

Chlorpyrifos Response Plan

I. Introduction

Chlorpyrifos is an active ingredient in commonly used insecticides in Minnesota and is highly toxic when present in aquatic ecosystems; it is also highly toxic to pollinators and other beneficial or desirable insects. In 2012, the Commissioner of the Minnesota Department of Agriculture (MDA) designated chlorpyrifos as a surface water pesticide of concern because of an increase in the number of detections above Minnesota water quality standards in rivers and streams. This Chlorpyrifos Response Plan (Plan) was developed in response to continued detections of chlorpyrifos in rivers, streams and lakes and the determination of chlorpyrifos water quality impairments of rivers and streams in agricultural areas of Minnesota. The information collected as a result of the activities described in this plan will be used to determine if existing chlorpyrifos label requirements (setbacks and wind speed) are being followed by applicators particularly in the surveillance areas. In addition, the information collected will also be used to gain a better understanding of the possible reasons chlorpyrifos is being detected in bodies of water (drift, overspray, runoff, erosion, etc.).

II. Problem Statement

The Minnesota Pollution Control Agency (MPCA) has currently designated nine watersheds on the state's 303(d) TMDL list of impaired waters for aquatic life due to violations of the MPCA maximum (acute) water quality standard for chlorpyrifos (Figure 1) as reported by the MDA in the water quality monitoring data. Additional designations will be determined by the MPCA as necessary (<https://www.pca.state.mn.us/water/minnesotas-impaired-waters-list>).

In 2017, the MDA detected chlorpyrifos in 21 samples collected from rivers, streams, and lakes. This is the most detections in any one year since the MDA first detected chlorpyrifos in 2005, and the first year in which the MDA detected chlorpyrifos in lakes. The MDA has never detected chlorpyrifos in groundwater. Due to the hazards posed by the chemical to aquatic and terrestrial life and the increase in detections, a response plan was developed.

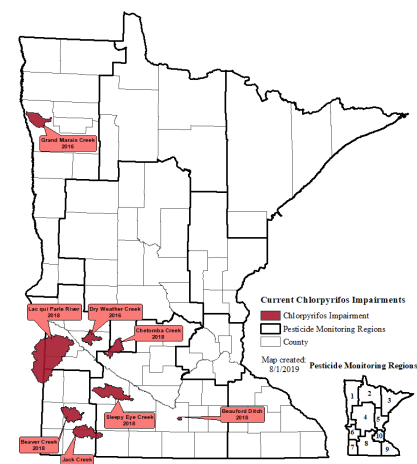


Figure 1. Watersheds in Minnesota with a designated or proposed pesticide impairment or delisted watersheds (as of 9/12/19).

III. Response Plan Details

This Response Plan has been developed to address concerns related to the presence of the insecticide chlorpyrifos in surface water systems in Minnesota. The specific objectives presented

below are designed to ensure that chlorpyrifos use will not cause unreasonable adverse effects on the environment¹:

1. Develop and provide education and outreach materials to applicators and growers.

Pesticide Nonpoint Section

- Education and outreach efforts

Regional

- Crop News release;
- Direct mailings;
- Distribute handouts to Ag and NRCS offices;
- Webinar;
- New handouts;
- Mass email;
- Expo displays;
- Conference presentations;
- Recertification training;
- MDA Update article; and
- Others as developed.

- Contact current registrants for information and possible support for on-going research, demonstration and outreach.

Targeted

- Direct mailings
- Define “surface water” as used on the label and provide guidance
- Update MDA chlorpyrifos Fact Sheet and FAQ material on MDA web page.
- Evaluate existing literature related to chlorpyrifos drift and assess the need to conduct a study of chlorpyrifos drift in Minnesota.
 - Conduct study on drift as route of water contamination
 - Assess drift with aerial application while adhering to BMPs for chlorpyrifos
 - Sample drainage tile as a possible routes of water contamination following heavy rainfall.
 - Use results to provide addition education on spray drift

2. Inspections

Targeted Inspections

- Conduct post use inspections for fields that had chlorpyrifos applied adjacent to surface water in watersheds where detections occurred (maps will be used to help identify target areas) and document the following:

¹ Minnesota Pollution Control Agency <https://www.pca.state.mn.us/water/water-quality-standards>

- Trade name of chlorpyrifos product applied;
- Date of application;
- Rate of application;
- Application method;
- Target site;
 - Determine distance to surface water;
- Determine required setbacks if any; and
- Document wind speed recorded by the applicator and/or nearest MN DOT weather station
- Conduct field investigations to determine label violations of required setback.
- Identify impairments due to chlorpyrifos detection(s), and modify the chlorpyrifos inspection map annually, as required.

Regional Inspections

- Conduct in-use inspections in areas where soybeans are grown
- Conduct field investigations to determine label violations of required setback.

3. Evaluate existing label requirements and further develop Best Management Practices Pesticide Technical Unit

- Review chlorpyrifos Best Management Practices (BMPs) and update as needed.
- Provide guidance on label use requirements and registration requirements.

4. Continue to monitor for the presence of chlorpyrifos in Minnesota water resources and assess factors related to fate and transport.

Monitoring and Assessment Unit

Targeted

- Conduct groundwater and surface water quality monitoring in the areas where previous detections occurred
- Work with MPCA for water quality data assessment to determine waterbody impairments.
- Summarize information (precipitation, water quality, climactic conditions) collected in monitoring areas to investigate possible chlorpyrifos fate and transport mechanisms.

Regional

- Conduct groundwater and surface water quality monitoring in waterbodies throughout the growing regions of the state.

IV. Background

Chlorpyrifos is an active ingredient in the organophosphate class (1B) and acts as a nerve agent in insects. The mode of action acetylcholinesterase inhibition, which acts by binding to the enzyme that acts to break down nerve impulses carriers, thereby causing seizures and eventual death of the

insect. In the areas of interest, as described in this plan, it is used primarily for soybean aphid control.

Chlorpyrifos is generally persistent (can vary depending on soil type and environmental conditions) and immobile (K_{oc} : 5860-6040) in the soil². Contamination of water can occur via soil runoff, erosion, overspray, volatilization, precipitation, or drift. It is primarily broken down (in the soil) through biodegradation. Volatilization is not considered significant with chlorpyrifos, as stated in the most recent Registration Eligibility Document from the U.S. Environmental Protection Agency (EPA), however, more recent studies have detected up to 30% volatilization approximately 6 hours after application³. Due to the toxicity to aquatic life, setbacks from surface water (ground: 25 feet; aerial: 150 feet) are required and stated on pesticide labels.

Laboratory Analytical Background

In 2008, a reduction in the method reporting limit (MRL) by the MDA Laboratory from 100 ng/L to 40 ng/L allowed quantification of chlorpyrifos at concentrations relevant to the Minnesota chronic (41 ng/L) and maximum (83 ng/L) aquatic life standards². Chlorpyrifos oxon, a degradate, is also monitored, but has never been detected at high concentrations in Minnesota.

Surface Water Monitoring Background

Chlorpyrifos detections in surface water occur most frequently in August, and most detections have occurred during base flow conditions, when rivers are low, and runoff is **not** occurring. Prior to 2010, chlorpyrifos was rarely detected (once or twice annually from 2005-2009) in Minnesota surface waters. The MDA expanded the number of samples collected in July and August starting in 2012 and 2013. Figure 2 presents the number of chlorpyrifos detections in surface water each year between 2005 and 2017.

² U.S. Environmental Protection Agency. Problem Formulation for the Environmental Fate and Ecological Risk, Endangered Species and Drinking Water Assessments in Support of the Registration Review of Chlorpyrifos.

³ Evaluation of Direct Flux Measurement of Chlorpyrifos and Chlorpyrifos-Oxon Emissions Following Applications of Lorsban Advanced Insecticide to Alfalfa (MRID 48883201)

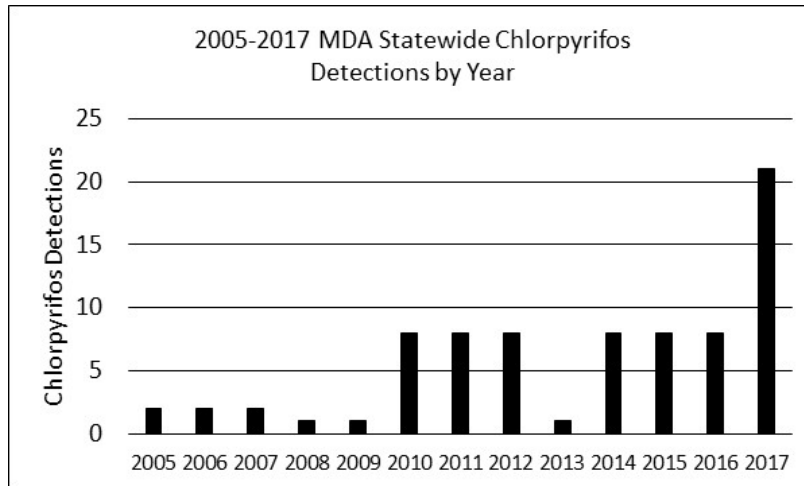


Figure 2. 2005-2017 MDA Chlorpyrifos Detections in Rivers, Streams, and Lakes.

Use and Soybean Aphids

Soybean aphids (*Aphis glycines*) are the most damaging insect on soybeans in the North Central U.S and outbreaks occur yearly in Minnesota. Due to increasingly mild temperatures occurring in Northwest Minnesota and milder winters throughout the crop-growing regions, as a result of climate change, soybean aphid outbreaks are becoming more prevalent in the state each year. Starting in 2015, cases of soybean aphid resistance to pyrethroids in parts of Minnesota, Iowa, North Dakota, and South Dakota were reported. To combat the loss of soybean aphid control on soybeans with pyrethroids, growers have applied chlorpyrifos instead.

For growers with documented soybean aphid resistance in their fields, chlorpyrifos is used as soon as aphid populations reach a threshold. For growers that experience poor pesticide efficacy for the first time in the growing season, chlorpyrifos is used as a secondary or rescue treatment to control the aphids that were not controlled by the pyrethroid treatment.

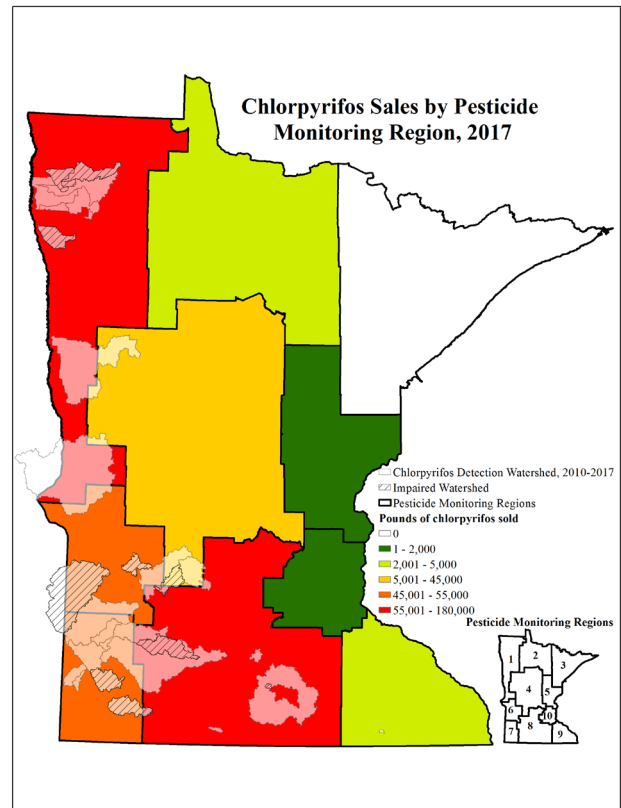


Figure 3. Chlorpyrifos sales (lbs of product) by pesticide monitoring region in 2017. Detections are shaded in light gray. Impaired water bodies are marked with hashes in light gray.

The Minnesota Zoo recently completed a study to evaluate the potential for pesticide drift in to prairies where threatened butterfly habitat exists⁴. Drift monitoring was conducted by sampling vegetation in mid-August to early September, to align with the period when soybean aphid spraying is likely to occur. Sampling locations were set up at the edge of the prairies (near the agricultural fields) and $\geq 100\text{m}$ into the prairie. Detections of chlorpyrifos were found at the edge as well as the interior locations of the prairies, which suggests drift is occurring with chlorpyrifos treatments.

Product use and label requirements

Chlorpyrifos was first registered for use in 1965. Minnesota has 32 restricted use products registered with chlorpyrifos as an active ingredient for agricultural use. The formulations available are emulsifiable concentrate, flowable concentrate, soluble concentrate, and granular. Granular formulations are not considered to be a large source of water contamination. The products contain between 28% and 45% chlorpyrifos (excluding granular products) and are applied to a wide variety of agricultural crops. Chlorpyrifos products can be applied pre-plant, at-plant, or post-plant.

Due to potential non-target effects from chlorpyrifos, label requirements and restrictions are stated on all product labels that an applicator must adhere to. The EPA requires setbacks from surface water due to the toxicity to aquatic life: 25 feet for ground application (and within 4 feet above the canopy), 150 feet for aerial application (and within 10 feet above the canopy), and 50 feet for orchard blast application. Measurements for setbacks are made from the water body's edge at the time of application. In addition to setbacks from water, applicators must monitor wind speed and apply only when wind speeds are between 3 and 10 mph.

Chlorpyrifos education and outreach history

Due to the toxicity of chlorpyrifos, best management practices (BMPs) for use of this chemical were developed by the MDA in 2014, with an update made in 2018. These BMPs guide growers on the proper steps and precautions to take while using the chemical. In 2016 and 2018, approximately 12,000 letters were sent to growers and applicators and a crop news email (in cooperation with the University of Minnesota) was sent reminding them of the setbacks required when applying chlorpyrifos.

Minnesota's Impaired Waters List⁵

Under direction of the federal Clean Water Act, Minnesota has adopted water quality standards to protect waters from pollution. These standards define how much of a pollutant can be in the water and still allow it to meet designated uses, such as drinking water, fishing, and swimming. A water body is "impaired" if it fails to meet one or more water quality standards.

To identify and restore impaired waters, the MPCA:

- Assesses waters of the state to determine if they meet water quality standards;

⁴ Imperiled Prairie Butterfly Conservation, Research, and Breeding. M.L. 2014, Chp. 226, Sec. 2, Subd. 05j1.

⁵ Content obtained from Minnesota Pollution Control Agency, <https://www.pca.state.mn.us/water/minnesotas-impaired-waters-list>

- Lists impaired waters that do not meet standards and updates the list in even-numbered years;
- Conducts studies to set pollutant reduction goals needed to restore impaired waters;
- Coordinates closely with other state and local agencies on restoration activities.

This Plan will provide specific actions MDA will undertake to address the items in the above list.

V. RESPONSE PLAN APPROACH

The purpose of this Plan is to fulfill the work plan objectives listed on pages 2-4 of this document. The response will be approached at two scales: regional and targeted. Regional responses will occur where the product is being used throughout the growing region of the state. A targeted response will occur within the watersheds or rivers that have or may have impairments. The strategies include: outreach and education, use inspections and enforcement, evaluation of practices, and continued water quality monitoring.

This Plan will combine and coordinate information relating to actions being conducted in direct response to the chlorpyrifos detections and water quality impairments and MDA's on-going responsibility is to assure pesticides are used in a manner that does not cause unreasonable adverse effects on the environment.

Potential delisting criteria

If water monitoring results indicate no additional chlorpyrifos standard violations, and the outcomes of the plan suggest current actions are adequate to prevent future violations, impairments may be considered for removal (delisting) from the 303(d) TMDL list of impaired waters.

Recommendations for delisting water bodies from the 303(d) TMDL list of impaired waters are made by a Delisting Review Committee consisting of MPCA monitoring and data assessment staff. The Delisting Review Committee can request input from MPCA project managers as well as local staff whose data was used in the assessments. In the case of chlorpyrifos, MDA staff would be asked to participate. The Delisting Review Committee only makes recommendations for delisting water bodies from the 303(d) TMDL list of impaired waters; final determinations are made by EPA.

Recommendations for delisting are based on the weight of evidence with consideration given to quality and quantity of available data, weather and flow conditions and documented changes in the watershed that could affect water quality. Particularly important for the delisting of a water body impaired for chlorpyrifos would be 1) new water quality data, collected during critical application periods, indicate the water body is no longer impaired and is meeting water quality standards; 2) changes in chlorpyrifos use or management sufficient to provide reasonable assurance that future exceedances are unlikely even during peak application periods; and, 3) no violations of the Chronic Water Quality Standard for chlorpyrifos within the last 6 years⁶.

⁶ A detailed description of the delisting process can be found in Section X of the "Guidance Manual for Assessing the Quality of Minnesota Surface Waters for Determination of Impairment: 305(b) Report and 303(d) List".

A previous impairment at Seven Mile Creek in Minnesota will be used as a model for evaluating current and future delistings. The MDA added Seven Mile Creek as a survey location in its routine pesticide monitoring program in 2002. The location was upgraded to a Tier 3 location in 2003 as MDA expanded its pesticide monitoring program. Tier 3 locations are monitored year-round and average between 20 and 30 pesticide sample collection events per year. Chlorpyrifos was detected in 0.4 percent (one sample) of the samples collected from 2002-2016 at Seven Mile Creek. The detection, which occurred in 2010, (240 ng/L) was above the Minnesota acute (maximum) standard (83 ng/L). The impairment involved continued monitoring without any subsequent detections as well as numerous outreach and education efforts and was delisted six years after the initial detection.

In comparison to other products, chlorpyrifos is different in that the detection limit is close to the chronic standard. This results in risk over a larger area and requires flexibility in the response to the issue.

Roles in work plan implementation

Activities proposed in this work plan will be conducted by MDA staff with assistance from the MPCA, industry, and local entities. Collaboration with a variety of partners and stakeholders is anticipated including:

- soil and water conservation districts;
- crop producers and crop producer organizations;
- watershed and environmental protection organizations;
- pesticide applicators and dealers;
- crop consultants; and
- University of Minnesota.

The MPCA holds final authority for the chlorpyrifos impairment response process. A letter of plan approval from MPCA will initiate MDA's formal implementation of this Plan.

VI. Planned Tasks

Pesticide Technical Unit

An education, media, and outreach campaign will be completed to increase awareness of label requirements and chlorpyrifos BMPs.

a. Approach and Timeline

Targeted

1. Informative letter sent to all applicators in counties where detections have occurred, sampling may be performed, or where critical habitat for endangered or threatened species exists.

- Completed July 2018

Regional

2. Outreach and displays at key events (Soybean Biodiesel Open, Ag Expo)

- Soybean Biodiesel Open, completed June '18
- Crop Production Retailers, December '18
- Ag Expo, winter '18/'19

3. Crop Newsletter involvement with the University of Minnesota

- Newsletter sent August '18

4. Power email.

- An email will be distributed through agricultural networks in MN regarding chlorpyrifos concerns and setbacks required.

5. Conference Presentation.

- Conference presentations will be given to applicators about the current issues with chlorpyrifos detections and the proper setbacks and label requirements.

6. Recertification Training

- Educate licensed applicators about proper use, setbacks, and current issues.

7. Outreach Document Dissemination

- Outreach documents concerning chlorpyrifos will be disseminated to state NRCS offices for distribution.

8. Webinar: Focused towards applicators with industry and university involvement.

- Chlorpyrifos Use: Water Detections, Proper Application, and Need

9. Conduct drift study from aerially applied chlorpyrifos to a soybean field

- Utilize BMPs for chlorpyrifos when applying to assess efficacy of recommendations
- Sample at multiple distances from application site.
- Complete in summer '19

Inspection and Enforcement Units

a. Inspections

The Inspection Units will complete chlorpyrifos application record surveillance for fields adjacent to surface water first at local pesticide dealerships. These visits will focus on verifying the total amount of chlorpyrifos used per acre, setback documentation, and provide compliance assistance following the growing season.

Targeted

Chlorpyrifos Application Record Inspections (Winter/Spring)

1. Obtain water sampling location specific to the surveillance area(s) from the Water Monitoring Unit. Agricultural Chemical Investigators (ACIs) conduct inspections with local agricultural pesticide dealers, commercial pesticide applicators, and/or landowners:
 - a. Review chlorpyrifos application record(s), sales records (dealers), and purchases of chlorpyrifos related to fields adjacent to surface water.

- i. For select small watersheds, ACIs may be requested to document all applications, sales, and purchases of chlorpyrifos.
 - b. Provide compliance assistance by reviewing the chlorpyrifos label restrictions and educating applicators. Provide applicators with guidance on how to document compliance by including a map that shows/describes the required buffer or area that must not get treated.
 - c. Inquire if/and where soybeans will be planted in 2019 adjacent to surface water.
2. Determine if chlorpyrifos label requirements are being followed;
 - a. Inform Response Plan management, through inspections and enforcement, how to minimize chlorpyrifos movement to surface water.

Field Inspections (Summer)

Regional/ Targeted

1. The ACIs may observe applications to target sites where soybeans are growing within the required label setback distances for chlorpyrifos. Such sites can be used for field inspections. ACIs will conduct agricultural use inspections (real time or post use) and may obtain vegetation samples within the buffer area adjacent to surface water to determine possible chlorpyrifos label violations.
2. Inspection Goals: Agricultural Use Inspections are assigned to ACIs who are responsible for multiple counties. Counties where inspections may take place can be found in Appendix 1. The number of inspections will vary due to multiple factors, including but not limited to aphid population, number of high priority human endangerment complaints, success in locating applicators who are applying chlorpyrifos in real time, etc.
3. Issue field orders if appropriate.

b. Enforcement

The MDA will determine whether any/further enforcement action is reasonable and necessary for any documented violation(s).

Monitoring and Assessment Unit

a. Surveillance

In response to the historic and future chlorpyrifos detections in surface waters, the Monitoring and Assessment Unit will provide spatial and data analysis to assist in the determination in the appropriate areas for inspections. The Monitoring Unit will ensure that water quality data is collected for the continued evaluation of chlorpyrifos and assessment of the effectiveness of the actions taken. Chlorpyrifos has label requirements that are designed to reduce the risk to surface water resources. The primary objectives associated with the Monitoring and Assessment Unit activities are:

1. Determine, if possible, the primary transport mechanism of chlorpyrifos to surface water;
2. Conduct groundwater and surface water quality monitoring in the areas where previous detections occurred and throughout the growing regions of the state.

b. Areas of interest

MDA chlorpyrifos surveillance activities will occur in areas where chlorpyrifos has been detected in surface water since 2010 (Fig. 4). In addition to the routine surface water sites, monitoring is planned for one lake where chlorpyrifos was detected in 2017 and 2018. Additional watersheds may be targeted if resources are available.

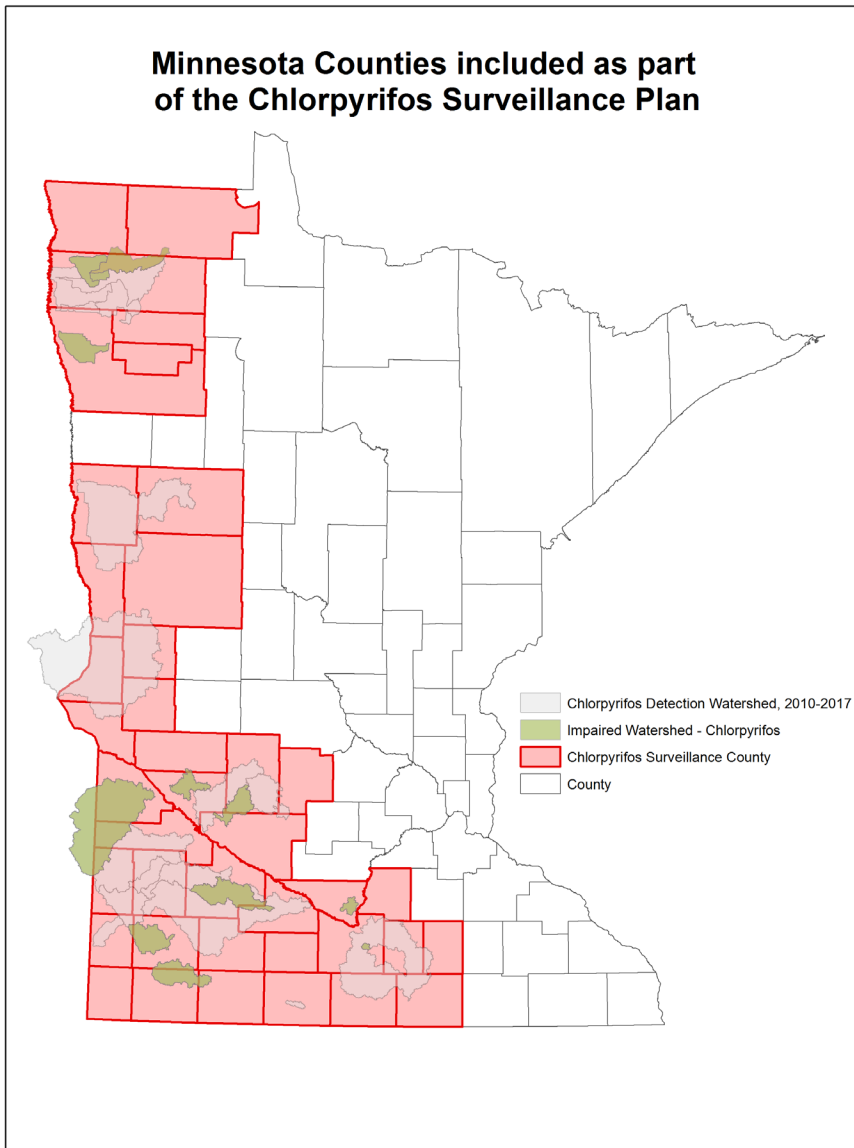


Figure 4. Minnesota counties in chlorpyrifos surveillance plan and watershed where chlorpyrifos has been detected.

Work Plan

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| Activity 1: | Informative Letter Mass mailing |
| Responsible party: | MDA- Pesticide Management Unit |
| On-going or impairment-specific: | This is in response to the increase in chlorpyrifos detections in water |
| Scope: | A letter describing the increase in detections of chlorpyrifos in water as well as the setbacks required from water when applying will be discussed. Supplemental materials included in the mailing are: a map showing where impairments due to chlorpyrifos exist in MN, Water Quality Best Management Practices for Chlorpyrifos, and the Chlorpyrifos Cue Card. The letter will be sent to applicators in counties where monitoring, detections, impairments, or sensitive habitats occur. |
| End product: | The letter will be sent to approximately 11,000 applicators in 43 different counties of the state. |
| Timeline: | Initial effort: July 2018, Future mailings when/if necessary |

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| Activity 2: | Chlorpyrifos Outreach Display |
| Responsible party: | MDA- Pesticide Management Unit |
| On-going or impairment-specific: | This is in response to the increase in chlorpyrifos detections in water |
| Scope: | A display and demonstration of water setbacks will occur at the Soybean Biodiesel Open. The display will include a poster and graphics of the setbacks required as well as a description of the issue. The demonstration will require golfers to hit a ball from the setback distance required for aerial and ground application of chlorpyrifos in order to provide a visual of the distance required. In addition, information will be available at the Ag Expo. |
| End product: | The letter will be sent to approximately 11,000 applicators in 43 different counties of the state. |
| Timeline: | Initial efforts: June 2018, December 2018. Participation in additional events will occur as opportunities arise |

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| Activity 3: | Crop Newsletter on Chlorpyrifos |
| Responsible party: | MDA- Pesticide Management Unit and University of Minnesota |
| On-going or impairment-specific: | This is in response to the increase in chlorpyrifos detections in water |
| Scope: | An E-newsletter describing the reason for increased chlorpyrifos use, best management practices, and respirator use was emailed to everyone that is signed up to receive the University of Minnesota-Extension's Crop Newsletter. |
| End product: | Newsletter to growers and applicators |
| Timeline: | Initial effort: August 2018 |

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| Activity 4: | Chlorpyrifos Power Email |
| Responsible party: | MDA- Pesticide Management Unit |
| On-going or impairment-specific: | This is in response to the increase in chlorpyrifos detections in water |
| Scope: | A message detailing the increased frequency in chlorpyrifos detections in water as well as BMPs and drift prevention will be drafted to be sent through a variety of Eblast newsletters. Organizations partnering in this effort will include soybean growers, corn growers, Minnesota Farmer's Union and more. |
| End product: | A widely distributed email containing a standard message about the issues surrounding chlorpyrifos use as well as the ways to prevent them. |
| Timeline: | June 2019, potentially on-going |

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| Activity 5: | Webinar |
| Responsible party: | MDA- Pesticide Management Unit |
| On-going or impairment-specific: | This is in response to the increase in chlorpyrifos detections in water |
| Scope: | The webinar be focused towards applicators. It will cover the background on chlorpyrifos, the reason for increased use, detections in water, and best management practices, drift prevention, and setbacks from water. |
| End product: | Applicators will receive information from multiple sources through the webinar. |
| Timeline: | Initial effort: Spring 2020 |

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| Activity 6: | Presentations |
| Responsible party: | MDA- Pesticide Management Unit, Licensing Unit, and University of Minnesota |
| On-going or impairment-specific: | This is on-going and in response to the increase in chlorpyrifos detections in water |
| Scope: | Presentations will be focused towards licensed applicators. Presentations will occur during recertification courses and at conferences. A completed presentation to licensed aerial applicators contained over 120 people in the audience. |
| End product: | Presentation on use, label requirements, set-backs, and issues will be given as opportunities arise. |
| Timeline: | Initial effort: February 2019 |

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| Activity 7: | Chlorpyrifos Drift Study |
| Responsible party: | MDA- Pesticide Management Unit |
| On-going or impairment-specific: | This is in response to the increase in chlorpyrifos detections in water |
| Scope: | Pesticide drift, specifically chlorpyrifos, will be evaluated when the application occurs for the control of soybean aphids to determine whether current water quality BMPs for chlorpyrifos, which are intended to protect water from unintended contamination, are sufficient. The study will also determine whether current setbacks provide enough distance between the application location and water body to prevent the movement of chlorpyrifos into the non-target areas. |
| End product: | Supporting data for the effectiveness of the chlorpyrifos BMPs in preventing water contamination due to drift. |
| Timeline: | Summer 2019, potentially on-going |

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| Activity 8: | Chlorpyrifos application record inspections |
| Responsible party: | MDA- Inspection Unit |
| On-going or impairment-specific: | This is in response to the increase in chlorpyrifos detections in water |
| Scope: | Inspections will occur primarily in areas where water detections of chlorpyrifos have occurred. In the winter/spring, ACIs will inspect application records from the previous season in order to verify that setbacks were maintained and other label requirements were followed. In the summer, ACIs will target fields with active applications to verify that label requirements are being met. In addition, records will be reviewed and vegetation samples may be acquired from a non-target area near the site of application. |
| End product: | Compliance assistance will occur as needed when inspections take place. Enforcement actions will occur as necessary for violations. |
| Timeline: | Initial efforts: January 2019 , on-going |

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| Activity 9: | Chlorpyrifos Water Monitoring Activities |
| Responsible party: | MDA |
| On-going or impairment-specific: | This activity is part of an ongoing effort to monitor pesticides in water |
| Scope: | The Monitoring Unit will provide spatial and data analysis to assist in the determination in the appropriate areas for surveillance. The Monitoring Unit will ensure that water quality data is collected for the continued evaluation of chlorpyrifos and assessment of the effectiveness of the actions taken. |
| End product: | Water quality monitoring data reports (yearly) indicate spatial and temporal occurrence of chlorpyrifos in surface water within the monitored area: a reduction in chlorpyrifos detections will demonstrate success of efforts to reduce water detections. Increased or maintained detection frequency will indicate a need for further actions. |
| Timeline: | This activity is ongoing. Water Quality Monitoring Reports will be completed yearly. |

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| Activity 10: | Chlorpyrifos Response Plan Report |
| Responsible party: | MDA- Pesticide Management Unit |
| On-going or impairment-specific: | This is in response to the activities developed in response to chlorpyrifos detections and impairments |
| Scope: | A report detailing the actions, findings, and outcomes of the activities detailed in this plan will be developed. |
| End product: | A report on the response to chlorpyrifos detections and impairments |
| Timeline: | On-going |

Appendix 1.

Minnesota Counties included in the chlorpyrifos surveillance plan.

| County | County |
|---------------|-----------------|
| Blue Earth | Kittson |
| Faribault | Marshall |
| Le Sueur | Pennington |
| Martin | Polk |
| Nicollet | Red Lake |
| Watonwan | Roseau |
| Brown | Chippewa |
| Redwood | Kandiyohi |
| Renville | Lac qui Parle |
| Big Stone | Meeker |
| Grant | Swift |
| Otter Tail | Yellow Medicine |
| Stevens | Cottonwood |
| Traverse | Jackson |
| Wilkin | Lincoln |
| Becker | Lyon |
| Clay | Murray |
| Freeborn | Nobles |
| Steele | Pipestone |
| Waseca | Rock |