



2016

Western Integrated Pest Management Center

Western
IPM
Center

2016

ANNUAL REPORT

Western
IPM
Center

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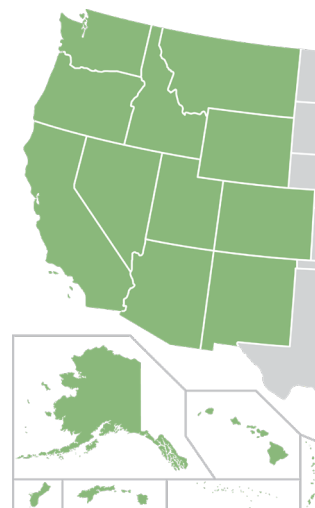
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Western Integrated Pest Management Center

The Western IPM Center serves the people, environment and economy of the West by supporting the development and adoption of integrated pest management to reduce the risks of pests and of pest-management practices.

Our vision is a healthier West with fewer pests.

We serve 17 Western states and Pacific Island territories and Western tribal nations.



Advice and Input

The Western IPM Center actively seeks stakeholder input and feedback. We are advised by four co-directors and a broad-based advisory committee.

Co-Directors:

Dr. Jim Farrar, University of California Statewide IPM Program; **Dr. Kassim Al-Khatib**, University of California, Davis; **Dr. Peter Ellsworth**, University of Arizona; **Dr. Paul Jepson**, Oregon State University

Advisory Committee:

Dr. Andy Jensen, Northwest Potato Research Commission; **Dr. H. Michael Harrington**, Western Association of Agricultural Experiment Station Directors; **Scott Ockey**, Certis USA; **Rebecca (Becky) Sisco**, Western Region IR-4; **Dr. Rhonda Miller**, Western Sustainable Agriculture Research and Education Program; **Dr. Richard Bostock**, Western Plant Diagnostic Network; **Ben Bowell**, Oregon Tilth; **Steve Ela**, Ela Family Farms; **Amy Gannon**, Montana Department of Natural Resources and Conservation; **Peg Perrault**, EPA Region 8; **Dr. Anil Shrestha**, California State University, Fresno; **Dr. Diane Alston**, Utah State University; **Africa Dorame-Avalos**, Inter-Tribal Council of Arizona; **Dr. Herb Bolton**, USDA National Institute of Food and Agriculture (ex-officio); **Dr. David Epstein**, USDA Office of Pest Management Policy (ex-officio)

We serve the people, environment and
economy of the American West.

The Western IPM Center:

Promotes Positive Change

4 In 2016, we welcomed a new director and developed a theory of change to measure our internal effectiveness and our impact in the West.

Represents the Region Nationally

6 We advocate for Western priorities and communicate regional perspectives and needs to the USDA, EPA and other federal agencies.

Provides Regional Leadership and Coordination

8 We link state IPM programs and researchers through communication and meetings, and help share materials, ideas and resources.

Advocates for IPM

10 We promote and advocate for IPM generally, not just programs we've funded. IPM works, and we spread that message.

Communicates Successes and Amplifies Messages

12 We share the work and successes of state IPM programs, researchers and local pest managers and promote their efforts nationally.

Creates and Evaluates IPM Solutions

14 Through our annual grants and signature programs, we help create new IPM knowledge and get those tactics out to growers and pest managers.

Helps Battle Invasive Species

16 The biggest challenges to successful IPM programs are new invasive insects, diseases and weeds. We help combat these invaders.

Supports Western Specialty Crops

18 Western agriculture is dominated by small-acreage specialty crops. We support pest-management research and IPM solutions for them.

Funds New IPM Research, Extension and Evaluation

20 In 2017, we are funding 10 projects selected from 36 proposals. Seven focus on agricultural, two on community IPM and one on natural areas.

Serves the Whole West

22 In the past 12 years, the Western IPM Center has provided more than \$3.5 million to realize our vision of a healthier West with fewer pests.

From the Director

Last summer, at a forest restoration meeting, I was chatting with a forester next to me. We talked about bark beetles, drought and white pine blister rust, and then he asked why I was there. Why was someone who works in integrated pest management at a forest meeting?



I pointed out that most everything on the agenda was integrated pest management in some form or fashion. He paused. “I guess you’re right,” he said. “We do IPM all the time, don’t we?”

I’d like to say that exchange was rare, but it wasn’t. As the new director of the Western IPM Center, I thought I’d be having different conversations about IPM, not pointing out that people are actually using the science without recognizing it.

But it’s easy to see why that happens. So many of us were taught IPM as a formula or prescription. And when IPM is seen as a specific set of practices instead of an intellectual approach to pest management, of course people don’t realize they’re doing it.

We’re working to change that – to be catalysts and champions for IPM – and in this report you’ll see some of the ways how.

This year, our team developed an internal framework to guide and motivate us. It’s shown to the right. We also worked at the national level to highlight Western pest-management needs, and with regional partners to advance and expand IPM successes. The projects we supported created solutions and leveraged more funding for Western states. We traveled the West and saw excellent examples of areawide integrated pest management strategies that battled borderless pests in unexpected ways.

Going forward, the Western IPM Center will continue to support those who research, teach and apply integrated pest management. We’ll support regional, systems-level and transdisciplinary approaches and champion Western priorities, reinforcing nationally the understanding the West is a unique and challenging place to battle pests. It’s important work, and I’m excited to be a part of it.

Thank you for your support of the Western IPM Center and helping us serve the people, environment and economy of the American West.

Amanda Crump

Theory of Change

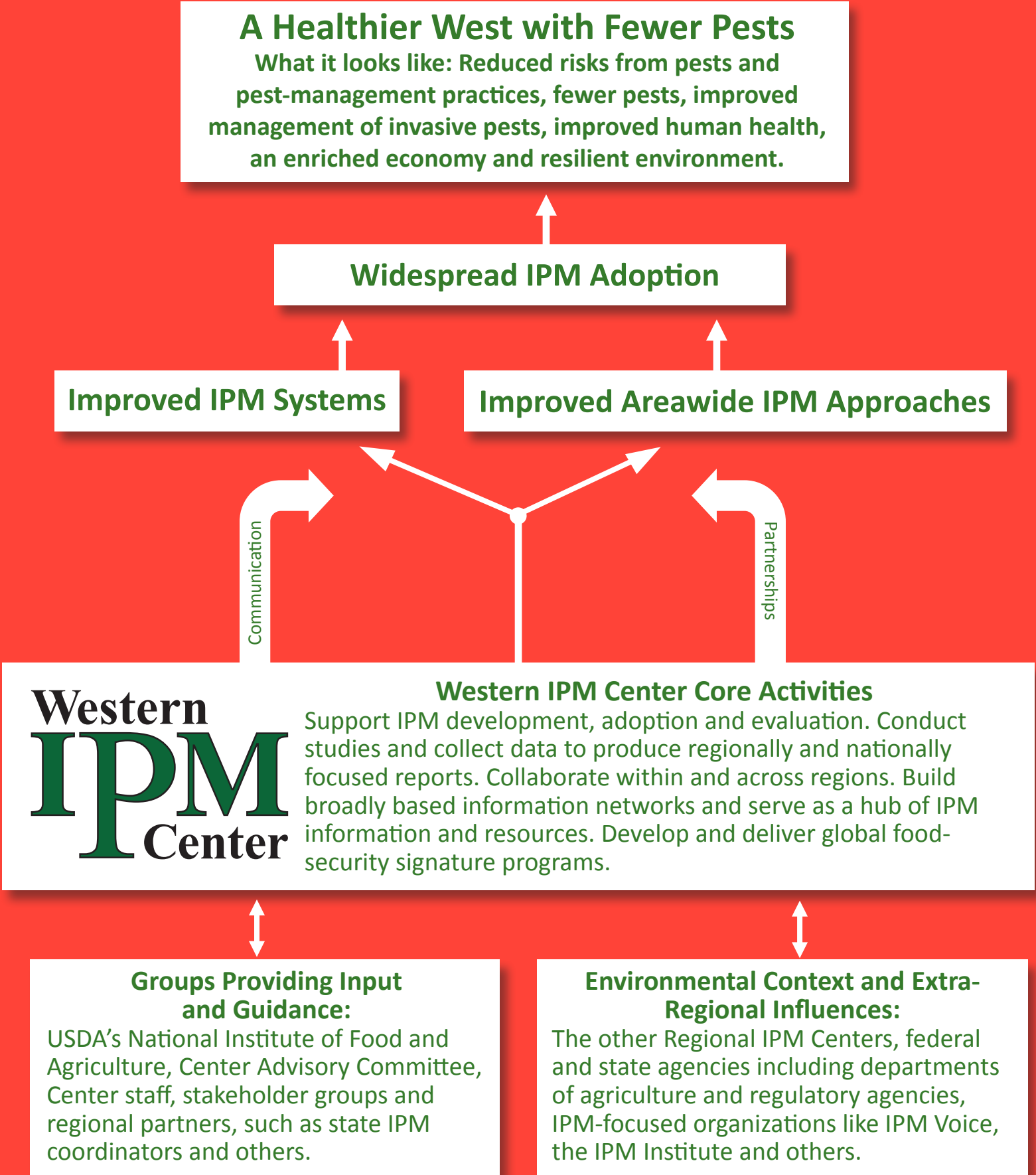
For years, our program has been guided by a logic model, a roadmap outlining how our activities create impact. This year, we added a theory of change to our evaluation framework to enrich how we evaluate our progress.

A theory of change complements a logic model. A logic model starts with the resources and ideas we have and spells out how they impact our programs, while a theory of change tests the impact of our program. Unlike a logic model, which only changes when we submit a new proposal, a theory of change is dynamic and can change as we encounter new challenges. With a theory of change, you start with the end goal and plan a program to achieve that goal. Because of that, theories of change often feel upside down.

We began with our goal of a healthier West with fewer pests and safer pest-management practices. Our program contributes to this goal by encouraging widespread IPM adoption, which is achieved through improved IPM systems and integrated pest management approaches that don’t stop at city, county, state or tribal borders.

A critical part of our work is championing pest-management approaches that work, and we’re not alone in this effort. The partnerships we have and work we support also build the foundation for IPM adoption.

We expect this initial theory of change to be adjusted as we use it. We’ll use it to motivate us and to measure our progress. We’ll use it to hold ourselves accountable. We’ll use it to create the next logic model and proposal for our program. And most importantly, we’ll use it to help create a healthier West with fewer pests.



We represent 17 states and territories in temperate, tropical, desert and arctic climates. Agriculture in that vast area has unique pest-management challenges. We make sure Western concerns get heard nationally.



PROMOTING WESTERN PRIORITIES

One of the important roles the Western IPM Center plays is bringing Western concerns and perspectives to national conversations so individual states, territories and tribes don't have to go it alone.

We begin by engaging with a diverse group of IPM stakeholders from around the region to understand their concerns and priorities. By bringing a variety of voices to our Advisory Committee, we ensure we're seeing IPM from all angles and able to represent a variety of viewpoints.

We also meet regularly with the state and territory IPM coordinators to get updates and stay engaged with their programs, challenges, accomplishments and concerns. In 2016, we invited recipients of USDA IPM research grants to attend that meeting, helping connect researchers with the extension-focused state programs.

We're then able to bring all of that input to conversations at the federal level. At three-times-a-year meetings of the Regional IPM Centers, which are attended by USDA National Institute of Food and Agriculture leaders, we make sure Western priorities are represented and Western needs are addressed.

We're also active in the National IPM Coordinating Committee, which is part of the advocacy structure of the Association of Public and Land-grant Universities. Center Director Amanda Crump served on the group's executive committee this year, and is active in an effort to increase IPM funding in the 2018 Farm Bill.

Center Director Amanda Crump was an enthusiastic member of the executive committee of the National IPM Coordinating Committee and did a great job representing both the West and the IPM Centers on the committee. She brought a fresh perspective to the group and we appreciated her new ideas.

Doug Walsh
Chair, National IPM Coordinating Committee
Washington State University

The pulse industry was extremely thankful to get a Western IPM Center grant to write a new Pest Management Strategic Plan. Center Director Amanda Crump attended the PMSP planning meeting and did a great job explaining how important PMSPs are and outlining all the different ways they are used. It's really valuable to have this kind of support, which helps the industry and growers. We plan to use the PMSP as a basis for our pest management research for the next five years.

Todd Scholz
Vice President of Research and Member Services
USA Dry Pea & Lentil Council

ENGAGING FEDERAL REGULATORS

Another important role we play for Western stakeholders – especially the agricultural sector – is engaging with federal regulators about important pest-management issues. We do this in several ways.

One is by collecting and coordinating comments from growers, commodity organizations, county agents and others when a federal agency like the Environmental Protection Agency proposes new regulations or restrictions on pest-management practices or products. By providing EPA with actual pesticide-use data and on-the-ground information from growers and pest managers, we help protect vital tools and help the EPA make better-informed decisions.

Another way we engage regulators is by funding, facilitating and publishing up-to-date Pest Management Strategic Plans for a variety of Western crops. Current PMSPs are very valuable to the EPA when it considers new regulations, and the West is far and away the most active region in updating and publishing new PMSPs.

Finally, we meet with federal regulators. An EPA representative is on our Advisory Committee, and in the fall we met with representatives from EPA and USDA's Office of Pest Management Policy to discuss PMSPs and our ongoing efforts to improve them to better serve Western agriculture.

The Western IPM Center...

States, territories and tribes have their own IPM programs, but pests cross borders. The Western IPM Center helps coordinate efforts and resources regionally to maximize the effectiveness of state-based programs.

The Western IPM Center is my conduit to national IPM programs and issues. It is very valuable to me as a local IPM advisor. Otherwise, I'd be at a loss to know what's going on throughout the West, much less nationally.

Pete Goodell
Cooperative Extension Advisor, IPM
University of California

Provides Leadership in the Region

BUILDING PARTNERSHIPS

If Arizona's aphids, California's cutworms and Wyoming's weeds were exclusive to those states, pest management might be properly seen as a state problem. But that's not the way it is.

Pests don't recognize boundaries. Our pest problems are shared throughout the West and constantly changing as temperatures rise, invasives appear and native pests reemerge. Solving our common pest problems – or just keeping up with them – is best done when we all share information, resources and strategies.

The Western IPM Center exists to help that happen.

We approach everything from a regional perspective. Our grants require multi-state collaboration unless a pest does just occur in a crop contained to one state. Our signature programs reach out across this region and into other regions.

We serve as an information and communication hub linking all the states, territories and tribes in the West. Researchers or extension specialists in one state may or may not know their counterparts in other states doing similar work, so we try to connect individuals to the broader network of IPM professionals.

In 2016, we created a resource-sharing tool to make it easy for state programs to share their publications, graphics and other material so that other states don't have to recreate the wheel. We also began building a map-based contact database to more clearly visualize the geographic and topic areas where our regional network is strong and identify places where we need to improve.

As the hub of a communication network, we collect and condense the latest IPM and pest-management information, including regulatory proposals and issues, into a monthly newsletter that connects more than 1,600 subscribers.

Our easy-to-navigate website highlights both Center and regional IPM programs and successes, and links people to IPM experts and resources throughout the region and nationally. Visit it at westernipm.org.

The Western IPM Center is a valuable resource to Wyoming. We have many pest problems in common with other Western states, but don't have the resources to develop our own IPM strategies for them all. Two recent examples of how the Center helps Wyoming: Our farmers are starting to produce hops and the Western IPM Center funded the publication of the "Field Guide for Integrated Pest Management in Hops" that I can provide to growers. Also, within the last year, the invasive, non-native grasses medusahead and ventenata have been discovered in northern Wyoming. The eradication of medusahead may still be possible. The Center-funded publication "Medusahead Management Guide for the Western States" will be a valuable resource for Wyoming weed and pest districts tasked with managing this weed.

Scott Schell
Assistant Extension Entomologist
University of Wyoming

SIGNATURE PROGRAMS

Our three signature programs were active in 2016 and expanded in interesting and important ways.

The Crop-Pest Loss and Impact Assessment Signature Program took its growers' surveys beyond Arizona cotton and melons and into California leafy greens and Oregon onions. This project has generated some of the most compelling data that exists on the pesticide risk-reduction benefits realized as a result of IPM, and we're excited to see the data from these new crops.

The Weather-Based Decision Support Tools Signature Program, which helped create the USPest.org weather and pest-model website, worked in 2016 to harmonize its work nationally. The Invasive Species Signature Program helped bring attention to a South American palm weevil outbreak in California and Arizona.

Integrated pest management isn't one thing. It's an approach to managing pests that works in agriculture and communities, natural lands and schools. We advocate for IPM in all arenas.

“The Western IPM Center has been a terrific resource for me as the director of environmental planning for the Kashia Band of Pomo Indians. My first foray with the Western IPM Center was through the Western Region Tribal IPM Work Group. Since then, our relationship has grown, and I am happy to be able to recommend the Center as a place to find support and resources to other tribes. I look forward to future projects and endeavors with the Western IPM Center.”

Nina Hapner
Director of Environmental Planning
Kashia Band of Pomo Indians

RECOGNIZING IPM ALL AROUND

One way we advocate for IPM is by helping people understand all the ways integrated pest management is already making a healthier West with fewer pests.

IPM is so effective and adaptable, it's used in large numbers of vastly different systems. Forest managers, rangeland managers, school districts, housing authorities and growers ranging from small organic farmers to corporate agribusinesses all use IPM to manage pests and reduce pesticide risk. It's so ubiquitous, some people don't recognize what they're doing is IPM, and others don't acknowledge it as IPM. That's a problem. It's difficult to generate support for a science when people don't see the benefits it brings all around them.

At the Western IPM Center, one task we embraced with renewed vigor in 2016 is pointing out the IPM at the heart of all kinds of pest-management decisions. When an individual organic grower picks a vegetable variety that will ripen before weeds set seed, it's IPM. And it's IPM when a group of large growers coordinate their aerial pesticide sprays to manage problem pests on an areawide basis. It's IPM when a forester recommends spraying a bacteria to control Tussock moth, or when a building manager installs door sweeps to keep mice out. If you look at pests as part of a bigger picture and think through a control strategy accordingly, you are practicing IPM, and we're here to support you.

When we advocate for IPM, it's for all IPM.

CREATING A UNIFIED VISION

Because IPM works in so many different systems, the idea of what IPM is can get fragmented. There's school IPM and community IPM and in agriculture, IPM is held up as an alternative to conventional and organic pest management, when really it's a feature of both.

There's a growing recognition in the national IPM community of the need to rally around a shared vision of IPM, and the Western IPM Center is deeply involved in laying the groundwork.

Center co-director Paul Jepson is organizing a large group of Western experts to write an article on pesticide risk assessment and communication. Co-

directors Jim Farrar and Kassim Al-Khatib recently drafted a proposal to the Council on Agricultural Science and Technology to produce a new white paper on IPM. Director Amanda Crump is part of a National IPM Coordinating Committee effort to define a "New IPM," and she and communicator Steve Elliott are organizing a national work group to develop a unified theory of IPM.

Stay tuned. It's an interesting time for IPM.

FORMING ALLIANCES

Another way we advocate for IPM is linking with other agencies or efforts that promote similar goals.

We worked with the Western Regional IR-4 Program, which helps register pesticides for specialty crops, to make IPM more important in its priority-setting process. A product that fits well with existing IPM programs is better than one that disrupts them.

We also began working more closely with the Western Sustainable Agriculture Research and Education Program. Showing IPM as an important element in overall sustainability benefits both organizations. And we formed a new partnership with the Western Extension Risk Management Education Center, which shares our goal of reducing risk in Western agriculture.

In a break from past practice, we also sought new funding this year. We submitted a proposal to distribute national Pesticide Safety Education Program funding to all the states. We believe PSEP and IPM should be natural allies and work together to protect people and the environment from pesticide risks.

“I look to the Western IPM Center as a resource for connecting the IR-4 program with those who can help assess how an IR-4 project request fits into a specialty crop's IPM program.”

Becky Sisco
Western Region IR-4
Regional Field Coordinator

At the Western IPM Center, we use our voice to communicate the successes and amplify the messages of our Western states and partners.

In 2016, we redoubled our communication efforts, visiting eight states to tell IPM stories in several different ways.

“We were thrilled that the Western IPM Center traveled to Idaho to feature some of our diverse faculty projects here at the University of Idaho! The Center interviewed and featured faculty involved in our growing urban agriculture market in addition to our traditional work at the Research and Extension Centers. The Center efforts were helpful to highlight the role of the University of Idaho in the Western region’s diversity of pest management and crop production.

Ronda Hirnyck
Extension Professor, Pesticide Specialist
University of Idaho

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A CALL FOR MORE STORIES

2016 began a new era in Western IPM Center communications.

It began after the meeting of our Advisory Committee in March. Listening to the committee members share the challenges and needs they had in their particular IPM arenas, we heard a repeated theme – a desire for more stories, more focus and more attention to IPM in all its complex diversity.

We responded.

We made our communication coordinator position full time and Center communicator Steve Elliott hit the road, visiting Montana, Idaho, Oregon, Washington, Wyoming, California, Utah and New Mexico between May and October. In each of those places, he visited IPM researchers, projects and practitioners, gathering information to write stories, produce videos and publish photo essays highlighting the wonderful diversity of the West and myriad of ways IPM helps agriculture, natural areas and communities with their pest-management challenges.

VENTURING INTO VIDEO AND ONLINE PHOTO ESSAYS



Video was a fun new challenge for us in 2016. To introduce IPM to a new audience, we invested in an iPad and the necessary accessories,

learned video editing software and joined the digital video revolution.

We’ve shot and posted 11 short videos to our YouTube channel, all around two- to four-minutes long. The videos focus on a variety of IPM topics and challenges, from wheat streak mosaic virus in Montana to weed control on the Snake River to areawide lygus bug management in safflower fields in California.



Another storytelling device we began using in 2016 was photo essays combining images and descriptions gathered during our reporting trips around the West. The first three we produced highlighted New Mexico, Montana and Utah, and make a strong argument that a picture really is worth a thousand words....

EXPANDING THE NEWSLETTER

Our newsletter, The Western Front, continued to grow in 2016. The monthly electronic publication crossed both the 1,500- and 1,600-subscriber milestones in 2016, and added new sections featuring IPM videos, webinars and trainings to our existing sections of news and briefs, conferences, funding opportunities and jobs.

The newsletter was also nationally honored, earning a silver award from the Association for Communication Excellence in Agriculture and Natural Resources.

“The Western IPM Center’s new videos and photos essays are a great addition to the IPM information available on its website. They are a great way to tell specific IPM stories, pique interest in new areas and illustrate the diversity in agriculture and IPM in the West. Basically they are fun to watch and explore.

Becky Sisco
Western Region IR-4
Regional Field Coordinator

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Western IPM Center funding often provides the first support for researchers to investigate new approaches to managing pests, diseases and weeds. Our funding launches projects and leverages significant additional resources.

“Western IPM Center support was instrumental in the development and publication of the “Field Guide for Integrated Pest Management in Hops,” which has been distributed to hop growers and crop consultants throughout the West. This tool has dramatically improved the management of pests and diseases throughout the industry, providing the latest information and best-management practices.

Ann George
Executive Director
Hop Growers of America

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DEVELOPING IPM BRICK BY BRICK

Every year, the Western IPM Center’s annual grant program awards a quarter million dollars or more to support IPM research, outreach and evaluation in the West. We fund around a dozen new projects each year; some research initiation projects, some work groups, some outreach and implementation efforts, some planning documents and some small special projects.

We award one-year grants with a \$30,000 upper limit, so no individual project is going to revolutionize pest management overnight. But that’s not our role.

Our grants build IPM knowledge and programs brick-by-brick. Western IPM Center research-grant recipients use our funding to launch new research ideas or answer specific pest-crop questions. And they build on those answers, securing additional funding from the Center or other state, regional or federal sources. Extension educators use our funding to spread that new knowledge to expand IPM adoption and combat invasive species. Here are some examples.

HOPS: BUILDING ON SUCCESS

The Pacific Northwest hop industry is a great example of how Western IPM Center support can help move an entire industry forward.

As the craft-brewing phenomena spread across the country, so did the demand for different varieties of locally grown hops. New growers installed hop yards and production spread beyond its Pacific Northwest base. As production spread, so did hop pests like powdery mildew.

The industry and university and federal researchers in Washington, Oregon and Idaho responded, using Western IPM Center funding to create an IPM-based response.

In 2013, the Washington Hop Commission received a Center research grant to develop IPM management strategies to address virulent strains of powdery mildew, which had overcome the disease resistance bred into certain hop cultivars. The researchers identified differences in disease susceptibility among formerly resistant cultivars, which allowed growers to tailor disease-management efforts. They found the

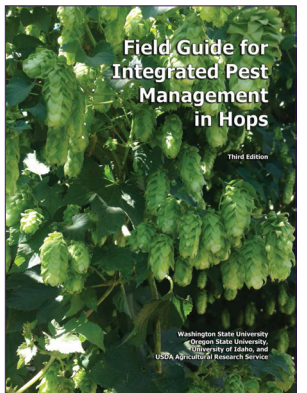
threat of disease outbreaks could be predicted based on regional disease pressure. The team also identified two resistance genes that appeared to be effective against emerging strains of the pathogen, and incorporated both into a breeding program to create varieties with pyramided powdery mildew resistance.

In 2014, the U.S. Hop Industry Plant Protection Committee received another Center grant to update the Pest Management Strategic Plan for U.S. Hops. The next year, the industry followed up by using Western IPM Center funding to produce and distribute a Field Guide for Integrated Pest Management in Hops, incorporating all the new research and IPM recommendations. The guide has been widely distributed to growers.

And the research continues. Oregon State University’s Dr. David Gent, who had been involved in much of the earlier research, received a Center grant in 2016 to look at network characteristics and modeling of powdery mildew spread as a foundation for developing an areawide IPM program, and Washington State University’s Dr. Doug Walsh received a federally administered grant to develop and deliver IPM strategies to the rapidly expanding U.S. hop industry.

ONIONS: UNDERSTANDING THRIPS AND YELLOW SPOT VIRUS

For onions, researchers supported by the Western IPM Center continue looking at onion thrips and the disease they carry, iris yellow spot virus. Recent research results include determining that onions with higher nitrogen concentrations were more apparent to and digestible by thrips, and had reduced plant-defense compounds. Thrips densities are influenced by neighboring crops and weeds. For instance, wheat is a host for thrips but not iris yellow spot virus, while corn is a poor host for both the insect and disease.



Invasive species are a constant threat to our region's multi-billion-dollar agricultural industries, and threaten forests and other natural areas. Western IPM Center funding helps build the first line of defense against these invaders.

“The Western IPM Center stepped up and made a significant contribution to the funding of a recent outreach meeting on the South American palm weevil invasion into Southern California. Without support from the Center, we would not have been able to reach the more than 125 participants who attended the meeting. The program also made it possible to pull together several agencies and a diversity of palm growers and arborists to help in the development of programs to manage this highly destructive pest.

Mark Hoddle
Extension Specialist in Biological Control
University of California, Riverside

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BOULDER: EMERALD ASH BORER

In September 2013, a forester in Boulder, Colorado found an emerald ash borer, an invasive beetle that's killed hundreds of millions of trees in the Midwest.

To hold the line at Boulder, the County of Boulder used a Western IPM Center grant in 2015 to conduct an extensive education and outreach effort, teaching people how to recognize the insect, monitor their trees and prevent the pest's further spread. Through an active social media campaign, print and display advertising – including on regional transit buses – Arbor Day events, information booths and direct mailers, the county dramatically raised awareness about the insect and taught tens of thousands of people how to avoid spreading it.

A second mini-grant in 2015 helped Colorado State University's Dr. Dan West begin surveying communities adjacent to Boulder to look for additional infestations.



MONTANA: ALL INVADERS

Montana Governor Steve Bullock formed the Montana Invasive Species Advisory Council in 2014 to get a handle on the terrestrial and aquatic invasive species threatening the state.

The council conducted an assessment of invasive species in Montana and held a public invasive species summit. It's now using Center funding to develop an implementation plan to protect against those threats.

ISLAND OF POHNPEI: COCONUT RHINOCEROS BEETLE

In the Federated States of Micronesia, the Conservation Society on the island of Pohnpei used Center funding in 2014 to conduct three days of focused training to help keep the coconut rhinoceros beetle from entering the island. The beetle can devastate coconut palm trees, and has been spreading across the Pacific. The training on Pohnpei targeted the people most likely to spot and stop an introduction – quarantine and port authority officers, airline employees and extension specialists.



WESTERN TRIBES: FOREST PESTS AND SUDDEN OAK DEATH

The Western Region Tribal IPM Work Group was formed in 2013 with Center funding. Its goal was to protect tribal natural and cultural resources from native and invasive pests by increasing cooperation and expanding the use of IPM.

The group held five meetings where representatives from tribes, government agencies and research institutions discussed IPM needs and barriers and produced a Tribal Forest Health/Invasive Species Management Needs Assessment.

In 2015, the group received additional Center funding for the logical next step: an outreach and implementation project to conduct high-priority IPM training for tribes. The training focused on forest and rangeland pests, including insects, pathogens, weeds and abiotic problems, and *Phytophthora ramorum*, the pathogen that causes sudden oak death.

The group is also producing a field guide of pests important to tribal communities that focuses on IPM management practices, including the use of sanitation, fire, pesticides and timber-harvest practices to reduce the spread and intensity of forest pests.

Another indispensable function of the Western IPM Center is funding pest-management research for small-acreage specialty crops that often can't count on funding from well-heeled commodity commissions or industry groups.

The Western IPM Center enabled research that stimulated the development and adoption of sustainable strategies for managing weeds in chile pepper – a crop with a great amount of economic and cultural significance in New Mexico.

Brian Schutte
Assistant Professor, Weed Physiology & Ecology
New Mexico State University

WEEDS IN CHILE PEPPER

Chile pepper is hugely important in New Mexico, but production in the state is threatened by low-cost imported chile pepper. The price of imported chile is directly tied to production-cost disparities, most notably cheaper hand labor, which is required for weeding and harvesting.

Center-funded research by New Mexico State University's Dr. Brian Schutte is expanding chemical and cultural weed-control options to reduce producers' reliance on costly hand labor. Other NMSU researchers are also looking at the interactions between weeds, pathogens and nematodes in chile production.

ERGOT IN GRASS SEED

Oregon and Washington are major producers of cool-season forage and turf-grass seed. Ergot is a seed-replacement disease of these grasses and multiple fungicide applications are routinely applied before and during flowering to control it.

Two recent Center-funded projects tackled this crop-pest combination. In 2015, Oregon State University's Dr. Jeremiah Dung validated a newly developed procedure to more quickly and accurately quantify the number of ergot spores caught by traps, and provided an electronic Ergot Alert to growers when spores were found. The next year, Dr. Navneet Kaur followed up with a project to identify and evaluate prospective biocontrol agents against ergot disease.

SOLARIZATION OF NURSERY SOIL

Nursery crops are vulnerable to several soilborne plant diseases, including root rots and leaf blights. They are difficult to manage because pathogens can survive in soil from year to year and infect new crops of plants. If infected plants are shipped, they can spread these diseases to other regions.

With the use of fumigants curtailed, Oregon State University's Dr. Jennifer Parke used Center funding to test soil solarization as a non-pesticidal alternative. The team found solarization is effective, and developed a web-based tool to help growers determine the length of time to solarize their soil.

The Western IPM Center provided opportunities to the Oregon State University ergot research team that enhanced the grass-seed industry's knowledge about ergot disease. Our research into potential biocontrol options may reduce the risk of resistance development and contribute to the implementation of IPM strategies for the long-term management of ergot in grass-seed crops.

Navneet Kaur
Postdoctoral Scholar
Oregon State University

CANOPY MODIFICATIONS IN MACADAMIA NUT ORCHARDS

Macadamia nut is an economically important crop in Hawaii, with an estimated value of \$35.7 million. Macadamia felted coccid is a critically important pest in macadamia nut, and current options for control are costly. It's also difficult to get effective chemical coverage due to the large and overlapping canopy structure in many macadamia orchards.

Dr. Alyssa Cho at the University of Hawaii is investigating whether modifying the orchard canopies can reduce coccid populations, increase natural enemies and increase effectiveness of insecticides. Her team is looking at pruned and unpruned canopies at a commercial macadamia nut orchard on Hawaii Island. They will quantify the relationship of macadamia felted coccid infestations to orchard canopy density, quantify natural enemy impacts in different canopy habitats, investigate the role of canopy modification and understory habitat on enhancing natural enemy effectiveness, and investigate the effects of canopy modification on production and quality components of the orchard.

Links to all Center-funded project reports can be found at westernipm.org in the "Searchable Data Sources" section.

One key benefit the Western IPM Center provides is ongoing funding to solve Western pest problems. Our annual grant program and signature programs are vital sources of support for new IPM research, outreach and evaluation in the West.

“The California Safflower Growers Association has found tremendous value in working with the Western Integrated Pest Management Center. Agriculture, particularly California agriculture, is quite diverse. Safflower is an example of a minor crop that plays a significant role in an areawide IPM effort. The California Safflower Growers Association has had some great successes in pest management, soil health and salinity management, as well as increased productivity. These benefits were realized by working closely with the Western IPM Center.”

Beau Howard
Vice President
California Safflower Growers Association

2017 CENTER-FUNDED GRANTS

Work Groups
Developing Effective Bed Bug Outreach Programs for Diverse Clientele in the West
Project Director: Andrew Sutherland, University of California Division of Agriculture and Natural Resources
This work group will consider new and underserved groups associated with bed bug management in the West and review effective outreach programs to educate these stakeholders about bed bug prevention and management, focusing on IPM tactics.

Outreach and Implementation
Enhanced Implementation of the Online Soil Solarization Forecasting Model
Project Director: Jennifer Parke, Oregon State University
Soilborne pathogens and weeds are some of the most costly pests affecting nursery-crop production systems. To support the adoption of pesticide-free soil solarization, Parke’s team developed a model to enable nursery growers to determine the feasibility and length of time necessary to disinfest soil by solarization. Specific project goals are improvement of the web interface, and holding workshops to demonstrate the online tool.

Sudden Oak Death: Prevent and Prepare Project
Project Director: Brendan Twieg, Mid Klamath Watershed Council
The mid-Klamath is the home of the Karuk Tribe and is at high risk of *Phytophthora ramorum* infestation. This project will allow the Mid Klamath Watershed Council and the Karuk Tribe to reach out to the community and prepare a response to this pathogen, which causes sudden oak death. The project goals are to prevent sudden oak death establishment through education and outreach, monitor for occurrence and develop a rapid-response plan.

Wyoming School Integrated Pest Management Outreach and Training
Project Director: John Connett, University of Wyoming
Effective, sustainable IPM programs in schools reduce the exposure of children and school personnel to pesticides and pests whose allergens are asthma triggers. This project will pilot IPM training workshops to six school districts that have a strong willingness to implement IPM.

Planning Documents
Utah Tree Fruit IPM Practices Evaluation
Project Director: Marion Murray, Utah State University
This project will survey tree fruit growers in Utah to evaluate IPM practices to determine the level and intensity of IPM use, demographics that may influence adoption, impediments to adoption, economic impacts and educational and research needs.

Updating the Pest (and Pollinator) Management Strategic Plan for Western U.S. Alfalfa Seed Production
Project Director: Shane Johnson, Northwest Alfalfa Seed Growers Association
An emphasis in this PMSP update will be integrating pollinator management, as alfalfa seed has unique needs and the balance between pest management and pollinator safety is critical.

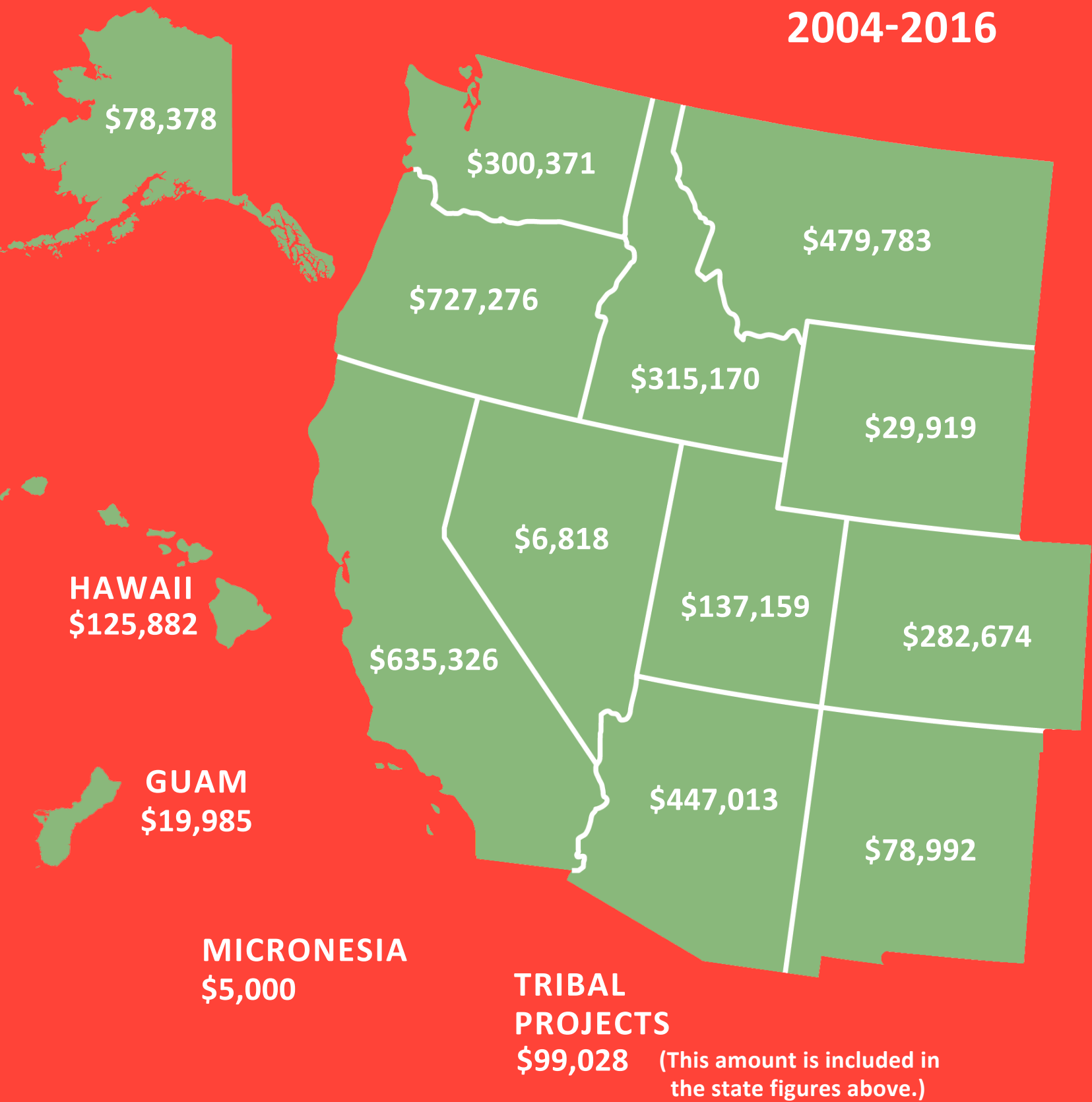
Pest Management Strategic Plan for California Prunes
Project Director: Gary Van Sickle, California Specialty Crop Council
The California Specialty Crops Council will update the PMSP for prunes to document pest-management priorities for growers.

Project Initiation
Establishing Insect Pest Management Needs and Priorities for Hemp Grown in the High Plains and Rocky Mountains
Project Director: Whitney Cranshaw, Colorado State University
Hemp (*Cannabis sativa*) is a crop that has a long but peculiar history in the United States. Historically harvested for fiber, a great many things have changed in the 65 to 70 years since it was last commercially grown. This project seeks to describe the insects associated with the crop and define the insect pest management needs associated with growing hemp in the West.

Distribution and Diversity of Barley Yellow Dwarf Virus in Eastern Oregon Grass Seed Production
Project Director: Kenneth Frost, Oregon State University
Barley yellow dwarf is a disease of small grains and cereals caused by the barley yellow dwarf virus. This project seeks to characterize the genetic diversity of virus strains affecting susceptible perennial ryegrass crops grown for seed and nearby cereal crops to better understand which strain or set of strains result in disease, determine if insecticides reduce the occurrence, accumulation or diversity of the virus, and examine the relationship between barley yellow dwarf incidence and seed yield.

Increasing the Adoption of Alfalfa Weevil Integrated Pest Management in the Western Region
Project Director: Kevin Wanner, Montana State University
Alfalfa weevil is the primary economic pest of forage alfalfa, a crop grown on 1.7 million acres in Montana and 17.8 million acres nationally. The objectives of this project are to quantify the current status of alfalfa weevil management in Montana and its impediments, conduct a pilot evaluation of areawide, real-time monitoring of alfalfa weevil populations and evaluate the accuracy of the degree-day model to predict alfalfa weevil development across different regions of Montana.

CENTER GRANT PROGRAM FUNDING
2004-2016



Guide to Funding

The map at the left shows the grant dollars the Western IPM Center has awarded to project directors in the Western states, tribes and territories over a 12-year period. The figures only represent competitive grant funding and do not include additional support the Center has provided for comment coordinators, signature programs or, in the early years, non-competitive awards to individual states.

Three factors affect the amount and distribution of these grant-based awards. They are the amount of funding the Center has available in any year, and the number and quality of the project proposals we receive. Here's how those factors have affected funding in the past three grant cycles.

In 2015, we received 23 proposals requesting \$572,000. We had \$300,000 available and funded 11 of those projects. Three others, requesting \$67,000 between them, were scored highly by our review panel but not funded because we didn't have any more money to award.

2016 was worse. We had \$279,000 available and received 29 proposals requesting \$770,000. We funded 11 proposals and had five projects from five different states that could have been funded if we'd had an additional \$141,000 to award. In 2017, there were also five worthy projects that went unfunded, and \$112,000 that would have been awarded.

Geographically, the distribution of awards represents the distribution of applications. The more researchers and extension specialists submitting proposals from a particular state over the years, the more awards that state has received.

IPM Is Not Just for Agriculture

While integrated pest management is important in agriculture, it is not exclusive to agriculture. IPM can be used to effectively and economically manage pests in forests and natural areas, and in community settings including housing and schools.

At the Western IPM Center, we support the advancement and adoption of IPM in all areas of pest management. Wherever pests occur, IPM can reduce the risks to people and the environment posed by the pests themselves, and by pest-management practices. Our 2017 funded projects reflect those priorities. Among the 10 projects we are funding, one focuses on bed bugs, one on school IPM and one on sudden oak death in a tribal area.

Here are highlights of other recent projects and efforts:

BIOLOGICAL CONTROL OF SALT CEDAR

New Mexico State University weed ecologist Dr. Erik Lehnhoff is studying how biocontrol insects can be incorporated with existing management practices to control salt cedar, a water-hungry invasive plant also known as tamarisk, near Western reservoirs.

Lehnhoff is looking at how native tamarisk beetles – which feed on tamarisk plants – can be incorporated into the overall management strategy, which often includes mowing and herbicides, to reduce the effort and cost.

SOUTH AMERICAN PALM WEEVIL

The South American palm weevil showed up in Southern California in 2011 and has been slowly spreading north toward Los Angeles, threatening the region's iconic palm trees.

Recently the Western IPM Center helped support a meeting of university scientists, members of the date palm industry, state and federal officials and San Diego County's agricultural department to coordinate efforts to combat the threat.

IPM IN LANDSCAPE TREES IN ALASKA

In Alaska, Dr. Gino Graziano is surveying landscapers and tree-care professionals to determine their understanding of pests and IPM practices as well as to determine emerging pest issues that may not be addressed in current IPM recommendations.

With over 120 million acres of forested land in Alaska, ornamental urban trees play an important role in detecting and monitoring for invasive and emerging pests. Having sound IPM plans for trees and shrubs in ornamental settings benefits natural areas through increased awareness of pest issues and an increased ability to respond to pest detections.

