

Fifteenmile Creek Orchard Pesticide Pollution Risk Study

Wy'East Resource Conservation and Development Area

Annual Report
2003 - 2004



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Wy'East Resource Conservation and Development Area

Annual Report 2003

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Accelerating the Application of Integrated Fruit Management to Reduce the Risk of Pesticide Pollution in Fifteenmile Subbasin Orchards

A five-year project funded in part by the Bonneville Power Administration (BPA)

The project aims to reduce pesticide pollution from orchard operations in the Fifteenmile Subbasin in Wasco County, Oregon by implementing Integrated Fruit Production (IFP) practices with attention to integrated pest management. Between the start of the project in May 2001, and the end of 2003, Wy'East Resource Conservation and Development (Wy'East RC&D) received \$484,920 from the BPA which represents 59% of the total project cost. BPA funding aided Wy'East in leveraging an additional \$326,604 or 41% of total project cost. To date the project cost totals \$809,930. Financial sponsors include the Oregon Watershed Enhancement Board (OWEB), the Oregon Department of Environmental Quality (DEQ), UAP Northwest, the Wasco County Fruit and Produce League, The Dalles Orchard Growers, and the Wasco County Soil and Water Conservation District (SWCD).

The IFP project grew out of the public's concern over pesticide residues on food, exposure to farm workers, and contamination in the environment. An issue of increasing importance is the effect of pesticides on watersheds and salmonid species. U.S. Geological Surveys samples in 1999 revealed that areas dominated by orchards and vegetables contained higher concentrations of pesticides where agricultural lands drained into streams. While concentrations of pesticides generally do not exceed drinking water standards, standards for aquatic life are commonly exceeded (Larson, Gilliom, and Capel, 1999).

Quantified water quality data is not available for the Fifteenmile Subbasin. However, water quality data from a neighboring orchard area, the Hood River Subbasin, identified a pesticide pollution problem. The Hood River Subbasin orchards use organophosphate (OP) pesticides to control insects in late winter, spring, and early summer. Both subbasins have highly concentrated orchard areas, and the pest management practices with OP application are similar. With orchards in both areas being located in the uplands of the watershed, the potential for runoff pollution in the riparian areas of the Fifteenmile subbasin exists as well.

The project encourages growers in Wasco County, Oregon, to reduce the use of broad-spectrum OP pesticides and replace them with new generation, less toxic pesticides. The new generation pesticides reduce the risk of pollution to land and aquatic resources affecting salmon and other endangered species. The use of less toxic pesticides requires growers to be more precise in the timing of the application of these pesticides because they do not persist in the environment like broad-spectrum OP pesticides. A network of remote weather stations in orchards allows growers to collect precise weather data to calculate pest and disease degree-day models for specific orchard sites. Using a web-based interface, IFP project participants use the degree-day models and data to make better decisions and precise timed application of new generation, less toxic pesticides.

Project Goals, Objectives, and Results

Goal

Accelerate the implementation of Integrated Fruit Production practices to reduce the amount of broad-spectrum pesticides used to control pests. Promote natural, cultural, biological, and bio-technical methods and the use of less toxic pesticides to control pests in Fifteenmile Subbasin orchards, which will minimize the risk of water pollution or damage to fish and wildlife species such as salmon and steelhead.

Objective 1: Establish and Operate a Network of Remote Orchard Weather Stations

- Task 1a: *Purchase Equipment & Install: weather and water monitoring stations*
- Task 1b: *Information Delivery System*
- Task 1c: *Develop & Implement IFP Plans with Growers*
- Task 1d: *Validate Degree-day Models*

Results

Equipment

The IFP Coordinator, Mike Omeg, assisted Automata, Inc. with the installation of 15 weather stations in 2001 and 32 stations in 2002. Growers ordered 11 stations in December 2003 which will be installed in spring 2004. To date, 27 stations operate in The Dalles area, 17 in the Dufur area, two stations in Mosier, and one in Hood River totaling 47 stations in the network. By December 2004, 64 IFPnet stations will be in operation.



Weather station at Treaty Oak Orchards in Wasco County, Oregon

Omeg and Automata worked with growers to choose station locations based on clear signal reception and to collect grower relevant degree-day information for the models. The installation of three repeaters allowed the signal to carry over hills. These stations operate throughout the growing season, providing data for the entire Fifteenmile Subbasin area. After the first year of operation, project coordinators gave growers the opportunity to purchase weather stations of their own, with a small cost share from project funds.

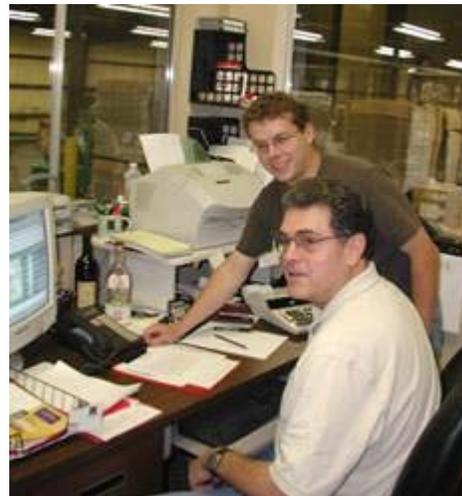
In 2002, growers purchased an overwhelming 31 stations at an investment of \$123,840 of their own funds. In 2003, growers purchased ten stations at \$4,000 per station with no cost share assistance. No cost share funding was available for 2003. An additional station, loaned by Automata, Inc., was placed at the Mid-Columbia Agriculture Research and Extension Center (MCAREC) as a demonstration for the Hood River area for the 2003 growing season. Two repeaters placed on the MCAREC station connected it with the existing network, allowing the Hood River and Mosier areas to communicate via an Internet connection with The Dalles area weather stations. Hood River will receive 25 stations in 2004 to expand coverage into this neighboring subbasin. The Hood River project received funding from the Altria Foundation, the Oregon Watershed Enhancement Board, and the Hood River Growers and Shippers Association.

The first year of weather station operations in 2001 revealed that the tower design needed modifying. The IFP Coordinator developed a new tower design in February 2003. Rather than placing stations on wood posts, the new stations were placed on galvanized pipe that employs a tipping mechanism. A counter-weight positioned at the bottom of the station permits the top portion to lower in order to be reached from the ground. This system reduces the risk of injury and improves efficiency by speeding up maintenance. The 31 stations installed for the 2003 growing season utilize the new tower design.

In 2003, the Wasco County SWCD partnered with Wy'East RC&D to establish a network of water quality monitoring stations linked with IFPnet. SWCD bought four weather stations to monitor restoration activity impacts on Bakoven Creek, a nearby watershed harboring salmonid species which drains into the Deschutes River at Maupin, Oregon. These stations correlate hydrologic response with precipitation events in the Bakeoven Watershed and produce data delivered via telemetry to the IFPnet web server. SWCD staff then view the data via the IFPnet website.

Information Delivery

In 2001 the project management team registered the domain www.ifpnet.com and contracted Gorge Networks to provide Internet connectivity. Registration for the domain will continue to be renewed for the life of the network. The domain is currently secured until 2007; at that time it will be registered for another five years. The project management team provided feedback to Automata, Inc. regarding the creation of the website to ensure successful development and design. The website had approximately 59,200 hits during the spring of 2002. Website data were unavailable for 2003.



Omeg teaches Grower Ken Bailey how to use the IFPnet interface

Fifty out of 75 growers in Wasco County used the information from IFPnet to help them devise appropriate pest and disease management plans in 2003, up from 25 users in 2002. Many of those growers who based their pest management plans on the models saw a reduction in their spray program by one or two pesticide applications. The IFP Coordinator continues to improve and enhance the website through feedback and suggestions from website users. IFPnet participants contact Omeg via email, phone, or mail to notify him of any issue concerning website usability. The website provides contact information via a direct "Contact Us" link on the homepage. As the project's web presence grows, feedback will be vital in developing a more comprehensive, timely and user-friendly website.

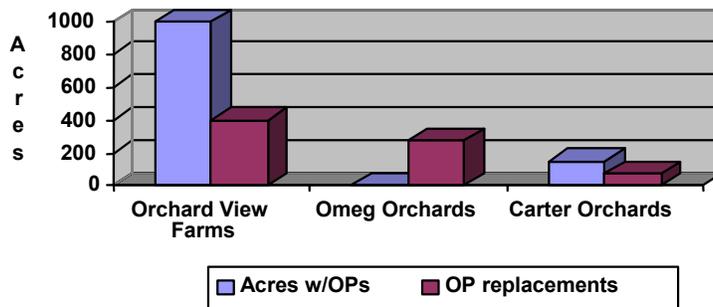
IFP Plan Implementation

The IFP Coordinator, Mike Omeg, worked with growers on a one-on-one basis to develop IFP conservation plans for their orchards. These plans follow the Natural Resources Conservation Service (NRCS) planning policies for Resource Management System (RMS) plans. Meeting these criteria enables growers to easily participate in

USDA conservation cost-share programs, such as the Environmental Quality Incentives Program (EQIP). All IFP plans meet the objectives of the Clean Water Act (CWA), the Endangered Species Act (ESA) and Oregon’s Senate Bill 1010 Agriculture Water Quality Act. Omeg developed seven plans in 2003. To date, plans have been designed for approximately 3,000 out of 9,000 acres in the county or 11 orchard operations.

With the implementation of the IFPnet and the IFP plans, the number of acres of orchards sprayed with OPs has decreased significantly.

Figure 1: The graph below illustrates the decreasing trend in OP use among three farms (approximately 1800 acres) under IFP management in 2003.



In addition to creating IFP plans with growers, Omeg helped the NRCS develop guidelines for EQIP funding on orchards and materials for ESA compliance of orchard practices.

Degree-day Validation

With MCAREC's assistance, the IFP team placed five insect traps in orchards and monitored them once a week beginning in June and continuing through July 2003. The traps captured Oblique-Banded Leaf Roller (OBLR) moths, a local cherry tree pest. The trap counts compared to the model prediction showed the models to be accurate.

During the first year of operation, the weather stations revealed that many more microclimates exist in the area than previously believed. Many long-held assumptions about weather trends were refuted. The new microclimate data heavily influenced growers’ decisions to purchase their own weather stations. Traditionally, temperature and wind-based decisions such as pest and disease management or irrigation and frost management depended on weather temperatures and wind-speed at a grower’s shop or home. However, stations revealed a large temperature and wind-speed gradient between the grower’s shop and other areas of the orchard. More precise weather data allows growers increased efficiency in pest and disease management, which leads to reduced pollution levels and a higher quality and quantity crop.

Objective 2: Information Transfer for IFP Implementation in Orchard Operations

- Task 2a: Group Training & Use IFP Techniques
- Task 2b: Grower Roundtable
- Task 2c: Outreach Information and Education

Results

Group Training

In the spring 2003, IFP Coordinator Mike Omeg held two training workshops in cooperation with the Oregon State University (OSU) Extension office at the Columbia Gorge Community College computer lab on degree-day models and IFPnet usage. Approximately 25 growers attended each workshop. Omeg also held individual sessions with 19 growers in 2003.

Grower Roundtable

In conjunction with the Wasco County Fruit and Produce League, the IFP management team held 12 grower roundtables in 2003. Since 2002, roundtables have occurred weekly during the spring months beginning in March and continuing through May. Topics of discussion include frost control, spray drift, aerial spray drift, powdery mildew control, OP replacement pesticides, nutrient management and water quality. IFP related speakers, such as Entomologist Helmut Riedl, often present and foster discussion on IFP topics. On average, 30 orchardists and agricultural consultants attend each meeting.

Outreach & Education

Through a variety of mediums, outreach and education efforts reached the general public and growers. At critical benchmarks in the project's progression, the Wy'East office issued press releases to local and regional media outlets. The local newspaper, The Dalles Chronicle, printed four IFP related press releases. Other articles discussing IFP and IFPnet appeared in publications such as agricultural newspapers and industry publications. (*Press Packet available*). Wy'East was also asked to develop articles for the Wasco County SWCD quarterly newsletter and the OSU Extension newsletter.

Promotional pieces included two brochures, two fact sheets, accomplishment pages, and progress reports published and distributed at conferences and meetings. (*Copies available*.) Omeg and former IFP Information Specialist, Megan Prine, delivered IFPnet presentations at several professional meetings of agricultural researchers including the Pacific Branch of the Entomological Society of America Annual Conference in 2002 and the Western Oregon Pest and Disease Management Conference in 2003. Prine and Omeg developed various PowerPoint presentations relevant to audiences such as SWCD neighborhood meetings, watershed council meetings, and Fruit and Produce League meetings in Wasco and Hood River counties. Since IFP's inception in the area, international scientists and orchardists from Korea, Chile, South Africa and Australia have attended tours highlighting IFPnet.

The Wy'East RC&D continues to work closely with the Wasco County Fruit and Produce League to develop a county-wide IFP certification program. The ongoing search for a certifying agency did not deter the development of IFP guidelines that many individual growers currently follow. To assist local growers with the guidelines, Wy'East RC&D

wrote and published an IFP Handbook in 2003. The handbook also included information about the implementation of IFP practices. BPA funding permitted approximately 100 copies of the handbook to be printed and distributed free of charge to local growers, field managers, and industry specialists. The handbook outlines the IFP program created by the IFP Committee and provides reference materials to help growers implement the practices.

To celebrate the first season of the operation and to increase IFPnet usage, Wy'East sponsored a "Weather Station Field Day" in July of 2002. Growers from Wasco and Hood River counties were invited, along with industry representatives, extension agents, and the general public. The event featured a training session in the morning, followed by lunch and a visit to a weather station site. Approximately 70 people attended the event. In 2003, the weather station field days evolved into a permanent demonstration site with the opening of a new information facility. The IFP management team began construction of a kiosk on an IFP participant's orchard in 2002. Visitors can now easily tour an accessible weather station and orchard demonstration site to learn more about IFPnet and IFP practices. Formal tours also visit the site during the county's annual Pre-Harvest Tour, an OSU Extension sponsored event in Wasco County that draws hundreds of regional growers and visitors to tour orchards and learn more about local horticulture.



Kiosk in Wasco County orchard

Objective 3: Water Quality Monitoring to Improve Understanding of Pesticides

- Task 3a: Plan Water Quality Monitoring
- Task 3b: Implement Water Quality Monitoring

Results

Plan Water Quality Monitoring

In October 2001, Wy'East RC&D used BPA funds to contract the Oregon DEQ to conduct water quality sampling and analysis on Mill Creek in The Dalles. Principal investigator Eugene Foster, an environmental toxicologist with the DEQ, wrote a plan titled "Rationale for Sampling & Analysis of Pesticides in Mill Creek Basin, Wasco County Oregon." The IFP management team, composed of growers from Wasco County, worked with DEQ to develop a sampling schedule and to select three sites to gather samples. DEQ staff also collected caged-fish and macro-invertebrate pre-and post-spray of OP pesticides.



Aerial view of Mill Creek

Implement Water Quality Monitoring

The monitoring plan's design assists growers in the evaluation IFP effectiveness. Analysts look for reductions in broad-spectrum pesticides in the Mill Creek drainage and direct and indirect effects of pesticides on fishery resources. The DEQ developed a draft

report in January 2003 of 2002 sampling results. The analysis indicated the presence of chlorpyrifos and malathion, sometimes in levels above state water quality standards. The IFP management team discussed the findings and developed a plan to address the issue. The DEQ announced the results and the plan at the Fruit and Produce League annual meeting in February 2003.

Growers immediately took a proactive stance to implement the plan and reduce the amount of pesticides in Mill Creek and other waterways around the area. DEQ and IFPnet representatives met with the aerial applicator who applies malathion to further extend buffers around waterways and discuss other options to reduce contamination. The IFP management team also consulted with the NRCS for advice on buffer plantings, and recommended the use of low-volume or tower sprayers to area growers.



Low-volume sprayer



Ryan Bessett, SWCD Staff monitoring Mill Creek

The IFP management team continues to monitor water quality in Mill Creek. No additional streams were added to the sampling. Foster presented 2003 results to Wy'East RC&D and the management team in a written interim report at the end of 2003. The samples in the graphs below, taken from the Wright Street location on Mill Creek, indicate a reduction in pesticides since the implementation of IFP practices.

Figure 2. Chlorpyrifos is applied in the spring against a variety of orchard pests. The sampling data indicate a reduction in chlorpyrifos levels in 2003.

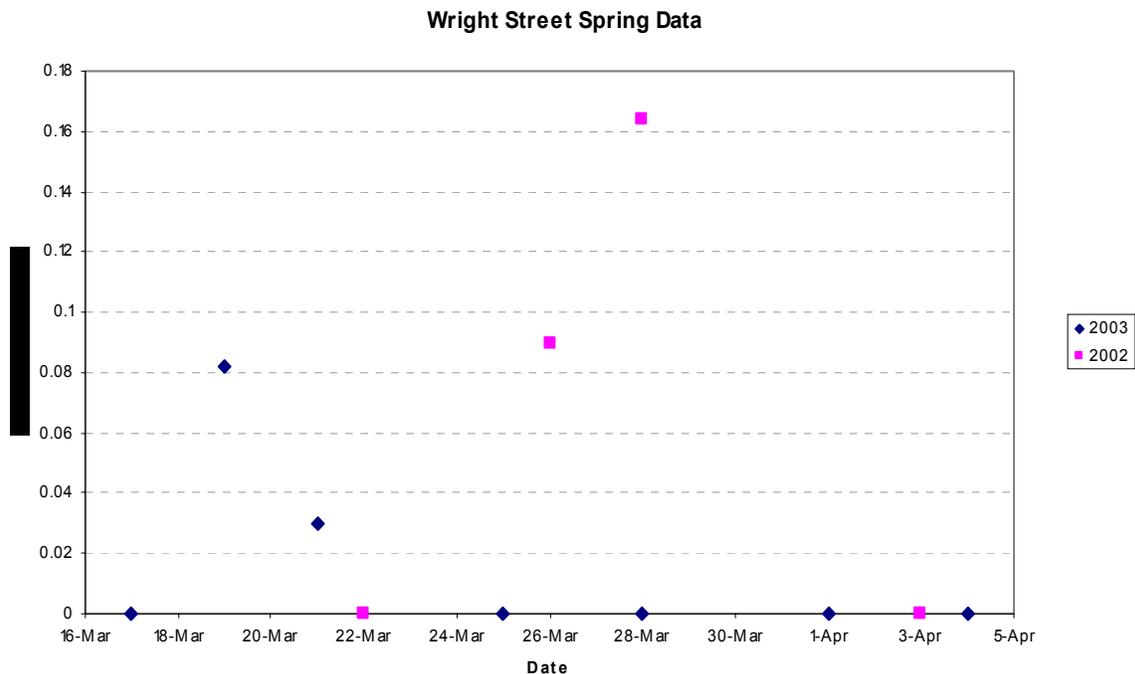
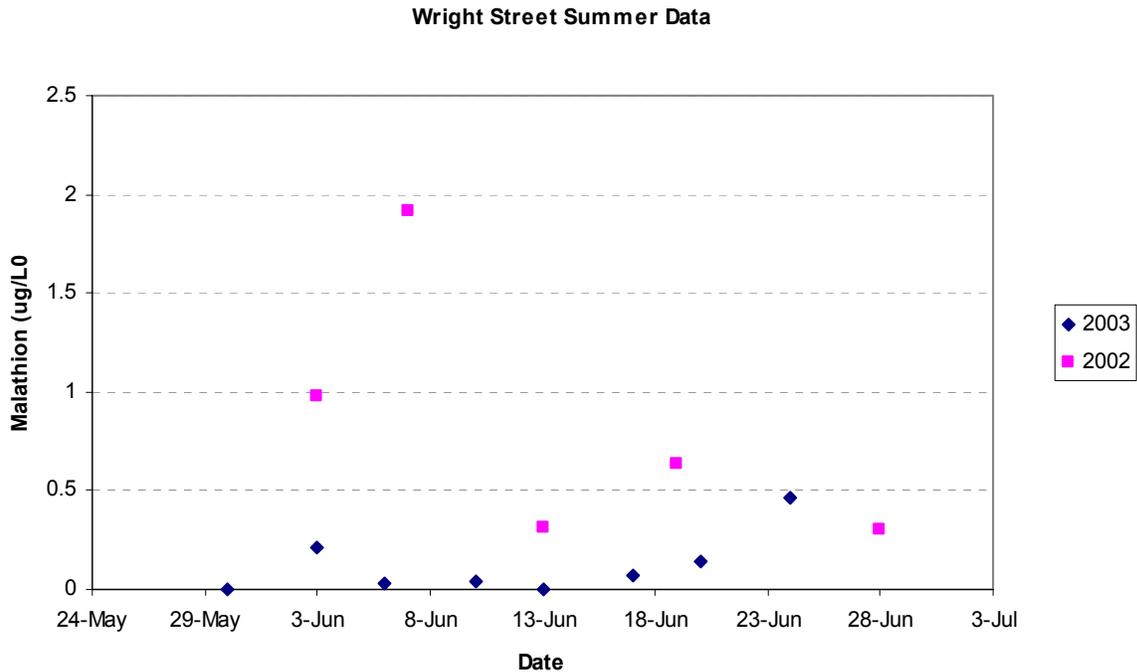


Figure 3. Malathion is applied in the later spring and early summer to control cherry fruit fly. The Oregon Department of Agriculture requires the application of cherry fruit fly sprays in all Wasco County orchards. The sampling data indicate a reduction in malathion levels in 2003.



Objective 4: Monitoring, Evaluation, and Experimentation to Adjust Resource Management Decisions

- Task 4a: Follow Up with Orchard Growers to Evaluate Progress

Results

Follow Up

To date, the IFP management team has not conducted formal evaluations of IFPnet participants. The project grew rapidly as more and more growers wanted individually designed plans and more towers installed. However, IFP Coordinator Omeg and the Wy'East staff are currently designing an evaluation that will gather qualitative and quantitative data for the project. The management team will use this data to adjust as needed any resource management decisions by IFP users. Evaluations will also measure the overall success of on-the-ground project implementation and reductions in OP pesticide usage. Omeg and Wy'East staff will compile data from the evaluations and present the data in Wy'East RC&D's 2004 annual report.

Objective 5: Project Management

- Task 5a: Contract & Financial Management
- Task 5c: Progress Reports to Funders, Management Team, and RC&D Council

Results

Contract & Financial Management

The IFP management team continues to manage the project with the help and coordination of IFP Coordinator Mike Omeg and Wy'East RC&D Coordinator Merlin

Berg. Treasurer Ron Graves of Wasco County SWCD managed the financial operations of the project in 2003.

Progress Reports to Funders, Management Team and RC&D Council

Omeg submits written monthly reports to Berg and the management team. Wy'East RC&D submits reports according to funder reporting policies and deadlines (e.g., progress and annual reports, work plans, and fiscal summaries).

Lessons Learned

Growers enthusiastically revere the IFPnet project. The management team has experienced very few hurdles during the implementation phase, and more growers continue to use and implement IFP practices. Minor issues arose with the IFPnet interface. As growers began to use the website, a few glitches developed concerning the amount of traffic the website could maneuver. Users provided very valuable feedback to make the website more user-friendly. Automata Inc. agreed to rewrite the interface at no additional cost. Moreover, rewriting the system turned out to be more economical than trying to modify the interface as growers used it.

Plans for the Future

IFPnet continues to evolve into an efficient system. Many area growers now rely on the stations' accurate data to make management decisions. While continuation funds have been secured from BPA for 2004, additional funds are being sought from private and public foundations and local groups to continue the pesticide monitoring of waterways. The project constantly changes as growers identify their needs to implement less toxic pesticide management practices. IFPnet continues to provide growers access to information in a timely manner that benefits the management of their crops and lowers OP pesticide usage.



IFP Project Management Team

Wy'East is currently in the process of securing funding to expand the weather station network into Hood River. While this is a completely separate project, it was developed based on the success of IFPnet in Wasco County. The work plan calls for 25 weather stations to be placed in Hood River apple and pear orchards to reduce OP pesticide use by over 40,000 pounds of active ingredient annually.

Fiscal Summary 2003

Actual Cost

Equipment	\$22,200.00
Service	
Administration	\$15,310.00
Contracted Services	
Exp. Station	\$2,547.38
IFP Coordinator	\$74,920.00
Other	\$34,688.62
Personnel	
Operations Manager	\$16,140.00
Supplies	\$2,300.00
Travel	\$250
Total	\$168,356.00

Acronyms

BPA – Bonneville Power Administration
CWA – Clean Water Act
DEQ – Oregon Department of Environmental Quality
EQIP – Environmental Quality Incentives Program
ESA – Endangered Species Act
IFP – Integrated Fruit Production
MCAREC – Mid-Columbia Agriculture Research & Extension Center
NRCS – Natural Resource Conservation Service
OP – organophosphate (pesticides)
OSU – Oregon State University
OWEB – Oregon Watershed Enhancement Board
RMS – Resource Management System
SWCD – Soil & Water Conservation District
USDA – US Department of Agriculture
Wy'East RC&D – Resource Conservation & Development Area Council

References

Larson, Steve; Robert Gilliom and Paul Capel. 1999. Pesticides in Streams of the United States—Initial Results from the National Water-Quality Assessment Program: U.S. Geological Survey, Water-Resources Investigations Report 98-4222.