#### **OCTOBER 2019**



## PACIFIC NORTHWEST AGRICULTURAL SAFETY & HEALTH CENTER

YEAR-END REPORT

Fiscal Year 2019 – 9/30/18 to 9/30/19

Research for healthy workers, strong communities & productive agriculture

#### ENVIRONMENTAL & OCCUPATIONAL HEALTH SCIENCES

SCHOOL OF PUBLIC HEALTH UNIVERSITY of WASHINGTON

#### **PNASH YEAR-END REPORT, FISCAL YEAR 2019 (9/30/18 - 9/30/19)**

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#### **CENTER OVERVIEW**

The Pacific Northwest Agricultural Safety and Health (PNASH) conducts **Research for Healthy Workers, Strong Communities & Productive Agriculture.** Visit our <u>website</u>.

PNASH is dedicated to the prevention of illness and injury among agricultural producers, workers, and their families. One of eleven regional centers, PNASH serves Alaska, Idaho, Oregon, and Washington, integrating expertise from multiple disciplines, institutions, and community partners. The Center is focused on safe and sustainable



1. PNASH's region includes Washington, Oregon, Idaho and Alaska.

agricultural workplaces and communities, with an emphasis on injury and illness prevention, especially among hired laborers, migrant/seasonal workers, and children.

Our approach includes:

- 1. Working in partnership with employers, workers, agencies, and other research and service organizations.
- 2. Conducting innovative research and intervention programs that focus on problem solving.
- 3. Taking solutions to the workplace through training, outreach, and participatory research.
- 4. PNASH research priorities and project selections are based on the burden and need of our Northwest communities, the seriousness of the hazard, the number of people affected, and the probability that research will lead to health improvements.

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, as well as with Washington State University (WSU) and Oregon State University, among others. PNASH's funding base is awarded through the National Institute for Occupational Safety and Health (NIOSH/CDC).

#### RELEVANCE

Jobs in the agricultural industries, which include farming, fishing, and forestry, consistently rank among the most dangerous. The fatality rate for workers in the farming sector is six times higher than the all-industry average, while the fatality rate for workers in the commercial fishing and logging sector is 32 times the all-industry average. In addition to injuries and fatalities, agricultural workers also face high risk for illnesses such as lung



Fishing workers are 24 times more likely to die on the job.

Forestry workers are 38 times more likely to die on the job.

Agriculture workers are 6 times more likely to die on the job.

diseases, hearing loss, heat-related illnesses, skin diseases, and certain cancers associated with chemical use and prolonged sun exposure. Farming is a unique workplace in that families frequently live on-site. Each year, 14,000 children are injured and 100 children are killed on US farms.

#### THIS REPORT & 2018-2019 NIOSH AWARD CYCLE

We invite you, in the following report, to learn about our work and Year 3 progress. New directions in this 5-year cycle include injury surveillance, dairy safety and health, and an enhanced Outreach Core to increase engagement of stakeholders and to move our research results into practice. Each project is at an early stage of development, so please feel free to contact us with your ideas or interests in collaborating. Most important to our mission are our partnerships with agricultural communities, which help ensure our work is relevant to the needs of the industries and the workers we serve.

And **Thank You** to our partners, advisors and our PNASH team of faculty, staff and students. This work is a testament to your dedication and range of expertise.

## **PNASH CORES**

#### **PLANNING & EVALUATION CORE**

#### **PILOT PROJECT & EMERGING ISSUES PROGRAMS**

#### **OUTREACH & EDUCATION CORE**



Join the conversation on the emerging health and safety issues for farming, fishing, and forestry communities. #WestAg2019

#### **PLANNING & EVALUATION CORE**

The Planning and Evaluation Core provides the infrastructure and support for the entire Center and assists in the implementation of individual project and program objectives. Our second year's activities have focused on launching project fieldwork, project team capacity building, and community engagement.

#### **New PNASH Leadership**

In Year 3, we proudly announce the advancement of Dr. Edward Kasner to PNASH's Director of Outreach and Education.



Edward Kasner, PhD, MPH

Director of Outreach and Education & Research Scientist Beginning fall 2019, Dr. Edward Kasner was appointed Outreach Director. Dr. Kasner has worked with PNASH as a former PhD Student and Fellow. He has made his mark at PNASH with not only his research and expertise, but also his spirit toward partner and stakeholder engagement. Dr. Kasner serves as a member of PNASH's Internal Advisory Committee, supporting PNASH project teams and leading the Center's Outreach Core. Visit this link to an interview with Eddie Kasner.

#### **Organization & Advisories**

Our PNASH internal network is comprised of over 30 faculty, staff, and students from multiple disciplines and institutions across the Northwest.



- Project specific stakeholder advisories facilitated through projects and supported centrally. See Outreach Core plan.
- riangle Projects served by El Proyecto Bienestar The Well Being Project Community Advisory Board

#### PNASH Internal Advisory Committee

A multidisciplinary team of current PNASH leadership, the Internal Advisory Committee (IAC), meets monthly, providing oversight and advice to the Principal Investigator and project investigators in making scientific and administrative decisions

	Table 1. External Advisory Comm	ittee
Michael Yost, PhD, MS	Director	airion@uw.edu
Richard Fenske, PhD, MPH	Associate Director	rfenske@uw.edu
Vanessa Galavíz, PhD	Director of Engagement & Education (Role in Year 2)	vanesg@uw.edu
Marcy Harrington, MPA	Center Manager	marcyw@uw.edu
Catherine Karr, MD, PhD	Internal Advisory Committee	ckarr@uw.edu
June Spector, MD	Internal Advisory Committee	spectj@uw.edu

#### PNASH Scientific Advisory Committee

PNASH's Scientific Advisory Committee (SAC) provides the Center and the projects with guidance on effectiveness, direction of future work, project methods, and result interpretation as well as relevance of activities to regional and national policies and initiatives. The SAC meets bi-annually with one in-person meeting each year: in this Cycle the SAC met in person on October 24, 2017 and focused on new project directions and surveillance research needs.

Kent Anger, PhD	Table 2. PNASH Scientific Advisory CommitteeProfessor and Director, OHSU and Portland State joint School of Public Health,Oregon Health Workforce Center
Jennifer Lincoln, PhD, CSP	Director, NIOSH Center for Maritime Safety and Health Studies
Howard Kipen, MD, MPH	Chair and Professor, Environmental & Occupational Medicine, Rutgers University
Linda McCauley, RN, PhD, FAAN, FAAOHN	Dean and Professor, Nell Hodgson Woodruff School of Nursing, Emory University

#### **Staff Spotlight**

Each year our staff plays a critical part in the success of the Center in building new collaborations, conducting innovative research, and mentoring student. Ms. Galvin's award below is a testament to her and other PNASH staff's extraordinary contributions.

**Kit Galvin, MS, CIH,** has served as a PNASH research scientist for over 15 years. Her contributions to worker and industry engagement, practical solutions, and pesticide safety have made a significant impact in Northwest agriculture. In 2019, the University of Washington Department of Environmental and Occupational Health Sciences recognized Mrs. Galvin for her exceptional work and awarded her the Distinguished Staff Award. Learn more about Kit Galvin's award.



#### **Student Education**

Every year, the PNASH Center provides mentorship and research opportunities for students. New this year, we have started a **PNASH Student AgFF (Agricultural, Fishing, and Forestry) Research Interest Group**. Sixteen students across the UW meet quarterly, bringing together PNASH faculty, students, and staff in a student-led and student-focused forum. The purpose of this group is to enhance collaboration and learning between PNASH faculty, staff, students, and others interested in AgFF research.

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Following are some key student achievements in Year 3. Please see each component report for additional descriptions of our students and their project work.



**Dennise Drury, MPH Student and PNASH Education and Outreach Specialist,** is completing her MPH degree in the UW Department of Environmental and Occupational Health Sciences. Ms. Drury recently received a Harry Bridges Labor Studies research grant to pilot and evaluate the ¡Basta! Prevent Sexual Harassment in Agriculture worksite training and toolkit alongside Dr. Jody Early. Training events are currently being organized to launch the

training program. At PNASH, she chairs the PNASH AgFF Student Research Interest Group for new and current students with interest in the Center's research and activities.



**Maria Blancas, PhD Student and PNASH Education and Outreach Specialist** recently received the 2019 Bullitt Environmental Prize for her work with immigrant farmworkers. This prize is awarded annually by the Bullitt Foundation and comes with a \$100,000 award over two years. The Bullitt Foundation award recognizes Ms. Blancas for her distinct dedication and passion for improving the health and safety of farm workers. Ms. Blancas' story was featured in the Seattle Times and on the UW DEOHS blog. She is continuing her

work with PNASH as a PhD student, under the mentorship of faculty Dr. June Spector and Dr. Vanessa Galavíz. Ms. Blancas will focus her PhD work on evaluating social and environmental impacts on farmworker health, supported in part by a PNASH Emerging Issues award. Through her dissertation, she is utilizing community participatory methods to assist farmworkers in developing participant-created digital stories. Ms. Blancas' prior experience includes working alongside Promotores de Salud and farmworkers to help work towards health equity. As the daughter of hard-working farmworker parents, Ms. Blancas is committed to ensuring farmworkers and their families are safe and healthy.



**Kori VanDerGeest, MPH,** completed her degree in the UW Department of Environmental and Occupational Health Sciences this spring and earned the DEOHS outstanding Master Student award. Ms. VanDerGeest examined communication methods to promote private testing of well water in a rural, agricultural region with a predominantly Latino population. She is determined to see her research translate into better outreach to Yakima Valley residents. In collaboration with a student in the College of the Environment, she

developed fact sheets that promote well-water testing and help people understand the results.



**Idanis Cruz, BA,** is a recent graduate from the School of Public Health, where she earned her undergraduate degree in Public Health-Global Health. Ms. Cruz interned for PNASH in the Etiquetas Bilingues de Pesticida/Bilingual Pesticide Safety Project and was recognized by the Alumni Association as part of the 2019 cohort Husky 100 for her work in improving farmworker safety. Ms. Cruz also earned a Mary Gates Research Scholarship to study farmworkers' perception on wildfire smoke exposure. Continuing her work at PNASH as

the Program Assistant and Latina Communication Jr. Specialist, Ms. Cruz plans to maintain her involvement in improving working conditions for her farmworker community.

#### Academic Collaboration

The PNASH Center recognizes 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 year the center was involved in two conferences that served as space for collaboration, presentation, and discussion. PNASH students, staff, and faculty played key roles in their success.



#### Association of University Programs in Occupational Health

Beginning in February 2019, Dr. Michael Yost began a one-year 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 National Institute for Occupational Safety and Health (NIOSH). It serves to coordinate priorities and communications between these Center programs. AUPOHS largely meets remotely and in person annually.

## Cascadia Occupational, Environmental and Public Health Conference Blaine, WA. January 10-11, 2019

PNASH co-sponsored the 30th annual joint meeting of faculty, staff, and students from the University of British Columbia, Simon Fraser University, Oregon State University, and the University of Washington. The 2019 theme was "From Evidence to Action." PNASH involvement included, facilitating a session on agricultural safety and health, and poster and platform presentations by students, staff, and faculty.



## Western Ag Safety & Health Conference - Cultivating Collaborations Seattle, WA. August 7-9, 2019

In 2019 PNASH hosted Cultivating Collaborations, a conference to build collaborative partnerships and foster the exchange of ideas. The program addressed forward thinking research for the safety and health of the western

agricultural workforce, including farming, fishing and forestry. Thematic sessions focused on hired/contract workers, climate change, animal/human



one-health, injury and exposure prevention, prevention through design, and research-to-practice. The conference was a success with 170 researchers and regional partners participating in poster, lighting talks, panels, and discussion

sessions on agricultural safety and health topics. The conference aimed at Cultivating Collaborations was co-sponsored by the five western NIOSH Agricultural Centers, the NIOSH Western States Division, and participation was invited from all partners in the implementation of science, service, and policy.

Cultivating Collaborations was supported by a NIOSH/CDC Conference Grant (Award# U13OH011391). See <u>conference website</u> and the upcoming dedicated issue of the Journal of Agromedicine.

#### **New 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.

New project awards granted in Year 3 include:



Kit Galvin, MS, CIH, Research Scientist, UW Dept. of Environ. & Occupational Health Sciences
Pesticide Labels Now! A Bilingual User Interface and Mobile Application for Pesticide
Safety Information. Washington State Department of Labor and Industries' Safety and
Health Investment Projects - \$175,000, 2 years
See project website.
& A Pesticide Application Risk Management Tool, The PestiSeguro/PestiSafe App.

Washington State Department of Agriculture - Specialty Crop Block Grant \$250,000 3 years See project website.



Laurel Kincl, Associate Professor, Oregon State U Dept. of Environ. & Occupational Health Viktor Bovbjerg, Professor, Oregon State U Dept. of Epidemiology Jay Kim, Assistant Professor, Oregon State U Dept. of Environ. and Occupational Health Three awards under the National Institute for Occupational Safety and Health (NIOSH) and the U.S. Coast Guard (USCG) Commercial Fishing Occupational Safety Research Cooperative Agreement and Training Project Grant Program:

- An Assessment of Sleep Patterns and Potential Impacts to the Health of Fisheries Workers (Sorenson)
- Improving Vessel Equipment: Evaluating Fishermen-Led Safety Design Ideas in the Dungeness Crab Fleet
  - (Kim and Kincl)
- Building Capacity for Fishermen First Aid Safety Training (FFAST) (Kincl and Bovbjerg). See project website.



Elena Austin, PhD, Research Scientist

WA State Dairy Safety Network. Award through the WA Dairy Federation Washington State Department of Labor and Industries' Safety and Health Investment Projects - \$69,710 TC, 2 years



Maria Tchong-French, MS, Research Scientist, UW Dept. of Environ. & Occupational Health Sciences

**Understanding Children Farm Safety Needs of Latino Farmworker/Farmers in the Pacific Northwest.** Small grant – National Children's Center for Rural and Agricultural Health and Safety - \$5,000, 1 year.

Additional PNASH awarded projects and progress reports are detailed in this report under sections: Pilot Project and Emerging Issues Programs (See page 10), and Externally Sponsored PNASH Projects (See page 28).

#### **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.

In addition to our regular aims, in Year 3, Dr. Yost, PNASH Director, launched a strategic planning effort engaging PNASH Internal and Scientific Advisors and all PNASH personnel. The re-envisioning process started with answering a few key questions:

- 1) Strengths What is going well? What are our strengths? What is our current capacity?
- 2) Wish list What ideas/paths do you wish had been taken? Where are the gaps? What would be exciting?
- 3) Opportunities What are our best opportunities (eg, partner or investigator interests)? What people/expertise and resources are available or underutilized?

These questions were followed-up with a survey of all PNASH personnel, reporting back our draft mission and vision statements and starting a list of priorities. The priorities list aims to be flexible and responsive, so will be revisited annually.

**AIM 1: Regional Needs Assessment.** To assess PNASH's responsiveness to regional needs and inform Center and project planning, three approaches will be taken: routine interviewing and surveying of Stakeholder Advisories and annual monitoring of Northwest Ag Health Indicators. See the Outreach Core's Needs Assessment section for our Year 3 activities in needs assessments, including:

- Children and youth farm safety information needs
- Logging sector needs assessment
- Sexual harassment prevention in agriculture

**Ag Health Indicators.** In Year 3, Dr. Elena Austin developed an interactive visualization platform using workers compensation case-level data. This flexible platform allows for injury trends and circumstances to be identified and visualized by partners and stakeholders. In addition to allowing for exploratory analyses, this allows for a systematic method to target training needs to specific injury circumstances. The platform has been introduced in Year 3 to dairy and fishing sector stakeholders where it has generated interest as an analytical tool to be used in collaboration with industry sectors. In August 2019, Dr. Austin introduced the tool to the PNASH Scientific Advisory Committee to consider the potential as a publically facing data system. Major issues discussed



2. Injury Rate of Cattle related Injuries

included misinterpretation of data, and the needs and restrictions of our data source partners. In the coming year, this tool will be used by our dairy partnership and our data source partners will be engaged in discussion about their needs and interest in use of this closed platform and a future public platform.

**AIM 2: Performance, Developmental, and Outcome Evaluation.** Each PNASH program and project participated in both a common monitoring system (PNASH's Harvest Database) and specific evaluation plans reflective of their team goals. PNASH's evaluation plan focuses on relevant and measurable outcomes. The system enables program leadership to conduct performance reviews for quality, efficiency, and productivity within each project and program. Our Program Monitoring Database, "Harvest" was revised for the new cycle, assisting us in tracking outcomes from recently closed projects and setting project objectives for our new cycle's projects. The database builds on previous NIOSH and Ag Center evaluation tools, assisting with tracking and analysis of PNASH project outcomes and impacts. Unique to this database is the integration of impact stories, stakeholder

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anecdotes/quotes, PHS Progress Report fields, and a customizable evaluation matrix to track project-specific indicators of success, such as those reported in this final report. The system employs a relational database with a web-hosted platform for anytime, anywhere data entry and reference. Currently, two Agricultural Centers, the National Children's Center, and the UC Davis Center, have adopted and developed the database for their use.

In Year 3, the Evaluation team conducted mid-cycle developmental evaluation sessions with each of our 5-year project teams. The developmental evaluation approach assists project teams in improving efficacy and outcomes.

AIM 3: NIOSH AgFF Initiative and Multi-Site Evaluation. The PNASH Evaluation team collaborates regularly with NIOSH and the ten other NIOSH-funded Agricultural Centers through the Agricultural Center Evaluation, Communication, and Outreach (ECO) group. PNASH joined a new collaboration in Year 3, the NIOSH Ag Center Surveillance Working Group organized by Erica Scott of the Northeast Center. In addition, PNASH served on a steering committee, along with other NIOSH Ag Centers, for the Marshfield Clinic Research Institute's Ag Injury <u>News Clippings database.</u> PNASH also participated in NIOSH organized efforts, such as the National Occupational Research Agenda.

#### **ADDITIONAL PLANNING & EVALUATION ACTIVITIES**

Monthly. AgFF Center Directors' Meetings

Monthly. Internal Advisory Meetings

Quarterly. Investigator Meetings

Bi-annual. Scientific Advisory Meetings

Bi-annual. Kincl, RISC Fishing Project Advisory Meetings. Elena Austin and June Spector

Bi-monthly. Agricultural Center Evaluation, Communication, and Outreach (ECO) Group. Marcy Harrington, Edward Kasner, Dennise Drury, and Sarah Fish.

2019. Washington Pesticide Application Workgroup: Invited voting member: Edward Kasner

Senate Bill 5597 Legislative Workgroup on Aerial Application of Herbicides on Forestlands. PNASH Participation: Edward Kasner

2019. AgInjuryNews.org Steering Committee. Marcy Harrington

September 26-27. 12th Annual Western States Occupational Network (WestON) Meeting, Denver, CO. PNASH Presenter: Elena Austin, Interactive Worker's Compensation Data Visualization Data Visualization Platform.

September 19. UW School of Public Health & WA Dept. of Health Forum. Edward Kasner

September 13-14. NIOSH Working Hours, Sleep & Fatigue, Couer D'Alene, ID. June Spector

August 13. NIOSH Center Director's Meeting, Cincinnati, OH. Edward Kasner

February 5-6. Annual Ag Center Directors Meeting, Washington DC. Mike Yost and Marcy Harrington

March 14. Invited Seminar Speaker: Barbara Lee, "Evidence-based Interventions: How They Fail to Safeguard Children in Agriculture."

#### RESOURCES

Year-End Report: Pacific Northwest Agricultural Safety and Health Center, FY 2019, October 2018. <u>Report.</u> Evaluation Tool: Harvest Program Monitoring Database, v. 3.0 (available on request) Website: <u>Western Ag Safety & Health Conference - Cultivating Collaborations.</u>

#### PILOT PROJECT PROGRAM AND EMERGING ISSUES FUND

PNASH administers an annual Pilot Project Program and Emerging Issues Fund, allowing us to award Northwest investigators small projects in research, intervention, and education projects.

#### Pilot Project Program – Year 3

The PNASH Pilot Program offers small grant opportunities to both new and experienced investigators who are seeking to explore new directions, test novel methods, or develop preliminary data for occupational safety and health research in farming, fishing, and forestry. A call for pre-proposals is released annually to investigators throughout the Northwest using our contacts and through collaborations with public health programs in regional universities. The practice of submitting pre-proposals and direct consultation with applicants ensures that the final proposals submitted align with the mission and goals of the Center and the Pilot Project Program. Final proposals undergo an internal and external review process where they are scored based on the criteria outlined by the Pilot Program Application Guidelines, including:

Significance: the project's responsiveness to regional and national priorities, focus on hazards that are serious and/or have high rates of exposure, and the probability that research will make a difference Investigator qualifications: qualifications of PI and/or mentor; early career investigators are encouraged Innovation: new and novel methods; interdisciplinary and community engaged research
 Approach: study design; population size and access; evaluation; research-to-practice
 Future Funding Potential: likelihood this project will lead to future studies and programs

The Pilot Program now has two application tracks:

**1)** Feasibility Research Track: for pilot research studies seeking to gather preliminary data or explore new directions to help inform future research, and

**2)** Education/Research Translation Track: for translation studies seeking to move research into practice through the development and evaluation of training, education, and outreach materials and activities.

The purpose of creating this new track is to provide an opportunity for academic and community partners to apply for funding to disseminate research findings, translate research into practical formats that are accessible to working populations and their families, and explore innovative education strategies based on research. Each application track has separate evaluation criteria to promote fair and comparable assessments by recognizing the distinct goals, strengths, and methods of each.

During the 2018 call for pre-proposals, there were of eight pre-proposal applications submitted from investigators in Washington, Oregon, and Idaho. Of the eight applications received, six were invited to submit a full proposal. Following an external and internal review, the Center selected three projects to award, two from the Feasibility Research Track and one from the Education/Research Translation Track. The projects awarded this year include Evaluation of Wearable-Based Activity Recognition Modeling Applications for Logging Safety for \$27,250 (University of Idaho), Nitrate Well Water Testing in Ag: Improving Environmental Health Communication with Behavior Theory for \$25,000 (University of Washington), and Northwest Safety Summit for Safety Professionals in the Logging Sector for \$5,000 (University of Washington).

#### Pilot Projects Awarded for Year 3:



#### Rob Keefe, PhD, Associate Professor, University of Idaho Evaluation of Wearable-Based Activity Recognition Modeling Applications for Logging Safety Follow the link to read <u>Dr. Keefe's bio</u>.

This pilot project integrates geospatial technology and activity recognition modeling into a Garmin smartwatch and smartphone application for rigging crew workers in the logging industry. This application aims to prevent injuries by improving situational awareness. Participating workers will receive near real-time updates of their coworkers' work activity status and location. This information allows workers to make informed

decisions in navigating locations relative to hazards and for team emergency alerts.



#### Elena Austin, PhD, Research Scientist, University of Washington Nitrate Well Water Testing in Agricultural Communities: Improving Environmental Health Communication with Health Behavior Theory Follow the link to read her bio.

This project is developing educational materials to promote nitrate well water testing among families in Lower Yakima Valley communities using theory-based message mapping. Focus groups will identify the well water testing needs, including knowledge and health beliefs. Message mapping will be used to integrate focus group findings with

publicly available agency resources to improve messaging for this community and culture. The project is guided by a committee composed of local environmental health stakeholders, including El Proyecto Bienestar and the Latino Community Fund.



#### John Garland, PE, OSU Professor Emeritus OSU and UW Affiliate Professor Northwest Safety Summit for Safety Professionals in the Logging Sector PNASH sponsored a NW Logging Safety Summit with the goal to convene logging safety professionals in a meeting to share information, train on new industry safety developments, and establish priorities for future needs. Participants gathered from across WA, OR, ID, MT, on February 20, 2018 in Springfield, Oregon.

See progress on these projects reported under the section, PNASH Pilot Projects starting on page 13.

Pilot Projects Newly Awarded for Year 4 include:

- Kevin Lyons, Associate Professor, Oregon State University, \$25,000. Use of Unexpected Events and Management Requiring Conditions in the Training and Management of Workers
- Edward Kasner, PNASH Outreach Director and Research Scientist, \$25,000 Smoke Monitoring for Agricultural Safety and Health (SMASH)
- Jay Kim, Assistant Professor, Oregon State University, \$5,000 Systematic Evaluation of Exoskeletons in Reducing Musculoskeletal Disorders in Manual Timber Felling
- Jody Early, Associate Professor, University of Washington Bothell, \$5,000 Sexual Harassment Prevention in Agriculture: Evaluating a Training Video and Curriculum

#### **Emerging Issues Fund – Year 3**

Through PNASH's Emerging Issues Fund we can take rapid action to address an emergent issue or cultivate a developing partnership. The Fund allocates up to \$50,000 direct costs per year with awards as small as \$2,000. Awards are available to active investigators within PNASH's Northwest network.

PNASH's Emerging Issues Fund prioritizes partnership building activities. The fund is used to address issues and priorities raised through project advisory committees, solicitation from Center stakeholder meetings, and input from ad hoc advisors. Activities should fall outside of the scope of currently funded PNASH work. Distinguishing criteria for this fund are:

New effort to cultivate a developing partnership Address issues and priorities raised by stakeholders High impact opportunity in preventing injury and illness Immediacy/timeliness of the need Not a fit for other funding streams Opportunity to extend our research into practice

#### **Emerging Issues Projects and Accomplishments**

**Christopher Simpson. Respiratory Health and Indoor Air Quality in Washington's Cannabis Industry** - **\$24,142 direct costs and funded in part by Pilot Project Program** (See report under Pilot Project Program, page 46). This pilot measures airborne contaminants associated with cannabis production and evaluates if they are associated with airway inflammation and/or respiratory symptoms. This project was supported in part through funding with the PNASH Emerging Issues fund and our Pilot Project program.

#### Tania Busch Isaksen. Knowledge transference effect on N95 mask fit, by communication medium.

**\$9,000 direct costs.** The frequency of wildfires is increasing in Washington State, as well as the impact from transboundary smoke originating from distant wildfires. The use of N95 masks as a personal exposure reduction intervention, by the general public, has increased over the last two years. In October 2018, the PI's research group hosted a wildfire smoke risk stakeholder symposium that brought together 90 practitioners, researchers and students, representing 35 organizations across Washington State, to develop a practice-based wildfire smoke research agenda. The symposium participants called for better understanding of the physical and mental health impacts of wildfire smoke, evidence-based intervention strategies (specifically N95 mask efficacy research), and risk communication strategies to protect health during prolonged and extreme smoke events.

Recruitment of participants has begun, and data collection begins in fall 2019. In this pre/post-test, quasi-experimental study subjects will be randomized into one of the four intervention arms, control, or one of three educational interventions designed to improve N95 mask use. Educational intervention materials include: <u>"Smoke From Fires: N95 Respirator Masks" video</u>, <u>DOH Wildfire Smoke</u> <u>and Face Masks factsheet</u>, and manufacturer's instructions. Subjects will be given and then don, or put on, an N95 mask that is their size, based on facial measurements taken by a member of the research team. All subjects will complete their pre-intervention fit test. We will assess the effect size



of the knowledge transfer of each communication medium and to see if participants achieved a fit factor of 100, indicative of proper fit. A Knowledge, Attitude and Practices (KAP) survey will also be administered to quantify the change in knowledge, as well as the observed behavior of participants while donning the mask.

Peter Rabinowitz. Next-Generation Sequencing of the Dairy Worker Microbiome. \$10,000 direct costs.Through Emerging Issues support, we are developing a pilot data set of metagenomics sequences from existingPACIFIC NORTHWEST AGRICULTURAL SAFETY AND HEALTH CENTERYear End Report FY 2019

DNA samples on subjects from our Healthy Dairy Project (see page 32). An emerging technology known as shotgun sequencing or "next-generation sequencing" (NGS) allows for sequencing of whole bacterial genomes, providing greater detail on genes, gene functional potential, and taxonomic resolution down to the strain-level. We are piloting the emerging technology of shotgun metagenomics sequencing and assesses the degree of added value of the metagenomics sequencing compared to our 16s rRNA gene sequencing data. Additionally, we were interested in comparing gene frequency, particularly of antimicrobial resistant genes, between dairy workers and community controls.

Progress has been made toward our first aim: to compare the 16s rRNA gene sequencing data with the shotgun sequencing data. In Year 4 we will compare our 16S rRNA gene sequenced samples to their shotgun sequenced counterparts and assess the added value of shotgun sequencing in taxonomic profiling. For our second aim of assessing the gene frequency between dairy workers and community controls we will: (1) perform taxonomic classification of our open-reading frames using Centrifuge, (2) use NCBI COGs to annotate the open-reading frames and do so with either BLAST or DIAMOND, (3) conduct automatic binning using several tools such as MaxBin2, Metabat2 and then harmonize and refine the bins using DAS Tool and anvi'o to define metagenome-assembled genomes, (4) refine the AMR gene search results to look at resistance genes by antibiotic classes and determine whether these may be different between the dairy workers and the controls. Based on our results, we hope to write a grant discussing our preliminary results to conduct shotgun sequencing for a larger set of our Healthy Dairy Worker study. Our preliminary results will shed light on whether resistance genes are moving between people and animals on farms and build research capacity for cutting-edge research into the health of agricultural workers with microbial exposures.

#### June Spector. Addressing Health Disparities Faced by Rural Underserved Agricultural Communities. \$10,000 direct costs. This project stems from concerns expressed by farmworker participants in our summer 2018 farmworker survey and by our community partner, Communities-to- Communities. This project was originally supported by the UW Population Health Initiative.

**AIM 1.** Address systematic challenges that impact health, environmental, and social equity in rural and indigenous agricultural communities located in Skagit and Whatcom county. The additional methods supported by PNASH included key informant interviews, focus groups, and the development of digital story workshops. In an effort to further characterize social and environmental climate-related concerns that impact



3. Maria Blancas, PhD Student and PNASH Education and Outreach Specialist recently received the 2019 Bullitt Environmental Prize for her work with immigrant farmworkers.

Farmworkers health, this project proposed to collect participant created digital stories. Digital stories are firstperson narrative stories that combine photographs, video, animation, sound, music, text, and a narrative voice. Theses digital stories will be used to further explore emerging hazards, immigration-related factors, and potential solutions, and/or adaptation strategies of farmworkers.

**AIM 2.** Support development of an innovative and adapted rural agricultural environmental and occupational *PromotorX certification program (Rural AgX Certification) that is shaped by Aim 1 results.* This past year key informant interviews and a focus group were conducted to help inform an educational

framework for the development of an environmental and occupational health-training curriculum (*Rural AgX Certification*). The goal for this training is to help support the capacity of promotores who work with farmworkers and agriculture worker communities. The PNASH Center has made extensive efforts to develop an innovative and adapted agricultural occupational safety training program which has also been identified as a need by promotora stakeholders. The emerging funds have allowed us to continue to build on this effort and strengthen the project's research to practice efforts.

#### Fluorescent Tracer: Train-the-Trainer. 16,733 direct costs.

The purpose of this Emerging Issues project was to provide agricultural managers and educators the tools and skills to deliver their own trainings using the Fluorescent Tracer (FT) technique. The Fluorescent Tracer technique uses fluorescents to visually demonstrate pesticide contamination. The project was developed in direct response to requests from two large stakeholders for FT training. One, a large vineyard requested FT training for their managers, a need which PNASH was unable to meet at that time. The other was a request by the Washington State Agricultural Safety Day (ASD) committee for



PNASH to provide an FT train-the-trainer (T-t-T) session at the two ASDs, held in winter 2019.

*T-t-T curriculum.* The core of the curriculum is based on the Quick Demos section from the Fluorescent Tracer Manual: An Educational Tool for Pesticide Safety Educators (2007 PNASH). These demos were developed as stand-alone shop talks or tail gate sessions for supervisors to use during safety meetings. Each demo includes a safety message, supplies list, the recipe for mixing the FT, preparation instructions and the training procedure. These procedures include a hands-on demonstration and discussion questions and topics. Prompts are provided for the trainer. The T-t-T curriculum focuses on providing trainers and supervisors hands-on experience with FT, enabling them to conduct training in their workplace.

	The	curriculum	included	four	demonstrations:
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Demo	Message
#1 – Baseball Cap	Remember: Caps are a common source of pesticide contamination.
#2 – Unplug Spray Nozzles	Bring proper tools to unplug your spray nozzles. (Don't blow on them.)
#3 – Cell Phones, Radios, & Cigarettes	Always decontaminate your gloves and hands before using items that transfer pesticides to your face.
#4 – Tyvek™ Suit	Only wear laminated Tyvek <sup>™</sup> suits for pesticide handling.
#5 – Inspecting Gloves	Inspect your reusable gloves for holes and damage every time you them on and when you clean them.

*Table Top FT Booth.* Design criteria for the booth were a) materials that were readily available and b) booths that were easy to assemble, store, and transport. These booths were constructed with used cardboard boxes or banker boxes purchased at office supply stores (Figure 1). The interiors were painted blank to absorb stray

visible light. Small handheld fluorescent black lights or LED strip black lights (UVA 395nm-400nm) were installed around the top inside of the box. Cell phone and tablet cameras were place over a hole on the outside top. The FT contaminated items were then viewed on the device screens.

#### "I liked the presentation and the interaction of the audience."

- FT Workshop Participant

*Workshop Outcomes.* Five workshops were held at two ASDs locations in Eastern WA during Winter 2019, three sessions in

Spanish and two in English. Pre-enrollment was 110 participants for the Spanish workshops and 50 for the English sessions. Participants also received credits for the Pesticide Applicators license, so many participants were pesticide handlers. Fifteen English and 59 Spanish evaluation surveys were completed. The workshops were successful, with almost all participants positively scoring the workshop as "agree" or "strongly agree" for the all five statements. At the end of the training, ninety-five percent of the participants agreed that they "got information from this session I can use immediately in my job," indicating participants would likely feel comfortable using the materials during their own trainings. Based on the positive feedback on the 2019 workshops, the ASD Committee requested the FT Workshop be brought "back by popular demand" for 2020.

PACIFIC NORTHWEST AGRICULTURAL SAFETY AND HEALTH CENTER

## **OUTREACH AND EDUCATION CORE**

The PNASH Center's Outreach and Education Core forges and sustains partnerships with agricultural stakeholders through engagement at the interpersonal, organizational, community, and policy levels:

- Workers: farmworkers, supervisors, fishermen, forestry workers, and loggers
- Employers: farm producers, managers, skippers, forest land managers, and contract logging firms
- Healthcare and safety providers: physicians, physician • assistants, nurses, health educators, community health workers, safety professionals, rural firefighters
- Government agency staff: departments of Labor & Industries (state OSHA), Health, Agriculture, EPA, US Coast Guard, Forest Service, NIOSH, OSHA, and state extension specialists
- Academics: researchers, educators, and students

The Outreach Core conducted listening sessions with Center investigators and staff to identify priorities and initiate plans to address gaps. The strategic planning process reorganized the Core into four committees that correspond to the specific aims below, in addition to a one-year task force for design and video production.

- Aim 1. Collaborate with stakeholders to identify the key issues and problems in agriculture that the Center can address through research, intervention, or educational activities
- Aim 2. Develop a research-to-practice plan for each of the Center's projects to ensure results of our research, interventions, and education are put back into the hands of agricultural workers and producers, health and safety professionals, health care providers, public agencies, and academic institutions
- Aim 3. Implement outreach strategies that are specific to the needs and preferences of each stakeholder group
- Aim 4. Provide regular communications between the Center and agricultural community and serve as a forum for stakeholders to discuss issues and resolve emerging problems

#### **Administrative Committee**

The Core convened a group of 10-12 Center members on a monthly basis to make decisions and carry out plans that not only leveraged the Center's collective agriculture, forestry, and fishing expertise but also ensured a balanced representation across projects. In addition, PNASH facilitated stakeholder advisory and engagement meetings for the following groups: Dairy Safety and Health Advisory Group; Heat Illness Expert Working Group; Fishing RISC Advisory Group; Pesticide Labels Advisory Group; and the Yakima Farmworker Partner and Community Advisory Board (El Proyecto Bienestar). Please see project reports for more information.



This year, Dennise Drury, current MPH student and previous PNASH Program Coordinator, was hired as our permanent Outreach and Education Specialist. She works closely with the Outreach Director to facilitate activities across all Outreach Core Committees. Dennise brings a special focus on sexual harassment prevention, research translation, and agricultural safety and health initiatives among industry and government partners. She also works alongside Maria Blancas, a PhD student and part-time Outreach and Education Specialist, who brings experience related to digital storytelling and engagement with Washington agricultural communities to the Design & Video Task Force and Needs Assessment Committee.



4. PNASH exhibit at 2019 ISASH Conference with José Carmona (left), Dennise Drury (middle), and Edward Kasner (right).

In Year 3, Dr. Kasner conducted listening sessions and joined the evaluation team in developmental evaluations with ten PNASH projects. From these meetings, research-to-practice action plans were developed for each five-year project. Examples of activities developed in these plans include:

- Developing data visualization products
- Increasing involvement with community-academic partnerships
- Establishing a clearinghouse for stakeholder management
- Returning results to participants
- Forging stronger Washington State University (WSU) -University of Washington partnerships
- Enhancing our online media presence

#### **Translation Committee**

This Committee focuses on translating PNASH research into practice by making English and Spanish content available to audiences in linguistically, culturally, and technically appropriate formats. To accomplish this, the Committee developed comprehensive guidelines for internal reviews of materials prior to dissemination. In FY2019, the Translation Committee reviewed products from several projects:

- Fact sheets (10): Potato Hazard Self-Assessment Tools
- Fact sheet: Is My Well Water Safe to Drink?
- Fact sheet: Understanding Your Well Water Report: Nitrate
- Fact sheet: Understanding Your Well Water Report: Total Coliform and E. Coli
- Executive Summary: Private Wells and Community Needs: Voices from the Yakima Valley
- Fact sheet: Understanding Risk for Better Training: Fishing Vessel and Casualty Information
- Training guide: ¡Basta! Prevent Sexual Harassment in Agriculture worksite training and toolkit
- Video and script: Partnership for Dairy Safety and Health

#### **Needs Assessment Committee**

This Committee administers needs assessments to evaluate regional needs, progress, and opportunities for the Center and its stakeholder engagement activities. The results prioritize issues and develop achievable action plans in collaboration with research teams.

#### Child Farm Safety for Latino Families

The Center led a hands-on voting booth activity to obtain information on Latino family farm safety needs and whether children or adolescents help with farm-related tasks. The surveys were conducted in Spanish at Ag Safety Day in Wenatchee. Forty people participated in the voting booth activity. Twenty participants said that they lived on a farm, however, the majority did not own the farm. Nine out of the forty participants owned family farms. Out of this group, four people responded that their own kids help with the family farm and five people responded that they supervise adolescents (15-19 years old) that work on the family farm. Operating a lawn mower was the most common task for the adolescent workers. The participants also voted on other child safety topics of interest. The top two topics were chemical safety and building safe areas. We hope to find other opportunities to conduct the



5. Elizabeth Torres and Maria Tchong French hosting the Latino family child safety voting board at the Yakima Valley Health Fair.

voting booth activity to understand the Latino family farm community in Washington State. A similar survey was conducted in Yakima, WA at the Fiesta de Salud Health Fair on July 27, 2019. These efforts are being used to guide the next steps of this project, which can be followed on its <u>new webpage</u>.

#### Logging Safety

Marcy Harrington and John Garland presented at OR and WA state logging association's logging safety meetings, reaching 400+ attendees. Their presentations integrated an innovative audience polling system. Responses showed a strong interest in regular and specialty training on the topics of safety leadership, fatigue and stress, fitness and health, and guarding and danger trees. Loggers in the Northwest are on the cusp of changes with a new workforce and mechanized technologies. Results from the audience

#### WHAT ARE THE MOST SERIOUS HAZARDS YOU FACE? (PRIORITY TOP 3)



"Sexual harassment training is

important but we also need to

know how to talk about it with

- Sexual Harassment Training Participant

our supervisors."

poll were summarized and shared with both WA and OR Safety Directors and also presented at the Logging Summit on February 20, 2019.

Dr. Garland continues to connect PNASH to stakeholder needs through his service as a member of the NIOSH



6. See video trailer for the Ag Sexual Harassment Prevention Training, available on youtube.

NORA Council, OR OSHA Forest Activities Code Committee, and the Joint FAO/ECE/ILO Committee on Forest Technology.

#### Farmworker Sexual Harassment Prevention

A survey was administered in English and Spanish during the sexual harassment training sessions at Ag Safety Day in Wenatchee and Kennewick. 128 farmworkers, supervisors, growers, human resources, and trainers attending a sexual harassment session completed the survey. All respondents indicated training was important, 80% reported previously receiving training, 10% were not aware of their workplace policies, and 4% indicated not knowing how to report harassment. Although only a small

percentage were not aware of sexual harassment workplace policies or how to report it, all the respondents spoke Spanish. These results suggest employers may need additional support communicating with Spanish-speaking workers. This is a gap the PNASH Center will seek to address by launching the ¡Basta! Prevent Sexual Harassment in Agriculture worksite training and toolkit this November.

Learn more about PNASH Sexual Harassment Prevention by following this link to see <u>the webpage</u> and this link to see the <u>video trailer</u>.

#### PNASH Center Workshop:

#### Community Engagement & Returning Results

In fall 2018, the Center hosted a Vulnerable Populations Workshop

facilitated by PNASH graduate student Maria Blancas. The goals of this workshop were to learn from each other about engagement strategies with vulnerable populations, identify needs and opportunities for growth and understanding, and start dialogue about engagement with vulnerable populations with project teams. As a result, the Center is planning a retreat of PNASH faculty, staff, and students in March 2020. The goal of the retreat is to learn about new theory and approaches for community engagement, share case examples of engagement and returning results, and workshop plans for returning results. We are also fostering the development of research-to-practice plans for current projects. The Center seeks to increase collaboration across the Center and identify ways to support engagement activities and returning results. An action plan has been established that includes a steering committee, a survey of PNASH participants to prioritize topics, and potential presenters. This process will help with planning and allow the Core to model how results can be returned.

#### **Communications Committee**

The Committee develops content to promote the Center's research and programs to disseminate through social media, e-news, and our website. In FY2019, a major focus has been on increasing the Center's social media presence, improving website navigation and visual design, and developing e-news blasts to share timely updates and information.

#### Website Activities

The departmental home of the Center recently upgraded its website content manager to Drupal 8. The Center's website efforts have focused on: 1) developing landing pages for agriculture, forestry, and fishing; 2) streamlining content tagging to increase visitor engagement with other pages by suggesting related content; and 3) converting e-News into a blog format.

PNASH has a new page, Child and Youth Farm Safety, to share the Center's work and provide resources. The purpose of this page is to identify Spanish language resources for youth including



7. PNASH e-News promoting mental health awareness during National Farm Safety and Health Week.

recommendations for age-appropriate tasks, tips for communicating and managing youth workers, and best practices to keep children and young workers safe on the farm. Visit <u>our webpage</u>.

#### **E-News**

PNASH e-News currently has 1,150 subscribers. Our FY2019 communications covered topical issues with resources and prevention tools (i.e., Cold Stress, Child and Teen Safety, Orchard Injury Prevention, Fishing Safety), PNASH news, and focused campaigns in collaboration with the NIOSH Agricultural Centers (i.e. Western Regional Conference, National Ag Week and National Ag Safety and Health Week). In coordination with our website upgrade, we are converting our e-News into a blog format for FY2020.

#### Table 3. Twitter Activity for FY2018

#### Social Media

Over the last year, the Center has increasingly experimented with social media as an engagement tool. To increase stakeholder engagement on social media, we have been posting more frequently, sharing Spanish content, "live tweeting", partnering with NIOSH Ag Centers on national campaigns, and highlighting the stories of researchers and students at the Center. We found this engagement to be most effective for engaging with Ag Center peers, safety and health professionals, other researchers, and government agencies.

Twitter Activity for FY2018				
Period	Impressions	Likes	Retweets	
Oct-Dec 2018	3,200	8	4	
Jan-Mar 2019	11,000	40	25	
Apr-Jun 2019	15,600	54	25	
Jul-Sep 2019	16,200	108	36	

See below for highlights from FY2018-2019:

- Since October 2018, the Center's Facebook followers have increased by approximately 48%.
- During the last quarter, the Center's Twitter impressions increased four-fold.
- Spanish content seemed to generate at least as many impressions as English content, indicating an important potential audience on this platform.

Western Regional Agricultural Safety and Health Conference, August 2019 During the conference in early August, social media efforts were coordinated across Ag Centers and partners by promoting the use of conference hash tags in a social media plan that we developed. The plan included the purpose, themes, hashtags, handles, and a media policy. A selfie frame photo booth was also created to encourage people to take pictures and post them on social media to highlight the event.

#### Child and Youth Farm Safety Campaign, September 2019

The Center launched the Children and Youth Farm Safety Campaign to increase awareness about hazards on the farm, share tips, and promote resources in English and Spanish. A social media kit was created with



8. Western Conference selfie frame with PNASH Outreach and Administrative staff.

messages designed to address the child and youth safety challenges raised by Latino farmworkers and owners in Washington State. The campaign resulted in 986 impressions and provided a reach from 778 people.



#### National Farm Safety and Health Week, September 2019

For NFSHW this year, the NIOSH Ag Centers collaborated to post and share Twitter polls to engage our stakeholders in agricultural health and safety topics that align with the daily themes of the campaign. The results suggest that polls about opinions did better than those based on knowledge. In the future, we will consider using more opinion-oriented questions in our polling strategy and collaborate with the Ag Centers to amplify our reach.

National Farm Safety and Health Week Twitter Polls - 2019				
Day	Торіс	Poll Type	Center	Impressions
Monday	Roadway Safety	Opinion	HICAHS	488
Tuesday	Opioids	Knowledge	SW Ag Center	-
Wednes.	Ag Youth Safety	Knowledge	PNASH Center	183
Thursday	Confined Space	Opinion	GPCAH	341
Friday	Ag Women's Health	Knowledge	UMASH	371

Table 4. National Farm Safety and Health Week Twitter Activity

#### **Design and Video Task Force**

This task force supports development, design, and production of multimedia graphics, infographics, and videos to share with stakeholders. They work with other committees to create illustrative figures, data visualizations, safety and prevention stories, project infographics, photo novellas, videos to highlight projects, teams, and partners. This year, the taskforce has dedicated its effort on developing an illustrative video for the dairy safety projects. The video will promote the partnership among the research teams and industry partners for preventing dairy worker injury and illness. The script has already been developed and the storyboarding is underway. Once this video is complete, we will disseminate it to our dairy partners and move into working on the PNASH Center video.

#### **EVENTS & ADVISORIES**

#### El Proyecto Bienestar – Farmworker Community Engagement, Yakima, WA

Over FY2019, PNASH continued our engagement work in the Yakima Valley community of farmworkers through our ongoing partnership El Proyecto Bienestar. El Proyecto Bienestar (the Well Being Project) is a long-standing community-based partnership between the UW PNASH Center, Northwest Communities Education Center/Radio KDNA, Heritage University, and the Yakima Valley Farm Workers Clinic. Regular outreach activities through the partnerships include local health fairs and dissemination of news and research results through Radio KDNA. New activities for this cycle worked in partnership with reported activities on Children's Farm Safety (Tchong-French), Farmworker Sexual Harassment Prevention (Breckwich-Vásquez), PNASH Pilot on Nitrate Communications (Austin), and NIEHS Home Air Program Intervention (Karr).

#### Western Regional Conference for Agricultural Safety and Health-Cultivating Collaborations, Seattle, WA

In August, the Western Regional Conference convened 170 agricultural health and safety researchers and educators from across the nation in a three-day event. PNASH faculty, staff and students and regional partners participated in poster, lightning talks, panels, and discussion sessions on agricultural safety and health topics. Cultivating Collaborations is co-sponsored by the five western NIOSH Agricultural Centers, the NIOSH Western States Division, and participation is invited from all partners in the implementation of science, service and policy.



9. Western Conference attendees having a discussion after a thematic session.

## International Society for Agricultural Safety and Health (ISASH), Des Moines, IA

The ISASH Conference provides a forum for agricultural safety and health professionals to share research and educational tools with one another and industry partners to improve knowledge, skills, and farm safety. PNASH participated by featuring an exhibit and delivering a poster and oral presentation.

#### Northwest Logging Education

Marcy Harrington and John Garland presented at this year's state logging association's logging safety meetings of 400+ attendees on the topics of Foundations for Safety Leadership and Safety in Steep Slope Logging. Their presentations integrated an innovative audience polling system (results shared previously under Needs Assessment Committee).

- January 19. WA Logging Safety Conference, Grand Mound, WA. PNASH Presenters: Marcy Harrington and John Garland
- December 8. Assoc. of Oregon Loggers Statewide Safety Conference, Lebanon, OR. PNASH Presenters: Marcy Harrington and John Garland



**10**. Marcy Harrington (left) and John Garland (right) give educational presentations to Washington and Oregon contract loggers.

#### Northwest Logging Safety Summit

PNASH organized the Northwest Logging Safety Summit in Springfield, Oregon in February 2019. The event convened 32 Northwest area logging safety educators and consultants in a one-day collaborative forum to cross-train and discuss issues in logging safety education across WA, OR, ID, and MT. The goal was to share expertise around rapidly developing technologies and pass knowledge to new educators and consultants. The Summit concluded with World Café discussions for future planning on current Northwest logging safety trends and needs. There was consensus to continue this group through an organized network and annual meeting. Network activities and planning for a Summit in 2020 continue. See full report under the Pilot Project Section (page 51).

#### **Fishing Engagement**

PNASH's Oregon State University-based fishing team includes Principal Investigators Laurel Kincl and Viktor Bovbjerg as well as Project Coordinator and PNASH Outreach Core member Amelia Vaughan. In 2018, the team was recognized by the Oregon State University Awards for Excellence in Outreach and Engagement for their unique approach to working alongside members of commercial fishing communities. The team continues to engage with fishing communities as part of their five-year project, Safety Surveillance for Pacific Northwest Fisheries. Guiding this project is a Technical Advisory Board composed of stakeholders from commercial fishingrelated organizations including commercial fishermen, the United States Coast Guard, fisheries management professionals, the Oregon Health Authority, academic institutions, and commercial fishing extension agents. Advisory meetings are held twice a year and includes UW-based PNASH investigators. The most recent advisory meeting occurred in conjunction with the Western Regional Agricultural Safety and Health Conference and yielded new national collaborations.

#### Washington Agricultural Safety Days

Ag Safety Days are a statewide training event for agricultural employers, supervisors, workers, and safety and health professionals sponsored by Washington State's Governor's Industrial Safety and Health Board. Each year, PNASH serves on the planning committee, hosts an exhibit, and facilitates training sessions. This year, the conferences were held in Kennewick and Wenatchee with approximately 600 attendees. For the first half of FY2019, Edward Kasner served on L&I's Ag Safety Day Planning Committee, through which he advised on and developed training sessions for the agricultural communities in the Kennewick and Wenatchee areas. PNASH facilitated training sessions on dairy worker safety (English), fluorescent tracer train-the trainer (English and Spanish), and heat and cold stress (English and Spanish). PNASH showcased two new displays at the event: the PNASH pop-up banner and Children Farm Safety exhibit. After Ag Safety Day 2019 concluded, Dennise Drury began serving on the Planning Committee.

#### WA DOSH Ag Safety and Health Forum

The Washington Dept. of Labor and Industries' Agriculture Safety and Health Forum meets biannually to provide a forum where business, labor, and government identify challenges and develop solutions to Washington's agriculture workplace health and safety challenges. Meetings have focused on state inspection data, Washington Safe at Work Outreach, Train the Trainer, Discrimination, WPS and Ag Safety Standard Update, Aquaculture, and the new PNASH bilingual labels app.



11. Jody Pope, Dr. Kincl's fishing community researcher, was the keynote speaker at Cascadia 2019.

Cascadia Annual Symposium on Environmental, Occupational and Public Health PNASH co-sponsored the 30th annual joint meeting of faculty, staff, and students from the University of British Columbia, Simon Fraser University, Boise State University, Oregon State University, and the University of Washington. The dinner keynote speaker was Jody Pope, a community researcher who works with PNASH investigators Laurel Kincl and Viktor Bovbjerg on fishing safety and health research projects. She presented a talk "Life as a West Coast Commercial Fishing Family." PNASH offered a special session on agricultural safety and health. Twenty PNASH affiliated faculty, staff and students presented in platform and posters sessions. Rachel Phinney, a student from Boise State University who works with PNASH Investigator Cynthia Curl, received an award for her poster presentation: "Recognizing and Reducing Safety Hazards in Northwest Potato Production."

#### Vulnerable Populations Workshop

A workshop was organized to provide Center faculty, staff, and students with an opportunity to explore challenges and solutions to engage with vulnerable populations. Maria Blancas, PNASH student, facilitated a discussion to learn from each other about engagement strategies with vulnerable populations, identify needs and opportunities for growth and understanding, and start dialogue about engagement with vulnerable populations with project teams. We hope this workshop will start an ongoing discussion within PNASH and perhaps generate follow-up training if there is interest. Attendees were asked to consider their project experience with agricultural workers about: 1) cultural and language translation of materials, 2) fear of participating in project/data collection, 3) enacting workplace safety solutions, 4) power and influence, and 5) worker priorities and challenges (e.g. health care access, childcare, time, stresses).

#### ¡Basta! Prevent Sexual Harassment in Agriculture

The ¡Basta! Prevent Sexual Harassment in Agriculture worksite training and toolkit is scheduled to be released November 15th. To celebrate the completion of this community-engaged project and thank the partners and donors, the team will host a Launch Party on November 21st. The reception will feature the first screening of the video and dissemination of the training materials. In January, a Train-the-Trainer event will be hosted to introduce local trainers to the materials, highlight key components to cover, and provide facilitation tips. The goal is to have a list of trainers certified to use the curriculum that can be shared with employers who are looking for trainers.



12. The filming cast and crew on the set of the ¡Basta! Prevent Sexual Harassment in Agriculture Training Video this summer.

#### **NEW EDUCATION RESOURCES**

#### Table 5. New Educational Resources



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Product	Description
PNASH Exhibit Roll-Up and Factsheet (featured left)	The PNASH exhibit banner and factsheet were redesigned to illustrate the Center's collaborative approach and process for moving our research into practice.
Outreach Core Organization Chart	This chart provides an overview of the Outreach Core structure and the responsibilities and membership of each committee.
RISC Fishing: Understanding Risk for Better Training (featured left)	This factsheet shares top injuries for fishermen and promotes the Fisherman First Aid and Safety Training (FFAST).
Is My Well Water Safe to Drink?	This factsheet provides information on nitrate and coliform bacteria in well water and step-by-step instructions for collecting a water sample.
Understanding Your Well Water Report: Nitrates	This factsheet provides guidance on interpreting well water results for nitrate and how your water can be used safely based on the nitrate levels in your water.
Understanding Your Well Water Report: Total Coliform and E. Coli (featured left)	This factsheet provides guidance on interpreting well water results, how your water can be used safely based on the detectable limits, and recommendations based on findings.
Private Wells and Community Needs: Voices from the Yakima Valley	This is an executive summary of the Well Water and Community Health project that provides an overview of recommendations to improve well water testing and services.
Hazard Self-Assessment Tool: A Tool for Growers and Producers	This tool helps growers stop, watch, and identify safety hazards associated with job tasks on their own farm.
Key Harvesting Safety Practices: Reduce Body Stress, Strain, and Injury	This brochure provides ergonomic safety tips to consider when using harvest-assisted platforms and orchard ladders.
¡Basta! Prevent Sexual Harassment In Agriculture (featured left)	This worksite training and toolkit seeks to address the organizational, interpersonal, and individual challenges to prevention for the ag community.
Accident reporting and analysis in forestry: guidance on increasing the safety of forest work	This report examines forestry accidents and illnesses internationally and establishes a roadmap for developing accident reporting and analysis systems.



PACIFIC NORTHWEST AGRICULTURAL	SAFETY AND HEALTH CENTER

#### ADDITIONAL OUTREACH ACTIVITIES

- September 12. Perrault Farms: Hops Harvest Tour. Toppenish, WA. PNASH Participation: José Carmona, Idanis Cruz, Dennise Drury, Kit Galvin, Marcy Harrington, Jen Krenz, Pablo Palmández, Elizabeth Torres, and Michael Yost
- September 7-8. Rural Firefighters Delivering Agricultural Safety and Health Training. Minneapolis, MN. PNASH Participation: Edward Kasner

August 7-9. Western Regional Agricultural Safety & Health Conference. Seattle, WA. Participation: All

August 6. HICAHS, International Dairy Research Consortium Meeting. Seattle, WA. PNASH Participation: Peter Rabinowitz, José Carmona, and Edward Kasner

- August 1. Port Blakely: Pesticide Safety Tour. Rochester, WA. PNASH Participation: Kit Galvin, Maria Tchong-French, Marcy Harrington, and Edward Kasner.
- June 24-27. International Society for Agricultural Health and Safety (ISASH) Conference, Des Moines, Iowa. PNASH Participation: Edward Kasner. José Carmona, Poster Presentation: Healthy Dairy Worker Study, and Dennise Drury, Oral Presentation: Sexual Harassment Prevention for Farmworkers
- June 23-24. Child Injury Prevention Workshop, National Children's Center for Rural and Ag Health and Safety, Des Moines, Iowa. Dennise Drury
- May 6-8. Washington State Environmental Health Association (WSEHA) Annual Education Conference. Yakima, WA. PNASH Participation: Poster presentation by Kori VanDerGeest and Elizabeth Torres
- February 21. Annual Oregon Logging Conference, Eugene, OR. PNASH Participation: John Garland and Edward Kasner
- December 3-5. Washington Dairy Conference, Grand Mound, WA. PNASH Participation: Elena Austin, José Carmona, and Edward Kasner
- November 18-20. Pacific Marine Expo. Century Link Field Event Center, Seattle, WA. PNASH Participation: Marcy Harrington, Michael Yost, and Edward Kasner
- November 1. Preparing the Health Workforce to Improve LatinX Health, Dr. America Bracho, Seattle, WA. PNASH Participation: Maria Blancas and Edward Kasner
- October 30. Wildfire Smoke Risk Communication Stakeholder Symposium, Seattle, WA. PNASH Participation: Edward Kasner
- October 3. DEOHS Fall Kick-Off: Community Partnerships in Environmental and Occupational Health. PNASH Exhibits: PNASH Center Exhibit (Galvin, Harrington, Kasner, Palmández), Skagit Valley Farmworker Survey Project (Blancas and Krenz), and Home Air Pediatric Intervention Trial (Karr, Stampfer, Younglove)

## **PNASH YEAR 3 PEER-REVIEWED PUBLICATIONS**

- Blanco MN, Fenske RA, Kasner EJ, Yost MG, Seto E, Austin E. Real-time particle monitoring of pesticide drift from an axial fan airblast orchard sprayer. J Expo Sci Environ Epidemiol. 2018 Nov 13. doi: 10.1038/s41370-018-0090-5. [Epub ahead of print] PubMed PMID: 30425317.
- Blanco MN, Fenske RA, Kasner EJ, Yost MG, Seto E, Austin E. Real-Time Monitoring of Spray Drift from Three Different Orchard Sprayers. Chemosphere. 2019 Jan 21;222:46-55. doi: 10.1016/j.chemosphere.2019.01.092. [Epub ahead of print] PubMed PMID: 30690400.
- Butler-Dawson J, Galvin K, Thorne PS, Rohlman DS. Organophosphorus pesticide residue levels in homes located near orchards. J Occup Environ Hyg. 2018 Aug 23:1-24. DOI: 10.1080/15459624.2018.1515489. [Epub ahead of print] PMID: 30138040.

Changa Y, Gea X, Wanga L, Leeb SS, Paulsen M, Khand QM, Khalidd ZM, Bhallid JA, Waheedd U, Simpson CD, Dua D, Lia L, Lina Y. An ultra low-cost smartphone device for in-situ monitoring of acute organophosphorus poisoning for agricultural workers. Sensors and Actuators B: Chemical 275. 2018: 300-305. [Epub ahead of print]

- Garland, Francisca Belart, Robert Crawford, Woodam Chung, Tamara Cushing, Stephen Fitzgerald, Preston Green, Laurel Kincl, Ben Leshchinsky, Brett Morrissette, John Sessions & Jeff Wimer (2019) Safety in steep slope logging operations, Journal of Agromedicine, 24:2, 138-145, DOI: 10.1080/1059924X.2019.1581115
- Garland, J.J. 2018. Accident reporting and analysis in forestry: guidance on increasing the safety of forest work. Forestry Working Paper No. 2. Rome, FAO.
- 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. Ann Work Expo Health. 2018 Nov 12;62(9):1134-1146. doi: 10.1093/annweh/wxy082. PubMed PMID: 30346469.
- 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. Accepted by Annals of Work Exposures and Health. 2018 Nov 28.
- Keifer M, Sammen J, Hoare L, Harrington M. At Work in the Woods: Occupational Hazards of Harvesting Non-Timber Forest Products in the Pacific Northwest. J Agromedicine. 2019 Apr;24(2):125-128. DOI: 10.1080/1059924X.2019.1578140. Epub2019 Mar 6. PubMed PMID: 30720391. PMCID: In Progress.
- Pouzou JG, Kissel J, Yost MG, Fenske RA, Cullen AC. Use of benchmark dose models in risk assessment for occupational handlers of eight pesticides used in pome fruit production. Regul Toxicol Pharmacol. 2019 Oct 23:104504. DOI:10.1016/j.yrtph.2019.104504. [Epub ahead of print] PubMed PMID: 31655092.
   PMCID: *In Progress.*
- Thamsuwan O, Galvin K, Tchong-French M, Kim JH, Johnson PW. A feasibility study comparing objective and subjective field-based physical exposure measurements during apple harvesting with ladders and mobile platforms. J Agromedicine. 2019 Jul;24(3):268-278. DOI: 10.1080/1059924X.2019.1593273. Epub 2019 Mar 27. PubMed PMID: 30880611. PMCID: *In Progress.*

- Spector JT, Masuda YJ, Wolff NH, Calkins M, Seixas N. Heat Exposure and Occupational Injuries: Review of the Literature and Implications. Curr Environ Health Rep. 2019 Sep 13. DOI: 10.1007/s40572-019-00250-8. [Epub ahead of print] Review. PubMed PMID: 31520291. PMCID: *In Progress.*
- WilmsenC, Castro AB, Bush D, Harrington Mj. System Failure: Work Organization and Injury Outcomes among Latino Forest Workers, Journal of PubMed PMID: 30734660. PMCID: 6476664. DOI:10.1080/1059924X.2019.1567421.



13. Poster presentation by PNASH Undergraduate Intern, Janna Amaly.



14. Masters Student Katelyn Kern. Photo: Elizar Mercado.

## **EXTERNALLY SPONSORED PNASH PROJECTS**



15. Pesticide safety exhibit at a community event in Yakima, Washington.

The Pacific Northwest Agricultural Safety and Health (PNASH) Center's foundational award is through NIOSH/CDC and establishes a base for other projects to fulfill PNASH's mission: Research for healthy workers, strong communities, and productive agriculture. In FY2019, the following projects and awards enhanced PNASH's innovative research and service in the Northwest.



16. he App, Etiquetas Bilingües de Pesticidas/Bilingual Pesticide Safety.

#### The Etiquetas Bilingües de Pesticidas/Bilingual Pesticide Safety

Sponsors: University of Washington CoMotion, Washington Labor and Industries SHIP, Washington State Department of Agriculture PI: Kit Galvin 2017-2022

The Etiquetas Bilingües de Pesticidas/Bilingual Pesticide Safety Project is developing an app for agricultural workers and growers which provides access to pesticide labels in English and Spanish. Pesticide labels and information on proper protective equipment and other

EPA pesticide safety requirements are currently only available in English. Throughout over 15 years of pesticide safety research, farm managers frequently expressed the need

for pesticide label information in Spanish. Farm managers and "We need pesticide safety information from the label in Spanish. I am bilingual but, the English is technical and I don't understand it. How can I explain it to my workers?"

- WA Pesticide Applicator

coworkers have traditionally provided on-the-spot translations, which often prove inaccurate or are unavailable when needed. We seek to address this language disparity by using common technology and true and accessible Spanish translations. Central to our work is removing language barriers and developing safety solutions designed for a predominantly Spanish-speaking audience, a high priority for the agricultural workforce. Then, agricultural workers, managers, and companies can have the confidence that they are taking the appropriate measures to minimize ag worker, family, and community exposure to pesticides, as well as protect their crops and the environment. The app is currently in the beta testing stage with the Tree Fruit industry and is available for development with other agricultural industries. Learn more about this project through PNASH's Pesticide Safety webpage.

#### Home Air in Agriculture Pediatric Intervention (HAPI) Trial

#### NIEHS 2015-2020

PI: Catherine Karr, University of Washington The HAPI project, made possible through our community partnership with El Proyecto Bienestar, aims to reduce exposure to inflammatory agents and allergens in the homes of asthmatic Latino children residing in an area of intense dairy and crop-based industrial agricultural production. Community-based participatory activities in the Yakima Valley of Washington State have identified pediatric asthma as a priority health concern. 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 farmworker children), and evidence-based intervention strategies in these



17. Home visit by PNASH partner, Adriana Pérez, Yakima Valley Farmworkers Clinic. Photograph credit: Yakima Herald.

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 children with asthma who reside within 800 meters of crop production or dairy operations. The study has now completed recruitment with 80 total enrolled families; 71 of these completed all phases of the study. The team is currently returning results to community participants and creating a comprehensive dissemination and outreach plan. Learn more about this project through these Yakima Herald articles by following these links to see the 2017 article and the 2018 article.



18. The partnership project video is available on youtube.

#### Addressing Health Disparities Faced by Underserved Rural Agricultural Communities -COMPLETED

UW Population Health Initiative 2018-2019 PIs: Vanessa Galavíz, June Spector, and Gino Aisenberg

This project partners with a local community organization, Community to Community Development (C2C), to conduct a community-wide survey and housing assessments for farmworkers in Skagit and Whatcom Counties. The purpose of this study is to assess the factors that impact farmworker health at the individual, community, and societal levels. In summer 2018, a farmworker survey, modeled after the

National Ag Workers Survey, was administered throughout the region. The survey covered topics such as current jobs and tasks being performed at work, work history in agriculture, access to water and sanitation facilities, previous work-related injuries, housing conditions, safety training preferences, and access to community resources. A subset of farmworkers also participated in a housing assessment. This assessment included a detailed home environment checklist, temperature and humidity measurements inside the home for approximately one to two weeks using Kestrel D2 Drops, and an assessment of sleep duration and efficiency using Actigraph accelerometers. A PNASH team of researchers and C2C promotorX administered 348 farmworkers surveys and completed 24 housing assessments. The study findings were reported back to community partners and integrated into a Rural AgX Certification program for community health educators, which will be developed in partnership with the community and designed to build the communities' capacity to respond to the social and environmental challenges faced by farmworkers. See partnership project video.

#### **Next-Generation Air Pollution Research - COMPLETED**

#### EPA Star Grant 2016-2019

#### PI: Catherine Karr, University of Washington

This partnership project develops low-cost air pollution sensors to help Native American and Latino communities in the Yakima Valley reduce their exposure to wood smoke. Researchers will use next-generation air particle sensors that are portable and battery powered. Researchers will then work with local students over the next three years to both understand and help reduce the community's exposure to wood smoke. Forest fires and residential fires are likely contributors to wood smoke pollution in rural Washington. "We work with the community, including with Heritage University, the Yakama Nation, and area high schools, putting new low-cost air pollution sensors to work to understand areas of concern and opportunities to improve local air quality," says lead investigator Catherine Karr, Professor of Pediatrics and Environmental and Occupational Health Sciences. The project built on longstanding research-to-action partnerships between the University of Washington PNASH Center and the Yakima Valley community.

## PREVENTION OF OCCUPATIONAL EXPOSURE TO PESTICIDE DRIFT

#### YEAR 3 OF 5 (2016-2021)

PI: Richard Fenske, PhD, MPH Professor

University of Washington



Our objective is to understand the mechanisms of pesticide drift exposure among agricultural workers and prevent these exposures in the future. Pesticide drift has been a long-standing issue in the Pacific Northwest, especially for the tree fruit industry and workforce. Data from the Washington State Department of Health (WA DOH) show that the incidence rate of agricultural drift illnesses ranged from 0.33 to 1.85 cases per 100,000 individuals between 2010 and 2015. A study of drift-related illnesses by the National Institute for Occupational Safety and Health (NIOSH) that included WA DOH data, highlighted unfavorable weather conditions as a contributing factor for drift exposure.

#### YEAR 3 ACCOMPLISHMENTS

- We identified a research gap using higher time resolution from historical weather data (at network weather and on-site low-cost weather stations) can improve understanding of drift-prone weather conditions.
- Nine field trials were completed during December 2018 and nine during May 2019 in collaboration with Washington State University (WSU). We are producing a manuscript to report these findings and compare results with our WSU colleagues.
- These experiences led to Dr. Kasner's appointment on two panels established by the Washington State Legislature: Pesticide Application Safety Committee (Senate Bill 5550) and Aerial Herbicide Application Working Group (Senate Bill 5597).

"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 Research Partner

#### YEAR 3 PROGRESS BY AIM

Aim 1. Determine the probability of drift events due to changing environmental conditions during spraying: we will estimate weather conditions during documented drift events in Washington State from 2000 to 2015 and build a 'drift determinants' model by conducting a case-crossover study of changing wind conditions on drift event days vs. non-drift event days.

This aim was completed at the end of 2017 and disseminated to WA DOH partners in Edward Kasner's PhD defense, and at the Northwest Climate Conference. Building on results from four previous publications about sprayer technology. Aim 1 results have been published in Kasner's dissertation and developed into a manuscript entitled "Occupational and Bystander Illness from Pesticide Drift in Washington State, 2000-2015. The major finding from the case crossover study indicates that wind speed and direction variability were statistically different between 'drift days' and 'control days' for all crops, but not when limited to tree fruit only. While the findings demonstrated a limited ability to predict drift, in orchard settings, the researchers will continue to explore the relationship between wind and speed direction and drift events using field data collected in Aim 2.

# Aim 2. Explore wind ramping as a determinant of drift: we will investigate the impact of distance and terrain on AgWeatherNet (AWN)-based meteorological measurements at representative sites in the Yakima Valley and model wind ramping during field sampling of pesticide drift.

For this aim, we collaborated with WSU scientists, who conducted orchard spray trials in the Yakima Valley with funding from the U.S. Forest Service, U.S. Department of Agriculture, and the Washington State Tree Fruit Research Commission. Their project, "Data to Model Apple Airblast Spraying Drift Exposure Levels," aims to generate data to validate a drift model for estimating human exposure from airblast spraying during dormant

and full-canopy tree growth stages. In 2018-2019, we completed tracer-based and real-time field monitoring of these orchard applications under variable wind conditions. Meteorological data was collected to assess for fine-scale changes in wind speed and direction. We are characterizing the impact of wind ramping on drift levels using a hand-held anemometer, a low-cost meteorological station, a scientific meteorological station, and a network of automated stations. Field sampling was conducted in 18 spray trials (n=9 dormant; 9 full canopy) following methods successfully developed in our previous studies (Kasner et al., 2018) and in conjunction with a WSU field study designed to validate the AgDRIFT model.

Aim 3. Translate study findings into exposure prevention tools for agricultural producers and workers: we will produce new training modules for regional 'Drift Management Best Practices' courses, provide a user-friendly method for WA DOH investigators to integrate weather conditions into drift event documentation, and develop a system to alert pesticide applicators about drift-prone weather conditions.

We began conversations with WA DOH and WSDA on two planned translational activities in Years 4 and 5. The first activity will be a video tutorial for WA DOH investigators to link weather data to pesticide illness data and also integrate spatial features from GoogleEarthPro, which is now being used at DOH. The second activity will

demonstrate the utility of installing a low-cost, on-site meteorological station 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, or the nearest AgWeatherNet (AWN) station, as we did in Aim 1. We anticipate incorporation of a novel metric known as wind ramping—or the magnitude, duration, and intensity of wind changes—into decision making around pesticide application. We will also search for ways to include our study findings in WSDA courses named "WPS - Train the Trainer", "Alternative Sprayers -New Technology", and "Sprayer Application Equipment & Best Management Practices." Aerial UAV footage was captured during our winter of 2018 spray trials, which could also be used in these trainings.



19. Water-sensitive paper (left) placed above real-time drift monitors (right) used in the orchard field studies.

#### RESOURCES

- 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. Ann Work Expo Health. 2018 Nov 12;62(9):1134-1146. doi: 10.1093/annweh/wxy082. PubMed PMID: 30346469.
- Blanco MN, Fenske RA, Kasner EJ, Yost MG, Seto E, Austin E. Real-time particle monitoring of pesticide drift from an axial fan airblast orchard sprayer. J Expo Sci Environ Epidemiol. 2018 Nov 13. doi: 10.1038/s41370-018-0090-5. [Epub ahead of print] PubMed PMID: 30425317.
- Blanco MN, Fenske RA, Kasner EJ, Yost MG, Seto E, Austin E. Real-Time Monitoring of Spray Drift from Three Different Orchard Sprayers. Chemosphere. 2019 Jan 21;222:46-55. doi:

10.1016/j.chemosphere.2019.01.092. [Epub ahead of print] PubMed PMID: 30690400.

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. Accepted by Annals of Work Exposures and Health. 2018 Nov 28.

Trade article: Steering the research on spray drift. Good Fruit Grower. 2019 Feb 15.

Trade article: Spray researchers aim to catch their drift: Video. <u>Good Fruit Grower. 2019 Feb 15.</u> Video/DVD: Air blast spray drift study begins. <u>Good Fruit Grower. 2019 Feb 14.</u>

#### WHAT IS NEXT?

In our coming year, we will be analyzing results of our Aim 2 field studies and working towards Aim 3's translation of study findings to our agency partners and the grower community through integration in approved WSDA pesticide applicator courses. Moreover, a future intervention study could place real-time readouts on tractors so operators can see current weather conditions and drift levels from on-site monitors.

#### THE HEALTHY DAIRY WORKER STUDY YEAR 3 of 5 (2016-2021)

PI: Peter Rabinowitz, MD, MPH Associate Professor University of Washington



The Healthy Dairy Worker Study is a collaboration between PNASH and the Center for One Health Research, and partners at the Allen School for Global Animal Health at Washington State University (WSU), the Washington State Dairy Federation, and the Migrant Clinician's Network.

We are characterizing dairy worker exposure to microbes and allergens common in dairies. It will provide a better understanding of whether these exposures provide immune benefits or an increased risk of disease. The "hygiene hypothesis" suggests that exposure to microbes on farms may have immune benefits and could be a critical determinant of whether farmworkers remain healthy or develop occupational disease (e.g., infection and airway inflammation). Better understanding of adaptation to dairy environments could lead to improved methods of detecting and preventing adverse infectious and allergic health effects among workers.

#### YEAR 3 ACCOMPLISHMENTS

- High levels of participant retention since the start of recruitment.
- 10 Subjects completed 2-years of follow-up and samples for blood, gut, and nasal microbiome were finished.
- Data cleaning and analyzing for the past two years of data collection has begun.

#### YEAR 3 PROGRESS BY AIM

Aim 1. Compare reported health status, gut and nasal microbiome, and respiratory function in a cohort of newly hired dairy workers, as well as comparison groups of community controls and experienced workers. As of fall 2019, we have completed most of our recruitment goals with a total of 37 existing dairy workers, four

new dairy workers, and 43 total community members (control group). We are still open for enrollment of dairy workers who are new to the dairy work environment and are exploring new recruitment strategies. Results of respiratory function (exhaled nitric oxide and spirometry) have been communicated back to participants in English and Spanish and recommendations were made for those with results outside of the norm to follow-up with their doctor.

Aim 2. Over a two-year follow-up period, compare gut and nasal microbiome change between new workers and controls. By fall of 2019, ten Subjects completed two years of follow-up and samples for blood, gut, and nasal microbiome were finished. Earlier this the year, we sent a pilot batch of extracted DNA to the Call Lab at Washington State University to test our data collection and extraction protocols. Following some refining of protocols, we sent out our first batch of extracted DNA for human fecal and nasal samples. Additionally, we sent DNA from environmental wall and floor samples and cow/calf fecal samples for sequencing. Results of this sequencing and analysis will provide the first comparative look at new and existing dairy workers and the community controls.



20. MPH student Brianna Willis and COHR staff Lauren Frisbie help collect environmental samples from the cow hutches at the farm.

Through PNASH Emerging Issues funding, we were able to expand Aim 2 to include blood sample collection and analysis for a subset of participants in order to explore "next-generation sequencing" (NGS) for sequencing of whole bacterial genomes, which will provide more detailed information on genes, gene functional potential, and taxonomic resolution down to the strain-level. MPH student Marine de Marcken will write her thesis on biomarkers in the blood samples for allergens, and we expect publication in a peer reviewed article prior to graduation.

Aim 3. Determine whether microbiome components are associated with health status or early work cessation. Pauline Trinh, PhD student in the Center for One Health Research, has started cleaning and analyzing data from the past two years of data collection. The data cleaning and analysis serves to compare community members, dairy workers, and their environments. This will then address the question of health status and early work cessation. The first publication, expected in June 2019 will consider lung function in these three 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

groups. This year we have successfully extracted and sequenced DNA from our human and animal specimens and environmental samples. Ms. Trinh has successfully completed the impact of DNA sequence files into the platform QIIME 2 and has performed both quality control check and preliminary analysis. Preliminary Principal Component Plots (PCOA) show some apparent overall between human and bovine gut microbiome communities.

#### RESOURCES

Brochure: Dairy Farming – Hygiene & Health Carmona J. 2019. The Healthy Dairy Worker Study: A Longitudinal Cohort Study of Dairy Workers' Respiratory Health. <u>See Abstract</u>

#### WHAT IS NEXT?

As of this fall, we have completed the bulk of our participant recruitment, with the exception of new dairy workers, and will be continuing our follow-up on these participants. Meanwhile our preliminary analysis has begun on the comparative samples for existing and new dairy workers. A second year MPH student will defend her thesis looking at biomarkers in the blood samples for allergens in Spring 2020, with goals to submit a manuscript to a peer-reviewed journal at the same time.

This coming year we will also look at how to provide return of results for participant microbiome samples when the field of microbiome research is still too young to say anything definitive. We will look to the American Gut Project to provide examples of what participants may find useful in terms of personal microbiomes.

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

YEAR 3 OF 5 (2016-2021)

PI: June Spector, MD, MPH Associate Professor University of Washington



This study works in collaboration with Washington state growers and workers, farmworker housing partners, and Washington State University's AgWeatherNet. This participatory intervention project is developing and evaluating a multi-level Heat Education & Awareness Tools (HEAT) approach to prevent adverse heat health effects by addressing risk factors for agricultural workers at individual, workplace, and community levels. The HEAT approach includes a heat awareness mobile application for supervisors and participatory educational materials for workers.

#### YEAR 3 ACCOMPLISHMENTS

- The Heat Awareness App was finalized and released in English and Spanish.
- The English and Spanish versions of the participatory educational materials were introduced in the intervention evaluation study this summer.
- Summer 2019 launched a summer-long field study (first of two) to evaluate the effect of the HEAT approach on farmworker heat symptoms and heat strain.

#### YEAR 3 PROGRESS BY AIM

Aim 1. Develop an adverse heat health effect prevention intervention approach that addresses individual, workplace, and community factors, using an established Expert Working Group model.

In Year 3, the English and Spanish versions of the participatory educational materials were finalized, with input from project advisors. The manual for the educational materials is titled: "Heat Education & Awareness Tools (HEAT): A train-the-trainer guide for the identification, prevention, and treatment of heat illness in outdoor agricultural workers." A PDF version is available and six posters can be printed in various sizes or displayed on a screen for a presentation. The tool kit uses a flip chart format for field training, facilitators guide, and popular education strategies (e.g., role-plays) for use by promotores (community health workers) and safety trainers. The formative development of HEAT education format and content was iterative and audience-tested by promotores and workers in Year 2. Washington State Labor & Industries (WA L&I) has reviewed the participatory educational materials to ensure they cover all the required training topics the WA Outdoor Heat Exposure Rule for Agricultural Workers (WAC 296-307-097) and endorsed the manual. We are evaluating worker knowledge pre and post education across a growing season as part of the intervention evaluation. After the intervention evaluation is completed, we plan to work with WA L&I to disseminate the manual.

Also in Year 3, the beta version of the Heat Awareness App was finalized and released for evaluation. The app is available in English and Spanish. Once downloaded, a user selects the WSU AWN weather station(s) of interest. When a hot day is forecasted (as defined by a heat index of higher than 80 degrees F) notifications are sent six days and one day before. The notification provides a worker health risk category and agriculture-specific recommendations, both of which were developed to be consistent with ACGIH and NIOSH guidelines. We are evaluating supervisor use patterns as part of the intervention evaluation.

## Aim 2. Assess the effectiveness of the intervention on occupational heat strain and heat-related symptoms in a parallel, comparison, group intervention study in WA summer tree fruit workers.

Based on our experiences during the summer of 2018, in Year 3 we refined and adapted our methods for assessing farmworker housing temperatures and relative humidity (see Aim 3), personal heat exposure, and periodic heat-related symptoms, in preparation for our summer 2019 field study. We cleaned, processed, and analyzed pilot data including sleep assessment data (see Aim 3), home and personal temperature and humidity data, and daily questionnaires.

In summer 2019, we conducted a season of field data collection to evaluate the intervention approach (HEAT worker training and App for supervisors). Work sites that were randomized into the intervention group were provided with the HEAT worker training led by a PNASH field staff member. In addition, the crew leader or direct supervisor in the intervention group was given access to the Heat Awareness App.

Worker surveys included a baseline questionnaire to learn about demographics, work, and, past behaviors and experiences related to heat; a weekly check-in questionnaire to learn about heat symptoms and exposures throughout the summer; pre-post education knowledge questions; and a field-monitoring questionnaire with questions about the workday when participants wore



21. Pablo Palmández conducting beta training with ag workers using the new HRI prevention flip chart.

monitoring devices. Supervisors were queried about their experience with the Heat Awareness App at the beginning and end of the season. Protocols for devices that were used from the pilot studies were adapted (temperature/humidity data loggers and activity monitors), and new protocols were developed for devices that were not used previously. To prepare for this large field study, the project team met throughout the year with site partners, as a team to develop protocols, and for training.

A total of 87 farmworkers enrolled and consented to be in the study, and a total of 78 farmworkers completed at least one field monitoring day. There were a total of 16 field monitoring days throughout the summer, and a total of 224 participant days. Prior to the field monitoring, participants completed the baseline questionnaire. In general, each participant was assigned one field-monitoring day per summer month for the field study (June, July, August). Heart rate, activity, and personal temperature/relative humidity were collected for each participant on their field monitoring days. In addition, field staff made detailed observations on work tasks, clothing, and hydration. Participants were also contacted weekly via a mobile application or by a phone call and asked a series of questions related to heat symptoms.

Aim 3. Assess whether the association between workplace heat stress and heat-related symptoms is modified by hot housing conditions using longitudinal observational study design in WA summer tree fruit workers. All participants who agreed to be in Aim 2 of the study also agreed to be in Aim 3. On field monitoring days, field staff asked participants to take activity monitors and temperature/relative humidity data loggers to their homes for the sleep assessment. Participants used these to collect data for two consecutive nights and then field staff picked up the devices at the participant's workplace and administered a sleep questionnaire. The sleep questionnaire contained questions to better characterize sleep quality and duration, complementing the data from device.

#### RESOURCES

Mobile App Version 1.0: Heat Awareness System for both Android and IOS operating systems. Train-the-Trainer Manual: Heat Education & Awareness Tools (HEAT) in English and Spanish.

Survey: Questionnaires/survey instruments used in 2019 field study - baseline survey, weekly questions, sleep assessment questions, knowledge questions, and field monitoring questions.

Protocols: All protocols used for 2019 field studies - heart rate, activity monitoring, temperature/relative humidity monitoring, etc.

#### WHAT IS NEXT?

We are currently optimizing analyzing plans and analyzing data collected during summer 2019. We are also in the process of returning preliminary results to individual and group results to participating workplaces and preparing manuscripts. The results and products from this project will be publicly released following completion of the evaluation and are expected to lead to more effective prevention of adverse occupational heat health effects for at-risk workers in a changing climate.

#### IMPACT STORY: "Knowing what to do, probably saved my life."

"I take blood pressure medication. This last summer, one day at the beginning of July, I worked doing a task with the tractor in an apple orchard. It was a hot day. Almost at the end of my day shift, I felt very unusually weak, like never before. Also, I started to sweat a lot and felt dizzy and disoriented. I was alone and would have kept working until I was done with my work day; however, I recognized I was having heat related illness symptoms thank you to what I learned about heat related illnesses with you (he referred to PNASH HRI project). So, instead of working, I went to the shop, stayed in the shade, rested, and had water. When I felt better, I went home. My wife took my blood pressure and it was low (80/64). Later that afternoon, even though I was feeling better, my blood pressure was still low. My family took me to the hospital. The doctor confirmed I had a heat related illness that day. Recognizing the symptoms and knowing what to do, probably saved my life."

- Orchard Worker and 2019 Project Participant

#### INJURY AND ILLNESS PREVENTION FOR THE PACIFIC NW DAIRY INDUSTRY

YEAR 3 of 5 (2016-2021)

PI: Michael Yost, PhD, MPH Professor University of Washington



This study combines expertise from Washington State University's

Department of Animal Sciences, Washington State Department of Labor and Injuries (LNI) Safety and Health Assessment and Research for Prevention (SHARP) Program, Washington State Fatality Assessment (FACE) Program, and the Washington State Dairy Federation.

This intervention project seeks to minimize acute worker injuries in Washington State dairies and develop a program to track acute and chronic injuries. Washington claims data shows that dairy workers in the state have a higher than average rate of injury than other industries. Dairy specific risks include animal assaults, slips and falls on wet surfaces, and chronic injuries from repetitive stress. We hypothesize that a targeted intervention for dairies addressing both worker training and their physical environment will result in workers adopting safer and more efficient practices.

#### YEAR 3 ACCOMPLISHMENTS

- Administered the Dairy Practice Survey in which 34 individual responses represented distinct dairy operation.
- Established a data sharing agreement with the Washington State Department of Labor and Industries (WA L&I) that permitted access to injury data from across the dairy industry.
- 143 workers underwent training over the course of seven distinct one-hour training sessions.

#### YEAR 3 BY PROGRESS AIM

Aim 1. Identify common tasks and circumstances associated with acute injury risk in Washington Dairies. We identified animal contact as a primary source of injury. It is necessary to understand the circumstances leading to injury to inform training and evaluation components of this project. This was determined through analysis of the training survey and after discussion with our Technical Advisory Group (TAG). We are now coordinating with WA L&I to analyze case level data relating to animal injuries. This information will be implemented to design training materials targeting these circumstances.

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## Aim 2. Survey current safety training and animal handling practices in Washington Dairies.

During the 2018 Dairy Federation Meeting, we administered the Safety Practices Survey. We had a 30% response rate among producers attending the meeting (34 individual responses represented distinct dairy operations). Survey results showed that 85% of respondents identified a need for an online collection of materials, 47% would devote 30 minutes per month per worker to an effective training program, 30% would devote one hour per month, and 17% would devote two hours per month. Over 52% of the respondents had between 1-4 employees in managerial positions on their dairy. Our findings support the feasibility of a train-the-trainer model to improving safety on dairy farms. "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

Aim 3. Establish an Expert Working Group (EWG) comprised of managers and workers involved in day-to-day activities in the dairy industry. An EWG was established in Year 3 with ten members. The EWG are currently user-testing our online training tool for use by dairy safety educators. In this case, members are dairy safety professionals, including safety managers, herdsmen and dairy farm owners. These participants will directly steer the direction of future training topics as well as provide feedback and share their experiences using the materials developed as part of the project.

#### Aim 4. Implement and evaluate selected training interventions with a study population.

This year 143 workers underwent training over the course of seven distinct one-hour training sessions. We also performed three-month follow-up visits for these workers. Our analysis of message retention is in progress. We have finalized the trainings for the Slips, Trips, and Falls (STF) and Cattle Handling 101. Each training includes two modules that will be randomly assigned to participating farms. The two trainings include the same key messages, but the training format is different. For STF the contrast will be between a PowerPoint presentation and an interactive workshop. For Cattle Training 101, the contrast will be between an interactive workshop and a video.

**Aim 5. Develop methodology for and conduct a dairy injury surveillance program.** In Year 3, we established a data sharing agreement with the Washington State Department of Labor and Industries that permitted us to access case level injury data from the dairy industry. This agreement allowed our surveillance program to move forward. Previous work in Aim 1 established preliminary methods; now with full data access, we can develop them in the next two years. Additionally, an interactive open source visualization has been developed and shared with key partners.

#### Aim 6. Translate results in a Best Practice Guide for minimizing injuries in Washington dairies.

To translate our results to a Best Practice Guide we have obtained funding from the State of Washington to develop an online Dairy Safety Toolkit. The Toolkit will include materials developed throughout the project with feedback from the Technical Advisory Group and participants. A key feature included in the toolkit will be region-specific guidance on implementation of training materials developed at the national level through the FARM program and NIOSH Agricultural Centers.

#### **RESOURCES**

Nov 2018. Exhibit at Washington State Dairy Federation Safety Meeting

Evaluation Tool: Survey of Dairy Owners and Producers Dairy Safety Training Curriculum: Slips, Trips, and Falls Dairy Safety Training Curriculum: Animal-Handling 101

#### WHAT IS NEXT?

- Implement the Slips, Trips, and Falls, and Animal-Handling 101 trainings at three new dairy locations, expecting to reach 100 additional workers.
- Return results to owners and producers on current safety and education practices.
- Delve into animal injury data to identify specific circumstances contributing to animal related injuries and integrate key messages in our training modules.
- Develop online training tools that are accessible and practical for our dairy partners and trainers.





22. A hazard mapping exercise in which workers identified the various injury risks associated with different tasks and locations on a farm.

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

#### YEAR 3 of 5 (2016-2021)

PI: Laurel Kincl, PhD, CSP Associate Professor Oregon State University (OSU)

Commercial fishing is vital to Northwest economies and communities.

Compared to other industries, it is one of the most hazardous due to higher rates of serious injuries and deaths. Yet, data on commercial fishing injuries have not been systematically collected or analyzed. RISC Fishing is a surveillance system that compiles personal and vessel casualties and disasters. It will be used by researchers and industry leaders to conduct hazard assessments for specific fisheries, vessels, and community needs. RISC Fishing will be beneficial to develop fishery-specific approaches to hazard identification, risk mediation, and intervention evaluation.

This partnership project brings together the expertise of the National Institute for Occupational Safety and Health (NIOSH), Marine and Environmental Research and Training Station (MERTS), OR Health Authority, United States Coast Guard, Alaska Marine Safety Education Association (AMSEA), the Northeast Center for Agricultural Health and Safety, OR and WA Departments of Fish and Wildlife, OR and WA Sea Grant, the National Oceanic and Atmospheric Association (NOAA) and Alaska Marine Safety Education Association (AMSEA), as well as the OR State University's Colleges of Earth, Ocean and Atmospheric Science, and Public Health and Human Sciences.

"Commercial Fishing is a difficult lifestyle for many reasons, but being a dangerous occupation doesn't have to be one of the reasons."

- Lori French, Dungeness Crabber's Wife, F/V Langosta II

#### YEAR 3 ACCOMPLISHMENTS

- The Commercial Fishing Incident Database (CFID) has been successfully upgraded to CFID 2.0 and moved to a CDC production server, which is secure, so it can be managed by the NIOSH Western States Division.
- Successfully adapted a proven probabilistic method to link datasets. In testing, we linked the Commercial Fishing Incident Database (1316 cases), and the Vessel Casualty Database (524 cases), with 9 overlap cases.
- Technical Advisory Board members were able to use and provide feedback on a web-based visualization of RISC Fishing information.

#### YEAR 3 PROGRESS BY AIM

Aim 1. Create a practical, scalable commercial fishery surveillance system for the Pacific Northwest.

The CFID has been successfully upgraded to CFID 2.0 and moved to a CDC production server, which is secure, so it can be managed by the NIOSH Western States Division. Investigators will guide NIOSH through the final step (adding personal identifying information data), after which the system will be ready for use, and is expected to be operational by November 2019. To continue work on this aim, we retained a version of the RISC Fishing (Risk Information System for Commercial Fishing) database locally at Oregon State University to build the additional modules for non-fatal injuries and vessel causalities. During Year 3, we continued to receive data to build the RISC system. Data received from the NEMSIS (National Emergency Medical Services Information System) and the Oregon Trauma Registry (2008-2016) has been ingested into the system. Recent data from the Oregon Trauma Registry for 2017 and 2018 is pending once finalized by the registry. Data from marine insurers (ISO) is not forthcoming to date despite NIOSH and USCG efforts.



#### Aim 2. Assess the utility and accuracy of commercial fishing surveillance

**data.** Commercial fishing incident data are collected by multiple organizations. Statistical data linkage methods are applied to these data sets to not only locate matches, but also increase the linkage accuracy and confidence. In Year 3, we adapted a proven probabilistic linkage method which assigns weights to potential matched records. At the Western Agriculture Health and Safety Conference (2019), Dr. Viktor Bovbjerg, with other members of the RISC research and advisory team, presented methods and results from linking the Commercial Fishing Incident Database (CFID; CDC/NIOSH) and Vessel Casualty database (VC; CDC/NIOSH). Of the 1316 CFID cases and 524 VC cases, nine were found to overlap. The strongest predictor variables of matching included incident date, vessel name, and vessel official number. Additionally, the RISC algorithm was improved to



match vessel incidents and injury cases with the Oregon Trauma Registry data. Out of all occupational "farming, forestry, fishing" cases (n=744), eleven were commercial fishing injuries. Investigators were able to match incidents in the RISC fishing system with five of the cases.



## Aim 3. Develop evidence-based hazard assessments with commercial

#### fishery safety stakeholders.

Guiding this project is a Technical Advisory Board composed of stakeholders from commercial fishingrelated organizations including fishermen, the United States Coast Guard, fisheries management professionals, the Oregon Health Authority, academic

institutions, and Pacific Northwest commercial fishing extension agents. In Year 3, the board convened in two meetings (one virtual and one in person) in December 2018 and August 2019, with 17 participants in the August meeting. The December meeting included a demonstration of, and allowed board members to use and review, a web-based visualization, developed in collaboration with Elena Austin and UW PNASH. At the August meeting, technical details of the database development and database variables were shared in an overview.

To inform the development of the hazard assessment communications products we have collected model products and expert content. Hazard assessments were provided by advisors who serve on the Coast Guard Commercial Fishing Vessel Advisory Committee. These will inform development of any RISC assessments. Additionally, examples of hazards sheets were identified from other PNASH projects. And to engage fishermen in the RISC project, we developed an information sheet for the project describing how the system is used to inform better training for fishermen (using surveillance data from the Fishermen First Aid and Safety Training FFAST). A Hazard Sheet for Cleaning Buoys was also drafted, that will be used and audience-tested through our training activities in the coming year.

#### **RESOURCES**

Version 2.0: Commercial Fishing Incident Database (CFID) Fact Sheet: Understanding Risk for Better Training

#### WHAT IS NEXT?

The compilation of relevant surveillance comes at an important time during commercial fishing safety regulatory action. This system can be scaled and tailored to other regions, providing a consistent yet fishery-specific approach to hazard identification, risk mediation, and intervention evaluation.

At the August 2019 Western Ag Safety and Health Conference, Dr. Bovbjerg hosted a roundtable, "Surveillance Systems for Agricultural Injuries." This lively and productive discussion concluded with participants agreeing to meet regularly to continue discussions on surveillance. On October 10, the first of those calls was hosted by Erika Scott of the Northeast Center and marks the start of ongoing collaboration among the US Ag Centers.

PACIFIC NORTHWEST AGRICULTURAL SAFETY AND HEALTH CENTER

#### PRACTICAL SOLUTIONS FOR PESTICIDE SAFETY: Handheld Application Equipment

#### YEAR 3 OF 5 (2016-2021)

PI: Kit Galvin, MS, CIH PNASH Research Scientist University of Washington



This education project identifies, evaluates, and adapts pesticide safety solutions that northwest farmers developed for themselves. These solutions will also be disseminated through an online platform. This project focuses on handheld equipment and builds upon our previous Practical Solutions for Pesticide Safety guide for broadcast spraying for tree fruit industries. This new project will meet safety concerns and challenges of the nurseries, grass seed production, and reforestation industries with solutions that: 1) reduce exposure; 2) are practical, compatible, convenient, adaptable, safe, novel, and meet regulations, and 3) support the training needs of the newly revised U.S. EPA Worker Protection Standard. We are engaging with regional industry managers and handlers in the identification and evaluation of solutions. Lastly, we will create a practical solutions online community presence-using web and social media tools for ongoing discussion and dissemination nationally. <u>Visit practical solutions website</u>.

#### YEAR 3 ACCOMPLISHMENTS

- Engaged eight representatives of different nurseries to serve on the Expert Review Group (ERG).
- Conducted two site visits and 16 interviews with industry managers, supervisors, and pesticide handlers.
- Developed new practical solutions website platform for sharing solutions and established the Facebook group for ongoing practical solution communications and promotion.

#### YEAR 3 PROGRESS BY AIM

## Aim 1. Establish advisory groups to inform the development and dissemination of new practical solutions for handheld pesticide application equipment.

In mid-March, we presented the practical solutions for hand held pesticide application to 18 members of the Oregon Association of Nursery. The agenda for this meeting included presenting selected practical solutions, a request for feedback on the solutions, and generating new locations for site visits and Expert Working Group (EWG) members. We initiated a new effort to engage representatives of different nurseries and other users of handheld equipment through an Expert Review Group (ERG). The goal of the ERG is to engage a broader range of experts beyond Expert Working Group (EWG) who face barriers (travel, scheduling, etc.) to participating in the EWG. The ERG experts include managers, supervisors, and pesticide handlers. Their participation expands our engagement with the nursery, greenhouse and forest services industry. Collaboration is ongoing with Oregon State University (OSU), participating nursery, greenhouse, and forest service companies, as well as nursery associations for the development and evaluation of the solutions.

#### Aim 2. Develop practical solutions for pesticide safety for handheld application equipment.

During the summer of 2019, we conducted two site visits and documented 13 more potential solutions. We conducted 16 interviews with managers, supervisors, and pesticide handlers for eight of the most promising solutions. In preparation for the 2020 season, we conducted two preliminary visits including a forest location and the Washington State Nurseries and Landscape Association (WSNLA).

Seven solutions were developed. A new website platform integrates these seven solutions and is now up for review by the EWG and ERP. The evaluation will cover practicality, safety, efficacy, and adaptability to other locations. We also met with the Oregon Association of Nurseries for their initial feedback on solutions. In addition, OSU members and resources of the pesticide Educational Resources Collaborative (PERC) are reviewing the cited regulations and resources that are part of the solutions to ensure their applicability to each solution. We will continue to collaborate with OSU and participating nurseries, greenhouses and forest products industries on solution identification, development and evaluation.

#### Aim 3. Disseminate Practical Solutions for Pesticide Safety guide

In spring of 2019, we selected and developed the platforms for the online PSPS community, as well as designed the structure and format. Solutions are posted at PNASH's new <u>Practical Solutions website</u>.

This website uses a blog software and a content management system that allows for rapid posting and modification along with a tested user interface in English. Seven solutions for handheld application equipment are uploaded to the new practical solutions website and are being evaluated. Spanish will come online during the winter of 2020. In conjunction, a Facebook group was selected as the platform to announce new solutions and allows members to provide feedback and post new ideas for solutions. Selected relevant information and links to other relevant pesticide safety information will be posted. The group page will also be bilingual and moderated.



23. A "No Entry" sign placed over the door knob is simple and effective "practical solution"

As solutions come online, different social media outlets will also be assessed and used as appropriate to our users' needs. In addition, we have continued to disseminate and promote the original Practical Solutions for Pesticide Safety (paper, pdf download, and shop-talk training modules) at meetings, WA Ag Safety Days, and at conferences to workers, managers, and colleagues. For dissemination strategies, we are also collaborating with the Oregon PERC at OSU.

#### **RESOURCES**

Version 1.0: Practical Solutions Website

#### WHAT IS NEXT?

- Continue to identify and develop addition practical solutions for the greenhouse and nursery industries.
- Continue to engage with EWG and ERG members for evaluations of draft solutions, the website, and the group platforms.
- Identify and develop forestry reforestation solutions with managers and applicators.
- Develop and evaluate the shop-talks that accompany the practical solutions.
- Disseminate solutions and shop talks to nursery, greenhouse, and forestry stakeholders.



24. Herbicides and backpack sprayers are used in reforestation activities.

## **PNASH PILOT PROJECTS**



25. Cutting potato seed pieces is a task that can present injury hazards, as it requires extended standing time and repetitive motion. Photo: Matthew Blua

#### PILOT: RECOGNIZING AND REDUCING RISKS IN THE NORTHWEST POTATO INDUSTRY

#### YEAR 2 OF 2 (2018-2019)

PI: Cynthia Curl, PhD, MS Assistant Professor Boise State University



This pilot project was conducted in collaboration with two organizations actively invested in fostering a safe and healthy environment for workers in the potato industry, the Washington State Potato Commission, and the Idaho Potato Commission.

The purpose of this pilot study was to work with potato growers in Idaho and Washington to understand growers' perceptions of the most problematic safety hazards associated with potato production. This study then aimed to assist growers in mitigating safety hazards using a guided hazard self-assessment tool. This tool encourages growers to stop, watch, and identify safety hazards at their own operations, and provides recommendations on how to address these hazards.

#### ACCOMPLISHMENTS

- Hazard Self Assessment Tool (HSAT) was distributed to 900 potato growers throughout Idaho and Washington. The HASAT is a model tool being presented to other AFF industries and safety researchers.
- Ten Hazard Sheets were created in response to the ten most common hazards that potato growers identified in the Hazard Perception Survey.
- New partnership with WA and Idaho potato growers. This successful partnership has led to new project directions. For example, the WA Potato Commission's partnership in a new PNASH project providing pesticide label safety information in an app in both Spanish and English.

#### **FINAL REPORT BY AIM**

Aim 1. Describe potato growers' perceptions of the highest priority safety hazards associated with potato production.

In the first year, Dr. Curl and Dr. Adams developed and piloted the Hazard Perception Survey to assess growers' perceptions of the frequency and severity of injuries associated with the tasks: planting, irrigation, pest management, harvest, storage, and other farm activities. The survey received 63 responses (7%) and showed the ten most common tasks associated with injury as: standing/sitting for extended periods of time, repetitive motion, lifting/carrying materials, falls during potato sorting, falls from machinery and equipment, falling/tripping while transporting materials, working at heights, reaching/stretching, awkward posture, and vehicle/ATV use. Growers felt bending, twisting, and lifting tasks resulted in the most common and severe injuries, as well as potato sorting. The results from the survey were then used to inform the development of the Hazard Self Assessment Tool (HSAT). "Keeping our workers safe is a high priority for the Washington state Potato Commission. We are pleased to be in partnership with Boise State University and PNASH on this project, which I am confident will help growers improve safety on their farms."

> - Matthew Blua, WA State Potato Commission

Aim 2. Develop a guided hazard self-assessment tool that will allow growers to identify, and potentially control, safety hazards on their own farms. The Hazard Self Assessment Tool (HSAT) was distributed to potato growers throughout Idaho and Washington. The HSAT includes a Job Hazard Analysis table that encourages users to stop, watch and identify safety hazards associated with job tasks on their own farm. The HSAT contains links to a series of recommended safety practices (Potential Hazard Sheets) that correspond to the hazards identified by growers in the Hazard Perception Survey (HPS). Each includes 2-3 recommendations on how to minimize work-related injuries. The development Hazard Sheets was a new activity that emerged during this project based on growers' interests.

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## Aim 3. Determine the usage rate of the hazard self-assessment tool among potato growers, and evaluate whether its use influenced hazard perceptions or affected farming practices.

Survey participants, along with the approximately 900 potato growers in Washington and Idaho, were sent an email containing a link to a website that investigators created for growers to access and download the HSAT and Potential Hazard Sheets, either for print or to view electronically. Investigators are tracking the frequency with which growers' access this website, which to date has been accessed by 84 unique users (220 total visits). These users are primarily located in Idaho (30%) and Washington (30%), with the remaining users primarily located in Oregon (9%), California (8%), and Colorado (5%).

#### **RESOURCES**

Our results and products have been presented through partner networks and membership, and to the Agricultural Safety and Health Council of America, Cascadia Symposium on Occupational, Environmental and Public Health, and the Western Ag Safety and Health Conference. And a manuscript is currently in preparation.

#### Website home: Recognizing and Reducing Safety Hazards in Northwest Potato Production

Hazard Self-Assessment Tool: A Tool for Growers and Producers Potato Hazard Sheets:

- Falling/Tripping While Transporting Materials
- Falling During Sorting
- Falling From Ladders & Heights
- Vehicles
- Falling From Machinery & Equipment
- Lifting & Carrying Materials
- Reaching & Stretching
- Repetitive Tasks
- Standing & Sitting
- Twisting & Bending



### PILOT: RESPIRATORY HEALTH AND INDOOR AIR QUALITY IN WASHINGTON'S CANNABIS INDUSTRY

YEAR 2 of 2 (2018-2020)

#### **FINAL REPORT**

PI: Christopher Simpson, PhD, MS Professor University of Washington



This pilot study of workers in cannabis production assesses airborne contaminants and evaluates associated airway inflammation and/or respiratory symptoms. Our goal is to provide solutions to the industry to improve workplace safety and reduce occupational exposures. This project was funded in part by PNASH's Emerging Issues Fund and the Washington State Department of Labor and

Industries' Safety and Health Investment Projects to respond to an emerged health concern in this industry.

Marijuana is now medically legal in 38 states and recreationally legal in 11 states, including Washington, Oregon and Alaska. Due to the drug's illegal history, there is a lack of scientific study on the occupational hazards for this workforce. A recent report identified 23 potentially hazardous exposures, and with the rapid growth of the cannabis industry, there is now a large worker population with potential exposures. This pilot research aimed to improve occupational health for cannabis production workers, by quantifying the specific hazards potentially associated with respiratory health concerns, and identifying appropriate industrial hygiene solutions to mitigate those hazards. Broadly, the pilot will build the research base of this emerging industry.

#### **ACCOMPLISHMENTS**

- Assessment of two indoor producer/processor facilities (42 total worker participants) for inhalational exposures and respiratory health in cannabis workers.
- Found a high prevalence of work-related allergic symptoms, particularly respiratory, in cannabis workers.
- Found a high prevalence of cannabis sensitization, airway inflammation and impaired lung function among employees with work-related symptoms.
- This is the first study of immunologically mediated response to cannabis amongst cannabis farm workers.

#### **FINAL REPORT BY AIM**

Aim 1. Measure airborne concentrations of specific contaminants associated with cannabis production, including organic dusts and volatile organic compounds, at a large indoor cannabis grower and processor. We measured occupational contaminants by placing measurement devices near employees' work areas and in each task zone during the full eight-hour shifts. We observed that exposures to respiratory hazards were highest in task zones where workers directly manipulated cannabis plants and material including the trim, pre-roll, and the grow task areas. The information can help employers by identifying where it may be most beneficial to deploy control measures.

Aim 2. In a panel of 20 workers obtain repeat pre-and post-shift measures of airway inflammation (assessed as exhaled nitric oxide, F<sub>i</sub>NO), respiratory symptoms and dermal symptoms (assessed via questionnaire). To investigate the association between workplace exposure and health symptoms we performed a cross sectional study using a questionnaire and conducted repeated measurement of work-related symptoms. Some findings included 97% of 31 workers used recreational cannabis and 71% of employees reported one or more work-related symptoms. We found a high prevalence of work-related allergic and respiratory symptoms in the PACIFIC NORTHWEST AGRICULTURAL SAFETY AND HEALTH CENTER Year End Report FY 2019

employees of two indoor cannabis grow facilities in WA State. Additionally, a high proportion of employees with work-aggravated symptoms at one facility had findings consistent with allergic occupational asthma.

# Aim 3. Evaluate the association between the exposure measures in Aim 1 and the health outcome measures in Aim 2, to identify specific exposures and work activities associated with adverse health outcomes. After evaluating the association between the exposure measures in Aim 1 and health outcomes in Aim 2, we noticed a high prevalence of work-related allergic symptoms, particularly respiratory, in cannabis workers. The data also showed a high prevalence of cannabis sensitization, airway inflammation and impaired lung function among employees with work-related symptoms. However, since almost all study subjects are cannabis smokers, it is difficult to disentangle the effects of occupational exposure to cannabis from personal use of cannabis.

Aim 4. Based on the findings in Aim 3, recommend industrial hygiene solutions to reduce hazardous exposures and reduce the incidence of respiratory health problems among cannabis production workers.

This pilot study suggests that cannabis workers may be at increased risk for allergic respiratory disease and impaired lung function. Respiratory exposures were highest in association with tasks that involved manipulating dry plant material including sorting dry flower, trimming and making pre-roll joints. Engineering controls including local exhaust ventilation and implementing appropriate respiratory protection programs can help to mitigate these exposures.

#### RESOURCES

*In addition, two manuscripts have been submitted for publication.* 

- Ghodsian N. 2019. Health Effects of Exposure to Cannabis in Workers in an Indoor Growing Facility. MS Thesis, University of Washington. <u>See Abstract</u>
- Silvey B. 2019. Characterization of Occupational Exposure to Airborne Contaminants in an Indoor Cannabis Production Facility. MS Thesis, University of Washington. <u>See Abstract</u>

#### WHAT IS NEXT?

Future studies are planned that include more workers, a wider variety of cannabis farms (both indoor and outdoor facilities), and attempt to recruit participants who are not cannabis users.



26. Example of hazard prevention factsheet for Cannabis industry from previous UV light exposure project.

#### PILOT: NITRATE WELL WATER TESTING IN AG COMMUNITIES: Improving environmental health communication with health behavior theory

YEAR 1 OF 1 (2018-2020)

#### **FINAL REPORT**

PI: Elena Austin, PhD, MPH Research Scientist University of Washington



The US Safe Drinking Water Act does not regulate private wells, leaving over 42 million residents with little oversight of their water quality. Trends in public water systems suggest that private wells in Latinx communities may have higher nitrate concentrations than wells in other communities. Well stewardship promotion is critical in rural Latinx communities, but few studies have examined their unique barriers and facilitators for well stewardship behaviors such as well water testing.

Our project is guided by a committee of local environmental health stakeholders of the Lower Yakima Valley (LYV) in Washington State, including El Proyecto Bienestar and the Latino Community Fund. Project methods include: 1) focus groups to identify the determinants of well water testing, including knowledge and health beliefs, and 2) message mapping to improve the persuasiveness and cultural appropriateness of messaging, integrating focus group findings, health behavior theory, and local public agency resources.

#### YEAR 1 ACCOMPLISHMENTS

- 37 private well users from LYV participated in four focus groups (20 Spanish and 17 English speakers).
- Project advisory committee was formed and included local community members, government agencies and community organizations.
- Drafts of educational pamphlets were developed around identified motivators for the LYV community. The local county health agency agreed to have their logo included on these educational pamphlets.

#### YEAR 1 PROGRESS REPORT BY AIM

## Aim 1. Conduct formative research on the determinants of a selected health behavior (nitrate well water testing) within the target population.

To launch the project, an advisory meeting guided key educational messages and behaviors to consider during the focus group process. From this, we developed a moderator guide for the focus group sessions, designed to identify barriers and motivators of well testing, as well as effective communication methods. Thirty-seven

participants were from Washington's LYV, a community with a large Latinx population and elevated nitrate concentrations in groundwater. In Year 1, El Proyecto Bienestar and the PNASH team conducted four focus groups (two in English, two in Spanish) to identify determinants of well water testing and effective communication methods for LYV residents. Focus group questions were drawn from the RANAS model for waterrelated health behaviors. Inductive thematic analysis was conducted by two coders to identify common themes, which included "Suspicion of Water", "Major Barriers to Testing" and "Important Motivators." These were then used to describe key determinants of well water testing. Important prevention topics included testing, well maintenance, and treatment, including water softeners, particle filters, and reverse osmosis systems. PACIFIC NORTHWEST AGRICULTURAL SAFETY AND HEALTH CENTER

"I am skeptical about the drinking water that we have. At our place, we have trucks that come in maybe two to three times a year and they're spraying, putting down the liquid nitrogen to fertilize their alfalfa fields."

- Focus group participant

Aim 2. Develop educational materials addressing determinants identified in Aim 1. The PAC will provide guidance on key messages, recommended message channel(s) and strategies for cultural appropriateness. Participants in the focus groups indicated that they preferred visual and colorful materials and would be more likely to review them if they came from trusted sources in the community. Factsheets were designed around four important motivators identified in the focus groups:

- How to determine drinking water safety.
- Communication that "testing of well water is your responsibility," which was not commonly known.
- Procedural information: who to contact, how to collect a sample, what to test for, and when to test.
- The idea of 'let's learn together' as a community about well water safety.

Our results also point to the following communications strategies:

**Standardize water quality reports:** Well users need well water quality reports that are easy to understand and provide recommended actions, regardless of the laboratory they visit.

**Partner with Radio KDNA for Spanish-language communications:** Radio KDNA is a trusted source of information for monolingual and bilingual Spanish-speaking participants. Radio spots, radionovelas (radio dramas), or radio shows can be effective ways to provide actionable information.

**Provide testing and treatment information online:** Well users need information on testing and treatment, and they need assistance navigating services. An online list of frequently asked questions and guidance on who to call for well maintenance, testing, and treatment could support well users.

**Develop tailored communications:** LYV residents need communications that are tailored to their culture, language, and literacy level. Messages that emphasize the importance of family health and the role that the household handyman plays in protecting family may be effective in LYV. Information that follows CDC's guidelines for literacy-appropriate communication may be useful for LYV residents.

## Aim 3. Evaluate the impact of educational materials on health behavior and/or determinants of health behavior. We will invite the focus group participants from Aim 1 to review existing agency materials on nitrate well water testing and the newly developed materials.

Evaluation of existing educational materials showed a strong preference for material that had fewer words and included colorful images. The radio station KDNA was identified as a trusted source for environmental health-related information. Entertaining materials were overall preferred with participants reporting, "I would read it, and I would pay more attention." The Technical Advisory Group (TAG) in Year 3, will conduct testing on the newly developed material.

#### RESOURCES

Manual: Moderator Guide and Coding book. English and Spanish.Poster: Developing Materials to Promote Private Well Water TestingVanderGeest K. 2019. We are all here to learn: A qualitative study on private well stewardship within a rural, agricultural Latino

community. University of Washington. <u>See Abstract</u> Factsheets:

Is My Well Water Safe to Drink?

Understanding Your Well Water Report: Nitrates

Understanding Your Well Water Report: Total Coliform and E. Coli Private Wells and Community Needs: Voices from the Yakima Valley

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Well Water Report

#### WHAT IS NEXT?

In Year 2, the project team and partners will evaluate the newly developed materials through the TAG review and feedback from the previous focus group participants. This study's results will be shared with regional agencies and water-testing laboratories that serve this community, and to the public health community. A manuscript has been submitted for publication.

PACIFIC NORTHWEST AGRICULTURAL SAFETY AND HEALTH CENTER

#### PILOT: EVALUATION OF WEARABLE-BASED ACTIVITY RECOGNITION MODELING APPLICATION FOR LOGGING SAFETY

YEAR 1 of 2 (2018-2020)

PI: Robert Keefe, PhD, MS Professor University of Idaho



This pilot research uses time and motion studies to develop and test wearable-based activity recognition models and smart alerts for high risk workers on logging operations. The study's resulting model will be coded for a Garmin smartwatch, enabled for real-time location, activity recognition and data sharing in remote areas. This system has high potential for improving safety on logging operations by improving crew situational awareness and facilitating rapid accident response.

#### **YEAR 1 ACCOMPLISHMENTS**

- Presented methodology of the study to 300 loggers and found widespread support for this system
- Conducted field sampling on active logging operations in fall 2019.

#### YEAR 1 PROGRESS REPORT BY AIM

Aim 1. Test the hypothesis that an activity recognition model based on wearable smartwatch sensors can predict rigging crew work activities at least 80% of the time.

During the fall of 2019, we began field sampling on active logging operations on timberlands managed by the Idaho Department of Lands and Hancock Natural Resources Group. This consists of conducting time and motion studies paired with smartwatch data for rigging crews during active cable logging operations. By winter of 2019, we will have completed the quality control and quality assurance of collected data and analysis to evaluate this hypothesis. "Wearable devices with GNSS, combined with activity recognition, may make it possible to quickly detect accidents for lone workers in remote areas, paired with the current location..."

- Robert Keefe

Aim 2. Test the hypothesis that an activity recognition model using a combination of Global Navigation Satellite System (GNSS) and smartwatch sensor data can detect a lack of movement and fallen worker position status at least 80% of the time. After collecting data from the GNSS and smartwatch sensors, we are now in the process of conducting preliminary analysis. During our data collection, loggers found the methods to be non-intrusive and easy to implement with minimal impact on normal work activities.

Aim 3. Code the two-activity recognition models into an existing smartphone application, Garmin Connect, so that a model that predicts the movements of rigging crew workers and detects lack of movement with 80% accuracy can be made publicly available. Coding of a new activity recognition model into the Garmin Connect smartphone application is in progress. While completing field sampling, we have worked with simulated data in order to make progress on coding the basic functionality. This preliminary coded model will be updated when the final parameter estimates are obtained from the analysis of our field data.

#### WHAT IS NEXT?

The major outcomes from this project will occur in 2020 as we obtain results and evaluate application of our activity recognition modeling methods using the Garmin Connect interface.

#### PILOT: Northwest Safety Summit for Safety Professionals in the Logging Sector

#### YEAR 1 of 1 (2018-2019) FINAL REPORT

PI: John Garland, PE OSU Professor Emeritus UW Affiliate Professor



PNASH sponsored a NW Logging Safety Summit, convening logging safety educators, consultants and researchers from across the greater NW in a one-day collaborative forum to cross-train and discuss key regional issues in logging safety. Participants joined from across WA, OR, ID, MT, on February 20, 2018 in Springfield, Oregon.

There is a need and opportunity for logging consultants involved in providing safety education to the forestry sector to

share ideas and approaches, and to update their knowledge of new technologies and research results. The forestry sector is the most dangerous industry sector in the United States and improvements are necessary and feasible. There have been few forums for convening on safety in logging in the last decade.

#### ACCOMPLISHMENTS

- Thirty-two Northwest area logging safety educators and consultants gathered in the inaugural Safety Summit held February 20, 2019 in Springfield, Oregon, just ahead of the Oregon Logging Conference.
- Participants' reported the Summit provided learning, networking, and opportunities to share their ideas. And the topics on the program were seen as "new" and "useful."
- Participants saw value in the Summit and endorsed continuing the network and sharing responsibility for hosting future Safety Summits. The Intermountain Region was suggested as the next location and Idaho Associated Logging Contractors has volunteered to host.

#### FINAL PROGRESS REPORT BY AIM

This small education grant from the PNASH Pilot Project Program was completed in a one-year intensive outreach engagement activity. Reported below are final activities and outcomes:

Aim 1. Convene Northwest leadership in logging safety in a steering committee for the Summit planning and establish an ongoing network of advisors and collaborator. Thirty-two Northwest area logging safety educators, consultants, and researchers participated in the inaugural Safety Summit held February 20, 2019 in Springfield, Oregon. Prior engagement and identification of potential participants included outreach to 43 individuals through interviews and referrals. Participants included insurers, government, universities, industry, and private consultants from Oregon, Washington, Idaho, Colorado, Montana and British Columbia.

"It was useful to hear from experienced people and how they have approached these issues in the past."

- Logging Safety Summit Participants

This organization and facilitation of the Steering Committee was led by co-chairs: John Garland (Consultant & UW PNASH) & Marcy Harrington (UW PNASH). Other members of the Steering Committee included: Steve Barnham (ID Assoc.), Francisca Belart (OSU), Jerry Bonagofsky (WA Assoc.), Rob Keefe (U of ID), Bryan Lorengo (MT Assoc.), Rod Huffman (OR Assoc.), Jeff Wimer (OSU). The event was sponsored by PNASH with in-kind contributions (travel and time costs) from presenters and participating organizations.

## Aim 2. Provide best training practices, new technologies, and research results. Primary topics included:

- Cable Splicing Best splices for complex circumstances, Brian Turor,
- Anchoring Multi-stump, tail-holds, machine-anchoring, rock bolts, synthetic rope. Francisca Belart, OSU
- Rigging Best Practices. Discussion w/ Brian Turor, Francisca Belart

Drone Technology for Logging (presentation and demonstration by Mark Standley, Bighorn Logging New technology in GPS and Location Safety Research was provided by Rob Keefe, UI



27. Drones are now being used to pull wire across difficult terrain and run supplies to the rigging crew.

Brief reports were provided on:

WA Logging Safety Initiative, Beth Covert, WA Dept. of Labor & Industries

Latino Forestry Services Worker Safety Study, Marcy Harrington, UW

Winch-assisted Tethered Logging for Steep Slopes. Panel discussion: John Garland, OSU/UW; Jeff Wimer, OSU, & Tom Bozicevic, OR OSHA, Budd Phillips, WorkSafeBC

BC's Forestry High Risk Strategy, Budd Phillips, WorkSafeBC

Aim 3. Build on expertise in the room to address new and emerging needs for logger safety and conduct future planning. Several sessions introduced needs assessment results to the group, including:

Workforce fatality and injury review, John Garland, OSU/UW

Lessons learned from litigation and logging safety efforts: Accident investigation, John Garland, OSU/UW PNASH OR & WA Logging Safety Conferences – Audience survey results, Marcy Harrington, UW The Summit concluded with a future planning exercise with breakout groups in a World Café format. What Trends will have the largest impact for safety improvement?

- Job pressure Short rotation-high productivity \$\$ compensation
- Long term contracts with landowners
- Safety leadership-top down
- Benefit packages: Retirement and insurance

#### What solutions and trainings can we develop?

- Supervisor training / Train-the-trainer
- Video-based trainings
- Training certification

#### Is there interest in a NW network of consultants? Yes, was the consensus response.

#### What are ideas for this network structure and future hosts?

- Online forum Website, private Facebook group, email, text
- Rotating responsibility for hosting Sponsors, location, and with focus on a local issues and needs
- Workgroup/Task forces to tackle problems/milestones
- Collaboration in developing safety alerts

#### WHAT IS NEXT?

The inaugural Safety Summit was successful in forming a network of on-the-ground educators, and forming a bridge between research and practice. The Summit's face-to-face interactions and discussions helped in the sharing of ideas and best practices across Northwest states and organizations. Participants saw value in the Summit and endorsed continuing the network and sharing responsibility for hosting future Safety Summits. The Intermountain Region was suggested as the next location and Idaho Associated Logging Contractors has volunteered to host. PNASH will continue to engage with this new network with assistance in the sharing of research results, best practices, and the responding to new research needs.