Technologies project.

ADDITIONAL ADMINISTRATIVE ACCOMPLISHMENTS

The Washington Farm Work Group Report

In 2014, PNASH was appointed to a new collaborative initiative, the Washington Farm Work Group. The Farm Work Group was formed under the WA Employment Security Commission by the state legislature to find mutual points of interest in the agricultural community and administrative solutions to agricultural issues. The group is charged to identify shared issues and solutions by the end of 2014. Several issue areas have called upon PNASH's expertise and previous research experience, including sexual harassment of women in agriculture and pesticide drift.

See report at <https://esdorchardstorage.blob.core.windows.net/esdwa/Default/ESDWAGOV/newsroom/Legislative-resources/2015-Farm-Work-Report.pdf>

Washington State Latino/Hispanic Assessment Report

The Washington State Latino/Hispanic Assessment Report for 2014 spotlighted Latino health issues. An exceptional range of topics are represented from contributions written by representatives from across the region. PNASH's Dr. Catherine Karr developed the feature, *Latino Children and Environmental Health Hazards*, and Victoria Breckwich Vásquez contributed, *Environmental Health Risks of Latinos in Washington State* and *Occupational Health Risks of Latinos in Washington State*.

See pages 82-89 of the report at http://cha.wa.gov/wp-content/uploads/CHA_Report-2014_Web.pdf

Oregon Partner Meeting

PNASH Convened our Oregon state investigators and partners in a meeting on February 10-11, 2015 in Portland, Oregon. Twenty-six participants reviewed our progress and discussed needs for occupational safety and health in farming, fishing and forestry in Oregon. Specific discussion topics addressed: included Total Worker Health, Sexual Harassment and the Mexican-Indigenous workforce in Oregon. In addition, a visit was made to Pineros y Campesinos Unidos del Noroeste (PCUN) to learn about their community initiatives and research priorities.

Agricultural Center Evaluators, Coordinators and Outreach (ECO) group

PNASH continues to collaborate across all NIOSH AFF Regional Centers through the Agricultural Center Evaluation, Communication, and Outreach (ECO) group. The ECO group's goals are to share resources and knowledge, collaborate on Center-wide communications and evaluation efforts, and enhance intra-extramural dialogue with the NIOSH Ag Centers and NIOSH program offices. Marcy Harrington has facilitated the overall ECO group since summer 2014, a group of 60 members that span all NIOSH Ag Centers. Meetings take place every other month with working groups focused on Legislative Education, YouTube Channel, Awareness Events, and the National Ag Safety Database.

Other Activities

- **Monthly meetings of PNASH Internal Advisory Committee and PNASH Staff**
- **Oct 3-5, 2013. NIOSH Ag Centers, ERCs, Healthy Workforce Center Meeting, Denver, CO**
- **Oct 10-11, 2013. PNASH Oregon Forest Sector Meetings and Tours, Salem, OR**
- **Feb 3-4, 2014. AUPOHS Meeting, Washington DC**
- **March 19-20 NIOSH. All Centers Director's Meeting, Cincinnati, OH**
- **June 16. NW Fishing Investigator Call-in Meeting**
- **June 18. Region X OSHA PNASH Presentation**
- **July 27-28. PNASH IAC Strategic Planning Retreat, Leavenworth, WA**
- **Sept 17-18 WestON Meeting, Golden, CO**

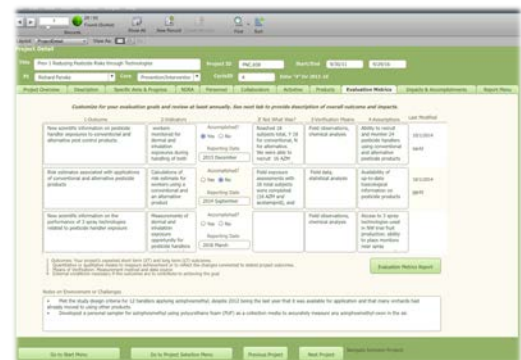


Communication Advisory Group meeting

EVALUATION PROGRAM

The PNASH evaluation program moves beyond traditional program monitoring, using a developmental approach to assist project teams in improving efficacy and outcomes. Our goal is to ensure that our efforts are relevant, feasible, sustainable, the best science and practice, and demonstrate efforts consistent with the ultimate goal of reducing injuries and illness. The program focuses at the micro project level and at the macro Center level. On an annual basis, PNASH internally assesses progress and impacts.

Program Monitoring Database, “Harvest,” builds on previous NIOSH and Ag Center evaluation tools, allowing our tracking and analysis of PNASH project outcomes and impacts. Unique to this database is the integration of impact stories, stakeholder anecdotes/quotes, PHS Progress Report fields, and a customizable evaluation matrix to track project-specific indicators of success. The system employs a relational database with a web-hosted platform for any-time, any-where data entry and reference. **Harvest** was introduced to NIOSH/Ag Centers in November 2014. Currently, two Agricultural Centers, the Nation Children’s Center and UC Davis Center are adopting and developing the database for their use.



PNASH's Harvest database is being adopted by other NIOSH Centers

Developmental Evaluation

Dr. Brock and Ms. Harrington continued developmental evaluation consultations with project teams - evaluating successes, unanticipated challenges, plans for navigating challenges, alternative ways success can be defined and evaluated, current and future project impacts, and how stakeholders can become more positively engaged. The Developmental Evaluation approach is described by Michael Patton as “The evaluator is part of a team whose members collaborate to conceptualize, design and test new approaches in a long-term, on-going process of continuous improvement, adaptation and intentional change.”

Agricultural Center Evaluators, Coordinators and Outreach (ECO) group

Ms. Harrington facilitates the NIOSH Agricultural Center ECO group to develop national and center-specific information materials, emphasizing program outcomes. National educational materials and templates for centers were developed..

PNASH Stakeholder Interviews

Over the summer 2015, a stakeholder needs and climate assessment conducted by PNASH leadership with 54 key stakeholders and partners around the Northwest.



Continuing education course

OUTREACH & EDUCATION PROGRAM

The Agricultural Community Outreach and Education Program (ACOEP) provides the Center's foundation for building relationships and sharing information with our agricultural community. This small program had an infusion of supplemental funding in FY2015, enabling PNASH to respond to regional needs for PNASH training and educational products. Through our combined education programs, in FY2015 we directly reached 3,300 individuals throughout the Northwest and across the country. Additionally, 31 collaborators/partners representing over two dozen different businesses and organizations were or continue to be actively engaged through our projects and programs.

EDUCATION & TRAINING

UW Health Sciences Common Book Series – Seth Holmes' *Fresh Fruit, Broken Bodies*

For the 14/15 academic year, agricultural worker safety and PNASH were highlighted across the UW Health Sciences. The focus of the year's Common Book was on the book *Fresh Fruit, Broken Bodies* by Seth Holmes. The series provided a shared framework for inter professional dialogue with a goal of creating true collaborations between health professionals. The author, Seth Holmes, is a medical anthropologist and physician who lived and traveled for several years with undocumented, indigenous Triqui migrant farmworkers and families in order to learn about the structural injustices that migrant farmworkers face. *Fresh Fruit, Broken Bodies* documents the challenges migrant farmworkers face in accessing affordable, humane, and quality health care, housing, and jobs. PNASH partnered in the program, offering educational forums for students and the public. The series included panel presentations, student discussion forums and articles throughout the year, including a panel forum, *Pesticide Issues in Agricultural Occupational and Environmental Health*, Seattle, WA on April 12, 2015.

See article on PNASH at http://sph.washington.edu/news/publications/SPHConnect_Autumn2014.pdf

Ag Safety Day, Wenatchee, WA. "Production to Processing"

On February 25th PNASH co-sponsored our state's annual Washington Governor's Industrial Safety and Health Conference for the agricultural industry. Led by the Washington Department of Labor and Industries, PNASH served on the planning committee advisory board along with 10 other organizations. The conference, with programs in English and Spanish, was designed for employers, supervisors, workers and safety and health professionals. It reached over 300 people. PNASH served as session proctors and exhibited with a demonstration on viewing pesticide exposure using Fluorescent Tracers. In conjunction with the event, our partner, The Northwest Center for Occupational Safety and Health, OSHA hosted a pre-conference course, *Introduction to Machinery and Machine Safeguarding*.

Current Topics and Best Practices in Occupational and Environmental Medicine in Agricultural Communities Held in Yakima, WA on February 27-28 2015, this was a new event in partnership with the [Northwest Center for Occupational Safety and Health](#). The session was geared towards health care providers and public health professionals in rural and agricultural areas, and provided current occupational and environmental health expertise on issues highly relevant to the Yakima Valley such as anencephaly cluster, pesticide drift, chronic back pain and ergonomics.

See program at <https://osha.washington.edu/professional-development/course/yakima-02272815>

"I have enjoyed being a part of research with PNASH and feel our joint work has resulted in positive impacts in the community. There are exciting opportunities to continue working together, especially given the enormous need that exists."
- PNASH Community Partner

International Society for Agricultural Safety and Health (ISASH) Conference, Normal, IL . "Making Ag Safety and Health the New Normal"

PNASH participated with posters and an exhibit highlighting PNASH key products and video trailers for new ladder injury and heat illness motivational videos. PNASH Poster presentations included *Practical Solutions for Pesticide Safety: What is the Impact?* and *Storytelling – Motivational Videos for Farmworker Ladder Safety and Heat Illness Prevention*.

Future of Occupational Health Speaker Series and Symposium

PNASH participated in the UW Department of Environmental & Occupational Health Sciences' project to define what the Future of Occupational Health may look like from research, training, and policy/management perspectives. This project consists of an invited speaker series and a cumulative symposium held June 24-25, 2015 in Seattle. In April the featured session included invited speakers on farmworker issues, Dr. Marc Schenker, UC Davis School of Medicine & Dr. Xochitl Castaneda, UC Berkeley.

Washington tree fruit industry outreach and training

New in FY2015, Pablo Palmandez, PNASH's Agricultural Workplace Specialist, lead an outreach and training program to Latino growers in the tree fruit industry. Visits were customized to the grower's need and often included training on heat related illness and pesticide safety. A total of 23 farms were visited, with 10 being new farms to PNASH's network. A total of 120 farmworkers were trained.

NEW PRODUCTS & RESOURCES DEVELOPED

PNASH Video by APHA TV

The PNASH Center was featured by the American Public Health Association (APHA) in a new venture to raise the visibility of the important work of public health professionals. This video provides information on new and ongoing initiatives that improve public health. PNASH was showcased for our work on behalf of agricultural workers and communities.

View PNASH's video on YouTube at <https://www.youtube.com/watch?v=6AOroKsclw0&feature=youtu.be>



New PNASH Website

The re-development of the PNASH website enabled mobile device user access. Key for our agricultural community users, who use hand-held devices more regularly than personal computers. In addition to a content management system (CMS) upgrade, new features were added to improve the search function across PNASH research projects. UW branding standards were adopted. In FY2015, the website was accessed by 7,000 unique visitors.

See <http://deohs.washington.edu/pnash>

Pesticides and Health Webpage

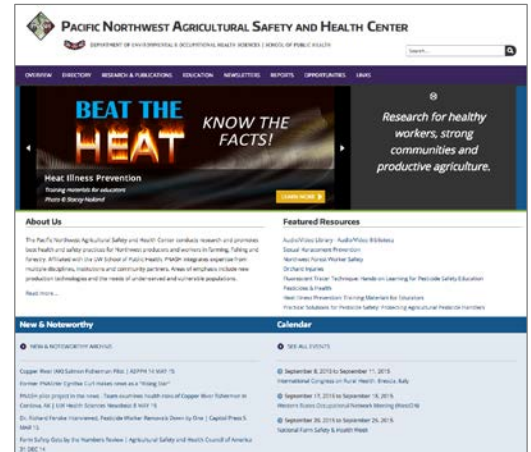
PNASH Pesticides and Health page underwent a review and substantial update. New resources were developed, including the course for health care providers, *Understanding Pediatric Outcomes from Pesticides and Nitrates*. The Pesticides and Health webpage receives the most unique visits of all PNASH Center pages.

See <http://deohs.washington.edu/pnash/pesticides health>

Heat Illness Prevention Webpage & Materials

Updated educational information has been posted on a page devoted to staying safe while working in the heat. The site presents types of heat illness, identification and treatment, prevention methods, and resources (English and Spanish).

See http://deohs.washington.edu/pnash/heat_illness



A dynamic new PNASH Center website launched in Spring 2015.

ADDITIONAL OUTREACH & EDUCATION ACCOMPLISHMENTS

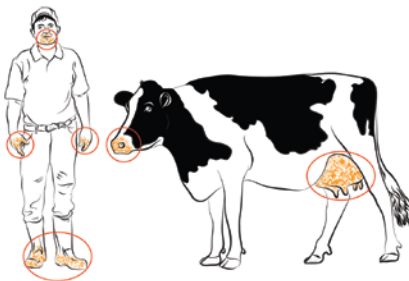
- **PNASH Mass Communications: monthly E-Newsletter, website, Facebook, YouTube**
- **Northwest media outlet outreach – radio, trade journals, dailies**
- **Monthly meetings of Community Advisory Board - El Proyecto Bienestar, Yakima County**
- **Dr. John Garland safety education at NW logging conferences and member of Oregon Forest Practices Committee**
- **Translational Lay Articles on heat illness, pediatric asthma, Latino forestry workers, salmon fishing, one health**
- **Washington State Department of Agriculture Stakeholder Advisory Committee Participation**
- **Oregon Law Center Indigenous Workers Project Advisor**
- **November 19-21. Pacific Marine Expo, Seattle, WA.**
- **Oct 23. Pediatric asthma results presented to EPA Regional Administer, Yakima Valley Farmworkers Clinic, Toppenish, WA**
- **Dec 2-4, 2014. Washington State Horticultural Association Annual Meeting, Tri-cities, WA**
- **Feb 2015. Community Based Participatory Research Weekend, Pacific Northwest University of Health Sciences, Yakima WA.**
- **February 23. Western Forum for Migrant and Community Health, “Advancing Health Equity through Community Action” Planning committee and workshop on sexual harassment in farmwork, San Diego, CA**
- **March 18. Regional promotion of National Ag Day, "Celebrating Safe and Healthy Ag Workers"**
- **April 13-15 Oregon Pesticide Symposium, Salem, OR**
- **May 5, 2015. Fluorescent tracer training to Opportunities Industrialization Center (OIC) of Washington, Yakima, WA**
- **June 2015. Washington Dairy Federation Meeting**
- **Sept 20-26. Regional promotion of National Farm Safety & Health Week**

NIOSH SPONSORED PROJECTS – COMPLETED FY 2015

Feasibility 5: Transmission of Microorganisms in Dairy Farms (PNASH Small Grant 2013-2015)

PI: Peter Rabinowitz, University of Washington

Dairy farming involves close contact between workers and animals, and exposure of both to environments including organic dusts that can be a source of microbial exposures. There is evidence that microbial transmission can be a source of zoonotic disease in workers due to pathogens, but also evidence that some exposures may have positive health effects for dairy farming families and workers. Despite this, there has been little study of the task-based risk of microbial transmission in dairy farming, nor of work practice and other control measures to manage such exposures.



Bacteria can transfer from humans to cows or from cows to humans.

This pilot study explores the mutually beneficial effect of measures to enhance human, animal, and environmental health in a "One Health" model. We successfully sampled five farms and analyzed worker surveys and microbial sampling results. Significant variability was found in worker behavior regarding hand-washing, use of PPE, and exposure to raw milk. We also found overlap of Staphylococcal species between people and cows, suggesting human-animal microbial transmission, including for species that could cause mastitis.

Research findings have been presented regionally and an educational pamphlet for workers provides best practices for reducing microbial transmission. We are also planning a follow-up study with Washington industry and research partners to look at the effect of microbial transmission on worker health and the impact of education on worker behavior. This project has also been successful in building trust with dairy workers and employers that will be critical to the success of future research and intervention projects.

RESOURCES

Educational pamphlet. Hygiene and Health in Dairy Farming. (English and Spanish)

Feasibility 8: Pilot: Total Worker Health in Salmon Fishermen from Cordova, Alaska (PNASH Small Grant 2014-2015)

PI: Deborah Cherry, University of Washington

Commercial fishing is the most hazardous occupation in the U.S. While fishing fatality data is an area of active research, information on chronic health conditions that affect fishermen is limited. "Total Worker Health in Salmon Fishermen" is a pilot study designed to assess chronic health conditions and habits among the gillnet fleet based out of Cordova, AK.

Information regarding the study was mailed to licensed gillnetters in Copper River Basin area in early 2015. Sixty-seven fishermen responded as willing participants and completed the initial "pre-season" fishing survey. This survey collected basic demographics and assessed health habits during the off-season. A follow-up survey was completed by 45 of the initial respondents to assess how health priorities changed during the fishing season. Nine participants wore FitBit devices to monitor sleep and activity before and during the fishing season.



Researchers Dr. Debra Cherry and Philip Tapang conduct survey recruitment

"The research team was top quality: UW is very well-respected, and we were happy to see our local Sea Grant involved, too. The collaboration made it easy to understand the goals of the project."
– Study Participant

The study team traveled to Cordova in July to meet with local stakeholders and to perform physical exams on a subset of participants. A subset of twenty Cordova gillnetters participated in an extensive physical exam including fitness, vision, and hearing tests. An in-depth health history interview with a focus on occupational injury and health-risk behaviors was conducted.

About half of survey participants reported hearing loss, and nearly all the exam participants had noise induced hearing loss on audiogram. About half of participants reported some type of upper extremity disorder affecting the shoulder, elbow, wrist, or hand. The

cardiovascular fitness level on exam was quite variable, ranging from poor to excellent. All reported challenges with fatigue while fishing, and some had poor sleep during the off season, as well.

We hope that awareness of these results will lead to more consistent use of hearing protection while fishing; greater attention to prevention of upper extremity disorders with proper ergonomics; and development of best practices to manage fatigue before and during the fishing season.



NIOSH SPONSORED PROJECTS – CONTINUING

Res. 1: Farmworker OP Exposure through Protein Adducts (NIOSH 2011-2016, UW Royalty Research Fund 2012)

PI: Christopher Simpson, University of Washington

The overall goal of this project is to improve methods for detecting overexposure to organophosphorus pesticides (OPs). This is being achieved by developing new analytical approaches based on detection of OP-protein adducts, and using these tools to measure pesticide exposures in agricultural workers who handle OP pesticides.

Organophosphorus (OP) pesticides cause illness through inhibition of cholinesterase (ChE), a critical enzyme in the nervous system. In Washington state, ChE activity is measured in farmworkers who are expected to have high exposures to OPs. When depression in ChE activity is observed, remedial actions are undertaken to reduce exposures and protect worker health. However, the ChE assay lacks sensitivity and specificity, resulting in a substantial number of false positives and false negatives. To improve assessment of worker exposures to OP pesticides we developed an assay based on the measurement of OP-adducts to butyryl cholinesterase (BChE) using immunomagnetic beads and HPLC-mass spectrometry. The assay provides accurate determination of the percentage modification of the active site of BChE and can detect down to 2% of BChE modified with pesticide, thereby eliminating the need for collection of a baseline pre-exposure blood sample from each worker. The assay has since been expanded to measure pesticide adducts to two other enzymes, acylpeptide hydrolase (APH) and red blood cell cholinesterase. These additional enzymes are more sensitive than BChE to certain pesticides, so their addition increases the breadth of pesticide exposures that we can monitor. Another improvement was to decrease the amount of blood required such that a dried blood spot can be analyzed. This could allow monitoring using a simple finger-stick rather than a blood draw. The assay has been, and will continue being used to measure OP exposure in samples collected from agricultural workers in Washington and Pakistan, and pesticide manufacturers in Pakistan. The three populations represent a range in levels of pesticide exposure with which to evaluate the assay as it is improved and expanded. Results from the new assays will be compared to measurements of ChE depression in the same samples.

Res 2: Using IPM to Reduce Pyrethroid Pesticide Exposures in Dairy Workers (NIOSH 2011-2016)

PI: Michael Yost, University of Washington

This project partners with Washington State University to reduce pyrethroid pesticide use in dairy operations by introducing Integrated Pest Management (IPM) practices in these workplaces. Since 2001, pyrethroid-related illnesses documented by the WS-DOH have quadrupled, suggesting that exposures to pyrethroid insecticides have been increasing both at home and in the workplace. Not only are pyrethroids harmful to workers, but they are also expensive to purchase and store. This project aims to evaluate new IPM strategies that reduce worker exposure as well as costs.

In 2015, four dairies collaborated in an intervention trial, introducing a feed-through product for the control of fly larvae in manure. This IPM option evaluated for the effectiveness of controlling flies along with the dairies' standard procedures. The dairies have both young calves (feed through is a supplement to their milk) and adult cows (feed through premixed with forage). To assess the potential for worker exposure, pre- and post-wipe samples



Treating for pests

were collected before and after pyrethroid application on adult cows. Samples were collected from surfaces in the vicinity that dairy workers could come in contact with. In addition, a decay study is taking place to ascertain the decay constant for permethrin in the dairy barn environment. The results will be compared to results from other studies. This will help inform both dairy operators and workers about the persistence of this pesticide.

Preliminary results show that manure management is a key element of a dairy IPM fly control program. One dairy using the feed-through product, uses an automated manure removal system (as well as, natural ventilation) did not use any pesticides to control flies on the cows this year. Usually this dairy does about one application on all cows each year. Observation and preliminary review of the fly cards data also indicate that good ventilation of both calf and cow barns are an important element of an IPM fly control program for dairies. One dairy owner was so pleased with the improvement in fly control at his calf hutches, he has adopted feed-through as part of his 2016 fly control program.

Results of the Survey of Pest Management Practices on Washington State Dairy Farms were provided the Washington Dairy Federation in a summary fact sheet. In addition, a Spanish language best-practices brochure for workers was audience tested with dairy farmworkers. We continue our outreach to the dairy farm community and maintain a close collaboration with the PNASH team members of the "One-health" dairy feasibility project to coordinate our work in this industry, share resources and support each other's project activities.

PUBLICATIONS

Dan Grinnell. Overcoming Literacy and Language Barriers to Improve Safety Knowledge of Washington State Dairy Farm Workers. MS Thesis. University of Washington, 2015.

Prev 1: Reducing Agricultural Worker Risks through New and Emerging Technologies (NIOSH 2011-2016, MAAF 2012-2013)

PI: Richard Fenske, University of Washington

Agricultural worker pesticide exposure and pesticide drift continue to be serious public health concerns in Northwest tree fruit production. Tree fruit production currently involves the use of high volumes of toxic pesticides. Personal protective equipment is the most commonly used form of protection among agricultural workers, however previous PNASH research has found that the use of personal protective equipment is often insufficient for protecting workers. The purpose of this project is to analyze the effectiveness of new pest control practices and application technologies in reducing worker exposure and drift.

A primary aim of the project is the evaluation of a product substitution intervention. PhD student, Jane Pouzou, has conducted a comparative risk analysis of nine different alternatives to the organophosphorus insecticide, azinphos-methyl, which was recently phased out for tree fruit pest control. Exposure data used by EPA and other regulatory agencies were obtained from two industry task groups. These data were combined with PNASH-generated exposure data to estimate total exposure and risk of acute neurotoxicity for each pesticide. Preliminary results support the cancellation of azinphos-methyl from the perspective of acute occupational health impacts, but also indicated that acetamiprid exposures may be higher than anticipated in handlers who wear protective clothing according to label instructions. This work was presented by Ms. Pouzou at the annual meeting of the International Society of Exposure Science in October 2014.



Field test of new method to measure pesticide drift with micronutrient tracers

In tandem with these quantitative risk assessments, we conducted, the Comparative Risk and Pesticide Decision Making Survey, a mixed-media survey and phone interview with 100 licensed crop consultants in Washington State on codling moth control method preferences and criteria. Participants responded positively to the codling moth control study in general, expressing interest in receiving the final results for their own review. Results will be disseminated to participants in Fall 2015, and will be presented at the annual meeting of the International Society of Exposure Science in October 2015.

The second aim of this project is focused on evaluation of new pesticide application technologies for drift reduction. We have continued our collaboration with Washington State University in field testing in the Fall of 2014. Under the direction of PhD student, Eddie Kasner, novel methods for measuring tracers of pesticide spray drift were developed and used in two orchard-based field studies. More than 300 field samples are being analyzed to compare worker exposure to drift from two sprayer technologies: one traditional air blast sprayer and one tower sprayer. Results will be presented at the annual meeting of International Society of Exposure Sciences in October 2015. Field studies for comparison to a third sprayer technology will be completed in 2016.

Collaboration with Washington State University (WSU) and Washington Tree Fruit Research Commission (WTFRC) was expanded. We implemented WSU orchard sprayer calibration techniques into our field studies and shared our standard operating procedures for spray drift sampling with WSU. All field work was conducted at a WSU Research Orchard with the assistance of a WTFRC certified pesticide applicator.

Related to this project, colleagues at Washington Department of Health (WA DOH) and NIOSH published a Morbidity and Mortality Weekly Report (MMWR) article about a Washington state drift event that cited three potential worker hazards in orchards: off-target pesticide drift, toxicity of some recently marketed pesticides, and a gap in worker notification requirements. PNASH and WA DOH are now collaborating to assess weather conditions and pesticide drift events between 2000 and 2015. This study marks the first time that occupational health drift incident data will be paired with historical weather and land use data over a large period of years. Study findings will impact state partner data collection techniques, enhance exposure prevention training, inform the value of orchard-to-orchard spray notification, and contribute to understanding and preventing drift exposure—a major reason for pesticide-related illnesses among Washington agricultural workers.

Prev 2: Ergonomic Evaluation of Emerging Technologies in the Tree Fruit Industry (MAAF 2009-2011, NIOSH 2012-2016)

PI: Peter Johnson, University of Washington

Tree fruit production activities, such as pruning and structural cutting, green fruit thinning, and fruit harvesting require high-intensity physical labor. Traditionally, these activities are performed from the ground or from ladders. Now, new interventions are being introduced: innovations in hand-held tools (pruners), apple collection systems (vacuums and conveyors), and ladder replacements (mobile platforms). This project aims to perform ergonomic evaluations of these interventions, integrating productivity and safety evaluations into the process of developing new agricultural technologies



Marking start/stop of work period for sensor data collection

A rigorous field study during the Fall 2014 harvest assessed three treatment groups: harvesting from the ground, ladder, and harvest-assisted mobile platforms. A new partnership was established with a large apple producer that adopted the harvest-assisted mobile platform and has hired workers with H2A visa (seasonal workers that may not have a background in agriculture). Due to this collaboration, we were able to obtain fixed

fieldwork conditions throughout the entire study; that is, orchard architectures, picking instructions and pay schemes. These controlled conditions allowed us to compare objective and subjective assessment of physical demands as well as productivity, providing a rigorous comparison of ladders and platforms.

A new method to measure repetitive arm motion was developed and validated by comparing to video observation. Repetition is a concern that arises from the workers' increased picking productivity when on harvest-assist platforms compared to ladders. Based on the project's Agricultural Ergonomic Advisory (AEA) suggestions, we added the measure of muscle activity and the standardized Nordic Questionnaire and improved the current Borg Questionnaire of perceived fatigue by addressing more body parts. The AEA group is composed of representatives of growers and workers, extension faculty specialists, an ergonomist, a physical therapist, and manufacturers all with the interest in reducing injuries in the tree fruit industry.

Based on this study, the use of harvest-assisted mobile platforms could reduce the physical work demands compared to orchard ladder use for back and shoulder inclination as well as the repetitive motion of arms. Workers' perception of exertion did not change. This project also demonstrates the workability of the mobile platform system for workers with little or no prior harvesting experience.

PUBLICATIONS

Thamsuwan O, Aulck L, Galvin G, Johnson P. Comparison of Exposure to Repetitive Upper Arm Motions and Non-neutral Upper Arm Postures between Apple Harvesting with Ladders and Mobile Platforms. Proceedings of the Human Factors and Ergonomics Society Annual Meeting Oct 2014. 58(1):1585-1589.

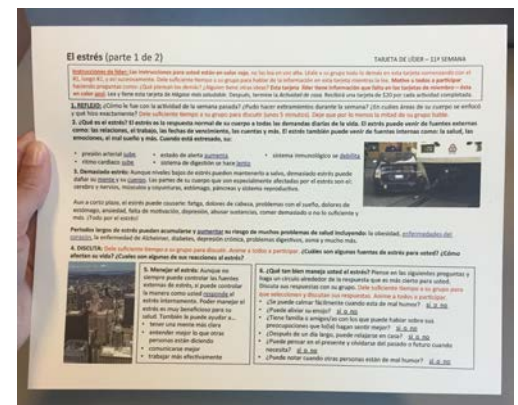
Prev 3: Impact of Workplace Stress on Health in Farmworker Families (NIOSH 2013-2015)

PI: Diane Rohlman and Kent Anger, Oregon Health Sciences University

This 2-year project was approved in summer 2015 by PNASH and NIOSH for a modification in aims and approach. It will continue the previous work to test the hypothesis that agricultural work demands are a major contributor to stress in the agricultural worker and their family. We found that our original hypothesis on low vs. high season stressors could not be tested in the vineyard worker population due to changes in agricultural employment patterns in Oregon where work takes place year-round with no periods of reduced work hours. Now, based on community and industry input, we are translating the previous results into the development of a TWH intervention to reduce stress in the workplace. The new aims of the pilot project are:

Aim 1: Identify workplace stressors and lifestyle factors associated with stress in farmworkers. (STRESS FACTORS SCREENING) A cohort of Latino agricultural workers currently employed in agriculture will be invited to participate in a broad-based total worker health assessment consisting of those measures that reflect stress and factors that are established or suspected to affect stress and the response to stress.

Aim 2: Develop a Total Worker HealthTM intervention to reduce workplace stress in the farmworker community via the workplace. (INTERVENTION) Training on effective supervision and work-life balance developed in the Oregon Healthy Workforce Center (OHWC) and piloted with Latino supervisors and entry-level employees will be adapted for farm managers and supervisors, and an intervention directed toward workers, also developed in the OHWC and piloted with Latino workers, will be provided to managers, supervisors and farmworkers to reduce workplace and individual stress, combined with optimized lifestyle education using scripted small-group procedures.



Reference card for team-based education

A TWH intervention is important for this population:

- 89% of participants from our previous project don't get enough fruits/vegetables, per self-report
- Over 75% of participants from our previous project were overweight and 50% of men had hypertension or prehypertension
- A high percentage of participants from the project consumed sugary drinks and fast food (which increased during high demand)
- Our community partner, Tuality Health Care, has data validating key risk factors in a wide range of vineyard workers.

Our TWH intervention will consist of computer-based skills training for supervisors/managers to improve work-life balance in the workforce, a practice app for the supervisors to practice what they learn, and a team-based education program addressing lifestyle behaviors and safety that also includes activities to practice the lifestyle behaviors. The TWH intervention is designed to reduce stress due to work and improve lifestyle-related behaviors, including the topics: Get Healthier, Stress and Stress Reduction, Sleep, Sun Protection, Calories, Nutrition, Exercise, Strength, Flexibility, Moving Forward.

Edu 1: Pesticide Safety in Tree Fruit: Translating Research, Overcoming Barriers (NIOSH 2011-2016)

PI: Nadine Lehrer, Chatham University, and Kit Galvin, University of Washington

The overall goal of this project is to minimize agricultural worker and family pesticide exposure in the tree fruit industry by translating and disseminating research results and overcoming barriers to pesticide safety practices, particularly those that affect the large Hispanic workforce in the Pacific Northwest. By translating research into an accessible and relatable form, orchard owners, managers, and handlers will be better equipped to protect workers and their families from potential pesticide exposure and illness. This project capitalizes on the expertise of two institutions, the University of Washington PNASH Center and the Washington State University Tree Fruit Research and Extension Center.

For the aim to identify and address barriers in pesticide safety education, Dr. Lehrer and a stakeholder working group (SWG) focused efforts on farm supervisor training and the underlying issue of improving human resource management. Thus, in Year 4, 13 interviews were conducted with human resources managers at primarily larger (and some smaller) tree fruit companies. Interviewing will continue into year 5. This information will complement knowledge about existing supervisory trainings in order to develop a more coordinated plan for training supervisors in the industry.

"We've done an injustice a little bit to these supervisors because we've not invested in their skills and knowledge... I'm like, 'Let's catch 'em up!' And when you have good supervisors you have less turn over because people want to work for that good supervisor."

"I don't have that [training resources] at this time. It's just me... So I was super excited to hear about what you're doing, because I'm like, 'Ahh, maybe there's another access point for getting information.'"

- Human Resource Manager Participants

Year 4 launched the project to distribute pesticide label health and safety information in English and Spanish. A stand-alone mobile app will be developed – an improved deliver system possible due to the leveraging support of our partners at the WSU Tree Fruit Research Research & Extension Center, who are investing in app technologies due to increased smart phone use by growers. During the past year the UW and WSU partners developed the design plan for deployment of the app – production and piloting will take place in Year 5.

In Year 4 a "Practical Solutions Pesticide Safety Kit" was developed for use by pesticide safety educators and orchard safety trainers. The kit includes materials for four practical solutions to be used in a hands-on training kit for pesticide safety educators. Two key training messages were selected for each solution. The package for each solution contains a large poster featuring a photograph and/or illustration of the solution and the two associate key safety messages, a hands-on example of the solution, and curriculum for the educator. The materials are bilingual. (Spanish and English) and were tested at 4 hands-on training for pesticide handlers.

RESOURCES

Practical Solutions for Pesticide Safety – Pesticide Educator Kit (English and Spanish)



Feasibility 7: GRAS2P Food Safety Video

(PNASH Small Grant 2013-2016)

PI: Nicole Brunner, Washington State Tree Fruit Association

The focus of this project is to integrate the current non-governmental food safety criteria of GlobalGAP and the governmental pesticide safety standards (Worker Protection Standard or WPS) of the EPA into a bilingual (Spanish/English), culturally sensitive, training video for farmworkers in our domestic produce industry. Conceived and created by AJL Productions, this project has been funded primarily through monies run through the Washington State Tree Fruit Association (WSTFA) including local partners in the agricultural industry, the WSTFA, PNASH, WA State Department of Agriculture and the EPA.

Five chapters, or modules, of this video have been completed; however the completion of the pesticide safety section has been delayed at the request of the EPA in order to integrate the new WPS due to be completed by the end of 2015. The EPA has put aside additional funding to make the integration of their new pesticide safety regulations into this project possible. These funds are being run through the WSDA and the project will go back into production as soon as these new regulations are made public. The pesticide safety component of this video will be available through the EPA as part of their pesticide safety outreach resources, the final video project will be available through AJL Productions.

There are few training resources available in this medium to creatively assist growers and farmworkers in both food safety and pesticide safety while at the same time assisting them in their compliance with GlobalGAP and the up-to-date federal Worker Protection Standard. In addition to being made available to all growers in the produce industry, the WSTFA will incorporate this video into their GRAS2P (Growers Response to Agriculture, Safe and Sustainable Practices) program. This video, when completed, will be compliant with the criteria set by GlobalGAP, and the EPA's Worker Protection Standard, it will be reviewed by the WSDA and also by Labor and Industries, Washington State.

See video trailer at <http://www.ajlproductions.com/completed-projects/worker-orientation-and-food-safety.html>

Feasibility 9: Pilot: Non-Fatal Injuries among Commercial Fishing Workers in Alaska, Washington, and Oregon

(PNASH Small Grant 2014-2016)

PI: Laurel Kincl, Oregon State University

Commercial fishing is the most hazardous occupation in the United States. Although there is a national database that collects fishing industry fatality data, information on non-fatal injuries is limited. Non-fatal injuries constitute the vast majority of workplace injuries and can result in lower productivity, lost wages, lost quality of life, or disability.

This project successfully prepared and analyzed reported commercial fishing nonfatal injury data from the US Coast Guard District 13 (Washington and Oregon). These results have been presented at the National Commercial Fishing Advisory Committee meeting in Seattle on September 15, 2015. In addition, Ms. Syron will present these results at the upcoming Northwest Occupational Health Conference where she was invited to present. She also has been invited to present a student poster at the State of the Coast Conference where for the first time, a student in the College of Public Health was invited to participate. Finally, as this work is continuing by working on data from District 17 (Alaska), our study team is also preparing a larger project proposal to continue to use reported data to engage the fishing community to improve the health and safety of the Pacific Northwest Commercial Fishing Industry.



Graduate Student, Samantha Case (NIOSH, Western States Division), works on project data with partners Devin Lucas, PhD (NIOSH, Western States Division), and Laura Syron, MPH (Oregon State University)

ADDITIONAL FY 2015 ACCOMPLISHMENTS

Heat Exposure, Injury Risk, and Productivity in Agricultural Workers (NIOSH K01 2014 - 2017)

PI: June Spector, University of Washington

This new project examines the association between heat exposure and traumatic injury risk in agricultural workers, with the ultimate goal of developing injury prevention solutions. The study will first draw on established climate models and WA workers' compensation data. Then, harvest workers will be evaluated, in the field, for associations between heat stress, psychomotor performance and productivity. In addition, the field studies will test the feasibility of using urinary 8-hydroxy-2'-deoxyguanosine (8-OHdG) as a biomarker of heat acclimation.

The results of this study will improve the ability to estimate future productivity losses and health effects related to climate change, engage employers in heat related illness prevention efforts, and allow for measurements of the effectiveness of prevention interventions.



Safety and Health of Latino Immigrant Forestry Services Workers (NIOSH U01 2014 – 2017)

PI: Arnold de Castro, University of Washington

Occupational injury and illness rates among workers in the forestry services industry (tree planting, forest thinning, brush piling, etc.) are 2 to 3 times the rates of the average US worker, and fatality rates are 9 times as high. The largely immigrant, Latino workforce in this industry is essential to US forest management, yet marginalized because of documentation status, lack of English proficiency, low literacy, occupational immobility, working in remote locations under contracted employment, and deficiencies in skills training. Applying principles of participatory action research with workers and a community-based promotora program, we examine how hazardous working conditions, workplace practices/systems and worker fears of retaliation affect occupational injuries and illnesses, post-injury health outcomes, and worker attempts to improve workplace safety and health. We will develop case studies based on in-depth, qualitative interviews with 25 forest workers in southern Oregon about serious on-the-job injuries/illnesses experienced in the previous year and their proactive attempts to improve working conditions. These case studies will be transformed into print and digital educational resources for workers and employers utilizing personal narrative storytelling.

The first year of the project saw great progress in engagement with the Technical Advisory Group and Expert Working Group (EWG). The EWG is comprised of Latino forest workers and our promotora partners. Each informed the development of the interview tools and subject matter priorities. In addition, employer and supervisor interviews were completed, provided a broad perspective on the work environment and issues that contribute to worker safety. Interviews of workers began in September of 2015.

Home Air in Agriculture Pediatric Intervention Trial (NIEHS R01 2014-2019)

PI: Catherine Karr, University of Washington

The primary goal of the HAPI project, made possible through [El Proyecto Bienestar](#), is to reduce exposure to inflammatory agents and allergens in the homes of an environmental justice community of Latino children residing in an area of intense dairy and crop based industrial agricultural production. Community based participatory activities in the Yakima Valley, Washington State have identified pediatric asthma as a priority health concern for the community. This study addresses three highly underdeveloped components of asthma and environment research: the health of children with asthma living in communities with industrial scale agricultural operations, asthma in a particularly vulnerable subpopulation (Latino farm worker children), and evidence-based intervention strategies in these populations.

Children with poorly controlled asthma aged six through twelve years, recruited through the Yakima Valley Farmworker Clinic, are randomized to the clinic's usual asthma educational program or an enhanced program which includes two portable high efficiency particulate air (HEPA/NH3) cleaners located in the child's sleeping area and living room. Children in the usual program group will receive HEPA/NH3 units after their study year. This study seeks to characterize key indoor pollutant exposures for 75 children with asthma who reside within 400 meters of crop production or dairy operations. The program opened for recruitment in the summer of 2015 and currently has twelve families enrolled.

ADDITIONAL RESEARCH PUBLICATIONS

Additional publications based on PNASH projects funded in previous cycles or other, non-NIOSH sponsorship.

Handal AJ, Hund L, Paez M, Bear S, Greenberg C, Fenske RA, Barr DB. Characterization of Pesticide Exposure in a Sample of Pregnant Women in Ecuador. Arch Environ Contam Toxicol. 2015 Aug 27

Isaksen TB, Fenske RA, Hom EK, Ren Y, Lyons H, Yost MG. Increase Mortality Associated with Extreme-Heat Exposure in King County, Washington, 1980-2010. Int J Biometeorol. 2015 May 10.

Loftus C, Yost M, Sampson P, Torres E, Arias G, Breckwich Vásquez V, Hartin K, Armstrong J, Tchong-French M, Vedal S, Bhatti P, Karr C. Ambient Ammonia Exposure in Agricultural Community and Pediatric Asthma Morbidity. Epidemiology. 2015 Nov;26(6):794-801.

Loftus C, Yost M, Sampson P, Arias G, Torres E, Vásquez VB, Bhatti P, Karr C. Regional PM2.5 and asthma morbidity in an agricultural community: a panel study. Environ Res. 2015 Jan;136:505-512.

Perla ME, Iman E, Campos L, Perkins A, Liebman AK, Miller ME, Beaudet NJ, Karr CJ. Agricultural Occupational Health and Safety Perspectives Among Latino-American Youth. J Agromedicine. 2015;20(2):167-177.

Spector JT, Krenz J, Blank KN. Risk Factors for Heat-Related Illness in Washington Crop Workers. J Agromedicine. 2015;20(3):349-359.

Spector JT, Sheffield PE. Re-evaluating occupational heat stress in a changing climate. Ann Occup Hyg. 2014 Oct;58(8):936-942.