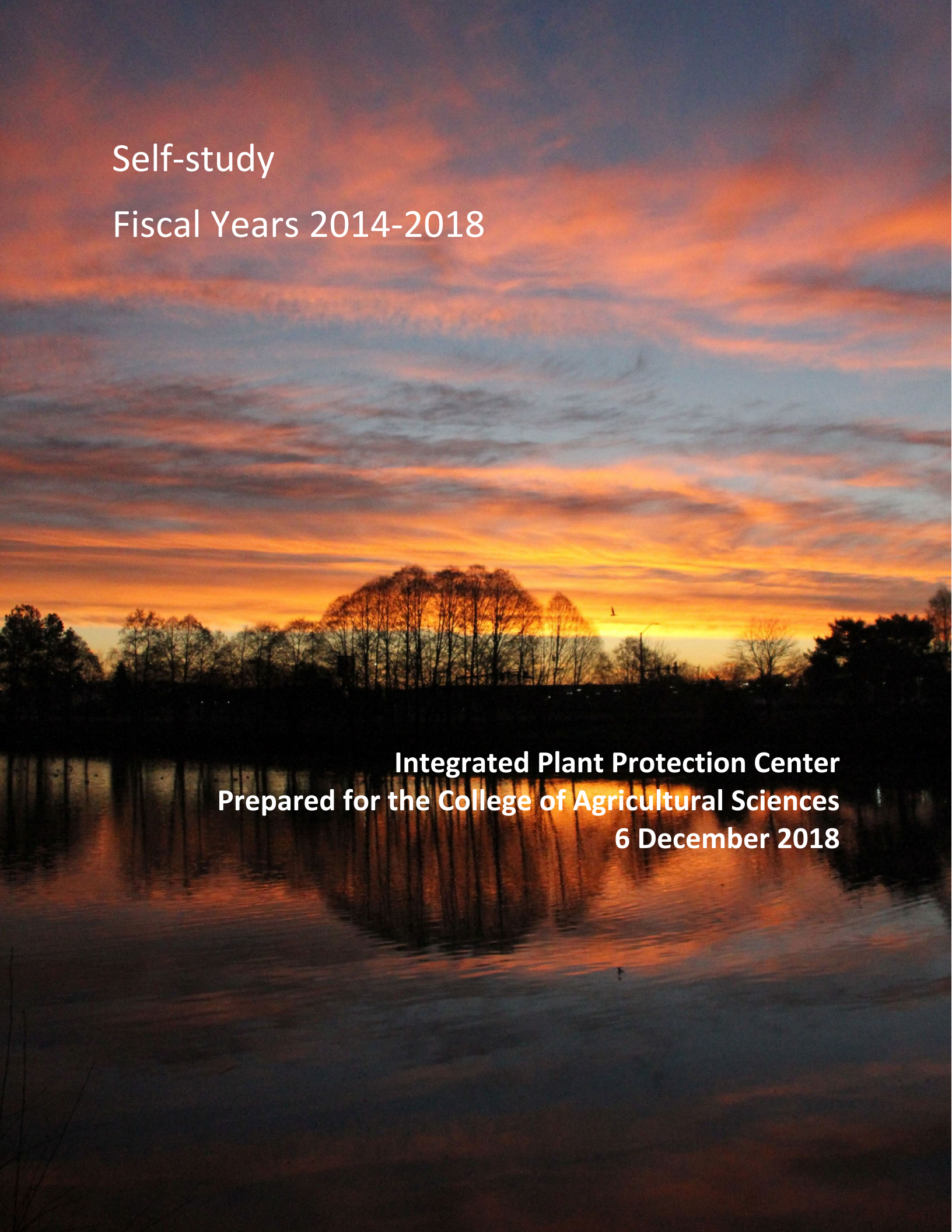

Self-study

Fiscal Years 2014-2018

Integrated Plant Protection Center
Prepared for the College of Agricultural Sciences
6 December 2018

Self-study

Integrated Plant Protection Center

Fiscal Years 2014-2018

6 December 2018

Prepared by

Integrated Plant Protection Center

for

College of Agricultural Sciences, Oregon State University

20 December 2018

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Executive Summary

The Integrated Plant Protection Center serves as a catalyst for discovery and new thinking relating to sustainable agriculture and integrated pest management (IPM). Our mission is to "help farmers adapt to an increasingly uncertain world through high impact science and education partnerships". The center's goal is to advance IPM in all of its applications in Oregon and beyond, through a sustainable portfolio of programs that address priority pest management challenges. This goal is achieved through three objectives: (1) Develop, streamline and maintain climate- and weather-based decision support tools for use with all agricultural commodities in the US; (2) Build and support participatory processes that engage and connect farming and other pest manager groups with researchers, educators, regulators, etc., to create an adaptive system that encourages widespread adoption of IPM and sustainable agricultural practices; and (3) Achieve significant and documentable pesticide risk reduction, meeting goals for crop production while protecting human health and ecological function. These goals are achieved through three core programs: (1) Pest and Weather Models; (2) IPM Engagement and Implementation; and (3) Pesticide Risk Reduction. Details and outputs for these three core programs are described below: we summarize current activities, collaborators, sources of support, and future plans.

IPPC operations and programs are highly dependent on grants and contracts. Approximately 66% of IPPC's funding comes from grants and designated operations, which are highly leveraged against the college's investment in the center. There have been a number of staffing changes during the evaluation period as a result of retirements, personnel changes and the college realigning programs. With the recent retirement of the former Director, the Center's staff include eight full and part time faculty and staff supported by 1.0 FTE from the college, and external grants and contracts.

Stakeholder input and perceptions regarding IPPC programs was solicited for this review in October 2018. Stakeholders range in their levels of interaction with IPPC depending on the program. Some programs are web-based with little direct interaction with faculty and staff, some programs address a wide range of crops on a biennial basis, and others include monthly workshops. 75% of respondents reported interactions from several times a year to monthly or weekly. The overwhelming majority of respondents surveyed stated that they were either satisfied or very satisfied with the IPPC programs that they were familiar with.

1.0 Background

Mission

The Integrated Plant Protection Center (IPPC) serves as a catalyst for discovery and new thinking relating to sustainable agriculture and integrated pest management (IPM). We develop research and education partnerships in subjects that include IPM implementation, adaptation to climate change, pesticide risk management, and outcome-based, participatory education. We promote informed dialogue among scientists, farming groups, regulatory agencies and policy makers to enhance global capacity to meet pressing problems in food security.

History

The Integrated Plant Protection Center (IPPC) was formed in the College of Agricultural Sciences at Oregon State University (OSU) in 1967, and has been conducting research and outreach in a state, national and international setting ever since. The IPPC is part of the Department of Environmental and Molecular Toxicology at Oregon State University, but it serves all constituent units in the College of Agricultural Sciences, on and off campus.

The IPPC is the home for the State IPM Coordinator, who works to advance and coordinate statewide and regional IPM policy, research, and education efforts through engagement with various stakeholder groups. This program of implementation is guided largely by USDA/NIFA's National Roadmap for IPM, which has established goals for delivering economically sustainable pest management with reduced risks to human health and to the environment. To aid in this process, the USDA has established four regional IPM Centers, and the IPPC works closely with the Western IPM Center based at University of California, Davis. The IPM Coordinator also works with regional and national colleagues through long-standing, and active coordinating committees. The Western coordinating committee (WERA 1017) serves the USDA Western Region, which includes the 14 Western states and the Pacific Island Territories.

While the IPPC leads and coordinates a number of multi-investigator, multi-state research and outreach programs based on IPM, it is a component of a broader IPM program at OSU. Elements of IPM programs can be found in the Department of Horticulture (Pollinator Health, School IPM, Turfgrass Program, individual faculty research), Department of Crop and Soil Science (Weed Science Program, individual faculty research), Department of Environmental and Molecular Toxicology (National Pesticide Information Center, Pesticide Safety Education Program), Department of Botany and Plant Pathology (Plant Clinic, individual faculty research), Extension (Master Gardeners, Consumer Horticulture), Center for Small Farms and Community Food Systems, and individual faculty research programs at several of our Branch Experiment Stations.

The IPPC has been agile in responding to, and pursuing competitive grant funding, largely from USDA regional and national programs, and it has played a role in encouraging OSU faculty to seek funding from these sources also. Oregon as a result is the highest earner of IPM Center funding among the Western States. We are pivoting again, towards greater stakeholder engagement, and an increased priority on building networks and partnerships that include OSU faculty. We report below, a framework that is being used to enable this process to ensue, and we also document our success in implementing this framework among many of Oregon's top agricultural industries. We also report budgetary constraints that limit possible expansion of this program, and short term concerns about the sustainability of our program that arise from its reliance upon external, competitive funding.

2.0 Key Goals and Objectives

The IPPC's goals and objectives are aligned with the USDA NIFA National Roadmap for IPM. The center's goal is to advance IPM in all of its applications in Oregon and beyond, through a sustainable portfolio of programs that address priority pest management challenges. We seek to achieve economically sustainable pest management in partnership with IPM stakeholders (agricultural industries, state agencies, other IPM professionals), with reduced risks to human health and the environment. Our objectives are to:

1. Develop, streamline and maintain climate- and weather-based decision support tools for use with all agricultural commodities in the US, as a key component of IPM.
2. Build and support participatory processes that engage and connect farming and other pest manager groups with researchers, educators, regulators, etc., to create an efficient and adaptive system that encourages widespread adoption of IPM and sustainable agricultural practices.
3. Achieve significant and documentable pesticide risk reduction, meeting goals for crop production while also protecting human health and ecological function.

We advance these goals through each of our core program initiatives, described in detail in section 3.0 below:

1. Pest and Weather Models
2. IPM Engagement and Implementation
3. Pesticide Risk Reduction

These three core programs are implemented by eight full- and part-time staff members. Staff have PhDs, Master's, and/or Bachelor's degrees. An associate dean currently serves as interim director of the center. Staff are specialists in crop production, modeling, ecology, pesticide impacts, risk assessment and communication, outreach and engagement, project and human resources management, and research within the IPPC focus areas (see Appendix A for staff CVs). Our staff are located in Corvallis and Portland.

3.0 Programs

Program 1: Pest and Weather Based Decision Tools

For over 20 years, IPPC faculty member Len Coop has been developing, testing and implementing models that integrate hourly and daily weather forecasts with phenology models of plants and invertebrates to provide predictive tools for crop growth and pest pressure. This information forms the basis of the website uspest.org (http://uspest.org/wea/), which supports agricultural capacity development in Oregon and throughout the US, by establishing a cooperative, multistate, multiagency, public- and private-sector platform for refinement and delivery of climate- and weather-based pest, beneficial organism, and crop models. Since 2014, Coop has secured in excess of $2.7 million in competitive grant support (Appendix B, grants 6, 16, 20, 21, 28, 30, 31, 38, 41, 45, 47, 51-59) to provide field model validations and establish web-based tools that bring together U.S. weather data and plant pest and disease models to serve many decision support needs in US agriculture.

The number of models developed has substantially increased over time (Figure 1). Currently this site provides over 114 degree-day and 24 hourly weather-driven models serving many IPM, regulatory, and plant biosecurity uses for the full U.S., specializing in IPM needs for the West (Appendix C). Weather data and forecasts are linked to the models for over 29,000 U.S. locations. Partners sharing data and/or using services include numerous weather networks, Washington State University, Montana State University, Utah State University Mesowest, the OSU PRISM spatial climatology group, University of California, Fox Weather, LLC, the Western IPM Center, the USDA RMA ipmPIPE, the National Plant Diagnostic Network, USDA ARS, USDA NIFA, and USDA APHIS PPQ. The system serves thousands of users in U.S. agricultural and pest management decision support in the U.S., and the mash-up utilities we have developed are in use by county-based extension faculty and independent crop consultants. The site began serving Oregon in 1996, Pacific Northwest states in 2003, and the full U.S. for plant biosecurity in 2007. The number of model runs has gradually increased over time, with over 32,000 model runs during 2009, to more than 328,000 model runs during 2017. The goal of this program is to advance IPM systems in the western U.S. and nationally by providing access to quality-controlled climate and weather data and models for all states and partner organizations.

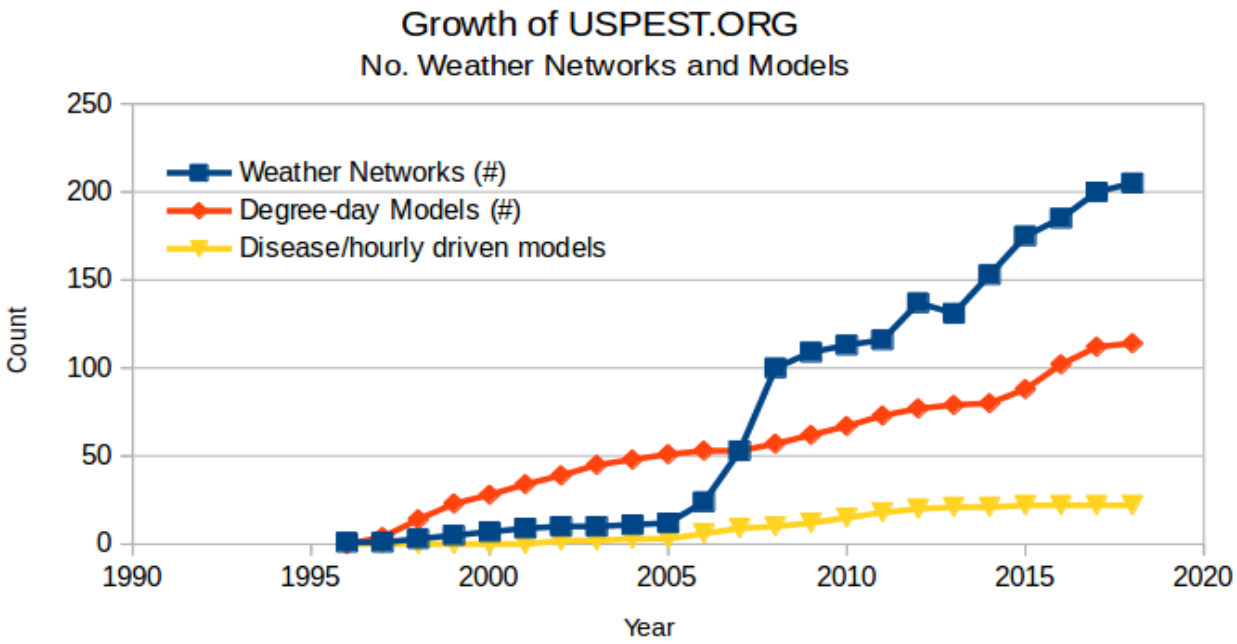

Figure 1. Growth of USPEST.ORG number of weather networks, number of degree-day models, and number of hourly weather driven models.

We are currently developing three stand-alone models that are not integrated into the "My Pests Page" because they have unique input needs. We are also working with USDA APHIS PPQ (Plant Protection and Quarantine) to develop and implement approximately 20 species phenology and climate suitability mapping models. This platform, DDRP (abbrev. For "Degree-Days, Risk, and Pest event maps"), is under active development and is expected to become the next-generation modeling platform for IPM as well and plant biosecurity needs. Finally, we recently released our first app for Android and Apple operating systems, a decision-support tool for Boxwood blight, which serves as a model for the development of apps to address other pest problems.

Outputs: In addition to the more than 130 models described above, since 2014 we have published three peer-reviewed journal articles (Burrows et al. 2016, Grevstad and Coop, 2015 Pfender et al. 2015), six Extension bulletins (Andrews et al. 2017; Coop et al. 2018; Dreves et al. 2014, 2015, 2016, 2017), three trade/industry articles (Andrews et al. 2016, 2015; Coop 2014) and seven conference proceedings (Andrews et al. 2017, 2015; Batuman et al. 2015; Coop et al. 2016; Dreves et al 2015; Kaiser et al. 2014; Meland et al 2017), and have organized two workshops (Appendix D).

Program 2: IPM Engagement and Implementation

The IPM Engagement and Implementation program led by Katie Murray seeks to build participatory processes that engage and connect farmers and farming groups with other key agents in the system including researchers, extension agents, government regulators and natural resource agencies, to create a more efficient and adaptive system. This program

develops and strengthens local and regional agriculture by ensuring that critical needs are rapidly identified, and that targeted knowledge, education, technological, and other support mechanisms are delivered.

Murray's leadership of this program also includes the statewide IPM Coordinator position funded at 0.25 FTE, which provides statewide leadership and direction for the development and implementation of integrated solutions to pest problems encountered in agricultural and urban environments. The coordinator supports the development of interdisciplinary IPM research, extension, and teaching programs across university departments, among public agencies, and between the public and private sectors.

The Statewide IPM Coordinator also serves as the Chair of the State IPM Coordinating Committee, a committee mandated by Oregon House Bill 3364. This committee includes representatives from Oregon's state natural resources agencies, and is tasked with:

- Promoting information exchange among state agencies regarding IPM methods and approaches, best practices, and program successes and challenges
- Providing opportunities for education and training for agency personnel that advance IPM and support pest management innovation.
- Supporting agency development of adaptive management approaches to IPM
- Achieving improved IPM adoption and reduced risk to humans and environment through collaborative tracking & monitoring of agency status, and collective response to challenges.

IPM Coordination is implemented through three main funded projects within this program, described below:

1) Integrated Pest Management Strategic Planning
2) Crop Pest Losses Impact Assessment
3) Northwest IPM Network Coordination

Project 1: Integrated Pest Management Strategic Planning (IPMSP)

The IPMSP is a model for stakeholder assessment and priority setting that has become a central aspect of Oregon's statewide IPM program. The project is supported by several competitive grants (Appendix B, grant numbers 39, 46, 49, 50, and 54). The project builds and tests a theoretical model for the complex social-ecological network that encompasses the local, regional and national context for IPM. This project builds on our former Pest Management Strategic Planning (PMSP) project (grants 14, 15, and 29) to create a more IPM-focused process, to better target IPM critical needs, and to develop greater agricultural network connectivity and responsiveness within Oregon and the Pacific Northwest. The process aims to build resiliency with a refined focus on decision-support and risk-management.

The IPMSP process formally documents the current practices and critical pest management needs of Pacific Northwest farmers, and builds pathways for sharing and meeting these critical needs through collaboratively-developed solutions. The program fosters consensus among industry stakeholders, including farmers, researchers, extension faculty, and regulators, and a regular revision cycle provides a mechanism for monitoring status and trends in IPM. Currently, eight Pacific Northwest industries are engaged in the program: onion, cranberry, sweet cherry, hazelnut, potato, grass seed, mint, and pear, with several other interested industries pending additional FTE and resources. The currently engaged industries represent eight of Oregon's 20 top agricultural commodities.

Outcomes and Impacts. Through the IPMSP process, a formal mode of communication is developed and maintained between farmers and other pest managers to regulators, policymakers, researchers, and other interested constituencies. IPMSPs serve as road maps that focus time, money, and energy on critical pest management issues. IPMSPs enable research and extension faculty to obtain federal grant funds to work on pest management issues that are critical for an industry.

The US Environmental Protection Agency (EPA) and other regulatory agencies use IPMSPs to better understand current production and pest management practices when they review and evaluate the merits and needs for a new pesticide registration or re-registration. IPMSPs support industries, especially minor crops, in obtaining or retaining conventional, biological, and organic pesticide registrations, all of which are needed to manage pests and produce high quality crops that enter the food chain, and help growers to remain economically viable.

Outputs: Since 2016, this project has produced IPM Strategic plans for four major industries (Murray *et al* 2017 *a* and *b*, Murray and Jepson 2018 *a* and *b*).

Project 2: Crop Pest Losses Impact Assessment

The Crop Pest Losses Impact Assessment process was developed by colleagues at the Arizona Pest Management Center, and is a Signature Program of the USDA Western IPM Center. In collaboration with colleagues at both centers, this project adapts this process for use with Pacific Northwest commodities, beginning with an initial eight including potato, onion, cranberry, hazelnut, sweet cherry, grass seed, mint, and pear. This project dovetails with the Integrated Pest Management Strategic Planning (IPMSP) project and takes place on a 2-3 year cycle with participating industries. The project is supported by several competitive grants (Appendix B, grant numbers 39, 46, 49, 50, and 54).

The assessment is comprehensive, and aims to develop and track data on the impacts of specific pests and management practices on crop yields, production costs, and profitability. The data are gathered in a workshop format based on self-reporting from growers and consultants. Data on pest occurrence, pesticide use, costs, and crop yield and quality losses caused by pests are collected through the process, which provide objective tools for assessing needs and

impacts. This process enables tracking of pest impact status and trends over time, and informs industry-wide discussions about IPM needs, while also providing critical data for comments to USDA/EPA as the need for these arises.

Outputs: An adaptable survey model has now been developed and implemented with five commodity groups, and is applicable for use with other Pacific Northwest commodities as well as adoption in other regions. Quantitative data on pesticide usage and pest impacts to yield and quality has been gathered through five workshops (Appendix D), including 62 participants from the hazelnut, cherry, cranberry, potato, and onion industries and accounting for a significant percentage ($\geq$ 20% of the acreage for each commodity). Detailed analysis of data is currently being performed, but Appendix E contains examples of basic summaries.

Project 3: Northwest IPM Network Coordination

When federal agencies consider changes to pesticide registrations, they issue a "Request for Information" or open a formal comment period to gather on-the-ground feedback from various stakeholders—growers, commodity groups, research/extension professionals, and others with relevant expertise. On behalf of the Western IPM Center (Appendix B, grants 11, 25, 35, 43, 48, and 53), data and information are gathered from a network of expert sources for issues impacting the Northwest (including Alaska, Washington, Oregon, Idaho, Colorado, Wyoming, and Montana). These comments address pollinator and natural enemy impacts, IPM compatibility issues, and water quality and human health considerations.

Outreach on this project has been conducted across the Northwest network, which keeps a wide range of industry groups informed regarding important regulatory reviews and proposed decisions, and increases stakeholder involvement in the regulatory process. Pesticide usage information, along with expert feedback on various products, alternatives, risks, and mitigations has been regularly communicated to USDA/EPA representing a number of Pacific Northwest industries.

Outputs. Comments have been submitted for the active ingredients acephate, acetamiprid, aldicarb, carbaryl, chlorpyrifos, copper products, cymoxanil, diazinon, ethoprop, synthetic pyrethroids, malathion, neonicotiniod insecticides, oxamyl, pyriproxifen, simazine, spinetoram, spinosyns, sulfoxaflor, and 22 sulfonylurea herbicides. Submitted comments can be searched by chemical, date, or state, using the comment database maintained by the Western IPM Center. Previously submitted comments have been cited in EPA response documents as relevant and helpful to their decision-making process. This information also supports the IPMSP project in understanding usage and critical needs related to specific pesticides.

Program 3: Pesticide Risk Reduction

Paul Jepson leads three projects under IPPC's Pesticide Risk Reduction Program (PRRP) with co-leadership from Murray. The program is needs-based, built from a foundation of consultation, and it includes social scientists working in partnership with stakeholders and agriculture specialists. Internationally, Jepson has worked with FAO and the Rotterdam Convention Secretariat, as well as with the pesticide industry, and led high-level panels and work groups. This work in pesticide risk reduction is designed to reside within the IPM strategic planning framework developed and led by Murray. Jepson has narrowed his programmatic focus to develop new research and education-led partnerships that achieve pesticide risk reduction in an IPM context at state, national and international scales.

Appendix F contains examples of combined IPM and PRM outreach products for Christmas Tree IPM, and pest management decision guide for Fall Armyworm in Kenya.

Each of these programs will either reach fruition in the next few years, at which point their findings can be incorporated with OSU IPM Extension and built upon, or a transition will take place to current OSU faculty who have an interest in pesticide risk management. We document below other areas of Paul's program that would require new resources or approaches to continue.

Project 1: Pesticide Risk Management in Africa: the Fall Armyworm Response

Paul is currently funded by a USAID contract (Appendix B, grant 52) that has been passed through the USDA Foreign Agriculture Service (FAS) to OSU. The objectives of the project are: "(1) farmers apply pest management technologies that ensure both efficacy and safety, and which are appropriate for real-world conditions at the farm level in African small-holder farms; (2) additional pest control tools are available for Fall Army Worm (FAW) and other damaging pests; (3) pesticides/biopesticides are registered and labeled based on sound risk-assessments; and (4) regional processes are strengthened to allow for regional registrations and mutual recognition of data".

His current activities address immediate needs that have emerged from consultations at five FAW management workshops in Uganda, Zimbabwe, Ethiopia (on two occasions) and Benin. The initial objectives span a 30-month time window, with activities guiding pesticide selection, risk management, and application in an IPM context, supporting for the adoption of a regional approach and scaling up access to education and training associated with the key deliverables. The three initial deliverables under the current program are:

1. **Pesticide Risk Communication train-the-trainer manual:** Preparation of an instructor manual in pesticide risk management that can be used to train trainers in a variety of educational settings in Africa. This manual will include risk profiles and pictograms for pesticides used against FAW. Most of the methodologies that we employ to calculate risks are

given in Jepson *et al* (2014), and they have been applied in over 50 countries through a partnership with the Rainforest Alliance (see pp5-58 of; https://www.rainforest-alliance.org/impact-studies/impacts-report-2018).

2. Pesticide applicator manual targeted at first time knapsack sprayer users: This manual will be targeted at extension educators, agency staff and farmer field school facilitators and will address selection, storage, handling, calibration, good application practices, clean up, and PPE. It will include cartoons and pictorial representations that convey essential information directly to farmers. If pilot training courses, which are also funded, are successful, this manual and associated media (including video content of the training program) will be distributed continent-wide.

3. An IPM decision-support guide: We will develop an initial IPM decision support guide for farmers using a participatory process in at least one country, built from an adapted version of the IPM strategic planning process used by Murray. We will establish a version of this process that may be used continent-wide in Africa, in collaboration with a cohort of African partners, development organizations and international agencies.

Jepson co-leads a UN-FAO-coordinated Technical Working Group in pesticides in Fall Armyworm management, he is a lead member of an international R4D (research for development taskforce), and he is also a member of a UN Sustainable Development Solutions Network (SDSN) group that is offering leadership in developing on-line conferencing and information sharing.

***Outputs*:** To date this project has produced five workshops (Appendix D) in four countries (Uganda, Zimbabwe, Ethiopia (twice), and Benin), three webinars, one book chapter (Jepson *et al.* 2018) and 11, country-specific pest management decision guides (Durocher-Granger, *et al*. 2018 a-k).

Continued engagement with this program is dependent upon a continued resource stream from USAID and other agencies including UN-FAO. Paul will seek other sources of funding for international IPM applications, but it is likely that direct engagement in explicitly international IPM programs may be reduced when this funding ceases.

Project 2: Western Region Pesticide Risk Reduction Professional Development

This project meets identified needs for capacity development among Extension IPM professionals from the Western US to achieve greater pesticide risk reduction throughout this region. It is funded by grants 42 & 53 (Appendix B), and through Oregon participation in WERA 1017, (Western Region IPM Coordination). Three main goals include: 1) professional development workshops for Extension IPM educators addressing methods to improve learning and outcomes regarding pesticide risks, 2) a central website for sharing information and tools on pesticide risk assessment, education, and mitigation, and 3) a science-based, user-friendly,

risk classification system for pesticide products, that can be adapted to specific assessment needs (e.g. agricultural, urban, home garden, institutional, etc.).

The project, initially funded through WSARE (Appendix B, grant 7), is a new 4-year Signature Program of the Western IPM Center. Activities include:

- Annual pesticide risk education workshops for Western Region IPM Coordinators and other extension faculty, focused on pesticide risk education and impact evaluation.
- Development of, and education around new pesticide risk classification tools that support risk-based decision-making to achieve increased use of reduced-risk products and adoption of risk mitigation practices, and diminished use of highly hazardous pesticides in the US Western region.
- Monthly conference calls targeted at capacity development in pesticide risk assessment and education for IPM practitioners including the concepts, principles, and delivery of pesticide risk assessment, communication, and education.

Outputs. This project is increasing the capacity of Western region state IPM coordinators and practitioners in pesticide risk assessment, communication, education, and mitigation, resulting in expanded skill sets for extension educators. This increased capacity will translate into documentable risk reduction in 12 Western states. This work responds directly to the needs expressed by Western region IPM coordinators. We have conducted monthly conference calls since fall of 2016, two annual workshops with approximately 20 western region participants each, and a Pesticide Risk Reduction Panel at the 2018 International IPM Symposium, Baltimore, MD, March 2018 (Appendix D).

This program will continue over the next 4 years, under Western IPM Center sponsorship, and Paul's role will transition from being program leader to that of program advisor. Katie Murray will gradually assume leadership as the most technical, toxicological elements of our work are completed, and we transition towards communication of pesticide risks and documentation of impacts. This represents a shift from a program supported through tenured faculty FTE, to a program supported by a grant and contract funded faculty member. There is an opportunity for state support for the IPM Coordinator position to be expanded to enable this high profile and important program to continue.

Project 3: IPM/PRM Marketplace Standards and Certification

Jepson has worked with the Sustainable Agriculture Network (SAN), and Rainforest Alliance (RA) to develop formal pesticide standards that protect against risks to natural enemies, humans and the environment. Market place certification standards may contribute to agricultural transformation by defining minimum requirements for sustainability within an economic framework that is set up to recognize and reward high quality production with limited health and environmental impacts. Certifying bodies seek to address many criteria of sustainability

including worker protection and rights, biodiversity protection, and good agricultural practices, but face a constant challenge of reconciling goals for production with those for protection.

We partner with leading standard-setting and certification bodies to implement IPM as a requirement for crop certification globally, focusing in particular on adoption of reduced-risk, biologically based pest management practices, and reduction in pesticide risks to human health and the environment. We also develop and provide education and training for certification auditors, and for farmers who seek crop certification. Our goals are to: (1) maximize the contribution that state-of-the-science understanding and procedures can play in the further development of standards for agricultural protection that can verifiably advance sustainability; (2) work with certification bodies to scale-up adoption of sustainable practices to encompass a significant proportion of global agricultural production; and (3) educate auditors and farmers in sustainable agricultural practices.

Activities and Outcomes. We have worked with the Food Alliance to establish a new, generic model for IPM that incorporates preventative practices, and which emphasizes biologically-based IPM, and pesticide risk management (Appendix B, grant 1). This approach builds upon the "Prevention, Avoidance, Mitigation and Suppression (PAMS)" model for IPM that was advanced in US National Roadmap for IPM (http://ipmcenters.org/Docs/IPMRoadMap.pdf). We developed Food Alliance Standard module 9 (https://foodalliance.org/crop-producers/) that addresses IPM and pesticide risk.

We also worked with Salmon Safe to employ our pesticide risk assessment tool IPMPRiME (see: Pesticide Risk Assessment and Management in West Africa) within their requirements for farmers and vineyard managers (Appendix B, grant 1 and grants in prior fiscal years). We have worked initially in the Technical Advisory Committee of the Sustainable Agriculture Network (funded by travel and subsistence support from SAN to Paul), and key partner, the Rainforest Alliance, to build IPM, pesticide risk management, and pesticide hazard elimination within their certification standard setting process (analysis conducted for initial application in Africa, by grants 2 & 3 in Appendix B) . This methodology has now been adopted and applied in more than 50 countries. IPPC has signed an MOU with the SAN to explore a unique partnership in advancing sustainable agriculture internationally.

Finally, we have joined the ISEAL IPM Coalition Partnership to advance effective IPM and pesticide risk management throughout global certifying bodies.

Outputs. We have participated in the production of seven documents related to sustainability standards and pesticide risk reduction (FAO 2016; Jepson et al. 2014; Rainforest Alliance 2017a, and b; Sustainability Agriculture Network 2017a, b, c).

Continued engagement with this program is dependent upon a resource stream from US and international sources. Paul will seek other sources of funding for international IPM applications, but direct engagement in explicitly international IPM programs may be reduced when this funding ceases. We note, importantly, that international funding to IPPC enabled it to sustain

staff positions, and employ several additional staff when the amounts of support were at their highest. This staff expertise contributed directly to IPM programs in Oregon and developed methods that are now used to benefit US producers.

Other programs:

IPPC is also home to the Western Region "Functional Agricultural Biodiversity" (FAB) Workgroup, a group that engages extension agents, farmers, industry consultants, conservation district representatives, and non-profit personnel. The work group is an incubator for collaborative projects and local networks in California, Idaho, Washington and Oregon. The FAB Workgroup seeks out farmers that are implementing conservation practices across the west, and entrains them as teachers. The group offers annual events and meetings focused on program development and education associated with agro-ecological practices for extension IPM, agency and industry personnel.

Through our USDA/Extension Implementation Program funding, IPPC also provides financial support for two other department-based IPM related programs: School IPM, and Pesticide Stewardship Partnership projects, an Interagency program which supports targeted farmer education based on pesticide use patterns detected through surface water testing programs.

4.0 Resources

Human Resources

There have been a number of staffing changes during the evaluation period as a result of retirements, personnel changes and the college realigning programs. During the 2014-15 legislative session IPPC received an additional 1.0 FTE—0.5 FTE was assigned to Len Coop for the climate- and weather-decision support program and 0.5 FTE was assigned to Mary Halblieb for educational capacity building. In 2017 the college transferred Tim Stock's School IPM program to the Department of Horticulture for better alignment with the Urban Horticulture and Turf Grass programs. At approximately the same time responsibility for the Pesticide Safety Education Program (PSEP), which provides recertification credits for licensed applicators and consultants was transferred to the National Pesticide Information Center in the Department of Environment and Molecular Toxicology. An outreach coordinator position, funded on revenues from the training courses, was transferred along with the educational program. In late 2017, Len Coop's position as a Faculty Research Associate was converted to a Professor of Practice position and Katie Murray and Mary Halblieb's positions were reclassified from Faculty Research Assistants to Professor of Practice. In May of 2018 Paul Jepson stepped down from the Director position to pursue his international research and development interests and Katie Murray was assigned the State IPM Coordinator responsibilities and allocated 0.25 FTE for that effort. Associate Dean Dan Edge was appointed Interim Director pending the outcome of this program review. In July 2018, Mary Halblieb was transferred to the Crop and Soil Science Department to work on sustainable agricultural education programs. Paul Jepson retired in

September 2018 and began working on an academic wage appointment supported by a new USAID grant. College decisions regarding future staffing options will be delayed until the outcome of this review and decisions about how to structure IPM programs in the college.

The program has changed in character, from a primary focus on tools and methods development to support IPM adoption, with a substantial education and workshop program, to one that employs a novel participatory framework to engage functional networks of OSU faculty, industry and agency personnel, consultants and farmers. This change very much followed funding priorities within USDA NIFA, and our success in the last round of USDA NIFA CPPM EIP grants (IPPC's application was among the top 6 of US funded programs with a rating of "outstanding") shows that we have been successful in this regard.

Dr. Jepson however provided a public face for IPPC and conducted workshops and specialized IPM support throughout the state, and with his retirement, there has been a loss of capacity within IPPC. This has not affected the leadership of existing grant programs because this was anticipated in our last round of grant applications, but it does leave a gap in visibility and support by IPPC for extension agents in the area of overall IPM program planning with diverse farmer audiences. Paul continues to provide support around the state in the short term, but there is a need to replace his widespread educational program delivery.

OSU employs a number of extension specialists in the constituent disciplines of IPM, but stable resources are required to meet a need for overarching IPM program planning support. We note however, that the plan to develop an annual IPM Summit (first summit planned for Dec 14th with 70 registered participants, all CAS faculty), with associated plans to network OSU faculty more effectively, could compensate for much of this loss. There will need however, to be a concomitant transition to greater state support for the IPM Coordinator, because her efforts are currently focused mainly upon external grants and contracts that are required to fund her position.

Financial Resources

IPPC operations and programs are highly dependent on grants and contracts. Approximately 68% of IPPC's funding comes from grants and designated operations (Figure 2). Since FY14, IPPC staff have acquired 54 grants and contracts totaling over $5.2 million. The majority of grants have come through the federal government (Appendix B). Federal funding has remained stable but with fewer sources over the years. The largest federal funding source is the United States Department of Agriculture, National Institute of Food and Agriculture, accounting for approximately 25% of the Center's funding. The transfer of PSEP and School IPM programs to other units in FY17 resulted in a significant reduction in designated operations starting in FY18. The remaining 32% of IPPC funding has come through the College of Agriculture Science (CAS) support via the Oregon Legislature. Although CAS support has remained stable over the last five years, it will decrease in FY19 due to faculty departures and retirements.

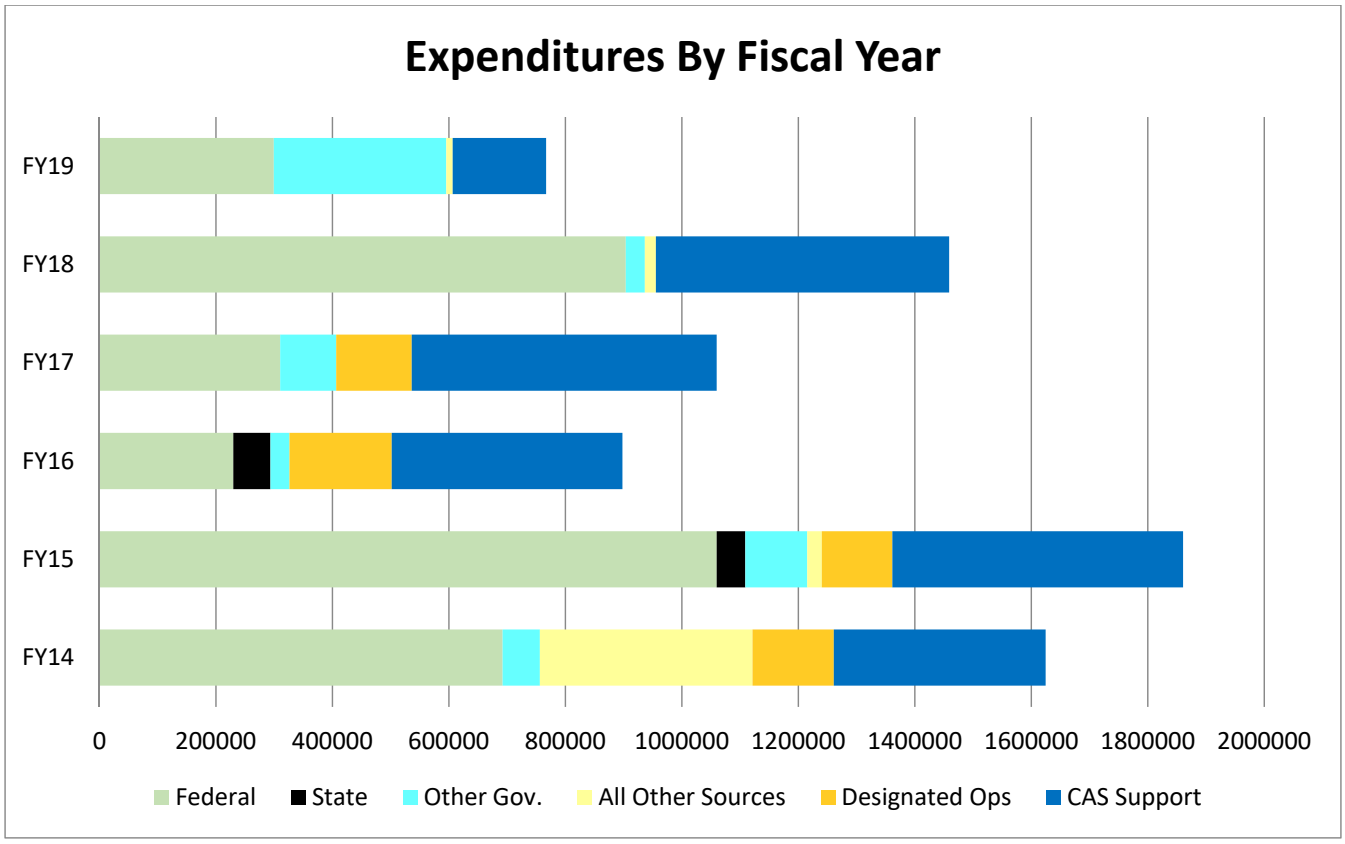

Figure 2. IPPC expenditures FY14 through FY19 by fund source.

Collaborations and Partnerships

IPPC staff collaborate broadly with numerous partners in Oregon, nationally and globally. These partners include state and federal agencies, producers, consultants, university researchers and Extension personnel. IPPC's model of engagement solicits input from mnltiple stakeholders for many of the programs. Appendix G lists collaborators for each of our core programs.

5.0 Assessment

In spring/summer of 2017 IPPC staff met to develop a SWOT analysis. The following lists of strengths, weaknesses, opportunities and threats were developed at that meeting.

Strengths

- Collective skills, knowledge, expertise, experience—including our unique methods and ability to anticipate and adopt new technologies.
- Broad and diverse connections; ability to work and engage/respond at multiple levels with multiple groups
- Proven record of success, reputation, ability to make things happen
- Great vision/passion which drives our work

Weaknesses

- Under-supported: need more funding and personnel
- Under-recognized by CAS and others; need to better communicate strengths/successes
- Overextended: need to better focus and prioritize our work
- Need more time for team-building and integration of projects
- Core methods and principles need to be adaptable and able to evolve

Opportunities

- Capacity to grow both funding and personnel; new sources of funding with themes that align with our strengths
- Ability to respond to current issues: plenty of problems to address, and we have unique set of responses that tackle issues from various perspectives
- We have an extensive network ranging from OSU to local, regional, national, and international connections, and there are plenty of opportunities to expand, deepen, and strengthen these connections.
- We have ideas and new frameworks to build on in addressing pressing issues across these scales (e.g. capacity building, pesticide risk reduction, and IPMSP/CPLIA)

Threats

- Leadership future in IPPC is uncertain and could impact our ability to move forward as we all currently envision
- Lack of resources including personnel and adequate funding (from college and outside sources) impacts our ability to meet current demand and engage in program development
- Our value and success is not well appreciated, which impacts our level of support and resources from the college and beyond, and could impact our status as a center and the potential for successful integration of staff into academic homes
- Chemical industry/advocacy groups misunderstand our work, can perceive us as a threat

Proposed Response

- Need to meet as a group to set priorities and goals,
- Create a plan as a team for communication about our work and success before any changes in leadership.
- Need to be clear about our focus areas and vision for these
- Need to each plan for expanding programs in terms of funding and personnel
- Need to continue to create opportunities for team-building and project integration

6.0 Stakeholder Input

We assessed stakeholder perceptions regarding IPPC and specific Center programs with an online survey conducted between 1 and 19 October. An email was sent to 173 stakeholders explaining the review and requesting input with a link to an online survey. Stakeholders represented producers, Extension personnel, state and federal employees in both Oregon and nationally that we have engaged over the past few years. Seventy-nine people responded to the survey with a response rate of 46%. A report containing all the responses and letters of support from grant applications can be found in Appendix H. The majority of respondents were faculty from OSU and other institutions. 75% of respondents reported interacting with IPPC from several times per year (50%) to monthly (19%) or weekly (6%). With responses scaled to remove the "not applicable" responses for each individual program, the majority of respondents reported being satisfied or very satisfied with all of IPPC's programs (Figure 3.) 39 respondents submitted comments, the majority of which were positive, noting the value of programs, the level of regional, national, and international leadership being offered, and the need for more support and integration within the College.

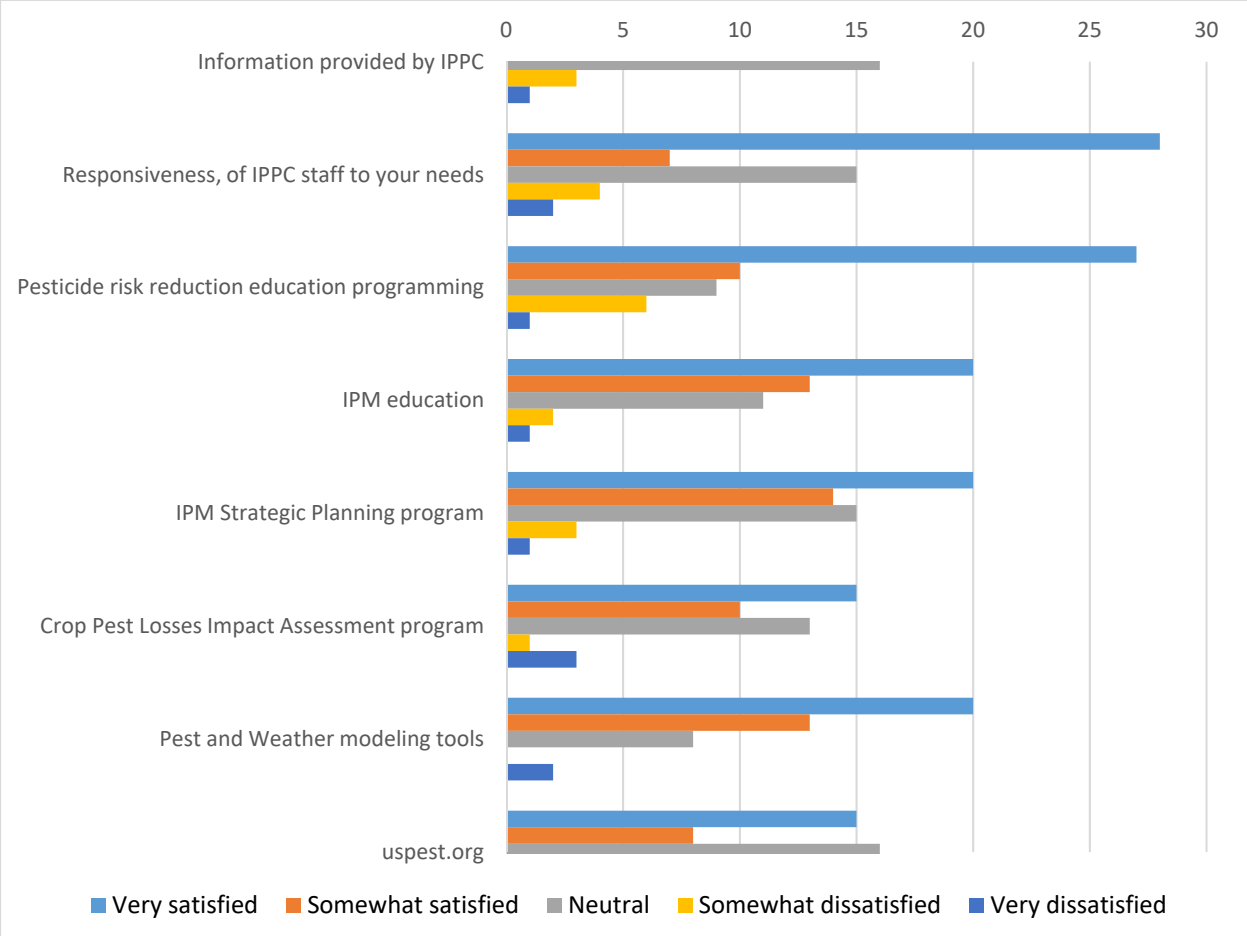

Figure 3. Stakeholder perceptions regarding specific IPPC programs. Responses have been rescaled to remove "not applicable" responses.

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8.0 Appendices

Appendix A. Curriculum Vitae of IPPC Staff

BRITTANY S. BARKER

2040 Cordley Hall, Corvallis, Oregon 97331

E-mail: brittany.barker@oregonstate.edu · Phone: (541) 737-9108

Homepage: http://brittanysbarker.org

RESEARCH INTERESTS

Population dynamics, species range shifts, biogeography, species invasions, evolution, climate change, population genetics, and conservation biology

EDUCATION

2012	**Ph.D. Biology,** University of New Mexico, Albuquerque
2003	**B.S. Zoology** (*Magna cum laude*), Oregon State University, Corvallis
2001	**A.A. Biological Sciences**, Central Oregon Community College, Bend

POSITIONS

2018−present	**Research Associate**, Integrated Plant Protection Center, Oregon State University, Corvallis
2017−2018	**Ecologist,** US Geological Survey, Forest and Rangeland Ecosystem Science Ctr., Boise, Idaho
2013−2016	**Postdoctoral Fellow,** National Institute of Health Postdoctoral Excellence in Research and Teaching (NIH PERT), Dept. of Ecology and Evolutionary Biology and Center for Insect Science, University of Arizona, Tucson
2015	**Adjunct Faculty**, General Biology for Majors II, Pima Community College, Tucson, Arizona
2013	**Adjunct Faculty**, Vertebrate Physiology, Dept. of Ecology and Evolutionary Biology, University of Arizona, Tucson
2012−2013	**Postdoctoral Research Associate**, Dept. of Ecology and Evolutionary Biology, University of Arizona, Tucson
2012	**Project Assistant**, Office for Support of Effective Teaching, Univ. of New Mexico, Albuquerque
2005−2012	**Research Assistant**, Dept. of Biology, University of New Mexico, Albuquerque
2009−2011	**Teaching Assistant**, Dept. of Biology, University of New Mexico, Albuquerque
2007−2009	**National Science Foundation (NSF) GK-12 Fellow**, Univ. of New Mexico, Albuquerque
2004−2005	**Lab Manager**, Dept. of Ecology and Evolutionary Biology, Univ. of California, Los

Angeles

TEACHING EXPERIENCE

2015 **Lecturer**, Pima Community College West Campus, Tucson, Arizona

- General Biology for Majors II (BIO 182), 1 semester

2013 **Lecturer**, Dept. of Ecology and Evolutionary Biology, University of Arizona, Tucson

- Vertebrate Physiology (ECOL 437), 1/2 semester

2012 **Active Learning Exercise Developer**, College Enrichment and Outreach Programs, Support

for Effective Teaching Office, University of New Mexico, Albuquerque

- Introductory Chemistry (CHEM 120), 2 modules
- Calculus (MATH 180), 2 modules

2009−2011 **Graduate Teaching Assistant**, Dept. of Biology, University of New Mexico, Albuquerque

- Microbiology Laboratory (BIOL 352L), 1 semester
- Microbial Ecology (BIOL 451), 1 semester
- General Vertebrate Zoology Laboratory (BIOL 386L), 2 semesters

2010−2016 **Guest Lecturer**

General Biology for Majors II (BIO 182), Pima Comm. College NW Campus, Tucson
Environmental Sciences (SC4730), ITT Technical Institute, Tucson
Herpetology (BIOL 488), Dept. of Biology, Univ. of New Mexico, Albuquerque
General Vertebrate Zoology (BIOL 386), Dept. of Biology, University of New Mexico, Albuquerque

2007−2009 **NSF GK-12 Fellow**, Belen Middle School, Belen, NM

- 7th Grade Life Science and 8th Grade Physical Science, 4 semesters

2003 **Undergraduate Teaching Intern**, Dept. of Biology, Oregon State University, Corvallis

- Principles of Biology Laboratory (BI 201L), 1 semester

FELLOWSHIPS AND GRANTS

Fellowships

2013	NIH IRACDA-PERT fellowship; University of Arizona; $150,000
2007−2009	NSF GK-12 fellowship; University of New Mexico; $60,000

Grants

2013	Youth Environmental Education mini-grant; Tucson Clean & Beautiful Inc.; $500
2011	Grove Summer Scholarship; University of New Mexico; $3,000
2010	Caughran Memorial Scholarship; University of New Mexico; $1,000
2007, 2009	Research Project and Travel grant; University of New Mexico; $2,000
2008, 2009	Grove Summer Research Scholarship; University of New Mexico; $1,750
2009	Grants in Herpetology; Society for the Study of Amphibians and Reptiles; $500
2008	Falconwood Foundation grant; The Conservation Agency; $4,100
2008	Graduate Research Development grant; University of New Mexico; $3,000
2006, 2010	Student Research Allocations Committee grant; University of New Mexico; $1,600
2007, 2011	Graduate Resource Allocation Committee grant; University of New Mexico; $1,150

HONORS AND AWARDS

2014	Graduate Women in Science Fellowship Honorable Mention
2012	Grand Prize Winner of "Faces of Biology: Teaching and Learning" Photo Contest, sponsored by the American Institute of Biological Sciences
2012	Doctoral Dissertation Defense Passed with Distinction, University of New Mexico
2008	Best Student Oral Presentation Award, Dept. of Biology Research Day, Univ. of New Mexico
2004, 2006	NSF Graduate Research Fellowship Honorable Mention

PROFESSIONAL DEVELOPMENT

2018	Bayesian Statistics for Ecologists, US Geological Survey, Boise, ID
2017	High Performance Computing in R, US Geological Survey, Denver, CO
2016	Diversity in the Classroom Workshop Series, University of Arizona, AZ
2013	Pedagogy Workshop, NIH PERT program, University of Arizona, AZ
2008	Species Distribution Modeling Workshop, American Museum of Natural History Center for Biodiversity and Conservation, Portal, AZ

MANUSCRIPTS IN REVIEW AND IN REVISION (* Undergraduate researcher)

In review	**Barker BS**, Pilliod DS, Rigge M, and Homer CG. Pre-fire vegetation drives post-fire outcomes in sagebrush ecosystems: evidence from field and remote sensing data. *Ecosphere.*
In review	Braasch JE, Barker BS, and Dlugosch KM. Effective population size variation during invasion of *Centaurea solstitialis*. *Molecular Ecology*.
In revision	**Barker BS**, Cocio JE*, Anderson, SR, Braasch JE, Cang AF, Gillette HD*, and Dlugosch KM. Potential limits to the benefits of admixture during biological invasion. *Molecular Ecology.*

PUBLICATIONS (* Undergraduate researcher)

2018 **Barker BS**, Welty J, Arkle RS, and Pilliod DS. In press. An introduction and practical guide to the use of the Soil Vegetation Inventory Method data. *Rangeland Ecology & Management.*

2017 **Barker BS** and Rodríguez-Robles JA. Origins of introduced populations of the Puerto Rican Coquí, *Eleutherodactylus antillensis,* in Saint Croix and Panamá. *Copeia.* 105(2): 220−228.

2017 **Barker BS**, Andonian K, Swope SM, Luster D, and Dlugosch KM. Population genomic analyses reveal a history of range expansion and trait evolution across the native and invaded range of yellow starthistle (*Centaurea solstitialis*). *Molecular Ecology*, 26(4):1131−1147.

2015 Dlugosch KM, Cang AF, **Barker BS**, Andonian K, Swope SM, and Rieseberg LH. Evolution of invasiveness through increased resource use in a vacant niche. *Nature Plants*, 1:15066.

***Press*:** - UA News Article: http://uanews.org/story/when-plants-become-space-invaders

2015 **Barker BS,** Rodríguez-Robles JA, and Cook JA. Climate as a driver of tropical insular diversity: comparative phylogeography of two ecologically distinctive frogs in Puerto Rico. *Ecography*, 38:769−781.

***Press*:** - *FrogLog* (Newsletter of the Declining Amphibian Survival Alliance), 123(4), 15.

2014 **Barker BS** and Ríos-Franceschi A. Population declines of Mountain Coquí (*Eleutherodactylus portoricensis*) in the Cordillera Central of Puerto Rico. *Herpetological Conservation Biology*, 9, 578−589.

***Press*:** *FrogLog* (Newsletter of the Declining Amphibian Survival Alliance), 123(2), 43.

2012 **Barker BS**, Rodríguez-Robles JA, Aran VS*, Montoya A*, Waide RB, and Cook JA. The role of sea-level fluctuations and topography in generating island diversity: phylogeography of the Puerto Rican Red-eyed Coquí, *Eleutherodactylus antillensis*. *Molecular Ecology*, 21, 6033−6052.

2011 **Barker BS**, Waide RB, and Cook JA. Deep intra-island divergence of a montane forest endemic in the Caribbean: phylogeography of the Puerto Rican frog *Eleutherodactylus portoricensis* (Anura: Eleutherodactylidae). *Journal of Biogeography*, 38, 2311−2325.

***Press*:** *FrogLog* (Newsletter of the Declining Amphibian Survival Alliance), 100, 61.

2011 **Barker BS** and Sawyer YE. *Aspidoscelis tessalatus* (Common Checkered Whiptail) and *Salvadora hexalepis deserticola* (Big Bend Patch-nosed Snake). *Herp. Review*, 42, 304.

2010 **Barker BS**, Phillips PC, and Arnold SJ. A test of the conjecture that G-matrices are more stable than B-matrices. *Evolution*, 64, 2601−2613.

2009 **Barker BS**, Henderson RW, and Powell R. Geographic distribution. *Epicrates monensis granti*. *Herpetological Review*, 40, 455−456.

POSTERS AND ORAL PRESENTATIONS (LAST EIGHT YEARS)

Invited Talks

2017 Brown Bag Seminar, USGS Forest Rangeland and Ecosystem Science Center, Boise
2017 Dept. of Biological Sciences, California State Polytechnic University, Pomona
2017 Plant and Animal Genome Conference, San Diego: Population and Conservation Genomics Symposium
2016 Dept. of Biology, California State University, San Marcos
2015 Dept. of Entomology, University of Arizona
2015 Plant and Animal Genome Conference, San Diego: Ecological Genomics Symposium
2012 Dept. of Ecology and Evolutionary Biology, University of Arizona

Contributed Talks and Posters (* Undergraduate researcher)

2018 Barker BS, Homer C, Pilliod DS, Society for Range Management Conference, Sparks, NV
2018 Pilliod DS, Barker BS, Homer C, Society for Range Management Conference, Sparks, NV
2017 Barker BS, Sert O, Keller SJ, and Dlugosch KM, International Biogeography Society Conference, Tucson, AZ
2015 Barker BS, Sert O, Gomez L*, Welchert J*, and Dlugosch KM, NIH IRACDA Annual Conference, San Diego, CA
2015 Alexandre N*, Gloss A, Barker BS, Whiteman NK, Dept. of Ecology and Evolutionary Biology Undergraduate Poster Session, University of Arizona, Tucson
2015 Welchert J*, Barker BS, and Dlugosch KM, Dept. of Ecology and Evolutionary Biology Undergraduate Poster Session, University of Arizona, Tucson
2014 Barker BS and Dlugosch KM, Plant and Animal Genome Conference, San Diego, CA
2013 Barker BS, PERT Meeting Seminar, Center for Insect Science, University of Arizona
2013 Barker BS, Society for the Study of Evolution, Snowbird, UT
2013 Barker BS and Dlugosch KM, Society for the Study of Evolution, Snowbird, UT
2011 Barker BS, Rodríguez-Robles JA, Waide RB, and Cook JA, Society for the Study of Evolution, Norman, OK
2010 Barker BS, Rodríguez-Robles JA, Waide RB, and Cook JA, Society for the Study of Evolution, Portland, OR
2010 Aran VS* and Barker BS, Dept. of Biology Research Day, University of New Mexico

2010 Barker BS, Brown Bag Seminar, Dept. of Biology, University of New Mexico

2009 Montoya A* and Barker BS, Dept. of Biology Research Day, University of New Mexico

2009 Barker BS, Snider JR, and Salem AC, Ecological Society of America, Albuquerque, NM

2009 Barker BS, Rodríguez-Robles JA, Waide RB, Cook JA, and Aran VS, Ecological Society of America, Albuquerque, NM

2008 Barker BS, Rodríguez-Robles JA, Waide RB, and Cook JA, Society for the Study of Amphibians and Reptiles, Portland, OR

2008 Barker BS, Rodríguez-Robles JA, Waide RB, and Cook JA, Society for the Study of Evolution, Minneapolis, MN

MENTORING EXPERIENCE

2015 Alex Figueroa (Pima Community College undergraduate)

2015 Lizel Mendoza (Pima Community College and University of Arizona undergraduate)

2015 Nicolas Alexandre (University of Arizona undergraduate)

2014−2015 Jack Welchert (Pima Community College and University of Arizona undergraduate)

2014−2015 Lucas Gómez (Pima Community College and University of Arizona undergraduate)

2014, 2015 Honors Introductory Biology (MCB 181) Univ. of Arizona undergraduates, literature review

2013 Xing Yue Ge (University of Arizona PhD student, rotation project with Dr. Katrina Dlugosch)

2013−2014 Michael Rivera (University of Arizona undergraduate)

2013−2014 Sonya Tran (Pima Community College undergraduate)

2012−2013 Kevin Gibson (University of Arizona undergraduate)

2012−2013 Janelle Cocio (University of Arizona undergraduate)

2009−2010 Vani Aran (University of New Mexico undergraduate, Honors thesis)

2008−2009 Ashley Montoya (University of New Mexico, Undergraduate Research Opportunities fellow)

2008 Alejandro Ríos-Franceschi (University of Puerto Rico graduate student)

2007−2009 Mary Farrah (high school student)

2007, 2008 Wilfredo Falcón-Linero (University of Puerto Rico undergraduate)

2007 Tomas Figueroa (University of Puerto Rico undergraduate)

2006 José Santiago (University of Puerto Rico undergraduate)

OUTREACH AND VOLUNTEER ACTIVITIES

2015−2016 **High School Science Fair Mentor**, Sunnyside High School, Tucson, AZ

2014−2015 **Wildlife Caretaker**, Tucson Wildlife Center, Tucson, AZ

2012−2014 **Visiting Scientist**, 4th grade science class, Agua Caliente Middle School, Tucson, AZ

2011 **Panelist,** Undergraduate Research Opportunities seminar series, University of New Mexico

2010, 2011 **Visiting Scientist,** 7th grade science class, Truman Middle School, Albuquerque, NM

2010 **Volunteer**, Museum of Southwestern Biology tours, University of New Mexico

2006−2010 **Associate Advisor**, Boy Scouts of America Venturing Crew, Albuquerque, NM

2005−2011 **Volunteer**, Expanding Your Horizons program for women grades 6-12, Albuquerque, NM

INSTITUTIONAL SERVICE

2017	**Manuscript Peer Reviewer,** US Geological Survey
2015−2016	**Conference Organizer,** NIH IRACDA annual conference, University of Arizona
2013−2015	**Event Co-coordinator,** Women in Natural Sciences (WINS) group, University of Arizona
2014−2015	**Co-head of PERT meetings,** Center for Insect Science, University of Arizona
2010	**Grant Committee Co-chair,** Dept. of Biology Graduate Resource Allocation Committee grant, University of New Mexico
2009−2010	**Research Day Planning Committee Member**, Dept. of Biology, University of New Mexico
2006−2009	**Grant Proposal Reviewer,** Resource Allocation grants in the Dept. of Biology and Graduate and Professional Student Associations, University of New Mexico
2005−2007	**Representative**, Graduate and Professional Student Association, University of New Mexico

PROFESSIONAL ORGANIZATIONS AND SERVICE

Professional Memberships: Society for Range Management, American Institute of Biological Sciences, Graduate Women in Science, Society for the Study of Evolution

Invited Reviewer: *Axios*, *Biological Invasions*, *Biological Journal of the Linnean Society*, *Evolution*, *Journal of Biogeography*, *Molecular Ecology*, *Molecular Phylogenetics and Evolution*

LEONARD BRYAN COOP

CURRICULUM VITAE Revised Oct 17, 2018

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A. EDUCATION AND EMPLOYMENT INFORMATION

Education

Ph.D. Dept. Entomology, Oregon State University, 1987 Dissertation Title: *Management of Variegated Cutworm in Peppermint* Minor: Statistics

M.S. Dept. Entomology, Oregon State University, 1983 Thesis Title: *Orange Tortrix: Parasitoid Complex and Thermal Constants for Egg Hatch* Minors: Statistics and Integrated Plant Sciences

B.A. Dept. Biology, Baker University, Baldwin City, KS 66006, 1979 Minor: Chemistry

Extra-Education Trainings

CLIMEX Modeling I Training, APHIS PPQ Ft. Collins, CO, Apr 3-7, 2017

GIS/GRASS Basic and Advanced Training, Central WA Univ. Ellensburg, WA, 1992 & 1994

Numerous Courses in Computer Science (over 36 credit hours), OSU, 1983-2002

Employment history

2017 – Present Assistant Professor (Practice), Dept. Horticulture and Associate Director, Integrated Plant Protection Center, Oregon State University (begin date: 8/16/2017)

2014 – Present Associate Director, Decision Support Systems, Integrated Plant Protection Center, Oregon State University

2002 – 2017 Assistant Professor (Senior Research). Oregon State University Botany and Plant Pathology Dept. and Integrated Plant Protection Center

1987 – 2002 Research Associate, Dept. Entomology and Integrated Plant Protection Center, Oregon State University

1983 – 1987 Graduate Research Assistant, Dept. Entomology, Oregon State University

1979 – 1982 Graduate Teaching Assistant, Dept. Entomology, Oregon State University

B. TEACHING, ADVISING, AND OTHER ASSIGNMENTS

While I have been involved in training but not in teaching for the past several years, back in the late

1990s I developed a course on quantitative and computer modeling in IPM. I taught this course as a 3-week intensive workshop to graduate students in Brazil, and then again in the OSU Entomology Dept. to undergrads and graduate students. I taught several modules of the class at Entomology IPM graduate level labs for classes led by Brian Croft, Paul Jepson, and Ralph Berry. This experience is consistent with my philosophy that students greatly benefit from a hands-on learning of quantitative tools in fields such as ecology, IPM, and agronomy.

1. Instructional Summary

I. Credit Courses

Course	Title	Enrollment	Term	Year
ENT 312x	Use of computers in IPM	14	Winter	1998

II. Graduate and Undergraduate Students and Postdoctoral Trainees

Graduate Students, committee member (recent)

Students in Horticulture and related Depts., committee member (recent only)

Jessica Wong PhD 2018
Luguang Wang PhD ongoing (grad rep.) {BEE Dept.}
Riki York MS 2016 (grad rep.)
Fumi Funahashi PhD 2015 {CSS Dept.}
Dani Lightle PhD 2013

Students NOT in Horticulture and related Depts.

Numerous (ca. 48) graduate committees since 2011 (grad rep.) for Depts. Including EECS, CEOS, Forest Engineering, and Zoology.

Postdoctoral trainees

Tyson Wepprich, Post-Doctoral Scholar, BPP Dept. 2017-present [serving as Co-Advisor]
Brittany Barker, Post-Doctoral Scholar, IPPC. 2018-present [sole Advisor]

Visiting scientists hosted/trained

Tor-Einar Skog, Norwegian Institute of BioEconomy, Norway, 2016-2017

III. Other teaching and training activities

Member of Graduate Faculty of OSU since 1995.
Guest Lecturer, HORT 451. Fruit Production, on Principles of IPM, Spring Term 2017.
Guest Lecturer, ENT 420/520. Principles of Insect Ecology, Winter Term 2002.

Assistant Instructor, ENT 442. Principles of IPM: Systems Design, Winter Term 1999, 2000, 2001.
Assistant Instructor, ENT 443. Systems Pest Management Laboratory, Winter Term 1997.
Guest Lecturer, USDA - OSU/IPPC IPM Shortcourse, July 1991, 92, 93, and 94.
Guest Lecturer, Intro IPM ENT 311, 1987, IPM II ENT 443, 1984-87, 1990, 1995.
Laboratory Instructor, IPM I ENT 441 & IPM III ENT 444, 1983-84.
Guest Speaker on insects; kindergarten, third and fourth grade elementary classes, Briarwood Elementary school, 1983, 1984, 1989, 1992, 1999, 2009, 2010.
Laboratory Prep and Teaching Assistant, Baker University, 1977-79: General Biology, General Zoology, General Botany, Invertebrate Zoology.
Volunteer Assistant, OSU Entomology Museum Days (public showcase of insects from around the world) 1996, 2001

V. Non-Credit Courses and Workshops

Workshops organized or co-organized

2016. Jan. Corvallis, OR. CROPTIME Scheduling Vegetable Plantings Hands-On Computer Workshop. Co-organizer and served as computer usage and modeling advisor.
2014. Aug. Corvallis, OR. Integrated Plant Protection Center – International IPM Workshop – New methods in IPM assessment and education. Co-organizer & presenter on 2 topics.
1998. Nov. Corvallis, OR. Integrated Plant Protection Center – IPM in Oregon Workshop – Use of Weather data for IPM. Co-organizer & presenter of 1 paper on online IPM decision support.
1996, Oct. Niamey, Niger. CILSS/DFPV Workshop/Conference. Served as chief trainer and presented 2 papers on millet crop loss assessment techniques.
1996, Sept. 11. Corvallis, Oregon. Co-sponsored a workshop "Interactions between the phenology of biocontrol organisms and climatic conditions" for "IPM in Oregon for the 90's and Beyond", organized by the Integrated Plant Protection Center, OSU.
1995, Nov-Dec. Jaboticabal, Brazil. Organized and conducted a 3-week graduate level workshop "Systems modeling for IPM" at Sao Paulo State University, Campus of Jaboticabal.
1995, Sept. Corvallis, Oregon. Conducted a workshop "Computer Applications in IPM" for "IPM in Oregon for the 90's and Beyond", organized by the Integrated Plant Protection Center, OSU.

VI. Collaborative Programs

Program	*Funded by*	*Participants*	*Recent Activities*	*Meetings at which I participated*
Western & Midwest Weather Workgroups	USDA NIFA IPM Centers 2004-present	Approximately yearly meetings various locations	Report on State and multi-region activities and collaborate on grant programs	Most years 2004-present; 2005 (Corvallis, OR), 2012 (Providence RI), 2013 (Austin, TX), 2016 (Tampa FL)

WERA-1017 Western IPM Coordinators Group	USDA funded yearly	State IPM Coordinators Reports, collaborate on regional and national programs	Fill in for Oregon IPM Coordinator (Paul Jepson, IPPC), present grant progress reports	2010, 2011, 2012, 2014 (Bozeman MT), 2015 (Reno NV), 2017 (Boise ID), 2018 (Portland OR)
WERA-102/WDC37 Climate Data and Analysis for Applications in Agriculture and Natural Resources	USDA funded	Yearly meetings normally attended by State Extension Climatologists	Present state climatology reports; research presentations	2010 (Monterey CA), 2011 (San Diego CA), 2012 (Monterey CA)
USDA-PPQ-CPHST modeling for CAPS (Cooperative Agricultural Pest Survey) program	USDA-PPQ	Mainly CPHST and CAPS personnel	Select target species for modeling; review status of modeling and mapping of invasive pests	2015, 2016, Apr. 2017 (Ft. Collins, CO)
USDA NPDN (National Plant Diagnostic Network)	USDA	Plant disease diagnosticians and epidemiologists; database specialists	Established National Database of plant disease, insect, and other invasive organism diagnostics	Numerous 2004-2013
USDA SARE CROPTIME	USDA-SARE	CROPTIME vegetable planting and harvest scheduling	Grant-funded project led by Nick Andrews, OSU Extension	Numerous 2012-2016

C. SCHOLARSHIP AND CREATIVE ACTIVITY

1. Publications

A) Peer-reviewed

Summary of peer-reviewed papers

Time frame	*Refereed papers*	*Book chapters*	*Extension publications*	*Proceedings (incl. posters)*	*Other peer-reviewed materials*

Since last promotion	9	1	3	26	2
Prior to last promotion	19	1	4	21	0
Total	**28**	**2**	**7**	**47**	**2**

I. Refereed publications

28. Burrows, M, Thomas, C., McRoberts, N, Bostock, R. Coop, L., Stack, J. 2016. Coordination of diagnostic efforts in the Great Plains: wheat virus survey and modelling of disease onset. Plant Disease, 100:1037-1045.

27. Pfender, W F.., L. B. Coop, S. G. Seguin, M. E. Mellbye, G. A. Gingrich, and T. B. Silberstein. 2015. Evaluation of the ryegrass stem rust model STEMRUST_G and its implementation as a decision aid. *Phytopathology*.105:35-44. Online at: <http://www.ncbi.nlm.nih.gov/pubmed/25098496>

26. Grevstad, F. and L. Coop. 2015. The consequences of photoperiodism for species in new climates. *Ecological Applications 25:1506-1517.* Online at: <http://onlinelibrary.wiley.com/doi/10.1890/14-2071.1/pdf>

25. Pfender, W., Gent, D., Mahaffee, W., Coop, L., Fox, A. 2011. Decision aids for multiple-decision disease management as affected by weather input errors. Phytopathology. 101:644-653. Online at: <http://dx.doi.org/10.1094/PHYTO-05-10-0131 >

24. Kim, K. S., S. E. Taylor, M. L. Gleason, F. W. Nutter, Jr., L. B. Coop, W. P. Pfender, R. C. Seem, P. C. Sentelhas, T. J. Gillespie, A. D. Marta, S. Orlandini. 2010. Spatial Portability of Leaf wetness models based on Empirical Approaches. Agric. and Forest Meteor. 150:871-880. Online at: <http://naldc.nal.usda.gov/download/43300/PDF>

23. Walton, V.M., A.J. Dreves, L.B. Coop, G.V. Jones and P.A. Skinkis. 2010. Developmental parameters and seasonal phenology of Calepitrimerus vitis (Acari: Eriophyidae) in wine grapes of Western Oregon. Environmental Entomology. 39:2006-2016. Online at: <http://ee.oxfordjournals.org/content/39/6/2006.long>

22. Stone, J. K., L. B. Coop, and D. K. Manter. 2008. Predicting effects of climate change on Swiss needle cast disease severity in Pacific Northwest forests. Canadian Journal of Plant Pathology. 30:169-176. Online at: <http://sncc.forestry.oregonstate.edu/sites/default/files/Stone_etal2008CanJ.pdf>

21. Bajwa, W., L. Coop, M. Kogan. 2003. Integrated Pest Management (IPM) and Internet-Based

Information Delivery Systems. Neotropical Entomology 32:373-383. Online at: <http://scielo.br/pdf/ne/v32n3/18749.pdf>

20. Song, Y.H., L. Coop, M. Omeg, H. Riedl. 2003. Development of a phenology model for predicting western cherry fruit fly, Rhagoletis indefferens Curran (Diptera: Tephritidae), emergence in the Mid-Columbia area of the Western United States. Journal of Asia-Pacific Entomology. 6:187-192. Online at: <http://ac.els-cdn.com/S1226861508601855/1-s2.0-S1226861508601855-main.pdf?_tid=fe837b9e-7169-11e6-8364-00000aacb360&acdnat=1472861253_0fb819db7217dcb064892692628d1fcc>

19. Croft, B.A. and L.B. Coop. 1998. Heat units, release rate, prey density, and plant age effects on dispersal by *Neoseiulus fallacis* (Acari: Phytoseiidae) after inoculation into strawberry. J. Econ. Entomol. 91:94-100. Access online via: <http://jee.oxfordjournals.org/content/91/1/94>

18. Coop, L.B. and B.A. Croft. 1995. *Neoseiulus fallacis*: dispersal and biological control of *Tetranychus urticae* following minimal inoculations into a strawberry field. Exper. Appl. Acarol. 19:31-43. Access online via: <http://link.springer.com/article/10.1007/BF00051935>

17. Horton, D.R., E.C. Burts, T.M. Lewis, and L.B. Coop. 1995. Sticky trap catch of winterform and summerform pear Psylla (Homoptera: Psyllidae) over non-orchard habitats. Pan-Pacific Entomol. 71:176-189.

16. Horton, D.R., E.C. Burts, T.R. Unruh, J.L. Krysan, L.B. Coop, and B.A. Croft. 1994. Phenology of fall dispersal by winterform pear psylla (Homoptera: Psyllidae) in relation to leaf fall and weather. Canadian Entomologist 126:222-230.

15. Coop, L.B. and B.A. Croft. 1994. Economic injury levels for Sahelian grasshoppers in millet. 1. Survey of grasshoppers and millet Injury. Nuisibles - Pests - Pragas, CILSS/UCTR/PV Bamako, Mali. 2:81-100.

14. Coop, L.B., G.P. Dively, A.J. Dreves, and B. Sidibe. 1993. The adjusted length method. In. Jago, N. [ed.] Millet Crop Loss Assessment Methods. Bull. 62. Natural Resources Institute [Overseas Development Administration] Chatham, England. pp. 9-12.

13. Coop, L.B., G.P. Dively, A.J. Dreves, and N.D. Jago. 1993. Damage recognition. In. Jago, N. [ed.] Millet Crop Loss Assessment Methods. Bull. 62. Natural Resources Institute [Overseas Development Administration] Chatham, England. pp. 48-61.

12. Coop, L.B., B.A. Croft, and R. Drapek. 1993. A model of corn earworm (Lepidoptera: Noctuidae) development, damage, and crop loss in sweet corn. J. Econ. Entomol. 86:906-916.

11. Coop, L.B., B.A. Croft. 1993. Pearl millet injury by five grasshopper species (Orthoptera: Acrididae) in Mali. J. Econ. Entomol. 86:891-898.

10. Horton, D.R., E.C. Burts, T.R. Unruh, J.L. Krysan, L.B. Coop, and B.A. Croft. 1993. Interorchard changes in distribution of winterform pear psylla (Homoptera: Psyllidae) in relation to leaf fall and weather. Ann. Ent. Soc. Am. 86:599:608.

9. Coop, L.B., Drapek, R., B.A. Croft, and G. Fisher. 1992. Relationship of corn earworm (Lepidoptera: Noctuidae) pheromone catch and silking to infestation levels in Oregon processing sweet corn. J. Econ. Entomol. 85:240-245.

8. Coop, L.B., B.A. Croft. 1992. Damage rates to pearl millet by adults of five grasshopper species and Psalydolytta blister beetles in Mali. Tropical Pest Management. 38:201-205.

7. Coop, L.B., B.A. Croft, C.F. Murphy, and S.F. Miller. 1991. A decision support system for economic analysis of grasshopper treatment operations in the African Sahel. Crop Protection. 10:485-495.

6. Drapek, R, L.B. Coop, B.A. Croft and G. Fisher. 1990. Improving pheromone trap catch for corn earworm monitoring in Oregon's Willamette Valley. Southwest. Entomol. 15:63-69.

5. Coop, L.B., B.A. Croft. 1990. Diapause and life history attributes of *Phytodietus vulgaris* (Hymenoptera: Ichneumonidae), a parasitoid of *Argyrotaenia citrana* (Lepidoptera: Tortricidae). Ann. Entomol. Soc. Am. 83:1148-1151.

4. Coop, L., A. Knight and G. Fisher. 1989. Parasitism of orange tortrix on caneberry, *Rubus* spp. in western Oregon and Washington. J. Entomol. Soc. Brit. Columbia 86: 63-65.

3. Coop, L.B. 1987. Management of variegated cutworm in peppermint. PhD Thesis. Oregon State University, Dept. of Entomology. 154 pp.

2. Coop, L.B. and R. Berry. 1986. Reduction in variegated cutworm (Lepidoptera: Noctuidae) injury to peppermint by larval parasitoids. J. Econ. Entomol. 79:1244-1248.

1. Coop, L.B. 1983. Orange tortrix: parasitoid complex and thermal constants for egg hatch. MS Thesis. Oregon State University, Dept. of Entomology. 125 pp.

II. Book Chapters

2. Stone, J. K., L. B. Coop, and D. K. Manter, 2007. A spatial model for predicting Swiss needle cast severity in the Pacific Northwest. Encyclopedia of Forest Environmental Threats. Forest Encyclopedia Network. Online at: <http://www.forestencyclopedia.net/p/p25/p81>

1. Hannaway, D. B., C. Daly, L. Coop, D. Chapman and Y. Wei. 2005. GIS-based forage species adaptation mapping. pp. 319-342 in S. G. Reynolds and J. Frame (eds.) Grasslands: Developments Opportunities Perspectives. FAO and Science Pub. Inc.

III. Extension Publications

4. Coop, L., A. J. Dreves, and J. Vlach. 2018. Biological Control. Chapter in: Hollingsworth, C, Editor. 2018 Pacific Northwest Insect Management Handbook. Oregon State University Extension and Experiment Station Communications. pp. 594-599. Updated Annually. Online at: <http://insect.pnwhandbooks.org/ipm/biological-control>

3. Andrews, N., Coop, L. B., Heinrich, A. L., Myers, J. R., Noordijk, H., Peachey, R. E., Stoven, H. M., Sullivan, D. M. Two online decision tools: organic nutrient management and crop scheduling in Oregon. *Joint Small and Family Farm Production Conference and Farmer Exchange*.

2. Dreves, A. J., J. Vlach, and L. Coop. 2006-2017. Biological Control. Chapter in: Hollingsworth, C, Editor. 2017 Pacific Northwest Insect Management Handbook. Oregon State University Extension and Experiment Station Communications. pp. 589-594. Updated Annually. Online at: <http://insect.pnwhandbooks.org/ipm/biological-control>

1. Knight, A., R. LaLone, G. Fisher and L. Coop. 1988. Managing leafrollers on caneberries in Oregon. Oregon State University Ext. Circ. 1263. 8 pp.

IV. Trade/industry articles

4. Andrews, N., Noordijk, H., Coop, L. B. (2016). Croptime: Scheduling Vegetables with Degree-Day Models. *Oregon Small Farm News* (1st ed., vol. XI, pp. 11-14). Corvallis, OR: OSU Extension - Small Farms. http://smallfarms.oregonstate.edu/sites/default/files/sfnarchive_img/sfnwinter2016.pdf

3. Andrews, N., L. Coop, and H. Noordijk. 2015. Scheduling vegetables using degree-days. New crop planning, planting model from Oregon State University. Tilth Producers Quarterly 25:4:1-6. Access online via: <http://tilthproducers.org/quarterly/2015-25-4-scheduling-vegetables-using-degree-days/>

2. Coop, L. 2014. The Best/Worst Time for Pathogens. New, weather-driven risk models indicate when box blight and apple scab are more likely to spread. Growing Knowledge Article in Digger Magazine Pub. by The Ore. Assoc. of Nurseries. Oct. 2014. Online at: <http://c.ymcdn.com/sites/www.oan.org/resource/resmgr/Digger2/Digger201410OSU.pdf>

1. Coop, L. and A. J. Dreves. 2013. Predicting when spotted wing Drosophila begins activity using a degree-day model. Whatcom Ag Monthly. Vol. 2 Issue 3 pp. 2-7. Online at: <http://whatcom.wsu.edu/ag/documents/newsletters/v2i3_2013MarchWCENewsletter.pdf>

V. Proceedings articles

47. Andrews, N., Coop, L. B., Heinrich, A. L., Myers, J. R., Noordijk, H., Peachey, R. E., Stoven, H. M., Sullivan, D. M. (2017). Two Online Decision Tools: Organic Nutrient Management and Crop Scheduling in Oregon. *Sino-U.S. Agricultural Education* (pp. 8). Corvallis, OR: Oregon State

University.

46. Meland, M., O. Frøynes, L. Coop and C. Kaiser, 2017. Sweet cherry flower phenology in a mesic Nordic climate. Proceedings of the COST Cherry FA 1104 Working Group 2. Cherry phenology, modelling and climate change. *Acta Horticulturae* 1162, 19-22.

45. Coop, L. A. Fox, G. Grove, and G. Cook. 2016. Medium and Extended Range Weather and Climate Forecasts Scaled and Teested for IPM Decision Support in US States. Poster presented at NW Climate Conference, Nov. 15, 2016, Stephenson, WA. Online at: <http://uspest.org/ipm/USPEST_Climate_Forecasts_NW_CLIM_CONF_2016b.pdf >

44. Andrews, N., L. B. Coop, H. E. Noordijk, and J. R. Myers. 2015. Crop Time: Degree-day Models and an Online Decision Tool for the Vegetable Industry. HortScience Supplement. 50:S138. Not avail. Online.

43. Batuman, O., A.J. Campbell, D.E. Ullman, R.L. Gilbertson, N. McRoberts, and L. Coop. 2015. Using a degree day insect development model to guide strategic management of western flower thrips and tomato spotted wilt virus (family Bunyaviridae, genus Tospovirus) on processing tomato in the central valley of California. Acta Horticulturae 1069:309-314. Access online at: <http://pubag.nal.usda.gov/pubag/article.xhtml?id=3112304&searchText=author%3A%22R.+L.+Gilbertson%22&searchField=>

42. Dreves, A. J., L. Coop, A. Ohrn, T. Peerbolt, J. Todd. 2015. Spotted wing Drosophila: Timing early season treatments. Pacific Northwest Pest Management Conference, Portland, OR. Jan 2015. Access online at: <https://ir.library.oregonstate.edu/downloads/fx719p66z>

41. Kaiser, C., L. Coop, M. Meland. 2014. Developing a robust, predictive model for sweet cherry (Prunus avium L.) flowering, comparing eastern Oregon and mesic Nordic climates. Am. Soc. Hort. Sci. 2013 Annual Conference. Access online at: <https://www.researchgate.net/publication/267353636_Developing_a_Robust_Predictive_Model_for_Sweet_Cherry_Prunus_avium_L_Flowering_Comparing_Eastern_Oregon_and_Mesic_Nordic_Climates>

40. Coop, L. A.J. Dreves, A. Ohrn, and P. Jepson. 2013. Phenology Models from USPEST.ORG – recent developments. Poster presented at Entomological Society of America, Pacific Branch Annual Meeting, Apr. 3, 2013, Lake Tahoe, CA. Online at: < http://uspest.org/ipm/USPEST_POSTER_Lake_Tahoe_2013_PBESA_Apr_3a.pdf>

39. Thomas, C. S., A. Coggeshall, R. M. Bostock, N. McRoberts, M. Burrows, E. Luke, M. Hill, P. Poe, S. Clark, L. Coop, P. Jepson, F. Nutter, S. Dabade, M. Draper. 2012. NPDN Expands Analysis of the National Repository. Phytopathology. 102:13.

38. Coop, L. B. and J. K. Stone. 2010. Climate models for predicting distribution and severity of Swiss Needle Cast. In: D. Shaw, Ed. Swiss Needle Cast Cooperative Annual Report, 2010. College of

Forestry, Oregon State University. pp. 68-82. Online at: <http://www.fs.fed.us/wwetac/projects/PDFs/SNC_Modeling_report_Oct_2010.pdf>

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6. Coop, L.B., and B.A. Croft. 1992. Decision tools for grasshopper control. Project report. Submitted to United States Agency for International Development Africa Bureau, Washington, D.C. July 1992.

5. Coop, L.B., B.A. Croft. 1990. GHLSIM: Sahelian grasshopper/crop loss simulation. Workshop on modeling pest-crop Interactions. International Benchmark Sites Network for Agrotechnology Transfer. University of Hawaii Research Extension Series 120:30-31.

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3. Coop, L.B., B.A. Croft, C. Murphy and S. Miller. 1989. Economic analysis of African locust/grasshopper control. Part II. GHLSIM user manual. IPPC Oregon State Univ. 44 pp.

2. Coop, L.B., B.A. Croft, C. Murphy and S. Miller. 1989. Economic analysis of African locust/grasshopper control. Part III. Analysis of the 1987 grasshopper campaign in Chad. IPPC Oregon State Univ. 56 pp.

1. Fisher, G., B. Croft, L. Coop and R. Drapek. 1988. Corn earworm pest management. Proc. Oregon Hort. Soc. 79:165-171.

VI. Abstracts from conferences without published proceedings

B) Other Publications

Summary of other publications

Time frame	*Proceedings articles*	*Newsletters*	*Extension publications*	*Trade/industry articles*	*Web sites and Software*
Since last promotion	0	0	1	1	19
Prior to last promotion	2	3	4	0	22
TOTAL	**2**	**3**	**5**	**1**	**41**

i. Proceedings articles

2. Coop, L. B. 2001. Pest Management Decision Tools: Examples of web-based phenology models, GIS, and databases for IPM decision support. IPPC/USDA CSREES Western Region Pest Management Center/PNW Pest Management Coalition Agroecological Regions Workshop: The Application of

Watershed, Basin, and Ecoregion Analytical Tools to Pest Management. Integrated Plant Protection Center Web Site Publication E.10-01-1: <http://ippc2.orst.edu/slides/ecoreg1>

1. Coop, L. B., M. Kogan, W. Bajwa, 2001. Information exchange driven IPM: applied research and decision support. Final Project Report to Western Regional IPM Program - Extension. Integrated Plant Protection Center website <http://pnwpest.org/wea/Rpt_WR_IPM_01c.html>

ii. Newsletters

3. Coop, L., P. Jepson. 2003. Supplement to Oregon IPM Newsletter: On-line, Site Specific Degree-Day Predictions Using GIS and Climate Map Technologies. Oregon State University: Integrated Plant Protection Center. April, 2003 - [cited August 8th, 2003]. Available from Internet: http://oregonipm.ippc.orst.edu/On-Line%20DD.pdf

2. Drapek, R, L.B. Coop. 1990. Corn earworm report newsletter IV (1-3). OSU Extension Entomology.

1. Coop, L.B., R. Drapek. 1989. Corn earworm report newsletter III (1-4). OSU Extension Entomology.

iii. Trade/industry articles

1. Croft, B.A. and L.B. Coop. 1994. IPM of spider mites on strawberry using the biological control agent *Neoseiulus fallacis*. Northwest Small Fruit Research 2:62-63.

iv. Web sites, Apps, and Software

41. Coop, L., D. Upper, and A. Fox. 2018. Access to weather station-based data of extended forecasts using NMME and CFSv2 models for degree-day and other daily temperature forecast needs. Access index at: <http://uspest.org/wea/indextable.html#tables> [forecasts updated monthly; first online March 2016]

40. Coop, L., and D. Upper. 2018. Boxwood blight risk model app for Apple iPhones and iPads. Available at the Apple App Store [First version: online May 31, 2018]

39. Coop, L., and D. Upper. 2018. Boxwood blight risk model app for Android phones. Available at the Google Play Store [First version: online Apr. 12, 2018]

38. Coop, L. 2017. Vapor Drift Risk Model: Predicting Thermal or Vapor Drift from Temperature and Dewpoint. Integrated Plant Protection Center Web Site Publication E. 16-01-1: <http://uspest.org/risk/models > [first version online 2010]

37. Coop, L. B. 2017. US degree-day mapping calculator vII. New version and infrastructure coded in R and GRASS GIS for 48 state online degree map mapmaking. Version II.01. Oregon State University Integrated Plant Protection Center Web Site: <http://uspest.org/dd/mapper > [first version online

2017]

36. Coop, L. B., D. Upper, F. Funahashi, and J. Parke. 2016. Soil Solarization Program – for using transparent anti-condensation plastic film to manage two soil-borne plant pathogens: *Phytophthora ramorum* and *P. pini*, developed for nursery beds. Version 0.91. Oregon State University Integrated Plant Protection Center Web Site: <http://uspest.org/soil/solarize > [first version online 2016]

35. Coop, L. B., D. Upper, and N. Andrews. 2016. CROPTIME: phenology models to schedule vegetable plantings and harvests. Version 1.01. Oregon State University Integrated Plant Protection Center Web Site: <http://uspest.org/dd/model?mdt=veg > [first version online 2015]

34. Coop, L., D. Debrito, D. Upper. 2016. MyPest Page: Hourly Weather, Plant Disease Risk, and Degree-day/Phenology Models. Integrated Plant Protection Center Web Site Publication E. 16-01-1: <http://uspest.org/risk/models > [first version online 2010]

33. Coop, L. B., G. Cook. 2016. US Degree-Day/Risk/Pest Event Mapmaker (DDRP): degree-day, pest/phenology event, and climate exclusion maps. Version 0.95. Oregon State University Integrated Plant Protection Center Web Site: <http://uspest.org/dd/maps > [first version online 2015]

32. Pfender, W. F., L. B. Coop, D. Debrito. Grass Stem Rust Estimator - 2016 version. Oregon State University Integrated Plant Protection Center Web Site Publication E.16-07-1: <http://uspest.org/cgi-bin/stemrust1.pl> [first version online 2004]

31. Coop, L. B., A. Dreves, and P. Jepson. 2016 version. Western Specialty Crops ipmPIPE – Spotted Wing Drosophila Decision Tools. Pest Incidence, Phenology and Overwintering Mortality Models. <http://uspest.org/swd > [first version online 2013]

30. Coop, L. B. 2016. Online phenology degree-day models. 2016 version. Oregon State University Integrated Plant Protection Center Web Site: <http://uspest.org/cgi-bin/ddmodel.us > [first version online 2013]

29. Coop, L., D. Debrito, D. Upper. 2016. MyPest Page: Plant Disease Risk Maps for Selected Regions. Integrated Plant Protection Center Web Site Publication E. 16-07-1: <http://uspest.org/risk/grid_display > [first version online 2012]

28. Coop, L. B. 2016. U. S. degree-day mapping calculator. Version 6.0. Oregon State University Integrated Plant Protection Center Web Site Publication E.16-03-1: <http://uspest.org/cgi-bin/usmapmaker.pl > [first version online 1998]

27. Coop, L. B. 2009. Online pest and disease models homepage for Milton-Freewater, Oregon. Oregon State University Integrated Plant Protection Center Web Site: <http://uspest.org/MF > [updated

regularly to the present]

26. Coop, L. B. and J. Stone. 2008. Douglas fir: Swiss needle cast risk model – Online mapping and model visualization. A climate and terrain based model of swiss needle cast severity. <http://uspest.org/snc> [last updated 2008]

25. Coop, L. B. 2008. Daily and interactive degree-day maps for the USA. Oregon State University Integrated Plant Protection Center Web Site: <http://uspest.org/wea/indextable.html > [updated regularly to the present]

24. Coop, L. B. 2005. Web Publishing System for Pacific Northwest Weed Managment Handbook. 2005 Edition. William, R. Lead Editor. OSU Extension / Integrated Plant Protection Center Web Site Publication E.05-05-1: <http://pnwpest.org/pnw/weeds > [updated yearly 2001-2010]

23. Coop, L. B. 2004. IPM Centers - Pacific Northwest Coalition Portal website. Oregon State University Integrated Plant Protection Center Web Site: <http://pnwpest.org/pmc/index.pl > [updated 2002-2005]

22. Coop, L. B. 2002. Online pear scab and powdery mildew risk model summaries for Hood River and Medford, Oregon. Oregon State University Integrated Plant Protection Center Web Site (e.g. Hood River: <http://pnwpest.org/hr > [updated regularly to the present]

21. Coop, L. B. 2002. MINTSIM - simulation model of Variegated Cutworm injury and economic thresholds in Peppermint (Pascal). PC & Web software. Most recent version completed 2002. Released as part of IPMP 2.0 and 3.0., Online at <http://mint.ippc.orst.edu/msim.html > [nominally updated to the present]

20. Coop, L. B. 2002. IPPC Grasslinks 3.2b: Public Access GIS. Web interface to maps, databases, and Geographic Information Systems analysis. <http://ippc2.orst.edu/glinks > [updated regularly to the present]

19. Coop, L. B. 2002. Web Publishing System for Pacific Northwest Insect Managment Handbook. McGrath, D. Lead Editor, 2002-2007; Hollingsworth, C. Lead Editor, 2008-2012. OSU Extension / Integrated Plant Protection Center Web Site Publication E.02-02-1: <http://pnwpest.org/pnw/insects > [published yearly 2002-2012]

18. Berry, R. E and L. B. Coop. 2001. Integrated Pest Management on Peppermint - IPMP 3.0. Oregon State University Integrated Plant Protection Center Web Site Publication E.01-01-1: <http://mint.ippc.orst.edu > [updated to the present]

17. Coop, L. B. 2001. Web Publishing System for Pacific Northwest Weed Managment Handbook. William, R. D. Lead Editor. OSU Extension / Integrated Plant Protection Center Web Site Publication E.01-04-1: <http://pnwpest.org/pnw/weeds > [published yearly 2001-2011]

16. Coop, L. B. 2000. Downscaling algorithm and preliminary documentation for improving resolution of climate maps. IPPC web site <http://ippc2.orst.edu/dscale/ >

15. Berry, R. E, G. L. Reed and L. B. Coop. 2000. Identification and Management of Major Pest and Beneficial Insects in Potato. Oregon State University Integrated Plant Protection Center Web Site Publication E.04-00-1: <http://ippc2.orst.edu/potato >

14. Coop, L. B. 1999. Phenology Models Research and Delivery for Areawide Tree Fruit IPM. Area Wide Codling Moth Project Report - 1999. Oregon State University Integrated Plant Protection Center Web site: <http://osu.orst.edu/dept/ippc/wea/phenolrpt99.html >

13. Coop, L. B. 1999. Area Wide Codling Moth Project Program Evaluation - 1 page grower survey - 1995-1998 Area Wide Codling Moth Project Report - 1999. Oregon State University Integrated Plant Protection Center Web site: <http://ippc.orst.edu/IPMsurvey/camp/campsurvrpt99.html >

12. Coop, L. B. 1999. Online phenology models and degree-day calculator. Version 2.0. Oregon State University Integrated Plant Protection Center Web Site: <http://ippc2.orst.edu/cgi-bin/ddmodel.pl >

11. Coop, L. B. 1998. Oregon degree-day mapping calculator. Version 1.0. Oregon State University Integrated Plant Protection Center Web Site Publication E.98-00-1: <http://ippc2.orst.edu/cgi-bin/mapmaker.pl> [updated regularly to the present, now at: <http://uspest.org/cgi-bin/usmapmaker.pl >]

10. Coop, L. B. 1998. Online IPM weather data and degree-days for pest management decision making in Oregon. Oregon State University Integrated Plant Protection Center Web Site: <http://www.orst.edu/Dept/IPPC/wea> [updated regularly to the present, now at: <http://uspest.org/wea >]

9. Coop, L. B. and D. Upper. 1998. Online daily degree-day maps of Oregon. GIS/mapping and degree-day modeling system for Oregon. Oregon State University Integrated Plant Protection Center Web Site: <http://uspest.org/wea/ddmaps.html > [updated daily to the present]

8. Coop, L. B. 1998. Oregon pear growers survey (online database analysis system). Oregon State University Integrated Plant Protection Center Web Site: <http://ippc.orst.edu/IPMsurvey/cfgph/pearsurvey.cfm > [available 1998-2012; currently off-line]

7. Coop, L. B., R. Rosetta, and B. A. Croft. 1997. Release calculator and guidelines for *Neoseiulus fallacis* to control two-spotted spider mites in strawberry. Oregon State University Dept. of Entomology Web Site: <http://www.orst.edu/Dept/entomology/ipm/mcalc.html> [nominally updated, now at <http://uspest.org/ipm/mcalc.html >]

6. Coop, L. B., R. E. Berry, G. Fisher, and M. Kogan. 1997. Insect pest management in peppermint (IPMP) - online version 1.0. Oregon State University Integrated Plant Protection Center Web Site:

<http://www.orst.edu/Dept/entomology/ipm/ipmp2.html> [nominally updated; now at <http://mint.ippc.orst.edu >]

5. Coop, L. B., R. E. Berry, G. Fisher, and M. Kogan. 1995. Insect pest management in peppermint (IPMP) - version 2.0. Computer Software Publication CS195. Integrated Plant Protection Center. Oregon State University. [PC software; replaced by online version]

4. Coop, L. B., R. Drapek, B. Croft and G. Fisher. 1990. CEWSIM: Corn Earworm Damage Simulator. Simulation model and decision support software for corn earworm in sweet corn. Version 1.5 User's manual. OSU Extension Entomology. 20 pp. [PC software; no longer available]

3. Berry, R. E., L. B. Coop and J. Duvall. 1989. IPMP - Insect pest management in peppermint. Users Guide. OSU Special Pub. No. 834. [initial release of PC software]

2. Coop, L. B. 1989. GHLSIM - simulation model/database system for grasshopper/locust damage to millet (West Africa) (Pascal). [PC software Submitted to USAID/Africa Bureau]

1. Coop, L.B., Drapek, R., B.A. Croft and G. Fisher. 1989. CEWSIM: Corn Earworm Damage Simulator. Version 1.1 Users manual. OSU Extension Entomology. 20 pp. [initial release of PC software]

2. Presentations to peers

Year	*Within Region*	*National*	*International*	*Total*	*No. Invited*
2018	1	1	2	4	2
2017	2			2	1
2016	1	2		3	
2015	2	2		4	
2014	3	3	1	7	1
2013		1	1	2	1
2003-2012 (totals)	5	16	10	30	5
1990-2003 (totals)	6	10	16	32	19

75. Coop. L. 2018. Concepts of systems modeling in agroecosystems. Invited seminar/class at Oklahoma State NIMFFAB. Oct. 12, 2018. Stillwater, OK (via Zoom). Online at:

<https://uspest.org/okstate/Systems_Modeling_Oct_2018b.pdf >

74. Coop, L. 2018. Boxwood blight infection risk model – when and where to be on alert. International Congress of Plant Pathology. Invited Presentation. Boston, MA, July 31, 2018.

73. Bean, D., T. Dudley, F. Grevstad and L. Coop. 2018. How Two Generations Became Six: Evolving Photoperiod Cues and Shifting Temperature Regimes Alter the Life History and Phenology of *Diorhabda carinulata*, a Biocontrol Agent for *Tamarix* spp. Presented at the annual Riparian Restoration Conference, sponsored by the Tamarisk Coalition and the Water Center at Colorado Mesa University, Grand Junction, CO, Feb. 6, 2018.

72. Coop, L. A. Fox, and P. Jepson. 2018. Weather and Climate driven models for IPM and invasive species management. Poster presented at 9th International IPM Symposium, Mar. 21, 2018, Baltimore, MD. Online at: <http://uspest.org/ipm/P4_Weather_and_Climate_Driven_Models_for_IPM.pdf>

71. Coop. L. 2017. Systems modeling of crop and insect development for agricultural decision support. Horticulture Dept. Seminar. Oct. 24, 2017. Corvallis, OR. Online at: <https://media.oregonstate.edu/media/t/0_72jrm3vb/80127602 >

70. Bean, D., Dudley, T. Grevstad, F. and Coop, L. 2017. Rapidly evolving responses to photoperiod cues allow phenology shifts and southward range expansion in *Diorhabda carinulata*, a biocontrol agent for *Tamarix.* An invited presentation for the symposium Tamarisk: from organism to landscape 14th Biennial Conference of Science and Management for the Colorado Plateau and Southwest Region, Flagstaff, AZ, Sept. 13, 2017.

69. Grevstad, F., L. Coop, D. Bean. 2016. Incorporating photoperiodism in insect phenology models with application for the biological control of weeds on DoD lands. Presentation at Dept. Of Defense, Sept. 14, 2016. Arlington, VA.

68. Coop. L., A. Fox, C. Daly. 2016. Update on weather and climate data and models at USPEST.ORG. Presentation at Combined Weather Workgroup Meeting, Aug. 4, 2016. Tampa, FL.

67. Coop. L., A. Fox, G. Grove, A. Dreves. 2016. Extended forecasts for IPM Decision Making. NIFA-CPPM-ARDP Grant Report at WERA-1017: Western Region IPM Coordinators Meeting. July 8, 2016. Boise, ID.

66. Coop, L. and G. Cook. 2015. DDRP Mapping: Degree-day, Risk, and Pest Event Maps. Invited talk. USDA-APHIS-PPQ-CPHST. Dec. 9, 2015. Ft. Collins, CO.

65. Coop, L. 2015. Pest Phenology Model Development & Online Tools. Oregon Agric. Extension Assoc. invited presentation. Apr 28, 2015, Medford, OR.

64. Coop, L. 2015. NW Pest Prediction Models Using Weather Data. IR-4 State Commodity Liaison Meeting. Invited presentation. Apr 22, 2015, Portland, OR.

63. Coop, L. 2015. Oregon IPM Coordinators Report 2015. WERA-1017 National and Western Region IPM Coordinators meetings. Mar 23, 2015. Salt Lake City, UT.

62. Coop, L. 2014. Phenology model for the omnivorous leaftier, *Cnephasia longana*: reviving intensive research from a bygone ear. Presentation at ESA National Meeting, Portland, OR, Nov. 23, 2014.

61. Kaiser, C., Christensen, J.M., Coop, L. and Masterson, K., 2014. Collaboration and Grant Writing in County Extension. OSUEA Annual Conference, Corvallis, OR – Sept 2014. (Invited Presentation)

60. Kaiser, C., Coop, L. and Meland, M., 2014. Developing a robust, predictive model for sweet cherry (Prunus avium L.) flowering, comparing eastern Oregon and mesic Nordic climates. ASHS Annual Conference. July 22-29, 2014. Orlando, FL.

59. Kaiser, C. and Coop, L., 2014. Camp program in the Walla Walla Valley. NACAA Annual Conference, July 19-24, 2014. Mobile, AL. (Invited presentation for National Award – Search for Excellence).

58. Coop, L. 2014. Oregon IPM report. WERA-1017 Western Region IPM Coordinators meeting Western Region. July 7, 2014. Bozeman MT.

57. Coop, L. 2014. Boxwood Blight: Epidemiology and Monitoring. Developing a Predictive Model for the United States. 2014 Boxwood Summit. May 13, 2014. Beltsville, Maryland.

56. Coop, L., F. Grevstadt, and G. Cook. 2014. Pest event mapping: a new tool to aid in prediction of insect phenology. Presentation and paper presented at: Pacific Northwest insect management conference. Jan. 6, 2014, Portland, Oregon.

55. Thomas, C. Coop. L. Mahaffee, W. Pfender, W. Fox, A. Daly, C, Johnson, D. Gent, D. Gubler, W. NcRoberts, N. Hoogenboom, G. 2013. Update on the Western Weather Work Group. Presentation at North Central Weather Workgroup Meeting, Aug. 9, 2013. Austin, TX.

54. Coop, L. et al. 2013. Spotted Wing Drosophila phenology and overwintering mortality models and maps for the US. COST-Action FA 1104 Meeting – WG3 Crop Protection. Advances and prospects on monitoring and modelling of Drosophila suzukii in Europe. Wädenswil, Switzerland 26-27 March 2013

53. Campbell, A, O. Batuman, L. Chen, L.. Coop, R. Gilbertson, N. McRoberts. 2012. Development and application of a degree-day model to predict thrips growth and development of tomato spotted wilt virus in California tomato fields. Phytopathology. 09/2012. Abstract online at: <http://www.apsnet.org/meetings/Documents/2012_Meeting_Abstracts/aps12abP527.htm>

52. Coop, L., P. Jepson. 2012. Automated mesoscale pest risk forecast maps for agricultural production

and potential plant biosecurity threats. – Presentation at Midwest Weather Working Group Meeting: Setting Uniform standards for design of pest-warning systems, Aug. 3, 2012, Providence, RI.

51. Coop, L. P. Jepson, C. Thomas. 2012. Online Phenology and Infection Risk Modeling System – 2012 Update. Poster. International IPM Symposium, Mar. 28, 2012, Memphis. http://www.ipmcenters.org/ipmsymposium12/092_Coop.pdf

50. Coop, L., V.M Walton, A.J. Dreves, D.T. Dalton, P.C. Jepson. 2012. A model estimating spotted wing Drosophila overwintering mortality.71st Annual PNW Insect Management Conf. Portland, OR 01/10/12.

49. Coop, L. 2011. Spatialized Disease Risk Forecasting for IPM and Plant Biosecurity. Dept. Botany and Plant Pathology Seminar Series, Oct 17, 2011, Corvallis, OR.

48. Thomas, C., Coggeshall, A., R. Bostock, E. Luke, M. Hill, T. Creswell, C. Estep, D. Barber, L. Coop, P. Jepson, H. Beck, F. Nutter, L. Madden. 2009. NPDN Launches Epidemiology Analysis Program. Poster at: NPDN National Meeting, Miami FL, Dec. 2009.

47. Coop, L. 2009. Oregon Report presenting: Oregon IPPC & Western Weather Workgroup Activities – Nov. 2009. WERA-102 Annual Meeting: Climatic Data and Analyses for Applications in Agriculture and Natural Resources, Monterey, CA. Nov 17, 2009.

46. Coop, L., A. Fox, W. Mahaffee, D. Gent, W. Pfender, C. Daly, C. Thomas, P. Jepson. Forecast and Virtual Weather Driven Plant Disease Risk Modeling System. Poster at: APS National Annual Meeting, Portland, OR, August 2009.

45. Coop, L. 2009. Forecasting weather and climate for plant disease models: A western perspective. North Central Division APS Annual Meeting, Ames, IA, June 22, 2009. Symposium: Implications of Climate Change on Plant Pathogens.

44. Ambrosino, MD., L. Coop, P. Jepson. Enhancing Leafroller Parasitoids in Caneberries. Poster at: Sixth International IPM Symposium, Portland, OR, March 2009.

43. Coop, L., P. Jepson, G. Grove, A. Fox, C. Daly, W. Mahaffee, C. Thomas. 2008. Delivery of IPM Tools in Real Time for Decision Support – Pull. APS Pacific Division Annual Meeting, Jackson, WY, June 25, 2008. Symposium.

42. Coop, L., J. K. Stone, and A. Fox. 2007. A Spatial Model for Foliar Life Expectancy in Douglas Fir Affected by Swiss Needle Cast. Poster. APS National Meeting, Jul 29-30 2007. San Diego, CA. Phytopathology 97:S24.

41. Coop, L., C. Daly, A. Fox, D. Gent. G. Grove, D. Gubler, P. Jepson, W. Mahaffee, W. Pfender, G. Taylor. Taming Uncertainties in Multi-Scale Pest and Disease Model and Decision Support Tools for

Plant Biosecurity. Presentation. APS National Meeting, Jul 29-30, 2007. San Diego, CA.

40. Pfender, W., W. Mahaffee, L. Coop, A. Fox, C. Daly, C. Thomas, W. Gubler, G. Grove, D. Gent, J. Strand, G. Taylor, P. Jepson, R. Graw. 2007. Western Weather Systems Workgroup: A collaborative effort to improve weather information for IPM. APS National Meeting, Jul 29-30 2007. San Diego, CA. Phytopathology 97:S92

39. Pfender, W., J. Eynard, L. Coop. 2007. Sensitivity of a rust simulation model to inputs of temperature obtained at standard weather observation height vs canopy height. APS National Meeting, Jul 29-30 2007. San Diego, CA. Phytopathology 97:S92

38. Stone, J. K. and L. B. Coop. 2006. Predicting the effects of climate change on Swiss needle cast. Western International Forest Disease Work Conference. Oct 2-6, 2006. Smithers, BC.

37. Stone, J. K. and L. B. Coop. 2006. Predicting effects of climate change on Swiss needle cast disease in the Pacific Northwest. APS/CPS/MSA joint meeting, Jul 29-Aug 2, 2006, Quebec-City, QC.

36. Stone, J. K., L. B. Coop, and D. K. Manter. 2006. A spatial model for predicting effects of climate change on Swiss needle cast disease severity in the Pacific Northwest. July 18-22, 2006. Ft. Collins CO. USDA-Forest Service: Advances in Threat Assessment and its Implications for Forest and Rangeland Management.

35. Coop, L. B. 2006. Online IPM Weather Data and Degree-Days – 2006 Update. L. Coop. Poster. Apr. 6, 2006. St. Louis, MO. 5th International IPM Symposium.

34. Coop, L. and P. Jepson. 2006. Oregon State University IPPC Online Programs: IPM Decision Support Tools. Presentation. Apr. 6, 2006. St. Louis, MO. 5th International IPM Symposium.

33. Blodgett, S. W. Lanier, L. Coop and C. Ford. 2006. Montana's Integrated Pest Management Program: Developing a Museum IPM Program and a Regional Cutworm Forecast. Presentation. Apr. 5, 2006. St. Louis, MO. 5th International IPM Symposium.

32. Coop, L. 2006. Use of GIS and Weather data for online crop and pest management models. Jan 9, 2006. Corvallis, OR. OSU CSS Dept. Seminar.

31. Coop, L. 2005. Interpolation & Pest Modeling: Codling Moth Degree-Day Model. Presentation. Nov. 10, 2005. Corvallis, OR. ipmPIPE Meeting – Western Weather Systems Workgroup & CSREES.

30. Coop, L., P. Jepson, A. Fox, D. Upper. 2005. Weather networks and internet-based management tools for orchard IPM. Invited Presentation, 3rd Asia-Pacific Congress of Entomology. Oct. 2005. Jeju, S. Korea.

29. Song, Y., H. Riedl, L. Coop, M. Omeg, S. Castagnoli, and L. E. Long. 2004. Development and

validation of phenology models for predicting cherry fruit fly oviposition in the Mid-Columbia area. Poster, 44th Annual Pest Management Conf., Jan 2004, Portland Oregon.

28. Coop, L. W. Bajwa, P. Jepson. Apr. 2003. Online IPM Decision Tools In the Northwest. Indianapolis Indiana. 4th National IPM Symposium/Workshop. Poster Abstract .

27. Coop, L. P. Jepson. 2003. Online Site-Specific Degree-Day Predictions Using GIS and Climate Map Technologies". Indianapolis Indiana. 4th National IPM Symposium/Workshop. Poster Abstract.

26. Apr. 2003. Indianapolis Indiana. 4th National IPM Symposium/Workshop. Poster Abstract, "Regionalization of Cutworm Forecasts and Risk Warnings". Will Lanier, Sue Blodgett, Gregory D. Johnson, and Leonard Coop.

25. Apr. 2003. Indianapolis Indiana. 4th National IPM Symposium/Workshop. Poster Abstract, "A Multi-Region Internet-based Extension Pest Alert System". Waheed Bajwa, Leonard Coop, and Paul Jepson.

24. Mar. 2003. Wageningen, The Netherlands. Poster Presentation, "A Phenological modeling and mapping system for NW USA: monitoring networks, pest models, online GIS, and site-specific predictions using open source technologies" at European Phenological Conference: Towards an operational system for monitoring, modeling, and forecasting of phenological changes and their socio-economic impacts. 31 March - 2 April.

23. Jan. 2003. Bozeman, Montana. "Applied Phenology Models. Combining weather networks, degree-days, GIS and the web for IPM decision support". Invited seminar at Dept. Entomology, Montana State University.

22. Feb. 2002. Corvallis, Oregon. "Open Source Software and IPM Decision Tools". OSU Entomology Dept. Seminar.

21. Feb. 2002. Boise, Idaho. L. Coop. "Demonstration of PMC Portal, Pest Alerts, and Web-GIS Pest Management Decision Tools". 45 minute presentation. IPPC/USDA CSREES Western Region Pest Management Center/PNW Pest Management Coalition Meeting.

20. Oct. 2001. Corvallis, Oregon. L. Coop. "Pest Management Decision Tools: Examples of web-based phenology models, GIS, and databases for IPM decision support". 45 minute presentation. IPPC/USDA CSREES Western Region Pest Management Center/PNW Pest Management Coalition Agroecological Regions Workshop: The Application of Watershed, Basin, and Ecoregion Analytical Tools to Pest Management.

19. July 2001. Queensland, Australia. L. Coop. "A Web-Based Server System for Phenology Modeling. Combining weather networks, development and risk models, GIS and the internet for Agricultural & IPM decision". Invited seminar and workshop conducted at Queensland Gov. Natural Resources

and Mines, Brisbane, Queensland Australia.

18. June-July 2001. Victoria, Australia. L. Coop. "A Web-Based Server System for Phenology Modeling. Combining weather networks, development and risk models, GIS and the internet for Agricultural & IPM decision support". Invited seminar and workshop conducted at Agric. Research institutes in Knoxfield, Rutherglen, Tatura, and Horsham, Victoria Australia.

17. Jan. 2001. Bozeman, Montana. L. Coop. "Applied Phenology Models. Combining weather networks, degree-days, GIS and the web for IPM decision support". Invited seminar and workshop conducted at Dept. Entomology, Montana State University.

16. Aug. 2000. Iguassu Falls, Brazil. L. Coop, W. Bajwa, M. Kogan. "Online Application Server for Phenology Models and Maps". Poster presented at the XXIII International Congress of Entomology.

15. Dec. 1999. Atlanta, GA. L. Coop, W. Bajwa, and M. Kogan. "On-line phenology modeling and mapping using weather station networks, climate maps and GIS". Entomological Society of America, National Meetings.

14. Nov. 1999. Yakima, WA. Areawide Codling Moth Research Reports. Presentation entitled "Update on Online weather data and phenology models for areawide codling moth management".

13. April. 1999. Corvallis, Oregon. "Online IPM Decision Support". IPM in Oregon Conference 1999: Achievements and Future Directions.

12. Feb. 1999. Corvallis, Oregon. "Introduction to online Phenology Models". OSU Entomology Dept. Seminar.

11. Oct. 1998. Corvallis, Oregon. Areawide Codling Moth Research Reports. Presentation entitled "Online weather data and phenology models for areawide codling moth management".

10. Nov. 8, 1995. Raleigh, NC. Represented Oregon State University at the second meeting of the National IPM Network.

9. April 7-9, 1994. Dakar, Senegal. Presented a paper entitled 'Developing Economic Injury Levels for Grasshopper Pests of Millet' at the Sahel IPM Conference.

8. July 14, 1993. Medford, Oregon. International Pear Research Conference. Presented a paper entitled 'Geographic information systems and simulation in regional orchard management: pesticide resistance in Hood River Valley, Oregon'.

7. June 29, 1993. Portland, Oregon. Entomological Society of America (ESA) regional meetings. Presented a paper entitled 'Pear psylla resistance patterns and geographic information systems'.

6. Dec. 5-10, 1992. Baltimore, MD. ESA national meetings. Presented a paper entitled 'Grasshopper

damage to pearl millet in Mali, West Africa'.

5. Dec. 6-10, 1991. Reno, Nevada. ESA national meetings. Presented a poster display entitled, 'Crop Loss Assessment and Decision Tools for Grasshoppers in Sub-Saharan Africa'.

4. July 8-12, 1991, Corpus Christi, Texas. International Sorghum/Millet INTSORMIL CRSP conference. Presented two poster displays: 1. Crop loss assessment in millet. 2. Millet pest damage recognition.

3. March 16-28, 1991. Ouagadougou, Burkina Faso, West Africa. Participated in USAID sponsored colloquy, 'Millet crop loss assessment: A colloquy on the current state of knowledge'.

3a. 45 minute talk entitled 'The adjusted-length crop loss assessment method, with emphasis on USAID-funded research done in Gambia, Senegal, Mali and Chad, 1980-90'.

3b. 45 minute talk entitled 'Crop loss assessment research on millet near Mourdiah, Mali'.

3c. 25 minute talk entitled 'Analysis of grasshopper control in the Sahel: GHLSIM model'.

3d. . Poster display entitled 'Damage recognition and assessment for pests of millet'.

2. May 1990, Corvallis, Oregon. Departmental seminar entitled 'Analysis of grasshopper control in the Sahel'. Oregon State University Department of Entomology.

1. Jan. 1990. Honolulu, Hawaii. Participated in a workshop entitled 'Modeling pest-crop interactions' organized by USAID-sponsored International Benchmark Sites Network for Agrotechnology Transfer. Presented paper GHLSIM: Sahelian grasshopper/crop loss simulation.

3. Grant and contract support – current grant support:

Year(s)	PI(s)	Agency	Title	Total $	$ my program
Sept 2017 - Aug 2020	Murray, K. (PD) Jepson, P. Coop, L. Halbleib, M.	USDA/ NIFA/ CPPM/ EIP	Climate and Weather-based decision support	$900,000	$120,000
July 2017 – Aug 2019	Hong, C., A Baudoin, M. Benson, L. Coop, J. Crouch, N. Dart, et al.	USDA/ APHIS /PPQ	Enhancing boxwood blight mitigation through innovation, integration, and education	$490,000	$42,639

May 2017-Apr 2021	Grevstad, F (PD), Coop, L. (Co-PD), D. Bean	DoD SERDP	Incorporating photoperiodism in insect phenology models with application for the biological control of weeds on DoD lands	$971,374	$229,615
Aug 2018-Dec 2019	Coop, L (PD)	USDA APHIS PPQ CAPS	Development of new mapping technologies for improved risk analysis and support of field operations	$85,000 +$55,000 = $140,000	$85,000 + $55,000 = $140,000
July 2017-Dec 2018	J. Parke (PD), Nackley, L, Coop, L (Co-PDs)	USDA WR-IPM Center	Enhanced Implementation of the online soil solarization forecast model	$30,000	$8,000

Prior Grants – cumulative total awards to my program and grants for which I was PI: $6,210,639. Total since last promotion: $5,573,855.

Aug 2018-Aug 2019. USDA APHIS PPQ CAPS. Development of new mapping technologies for improved risk analysis and support of field Operations. L. Coop, J. Bowers. $85,000.

Sept 2017-Aug 2020. USDA NIFA CPPM EIP. Coop Portion Title: Climate and weather-based decision support. K Murray (PD), P Jepson, L Coop (Co-PD). $900,000 [Full Grant], $120,000 [Coop Portion].

July 2017 – Dec 2018. USDA/APHIS/PPQ. Enhancing boxwood blight mitigation through innovation, integration, and education. Hong, C., A Baudoin, M. Benson, L. Coop, J. Crouch, N. Dart, et al. $490,000 [Full Grant], $42,639 [Coop Portion]

July 2017- Dec 2018. USDA WR-IPM Center. Enhanced Implementation of the online soil solarization forecast model. J. Parke (PD), Nackley, L, Coop, L (Co-Pds). $30,000 [Full Grant], $8,000 [Coop Portion].

Aug 2016-Dec 2017. USDA APHIS PPQ CPHST. Development of new mapping technologies for improved risk analysis and support of field Operations. L. Coop, G. Cook. $89,000.

July 2016-Dec 2017. USDA WR-IPM Center. A model to predict duration of soil solarization for disinfesting nursery soils contaminated by Phytophthora spp. J. Parke (PD), Coop, L (Co-PD).$30,000 [Full Grant], $8,000 [Coop Portion].

July 2015- Dec 2017. USDA/APHIS (Farm Bill). Understanding environmental factors for boxwood blight development. Hong, C (PD)., A. Baudoin, M. Benson, L. Coop, J. Crouch, N. Dart, et al. $496,178 (2015-16) + $89,300 (2016-17) [Full Grants], $38,809 (2015-16) + $5,900 (2016-17) [Coop / OSU Portion].

Sept 2014- Aug 2018. USDA WR-IPM Center Signature Program. Climate and weather-based decision support tools. L. Coop (PD) and P. Jepson. $193,066.

Sept 2014- Dec 2017. USDA/NIFA/CPPM/ARDP. Medium and extended range weather and climate forecasts scaled and tested for improved IPM decision support in US States. Coop, L., (PD), G. Grove, A. Fox, D. Johnson, A. Dreves. $240,466 [Full Grant], $156,492 [Coop Portion].

Sept 2012-Aug 2017. USDA NIFA SCRI. Rear and release psyllids as biological control agents - An economical and feasible mid-term solution for Huanglongbing (HLB) disease of citrus.Tom Turpen (PD) H. Browning (co-PD) J. Brown (co-PD) ...Coop, L (Key Personnel). >$10M. OSU/Coop: $85,829.

Sept 2015-Aug 2016. USDA APHIS PPQ CPHST. Development of new mapping technologies for improved risk analysis and support of field Operations. G. Cook, L. Coop, $109,000.

Sept 2013-Aug 2014. USDA APHIS PPQ CPHST. Development of new mapping technologies for improved risk analysis and support of field Operations. G. Cook, L. Coop, $25,000.

Sept 2012-Aug 2015. USDA-SARE Global Food Security and Hunger/Crop Production. A Collaborative Phenology Modeling System to Enhance Crop Management on Vegetable Farms. Andrews, N. (PD), Coop, L. (Co-PD). $203,608. (Crop phenology/web development portion $74,932).

Aug 2014-Jun 2015. USDA APHIS PPQ. Understanding environmental factors for boxwood blight development. C. Hong, A. Baudoin, M. Benson, L. Coop et. al. $21,902 (subaward to L. Coop).

Apr 2013-Mar 2015. USDA-Forest Health BCIP. Incorporating Photoperiod in the Prediction of Biocontrol Agent Photoperiod in the Prediction of Biocontrol Agent Phenology and Voltinism. Grevstad, F. (P.I.), Coop, L. (Co-PI). Year 1 $44,765, Year 2 $46,000.

Aug 2010-Jul 2014. WSC-PIPE. Specialty Crops in the Western USA - Pest Information Platform for Extension and Education. Monitoring, diagnosis, forecasting and reduced risk management of invasive pests and diseases. USDA RMA Jepson, P (PD), Coop, L (Co-PD). $999,969. (Pest risk modeling and mapping portion $260,195)

Jan 2010-Jul. 2012. Sustainable grape pest management for California using weather data, models, and cultural controls. Calif. Dept. Food and Agri. SCBGP. Coop, L. (PD of subcontract); Gubler, W.D., Broome, J.C. $154,359.

Mar 2010 – Feb 2014. Automated mesoscale pest risk forecast maps for agricultural production and potential plant biosecurity threats. USDA AFRI Plant Biosecurity. Coop, L (PD), Gent, D, Mahaffee, W, Johnson, D., Gubler, W.D. $996,112.

July 2009 – June 2010. NPDN Diagnostic Data Anomalies: Geographic Visualization and Mining System USDA NPDN (Nat. Plant Diag. Network). L. Coop, P. Jepson. $53,400.

Sept 2009 – Aug 2011. IPM Disease Risk Forecasts and Virtual Weather for Western States. USDA WRIPM Specialty Grants. Coop, L.B., Jepson, P., Gent, D., Grove, G. $179,221.

April 2009 – Mar 2011. Adapting and improving swiss needle cast management tools to incorporate climate change. USDA Forest Service PNW Region – FHP Technology Development Program. Stone, J., Coop, L. $121,581.

Jan 2008 - Dec 2009. Accessing IFPnet weather data through the OSU Integrated Plant Protection Center pest and disease modeling system. Columbia Gorge Fruit Growers/ARF. L. Coop, S.

Castagnoli, L. Long. $12,000.

July 2008 – June 2009. NPDN Diagnostic Data Anomalies: Geographic Visualization and Mining System USDA NPDN (Nat. Plant Diag. Network). L. Coop, P. Jepson. $82,583.

Apr 2009 – Mar 2011. Implementing conservation biological control for caneberries. USDA PMAP. P. Jepson, L. Coop, J. Lambrinos. $270,835.

Jun 2007 – May 2008. NPDN Diagnostic Data Anomalies: Geographic Visualization and Mining System USDA NPDN (Nat. Plant Diag. Network). L. Coop, P. Jepson. $80,000.

Jan-Nov 2007. A Spatial model for predicting swiss needle cast distribution and severity. Swiss Needle Cast Cooperative. J. Stone, L. Coop. $48,532.

Jul 2006 – Jun 2007. NPDN Diagnostic Data Anomalies: Geographic Visualization and Mining System USDA NPDN (Nat. Plant Diag. Network). L. Coop, P. Jepson. $81,000.

Jan 2006-Jan 2009. Taming uncertainties in multi-scale pest and disease model and decision support tools for plant biosecurity. USDA NRI – Plant Biosecurity. L. Coop, P. Jepson, C. Daly, W. Mahaffee, G. Taylor. $645,000.

Jul 2005 – Jun 2006. NPDN Diagnostic Data Anomalies: Geographic Visualization and Mining System USDA NPDN (Nat. Plant Diag. Network). P. Jepson, L. Coop, H. Luh. $110,000.

Jun 2005 – May 2006. Assessing the contribution of biocontrol for leafrollers in caneberries ORBC (OR Raspberry and blackberry Commission/ARF): L. Coop, M. Ambrosino. $9,879.

Mar 2005 – Dec 2005. Determining the potential of biocontrol for leafrollers in caneberries. USDA WR-IPM. L Coop, P. Jepson. $59,979

Sep 2005 – Aug 2008. Enabling transition to biocontrol of leafrollers in caneberries. USDA CAR (Crops at Risk). P. Jepson, L. Coop. $477,427.

Sep 2005 – Aug 2006. Swiss Needlecast GIS modeling framework. Swiss Needle Cast Cooperative. J. Stone, L. Coop, D. Manter. $25,000.

Jul 2004 – Jun 2005. NPDN Diagnostic Data Anomalies: Geographic Visualization and Mining System USDA NPDN (Nat. Plant Diag. Network). P. Jepson, L. Coop, H. Luh. $105,000

Jun 2005. New server for pest modeling, GIS, and webserving. NPDN/WRPMC. L. Coop, P. Jepson. $5,000.

Feb 2004 - May 2004. Development of a Database of Host and Pest Taxonomies for NPDN (National Plant Diagnostic Network). L. Coop, D. Upper, P. Jepson. Subcontract with USDA/APHIS/NAPIS/NPDN/Purdue Univ. $10,000.

July 2004 - June 2006. Stem Rust Prediction and Decision Aid for Disease Management. C. Lipp, L. Coop, W. Pfender. CSREES GSCSSA. $84,908.

Aug 2003 - July 2005. Regional Internet and GIS-Based Multiple pest Forecasting and Risk Management System. L. Coop, and R. Spotts, Project Directors. USDA WR-IPM Grants Program. $98,000.

Aug 2003 - July 2005. Electronic Delivery of IPM and Decision Support Tools for Field Use. R. William, M. Engels. USDA WR-IPM Grants Program. $29,000.

========(17 grants, $636,784 total to date)

Jan - July 2003. Cutworm Risk Mapping GIS. Sub-contract to Montana State University. Provide automated data processing and mapping of cutworm risk monitoring data for 7-state western region. $5,000.

Sept 2001 - Aug 2003. IPM Web Portal System. Western Regional Pest Management Centers USDA Grants Program. Oregon Proposal FY 2002-2003 $26,000 (Objective 2. Establish a state/multi-state/territory based pest management information and communication network linking USDA and other Federal agencies with agricultural researchers and stakeholders throughout the region.) (Lead authors Jeffrey Jenkins, Paul Jepson and Marcos Kogan).

July 1999 - July 2002. Information Exchange Driven IPM: Applied Research and Decision Support. L. Coop, M. Kogan, W. Bajwa. WR-IPM USDA Grants Program. $100,000.

July 1999 - June 2001. Web-based Decision Support System for Integrated Pest Management. Online version of PNW Pest Control Handbooks. L. Coop, Principal Investigator. OSU Extension Service Innovative Projects. $10,000.

July 1999 - Jan 2002. Online Decision Support System for Integrated Pest Management on Peppermint - IPMP version 3.0. R. Berry, L. Coop. Mint Industry Research Council & Oregon Mint Commission. $19,648.

Jan 1999 - Sept 1999. Areawide management of Codling Moth. USDA areawide control project. (Co-author with M. Kogan and W. Bajwa). $20,000.

July 1998 - June 1999. Oregon Processed Vegetable Commission. Regional pest monitoring program. $9,800.

Mar 1998 - Feb 1999. Areawide Management of Codling Moth. L. Coop, M. Kogan, W. Bajwa. USDA Areawide Control Project. $15,000

Mar 1997 - Feb 1998. Areawide Management of Codling Moth. L. Coop, M. Kogan. USDA Areawide Control Project. $27,416

Jun 1996 - Jun 1998. Phenology Mapping of Tree Fruit Pests. L. Coop, M. Kogan. Western Regional IPM USDA Grants Program. $60,000.

Jun 1995 - July 1996. Phenology Mapping of Tree Fruit Pests. L. Coop, M. Kogan, B. A. Croft. Western Regional IPM USDA Grants Program. $15,910.

March 1995. Biological Control of Spider Mites with Neoseiulus fallacis. L. Coop, B. A. Croft. Strawberry Commission/CAAR. $12,000.

Feb 1995 - Jan 1996. Dispersal of Neosieulus fallacis, a Bbiological Control Agent of Spider Mites in Strawberry and Raspberry. L. Coop, B. A. Croft. Northwest Center for Small Fruits Research (USDA). $12,000.

May 1991 - Apr 1992. Decision tools for grasshopper control in the Sahel. $101,000. L. Coop, B. A. Croft. USAID/Africa Bureau. Matched by additional field research support of $25,000 by USAID/Mali.

Jan 1990 - Apr 1991. Economic analysis of grasshopper and locust control in the Sahel of Africa. L. Coop, B. A. Croft. $61,000. USAID/Africa Bureau. Matched by additional field research support of $50,000 by USDA/OICD and USAID/Mali.

June 1987 - May 1989. Management of corn earworm in processed sweet corn. L. Coop, R. Drapek, B. A. Croft. Oregon State University Agricultural Experiment Station. $30,000.

Jan 1987 - Dec 1991. Control of corn earworm in processed sweet corn. L. Coop, R. Drapek, B. A. Croft. Oregon Processed Vegetable Commission. $47,000.

D. SERVICE

1. University Service

a. Integrated Plant Protection Center

I serve as Associate Director for Decision Support Systems and participate and assist in meetings, committees, decision making, CAS Unit Head meetings, etc. I haved served as IPPC/Oregon IPM Coordinator Representative and numerous WERA-1017 Western Region IPM Coordinator meetings. I served as lead P.I. for the NIFA/WR-IPM Center funded Signature Program (2013-2018).

b. Entomology, BPP, and Horticulture Depts.

I have served in the usual ways by serving on committees, giving and participating in seminars and trainings, and providing guest lectures at courses led by others in the unit.

2. Service to the Professional Community

2a) Peer-Review of Journal Articles

2014, 2015, 2016 – Review articles for the Journals: 1) Plant Disease, 2) Phytopathology (x2), and 3) Invasion Biology

2b) Service on Grant and Awards Review Panels:

2016 – Undergraduate Entomology Scholarship Award

2013 – USDA NIFA Pest Management Alternatives Program (PMAP)

3. Service to the Public (Professionally Related)

3a. Extension Presentations

EXTENSION ACTIVITIES, PRESENTATIONS, TRAININGS, AND INTERNATIONAL (last 28 years)

Total no. since last promotion (2003): 44 (probably several more unaccounted for)

Total no. 1990-2003: 12

44. Coop, L. 2017. Weather Models and Predictive Tools for IPM. Pesticide Stewardship Conference and Recertification Course, Univ. Idaho Extension. Nov. 30, 2017. Boise, ID. 1 hr invited talk.

43. Coop, L. 2017. Web based decision tools for pest management: New and Used. Pesticide Recertification Course. Jan 24, 2017. Central Point, OR. 1 hr invited talk.

42. Coop, L. and N. Andrews. 2016. Introducing and Using CROPTIME: Forecast Options for DD Models. Hands-on computer workshop. Mar. 14, 2016. Aurora, OR.

41. Coop, L. and N. Andrews. 2016. Weather forecasting (long-term forecasts) and future capacity for the modeling system and user interface. In: Introducing and Using CROPTIME: Vegetable Crop Schedule with Degree-Days. 2.5 hr lecture and hands-on computer workshop. 2016 Small Farms Conference. Feb. 20, 2016. Corvallis, OR.

40. Coop, L. 2016. Integrated Pest Management as it Relates to Climate. Blue Mountain Horticulture Society Annual Meeting. Feb. 10, 2016. Milton Freewater, OR.

39. Coop, L., P. Jepson, and C. Landgren. 2015. Tools for sprayers and IPM innovators – with focus on aphids and midges. Oregon Christmas Tree Assoc. Meeting. Mar 6, 2015. Wilsonville, OR.

38. Coop, L. 2015. Crops and Climate – Has it been getting warmer in the Pacific Northwest and how will that affect plant/crop phenology. FRED Talk (Food and Farming Research Extension and Development). Small Farms Conference. Corvallis OR Feb. 28th 2015.

37. Andrews, N., D. Andrews, L. Coop. 2015. Croptime: Crop Phenology Models Interface Usability Tests. NWREC Aurora, OR. Jan 27, 2015.

36. Halbleib, M, C. Landgren, G. Ellen, L. Coop, G. Ahrens, T. Stone, D. Silen, others. Visioning session for IPM of Christmas Trees program. NWREC Aurora, OR. Jan 23, 2015.

35. Andrews, N., C. Bubl, L. Coop, A. Garrett, S. Kawai, J. Myers, H. Noordijk, E. Peachey, and D. Sullivan. 2015. Croptime: Vegetable degree-days. NW Horticultural Soc. Ann. Mtg. Jan 13, 2015, Canby, OR.

34. Coop, L. and A. Dreves. 2014. Using a phenology model for spotted wing Drosophila. SWD Tool

Conversations - Extension Worksop. NWREC Aurora, OR Dec 11, 2014.

33. Coop, L. 2014. Spotted Wing Drosophila: Predict Spring Activity and Generation Increase: Degree Day Model. NWREC Spotted Wing Drosophila Extension Workshop May 22, 2014. Aurora, OR.

32. Coop, L. 2014. Tree fruit decision support – phenology and plant disease risk models. Presentation at N. Willamette Tree Fruit Growers Meeting. Feb. 15, 2014. Salem, Oregon.

31. Coop, L. 2014. Weather data and weed control: degree-day models and pesticide drift forecasts. Presentation at Douglas County Weed Day 2014. Feb. 5, 2014. Roseburg, Oregon.

30. Coop, L. 2014. Using phenology models and pheromone traps. Presentation at IPPC Chemical Applicators Short Course, Jan. 7, 2014. Wilsonville, Oregon.

29. Coop, L. 2013. Degree Days, Climate and Mosquito Risks - Some Guidelines and Tools For Decision Support. Oregon Mosquito and Vector Control Association – Fall Meeting and Recertification Workshop. Oct 17, 2013, Newport Oregon.

28. Coop, L., M. Guzzy. 2012. IPPC capabilities with pest modeling and risk mitigation models – NORPAC growers meeting. Grower Meeting. Feb. 15, 2012, Salem, OR.

27. Coop, L. 2012. Update on Weather Driven Pest Models for IPM – IFPNET Cherry & Pear Growers. IFPnet Management Team Meeting. Feb. 10, 2012. The Dalles, OR.

26. Coop, L. 2012. Using Degree-day Tools to Improve Pest Management. Presentation at: Non Crop Vegetation Management Course. Jan. 25, 2012, Corvallis, OR.

25. Coop, L., S. Castagnoli. 2011. Use of virtual weather for tree fruits. Hood River, OR. Training workshop for consultants and fieldmen. Mar. 10, 2011.

24. Mahaffee, W., Coop, L., 2011. Use of virtual weather for winegrapes. Training workshop for winegrape growers. Salem, OR. Mar. 2, 2011.

23. Coop, L., 2011. Using weather driven Models and virtual data at uspest.org/wea. Training workshop - Potato Seed Growers Meeting. Missoula, MT. Feb. 18, 2011.

22. Coop, L., P. Jepson, M. Halbleib, B. Pfender 2011. Virtual Weather Stations for the Willamette Valley. Training workshop for agricultural consultants and field representatives. Chemeketa Campus Extension. Feb. 10, 2011, Salem, OR.

21. Coop, L., 2010. Using weather driven Models at uspest.org/wea. Invited talk at Montana Potato Seed Growers Meeting. Nov. 11, 2010, Bozeman, MT.

20. Ellen, G., P. Jepson, L. Coop, Mace Vauhan. 2010. Farmscaping for Predators, Parasitic Wasps, and

Native Bees in PNW Berry Systems. Farmwalk and Farmscaping Exercise for Blueberry and Caneberry Growers. Riverbend Organic Farms, LLC, July 13, 2010, Jefferson, OR.

19. Coop, L., G. Ellen, P. Jepson. 2010. Biological and landscape alternatives for leafroller management in caneberries – Fifth Annual Pre-Season Production Workshop for Caneberry Growers. Oregon Raspberry and Blackberry Commission. Mar. 3, 2010, Woodburn, OR.

18. Coop, L. & The Western Weather Workgroup. 2010. The Prospect of virtual weather for pest and disease management in winegrapes. Oregon Wine Industry Symposium. Feb 22, 2010, Eugene, OR. http://explorer.oregonwine.org/symposium/files/Sessions/Viticulture/VineyardTech/Vineyard_Tech.pdf

17. Coop, L. 2010. Virtual Weather Stations and Their Application to Pest and Disease Modeling. Blue Mountain Horticultural Society. Annual Meeting. Feb. 2, 2010, Milton Freewater, OR.

16. Coop, L., G. Ellen, P. Jepson. 2010. Biology and Ecology of Parasitoids in Raspberries – Extension talk at 55th Annual N. Willamette Horticulture Society Meeting, Organic Section, Jan. 12, 2010.

15. Coop, L., S. Castagnoli. 2009. Hood River IPM Insect and Disease Pest Modeling Website Review/Preview and Focus Group. 2-hour meeting/presentation/focus session w/selected growers and fieldmen. Dec. 11, Hood River, OR.

14. Coop, L., L. Long. 2009. The Dalles IPM Insect and Disease Pest Modeling Website Review/Preview and Focus Group. 2-hour meeting/presentation/focus session w/selected growers and fieldmen. Dec. 11, The Dalles, OR.

13. Coop, L., G. Ellen. 2009. On-going Work on Beneficials in Caneberries. Caneberry Open House – Extension Event, NWREC, July 8, 2009. Aurora, OR.

12. Coop, L. 2009. Conservation Biological Control – Supporting the Needs of Leafroller Parasitoids in Caneberries. Bugscaping Farm Walk – Extension Program, June 16th, 2009. Woodburn, OR.

11. Coop, L. 2008. Orange Tortrix: Biology and Biological Control. NW Horticultural Society Meeting, invited speaker. Jan. 17, 2008. Canby, OR.

10. Coop, L. 2008. Swiss Needle Cast Risk Model Presentation. Swiss Needle Cast Cooperative Field trip, Apr 29, 2008. Newport-Corvallis, OR.

9. Coop, L. 2006. Weather Models and Pest Management Decision Timing. Integrated Soil Nutrient and Pest Management Workshop, Nov. 8, 2006. Corvallis, OR. OSU Extension Service.

8. Coop, L. and P. Jepson. 2006. Support for grower networks by OSU IPPC – Online weather data and pest models. Sept 12, 2006. Milton-Freewater, OR. Grower meeting run by Umatilla Co. Extension.

7. Coop, L. 2006. Weather Models and Pest Management Decision Timing. Presentation. Feb 17, 2006. Redmond, OR. Presentation – Central Oregon Pest Management Course, OSU Extension.

6. Coop, L. 2006. Concepts of IPM. Redmond, OR. Feb 17, 2006. Redmond, OR. Presentation – Central Oregon Pest Management Course, OSU Extension.

5. Coop, L. 2005. Weather Models and Pest Management Decision Timing. Integrated Soil Nutrient Management Options: Practices and Tools to Protect Water Quality. Oct. 26, 2005. Vancouver, WA. iSNAP Workshop.

4. Coop, L. 2005. Web-Based Decision Support Tools for Nursery IPM. Farwest Nursery Show Seminars. Oregon Convention Center, Aug 2005. Portland, OR.

3. Coop, L. 2005. Using Degree-Day Models in Pest Management. Washington State University. 6th Annual Small Fruit Grower's Workshop, Mar. 2004. Vancouver, WA.

2. Coop, L. 2003. Dec. Lyndon, Washington. "Degree-days for Pest Management: Website Decision Making Tools" presentation at the 5th Annual Small Fruit Grower's Workshop. WSU Lyndon, WA.

1. Coop, L. 2003, Jun. Londrina, Brazil. Co-presented a workshop, "Systems IPM, Decision Support Systems and Pest Alerts", sponsored by USDA and Embrapa, Brazil.

Last Promotion Oct 2003.

12. Coop, L. 2003. Apr. Hood River, Oregon. "Web-based phenology modeling and mapping: applications for pest and disease management in tree fruits". Mid-Columbia Agric. Res. and Ext. Center Seminar.

11. Coop, L. 2003. Mar. Vancouver, WA. "Degree-Days for Pest Management: Website Decision Making Tools". Washington State University. 5th Annual Small Fruit Grower's Workshop in Vancouver WA.

10. Coop, L. 2003. Jan. Bozeman, Montana. "Applied Phenology Models. Combining weather networks, degree-days, GIS and the web for IPM decision support". IPM Crop School Workshop, Montana State University.

9. Coop, L. 2001, Sept. Corvallis, Oregon. "Web-Based Pest Management Tools". 2.5 hour OSU Extension Conference Technical Workshop with B. Simko, W. Bajwa, J. Pscheidt.

8. Coop, L. 2001, July 11. Victoria, Australia. "Virtual crop a model answer to growers' prayers" By Andrew Madden. The Weekly Times, Business Section. (Newspaper article).

7. Coop, L. M. Kogan, and W. Bajwa. 1999. Dec. Wenatchee, Washington. "Extending the principles and lessons learned outside the project and to other commodities". In: "Areawide Program for

Suppression of Codling Moth: Summary of the Effect of 5 years of Control". Washington Horticultural Association Annual Meeting.

6. Coop, L. 1999. May. The Dalles, Oregon. "Introduction to online phenology models for IPM decision support", IPM workshop with Cherry producers.

5. Coop, L. 1998. Dec. Portland, Oregon. Portland Parks/Recreation Pesticide Applicators Recertification Class, Presentation titled "IPM on the World Wide Web".

4. Coop, L. 1991. Aug-Oct. Mali, West Africa. Directed second year of project, Crop Loss Assessment and Improved Decision Tools for Grasshopper Control in the Sahel. Survey of pest and crop in eight villages, a yields and harvest crop loss assessment, and cage experiments to determine millet damage rates by five grasshoppers species. Supervised project personnel including one American Entomologist (MS), one Senegalese Entomologist (PhD), two Malian Agronomists (MS), and three Malians for language interpretation/field work. Included at least 4 Extension meetings with growers on “IPM practices for millet pests”.

1-3. 1990. June-July & Aug-Oct. Mali, West Africa. Supervision of crop loss assessment project. Sampling of grasshoppers and millet, crop loss assessment, cage experiments on effects of grasshoppers and Meloidae to millet spikes. Included at least 3 Extension meetings with growers on “IPM practices for millet pests”.

E. AWARDS

1. National and International Awards and Memberships

2013-2018 Western IPM Centers Signature Program

2012 IPM International Achievement Award, IPM Symposium Mar. 28, 2012, Memphis TN. Awarded to members of the Integrated Plant Protection Center.

2007-2015. Member American Phytopathological Society

1983-2001,2007-present. Member of Entomological Society of America.

2005-present. Member Western & Midwest Weather Systems Workgroups

2004-2014. Member National Plant Diagnostics Network

1997-2003. Member local and campus Linux computer user groups.

1998. Infoworld Top 100 Innovative Technology Achievements Award.

1995-2006. National IPM Network representative and member of Standards Committee.

1992-1995. Member Organization for Sustainable Agriculture.

1988-1992. Member of Southwestern Entomological Society.

1986. OSU Entomology graduate student travel award.

1980-81, 1984-85. Departmental representative in Graduate and Professional Student Association.

1977. Freshman chemistry award (top student in general chemistry).

1975-79. Kansas State Scholar award and scholarship.

1975-79. Baker University Honors scholarship.

SKILLS

Development of integrated pest management systems

Systems modeling of arthropod, weed, disease, and crop phenology, population dynamics and ecological interactions

Development of decision support systems (integrated delivery systems, knowledgebases, expert systems, models, databases, and GIS)

Development and maintenance of World Wide Web pages (HTML, XML, Javascript, etc.)

Geographic information systems: GRASS 5.4 & 6.4, GRASSLinks, IDRISI, ArcView

GIS database development and delivery (USGS NLCD & DEM, US Census Bureau TIGER, EPA Ecoregions, STATSGO Soils, etc.)

Development of database applications (MySQL, Perl DBI, DB_Browser)

Global Positioning Systems (GPS)

Statistical Analysis: NCSS, R

Spatial Population Modeling and Climate Suitability Mapping: GRASS GIS, R, CLIMEX

Statistics Classes Completed: Statistical Methods for Research Workers, Field Plot Techniques, Regression Analysis, Multivariate Analysis, Quantitative Ecology, Systems Ecology, Simulation Analysis (audit), Statistical Computing Survey

Programming Languages: Perl, R, C, C++, Pascal, FORTRAN, BASIC, PROLOG, UNIX shell scripts, CGI, HTML, Javascript, Coldfusion

Computer Science Classes Completed: Intro Computing (structured BASIC), Fund. Comp. Prog. (Pascal I & II), Computer Organization and Architecture, Data Structures I-III, Computer Languages (ML, Lisp, C++, Smalltalk, Prolog), Expert Systems for Agriculture (Prolog), C/Unix (audit), Unix Systems Administration (audit), Networking (audit)

Computer Operating Systems/Applications: UNIX, LINUX & PC systems administration, internet, Macintosh, Windows, spreadsheet, database, word processing, graphics (Photoshop/GIMP), multimedia, Google Maps API, GRASS GIS, GRASSLinks webGIS, Idrisi GIS, ArcView GIS, open source software tools in general.

Collaborative: teaching, personnel management, project management, grant writing and submission

LANGUAGE PROFICIENCY

English (native)
French (2 years University level): written, verbal - some.
German (3 years High School, 2 years University level): written, verbal - some.

Kathy DeBellis

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katdebellis@gmail.com

Qualification Summary

- As Center Administrator/Assistant Director of Integrated Plant Protection Center (IPPC) at Oregon State University serve as liaison between Director, faculty, OSU community, local, state, federal and international arenas.
- Responsible for administration and coordination of business operations, personnel and development of policies and management practices for IPPC.
- Over ten years of supervisory experience, working with sensitive and confidential information.
- Experience working in a fast paced elementary school. Responsible for staff and volunteer supervision/training, monthly & quarterly reports and budgeting. Managed all operations and ensured compliance with Department of Early Learning and State of Washington.
- Organized numerous community, statewide, and local events in Washington and Oregon.
- Directed, trained, recruited Volunteers for Peace Corps and other organizations.
- Technical Skills: proficient in MS Word, Excel, Publisher, PowerPoint, InDesign, OSU's Banner, GRRS, CORE, Oscar, Cayuse, Outlook, TouchNet/Marketplace and PeopleAdmin.

Experience Highlights

Administration and Supervision

- Manage departmental budgets and expenses for IPPC.
- Manage office personnel policies and oversee day to day business operations for IPPC.
- Administer the full range of supervisory duties at IPPC.
- Develop and facilitate monthly IPPC faculty/staff meetings.
- Chair of Core Leadership committee in developing programs and policies for IPPC.
- Peace Corps Administration, delegate manager for regional office. Trained employees and Peace Corps Volunteers. Supervisor for Peace Corps Representatives at various college campuses.
- Co-Chair Parent for Senior Committee at Columbia River H.S. Responsible for fundraising, transportation, parent volunteers, design all materials, and security coordination.

Coordination, Program Development, and Compliance

- Coordinate business operations and management practices for IPPC that is consistent with OSU's goals and mission.
- Recruited speakers and coordinated the PSEP program for IPPC.
- Established a seaweed farm and created an aquaculture program in the

Western Pacific Basin which provided needed revenue for Micronesia.
- Assisted Micronesian Mayor and Town Councilmen in team building, program development, budgeting, and panning community projects.

Communication and Teaching
- Organized and implemented very successful large Pesticide Safety & Education Program (PSEP) courses throughout the state of Oregon for IPPC.
- Public speaking at colleges, community events, and TV news shows including "Good Morning America".
- Developed and led several education programs for 170 students in grades kindergarten through twelfth and trained teachers in Micronesia.

Employment History

Center Administrator/Assistant Director;
Oregon State University, Corvallis, OR

Administrative Program Specialist for IPPC
Oregon State University, Corvallis, OR

Office Manager/Administrator;
Skinner Elementary Montessori School, Vancouver, WA

Coordinator/Academic Year in America;
Arizona Metropolitan Area

Medical Service Coordinator;
Evergreen Hospital/ Evergreen Care Network, Kirkland, WA

Computer Consultant/Teaching Assistant;
School of Social Work, University of Washington, Seattle, WA

Peace Corps Representative;
Jackson School of International Studies, University of Washington, Seattle, WA

Peace Corps Administration;
Northwest Regional Office, Seattle, WA

Community Development Advisor, Teacher and Teacher Trainer –Peace Corps;
Ponape, Micronesia

Teacher and Coach;
Parrish Middle School & North Salem High School, Salem, Oregon

Education

- Master of Social Work-Administration, University of Washington, Seattle, WA (Emphasis in organizational and program development.)
- Bachelor of Science, Education, Oregon State University, Corvallis, OR

Award

"Peace Corps Volunteer of the Year" awarded by President Ronald Reagan in Rose Garden Ceremony at the White House.

Leadership and Service Involvement- OSU

Board Member OSU TRIAD Club
Search Advocate
Committee Member -Student Recognition and Awards Committee of the Faculty Senate

Detailed career summary

Paul Charles Jepson

Integrated Plant Protection Center,
2040 Cordley Hall, Oregon State University, Corvallis, Oregon 97331-2915
tel: 1 (541) 737-9082, E-mail: *jepsonp@science.oregonstate.edu*

Career and achievements to date

Co-Director, USDA Western IPM Center	October 2012-present
Director, Integrated Plant Protection Center (IPPC) & State IPM Coordinator for Oregon, OSU	July 2002-May 2018
Director, USDA Western Specialty Crop PIPE (*Pest Information Platform for Extension and Education*)	October 2010-2012
Professor, Department of Environmental and Molecular Toxicology	Jan 2003-present
Member, graduate faculties of Environmental and Molecular Toxicology, Entomology, Environmental Sciences & Marine Resources Management	1995-present
Associate Director, Integrated Plant Protection Center, OSU	Nov 2000-June 2002
Professor and Head, Department of Entomology, Oregon State University, USA	Aug 1995–Nov 2000
Adjunct, Department of Environmental and Molecular Toxicology, OSU	Dec 1997-Dec 2002
Senior Lecturer, Southampton University, UK	Sept 1992-Aug 1995
Courtesy Professor, Oregon State University, USA	April 1992-July 1995
Director, Agrochemical Evaluation Unit, Southampton University	Oct 1984-Aug 1995
Lecturer, Southampton University, UK	Sept 1983-Sept, 1992

Previous appointments

Agriculture and Food Research Council, post-doctoral research fellow, Cambridge University, UK Department of Applied Biology and member Queens' College	Jan, 1982-Sept, 1983
Junior Research Fellow, Sugar Beet Research and Education Committee, Cambridge University, UK Department of Applied Biology and member Queens' College	Jan, 1980-Dec, 1981

Education

Ph.D. in Insect Ecology Natural Environment Research Council, Co-operative Award in Science and Engineering (CASE) studentship	Cambridge University, UK, Department of Applied Biology, member Queens' College; CASE Institution, Broom's Barn Experimental Station	1977 - 1980
B.Sc. (Hons.), Associate of the Royal College of Science (ARCS,) Zoology and Applied Entomology	Imperial College London University, UK	1973 - 1976

Awards and Distinctions

2014 Oregon State University International Service Award

2012 International IPM Award of Recognition for the Integrated Plant Protection Center, 7th International IPM Symposium, Memphis, USA.

2010 Thank You Award (with Mary Halblieb, IPPC), Marion County Soil and Water Conservation District, for IPM education in the Pudding watershed

2009 International IPM Excellence Award (co-recipient with other PI's associated with the USAID IPM CRSP)

2008 James and Mildred Oldfield/E.R. Jackman Team Award for Oregon Potato Project 'OSpud' (with Mario Ambrosino, Nick Andrews, Gwendolyn Ellen, John McQueen, Alvin Mosley, Lane Selman, Alex Stone, Dan Sullivan, Isabel Vales & Solomon Yilma).

Other distinctions (referred to in more detail in CV):

- 96 invited presentations including:
    - *Invitations to speak at prestigious <u>international</u> conferences*: N8 Agrifood, Durham (UK, 2017); Ecological Society of America (USA, 2015); PURE IPM Congress (Poland, 2015); Royal Society (UK, 2012); Nordic Association of Agricultural Scientists (Estonia, 2012); ERGO (the Netherlands, 2012); International Union of Pure and Applied Chemistry World Congress (Australia, 2010; Japan, 2005); International IPM Symposium (USA, 2009, 2012); SETAC Europe (Poland, 2008; Austria, 2002); International Plant Protection Convention (Scotland, 2007; the Netherlands, 1995); FAO (Italy, 2005, 2013); International Congress of Entomology (Brazil, 2000); SETAC World Congress (USA, 2000); International Arachnological Congress (USA, 1998); New Zealand Plant Protection Society Congress (New Zealand, 1997)
    - *Invitations to present or chair <u>international</u> workshops*: CIMMYT, USAID (Uganda, Zimbabwe, Ethiopia, Benin 2017/18); FAO (Belgium, 2014; Italy, 2014, 2005, 2003; Senegal, 2010; Vietnam, 2007; Morocco, 1993); Global Environment Facility (GEF) (Senegal, 2014);

Rotterdam Convention (Senegal, 2014); European Food Standards Agency (EFSA) (Italy, 2013); UC Davis (USA, 2012); Jagiellonian University, Poland (2013); AAIE (USA, 2011); SETAC (the Netherlands, 2010; 2002; 1994); European Union (Poland, 2004); Canadian Pest Management Regulatory Agency (Canada, 2002); North Atlantic Treaty Organization [NATO] (Poland, 1998); Welsh Pest Management Forum (Wales, 1996); Commonwealth Agricultural Bureau [CABI] (Malaysia, 1995); European Environmental Research Organization [EERO] (the Netherlands, 1995; Germany, 1994); European Union (Denmark, 1994); British Council (Turkey, 1991; Peru, 1989,1990); International Center for Insect Physiology and Ecology [ICIPE] (Kenya, 1988)

- Invited member Fall Armyworm R4D International Consortium
- Appointed Member, International Standards Committee (ISC), Sustainable Agriculture Network (SAN), San Jose, Costa Rica, 2014 - 2017
- Elected to Advisory Committee, Northwest Center for Alternatives to Pesticides, 2013-2016
- Academic Editor (nominated), PeerJ, Open Source science journal
- Co-organizer, Royal Society of London discussion meeting, and associated satellite meeting on food and environmental security, 2012
- Appointed consultant to government and international organizations: USAID, CIMMYT (2017-18); European Union (2009-10; 2010-11); FAO (UN) (2008-11; 2005); Environmental Protection Agency (US) (2002; 2004); North Atlantic Treaty Organization [NATO] Program for Science and Peace (2000); International Institute for Biological Control (CABI) (1995); Ministry of Agriculture, Pesticide Safety Division (UK) (1992)
- Member (nominated) US Board on Agriculture Assembly, Working Group to Envision USDA Integrated Crop Protection Program, 2012-2013
- Member USDA Western Region IPM Center Advisory Committee, 2003-present
- Member USDA Western Region IPM Center Steering Committee, 2012-present
- Member, International Advisory Board, Institute of Environmental Sciences, Jagiellonian University, Krakow, Poland, 2004-2006
- Member USDA National IPM Committee, 2003-2005; 2017-18; USDA National Plant Diagnostics Network, Epidemiology Committee, 2003-2015
- Chair, State of Oregon IPM Coordinating Committee, 2013-2018
- Chair (elected) WCC-069 USDA Western Regional IPM Coordination Committee, 2004-2005; Chair (elected) WERA 1017 USDA Western Regional IPM Coordination Committee, 2017-2018
- Member, International Standards Organization Working Group, 1987-1991: UK delegation leader to ISO environmental standards meeting, 1988
- Invited participant in legislative working groups, on pesticides and IPM, State of Oregon (2009, 2010); Oregon University System representative on Oregon Natural Heritage Program, 2002-2005; invited participant in Oregon Governors' State of Environment Panel, 1998-2001
- Elected to Society of Environmental Contamination and Toxicology (SETAC), UK Council, 1993; and to Royal Entomological Society of London, Finance Committee, 1991

- Appointed external examiner for Ph.D. degree candidates at University of Wales, Lincoln University (New Zealand), Imperial College (London)
- Appointed external examiner for undergraduate Environmental Science degree program, University of East Anglia (UK)

Professional Qualifications

Certificate of Completion	Protecting Human Research Participants (NIH)	2011
Certificate in Pesticide Application	National Proficiency Tests Council, UK	1988

Professional Affiliations

Member, Society for Environmental Toxicology and Chemistry, Europe (USA branch since 2004)	since 1991
Elected to Council	1993
Member, British Ecological Society, UK	since 1977
Member, Entomological Society of America, USA	1992-2002
Member, Association of Applied Ecologists, UK	1977-1998
an Entomology editor for Annals of Applied Biology	1989-1995
Member, Society for Chemical Industry, UK, Pesticides Group	1991-1992
Fellow of the Royal Entomological Society of London, UK (FRES)	1977-1995
Member Finance Committee	1991-1992

Membership of Professional Bodies

Member, International Standards Organisation (ISO) Working Group developing international standards for measuring biological effects of soil pollution [UK delegation leader to ISO meeting, London, 1988]	1987-1991
Member, British Standards Institute (BSI) shadow committee for ISO activities	1987-1995
Member, International Organisation of Biological Control (IOBC) working group, “Pesticides and Beneficial Invertebrates”	1988-present
Member, British Agrochemicals Association working group designing pesticide registration testing methods	1989

Member, Beneficial Arthropods Regulatory Testing Group (BART)	1990-1995
Founder member, and elected executive committee member of SERAS (Soil Ecotoxicology Risk Assessment System): a network of environmental protection and pollution specialists from the European Union, Eastern Europe and Scandinavian states	1992-1995
Member USDA NPDN-NAPIS Epidemiology Workgroup	2003-2018
Member USDA CSREES National IPM Committee	2003-2005; 2012-present (2017-18 as Chair WERA 1017)
Invited member Fall Armyworm R4D International Consortium	2018-

Professional Activities

Peer reviewed journals

Co-Editor, Special Issue, Philosophical Transactions of the Royal Society (2014)

Entomology Editor, Annals of Applied Biology, 1989-1995

Editor, Functional Ecology, Special Issue Volume 4 (1990)

Contributions to international workshops and courses:

'Pest and Vector Management in the Tropics', International Centre for Insect Physiology and Ecology, Nairobi, Kenya, 1988: (25 contact hours, 35 participants).

'*Tropical Resource Management',* University of Oslo, Norway, 1989: (16 contact hours, 24 participants).

'Pesticide Resistance Management', University of Piura, Peru, 1989 & 1990: (8 contact hours, 100-150 participants on each occasion).

'*Developing Ecotoxicological Research Programs*', Ataturk Horticultural Research Institute, Yalova, Turkey, 1991: (5 contact hours, 200 participants).

'Soil Ecotoxicology and Risk Assessment', Bremen, Germany (European Environmental Research Organisation (EERO)), guest lecturer, 1994 (2 contact hours, 30 participants).

'Annual Course in Ecotoxicology', Texel, The Netherlands (EERO opening lecturer) 1995: (2 contact hours, 30 participants).

'*Analysing Stress in Ecosystems*", EERO course, Oxford, UK, 1995. 1 week workshop, course leader (>40 contact hours, 20 participants)

'Course and Workshop on the Evaluation of Pesticide Side-Effects on Natural Enemies' , Serdang and Tanah Rata, Malaysia (International Organisation of Biological Control and International Institute of Biological Control consultant), 1995 (120 contact hours, 18 participants).

'Ecological Assessments in Agricultural Biotechnology' SETAC Short Course, contributing module on 'Assessment of effects on non-target organisms' Baltimore, USA, November, 2001 (2 contact hours, 20 participants)

'*Environmental Risk Assessment Workshop and School'*, European Community Center of Excellence, Jagiellonian University, Institute of Environmental Sciences, Krakow, Poland, October 1st-3rd, 2004 (3 contact hours, 30 participants).

'Planning and implementing sustainable IPM systems', Co-Director and lead instructor, 10-day residential course, Oregon State University, August 11th-24th, 2013

'Pollinator Ecotoxicology and Risk Assessment', Sole instructor (invited), Institute of Environmental Sciences, Jagiellonian University, Krakow, Poland, October 9th-16th, 2013: (30 contact hours, 10 participants)

'Pesticide risk communication for small farmers in Senegal', Co-instructor, Diender, Senegal, April 9th-10th, 2014 (8h, 20 participants); July 1st-2nd, 2014 (10h, 8 master facilitators and teachers). February, 2015 (25 farmer facilitators)

'*ISEAL IPM Coalition Pesticides Workshop*', invited co-organizer and presenter, Amnesty International, International Human Rights Center, London, UK, November 2016. (ISEAL Alliance; SAN: 6 contact hours, 18 participants, leader IPM and pesticide risk management)

'*IPM and Pesticide Risk Management & Stakeholder Review Workshop*' San Jose, Costa Rica May 2017 (SAN, 8 participants, 12 contact hours)

'Workshop on Fall Armyworm Pest Management Field Manual Development', Entebbe, Uganda, Sept 2017. (CIMMYT, USAID; 18 contact hours, ~30 participants, leader of pesticide efficacy and risk management workgroup (participated remotely)).

'*Regional Training-of-Trainers and Awareness Generation Workshop on Fall Armyworm Pest Management in Southern Africa*', Harare, Zimbabwe, October 2017 (CIMMYT, USAID; ~50 participants, 20 contact hours, lead presenter IPM program construction and pesticide risk management)

'*Regional Training-of-Trainers and Awareness Generation Workshop on Fall Armyworm Pest Management in East Africa*', Addis Ababa, Ethiopia, November 2017 (CIMMYT, USAID; ~50 participants, 20 contact hours, lead presenter and discussion leader IPM challenges and program construction, and pesticide risk management)

Regional Training-of-Trainers and Awareness Generation Workshop on Fall Armyworm Pest Management in West Africa', Cotonou, Benin, February, 2018 (CIMMYT, USAID; ~120 participants, 20 contact hours, lead presenter and discussion leader IPM challenges and program construction, and pesticide risk management)

Large scale webinars on Fall armyworm management 2018: See SDG Academy Webinar (May 2018: https://www.youtube.com/watch?v=htGQgCT1d1E&t=5s&list=UU7XdauqZJSurqz55qlZbqhw&index=12) ; USAID Webinar (Sept 2018: https://www.youtube.com/watch?v=t0Hp9zEbYpc&feature=youtu.be).

Agrochemical Evaluation Unit, Southampton University, UK.

Co-founder and co-director of AEU 1984-1995 (sole director 1992-1995).

The AEU was a university-based advisory unit and consultancy, undertaking contract work for government and industry world-wide. It was established by myself, and Dr. Steve Wratten, in 1984. Specialised services included beneficial insect pesticide risk-assessment procedures in the laboratory and field, and the screening of natural products to identify biorational alternatives to conventional synthetic pesticides. Overseas projects included evaluation of anti-locust insecticides (Mali and Saudi Arabia), screening of the Andean flora for new toxins (in partnership with the University of Santiago, Chile) and integration of novel pesticides within tomato pest management programs (Spain). The AEU obtained Good Laboratory Practices (GLP) accreditation, for both laboratory and field-based projects, from the UK Health and Safety Executive in 1992, enabling it to work for pesticide regulatory agencies. Income from 1984 to 1995 was UK pounds 3,000,000 (approximately $5,000,000). The unit still operates from Southampton University and has become a private business, “Mambo-Tox”.

Major teaching responsibilities

Oregon State University, USA

In 1995/6, 1998/9 and 1999/00 I taught the ecology module in the lower division Biology (BI 213) Program introductory series to approximately 600 students. I co-taught the Ecological Methods (BI 317) field course in the BI program 1995/6 to 2001/2, and was sole instructor in 1996/7. In 1996/7, I was co-instructor in a graduate course in Environmental Toxicology. In 1997/8 and 1999/00, and 2001/2 I co-taught a new upper division course in Applied Stream Ecology, developed from undergraduate group research projects. I was co-instructor in a summer Field Course in Entomology in Southern Arizona in 1998/9. In 1998/9, 1 also taught a graduate course in Environmental Toxicology and Pesticide Risk Assessment. From 1998/9 to 2000/01, I was co-instructor in the Environmental Sciences core graduate course, Environmental Perspectives and Methods: Humans and the Global Environment. In 1999/00, I was instructor for the Department of Entomology graduate/upper division course in Pest Management (Systems Design), and returned to instructing on this course in 2006. In 2005, I was co-instructor in ‘Food Fright: Genes Chemicals and the Environment’. In 2007, 2008, 2012 and 2014, I taught ‘Fundamentals of Ecotoxicology’, and the ‘Ecotoxicology of Organophosphate Insecticides’ in the graduate program of the Department of Environmental and Molecular Toxicology. In 2010, I taught a graduate seminar course in Ecosystem Services and Ecotoxicology, a seminar course in Ebola disease epidemiology and management (2015), and a course on interpretation of the science behind designation of the Anthopocene Epoch, 2017, 2018).

University of Southampton, UK

Co-ordinator of an M.Sc. program in Insect Pest Management, 1983-1990

Responsible for administrative, academic and financial aspects of the program. Competitive quota studentships were obtained from the UK Ministry of Agriculture, Fisheries and Foods and the Science and Engineering Research Council. The course was formally recognised by the UK Overseas Development Administration, the Food and Agriculture Organisation (UN) and the GTZ (German overseas development agency). It expanded from 3 students in 1983 to between 10 and 14, fully-funded students per annum from 1984 onwards. The course content focused upon research planning and communication skills, as well as key chemical and biological aspects of pest management. In addition to having a conventional syllabus, a 20 week 'group research project' was built into the program. A large network of international collaborators (Africa, South America, south-east Asia) was established, who offered supervision of overseas research projects. The employment record for the course was greater than 95%.

1983-1995, co-ordinator of 'Insect Pest and Vector Management' and 'Theoretical Ecology' (final year undergraduate courses) and lecturer in 7, first to third year courses in pure and applied ecology, statistics, environmental toxicology and plant pathology.

1992-1994, co-organiser for first year field course for 90 undergraduate biologists in southern Spain (14 days). Training was provided in invertebrate systematics and ecological methods.

I gave individual lectures or short courses at the Universities of Surrey, Portsmouth, Nottingham UK, and the Agricultural University, Wageningen, the Netherlands.

Research

Current graduate students:

No current graduate students, in order to focus on development of the IPPC's US, and international programs.

Formerly committee member for Work, LeMieux, Ryken (Ph.D. Entomology), Morris, Schooler, (MS, Entomology), Russell (Ph.D. Horticulture), Colley, Reich, (MS, Horticulture), Hatch, Bracken, Romansic (Ph.D. Zoology), Gianou (MS Marine Biology), Janey (Ph.D. Toxicology), Ingeman, Kindinger (both Ph.D., Zoology). All of whom have now graduated.

Post-doctoral workers at OSU:

Leonard Coop (Assistant Professor, Senior Research) (2000-2018): Phenological modelling, and web-based decision-support tools; interpolation and downscaling of weather parameters; GIS data acquisition, GRASS GIS processing and GIS-web user interface (e.g. http://uspest.org/wea).

Hans Luh (Assistant Professor, Senior Research) (2003-2018): Web services; databases transfer (XML formats); programming for mathematical and statistical and web-based information technologies; pattern analysis; Windows ArcGIS and ArcIMS.

Dan Upper (Research Associate) (2003-2005; 2012-2018): Development of mathematical methodologies for interpolation and downscaling of GIS and weather parameters; application programming for automated processing and data conversion (formatting weather and pest data) using Perl, Unix scripts, XML, GRASS GIS, and R. Software design and testing.

Michael Guzy (Assistant Professor, Senior Research) (2008-2016): Systems modelling for ecological risk assessment; pesticide fate and behaviour modelling; advanced information management systems

Stephen Ndziedze (Post-doctoral scientist) (2012-2015): Remote sensing for ecological service determination using ground-based imagery and novel, computer-based analytical tools

Kellie Vache (Assistant Professor, Senior Research) (2009-2013): Modelling for pesticide fate and behaviour, ecological risk assessment

Mario Ambrosino (Research Associate) (2006-2009): Conservation biological control; caneberry pest IPM

Nagajeran Ramalingham (Research Associate) (2005-2006): Pesticide application engineering; pesticide drift modelling and management in tree fruit, including climatic and meteorological drivers; analysis of deposition patterns and drop transport and comparison of sprayer types.

Waheed Bajwa (Assistant Professor, Senior Research) (2000-2002) (Research Associate), Ecological risk assessment; tree fruit IPM; development of advanced computer knowledge bases and pest alert systems.

Phil Heneghan (Research Associate) (1995-2000): terrestrial and freshwater invertebrate ecotoxicology; meta-analysis of ecotoxicological datasets and construction of interactive web-based databases.

At Southampton University in the UK, I supported John Wiles (soil invertebrate ecotoxicology), Phil Heneghan (ecotoxicological database development) and Martin Longley (pesticide drift) as post-doctoral researchers.

Post-graduate supervision:

At Southampton University, UK, I supervised to completion 19 Ph.D., 4 M.Phil. and 32 M.Sc. students (final M.Sc. projects), with funding from UK Ministry of Agriculture Fisheries and Foods, Science and Engineering Research Council, Natural Environment Research Council, Overseas Development Administration and the UN, Food and Agriculture Organisation. At Oregon State University since 1995, I have supervised to completion 6 Ph.D. students and 2 MS students.

Total graduate students supervised and graduated as major professor to date: Ph.D., 25; **M.Sc.,** 32; **MS,** 2; **M.Phil.,** 4

Supervision of higher degree (Ph.D.; M.Phil., MS) candidates to completion

Year	Name	Degree	Title
1989	Alice Lucy Millest	Ph.D.	The *Simulium ochraceum* and *S. metallicum* species complexes in Mexico: identification, distribution and relation to Onchocerciasis.
1989	Yeneneh Taye-Belayneh	Ph.D.	The effects of reduced-doses and strip spraying of aphicides on aphids and their predators and parasitoids in winter wheat fields.
1990	Andrew James Pullen	Ph.D.	Autumn applied pyrethroid insecticides: consequences for the natural enemies of cereal aphids.
1990	Derek Morgan	Ph.D.	Modeling the epidemiology of Barley Yellow Dwarf Virus.
1990	Altaf Hussain Hazara	M.Phil.	Studies of the distribution of the European red spider mite, *Panonychus ulmi* (Koch) (Acarina: Tetranychidae) and the apple rust mite, *Aculus schlechtendali* (Nal) (Acarina: Eriophyidae) in an experimental glasshouse and a commercial orchard.
1991	Jonathan Richard MacDougall Thacker	Ph.D.	The spatial and temporal dynamics of pesticide side-effects on non-target invertebrates in UK cereal crops.
1991	Alvaro Eduardo Eiras	Ph.D.	The role of human odours in host location behaviour of female *Aedes aegypti* (Diptera: Culicidae).
1991	Moussa Sissoko	M.Phil.	A novel experimental investigation of the persistence of dimilin against grasshoppers.

Year	Name	Degree	Title
1991	Simon John Duffield (Co-supervisor with S.D. Wratten)	Ph.D.	Spatial dynamics of invertebrate population recovery in cereals following treatment with the insecticide dimethoate.
1992	Aynekulu Yemane	M.Phil.	A laboratory study of diflubenzuron to determine toxicity to the Desert Locust (*Schistocerca gregaria* Forsk.) and to predict efficacy in the field.
1992	John Anthony Wiles	Ph.D.	Predicting the risk posed by deltamethrin to beneficial invertebrates in temperate cereal crops.
1992	Christopher Francis George Thomas	Ph.D.	The spatial dynamics of spiders in farmland.
1993	Edward Dominic Pilling	Ph.D.	Synergism between EBI fungicides and a pyrethroid insecticide in the honeybee, *Apis mellifera* L.
1994	George Donald Aylmer Coppen	Ph.D.	The use of benzoylphenyl ureas as novel insecticides for the control of locusts and grasshoppers.
1994	Tamer Cilgi (Co-supervised with S.D. Wratten)	Ph.D.	Effects of pesticides on non-target invertebrates in arable crops and field boundaries.
1994	Philip Andrew Heneghan	Ph.D.	Side-effects of synthetic pyrethroid insecticides on the dispersal activity of predatory Coleoptera, with particular reference to the Carabidae.

Year	Name	Degree	Title
1994	Nimal Chandrakantha Kumarasinghe (Co-supervisor with S.D. Wratten)	Ph.D.	Host plant resistance in sugarcane *Saccharum officinarum* to the lopophid planthopper *Pyrilla perpusilla* Walker (Homoptera: Lopophidae).
1994	Stephen John Moreby	M.Phil.	The influence of agricultural practices on Heteroptera in arable field margins.
1994	Justine Louise Moyle	Ph.D.	The lethal and sub-lethal effects of lambda-cyhalothrin to the syrphid *Episyrphus balteatus* (Degeer) (Diptera: Syrphidae).
1994	Gabriel Simon Weyman	Ph.D.	The causative factors of aeronautic behavior in spiders on arable farmland.
1995	Martin Longley	Ph.D.	The effects of pyrethroid insecticides upon parasitic Hymenoptera in the cereal ecosystem.
1995	David Turner (Co-supervisor with S.D. Wratten)	Ph.D.	A toxicological analysis of reduced-dose tactics in cereal pest management.
1996	Janice Hickman (Co-supervisor with S.D. Wratten)	Ph.D.	The ecology of aphidophagous Syrphidae in cereals.

1995 onwards: Oregon State University

Year	Name	Degree	Title
1999	Patrick Moran (Co-supervised with J. Jenkins, OSU)	MS	The susceptibility of riparian soil invertebrates to the herbicide trichlopyr.
2001	Jennifer Peterson (Co-supervised with J. Jenkins, OSU)	Ph.D.	The use of native macro-invertebrates to assess pesticide risk in Oregon streams.
2001	David Stone	Ph.D.	Physiological and organism level endpoints in the beetle *Pterostichus oblongopunctatus* (Coleoptera: Carabidae), inhabiting a gradient of heavy metal pollution.
2002	Scott Alan Hecht	Ph.D.	Accumulation and effects of 4-nonylphenol in Chinook salmon fry and their estuarine amphipod prey.
2002	Christopher Beatty (Co-supervised with J. Li, OSU)	MS	Habitat Associations and Life Histories of Odonata in Riverine Wetlands of the Willamette Valley, Oregon.
2004	Wendy Walker (Co-supervised with K. Anderson, OSU)	Ph.D.	Selenium and trace metal bio-accumulation and bio-availability in detrital-benthic food webs of lotic and lentic wetlands, Utah, USA
2006	Mario Ambrosino (Co-supervised with John Luna, OSU)	Ph.D.	Enhancing the predatory potential of hoverflies on aphids in Oregon broccoli fields with floral resources

Year	Name	Degree	Title
2007	Katherine Johnson (Co-supervised with Jeff Jenkins, OSU)	Ph.D.	Effects of esfenvalerate on native macro-invertebrates representative of Pacific Northwest streams

2008/17: A break in graduate student supervision to focus on IPPC leadership and international development

Grants obtained (Awards up to 1995 in UK pounds converted to US$ equivalent @$1.7)

Total number of competitive external research and extension grants awarded to date: 110

Total grant value to date: $18,705,326

Date	Awarding body	Topic	Amount
1984 - 1985	Southampton University, UK	*Floral feeding behaviour of Aedes aegypti*	11,390
1985 - 1986	World Health Organisation, Geneva, Switzerland, Directors Initiative Fund	*Mosquito nectar feeding*	15,938
1986 - 1989	Overseas Development Administration, UK, Extra Mural Contract with Dr. R. Cheke (Natural Resources Institute)	*Simulium biosystematics*	107,644
1987 - 1988	Southampton University Research Fund	*Departmental Insectary*	51,000
1987 - 1989	Natural Environment Research Council, UK, (With Dr. N.W. Sotherton, Game Conservancy Trust)	*Ecological impact of pesticide drift*	59,200

Date	Awarding body	Topic	Amount
1988	Royal Society Travel Grant, UK	*Attendance International Congress of Entomology, Vancouver, Canada*	850
1989 - 1992	Natural Environment Research Council, UK, (Joint Agriculture and Environment Program), with Dr. K. Sunderland, Horticultural Research International)	*Spatial dynamics of spiders in farmland*	238,240
1990 - 1993	British Council, UK	*Academic Link with Peru (pest management in cotton)*	25,500
1989 - 1990	Food and Agriculture Organisation, (UN), Rome, Italy	*Insect Growth Regulators in Locust Control*	40,800
1991	Ditto		8,500
1992	Ditto		15,645
1990	Royal Society Travel Grant, UK	*Attendance SETAC Congress, Washington*	901
1991 - 1992	British Technology Group, UK	*Pesticides from the Andean flora*	43,161
1992 - 1993	Ministry of Agriculture Fisheries and Food, UK, with Dr S.D. Wratten, and Dr. N. Sotherton, Game Conservacy Trust	*Sustainable farming systems*	510,000
1992	USAID	*Database analysis of pesticide side-effects*	3,720
1993 - 1996	European Community Environmental Research Program, Brussels, Belgium (with collaborators from Germany, Hungary, Czech Republic, Poland, Sweden, Denmark and The Netherlands)	*Sub-lethal effects of pollutants on soil fauna*	201,270
1993 - 1996	Leverhulme Trust, UK	*Ecological insights into risk analysis*	116,552

Date	Awarding body	Topic	Amount
1993 - 1994	Biotechnology and Biological Sciences Research Council, UK, with Dr. S.D. Wratten, Southampton University	*Pesticide reduction via enhanced predation*	88,040
1995 - 1998	Zeneca Strategic Research Fund, UK, with Dr. T. Sherratt, Durham University, Dr. J. Biggs, Oxford Brookes University, Dr. S. Maund, Zeneca, UK	*Spatial dynamics of invertebrates in pond ecosystems*	272,000
1996 - 1997	United States Department of Agriculture	*Ecological risk assessment for cereal pesticides* (Part of a western regional program in Russian wheat aphid management)	42,000
1996 - 1997	Oregon State University, with Drs J. Lieu, G. Poinar and R. Berry (OSU)	*Factors underlying species diversity in entomopathogenic nematodes*	8,000
1996 - 1998	City of Eugene and Springfield, Oregon	*Invertebrate biomonitoring in urban streams*	24,000
1997 - 2002	USDA Forest Service, Joint Venture Agreement (with Dr. Jeff Miller, OSU)	*Development and maintenance of the Western Forest Insect Collection and Biodiversity Center*	46,000
1998 - 2001	USEPA STAR grant 98-NCERQA-M1 with J. Bolte (PI), M. Santelmann, S. Polasky, C. Smith, & J. Li, OSU	*Developing methods and tools for watershed restoration and assessment in the Willamette Basin, Oregon*	883,500
1998 - 2001	NATO, with R. Laskowski (Jagellonian University, Krakow) and J. Stark, WSU, USA.	*Interactions between the ecotoxicological impacts of pesticides and heavy metals*	28,510
1999 - 2001	USDA/CSREES Sustainable Agriculture Research and Education Program (SARE) grant with J. Luna (Co-project coordinator, OSU)	*Enhancing biological control with beneficial insectary plantings*	83,929

Date	Awarding body	Topic	Amount
1999 - 2000	Markham Research Award, with S. Hecht (OSU)	*Uptake and accumulation of nonyl-phenol through estuartine food chains*	8,335
1999 - 2002	EPA 82702 P. Jepson, S. Hecht STAR Fellowship	*Uptake and accumulation of nonyl-phenol through estuarine food chains*	44,217
1999	OSU Research Equipment Reserve Fund (with J. Giebultiwicz & J. Jenkins, OSU)	*Spectramax UV/VIS spectrophotometer*	13,500
2000	Kennecott Utah Copper Corporation (With J. Westall, OSU)	*Selenium uptake through a wetland food web*	25,085
2000	Markham Research Award, with S. Hecht (OSU)	*Uptake and accumulation of nonyl-phenol through estuarine food chains*	9,821
2001 - 2003	USDA CSREES: with J. Jenkins	*Western Regional PM Center Grant: Oregon Contribution, 2001-2003*	219,692
2003	EPA Region 10 (via ODA): with J. Jenkins, J. Bolte (OSU)	*Watershed-based ecological risk assessment of pesticide use in Oregon*	85,000
2003	USDA CSREES Regional Pest Management Centers Program	*IPMnet News Funding*	25,000
2003 - 2005	USDA NIWQP: Sullivan D.M., Jepson P.C., Jenkins, J.J. (OSU)	*Nutrient and pest management education for technical service providers in the Pacific Northwest*	193,000
2003 - 2004	USDA Western Region IPM Center: Jepson, P.C.	*Western Region IPM Center Pest Management Strategic Plan Coordinator*	42,307
2004	USDA Western Region IPM Center: Jenkins, J., Jepson, P.C.	*Western Region IPM Center, Oregon Information Network*	25,000
2004 - 2005	USDA Western Region IPM Center: Jepson, P.C.	*Western Region IPM Center, Workgroup on Weather Systems*	15,062

Date	Awarding body	Topic	Amount
2004 - 2005	Oregon NPS Section 319: Seavert, C., Jepson, P.C., Castagnoli, S.,	*Eliminating pesticide air drift from orchards into fish-bearings streams: evaluation and demonstration of new BMP's to eliminate pesticide air drift from orchards to fish bearing streams*	149,750
2004	USDA Western Region IPM Center: Jepson, P.C.	*PNW Pest Management Strategic Plan for Blueberries*	5,054
2004	USDA Western Region IPM Center: Jepson, P.C.	*PNW Pest Management Strategic Plan for Dry Bulb Onions*	11,000
2004 - 2005	Jepson, P.C. USDA National Plant Diagnostic Network	*NPDN Diagnostic Data Anomalies: Geographic Visualization and Mining Systems* *(Contracts with University of California, Davis; Kansas State University; USDA NAPIS)*	95,000
2004 - 2005	William, R.D., Jepson, P.C. Western Regional IPM Center	*IPM: Connecting Practices and Strategic Directions A Workshop Proposal*	5,000
2004	Jepson, P.C., USDA CSREES IPM Special Program	*IPMnet News Funding*	25,000
2004 - 2007	USDA CSREES IPM Centers Program, Jepson, P.C.	*Western Regional Pest Management Strategic Plan Coordinator* *Supplements for PMSP's (2005-)*	150,647 4,864
2005 - 2006	USDA CSREES Western Region IPM Center Critical Issues Program, Jepson, P.C., Jenkins, J., Staben, M,	*Regionalized IPM Outreach: Buffers, Drift Management and BMP's to Protect Water Quality*	54,113
2004 - 2005	USDA Western Region IPM Center: Jenkins, J., Jepson, P.C.	*Oregon information network in support of the USDA Western Region IPM Center*	25,000

Date	Awarding body	Topic	Amount
2005 - 2006	USDA National Plant Diagnostic Network. Jepson, P.C.	*NPDN Diagnostic Data Anomalies: Geographic Visualization and Mining Systems* *(Contracts with University of California, Davis; Kansas State University; USDA NAPIS)*	110,000
2005	Oregon Raspberry and Blackberry Commissions. Coop, L., Ambrosino, M., Jepson, P.C., Peerbolt Consulting	*Assessing the contribution of biological control for leafroller management programs in caneberries*.	9,879
2005	USDA Western Region IPM Program; Coop, L., Jepson, P.C., Peerbolt, T.	*Determining the potential for release of Lepidopteran parasitoids from pesticide limitation to enable biologically-based IPM in caneberries.*	59,979
2006 - 2007	Western Region USDA Sustainable Agriculture Research and Education Program; Sullivan, D., Jepson, P.C., Stone, A.	*Integrated Soil and Crop Management for Organic Potato Production*	196,067
2006 - 2008	USDA CSREES CAR Program, Jepson, P.C., Coop, L.B.	*Enabling transition to biologically-based IPM for leafrollers in caneberries*	477,427
2006 - 2009	USDA CSREES NRI Coop L., Jepson P.C., Mahafee W, Daly C.	*Taming uncertainties in multi-scale pest and disease model and decision support tools for plant biosecurity*	645,000
2005 - 2006	USDA Western Region IPM Center, DeFrancesco J., Jepson P.C.	*Pest Management Strategic Plan for Sweet Cherries in the Western States*	4,895
2005 - 2006	USDA Western Region IPM Center: Jepson, P.C.	*Oregon information network in support of the USDA Western Region IPM Center*	25,000
2006 - 2007	Western Region USDA Sustainable Agriculture Research and Education Program, Ellen, G, Jepson, P.C., Ambrosino, M	*Banking on beetles in Oregon*	19,068

Date	Awarding body	Topic	Amount
2006 - 2009	USAID IPM CRSP, Jepson, P.C.	*IPMnet NEWS*	45,000
2006	FAO (UN), Jepson, P.C., Jenkins, J., Anderson, K, Bolte, J., Sudakin, D.	*Environmental Monitoring of the Senegal River Basin*	180, 224
2006 - 2007	USDA National Plant Diagnostic Network. Coop, L., Jepson, P.C.	*NPDN Diagnostic Data Anomalies: Geographic Visualization and Mining Systems* *(Contracts with University of California, Davis; Kansas State University; USDA NAPIS)*	81,000
2006 - 2007	USDA Western Region IPM Center: Jenkins, J., Jepson, P.C.	*Oregon information network in support of the USDA Western Region IPM Center*	25,000
2006 - 2007	USDA Risk Management Agency, Jepson, P.C., Staben, M., Jenkins, J.	*Enabling Lower Risk Pest Management Practices Through Localized Weather and Climate Information*	64,000
2007 - 2008	USDA National Plant Diagnostic Network. Coop, L., Jepson, P.C.	*NPDN Diagnostic Data Anomalies: Geographic Visualization and Mining Systems* *(Contracts with University of California, Davis; Kansas State University; USDA NAPIS)*	85,000
2007 - 2008	FAO (UN), Jepson, P.C., Jenkins, J., Anderson, K, Bolte, J., Sudakin, D.	*Environmental Monitoring of the Senegal River Basin*	199,977
2007	NRCS CESU, Jepson, P.C., Tuck, B., Macnab, S.	*Developing IPM guidelines using wheat in the Columbia Basin as a model*	32,129
2007 - 2012	WIPM Center, Jepson, P.C.	*PNW PMSP Coordinator*	160,000
2008 - 2010	USDA Western Region IPM Center: Jepson, P.C.	*Oregon information network in support of the USDA Western Region IPM Center*	50,000

Date	Awarding body	Topic	Amount
2008 - 2010	USDA Western Region IPM Center: Ellen, G., Jepson, P.C.	*Western Region Conservation Biological Control Working Group*	18,759
2007 - 2008	FAO (UN) Jepson, P.C.	*Pesticide toxicity to pollinators*	34,611
2007	Mercy Corps Staben, M., Jepson, P.C.	*Education exchange to improve apple production in Korea*	11,437
2008	Western IPM Center, DeFrancesco, J., Jepson, P.C.	*Pest Management Strategic Plan for Hops*	6,583
2008 - 2010	USDA NRCS Green, T (PI) with Benbrook, K., Jepson, P.C., Kaplan, J., Mineau, P.	*Comprehensive Environmental Assessment Tool for US Agriculture:* *OSU sub-award: $192,000 + supplements of $7,681, 24,311*	808,013
2008	FAO(UN) Jepson, P.C; Anderson K	*Training program for pesticide residue analysis in Senegal*	44,457
2009 /2011	USDA PMAP Program, Jepson, P.C., Coop, L., Lambrinos, J	*Implementing conservation biological control for caneberries*	270,835
2008 - 2009	USDA National Plant Diagnostic Network. Coop, L., Jepson, P.C.	*NPDN Diagnostic Data Anomalies: Geographic Visualization and Mining Systems* *(Contracts with University of California, Davis; Kansas State University; USDA NAPIS)*	85,000
2008 - 2009	NRCS, Oregon. Jepson, P.C.	*Crop and Watershed Specific IPM Guidelines for Oregon*	70,000
2008 - 2009	Florida Department of Agriculture. Jepson, P.C.	*Integrated Pest Management for Honey Bees*	35,000
2008 - 2009	FAO(UN) Jepson, P.C; Anderson K	*Building regional technical capacity at the CERES/Locustox laboratory*	38,674

Date	Awarding body	Topic	Amount
2009 - 2010	E-IPM USDA NIFA, Jepson, P.C.	*Implementing and advancing IPM in Oregon*	157,866
2009	FAO(UN), Jepson, P.C.	*Refining surveys for pesticide human health risk assessment*	28,036
2009 - 2011	USDA NIFA Regional IPM, Coop, L., Jepson, P.C., Gent, D.	*IPM disease risk forecasts and virtual weather for the western states*	179,227
2009 - 2011	USDA SARE Lambrinos,J., Ellen. G., Jepson P.C.	*Integrating beetle habitat into Pacific Northwest farming systems*	206,002
2009 - 2010	FAO (UN) Jepson, P.C.	*Human health risk assessment training in West Africa*	65,313
2010 - 2013	USDA NIFA Jepson, P.C.	*Implementing and evaluating participatory IPM education at the watershed scale in Oregon*	516,066
2010 - 2013	USDA RMA Jepson P.C.	*Pest Information Platform for Extension and Education (PIPE): Specialty Crops in the Western USA*	909,090
2010 - 2011	USDA NRCS Jepson, P.C.	*Second phase crop and watershed-specific IPM guidelines for Oregon*	70,000
2010 - 2013	USAID IPM CRSP, Jepson, P.C.	*IPMnet NEWS*	75,000
2010 - 2013	USDA NIFA, Jepson, P.C. (Co-PI)	*Western Region Small Farms Working Group (part of a regional grant to NM State)*	24,250
2010 - 2011	GEF via FAO (UN), Jepson, P.C.	*Water-borne pesticide risks in the Niger and Senegal River Basins*	173,784

Date	Awarding body	Topic	Amount
2011 - 2012	NRCS, Oregon. Jepson, P.C.	*Crop and Watershed Specific IPM Guidelines for Oregon*	70,000
2011 - 2012	GEF via FAO (UN), Jepson, P.C.	*Water-borne pesticide risks in the Niger and Senegal River Basins*	183,883
2012 - 2016	USDA Regional IPM Centers, Jepson, P.C.	*Regional IPM Center Signature Program 1*	174,647
2013 - 2015	National Fish and Wildlife Foundation, Governor's Fund for the Environment, Hensey, A., Halbleib, M., Jepson P.C. (Co-PI)	*Clackamas Basic Strategic Pesticide Stewardship Partnership*	74,989
2013 - 2014	GEF via FAO (UN), Jepson, P.C.	*Water-borne pesticide risks in the Niger and Senegal River Basins*	193,263
2013 - 2014	FAO (UN), International development sources, Jepson, P.C.	*Synthesis project, pesticide risk management in West Africa*	52,800
2013 - 2016	USDA NIFA E-IPM (CS), Jepson, P.C., Stock, T., Halbleib, M.L. Funding authority ceased after first year; alternative grant program (EIP) established	*Implementing, coordinating and evaluating efficient, low risk IPM in Oregon*	886,457
2013	FAO (UN) European Union, Jepson, P.C., Halbleib M.L.	*Global Pilot Project in IPM Capacity Building for Sustainable Intensification of Crop Production*	131,036
2014 - 2017	USDA Regional Centers Program, Jepson, P.C.	*Regional IPM Center Signature Program 1*	193,066
2014 - 2017	USDA NIFA EIP Program, Jepson P.C., Halbleib M.L., Stock, T.	*Implementing and improving IPM adoption in Oregon farms, nurseries and schools*	570,000
2014 - 2015	Oregon Agricultural Experiment Station, Jepson P.C., Halbleib, M.L.	*Capacity building for Oregon Extension IPM*	100,000

Date	Awarding body	Topic	Amount
2014 - 2016	Pesticide Stewardship Program Technical Assistance Program, Halbleib,M.L., Jepson, P.C.	*Enabling IPM transitions in Christmas Trees*	49,278
2016 - 2018	Western SARE, Halbleib., M., Jepson, P.C., & 7 others	*Redefining learner-centered education to build high impact IPM partnerships*	67,802
2016 - 2017	Pesticide Stewardship Program Technical Assistance Program, Hilton, R., Jepson, P.C., Halbleib, M., Coopl, L.	*Pesticide management decision support education*	40,854
2016 - 2017	Pesticide Stewardship Program Technical Assistance Program, Ellen G., Jepson, P.C., Halbleib, M	*Biological Christmas tree pest management*	25,170
2017 - 2019	USDA WSARE, Jepson, P.C., M.K. Murray	*Western Pesticide Risk Reduction Through Professional Development for Western State IPM Programs*	68,899
2016 - 2020	USDA NIFA ARDP. Murray, M.K., Jepson, P.C.	*IPMSPs: Bringing Integration to Pest Management Strategic Plans*	215,460
2017 - 2020	USDA NIFA CPPM EIP Jepson, P.C., Murray, M.K., Coop, L., Halbleib, M.L., Stock, T.	*Statewide Networks for Overcoming Barriers to IPM Adoption in Oregon*	858,870
2018 - 2022	USDA NIFA CPPM, Ferrar, J, Crump, A., Al-Khatib, K., Ellsworth, P, Jepson, P	*A Western IPM Center led by California, Arizona and Oregon*	4,000,000 *296,141 to prog.*
2018 - 2019	USDA FAS, USAID, Jepson, P.C.	*Fall Armyworm IPM and Pesticide Risk Management*	299,507

Other activities

Co-Director Western Region IPM Center, October 2012 -

Duties and responsibilities

Co-leadership of USDA Western Regional IPM Center program; cooperative establishment and implementation of mission and vision; responsible for climate and weather-based decision support signature area, and jointly responsible for planning, administration and leadership of a > $4 million, 14-state and Pacific island territory grant and IPM information program; represent the Center at regional and national meetings, and on the Advisory Board, Steering Committee and working groups; joint oversight of grant-supported Director and Associate Director and staff, Center grant programs, regional communications network; liaison with state and federal agencies; joint leadership responsibility for resourcing.

Director Integrated Plant Protection Center, July 2002 –May 2018

Duties and responsibilities

Development and implementation of a strategic vision for the IPPC that advances food security, food safety, environmental and human health through it's research and extension mission and a portfolio of strategic partnerships and cooperative networks that extend from the state, to national and international agricultural and food production systems

Leadership and coordination of state, regional and international research and extension programs in IPM, consistent with the mission of OSU, the College of Agricultural Sciences, the National Roadmap for IPM and the Millennium Development Goals

Leadership and coordination for Oregon of the USDA NIFA *Extension IPM Program*, *Pesticide Safety Education Program*, *Farm Safety Program*, and *Regional Pest Management Center Program*

Director and PI (October 2010-present), USDA Western Specialty Crop ipmPIPE (*Pest Information Platform for Extension and Education*)

Engagement with federal, regional and state government agencies, farming organizations and non-profit organizations to facilitate advances IPM and sustainable agriculture in Oregon and beyond

Delivery of a high impact international, national and state-wide program of research and extension in IPM, agro-ecology, ecotoxicology, risk assessment and crop production

Coordination of additional IPPC services, including IPMnet News, the Ray Smith IPM Library and web-services including on-line IPM decision support tools and the national pest and disease modelling infrastructure for crop bio-security

Management and administration of the IPPC, including budget and personnel management and participation in the leadership team of the College of Agricultural Sciences, OSU.

Associate Director, Integrated Plant Protection Center, Oregon State University, September 2000- June 2002

Duties and responsibilities

- Leadership in developing the case for an OSU-based Pacific North West Regional Pest Management Center

- Lead in multi-investigator research programs that address landscape level risk assessment, agro-ecoregional pest management and agro-ecology.
- Review of IPPC mission and scope in the context of a new Natural Resources Institute at OSU

Head of Department of Entomology, Oregon State University, 1995-2000

Duties and responsibilities

- Administration and leadership for on-campus research, instruction, extension and outreach programs.
- Responsibility for all aspects of fiscal management and administrative leadership of a 3-person office team, including office and personnel management, support for instruction and extension programs, and accountancy.
- Establishment and maintenance of a system of faculty governance, including committee assignments and charges.
- Faculty review, promotion and tenure
- Leadership for long- and short-range planning, particularly prioritisation for new faculty positions, five of which were funded (systematic entomology (2 positions), aquatic entomology, IPM and biological control).
- Representation of the Department and its faculty to College and University administration and stakeholder groups, within and beyond the state.

Other Activities

International

Member IPM and pesticides working group, Sustainable Agriculture Network (SAN), San Jose, Costa Rica, 2017-

Member ISEAL Alliance, IPM Coalition, 2016-

Member, International Standards Committee (ISC), Sustainable Agriculture Network (SAN), San Jose, Costa Rica, 2014-2017

Independent Expert (nominated by USDA NIFA) for review of ENDURE program in IPM, European Union, 2009-10

Member, International Advisory Board, Institute of Environmental Sciences, Jagiellonian University, Krakow, Poland, 2004-2006

National, USA

Member, US Board on Agriculture Assembly, Working Group to Envision Integrated Crop Protection Program, 2012-2016

Member (invited) review team for North Carolina State University Center for Integrated Pest Management, December 2012

Member Review Panel, 2008 USDA CSREES National Extension Integrated Pest Management Special Projects Program

Co-chair, Local Arrangements Committee, International IPM Symposium, Portland, OR, 2009

Member National IPM Symposium Awards Committee, 2006

Member FIFRA Scientific Advisory Panel considering product characterization, human health risk,

ecological risk, and insect resistance management for *Bacillus thuringiensis* (Bt) cotton products. Arlington, VA., June 8th-10th, 2004

Member, National IPM Committee, 2003-2005, 2017-2018

Member USDA NPDN-NAPIS Epidemiology Workgroup 2003-

Member FIFRA Scientific Advisory Panel considering Corn Rootworm Plant-Incorporated Protectant Non-Target Insect Issues. Arlington, VA., August 27th-29th, 2002

Council for Agricultural Science and Technology (CAST) Pew Initiative on Food and Biotechnology: Corn Rootworm Steering Committee, 2001

National Association of State Universities and Land Grant Colleges, Board on Natural Resources, Ecology Section, 1998-

Regional, USA

Co-leader, Western Region Pesticide Risk Reduction Workgroup, 2016-present

Co-leader, Resilient Potato Production Initiative Workgroup, 2017-present

Member review panel, USDA Regional IPM Program, 2010

Member Planning Committee, *'Tilth-30'*, 2004

Member USDA Western Region, Western Region IPM Center Advisory Committee, 2003-present; Steering Committee, 2012-present

Chair (elected) WCC-069 USDA Western Regional IPM Coordination, 2004-2005, WERA 1017, 2017-18

Secretary (elected) WCC-069 USDA Western Regional IPM Coordination, 2003-2004

Chair WERA 1017 USDA Western Regional IPM Coordination, 2017-18

State of Oregon, USA

Appointed first Chair, State of Oregon IPM Coordinating Committee, 2013-2018

Elected member, Advisory Committee to Northwest Center for Alternatives to Pesticides, 2013-2016

Invited to draft bill (now signed into law) requiring IPM in Oregon State Agencies by Office of the Governor, 2013

Invited participant: IPM in State Agencies Working Group, Representative Alisa Kenny-Guyer, 2013

Invited participant: Pesticide Working Group, IPM in Schools legislative initiative (Bill now signed into law), Senator S. Bonamici (OR), 2009

State CAPS (Cooperative Agricultural Pest Survey) Committee, 2005-

Oregon University System representative on Oregon Natural Heritage Program, 2002-2005

State of Environment Report, Science Panel, developing indicators of environmental health, 2001

Member, Science Panel, developing a State of the Environment Report, and a set of environmental benchmarks for the Governor, the Oregon Progress Board and the State Legislature, 1998-2000

Oregon State University, USA

Elected faculty representative of the Department of Environmental and Molecular Toxicology on the College of Agricultural Sciences Promotion and Tenure Committee, 2010-2012

Nominated (to represent College of Agricultural Sciences) to VP Research Committee on Policies/procedures associated with International Contracts and Sub-Contracts, 2010-2011

Nominated participant in vision-setting discussions for new Division of Earth System Sciences, 2010

Nominated participant in Provost's discussions about the future of plant sciences at OSU, 2008

Co-lead Sustainable Agriculture, food and forest systems Natural Resources Theme Team, 2008

Member, OSU Natural Resources Theme Team, 2007-2008

Member, College of Agricultural Sciences Pesticide Policy drafting group, 2007

Elected Senator, College of Agricultural Sciences, Oregon State University Faculty Senate, 2007-8, 2011-12

Member, Outreach in Resource Biotechnology (ORB) Advisory Board, 2005-

Member, CAS Affirmative Action Scoping Committee, September, 2003

Elected Senator, Faculty of Science, Oregon State University Faculty Senate, 2003-2006 (resigned when appointment changed to College of Agricultural Sciences only)

Chair, 'OSU 2007' Satellite Planning group for the future of Centers, Institutes and Programs, 2002

Member, Fisheries and Wildlife Biology, External Lab. Evaluation Committee, 2001

Chair, Department of Entomology Seminar Committee, 2001-2002

Member, Priority Staffing Committee, Department of Entomology, 2001-2002

Chair, Search Committee, Director OSU Marine/Freshwater Biomedical Sciences Center, 2001

Chair, College of Science Promotion and Tenure Committee, 1998 & 1999

Chair, search committee for Department Head, Department of Environmental and Molecular Toxicology, 1998

Member, Advisory Board to National Institute of Environmental Health Sciences Program in Toxicology, 1998-

Senator, Oregon State University Faculty Senate (elected), 1998-2000

Member, graduate faculty for the State-wide program in Environmental Sciences, 1998-

Member, Deans Advisory Council (elected spring, 1998, re-elected fall, 1998 & fall 1999), College of Science, 1998-1999

Member, College of Science Promotion and Tenure Committee, 1997

Member, Advisory Board, Center for the Humanities, 1997-1999

Member, Deans Advisory Committee, College of Agricultural Sciences, 1996-1999

Member, Case Statement Drafting Committee, also known as the Planning Committee, (College of Science), 1996-1997

Member, Advisory Board to the Integrated Plant Protection Center, OSU, 1995-2000

Southampton University, UK

Member, drafting group for departmental research profile for national review exercise, 1989.

Member, Science Faculty Committee designing framework for School of Biological Sciences, 1990.

Elected member, School of Biological Sciences Management Board, 1993-1995.

Sabbatical leave

April-September 1992, Oregon State University, Department of Entomology, USA

Consultancy

I have undertaken numerous short consultancies with the Agrochemical Evaluation Unit in the UK, Denmark, Germany, Spain, USA, France and Mali (1984-1995). I have also undertaken consultancy for ICI in Denmark (sugar-beet virus epidemiology) and Greece (pesticide resistance management). I have undertaken hazard reviews for the UK Ministry of Agriculture Fisheries and Foods Pesticides Hazard Evaluation Branch (1992). I have been a consultant for the International Institute of Biological Control and International Organisation of Biological Control in Malaysia (1995), co-presenting a workshop on the development of tests for pesticide side-effects in Asian tropical conditions.

Since arriving at OSU I have been made a consultant to the North Atlantic Treaty Organisation (NATO) program for Science and Peace, assisting in the development of a collaborative ecotoxicology research program between Universities in the Czech Republic, Canada, Austria, Belgium and Hungary. I have also served as a consultant to EPA on three FIFRA Scientific Advisory Panels in 2002 and 2004. In 2004-5, I was a consultant to Gerber Foods concerning pesticide risk indexing systems.

In 2005, I was appointed as a consultant to the FAO (UN) on development of monitoring systems for determining environmental impacts of GMO's. I undertook (April-December, 2005) a consultancy for the US EPA, leading the development of new, rigorously-designed protocols for field-based risk assessment of GMO's. I visited Senegal in 2005 as an FAO consultant, designing a program to measure and mitigate pesticide impacts in the Senegal and Niger river basins, and Mali in 2007 for the same purpose. In 2008/9 I was appointed a consultant to the FAO (UN) to scope a possible Center for Agricultural Risk Assessment and Management for Sustainability (CARAMS) in West Africa (visiting FAO in Rome, and potential partners in Bourkina Faso, Mali and Senegal).

I was appointed as an Independent Expert (nominated by the USDA NIFA) to the European Union to review the ENDURE IPM program (2009-10; renewed 2010-11).

Extension IPM Presentations at state workshop and national meetings (2002 onwards, following appointment as State IPM Coordinator).

- *Pesticide Risk Communication:* co-organizer, co-facilitator, presenter, Western Pesticide Risk Management Workgroup annual workshop, Portland, OR May16th-17th, 2018
- *Oregon IPM Program Annual Report:* co-organizer, co-facilitator, presenter, WERA 1017 Western Region IPM Coordinator workshop, Portland, OR May16th-17th, 2018
- *Overcoming Barriers to IPM Adoption and Pesticide Risk Reduction:* invited speaker, Oregon State University Extension Association, March 17th, 2018
- *Cherry Crop Pest Losses workshop: Hood River, OR February 9th, 2018*
- *Pesticide Resistance Prevention:* co-organizer, presenter, facilitator, Malheur County Extension Office, Ontario OR February 7th, 2018
- *The Emerging Problem of Pesticide Resistance:* Annual Treasure Valley Onion Growers Meeting, Ontario, OR, February 6th, 2018
- *Cherry Integrated Pest Management Strategic Plan:* co-facilitator, Hood River, OR, January 31st, 2018
- *The Resilient Potato Production Workgroup:* invited presenter, 9th Oregon and Washington Potato Conference, Kennewick, Washington, January 25th, 2018
- *Keeping Pesticides out of Water:* invited presenter, Annual Non-crop Vegetation Management Workshop, Corvallis, OR January 23rd, 2018
- *Resilient Potato Production Initiative Workshop:* co-organizer and co-facilitator, Portland, OR December 5th, 2017
- *The Emerging Problem of Resistance:* invited speaker, Hermiston Farm Fair, Hermiston, OR November 30th, 2017
- *Pesticides, soils, pests and beneficial insects – some practical considerations:* Hermiston Farm Fair, CORE recertification credit workshop, Hermiston, OR November 30th & December 1st, 2017
- *IPM Festival for the Bear Creek Watershed, Middle Rogue workshop and tour:* co-organizer, facilitator and presenter, September 21st, 2017
- *Western Pesticide Risk Reduction Project Workshop:* co-organizer and facilitator, UC Extension, Irvine, July 25th-27th, 2017
- *Potato IPM Working group:* Co-organizer and facilitator, Portland, OR, April 27th, 2017
- *Cranberry Integrated Pest Management Strategic Planning:* co-organizer and co-facilitator, Coos County Extension, Myrtle Point, OR, April 7th, 2017
- *Cranberry Crop Pest Losses Assessment Workshop:* co-organizer and facilitator, Coos County Extension, Myrtle Point, OR, March 1st, 2017

- *Middle Rogue PSP: Pesticide Risk and Best Management Practices:* co-organizer and facilitator, Middle Rogue Soil and Water Conservation District, Medford, OR, February 28th, 2017
- *Onion Integrated Pest Management Strategic Planning:* co-organizer and co-facilitator, Ontario, OR February 6th, 2017
- *Potato IPM Needs Assessment: co-organizer and co-facilitator,* Washington and Oregon Potato Conference, Kennewick, Washington, January 25th, 2017
- *Potato IPM:* invited guest co-presenter, Washington and Oregon Potato Conference, Kennewick, Washington, January 25th, 2017
- *Mint and grass seed IPM Needs Assessment Workshop:* co-organizer and facilitator, Union County Extension, La Grande, Oregon, January 24th, 2017
- *Potato Crop Pest Losses workshop:* co-organizer and facilitator, Farm Fair, Hermiston, December 1st, 2016
- *Different paths to IPM on your Farm*: invited keynote speaker, PNW Christmas Tree Association, Salem, OR June 17th, 2016
- *Whole Farm Planning to Minimize Pests and Pesticide Use in Christmas Trees:* workshop co-organizer and presenter, North Willamette Research and Extension Center, April 13th, 2016
- *Pesticide Stewardship Partnership needs assessment:* workshop co-organizer and presenter, Southern Oregon Research and Extension Center, March 31st, 2016
- *Pesticide Application Management in Vineyards*: workshop co-organizer and presenter, Southern Oregon Research and Extension Center, March 31st, 2016
- *Winegrape Pest Management Strategic Planning:* invited participant, IPM and pesticide risk management, Portland, OR February 25th, 2016
- *Functional Agricultural Biodiversity Workgroup Needs Assessment:* workshop co-organizer and discussion leader, research and agency working group, Portland, OR February 17th, 2016
- *Keeping Pesticides out of Water:* invited presenter, Non-Crop Vegetation Management Conference, OSU, January 20th, 2016
- *Whole farm planning to manage pests and minimize pesticide use:* workshop co-organizer and presenter, Aurora, OR, 7th January, 2016
- *Outcome-based education program planning:* workshop co-organizer and presenter, OSU Extension Annual Conference, 9th December, 2015
- *The principles of IPM and the role of pesticides (addressing IPM planning, pollinator protection and drift management, adapted to each audience over 2h sessions):* OACFA 4th & 5th November, Springfield and Wilsonville; Oregon Ag Expo, Albany, 17th & 19th November; Union/Baker/Wallowa/Grant/E OR Ag College/ Morrow, Gilliam/ Klamath/Coos and Curry counties, 16th December (approx. 1,500 applicators reached)
- *Pesticide applicator nozzle selection for efficacy and drift reduction*, workshop co-organizer and presenter, GK Engineering, OR, June 18th, 2015
- *Beneficial insects in Christmas Trees*, Moving ahead, workshop co-organizer and presenter, Aurora, OR, February 11th, 2015
- *Combining effective IPM and pesticide risk management in nurseries*, workshop co-organizer and presenter, Boring, OR, February 3rd, 2015
- *Tree fruit IPM*. Invited speaker at Oregon Small Farm School, Clackamas Community College, September 6th, 2014
- *IPM framework for aphid control. Invited speaker at:* Identification and use of beneficial insects in controlling aphids in Christmas trees, North Willamette Research and Extension Center, June 11th, 2014

- *IPM in Christmas Trees with an emphasis on aphids and midges.* Invited workshop speaker, OSU Tree School, Clackamas Oregon, March 22nd, 2014
- *ipmPRiME risk assessment for pesticides in Arizona lettuce production.* Invited computer-lab workshop, Southwest Ag Summit, Yuma, Arizona, February 27th, 2014
- *Pesticide application management for reduced risk to surface waters.* Co-organizer and speaker, Oregon Association of Nurseries Workshop, Boring, OR, February 20th, 2014
- *Considering pesticide risks in pesticide application decision-making*, and*, New best management practices for non-crop vegetation management.* Invited speaker, Non-Crop Vegetation Management Conference, OSU, February 23rd, 2014
- *Pesticide Selection that Considers Markets, Efficacy, Impacts and Resistance.* Co-organizer and speaker: OSU Chemical Applicator's Short Course, Wilsonville OR, January 7th, 2014
- *Practical Guidance for the Conservation and Protection of Pollinators and other Beneficial Insects on Your Farm.* Co-organizer and speaker: OSU Chemical Applicator's Short Course, Wilsonville OR, January 7th, 2014
- *IPM tools*. Invited speaker, Wilco Agronomy University, Salem, OR, January 6th, 2014
- *IPM PRiME and pesticide risk assessment for Washington State Small Fruit:* WSU Private Applicator Short Course, Mt Vernon, WA, November 7th, 2013
- *Pesticide risk assessment and management:* invited guest speaker (coupled international teleconference and live presentation), California fruit growers, processors and Whole Foods Market suppliers, Watsonville, California, June 13th&14th, 2013
- *Christmas Tree IPM: Concepts and practicalities:* invited speaker, North Willamette Research and Extension Center, June 3rd, 2013
- *Global IPM challenges:* invited keynote speaker, Annual LIVE symposium, Newburg, Oregon, April 12th, 2013
- *Pesticide drift and application management:* invited speaker, The Dalles, Oregon, March 15th, 2013
- *Pesticide risk analysis and trends over 20 years in the Arizona lettuce industry:* invited speaker; Yuma Agriculture Conference, Arizona, March 6th and 7th, 2013
- *Vegetable and small fruit IPM workshop:* invited organizer, sole speaker, OSU Small Farms Conference, Corvallis, Oregon, March 2nd, 2013
- *Vegetable IPM and pesticide risk management workshop:* co-organizer and joint presenter, N. Willamette Valley, February, 2012
- *Vegetable IPM and pesticide risk management:* invited speaker, NORPAC cooperative growers, Salem, Oregon, February 13th, 2012
- *Pesticide risks and their management:* Invited sole presenter -Annual technical meeting, Napa Valley winegrape producers, Napa, California, February 6th, 2013
- *Maximizing pesticide efficiency:* Annual Non-crop Vegetation Management course, Oregon State University, January 22nd, 1013
- *Recognizing and managing pests and beneficial insects in organic farms:* invited speaker, North Willamette Horticultural Society, Aurora, Oregon, January 15th, 2013
- *Vegetable and small fruit IPM, and pesticide risk management workshop:* co-organizer, joint presenter, Wilsonville, Oregon, January 8th, 2012
- *Innovative approaches to IPM:* Wilco growers annual meeting, Salem, Oregon, January 3rd, 2013
- *Small fruit IPM and pesticide risk management challenges workshop:* co-organizer, joint presenter, Aurora, Oregon, December 18th, 2012
- *Apple and cherry pest and pesticide risk management workshop:* co-organizer, presenter, Milton Freewater, Oregon, Nov 28th, 2012

- *Cherry pest and pesticide risk management workshop:* co-organizer, presenter, The Dalles, Oregon, Nov 27th, 2012
- *Pest management challenges and IPM program design:* co-organizer, sole presenter: Wilbur-Ellis, Wilsonville, Oregon, September 6th, 2012
- *Pest management challenges and IPM program design:* co-organizer, sole presenter, Wilco, Mount Angel, Oregon, Sept 5th, 2012
- *Farm design and planning for functional agricultural biodiversity*: co-organizer, invited joint-presenter, Berggren Watershed Conservation Area demonstration farm, Springfield, Oregon, August 15th, 2012
- *Pesticide risk assessment and mitigation to protect aquatic life:* Invited Speaker: Salmon Safe Summit, Edgefield, Oregon, June 14th-15th, 2012
- *IPM challenges in stone fruit:* invited keynote speaker, Northwest Horticultural Society, January 31st, 2012
- *Developing IPM solutions to serious pest, disease and weed problems,* invited speaker, North Valley CORE pesticide training, Forest Grove, Oregon, January 19th, 2012
- *Pesticide management, rational use and risk mitigation:* invited speaker, Oregon Seed Growers League 2011 Annual Meeting, Salem, OR, December 6th, 2011
- *Pesticide risks and their mitigation: PRiME analysis of farmer pesticide use records:* invited speaker at a series of events planned and coordinated by Food Alliance and Salmon Safe, with certified producers.
  - Grape and apple production in the Columbia Basin: December 7th, Milton Freewater, OR
  - Vegetable production in the Willamette Valley: November 18th, Norpac Foods Inc., Salem, OR
  - Wheat and grass seed production in the Willamette Valley, IPPC, Corvallis, OR
- *Assessing beneficial insect habitat on your farm: a predacious ground beetle example:* invited presenter, Gathering Together Farm, Philomath, OR, Sept 1st, 2011
- *IPM solutions to critical pest and pesticide problems:* invited presenter, Wilco, Mt. Angel, OR, August 4th, 2011
- *PRiME Hands-on demonstration* & *IPM, the new standard and ways to incorporate beneficial insects in conservation:* invited presenter, Lower Willamette Basin NRCS Meeting, Salem, OR, July 21st, 2011
- *Farmscaping for predators, parasitic wasps and native bees at Goschie Farms:* co-organizer and presenter, Goschie Farms, Silverton, OR, July 20th, 2011
- *3rd Annual Farmscaping with native plants field day:* presenter and co-organizer, USDA NRCS Plant Materials Center, Corvallis, OR, June 16th, 2011
- *Pollination: global crisis, local consequences*: invited workshop presenter, '12 Days of Earth Day' public lecture series, Canon Beach, Oregon, April 14th, 2011
- *Managing Invasive Plants*: Invited presenter, workshop, Yachats, Oregon, March 5th, 2011
- *Plant selection and propagation for beneficial habitat:* co-organizer, USDA NRCS Plant Materials Center, Corvallis, OR, Feb 17th, 2011
- *Reducing pesticide drift through weather and climate information:* invited presenter, Weed Short Course, Ontario, OR, Feb 16th, 2011
- *Management decisions with regard to beneficial insects:* invited presenter, Northwest Horticulture Society Annual Meeting Berry Section, Canby, OR, January 13th, 2011
- *Organic IPM and maximizing habitat for beneficial insects:* invited presenter, Northwest Horticulture Society Annual Meeting, Organic Crops Section, Canby, OR, January 11th, 2011
- *Watershed-scale IPM, late harvested crops:* organizer and main presenter, Salem, Nov 17th; McMinnville, Nov 19th, 2010.

- *Opportunities for Biological Pest Management in Oregon:* invited speaker, Oregon Agricultural Chemicals and Fertilizer Association annual workshops, (Pendleton) November 2nd, (Eugene) 3rd, (Wilsonville) 4th, 2010
- *Watershed-scale IPM, early harvested crops:* Organizer and main presenter, McMinnville, Oct 20th; Mt Angel, Oct 22nd, 2010.
- *Pesticide risk reduction and IPM in Christmas trees:* invited presenter, PNW Christmas Tree Association, Vancouver, WA, September 11th, 2010
- *Hazelnut IPM field day:* invited presenter, McMinnville, OR, September 8th, 2010
- *Caneberry leafroller conservation biological control farm walk:* invited presenter, Riverbend Farm, Jefferson, OR, July 13th, 2010
- *Farm-scaping with Native Plants Field Day:* co-organizer and presenter, NRCS Plant Materials Center, Corvallis OR, June 1st, 2010
- *New developments in IPM for the wine grape industry:* invited speaker, Oregon Wine Symposium, Eugene Oregon, Feb 22nd, 2010
- *Pesticide selection:* Co-organizer and speaker, IPPC extension IPM program; , McMinnville, OR, Nov 3rd, Mt Angel, OR, Nov 4th, 2009
- *IPM Guidelines for commodities in the Yamhill watershed:* Co-organizer and sole speaker, IPPC extension IPM program, McMinnville, OR, Oct 28th, 2009
- *IPM Guidelines for commodities in the Pudding watershed:* Co-organizer and sole speaker, IPPC extension IPM program, Mt. Angel, OR, Oct 21st, 2009
- *Habitat & conservation practices for beneficial insects on farms: predators, parasites and pollinators:* Xerces Society and Farmscaping for Beneficials Program field class and farm walk, co-organizer and speaker, Southern Oregon Research and Extension Center, Medford & Vaughn Farms, October 8th, 2009
- *Beetle banks, beneficial insects and native pollinators:* Xerces Society and Farmscaping for Beneficials Program field class and farm walk, co-organizer and speaker, Dancing Roots Farm, Troutdale, OR, September 11th, 2009
- *Predators, parasitoids and native bees in an annual vegetable system:* Xerces Society and Farmscaping for Beneficials Program field class and farm walk, co-organizer and speaker, Gathering Together Farm, Philomath, OR, August 18th, 2009
- *Organic IPM in tree fruits and vineyards:* Tri-State Organic Certification & Conservation Planning Cross-Training, invited speaker, J.D. Orchards, Pasco, WA, August 6th, 2009
- *Habitat and conservation practices for beneficial insects on farms: predators, parasites and pollinators:* Xerces Society and Farmscaping for Beneficials Program field class and farm walk, Co-organizer and speaker, Gray Farms, Albany, OR, August 4th, 2009
- *Habitat and conservation practices for beneficial insects on farms: predators, parasites and pollinators:* Xerces Society and Farmscaping for Beneficials Program field class and farm walk, Co-organizer and speaker, Yamhill County Fairgrounds, McMinnville and Tim Kreder Farm, OR, July 28th, 2009
- *Biodiversity that works!:* Western Region Functional Agro-biodiversity Field Course and Tour, Co-organizer and speaker, Kenagy Family Farms, Heavenly Harvest Farm, Tyee Vineyard, Gathering Together Farm, Willamette Valley, OR, July 21st, 2009
- *Habitat and conservation practices for beneficial insects on farms: predators, parasites and pollinators:* Xerces Society and Farmscaping for Beneficials Program field class and farm walk, Co-organizer and speaker, Vaughn Farms, Central Point, OR, July 15th, 2009
- *Farmscaping with native plants:* Co-organizer and speaker, NRCS Plant Materials Center 2009 Field Day, in cooperation with the Xerces Society, June 11th, 2009

- *Habitat and conservation practices for beneficial insects on farms: predators, parasites and pollinators:* Xerces Society and Farmscaping for Beneficials Program field class and farm walk, Co-organizer and speaker, Columbia Gorge Discovery Center and Omeg Orchards, The Dalles, OR, June 3rd, 2009
- *Overview of a new, watershed scale IPM extension program and IPM* & *Climate, weather and pest management: invited speaker and organizer: '*A fresh look at IPM in the Yamhill Watershed', Co-organizer and speaker, IPPC extension IPM program, McMinnville, OR, March 20th, 2009
- *Overview of a new, watershed scale IPM extension program and IPM* & *Climate, weather and pest management: invited speaker and organizer: '*A fresh look at IPM in the Pudding Watershed', Co-organizer and speaker, IPPC extension IPM program, Mt. Angel, OR, March 20th, 2009
- *Applying IPM in Christmas Trees:* invited speaker, Christmas Trees 2009 Short Course, PNW Christmas Tree Association, Vancouver, WA March 6th, 2009
- *Alternatives to Pesticides*: invited speaker, Wasco County Master Gardeners, Wasco, OR, March 4th, 2009
- *Application management for more effective spraying with fewer risks*: invited speaker, Oregon Horticultural Society, Portland, OR, January 27th, 2009
- *Watershed-specific IPM outreach*: Co-organizer and speaker, Mount Angel, OR, January 16th, 2009

Autumn 2008: reconfiguring IPM extension program to align with priorities within the state and region [watershed-specific IPM guidelines; BMP's/GAP's and water quality; IPM in sensitive sites (schools, parks, and other facilities, IPM certification], and sources of funding [Oregon NRCS, CSREES National Water Quality Program, altered competitive Smith-Lever IPM 3(d) funds]. Outreach events resumed spring 2009

- *Alternatives to pesticides in the home and garden:* Invited speaker, Master Gardener Mini College, OSU, Corvallis, July 24th, 2008
- *Farmscaping for beneficials farm walk: farming for bees, beetles and (true) bugs:* Co-organizer and presenter, Persephone Farm, Lebanon, Oregon, July 22nd, 2008
- *Habitat and Conservation Practices for Beneficial Insects on Farms: Predators, Parasites and Pollinators:* Co-organizer and speaker, USDA SARE training/outreach program for agricultural professionals, Xerces Society/IPPC: Hood River, April 21st, Klamath Falls, April 28th, Lebanon - May 13th, Medford – June 3rd, 2008
- *Biorational IPM in orchards, vineyards and row crops: :* Co-organizer and speaker, iSNAP program, Medford, OR, March 4th, 2008
- *Biorational IPM in Vegetables:* Co-organizer and speaker, iSNAP program, Lane County Extn., Eugene, OR, February 19th, 2008
- *Planning to manage pests on your farm*: invited speaker, OSU Extension Small Farms Conference, Corvallis, OR, February 16th, 2008
- *Marketing IPM in hops:* Keynote speaker, Hop Research Council Annual Meeting, Portland, OR, January 24th, 2008
- *Biorational IPM in Orchards:* Co-organizer and speaker, iSNAP program, Yakama Nation, Toppenish, WA, January 22nd, 2008
- *Biopesticides:* invited speaker, North Willamette Research and Extension Center, November 27th, 2007
- *Record keeping for effective IPM*: Co-organizer and speaker, iSNAP workshop, McMinnville, OR, November 19th, 2007

- *Conservation Biological Control:* invited workshop presenter, Tilth Producers Conference, Yakima, Washington, November 9th-11th, 2007
- *Managing pesticide resistance,* and*, Application Management:* Speaker to Oregon Agrochemical and Fertilizer Association meetings in Pendleton (both presentations), Eugene (resistance only) and Wilsonville (both presentations), OR, November 6th, 7th, 8th , 2008
- *IPM and Drift Management*: invited speaker, Targeted Applications, Sprayer Calibration Workshop, iSNAP Program, Marion County SWCD, Salem, OR, November 2nd, 2007
- *Farming for Bees, Beetles and (True) Bugs:* Farmscaping for beneficials farm walk, Sauvie Island Organics, Portland, OR, July 23rd, 2007
- *Planning for Success: Organic Vegetable Production, Habitat Diversity and Ecological Pest Management:* Farm walk, co-organizer, presenter, Stahlbush Island Farms, Medford, OR July 11th, 2007
- *Drift avoidance and management* and *Reducing the ecological impacts of pesticides.* Invited speaker, Southern Oregon Recertification Workshop, April 5th, 2007
- *Design and implementation of an IPM plan for your farm:* IPM Plan Development and Implementation Workshop, LaGrande, OR, March 8th, 2007
- *Organic systems management of insect pests*: invited speaker, OSU Organic Working Group Training, OSU, March 1, 2007
- *IPM and pesticide risk reduction in Caneberries:* speaker, iSNAP workshop series, Oregon Blackberry and Raspberry Commission Workshop, Aurora, OR, February 28thth, 2007
- *Update and future direction of spray application technology research.* Invited speaker, 2007 Hood River Winter Horticulture Meeting, February 20th, 2007
- *IPM and pesticide risk reduction in onions:* speaker, iSNAP workshop series, Ontario Pest Management Seminar, Ontario, OR, February 15th, 2007
- *Organic IPM for potato flea beetles:* USPUD Participatory Potato Project, Gathering Together Farm, Philomath, OR, February 13th, 2007
- *Application technology and drift management:* speaker, iSNAP workshop series , 2007 Columbia Basin Crop Consultants Association Short Course, Moses Lake, WA, January 25th-26th, 2007
- *IPM, application technology and drift management to protect aquatic resources:* speaker and joint organizer, iSNAP workshop series, Yakama Nation, Toppenish, WA, January 24th, 2007
- *Conserving biological diversity on the farm through habitat management &, Pest control using organic methods*: speaker, Vegetable gardening symposium, Clackamas Community College, OR, January 20th, 2007
- *IPM and pesticide risk reduction in potatoes:* speaker and joint organizer, iSNAP workshop series, Intermountain Pest Management Seminar, Klamath Falls, OR, January 11th, 2007
- *Using donuts to manage pesticide application efficiency with air-blast sprayers:* speaker, iSNAP workshop series, Mario County Soil and Water Conservation District, Aurora, OR, December 14th, 2006
- *Principles of Organic Insect Pest Management:* speaker with Mario Ambrosino, Pacific Northwest Vegetable Association annual conference, Pasco, WA, November 15th, 2006
- *Pesticide application technology and drift management* and, *Making it real: pest management case studies in vegetable and grass seed systems*: speaker and joint organizer, iSNAP workshop series, Integrated Pest and Nutrient Management Options: Practices to Protect Water Quality and Enhance Crop Yields, OSU Alumni Center, November 8th-9th, 2006
- *Writing a comprehensive pest management plan for your farm:* speaker and joint organizer 'Making IPM work for your farm: practical guidance on decision-making and risk reduction', iSNAP workshop series, OSU Extension, McMinnville, OR, November 7th, 2006

- *Get my drift: strategies to reduce off-target pesticide movement:* sole presenter, 3h workshop 'Oktoberpest' series, Pest Management Workshops for Greenhouse and Nursery Growers, North Willamette Research and Extension Center, Aurora, OR, October 26th, 2006-10-24
- *A closer look at conservation hedgerows as habitat for beneficial organisms on and off the farm:* speaker and joint farm walk organizer, Sauvie Island Organics, Portland, OR, August 18th, 2006
- *Drift potential and spray coverage of traditional vs modified and new technology sprayers in mid-colombia orchards:* poster with Nagajeran Ramalingham, American Society of Agricultural and Biological Engineers, Portland, OR, August 10th, 2006
- *The climate and weather drivers of pesticide drift*: Speaker, EPA Region 10, Seattle, WA, 19th April, 2006
- *Pesticide drift management* and, *Pesticide risk mitigation case study*: Speaker and joint workshop organizer,
- *IPM Developments in Oregon:* poster, National IPM Symposium, St. Louis, MO, April 4th-6th, 2006
- *IPMnet NEWS: a globally distributed news and information service:* poster with Allan Deutsch, National IPM Symposium, St. Louis, MO, April 4th-6th, 2006
- *Interactive farm planning for conservation biological control:* poster with Gwendolyn Ellen, Mario Ambrosino, Nick Andrews, National IPM Symposium, St. Louis, MO, April 4th-6th, 2006
- iSNAP Workshop Series, February 14th, 2006. LaGrande, OR, February 15th, 2006. Toppenish, WA
- *Participatory organic potato project workshop:* Co-organizer and contributor (potato pest management), Peavey Lodge, Corvallis, OR, Feb 10th, 2006
- *Oregon IPM update: Speaker,* Pesticide chemistry, toxicology and policy short course, Lane Community College, Eugene OR, February 7th, 2006
- *Designing comprehensive IPM plans:* workshop at Wasco County NRCS, The Dalles, OR, Jan 25th, 2006
- *Pesticide drift management*: Speaker and joint workshop organizer, iSNAP Workshop Series, Idaho Potato Conference, January 18th-19th, 2006. Pocatello, ID
- *Organic potato production:* Co-organizer of workshop, Silver Falls State Park, OR, December 14th-16th, 2005
- *Increasing your reliance on beneficial insects: predators, parasites and pollinators*: Joint workshop with Xerces Society , Oregon Tilth 31st Annual Fall Conference, November 19th, 2005. Salem, OR
- *Application technology and drift management:* Speaker to Oregon Agrochemical and Fertilizer Association meetings in Pendleton, Eugene and Wilsonville, OR, November 1st, 2nd, 3rd
- *Pesticide management for water quality (various topics*): Speaker and joint workshop organizer, iSNAP Workshop Series: "Integrated Pest and Nutrient Management Options: Practices and Tools to Protect Water Quality", October 25th-26th, 2005 Vancouver WA
- *Beneficial beetle conservation:* Farmscaping program on-farm workshop, Whistling Duck Farm, Medford, OR. September 15th, 2005
- *Sprayer Technology Research*: Joint presenter with Nagarajan Ramaligam at Mid-Colombia Agricultural Research and Extension Center Annual Field Day (MCAREC), August 4th, 2005
- *IPM, Weather and Climate: Integrating Data, Tools and Services within the W-IPM Center Weather Workgroup.* Invited presentation at Pest Information Platform for Extension and Education (PIPE), Bellefonte, PA, June 16th, 2004
- *IPM planning and system design workshop, with farm tour*: In conjunction with WCC-069 regional IPM coordinators meeting, 2005, Wilsonville, Oregon, April 18th-21st, 2005
- *Sustainable Agriculture:* Presentation to Oregon Department of Fisheries and Wildlife, Stakeholder Advisory Committee concerning the draft State-wide Conservation Plan. Oregon Department of Fisheries and Wildlife, Salem, Oregon, March 17th, 2005

- *How to build an IPM program:* Presentation to Grape Day/Oregon Wine Symposium, Corvallis, OR, March 8th-9th, 2005
- *IPPC Farmscaping Project:* Poster presentation to Farm Direct Marketing Conference, 2005. Oregon State University, February 26th, 2005
- *Pesticide management for water quality (various topics*): Speaker and joint workshop organizer, iSNAP Workshop Series: "Integrated Pest and Nutrient Management Options: Practices and Tools to Protect Water Quality", Feb 15-16, Pasco, WA
- *Garden landscape design for conservation biological control*: Speaker, Insights into Gardening, Oregon State University, Feb. 12th, 2005
- *Participatory, on-farm research and development for conservation biological control*: Organic growers annual meeting, Breitenbush, Oregon, Feb 10th, 2005
- *Pesticide drift management in nurseries:* Invited speaker, J. Frank Schmidt Nurseries, Boring, Oregon, Feb. 9th, 2005
- *Pesticides and the IPPC Program*: Presentation to the PNW IPM Short Course, Lane Community College, Eugene, OR, Feb. 8th, 2005
- *Pesticide management for water quality (various topics*): Speaker and joint workshop organizer, iSNAP Workshop Series: "Integrated Pest and Nutrient Management Options: Practices and Tools to Protect Water Quality", Feb 1-2, Boise, ID
- *Pest Management Update:* Invited speaker, Target Specialty Products workshop series, Seattle, December 7th, 2004; Portland, OR, December 9th, 2004
- *Bugscaping Faire:* Joint fair/workshop with Oregon Tilth, on conservation biological control. Benton County Fairgrounds, December 2nd, 2004
- *Optimizing the performance of orchard air-blast sprayers:* Pesticide applicator licence core training, November 22nd, 2004, Mid-Columbia Research and Extension Center, Hood River, OR
- *Pesticide management for water quality (various topics*): Speaker and joint workshop organizer, iSNAP Workshop Series: "Integrated Pest and Nutrient Management Options: Practices and Tools to Protect Water Quality", November 9-10, Corvallis, OR
- *Organic vs Conventional Farming and Worker Safety and Health:* Invited speaker: " Cultivating a Sustainable Agricultural Workplace", 2004 Agricultural Health and Safety Conference, Troutdale, Oregon, September 13th, 2004
- *Beetle Banks, Bugs and Beneficials:* Invited speaker, OSU Master Gardener Mini College, August 6th, 2004
- *How Surrounding Landscapes Fit into your Bugscape:* Workshop/farm walk, Sauvie Island Organics, July 7th, 2004
- *Making Bloom Happen:* Workshop/farm walk, Gathering Together Farm, Philomath, Oregon, June 3rd, 2004
- *Mid-Columbia Sprayer Technology Field Demonstrations*: Invited Contributor, John Fulton Ranch, The Dalles, Oregon, May 25th, 2004
- *Farm Planning for Beneficials:* Workshop/farm walk, Fry Family Farm, Medford, Oregon, May 13th, 2004
- *Conservation biological control in orchard systems:* Workshop/farm walk, with Oregon Tilth, Mosier, Oregon, March 18th, 2004
- *Better Bugs, Brighter Future: Opportunities in Biological Control:* Invited presentation, Food Alliance Annual Growers Meeting, Portland Oregon, February 26th, 2004
- *Farmscaping for beneficials* (poster): Invited poster, Organic Agriculture Principles and Practices: Workshops for PNW Ag Professionals. Wilsonville, Oregon, February 25th, 2004

- *Gardening for Beneficials:* Oregon Master Gardener Program, Linn-Benton Community College, OSU Extension Service, Corvallis Public Library, Corvallis Library, Feb 24th, 2004
- *Oregon State-wide IPM Program:* Invited presentation, Pesticide Chemistry, Toxicology and Policy Short Course, Ontario, OR, Feb. 10th, 2004
- *Understanding orchard spray drift:* Invited presentation, Mid-Columbia Cherry Day, Wasco County Fruit & Produce League/OSU Wasco County Extension Service, The Dalles, OR, February 5th, 2004
- *New Pesticides and their future:* Invited Presentation, PNW Entomology and Plant Pathology Short Course, Eugene, OR, February 4th, 2004
- *Good neighbour policies in regard to pesticide use.* Invited presentation, Northwest Agricultural Show, Oregon Association of Nurserymen, Portland, Oregon, January 29th, 2004
- *Mid-Columbia Sprayer Technology Workshop:* Invited presentation, Dryland and Field Crops Extension Program, Wasco, Oregon, January 19th, 2004
- *Insectary Plantings:* Invited presentation, Organic Seed Production Conference, Organic Seed Alliance, OSU, January 11th, 2004
- *Ecotoxicology and pesticide use in Hood River watershed: :* Invited presentation,Chemical Applicators Short Course, Portland OR, January 6th, 2004
- *Applying IPM in non-agricultural settings: :* Invited presentation, Chemical Applicators Short Course, Portland OR, January 6th, 2004
- *IPM Grant Opportunities:* Offered Workshop, Oregon Agricultural Extension Association Annual Meeting and Professional Improvement Conference, Madras, Oregon, December 17th, 2003
- *IPM: Current challenges.* Invited presentation, High Desert Green Industry Conference, Bend, Oregon, December 9th, 2003
- *Sprayer technology, buffers, drift, regulation and toxicology*. Invited presentation to Washington Horticulture Association meeting, Wenatchee Convention Center, WA. December 3rd, 2003
- *Promise of Pesticides-The History of the Uses of Pesticides*. Invited presentation to Oregon Vegetation Management Association Annual Conference, Seaside Oregon, November 19th, 2003
- *Bugscaping Faire:* Joint fair/workshop with Oregon Tilth, on conservation biological control. Benton County Fairgrounds, November 17th, 2003
- *IPM Guidelines,* 3-day seminar prepared for Oregon Pest Control Association, Seminar-at-Sea, California coast, November 3rd-7th, 2003 [seminar presented by Rick Hilton, SOREC, OSU]
- Conservation Biological Control, Horton Road Organics and Wintergreen Farm, September 25th, 2003
- *Watershed-based Ecological Risk Assessment of Pesticide Use in Oregon*, Workshop for USGS, EPA, NOAA, NRCS, in collaboration with Departments of Environmental and Molecular Toxicology and Bioresources Engineering, OSU, Salem, Oregon, September 3rd, 2003
- *Pesticides in Perspective*, presentation to 2003 Master Gardener Mini-College, OSU, August 7th, 2003
- *Conservation Biological Control:* Farm walk with Oregon Tilth certified growers, Persephone Farm, August 6th, 2003
- *Gardening and IPM:* phone-in radio show slot on 'Gardening with Jolly Butler', KPAM, Portland, OR, May 3rd, 2003
- *Structural Pest IPM:* workshop at annual Oregon Pest Control Association Technical Seminar, OSU, April 26th, 2003
- *Pesticides and Pest Management in the Food Alliance's Certification Program*: presentation to Food Alliance Stewardship Council, Portland, Oregon, April 22nd, 2003
- *Hoverfly habitat management for aphid pests of broccoli: (Poster)* Mario Ambrosino, Paul Jepson, John Luna, National IPM Symposium, April 8-10, 2003, Indianapolis
- *Enhancements to the State-Wide IPM Program in Oregon: (Poster)* Paul Jepson, National IPM Symposium, April 8-10, 2003, Indianapolis

- *Biologically-based Pest Management in Oregon: (Poster)* Paul Jepson, National IPM Symposium, April 8-10, 2003, Indianapolis
- *Visionary IPM: Systems research across, landscape, farms, crops and pests*: *(Poster)* Ray William, Diane Alston, Paul Jepson, National IPM Symposium, April 8-10, 2003, Indianapolis
- *Online IPM Decision Tools in the Northwest: (Poster)* Len Coop, Paul Jepson, National IPM Symposium, April 8-10, 2003, Indianapolis
- *Online Site-Specific Degree-Day Predictions Using GIS and Climate Map Techniques: (Poster)* Len Coop, Paul Jepson, National IPM Symposium, April 8-10, 2003, Indianapolis
- *Cover crops, land use and IPM:* presentation to Vineyard Cover Crop & Environmental Land Use Workshop, North Willamette Research and Extension Center, April 3rd, 2003
- *Integrated Pest Management: pest management in the home without pesticides:* OSU Master Gardener Program classroom training 2003, Redmond, Oregon, January 29th 2003
- *The Promise of Pesticides* Jan 15th, 2003. 2003 Chemical Applicator Short Course, Portland, Oregon
- *Update-Online IPM decision tools in the Northwest:* Len Coop, Waheed Bajwa, Paul Jepson, Portland Insect Control Conference, 2003, January 13th, 2003
- *Ecotoxicology of Pesticide Residues in Streams*: presentation to Non-crop Vegetation Management Course, OSU, February 13th, 2002
- *Whole day entomology and IPM workshop,* Paul Jepson (organizer, and speaker for *Introduction* and *Ecotoxicology*), Oregon Pest Control Association Annual Meeting, OSU, April 13th, 2002

Extension IPM publications/outreach media (2002 onwards, following appointment as State IPM Coordinator).

- IPM Information Source web site (August 14th, 2002-present)
- Oregon IPM E-mail news updates to i.) IPM professionals in OR (OSU; USDA ARS, NRCS, APHIS; ODA). ii.) IPM stakeholders in OR (e.g. EPA, growers, NGO's (Oregon Tilth, Food Alliance). (August 14th, 2002-present)
- Oregon IPM Newsletter (see Electronic Publications, below) (now continued as news updates on IPPC website)
    - No 1: January 2003 (with four supplements)
    - National IPM News Digest, October 2003
- *IPM,* Radio interview on "Gardening with Jolly Butler" KPAM 860 AM, Portland, Oregon, 3rd May, 2003
- OSU (IPPC [Jepson], Agriculture and Resource Economics [W. Jaeger]) *Potential impacts of NPDES permit requirements on aerial spraying in forestry and agriculture in Oregon*. Report to Dean Dutson, May 16th, 2003, 7pp
- OSU (IPPC [Jepson]) *The use of buffer zones to limit pesticide input to fish bearing streams,* Report to Dean Dutson, August 4th, 2003, 74pp
- *Bugscaping,* Radio interview on "The Dirtbag" on KBOO, 90.7 FM in Portland
- *Pest, Disease and Weed Management.* In 2005 Farming Sourcebook, pp18-21 Celilo Group Media Inc., Portland OR, in collaboration with ODA, WSDA, OSU, OECDD, WSU, CSNAR, November, 2004
- IPPC website: joint developer and author, June, 2006-present, http://ipmnet.org/
- *Integrated Pest Management Resource Guide*. Jepson, P.C., Brewer, L.J., Jepson, S.B. (2006) EM 8898, Oregon State Extension Service, 37pp
- *Pesticide Drift Management*. Jepson, P.C. (2006) EM 8934-E, Oregon State Extension Service

- Pesticide Risk Management movies, with audio, available at http://ipmnet.org/IPM_Self-Study_Resources_Main_Page.htm (cited October 2nd, 2007)
    - *Pesticide drift management*
    - *Planning ahead with climate and weather information*
- *Regional workshop on conservation biological control leads to new workgroup proposal*. In: *The Western Front*, Western IPM Center newsletter, October 2007, available at http://www.wripmc.org/newsletter/October%202007.pdf
- *Oregon's IPPC seeks to improve agricultural sustainability and food security.* In: *The Western Front*, Western IPM Center newsletter, October 2007, available at http://www.wripmc.org/newsletter/October%202007.pdf
- *Farming for Pest Management,* Jepson, P.C., Vaughn, M. (2008) Xerces Society, Portland, OR

Conference papers

A selection of invited and keynote papers and invited workshop participation (excludes regular offered platform papers)

- Invited keynote speaker, *Pathways to Agricultural Transformation*, N8 AgriFood Conference, *Food Production for the Future,* Durham, UK, July 11th, 2017
- Invited keynote speaker, *Ecological principles and the future of food security viewed through the lens of small-holder West-African farmers*. Ecological Society of America, 100th Anniversary meeting symposium, *The Role of Ecology in Achieving Global Food Security*, Baltimore, MD, August 14th, 2015
- Invited keynote speaker, plenary session, *'Scaling up IPM'*. PURE Congress 'IPM Innovation in Europe, Poznan, Poland, January 14th-16th, 2015.
- Invited speaker and discussion leader, *'Philosophies for non-target invertebrate risk assessment and management – options and alternatives for the developing world'*, and *'Pesticide risk assessment and management for beneficial arthropods in North America – an overview of procedures and assumptions, and a global perspective'*. Working Group on Risk Assessment for Pollinators and other Beneficial Arthropods, Ghent, Belgium, September 18th-19th, 2014
- Invited speaker, *'Scaling up agroecology – how hard is that?*'. UN FAO, Rome, Italy, June 24th 2014
- Invited speaker, *'Pesticide risk reduction – novel tools and approaches for analysis, education and policy development'*, Rotterdam Convention technical meeting, Renforcement de la coopération entre le Comité Sahélien des Pesticides (CSP) et les Autorités Nationales Désignées dans la mise en œuvre des obligations de la Convention de Rotterdam en tenant compte du facteur durabilité sociale, environnementale et économique; Sénégal, Dakar, 7th-10th April, 2014
- Invited speaker, *'Pesticide risks to human health and the environment'*, & *'Opportunities for action and future collaborative programs'*, Final Restitution Meeting, Global Environment Facility (GEF) Program - Reducing Dependence on POPs and other Agro-Chemicals in the Senegal and Niger River Basins Through Integrated Production, Pest and Pollution Management, Dakar, Senegal, January 29th-30th, 2014
- Invited colloquium chair and speaker, *'Protection Goals for Environmental Risk Assessment in Agro-Ecosystem Landscapes'*, European Food Safety Authority, Parma, Italy, November 27th-28th, 2013
- Invited seminar presenter: *'Pesticide risk reduction and sustainable production intensification (SPI) – novel tools and approaches for analysis, education and policy development'*, UN FAO, Rome, Italy, January 29th, 2013
- Conference co-organizer and presenter: '*Establishing state-of-the-science environmental monitoring and analysis to support production intensification in West Africa'* (co-author)*; 'New tools to enable*

adaptive management of crop production, human health and environmental protection in West Africa' (lead author and presenter)*:* Royal Society of London discussion meeting and satellite meeting, *'Achieving food and environmental security – new approaches to close the gap'*. Royal Society, London, UK, December 5th-6th 2012; Kavli Center, London UK December 3rd-4th, 2012

- Invited keynote speaker: *'The practical implementation of IPM'*: NJF (Nordic Association of Agricultural Scientists) Conference *'Are We Ready for the EU IPM'*?, Tallin, Estonia, November 7th-8th, 2012
- Invited participant: *'Toward a 21st-century invasive pest policy: Re-conceiving the strategic framework'*, UC Davis, California, May 14th-15th, 2012
- Invited speaker for three presentations: 1) *'From regulation to research, developing large-scale monitoring and management efforts':* Symposium *Making the hand-off: moving invasive species from regulation to management.* 2) '*Coordinating and networking IPM research and extension in the USA*': Symposium *Networking Approaches for IPM Research and Extension.* 3) *'Putting PRiME to work for specialty crop IPM'* Symposium *Doesn't the EPA Regulate Pesticide Use: Why do we need the Pesticide Risk Mitigation Engine?* 7th International IPM Symposium, Memphis, TN, March 27th-29th, 2012
- Invited keynote speaker: *'Effect of GMO's on above-ground, multi-trophic interactions'*: ERGO (Ecologically Regarding Genetically Modified Organisms) Congress, Amsterdam, the Netherlands, February 16th-17th, 2012
- Invited plenary speaker: *'Analysis of epidemics and outbreaks'*. National Plant Diagnostics Network National Conference, Berkeley, California, USA, November 7th, 2011
- Invited speaker: 'Vulnerabilities in US and West African IPM systems', University of California, Davis, October 3rd, 2011
- Invited speaker: *'PRiME: Pesticide Risk Mitigation Engine Applications in AZ Cotton'*. Desert Agriculture Conference, Casa Grande, Arizona May 5th, 2011
- Invited speaker: '*The sources and consequences of uncertainty associated with pesticide risk assessment and management in West Africa*' FAO (UN), Rome, March 21st, 2010
- Invited keynote and invited plenary speaker: '*International efforts to improve pesticide safety and increase IPM*', and '*Developing community partners to improve pest management and protect the environment*', Association of Applied IPM Ecologists (AAIE) Annual Conference, Monterey, California, Jan 31st, 2011
- Invited speaker: '*Opportunities for high resolution decision support tools in time and space, to meet IPM needs associated with invasive pests and diseases'.* Entomological Society of America symposium: *'Harnessing the Internet for Production Agriculture Stakeholders Using the IPM-PIPE Paradigm'*, ESA Annual Meeting, San Diego, CA, Dec 12th-15th, 2010
- Invited speaker: *'Pro's and cons, do's and don'ts associated with pesticide risk scoring and assessment systems'*. 12th IUPAC International Congress of Crop Protection Chemistry, Melbourne, Australia July 4th-8th, 2010
- Invited workshop chair, and organizing committee chair: *Workshop on Advances in the Regulatory Testing and Risk Assessment Procedures for Plant Protection Products with Non-Target Arthropods*. SETAC Europe & Beneficial Arthropods Regulatory Testing Group (BART), Wageningen, The Netherlands, March 8th-11th, 2010
- Invited speaker: *Landscape scale IPM principles and technologies*: System-Wide Program-IPM, CGIAR Institutes global workshop, Gustav-Stresemann Institut, Bonn Germany, March 33rd-5th, 2010
- Invited speaker: *Integrated Pest Management (IPM) and environmental protection*. Department of Environmental Quality (OR) Toxics Reduction Opportunities Workshop, Portland, OR, Nov 17th, 2009,

- Invited speaker: '*Barriers to IPM adoption in developed and developing countries':* APS Annual meeting, Portland Oregon, July 30th-Aug 6th, 2009
- Invited speaker: *'IPM extension in the USA'*. In: 'Diversity in IPM education and delivery systems: strengths, weaknesses, opportunities and threats'. The Sixth International IPM Symposium, 'Transcending Boundaries', Portland, Oregon, March 24-26, 2009
- Invited speaker: '*Internationalization*'. In: 'A New Pesticide Evaluation and Selection Tool for Agriculture'. In 'Mitigating and eliminating pesticide risks in surface waters in West Africa and the Pacific Northwest'. The Sixth International IPM Symposium, 'Transcending Boundaries', Portland, Oregon, March 24-26, 2009
- Speaker and session organizer: *'IPM and pesticide challenges in West Africa and the Pacific Northwest with water as a common thread'* (co-authors, W. Settle, H. Garba, M. Sarr); *'The role of IPM education in reducing or eliminating risks, and in meeting food security goals'* (co-authors W. Settle, H. Garba, M. Sarr). In 'Mitigating and eliminating pesticide risks in surface waters in West Africa and the Pacific Northwest'. The Sixth International IPM Symposium, 'Transcending Boundaries', Portland, Oregon, March 24-26, 2009
- Invited conference keynote speaker: '*Does ecological risk assessment advance or inhibit sustainability*?': SETAC Europe Annual Meeting, Warsaw, Poland, May 25th-29th, 2008
- Invited speaker: '*The Pacific Northwest's iSNAP Project: An Educational Success Story for Best Management Practices'*. USDA National Water Quality Conference, Reno, Nevada, Feb 3rd-7th, 2008
- Invited speaker: *'Mechanisms underlying population effects of pesticides on beneficial insects'*, session: The use of beneficial organisms in plant protection – population level management, 16th International Plant Protection Congress, Glasgow, October 15th-18th, 2007
- Invited speaker/contributor: *'International experience with the environmental impact quotient (EIQ): its potential and uses'*, & *'Experience in environmental monitoring: West Africa'*, Workshop on the Environmental Impact Quotient, FAO (UN) Hai Phong, Vietnam, 19th-21st April 2007
- Invited speaker: *'Pest Management Strategic Plans: Benefits to Producers'*, Pacific Branch ESA Meeting, Portland Oregon, March 28th, 2007
- Invited speaker: *'Epidemiology: a regional to local focus',* 1st National NPDN Meeting, Orlando, Florida, January 28th-31st, 2007
- Invited workshop participant: U.S. EPA-sponsored technical workshop to *Explore Ecological Impacts from Plant-Incorporated Protectants (PIPs) and Research Project Development*, Corvallis, Oregon, December 5th-6th, 2006
- Invited speaker: *'Understanding and managing pesticide-natural enemy interactions as a critical component of IPM'*, 11th IUPAC International Congress of Pesticide Chemistry, Kobe, Japan, August 6th-11th, 2006
- Invited speaker: *'Understanding and managing pesticide-natural enemy interactions as a critical component of IPM',* NARC, NIAES meeting, Tsukuba, Japan, August 3rd, 2006
- Invited speaker: '*Pesticide impacts on biological control agents: insights from ecotoxicology, landscape ecology and conservation biology*', Biological Control Section of Tokyo University of Agriculture, Japan Biological Control Meeting (NRI), Tokyo, Japan, August 1st, 2006
- Invited participant: '*Development of generic methods for risk assessment to transgenic crops and non-target organisms*' IOBC/WRPS Workshop, Engelberg, Switzerland, May 3rd-5th, 2006 [participated remotely from USA]
- Invited speaker: '*Predicting pesticide risks and finding out if IPM programs reduce them*': symposium, 'Evaluating risk reduction' at The Fifth National IPM Symposium, '*Delivering on a Promise*', St. Louis, MO April 4th-6th, 2006

- Invited speaker with Len Coop (IPPC):: '*On-line IPM Delivery*' at The Fifth National IPM Symposium, '*Delivering on a Promise*', St. Louis, MO April 4th-6th, 2006
- Symposium co-organizer (with R.D. William and M. Engle): mini symposium '*Connecting IPM practices, priorities and strategic directions*': at The Fifth National IPM Symposium, 'Delivering on a Promise', St. Louis, MO April 4th-6th, 2006
- Workshop, sole presenter, 'Development of field studies to investigate the ecological impact of GM crops containing plant-incorporated protectants'. EPA, Washington DC, March 16th-17th, 2006
- Invited speaker: *"Mechanisms for testing and refining the effectiveness of ecological risk assessment procedures for GM crops"*. USEPA, USDA APHIS, FDA Symposium for agricultural biotechnology risk analysis research. USDA APHIS Conference Center, Riverdale, MD, November 29th-Dec 1st, 2005
- Invited speaker: Provisional title*: "Critical steps in the development and adoption of effective environmental monitoring for GM crops".* Inter-departmental working groups on Biotechnology and Biodiversity, FAO, Rome, Italy, October 4th, 2005
- Invited joint seminar presenter, with Jeff Jenkins (EMT, OSU): Provisional title: *'Understanding pesticide fate and environmental impact at the watershed scale and beyond'*. Global IPM Facility, FAO, Rome Italy, October 5th, 2005
- Invited keynote speaker: '*GMO's in crop production and their effects on the environment: methodologies for monitoring*' (co-authored with Ghosh, K., Kenmore, P.), Ecological Impact of Genetically Modified Organisms, IOBC/WPRS Working Group on GMO's in Integrated Plant Production, Lleida, Catalonia, Spain, June 1st-3rd, 2005
- Invited speaker and FAO-appointed consultant to expert panel: '*Environmental Monitoring of GM Crops: Monitoring Methodologies and the Way Ahead'*, FAO, Rome, Italy, January 18th-20th, 2005
- Invited Panel Member '*Review of non-target risk assessment white paper*' for the USDA Biotechnology Regulatory Services. USDA APHIS, Maryland, December 14th-16th, 2004
- Invited Speaker: *'Population persistence in real and model ecosystems'* Fourth SETAC World Congress, session: New Advances in Estimating Effects of Toxicants on Populations, Portland, OR, November 18th, 2004
- Invited Speaker: '*A rule-based model for the development of community-level distributions that compare susceptibilities of macro-invertebrate assemblages to short and long-term pesticide impacts'* Fourth SETAC World Congress, session: Pesticides in Pacific Northwest Watersheds, Portland, OR, November 17th, 2004
- Invited speaker: *'Evaluating population and community recovery of invertebrates in B.t. crops'*, in: 'Current Advances Toward Developing Non-Target Insect Testing in Bt Crops', Entomological Society of America, Salt Lake City, UT, Nov 14th-17th, 2004 [talk presented by Mario Ambrosino]
- Invited Speaker: '*Biologically-based IPM'*, Tilth-30, Portland, OR, Nov. 12th, 2004
- Invited contributor: Environmental Risk Assessment Workshop and School, European Union sponsorship, Krakow, Poland, October 1st-3rd, 2004
- Member FIFRA Scientific Advisory Panel considering Cotton Plant-Incorporated-Protectant Non-Target Insect Issues, Arlington, VA., June 8-10th, 2004
- Invited plenary speaker: *'Implications for future R&D and policy strategies'*, BCPC Forum 'Enhancing eco-efficiency in agriculture', UK Department of Environment, Food and Rural Affairs, Scottish Executive Environment and Rural Affairs Department, Scottish Agricultural College, Hampshire, UK, April 26th-27th, 2004
- Invited session organizer: '*Environmental Effects of Agrochemicals*', XVth International Plant Protection Congress, Beijing, China, July 6th-11th, 2003 [CONFRERENCE POSTPONED BECAUSE OF SARS OUTBREAK]

- Invited participant on expert panel: '*Expert consultation on Environmental Effects of Genetically Modified Crops'*, FAO, Rome, Italy, June 16th-19th, 2003
- Invited Speaker '*Biotechnology: philosophical perplexities and ethical enigmas'.* National Agricultural Biotechnology Council 15th Annual Meeting 'Biotechnology: science and society at a crossroads', Seattle, June 1st-3rd, 2003
- Invited participant 'Homeland Security Epidemiology Workshop', USDA CSREES, Washington DC, March 6th-7th, 2003
- Invited Panel Member '*Assessing Environmental Effects of Transgenic Crops*' for the USDA Biotechnology Regulatory Services. USDA APHIS, Maryland, March 3rd-4th, 2003
- Invited seminar: 'Rachel Carson Lectures', *'The promise of pesticides 1942, 1962, 1982, 2002'*, Department of Philosophy, OSU, Ideas Matter Lecture Series, November 14th, 2002
- Invited speaker. '*Terrestrial non-target invertebrates*'. Workshop on Assessment Endpoints for Environmental Protection. The Environmental Assessment Division of the Canadian Pest Management Regulatory Agency (PMRA), Val Morin, Quebec October 4th to 6th, 2002
- Member FIFRA Scientific Advisory Panel considering Corn Rootworm Plant-Incorporated Protectant Non-Target Insect Issues. Arlington, VA., August 27th-29th, 2002
- Invited workshop focus presenter: '*Ecological Assessment of B.t. Crops on Non-target Invertebrates*', EPA Workshop Series on *B.t.* Crop Management and Environmental Effects. Washington DC, June 3rd-4th, 2002
- Invited Presentation: Third California Conference on Biological Control (CCBC III): *'Size matters: the enigma of scale dependency in the ecological impact of pesticides'*, University of California, Davis, August 15th-16th, 2002
- SETAC Workshop "*Integrating Eco-Modelling & Risk Assessment: Exploring the Recovery Potential of Perturbed Ecological Systems*", invited speaker, Talk "*Outlook and the way forward*", Vienna, Austria, May, 2002
- SETAC Europe Annual meeting, special symposium "Biotechnology products and genetically modified organisms*",* invited session organizer, chair and speaker, Talk: *"New paradigms in ecological risk assessment for GMO's"*, Vienna , Austria, May 2002
- SETAC Europe Annual meeting, session "Effects of pollutants on biological diversity" invited speaker, Talk "*What don't we know about the effects of pesticides on biodiversity*", Vienna , Austria, May 2002
- Invited speaker: 63rd Biology Colloquium, Oregon State University, *'Environmental Risk Assessment for GMO's'* April 18th, 2002
- Rothamsted Experimental Station and John Innes Center, UK, workshop "Growing the Future: Insect Pests and their control", invited presentation "*Impact of pest control measures on the environment, food and human health"*, Harpenden, UK, March, 2002
- Ideas Matter seminar series "Biotechnology: Philosophical Puzzles and Ethical Enigmas" invited seminar "*The Science and Ethics of Risk Assessment*" Department of Philosophy, OSU, February, 2002
- Entomological Society of America, invited speaker in session**, "**Ecological Impact of Transgenic Bt Crops: Results of Farm-scale Field Studies**",** talk*: "Scale-dependent ecological effects, with implications for study design and analysis",* San Diego, December, 2001
- American Phytopathological Society, invited speaker in session, "Presenting Biotechnology to the Public", talk: "*Environmental issues surrounding biotechnology*" Salt Lake City, August, 2001
- International Congress of Entomology, invited symposium organiser for *Pesticide Ecotoxicology*, Foz doIguassu, Brazil, August, 2000

- International Congress of Entomology, invited speaker "*Ecotoxicology of Pesticides and IPM*", and invited co-moderator of symposium (Perspectives in Ecotheory and IPM), Foz doIguassu, Brazil, August, 2000
- SETAC World Congress, Symposium on "*Ecological risk assessment for transgenic crops",* invited speaker, Brighton, UK, April, 2000
- SETAC workshop "ESCORT II" "*Decision making scheme for the environmental risk assessment of plant protection products*", invited speaker and consultant, Wageningen, the Netherlands, March, 2000
- SETAC Pellston Workshop, "*Assessing the Effects of Complex Stressors in Ecosystems*", invited contributor, Pellston, Michigan, September, 1999
- Conference on 'Emerging Technologies in IPM: Concepts, Research & Implementation', invited contributor (*Pesticide use in IPM: Concepts and Reality*), North Carolina State University, Spring, 1999
- Entomological Society of America symposium on *Agroecological Implications of Transgenic Plants*, invited contributor, Las Vegas, USA, November, 1998
- North Atlantic Treaty Organisation workshop on *Demographic Ecotoxicology*, invited contributor, Krakow, Poland, September, 1998
- International Arachnological Congress, invited paper on *Spiders in Agroecosystems*, Chicago, USA, July, 1998
- National Institute for Environmental Health Sciences, workshop on *Strategies for Assessing the Implications of Malformed Frogs for Environmental Health*, invited speaker, Research Triangle Park, NC, USA, December, 1997
- Society for Environmental Toxicology and Chemistry meeting on *Setting Priorities in Environmental Protection*, invited guest speaker, York, UK, September, 1997
- New Zealand Plant Protection Society, invited keynote speaker at 50th Anniversary Conference, Lincoln University, New Zealand, August, 1997.
- Welsh Pest Management Forum Conference on *Ecotoxicology: Pesticides and Beneficial Organisms*, invited keynote speaker, Cardiff, UK, September, 199
- International Congress of Plant Protection, invited session convenor on *Long-term Pesticide Side-Effects*, and invited speaker on G*rasshopper and Locust Management*, and *Validation and Application of Ecotoxicological Models*, The Hague, The Netherlands, July, 1995
- European Union Workshop on *Beneficial Invertebrates in Agroecosystems*, invited Chair and presenter, Aarhus, Denmark, December, 1994
- Society for Environmental Toxicology and Chemistry: Europe, conference on *ECOtoxicology: ecological dimensions*, invited speaker on *Time and Space*, Sheffield, UK, September, 1994
- Society for Environmental Toxicology and Chemistry, workshop on *European Standard Characteristics of Beneficials Regulatory Testing (ESCORT)*, invited keynote speaker and summariser, Wageningen, the Netherlands, March 1994
- Food and Agriculture Organisation, United Nations, workshop on *Desert Locust Control*, invited guest speaker, Marrakech, Morocco, May, 1993
- United States Environmental Protection Agency, symposium on the *Ecological Risks Posed by Transgenic Plants*, invited speaker, Maryland, USA, November, 1992

Conference organisation

- Initiated and organised 17 conferences, symposia or workshops since 1983. These include a session at the International Congress of Entomology, Vancouver, 1988; the BES/NERC conference 'New

Horizons in Ecotoxicology' Southampton, 1989 and several workshops or regional meetings for the Royal Entomological Society. I convened the Ecotoxicology and Environmental Pollution sessions at the World Congress of Ecology in 1994. I was an invited organiser for a symposium in Ecotoxicology for the International Congress of Entomology, Brazil, 2000, and co-organiser for the symposium on Ecological Theory and Integrated Pest Management. In 2000, I ran a workshop for the USDA Regional Pest Management Center, entitled "*agroECOLOGICAL Regions: The Application of Watershed, Basin and Ecoregion Analytical Tools to Pest Management"*. In 2002, I ran a symposium at the Entomological Society of America entitled '*Effects of agricultural practices on natural enemies*'. In 2004, I RAN a symposium at the SETAC World Congress titled: *'Pesticides in Pacific Northwest Watersheds'*. In 2005, I ran a meeting for the USDA CSREES, RMA and APHIS '*A Discussion Meeting to Explore the Possibilities for a Coordinated National Infrastructure for IPM Decision Support*', at OSU. In 2006, I ran a mini-symposium at the National IPM Symposium in St. Louis, '*Connecting IPM practices, priorities and strategic directions*'. Two symposia were presented at the International IPM Conference in Portland, OR, 2009: *'Mitigating and eliminating pesticide risks in surface waters in West Africa and the Pacific Northwest'* and *'Developing and delivering IPM tools that transcend boundaries'.* I co-organized two meetings for the Royal Society of London in 2012 addressing the theme:*'Achieving food and environmental security – new approaches to close the gap'*.

External examination (UK)

PhD examiner at University of Wales, University of Reading, Imperial College (London) (twice), and Lincoln University, New Zealand. Also external examiner for the Environmental Science undergraduate degree at University of East Anglia, UK, in 1995.

Journal refereeing

Referee for Philosophical Transactions of the Royal Society, Annals of Applied Biology, Bioscience, Bulletin of Entomological Research, Crop Protection, Environmental Entomology, British Ecological Society Journals, Agriculture Ecosystems and the Environment, Entomologia Experimentalis et Applicata, Environmental Pollution, Ecological Applications, Ecotoxicology, Molecular Ecology, Oecologia, Environmental Entomology and Journal of Economic Entomology, PeerJ

Publications

Total publications to date:

Book chapters: 22

Edited works: 8

Papers: 115

With 11 electronic publications; 1 newspaper article; 17 extension publications

Book contributions:

Jepson, P.C. & Green, R.E. *(1983) "*Prospects for improving control strategies for sugar-beet pests in England". In: *Advances in Applied Biology VII* (Ed T.H. Coaker), pp 175-249. Academic Press, London.

Jepson, P.C. (1987) “Sugar beet”. In: *Integrated Pest Management* (Eds. A.J. Burn, T.H. Coaker, P.C. Jepson), pp 295-328. Academic Press, London.

Jepson, P.C. (1989) “The temporal and spatial dynamics of pesticide side-effects on non-target invertebrates”. In: *Pesticides and non-target invertebrates* (Ed. P.C. Jepson), pp 95-128. Intercept, Wimbourne.

Jepson, P.C. & Sherratt, T.N. (1996) “The dimensions of space and time in the assessment of ecotoxicological risks”. In: *ECOtoxicology: Ecological Dimensions* (Eds. D.J. Baird, P.W. Grieg-Smith & P.E.T Douben) pp 44-54. Chapman and Hall, London

Jepson, P.C. (1997) “Scale dependency in the ecological risks posed by pollutants: is there a role for ecological theory in risk assessment?” In: *Ecological Risk Assessment of Contaminants in Soil* (Eds. N.M. van Straalen & H. Lokke) pp 175-190. Chapman and Hall, London

Jepson, P.C. (1998, 1993) “Insects Spiders and Mites”. In: *Handbook of Ecotoxicology Vol. 1* (Ed. P. Calow), pp 299-325. Blackwells, Oxford.

Croft, B.A., Jepson, P.C. & Heneghan, P.A. (1998) “Issues of pesticide toxicology and arthropod natural enemies in pre- and post-registration stages of chemical pesticide development”. In: *Ecotoxicology:*

Pesticides and Beneficial Organisms. (Eds. P.T. Haskell & P. McEwen). pp. 7-21. Kluwer Publishers, London.

Jepson, P.C. & Croft, B.A. (1998) “Introduction” In: *Ecotoxicology: Pesticides and Beneficial Organisms*. (Eds. P.T. Haskell & P.McEwen). pp. 3-6. Kluwer Publ., London.

Laskowski, R & Jepson, P.C. (1998) “Selection of species for soil ecotoxicity testing”. In: *Handbook of Soil Invertebrate Toxicity Tests*. (Eds. H. Lokke, C.A.M. van Gestel). pp. 21-32. John Wiley, Chichester, UK

Jepson, P.C. (2000) “Pesticides and IPM: concepts and reality”. In: *Emerging Technologies for Integrated Pest Management: Concepts, Research and Implementation*. (Eds. G. Kennedy & T. Sutton) pp 307-322. American Phytopathological Society (APS) Press, St.Paul, MN

Jepson, P.C., Dick, R., Boggess, B., Jenkins, J., Gamroth, M. (2000) "Summary of Current Status and Health of Oregon's Agricultural Ecosystems" In: *Oregon State of the Environment Report, Full version.* pp 85-105. Oregon Progress Board, 775 Summer Street N.E. Suite 330 Salem, OR 97301-1283

Jepson, P.C. (2001) "Pesticides, compounds and uses" In: *Encylopedia of Biodiversity*, Volume 4, pp 509-522 Academic Press

Luoma S.N., Clements, W., DeWitt, T., Gerritsen, J., Jepson, P. Hatch, A., Reynoldsen, T., Thom, R. (2001) The role of environmental variability in evaluating stressor effects. Chapter 5, in Baird D.J., Burton G.A. (Eds.) *Ecological variability: separating natural and anthropogenic causes of ecosystem impairment.* Pp 141-176 SETAC Press

Luoma S.N., Clements, W., Gerritsen, J., Jepson, P. Hatch, A., Reynoldsen, T., Thom, R. (2001) Separating stressor influences from environmental variability: eight case studies from terrestrial and aquatic ecosystems. Chapter 6, in Baird D.J., Burton G.A. (Eds.) *Ecological variability: separating natural and anthropogenic causes of ecosystem impairment.* Pp 179-213 SETAC Press

Luoma S.N., Clements, W., Gerritsen, J., Jepson, P. Hatch, A., Reynoldsen, T., Thom, R. (2001) Stressor interactions in ecological systems. Chapter 7, in Baird D.J., Burton G.A. (Eds.) *Ecological variability: separating natural and anthropogenic causes of ecosystem impairment.* Pp 215-230 SETAC Press

Romeis, J., Bartsch, D., Bigler, F., Candolfi, M.P., Gielkens, M.M.C., Hartley, S.E., Hellmich, R.L., Huesing, J.E., Jepson, P.C., Layton, R., Quemada, H., Raybould, A., Rose, R.I., Schiemen, J., Sears, M.K., Shelton, A.M., Sweet, J., Vaitusis, Z., Wolt, J.D. (2006) Moving through the tiered and methodological framework for non-target arthropod risk assessment of transgenic insecticidal crops. Proceedings of the 9th International Symposium on the Biosafety of Genetically Modified Organisms, September 24th-29th, 2006, Jeju Island, Korea, pp 62-67.

Jepson, P.C. (2007) Challenges to the design and implementation of effective monitoring for GM crop impacts: lessons from conventional agriculture. In: Ghosh, K., Jepson, P.C. (Eds), *Genetically Modified Organisms in Crop Production and their Effects on the Environment: Methodologies for Monitoring and the Way Ahead*. Report on Expert Consultation and Selected Papers, Food and Agriculture Organization (UN), pp 34-57

Jepson, P.C. (2007) Ecotoxicology and IPM, In: Kogan, M., Jepson, P.C. (Eds) *Perspectives in Ecological Theory and Integrated Pest Management*, pp 522-551 Cambridge University Press, UK. 570pp

Kogan, M, Jepson, P.C. (2007) Ecology, sustainable development and IPM In: Kogan M, Jepson, P.C. (Eds) Perspectives in Ecological Theory and Integrated Pest Management, pp 1-44. Cambridge University Press, UK. 570pp

Jepson, P.C. (2009) Assessing environmental risks of pesticides In: Radcliffe, E.B., Hutchinson, W.D., Cancelado, R.E. (Eds*) Integrated Pest Management: Concepts, Strategies, Tactics and Case Studies* pp 205-220 Cambridge University Press, 540pp

Huesing, J.E., Prasanna, B.M., McGrath, D., Chinwada, P., Jepson, P.C., Capinera, J.L. (2018) Integrated Pest Management of Fall Armyworm in Africa: an Introduction, pp 1-10. In Prasanna, B.M., Huesing, J.E., Eddy, R., Preschke, V.M. *Fall Armyworm in Africa: A Guide for Integrated Pest Management, First Edition.* Available at: https://feedthefuture.gov/resource/fall-armyworm-africa-guide-integrated-pest-management-first-edition

Jepson, P.C., Murray, K., Bach, O., Kachigamba, D., Ndeithi, F., Kibaki Miano, J., McCracken, T., Onyango, D., Nthegna, I, Agboka, K., Byantwala, S., DeGroote, H. (2018) Pesticide hazard and risk management, and compatibility with IPM, pp 29-44. In Prasanna, B.M., Huesing, J.E., Eddy, R., Preschke, V.M. *Fall Armyworm in Africa: A Guide for Integrated Pest Management, First Edition.* Available at: https://feedthefuture.gov/resource/fall-armyworm-africa-guide-integrated-pest-management-first-edition

World Wide Web Sites and Electronic Publications

Heneghan, P.A., Briggs, J., Jepson, P.C., Kedwards, T., Maund, S.J., Sherratt, T.N., Shilabeer, N., Strickland, T.R., Williams, P. (1999) *Pond-FX: ecotoxicology from pH to population recovery*. 1st edition. Oregon State University: Department of Entomology.

Jepson,P.C. (August 2002-present) *Oregon IPM Information System*. Oregon State University: Integrated Plant Protection Center.

Jepson,P.C. (Ed.) (2003) *Oregon IPM Newsletter: Issue 1*. Oregon State University: Integrated Plant Protection Center.

Jepson,P.C. (2003) *Supplement to Oregon IPM Newsletter: Enhancements to the state-wide IPM program*. Oregon State University: Integrated Plant Protection Center.

Deutsch, A., Ford, R., Jepson,P.C. (2003) *Supplement to Oregon IPM Newsletter: Nine years of global IPM decision making*. Oregon State University: Integrated Plant Protection Center.

Coopl L., Jepson,P.C. (2003) *Supplement to Oregon IPM Newsletter: On-line, Site Specific Degree-Day Predictions Using GIS and Climate Map Technologies*. Oregon State University: Integrated Plant Protection Center.

Jepson, P.C. (2003) National IPM News Digest: Oregon State University: Integrated Plant Protection Center.

Jepson, P.C. (2004) Oregon IPM Program Highlights July, 2002- December, 2003: Oregon State University: Integrated Plant Protection Center.

Jepson, P.C., Brewer, L.J., Jepson, S.B. (2006) Integrated Pest Management Resource Guide. Oregon State University Extension Publication EM 8898, 37pp

Jepson, P.C. (2007) *Pesticide Drift Management*. Oregon State University Extension Publication EM 8934-E, with narrated audio file available from the Internet: http://ipmnet.org/IPM_Self-Study_Resources_Main_Page.htm ; and (English) http://ipmnet.org/Pesticide_Drift_Artwork/Spray%20Drift%20lo%20res%20print.pdf ; (Spanish) http://ipmnet.org/Pesticide_Drift_Artwork/Spray%20Drift%20lo%20res%20print-Spanish.pdf

Guzy M.R., Jepson P.C., Mineau, P., Kegley, S. (2014). The http://ipmPRiME.org agricultural pesticide use risk assessment tool at Oregon State University, Integrated Plant Protection Center and Biological and Ecological Engineering, 2008-2014.

Newspaper articles:

Jepson, P.C. (2003) New Opportunities for Biological Control In: *In Good Tilth* **14**(4), p1& p18

Extension publications

Jepson, P.C., Brewer, L.J., Jepson, S.B. (2006) *Integrated Pest Management Resource Guide*. EM 8898, Oregon State Extension Service, 37pp

Jepson, P.C. (2007) *Pesticide Drift Management*. Publication EM 8934-E, Oregon State Extension Service

Jepson, P.C., Vaughn, M. (2008) *Farming for Pest Management,* Xerces Society, Portland, OR

Halbleib, M.L., Jepson, P.C. (2016) Adaptive, learner-centered education: a toolkit for extension. EM 9144, Oregon State Extension Service.

Murray, M.K., Jepson, P.C., Bouska, C, Patten, K. (2017) *Integrated Pest Management Strategic Plan for Oregon and Washington Cranberries.* USDA Western IPM Center, and OSU Extension (in press)

Murray, M.K., Reitz, S., Jepson, P.C. (2017) *Integrated Pest Management Strategic Plan for Onions in the Treasure Valley, Oregon and Idaho*, USDA Western IPM Center, and OSU Extension EM 9187 (available at: https://catalog.extension.oregonstate.edu/sites/catalog/files/project/pdf/em9187.pdf)

Durocher-Granger L, Babendreier D, Huesing J.E., Jepson P.C., Eddy R, Prasanna B.M. (2018) Fall Armyworm (FAW) on Maize – Kenya. *Feed the Future Pest Management Decision Guides.* Wallingford, CABI.

Durocher-Granger L, Babendreier D, Dey K, Huesing JE, Jepson P.C., Eddy R, Prasanna B.M. (2018) Fall Armyworm (FAW) on Maize – Malawi. *Feed the Future Pest Management Decision Guides.* Wallingford, CABI.

Durocher-Granger L, Babendreier D, Cole, S., Huesing JE, Jepson P.C., Eddy R, Prasanna B.M. (2018) Fall Armyworm (FAW) on Maize – Liberia. *Feed the Future Pest Management Decision Guides.* Wallingford, CABI.

Durocher-Granger L, Babendreier D, Huesing JE, Jepson P.C., Eddy R, Prasanna B.M. (2018) Fall Armyworm (FAW) on Maize – Mali. *Feed the Future Pest Management Decision Guides.* Wallingford, CABI.

Durocher-Granger L, Babendreier D, Dey K, Huesing JE, Jepson P.C., Eddy R, Prasanna B.M. (2018) Fall Armyworm (FAW) on Maize – Mozambique. *Feed the Future Pest Management Decision Guides.* Wallingford, CABI.

Durocher-Granger L, Babendreier D, Huesing JE, Jepson P.C., Eddy R, Prasanna B.M. (2018) Fall Armyworm (FAW) on Maize – Uganda. *Feed the Future Pest Management Decision Guides.* Wallingford, CABI.

Durocher-Granger L, Babendreier D, Dey K, Huesing JE, Jepson P.C., Eddy R, Prasanna B.M. (2018) Fall Armyworm (FAW) on Maize – Sierra Leone. *Feed the Future Pest Management Decision Guides.* Wallingford, CABI.

Durocher-Granger L, Babendreier D, Dey K, Huesing JE, Jepson P.C., Eddy R, Prasanna B.M. (2018) Fall Armyworm (FAW) on Maize – Rwanda. *Feed the Future Pest Management Decision Guides.* Wallingford, CABI.

Durocher-Granger L, Babendreier D, Dey K, Huesing JE, Jepson P.C., Eddy R, Prasanna B.M. (2018) Fall Armyworm (FAW) on Maize – Tanzania. *Feed the Future Pest Management Decision Guides.* Wallingford, CABI.

Durocher-Granger L, Babendreier D, Huesing JE, Jepson P.C., Eddy R, Prasanna B.M. (2018) Fall Armyworm (FAW) on Maize – Zambia. *Feed the Future Pest Management Decision Guides.* Wallingford, CABI.

Durocher-Granger L, Babendreier D, Huesing JE, Jepson P.C., Eddy R, Prasanna B.M. (2018) Fall Armyworm (FAW) on Maize – Senegal. *Feed the Future Pest Management Decision Guides.* Wallingford, CABI.

Edited works:

Burn A.J., Coaker, T.H., Jepson, P.C. (1987) (Eds.) *Integrated Pest Management.* Academic Press, London.

Jepson, P.C. (1989) (Ed.) *Pesticides and non-target invertebrates*. Intercept, Wimbourne.

Jepson, P.C., Walker, C., Calow, P. (1990) (Eds.) *New Horizons in Ecotoxicology.* Functional Ecology Volume 4, Special Issue. Blackwells, Oxford.

Brown, R.A., Jepson, P.C., Sotherton, N.W. (1992) (Eds.) "Interpretation of Pesticide Effects on Beneficial Arthropods". *Aspects of Applied Biology,* **31.**

Ghosh, K., Jepson, P.C. (2007) (Eds.) *Genetically Modified Organisms in Crop Production and their Effects on the Environment: Methodologies for Monitoring and the Way Ahead*. Report on Expert Consultation and Selected Papers, Food and Agriculture Organization (UN), 124pp

Kogan, M., Jepson, P.C. (2007) (Eds) *Perspectives in Ecological Theory and Integrated Pest Management*, Cambridge University Press. 570pp

Alix, A, Bakker, F., Barrett, K., Bruhl, C.A., Coulson, M., Hoy, S., Jansen, J-P., Jepson, P.C., Lewis, G., Neuman, P., Sussenbach, D., van Vliet, P. (Eds) (2012) *ESCORT 3: Linking non-target arthropod testing and risk assessment with protection goals.* 137pp

Poppy, G., Jepson, P.C., Birkett, M., Pickett, J. (2014) (Eds) Achieving food and environmental security: new approaches to close the gap. *Philosophical Transactions of the Royal Society* **B**

http://rstb.royalsocietypublishing.org/content/369/1639.toc

Refereed papers:

Jepson, P.C. (1981) Prospects for improving the control of virus diseases in sugar beet. *Proceedings of the BCPC Conference, Pests and Diseases*, 769-776.

Jepson, P.C. (1982) The movement of apterous *Myzus persicae* on sugar beet. In *Proceedings of the fifth international symposium in Insect Plant Relations.* Pudoc, Wageningen. pp 415-416.

Jepson, P.C. (1983) A controlled environment study of the effect of leaf physiological age on the movement of apterous *Myzus persicae* on sugar beet plants. *Annals of Applied Biology,* **103**, 173-193.

Jepson, P.C., Cuthbertson, P.S., Thacker, J.R., Bowie, M.H. (1987) A computerised droplet size analysis system and the measurement of non-target invertebrate exposure to pesticides. *Aspects of Applied Biology,* **14,** 97-112.

Borges, M., Jepson, P.C., Howse, P.E. (1987) The long-range mate location and close range courtship behaviour of the Green stink bug *Nezara viridula* and its mediation by sex pheromones. *Entomologia Experimentalis et Applicata,* **44,** 202-212.

Jepson, P.C., Cuthbertson, P.S., Downham, M., Northey, D., O'Malley, S., Peters, A., Pullen, A., Thacker, R., Thackray, D., Thomas, G., Smith, C. (1987) A quantitative ecotoxicological investigation of the impact of synthetic pyrethroids on beneficial insects in winter cereals. *IOBC Bulletin, 'Integrated Control of cereal pests' 1987.* 194-205.

Jepson, P.C. (1987) An experimental rationale for the quantitative evaluation of pesticide side-effects on beneficial insects in cereal crops. *IOBC Bulletin 'Integrated control of cereal pests' 1987*. 206-215.

Mann, B.P., Wratten, S.D., Jepson, P.C. (1987) Pest advisory packages and their development for a viewdata system. *Proceedings of the BCPC Conference, Pests and Diseases 1986,* 1027-1031.

Jepson, P.C., Healy, T.P. (1988) The location of floral nectar sources by mosquitoes: an advanced bioassay for volatile plant odours and initial studies with *Aedes aegypti* (L.)(Diptera: Culicidae). *Bulletin of Entomological Research,* **78,** 641-650.

Healy, T.P., Jepson, P.C. (1988) The location of floral nectar sources by mosquitoes: the long range responses of *Anopheles arabiensis* (Diptera: Culicidae) t*o Achillea millefolium* flowers and isolated floral odour. *Bulletin of Entomological Research,* **78,** 651-657.

Cilgi, T., Jepson, P.C., Unal, G. (1988) The short-term exposure of non- target invertebrates to pesticides in the cereal crop canopy. In *Proceedings of the BCPC Conference: Pests and Diseases.* 759- 764.

Cuthbertson, P.S., Jepson, P.C. (1988) Reducing pesticide drift into the hedgerow by the inclusion of an unsprayed field margin. In *Proceedings of the BCPC Conference, Pests and Diseases.* 747-751.

Taye, Y., Jepson, P.C. (1988) A comparison of reduced doses and strip spraying as selective tactics for pesticide application in cereals. In *Proceedings of the BCPC Conference, Pests and Diseases.* 971-977.

Morgan D., Carter, N., Jepson, P.C. (1988) Modelling principles in relation to the epidemiology of barley yellow dwarf virus. In *OILB Bulletin 'Models in integrated crop protection'.* 27-32.

Jepson, P.C. (1988) Ecological characteristics and the susceptibility of non-target invertebrates to long-term pesticide side-effects. In Field methods for the study of environmental effects of pesticides. *BCPC monograph,* **40,** 191-200.

Sotherton, N.W., Jepson, P.C., Pullen, A.J. (1988) Criteria for the design execution and analysis of terrestrial non-target invertebrate field tests. In Field methods for the study of the environmental effects of pesticides. *BCPC monograph*, **40,** 183-190.

Wratten, S.D., Mead-Briggs, M., Vickerman, G.P., Jepson, P.C. (1988) Effects of the fungicide pyrazophos on predatory insects in winter barley. In Field methods for the study of the environmental effects of pesticides. *BCPC monograph*, **40**, 327-334.

Jepson, P.C. (1988) Defining the temporal and spatial scales of interaction between pesticides and non-target invertebrates. *Aspects of Applied Biology,* **17**, 261-263.

Jepson, P.C. (1988) Experimental options for developing selective pesticide usage tactics within cereals IPM. In *Integrated Crop Protection in Cereals* (Ed. Cavalloro, R., Sunderland K.D.) pp 121-134. Balkema, Rotterdam.

Jepson, P.C., Chaudhry, A.G., Salt, D.W., Ford, M.G., Efe, E., Chaudhury, A.B.N.M.U., (1990) A reductionist approach towards short-term hazard analysis for terrestrial invertebrates exposed to pesticides. *Functional Ecology,* **4,** 339-348.

Jepson, P.C., Thacker, J.R.M. (1990) Analysis of the spatial component of pesticide side-effects on non-target invertebrate populations and its relevance to hazard analysis. *Functional Ecology,* **4**, 349-358

Thacker, J.R.M., Jepson, P.C. (1990) Can within-field experiments be used to predict the harmful side-effects of pesticides on an agricultural scale? In Ground beetles: their role in ecological and environmental studies. (Ed. N.E. Stork). pp 353-357 Intercept, Wimbourne.

Jepson, P.C., Duffield, S.J., Thacker, J.R.M., Thomas, C.F.G., Wiles, J.A. (1990) Predicting the side-effects of pesticides on beneficial invertebrates. In *Proceedings of the BCPC Conference, Pests and Diseases,* Brighton. 957- 962.

Unal, G., Jepson, P.C. (1991) The toxicity of aphicide residues to beneficial invertebrates in cereal crops. *Annals of Applied Biology,* **118**, 493-502.

Wiles, J.A., Jepson, P.C., Salt, D.W., Ford, M.G. (1991) Evaluating the hazard of pesticides to target and non-target terrestrial invertebrates. *Pesticide Science,* **31**, 98-99.

Eiras, A., Jepson, P.C. (1991) Host location by *Aedes aegypti* (Diptera: Culicidae): A wind tunnel study of chemical cues. *Bulletin of Entomological Research,* **81**, 151-160.

Jepson, P.C., Sherratt, T.N. (1991). Predicting the long-term impact of pesticides on predatory invertebrates. In *Proceedings of the BCPC Conference, Pests and Diseases,* Brighton. 911-919.

Pullen, A.J., Jepson, P.C., Sotherton, N.W. (1992) Terrestrial non-target invertebrates and the autumn application of synthetic pyrethroids: experimental methodology and the trade-off between replication and plot size. *Archives of Environmental Contamination and Toxicology,* **23,** 246- 258.

Jepson, P.C., Mead-Briggs, M. A. (1992) The field approach to pesticide ecotoxicity testing against beneficial invertebrates in cereals. *Bulletin of the IOBC 1992/XV/3. Guidelines for testing the effects of pesticides on beneficial organisms: description of test methods*. 183- 86.

Jepson, P.C., Mead-Briggs, M. A. (1992) Discussion of methods used in semi-field studies to evaluate pesticide toxicity to beneficial invertebrates. *Bulletin of the IOBC 1992/XV/3. Guidelines for testing the effects of pesticides on beneficial organisms: description of test methods*. 4-17

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- "Evaluating Broad-scale Effects of Hardwoods on Riparian Food Webs: What Are the Consequences of Conversion to Conifers?" funded by Forest Science Partnership (USGS, OSU, BLM, ODF) 7015WS0015 (USGS) ($99,500.00, Nov. 2008 – May. 2010)
- "Teaching ecosystem complexity through field science inquiry" funded by National Science Foundation (with Andy Moldenke) NSF-Edu-TPC ($1,700,000 2006-2010)
- "Researching ecological processes for high school science: linking teachers with ecologists' research " funded by National Science Foundation (with Andy Moldenke) NSF-Edu-TPC ($1,198,000 2006-2010)"NPDN Diagnostic Data Anomalies" funded by UC Davis S05019 (June, 2004-May, 2007)
- "A planning visit to Taiwan, Japan, and Korea to establish coordinated international long-term observation stations for biodiversity of Lepidoptera" funded by National Science Foundation (with Jeff Miller and Andy Moldenke, January 2006 – December 2007)
- "Web Loop Analysis: A Web-Based Computer Application to Model Complex Ecosystems" funded by NorthWest Academic Computing Consortium (May 2005 - April 2006)
- "U.S.-Taiwan Cooperative Research: Canopy Arthropod Responses to Storm Disturbances at U.S. and Taiwanese LTER Sites" funded by National Science Foundation (with T. Schowalter, May 2001 - December 2005)
- "National Biological Control of Weeds Data Base Project" funded by National Biological Control Institute (with P. McEvoy and E. Coombs, Sept. 2000 – Sept. 2001)
- "Multi-level Modeling of Codling Moth Population Dynamics: Assessment of Sustainable Strategies and Tactics for Pome Fruit IPM with Emphasis on Area-Wide Mating Disruption" funded by USDA (with B. Croft, 1997-1999)
- "Parallel processing for individual-based ecological models" funded by National Science Foundation, Computational biology program for 3 years (with T. Hallem, L. Gross, and M. Berry, 1994-1996).
- "Landscape-scale ecosystem analysis of forest productivity and habitat suitability indices" funded by US Forest Service Southern Forest Experiment Station for two years (with L. Gross and M. Huston, 1992-1993)

Presentations

- "Decoupling density-dependent and density-independent features of pollination networking studies " in International Conference of Applied Entomology-Ecology and Management of Forest, Urban and Medical Insects at The National Museum of Natural Science, Taiwan in July 2015
- "Developing online image-based insect identification systems" in the 67th annual meeting of Entomological Society of America North Central Branch in June 2012.
- "LepWingID: An interactive identification aid using digital image pattern matching" in the 58th annual meeting of Entomological Society of America in December 2010
- "Design and analyze a qualitative model for a soil ecosystem by using Web Loop Analysis" in Soil Biodiversity Workshop held at Taiwan Forestry Research Institute in October 2005.
- "Building a dynamic website: Digital delivery with a query" in Symposium: Digital Imaging In Entomological Studies: A Sense of Science and an Expression of Art, The 2005 ESA Annual Meeting and Exhibition

PROFESSIONAL EXPERIENCE

Provide consulting services to academic institutes in software development, simulation modeling, and database design

CERTIFICATION

- Microsoft Certified Professional for Implementing and Supporting Microsoft Windows NT Workstation 4.0, Server 4.0, NT, and Server 4.0 in the Enterprise

DATABASE MANAGEMENT

- Extensive experience with the Internet database applications such as Microsoft Universal Data Access (SQL, ACCESS, OLE DB, ODBC, and ADO.NET), ColdFusion Server, and SYBASE Powerbuilder

WEB/GIS DEVELOPMENT

- Extensive experience developing interactive mapping web sites integrating content from research databases with multiple spatial data formats using ARCSDE and ARCIMS

- Extensive experience developing web-based interactive modeling tools for simulating ecological community systems

PROGRAMMING

- C, C++, C# - 20 years advanced knowledge, advanced programming skills
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- PHP 3.x, 4.x - 4 years advanced knowledge, advanced programming skills
- Python - 10 years advanced knowledge, advanced programming skills
- MATLAB, IDL, PV-WAVE- 10 years advanced knowledge, advanced programming skills
- HTML - 10 years hand coding, following w3c standards, advanced programming skills
- CSS, JavaScript - 4 years general knowledge, intermediate programming skills
- XML, XSL - 10 years general knowledge, basic programming skills

QUANTIATIVE SKILLS

- Advanced knowledge in informational statistics, such as Akaike's Information Criterion (AIC), Bayesian information criterion (BIC), and Minimum Description Length (MDL)
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TEACHING EXPERIENCE

- Systematics Phylogeny
- Informational Statistical Modeling and Applications in Ecology
- Essential Models in Ecology
- Relational Database Management for Biological Systems
- VBA for MS Access Workshop

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KATIE MURRAY

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A. EDUCATION AND EMPLOYMENT INFORMATION

Education

- M.A. Applied Anthropology: Natural Resources and Communities. Oregon State University, 2007.
- B.A. Psychology, Philosophy. University of Alabama in Huntsville, 2000.

Employment

- Statewide IPM Coordinator, Integrated Plant Protection Center, Oregon State University, 2018-present
- Assistant Professor of Practice, Department of Environmental and Molecular Toxicology, Oregon State University, 2017-present
- Program Leader, IPM Engagement and Implementation Program, Integrated Plant Protection Center, Oregon State University, 2016-present
- Western IPM Center Northwest Network Coordinator, USDA Western Integrated Pest Management Center, 2014-present
- Faculty Research Assistant, Integrated Plant Protection Center, Oregon State University, 2007-2017
- Sustainable Rural Communities Initiative Research Fellow, Dept of Anthropology, Oregon State University, 2005-2007
- Community Food Systems Intern, Small Farms Program, Oregon State University, 2006-2007
- English Teacher, United States Peace Corps, Mongolia, 2003-2005

B. TEACHING, ADVISING, AND OTHER ASSIGNMENTS

1. Instructional Summary

Credit Courses (taught as a graduate research fellow)

Course	*Title*	*Enrollment*	*Term*	*Year*
Anthropology 380	Cultures in Conflict	33	Spring	2007
Anthropology 380	Cultures in Conflict	68	Fall	2006
Anthropology 380	Cultures in Conflict	52	Winter	2006

Workshops organized and facilitated (as a faculty member)

Year range	*Topic*	*Total no. events*	*Role*	*No. participants from beyond Oregon*	*Total no. participants*
2017-2018	Integrated Pest Management Strategic Plan Workshops	4	Designed, organized, co-facilitated	20	85
2016-2018	Crop Pest Losses Impact Assessment Workshops	5	Co-designed, organized, co-facilitated, evaluated	36	64
2017-2018	Pesticide Risk Reduction Professional Development Workshop	2	Co-designed, organized, co-facilitated, evaluated	22	25
2016-2018	Pesticide Risk Reduction Professional Development monthly (remote) workshops	16	Co-designed, organized, co-facilitated, evaluated	27*	29*
2017-2018	Resilient Potato Production Workgroup Meetings	3	Co-designed, organized, co-facilitated	20	40
2008-2016	Pest Management Strategic Plan Workshops	6	Co-designed, organized, co-facilitated	95	190
	TOTAL	**29**		**318**	**534**

* Refers to total number of workgroup members, monthly call participation varies

2018

- Hazelnut Pest Losses Workshop, Salem, OR, June 2018. Led design, organized, co-facilitated. 9 participants.
- Cherry IPMSP Workshop, The Dalles, OR, January 2018. Designed, organized, co-facilitated. 18 attendees, + 5 workgroup members not present.
- Hazelnut IPMSP Workshop, Salem, OR, February 2018. Designed, organized, co-facilitated. 19 participants.
- Cherry Pest Losses Workshop, Hood River, OR, March 2018. Led design, organized, co-facilitated. 9 participants.
- Western Region Pesticide Risk Reduction Professional Development Workshop, May 2018, Portland, OR. Led design, organized, co-facilitated, evaluated. 19 attendees.
- Western Region Pesticide Risk Reduction Professional Development Monthly Workshops (remote), 2018. Led design, organized, co-facilitated, evaluated. 5 monthly workshops between Jan 2018-present.
- Potato Production Chain IPM Working Group Meeting (now Resilient Potato Production Initiative), June 2018, Portland, OR. Co-designed, organized, co-facilitated, evaluated. 19 attendees.
- WERA-1017 Regional Technical Committee Annual Meeting, May 2018, Portland OR. Co-designed, organized, co-facilitated. 30 attendees.

2017

- Western Region Pesticide Risk Reduction Professional Development Monthly Workshops (remote), 2017. Led design, organized, co-facilitated, evaluated. 9 monthly workshops for 2017.
- Western Region Pesticide Risk Reduction Professional Development Workshop, July 2017, Irvine, CA. Co-designed, organized, co-facilitated, evaluated. 18 attendees.
- Potato Production Chain IPM Working Group Meeting, December 2017, Portland, OR. Co-designed, organized, co-facilitated, evaluated. 20 attendees.
- Potato Production Chain IPM Working Group Meeting, April 2017, Portland, OR. Co-designed, organized, co-facilitated, evaluated. 21 attendees.
- Cranberry IPMSP Workshop, Bandon, OR, April 2017. Designed, organized, co-facilitated. 20 participants (13 attendees + 7 remote participants).
- Cranberry Crop Pest Losses Impact Assessment Workshop, Bandon, OR, March 2017. Led design, organized, co-facilitated, evaluated. 11 attendees.
- Onion IPMSP Workshop, Ontario, OR, February 2017. Designed, organized, co-facilitated. 25 participants (16 attendees + 9 remote participants).

2016

- Potato Crop Pest Losses Impact Assessment Workshop, December 2016, Hermiston, OR. Co-designed, organized, co-facilitated, evaluated. 17 attendees.
- Onion Crop Pest Losses Impact Assessment Workshop, November 2016, Ontario, OR. Led design, organized, co-facilitated, evaluated. 17 attendees.
- Wine Grape PMSP Workshop, February 2016, Portland, OR. Led design, organized, co-facilitated. 36 participants (27 attendees + 9 workgroup members not present).

2013

- Pear PMSP Workshop, November 2013, Hood River, OR. Co-designed, organized, co-facilitated. 34 attendees.

2011

- Blueberry PMSP Revision Workshop, April 2011, Troutdale, OR. Co-designed, organized, co-facilitated. 25 attendees.

2010

- Bivalve PMSP Workshop, March 2010, Long Beach, WA. Co-designed, organized, co-facilitated. 25 attendees. 29 participants (19 attendees + 10 remote participants).

2009

- Christmas Tree PMSP Workshop, February 2009, Aurora, OR. Co-designed, organized, co-facilitated. 33 participants (28 attendees + 5 remote participants).

2008

- Hop PMSP Workshop, January 2008, Portland, OR. Co-designed, organized. 33 participants (30 attendees + 3 remote participants).

2. Participant/Client Evaluation Data: an evaluation instrument is distributed to participants at workshops with specific questions about participant experience and workshop format and content, as well as an invitation to submit more general comments. This feedback is incorporated into future events, and included in annual performance reviews. Data from recent events include:

- *100% of IPMSP workshop participants surveyed (n = 50 across cranberry, onion, hazelnut, and sweet cherry) agreed or strongly agreed that the potential accomplishments of the process are worth the resources invested.*
- *100% of Pest Losses Impact Assessment participants surveyed (n=53 across cranberry, onion, potato, hazelnut, and sweet cherry) responded that they would participate in a future workshop.*
- *100% of IPMSP and Pest Losses Impact Assessment participants (n=103) indicate agreement or strong agreement that the processes have value to participants and the industry as a whole.*
- *100% of participants surveyed from 2017 and 2018 annual Western Region Pesticide Risk Reduction Workgroup meetings (n=28) agreed or strongly agreed that the workshops offered a valuable professional development opportunity.*
- *94% of IPMSP workshop participants (n = 50) reported learning a little to a great deal about: the impacts of pest management methods and tools, including pesticides; the PAMS approach to understanding pest management; and industry critical needs and priorities.*
- *93% surveyed from 2017 Western Region Pesticide Risk Reduction Workgroup meeting (n=15) agreed or strongly agreed that the outcomes of the workgroup would benefit their state IPM program.*
- *77% surveyed from the 2018 Western Region Pesticide Risk Reduction Workgroup meeting (n=13) plan to implement new learning about pesticide risk communication in their Western region statewide Extension programs.*

Comments from workshop participants reflect value and importance:

- *Katie did a great job keeping us on track, and putting our ideas into a context that can be used constructively* (Cranberry IPMSP meeting participant).
- *The meeting was well done and organized* (Hazelnut Pest Losses meeting participant).
- *This experience will change the way I do a significant portion of my job* (Western Pesticide Risk Reduction Workgroup member).
- *I never used to mention risk unless asked directly during a talk. Now when I train about pesticides (or even in conversation) I bring up risk* (Western Pesticide Risk Reduction Workgroup member).

Workshop evaluation summary documents are available on request for all IPMSP, Crop Pest Losses, and Pesticide Risk Reduction Workgroup workshops.

3. Peer Teaching Evaluations

Two peer reviews of teaching were conducted at workshops in 2017. For both reviews, all elements considered in the departmental review form related to organization, teaching and learning environment, knowledge of material, and relationships and participant reactions were noted as having been met. Comments were as follows:

Organization:

Reviewer 1: "*Her presentation was extremely well organized*. "

Reviewer 2: "*The entire program was well organized. The program started on time even though some participants were still arriving. Ms. Murray clearly stated the goals/objectives for the meeting and the individual subcomponents were structured to solicit lots of input. Participants were highly attentive throughout the program. Ms. Murray clearly identified transitions to new agenda items and the agenda progressed throughout the day according to the scheduled timing. Participants were regularly encouraged to ask questions and plenty of time was allowed to address questions as they arose. Ms. Murray did an effective job of interpreting and recording input from participants*."

Teaching and Learning Environment:

Reviewer 1: "*She judged audience attention well and took frequent breaks at key moments. She was very clear about the objectives for each section, so participants remained focused. She was able to maintain audience attention and participation through the session, even though the material was extremely detailed*."

Reviewer 2: "*Ms. Murray's public speaking skills are well developed. She has good voice projection, is easy to understand and maintains eye contact with participants. She regularly checked in regarding participants' comfort and needs, and participants knew they were welcome to take care of their own needs. The entire day focused on receiving, interpreting and recording input from participants. Ms. Murray used an effective, structured process (forms, small group discussions, input/need prioritization voting) for directing the conversation and recording input. Ms. Murray carefully interpreted and recorded input throughout the sessions and checked back to make sure that participants agreed with how*

she recorded input and she asked clarifying questions when she did not understand what a participant was trying to explain."

Scholarship and Knowledge of Material:

Reviewer 1: "*She effectively motivated the session by explaining how IPMSPs would be used to the advantage of the industry. Her knowledge of pesticide regulation and approaching issues with various products was a key resource during the session. She remained very objective when controversial issues arose and used these moments as opportunities to gather information for the IPMSP*."

Reviewer 2: "*She clearly demonstrated a high level of knowledge of IPM, crop production practices and issues related to hazelnut industry, but she readily stated she is not a hazelnut production specialist. The input she received throughout the day considered recent developments in the field and provided on-going evaluation of the efficacy of historical practices. Some controversial topics were discussed and Ms. Murray purposefully did not guide the discussion, but rather gathered input without expressing an opinion on the topic."*

Relationships and Participant Reaction:

Reviewer 1: "*She is a remarkable facilitator and growers and consultants felt comfortable sharing information about their businesses during the session. Ms. Murray was comfortable relying on the growers and other extension specialist when she did not know the answers. She commonly would ask the audience for their ideas and thoughts and would clarify points from the audience if they were not clear*. "

Reviewer 2: "*Overall, I would rank relationships and participant reactions as exceptional for this program. The participants were highly engaged throughout the day and Ms. Murray gathered a large amount of information. The different exercises used throughout the day were effective at keeping participants engaged*."

Full reviews from two peers in 2017 are available on request.

4. Other Assignments

My primary role is Statewide IPM Coordinator for Oregon, as an Assistant Professor of Practice in the Integrated Plant Protection Center (IPPC), and the Department of Environmental and Molecular Toxicology. In this role I lead the IPPC's IPM Engagement and Implementation Program. I am responsible for developing and enhancing IPM stakeholder networks, leading processes that reveal barriers to IPM adoption, and elucidating pathways to overcoming them. My work engages with diverse groups of local, regional, national, and international IPM stakeholders, and facilitates IPM adoption and pesticide risk reduction across these scales. The stakeholder-driven processes that I lead include long-term collaborations with local and regional research and extension faculty, regulatory agencies, regional farmer commodity groups, and state and federal agencies. My work builds agricultural network connectivity and information flows within Oregon and across the Pacific Northwest and beyond, and it develops feedback pathways that potentiate understanding of, and response to, critical crop production, human and environmental health needs.

The processes that I develop provide mechanisms for integrating high-level social and natural sciences within a collaborative working environment that engages agricultural production processes with social and governance networks operating at multiple scales. My work also provides an organizational structure for optimizing the contribution of crop management to sustainable production. This has the potential to be applied internationally as part of the movement toward sustainable production intensification, and I am developing collaborations that explore this opportunity.

I apply a scholarly approach to this program, drawing upon the social sciences and my background in applied anthropology. I am exploring the context of social-ecological systems theory and sustainable agricultural intensification research as an overarching framework for my work. I currently contribute practical tools, processes, and theory to the current state of the science in these fields.

I lead four main projects (numbered I - IV below) and co-lead several collaborative projects (numbered V - VI below). I also detail past work as a faculty research assistant (number VII below). The projects I lead are: 1) Integrated Pest Management Strategic Planning (IPMSP), 2) Crop Pest Losses Impact Assessment, 3) Northwest IPM Network Coordination, and 4) Resilient Potato Production Initiative Working Group. For each project, I am responsible for securing supporting funds and for leading project implementation, including project planning and design, workshop facilitation, and the drafting and publication of reports.

Each of these main projects merges aspects of social and natural science theory with effective practice that properly engages stakeholders as partners. This work has scholarly underpinnings, and is funded by competitive, peer-reviewed grants, the majority of which I am PI. My work is peer reviewed, and I am lead author for extension publications. I plan to submit peer-reviewed journal articles as analyses and interpretation of program results evolves, and when multi-year cycles of IPMSPs and CPLIA have been completed. These processes carry the potential for widespread adoption internationally as mechanisms that underpin and enable sustainable crop production intensification, and the level of collaboration with university faculty as well as local and regional industry stakeholder groups demonstrates a high level of professional recognition and validation of my work.

Overall Program: Statewide IPM Coordinator; Program Leader, IPM Engagement and Implementation

Approach: Widespread adoption of IPM and sustainable agricultural practices requires a fully functional and connected agricultural system that accommodates feedback between farmers, locally-relevant education and research, and regulatory policy. As Statewide IPM Coordinator, I build participatory processes that engage and connect farmers and farming groups with other key agents in the system including researchers, extension agents, government regulators and natural resource agencies, to create a more efficient and adaptive system. My program develops and strengthens local and regional agriculture by ensuring that needs are rapidly identified, and

that targeted knowledge, education, technological, and other support mechanisms are delivered.

Program Outcomes: My program leads to broad and specific short, medium, and long-term outcomes. In the short term, a wide range of stakeholders are consulted, data are gathered, and consensus is reached regarding pest management practices, pesticide usage, and critical needs. This information is formally communicated to appropriate state, regional, and federal agencies through the various projects I lead. In the medium term, documented behavior change takes place in the form of more targeted research and education programs, targeted funding acquisitions, regulatory responses to needs, and improved farmer decision-making. In the longer term, IPM adoption is facilitated, which leads to measurable reductions in environmental, economic, and human health risks.

Specific achievements:

- My program is funded by a portfolio of competitive grants of which I am PI, currently totaling $1.4 million (see grants # 1, 2, 3, 4, 5, and 6 in part **3.** Grant and contract support).
- I have developed a refined model for Pest Management Strategic Planning that advances IPM: this process and it's further development is funded through competitive grants. IPM Strategic Planning has been implemented with four Pacific Northwest industries: onion, cranberry, cherry, and hazelnut, with plans and funding acquired to continue this work, adding mint, grass seed, pear, and potato to the schedule of IPMSPs, all with regular update cycles (2-3 years). This work was originally supported by a USDA ARDP grant of which I am PI; and it has also attracted a USDA CPPM EIP grant and small industry grants, where I also act as lead-PI (see project I below, and grants # 2, 3, 5, and 6)
- Based on my initiation, funding, and leadership, Crop Pest Losses Impact Assessments, a Signature Program of the Western IPM Center, have been conducted for five Pacific Northwest industries: potato, onion, cranberry, hazelnut, and cherry, with plans in place to continue this work, adding mint, grass seed, potato, and pear to the schedule of CPLIA and regular updates (1-2 years). This has involved extensive collaboration with the USDA Western IPM Center and the University of Arizona to lead the design and implementation of our own survey software program. See project II below; supported by competitive grants # 2, 3, 5, and 6.
- Targeted Extension education events have been designed and carried out for the onion and cranberry industries, in collaboration with our lead Extension agents, based on stakeholder-identified education needs, which has enhanced local and regional Extension education programs. Proposals for research and Extension have cited my pest management strategic plans, which tune programs to stakeholder needs and provide leverage for regional faculty in acquiring funds.
- Well-researched and detailed comments have been submitted to EPA (see project III below) on usage of various pesticides in the Pacific Northwest that address pollinator

protection concerns and human and environmental risk mitigations. Many of these have been cited by EPA as playing a role in their risk/benefit analysis.

Projects:

I. Project Leader: Integrated Pest Management Strategic Planning (IPMSP)

Approach: The IPMSP is a research-in-progress model for stakeholder assessment and priority setting that I am developing and implementing, and which has become a central aspect of Oregon's statewide IPM program. Development is supported by several competitive grants of which I am PI (see grant numbers 2, 3, 5, and 6 under grant and contract support). The project builds and tests a theoretical model for the complex social-ecological network that encompasses and describes the local, regional and national context for IPM. The IPMSP project builds on my former Pest Management Strategic Planning (PMSP) project (see Project VII below) to create more IPM-focused PMSPs, to better understand IPM (i.e. pest management-related) critical needs, and to develop strong feedback pathways and greater agricultural network connectivity and responsiveness within Oregon and the Pacific Northwest. This advances IPM and achieves a balance between production and protection goals.

Data gathered from the process supports targeted extension education in collaboration with Oregon's statewide extension agents. The IPMSP project aims to build resiliency and improve IPM adoption with a refined focus on decision-support and risk-management.

The IPMSP program formally documents and tracks the current practices and critical pest management needs of Pacific Northwest farmers, and builds strong communication pathways for sharing and meeting these critical needs through collaboratively-developed solutions. The program fosters collaboration and consensus among industry stakeholders, including farmers, researchers, and regulators. Currently, eight Pacific Northwest industries are engaged in the program: onion, cranberry, sweet cherry, hazelnut, potato, grass seed, mint, and pear.

For each industry, I create a formal document in collaboration with a representative group of farmers, researchers, extension agents, crop consultants, regulators, and other relevant stakeholders. I obtain detailed information from this group regarding the pest management activities and strategies conducted during each of the crop growth stages. I consult stakeholders on critical pest management needs in research, regulation, and education, as well as broad needs related to IPM. The resulting document describes these pests, challenges, and critical needs in detail, and incorporates unique datasets including stakeholder-defined pesticide efficacy tables, timelines of activities, and pesticide risk assessments for human bystanders, aquatic life, vertebrate wildlife and pollinators. The documents are peer-reviewed and edited by IPM Center staff, and approved for publication to the National IPM Database, where they are consulted by federal agencies, and used to prioritize research and extension programs.

A key feature of IPMSPs that I have introduced is the requirement for routine revision (on a 2-3 year cycle), with more explicit assessment of changes in IPM adoption that take place between consultations. The IPMSP working group is an advisory group that

partners with extension to provide capacity for industry-wide, adaptive improvements in IPM. The process provides a mechanism for monitoring status and trends in IPM, and maintaining engagement with the commodity advisory group. The process also includes pesticide risk assessments, and provides information about application management, pollinator and natural enemy protection and agro-ecology to support local extension IPM programing. Extension education events are developed with agents that act upon the critical IPM needs identified by stakeholders through the IPMSP process.

Outcomes. Through the IPMSP process, I am offering a formal mode of communication between farmers and other pest managers to regulators, policymakers, researchers, and other interested constituencies. The process and resulting document offers guidance on how time and money should be spent in responding to pest management issues. The IPMSP also provides granting organizations with evidence of stakeholder input on pest management priorities, and enables researchers to be more successful in obtaining federal grant funds to work on pest management priorities with the industry. This process is requested as a source of stakeholder needs in both regional and federal grant programs.

The EPA and other regulatory agencies utilize IPMSPs to better understand current production and pest management practices when they review and evaluate the merits and needs for a new pesticide registrations or re-registrations. IPMSPs support industries, especially minor crops, in obtaining or retaining conventional, biological, and organic pesticide registrations, all of which are needed to manage pests and produce high quality crops that enter the food chain, and help growers to remain economically viable.

This program is evaluated across multiple dimensions, including at-event evaluations, tracking of IPM advances and evidence for adoption over time, regulatory changes, and leveraged research funding. I am also managing the education follow-up as a formal part of the program, and am developing a process for initiating the research response to stakeholder-identified needs.

Collaboration:
Project Co-PIs: Paul Jepson, Oregon State University IPPC, Al Fournier, Arizona Pest Management Center
University Research and Extension Collaborators:
From Oregon State University: Cassie Bouska, Steve Castagnoli, Hans Luh, Andony Melathopoulos, Stuart Reitz, Vaughn Walton, Nik Wiman, Darrin Walenta, Silvia Rondon, Ken Frost, Rick Hilton
From University of Arizona: Peter Ellsworth, Arizona Pest Management Center
University of Idaho, Research and Extension faculty
Washington State University, Research and Extension faculty
Farming Commissions/Commodity Group Collaborators:
Columbia Gorge Fruit Growers Association, Idaho Potato Commission, Malheur County, Onion Growers Association, Northwest Potato Research Consortium, Oregon Cranberry Growers Association, Oregon Hazelnut Commission, Oregon Mint Commission
Oregon Potato Commission, Oregon Seed Council, Oregon Sweet Cherry Commission, Washington Potato Commission, Washington Tree Fruit Research Commission

Regional/Federal Agency Collaborators:
US Department of Agriculture Office of Pest Management Policy, US Environmental Protection Agency, Southern IPM Center, Western IPM Center
Engages >200 Pacific Northwest farmers and consultants as participants

Project Outputs: 4 Extension publications (see **C. 1.** Publications).

II. Project Leader: Crop Pest Losses Impact Assessment

Approach. The Crop Pest Losses Impact Assessment process was originally developed by colleagues at the Arizona Pest Management Center, and is a Signature Program of the USDA Western IPM Center with a goal of expanding to other regions and industries. In close collaboration with colleagues at both centers, I am now leading a project to adapt this process for an initial eight Pacific Northwest commodities including potato, onion, cranberry, hazelnut, sweet cherry, grass seed, mint, and pear. This project dovetails with my Integrated Pest Management Strategic Planning (IPMSP) project (above) and takes place on a 2-3 year cycle with participating industries. The project is supported by several competitive grants of which I am PI (see grant numbers 2, 3, 5, and 6 under grant and contract support).

With guidance from collaborators, I have led the development of a detailed economic assessment of pest management practices and pest impacts for five Pacific Northwest industries, designed to acquire self-reported data from growers and consultants. The assessment is comprehensive, and aims to develop and track "real world" data on the impacts of specific pests and management practices on crop yields, production costs, and profitability. The data is gathered in a workshop format, which I organize, lead and co-facilitate. I am responsible for leading all stages of the process, from participant invitation and recruitment, to survey development, to delivery and analysis.

Quantified measurements of pest occurrence, pesticide use, costs, and crop yield and quality losses caused by pests are collected through the survey process, which provide objective tools for assessing needs and impacts. This process enables tracking of pest impact status and trends over time, and brings focus to industry-wide discussions about IPM needs, while also providing critical data for comments to USDA/EPA as the need for these arises. Data of this quality and credibility also influence EPA registration decisions, helping growers retain access to important pest management tools.

Outcomes: A survey model has been developed and implemented with 5 commodity groups, and is applicable for use with other Pacific Northwest commodities as well as adoption in other regions.

Quantitative data on pesticide usage and pest impacts to yield and quality has been gathered through 5 workshops including 62 participants from the hazelnut, cherry, cranberry, potato, and onion industries. Data represents 25% of Oregon's hazelnut industry, 12% of the Oregon/Washington sweet cherry industry, 65% of the Oregon and Washington cranberry industry, 22% of the Oregon and Washington potato

industry, and 20% of the Oregon and Idaho onion industry. Data analysis is currently being performed, and will be summarized and reported for each workshop.

Collaborators: This project dovetails with IPM Strategic Planning project above, and the same collaborators are engaged.

III. Project Leader: Northwest IPM Network Coordination

Approach. When federal agencies consider changes to pesticide registrations, they issue a "Request for Information" or open a formal comment period to gather feedback from various stakeholders—growers, commodity groups, research/extension professionals, and others with on-the-ground expertise.

On behalf of the Western IPM Center, I lead in the gathering of data and information from a network of expert sources throughout the Pacific Northwest, and provide federal agencies with a coordinated, evidence-based comment, which assists the agencies in their pesticide registration and re-registration decision-making process. Within these comments, I include assessments by experts on pollinator and natural enemy impacts, IPM compatibility issues, and water quality and human health considerations. I am one of three Coordinators working with the Western IPM Center, and my work encompasses the Northwest Region, including Alaska, Washington, Oregon, Idaho, Colorado, Wyoming, and Montana.

Outcomes. Outreach on this project has been conducted across the Pacific Northwest network, which keeps a wide range of industry groups informed regarding important regulatory reviews and proposed decisions, and increases stakeholder involvement in the regulatory process. Pesticide usage information, along with expert feedback on various products, alternatives, risks, and mitigations has been regularly communicated to USDA/EPA representing a number of Pacific Northwest industries.

I maintain a coordinated and responsive network of growers, commodity group representatives, and university personnel in the Pacific Northwest, centered around the theme of understanding pesticide usage patterns, critical crop/pest/pesticide product combinations, and risks and mitigation strategies. This makes it possible to communicate more effectively with regulatory agencies, and supports more informed regulatory decision-making that benefits Pacific Northwest Agriculture, consumers, and the environment.

Pesticide risk reduction, an important aspect of IPM, is enabled by an informed and communicative regulatory system that is able to listen and respond to stakeholder needs and input. This maintains the availability of efficacious pesticides, targets their uses to where they are most needed, and encourages crop and pest-specific risk management practices that minimize the potential for harm to human health and the environment.

I have coordinated Pacific Northwest comments on the active ingredients acephate, aldicarb, carbaryl, chlorpyrifos, copper products, cymoxanil, diazinon, synthetic pyrethroids, malathion, neonicotiniods, oxamyl, pyriproxifen, simazine, spinosyns, sulfoxaflor, and sulfonylurea herbicides. Submitted comments can be searched by

chemical, date, or state, using the comment database maintained by the Western IPM Center. Previously submitted comments have been cited in EPA response documents as relevant and helpful to their decision-making process. This information also supports the IPMSP program in understanding usage and critical needs related to specific pesticides.

Project Collaborators: Amanda Crump, Western IPM Center, Matt Baur, Western IPM Center, Al Fournier, Arizona Pest Management Center, Peter Ellsworth, Arizona Pest Management, Verna Subere, University of Hawaii, Jim Farrar, University of California, Davis IPM Program, OSU Statewide Extension Agents, Doug Walsh, Washington State University, Kim Patten, Washington State University, Elizabeth Beers, Washington State University, Ronda Hirnyck, University of Idaho, Frank Peairs, Colorado State University, Kevin Masterson, Oregon Pesticide Stewardship Partnership, US Environmental Protection Agency, US Department of Agriculture Office of Pest Management Policy, Pacific Northwest Farming/Commodity Groups, Pacific Northwest Farmers

IV. Project Leader: Resilient Potato Production Initiative Working Group.

Approach. I have led members of the Pacific Northwest Potato Industry in forming a technical working group, with a goal to identify and remove barriers to IPM. The group contains representatives of multiple sectors across the potato industry and including participants from Washington, Oregon, and Idaho. The attendees comprise university research and extension personnel, chemical industry representatives, potato processing company representatives, commission staff and members from each of the three states, consultants, and farmers. For this project, I have invited members, designed, organized, and facilitated workgroup meetings, and provided leadership in the identification and selection of workgroup projects. This project is supported by competitive funds of which I am PI (see grant number 5 in Grant and contract support) as well as support for meetings and travel from the Northwest Potato Research Consortium.

Outcomes. Three meetings have been held since December 2016 on a biannual basis, with ~ 20 members from across Oregon, Washington, and Idaho. This diverse group has reached consensus about the fundamental problems that need to be solved to advance IPM within the industry. Workgroup members have engaged in priority-setting to identify projects of interest: these include IPM Strategic Planning, and Potato Pest Losses Impact Assessment for the Pacific Northwest potato industry. Smaller working groups have been formed around four main themes: 1) addressing knowledge and information gaps; 2) sharing stories of successful innovation; 3) understanding the nature and distribution of risks across the potato production chain; and 4) incentivizing innovation and IPM adoption.

Project Co-Leads: Paul Jepson, Oregon State University, Andy Jensen, Northwest Potato Research Consortium, Matthew Blua, Dir. of Industry Outreach/Research WA potato commission

Current Working Group Members

Bill Brewer, Exec. Dir. OR potato commission, Ken Frost, Oregon State University Extension, Amellia Haguewood, Grower, Oregon, Chris Hiles, Lamb Weston, Rebecca Jones, Simplot, Mike Larsen, Grower, Eastern Idaho, Mike Madsen , AgriNorthwest, Jeff Miller, private researcher and consultant, Jennifer Riebe, Consultant, Silvia Rondon, Oregon State University Extension, Tom Salaiz, McCain foods, Alan Schreiber, Private researcher/consultant, Kris Thomas, Bayer Corp., Mike Thornton, University of Idaho, Ritchey Toevs, Grower, Idaho Potato commission Chair, Chris Voigt, Exec. Dir. WA potato commission, Tim Waters, Washington State University Extension, Carrie Wohleb, Washington State University Extension

V. Project Co-Lead, Western Region Pesticide Risk Reduction Professional Development Project.

Approach: At their 2016 annual meeting, Extension IPM professionals from the Western US overwhelmingly agreed that capacity development in IPM extension is needed to achieve greater pesticide risk reduction throughout this region. In addition to expanding knowledge and skill development in pesticide risk education, an informal survey of collaborating Western region extension programs revealed three main needs, which are now within the goals of this USDA Western SARE-funded project: 1) professional development workshops for Extension IPM educators addressing methods to improve learning and outcomes regarding pesticide risks, 2) a central website for sharing information and tools on pesticide risk assessment, education, and mitigation, and 3) a science-based, user-friendly, risk classification system for pesticide products, that can be adapted to specific assessment needs (e.g. agricultural, urban, home garden, institutional, etc.).

I co-lead this project, which aims to address the needs expressed by collaborating programs to achieve significant and documentable pesticide risk reduction across the Western US through:

- Annual pesticide risk education workshops for Western Region IPM Coordinators and other extension faculty, focused on pesticide risk education and impact evaluation. Each state IPM program is learning about, designing, and evaluating risk education programming, targeted to the specific needs of their respective audiences.
- Development of, and education around new pesticide risk classification tools that support risk-based decision-making to achieve increased use of reduced-risk products and adoption of risk mitigation practices, and diminished use of highly hazardous pesticides in the US Western region.
- Monthly conference calls targeted at capacity development in pesticide risk assessment and education for IPM practitioners including the concepts, principles, and delivery of pesticide risk assessment, communication, and education.

As project co-leader, I have been responsible for writing the grants that support the work, co-developing the monthly curriculum and workshop agendas, co-delivering the educational content regarding pesticide risk reduction and hazard elimination, and co-designing and facilitating the calls and workshops.

Outcomes: This project is increasing the capacity of Western region state IPM coordinators and practitioners in pesticide risk assessment, communication, education, and mitigation, resulting in expanded skill sets for extension educators. Further, each Western region IPM program is receiving specific education on pesticide risk education program design that will be used in each state's IPM programming. This increased capacity will translate into documentable risk reduction in 12 Western states. This work directly responds to the needs expressed by Western region IPM coordinators.

We seek to achieve significant reduction in the use of highly hazardous pesticides in the West, and increase the use of reduced-risk products, with expanded risk mitigation for other products. Alignment with a pesticide hazard and risk classification system, developed at OSU, will also bring Western US farmers more into line with internationally-recognized and reviewed agricultural sustainability standards that address pesticide risk management. This will increase access to crop certification and high value market pathways.

- Two annual workshops have been conducted with ~20 participants (details in "3. Workshops organized"), in 2017 and 2018, along with monthly conference calls since October 2016.
- A Pesticide Risk Reduction Panel was given to the 2018 International IPM Symposium, Baltimore, MD, March 2018. Group members, including a NIFA Program Leader, gave presentations that demonstrated successful applications of the workgroup's learning and skill development.

Project PI:
Paul Jepson, Oregon State University IPPC
Project Collaborators: Hans Luh, Oregon State University, Diane Alston, Utah State University IPM, Oliver Bach, Sustainable Agriculture Network, Costa Rica, Matt Baur, Western IPM Center, Ashley Bennett, New Mexico State University, Mary Burrows, Montana State University, Amanda Crump, Western IPM Center, Steve Elliot, Western IPM Center, Peter Ellsworth, Arizona Pest Management, Jim Farrar, University of California IPM, Emily Sims, University of California IPM, Lisa Blecker, University of California IPM, Al Fournier, University of Arizona, Dawn Gouge, University of Arizona, Ronda Hirnyck, University of Idaho, Alexandre Latchininsky, University of Wyoming, John Connett, University of Wyoming, Neil McRoberts, University of California, Tunyalee Martin, University of California IPM, Casey Matney, University of Alaska Fairbanks Cooperative Extension, Marion Murray, Utah State University IPM, Bob Nowierski, National Institute of Food and Agriculture, Frank Peairs, Colorado State University, Verna Subere, University of Hawaii, Cheryl Wilen, University of California IPM, Karey Windbiel–Rojas, University of California IPM, Doug Walsh, Washington State University, Mark Wright, University of Hawaii

VI. Collaborator, Integrated Pest Management (IPM) and Pesticide Risk Management (PRM) Marketplace Standards and Certification Project

Approach: Certifying bodies seek to address many criteria of sustainability, from worker protection and rights, to biodiversity protection, to good agricultural practices. However, reconciling production and protection goals is a continual challenge. There is a global imperative to sustainably intensify crop production to meet future food needs for an expanding population, and this project seeks to provide a novel mechanism for achieving progress on a global scale.

This project partners with leading standard-setting and certification bodies across the globe to include IPM as a standard requirement for crop certification. In particular, my work focuses on supporting standard-setting and certification bodies in enabling reduced-risk, biologically based pest management practices, and reduction in pesticide risks to human health and the environment. The IPM strategic planning model, as well as the Crop Pest Losses Impact Assessment model, have garnered attention from potential international collaborators as a way to track and measure current practice and critical needs in certified commodities. Collaborative projects have been identified and funding is currently being sought.

Outcomes. A framework for formal collaboration has been developed through an MOU with the Sustainable Agriculture Network (SAN) to explore a unique partnership in advancing sustainable agriculture internationally. I attended an ISEAL IPM Coalition meeting on London, UK, November 2016, as well as a project planning meeting in San Jose Costa Rica in January 2018, where I gave presentations on both the IPM Strategic Planning model and the Crop Pest Losses Impact Assessment process. I regularly participate in conference calls with collaborators in support of the development of an international program.

Project Lead:

Paul Jepson, Oregon State University IPPC
Project Collaborators: Sustainable Agriculture Network, Costa Rica, ISEAL IPM Coalition Members including Better Cotton Initiative, Fair Trade, Global Coffee Platform, Bon Sucro, Rainforest Alliance, UTZ

VII. Past Projects: IPM Program Support (2007-2015)

Pest Management Strategic Planning Project (2007-2015).

The Pest Management Strategic Plan (PMSP) project was active within the IPPC between 2002 and 2016, led by Joe DeFrancesco, with myself as co-lead. In 2016, this project was superseded by the Integrated Pest Management Strategic Plan (IPMSP) project (described in I above).

Beginning in 2007, I supported the development and/or revision of PMSPs for Pacific Northwest crop industries (see links to completed PMSPs in publications section), including outreach to compile a work group of stakeholders, information gathering from work group members regarding pest management strategies and challenges; organizing and facilitating work group meetings; writing, editing, and publishing findings in a university peer-reviewed formal report; and follow-up to assess whether cited critical needs were met.

Registration/MRL tracking for Berry Crops (2007-2015).

I regularly tracked and updated pesticide registration and maximum residue limit (MRL) information for PNW berry industries (strawberry, blueberry, caneberry); tracked weekly EPA pesticide notices for issues relevant to PNW commodities.

IPM Guideline Development (2007-2015).

I assisted in developing IPM Guidelines for crops in the Pacific Northwest, including the assembly of materials and resources for guidelines in cooperation with producers, processors, agents, researchers, and certifiers; formatted IPM guides for online use.

I also served as liaison between OSU and other agencies in developing agricultural product certification standards based on IPM best practices.

C. SCHOLARSHIP AND CREATIVE ACTIVITY

Scholarship activities and creative work for Professor of Practice positions at OSU is defined as: "*intellectual work whose significance is recognized and validated by peers, and whose significance is communicated in peer reviewed materials. Scholarship activities also include local and regional adoption of improved programs and methods that contribute to educational program delivery and research application at local and regional levels, as well as secured competitive grants and contracts*." (from Karow, R. – Professor of Practice Standards for College of Agricultural Sciences)

I am currently PI of three federally-funded and three industry-funded awards, totaling over $1.4 million. I am co-PI on an additional two projects totaling $362,416. I have authored 10 Pest Management Strategic Plans, which are peer reviewed before publication. Two of these plans have been published through OSU Extension, with two more *in press* (as of August 2018). These plans are co-funded by local and regional industries, and utilized regionally to target university research and extension programs to stakeholder needs. I have also co-authored a manual chapter on Pesticide Hazard and Risk Management as part of Fall Armyworm in Africa IPM Guide, and co-authored a publication for the Journal of IPM assessing pesticide compatibility with IPM. The extensive level of regional industry engagement (eleven of Oregon's top 20 industries are currently or have been engaged in my program) and collaboration by university faculty in my program and projects demonstrates a high level of peer validation and program adoption locally and regionally.

Widespread adoption of IPM and sustainable agricultural practices requires a fully functional and connected agricultural system that engages farmers and industry, locally relevant education and research entities, and those who develop and implement regulatory policy. With this goal in mind, I have contributed practical tools towards ecological systems theory that generate insights into the functioning of sustainable agriculture systems. As my career advances, I seek to further develop and strengthen local, regional, national, and international IPM networks by ensuring that needs are rapidly identified, research, education, technology, and policy are targeted, and progress is tracked.

Summary of peer-reviewed papers

Time frame	*Refereed papers*	*Book chapters*	*Extension publications*	*Other peer-reviewed materials*
2008-2018	1	1	2	11
TOTAL				**15**

1. Publications

Peer-reviewed journal article:

- Farrar J., Ellsworth P., Sisco R., Baur M., Crump A., Fournier A., Murray K., Tarutani C., Dorschner K., Jepson P. (2018). Assessing the compatibility of a pesticide in an Integrated Pest Management program. Journal of Integrated Pest Management. doi.org/10.1093/jipm/pmx032

Role in joint effort: I contributed to the development of the IPM compatibility tool described in the publication, as well as publication editing.

Manual chapter:

- Jepson P., Murray K., Bach O., Kachingamba D., Ndeithi F., Milano J., McCracken T., Onyango D., Nthenga I., Agboka K., Byantwala S., De Groote H. (2018). Pesticide Hazard and Risk Management and Compatibility with IPM, Chapter 3 of Fall Armyworm in Africa: A guide for integrated pest management, first edition. https://feedthefuture.gov/sites/default/files/resource/files/FallArmyworm_IPM_Guide_forAfrica.pdf

Role in joint effort: I contributed to the development of the Pesticide Hazard and Risk tool described in the publication, as well as publication editing and formatting to increase end-user understanding of the tool.

Extension Publications:

- Murray, K. & Jepson, P. (2018). An Integrated Pest Management Strategic Plan for Hazelnuts in Oregon and Washington (*in pre-publication review by Western IPM Center*).
- Murray, K. & Jepson, P. (2018). An Integrated Pest Management Strategic Plan for Sweet Cherries in Oregon and Washington (*in press with Oregon State University Extension*).
- Murray, Jepson, Bouska, and Patten (2017). An Integrated Pest Management Strategic Plan for Oregon and Washington Cranberries. Oregon State University Extension Publication EM 9212. https://catalog.extension.oregonstate.edu/em9212
- Murray, K., Jepson, P., and Reitz, S. (2017). An Integrated Pest Management Strategic Plan for Treasure Valley Onions: Oregon and Idaho. Oregon State University Extension Publication EM 9187. https://catalog.extension.oregonstate.edu/em9187

I am lead author of these publications. They are peer-reviewed by a panel at the Western IPM Center before publication to the National IPM Centers website, where they are accessed by EPA and USDA personnel and contribute to EPA's pesticide registration review process.

Special Reports:

- Farrar, J, Baur, M, Murray, K, & Elliot, S. (2015). Integrated Pest Management Improvements in Hops from 2008 to 2015. A special report publication of the Western Ipm Center. http://westernipm.org/index.cfm/about-the-center/publications/special-reports/ipm-improvements-in-hops-pdf/

Role in joint effort: I was reponsible for conducting the compartive analysis of the original and revised Pest Management Strategic Plans for Hops, for identifying IPM improvements over time, and for drafting the initial report.

Pest Management Strategic Plans:

- Murray and DeFrancesco (2016). Pest Management Strategic Plan for Wine Grapes in Oregon.
- Murray and DeFrancesco (2014). Pest Management Strategic Plan for Pears in Oregon and Washington.
- DeFrancesco and Murray (2011). Pest Management Strategic Plan for Blueberries in Oregon and Washington, Revision.
- DeFrancesco and Murray (2010). Pest Management Strategic Plan for Bivalves in Oregon and Washington.
- DeFrancesco and Murray (2009). Pest Management Strategic Plan for Christmas Trees in Oregon, Washington, and Idaho.
- DeFrancesco and Murray (2008). Pest Management Strategic Plan for Hops in Oregon, Washington, and Idaho.

These publications are peer-reviewed by a panel at Western IPM Center before publication to the National IPM Centers website, where they are accessed by EPA and USDA personnel and contribute to EPA's pesticide registration review process. Role in publications with DeFrancesco as lead author: I was responsible for coordinating the workshops, and drafting and editing the final documents with workgroup input.

Master's Thesis:

- Murray, Mary K. (2007). Challenges to re-embedding food systems: Tracing the decline and revival of a farmers' market on the edge. Masters Thesis, Oregon State University.

Other:

- Rosenberger, et al. (2006). From Our Own Soil: Community Food Assessment of Benton County and its Foodshed: Interfaith Food and Farms Partnership, Ecumenical Ministries of Oregon.

2. Presentations to peers (since last promotion)

Year	*Within region*	*National*	*International*	*Total*	*No. Invited*
2018	1	0	1	2	1
2017	1	0	1	2	1
2016	3	1	1	5	5
TOTAL	**5**	**1**	**4**	**10**	**7**

List of conferences/presentations and those invited

2018

- Co-author: Presentation to the 2018 Annual Potato Conference, Kennewick, WA, January 2018. "The Resilient Potato Production Workgroup" Jepson & Murray.
- Co-organizer, presenter: Panel Presentation to the 2018 International IPM Symposium, Baltimore, MD, March 2018. "Overcoming Barriers to IPM Adoption and Pesticide Risk Reduction: A system-level view." Murray, Jepson, Fournier, Ellsworth, Reitz.

2017

- Presentation to N8 AgriFood Conference, Durham, UK. July 2017. "Pathways to Agricultural Transformation," Jepson, Murray, Halbleib, Bach.
- Presentation to the WERA-1017 Regional Committee, Irvine, CA, July 2017. "IPMSP: Bringing Integration to Pest Management Strategic Planning," Murray, Jepson, Fournier, Ellsworth.

2016

- Presentation to the Oregon Wine Research Institute regarding best utilization of the Wine Grape Pest Management Strategic Plan August 2016.
- Presentation at the Hermiston Farm Fair: "Tools and Processes to Support Pest Management" December 2016.
- Contribution to seminar on pesticide risk reduction in certified crops at annual ISEAL conference in London, November 2016.
- Presentation/workshop on PMSP/IPMSP delivered to representatives from USDA and USEPA at annual All Centers meeting of Regional IPM Centers, Washington D.C., October 2016
- "Environmental Justice and Research Ethics" Presentation to Kim Anderson's Research Group, Department of Environmental and Molecular Toxicology, March 2017.

Poster presentations

Farrar, et al. (2018). "Regional IPM and IR-4 collaboration: Assessing pesticide compatibility in an IPM program." Poster presented to the 2018 International IPM Symposium, Baltimore, MD, March 2018.

Bauer, et al. (2016). Pest Management Strategic Plans: Document Stakeholder Needs – and Generate Funding. Poster presented to the Pacific Branch Entomological Society of America.

Farrar, et al. (2016). Pest Management Strategic Plans improve investment in integrated pest management in Pacific Northwest hops. Poster presented to the Pacific Division of the American Pathological Society.

3. Grant and contract support

Number	*Year(s)*	*PI(s)(*=PI)*	*Agency*	*Title*	*Total $*	*$ to my program***
1.	2018-2021	Katie Murray, Paul Jepson	Western IPM Center	*IPM Network Coordination Program and Risk Management Signature Program*	*$286,141*	*100%*
2.	2018	*Katie Murray	Oregon Mint Commission	*IPM Strategic Planning for Oregon, Washington, and Idaho Mint*	*$10,246*	*100%*
3.	2018	*Katie Murray	Malheur County Onion Growers Association	*IPM Strategic Planning for Treasure Valley Onions*	*$8,704*	*100%*
4.	2017-2018	*Katie Murray	Western IPM Center	*Northwest IPM Network Coordinator*	*$32,832*	*100%*
5.	2017-2020	*Katie Murray, Paul Jepson, Len Coop, Tim Stock	USDA EIP	*Statewide Networks for Overcoming Barriers to IPM Adoption*	*$858,870*	*40%*
6.	2016-2020	*Katie Murray, Paul Jepson, Al Fournier	USDA ARDP	*Integrating Pest Management Strategic Planning with Extension Education*	*$215,460*	*100%*
7.	2016-2017	*Paul Jepson, Katie Murray	WSARE	*Western Region Pesticide Risk Reduction Professional Development Project*	*$63,299*	*50%*
8.	2016-2017	*Katie Murray	Western IPM Center	*PNW Regulatory Information Coordinator*	*$32,832*	*100%*
9.	2015-2016	*Katie Murray, Joe DeFrancesco,	Western IPM Center	*PNW Regulatory Information Coordinator*	*$31,269*	*100%*
10.	2015-2016	*Katie Murray, Joe DeFrancesco	Oregon Wine Board	*Pest Management Strategic Plan for Wine Grapes in Oregon*	*$21,929*	*100%*

11.	2014-2015	Joe DeFrancesco, *Katie Murray	Western IPM Center	*PNW Regulatory Information Coordinator*	*$31,269*	*100%*
12.	2013-2014	*Joe DeFrancesco, Katie Murray	Washington Tree Fruit Research Commission	*Pest Management Strategic Plan for Pears in Oregon and Washington*	*$15,415*	*100%*
13.	2013-2014	*Joe DeFrancesco, Katie Murray	Western IPM Center	*Pest Management Strategic Plan for Pears in Oregon and Washington*	*$4,953*	*100%*
14.	2011-2012	*Joe DeFrancesco, Katie Murray	Western IPM Center	*Pest Management Strategic Plan for Blueberries in Oregon and Washington*	*$5,000*	*100%*
15.	2011-2012	*Joe DeFrancesco, Katie Murray	Oregon Blueberry Commission	*Pest Management Strategic Plan for Blueberries in Oregon and Washington*	*$2,000*	*100%*
16.	2011-2012	*Joe DeFrancesco, Katie Murray	Washington Blueberry Commission	*Pest Management Strategic Plan for Blueberries in Oregon and Washington*	*$2,000*	*100%*
17.	2010	*Joe DeFrancesco, Katie Murray	Western IPM Center	*Pest Management Strategic Plan for Bivalves in Oregon and Washington*	*$8,131*	*100%*
18.	2008-2009	*Joe DeFrancesco, Katie Murray	Western IPM Center	*Pest Management Strategic Plan for Christmas Trees in Oregon, Washington, and Idaho*	*$4,412*	*100%*
19.	2008	*Joe DeFrancesco, Katie Murray	Western IPM Center	*Pest Management Strategic Plan for Hops in Oregon, Washington, and Idaho*	*$6,563*	*100%*
20.	2008-2009	*Joe DeFrancesco, Katie Murray	Western IPM Center	*Development of Pest Management Strategic Plans For PNW Crops*	*$44,000*	*90%*
21.	2007-2008	*Joe DeFrancesco, Katie Murray	Western IPM Center	*Development of Pest Management Strategic Plans For PNW Crops*	*$45,000*	*90%*
	TOTAL				**$1,730,325**	

D. SERVICE

University Service

- Chair, Oregon State Agency IPM Committee
- Invited to serve on Food Safety and Environmental Stewardship External Advisory Council, 2018
- Professional Development: Social Justice Education Workshop. Spring 2017, Spring 2018.

- Contribute to IPPC staff meeting facilitation, lead IPPC's website development.

Service to Profession

- Co-leader, Western Region Pesticide Risk Reduction Signature Program, Western IPM Center
- Co-leader, tri-state Resilient Potato Production Initiative
- Invited member, Steering Committee for 10th International IPM Symposium, 2021

E. AWARDS

1. National and International Awards

- 2012 International IPM Award of Recognition for the Integrated Plant Protection Center, 7th International IPM Symposium, Memphis, USA

2. State and Regional Awards

- Sustainable Rural Communities Initiative Graduate Fellowship, Oregon State University, 2005-2006,
- Alumni Award, Oregon State University Anthropology Department, 2007
- Southeastern Psychological Association's Regional Research Award, University of Alabama in Huntsville, 2000

Isaac Sandlin

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Education

Master of Science, Botany and Plant Pathology, Oregon State University, September 2015 – March 2018

- 3.93 GPA
- Thesis evaluated hybridization between *Castilleja levisecta* and *C. hispida* to benefit Taylor's checkerspot butterfly (*Euphydryas editha taylori*) recovery.
- Academic training included participation in teaching assistant program for the following classes:
  - BOT 220: Introduction to Plant Sciences
  - BOT 323: Flowering Plants of the World
  - BI 371: Ecological Field Methods
  - BOT 461/561: Mycology
  - BI 301: Human Impacts on Ecosystems
  - BOT 323 and BI 371 were writing intensive courses. The main duties of these positions were geared towards teaching and coaching effective science communication.
- Coursework has included: statistics, data analysis, geographic information systems, plant taxonomy, ecological theory, evolutionary ecology and restoration ecology.
- Botany and Plant Pathology Undergraduate Mentor
- Graduate Student Association Travel Grant Committee

Post Baccalaureate Study, January 2012 - March 2014

• 3.7 GPA

• Portland Community College University Transfer, Biological Sciences. General Chemistry 221, 222, 223; Geology of the Pacific Northwest; Biology 211, 212; Statistics 243, 244; Trigonometry.

Bachelor of Arts, Journalism, UNC Chapel Hill, Class of 2007

• 3.0 GPA

• Dual emphasis in visual communication and newswriting with additional coursework in photojournalism, reporting, economics and statistics.

Associate of Arts, History, Cape Fear Community College, January 2002 – May 2004

• 4.0 GPA

• Student Body President, 2003- 2004

• Focused on US history and political science

• CFCC President's Award for Service

Experience

Botanical Technician, US Army Corps of Engineers

March 2018 – present

Worked on Army Corps properties throughout the Willamette Valley to survey and restore Kincaid's lupine, Fender's blue butterfly, and Bradshaw's lomatium. Duties include field crew leadership, GIS database management, restoration planning, invasive species management and mapping, and community engagement.

Botanical Technician, Institute for Applied Ecology

2013 - 2016 Field Seasons

Worked under direct supervision of the organization's executive director, Dr. Tom Kaye, to reintroduce the federally listed species, golden paintbrush, throughout the Willamette Valley and survey all Oregon populations. Duties included restoration planning and implementation, volunteer coordination, native flora identification, project management, data management and data analysis.

Conservation and Land Management Intern, Chicago Botanic Garden

Seasonal, June 2014 to March 2015

Worked directly with Dr. Edward O. Guerrant at Portland State University and Oregon/Washington BLM to collect native grass and forb seed throughout greater sage-grouse habitat.

Botanical Technician, Walker Botanic Consultants

Seasonal, Summer 2013

Surveyed rare and endangered flora in the longleaf pine/sandhills ecosystem under Department of Defense contract on Ft. Bragg, NC.

Tree Inventory Coordinator, Portland Parks & Recreation

Seasonal, June 2011 to November 2011

Collaborated with citizens, community leaders and city administrators to facilitate and implement the measurement and mapping of over 25,000 street trees in the greater Portland area. Additional duties included ArcGIS mapping and database management, environmental education and event coordination.

Stewardship Crew Leader, Columbia Land Trust

Seasonal, January 2010 to June 2011

Implemented ecological restoration projects throughout the diverse ecosystems of the lower Columbia River and its tributaries. Duties included field team management and administration, community outreach, forest measurements and vegetation monitoring.

Botanical Technician, North Carolina Botanical Garden

Seasonal, August 2009 to December 2010

Collected native grass and forb seed on National Forest holdings throughout the southeastern United States in support of USFS soil stabilization initiatives.

Field Crew Leader, Montana Conservation Corps

Seasonal, January 2009 to August 2009

Responsible for crew safety, conservation education and project supervision of high school juniors and seniors in Glacier National Park and the Bob Marshall Wilderness complex.

Horticulture Technician/Conservation Intern, North Carolina Botanical Garden

January 2007 to December 2007

Assisted horticulture and conservation personnel in day-to-day garden activities, including native-plant seed collection, eradication of exotic invasive species, revegetation and native plant nursery support. Additional duties included habitat interpretation and environmental education.

Electrician Mate 3rd Class, United States Coast Guard

February 1998 to February 2002

Gained unique and invaluable leadership experience associated with the Coast Guard's dynamic operational environment. Honorably discharged February 2002, federal 5-pt. veteran status, VRA certified.

Awards and Scholarships

Katherine Pamplin Scholarship, Portland Garden Club, March 2016

Hardman Award for Native Plant Research, May 2016

National Native Seed Conference Scholarship, 2015

Skills

Project management

Pacific Northwest native and exotic plant identification

Native plant propagation

Community engagement and public speaking

Grant, technical, and editorial writing

Data analysis using R, Python, and SAS

ArcGIS geodatabase management

Mobile mapping using Tremble handheld devices and ArcCollector

Adobe Creative Suite design and layout

Social media management

Professional Certifications

Licensed OR pesticide applicator (in process)

Wilderness First Responder

USFS Class B sawyer

Appendix B. List of IPPC grant-funded and designated operation projects: FY14 through FY19.
FY14

1. Implementing, coordinating and evaluating efficient, low-risk IPM in Oregon State University; United States Department of Agriculture/ National Institute of Food and Agriculture; PI- Paul Jepson; $299,900.00
2. Support of activities related to pesticide monitoring and analytical capacity building for the CERES Locustox Laboratory in Dakar, Senegal; Food and Agriculture Organization of the United Nations; PI- Paul Jepson; $190,867.46
3. Support of activities for the Global Pilot Project in IPM Capacity Building for Sustainable Intensification of Crop Production; Food and Agriculture Organization of the United Nations; PI- Paul Jepson; $132,646
4. Pacific Northwest Consortium to Improve and expand Verifiable IPM in Washington and Oregon Schools; Washington State University; PI-Tim Stock; $106,595.75
5. Regional IPM Center Signature Program; UC Davis; PI-Paul Jepson; $88,260.04
6. Rear and Release Psyllids as Biological Control Agents – An Economical and Feasible Mid=Term Solution for Huanglongbing (HLB) Disease of Citrus; United States Department of Agriculture/ National Institute of Food and Agriculture; PI- Leonard Coop; - $85,828.59;
7. Pesticide Safety Education Program; Designated Operations; Lead – Tim Stock; $82,990.00;
8. School IPM Program; Designated Operations: Lead- Tim Stock; $56,715
9. Implementing and Evaluating Participatory IPM Education at the Watershed Scale in Oregon; United States Department of Agriculture/ National Institute of Food and Agriculture; PI – Paul Jepson; $48,880.28
10. Clackamas Basin Strategic Pesticide Stewardship Partnership; Oregon Environmental Council; PI-Mary Halbleib; $41,437
11. PNW Regulatory Information Coordinator. Western IPM Center. PI Katie Murray: $31,269.
12. School IPM Landscaping; Metro/Portland; PI- Tim Stock; $27,822.89
13. Integrating Agricultural Conservation Practices into Idaho and Washington Farms; UC Davis; PI-Gwendolyn Ellen: $22,854
14. Pest Management Strategic Plan for Pears in Oregon and Washington. Washington Tree Fruit Research Commission. PI – Joe DeFrancesco: $15,415
15. Pest Management Strategic Plan for Pears in Oregon and Washington. Western IPM Center. PI Joe DeFrancesco: $4,953.
16. Understanding Environmental Factors for Boxwood Blight Development – OSU Modeling Component; Virginia Tech; PI- Leonard Coop; $15,014.00
17. IPMnet NEWS; Virginia Tech; PI- Paul Jepson; $15,000
18. Pesticide Safety Education Program; USDA NIFA; PI- Tim Stock: $10,000

FY15

19. Implementing and Improving IPM Adoption in Oregon Farms, Nurseries, and Schools; United States Department of Agriculture/ National Institute of Food and Agriculture; PI – Paul Jepson; $580,000.00
20. Medium and Extended Range Weather and Climate Forecasts Scaled and Tested for Improved IPM Decision Support in United States; United States Department of Agriculture/ National Institute of Food and Agriculture; PI-Leonard Coop; $240,845
21. Signature Program 1: Regional Infrastructure for Climate and Weather – Based Decision Support Tools; UC Davis; PI – Paul Jepson & Leonard Coop; $193,066.00
22. Pesticide Safety Education Program; Designated Operations; Lead – Tim Stock; $89,814.00
23. Metro IPPC PRiME (MIP) Pesticide Risk Assessment Project; Metro/Portland; PI – Michael Guzy; $75,000.00
24. Enabling IPM Transitions in Christmas Trees; Oregon Department of Agriculture; PI – Mary Halbleib; $49,278
25. PNW Regulatory Information Coordinator. Western IPM Center. PI Katie Murray: $31,269.
26. School IPM Program; Designated Operations; Lead – Tim Stock; $31,140.00
27. Pursuit of a Stronger, More Sustainable Pesticide Safety Education Program; CropLife Foundation; PI- Paul Jepson; $25,000
28. Development of New Pest Mapping Technologies for Improved Risk Analysis and Support Field Ops; United State Department of Agriculture/ Animal and Plant Health Inspection Service; PI -Leonard Coop; $25,000.00
29. Pest Management Strategic Plan for Wine Grapes in Oregon. Oregon Wine Board. PI- Katie Murray: $21,929.
30. Boxwood Blight: Studying Calonectria Pseudonaviculata Biology and Epidemiology to Enhance Mitigation Strategies: - Understanding Environmental Factors for Boxwood Blight Development; Virginia Tech; PI – Leonard Coop; $21,024.00

FY16

31. Development of New Pest Mapping Technologies for Improved Risk Analysis and Support of Field Ops; United States Department of Agriculture/ National Institute of Food and Agriculture; PI – Leonard Coop; $108,950.

32. Pesticide Safety Education Program; Designated Operations; Lead – Tim Stock; $102,955.00 School IPM Program; Designated Operations; Lead – Tim Stock; $72,550.00

33. Collaborative Approaches to Increase the Integration of Functional Agricultural Biodiversity (FAB) in Western Farming Systems; Utah State University; PI – Gwendolyn Ellen; $67,699.00

34. Pesticide Management Decision Support and Education; Oregon Department of Agriculture; PI – Rick Hilton/ Mary Halbleib; $38,443

35. PNW Regulatory Information Coordinator. Western IPM Center. PI Katie Murray: $32,832.
36. Redefining Learner-centered Education to Build High Impact IPM Partnerships; Utah State University; PI – Mary Halbleib; $29,993.00
37. Biological Christmas Tree Pest Management; Oregon Department of Agriculture; PI - Gwendolyn Ellen; $25,170
38. Understanding Pathogen Biology & Epidemiology to Enhance Mitigation Strategies for Boxwood Blight; Virginia Tech; PI – Leonard Coop; $23,410.00

FY17

39. IPMSP's: Bringing Integration to Pest Management Strategic Plans; United States Department of Agriculture/ National Institute of Food and Agriculture; PI- Katie Murray; $215,460
40. Pesticide Safety Education Program; Designated Operations; Lead – Tim Stock; $112,280.00
41. Development of New Pest Mapping Technologies for Improved Risk Analysis and Support of Field Ops; United States Department of Agriculture/ National Institute of Food and Agriculture; PI – Leonard Coop; $89,241
42. Western Region Pesticide Risk Reduction Professional Development Project. Western Sustainable Agriculture Research and Education program. PI- Paul Jepson: $63,299.
43. PNW Regulatory Information Coordinator; University of California-ANR; PI – Katie Murray; $32,832;
44. School IPM Program; Designated Operations; Lead – Tim Stock; $17,280.00
45. Biologically-based New Mitigation Strategies for Boxwood Blight; United States Department of Agriculture/ National Institute of Food and Agriculture; PI – Leonard Coop; $5,900

FY18

46. Statewide Networks for Overcoming Barriers to IPM Adoption in Oregon; United States Department of Agriculture/ National Institute of Food and Agriculture; PI- Paul Jepson/Katie Murray; $858,870
47. Enhancing Boxwood Blight Mitigation through Innovation, Integration, and Education; Virginia Tech; PI – Leonard Coop; $44,883.35
48. PNW Regulatory Information Coordinator; University of California-ANR; PI – Katie Murray; $32,832
49. IPM Strategic Planning for Oregon, Washington, and Idaho Mint. Oregon Mint Commission. PI – Katie Murray: $10,246.
50. IPM Strategic Planning for Treasure Valley Onions, Malheur County Onion Growers Association. PI – Katie Murray: $8,704.
51. Development of new mapping technologies for improved risk analysis and support of field Operations. USDA APHIS PPQ CAPS. L. Coop, J. Bowers. $140,000.

FY19

52. Fall Armyworm IPM and pesticide risk management, USDA FAS, USAID, P.C.Jepson, $299,507

53. A Western IPM Center led by California, Arizona, and Oregon ($4,000,000 to UCD, P.C. Jepson, Co-PI and Associate Direcror): Western IPM Network coordination, and pesticide risk management signature program, M.K. Murray, P.C.Jepson, $296,141

54. IPM Strategic Planning for Pacific Northwest Potatoes, Northwest Potato Research Consortium. PI – Katie Murray: 10,876.

Appendix C. Weather and degree day models implemented on USpest.org.

Table 6a. IPPC uspest.org/cig-bin/ddmodel.us and dd/model Phenology model/degree-day calculator usag

#	Model name/species	Type	2015	2016	2017	2018 to Oct 18	Totals	Year first onlir
	Last 3 years and total since 1999							
1	degree-day calculator	generic	25,702	27,041	28,822	24,391	232,352	1996
2	asian citrus psyllid	invasive insect	412	292	827	74	2,299	2013
3	asian longhorned beetle	invasive insect	0	0	119	61	180	2017
4	apple maggot 1st emerge	pest insect	324	312	403	243	3,841	2004
5	apple maggot percent emerge	pest insect	216	162	150	137	1,571	2004
6	apple scab	plant disease	1,343	1,051	1,112	902	11,944	1998
7	pear scab infection season	plant disease	314	250	322	281	4,960	2002
8	alfalfa weevil #1	pest insect	155	288	361	174	978	2015
9	bertha armyworm	pest insect	133	130	69	46	1,285	1998
10	black cutworm	pest insect	486	240	225	71	3,246	1998
11	brown marmorated stink bug	invasive insect	468	293	562	142	2,924	2011
12	broccoli-Arcadia	crop	45	431	172	115	763	2015
13	broccoli-Emerald Pride	crop	0	187	70	64	323	2015
14	broccoli-Green Magic	crop	20	249	161	91	521	2015
15	broccoli-Imperial	crop	6	92	140	49	287	2015
16	Barley	crop	64	143	95	40	912	2002
17	cabbage looper	pest insect	115	133	132	72	1,735	1998
18	corn earworm	pest insect	338	240	269	92	2,822	1998
19	west. cherry fruit fly v2	pest insect	346	1,217	1,227	2,543	8,560	2003
20	western cherry fruit fly	pest insect	356	281	341	132	5,116	1997
21	ChickPea Desi intrmd grwth	crop	43	108	112	6	431	2002
22	codling moth v2	pest insect	561	1,451	1,572	2,938	11,924	2007
23	codling moth no biofix	pest insect	1,496	1,079	1,288	925	14,540	2009
24	cereal leaf beetle	pest insect	552	218	314	123	3,127	2010
25	codling moth	pest insect	2,193	2,765	2,710	4,024	43,532	1997
26	cabbage maggot	pest insect	747	182	354	92	7,264	2006
27	cucumber-Mktmore 76 (dir. seed)	crop	0	71	87	31	189	2016
28	Canola-Argentine	crop	165	127	66	18	770	2002
29	Canola-Polish indet. growth	crop	44	104	37	8	345	2002
30	Canary	crop	36	74	22	7	329	2002

Table 6b. IPPC uspest.org/cig-bin/ddmodel.us and dd/model Phenology model/degree-day calculator usag

	Last 3 years and total since 1999					2018		Year
#	Model name/species	Type	2015	2016	2017	to Oct 18	Totals	first onlir
31	cucumber-Cobra (dir. seed)	crop	0	76	57	55	188	2016
32	cucumber-Mktmore 76 (trnsplant)	crop	0	113	44	80	237	2016
33	cucumber-Dasher II (dir. seed)	crop	0	26	67	30	123	2016
34	cucumber-Zapata (dir. seed)	crop	0	36	12	14	62	2016
35	cucumber-Extreme (dir. seed)	crop	0	27	60	42	129	2016
36	cucumber-Supremo (dir. seed)	crop	0	13	35	13	61	2016
37	downy brome	weed	155	190	116	24	2,780	2000
38	Diorhabda carinulata	biocontrol insect	0	0	200	164	364	2017
39	Douglas-fir needle midge	pest insect	353	171	119	75	1,841	2011
40	emerald ash borer	invasive insect	592	383	603	337	3,877	2010
41	early blight of potato	plant disease	590	175	288	65	6,724	2011
42	european grapevine moth	invasive insect	616	389	337	235	5,523	2010
43	european pine shoot moth	pest insect	394	138	212	74	2,721	1999
44	Fenders blue butterfly	endangered insect	61	163	91	3	940	2012
45	cougarblight (fire blight)	plant disease	570	893	587	675	12,277	1998
46	filbertworm	pest insect	310	478	399	269	5,128	1999
47	Flax	crop	42	93	95	16	417	2003
48	fruittree leafroller	pest insect	505	263	229	131	2,467	2009
49	Galerucella calmariensis	biocontrol insect	88	181	112	298	1,624	2013
50	gypsy moth egg hatch	invasive insect	80	133	114	31	865	2008
51	gypsy moth larvae & pupae	invasive insect	51	86	135	13	767	2008
52	gypsy moth Sheehan-simplified	invasive insect	1,848	1,480	1,854	1,547	13,050	2009
53	hop downy mildew	plant disease	185	277	274	230	2,859	2010
54	hairy nightshade	weed	0	142	78	29	249	2016
55	isomate-c+	pheromone lure	65	116	40	8	523	1999
56	Japanese knotweed psyllid	biocontrol insect	0	0	28	8	36	2017
57	Japanese beetle	invasive insect	481	191	331	304	1,307	2015
58	Japanese pine sawyer beetle	invasive insect	0	104	222	38	364	2016
59	light brown apple moth	invasive insect	288	124	231	59	1,228	2012
60	lambsquarter	weed	0	43	52	34	129	2016

Table 6c. IPPC uspest.org/cig-bin/ddmodel.us and dd/model Phenology model/degree-day calculator usag

Last 3 years and total since 1999

#	Model name/species	Type	2015	2016	2017	2018 to Oct 18	Totals	Year first onlir
61	Lentil-intermed grwth chars	crop	57	93	69	36	408	2002
62	Lacanobia fruitworm	treefruit insect	38	97	88	10	429	2005
63	Lygus bug [alfalfa seed]	pest insect	329	283	554	332	3,653	2002
64	mint flea beetle	pest insect	80	110	101	24	1,038	2000
65	mummy berry infection season	plant disease	213	72	69	24	430	2014
66	Metaseiulus occidentalis	predatory mite	47	96	111	16	417	2000
67	mint root borer	pest insect	206	517	162	94	2,094	2000
68	Mustard-Brwn+Orntl indgrwth	crop	46	79	55	8	300	2003
69	Mustard-Yellow indet grwth	crop	55	82	60	5	348	2002
70	Neoseiulus fallacis	predatory mite	51	70	61	15	431	2000
71	oak ambrosia beetle	invasive insect	0	83	164	39	286	2016
72	Oat	crop	51	86	56	18	774	2002
73	obliquebanded leafroller no.2	pest insect	312	1,142	1,430	2,408	8,740	1998
74	obliquebanded leafroller no.1	pest insect	204	139	127	68	2,241	1998
75	oriental fruit moth	pest insect	176	1,079	1,254	2,412	5,897	2003
76	omnivorous leaftier	pest insect	299	157	125	95	2,180	2012
77	orange tortrix (cold winter)	pest insect	78	90	126	19	796	1998
78	orange tortrix (mild winter)	pest insect	2,038	1,237	3,174	4,317	16,329	1998
79	old world bollworm (H. armigera)	invasive insect	0	0	0	52	52	2018
80	pink bollworm	pest insect	31	77	46	28	182	2015
81	pecan nut casebearer	pest insect	206	84	221	57	1,025	2009
82	Pea (yellow)	crop	542	113	83	49	2,793	2002
83	Pandemis leafroller	pest insect	71	978	1,106	2,142	4,662	1998
84	Pepper-Bell King	crop	0	0	77	126	203	2017
85	Pepper-Gatherers gold	crop	0	0	24	9	33	2017
86	Pepper-King Arthur	crop	0	0	22	37	59	2017
87	Pepper-Stocky red roaster	crop	0	0	26	22	48	2017
88	potato psyllid	pest insect	0	0	180	54	234	2017
89	pine shoot beetle	pest insect	321	90	202	61	1,214	2011

Table 6d. IPPC uspest.org/cig-bin/ddmodel.us and dd/model Phenology model/degree-day calculator usag

#	Model name/species	Type	2015	2016	2017	2018 to Oct 18	Totals	Year first onlir
	Last 3 years and total since 1999							
90	peach twig borer	pest insect	160	1,046	1,246	2,427	5,706	2008
91	pine tree lappet moth	invasive insect	0	72	208	59	339	2016
92	redroot pigweed	weed	0	65	78	39	182	2016
93	Safflower (Saffire)	crop	43	91	106	93	511	2002
94	small broomrape	weed	102	124	103	92	851	2004
95	sweet corn	crop	362	375	599	368	6,581	1999
96	San Jose scale	pest insect	107	976	1,231	2,402	6,630	1998
97	Spodoptera litura com cutworm	invasive insect	0	0	32	50	93	2002
98	Sunflower early maturing only	crop	69	108	117	10	539	2002
99	sugarbeet root maggot	pest insect	63	155	122	42	1,132	2002
100	strawberry root weevil	pest insect	120	139	88	28	1,284	1997
101	strawberry root weevil (mint)	pest insect	143	131	264	38	2,011	2004
102	Small tomato borer	invasive insect	0	0	0	5	93	2018
103	sunflower stem weevil	pest insect	62	106	133	47	571	2011
104	spotted wing Drosophila	invasive insect	8,767	10,064	3,284	3,194	48,732	2010
105	testng spot wing Dros newer	invasive insect	94	69	183	33	462	2010
106	spot. wing Dros. OW Mortal.	invasive insect	130	205	203	61	1,096	2011
107	threecornered alfalfa hopper	pest insect	0	0	364	204	568	2017
108	variegated cutworm	pest insect	332	265	224	123	2,900	1997
109	western bean cutworm	pest insect	183	155	255	38	1,622	2010
110	western flower thrips	pest insect	787	630	920	513	6,815	2011
111	Wheat (Bauer spring wheat)	crop	62	89	217	191	800	2012
112	walnut husk fly	pest insect	77	121	192	122	1,010	2008
113	Wheat R	crop	111	143	162	110	2,216	2008
114	winter wheat	crop	318	227	452	277	4,277	1999
	Totals		**67,542**	**73,973**	**75,770**	**65,936**	**592,159**	
	Count # DD Models		**91**	**105**	**115**	**114**	**114**	

Appendix D. List of outreach presentations, workshops, panels that current IPPC staff presented or participated in, FY14-FY18 [list does not include workshops and presentations by former staff present during these years].

2018

Coop. L. 2018. Concepts of systems modeling in agroecosystems. Invited seminar/class at Oklahoma State NIMFFAB. Oct. 12, 2018. Stillwater, OK (via Zoom). Online at: <https://uspest.org/okstate/Systems_Modeling_Oct_2018b.pdf >

Coop, L. 2018. Boxwood blight infection risk model – when and where to be on alert. International Congress of Plant Pathology. Invited Presentation. Boston, MA, July 31, 2018.

Coop, L. A. Fox, and P. Jepson. 2018. Weather and Climate driven models for IPM and invasive species management. Poster presented at 9th International IPM Symposium, Mar. 21, 2018, Baltimore, MD. Online at: <http://uspest.org/ipm/P4_Weather_and_Climate_Driven_Models_for_IPM.pdf>

Murray, Katie. Reducing risks from pests and pesticides: data and metrics to understand needs and track progress. Presenter, CORE recertification workshop, Wilsonville, OR. November 15 2018.

Murray, Katie. Hazelnut Pest Losses Workshop, Salem, OR, June 2018. Co-designed, organized, co-facilitated. 9 participants.

Murray, Katie. Hazelnut IPMSP Workshop, Salem, OR, February 2018. Designed, organized, co-facilitated. 19 participants.

Murray, Katie. Cherry Pest Losses Workshop, Hood River, OR, March 2018. Co-designed, organized, co-facilitated. 9 participants.

Murray, Katie. Cherry IPMSP Workshop, The Dalles, OR, January 2018. Designed, organized, co-facilitated. 18 attendees, + 5 workgroup members not present.

Jepson, Paul; Murray, Katie. Western Region Pesticide Risk Reduction Professional Development Monthly Workshops (remote), 2018. Co-designed, organized, co-facilitated, evaluated. 9 monthly workshops for 2018.

Jepson, Paul. Regional Training-of-Trainers and Awareness Generation Workshop on Fall Armyworm Pest Management in West Africa', Cotonou, Benin, February, 2018 (CIMMYT, USAID; ~120 participants, 20 contact hours, lead presenter and discussion leader IPM challenges and program construction, and pesticide risk management)

Jepson, Paul. Large scale webinars on Fall armyworm management 2018: See SDG Academy Webinar (May 2018:

https://www.youtube.com/watch?v=htGQgCT1d1E&t=5s&list=UU7XdauqZJSurqz55qlZbqhw&index=12);

Jepson, Paul. USAID Webinar (Sept 2018: https://www.youtube.com/watch?v=t0Hp9zEbYpc&feature=youtu.be).

Jepson, Paul; Murray, Katie. Western Pesticide Risk Management Workgroup annual workshop, Portland; co-organizer, co-facilitator, presenter, OR May 16th-17th, 2018

Jepson, Paul. Oregon IPM Program Annual Report: co-organizer, co-facilitator, presenter, WERA 1017 Western Region IPM Coordinator workshop, Portland, OR May 16th-17th, 2018

Jepson, Paul; Murray, Katie. WERA 1017 Western Region IPM Coordinator workshop; co-organizer, co-facilitator, presenter, Portland, OR May 16th-17th, 2018

Jepson, Paul. Overcoming Barriers to IPM Adoption and Pesticide Risk Reduction: invited speaker, Oregon State University Extension Association, March 17th, 2018

Jepson, Paul. Pesticide Resistance Prevention: co-organizer, presenter, facilitator, Malheur County Extension Office, Ontario OR February 7th, 2018

Jepson, Paul. The Emerging Problem of Pesticide Resistance: Annual Treasure Valley Onion Growers Meeting, Ontario, OR, February 6th, 2018

Jepson, Paul; Murray, Katie. The Resilient Potato Production Workgroup: invited presenter, 9th Oregon and Washington Potato Conference, Kennewick, Washington, January 25th, 2018

Jepson, Paul. Keeping Pesticides out of Water: invited presenter, Annual Non-crop Vegetation Management Workshop, Corvallis, OR January 23rd, 2018
Murray, Katie; Jepson, Paul. Resilient Potato Production Initiative Workshop: co-organizer and co-facilitator, Portland, OR June, 2018.

Jepson, Paul; Murray, Katie. Overcoming Barriers to IPM Adoption and Pesticide Risk Reduction: A system-level view. Co-designed, co-presented. Panel Presentation to the 2018 International IPM Symposium, Baltimore, MD, March 2018.

2017

Coop, L. 2017. Weather Models and Predictive Tools for IPM. Pesticide Stewardship Conference and Recertification Course, Univ. Idaho Extension. Nov. 30, 2017. Boise, ID. 1 hr invited talk.

Coop, L. 2017. Web based decision tools for pest management: New and Used. Pesticide Recertification Course. Jan 24, 2017. Central Point, OR. 1 hr invited talk.

Coop. L. 2017. Systems modeling of crop and insect development for agricultural decision

support. Horticulture Dept. Seminar. Oct. 24, 2017. Corvallis, OR. Online at: <**https://media.oregonstate.edu/media/t/0_72jrm3vb/80127602** >

Jepson, Paul. The Emerging Problem of Resistance: invited speaker, Hermiston Farm Fair, Hermiston, OR November 30th, 2017

Jepson, Paul. Pesticides, soils, pests and beneficial insects – some practical considerations: Hermiston Farm Fair, CORE recertification credit workshop, Hermiston, OR November 30th & December 1st, 2017

Jepson, Paul; Murray, Katie. Western Region Pesticide Risk Reduction Professional Development Monthly Workshops (remote), 2017. Co-designed, organized, co-facilitated, evaluated. 9 monthly workshops for 2017.

Jepson, Paul. 'IPM and Pesticide Risk Management & Stakeholder Review Workshop' San Jose, Costa Rica May 2017 (SAN, 8 participants, 12 contact hours)

Jepson, Paul. 'Workshop on Fall Armyworm Pest Management Field Manual Development', Entebbe, Uganda, Sept 2017. (CIMMYT, USAID; 18 contact hours, ~30 participants, leader of pesticide efficacy and risk management workgroup (participated remotely)).

Jepson, Paul. 'Regional Training-of-Trainers and Awareness Generation Workshop on Fall Armyworm Pest Management in Southern Africa', Harare, Zimbabwe, October 2017 (CIMMYT, USAID; ~50 participants, 20 contact hours, lead presenter IPM program construction and pesticide risk management)

Jepson, Paul. 'Regional Training-of-Trainers and Awareness Generation Workshop on Fall Armyworm Pest Management in East Africa', Addis Ababa, Ethiopia, November 2017 (CIMMYT, USAID; ~50 participants, 20 contact hours, lead presenter and discussion leader IPM challenges and program construction, and pesticide risk management)

Murray, Katie; Jepson, Paul. Resilient Potato Production Initiative Workshop: co-organizer and co-facilitator, Portland, OR December 5th, 2017

Murray, Katie; Jepson, Paul. Resilient Potato Production Initiative Workshop: co-organizer and co-facilitator, Portland, OR April, 2017

Jepson, Paul. IPM Festival for the Bear Creek Watershed, Middle Rogue workshop and tour: co-organizer, facilitator and presenter, September 21st, 2017

Jepson, Paul; Murray, Katie. Western Pesticide Risk Reduction Project Workshop: co-organizer and facilitator, UC Extension, Irvine, July 25th-27th, 2017

Murray, Katie. IPMSP: Bringing Integration to Pest Management Strategic Planning.Presentation to the WERA-1017 Regional Committee, Irvine, CA, July 2017

Murray, Katie; Jepson, Paul. Potato IPM Working group: Co-organizer and facilitator, Portland, OR, April 27th, 2017

Murray, Katie. Cranberry IPMSP Workshop, Bandon, OR, April 2017. Designed, organized, co-facilitated. 20 participants (13 attendees + 7 remote participants).

Murray, Katie. Cranberry Crop Pest Losses Impact Assessment Workshop, Bandon, OR, March 2017. Co-designed, organized, co-facilitated, evaluated. 11 attendees.

Jepson, Paul. Middle Rogue PSP: Pesticide Risk and Best Management Practices: co-organizer and facilitator, Middle Rogue Soil and Water Conservation District, Medford, OR, February 28th, 2017

Murray, Katie. Onion IPMSP Workshop, Ontario, OR, February 2017. Designed, organized, co-facilitated. 25 participants (16 attendees + 9 remote participants).

Murray, Katie. Potato IPM Needs Assessment: co-organizer and co-facilitator, Washington and Oregon Potato Conference, Kennewick, Washington, January 25th, 2017

Jepson, Paul. Potato IPM: invited guest co-presenter, Washington and Oregon Potato Conference, Kennewick, Washington, January 25th, 2017

Jepson, Paul. Mint and grass seed IPM Needs Assessment Workshop: co-organizer and facilitator, Union County Extension, La Grande, Oregon, January 24th, 2017

Jepson, Paul. Pathways to Agricultural Transformation. Presentation to N8 AgriFood Conference, Durham, UK. July 2017

Murray, Katie. Environmental Justice and Research Ethics. Presentation to FSES Research Group, Department of Environmental and Molecular Toxicology, March 2017.

2016

Coop, L. and N. Andrews. 2016. Introducing and Using CROPTIME: Forecast Options for DD Models. Hands-on computer workshop. Mar. 14, 2016. Aurora, OR.

Coop, L. and N. Andrews. 2016. Weather forecasting (long-term forecasts) and future capacity for the modeling system and user interface. In: Introducing and Using CROPTIME: Vegetable Crop Schedule with Degree-Days. 2.5 hr lecture and hands-on computer workshop. 2016 Small Farms Conference. Feb. 20, 2016. Corvallis, OR.

Coop, L. 2016. Integrated Pest Management as it Relates to Climate. Blue Mountain Horticulture Society Annual Meeting. Feb. 10, 2016. Milton Freewater, OR.

Coop. L., A. Fox, C. Daly. 2016. Update on weather and climate data and models at USPEST.ORG. Presentation at Combined Weather Workgroup Meeting, Aug. 4, 2016. Tampa, FL.

Coop. L., A. Fox, G. Grove, A. Dreves. 2016. Extended forecasts for IPM Decision Making. NIFA-CPPM-ARDP Grant Report at WERA-1017: Western Region IPM Coordinators Meeting. July 8, 2016. Boise, ID.

Jepson, Paul. 'ISEAL IPM Coalition Pesticides Workshop', invited co-organizer and presenter, Amnesty International, International Human Rights Center, London, UK, November 2016. (ISEAL Alliance; SAN: 6 contact hours, 18 participants, leader IPM and pesticide risk management)

Murray, Katie. Potato Crop Pest Losses Impact Assessment Workshop, December 2016, Hermiston, OR. Co-designed, organized, co-facilitated, evaluated. 17 attendees.

Murray, Katie. Onion Crop Pest Losses Impact Assessment Workshop, November 2016, Ontario, OR. Co-designed, organized, co-facilitated, evaluated. 17 attendees.

Murray, Katie. Wine Grape PMSP Workshop, February 2016, Portland, OR. Co-designed, organized, co-facilitated. 36 participants (27 attendees + 9 workgroup members not present).

Murray, Katie. Industry Utilization of Pest Management Strategic Planning Documents. Oregon Wine Research Institute Meeting, August 2016.

Murray, Katie. IPM Strategic Planning and needs from EPA/USDA. National IPM Centers Meeting, Washington DC, October 2016.

Murray, Katie. Tools and Processes to Support Pest Management. Hermiston Farm Fair, December 2016.

Jepson, Paul. Different paths to IPM on your Farm: invited keynote speaker, PNW Christmas Tree Association, Salem, OR June 17th, 2016

Jepson, Paul. Whole Farm Planning to Minimize Pests and Pesticide Use in Christmas Trees: workshop co-organizer and presenter, North Willamette Research and Extension Center, April 13th, 2016

Jepson, Paul. Pesticide Stewardship Partnership needs assessment: workshop co-organizer and presenter, Southern Oregon Research and Extension Center, March 31st, 2016

Jepson, Paul. Pesticide Application Management in Vineyards: workshop co-organizer and presenter, Southern Oregon Research and Extension Center, March 31st, 2016
Jepson, Paul. Winegrape Pest Management Strategic Planning: invited participant, IPM and pesticide risk management, Portland, OR February 25th, 2016

Jepson, Paul. Functional Agricultural Biodiversity Workgroup Needs Assessment: workshop co-organizer and discussion leader, research and agency working group, Portland, OR February 17th, 2016

Jepson, Paul. Keeping Pesticides out of Water: invited presenter, Non-Crop Vegetation Management Conference, OSU, January 20th, 2016

Jepson, Paul. Whole farm planning to manage pests and minimize pesticide use: workshop co-organizer and presenter, Aurora, OR, 7th January, 2016

2015

Coop, L., P. Jepson, and C. Landgren. 2015. Tools for sprayers and IPM innovators – with focus on aphids and midges. Oregon Christmas Tree Assoc. Meeting. Mar 6, 2015. Wilsonville, OR.

Coop, L. 2015. Crops and Climate – Has it been getting warmer in the Pacific Northwest and how will that affect plant/crop phenology. FRED Talk (Food and Farming Research Extension and Development). Small Farms Conference. Corvallis OR Feb. 28th 2015.

Andrews, N., D. Andrews, L. Coop. 2015. Croptime: Crop Phenology Models Interface Usability Tests. NWREC Aurora, OR. Jan 27, 2015.

Halbleib, M, C. Landgren, G. Ellen, L. Coop, G. Ahrens, T. Stone, D. Silen, others. Visioning session for IPM of Christmas Trees program. NWREC Aurora, OR. Jan 23, 2015.

Andrews, N., C. Bubl, L. Coop, A. Garrett, S. Kawai, J. Myers, H. Noordijk, E. Peachey, and D. Sullivan. 2015. Croptime: Vegetable degree-days. NW Horticultural Soc. Ann. Mtg. Jan 13, 2015, Canby, OR.

Coop, L. and G. Cook. 2015. DDRP Mapping: Degree-day, Risk, and Pest Event Maps. Invited talk. USDA-APHIS-PPQ-CPHST. Dec. 9, 2015. Ft. Collins, CO.

Coop, L. 2015. Pest Phenology Model Development & Online Tools. Oregon Agric. Extension Assoc. invited presentation. Apr 28, 2015, Medford, OR.

Coop, L. 2015. NW Pest Prediction Models Using Weather Data. IR-4 State Commodity Liaison Meeting. Invited presentation. Apr 22, 2015, Portland, OR.

Coop, L. 2015. Oregon IPM Coordinators Report 2015. WERA-1017 National and Western Region IPM Coordinators meetings. Mar 23, 2015. Salt Lake City, UT.

Jepson, Paul. Outcome-based education program planning: workshop co-organizer and presenter, OSU Extension Annual Conference, 9th December, 2015

Jepson, Paul. The principles of IPM and the role of pesticides (addressing IPM planning, pollinator protection and drift management, adapted to each audience over 2h sessions): OACFA 4th & 5th November, Springfield and Wilsonville; Oregon Ag Expo, Albany, 17th & 19th November; Union/Baker/Wallowa/Grant/E OR Ag College/ Morrow, Gilliam/ Klamath/Coos and Curry counties, 16th December (approx. 1,500 applicators reached)

Jepson, Paul. Pesticide applicator nozzle selection for efficacy and drift reduction, workshop co-organizer and presenter, GK Engineering, OR, June 18th, 2015

Jepson, Paul. Beneficial insects in Christmas Trees, Moving ahead, workshop co-organizer and presenter, Aurora, OR, February 11th, 2015

Jepson, Paul. Combining effective IPM and pesticide risk management in nurseries, workshop co-organizer and presenter, Boring, OR, February 3rd, 2015

2014

Coop, L. and A. Dreves. 2014. Using a phenology model for spotted wing Drosophila. SWD Tool Conversations - Extension Worksop. NWREC Aurora, OR Dec 11, 2014.

Coop, L. 2014. Spotted Wing Drosophila: Predict Spring Activity and Generation Increase: Degree Day Model. NWREC Spotted Wing Drosophila Extension Workshop May 22, 2014. Aurora, OR.

Coop, L. 2014. Tree fruit decision support – phenology and plant disease risk models. Presentation at N. Willamette Tree Fruit Growers Meeting. Feb. 15, 2014. Salem, Oregon.

Coop, L. 2014. Weather data and weed control: degree-day models and pesticide drift forecasts. Presentation at Douglas County Weed Day 2014. Feb. 5, 2014. Roseburg, Oregon.

Coop, L. 2014. Using phenology models and pheromone traps. Presentation at IPPC Chemical Applicators Short Course, Jan. 7, 2014. Wilsonville, Oregon.

Coop, L. 2014. Phenology model for the omnivorous leaftier, Cnephasia longana: reviving intensive research from a bygone ear. Presentation at ESA National Meeting, Portland, OR, Nov. 23, 2014.

Kaiser, C., Coop, L. and Meland, M., 2014. Developing a robust, predictive model for sweet cherry (Prunus avium L.) flowering, comparing eastern Oregon and mesic Nordic climates. ASHS Annual Conference. July 22-29, 2014. Orlando, FL.

Kaiser, C. and Coop, L., 2014. Camp program in the Walla Walla Valley. NACAA Annual Conference, July 19-24, 2014. Mobile, AL. (Invited presentation for National Award – Search for Excellence).

Coop, L. 2014. Oregon IPM report. WERA-1017 Western Region IPM Coordinators meeting Western Region. July 7, 2014. Bozeman MT.

Coop, L. 2014. Boxwood Blight: Epidemiology and Monitoring. Developing a Predictive Model for the United States. 2014 Boxwood Summit. May 13, 2014. Beltsville, Maryland.

Coop, L., F. Grevstadt, and G. Cook. 2014. Pest event mapping: a new tool to aid in prediction of insect phenology. Presentation and paper presented at: Pacific Northwest insect management conference. Jan. 6, 2014, Portland, Oregon.

Jepson, Paul. Tree fruit IPM. Invited speaker at Oregon Small Farm School, Clackamas Community College, September 6th, 2014

Jepson, Paul. IPM framework for aphid control. Invited speaker at: Identification and use of beneficial insects in controlling aphids in Christmas trees, North Willamette Research and Extension Center, June 11th, 2014

Jepson, Paul. IPM in Christmas Trees with an emphasis on aphids and midges. Invited workshop speaker, OSU Tree School, Clackamas Oregon, March 22nd, 2014

Jepson, Paul. ipmPRiME risk assessment for pesticides in Arizona lettuce production. Invited computer-lab workshop, Southwest Ag Summit, Yuma, Arizona, February 27th, 2014

Jepson, Paul. Pesticide application management for reduced risk to surface waters. Co-organizer and speaker, Oregon Association of Nurseries Workshop, Boring, OR, February 20th, 2014

Jepson, Paul. Considering pesticide risks in pesticide application decision-making, and, New best management practices for non-crop vegetation management. Invited speaker, Non-Crop Vegetation Management Conference, OSU, February 23rd, 2014

Jepson, Paul. Pesticide Selection that Considers Markets, Efficacy, Impacts and Resistance. Co-organizer and speaker: OSU Chemical Applicator's Short Course, Wilsonville OR, January 7th, 2014

Jepson, Paul. Practical Guidance for the Conservation and Protection of Pollinators and other Beneficial Insects on Your Farm. Co-organizer and speaker: OSU Chemical Applicator's Short Course, Wilsonville OR, January 7th, 2014

Jepson, Paul. PM tools. Invited speaker, Wilco Agronomy University, Salem, OR, January 6th, 2014

Appendix E. Examples of Oregon crop pest loss data for cherry, hazelnut and cranberries.
Sample Data: Crop Pest Losses and Impact Assessment Program

The following graphs depict sample data from our crop pest losses and impact assessment program. Analysis has recently begun for the first five assessments. This data will be summarized and published in two ways: 1) as part of the IPM Strategic Plan documents, and 2) as a stand-alone data summary. The data provides valuable insight into pest pressures, drivers of management, pesticide use, and economics of management and pest impacts. In Oregon, there are few ways to access this type of quantitative data. The data will be critical to industries and university faculty in tracking and monitoring changes in pests and management over time.

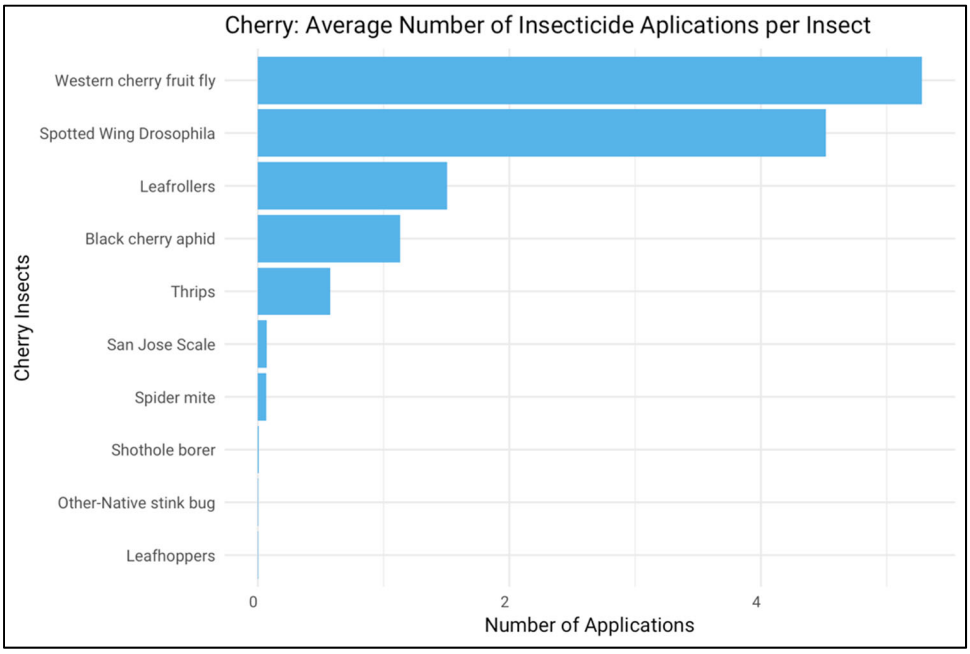

Figure 4. Average number of insecticide applications required for control of sweet cherry insect pests in Oregon.

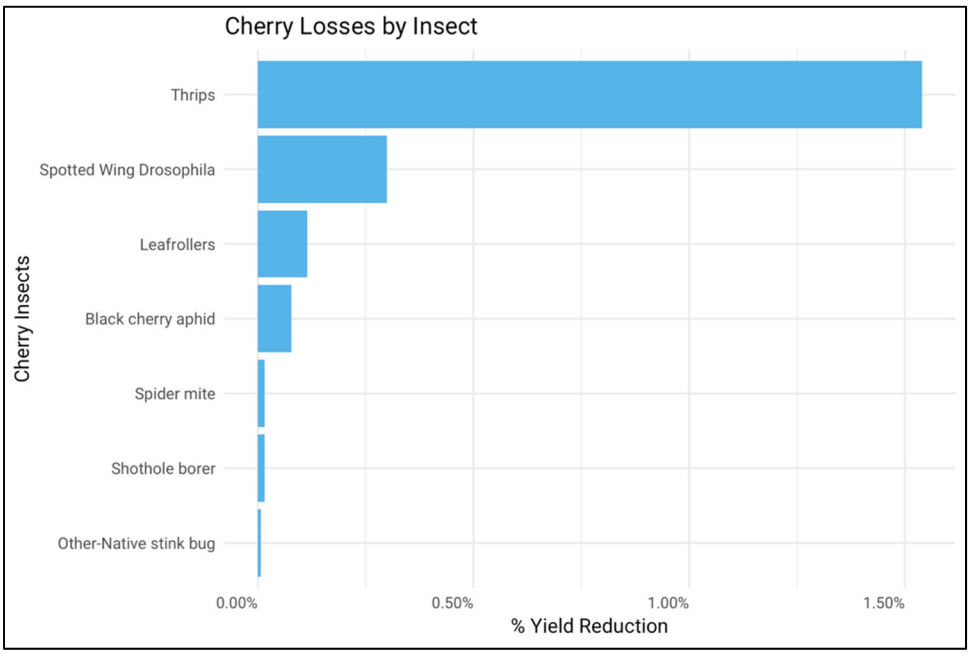

Figure 5. Percent yield reduction resulting from Oregon sweet cherry insect pests.

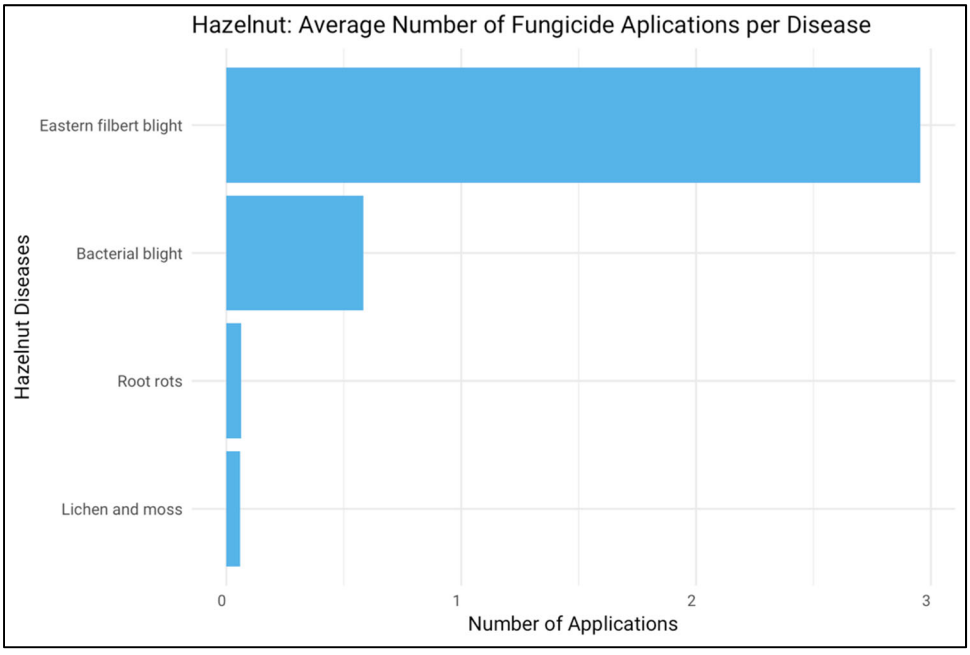

Figure 6. Average number of fungicide applications required for control of hazelnut diseases in Oregon.

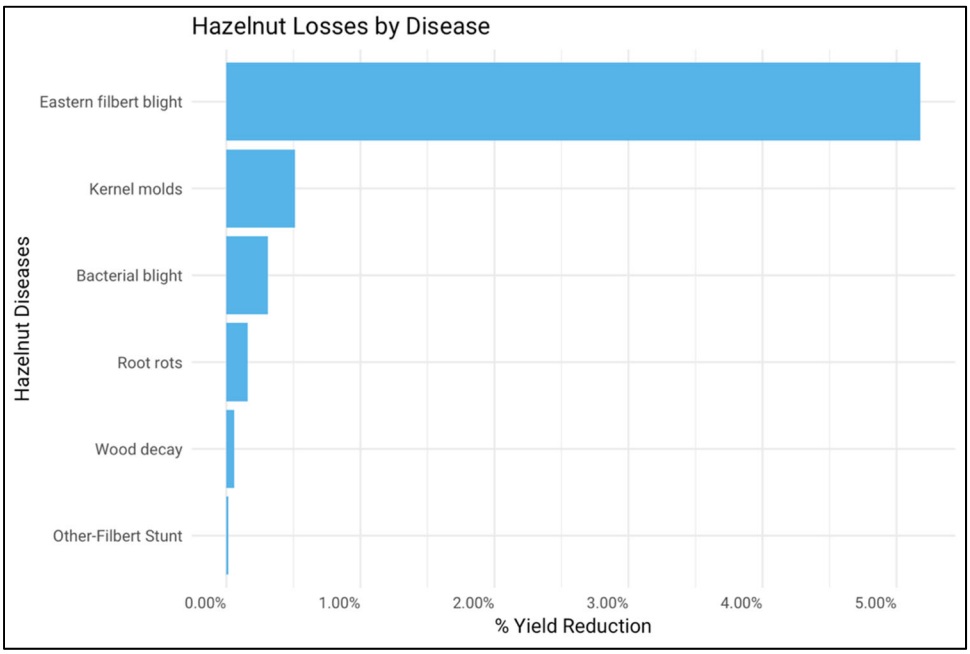

Figure 7. Percent yield reduction resulting from Oregon hazelnut diseases.

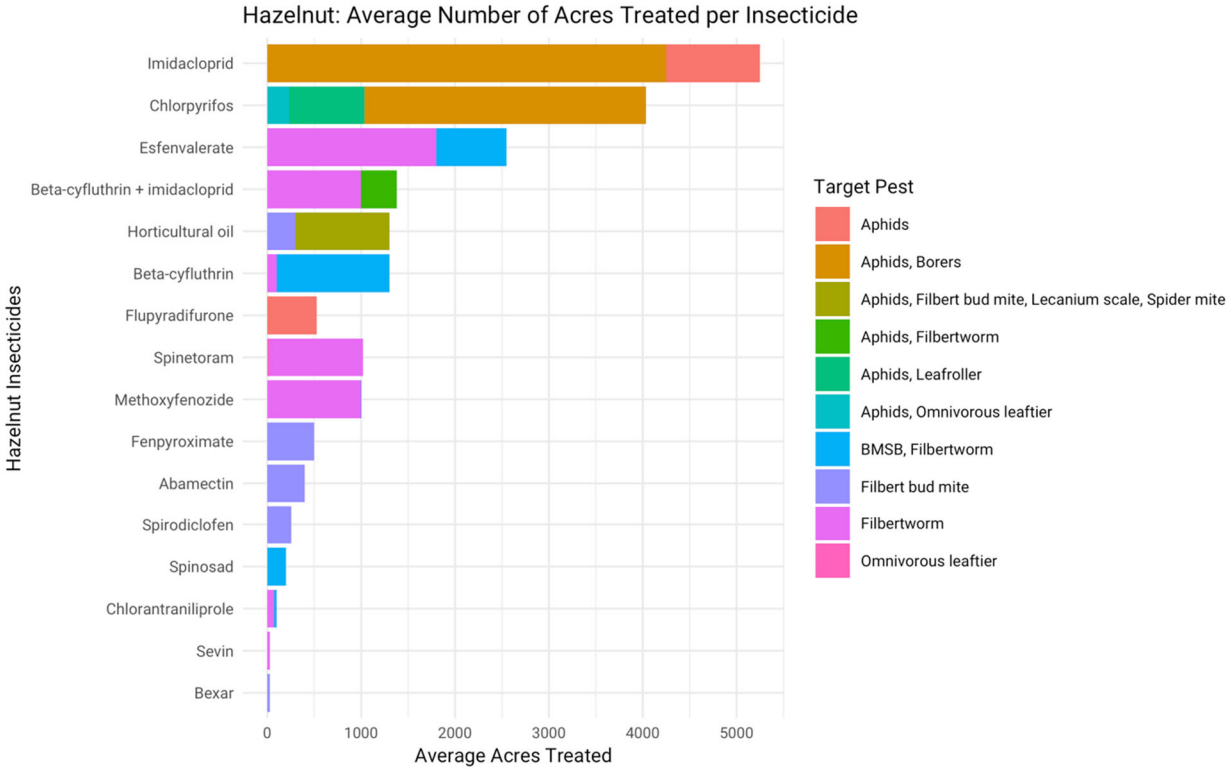

Figure 8. Top 16 insecticides used in the Oregon hazelnut industry by average acres treated, and their target pests.

Oregon Cranberry Industry Global Summary (per acre)	
Average number of insecticide applications for insects:	4.03
Average number of fungicide applications for diseases:	0.86
Average number of herbicide applications for weeds:	0
Insecticides costs, including application costs:	$28.63
Fungicide costs, including application costs:	$19.81
Herbicide costs, including application costs:	$0.00
Total insect management costs:	$43.22
Total disease management costs:	$126.75
Total weed management costs:	$61.61
Value of yield lost to insects:	$0.60
Value of yield lost to diseases:	$0.25
Value of yield lost to weeds:	$0.42

Figure 9. Average number of pesticide applications, yield losses, and associated management costs per acre associated with the Oregon Cranberry pests.

Appendix F. Examples of outreach products developed by IPPC faculty.

DRAFT IPM GUIDELINES FOR APHIDS ON CHRISTMAS TREES

Paul Jepson, OSU IPPC; Chal Landgren, OSU Extension Christmas Tree Specialist

IPM Goals

1. Reduce the risk of aphid outbreaks on your farm
2. Manage aphids cost-effectively
3. Preserve and enhance natural enemy populations
4. Limit pesticide risks to aquatic life and bees
5. Limit the risk of pest resistance

IPM practices	Check those that apply to you
Douglas-fir needle midge: **Use phenology model** to time setting of emergence traps and, in outbreak years, use weather forecasts on IPPC website to target warm evenings when swarms occur - **only spray when necessary to reduce the probability of early aphid build up**	
Application management: **Avoid any risk of drift** into field boundaries and towards surface waters when using Lorsban (chlorpyrifos) – **to avoid contaminating surface water**	
Aphid management: **Monitor** for aphid outbreaks and use early spot treatments – **to minimize risk to natural enemies**	
Aphid management: **Use selective pesticides** that are less toxic to natural enemies, early in the season – **to protect natural enemies**	
Aphid and other pest management: Use **insectary plantings**, but prepare the sites to make this investment sustainable – **to reduce aphid outbreak risk in the long term**	
Aphid and other pest management: Consider **edge or buffer plantings** with a less susceptible tree (Douglas or Nordmann Fir) **– to reduce pest risks in susceptible trees**	
Aphid and other pest management: **Innundative release of natural enemies** may have promise but is being tested – **to reduce aphid outbreak risk and the need to use pesticides**	

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PAMS IPM Summary for Balsam Twig Aphid, and Giant Conifer Aphid

Tactic	Method	Effectiveness	$$
Prevention	Unknown **(how do they enter fields/ natural hosts are widespread, derelict plantations?)**		
Avoidance	Douglas and Nordmann Fir less susceptible to aphids: barrier plantings might limit edge invasions	Untested	
Monitoring & decision support	Monitor for populations or signs of honeydew from early spring; determine if populations are increasing, and how widespread they are	No economic thresholds, yet	*
Suppression (biological)	*Beauvaria basiana* (Mycotrol) Predator and parasite conservation with insectary plantings (combined with selective pesticides) Natural enemy release (lacewings)	*? ? Not tried, but very effective in perennial crops **Worked in 2/3 of fields MI	** ** **
Suppression (chemical) Note restrictions for aerial application, and SLN labels for some products	*Broad spectrum (toxic to beneficials)*: chlorpyrifos (Lorsban), oxydemeton-methyl (MSR), imidacloprid (Admire, Provado), dinotefuran (Safari), thiamethoxam (Flagship), esfenvalerate (Asana) *Narrow spectrum, selective*: pymetrozine (Endeavor), spirotetramat (Ultor, Movento) (may be toxic to predatory mites), soaps (M-pede)	** (but can promote outbreaks) **, but some new AI's	*-** **

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PAMS IPM Summary for Douglas Fir Needle Midge, *Contarinia* spp.

Tactic	Method	Effectiveness	$$
Prevention	Remove heavily infested trees in the fall		
Avoidance	Late budding cultivars avoid damage	**	*
Monitoring & decision support	Traps used to detect adult emergence: very important in avoiding serious damage Use phenology model to time trapping and maximize efficiency of any treatments	** No economic threshold, but a regulatory pest	*
Suppression (mechanical, biological)	Shearing in low infestations. Parasitoids: and larval predation in soil possible	** ?	**
Suppression (chemical)	*Broad spectrum (toxic to beneficials)*:(Orthene, Lorsban,Flagship) *Narrow spectrum, selective*: none available	** (may cause outbreaks of other pests)	*-**

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OSU Oregon State

Christmas Tree Aphid Pesticide Risk Mitigation
Apply recommended mitigations for high risk applications

Pesticide	Inhalation	Aquatic risks, based on results for invertebrates, algae and fish	Wildlife risks, based on results for small mammals and birds	Bees
Admire/Provado				
Endeavor				
Lorsban				
M-pede				
Ultor/Movento				
Safari				
Flagship				
Asana				

MSR	Oxydemeton-methyl classified as highly hazardous by WHO/FAO JMPR – WHO Class 1b pesticide

Risks calculated using recommended application rates in ipmPRiME (ipmPRiME.org), including a new bee risk tool. Risks to beneficial insects and mites obtained from literature review (parasitic hymenoptera adults and larvae, ladybugs, lacewings and predatory mites).

Note – a recent human health risk assessment by EPA has taken account of occupational risks, including those to pregnant women and workers in areas where chlorpyrifos is used, and concluded that further restrictions will be necessary (EPA-HQ-OPP-2008-0850-0195).

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Christmas Tree Aphid Pesticide Toxicity to Natural Enemies

Pesticide	Parasite adult	Parasite larva	Predatory bugs	Predatory mites
Admire/Provado	**>75% H**	**50-75% I**	**H**	I
Endeavor	I	H	I	I
Lorsban	H	H	I	I
M-pede	**0-10% L**	L	L	L
MSR	H	H	H	H
Ultor/Movento	L	L	L	H
Safari	L	L	H	I
Flagship	H	H	H	H
Asana	H	H	H	H

M-Pede risks are low, Ultor/Moveto and Safari are also lower risk than many of the older materials. **Early sprays can be with more selective materials**

Try not to use only one chemical type, and try to use a different mode-of-action to chemicals used against other pests. Resistance management is seen as an issue

Aphid/midge pesticide mode-of-action for rotation

Chemical class	Pesticide
Nitroguanidine nicotinoid	Provado, Admire, Safari, Flagship
Pyridine azomethine	Endeavor
Soaps	M-Pede
Pyrethroid ester	Asana
Teramic acid	Movento, Ultor
Phosphoramidothioate Aliphatic organothiophosphate Pyridine organothiophosphate	Orthene MSR Lorsban

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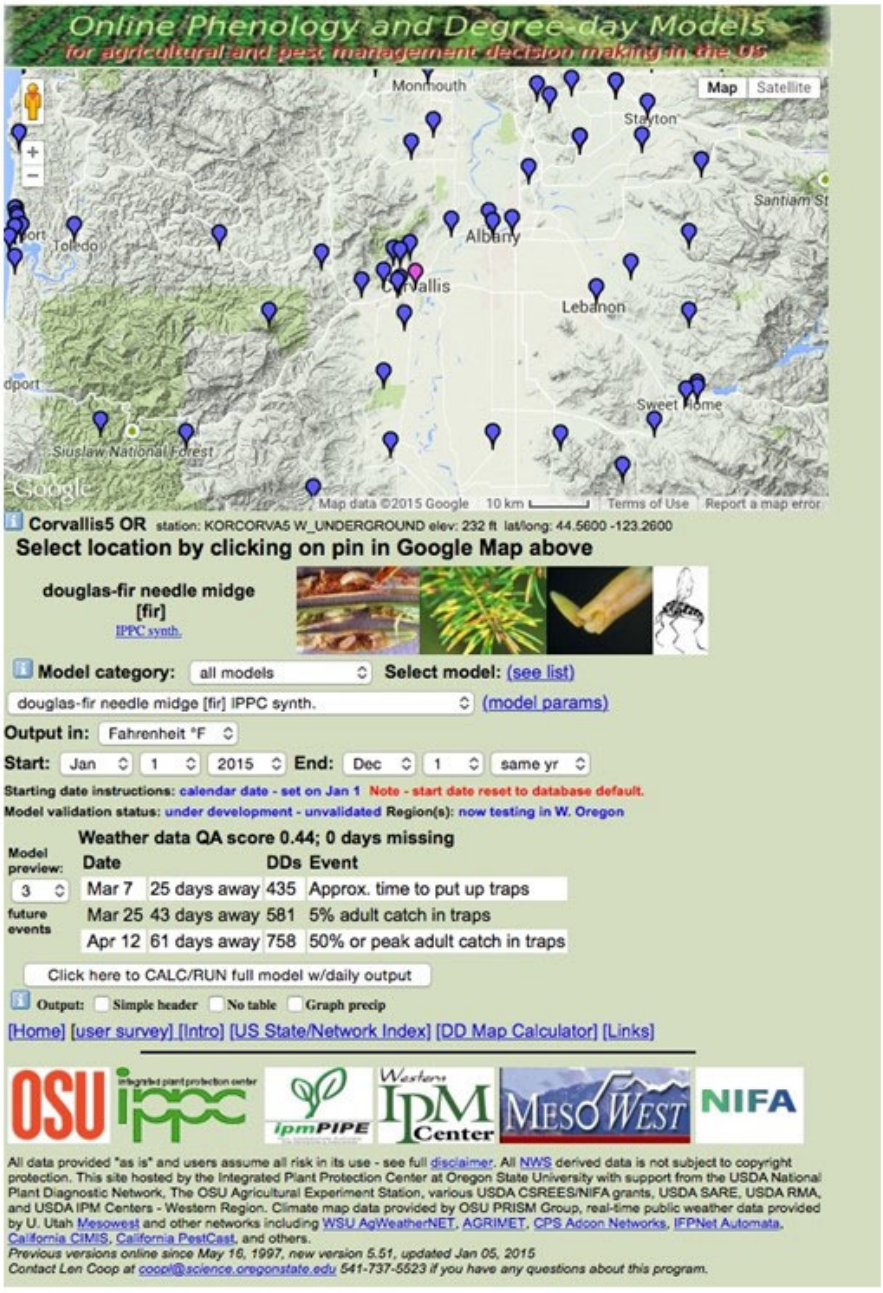
New interface to Degree-Day Models – Douglas-fir needle midge

http://uspest.org/cgi-bin/ddmodel.us?spp=dnm



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PESTICIDE MANAGEMENT CHECKLIST

Applicable to Christmas Tree production

ACTIONS TO CONSIDER WHEN THE ARE NO VIABLE ALTERNATIVES TO COMPOUNDS THAT POSE A RISK TO AQUATIC LIFE

IPM with reduced impacts on water quality	chlorpyrifos	bifenthrin	
SOURCE REDUCTION			
Substitute alternatives to pesticides (biological, cultural, physical)	*_***	*_***	
Minimize amounts applied (e.g. monitoring, thresholds)	**	**	
RISK MITIGATION			
Use of an alternative, lower risk pesticide to aquatic life (has the potential to eliminate risks)	*_***	*_***	
Eliminate off-site pesticide losses (e.g. drift reduction technology, application management, buffers	**	**	

Asterisks indicate value in reducing risk to aquatic life: * = minor contribution, ** = major contribution if properly adopted, * = elimination of risk**

Chlorpyrifos and bifenthrin have been monitored as part of the Oregon DEQ Pesticide Stewardship Partnership Program. They have been detected with elevated concentrations relative to benchmarks, or with frequent, multi-year detections. They have been detected at least once since 2010 over the aquatic life benchmarks or Oregon water quality criteria.

Pesticide	General properties that enable them to be efficacious when properly used, and which make them difficult to replace
chlorpyrifos	Broad spectrum, organophosphate pesticide in use since 1965, it is not systemic, but active as a foliar spray, and in soil applications, where the half-life is 7-15d on the soil surface, and 33-56d when incorporated. Toxic to beetles, flies, bugs and worms.
bifenthrin	Broad spectrum, pyrethroid insecticide in use since 1984, it is not systemic, but active as a foliar spray, and in the soil. Toxic to beetles, flies, bugs, worms, some mites, and grasshoppers.

PESTICIDE RISKS

Mitigation	Risk management advice
General	ONLY USE WHEN JUSTIFIED BY MONITORING, AND CHECK FOR NATURAL ENEMY ACTIVITY IF YOU CAN ONLY USE AGAINST THOSE PESTS WHERE EFFICACIOUS ALTERNATIVES DO NOT EXIST FOLLOW ALL LABEL REQUIREMENTS AND RECOMMENDATIONS CALIBRATE AND TUNE APPLICATION EQUIPMENT AVOID SPRAYING IN CONDITIONS THAT ARE CONDUCIVE TO DRIFT AND RUN-OFF CONSIDER SPOT SPRAYS USE BUFFERS OR OFFSETS WHERE POSSIBLE INVEST IN DRIFT REDUCTION TECHNOLOGY (I.E. THE MOST APPROPRIATE NOZZLES) FOLLLOW DRIFT MANAGEMENT GUIDELINES KEEP RECORDS OF ALL THE PRECAUTIONS THAT YOU TAKE
Inhalation	Follow all label requirements Post signs to minimize field edge risks
Aquatic	Follow drift management advice (see following pages) Install in-crop, or of- crop buffer zones, of at least 10 yards for boom sprayers and 30 yards for air-blast sprayers Use drift reduction technology
Terrestrial	As above, but in crop buffer zones offer some protection to vertebrates that stray into fields
Pollinators	Use less toxic, efficacious pesticides; Install an off-crop or in-field 10 yard buffer zone to protect off crop habitat Ensure flowering weeds are not present at the time of application Bee hives are temporarily covered during application Hive bees are provided with a clean water source away from the treated area If pollinators are present at the application site, substances are applied only in the evening after the period of diurnal pollinator activity is completed.

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Seasonal drift risk

There is a high risk of drift occurring when:

1. **Wind drift:** Wind speeds > 9mph
2. **Thermal drift:** Temperatures > 70°F, RH <40%
3. **Inversion drift:** Stable air, following cool, cloudless nights in spring and fall

THE FOLLOWING TABLES ARE BASED ON LONG-TERM AVERAGES AND ARE FOR GUIDANCE ONLY, TO ASSIST DISCUSSIONS ON HOW YOU SHOULD PLAN YOUR APPLICATION AND DRIFT MANAGEMENT PRACTICES IN THE SEASON AHEAD

CALENDAR OF LOW Risk, CAUTION AND HAZARD FOR WIND, THERMAL, AND INVERSION DRIFT, PORTLAND

MONTHS	J	F	M	A	M	J	J	A	S	O	N	D
Mean wind speed (mph)	10	9	8	8	7	7	7	7	7	7	9	9
Low wind drift risk (% of time <7 mph)	32	32	38	43	47	46	46	49	53	50	35	34
Caution (% of time 7-11 mph)	25	27	30	29	33	35	37	35	27	22	27	25
Hazard (% of time >12 mph)	33	30	22	15	12	12	12	10	10	13	27	30
Mean max temp (degF)	45	51	56	61	67	74	80	80	75	64	53	46
Relative Humidity 10am (%)	82	80	73	69	66	65	62	64	67	78	82	83
Relative Humidity 4pm (%)	75	67	60	55	53	49	45	45	48	62	74	78
Percentage of time calm	10	11	11	12	8	7	5	7	11	15	10	11

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CALENDAR OF LOW Risk, CAUTION AND HAZARD FOR WIND, THERMAL, AND INVERSION DRIFT, SALEM

MONTHS	J	F	M	A	M	J	J	A	S	O	N	D
Mean wind speed (mph)	8	8	8	8	7	7	7	7	7	7	8	8
Low wind drift risk (% of time <7 mph)	38	38	39	42	45	45	44	46	46	44	36	39
Caution (% of time 7-11 mph)	22	25	27	29	30	31	32	27	24	20	25	24
Hazard (% of time >12 mph)	22	21	21	15	10	9	9	8	9	10	22	20
Mean max temp (degF)	47	51	56	61	67	73	80	80	75	64	52	46
Relative Humidity 10am (%)	84	81	75	70	65	62	57	58	64	76	85	85
Relative Humidity 4pm (%)	75	68	60	57	53	49	40	40	75	59	77	80
Percentage of time calm	18	16	14	14	14	14	14	18	21	24	17	17

Develop a strategy for responding to marginal and hazardous conditions

- Use weather forecasts (http://uspest.org/wea/). Now very widely used in OR.
- Buy equipment to measure wind speed and direction, air temperature and humidity on spray days
- Spray less sensitive areas on marginal days, or only spray part of area that are upwind of sensitive sites
- Use less hazardous materials, increased drop size, lower ground speed, lower air volume, in parts of field near sensitive sites

FEED THE FUTURE
The U.S. Government's Global Hunger & Food Security Initiative

PEST MANAGEMENT DECISION GUIDE: GREEN AND YELLOW LIST

Fall Armyworm (FAW) on Maize

Kenya

Spodoptera frugiperda

Fall Armyworm egg mass (Desiree van Heerden, Syngenta)

Fall Armyworm caterpillar. Look for the inverted 'Y" on the head or the cluster of four dots on the rear (Russ Ottens, University of Georgia, Bugwood.org)

Damage to leaf, resulting in a "window pane" (Phil Sloderbeck, Kansas State University, Department of Entomology)

Prevention

- Plant early, with the first rains, as Fall Armyworm (FAW) populations build up later in the crop season.
- Avoid planting at different times as this provides a continuous source of food for FAW.
- If available, plant maize varieties with resistance to FAW.
- Consider planting maize varieties with short maturity periods.
- Ensure optimum use of fertilizer for healthy and vigorous maize plants, so that they can compensate for pest damage.
- Keep the area around the plot free of weedy grasses.
- Plant hedgerows of leguminous trees or perennial flowering plants around the fields, to the extent possible, to provide shelter to beneficial insects, predators and birds.
- Intercrop maize with compatible and less susceptible crops, such as beans and cassava.

Scouting

- Start scouting as soon as maize seedlings emerge.
- Scout 10-20 consecutive plants in 5 different locations in the field and calculate % of infestation (See Scouting Form).
- Look for signs of FAW feeding:
  - FAW are easiest to control when the larvae are very small.
  - FAW larvae are extremely hard to find when they are small.
  - Look for FAW feeding signs in the central emerging leaves (whorl): light coloured patches ("window panes") and elongated holes.
  - Look for accumulation of FAW excreta in the whorl.

Decision point:

- At early whorl stage (knee high), take action if >20% of plants are damaged.
- At late whorl stage (shoulder high), take action if >40% of whorls are freshly damaged.
- At tassel and silk stage, do not spray pesticides.

Direct control

This Green Column describes control options that are safest for smallholder farmers.

- On small-scale farms, handpick and destroy the egg masses and larvae.

Direct control | Restrictions

This Yellow Column describes control options that require additional safety precautions for smallholder farmers.

- Avoid spraying broad spectrum synthetic insecticides which might kill beneficial insects or harm the applicator.
- Only select products with proven success in controlling FAW, such as those listed below.
- Personal Protective Equipment (PPE) must be worn to minimize exposure to insecticides. PPE includes coveralls, gloves, respirators and boots.
- The **Pre-Harvest Interval (PHI)** is the time between the application of a pesticide and when that crop can be harvested. The PHI values below were determined with a precautionary approach, but if the PHI value on the pesticide label is higher, observe the longer period.
- The **Restricted Entry Interval (REI)** is the period of time after spraying before anyone should re-enter the field. The REI values provided apply to situations in which PPE is not available. If the REI printed on the pesticide label is longer than the value given below, please observe the longer period.

For more information, please consult: Fall Armyworm in Africa: A Guide for Integrated Pest Management (USAID & CIMMYT), WHO Recommended Classification of Pesticides (WHO), Pesticide Risk Assessment (Jepson *et al.*, DOI: 10.1098/rstb.2013.0491)

♦ *Bacillus thuringiensis*	♦ **REI** 1 day; **PHI** 1 day ♦ **WHO Class** III Slightly Hazardous
♦ Spinosad	♦ **REI** 1 day; **PHI** 3 days ♦ **WHO class** III Slightly Hazardous
♦ Chlorantraniliprole	♦ **REI** 1 day; **PHI** 21 days ♦ **WHO Class** U Unlikely Acute Hazard
♦ Indoxacarb	♦ **REI** 1 day; **PHI** 21 days ♦ **WHO class** II Moderately Hazardous
♦ Alpha-cypermethrin	♦ **REI** 1 day; **PHI** 21 days ♦ **WHO class** II Moderately Hazardous

USAID FROM THE AMERICAN PEOPLE CABI CIMMYT International Maize and Wheat Improvement Center

AUTHORS: Durocher-Granger L (CABI), Babendreier D (CABI), Huesing JE (USAID), Jepson PC (Oregon State University), Eddy R (USAID), Prasanna BM (CIMMYT). This PMDG is produced with support from Feed the Future, contact *fallarmyworm@usaid.gov.* Plantwise is supported by a consortium of donors. See *www.plantwise.org.*
EDITED BY: Mulaa M (CABI), Otipa M (KALRO), Mwangi D (MOALF), Heya H (KEPHIS)
CREATED/UPDATED: April 2018

LOSE LESS, FEED MORE

Scouting Form

Planting Date: **District:** **Location:** **Your name:**

	Week 1	Week 2	Week 3
Sampling Date			
Maize Growth Stage:			
Dates of rainfall /intensity:			
Insecticides Applied/Rates/Dates:			
Pheromone Trap Data	Raise the trap as the maize grows taller. Keep the bottom of the trap 30 cm above the plants.		
Number of FAW moths:			
Number of AAW moths:			

Early Whorl Stage (VE-V6)	**Examine two to three (2-3) newest leaves emerging from the whorl.**																						
Five Stops	**1**	**2**	**3**	**4**	**5**	**Sum**	**%**	**1**	**2**	**3**	**4**	**5**	**Sum**	**%**	**1**	**2**	**3**	**4**	**5**	**Sum**	**%**
#Plants with fresh window panes/ Total																					
#Plants with infested whorls/ Total																					

Late Whorl Stage (V7-VT)	**Examine three to four (3-4) newest leaves emerging from the whorl plus the emerging tassel.**																						
Five Stops	**1**	**2**	**3**	**4**	**5**	**Sum**	**%**	**1**	**2**	**3**	**4**	**5**	**Sum**	**%**	**1**	**2**	**3**	**4**	**5**	**Sum**	**%**
#Plants with fresh window panes/ Total																					
#Plants with infested whorls/ Total																					

Tassel & Silk Stage (R1-R3)	**Examine ear(s) plus leaves and leaf axils at, above, and below the ears.**																						
Five Stops	**1**	**2**	**3**	**4**	**5**	**Sum**	**%**	**1**	**2**	**3**	**4**	**5**	**Sum**	**%**	**1**	**2**	**3**	**4**	**5**	**Sum**	**%**
#Plants with any fresh damage/ Total																					
#Plants with worms/ Total																					
#Plants with damaged ear/cob/ Total																					

Appendix G. List of IPPC collaborators by core program.

Climate and Weather Crop and Pest Modeling program

Leonard Coop, IPPC OSU
Nick Andrews, Small Farms Extension, OSU
Seanna Annis, Plant Pathologist, U. Maine
Herve Avenot, Plant Pathologist, Virginia Tech.
Anton Baudoin, Plant Pathologist, Virginia Tech.
Dan Bean, Entomologist, Colo. State Dept. Agriculture
John H. Bowers, Nat. Policy Manager, USDA APHIS PPQ CAPS
Juliet Carroll, Plant Pathologist, Cornell, New York
Steve Castagnoli, Extension Horticulture, Hood River, OR
Roland Clark, Forecast Management, WeatherMission.com
Gericke Cook, Spatial Analyst, USDA-APHIS PPQ CPHST, Ft. Collins, CO
Amanda Crump, WIPM Center, UC Davis
Chris Daly, Climatologist, OSU
Margery Daughtrey, Plant Pathologist, Cornell, New York
Matt Doggett, Software Developer, NACSE, OSU
Maria Dragila, Soil Scientist, OSU
James Farrar, UC Statewide IPM Program, UC Davis
Alan Fox, Fox Weather LLC, Fortuna, CA
David Gent, Plant Pathologist, USDA ARS Corvallis
Katharine Gerst, US National Phenology Network, U. Arizona
Mark Gleason, Plant Pathologist, Iowa State University
Fritzi Grevstad, Entomologist, BPP, OSU
Gary Grove, Plant Pathologist, Washington State University
Doug Gubler, Plant Pathologist, UC Davis
David Hannaway, OSU Forage Crops, CSS OSU
Michael Hill, CERIS Purdue, NE
Dan Hofer, GIS Specialist, USDA APHIS, Aurora, CO
Chuan Hong, Plant Pathologist, Virginia Tech.
Gerrit Hoogenboom, Crop Modeler, U. Florida
Ronda Hirnyck, University of Idaho
Paul Jepson, IPPC, OSU
Dennis A. Johnson, Plant Pathology, WSU Pullman WA
Otari Ioseliani, Programmer, AgWeatherNet, Prosser WA
Clive Kaiser, Extension Horticulture, Milton-Freewater OR
Lisa Kennaway, USDA APHIS PPQ, Ft. Collins, CO
Darren Kriticos, Princial Research Scientist, CSIRO, Canberra Australia
Joe Laforest, Dir. SE IPM Center, Univ Georgia
Peter McEvoy, BPP, OSU
Walt Mahaffee, Plant Pathologist, USDA ARS Corvallis
Carol Mallery-Smith, Weed Scientist, OSU
Neil McRoberts, Plant Pathologiest, UC Davis
Amanda Ohrn, Entomologist, Oregon Dept. Agriculture

Dan Olmstead, NEWA Corrdinator, Cornell
Jennifer Parke, Soil Ecologist, CSS, OSU
Ed Peachey, Weed Scientist, Horticulture, OSU
Tom Peerbolt, Peerbolt Crop Management, Portland OR
William Pfender, USDA ARS Corvalis (emeritus)
Jay Pscheidt, Extension Plant Pathology, BPP, OSU
Silvia Rondon, Entomologist, OSU Hermiston
Alyssa Rosemartin, National Phenology Network, U. Arizona
Nina Shishkoff, USDA APHIS, Frederick, MD
Tor-Einar Skog, Software Developer, NIBIO, Oslo, Norway
Damon Smith, Plant Pathologist, Univ. Wisconsin-Madison
Jeff Stone, Plant Pathologist, BPP, OSU
Heather Stoven, OSU Extension, Horticulture Dept, OSU
Lauri Streaker, Cascade Weather, Hood River, OR
Dan Sullivan, Soil Nutrition, CSS, OSU
Carla Thomas, Plant Pathologist, UC Davis
Ashley Thompson, Extension Hort., Wasco & Hood River Counties
Dan Upper, Programmer, Private Contractor, Corvallis
Joshua Vlach, Entomologist, Oregon Dept. Agriculture
Darrin Walenta, Extension Agronomy, Baker, Union, Wallowa Co.s OR
Tyson Wepprich, Entomologist, BPP, OSU
Amanda West, CO state Forest Service, Ft. Collins, CO
Nik Wiman, Extension Horticulture, Horticulture Dept., OSU
Nina Zidack, Plant Pathologist, Montana State University

IPM Engagement and Implementation

Project Collaborators-University Research and Extension:
Cassie Bouska, Oregon State University Extension
Steve Castagnoli, Oregon State University Extension
Peter Ellsworth, Arizona Pest Management Center, University of Arizona
Hans Luh, Oregon State University IPPC
Andony Melathoupolos, Oregon State University Horticulture
Stuart Reitz, Oregon State University Extension
Vaughn Walton, Oregon State University Horticulture
Nik Wiman Oregon State University Extension
Darrin Walenta, Oregon State University Extension
Silvia Rondon, Oregon State University Extension
Ken Frost, Oregon State University Extension
Rick Hilton, Oregon State University Extension
Andy Jensen, Northwest Potato Research Consortium
Amanda Crump, Western IPM Center
Matt Baur, Western IPM Center
Al Fournier, Arizona Pest Management Center
Verna Subere, University of Hawaii

OSU Statewide Extension Agents
Doug Walsh, Washington State University
Kim Patten, Washington State University
Elizabeth Beers, Washington State University
Ronda Hirnyck, University of Idaho Bill Brewer, Exec. Dir. OR potato commission
Ken Frost, Oregon State University Extension
Amellia Haguewood, Grower, Oregon
Chris Hiles, Lamb Weston
Rebecca Jones, Simplot
Mike Larsen, Grower, Eastern Idaho
Mike Madsen , AgriNorthwest
Jeff Miller, private researcher and consultant
Jennifer Riebe, Consultant
Tom Salaiz, McCain foods
Alan Schreiber, Private researcher/consultant
Kris Thomas, Bayer Corp.
Mike Thornton, University of Idaho
Ritchey Toevs, Grower, Idaho Potato commission Chair
Chris Voigt, Exec. Dir. WA potato commission
Tim Waters, Washington State University Extension
Carrie Wohleb, Washington State University Extension
Kevin Masterson, Oregon Pesticide Stewardship Partnership
Oregon State University Researchers: Horticulture, Botany and Plant Pathology, Crop and Soil Science
University of Idaho, Research and Extension
Washington State University, Research and Extension

Project Collaborators-Farming Commissions/Commodity Groups:
Columbia Gorge Fruit Growers Association
Idaho Potato Commission
Malheur County Onion Growers Association
Northwest Potato Research Consortium
Oregon Cranberry Growers Association
Oregon Hazelnut Commission
Oregon Mint Commission
Oregon Potato Commission
Oregon Seed Council
Oregon Sweet Cherry Commission
Washington Potato Commission
Washington Tree Fruit Research Commission

Project Collaborators, Regional/Federal Agencies:
US Department of Agriculture Office of Pest Management Policy
US Environmental Protection Agency
Southern IPM Center
Western IPM Center

Pacific Northwest Farmers (>200 will be participants)
Pacific Northwest Farming Industry Consultants (>120 will be participants)

Pesticide Risk Reduction

Western Region Pesticide Risk Reduction Workgroup Collaborators
Hans Luh, Oregon State University IPPC
Diane Alston, Utah State University IPM
Oliver Bach, Sustainable Agriculture Network, Costa Rica
Matt Baur, Western IPM Center
Ashley Bennett, New Mexico State University
Mary Burrows, Montana State University
Amanda Crump, Western IPM Center
Steve Elliot, Western IPM Center
Peter Ellsworth, Arizona Pest Management
Jim Farrar, University of California IPM
Emily Sims, University of California IPM
Lisa Blecker, University of California IPM
Al Fournier, Arizona Pest Management Center, University of Arizona
Dawn Gouge, Arizona Pest Management Center, University of Arizona
Ronda Hirnyck, University of Idaho
Alexandre Latchininsky, University of Wyoming
John Connett, University of Wyoming
Neil McRoberts, University of California
Tunyalee Martin, University of California IPM
Casey Matney, University of Alaska Fairbanks Cooperative Extension
Marion Murray, Utah State University IPM
Bob Nowierski, National Institute of Food and Agriculture
Frank Peairs, Colorado State University
Verna Subere, University of Hawaii
Cheryl Wilen, University of California IPM
Karey Windbiel–Rojas, University of California IPM
Doug Walsh, Washington State University
Mark Wright, University of Hawaii
Sustainable Agriculture Network, Costa Rica
ISEAL IPM Coalition Members including Better Cotton Initiative, Fair Trade, Global Coffee Platform, Bon Sucro, Rainforest Alliance, UTZ

International pesticide risk management collaborators

Regina Eddy, Joseph Huesing, USAID, Washington DC;
Jason Sandahl, Chris Peterson, Marie Durane, Margaret McDaniel, USDA Foreign Agriculture Service (USDA FAS), Washington DC;
Tracey McCracken, USDA FAS/USAID, Kenya;

David Walufa, USDA FAS/USAID, Tanzania;
Gregg Nuessly, U Florida;
John Oppong-Otto, African Union, Kenya;
Bakari Kaoneka, Tanzania Pesticide Research Institute;
Lucy Namu, Kenyan Plant Health Inspectorate Service;
Prasanna Boddupalli, Anani Bruce, CIMMYT, Kenya;
Marton Kropff, CIMMYT, Mexico;
May-Guri Saethre, IITA, Nigeria;
Cunzheng Zhang, Gu Baogen, Allan Hruska, Junhua Song, Francesca Mancini, UN FAO Rome;
Ivy Saunyama, FAO, Zimbabwe;
Melanie Bateman, Patricia Neenan, Lena Durocher-Grainger, Roger Day, CABI International, UK;
Bryan Sobel, Catholic Relief Services (CRS), Baltimore;
Michael Eddleston, Edinburgh University, UK;
Keith Tyrell, PAN UK;
Albert Abang, IITA, Cameroon;
Makhfousse Sarr, UN FAO, Senegal;
Lauren Baredo, UN Sustainable Development Network;
Rebecca Nelson, Cornell University, McKnight Foundation;
Ken Giller, Linda Veldhuizen, Wageningen Agricultural University, the Netherlands;

International Standards program collaborators
Katie Murray, IPPC
Karen Lewotsky, Food Alliance, Portland, Oregon
Oliver Bach, Sustainable Agriculture Network, Costa Rica
Juan Carlos Isaza, Global Coffee Platform, and ISEAL IPM Coalition Partnership
Jeff Milder, Rainforest Alliance, New York
Dan Kent, Salmon Safe, Portland, Oregon

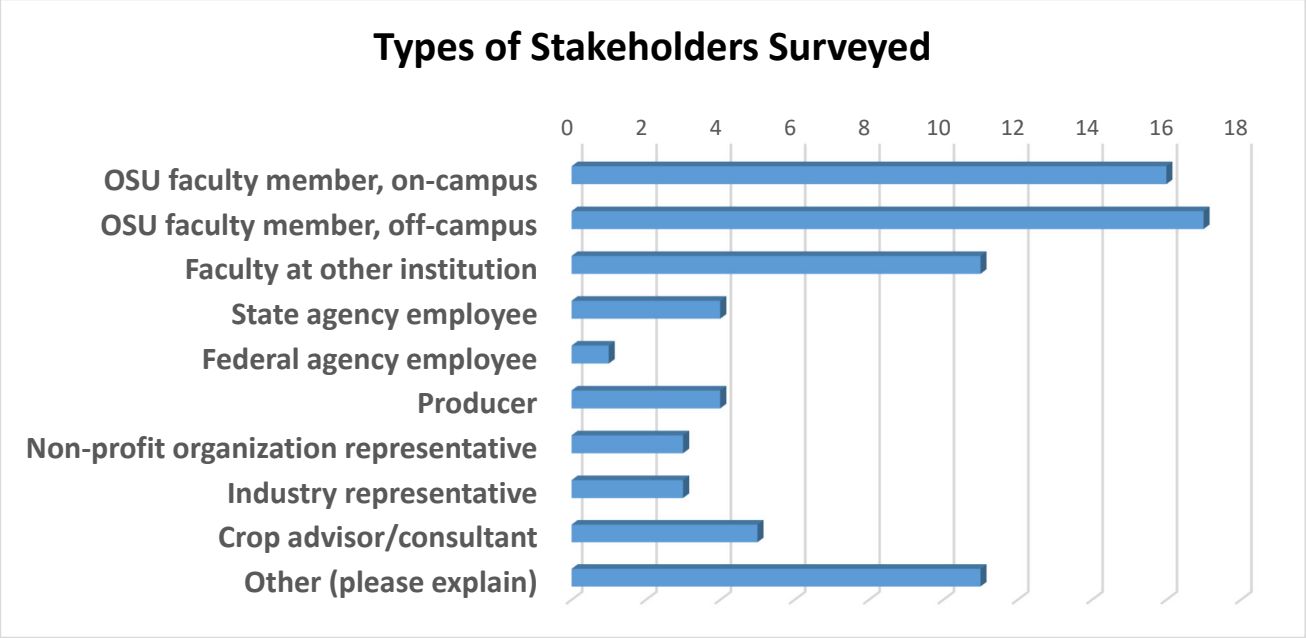
Appendix H. Report and verbatim responses from IPPC stakeholder survey.

Survey of IPPC External Stakeholders for Center Review

October 2018

A total of 79 responses were received, with several incomplete responses. The report below includes response totals for each question.

Question 1. I am a:

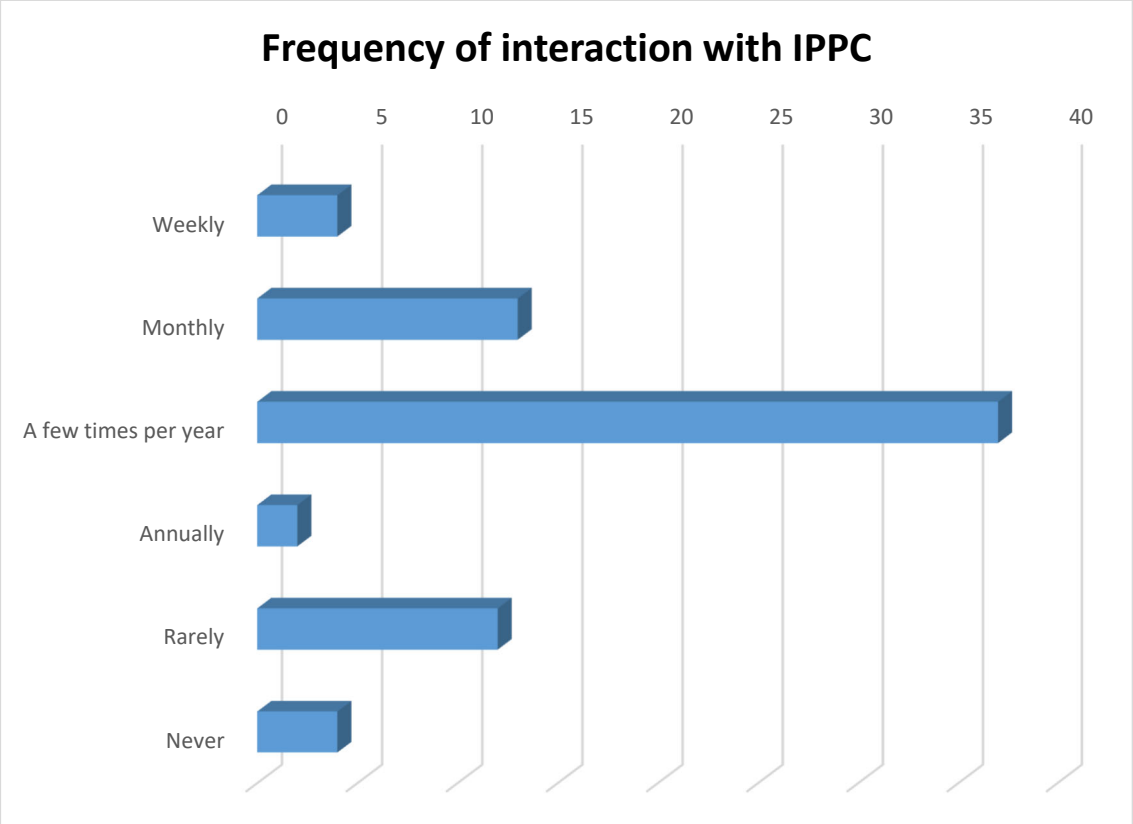


Type of stakeholder	%	Count
OSU faculty member, on-campus	21%	16
OSU faculty member, off-campus	21%	16
Faculty at other institution	14%	11
State agency employee	5%	4
Federal agency employee	1%	1
Producer	5%	4
Non-profit organization representative	4%	3
Industry representative	4%	4
Crop advisor/consultant	7%	5
Other (see below)	13%	10
Total	100%	76

Other:

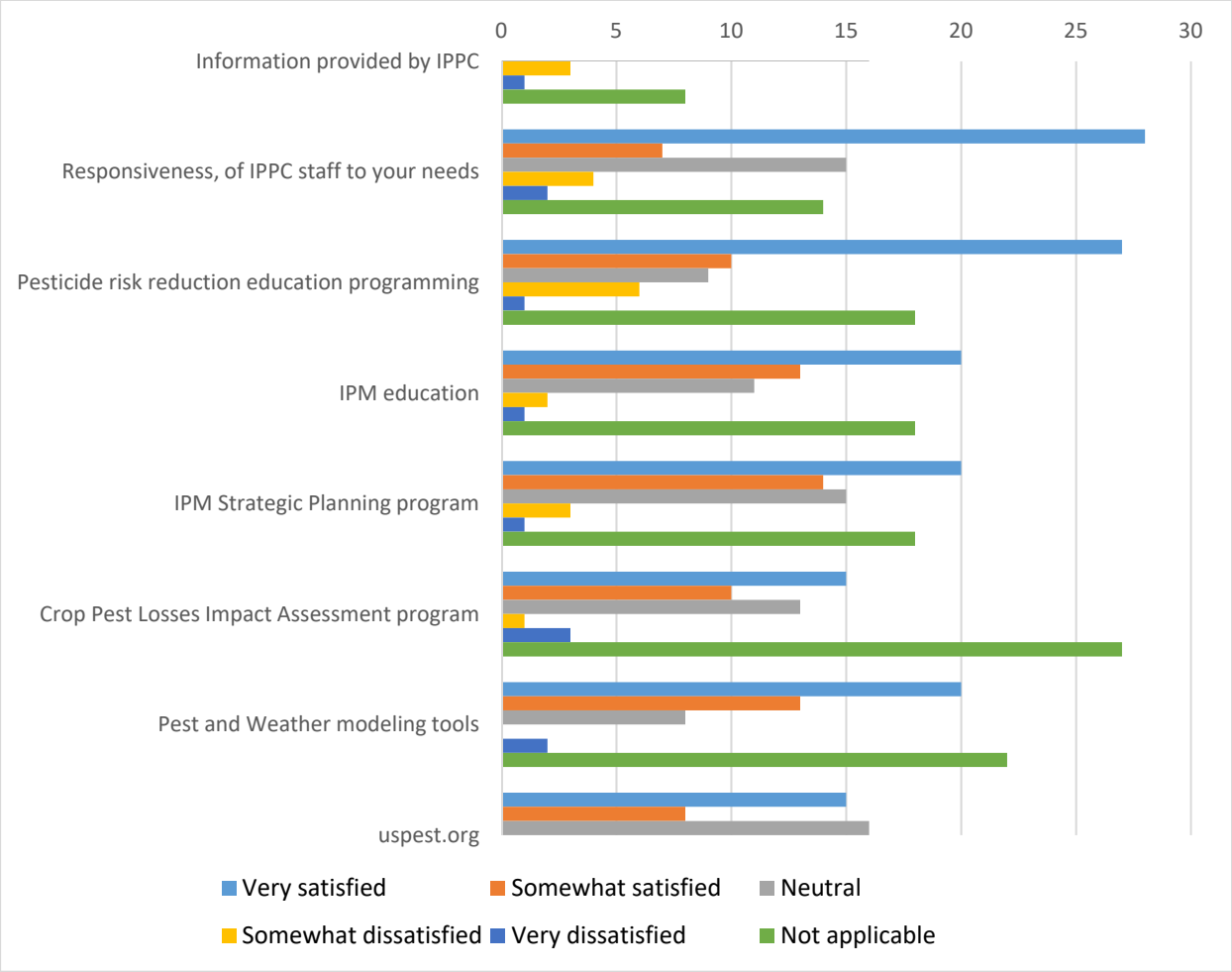
Answer	Count
Academic at other institution (non faculty)	1
Director Hazelnut Industry Office	1
Director of Outreach, Washington State Potato Commission	1
Former osu faculty member	1
International consultant	1
Manager at Holiday Tree Farms, Inc.	1
Professional Faculty, on-campus	1
project manager at FAO Senegal	1
Research Agronomist	1
Staff (extension) at another institution	1
University of Idaho Faculty	1

Question 2. How often do you interact with IPPC staff, or IPPC programming?



Frequency:	%
Weekly	6%
Monthly	19%
A few times per year	50%
Annually	3%
Rarely	17%
Never	6%
Total	100%

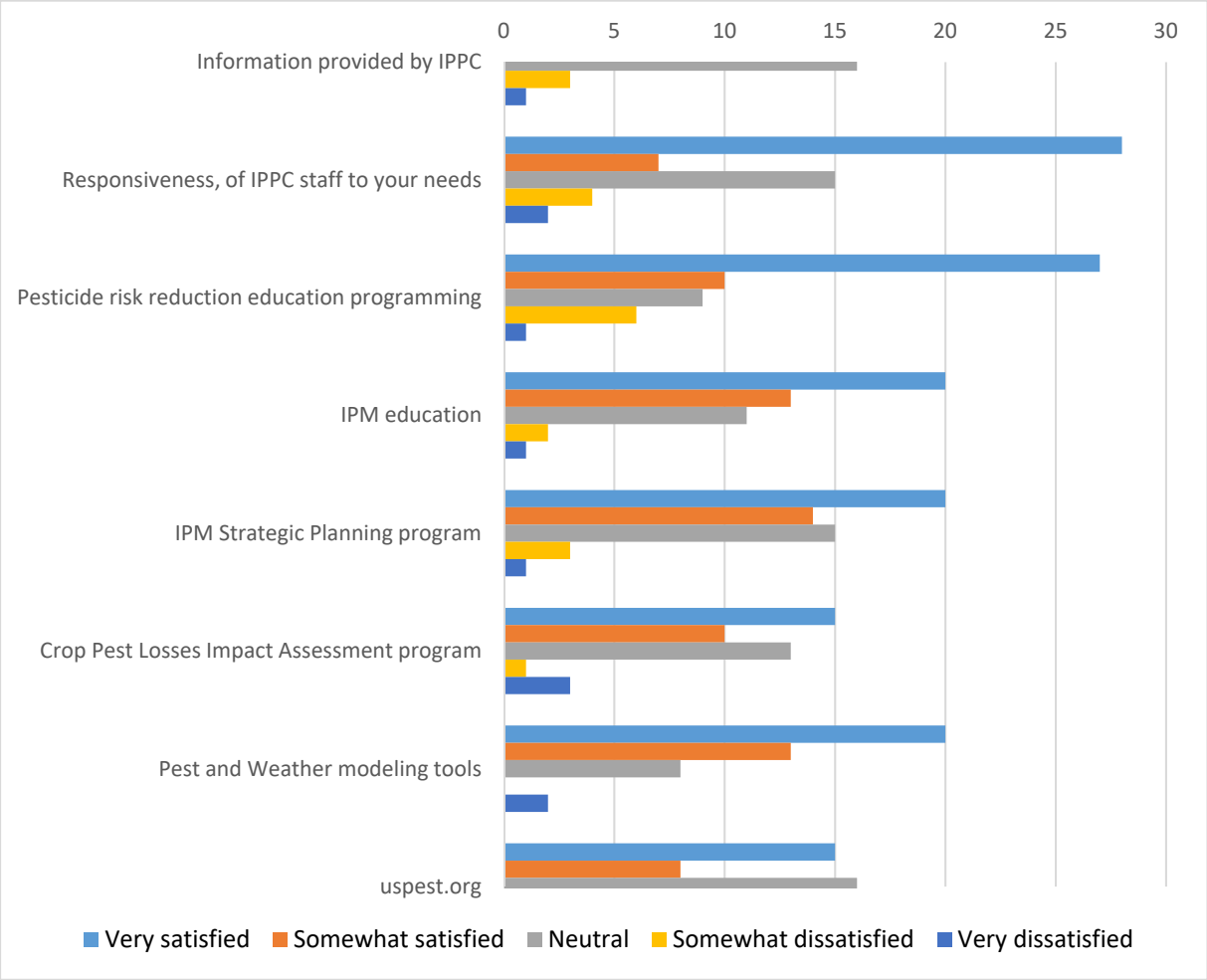
Question 3. How satisfied are you with the following IPPC programs, tools or services?



Question 3. Matrix

Questions	Very satisfied	Somewhat satisfied	Neutral	Somewhat dissatisfied	Very dissatisfied	Not applicable	Total responses
Information provided by IPPC	40%	21%	24%	0%	1%	13%	70
Responsiveness, of IPPC staff to your needs	42%	10%	21%	4%	3%	20%	71
Pesticide risk reduction education programming	38%	14%	13%	6%	1%	28%	71
IPM education	29%	19%	16%	9%	0%	29%	70
IPM Strategic Planning program	30%	20%	21%	0%	1%	27%	70
Crop Pest Losses Impact Assessment program	21%	14%	20%	3%	1%	40%	70
Pest and Weather modeling tools	28%	18%	13%	4%	4%	32%	71
uspest.org	21%	11%	23%	3%	3%	39%	70

Question 3: Satisfaction ratings re-scaled for those engaged in programming (excluding responses of "not applicable"):



Question 3: Re-scaled matrix (excluding responses of "not applicable"):

Questions	Very satisfied	Somewhat satisfied	Neutral	Somewhat dissatisfied	Very dissatisfied	Total Responses
Information provided by IPPC	46%	25%	28%	0%	2%	61
Responsiveness, of IPPC staff to your needs	53%	12%	26%	5%	4%	57
Pesticide risk reduction education programming	53%	20%	18%	8%	2%	51
IPM education	40%	26%	22%	12%	0%	50
IPM Strategic Planning program	41%	27%	29%	0%	2%	51
Crop Pest Losses Impact Assessment program	36%	24%	33%	5%	2%	42
Pest and Weather modeling tools	42%	27%	19%	6%	6%	48
uspest.org	35%	19%	37%	5%	5%	43

IPPC Satisfaction Summary based on re-scaled matrix:

Percent of respondents somewhat to very satisfied:

Information provided by IPPC:	70%
Responsiveness, of IPPC staff to your needs:	65%
Pesticide risk reduction education programming:	73%
IPM education:	66%
IPM Strategic Planning program:	69%
Crop Pest Losses Impact Assessment program:	60%
Pest and Weather modeling tools:	69%
uspest.org:	53%

Percent of respondents somewhat to very dissatisfied:

Information provided by IPPC:	2%
Responsiveness, of IPPC staff to your needs:	9%
Pesticide risk reduction education programming:	10%
IPM education:	12%
IPM Strategic Planning program:	2%
Crop Pest Losses Impact Assessment program:	7%
Pest and Weather modeling tools:	13%
uspest.org:	9%

Question 4. What new or continued topics do you feel are important for IPPC to pursue?

All are high quality. Crop losses and pest modeling/weather are quite helpful to other institutions
Pesticide risk education workgroup led by Paul and Katie is offering valuable professional development across the Western Region; IPM Strategic Planning/Crop Pest Losses needs to expand to more crops
Pesticide risk assessment and outreach to extension agents, field reps and growers.
Better integration of disciplines.
Pest models that are easier to use.
Continue to develop guidelines that are up to date and logical for current cropping situations
more interaction with ag industry
Evaluation toolbox for IPM educators
Continue to provide and refine existing services
Disease forecasting and risk mapping
Incorporation/integration of ET-based irrigation scheduling
The pest and weather models are valuable nationwide; continued support for this program is of high importance.
IPM Strategic Planning, Crop Losses Impact (Kathy Murray), IPM coordination
Understanding timing issues with low toxicity pesticide programs
A continued focus on identifying and overcoming roadblocks to IPM adoption (e.g. IPMSPs, facilitation of industry- or organization long-term planning).
Sustainable ag practices that balance production and environmental protection goals.
Less on the IPM strategic planning. Mre on pesticide risk
Additional focus on soil ecology
Safe use of products
STrategic Planning process is very important to the hazelnut industry.
IPPC has an excellent balance of investments now, but the addition of the pesticide risk reduction education program is outstanding and continues to fit well with strategic planning and impact assessment activities.
fall armyworm issues which happened in Africa and Asian
I have not received information from the center, I think they should definitely do more outreach so their services are better know. I'm not sure what the center does.
Pesticide reduction outreach to statewide locations
Stay on the same track
PMSPs are useful, but they need more attention within Extension.

economic analysis of IPM
Continue cross departments connectivity
The program on misuse of pesticides in developing countries is very important
IPM in tropical countries/climates
Extension/outreach - their presence and tools could reach a broader audience
IPM Strategic Plans, Further developing crop loss projects, making the USPest.org data more flexible
Growing Degree Model website should be continued.
Continue to expand influence and technical support nationally.

Question 5. Please provide additional comments regarding your interactions with IPPC:

Some high quality programs are being envisioned and developed by IPPC faculty that need more support and attention from other faculty in order to grow and sustain.
This is difficult say this but it is apparent that there are problems at the IPPC. Two faculty moved by request out of the center and into departments. There is really not much left. Perhaps it is best to move the few faculty left into departments and relevant work can continue in working group environment with other faculty.
Pest models are ok but not user friendly. Does not encourage use.
more interaction with industry to provide services that are applicable and timely.
Mary Halbleib provided in-depth review of an evaluation plan based on a request.
IPPC is providing regional and national leadership and direction on important pesticide safety and integrated pest management issues while providing effective tools and strategies.
I have found the scientists from OSU to be very knowledgeable and helpful.
My interactions with IPPC has been primarily through Len. He has been an important player in our effort to contain and manage boxwood blight, an emerging disease of national significance. This can be a model system for other important diseases in the future.
PLEASE improve the USPest.org website. It is very useful, but extremely non user-friendly. It appears as though the website was designed in the early-2000s and never updated. It is hard to use for me (a faculty member) who uses it weekly, let alone a grower.
The staff are responsive and the resources are helpful. Thank you.
My program has met with Len Coop to talk about uspest.org and weather modeling. Our interactions with Len have helped us make good decisions about how to implement and improve our own weather modeling tools. We may partner with uspest.org in the future.
I don't interact directly with this program. Several of the tools appear to be beneficial, but we work more closely with commercial products available to the Ag Industry.
I think my interaction with IPPC staff started about 2-3 years ago. The director then came with ideas to expand his role as IPM coordinator. I think about 2 years ago it looked promising. I think Mary H at that time and Kathy Murray were the engine of the IPPC impact. However, sometimes I feel both ended tangled up in a sort of dysfunctional role when their lack of independence as PIs did not let

them develop their own programs. I am happy to see that Kathy took the role of IPM coordinator now; with support from OSU and some funding she could do a lot. The pest and modeling tools is a great topic, however, for whatever reasons, the communication has not been the best.
I refer frequently to the website for pest status issues
I understand the modeling tools are very useful, I just haven't figured out how to use them yet. (I'm too busy answering surveys!! ha ha)
My interactions have been entirely with Paul Jepson and Katie Murray, who have added valuable, and completely new, skills and approaches to the Northwest potato industry.
I just recently started communicating with Jeff Jenkins on a few projects. We are at the beginning stages of our work, and I have not worked with IPPC in the past. That is why I don't have any constructive feedback at this time. However, I hope to in the future. I like his projects that use the Soil and Water Assessment Tool (SWAT) for watersheds to help people understand how land use practices affect water quality and the related transport of pesticides.
USPEST.org provides detail on growing degree days that is crucial for commercial vegetable farms and vineyards. Thank you!
I do not have a commercial agriculture appointment and only use take pieces that are relevant to community horticulture (some of the modeling tools). I hope that the customer service will improve under new leadership! Already communication has improved.
Sooooo glad we've got this resource!
We work in developing countries. While we find IPPC concepts, knowledge, experience and tools very valuable, and potentially useful, we have encountered that IPPC involvement in our possible projects prohibitively expensive. We would like the ability to adapt IPPC tools to local scenarios and needs, particularly the IPM strategy development and adult educational tools. We believe they are excellent, and would have high demand and success even if imperfectly implemented by others.
It is unclear to me what role Paul Jepson is playing in IPPC and the university. Likewise, it is not clear what services and staff are at IPPC- though that may be as function of my not checking. With Gwedolyn Ellyn's retirement and questions of Paul's involvement it may be a good time to
I interact regularly with faculty members at HAREC regarding potato research. The WSPC has recently provided funds to enhance facilities there, and I and am satisfied that our contribution was well spent. The WSPC staff and commissioners are always made to feel welcome and important there.
There is need to engage ore with Industry and product end users(farmers) to put in place clear mitigations and a thorough understanding of risks, hazards , efficacy and modes of action of pesticides.
I have two interactions with the IPCC: an annual attendance or presentation at pesticide license recertification programs, and I use the network of weather stations to find records for various cities during the past year or so. The latter is extremely useful. The former is necessary.
I am not really aware of the education, crop loss impact, pest & weather modeling or uspest. which is why I am neutral on satisfaction. They Strategic plan for each commodity is VERY important and I have been part of the last two done for the industry. It is the one place where all pests and potential pests and potential mitigation for all pests is studied. The report has been used to educate growers as well as to interact with regulators. The folks working on this have been exceptional!
A very professional and responsive team. Faculty, staff and industries should be engaging them more to reap the benefits of their expertise, services, and IPM support to stakeholders.
I have never worked with the center. I'm not very aware of what their capabilities are and how we can work together. As new faculty it would be great to have them as a resource and they should contact new faculty (extension specially) so that their services and knowledge can be used. For example, the

plant clinic (disease and entomology services), were a resource that was not know to me when I started work at OSU, then I was recommended and introduced to their staff and resources and now I use what they offer all the time, both for my research projects and clients. The center could do the same.
Would love to have all the models on uspest.org be in a more modern, user-friendly format.
Most farmers and field reps in the state do not understand what IPPC is. This is because they have not been relevant for many years. Jepson was not a good leader and many OSU colleagues refuse to work with IPPC because of that. College funds should no longer be spent on IPPC. Hire skilled Extension and research faculty members who do applied work. That is how management practices are changed and valuable clientele relationships are built and maintained.
My contact completed their grant and left the program. I have had no contact with anyone since. Not that, that is a problem. I would advice IPPC staff to teach at Clackamas Tree School.
I have limited experience with IPPC. I have found working with Katie Murray to be extremely productive.
IPPC would benefit from aligning more fully within Extension. It suffers from too much isolation.
Oregon State is awesome, every ounce of effort that is put forth by faculty helps growers make informed decisions. The dedication to basic applied research that genuinely serves the interests of stakeholders is great.
My interactions with IPPC was restricted to IPM strategic plannings. After attending meetings, the IPPC group continue to request input and editing of IPM planings. If the faculty participation is so important, IPPC should include key faculty in the grant proposal. I felt that IPPC was very disconnected from all research faculty working in the commodity crops, and that the strategic plans meetings were in a mass production mode using template questions, coffee and cookies, and a lot of time from all participants.
Always informative, excellent customer service.
I believe great effort is put towards educational activities such as pesticide useage and environmental consequences of pesticide use
IPPC has an important strategic role to play in issues relating to IPM in developing countries
Collaboration works both ways and information sharing should go both ways. Some IPPC staff are guilty of not wanting to acknowledge the input of others
The faculty and staff are always responsive to my requests for information and presentations at educational programs related to their work.
IPPC houses faculty who are recognized leaders in pesticide risk reduction and IPM. They are a national and international asset.

Western IPM Center

Western Integrated Pest Management Center

U.C. ANR Building • 2801 Second Street • Davis, CA 95618 • Tel: (530) 750-1271 • www.westernipm.org

5 May 2017

Rubella Goswami, National Program Leader
USDA-NIFA
1400 Independence Ave, SW; Stop 2240
3105 Waterfront Centre
Washington, DC 20250-2240

Dear Dr. Goswami,

This letter is in support of Oregon State University's proposal to the USDA-NIFA Crop Protection and Pest Management Extension Implementation Program (EIP). The team's approach, based on integration of Pest Management Strategic Plans and Crop Pest-Losses Impact Assessments, is welcomed and supported by the Western Integrated Pest Management Center.

Pest Management Strategic Plans (or PMSPs) have been a long standing output from the regional IPM center program. The documents are snapshots in time of stakeholder practices and serve as an essential tool in identifying critical needs. The documents are used by federal and state regulatory agencies to gain a clear view into practices at the local, state and regional levels. They are used by our stakeholders and producers to gain valuable information about product efficacy. They also generate an average of $20 in additional funding for every dollar invested. Oregon State University is strengthening the integrated pest management component of a PMSP by creating "Integrated Pest Management Strategic Plans". These are highly valuable to the Center and our work.

The Crop Pest-Losses and Impact Assessments signature program has been exceptionally successful in cotton grown in the lower desert regions of California and Arizona. This program has been essential in identifying how production practices and pest complexes have affected pesticide use. The program outputs figured significantly in center progress reports and the report on IPM Adoption and Impact in the West (available at westernipm.org). Because of these successes, the Center has been interested in expanding these results to other crops throughout the western region, and our colleagues at Oregon State University are now doing that.

Their resulting "IPMSP" process, which acquires additional information through the crop pest-loss survey tools, and allows for the PMSP and crop pest-loss survey to be conducted on a more regular or routine basis, is a valuable program for understanding current practices with a goal of improving IPM adoption.

The Center is collaborating with Oregon State University already on the IPMSP program, supporting the use of our advisory committee, staff and co-directors to help advise the project. Their work on this project aligns well with the objectives of the Center, particularly the aspects of inter- and intra-regional collaboration, the development of partnerships, the strengthening of signature programs, and the evaluation of IPM adoption. The project concept fits nicely into the changes the centers are making to the PMSP document concept. The centers are working on cataloguing the PMSPs so that the documents

can be updated more readily. In providing a model for more frequent updates, the project will make better use of the updated technology developed through the Southern IPM Center.

In short, we are very supportive of their IPMSP program, that ultimately strengthens two programs that are highly valued by our center, and we are certain that this will bolster the adoption of integrated pest management. If you have any questions, please contact me.

Sincerely,

Amanda Crump, Director
Western Integrated Pest Management Center
acrump@ucanr.edu

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COLLEGE OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES
AGRICULTURAL EXPERIMENT STATION
TELEPHONE (530) 752-7633
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IR-4 PROGRAM, WESTERN REGION
DEPARTMENT OF ENVIRONMENTAL TOXICOLOGY
ONE SHIELDS AVENUE
DAVIS, CALIFORNIA 95616-8588

Rebecca (Becky) Sisco
Regional Field Coordinator
4218 Meyer Hall
rsisco@ucdavis.edu
530-752-7634 (phone)
530-867-1664 (cell)

October 20, 2016

Letter of Collaboration: **Western Region Pesticide Risk Reduction through Professional Development for Western State IPM Programs**

As Regional Field Coordinator for the Western Region IR-4 Center, I work to support specialty crop growers and their need for pesticide tools as part of their Integrated Pest Management practices. Our focus is to insure that specialty crops have the appropriate pesticide tools when needed to combat pest problems (weeds, plant diseases and insects).

Once a product is labeled and available for use to a grower, there is a need for an individual pest management decision maker, be that a grower or a pest control advisor to assess specific locations and situations regarding potential risk and required pest management. That decision should be based on specific circumstances of that crop in a specific location. The pest pressure, the efficacy of available tools, the proximity of fields to communities, rivers, lakes, the potential exposure to workers all are critical elements to that decision.

The Western Region Pesticide Reduction project has the objectives of building the capacity of State IPM programs to assess pesticide risk and educate IPM practitioners in risk education principles, tools and processes. I am committed to work as part of this team to assist in meeting the goals and objectives outlined in this SARE PDP proposal. I am encouraged to help move the IPM decision making process to evaluate specific pest management needs, specific to crop and location and to develop appropriate risk assessment and mitigation in those situations.

The ability to make sound IPM risk assessment decisions will benefit growers, communities and environments that may be impacted by these decisions. I believe this proposal will help move us in that direction.

Sincerely,

Rebecca (Becky) Sisco
Western Region IR-4 Center
University of California, Davis

USAID
FROM THE AMERICAN PEOPLE

Bureau for Food Security

7 December, 2017

Dr. Edward J. Ray
President
Oregon State University
Corvallis, OR 97331-2915

Dear Dr. Ray,

We are writing to express our heartfelt appreciation for the transformational role that Oregon State University's Paul Jepson and the Integrated Plant Protection Center (IPPC) have played in supporting the response to the emergence of Fall Armyworm (FAW) in Africa and to appeal for their continued engagement in this important collaboration.

As I am sure you are aware, the invasion of this pest threatens food security for millions of smallholder farmers in Africa given its impact on maize yields, which is a staple for many. Over the past six months, USAID has joined dozens of global donors and partners from the research community, private sector, civil society and host country governments to quickly mobilize an effective response.

Yet, given projected crop losses this year (estimated to range from 20-55 percent[1]), the short-term emergency response has included the rapid deployment of chemical pesticides, irrespective of efficacy and risk management practices. Not only is there a lack of knowledge on when and how to apply these chemicals correctly among farmers, but governments themselves lack the capacity to select less toxic materials. There is great concern about human health and environmental impacts as a result.

While international organizations have been working quickly to operationalize this information and get it to farmers in a form that they can use, the rapid spread of FAW across Africa is outpacing us. Given IPPC's extensive experience in this area, Paul is helping a loose consortium of development partners fast-track some needed tools and resources that we believe will truly yield impact in limiting hazardous chemical exposure. Since September, Paul contributed to three Expert Workshops USAID and CIMMYT convened to develop a common protocol for FAW management and has been instrumental in disseminating guidance on pesticide risk reduction to over 130 African research scientists, policy makers and senior extension staff at workshops in Southern and Eastern Africa last month.

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[1] Evidence Note commissioned by the UK Department for International Development (Fall Armyworm: Impacts and Implications for Africa) and published by CABI in September 2017, www.invasive-species.org/fawevidencenote.

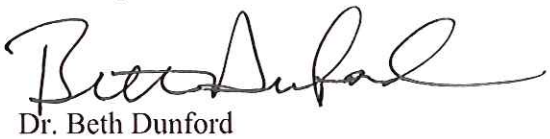
U.S. Agency for International Development
1300 Pennsylvania Avenue, NW
Washington, DC 20523
www.usaid.gov

This collaboration has been vital, as we press hard to influence the next crop cycle across Africa. We realize that Paul is a valuable resource to your institution as well as to West Coast farmers and hence wanted you to be aware of the enormous contribution he and IPPC are making to an effective FAW response at this time. IPPC's unique data and skills are providing information that could help reduce adverse pesticide impacts on the ground. Through our continued intense collaboration, I believe we can influence pesticide use policy in Africa in the next crop cycle.

We are working through the United Nations Food and Agriculture Organization to formalize a structure that would facilitate a coordinated FAW response. However, in the interim, we feel the engagement of Paul and the IPPC are critical and sincerely hope they can continue to prioritize their engagement in this important collaboration.

We sincerely appreciate your institution's support for agriculture, food security, and sustainable management practices and look forward to continued collaboration, including managing this new emerging threat in Africa.

Cordially,



Dr. Beth Dunford
Deputy Coordinator for Development for Feed the Future, Assistant to the Administrator for USAID's Bureau for Food Security

U.S. Agency for International Development
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United States Department of Agriculture

Marketing and Regulatory Programs

Animal and Plant Health Inspection Service

Plant Protection and Quarantine

Center for Plant Health Science and Technology

2301 Research Blvd.; Ste. 108
Fort Collins, CO 80526

(970) 490-4464
FAX: 482-0924

June 16, 2014

USDA-NIFA-CPPM-ARDP
National Institute of Food and Agriculture
U.S. Department of Agriculture

To Whom It May Concern,

It is our sincere pleasure to write a letter of support for Dr. Len Coop et al for the proposal entitled "**Medium- and Extended-Range Weather Forecasts Scaled and Tested for Improved IPM Decision Support In Western States**".

USDA APHIS Plant Protection and Quarantine has sought Dr. Coop's expertise in IPM decision support systems because our field operations have identified the need for delivery of analytical tools to predict the timing of weather-driven pest events to support survey planning. The research and risk analysis conducted within the agency guides survey activities for over 100 pests of regulatory concern via cooperative agreements in the CAPS program (Cooperative Agricultural Pest Survey). Our collaborative project with Oregon State University and Dr. Coop utilizes the USPest.org weather and climate modeling system to predict the timing of pest life stages for more efficient survey trap deployment. The ability to produce extended forecasts for weather and associated pest development has real applicability to agency or IPM programs that rely on weather driven phenology models to safeguard agriculture.

We would find tremendous benefit to our pest risk deliverables if Dr. Coop could improve forecasting of pest events using real-time weather products. This improvement would yield tangible results in our agency's ability to effectively plan short-term survey resources and as well as increasing accuracy for surveying the appropriate lifestage for an agricultural pest of concern. As a customer of the USPest.org platform, we see the value and broader appeal of extended range forecasting to support pest management decisions.

Sincerely,

Richard T. Zink, Ph.D.
APHIS PPQ S&T Laboratory Director
Fort Collins and Phoenix
2301 Research Blvd., Fort Collins, CO 80526
970-490-4472

May 5, 2017

Paul Jepson, Director
Integrated Plant Protection Center
Oregon State University
Corvallis, OR 97331-2915

Dear Dr. Jepson,

On behalf of the Oregon inter-agency Water Quality Pesticide Management Team, we strongly support the grant proposal, *Statewide Networks for Overcoming Barriers to IPM Adoption in Oregon* that you are submitting to the Extension Implementation Program area of USDA NIFA. We are pleased to hear that your team will continue to work in the Middle Rogue Pesticide Stewardship Partnership (PSP) over the next three years. This location exemplifies Oregon watersheds with unique challenges for increasing adoption of IPM practices that also reduce pesticide entry into surface waters due to the complexity and diversity of pesticide users.

You have made progress in identifying the critical education needs of these user groups, and in providing pesticide application management education. However, it is now necessary to expand this program to embrace a wider community, and to increase the focus on IPM as a mitigating factor.

Recent technical assistance efforts by the Integrated Plant Protection Center (IPPC) have also shown progress in the Clackamas Pesticide Stewardship Program, and this may serve as a model for wider application within Oregon, including the Middle Rogue PSP. In particular, your work with the Christmas tree industry and with Oregon Association of Nurseries members has resulted in both better managed and reduced use of organophosphates and pyrethroids that are toxic to fish when they enter salmon bearing streams. In this work, you were able to document behavior change among farmer participants of the education programs, and may have contributed to the significant reductions in insecticide concentrations that we observed in 2014 after the initial training workshops were held in the watershed.

Continuation of the IPPC approach to learner-centered education and decision support design will assist local partners in the Middle Rogue and throughout Oregon to adopt IPM and pesticide risk management practices that can better protect surface water. Your group plays a key role in translating scientific data into forms that support farmers and others in making

informed decisions that are more aligned with the principles of IPM, and that can sustain program impacts across user groups in the longer term.

Your plan for a multiple stakeholder group IPM event this fall in Middle Rogue Watershed is a great next step to increase local knowledge of the alternatives to using the pesticides of concern and to expand adoption of mitigation strategies that can reduce losses to surface water.

In support of this work, ODEQ will continue to share water quality monitoring data with IPPC and liaise with the State Water Quality Pesticide Management Team to keep them informed of your plans in Middle Rogue PSP and beyond. We will also attend and participate in extension programing wherever possible.

Kevin Masterson, Oregon Department of Environmental Quality

Kirk Cook, Oregon Department of Agriculture

1 May 2017

Dr. Paul Jepson
Ms. Katie Murray
Integrated Plant Protection Center
Corvallis, OR 97330

Dear Paul and Katie,

This letter is to express my support for your proposal to create "Statewide Networks for Overcoming Barriers to IPM Adoption in Oregon." The Northwest Potato Research Consortium, which I manage, is a cooperative effort in research funding by the state potato commissions in Washington, Idaho, and Oregon. The aim of the Consortium is to increase cooperation and efficiency of the research and extension programs funded by the three potato commissions that total about $2 million annually. My role as Manager of the Consortium was originally conceived as a research grants program administrator, but my regional role also creates a great opportunity to facilitate regional thinking by the potato industry in terms of broad issues. Two that I have actively engaged in for the Northwest have been soil health and, to the point of this letter, integrated pest management. Regarding the latter, potato is afflicted by a very long list of harmful pathogens and arthropod pests, and its production is pesticide-intensive across most of the Northwest. End users, distributors, and consumers have recently begun demanding reduced pesticide use in potato production and the issue is top-of-mind among many of my colleagues and stakeholders.

I am convinced that better pest management practices, leading to reduced pesticide use, are possible and the Consortium is ideally situated to facilitate change as a sort of conduit of communication among three state potato commissions, three land grant universities, and the breadth of allied industry members. As you know, the three of us have spent the past year learning from each other and assembling a plan to engage the Northwest potato industry in a process of improved pest management practices. I was thrilled to make our first major effort with a team of eighteen industry leaders at a meeting in Portland on April 27. This group, named the Potato Production Chain IPM Working Group established momentum and common ground among its diverse members, and I think that due to your leadership we are on the right road to effect change in this multi-billion dollar industry. I am excited and optimistic that, through the project described in your new proposal to USDA-NIFA's Extension Implementation Program, the three of us can continue to collaborate and stimulate innovative thinking and programs in potato pest management. An important aspect of that work would be a broad ongoing Integrated Pest Management Strategic Plan (IPMSP) and Crop Pest Losses Impact Assessment (CPLIA) process for our industry. As the working group discussed on April 27, charting a path toward change requires a lot of information and data about the system. I'm optimistic that, if committed to, a strong IPMSP and CPLIA for Northwest potatoes will allow industry members to see their system differently and create a vision for change.

In a nutshell, I've been glad to engage with you, I am grateful to you for the effort you've made to date for the potato industry, and optimistically look forward to the coming years of impactful collaboration.

Sincerely,

Andrew Jensen, Ph.D.

Manager, Northwest Potato Research Consortium
95873 E Goldmohr LN, Lakeview OR 97630
ajensen@potatoes.com www.nwpotatoresearch.com

Oregon
HAZELNUTS
Indulgence in a Nutshell

May 1, 2017

Katie Murray
Integrated Plant Protection Center
Oregon State University
Corvallis, OR 97331-2915

Dear Katie,

The Oregon Hazelnut Commission strongly supports your USDA Extension Implementation Program proposal to continue your Integrated Pest Management Strategic Plan (IPMSP) project begun through the Applied Research and Development Program area of the USDA – NIFA. This program will be a tremendous asset for Hazelnut growers in multiple counties in the Willamette Valley. Our industry produces more than 99% of all hazelnuts in the USA. The annual farm gate value of hazelnuts averages $120 million. The industry is going through a growth phase and we need to continue our focus on research and support to ensure the continued high level of expertise and productivity.

The Pest Management Strategic Plan for hazelnuts was last updated in 2006, and since then several new production challenges and opportunities have arisen. The industry now has several new cultivars that are either resistant or tolerant to Eastern Filbert Blight. We are particularly interested in optimized development practices of new orchards using these cultivars. In addition, several new and old pest insects still persist including filbertworm, invasive aphid species and Brown Marmorated Stink Bug. The new cultivars place our industry in a position to develop sustainable management practices, which may open up new markets. Having a program that creates a continually updated IPMSP will enable our industry to discuss and better understand current and emerging pest management concerns. In turn, this greater awareness will enable us to better inform regulators and policymakers about the status of pest management in our crop and our future needs.

The IPSMPs and crop loss assessments that will come from your project will be important tools to document formally, our production practices and economic impacts of pests. Hazelnuts are considered to be a "minor" crop; therefore, we are reliant on specialized programs for pesticide registrations. These programs include the IR-4 program, Section 18 emergency exemptions and Section 24(c) special local needs. The IPMSPs and annual crop loss assessments will provide the critical economic impact data on our pest problems to prioritize our requests within the IR-4 Food Use program and to justify Section 18 and Section 24(c) requests for pesticide registrations to better manage important pests.

We look forward to working with you, other members of the IPCC, Vaughn Walton, Shawn Mehlenbacher, Jay Pscheidt, Nik Wiman and grower cooperators in developing an IPMSP/Crop loss assessment tool for our industry so that we can continue to manage pests successfully and to produce a high quality, high yield, and a healthy hazelnut crop.

Sincerely,

Meredith Nagely

Meredith Nagely

Administrator
Oregon Hazelnuts Commission

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OREGON SEED COUNCIL

April 27, 2017

Katie Murray
Integrated Plant Protection Center
2034 Cordley Hall
Oregon State University
Corvallis, OR 97331

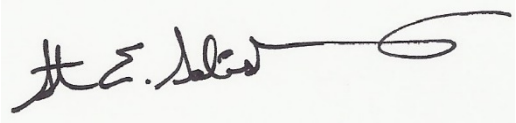
Dear Ms. Murray,

The Oregon Seed Council supports the grant proposal you are submitting to the USDA-NIFA Crop Protection and Pest Management program, Extension Implementation Program area. We support the proposed efforts to develop an Integrated Pest Management Strategic Plan and Crop Pest Losses Impact Assessment for grass seed crops. Oregon is the world leaders in grass seed production and it is imperative that our industry remains current with pest management strategies to sustain our competitive position with superior quality seed production.

It is important to understand that there has never been an IPMSP established for grasses grown for seed. Additionally, there is no established CPLIA for grass seed. It is understood that these documents are key pieces of information when it comes to obtaining and maintaining pesticide registrations, as well as playing a critical role in regulatory actions proposed by the U.S. Environmental Protection Agency and/or the Oregon Department of Agriculture. As a minor/specialty crop, it is imperative to have these documents to define our pest challenges, needs and the realized economic impacts to grass seed producers. Without this information, there are limited sources of good information to assist regulators in their understanding of our industry.

The Oregon Seed Council understands the value of the proposed project and the benefits to the grass seed industry upon its completion. We look forward to working with you in developing these tools for our industry so that Oregon grass seed producers can remain leaders in quality grass seed production and sustainable in the global market.

Sincerely,



Steven E. Salisbury
Research & Regulatory

May 5, 2017

Katie Murray
Integrated Plant Protection Center
2040 Cordley Hall
Oregon State University
Corvallis, OR 97331-2915

Dear Katie,

On behalf of the Oregon Cranberry Growers Association (OCGA), I would like to express our interest in working with the IPPC to continue the IPMSP program, updating our Oregon/Washington Integrated Pest Management Strategic Plan (IPMSP) for cranberry production in winter of 2019. The majority of Oregon cranberries are grown on the coast of southwestern Oregon, in Coos and Curry Counties, but there are also a small number of farms located on the northwestern Oregon coast. Approximately 2,900 acres were in production in 2014 in Oregon.

Pest management is an ongoing concern for us, and the need to prioritize management strategies is becoming more and more important as cranberry prices continue to remain low. Time is often a constraint as well, as many growers have been forced by poor prices to seek steady employment off-farm, so a focused pest management strategy that will help maximize time and financial inputs on the farm would be very valuable.

Having an updated PMSP specific to the west coast growing region is extremely beneficial to our industry and provides benefit to the entire PNW growing region.

Further, the data from the annual Crop Pest Losses Impact Assessment Surveys helps us as an industry better understand the economics of pest impacts and management costs, and will help us as we continue to strategize better management practices.

Thank you for considering us for this opportunity.

Sincerely,

Bob Donaldson
OCGA President

Columbia Gorge fruit growers
po box 168 • odell, oregon • 97044
(o) 541.387.4769 • (c) 541.399.3680
www.cgfg.org • cgfg@hrecn.net

April 14, 2017

Katie Murray
Research Assistant, Extension IPM
Integrated Plant Protection Center
2040 Cordley Hall
Oregon State University
Corvallis, OR 97331-2915

Dear Ms. Murray:

Columbia Gorge Fruit Growers is pleased to provide this letter of support for work on an Extension Implementation Program Grant for projects supporting the local cherry industry. This work is critical to our cherry growers who face new threats from Spotted Wing Drosophila, the Obliquebanded Leafroller and the Western Tentiform Leafminer, as well as the pests that have been around for years like the Cherry Fruit Fly.

The update to the Integrated Pest Management Strategic Plan (IPMSP) that we will create this winter will include insights from stakeholder groups to understand progress and accomplishments related to critical pest management needs, and to identify new needs. It will provide a baseline of current practices and control strategies, with information given to researchers, growers and extension service. Its scope is well defined, and its results will be vital for our growers.

A similar project, 2014's Pest Management Strategic Plan for Pears in Oregon and Washington, has become an indispensable resource for Northwest tree fruit growers. It includes vital details on pest management economics, impacts on horticultural practices, pest management strategies and pear production.

Having the economic data from the updated crop loss assessment will aid in the understanding of pest impacts, and allow for the tracking of changes in pesticide usage. Understanding all of this will help refine our research and educational programs, and outreach efforts with growers.

CGFG represents 440 cherry, pear and apple growers in the Mid-Columbia Region. Oregon is the third largest sweet cherry producer in the U.S. with about 40,000 tons of fresh cherries in 2015 – many coming from Mid-Columbia orchards.

We look forward to being involved in the project and sharing information regarding pest management with our growers.

Best regards,

Mike Doke
Executive Director
Columbia Gorge Fruit Growers

Malheur County
ONION GROWERS ASSOCIATION
"The Home of Mild Sweet Spanish Onions"
710 S. W. 5th Avenue . . . Ontario, Oregon 97914
Phone (541) 881-1417

28 April 2017

Katie Murray
Integrated Plant Protection Center
Oregon State University
Corvallis, OR 97331-2915

Dear Katie,

The Malheur County Onion Growers Association enthusiastically supports your continued work on the Integrated Pest Management Strategic Plan (IPMSP) and Crop Loss Assessment for our onion industry that you began last year. Our county is the leading onion-producing county in the US, with an annual farm gate value of $60 – 80 million, which is a vital component of our local economy.

The IPSMPs and annual crop loss assessments are important tools to formally document our production practices and the economic impacts of pests. This information helps our growers better understand their pest management practices and the economics of them. In addition, onions are considered to be a "minor" crop; therefore, we are reliant on specialized programs government for pesticide registrations. These programs include the IR-4 program, Section 18 emergency exemptions and Section 24(c) special local needs. The IPMSPs and annual crop loss assessments will provide the critical economic impact data on our pest problems to prioritize our requests within the IR-4 Food Use program and to justify Section 18 and Section 24(c) requests for pesticide registrations to better manage important pests.

We look forward to working with you, other members of the IPCC, and Stuart Reitz in Malheur County Extension in keeping the IPMSP and Crop Loss Assessment tools up to date for our onion industry so that we can continue to manage pests successfully and to produce a high quality, high yield, and healthy onion crop.

Sincerely,

Paul Skeen

President, Malheur County Onion Growers Association

Agricultural Experiment Station
Cooperative Extension

THE UNIVERSITY OF
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MARICOPA
AGRICULTURAL CENTER

37860 West Smith-Enke Road
Maricopa, Arizona 85138
(520) 374-6273

ARIZONA PEST MANAGEMENT CENTER

May 17, 2017

Dr. Paul Jepson
Professor, State IPM Coordinator &
Director, Integrated Plant Protection Center,
Oregon State University

Re: Ongoing and Future Extension IPM Collaboration

Dear Paul,

This letter is to confirm my commitment to collaborate with you in Oregon, as a component of the EIP grant program activities in our respective states. We will interact with you and your IPM team regularly in any number of capacities and collaborative projects. This will occur over the course of meetings throughout the year where we can interact directly, such as: the annual WERA-1017 meeting of the Western coordinating committee for "IPM Research and Extension / Educational Programs for the Western States & Pacific Basin Territories"; the International IPM Symposium; advisory committee meetings of the Western IPM Center; PD workshops, and regional and national school IPM and public health related working groups, meetings and conference calls. We will continue to work with you, Ms. Katie Murray and other OSU personnel, growers and pest managers in your region, to implement Integrated Pest Management Strategic Plans (iPMPSPs) and Crop Pest Losses & Impact Assessment surveys for major cropping systems in the Pacific Northwest (also leveraged by our Western IPM Center Signature Program and your team's ARDP grant). We appreciate your regional leadership in coordinating professional development for western IPM Coordinators and Extension personnel on the important topic of educating end-users about highly hazardous pesticides (leveraged through your SARE grant). We anticipate on-going and future collaborations to incorporate risk measurement via ipmPRiME into our IPM programs in lettuce and possibly cotton. The purpose of this collaboration is to enable a deeper level coordination between our state IPM programs, to enable specialized tools and services to be exchanged and to enable high quality outreach to be jointly delivered in shared commodities.

In the University of Arizona's EIP submission, we have outlined ways in which this collaboration will contribute to a number of Extension outputs and overall program outcomes, including improving pesticide risk education across our IPM programs, and better quantifying reductions to pesticide risk achieved through implementation of IPM using ipmPRIME and other tools which you and your team have developed. It reflects the extensive informal cooperation that already takes place between our respective states and other states in the western region. We hope that by stating our intended collaboration here this cooperation will play an explicitly stated role within our respective programs and help us in pursuing IPM Roadmap goals of reducing pest, economic and environmental risks within our states. This model of ongoing interactions and collaborations between our two state programs helps us envision future multi-state cooperation throughout the Western region and beyond.

I look forward to our continued collaborations so that we can learn and improve each other's IPM programs. Arizona has much to gain from this interaction and the expertise present in the Oregon IPM programs.

Yours sincerely,

Peter C. Ellsworth, Ph.D.
Full Specialist / Professor, IPM Coordinator &
Director, Arizona Pest Management Center, University of Arizona

COOPERATIVE EXTENSION SERVICE

10/30/2016

Dear SARE Grant Panel:

We are writing this letter to confirm Alaska's participation as collaborators in the proposed SARE project, led by Oregon State University, "**Western Region Pesticide Risk Reduction through Professional Development for Western State IPM Programs.**" This project addresses an important need for risk assessment and mitigation education for Extension professionals throughout the west. Growers and other stakeholders, working in many cropping systems, will benefit from the knowledge and tools already developed by OSU with partner organizations to mitigate pest and pesticide risk. The idea for this project was initiated in July during the WERA-1017 Regional Coordinating Committee meeting of state Extension IPM Coordinators in the West. Coordinators were enthusiastic and identified a need for a novel education and professional development program for Extension professionals. They will each serve as conduits for knowledge and resources, to be integrated into their respective Extension IPM programs throughout the West in ways that make sense for each participating state. This will greatly increase our capacity for risk assessment and mitigation. This project will also enhance our relationships and effectiveness of our programs that directly engage growers and pest managers across the state.

The Integrated Plant Protection Center (IPPC) and Oregon State University are recognized worldwide for their scholarly and collaborative research and outreach on pesticide risk assessment and mitigation. They play a leadership role in developing decision-support tools, such as ipmPRiME.org, Pesticide Risk Mitigation Engine. Part of the success of their program is in the direct connections they have with growers and pest managers, through development of pest management strategic plans (PMSPs), IPM programs, and risk mitigation decision support systems, and in their emphasis and expertise on measuring adoption and impacts of IPM. We have engaged in previous research and Extension collaborations with Dr. Paul Jepson and the IPPC; they are the right group to lead this project.

The Cooperative Extension Service is the lead organization for IPM in Alaska (AKIPM), including insect, weed, disease, and other pest management. The AKIPM program has provided educational outreach in Alaska since 1981. This unique program was originally designed to meet the public demand for IPM information and continues to

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Fax: 907-262-3939

www.uaf.edu/ces
UAF and USDA Cooperating

UAF UNIVERSITY OF ALASKA FAIRBANKS

COOPERATIVE EXTENSION SERVICE

develop in response to public needs and the changing pest trends in Alaska. Our statewide IPM program is a cooperative effort, with IPM staff and technicians strategically position in key locations across the state. As leaders of the IPM program, we insure effective teamwork across the state as well as training and dissemination of education on topics of risk assessment.

We believe this innovative project will greatly benefit our IPM program in Alaska, and we look forward to engaging with partners at OSU and other western states.

Best Regards,

Casey Matney, Ph.D.

Agriculture and Horticulture Agent

Steven Seefeldt, Ph.D.

State Horticulture Specialist

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UAF and USDA Cooperating

UAF UNIVERSITY OF ALASKA FAIRBANKS

THE UNIVERSITY OF ARIZONA
COLLEGE OF AGRICULTURE AND LIFE SCIENCES
COOPERATIVE EXTENSION
Arizona Pest Management Center

Dawn H. Gouge, Ph. D.
Professor and Specialist – Public Health Entomologist
University of Arizona - MAC
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October 18th 2016

Letter of Collaboration: **Western Region Pesticide Risk Reduction through Professional Development for Western State IPM Programs**

As a University of Arizona Urban IPM Specialist of more than 16 years, I am acutely aware of pesticide risks on a daily basis. I field enquiries from US residents and built-environment managers battling pest problems including commensal rodent, cockroach, and ant infestations as well as unhappy hosts troubled by head lice, bed bugs, ticks, and mosquitoes. My own Extension and applied research program focuses on environments housing vulnerable people, and I work largely in school and low-income elder and disabled housing.

Contemporary academics are acutely aware of ever increasing epidemiologic studies based on real-world pesticide exposure links, and tragic and avoidable human health effects. There is a critical need for further development and expansion of risk-assessment based mitigation as well as broad-based risk education, if pesticide risk reduction is to be achieved.

I am committed to working as part of the team to meet the goals and objectives outlined in this SARE PDP proposal. Working on public health pests, and with the most vulnerable members of society I acknowledge significant pest as well as pest management related risks. I therefore view pesticides as an important, and in many instances vital part of establishing healthy environments. I am dedicated to science-based risk-reduction, and adamantly state that we have the technology, and are ethically obligated to minimize negative health impacts.

I serve on the National School IPM 2020 Team (https://ipminstitute.org/projects/school-ipm-2020/), Co-direct the IPM for Sensitive Sites in the Built Environment - Western Region Work Group (http://ag.arizona.edu/apmc/westernschoolIPM.html), am a member of the EPA Pesticide Program Dialogue Committee, and StopPests in Multi-Family Housing Advisory Committee. I intend to use the avenues available to me to expand the impact of the WERA team activities nationally.

Sincerely,

Dawn H. Gouge
University of Arizona

Extension Service Union County
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April 26, 2017

Dr. Paul Jepson
Ms. Mary Halbleib
Ms. Katie Murray
Integrated Plant Protection Center
Oregon State University
2034 Cordley Hall
Corvallis, OR 97331-2915

Dear Dr. Jepson, Ms. Halbleib, and Ms. Murray –

The purpose of this letter is to express my strong support for your USDA-NIFA Crop Protection and Pest Management - Extension Implementation Program proposal to conduct an integrated pest management strategic planning (IPMSP) process and crop pest loss impact assessment (CPLIA) on peppermint and grasses grown for seed in Oregon. Both crops represent key economic components of the northeastern Oregon (NE OR) agriculture economy and other production areas across the state. Recent consultation with NE OR growers and industry representatives indicated an urgent need to develop resource tools so the industry can more effectively respond to pest management challenges, proposed regulatory action, and also provide fact-based information for educational outreach to various audiences. It is apparent that both IPMSP and CPLIA processes create key information resources that effectively communicate current pest management practices, pest economic impacts and future needs with regulatory agencies and policy makers. Currently, a regional IPMSP exists for peppermint in the western U.S. but is seriously out-of-date (e.g. last revised 2002). Unfortunately, an IPMSP for grass grown for seed does not exist for Oregon or the PNW region.

My collaboration with OSU-IPPC has increased exponentially in recent years as I have joined the effort to help develop the new "Oregon Extension IPM Network". The primary objective of the Oregon network is to facilitate extension outreach and research efforts across the state to help educate growers and increase IPM adoption across a diverse array of agricultural and horticultural crops. As part of this effort, I've attended (Halbleib, Ellen) two OSU-IPPC professional development training sessions (e.g. Halbleib, Ellen) which will help my extension outreach program build IPM capacity within northeastern Oregon cropping systems and the Oregon Extension IPM network.

I am fully committed to work with OSU-IPPC to design and deliver targeted educational programs in northeastern Oregon and to adapt/develop programs for peppermint/grass seed

producers in other production areas across the state based on IPMSP/CPLIA outcomes and to collect impact data. It is an exciting time to build IPM capacity in both crops since I am actively engaged in the development of IPM decision tools for key economic pests in Kentucky bluegrass and peppermint. This past winter I was able to participate in Crop Pest Loss Impact Assessments conducted for onions (Ontario, OR) and potatoes (Hermiston, OR) by OSU-IPPC. I was able to observe the new CPLIA and see first-hand its value as an innovative process that engages participants in the creation of an information resource to document the relationship between pest economic impacts, current management practices and changes over time. Peppermint and grasses grown for seed are considered minor-use crops in the PNW region, therefore, these tools will provide vital economic impact data needed justify and support future pesticide registration requests for newer, more effective and sustainable pesticide products.

I look forward to working with OSU-IPPC to develop IPMSP and CPLIA tools, continue collaboration on the development of IPM educational programs, and to engage the peppermint and grass seed industry in ways that will further enable growers to access markets with their production and practice sustainable pest management.

Respectfully submitted,

Darrin L. Walenta

Extension Agronomist – Union, Baker and Wallowa Co.

Extension Service Coos County
Oregon State University, Ohlsen Baxter Building, 631 Alder Street, Myrtle Point, Oregon 97458
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May 26, 2016

Katie Murray
Integrated Plant Protection Center
Oregon State University
Corvallis, OR 97331-2915

Dear Katie,

I would like to express my support for the Integrated Pest Management Strategic Plan (IPMSP) project. I work closely with cranberry producers in Oregon, and I believe the IPMSP and associated Crop Pest Loss Impact Assessment (CPLIA) will be extremely valuable to the industry, not only in southern Oregon, but in northern Oregon and Washington as well, as we share many common pest management issues.

I am excited to engage with a project that is focused on improving IPM effectiveness within the local industry. Many cranberry producers have been struggling financially over the past several years as a result of poor market prices. More than ever they are in need of tools to inform on-farm pest management prioritization in order to minimize unnecessary pest management expenditures. I am encouraged that the approach utilized in the IPMSP project is one that depends heavily on producer input for defining and prioritizing pest management needs. Not only will an IPMSP enable cranberry producers to better understand current and emerging pest management concerns, it will also fuel enhanced communication between the industry and regulators and policymakers about the current and future status of pest management in cranberries.

Cranberries are considered to be a 'minor' crop in the United States. We rely on specialized programs for pesticide registrations, including the IR-4 program, Section 18 emergency exemptions, and Section 24(c) special local needs registrations. The IPMSP and the annual CPLIA that will result from the project will document the economic impact of existing pest problems that will help prioritize pesticide registration requests for managing important pests.

As the Agriculture Extension Agent in Oregon's primary cranberry producing counties, I will work closely with local producers and the Oregon Cranberry Growers Association board of directors to select program participants that will maximize industry representation and facilitate collaboration throughout the process. I look forward to working with you, the IPPC, cranberry producers, and other stakeholders to develop an IPMSP and CPLIA program for the the cranberry industry.

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I am committed to collaborating with Katie Murray and Dr. Paul Jepson to support the IPMSP grant, its development, and its projected outcomes with regard to education and evaluation. A new IPMSP will provide guidance to the industry that will better inform pest management decisions and lead to increased on-farm efficiency, production, and profitability.

Sincerely,

Cassie Bouska
Extension Agriculture Faculty
Coos/Curry OSU Extension Service
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OSU - Dept. of Horticulture
4017 ALS Bldg., Corvallis, Oregon 97331-7304
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25 May 2016
Katie Murray
Integrated Plant Protection Center
Oregon State University
Corvallis, OR 97331-2915

Dear Katie,

I strongly support your grant proposal for the Integrated Pest Management Strategic Plan (IPMSP) project that you are submitting to the Applied Research and Development Program area of the USDA – NIFA. This program will be an asset for Hazelnut growers in multiple counties in the Willamette Valley. The hazelnut industry produces more than 95% of all hazelnuts in the USA. The industry is currently going through a growth phase with multiple new plantings and changes. From a pest management perspective, we need to continue our focus on research and support to ensure the continued high level of expertise and productivity.

The existing PMSP for hazelnuts was updated in 2006, and since then several new production challenges and opportunities have arisen. Several new and old pest insects persist, including filbertworm, invasive aphid species, and Brown Marmorated Stink Bug. Based on needs identified on the 2006 PMSP, we have developed mating disruption for Filbertworm, a new technique which has resulted in a 60-75% reduction of pesticides. There are, however, several hurdles that need to be crossed in order to result in widespread adoption of this technology in the industry, and a new PMSP may help this process.

New cultivars place our industry in a position to develop sustainable management practices, which together with mating disruption, may open up new markets. The development of an “IPMSP” as envisioned will enable our industry to discuss and better understand current and emerging pest management concerns. In turn, this greater awareness will enable us to better inform regulators and policymakers about the status of pest management in our crop and our future needs.

The IPSMPs and annual crop loss assessments that will come from your project will be important tools to document formally our production practices and economic impacts of pests. Hazelnuts are considered a ‘minor’ crop; therefore, we are reliant on specialized programs for pesticide registrations. These programs include the IR-4 program, Section 18 emergency exemptions and

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Section 24(c) special local needs. The IPMSPs and annual crop loss assessments will provide the critical economic impact data on our pest problems to help prioritize our requests within the IR-4 Food Use program and to justify Section 18 and Section 24(c) requests for pesticide registrations to better manage important pests.

We look forward to working with you, other members of the IPPC, and other stakeholders in developing an IPMSP/Crop loss assessment program for our hazelnut industry so that we can continue to manage pests successfully and to produce a high quality, high yield, and a healthy hazelnut crop.

With this I would like to state that I would collaborate with Katie Murray and Dr. Paul Jepson to support the above grant. It is clear that the development of a new and refined IPMSP program will guide the industry to increased levels of production and market access. I would be willing to attend the planned meetings, and contribute from a technical perspective to help steer research and outreach.

Yours sincerely

Vaughn M. Walton, Ph.D
Associate Professor, Horticultural Entomologist
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December 12, 2018

To: Integrated Plant Protection Center (IPPC) Review Team

Re: Support of the IPPC from the Hazelnut Industry

The Oregon hazelnut industry has long been an advocate of the IPPC. The Oregon Hazelnut Commission has worked closely with IPPC in drafting and updating their Integrated Pest Management Strategic Plans through the years. This has become a critical part of communication with the regulators as well as growers. It provides a basis for grower practices and incorporates the sustainability and stewardship efforts of the industry. The expertise from the center has been very high quality and folks there work closely with extension, allied industry and growers so that the result is very credible.

The Oregon Hazelnut Commission is funded by all Oregon hazelnut growers and it is very important that we have credible documentation when we are confronted with issues arising from being near population centers. When working with federal regulators it has been very rewarding to see how seriously they take documentation from the IPPC.

The hazelnut industry has been a leader in the use of biological controls for aphid and BMSB control as well as filbertworm management. It has also reduced the need for EFB sprays with resistant trees. When these are substantiated in the PMSP documents, they are credible. Even more important the IPPC provides an opportunity for representation from all facets of the industry to discuss potential for increased IPM practices.

Having been working in the industry for over 23 years, I can attest to the importance of the IPPC and our PMSP document. It has been referred to on many levels every year. It has been used by the Commission, the Hazelnut Marketing Board, the Nut Growers Society and the Associated Oregon Hazelnut Industries. Without it the void would be no "credible unbiased" information to substantiate what is actually happening in the hazelnut industry with regard to IPM.

Sincerely,

Polly Owen, Director
Hazelnut Industry Office

Oregon Hazelnut Commission, Hazelnut Marketing Board, Nut Growers Society,
Associated Oregon Hazelnut Industries
21595 A Dolores Way NE - Aurora, OR 97002
Phone 503.678.6823 Fax 503678.6825
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Colorado State University

Department of Bioagricultural Sciences and Pest Management
Fort Collins, Colorado 80523-1177
December 12, 2018

IPPC Review Team
College of Agricultural Sciences
Oregon State University
Corvallis, OR 97331

To Whom It May Concern:

This is to express my support for the Integrated Plant Protection Center (IPPC) at Oregon State University. I first become aware of the IPPC while working in Central America in the late 1970s. I quickly came to recognize it as a unique source of unbiased, research-based information on pesticides and pesticide application methods, consistently provided within an Integrated Pest Management (IPM) context. The Center clearly has evolved over the years to reflect the changing realities of modern plant protection, but remains a unique resource for IPM practitioners in Oregon and well beyond.

My current involvement is through my membership in the Western Region Pesticide Risk Mitigation Alliance, which is a regional group working to address issues associated with the use of highly hazardous pesticides. IPPC members (Murray and Jepson) provide quality, informed leadership for the group and continually impress me with the depth and breadth of their pesticide knowledge.

I consider our group to be involved in two activities. The first is internal education, i.e., bringing all of us "up to speed" regarding highly hazardous pesticides. The second, and more important, will be an attempt to bring the western region "up to speed" regarding highly hazardous pesticides. I think it is critical that this be a regional effort, given that I have seen individual attempts to provide similar information to the public run into problems with the pesticide industry, as well as other interests. This IPPC-led, regional approach will allow me to provide better pesticide information to my clientele, thanks to the within-group education effort, with enhanced credibility, thanks to the regional nature of our work.

While my experience and relationship with IPPC is primarily with pesticide and pesticide application information, I am aware that there is much more to the Center than this. For example, the weather and climate work is just as recognized and impactful for a wide variety of IPM programs as the pesticide related activities. I encourage you to allow the IPPC to remain as an unique IPM resource in your college and institution, to the benefit of IPM workers in Oregon, the region, nationally and internationally.

Sincerely,

Frank B. Peairs

Frank B. Peairs
Professor of Entomology

IPPC Review Team

Oregon State University

San José, Costa Rica, December 13, 2018

Dear IPPC review team,

SAN has engaged since 2014 in a technical and strategic alliance with OSU's Integrated Plant Protection Center. Our alliance has yielded state-of-the-science pesticide risk mitigation measures based on IPMprime's risk type categories that have been reflected in SAN Sustainable Agriculture Standards and technical project frameworks and are being implemented in thousands of tropical export crop farms in almost 50 countries in Africa, Asia and Latin America.

Together, we have consolidated two important pesticide lists that are guiding agriculture producers we are engaging with through our programs:

1. Banned list based on an adapted version of the FAO/WHO JMPM highly hazardous pesticide parameters; and
2. List of pesticides with specific bystander, wildlife, aquatic life or pollinator risks that should only be used when implementing specific risk mitigation measures.

With IPPC's support, the use of these lists and their mitigation measures have been promoted through the "Pesticides & Alternatives APP" for worldwide use (with specific information for Brazil, Colombia, India, Kenya and Mexico), the SAN-Nestlé Spices Responsible Sourcing Partnership for India, and Mesoamerican Biodiversity Check Agrícola initiative (Central America, Mexico and the Dominican Republic).

We are also exploring pathways how to effectively implement the IPPC's IPM Strategic Planning Process in tropical export crops through an adapted and customized approach with local experts and stakeholders.

We are confident, that the scientific power and vision of the extremely skilled and enthusiastic IPPC team will yield many more projects that will benefit tropical agriculture producers, their families, communities and the environment.

We trust that we will be able to keep working together on this mission over the next years and decades. Kind regards,

Oliver Bach

Technical Manager

Sustainable Agriculture Network

13 December 2018

IPPC Review Team
Oregon State University

RE: Support for the work of IPPC

Dear IPPC Review Team,

This letter is to express my enthusiastic support for the IPPC and its work in promoting IPM in the Northwest. I've worked in potato research on the industry side since 1999, including developing my own industry outreach and education program. The Northwest Potato Research Consortium, which I manage, is a cooperative effort in research funding by the state potato commissions in Washington, Idaho, and Oregon. The potato industry of the Northwest accounts for over 50% of all potatoes produced in the U.S. The aims of the Consortium are to increase cooperation and efficiency of the research programs funded by the three potato commissions (totaling $1.5 million annually) and to facilitate projects and outside funding that benefit potato research and the commissions' stakeholders across the Northwest. A majority of the Consortium's research funding addresses the pest management needs of our pest- and pesticide-heavy crop. Therefore, IPM is a top priority for my position and for the Consortium as a whole.

As a graduate of OSU's Department of Entomology in 1990 and 1996, I have been familiar with the IPPC for many years. Since 2016, however, I have had a strong working relationship with Katie Murray and Paul Jepson. They were aware of the extreme pest management challenges of potato in the Northwest, and the industry's pesticide reliance and poor implementation of IPM. During a meeting of the advisory committee of the Western IPM Center in spring of 2016, Katie approached me about starting work in the potato industry aimed at making progress on what seemed to me a bewildering set of intractable problems in our industry. Long story short, through many conversations during the remainder of 2016 Katie's tenacity and drive convinced me to work with the IPPC to create an IPM-focused working group of the Northwest potato industry to study and attempt to change the sociological, economic, and scientific barriers to IPM in potato. For many years I had wanted to effect change in the industry but could not lead such a process alone. I was only willing to tackle such a massive project with the talented leadership of Katie and Paul and the backing of the IPPC. We have now cooperated in conducting four meetings of the working group, which has adopted the name, "Resilient Potato Production Initiative Workgroup" and the goal "*to collaboratively identify and remove barriers to the adoption of alternative, innovative, non-conventional pest*

Manager, Northwest Potato Research Consortium
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management practices." This working group has gained momentum and is now recognized as an important force among potato industry leaders across the region.

I want to emphasize that barriers to IPM in potato go far beyond knowledge gaps in crop management information such as pest biology, treatment thresholds and management recommendations, etc. Forces that affect the pesticide-intensive nature of Northwest potato include (among others):

- Many pests and diseases requiring different and sometimes conflicting management strategies,
- Near zero-tolerance for some pests and their damage in the marketplace,
- Extremely tight crop quality requirements defined by grower-processor contracts,
- Strong influence of the pesticide industry in grower decision-making,
- High crop value and low pesticide prices that combine to encourage preventative pesticide applications,
- Cultural momentum behind various production practices and ways of thinking, including a very risk averse mindset among most producers and processors.

Tackling such a complex scenario requires a long-term view and participation from a diverse set of viewpoints and backgrounds. No single person can lead a team that is tackling these issues, and the mission of the IPPC and my regional responsibilities have been the right combination to possibly effect real change. My experience has been that rank-and-file research/extension faculty are rarely if ever equipped and incentivized to tackle ambitious projects like ours. I am certain that without the backing of the IPPC and its talented, mission-driven personnel, our working group would not exist today. Our working group has already committed to completing an IPM Strategic Plan for Northwest potatoes in 2019 and is very interested in a systematic evaluation of risk across the potato supply chain later in the year and in 2020.

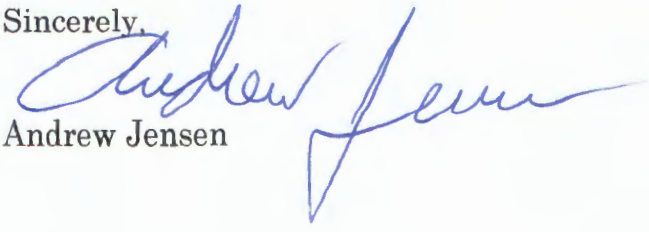
<u>In my view the strength of the IPPC is a combination of the following:</u>

- A mission focused solely on IPM science and education in the broad sense,
- A team of talented personnel with diverse expertise in agricultural and human sciences, and
- The support of a dedicated leader focused on supporting team members through securing funding and providing long-term vision.

I think it would be very difficult for current IPPC personnel to independently sustain their impact and reach in the agricultural industry. In other words, the existence of IPPC as an institute has made OSU more impactful than it otherwise would be, and unlike any of the other universities I work with.

In short, the IPPC uniquely supports important agricultural groups across Oregon and the Northwest and adds markedly to Oregon State University's profile and prestige. Please let me know if I can be of any further help in this matter.

Sincerely,



Andrew Jensen

THE UNIVERSITY OF ARIZONA
COLLEGE OF AGRICULTURE & LIFE SCIENCES
Entomology

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December 16, 2018

Dear IPPC Review Team,

I understand that the Integrated Plant Protection Center (IPPC) at Oregon State University is under review, and I am happy to provide comment as an external collaborator whose research and Extension program has benefited greatly from IPPC faculty expertise.

I am an entomologist with an applied research and Extension program aimed at reducing human health risks associated with medically significant pests, and associated pest management practices. I have received guidance and a good deal of mentoring from several members of the IPPC over the past decade, which has afforded ongoing success for me academically, and for the broad array of stakeholder communities I serve.

The Arizona Pest Management Center (APMC) is an umbrella organization within the University of Arizona College of Agriculture and Life Sciences whose goal is to create a working environment in which the science and implementation of Integrated Pest Management (IPM) can thrive in Arizona. Several APMC faculty focused on pest management in agricultural crops, structures, vector, venomous and vertebrate pest management work closely with IPCC faculty to facilitate the adoption of rigorous IPM practices. Thus, influencing crop growers, technical advisors, and many other related investors within Arizona and many other states.

The APMC does not have a toxicologist, and in fact none of the related departments have faculty focused on pesticide toxicology, yet an immense amount of concern surrounds the safe and effective use of pesticides. In short, the IPCC serves a critical role providing expertise applied widely within several IPM programs in Arizona, a number of western region states, and more than 50 countries.

As a member of the WERA1017 Regional Technical Committee Katie Murray and Paul Jepson play a leadership role coordinating team efforts, meetings, and subcommittee activities for over 30 members from 17 western states and territories. WERA1017 is an extremely active coordinating committee named and focused on the Coordination of IPM Research and Extension/Educational Programs for the Western States and Pacific Basin Territories. During 2016, the team identified the urgent need to deepen academic understanding of pesticide toxicology and practical evaluation of risk, and a subgroup formed as the Western Region Pesticide Risk Reduction professional development team. The group has learned and applied principles regarding risk evaluation from the IPPC faculty, and the team are involved in the practical application of that information as well as improving ways to communicate findings effectively to a lay audience. The IPPC team deploys risk-reduction information to a network of academics and agricultural professionals who interface with thousands of stakeholders through the Pacific Northwest, and over a million farmers in tropical countries each year. Through the Western Region Pesticide Risk Reduction team, thousands more also benefit.

Through IPM Strategic Planning and weather-based decision-support, IPPC directly impacts most of the top agricultural and horticultural industries in Oregon, more than 8 other industries in Arizona, and many more industries associated with IPM programs in western states and internationally. The IPPC is no doubt an asset to OSU, and the Oregon citizenry, but the value of such rare expertise as it is so generously shared within the academic community globally, cannot be overstated.

The WERA1017 team have a number of current activities underway including the production of:

- An Extension publication about hazardous pesticide use, classification, and risk mitigation,
- A high impact journal article covering the use, management and phase-out of highly hazardous pesticides (HHPs) in the western U.S.,
- A multi-state Extension publication, which will be promoted through the four existing IPM Centers, each of which have vast reach within the U.S.

Long-term, the group goal is to reduce dependency on HHPs within the U.S. and facilitate international groups with related goals. The IPPC are leaders in this effort with unique expertise and experience, I look forward to ongoing collaboration and further success.

Sincerely,

Dawn H. Gouge
cc. Associate Dean Dan Edge
Katie Murray
Len Coop
Paul Jepson

17 December 2018

IPPC Review Team
Oregon State University
Corvallis, OR 97331-2915

Dear Ms Murray,

I am writing in light of the administration review of the Integrated Plant Protection Center (IPPC) at OSU. It is crucial that we make the reviewers aware of the history of support and daily collection of data that has been made possible by the IPPC, which is the only source we are aware of for this information.

In response to client requests from several international blueberry growers in 2015, we began searching for sources of growing degree (GD) unit analysis and forecast. GD's are very relevant to determining the rate of growth of numerous crops as well as forecasting the arrival of pestilence for planning the proper application of pesticide and fertilizers. This is when we discovered the USPEST.org program that was created by the IPPC.

Over the past three years Dr Len Coop has been extremely helpful in guiding our retrieval of the data and troubleshooting occasional technical problems with the model.

We have since modified all of our regional weather forecast reports to include daily updates of GD units and forecasts, as we learned that our wine vintners, vegetable and other berry growers all found the information of value. We are providing this output daily to over 220 national produce and wine companies in all west coast states and Arizona.

To the best of my knowledge, there is no other source for this information available through the internet. We are very grateful to IPPC for their work and would be happy to make some donation to ensure the program's perpetuity.

Sincerely,

Roland Clark
President, Weather Mission Inc.
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roland@weathermission.com

USDA
United States Department of Agriculture

Animal and Plant Health Inspection Service

Plant Protection and Quarantine

Plant Health Programs

Pest Detection & Emergency Programs

4700 River Road
Riverdale, MD
20737

December 17, 2018

Integrated Plant Protection Center
College of Agricultural Sciences
Oregon State University
Corvallis, OR 97331

To the IPPC Review Team:

I am writing in support of the Integrated Plant Protection Center at Oregon State University. The U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS), Plant Protection and Quarantine (PPQ), Cooperative Agricultural Pest Survey (CAPS) detects and monitors plant pests and diseases to help prevent them from establishing and harming our agricultural and natural resources throughout the United States. APHIS has funded a cooperative agreement with Dr. Coop of the IPPC for the last several years to develop new pest mapping technologies for improved risk analysis. The challenge was to push the envelope on pest risk analyses in both space and time, and he has succeeded all expectations.

The work brings immense value to our pest surveillance programs and early pest detection mission. A new decision support system has been created, named the Degree-Day, Establishment Risk, and Pest Event Mapping System (DDRP). Pest-specific products developed on this platform will enable the CAPS program to target the early detection of high priority agricultural and environmental plant pests through space and time using lines of thought and technologies that have not been used in this arena before. The phenology models will help us to time the correct deployment of traps and surveillance activities, including personal management. The climate suitability maps are a huge improvement over the classic degree day generation maps, and help us to refine surveillance in more detail to areas where the pest is most likely able to establish. The weather-based forecasting products behind these models will allow us to estimate resources and the time that those resources will be needed months in advance, which will have a positive impact on developing realistic budgets. The automation of daily model updates will then allow us to re-check estimates closer to field season when resources are deployed. These accomplishments add real value to the CAPS program over previous phenology models that were poor approximations, or did not even exist. Ongoing collaboration is anticipated as additional pests are parameterized for model input and pest-specific mapping products developed.

The CAPS program highly values and is engaged with the IPPC, as are other programs in APHIS-PPQ. The quality of the library of products produced greatly benefit and influence pest surveillance in the United States. The IPPC has been, and will continue to be a valuable resource for early pest detection and surveillance activities as no other group can marshal the combined expertise present in the Center. Providing the necessary resources to maintain and expand the Center's excellence is important not only to APHIS and the CAPS program, but to all of U.S. agriculture.

Dr. John Bowers
National Policy Manager for Pest Detection
USDA, APHIS, PPQ
Office: (301) 851-2087; email John.Bowers@aphis.usda.gov

3122 Stahlbush Island Rd., Corvallis, OR 97333-2709, (541) 757-1497, FAX (541) 754-1847

December 17, 2018

Dan Edge, Associate Dean
College of Agricultural Sciences
Strand Agriculture Hall 430E
Oregon State University
Corvallis, OR 97331

RE: Integrated Plant Protection Center at Oregon State University

Dear Dean Edge,

Stahlbush Island Farms, Inc. respectfully submits comments in support of the Integrated Plant Protection Center at Oregon State University. We thank the Administrators at the College of Agricultural Sciences for the opportunity to provide our comments.

Stahlbush Island Farms is a family-owned farm and food processing company based on Stahlbush Island in Corvallis, Oregon. Our farms are third-party certified for meeting the highest standards of sustainability, organic farming and food safety. Bill and Karla Chambers founded the company in 1985, with only 2 employees and 2 crops. In just over 30 years, they have grown the business to include nearly 5,000 acres of farmland and many local jobs.

Our farm was the first one certified sustainable by Food Alliance, a third-party organization certifying farms, ranches and processors for sustainable practices. IPPC has worked with Food Alliance to develop pesticide risk management tools and the Food Alliance Standard module for IPM. The strength of the Food Alliance and the integrity of their standard is important to our customers and therefore, critical to our business.

Integrated Pest Management (IPM) aligns with our value of sustainability. Our farm and local contract growers produce multiple fruits and vegetables, including sweet corn, pumpkins, spinach, cole crops, berries, etc. Our Field Department uses IPPC tools frequently. One example of this is the use of the degree-day modeling to estimate maturity and improve planting schedules, as well as make pest predictions. The mapping tools are also helpful when we are working in areas outside of Corvallis, such as Southern Oregon or the Columbia Basin.

IPPC's crop specific tools are important as we face changing pest challenges, including Spotted Wing Drosophila. The introduction of this pest in the Pacific Northwest has completely changed our berry production system. The tools provided by IPPC are critical to help us effectively control this pest while minimizing our use of pesticides.

Approximately 1800 acres of our farm are certified organic or transitional. This certification further limits our use of inputs, and increases the importance of IPM. In organic agriculture, broad spectrum solutions are generally unavailable to us. Therefore, we rely on IPPC tools to make the best use of the inputs available in organic production. The ongoing research of the group will be critical in the future as growers in the region continue to produce organic fruits and vegetables.

IF IPPC didn't exist, agriculture in this region would be negatively impacted. We don't know of another source for the kinds of IPM tools that we can find through IPPC. For example, if we weren't able to access the degree-day calculators (crop specific and otherwise), we would have to download weather data and conduct the analyses ourselves, adding time, cost and likely errors to our own programs. Each individual grower in the region would be doing the same thing, creating inefficiencies in the entire region.

The Integrated Plant Protection Center at Oregon State University is a critical contributor to agriculture in this region. Their work not only supports the production and economic success of growers, but also ensures protection of the environment and the future sustainability of agriculture in the area. We strongly support the continuation of the IPPC and their important work. Thank you for your consideration of our comments.

Best regards,

Tina Galloway
Director of Agriculture Quality & Compliance

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

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515 294-1741
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plantpath@iastate.edu

December 17, 2018

Dear Katie,

I'm writing in support of the Integrated Plant Protection Center (IPPC) at Oregon State University. I have been aware of IPPC for about 15 years, and consider it to be the most reliable and effective source of weather-based pest and disease management information in the entire U.S.

IPPC is founded on exceptionally firm ground. What sets it apart are its connection to OSU's world-famous PRISM group and its first-rate programmers who are also IPM specialists. I've been working in IPM for 32 years, and I'm not aware of any other site that combines the highest-quality weather estimates with the highest-quality IPM applications in near-real time. In the U.S. and abroad, the tandem of PRISM and IPPC is held up as the model that other providers of IPM decision support aspire to. From my perspective, they are the most prestigious and universally respected agricultural-science resources that Oregon State University possesses.

In my own research and outreach to fruit and vegetable growers in Iowa and nationally, I have looked to IPPC to help growers throughout the country make critical decisions about pest management on time scales from hours to months. A couple of years ago, I led a $7 million grant proposal to accomplish these goals. The centerpieces of the proposed research were collaborations of multiple states and IPM leaders with PRISM and IPPC, because these organizations at the forefront of connecting weather and climate conditions to risk assessment for production agriculture. In other research projects involving weather-based IPM decision support for growers, I have always measured my progress against the more advanced algorithms and organizational collaboration at OSU exemplified by IPPC and PRISM.

PRISM and IPPC are twin pillars that together deliver the best IPM advice in the U.S. to Pacific Northwest growers. These two organizations are tightly intertwined, and in my perception they are highly efficient as a result. I am often amazed that so much IPM-based research and outreach emanates from so few people! I think OSU is highly fortunate to have IPPC and its staff; I know that many other land-grant universities would be ecstatic to claim them.

Sincerely,

Mark L. Gleason

Professor

WASHINGTON STATE POTATO COMMISSION
108 INTERLAKE ROAD, MOSES LAKE, WA 98837
PH: 509 765-8845 FAX: 509 765-4853 WWW.POTATOES.COM

Katie Murray
Cordley Hall 2036A
2701 SW Campus Way
Corvallis, OR 97331

December 17, 2018

Re: Support for IPPC

Dear Ms. Murray,

On behalf of the Washington State Potato Commission (WSPC), it is important for me to express our support of you and the Oregon State University Integrated Plant Protection Center. We feel the IPPC has made an important impact in the adoption of Integrated Pest Management (IPM) in many crops, and now is impacting our crop, potatoes, in the Pacific Northwest. As you are aware, our support is more than words, it includes a commitment of $10,000 in support of the potato IPM Strategic Plan for which you are initiating work. Importantly, that work includes a Crop Pest Losses Impact Assessment that will provide quantitative data regarding pest impacts to yield and quality, pesticide usage, and the economics of management. This information is vital to the implementation of IPM in our industry.

We are convinced that work you and Paul Jepson initiated in forming our "Resilient Potato Production Initiative Workgroup" will pay important dividends including a revitalization of our IPM practices that will culminate in a reduction in pesticide use, and costs associated with pest control for our growers. The WSPC commitment of time from staff and commissioners, and our funds, are testament to our support. Without the IPPC leadership and expertise, I suspect the Pacific Northwest potato industry would continue an overreliance on pesticides.

Your work within the IPPC positively impacts all aspects of agricultural production and reaches consumers as well. The WSPC is an ardent supporter of IPM strategies, innovative pest control tactics, and research in that realm.

Sincerely,

Matthew J. Blua, PhD
Director of Industry Outreach
mblua@potatoes.com

UtahStateUniversity
COOPERATIVE EXTENSION

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UTAH PESTS

IPPC Review Team
Oregon State University
2040 Cordley Hall
Corvallis, OR 97331

Dear IPPC Review Team:

I co-run the Integrated Pest Management Program for Utah, housed in the Biology Department and within USU Extension. The work involves outreach and applied research in fruit and vegetable pest management, and I have been fortunate to interact with members of the IPPC, Oregon State University.

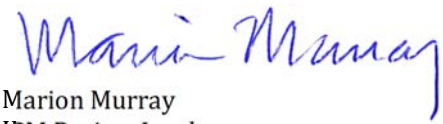
My primary involvement with IPPC has been through collaborative efforts: the committee, WERA-1017, on which members of the IPPC serve (Paul Jepson, Katie Murray), and lately, a project on pesticide risk reduction, led by Murray and Jepson. In addition, Len Coop was instrumental several years back in helping our IPM program in developing an online degree-day tool for Utah.

This letter of support speaks to my opinion on the collaborative efforts of the IPPC. The members stated above that I have had the opportunity to work with, have made great strides in furthering IPM training and adoption. Learning from them has helped our own organization to obtain tools and knowledge that we have passed on to our own clientele.

Just from my limited interaction, I know that the IPPC team has done vast amounts of projects targeting not only Oregon citizens, but the western U.S., and beyond. USPEST.org is a well-respected decision aid tool, used by researchers and growers nation-wide. Other crucial topics that the IPPC addresses include pesticide risk management, which includes the collaboration mentioned above, and conducting crop surveys to document pest losses.

Our own IPM program in Utah has benefitted from the work of the IPPC, and if this Center were to be lost, the effects would be felt not only region-wide, but world-wide.

Sincerely,



Marion Murray
IPM Project Leader
Utah State University
marion.murray@usu.edu
435-797-0776

December 18, 2018

Dear Dr. Edge,

Thank you for the opportunity to provide my strong statements of support for the staff and work of the Integrated Plant Protection Center (IPPC) at Oregon State University.

As the team-leader of the National Institute of Food and Agriculture's (NIFA), Crop Protection and Pest Management Program, I can attest to the full support, high technical expertise, and strong leadership that the staff of the IPPC brings to the nation's high priority areas in integrated pest management. The IPPC staff have each been successful in receiving NIFA grants from the three distinct program areas of the CPPM. The accomplishments from these NIFA awards are indicative of the quality of the IPPC.

Both Katie Murray and Len Coop have received funding from the highly competitive Applied Research and Development Program Area of the CPPM Program. It seeks to develop and enhance adoption of innovative, ecologically-based, sustainable IPM technologies, tactics, strategies and systems that address regional and/or national IPM priorities. Len Coop's project advanced development of new weather forecasting decision support tools that can extend the forecast horizon used by agricultural producers. Katie Murray's project is significantly enhancing the model for national and regional Pest Management Strategic Plans, by incorporating important aspects from Crop Pest Losses Impact Assessment Surveys.

Both Paul Jepson and Katie Murray have provided key leadership for integrated pest management within the state of Oregon through the CPPM funding for the Extension Implementation Program Area. The priority areas for this funding are "IPM Implementation in Specialty Crops" and "IPM Training and Implementation in Schools" – both high priority areas for Oregon specialty crop producers and residents. Their efforts are ensuring that integrated pest management knowledge is adopted in Oregon. Paul Jepson also provides state integrated pest management leadership by serving as the designated integrated pest management coordinator for Oregon as part of a national network of integrated pest management coordinators.

Paul Jepson has contributed exceptional leadership in integrated pest management across the entire U.S. Department of Agriculture's western region by his direct support to the third program area of the CPPM Program, the Regional Coordination Program Area. For two, four-year funding cycles through this program, Paul Jepson has been an integral leader in the Western Integrated Pest Management Center as a Co-Project Director. The current Western Integrated Pest Management Center award is "A Western IPM Center Led by California, Arizona, and Oregon (FY 18)." Paul Jepson's contributions ensures development and adoption of regional IPM solutions and strategical promotion of national outcomes for priority pest management issues.

I continue to look forward to working with the staff of the IPPC as a proven Center of integrated pest management excellence.

Sincerely,

Herb Bolton

Herb Bolton
NIFA National Program Leader for Entomology

Agricultural Experiment Station
Cooperative Extension

THE UNIVERSITY OF
ARIZONA®
MARICOPA
AGRICULTURAL CENTER

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(520) 568-2273

December 18, 2018

IPPC Review Team

via email

cc: Associate Dean Dan Edge (daniel.edge@oregonstate.edu)
Katie Murray (murramar@science.oregonstate.edu)

Subject: Importance and Value of the IPPC

Dear IPPC Review Team,

If this is like any other internal review, I suspect your team has amassed a stack of papers that document the many ways that the IPPC serves the stakeholders of your University and the State of Oregon. They've likely shown and documented how their programs support research and organized outreach statewide. My goal is not to provide that perspective, but to articulate how incredibly important the IPPC is to the science and practice of IPM beyond your own institution and beyond the borders of Oregon.

For me and my individual orientation to my profession, my initial interactions with the IPPC under Paul Jepson's leadership led to an ephiphany that has helped change the course of my own scientific and practical contributions to IPM in a very positive way. Through subsequent interactions with Katie Murray, Len Coop and others at the Center, it helped me forge a rennaisance of interest in the application of pest and pest management science to benefit the daily lives of people in Arizona and throughout the Western U.S..

As Director of the Arizona Pest Management Center, an organization akin to the IPPC, I have found useful models in the IPPC and many examples of how to conduct myself and coordinate the IPM teams of Arizona. Interacting with the IPPC and their personnel has enriched our IPM organization here in Arizona with many of our staff directly interacting with IPPC staff to break new ground in knowledge generation, stakeholder engagement and IPM assessment. Even more importantly, our interactions with IPPC have resulted in new research and application directions that simply were not possible without its intellectual assets and capacity.

Our group has directly engaged the IPPC on large pesticide use and risk assessment questions. We openly and thoroughly embraced the landmark tool developed there, the Pesticide Risk Mitigation Engine (PRiME, and later ipmPRiME). It became a central tool for us in planning stakeholder interactions and education. We accomplished a sector wide, eco-toxicological assessment of pesticide use in lettuce in Arizona, a place that supplies 90% or more of the winter supplies of fresh lettuce in the U.S.. Our group has worked with Jepson and Murray in particular in the development of research and Extension that helps strategically assess IPM directly on the ground with practitioners throughout the Pacific Northwest. This effort alone is

unlike anything else in the U.S. or world, and is now funded through a USDA-NIFA Applied Research & Development Program grant to Murray et al.

Further, in my role as a co-Director of the Western IPM Center, a regional coordination hub for federal investment in State and regional priorities for IPM research and Extension, I have had ample interactions with Jepson and Murray where they have been thought-leaders in pesticide risk assessment and mitigation. Their ideas led to their creation of a Western SARE funded project that is both innovative and immensely helpful to the professional development of many here at the APMC that participate in these monthly exchanges, let alone the broader community of IPM scientists throughout the West that are involved.

Also in my capacity at the Western IPM Center, I direct one of its signature programs in crop pest losses and impact assessment. IPM scientists are charged with changing behaviors in a manner that broadly and cumulatively results in changed conditions (e.g., improved economy, environment, human health, and society). Unfortunately few industries are introspective enough to know where they are, let alone where they need to be in 10 years, because they do not have routine measurement systems for understanding their present condition with respect to crop pest losses and IPM. I tried for years to attract interest in installing this important program in many of the West's agricultural systems. Only once Jepson and Murray of the IPPC got involved has the program taken off. We have now worked directly with IPPC staff to implement this assessment program in onions of the Treasure Valley of OR/ID, in potatoes of the PNW, in cranberries in OR/WA, in cherries in OR/WA, in hazelnuts in OR, and with plans to address mint production there this coming month. In the course of implementing these programs, I have had the opporutnity to witness the interactions that IPPC staff have with these diverse stakeholders. The rapport that IPPC has with these key industries of the region is outstanding, and the groundwork they lay today will pay dividends for years to come for these IPM stakeholders. The relationships formed will be key to leveraging future successes in IPM science and application by the IPPC and speaks well of Oregon State University.

Given IPPC's influential role in developing and guiding IPM innovation throughout the West, I would hope a review of this type would result in administrative recognition and new investment in this highly effective organization. It's hard to believe what they have accomplished with the few people and resources they have. The IPPC strikes the perfect balance of function and influence. They address IPM needs for thousands of Oregon's stakeholders, while leading broader advances and efforts regionally and nationally. I would count the IPPC among the top 3 most important IPM institutions in the Land Grant system today. Please contact me should you have any questions.

Best Regards,

Peter C. Ellsworth, Ph.D.
Full Specialist / Professor, IPM Coordinator & Director,
Arizona Pest Management Center
University of Arizona, Department of Entomology

December 18, 2018

To IPPC Review Team:

I am writing to express my enthusiastic support for the Integrated Plant Protection Center (IPPC) at Oregon State University. This important center provides leadership and expertise that is of critical significance to the Western Region of the United States.

As an entomologist and Integrated Pest Management (IPM) scientist at the University of Arizona, and Associate Director of the Arizona Pest Management Center, I have had pretty much continuous interactions with scientists and personnel at the IPPC for at least the past 10 years. I have collaborated with Dr. Paul Jepson and colleagues over a series of grants analyzing risks associated with decades of pesticide use in Arizona lettuce. Dr. Jepson's toxicological expertise is an enormous asset to Western IPM programs, including those in Arizona. Myself and others have gained considerable knowledge to support effective communication in our Extension programs, about pesticide risk and its mitigation, through participation in a Western Region work group which is led by Ms. Katie Murray and Dr. Jepson.

I have also interacted with Katie for many years in our common roles as IPM Network coordinators for the Western IPM Center (her for the Pacific Northwest, and myself for the arid Southwest states). Through these interactions we engage with and develop critical input from growers and other agricultural stakeholders to support pesticide regulatory decisions that impact thousands of growers and billions of dollars of agriculture. I could not possibly overstate how much I have learned from Ms. Murray about how to effectively engage stakeholders and to develop public comments that, more often then not, are cited by EPA as having an impact on federal regulatory decisions.

More recently, I have had the opportunity to serve as co-PI on a Murray-led grant project (USDA-NIFA Applied Research and Development Program), which is helping agricultural industries in the Pacific Northwest to document their research, education and regulatory needs, and identify opportunities for reduced risk pest management. Leveraged by our own Western IPM Center Signature Program, which documents crop pest losses and assesses economic impacts of IPM practices, Ms. Murray has led a very significant project to develop Crop Pest Losses data through detailed surveys and face to face interactions with several key industries in the Pacific NW, including onions, potatoes, cranberries, cherries and hazelnut. Her leadership in this role demonstrates the enormous respect she has earned in more than a decade of ongoing interactions with key industries in the region, and her ability to work with and mobilize the resources of Oregon Cooperative Extension for the mutual benefit of state industries and OSU.

Based on my experiences through all these interactions, the IPPC and its outstanding personnel have provided creative energy, scientific expertise and professionalism that is highly esteemed and influential throughout the West among Extension IPM Scientists. As noted above, I have benefited personally, and our IPM programs in Arizona are stronger and more informed as a result.

The work of the Integrated Plant Protection Center is novel and irreplaceable in the West and nationally. IPPC Scientists have been, and remain, on the cutting edge of IPM science and its application in the development of workable solutions for growers. Their programs, including the weather network, crop pest losses, integrated pest management strategic planning, and pesticide risk mitigation education, among others, are informed by the highest caliber science and driven by identified stakeholder needs. Their successful track record of competitive grants and scientific publications, on top of their major Extension and outreach work, must be a point of pride for the college**. I encourage ongoing and increased investments in the IPPC, which is among the most respected IPM programs nationally.** The work of the IPPC helps support many smaller IPM programs throughout the West, and helps them deliver science-based information to support reduction of pesticide risks to people and the environment, a key expected outcome of federally-funded IPM programs. The work of the IPPC has impacts and influence on growers, pest managers, scientists, Extension professionals throughout the West.

I encourage you to contact me with any questions you may have. I appreciate this opportunity to express my enthusiastic support for the Integrated Plant Protection Center.

Sincerely,

Dr. Alfred Fournier
IPM Program Manager & Associate Director,
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fournier@cals.arizona.edu

University of California
Agriculture and Natural Resources
Statewide Integrated Pest Management Program

18 December 2018

RE: Support for the Integrated Plant Protection Center

Dear IPPC Review Team:

Please accept this letter as my support for the Integrated Plant Protection Center (IPPC). Like the IPPC, the University of California Statewide Integrated Pest Management Program (UC IPM) offers integrated pest management (IPM) solutions to pest problems. Everyone confronts pests at some level. Whether cleaning up an ant infestation in your home or as a farmer protecting your orchard, the next step after encountering a pest is to look for trusted, practical information to make smart management decisions. The IPPC and UC IPM have a shared mission to provide this information and improve adoption of IPM practices in agriculture, urban areas, and natural areas. The IPPC ensures wherever there is a pest problem, sustainable IPM practices are implemented with reduced risk to human health and the environment.

I want to acknowledge the valuable interactions that I have benefited from by working with the IPPC. I greatly appreciate the expertise and sharing of knowledge by Dr. Leonard Coop. As I work through updating access to our California pest weather models, discussions with Dr. Coop about the pest models, weather station management, and information technology (IT) components of user access have helped us make decisions about how to best serve our clientele. At the Western Region IPM Coordinating Committee meetings, WERA 1017, which includes interactions with IPPC as the home of the State IPM Coordinator, the sharing of project results has increased my knowledge about western agriculture. My participation in the Western Region Pesticide Risk Mitigation Alliance headed by Dr. Paul Jepson and Ms. Katie Murray provides professional development in risk communication. I appreciate their project leadership. Ms. Murray kindly invited me to attend an Integrated Pest Management Strategic Plan workshop where stakeholders and Cooperative Extension personnel discuss and capture the most current information about a crop and IPM. From attending this meeting, I better understood how to develop a Pest Management Strategic Plan and submitted a proposal to the Western IPM Center to draft one for California rice. During our process to update the UC IPM Pest Management Guidelines, we plan to follow Ms. Murray's lead and ask specifically about IPM practices and have a conversation with our Cooperative Extension experts about strengthening IPM in agriculture.

I am pleased to provide this letter in support of the IPPC and look forward to continued collaborations with the Center.

Cordially,

Tunyalee A. Martin, Ph.D.
Associate Director for Communications
University of California Statewide Integrated Pest Management Program

UNIVERSITY OF CALIFORNIA, DAVIS

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ONE SHIELDS AVENUE
DAVIS, CALIFORNIA 95616-8680

University of California, Davis, 12/18/2018

Dear IPPC Review Team,

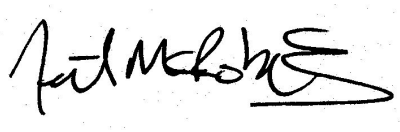
The National Plant Diagnostic Network (NPDN) has worked closely with the Integrated Plant Protection Center to create a unique national resource http://uspest.org/wea/ . This web-based platform is available for weather-based plant health decision support use by scientists for research, implementation and outreach; for growers, land managers, and diagnostic clinicians for decision support and disease risk assessment and by other environmental monitoring interests including controlled burn and wildland fire management.

Through the NPDN Epidemiology Committee, which was chaired by the WPDN Associate Director from 2003, were able to leverage the expansive prior funding obtained by IPPC to expand their 5-state IPM Pacific Northwest weather decision support utility to include ***all*** US territories and states. We at NPDN have used this national resource to conduct regional and national program monitoring weather-based risk assessment for powdery mildew, wheat virus diseases, soybean rust, potato late blight, and Asian citrus psyllid, Asian long-horn beetle, western cherry fruit fly and spotted wing drosophila as well as many others.

The IPPC has also served as an intellectual hub ($4.5 M in funding) for other scientists in advancing the sophistication of weather and weather-based decision support interpolation for plant health by leading the Western IPM Weather Work Group which generated many long-term collaborations that continue today to make significant advancements to the science. Additionally, the IPPC scientists and education specialists have pioneered and implemented novel methods of implementing and documenting adoption of IPM research for reduction of environmental impacts on from crop management practices (PRIME Program. The education specialist contributed significant content and edits to the Western IPM Impact Assessment Toolkit, another resource for IPM specialists throughout Oregon and as well as the rest of the county.

It is our emphatic recommendation that the IPPC continue to serve in all of its current capacities, expanding its funding level and increasing its computing, research and operational capacity. There is no other IPM center of expertise that equals this important resource for Oregon nor the nation. If IPPC were not to continue with its current functions it would take decades to rebuild its replacement. As NPDN continues to serve its role in maintaining national biosecurity, we will be counting on the tools and intellectual resources of IPPC to support our work.

Yours sincerely,



Dr Neil McRoberts, Western Plant Diagnostic Network, Director
Associate Professor, Plant Pathology Department UC Davis

On behalf of,
Prof Rick Bostock (WPDN Director, until 1/1/2017)
Carla Thomas (WPDN Associate Director, until 3/31/2018)
Dr Tania Brenes Arguedas (WPDN Associate Director)

Oregon

Kate Brown, Governor

Department of Environmental Quality
Agency Headquarters
700 NE Multnomah Street, Suite 600
Portland, OR 97232
(503) 229-5696
FAX (503) 229-6124
TTY 711

December 19, 2018

OSU IPPC Review Team
2034 Cordley Hall
Oregon State University
Corvallis, OR 97331

RE: Letter of Support for OSU Integrated Plant Protection Center

The Oregon Department of Environmental Quality (DEQ) has worked closely with OSU's Integrated Plant Protection Center (IPPC) since 2006 on advancing IPM and pesticide risk reduction initiatives at a watershed level to achieve common goals for our two organizations. DEQ strongly supports continued maintenance and enhancement of IPPC's valuable services. In carrying out its core mission IPPC demonstrates the inherent compatibility between environmental quality and a sustainable agricultural economy.

One of my roles at DEQ is to co-manage the Pesticide Stewardship Partnership (PSP) Program with the Oregon Department of Agriculture. This program uses water quality monitoring data to drive voluntary actions to reduce the concentration and occurrence of pesticide in Oregon waters. IPPC has consistently used our pesticide water quality data in its trainings and outreach to growers on IPM and pesticide risk reduction approaches and tools. Implementing the practices advocated by IPPC directly benefits Oregon water quality. IPPC's training workshops and focused grower and applicator technical assistance activities have been consistently held in watersheds where DEQ has observed elevated concentrations of priority pesticides. This in-kind assistance to the Pesticide Stewardship Partnership Program has been critical to the success of the program's efforts to reduce the occurrence of pesticides in water. IPPC, along with Extension, was an integral partner in helping to achieve several water quality successes in PSP watersheds, most notably in the fruit growing areas north central and northeast Oregon.

The type of expertise housed within IPPC is unique within Oregon, and the type of assistance it delivers to growers and applicators in the state cannot be delivered by other entities. Since 2013, ODA and DEQ have received stable funding from the Oregon Legislature to support the PSP program. As a result, we've been able to provide some small amount of grant funding to IPPC to augment its long-standing in-kind contributions to help improve water quality while also enhancing the management of pests, weeds and diseases in our project watersheds. The PSP program is now working with local partners to develop longer-term strategic plans to address pesticide water quality concerns through voluntary and collaborative actions. Incorporating a role for IPPC in helping to achieve the goals of those strategic plans would benefit the PSP program greatly. Ideally, IPPC could provide multi-watershed tools and assistance that address priority pesticides used by growers and other applicators.

Without IPPC's expertise, tools, technical assistance resources, collaborative efforts like the Pesticide Stewardship Partnership Program would be left with a major hole in the services it provides in Oregon, and it would be much more challenging to achieve our goals.

Oregon DEQ looks forward to further collaborating with IPPC on future endeavors to protect Oregon's water quality while ensuring crop quality for state's many important agricultural commodities.

Sincerely,

Kevin Masterson, Agency Toxics Coordinator
Oregon Department of Environmental Quality

cc: Dan Edge, Associate Dean