To: Oregon Pesticide Stewardship Partnership Staff

Re: PSP Data Analysis/Overall Program Concerns

Cc: Oregon Interagency Water Quality Pesticide Management Team
Director Leah Feldon, Oregon Department of Environmental Quality
Acting Director Lauren Henderson, Oregon Department of Agriculture
Karin Power, Natural Resources and Climate Policy Advisor, Office of Governor Tina Kotek
Ed Kowalski, EPA Region 10 Enforcement and Compliance Division Director

Sent via email November 16, 2023

The undersigned organizations would like to – again - formally share serious concerns regarding Oregon's Pesticide Stewardship Partnership Program led by the Oregon Departments of Environmental Quality and Agriculture. For almost two decades, industry partners have engaged with and supported this unique program, which has a strong track record of success in limiting pesticide impacts to waterways in Oregon through targeted stream monitoring efforts which inform education and outreach.

Over the last few years, we note a significant shift in this program's focus, with outreach and education declining, and increased focus on monitoring and data presentation, with the latter now consuming most of the PSP budget. Along with this overall shift in focus, PSP staff turnover has led to substantial and concerning changes in how the PSP monitoring data is being analyzed, interpreted, and presented to agency staff, advisory group members, partners, and the public. This is posing substantial barriers to achieving program goals, and impacting the overall credibility and trust upon which this program's success depends.

Below we outline several key examples of ways in which the PSP data is being analyzed and presented inappropriately with respect to scientific practice. This has resulted in data presentations that invite misleading and even false conclusions. More importantly, attempts to aggregate and generalize have largely replaced what should be a key process of examining and reporting full PSP datasets so that agency staff, PSP advisory group members and local partners can gain insights into specific locations and associated detections, and work together to focus outreach where data indicates it could be useful and successful. We note that these issues have been repeatedly raised with agency leadership, beginning in July 2022, and again in January of 2023, yet the problems continue and are now worsening.

This letter serves as a formal request that the PSP program pause data analysis and presentation until a formal document containing Standard Operating Procedures (SOPs) can be developed to outline and justify methodologies and approaches for data collection, handling, analysis, interpretation, and presentation. This document should be transparent and accessible to partners and the public and should connect the approaches taken with PSP data to accepted, peer-reviewed, scientific practice for data of this nature.

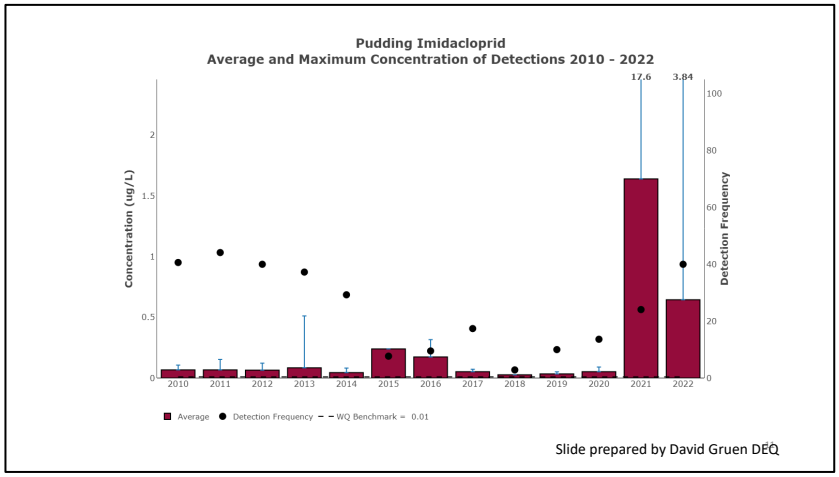
Concerns:

We want to highlight that there are two main categories of concern. One is that errors are being made with analysis and interpretation, which has resulted in misleading and incorrect data presentations. The other is that PSP data is being aggregated and generalized in ways that are inappropriate based on the limitations of

the data itself, and which also mask the key information needed to inform outreach and education goals. In addition to these main concerns, we also request a reassessment of the program's "Decision Matrix," where currently, a single detection over three years can trigger a level of statewide high concern, even when a detection falls significantly below acute benchmarks. Below we provide more detail on each of these concerns, with examples.

I. Errors with data analysis and interpretation

The following graph was presented to local partners for the Pudding Watershed, including Soil and Water Conservation District and Watershed Council staff, and University and industry partners. Below we highlight some key errors with the various approaches taken to produce this image.



1. Exclusion of key data from analyses

The graph leaves out all the "non-detect" data from each of the years' datasets. The non-detects are a critical and significant portion of the PSP data, and there are several scientifically-accepted methods for inclusion of these data in analyses. It is misleading - and in fact dishonest - to analyze or present pesticide monitoring data sets with significant data subjectively excluded. Agencies should not be excluding *any* data from data sets, and certainly not the large proportion of data which demonstrates a lack of impact. Non-detects should be included in every analysis, using scientifically accepted methods. This is fundamental.

2. Use of simple arithmetic means for data that is not normally distributed

The main calculation being presented in this graph is a simple arithmetic mean (of just detections, excluding non-detects). For data such as pesticide monitoring data, which is not normally distributed, a simple mean is an inappropriate method of analysis. The data must first be transformed to account for the impact of extremes or outliers, which dominate these data sets. Analysis methods for PSP data should align with scientifically accepted methods for data of this nature, and these methods need to be researched, translated into an appropriate SOP, and implemented after review.

3. Inappropriate benchmark comparisons

This graph takes averages of a selected and thus biased portion of each of these data sets (excluding non-detects), and compares these against chronic benchmarks. This is counter to both logic and scientifically-accepted practice. Chronic exposure should be estimated from established methods using time-weighted averages, not from simple means of hand-picked, detection-only data that do not represent continuous sampling methods. Only acute benchmarks can be used against single values for environmental concentrations, and calculations of risk should be conducted for each sampling occasion, not just those that are selected because they represent extremes. And given the significant limitations of the PSP dataset, comparing PSP data to *any* aquatic life benchmarks – even acute ones - should be done with extreme

caution. If DEQ has a reason for doing this, it needs to be outlined and justified in a fit of purpose statement that considers the nature of the PSP data and aligns with accepted scientific practice given those considerations.

We note that the primary methodology used in this program, grab sampling, is a low-cost and convenient sampling method initially developed to check for exceedances of discharge permit limits. While it is a convenient method to conduct in the field, and can provide valuable preliminary information, the limitations are significant. Grab sampling is not designed to cover a range of time and locations, and it generally doesn't follow experimental design principles based on statistics. This type of data does not represent exposure scenarios used in risk assessment. Again, extracting a small proportion of only the most extreme values from a dataset and comparing those against chronic benchmarks is wholly inappropriate, and unacceptable from a scientific perspective. This leads to highly misleading data presentations with no basis in reality.

4. <u>Focus on detection frequencies rather than real numbers is misleading</u>

Many of the PSP reports and summaries focus on detection frequency rather than using real numbers. This can be misrepresentative for several reasons. True numbers of detections vs numbers of sampling events provide essential context, and enable more informed data interpretation. Detection percentages can change significantly due to inevitable variation in sampling event numbers, particularly where detections are rare, as is the case with most PSP datasets.

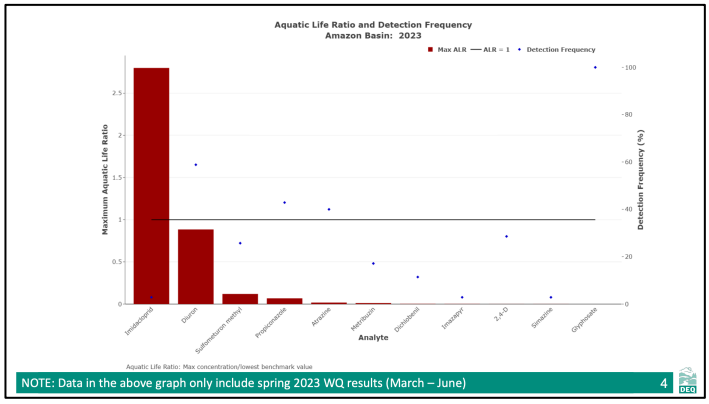
Detection frequency may also increase based on variations in detection limits and advances in instrumentation and analytical methods. These are important to reporting; detection data must be accompanied by a summary of analytical sensitivity. Without this context for interpretation, readers may be left with misguided conclusions that pesticide loadings are increasing, when that may not be the case. Using detection frequency may be acceptable for some purposes, but it should not be the primary mode of presentation for PSP data. This should be researched and justified within the SOP document.

5. <u>Ignoring quality control outcomes</u>

Based on the raw data sets that underlie this graph above, which we have reviewed, a number of data points appear to have failed quality control in the laboratory, yet have been included in data analyses and presentations. If data is failing quality control, it is not suitable for inclusion in analyses and presentations, nor should conclusions be drawn from any results.

II. Aggregation, generalization, and worst-case scenarios obscure critical detail

The following calculation of "Aquatic Life Ratio" for pesticide detections in each watershed was the *only* data initially sent to PSP Advisory Committee members ahead of a scheduled (twice annual) meeting.



The Aquatic Life Ratio calculation used above seems to have been invented by Oregon DEQ and does not appear in any scientific literature that we can locate. This calculation selects the maximum concentration

from a given location and time period, and divides it by the lowest possible benchmark, (which in most cases will be a chronic benchmark). To again emphasize a critical point, comparing single, extreme values against chronic benchmarks represents a false scenario, as well as bad scientific practice. This calculation does not represent a realistic worst-case scenario, for which there are numerous methods available.

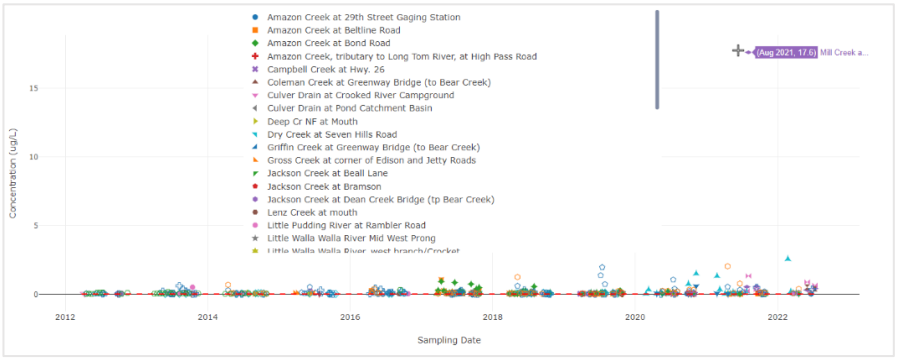
The ALR was never explained to Advisory members, and no information was offered on interpretation, or the goal of this specific calculation. This ratio - with a no relevance to actual impacts – presents false conclusions and simply distracts from understanding the full range of data and specific detections and locations, which Advisory members and others need to see and understand to identify program and educational priorities.

Following a request for additional information on the data sets, DEQ staff followed up with a chart such as the example below for each watershed, where again, simple means are used, non-detects are excluded from means, maximums, and minimums, and chronic benchmarks are the only benchmarks referred to against data that has been selected to include only extremes.

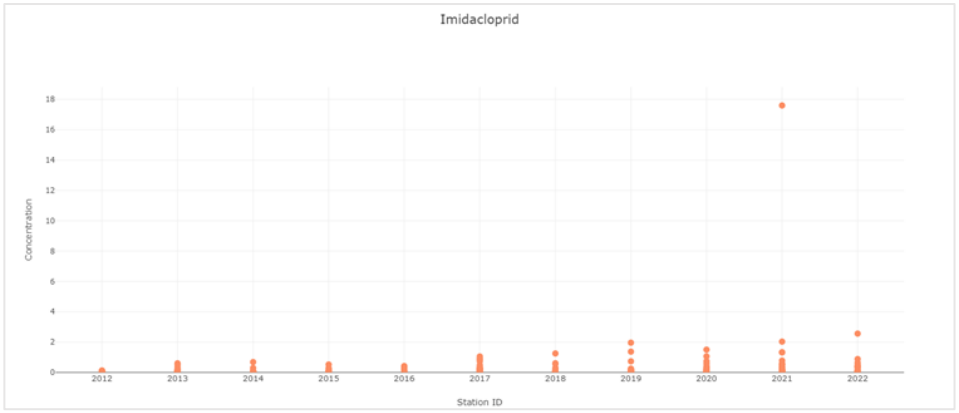
Analyte	Number of Detections	Number of Samples	Detection Frequency	Minimum Detection Concentration (ug/L)	Median Detection Concentration (ug/L)	Mean Detection Concentration (ug/L)	Maximum Detection Concentration (ug/L)	Most Stringent Aquatic Life Benchmark (ug/L)	Most Sensitive Taxon
(RS)-AMPA (Aminomethyl phosphonic acid)	8	8	100%	0.12	0.48	1.25	6.23	NA	NA
2,4-D	2	7	29%	0.10	0.25	0.25	0.40	299.2	Vascular Plants
2,6-Dichlorobenzamide	29	35	83%	0.04	0.09	0.11	0.26	NA	NA
2-Chloro-4-isopropylamino-6-amino-s-triazine	13	35	37%	0.01	0.01	0.01	0.02	NA	NA
Atrazine	14	35	40%	0.01	0.01	0.01	0.02	1	Nonvascular Plants
Dichlobenil	4	35	11%	0.04	0.05	0.06	0.09	30	Vascular Plants
Diuron	20	34	59%	0.01	0.04	0.05	0.12	0.13	Vascular Plants
Glyphosate	8	8	100%	0.10	0.26	0.25	0.34	11900	Vascular Plants
Imazapyr	1	35	3%	0.05	0.05	0.05	0.05	24	Vascular Plants
Imidacloprid	1	35	3%	0.03	0.03	0.03	0.03	0.01	Freshwater Invertebrates Chronic
Metribuzin	6	35	17%	0.01	0.03	0.04	0.10	8.1	Nonvascular Plants

Attempting to average data over entire watersheds rather than examining areas where spikes are found runs counter to the needs and overall goals of the PSP program, and obscures detail that is critical to designing education and outreach programs. Further, due to the nature of PSP data collection methods (grab sampling), these data are not generalizable beyond the specific times and locations of sampling. The PSP Program uses non-random samples that have been intentionally biased with respect to the overall population of water samples. **Rather than aggregating and generalizing, these data should be presented in ways that reveal detail, including areas where spikes are occurring, and allow partners to understand where and to whom targeted education may be needed and beneficial**.

Below are two examples of alternative data presentations, using the PSP data on imidacloprid in the Pudding watershed. The presentation below shows imidacloprid detections by sampling station, clearly revealing the 2021 peak and its location. This type of presentation helps contextualize the data, and is useful in targeting education:



Another approach, which we have requested many times, is to use box-whisker plots (rather than simple means) to show the range of data and outliers. Again, the significant outlier in 2021 is made apparent.



We ask that presentation approaches such as these be explored, and science-based methodologies employed which lead to data transparency and better inform the education and outreach efforts that are central to PSP program goals.

III. Decision matrix thresholds for pesticides of concern need to be re-evaluated

Decision Matrix Based on Water Quality Monitoring Data (2019)
Detected concentration relative to aquatic life benchmark (ALBs) and frequency of detection

Frequency of Detection in Last 3 Years (%)	Reference Level Criteria: ≥ 1 detection at or above 50% of an acute ALB	≥ 3 detection at or above 50% of a chronic ALB	1 - 2 detections at or above 50% of a chronic ALB	No detections over 50% of any ALB
65.1% - 100%	High Level of Concern	High Level of Concern	High Level of Concern	Moderate Level of Concern
35.1% - 65%	High Level of Concern	High Level of Concern	Moderate Level of Concern	Moderate Level of Concern
0% to 35%	High Level of Concern	High Level of Concern	Moderate Level of Concern	Low Level of Concern

8
Slide prepared by David Gruen DEQ

The matrix above displays the current decision thresholds for designating pesticides as high, moderate, or low concern. It is questionable that a single detection over three years could lead to a high concern designation, even when it falls well below acute benchmarks. The matrix appears to have changed significantly from previously published versions used by the program (e.g., see Appendix 1 of the Evaluation of South Yamhill PSP Area). The decision matrix and associated criteria and thresholds should be evaluated and linked to scientific justifications.

Summary:

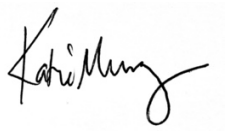
The details outlined above demonstrate a significant shift in program direction, and a lack of scientific expertise around data handling. These issues need to be addressed as soon as possible to preserve and uphold trust and credibility within this program and ensure that the overall program goals can continue to be met. The simplified and flawed analytical methods currently being utilized have eliminated the ability for those receiving information on the program to gain insights into areas where education could be targeted.

Data analysis and interpretation lie at the heart of the PSP program, and our goal is to ensure that the program's value and utility continue to grow. What we have seen in recent years is the opposite, with current utilization of data not only jeopardizing the ability to continue to meet program goals, but also calling into question the scientific integrity of the program itself. The goal with PSP data should not be to try to generalize and draw sweeping conclusions about overall trends. That is not what the program represents, nor is it what the data represent. The goal should remain, as it always has been, to use these data to follow up on detections by evaluating datasets in detail, identifying concerns, and designing targeted outreach and education materials that seek to limit future impacts.

We hope this detailed letter makes clear that based on the ongoing issues with the data, the PSP program should pause data analysis and presentation, and work instead on developing Standard Operating Procedures for data collection, handling, statistical analysis, and data interpretation that are transparent and accessible, and are linked to peer-reviewed scientific practice. This should include a Field Sampling Plan/Quality Assurance Project Plan, a vetted study purpose consistent with the significantly limited monitoring in this program, and a plan for using appropriate statistical methods for analysis.

We could not be more supportive of the PSP program overall, and it is in that spirit that we urge you to ensure that the program continues to adhere to rigorous scientific principles, garner trust, and achieve its goals. We appreciate your prompt attention to this important issue.

Sincerely,



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On behalf of:

Oregonians for Food & Shelter
Associated Oregon Hazelnut Industries
Columbia Gorge Fruit Growers
Far West Agribusiness Association
Oregon Association of Nurseries
Oregon Cattlemen's Association
Oregon Dairy Farmers Association
Oregon Farm Bureau
Oregon Forest Industries Council
Oregon Golf Course Superintendents Association of America
Oregon Seed Council
Oregon Water Resources Congress
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