

# PACIFIC NORTHWEST AGRICULTURAL SAFETY AND HEALTH (PNASH) CENTER

*Research for  
healthy workers,  
strong communities &  
productive agriculture*

## YEAR-END REPORT

**Fiscal Year 2017**

**September 30, 2016 to September 29, 2017**

CDC/NIOSH Cooperative Agreement #5 U54 OH007544

**OCTOBER 2017**

**Richard Fenske, PhD, MPH, Professor & Director**



DEPARTMENT OF ENVIRONMENTAL & OCCUPATIONAL HEALTH SCIENCES  
UNIVERSITY of WASHINGTON · SCHOOL OF PUBLIC HEALTH





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*Our PNASH Outreach Team this summer, at the Columbia Valley Community Health Clinic in Wenatchee, WA.*



*A young participant at the PNASH Research Showcase in Granger, WA.*

## CENTER OVERVIEW

The [Pacific Northwest Agricultural Safety and Health](#) (PNASH)

Center is dedicated to the prevention of illness and injury among agricultural producers, workers, and their families. 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 agricultural workplaces and communities with an emphasis on injury and illness prevention, especially among hired laborers, migrant/seasonal workers, and children. Our approach includes:

- Working in partnership with employers, workers, agencies, and other research and service organizations.
- Conducting innovative research and intervention programs that focus on problem solving.
- Taking solutions to the workplace through training, outreach, and participatory research.

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. Our faculty, staff, and students bring expertise in the areas of medicine, nursing, industrial hygiene, epidemiology, engineering, and education.

## 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 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.



Fishing workers are 32 times more likely to die on the job.<sup>1</sup>



Forestry workers are 32 times more likely to die on the job.<sup>1</sup>



Agriculture workers are 6 times more likely to die on the job.<sup>1</sup>

*PNASH's region includes Washington, Oregon, Idaho and Alaska*



## 2016-2016 NIOSH AWARD CYCLE

The PNASH Center has begun a new 5-year cycle, October 2016 to September 2021, awarded by the National Institute for Occupational Safety and Health (NIOSH/CDC). New directions of this 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.

We invite you in the following report to learn about our first year's accomplishments. 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 is ensuring that our work is relevant to industry and worker needs.



## PLANNING AND EVALUATION CORE

The Planning and Evaluation Core provides the administrative infrastructure and support for the entire center and assists in the implementation of individual project and program objectives. Our new cycle start-up activities have focused on staff capacity building, establishment of our new cycle subcontracts, and project coordination.

### PNASH People

PNASH personnel are comprised of faculty, staff, and students from multiple disciplines and institutions across the Northwest. Launching our new cycle and to support our new Outreach and Education Core, are several exceptional additions to our team.



**Vanessa Galavíz, PhD, MPH**

#### **Director of Engagement and Education**

Dr. Galavíz is an environmental health scientist, lecturer, and Director of Engagement and Education for the PNASH Center. Her work in community-based participatory research began in 2004 while obtaining her Master's of Public Health. As a PhD student she came to the Northwest where she focused on exposure assessment and environmental justice for low-income and minority populations. Prior to her appointment at the UW and PNASH, Dr. Galviz served as Assistant Secretary at the California EPA, providing technical scientific consultation on public health issues of concern for environmental justice communities to assist in identifying and prioritizing science-policy efforts. Dr. Galaviz works toward public health improvements, bringing meaningful involvement through sustainable community partnerships, applicable translational research, and effective research to action initiatives.



**Jose Carmona, Research Coordinator**

Mr. Carmona facilitates research and helps promote best health and safety practices for farmers, fishermen, and forestry workers in the Northwest. Mr. Carmona began as a research intern and assisted with various field studies, including projects on heat-related illness among agricultural workers and pesticide exposure in dairy workers. He joined the team part time during his senior year and moved into a role as program coordinator after graduating. This fall he will pursue an MPH degree at the UW School of Public Health.



**Dennise Drury, Program Coordinator**

Ms. Drury serves as the primary liaison for the Center and provides support for the administrative and fiscal operations, outreach and communications, and project operations. She coordinates the general program activities, plans meetings, and maintains communications for the Planning and Evaluation Core. Coming from a background in environmental science, her interest in the PNASH Center stems from the intersection of research and community health. Her previous research experience allows her to assist with research translation important for sharing research results with the community.



**Sarah Fish, Graphic Designer**

Ms. Fish creates eye-catching visuals for PNASH Center communications. As an experienced graphic designer, illustrator, and photographer, she enjoys developing different types of graphics for print and web. These include logos, brochures, fact sheets, posters, event materials, and photography. Much of her work focuses on the creation of outreach materials related to occupational safety and health. Ms. Fish maintains a social media presence for the Center through various platforms and select public campaigns.



### **Jennifer Grasso, MPH, Outreach and Education Specialist**

As a member of the Outreach Core, Ms. Grasso aims to serve the educational needs for regional stakeholders by managing the Center's outreach and education activities. She supports projects in participatory research and research translation for multiple audiences and delivers educational presentations on agricultural safety and health. She also serves on regional planning and advisory committees to support the Center's outreach to key organizations and participation in agricultural safety events.

**Dr. Catherine Karr**, member of PNASH's Internal Advisory Committee and a pediatric environmental health doctor, was honored with the prestigious 2017 Presidential Early Career Scientist Award from President Obama.

**Dr. Michael Yost**, PNASH Associate Director, was honored with the 2017 Rachel Carson Award for Environmental Advocacy, the highest honor given by the American Industrial Hygiene Association.

*The award "reflects the shared dedication and hard work of community partners and community members who enable community engaged research to be done and be relevant. I am particularly grateful for the longstanding collaboration with El Proyecto Bienestar."*

- Catherine Karr, Professor and PNASH PI

## **Organization & Advisories**

### **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.

<b>Richard Fenske, PhD, MPH</b>	Director	rfenske@uw.edu
<b>Michael Yost, PhD</b>	Associate Director	airion@uw.edu
<b>Vanessa Galaviz, PhD</b>	Director of Engagement & Education	vanesg@uw.edu
<b>Marcy Harrington, MPA</b>	Center Manager	marcyw@uw.edu
<b>Catherine Karr, MD, PhD</b>	Internal Advisory Committee	ckarr@uw.edu
<b>June Spector, MD</b>	Internal Advisory Committee	spectj@uw.edu

### **PNASH SCIENTIFIC ADVISORY COMMITTEE**

PNASH's Scientific Advisory Committee (SAC) provides the Center and 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.

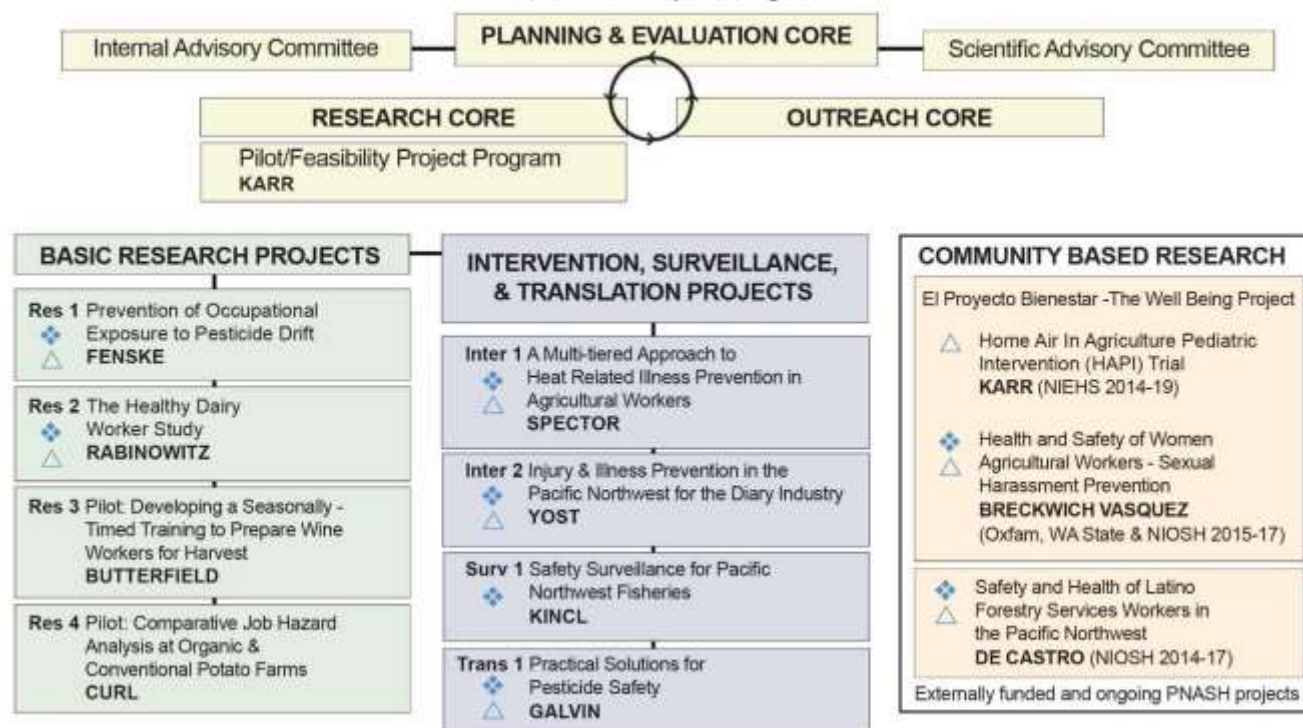
<b>Kent Anger, PhD</b>	Professor and Director, OHSU and Portland State joint School of Public Health, Oregon Health Workforce Center
<b>Jennifer Lincoln, PhD, CSP</b>	Director, NIOSH Center for Maritime Safety and Health Studies
<b>Howard Kipen, MD, MPH</b>	Chair and Professor, Environmental & Occupational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

PNASH recently held a Research Review and Scientific Advisory Committee meeting for October 23, 2017. The event highlighted recent accomplishments and shared our future directions. To promote further conversation and collaboration, we encouraged project teams to facilitate add-on meetings with regional partners.



# PACIFIC NORTHWEST AGRICULTURAL SAFETY AND HEALTH CENTER

R. Fenske, Principal Investigator



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

## 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. Funded in FY 2016 to Dr. Catherine Karr, is the project **Next-Generation Air Pollution Research (EPA Star Grant 2016-2019)**. This innovative 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 and then work with local students to both understand and help reduce the community's exposure to wood smoke.

In addition, two new NIOSH grant applications were submitted and received excellent scores. These new projects were not awarded due to a NIOSH hiatus on funding new awards. Meanwhile, we anticipate funding once NIOSH administration is able to resume regular operations.

## Evaluation

PNASH's evaluation program moves beyond traditional program monitoring, using a developmental approach to assist project teams in improving efficacy and outcomes. Our goal is to ensure that our efforts are relevant, feasible, and sustainable; that they reflect the best science and practice; and that they demonstrate efforts consistent with the ultimate goal of reducing injuries and illness.

In Year 1, PNASH's methods of program monitoring and developmental evaluation have been introduced to new investigators and new personnel. In collaboration with project teams, we developed needs assessments and are consulting on new project methods and approaches for engagement and evaluation, including starting the new Ag Health Indicators sub-project.

**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.

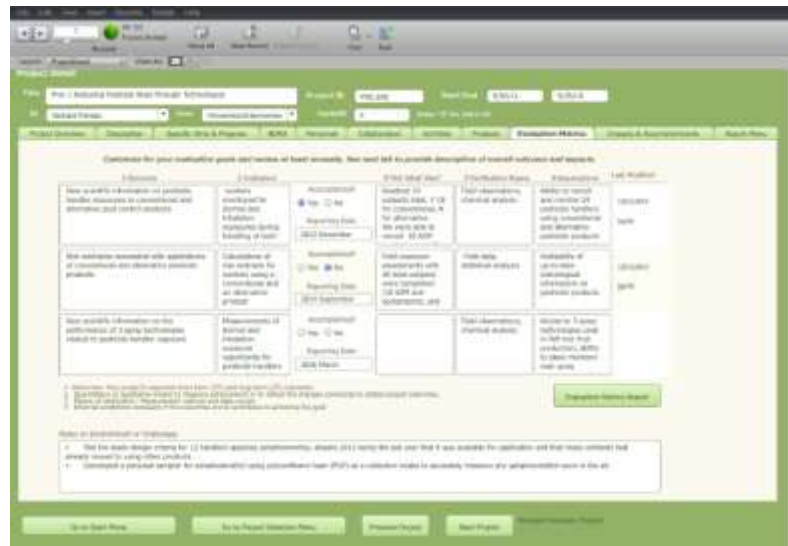
### Needs Assessments

To launch our new cycle, three initial stakeholder needs assessments were conducted in conjunction with the Outreach and Education Core using a display voting booth customized for that project and audience.

- **Dairy training needs and formats** for workers and managers in the Dairy industry. A survey in conjunction with the Dairy Safety Conference (November 2016).
- **Farm training needs and formats** for Spanish and English speaking workers and managers. A survey in conjunction with the WA Governor's Safety and Health Conferences: Agricultural Safety Day – Wenatchee (February 2017) and Agricultural Safety Day – Yakima (February 2017).
- **Yakima community needs were assessed** in conjunction with the PNASH Research Showcase, with a 'voting booth.' Three boards presented issues under the categories: Community environment, Health issues, Occupational health issues. Initial results of 34 participants ranked priority concerns as: 1) Safe drinking water, 2) Obesity, 3) Outdoor air quality, 4) Pesticide or other chemical exposure, 5) Slips, trips and falls, 6) Mental health, 7) Asthma and respiratory health, 8) Green space and access to outdoor play areas, 8) Healthy school environment. Administered in conjunction with El Proyecto Bienestar at the PNASH Showcase (March 2017), Community Advisory Board (March 2017), and community health fair (August 2017).
- **Wenatchee migrant farmworkers.** Workers were invited to rank the top 5 health and safety issues that were most important to them. The board included topics related to personal health, equipment safety, and health and safety when off the farm. All topics were presented and discussed in Spanish and were accompanied with a visual representation. The voting board was used at the education station (staffed by PNASH Outreach Core) at a medical clinic hosted by Columbia Valley Community Health at Stemilt Farms. (July 2017).
- **Tree fruit and pesticides.** Also an important contribution to our understanding of stakeholder needs was a survey conducted in the last year through our past pesticide education project - a state-wide [survey](#) of growers, *Emerging Issues and Concerns in Tree Fruit* (English and Spanish). This survey was a collaboration with WSU's Tree Fruit Research and Extension Center to understand current trends in safety and pesticide topics important to the industry, including: emerging pests, IPM programs, lime sulfur drift, supervisory training, the revised EPA Worker Protection Standard, and heat-related illness.
- **Agricultural Health Indicators.** Our second approach reviews evidence-based Northwest Agricultural Health Indicators (AHI). Year 1 progress included establishment of an agreement with the WA Department of Labor and Industries for worker compensation data and identification of indicator data sources. Our goal is to conduct routine surveillance of indicator data from other NW state data, including demographic, mortality, morbidity, and sentinel indicators. An emphasis is placed on the industries and communities in which PNASH investigations are conducted. Our pilot has demonstrated a trend in utility over time and has helped us identify high risk industry sub-sectors and



jobs/tasks (e.g. animal handling, orchard ladder injuries, logging fellers). This novel approach was inspired by the NIOSH West-ON meeting and the use of Occupational Health Indicators developed by the Council of State and Territorial Epidemiologists. The use of AHIs in cycle 2016-2021 will enhance PNASH's identification of regional research outreach/education priorities. The AHI system and a presentation of preliminary results, including visual mapping techniques, will be presented at the PNASH Research Review and to our Scientific Advisors in October 2017.



*PNASH's Harvest database - adopted by other NIOSH Centers.*

**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 is rigorous and focused on relevant and measurable outcomes. The system enables program leadership to conduct performance reviews for quality, efficiency, and productivity within each project and program.

Program Monitoring Database, “Harvest.” “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 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 any-time, any-where data entry and reference. Currently, two Agricultural Centers, the Nation Children’s Center, and the UC Davis Center, have adopted and developed the database for their use.

**AIM 3: NIOSH AFF 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. Current collaborations and workgroup have included: introducing the new Florida Ag Center to our evaluation methods and tools; leading the national summer Beat the Heat social media campaign (see Outreach Core), and development of agricultural and Center national educational materials.

PNASH also participated in NIOSH organized efforts, including participation in the NIOSH State of the Science meeting, preparation of a Program Performance One-Pagers (PPOPs) and the contribution to the evidence package (Chapter 5 on pesticides) for the NIOSH AFF 10-year Review.

## Resources

[Final Report: Pacific Northwest Agricultural Safety and Health Center, October 2017](#)

[PPOP: Pacific Northwest Agricultural Safety and Health Center, November 2016](#)

Tool: Social Media Evaluation Spreadsheet, August 2017

Tool: Harvest Program Monitoring Database, v. 3.0 (available on request)

## Additional Activities

- February 2017. Annual Ag Center Directors Meeting, Washington DC. Attended by Michael Yost.
- September 2017. WestON Meeting, Denver, CO. Attended by Elena Austin.
- June 2017. NIOSH Expanding Research Partnerships: The State of the Science, Denver, CO. Attended by Michael Yost, June Spector, Laurel Kincl.
- AgInjuryNews.org Steering Committee. Member Marcy Harrington.
- Monthly. Ag Directors' meetings.
- Monthly. Internal Advisory Meetings.
- Bi-annual. Scientific Advisory Meetings.
- Bi-monthly. Agricultural Center Evaluation, Communication, and Outreach (ECO) group.



Page 2 of PNASH's Final Report 2011-2016.



## OUTREACH AND EDUCATION CORE

The Agricultural Community Engagement, Education, and Outreach Core referred to as the “Outreach Core,” is the Center’s foundation for building relationships and sharing information with our agricultural community. The Outreach Core links the Center to its stakeholders by forging partnerships that are essential to the success of all our activities. Our stakeholders include:

- Agricultural workers – farmworkers, farm supervisors, fishermen, forestry workers, and loggers
- Agricultural employers – farm producers and managers, skippers, forest land managers, and contract logging and service firms
- Health Care Providers/Safety Professionals – physicians, physician assistants, nurses, health educators, community health workers, and safety professionals
- 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

This report marks the first year in a new PNASH program cycle and the launch of an enhanced outreach and education program. Our first year activities have focused on capacity building of our new Outreach Team, community needs assessments, and partnerships.

### Outreach Interns

New to the PNASH Team are student interns. Through an NIEHS training grant, Supporting Undergraduate Research Experiences in Environmental Health (SURE-EH), we are able to provide a meaningful opportunity to work with PNASH on farmworker safety and health projects. Our trainees, Mr. Aguilar and Ms. Amaly, are working alongside Dr. Galaviz, PNASH Director of Engagement and Education, over the coming 2 years. Ms. Blancas is the recipient of a UW grant, Graduate Opportunities and Minority Achievement Program.



**Arthur Aguilar** is in his third year in the School of Public Health at the University of Washington. He recently joined PNASH as an Outreach and Education Jr. Specialist, where he will be supporting the Center’s research on injury and illness prevention on dairy farms. One of the main goals of his research is to seek out educational trainings that are culturally and linguistically appropriate for the multiple agricultural communities in Washington.



**Jannah Asirah Amaly** recently joined PNASH as an Outreach & Education Jr. Specialist and will be supporting the team’s efforts in the investigation and improvement of farmworker health and safety, a topic that resonates with her because of the related experiences some of her family members had after emigrating to the US. She hopes to leverage the experience she will gain with PNASH and her academic studies in public health to further explore the social determinants of health and economic barriers faced by underrepresented communities.



**Maria Blancas** recently completed her MPH degree in the Community-Orientated Public Health Practice Program at the University of Washington. As a member of the Outreach Team, she is helping to provide community engagement support on the Center’s dairy worker and family projects. 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.

### Year 1 Progress & Specific Aims

**Aim 1: Collaborate with our stakeholders to identify the key issues and problems in agriculture that our Center can address by further research, intervention, or educational activities.** This year, we worked towards this aim by meeting

with organizations (i.e. Migrant Clinicians Network, Sea Mar Clinics), agriculture stakeholders (i.e. dairy owners and supervisors), and community representatives (i.e. migrant workers, Columbia Valley Community Health, Promotoras de Salud) and have identified several key issues to pursue in our future research and activities. Mr. Palmández's outreach efforts in Central Washington built relationships with several new growers and community occupational health clinics.

**Aim 2: Develop a research-to-practice plan for each of the Center's projects to ensure that the benefits 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.** We are working toward our Aim 2 by 1) taking the first steps toward developing an environmental and occupational health and safety certification program for Promotoras; 2) meeting with public school representatives and the UW Continuing Education Department to set the groundwork for a Youth Ambassador program for high schoolers in Skagit County; 3) assisting the HRI team in developing a training manual for supervisors to administer heat illness education to workers in the field; 4) attending regional and national ag safety conferences to learn of successful research-to-practice methods utilized by other centers; and 5) participating in planning committees (i.e. Western Forum, Ag Safety Day, ISASH) to bring our messages to and learn from health and safety professionals, workers, producers, and other community stakeholders. Additional research-to-practice translation and dissemination planning is underway for recently closed projects: heat-related illness for results recently published by Spector; ergonomic results for mobile-platform use in the tree fruit industry; integrated pest management solutions for dairies to reduce use of pyrethroid pesticides; pesticide education needs in the tree fruit industry.

## **Community Advisories & Engagement**

### **Stakeholder Advisories**

For our new cycle, stakeholder advisories are facilitated through projects and supported centrally through the Outreach and Education Core. Our advisories are structured for their audience with the goal of achieving highly relevant/actionable agendas, empowerment/equal voice, and respect. This can mean operationally that some of our advisories, such as Expert Working Groups made up of workers and supervisors, are held in Spanish with simultaneous translation for those who require it. Our advisories coordinate by having dual representation across boards and the participation of a Center Outreach Core team member. Internal best practices were shared and the first Expert Working Group meetings were held for our heat illness prevention project.

### **NW Washington - Community Engagement and Youth Ambassador Program in Skagit County**

Aligning with the Center's initiative to expand into the northwestern region of WA state, Dr. Galaviz and the Outreach Core team is working to establish a partnership with a public high school in Skagit County to develop a Youth Ambassador program for students of migrant farming communities. We are currently working on establishing relationships with teachers and school administrators who may be interested in facilitating such a project. We envision this to be an after-school program that would meet weekly and expose students to different environmental and occupational aspects of agriculture. Over the course of 10-12 weeks, our team will work alongside the school teacher to guide students through the development of a relevant project of their choice, which they will have the chance to execute in the community during the second half of the school year. Development of this project is ongoing and we hope to conduct the first pilot in fall 2018.

### **Yakima Valley, WA - Community Engagement and El Proyecto Bienestar.**

Over Year 1, 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 participatory research project and partnership between the UW PNASH Center, Northwest Communities Education Center/Radio Cadena, Heritage University, and the Yakima Valley Farm Workers Clinic. This partnership is working to resolve issues in the areas of children's asthma, air pollution, pesticide safety, dairy health and safety, heat illness, and worker safety. Regular outreach activities through the partnerships include local health fairs and dissemination of news and research results through Radio KDNA. A new activity for this cycle is a strategic planning

effort, re-engaging current members and potential partners through personal interviews. This will inform a strategic approach for El Proyecto Bienestar in the future.

On March 3rd, PNASH and El Proyecto Bienestar opened their doors to the community at the 1st PNASH Research Showcase at the NCEC/Radio KDNA in Granger, WA. This free event provided a unique opportunity for the community to meet with PNASH researchers and student, participate in hands-on activities and vote for the future direction of projects in the Yakima Valley. Participants learned about public health research taking place in the Yakima Valley on agricultural contaminants and worker health and safety. Interactive exhibits and family-friendly activities included asthma solutions, a fluorescent tracer demonstration, and climate change lotería. The event was attended by 60 people including local students, workers, and organizational representatives. The showcase was also covered in the media by Radio KDNA (Spanish public radio), the Yakima Herald, and the Yakima Valley Business Times.

### Northwest Forestry

Dr. John Garland reached over 500 Northwest forestry workers and safety professionals with safety educational seminars and consultation in Washington, Idaho, and Oregon. He developed a unique resource with supplementary funding from Oregon OSHA for Latino forestry workers in the form of a Spanish/English glossary, [Glossary of Forestry Services](#), to facilitate communication and understanding of forest management practices. He is a co-investigator and a technical advisor to multiple NIOSH-funded logging and forestry projects and is a member of the NIOSH NORA council.

Also in Year 1, Dr. Garland was named co-PI of a NIOSH funded U01 project on tethered steep slope logging and safety and health. Dr. de Castro is PI of another forestry U01 community-based project for Latino forestry services worker safety. Currently we are finalizing results and the educational materials, including “Safety Talks” for supervisor-led trainings and motivational worker injury stories.

### Northwest Fishing

Previously PNASH had limited direct work in commercial fishing, instead serving as a general resource, launching small projects and assisting the NIOSH Alaska Regional Office with its initiatives. This cycle, we work in partnership with our PNASH Oregon State University investigators under PI, Laurel Kincl and her 5-year project, Safety Surveillance for Pacific Northwest Fisheries (see Kincl project report). Dr. Kincl held her first project technical advisory meeting this summer and coordination with PNASH Outreach Core will begin in Year 2 in conjunction with field work and the Pacific Marine Expo held in Seattle on November 2017.

### Education

#### 2017 Beat the Heat / Vence al calor - A Preparedness Campaign for Ag – Farming, Fishing and Forestry

Over the summer of 2017, PNASH facilitated the U.S. Ag Centers in a new national educational campaign – heat-related illness prevention. This campaign’s media outreach emphasized key messages from Ag Center initiatives and research and coordinated with NIOSH and OSHA campaigns. The U.S. Ag Center internal goal was to enhance our social media and evaluation efforts and build Ag Center capacity on the issue of heat-related illness. Ms. Harrington at PNASH facilitated an intercenter steering committee and PNASH hosted an HRI training webinar for NIOSH and Center personnel on June 5<sup>th</sup> – providing current research on HRI prevention. Our public campaign message was that heat illness can be deadly, but with education and preparedness, you can save lives. We invited our regional partners (employers, safety specialists, and educators) to join the launch of the Summer 2017 Beat the Heat campaign to prevent heat illness and deaths in agriculture. Key information, regional cases, media releases, engaging training materials, videos, and games (English and Spanish) were made available at [nasdonline.org](http://nasdonline.org).



Golpe de calor, ¡llame al 911 y enfríelo como pueda!  
Heat Stroke Call 911: Cool by any means possible!



PNASH Center English and Spanish materials at [http://deohs.washington.edu/pnash/heat\\_illness](http://deohs.washington.edu/pnash/heat_illness)

For PNASH's regional effort, there is evidence of a marked uptick in engagement through our Facebook and Twitter accounts. Currently, multi-site evaluation data is being analyzed to assess our national research and impacts in social media engagement.

### **Collaboration with Columbia Valley Community Health (CVCH) Clinic**

In June 2017, our team partnered with CVCH to provide occupational health and safety education and information to farmworkers at a migrant camp during a mobile clinic visit. Based on team planning with CVCH leading up to event, they developed an education station that would focus on heat-related illness and pesticide/chemical exposure. The station consisted of hands-on learning displays and activity boards, in addition to a fluorescent tracer table-top demonstration. The team also collected input from clinic visitors on their main health safety concerns through a needs assessment voting board. PNASH intends to continue this collaboration in Year 2, building on CVCH's educational capacity with popular education approaches for migrant safety and education in the field and at temporary housing facilities.

### **Promotora Certification Program**

Over the last several months, our team has met with representatives from the Migrant Clinicians Network and SeaMar Clinics and with several Promotoras de Salud in eastern and northeastern Washington who have expressed a desire to have more in-depth training in environmental and occupational health/safety in order to enhance the effectiveness of Promotora outreach to agricultural communities. Ms. Grasso and the Outreach Core team have begun strategic planning for a newly proposed educational project: an 8-module course which would incorporate training sessions on topics that were raised during their conversations as well as topics in which PNASH has expertise, including ladder safety, pesticide use and exposure, and heat-related illness. Through interactive modules, this program will ideally allow Promotoras to enhance their abilities to serve, liaise with, and advocate for migrant agricultural workers and their families. The team also recently met with Nancy Simcox in the Continuing Education Department to discuss developing this training into a certification program.

### **Social Media Development and Evaluation**

Another aim of PNASH is to provide regular communications between the Center and the agricultural community and serve as a forum for our stakeholders to discuss issues and resolve emerging problems. In Year 1, we expanded our social media use on Facebook and Twitter. We participated in national campaigns (i.e. Beat the Heat, National Ag Safety and Health Week), broadcasted internal successes and hirings, and encouraged staff members to attend social media educational seminars (i.e. #SafetyCulture: Health and Safety in the Social Media Age, Compelling Science Storytelling: A Pacific Northwest Workshop for Science Communicators). We also purchased a few "boosts" in order to reach a broader audience with our messaging and strove to incorporate more Spanish translation in our posts. Our initial evaluation showed the effectiveness of boosting a post, with one post alone reaching over 1400 people and as a result, it led to new people liking the post and our page. Three weeks after the Beat the Heat campaign launch, viewers who liked our Facebook page grew by 16%.

### **Additional Activities**

***Regular communications include e-media such as our website, monthly e-news, and social media engagement.***

November 7-8, 2016, PNASH Exhibit and Training Needs Assessment. Washington Dairy Safety Conference, Ellensburg, WA.

November 17, 2016, Pacific Marine Expo, Seattle, WA. Laura Syron and Devon Lucas (NIOSH) hosted panel on research findings.

December 6, 2016, PNASH Research Results Review. Presentation at Washington State Tree Fruit Association Annual Meeting, Edward Kasner. Wenatchee, WA.

January 18-20, 2017, Presentation at Association of Oregon Loggers Association Convention, John Garland.

January 26, 2017, Presentation "Personal Protective Equipment (PPE) for Pesticide Handlers: The Basics" for Farmworker Justice Conference, Kit Galvin.



February 1st and 22nd, WA Governor's Safety and Health Conferences: Agricultural Safety Day. Marcy Harrington, member of Planning Committee. PNASH Exhibit. Presentation on Dairy Safety (English/Spanish) at Yakima Ag Safety Day. Wenatchee and Yakima, WA

February 25, 2017. Presentation on "Steep Slope Logging and Safety" at Oregon Logging Conference, John Garland.

March 3, 2017, PNASH Community Research Showcase, Yakima, WA. boost a post on 6/14, and the result was very promising! This post alone reached over 1400 people and led to new people liking the post and our page as a result. Since the campaign launch week, the viewers who like our page has grown by 16%.

March 4, 2017, Presentation "An App in the Apple Orchard: Anytime Anywhere Safety on the Farm" at Friends of Farms and Forests Annual Meeting, Kit Galvin.

March 17, 2017, Migrant Clinician's Network Workers' Health and Safety Training for Promotoras de Salud. PNASH invited participant, Jennifer Grasso. Tri-cities, WA.

May 9, 2017, X Community dialogue: Working conditions in Washington's Dairy Industry, PNASH invited participant: Elizabeth Torres. Granger, WA.

June 5, 2017. Training Webinar: Heat-related Illness Training in Ag.

June 25-28, 2017. ISASH Annual Meeting, PNASH Participant: Jennifer Grasso. Logan, UT.

July 10, 2017, Fishing Surveillance Project Advisory. OSU PNASH hosted and UW PNASH Advisor: June Spector.

September 14, 2017, Latino Health Research Clearinghouse Meeting, Heritage College, PNASH Participant: Catherine Karr. Toppenish, WA.

September 19-21, 2017, NIEHS Partnerships for Environmental Public Health (PEPH). PNASH and Yakima Partner Participants: Catherine Karr, Maria Tchong-French, Elizabeth Torres, Adriana Perez. Research Triangle Park, NC.

Advisor: NIOSH NORA Steering Committee. John Garland.

Advisor: Washington State Logger Safety Initiative. John Garland.

Advisor: Oregon OSHA Forest Activities Code Committee. John Garland.

Advisor: Washington Agricultural Leadership, skills and Safety Program. Pablo Palmández.

Advisor: Washington State Department of Occupational Safety and Health – Agricultural Committee. Jose Carmona.

Advisors: Washington Governor's Safety and Health Conference – Ag Safety Days. Marcy Harrington, Pablo Palmández, Jose Carmona, Jennifer Grasso.

Advisor: Western Forum for Migrant and Community Health. Planning Committee, Jennifer Grasso.

## New Resources

Harrington MJ, Lloyd K: [2017] A Case History Introducing the Oregon Ag Seminar Series – Keys to Program and Research-to-Practice Success. J of Agromedicine 22(4) 420-424. PMID: 28742449.

[Spanish Glossary of Forestry Services Terms](#) (English and Spanish)

[Video: EPA Pesticide Safety for Agricultural Workers](#) (English and Spanish)

[Video Trailer: Sexual Harassment Prevention](#) (English and Spanish)

Online CE: [Introduction to Agriculture Medicine](#) Course and [Special Topics Lecture Series](#)

Survey: Emerging Issues in the Washington State Tree Fruit Industry (English and Spanish). Report at [http://deohs.washington.edu/pnash/sites/deohs.washington.edu.pnash/files/documents/PestEd16\\_GrowerSurvey\\_Ver7Final\\_13April17.pdf](http://deohs.washington.edu/pnash/sites/deohs.washington.edu.pnash/files/documents/PestEd16_GrowerSurvey_Ver7Final_13April17.pdf)

App - beta version: Pesticide Label Safety and Health Information (English and Spanish)

Social Media Kit: 2017 Beat the Heat / [Vence al calor](#) - A Preparedness Campaign for Ag – Farming, Fishing and Forestry (English and Spanish)

Article: "The job no one wants: why won't young people work in logging?" The Guardian, August 23, 2017. Available at: <https://www.theguardian.com/us-news/2017/aug/23/logging-industry-work-employment-oregon>

# PILOT PROJECT PROGRAM AND EMERGING ISSUES FUND

PNASH administers a Pilot Project Program and Emerging Issues Fund on an annual basis, allowing us to solicit, review, and award small projects and funds to investigators in the Northwest in research, intervention, and education.

## Pilot Project Program – FY2016

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:

**Innovation:** new and novel methods for research, prevention, or education

**Future Funding Potential:** likelihood this project will lead to future studies and programs

**Significance:** the project's responsiveness to regional and national priorities, focus on hazards that are serious and/or have high rates of exposure, and reliance on research for the ability to make a difference

**Approach:** the study population and research/formative methods

In 2017, PNASH updated the Pilot Proposal Evaluation Guidelines to reflect current common NIH criteria. As a result, 2 new categories were added to the evaluation criteria including 1) Innovation: the new and creative way to solve a problem and 2) Future Funding Potential: the preliminary data that will be used to inform future studies. Scientific Relevance and Relevance to PNASH goals were modified to Significance: the project's responsiveness to NIOSH AFF research agenda, hazards that are serious and/or have high numbers of exposure, and research has the ability to make a difference. In addition, Population/Model, Data Gathering/Analysis Method, and Time and Personnel are all now described in the single category of Approach: the specific aims and study design. With the new guidelines, the PNASH Center's evaluation criteria also consider additional elements that reduce the disadvantage previously faced by proposals that did not have a strong research component (e.g. educational projects) by removing the highly methodological and analytical evaluation categories.

In 2017, we received a total of 9 pre-proposals encompassing the states of Washington, Oregon, and Idaho. From those, 6 investigators were invited to submit a full proposal. One of the applicants had to withdraw and we received a total of 5 full proposal submissions. Three projects were selected, with one supported through the Emerging Issues Fund. These new projects included Pacific Northwest (PNW) Data COD, Hazard Assessment in the Potato Industry, and Respiratory Health in the Cannabis industry (Emerging Issue). Each was funded at the level of \$27,500 Direct Costs.

### **PNW Data COD: An Agricultural Worker Data Repository and Interactive Visualization** (P.I. Elena Austin)

This project combines agricultural injury, demographic, and geographical data sources in the NW region, including results of previously conducted PNASH research into a visual, interactive web-based database. This data repository and analytical tool will allow PNASH, communities, industries, and other researchers to assess environmental justice indicators and emerging issues. In the long-term, PNASH research data represented with this tool could be combined with an evaluation framework that could potentially serve to demonstrate changes to the overall worker health and safety in the region.

**Recognizing and Reducing Safety Hazards in Northwest Potato Production** (P.I. Cynthia Curl) This project will introduce a novel hazard assessment for potato growers to conduct on their own farms. Boise State researchers have partnered with the Potato Commission to address safety on potato farms in Idaho and Washington. The project will begin with an online survey to obtain management perspectives on the tasks and operations that they perceive to be the most hazardous. Growers will then be provided with a guided hazard self-assessment tool that allows them to mitigate and reduce safety hazards in their own operations. Finally, the utility of the self-assessment will be evaluated with a second survey to determine the proportion of growers who used the tool and who self-reported an increased awareness of the

safety hazards at their workplaces and/or implemented steps to minimize or mitigate those hazards. This project could lay the groundwork for hazard intervention projects for the potato industry and novel assessment methods for use with other industries.

**Respiratory Health and Indoor Air Quality in Washington's Cannabis Industry** (P.I. Chris Simpson) Funded in part by the Pilot Project Program and the 2017 Emerging Issues Fund, this will be the first research project in Washington that will identify and address occupational respiratory health issues faced by workers in the cannabis industry. The study team will measure airborne contaminants associated with cannabis production and evaluate if they are associated with either increased airway inflammation and/or increased respiratory symptoms. The goal is to provide solutions to the industry to improve workplace practices and occupational health for cannabis workers.

### **Emerging Issues Fund – FY2016**

The Emerging Issues Fund is housed in the Planning and Evaluation Core, allowing PNASH to respond or take rapid action as needed in order 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. The Emerging Issues Fund is used to address issues and priorities raised by members of PNASH's Stakeholder and Advisory groups through project advisory committees, solicitation from Center Stakeholder meetings, and ad hoc advisors. Activities should fall outside of the scope of currently funded PNASH work. Distinguishing criteria for this fund are:

- Address issues and priorities raised by stakeholders
- New effort to cultivate a developing partnership
- 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

Funded Emerging Issues projects for 2016-2017 included:

#### **Bilingual Pesticide Safety Project - \$26,819**

##### **Kit Galvin, Senior Scientist**

The purpose of this small project is to provide safety information from the pesticide label directly to pesticide handlers and managers in Spanish and English. The service uses a mobile app delivery system and includes information on the product, registrant, first aid measures, protective equipment, engineering controls, storage and disposal, and toxicity/health effects. The service is fully functional anytime and anywhere on a farm and there is no need for cell or internet service, an important feature for rural farms.

Three hundred acute pesticide poisonings occurred among Washington state agricultural workers in a recent five-year period. US EPA regulations require a booklet (label) to come with the pesticide product that includes safety procedures for handling pesticides, environmental protection, emergency response, and first-aid measures. For the majority of agricultural workers Spanish is their primary language. The only Spanish on the label is, "If you do not understand this label, find someone who can explain it to you in detail." Often, orchard managers provide ad hoc translations and they may not be available when needed. This may result in improper pesticide handling, worker exposure, acute pesticide illness, and environmental & crop damage.

The *Bilingual Pesticide Safety Label Service* is ready to be scaled up from research into large-scale practice. Our successful 2016 field pilot test provided proof of concept. Managers on their own shared the Spanish safety information with their handlers and told others in the industry about the mobile service. Some asked for copies to put on their phones. We have the support of labor and industry organizations and tree fruit growers in Washington. To quote one grower, "This has been a long-time coming. It's a great solution."

Our plan is to partner with UW CoMotion (technology transfer group). With this approach, we will provide the safety label service on a self-sustaining basis, with the service being housed in the UW PNASH Center. Access will be granted

through a subscription and cost will be based on number of crops, employees, and labels. The subscription service will support accurate translations, strict content quality control, prompt push-through updates for any label changes, customer service, and project evaluation. The app project and data will be available for pesticide safety research in the future. CoMotion will provide billing, legal, copyright, and licensing support services.

### **Engaging Children of Agricultural Workers in Skagit County through a Youth Ambassador Program - \$5,000**

**Vanessa Galavíz, Senior Lecturer**

In efforts to expand worker and family agricultural outreach and education activities, the PNASH Outreach Team has been conducting formative research in Skagit and Whatcom County. Agriculture is the most prominent economic sector in Skagit County. Many agricultural workers in Skagit and Watcom County come from Mexican indigenous communities only speaking the indigenous languages, such as Triqui and Mixteco. These indigenous workers and their families embody the mutual inclusivity of social, environmental, and occupational justice falling within the framework of marginalized communities. They are subject to harmful living conditions, non-livable wages, hazardous working conditions, limited access to medical care, language barriers, and unfair labor management. The social, cultural, and political sensitivities create complexities in addressing the social and environmental disparities that ultimately impact the safety and health of agricultural workers and their families. The challenge in overcoming these complexities is, in part, due to a lack of systematic trust between agricultural communities and organizations, such as academic institutions working on issues of justice.

Through a bottom-up approach, the PNASH Outreach Team will engage in worker and family community-capacity building in Skagit County. This should build trust and support for grassroots efforts for social, environmental, and occupational justice. This work will include aspects of translational research, civic science, and participatory democracy to improve safety and health among agricultural communities. To initiate a collaborative framework for justice, PNASH Outreach will work with grassroots organizations and a local high school supported by the community to implement an Environmental and Occupational Youth Ambassador Program for children of agricultural workers in Skagit County. This type of community-based educational program can play a significant role in 1) reciprocal knowledge translation between the agricultural community and academic institutions, 2) the democratization of environmental and occupational safety and health information, 3) creating community structural support for outreach and education efforts, 4) leadership development, 5) support for higher education among underrepresented groups, and 6) results-oriented actions. Through this process, PNASH Outreach hopes to build on the Youth Ambassador Program and continue collaborative efforts to expand into other needed opportunities such as agricultural research-to-action initiatives.

Activities have included community asset mapping, defining goals, creating implementation plans, developing research questions, and community-capacity building. We have been able to meet with local government representatives, a local community clinic, and community organizations that work for and with agricultural workers and families. These meetings have been successful in learning about the demographics of the indigenous agricultural communities, literacy levels, current projects, overall needs, and the potential for collaborative efforts with the PNASH Outreach Team. Two important relationships and projects have resulted from the formative research, including a Promotor/a Environmental and Occupational Certification Pilot Program with Sea Mar Community Health Center and an Environmental and Occupational Youth Ambassador Pilot Program with Mount Vernon High school. We will continue to establish a presence in Skagit and Whatcom County and continue developing and strengthening partnerships to ensure improved agricultural health and safety for vulnerable at-risk populations through active research, outreach, and education.

### **Farm Worker Housing and the Application Exclusion Zone - \$5,000**

**Richard Fenske, Professor and Eddie Kasner, Post Doc**

Revisions to the federal Worker Protection Standard include establishment of an Application Exclusion Zone (AEZ) for agricultural pesticide applications. In the case of air blast applications, the AEZ is a 100-foot 'bubble' around the sprayer to prevent human exposure to pesticide drift. In Oregon, there are a substantial number of employer-provided worker housing units within 100 feet of the edge of orchards. The AEZ regulation requires that all people be removed from the AEZ. Producers in Oregon believe it is impractical to remove workers and their families from housing during orchard spraying. In response to their concerns, Oregon OSHA is crafting an alternative to the AEZ.



PNASH was contacted by Nargess Shadbeh at the Oregon Law Center and asked to consult on this issue. Michael Wood, Director of Oregon OSHA, invited Dr. Fenske to participate in his Small Agricultural Employer Advisory Committee (SAEAC). The development of an alternative to AEZ in Oregon represents a new issue for PNASH that is time-sensitive, as Oregon OSHA plans to release a draft rule by September 2017. This is an important issue for farm workers and their families. The alternative rule needs to provide adequate protection from pesticide drift. Our work on drift can inform the development and implementation of this rule. Dr. Fenske and doctoral student Eddie Kasner provided consultation to Oregon OSHA during the summer of 2017, attending SAEAC meetings in Oregon, advising on scientific questions, and providing detailed comments on the proposed alternative rule.

### **Blood Sampling Addition to the Healthy Dairy Worker Study - \$5,000**

#### **Peter Rabinowitz, UW Center for One Health Research**

The Healthy Dairy Worker Study is a longitudinal study of dairy worker adaptation to the dairy environment, with a focus on the effects of dairy work environments including milking parlors on the intestinal and nasal microbiome. The study is now in its first year, and recruitment and sampling of workers have begun on two large farms in eastern Washington. This emerging issues funding supports the collection of blood samples from participants in addition to the other biosampling (stool, nasal swabs, lung function testing). The ability to collect blood specimens from participants will open up exciting and important scientific possibilities to further correlate dairy work activities and immune function, in relation to both allergic and microbial environmental exposures.

At the Dairy Projects meeting convened by PNASH at the end of January 2017, advisor Dr. Susan Kerr from the WSU Agricultural Extension service questioned why we were not including blood testing in our sampling strategy. We explained that due to budget limitations, we had not included blood testing in the original proposal. At the PNASH Dairy projects meeting however, Dr. Kerr and others pointed out two distinct advantages to doing the blood testing. First, there are a number of immune markers such as serum IgE (total and antigen specific to particular pathogens and allergens) as well as markers of inflammation, such as C reactive protein that can only be tested on blood specimens. Having blood samples would therefore allow us to have direct measurement of immune responses both generalized and specific. It would be highly valuable to compare longitudinal changes in microbiome communities of the gut and nasal mucosa with changes in immune markers, shedding important light on these exposure-effect relationships. Second, obtaining blood samples will also allow for blood glucose testing. The results of such testing provide a screening for diabetes, and we will be able to share the results of this blood glucose testing with our participants, resulting in a potential health benefit for study participants.

### **El Proyecto Bienestar Community Research and Development - \$3,333**

#### **Victoria Breckwich Vasquez, Asst. Prof, UW Bothell**

- **Strategic planning with and for El Proyecto Bienestar (EPB)**

Developing the EPB strategic plan is relevant to emerging issues because: 1) EPB is the only grassroots organization addressing the environmental and occupational health needs of agricultural communities in eastern Washington; 2) EPB needs to update its goals and directions to better respond to emerging environmental and occupational health concerns; and 3) EPB needs a sustainable plan of action informed by agricultural stakeholders that are important to PNASH and its current/future work. A strategic plan will respond to these challenges and hopefully set in motion a plan of action that further strengthens and formalizes the organization towards greater sustainability as an independent entity and valuable community partner.

- **Strengthening connections with the grower industry to raise funds to support the completion of the PNASH-supported sexual harassment prevention training video.**

Raising funds to support the completion of the sexual harassment prevention training video specifically for the agricultural industry is relevant to emerging issues because: 1) sexual harassment is a priority occupational health and safety concern in the NORA Vulnerable Workers research agenda; 2) the video and training curriculum address the many gaps that exist in preventing this occupational health and safety issue in the agricultural workplace; 3) planned national distribution of this resource/tool enhances PNASH's outreach efforts and increases its recognition as an educational resource on sexual harassment prevention in agriculture.

# PREVENTION OF OCCUPATIONAL EXPOSURE TO PESTICIDE DRIFT

## YEAR 1 of 5 (2016-2021)

PI: Richard Fenske, PhD, MPH  
Professor  
University of Washington

This study works in collaboration with the Washington State Department of Health, Pesticide Program and Washington State University, Ag Weather Net.

The overall objectives of this project are to understand the mechanisms of pesticide drift exposure among agricultural workers and prevent these exposures in the future. In May 2014, the Washington Department of Health (WA DOH) alerted state agencies and growers to a spike in pesticide spray drift illness cases among tree fruit orchard workers. Over a two-month period, approximately 60 individuals were exposed to pesticides in 15 drift events, which is equal to the number of cases that the agency normally sees over the course of an entire year. In response, there have been many efforts to improve safety practices and pesticide application technologies. Yet, pesticide-related illness among agricultural workers remains a significant public health concern in the Pacific Northwest.

Over a five-year period, we will address pesticide drift in three aims:

**Aim 1.** Determine the probability of drift events due to environmental conditions during spraying: we will estimate drift-related weather conditions at the time and location of all documented drift events in Washington State between 2000 and 2015, and conduct a case-crossover study of weather conditions on drift event days vs. non-drift event days to build a ‘drift determinants’ model.

**Aim 2.** Conduct validation studies of our Drift Determinants model: we will compare field meteorological measurements to AgWeatherNet (AWN)-based estimates at representative sites in the Yakima Valley, and test the validity of model predictions through field sampling of pesticide drift under variable weather conditions.

**Aim 3.** Translate study findings into exposure prevention tools for agricultural producers and workers: producing new training modules for regional “Drift Management Best Practices” courses, providing 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 event-prone weather conditions.

*“All of us have benefited from your steady dedication to engagement with diverse institutions and communities confronting a diverse and dynamic array of agricultural safety challenges.”*

- James McFerson  
WSU Research & Extension

Over our first year, Dr. Edward Kasner, a PNASH Post-doc completed Aim 1 of the study to determine the probability of drift events due to environmental conditions during spraying. In the first study of its kind, we systematically linked human pesticide exposure and illness data with weather data. Our study integrated data from the Washington State Department of Health (WA DOH) with data from the Washington State University (WSU) AgWeatherNet (AWN) system to characterize drift-related weather conditions.

Between the years 2000 and 2015, we identified 252 drift events involving 738 individuals, 690 of whom were confirmed cases. In tree fruit alone, there were 151 drift events involving 320 confirmed cases. Mean distances from the nearest AWN station to all crop events and tree fruit events were 4.0 miles and 3.8 miles, respectively. Weather data were available for 78% of all crop drift events and 81% of tree fruit events. A total of 15,252 wind speed measurements were available for 2-hr exposure windows containing 9 data points each from 120 tree fruit events. There were 1,082 measurements from drift days and 14,170 from control days. We propose the use of wind speed





coefficient of variation (CV) and wind direction standard deviation (SD) as wind ramping metrics for analyzing past drift events and predicting future ones. Future studies could combine wind data from several nearby stations to estimate conditions at unsampled locations. An AWN-driven wind alert system for applicators could be built on an enhanced version of our model.

These findings have been shared with WA DOH partners and presented in a dissertation defense and at the Northwest Climate Conference. Immediate plans include sharing study results among state partners and other stakeholder groups. Future work over Years 2017-2021 will launch study Aims 2&3.

A video interview with Kasner. [See video.](#)

## RESOURCES

- Prado JB, Mulay PR, Kasner EJ, Bojes HK, Calvert GM: [2017] Acute Pesticide-Related Illness Among Farmworkers: Barriers to Reporting to Public Health Authorities. *J of Agromedicine* 22(4) 395-405. PMID: 28762882.
- Kasner EJ: [2017] On Preventing Farmworker Exposure to Pesticide Drift in Washington Orchards. PhD Thesis, University of Washington.
- Kasner EJ, Fenske RA, Galvin K, Yost MG, Palmández P: [2016] Review of Agricultural Spray Notification Systems. Technical Report.
- Spray Application Equipment Best Management Practices (English and Spanish) 60 Minute Sessions at the 12th Annual Agriculture Safety Day, "Production to Processing," in February 2016.

# THE HEALTHY DAIRY WORKER STUDY

## YEAR 1 of 5 (2016-2021)

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

This study collaborates with the Allen School for Global Animal Health at Washington State University, the Washington State Dairy Federation, and the Migrant Clinician's Network.



Research with PNASH and the [Center for One Health Research](#) is characterizing dairy worker exposure to microbes and allergens common in dairies. The study evaluates the impact of these factors on respiratory health by measuring the nasal and gut bacteria present in the body and comparing it to respiratory function of workers. This 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, including infection and airway inflammation. Better understanding of adaptation to dairy environments could lead to preventative interventions.

This study has three specific aims:

- 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.
- Aim 2.** Over a two-year follow-up period, compare gut and nasal microbiome change between new workers and controls.
- Aim 3.** Determine whether microbiome components are associated with health status or early work cessation. During the first year of this study, we visited four dairy farms to discuss our research with dairy owners and operators and recruit workers to participate in our study. We have established three new dairy industry partnerships from which we have recruited 12 workers and two community members (controls) to participate in the study. To date, we have administered 14 surveys on these farms, assessing demographics, use of Personal Protective Equipment, hygiene and exposure risks.

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

- WA Dairy Owner

Over the next three years, we will continue outreach efforts to engage new farms and workers in our study with an aim to enroll 60 dairy workers and 30 community members as participants. We will begin completing the biological comparative analysis in Aim 1, once we achieved this sample size.

To promote our study within the agriculture industry, we attended the 2016 Washington Dairy Safety Meeting and the 2017 Washington Governor's Safety and Health Conferences for Agriculture, “Ag Safety Days.” At the Yakima Ag Safety Day conference, the project led a session in English and Spanish, to discuss our research and share worker injury data. This was the first year a session featured Northwest dairy safety and health issues. We are on the planning committee for these events in the coming year and will feature a session devoted to dairy safety and health.

There is a need for effective training programs for dairy workers, including culturally and linguistically appropriate methods. Providing practical and effective guidance that integrates this study's findings on health adaptations will result in a safer workforce and efficient use of resources.

## RESOURCES

Brochure: Dairy Farming – Hygiene & Health



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

YEAR 1 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 program.

Our overall goal is to introduce and evaluate an intervention program that aims to the risk of occupational heat-related illness (HRI) and heat-related injury in Washington agricultural workers and leads to more effective adverse heat health effect prevention programs for at-risk workforces. Outdoor workers are at high risk for occupational adverse heat health effects, and previous research has identified modifiable risk factors at the individual, workplace and community level. This study will develop an approach to prevention guided by a multi-level model of prevention to address these risk factors both within and outside the worksite.

We will address adverse heat health effects in agricultural workers in three specific aims:

- 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.
- Aim 2.** Assess the effect of the intervention on occupational heat strain and HRI symptoms in parallel, comparison, group intervention study in WA summer tree fruit workers.
- Aim 3.** Assess whether the association between workplace heat stress and heat strain/HRI symptoms is modified by hot housing conditions using longitudinal observational study design in WA summer tree fruit workers.

Over the course of our first year, we established two groups, an advisory group comprised of industry and government representatives and an Expert Working Group comprised of growers and farmworkers, as outlined in Aim 1. Together, these groups offer perspectives for each level of the study to shape a practical set of prevention interventions aimed at addressing adverse heat health effects from the individual to the community level. At meetings in May 2017, the study team presented past research results and provided an overview of the current project. Feedback was solicited on draft heat training toolkit materials and a proposed heat awareness ('alert') system in conjunction with the WSU AgWeatherNet online system. These discussions have informed the following new directions: 1) Need to include information on how behaviors outside of work can influence performance and risk of HRI at work (e.g. drinking too much alcohol the night before work), 2) Including economic or other practical implications will strengthen recommendations for prevention strategies, 3)

There is a need to address situations that workers may encounter when there may not be resources like drinking water and shade at the workplace and provide information on what to do when this occurs (e.g. steps to ask for resources through supervisor, HR departments, and notifying outside groups to get help). These advisory groups will continue to guide the development of the project and products through the life of the project.

As part of the heat awareness system, HRI prevention messages and tips for supervisors will be sent out during weather forecasts with a high risk HRI - determined by the WBGT, heat index, air temperature, or other metrics of heat exposure. We are currently working with our advisory and expert working groups to develop the messages to ensure they are

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

- Advisor

practical for use in the field. In our recent meeting, there was also discussion on how to address uncertainty in forecasting. Our goal is to develop a heat awareness application that is tailored to the agricultural community and that assists with making decisions to support occupational health.

Other activities in Year 1 have included developing technical aspects of integrating the heat awareness feature within the current WSU AgWeatherNet (AWN) system. One of the metrics of heat exposure that will be used in the heat awareness system is the wet bulb globe temperature (WBGT), which is a composite measurement that accounts for air temperature, relative humidity, wind speed, and solar radiation. There are several ways to calculate WBGT, and we have been working with AWN staff to compare these calculations to determine if WBGT can be estimated without solar radiation measurements, which is measured by black globe sensors and an input into the standard WBGT equation. The reason for doing this is because we would like to estimate WBGT at all AWN stations, but it is cost prohibitive to install black globe sensors on all stations. There are currently five AWN stations with black globe sensors. We used data from the five stations that have black globe sensors and calculated the WBGT using the standard equation and compared that to WBGT as calculated using an algorithm that does not require using a black globe sensor. We will do more comparisons with five additional stations that were selected to have black globe sensors installed based on proximity to vineyards and other crops where manual labor is performed during the summer months. After this is completed, we will be able to decide if we can estimate WBGT using the algorithm (and to what extent) or if we can only use WBGT from stations that have black globe sensors. We are also working with collaborators to explore the heat index as a proxy for WBGT.



In the next growing season (2018), we plan to do an initial assessment and optimization of the heat education toolkit by obtaining feedback from workers and supervisors and comparing knowledge and practice outcomes over a growing season between the heat education toolkit group and a “usual practice” group (e.g. provided with standard WA heat education). Study Aims 2 and 3 will begin in 2019. In Aim 2, we will provide and evaluate the educational toolkit and heat awareness system packaged together for the agricultural industry. Outcomes measured will include self-reports of heat-related illness and injury and field measurements of heat strain, including core body temperature, and activity levels. These studies will be conducted with participating growers and workers in real field conditions.

# INJURY AND ILLNESS PREVENTION FOR THE PACIFIC NW DAIRY INDUSTRY

## YEAR 1 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 Industries Safety (LNI) 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 surveillance program to track acute and chronic injuries. Washington claims data show that dairy workers in the state have a higher than average rate of injury than the overall worker population. Industry specific risks include acute injuries from animal assaults, slips and falls on wet surfaces and chronic injuries from repetitive stress. We hypothesize that a targeted intervention in participating dairies for both worker training and their physical environment will result in workers adopting safer and more efficient working practices.

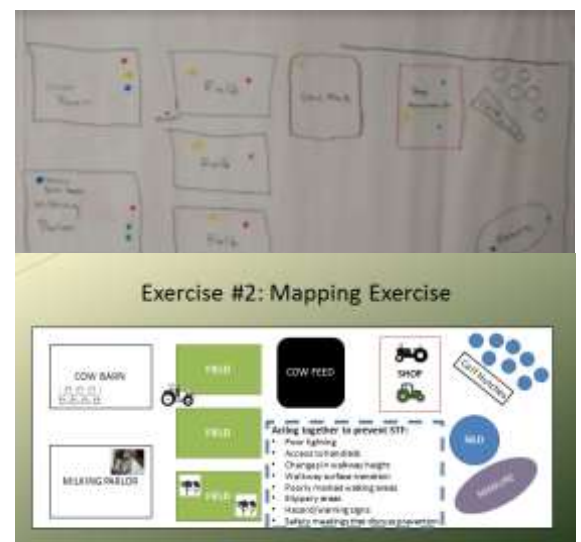
During the course of this five year intervention study, we aim to:

- Aim 1.** Identify common tasks and circumstances associated with acute injury risk in Washington Dairies.
- Aim 2.** Survey current safety training and animal handling practices in Washington Dairies.
- Aim 3.** Establish an Expert Working Group (EWG) comprised of managers and workers involved in day-to-day activities in the dairy industry.
- Aim 4.** Implement and evaluate selected training interventions with study population.
- Aim 5.** Develop methodology for and conduct a dairy injury surveillance program.
- Aim 6.** Translate results in a Best Practice Guide for minimizing injuries in Washington dairies.

In our first year of the study, we established working relationships with a number of dairy operations in our region and completed site visits to begin informal discussions with managers. Two of these locations have agreed to cooperate with us on the training intervention portion of this study. With these new partnerships, we will be able to recruit workers, enroll workers at these sites into our training intervention program and identify participants for our Expert Working Group (EWG).

We began Aim 1 by working with LNI partners to calculate the rate of injury among different subsets of dairy workers including age group and Spanish speaking workers. We have also collaborated on a system to capture all dairy related injuries in the LNI Workers compensation database including NAICS code identification and Washington Risk Class identification. Initial analysis has shown the most common injuries result from being struck-by objects or equipment.

For Aim 2, we have drafted a survey of Washington State dairy owners and operators, to establish their current safety practices and needs. This survey was formatively developed by a precursor survey and discussion session we hosted at the WA Dairy Federation Safety meeting. This survey has also been reviewed by our newly established Technical Advisory Group (TAG) who have provided feedback to the content and provided avenues for



*Worksite hazard mapping exercise*

dissemination of the survey. The survey has been adapted to allow for electronic delivery using the secure REDCap web application. An initial pilot of the survey was administered to 30 dairy owners. The results revealed that a priority topic of interest is animal handling. To address this issue, we are partnering with Amber Adams-Progar and Susan Kerr at WSU to share training videos and demonstrations of safe animal handling practices.

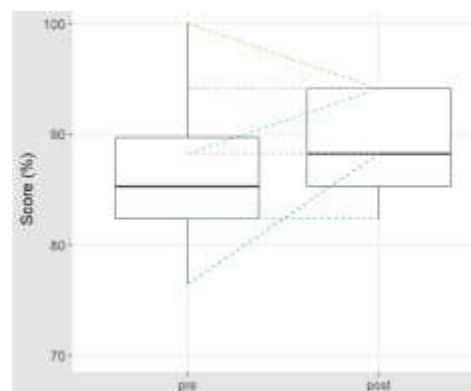
In addition, a Slips, Trips and Falls (STF) pilot curriculum was trial-run with a group of 10 English-speaking dairy workers, including manager level positions. A pre-post test was administered and analyzed and feedback on the session, material and presentation was collected. Preliminary results show a slight improvement. We are currently working on a pilot of the training to Spanish-speaking workers and extending outreach efforts to dairy farms in the Skagit Valley.

## OUTPUTS

Nov 2016. Exhibit at Washington State Dairy Federation Safety Meeting

February 22 2017. Presentation at Washington Governor's Safety and Health Conference – Ag Safety Day, Yakima, WA.  
(English and Spanish)

Evaluation Tool: Survey of Dairy Owners and Producers



*Pilot English training pre- and post- test results*



# NORTHWEST COMMERCIAL FISHING

YEAR 1 of 5 (2016-2021)

PI: Laurel Kincl, PhD  
Associate Professor  
Oregon State University

The overall goal of this project is to develop a safety surveillance system for commercial fishing that can be used to evaluate and inform safety initiatives to prevent injuries in this dangerous industry. To achieve this, we have brought together the expertise of NIOSH Western States Division, Marine and Environmental Research and Training Station (MERTS), Oregon Trauma Registry, United States Coast Guard, Alaska Marine Safety Education Association, and Alaska Marine Safety Education Association, as well as the OSU Colleges of Earth, Ocean and Atmospheric Science, and Public Health and Human Sciences.

This surveillance system will compile details on personal and vessel casualties and disasters, and will be used by researchers and industry leaders to conduct hazard assessments for specific fisheries, vessels or community needs. The compilation of relevant surveillance data comes at an important time during commercial fishing safety and will be beneficial to developing evidence-based intervention strategies. 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.

This study includes three specific aims:

- Aim 1.** Create a practical, scalable commercial fishery surveillance system for the Pacific Northwest.
- Aim 2.** Assess the utility and accuracy of commercial fishing surveillance data.
- Aim 3.** Develop an evidence-based hazard assessment with commercial fishery safety stakeholders.

**Aim 1. Create a practical, scalable commercial fishery surveillance system for the Pacific Northwest.** The study team at Oregon State University along with PNASH, have begun progress toward Aim 1 by building the framework for a centralized database that will pull information from a variety of sources to create a comprehensive injury surveillance system.

Modifications were made to NIOSH's Commercial Fishing Incident Database (CFID) that increase utility and incorporate new data fields. The CFID did not previously have the capability to include nonfatal injury and illness data, and less severe vessel casualty data (e.g. loss of power, loss of propulsion). The following changes have been integrated to the CFID:

- Cleaning and modifying existing variables and options to simplify data entry and make analyses more useful;
- Adding refined treatment and response options for nonfatal injuries and illnesses;
- Adding long-term outlook and functional capacity index scores to capture disability and impairment;
- Adding a secondary nature variable to capture injury sequelae; and
- Adding vessel casualty events and resolution (e.g., towed, repaired).

Additional changes were made to facilitate and improve the accuracy and consistency of data entry, including: A new web-based interface; drop-down lists, and field format checks.



*“Research can have powerful effects on policy... (and the) biggest obstacle is overcoming the preconceived risk that fishermen have”*

- Project Advisor

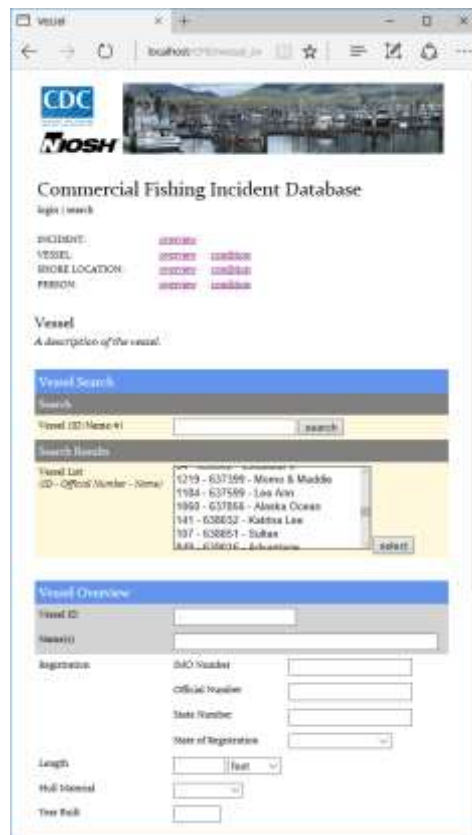
## Aim 2. Assess the utility and accuracy of commercial fishing surveillance data.

In Year 1 we began the migration of the existing CFID and vessel casualty databases from Microsoft Access to SQL Server. The updated database will be hosted on the CDC consolidated servers and will satisfy the current requirements for data containing personally identifiable information. The database will include existing study datasets and can be used to successfully collect a variety of data going forward. In addition, the upgraded database will help facilitate casualty data sharing with OSU. Also in the course of the first year, a partnership has been established with the Oregon Health Authority (OHA) Emergency Medical Services and Trauma Systems Program to obtain and investigate Oregon Trauma System data. The most recent data, from 2000-2017, has been requested for all trauma system entries with either a worker or an industry code related to “farming, fishing, and forestry.” The request is currently under review by the OHA IRB; the protocol for receiving and using the trauma registry data has already been reviewed and approved by the OSU IRB.

This year also marked assembling our Technical Advisory Board. The meeting introduced the project and study team and began discussions to elicit feedback for establishing this system. This group consists of stakeholders from commercial fishing related organizations including commercial fishermen, the United States Coast Guard, fisheries management professionals, the Oregon Trauma Registry, academia, and Pacific Northwest commercial fishing extension agents. Obtaining input early in the development of the system will ensure the system will be able to develop evidence-based hazard assessments relevant to stakeholders. During this meeting, we received feedback on our current data sources and addressed logistic and implementation concerns. With the guidance of the board, we have now named our project: Risk Information for Commercial Fishing or RISC Fishing System/Project. The study team is continuing to work on gaining access to data sources to populate the injury surveillance system and has a 2nd technical advisory board meeting planned for December 2017.

## RESOURCES

Laurel, Kincl. [2017] Injury Prevention for Commercial Fishermen: From Surveillance to Interventions. Oregon State University [College of Public Health and Human Sciences](https://www.youtube.com/watch?v=01zgBajHhD0). Online presentation at <https://www.youtube.com/watch?v=01zgBajHhD0>



The screenshot shows the 'Commercial Fishing Incident Database' web application. At the top, there are logos for CDC and NIOSH. Below the logos is a search bar and a list of search criteria: INCIDENT, VESSEL, SHORE LOCATION, and PERSON. Each criterion has a corresponding dropdown menu. The 'VESSEL' dropdown is currently selected, showing a list of vessels with their IDs and names. Below the search bar is a 'Vessel Search' section with a search box and a dropdown menu. The 'Vessel Overview' section displays fields for Vessel ID, Name, Registration, Length, Hull Number, and Tonnage.

# PRACTICAL SOLUTIONS FOR PESTICIDE SAFETY

## YEAR 1 of 5 (2016-2021)

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

Over a 5-year period, this education project will develop new practical solutions for pesticide use for farm and forest service managers and pesticide handlers to minimize exposures. These solutions expand on the previous [Practical Solutions for Pesticide Safety](#) guide developed for the tree fruit industry and broadcast spraying. The new practical solutions guide will include best practices for handheld application equipment used in nurseries (greenhouses), grass seed production and forest services (reforestation) industries. We will engage with regional industry managers and handlers in the identification and evaluation of solutions that are effective and practical for these specific industries. Lastly, we will create a practical solutions online community presence using web and social media tools for ongoing discussion and dissemination nationally.



The specific aims of this study include:

- Aim 1.** Establish advisory groups to inform the development and dissemination of new practical solutions for handheld pesticide application equipment.
- Aim 2.** Develop practical solutions for pesticide safety for handheld application equipment.
- Aim 3.** Disseminate Practical Solutions for Pesticide Safety guide.

During the first year, we developed an online training "Keeping Pesticides on the Farm: Practical Solutions for Minimizing Family Exposures" using the new National Ag Safety Database (NASD) training platform. This platform is under consideration for this project's future proposed online format for the guide. The result was an easy to use web-based educational training on the Work-to-Home exposure route from the "Practical Solutions for Pesticide Safety" guide – on how to prevent the unintended pesticide transfer that occurs when workers bring residual chemical contaminants from their skin, clothes and shoes into their home. The training was developed in collaboration with Conceptual Arts (NASD database contractor) and the Southeast Center for Agricultural Health and Injury Prevention.

We are engaging stakeholders for each industry/worker stakeholder group. First, an Expert Working Group (EWG) will include a collaboration of the experts – the managers and pesticide handlers that understand the daily operational needs and the research team. Second, a National Advisory Group will include representatives from employer and agricultural and forestry worker organizations; pesticide educators, and federal agencies that will provide feedback for adapting the solutions for a national audience and advise on national dissemination.

This fall we will begin to identify practical solutions using worksite walkthrough checklists and interviews with handlers and managers. These assessments will inform development of new proposed solutions and the review by the EWG. Solutions will be evaluated based on selection criteria and field tested. Some solutions will be developed into hands-on training modules for pesticide safety training in support of the EPA's Worker Protection Standard (WPS).

*"A top priority is the need for practical site-specific ways applicators can reduce exposure in their work to compliment the standard PPE and safety practice recommendations."*

- Extension Pesticide Safety Educator

## RESOURCES

NASD Online Training: [Keeping Pesticide on the Farm: Practical Solutions for Minimizing Family Exposure](#)