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Pesticides of Interest Evaluation Summary

Nebraska Department of Agriculture

Introduction

Beginning in 2007, state lead agencies for pesticide regulation were required by the Environmental Protection Agency (EPA) to evaluate “pesticides of interest” for water quality concerns from an initial list of 57 active ingredients. The results of the evaluations are intended to provide EPA with national measures of performance in addressing water quality issues related to pesticide use¹. In addition, these evaluations can be used by states to target specific outreach efforts and broadly measure the effectiveness of those efforts in affecting change in water quality. Table 1 tabulates the pesticides of interest evaluations conducted to date by the Nebraska Department of Agriculture (NDA) and Table 2 shows the performance measure calculations for Nebraska based on these evaluations.

Table 1. Count of pesticides of interest evaluations for Nebraska in the Pesticides of Interest Tracking System (2007-2013, 2015, 2017, 2022)

Section	Total Number of Pesticide Entries	Total Entries Evaluated This Year (new)	Total Entries Re-Evaluated This Year	Cumulative Pesticides Evaluated	Cumulative Pesticides Re-Evaluated
Pesticides of Interest Characterizations	57	0	12	57	24
Additional Pesticides of Interest Characterizations	32	0	1	32	3
Pesticides of Concern (POC) Identified	2				
POCs Under Active Management	1				
Demonstrated Progress	1				
Program Management Section Completed	1				
POC reclassified as NPOC	0				

Table 2. NDA pesticide program performance measures based on pesticides of interest evaluations (2007-2013, 2015, 2017, 2022).

Measure 1 Pesticides of Interest Evaluated = $\frac{\text{number evaluated not a concern} + \text{evaluated concern}}{57 \text{ pesticides of interest} + \text{\#added pesticides of interest}}$	89/89 or 100%
Measure 2 Pesticides of Concern Actively Managed = $\frac{\text{number of pesticides of concern under active management}}{\text{number of pesticides of concern identified}}$	1/2 or 50%
Measure 3 Demonstrated Progress = $\frac{\text{number actively managed with demonstrated progress}}{\text{active ingredients under active management}}$	1/1 or 100%
Measure 4 Number of re-evaluations (cumulative)	27
Measure 5 Number of pesticides of concern re-evaluated not a concern (cumulative).	0

Definitions of terms used in the preceding tables and text:

A Pesticide of Interest is any active ingredient or degradate identified by State and Tribal pesticide regulatory agencies in a survey conducted in 2005, plus any others that are the cause of impairments under Clean Water Act §303(d), plus any other pesticides a State or Tribe wishes to add. This list represents those pesticides that have the potential to occur in ground or surface water at concentrations approaching or exceeding a human health or ecological reference point.

A Pesticide of Concern is one that, based on an evaluation of available information, is found to pose a significant risk to water quality in geographically sensitive areas i.e., the State or Tribe has identified them as having a significant potential to approach or exceed an established human health or environmental reference point or other “benchmark” in ground or surface water. Designation as a pesticide of concern would elevate that pesticide for management to ensure concentrations are maintained or reduced below the reference point. This metric is aimed at quantifying State and Tribal efforts to manage pesticides that have been identified as posing a risk of significant contamination.

A Pesticide Actively Managed is one where activities are carried out to prevent or reduce contamination of water resources by a particular active ingredient, so it is prevented from reaching the water quality standard or other reference point, or brought below the reference point. Over time, EPA will be looking for 100% of pesticides of concern to be managed.

A Reference Point is the concentration of a pesticide active ingredient in water used to judge the severity of contamination. It may be based on a Maximum Contaminant Level (MCL), drinking water health advisory, surface or ground water quality standard (which can address human or aquatic life toxicity), EPA reference dose, EPA drinking water level of concern, or another benchmark that the

State or Tribe adopts by regulation or policy. In general, the State and Tribal goal is to prevent contamination from reaching the reference point.

Demonstrated Progress is defined as progress toward reduction or maintenance of concentrations below the reference point, and could be demonstrated by any of the following:

- Targeted monitoring of water samples from vulnerable use areas that determines that mitigation measures are preventing residue levels from approaching or exceeded a reference point.
- Downward trends in concentration established by coordinated monitoring of ground water or surface water in geographic areas where the pesticide of concern is being used.
- The adoption of use prohibitions in vulnerable areas, plus targeted inspections and enforcement that assures widespread compliance.
- The results of targeted surveys or inspections that document the wide adoption of voluntary or regulatory measures which have been proven via research to protect water quality.

Pesticides of Interest Evaluation Logic:

The following pages list the active ingredients evaluated by NDA and provide the justification used for the determination. Data contained in the Nebraska Groundwater Quality Clearinghouse² (hereafter called the “Clearinghouse”), U.S. Geological Survey National Water Information System (NWIS)⁴, and data collected by the Nebraska Department of Health and Human Services³ (NDHHS), were used to evaluate potential ground water impacts. The Clearinghouse contains data collected and submitted by many entities spanning 1972 — present, and NDHHS data come from municipal drinking water suppliers, as required by the Safe Drinking Water Act (SDWA). USGS surface water quality data from NWIS⁴, and monitoring data and determinations by the Nebraska Department of Environment and Energy⁵ (NDEE) were used to assess potential surface water impacts. In addition, USDA National Agricultural Statistics Service pesticide use data⁶ for agricultural field crops, USGS pesticide use estimates⁷, and USDA’s Windows Pesticide Screening Tool (Win-PST)⁸ were used to help gauge potential risk to water quality. These tools help gauge the potential for pesticides to be found in water and are especially useful if there are limited monitoring data.

For comparing sample results to concentrations which may cause human or environmental health effects, the following sources were used: EPA’s [Drinking Water Standards and Health Advisories](#)⁹ for regulating the Safe Drinking Water Act, and EPA’s [Human Health Benchmarks for Pesticides](#) (HHBP)¹⁰, which are advisory values and not legally enforceable federal standards, were used to gauge risk to human health. EPA’s [Aquatic Life Benchmark Table](#)¹¹, developed by EPA’s Office of Pesticide Programs from pesticide registration studies, and EPA’s [Aquatic Life Criteria](#)¹², developed by EPA’s Office of Water for regulating the Clean Water Act, were used to assess ecological risk. In addition, NDEE’s [Surface Water Quality Standards](#)¹³ were used, where available. Drinking water standards and human health benchmarks are listed with most of the pesticide of interest evaluations below. Nebraska aquatic life standards or EPA aquatic life criteria are listed for most ingredients below, if available, or the lowest two categories of aquatic life benchmarks. However, readers are encouraged to use the links above if these values are not listed, or if much time has passed since the last evaluation, because these values, especially the benchmarks for human health and aquatic life, change as new information is analyzed by EPA.

Toxicity of pesticides in the environment is measured in acute and chronic terms. Acute effects occur rather immediately or after a relatively short time, and acute risk values are generally higher than chronic risk values. Chronic effects are those that occur over the long term, and the risk values are generally lower, and are used to assess potential risk over a longer exposure period. Chronic human health risk is generally estimated for exposures over a lifetime. Aquatic life criteria are developed to protect aquatic organisms from death, slower growth, reduced reproduction, and the accumulation of harmful levels of toxic chemicals in their tissues that may adversely affect consumers of such organisms.

Another consideration not evaluated here, is the concept of mixtures of pesticides and the effects of these mixtures on aquatic plant or invertebrate communities. Recent analysis by USGS²¹ in Plains and Midwestern

watersheds indicated a median of 25 pesticide active ingredients or degradates per surface water sample (ranging from 1 to 61 compounds) and 54 compounds per sampling location (ranging from 24 to 79 compounds). The number and types of pesticide compounds varied by land use as well as throughout the use season, but both aquatic life benchmarks for individual compounds and toxicity indices of compound mixtures were exceeded at specific sites. Potential effects will need to be considered in the future as more information is known about the occurrence and extent of these mixtures in Nebraska.

While this process of evaluating pesticides of interest considers several data sources and attempts to relate these data to potential risk, it is still somewhat subjective. However, it is NDA's intent to vet this evaluation through the Nebraska Ground Water Monitoring Advisory Committee and the Nebraska Surface Water Advisory Council¹⁴, as well as the State Management Plan/Pesticide Management Plan Committee. The State Management Plan (or SMP) Committee was designated by the director of the Nebraska Department of Agriculture for reviewing summaries of monitoring data and determining whether there is enough evidence or need for developing a Pesticide Management Plan for a specific active ingredient¹⁵. This committee formally met first in 2016 and will likely meet at least annually in the years to come.

2,4-D (2,4-dichlorophenoxyacetic acid, herbicide, CAS 94-75-7); Pesticide of Interest; 2008 & 2013.

- **MCL**⁹: 0.07 ppm or 70 ppb; **Aquatic Life Benchmarks**¹¹: acute nonvascular plants (ANV) = 3,880 ppb; acute vascular plants (AV) = 13 ppb
- 0 detections of 2,4-D from 316 samples in the Clearinghouse archive. Approximately 60% of these samples were collected from 2002-2004, with no samples after this time.
- The only other derivative of 2,4-D in the clearinghouse is 2,4-D methyl ester, with 197 samples analyzed with no detections. (see bit.ly/182fEgp¹⁶ for more info on how chemicals are classified, including 2,4-D).
- Only one public water supply sample contained a detection of 2,4-D out of 3,732 samples since 2000.
- Very few surface water samples in the USGS dataset were analyzed for 2,4-D, and there were no detections. The few detections of 2,4-D methyl ester in USGS samples were sub-ppb.
- 2,4-D and its derivatives are used on a variety of crops in Nebraska, however it is only used on less than 5% of the corn acres and approximately 12% of the soybean acres. USDA National Agricultural Statistics Service (USDA NASS) pesticide use data for the last Nebraska crop surveys are as follows:

Survey Year	2012	2011	2010	2005
Pounds Applied (2,4-D and derivatives, combined)	810,000	18,000	429,000	1,000
Crop Surveyed	soybeans, winter wheat	sorghum	corn	oats

- These data appear to match USGS estimates for 2,4-D use in Nebraska for all crops, which is approximately 1 million pounds per year for the last couple of decades.
- 2,4-D is also found in many non-agricultural use products, including those with residential and pasture/hay land/right of way sites. In addition, there are products with 2,4-D or derivatives labeled for aquatic uses, though most are limited to use in slow moving water such as impoundments or controlled irrigation systems.
- 2,4-D is ranked as intermediate for both leaching potential and soluble runoff potential, and low for adsorbed runoff potential. The same is true for 2,4-D methyl ester.⁸
- Use of 2,4-D and its derivatives will likely increase in the coming years with the advent of 2,4-D tolerant crops such as corn and soybeans, which are expected to be available in 2014 or 2015.
- Remains a Pesticide of Interest: based on data analysis, concentrations did not approach or exceed human health or ecological reference points or other environmental factors.

2,4-DB (herbicide, CAS 94-82-6) – Pesticide of Interest; 2011.

- Zero detections out of 174 analyses in ground water, but there have been no analyses recorded since 2004.
- Was not analyzed as part of the Safe Drinking Water Act monitoring requirements for Nebraska public water supply systems.
- No detections were found above the minimum reporting limit in USGS surface water samples, which was generally 0.02 to 0.04 ppb, while the acute nonvascular plant benchmark level is 932 ppb.
- Leaching potential is low (WIN-PST).
- Solution runoff potential is high, and soil adsorbed runoff potential is low (WIN-PST).

acetochlor (herbicide, CAS 34256-82-1) – Pesticide of Concern; 2007 & 2013.

- **HHBP**¹⁰: 100 ppb. The State of Minnesota has set a chronic health-based guideline for acetochlor in drinking water at 9 ppb¹⁴. **Aquatic Life Benchmarks**¹¹: acute nonvascular plant (ANV) = 1.43 ppb and acute vascular plant (AV) = 3.4 ppb. The State of Minnesota has established 3.6 ppb (4-day average) as its water quality standard for aquatic plants and other aquatic life¹⁷.
- For ground water, few detections have been recorded in the Clearinghouse and none have been > 0.7 ppb.
- Acetochlor is not among the analytes tested in samples collected as part of the Nebraska Safe Drinking Water Act.
- For surface water, many of the sites sampled frequently by USGS have spikes which approach or exceed 5 ppb more than once per year, within the last 3-5 years; NDEE data also show this type of chemograph in areas that are planted to predominantly agricultural crops labeled for acetochlor use (corn, soybeans, and sorghum).
- Acetochlor use has leveled from approximately 4 million pounds in 1997 to approximately 2.5 million annually for the last several years it was surveyed (USDA NASS). USGS estimates closely match this amount for all uses in 2009. In 2010, it was applied on approximately 23% of the corn acres planted (USDA NASS).
- Acetochlor is ranked as intermediate for both leaching and soluble surface runoff, and low for adsorbed runoff (Win-PST).
- Products containing acetochlor prohibit use within 50 feet of wells in areas with ground water depth less than 30 feet and having sandy soils and low organic matter.
- Remains a Pesticide of Concern.

alachlor (herbicide, CSA 15972-60-8); Pesticide of Interest; 2007.

- only 10 records in historical Clearinghouse \geq 2.0 ppb (MCL); 592 detections total - mostly in areas of known vulnerability;
- no USGS detections in SW anywhere near NDEE's 76 ppb ALC. Some sites in late 1990s had levels reaching 7-10 ppb, but highest levels in recent 3-5 years have been 1-4 ppb;
- no 303(d) listed impairments;
- declining use estimates over last decade.

aldicarb (insecticide, CAS 116-06-3); Pesticide of Interest; 2009.

- **MCL**⁹: 3 ppb; **Aquatic Life Benchmarks**¹¹: CF = 0.46 ppb, CI = 1 ppb
- 0 detections out of 204 historical records in ground water. Also, no detections of aldicarb sulfoxide and aldicarb sulfone (91 and 103 samples, respectively). Samples were collected between 1991 and 2003.
- No concentrations were detected in surface water above the method reporting limit for either parent or degradates, but there have been no samples taken since 2002.

atrazine (herbicide, CAS 1912-24-9) & degradates – Pesticide of Concern; 2007 & 2013.

- Atrazine was not re-evaluated in 2017, however, the NDEE surface water information below, in Figure 1, and in Table 3 was updated based on recent reports from NDEE.
- **MCL**⁹: 3 ppb; **Nebraska Aquatic Life Criteria**¹³: 12 ppb (4-day average)

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- There has been no exceedance of the 3 ppb MCL in the Clearinghouse since 1997, but sampling/analysis has been sporadic and limited geographically.
- Very few detections approaching or exceeding the 3 ppb MCL have been recorded in NDHHS public water supply data since 2000. All of those occurred prior to 2007, and a majority of these were associated with surface water sources or ground water influenced by surface water. In general, concentrations have declined for public drinking water supplies or are staying constant with relatively low (sub-ppb) concentrations. It is assumed that a combination of landowner awareness in the wellhead capture area (such as the Wellhead Protection Program, Consumer Confidence Reports, and pesticide applicator certification), mixing of water from multiple wells, and/or the addition of new/deeper wells, is the cause of this general statewide decline.
- Approximately 25 stream segments are listed as impaired in [NDEE's 2016 Integrated Report](#)⁵; Total Maximum Daily Load documents (TMDLs) estimating needed load reductions to meet water quality standards have been finalized for 22 stream segments. See Figure 1 for geographic distribution of impaired streams for atrazine and Table 3 for summary statistics of NDEE's atrazine analyses for these segments.
- One of the impaired segments is listed because it is either used as a drinking water source or directly influenced ground water is used as drinking water, and has exceeded the MCL of 3 ppb.
- Many of the sites sampled frequently by USGS exceed the 12 ppb NE ALC almost annually, depending on precipitation; however, some sites appear to be trending downward with fewer samples exceeding this level.
- Except for 2002 and 2010 (the last NASS survey for pesticide use on corn), atrazine was used on approximately 70-90% of the corn acres, which has increased annually from 7 million acres in 1990 to just over 10 million acres in 2013. In 2002 and 2010, atrazine use dipped to 64% and 57%, respectively. USDA estimates for use on corn was 5.5 million pounds in 2010, down from 7.3 million pounds in 2005, however, USGS estimates for the state for 2009 was 7.6 million pounds. Atrazine is also used on grain sorghum – 60% of the acres in 2011, down from 80 and 90% in 1991 and 2003, respectively. Sorghum acres have declined much over the years as other crops have become more profitable, however, the possibility of sorghum being used more as a biofuel may see acres increase in the future. See USDA National Agricultural Statistics Service reports⁶ and U.S. Geological Survey Pesticide Use Maps⁷ for use estimates on the major crops grown.
- Atrazine is ranked as high for both leaching potential and soluble runoff potential, and intermediate for adsorbed runoff potential.
- Remains a Pesticide of Concern.

azinphos-methyl (insecticide, CAS86-50-0); Pesticide of Interest; 2008.

- **HHBP:** 9.6 ppb; **Aquatic Life Benchmarks**¹¹: AI = 0.08; CI = 0.16 ppb
- 0 detections in 378 samples analyzed in ground water archives, with roughly 75% of these taken since 2002.
- For surface water, detections approached the acute invertebrate benchmark at half the sites.
- No toxicological information was found for azinphos-methyl OA, but it was found in the USGS dataset, and is shown here as a reference.
- Azinphos-methyl is being phased out for many uses over the next several years by EPA.

azoxystrobin (fungicide, CAS 131860-33-8); Pesticide of Interest; 2017.

- **HHBP** = 1200 ppb; CI = 44 ppb; CF = 147 ppb.
- Use of this active ingredient was stable from 2012-2014 at approximately 90,000 pounds, but that was a significant increase over previous five years.
- Azoxystrobin has intermediate leaching potential, and high and intermediate solution runoff and adsorbed runoff potential, respectively.
- There are no analyses in the Clearinghouse.

- There were no detections in about a dozen USGS groundwater samples from 2013 and 2015 (0.003 ppb reporting limit).
- Approximately 400 surface water samples were analyzed across Nebraska between 2012 and 2017. The majority were from Maple Creek, Elkhorn River at Waterloo, and Missouri River at Omaha, Platte River at Louisville. Approximately 61 samples had detections ranging from 0.01 to 0.05 ppb; another 60 samples ranged from 0.003 to 0.01 ppb. The remaining samples were detections near, or non-detections below, the reporting limit, which generally was around 3 ppt (0.003 ppb).
- 8 samples were analyzed in 2013 for azoxystrobin in stream sediment with no detections above the reporting limit of 0.9 ug/kg.

bentazon (herbicide, CAS 50723-80-3)- Pesticide of Interest; 2009.

- **Lifetime HA⁹**: 200 ppb; **Aquatic Life Benchmarks¹¹**: ANV = 4,500 ppb; AV = 5,350 ppb
- 0 detections out of 221 historical ground water samples collected from 1993 to 2003.
- No detections were found close to any surface water standard or benchmark; one sample was at 1 ppb, but the rest of the samples were at or below 0.06 ppb (depending on the reporting limit of the method used). No samples were collected at sites selected for analysis, however, since 2002.

bifenthrin (insecticide, CAS 82657-04-3); Pesticide of Interest; 2015.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- 0 groundwater analyses in the Clearinghouse.
- Nebraska DHHS did not do analysis for bifenthrin through SDWA samples.
- bifenthrin analyses in surface water occurred at 2 of the sites selected for review:
 - Maple Creek (n = 17); all samples were listed as “less than” the minimum reporting limit (0.005 ppb), which is larger than the chronic aquatic invertebrate benchmark of 0.0013 ppb.
 - Little Papillion Creek (n = 6) samples were also estimated to be below the 0.0047 ppb reporting limit.
- One bed sediment sample each from Little Papillion Creek and Maple Creek in 2013 was estimated 3.3 and 0.8 micrograms per kilogram (ppb), respectively.
- Leaching potential is very low; solution and adsorbed runoff potential is low and intermediate, respectively.
- Categorized as a Pesticide of Interest: because actual concentrations may be greater than aquatic benchmark levels and there is potential for bed sediment concentrations to impact aquatic life. However, based on data analysis, concentrations did not approach or exceed human health or ecological reference points or other environmental factors; no effect from exposure is expected.

bromacil (herbicide, CAS 314-40-9); Pesticide of Interest; 2009, 2022.

- **Lifetime HA⁹**: 70 ppb; **Aquatic Life Benchmarks¹¹**: ANV = 6.8 ppb; AV = 45 ppb
- Bromacil has a high potential for both leaching and surface runoff, and intermediate potential for soil adsorbed runoff.
- Only 1 detection out of 754 historical ground water samples in the Clearinghouse, collected from 1996 to 2019 (0.14 ppb in a shallow USGS monitoring well near the Platte River in 2003).
- No groundwater detections in NWIS less than method reporting limit, which was 1 ppb or less.
- Public water supply samples were not reviewed for this review.
- No concentrations detected in surface water samples above the method reporting limit, which was 0.5 ppb or less.
- Remains a Pesticide of Interest: based on data analysis, concentrations did not approach or exceed human health or ecological reference points or other environmental factors.

carbaryl (insecticide, CAS 63-25-2); Pesticide of Interest; 2009.

- **DWEL HA⁹**: 400 ppb; **Aquatic Life Benchmarks¹¹**: CF = 6.8; CI = 0.5 ppb
- 0 detections in 2719 historical ground water samples having good spatial coverage, however, most (95%) were in the late 1980s to late 1990s.

- One surface water sample was estimated at 0.49 ppb; the rest were below the method reporting limit, which was half as much or less than the CI benchmark. Unfiltered water samples from 1991/1992 were less than the reporting limit of 0.5 ppb.

carbofuran (insecticide, CAS 1563-66-2); Pesticide of Interest; 2009.

- **MCL**⁹: 40 ppb; **Aquatic Life Benchmarks**¹¹: CF = 5.7 ppb; CI = 0.75 ppb
- 0 detections in 2674 historical ground water samples having good spatial coverage, however, most (97%) were in the 1980s and 1990s.
- Only 1 surface water sample had a detection above the CI benchmark (1 ppb), and only two others were near it (~ 0.5 – 0.6 ppb). All three were at separate sites. There are a few samples that are at half the CI benchmark level, plus/minus 0.2 ppb. The majority of detects are 0.1 ppb or lower.

chlorothalonil (fungicide, CAS 1897-45-6); Pesticide of Interest; 2009.

- **DWEL HA**⁹: 500 ppb; **Aquatic Life Benchmarks**¹¹: AI = 1.8 ppb; CI = 0.6 ppb; ANV = 6.8 ppb
- 0 detections out of 25 historical ground water samples. Most samples were collected in 1997 and 2002/2003.
- Detections in surface water at the selected sites never exceeded 0.05 ppb, but sampling ended in 2002.

chlorpyrifos (insecticide, CAS 2921-88-2); Pesticide of Interest; 2009 & 2013.

- **Lifetime HA**⁹: 2 ppb; **Aquatic Life Benchmarks**¹¹: AI = 0.05 ppb; chronic invertebrate (CI) = 0.04 ppb; ALC max = 0.083 ppb; ALC continuous = 0.041 ppb
- Only 1 detection out of 5,738 historical ground water samples having good spatial coverage, however, most (75%), were in the late 1980s to late 1990s. The one detection (0.43 ppb) was from a sample in a Harlan County irrigation well in 1997; this well had no other samples analyzed for chlorpyrifos before or since.
- There were no detections of chlorpyrifos out of approximately 8600 samples taken from public drinking water supplies from 2000-2013.
- Approximately one dozen surface water samples were near or above the ALC max of 0.083 ppb. These occurred at four separate sites, but all these samples were collected in the early to late 90s.
- Chlorpyrifos is ranked as low for both leaching and soluble runoff potential, and intermediate for adsorbed runoff potential.
- Chlorpyrifos use was estimated by USDA at 125,000 pounds on soybeans in 2012. It was also used on corn in 2010, but not enough for an estimate with confidence. USGS use estimates are variable for the last several years, but generally down in the 2000s compared to the previous decade. This decline is likely due to registration changes as well as newer active ingredients used as insecticide seed coatings and plant incorporated protectants.
- Continued evaluation of chlorpyrifos is warranted, but given the discontinuation of products and use sites, and label changes of registered products at the national level, concentrations should remain below the aquatic life criteria.
- Remains a Pesticide of Interest: based on data analysis, concentrations did not approach or exceed human health or ecological reference points or other environmental factors.

clopyralid (herbicide, CAS 57754-85-5) – Pesticide of Interest; 2007.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- No detections out of 222 samples in the Clearinghouse
- Only 2 USGS sites contain data (and last sample was in 2002) w/ only 1 detect of 0.06 ppb;
- 5-10% corn acres treated, 66% of sugar beets treated in 2000.

clothianidin (insecticide, CAS 210880-92-5); Pesticide of Interest; 2015 & 2017.

- **HHBP** = 630 ppb; AI = 11 ppb ; CI = 1.1 ppb
- 0 Clearinghouse analyses

- No USGS groundwater samples were analyzed for clothianidin.
- Nebraska DHHS did not do analysis for SDWA.
- Six samples were analyzed in 2013 at one site, the Missouri River near Omaha. Three of the samples were less than the minimum reporting limit and the other three were less than 0.03 ppb. The chronic invertebrate benchmark estimate is 1.1 ppb; the acute invertebrate benchmark is 11 ppb.
- Leaching potential high; solution and adsorbed runoff potential is high and intermediate, respectively.
- Categorized as a Pesticide of Interest: based on data analysis, concentrations did not approach or exceed human health or ecological reference points or other environmental factors; no effect from exposure is expected.

copper pesticides (herbicide, bactericide, fungicide, insecticide, CAS 7440-50-8) – Pesticide of Interest; 2011, 2022.

- Nebraska Department of Environment and Energy (NDEE) has listed two water bodies as impaired for copper⁵ according to their aquatic life criteria for copper¹³.

$$0.960 e^{(0.9422[\ln \text{ hardness}] - 1.700)} \quad \text{Acute} \quad 0.960 e^{(0.8545[\ln \text{ hardness}] - 1.702)} \quad \text{Chronic}$$

The acute criterion is a one-hour average, and the chronic criterion is a 4-day average.

- Copper also has a state drinking water standard of 1 mg/l (1000 ppb).
- Leaching potential is low to very low (WIN-PST).
- Solution runoff potential is intermediate to high for all formulations, and high for soil adsorbed runoff potential (WIN-PST).
- Zero analyses for copper in the Clearinghouse.
- Two impaired waters, Little Salt Creek and Antelope Creek, are in and around the Lincoln urban/wastewater/industrial area, and it is unknown if or how much pesticide applications are contributing to this load.
- There are many potential sources of copper, including vehicle brake pads, vehicle tires, fertilizer and micronutrients, CCA treated wood, anti-fouling paint, and others.
- A San Francisco Bay-area study¹⁸ estimated urban uses of copper pesticides as the 2nd largest load source. This estimate did not include sewer root control products, though, because it had been banned by the local water supplier in the past.
- A report by the Washington Department of Ecology²² estimated 0.003% of the copper load coming from fungicide use in an urban watershed. Sewer root products and aquatic use herbicides were not captured in their survey; however, they may not even be allowed in the watershed studied. Treated lumber was another potential source of copper, estimated at 6% of the load.
- Concentrations in USGS samples have exceeded the aquatic life criteria in the historical data record, however, many of the highest concentrations occurred at least 20 years ago.
- Remains a pesticide of interest, especially given NDEE's impairment listings, the unknowns about the source of copper in surface water, the labeled sewer root and aquatic uses for certain formulations, and the potential need for NPDES permits for labeled uses.

cyanazine (herbicide, CAS 21725-46-2); Pesticide of Interest; 2008.

- **Lifetime HA⁹: 1 ppb; No aquatic life benchmarks¹¹**
- Only 442 detections in ground water from over 17,000 samples, ranging from 0.01 to over 3.2 ppb, with a mean of 0.21 ppb.
- Only 7 samples with detections approached or exceeded 1 ppb and there were only 6 detections - from one well location - since 1/1/2000 (out of approximately 1,530 samples). None of these, however, were at or exceeded the 1 ppb HA.
- For surface water, several samples exceeded 3 ppb, with one reaching 33 ppb, but all were pre-2000.
- All products containing cyanazine were cancelled in late 1990s.

cyfluthrin (insecticide, CAS 68359-37-5); Pesticide of Interest; 2015.

- **HHBP** = 150 ppb; CI = 0.0074 ppb; AI = 0.0125 ppb
- 66 groundwater analyses in the Clearinghouse with 0 detections. However, samples were taken only from Lower Elkhorn and Upper Big Blue NRDs; predominantly from 4 counties in 2002-2004.
- Nebraska DHHS did not do analysis for SDWA.
- Surface water samples were analyzed from 6 USGS sites selected for review. All were recorded as less than the method reporting limit, which for most samples, was above the chronic aquatic life benchmark of 0.0074 ppb.
- One bed sediment sample was collected at two sites in 2013; both were reported as being less than the minimum reporting limit of 1.3 ug/kg (ppb)
- Leaching potential is very low; solution and adsorbed runoff potential is low and intermediate, respectively.
- Categorized as a Pesticide of Interest: because actual concentrations may be greater than aquatic benchmark levels and there is potential for bed sediment concentrations to impact aquatic life. However, based on data analysis, concentrations did not approach or exceed human health or ecological reference points or other environmental factors; no effect from exposure is expected.

cyhalofop (herbicide, CAS 122008-78-0); Pesticide of Interest; 2011.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- Zero analyses in the Clearinghouse.
- Was not analyzed as part of the Safe Drinking Water Act monitoring requirements for Nebraska public water supply systems.
- Was not analyzed in any of the USGS stream samples contained in NWIS.
- Leaching potential is very low (WIN-PST).
- Solution runoff potential is low and soil adsorbed runoff potential is low (WIN-PST).
- No products with this active ingredient are currently registered in Nebraska ²¹.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

cypermethrin (insecticide, CAS 52315-07-8); Pesticide of Interest; 2015.

- CI = 0.00059 ppb; AI = 0.0018 ppb
- 66 groundwater analyses in the Clearinghouse with 0 detections, however, samples were taken only from Lower Elkhorn and Upper Big Blue NRDs; predominantly from 4 counties in 2002-2004.
- Nebraska DHHS did not do analysis for SDWA.
- Surface water samples were analyzed from 6 USGS sites selected for review. All sampled were recorded as less than the method reporting limit, which was generally below the chronic aquatic life benchmark.
- One bed sediment sample was analyzed from 2 sites in 2013; both were reported as less than the reporting limit of 1.2 ug/kg (ppb)
- Leaching potential is very low; solution and adsorbed runoff potential is intermediate and high, respectively.
- Categorized as a Pesticide of Interest: based on data analysis, concentrations did not approach or exceed human health or ecological reference points or other environmental factors; no effect from exposure is expected.

dacthal DCPA (herbicide, CAS 1861-32-1); Pesticide of Interest; 2008.

- **Lifetime HA**⁹: 70 ppb; **Aquatic Life Benchmarks** ¹¹: ANV = 11,000 ppb; AV = 11,000 ppb
- Zero detections from 412 samples analyzed for dacthal in the Clearinghouse.
- Only 2 of the surface water sites had samples analyzed for dacthal, and detections were nowhere near the aquatic life benchmarks.

deltamethrin (insecticide, CAS 52918-63-5); Pesticide of Interest; 2015.

- CI = 0.0041 ppb; CF = 0.017 ppb
- 0 groundwater analyses in the Clearinghouse.
- Nebraska DHHS did not do analysis for SDWA.
- Deltamethrin was analyzed in only 6 surface water samples at two USGS sites. Estimates less than the reporting limit of 0.0035 ppb were reported for both the Little Papillion Creek and Maple Creek sites, which is less than the chronic aquatic invertebrate benchmark of 0.0041 ppb.
- One bed sediment sample at each site in 2013 was also analyzed, with results being less than the reporting limit of 1.3 ug/kg (ppb).
- Leaching potential is very low; solution and adsorbed runoff potential is low and high, respectively.
- Categorized as a Pesticide of Interest: based on data analysis, concentrations did not approach or exceed human health or ecological reference points or other environmental factors; no effect from exposure is expected

diazinon (insecticide, CAS 333-41-5) – Pesticide of Interest; 2008, 2013, 2022.

- **Lifetime HA⁹**: 1 ppb, **Aquatic Life Benchmarks¹¹**: Aquatic Life Criteria (ALC) = 0.17 ppb; acute invertebrate (AI) = 0.11; CI = 0.17 ppb.
- Diazinon is ranked low for leaching potential and high for both soluble and adsorbed runoff potential.
- Only 1 detection out from 597 ground water samples in the Clearinghouse, which was 0.01 ppb in Polk County; approximately half of these were collected after 1/1/2000 but none after 2008.
- Zero detections of diazoxon, a degradate, in approximately 70 samples from the early 2000s.
- No samples were analyzed in public water supplies for diazinon as of 2013.
- Except for one sample in the mid-1980s, very few GW samples in NWIS have been above the method reporting limit (ranging from less than 0.002 to 0.5 ppb).
- For SW, few samples exceed the reporting limit but there are some. Because the reporting limit is near or above the aquatic life criteria for many samples, determining impact is difficult.
- All household and residential use products have been cancelled, and agricultural use products have been more restricted within the last few years
- Pesticide use estimates for diazinon in agricultural crops in Nebraska is essentially 'zero' since 2011 based on a visual review of the USGS annual estimates. Nationally, ag use estimates are mostly limited to fruit and vegetable crops.
- Remains a Pesticide of Interest: based on data analysis, concentrations did not approach or exceed human health or ecological reference points or other environmental factors.

dibromochloropropane DBCP (insecticide, CAS 96-12-8); Pesticide of Interest; 2009.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- 0 detects from 235 historical samples in ground water, taken along the Platte River valley (1995-2004)
- Only one surface water sample was analyzed in USGS data from 1990-2009 (1995), and the concentration was "less than" the method reporting limit of 1 ppb.
- All pesticide products were canceled in the 1970s/1980s.

dicamba (herbicide, CAS 1918-00-9) – Pesticide of Interest; 2007 & 2013.

- **Lifetime HA⁹**: 4000 ppb; **Aquatic Life Benchmarks¹¹**: ANV = 61 ppb, AV = >3,250 ppb
- 0 detections from 296 samples in ground water in the Clearinghouse; approximately 2/3 of these have been since the year 2000. For municipal wells, only 8 detections of dicamba were reported out of approximately 3700 samples from 2000-2013; each were from different municipalities/suppliers with the highest being 9.7 ppb; the majority were between 1 and 3 ppb and were collected in 2004.
- Very few USGS surface water sites had dicamba analyses and maximum concentrations from those taken were in the sub-ppb range.
- Dicamba is ranked as high for leaching potential, intermediate for soluble runoff potential, and low for adsorbed runoff potential.

- Use estimates for dicamba and derivatives could not be made with confidence in the last survey by USDA NASS in corn, sorghum, and soybeans, however, use estimates for dicamba sodium salt was 14,000 pounds statewide for winter wheat. Dicamba use estimates from USGS were steady from 2004-2009, and quite a bit less (approximately 75%) than in the 1990s. Use of dicamba and its derivatives will likely increase in the coming years with the advent of dicamba-tolerant crops such as corn and soybeans, which are expected to be available in 2015.
- Remains a Pesticide of Interest: based on data analysis, concentrations did not approach or exceed human health or ecological reference points or other environmental factors.

dichlorprop (2,4-DP) (herbicide, CAS 120-36-5); Pesticide of Interest; 2011.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- Zero detections out of 222 analyses in ground water, but there have been no analyses since 2004.
- Was not analyzed as part of the Safe Drinking Water Act monitoring requirements for Nebraska public water supply systems.
- No detections were found above the minimum reporting limit in USGS surface water samples.
- Leaching potential is low (WIN-PST).
- Solution runoff potential is intermediate, and soil adsorbed runoff potential is low (WIN-PST).
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

dichlorprop-P (herbicide, CAS 15165-67-0); Pesticide of Interest; 2011.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- Zero analyses in the Clearinghouse.
- Was not analyzed as part of the Safe Drinking Water Act monitoring requirements for Nebraska public water supply systems.
- Was not analyzed in any of the USGS stream samples contained in NWIS.
- Leaching potential is intermediate (WIN-PST).
- Solution runoff potential is intermediate and soil adsorbed runoff potential is low (WIN-PST).
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

diclofop (herbicide, CAS 40843-25-2); Pesticide of Interest; 2011.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- Zero analyses in the Clearinghouse.
- Was not analyzed as part of the Safe Drinking Water Act monitoring requirements for Nebraska public water supply systems.
- Was not analyzed in any of the USGS stream samples contained in NWIS.
- Leaching potential is very low (WIN-PST).
- Solution runoff and soil adsorbed runoff potential are both intermediate (WIN-PST).
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

diflubenzuron (insecticide, 35367-38-5); Pesticide of Interest; 2017

- **HHBP** = 100 ppb; **AI** = 0.0014 ppb, **CI** = 0.00025 ppb
- This active ingredient is an insect growth regulator found in livestock feed for feedlot fly control, livestock pour-on products, termiticide baits, and products with various crop and non-crop uses
- Diflubenzuron is low, low, and intermediate for leaching, solution runoff, and adsorbed runoff potential, respectively.
- No records in the Clearinghouse

- No USGS groundwater samples were analyzed in Nebraska
- 400 samples were analyzed from 2012-2017; three surface water samples from two sites, each from a separate year (2013-15) were above the reporting limit, which was generally 0.006 ppb.
- Remains a Pesticide of Interest given the low benchmarks and the fact that these benchmarks are generally below the method reporting limit.

dimethenamid (herbicide, CAS 163515-14-8) – Pesticide of Interest; 2007.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- 0 detections out of 1,616 records in the Clearinghouse, but sampling is limited to two major geographic areas in the Lower Loup and Lower Platte South NRDs, and the Blue River basin;
- only 2 USGS sites w/ SW data - highest reading was ~ 7 ppb in Maple Creek in 2004;
- ~5-10% corn acres treated, 20% sorghum acres (2003 data)

dinotefuran (insecticide, CAS 165252-70-0); 2015, 2017

- **HHBP** = 6,000 ppb; **CF** = >6360 ppb; **AF** = >49 ppm
- 0 Clearinghouse analyses
- No USGS groundwater samples were analyzed for clothianidin.
- Nebraska DHHS did not do analysis for SDWA.
- Six samples were analyzed in 2013 at one site, the Missouri River near Omaha. All were less than the minimum reporting limit of 0.005 ppb.
- Leaching potential high; solution and adsorbed runoff potential is high and intermediate, respectively.
- Categorized as a Pesticide of Interest: based on data analysis, concentrations did not approach or exceed human health or ecological reference points or other environmental factors; no effect from exposure is expected.

diuron (herbicide, CAS 330-54-1); Pesticide of Interest; 2010.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- Detected only three times from 551 analyses in ground water from 1997 to 2008 (all less than 0.1 ppb)
- No surface water samples approached aquatic life benchmarks; most were at or below the method reporting limit. Data are limited spatially and temporally, however.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

endosulfan (insecticide, CAS 115-29-7); Pesticide of Interest ; 2010.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- 0 detections from 172 ground water samples collected in 1987 and 1988 for α -endosulfan, β -endosulfan, and endosulfan sulphate (biologically relevant compounds).
- All surface water samples for α -endosulfan, β -endosulfan, and endosulfan sulphate (biologically relevant compounds) were at the method reporting limit. For endosulfan sulphate, the reporting limit was approximately half of EPA's continuous aquatic life criterion (0.056 ppb).
- A [June 2010 announcement by EPA](#) to cancel all existing uses of endosulfan will eventually reduce potential risks to aquatic life.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

esfenvalerate (insecticide, CAS 66230-04-4); Pesticide of Interest; 2010.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- 0 detections from only 17 ground water samples, all in 1997.

- No surface water samples collected at the sites selected for this assessment, and only three other samples analyzed statewide: from the early 1990s with concentrations at or below the method reporting limit.
- There are approximately only 2 agricultural site products; the rest are mostly indoor or institutional use products.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

ethoprop (insecticide, CAS 13194-48-4); Pesticide of Interest; 2010.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- 0 detections from 315 ground water samples, collected from 1995 to 2003.
- All surface water samples were at or below the method reporting limit and did not approach aquatic life benchmarks.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

fenoxaprop (herbicide, CAS 95617-09-7); Pesticide of Interest; 2011.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- Zero analyses in the Clearinghouse.
- Was not analyzed as part of the Safe Drinking Water Act monitoring requirements for Nebraska public water supply systems.
- Was not analyzed in any of the USGS stream samples contained in NWIS.
- leaching potential is low
- Solution runoff and soil adsorbed runoff potential are both intermediate.
- There are only products having the p-isomer of this active ingredient registered in Nebraska²¹.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

fenoxaprop-p-ethyl (herbicide, CAS 113158-40-0); Pesticide of Interest; 2011.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- Zero analyses in the Clearinghouse.
- Was not analyzed as part of the Safe Drinking Water Act monitoring requirements for Nebraska public water supply systems.
- Was not analyzed in any of the USGS stream samples contained in NWIS.
- Leaching potential is low;
- solution runoff and soil adsorbed runoff potential are both intermediate
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

fenthiaprop (herbicide, CAS 73519-50-3); Pesticide of Interest; 2011.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- Zero analyses in the Clearinghouse.
- Was not analyzed as part of the Safe Drinking Water Act monitoring requirements for Nebraska public water supply systems.
- Was not analyzed in any of the USGS stream samples contained in NWIS.
- No products are currently registered in Nebraska with this active ingredient²¹.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

fipronil (CAS 120068-37-3); Pesticide of Interest; 2015, 2017.

- Fipronil has a chronic invertebrate benchmark of 0.011 ppb and an acute invertebrate benchmark of 0.11 ppb.
- Leaching potential is intermediate; solution and adsorbed runoff potential is high and intermediate, respectively.
- Use of fipronil has steadily declined over the years, to about 20,000 pounds annually. Corn is the major crop where it is used, although there are other non-ag uses, including public and private vector control.
- Nebraska DHHS did not do analysis for SDWA.
- There were no detections in groundwater from approximately 300 USGS samples from 2002-2012; the majority had 0.007 or 0.016 ppb reporting limits. In addition, approximately a dozen samples from 2013 and 2015 contained no detections at a 0.004 ppb reporting limit.
- Over 540 surface water samples were collected by USGS at several sites with varying frequency between 2002 and 2017. Many of these were less than the minimum reporting limit of the analytical method (not detected), which in many cases, was greater than the aquatic life benchmark (Chron. Invert. = 0.011 ppb). However, there were 19 sample detections at or above this standard. Most were at Maple Creek near Nickerson and Platte River at Louisville.
- Over 400 samples taken from 2012-2017 were analyzed with another method. The majority were from Maple Creek, Elkhorn River at Waterloo, and Platte River at Louisville. A handful of samples approached the benchmark of 0.011 ppb, but most samples were non-detects with minimum reporting levels of 0.01 ppb or less.
- Eight bed sediment samples at 8 separate sites were analyzed in 2013 for fipronil – all without detections (reporting limit of 1.6 ug/kg).
- Categorized as a Pesticide of Interest: based on data analysis, concentrations did not approach or exceed human health or ecological reference points or other environmental factors; no effect from exposure is expected.

fipronil sulfide (degradate); Pesticide of Interest; 2017.

- **HHBP** (fipronil) = 1 ppb; AI = 1.065 ppb; CI = 0.11 ppb
- Nebraska DHHS did not do analysis for SDWA.
- There were no detections in approximately 300 USGS groundwater samples collected between 2001 and 2012 (at 0.013 and 0.005 ppb reporting limit). In addition, approximately a dozen samples from 2013 and 2015 contained no detections at a 0.004 ppb reporting limit.
- Over 540 surface water samples were collected by USGS at several sites with varying frequency between 2002 and 2017. Many of these were less than the minimum reporting limit of the analytical method (not detected), which in many cases, was greater than the aquatic life standard (Chron. Invert. = 0.11 ppb). There were only 2 sample detections at or above this standard.
- Over 400 samples taken from 2012-2017 were analyzed with another method. The majority were from Maple Creek, Elkhorn River at Waterloo, and Platte River at Louisville. Most samples were non-detects (MRL of 0.005ppb) with only 1 detect of 0.22 ppb.
- Eight bed sediment samples at 8 separate sites were analyzed in 2013 for fipronil – all without detections (reporting limit of 1.5 ug/kg).

fipronil sulfone (degradate); Pesticide of Interest; 2015, 2017.

- Nebraska DHHS did not do analysis for SDWA.
- There were no detections in approximately 300 USGS groundwater samples collected between 2001 and 2012. In addition, approximately a dozen samples from 2013 and 2015 contained no detections at a 0.004 ppb reporting limit.
- Over 540 surface water samples were collected by USGS at several sites with varying frequency between 2002 and 2017. Many of these were less than the minimum reporting limit of the analytical method (not detected), which in many cases, was greater than the aquatic life standard (Chron. Invert. = 0.037 ppb). However, there were 11 sample detections at or above this standard. The majority of these were at a tributary to S. Fk. Dry Creek, near Schuyler. In addition, a few of these same samples also had detections of fipronil and/or fipronil sulfide, though most of all samples were less than the reporting limit.

- Over 400 samples taken from 2012-2017 were analyzed with another method. The majority were from Maple Creek, Elkhorn River at Waterloo, and Platte River at Louisville. Most samples were non-detects (MRL of 0.005 ppb) and the few detects were less than 0.003.
- Eight bed sediment samples at 8 separate sites were analyzed in 2013 for fipronil – all without detections (reporting limit of 1 ug/kg).
- Categorized as a Pesticide of Interest: based on data analysis, concentrations did not approach or exceed human health or ecological reference points or other environmental factors; no effect from exposure is expected.

desulfinylfipronil (degradate); Pesticide of Interest; 2015, 2017.

- The chronic fish benchmark is 0.59 ppb; chronic invertebrate benchmark is 10.3 ppb.
- Nebraska DHHS did not do analysis for SDWA
- Approximately 300 USGS groundwater samples were analyzed between 2002 and 2012; none were above the reporting limit of 0.004 and 0.012 ppb)
- Approximately 540 USGS surface water samples were analyzed between 2002 and 2017; there were very few detections, with the reporting limit for most samples being 0.012 or 0.004 ppb. An additional 400 samples using another analytical method were analyzed, also with no detections (0.004 ppb reporting limit)
- Eight sediment samples were analyzed for desulfinylfipronil yielded no detections at the 1.8 ug/kg reporting limit.
- desulfinylfipronil amide, another fipronil degradate, was analyzed in approximately 540 USGS surface water samples collected between 2002 and 2017; there were very few detections, with the reporting limit for most samples being 0.029 or 0.009 ppb.
- Categorized as a Pesticide of Interest: based on data analysis, concentrations did not approach or exceed human health or ecological reference points or other environmental factors; no effect from exposure is expected.

fluazifop (herbicide, CAS 69335-91-7); Pesticide of Interest; 2011.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- Zero analyses in the Clearinghouse.
- Was not analyzed as part of the Safe Drinking Water Act monitoring requirements for Nebraska public water supply systems.
- Was not analyzed in any of the USGS stream samples contained in NWIS.
- Leaching potential is low (WIN-PST).
- Solution runoff and soil adsorbed runoff potential are both intermediate (Win-PST).
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

fluazifop-p (herbicide, CAS 83066-88-0); Pesticide of Interest; 2011.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- Zero analyses in the Clearinghouse.
- Was not analyzed as part of the Safe Drinking Water Act monitoring requirements for Nebraska public water supply systems.
- Was not analyzed in any of the USGS stream samples contained in NWIS.
- Leaching potential is low (WIN-PST).
- Solution runoff and soil adsorbed runoff potential are both intermediate (Win-PST).
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

fluoastrobin (fungicide, 361377-29-9); Pesticide of Interest; 2017, 2022

- **HHBP**¹⁰ = 96 ppb; **Aquatic Life Benchmarks**¹¹: CI = 45 ppb, AI = 60 ppb, CF = 56 ppb
- Annual use was variable in Nebraska, ranging from 108K pounds in 2011 to 2K pounds in 2012, and has been evenly split between corn and soybeans. Use appears to have increased geographically in the state in the last decade based on visual review of USGS use estimate maps, but more recent USDA NASS estimates were not consulted.
- Fluoastrobin has a low leaching potential, and high potential for both solution runoff and adsorbed runoff.
- There were no analyses in the Clearinghouse
- There were no USGS groundwater samples analyzed in Nebraska.
- Very few surface water samples were analyzed in NWIS and most were at the reporting limit of 0.004 ppb.
- Remains a Pesticide of Interest: No reasonable exposure expected; insignificant level of use;

glyphosate (herbicide, CAS 1071-83-6) & AMPA (a degradate) – Pesticide of Interest; 2007, 2013, 2022.

- **MCL**⁹: 700 ppb; **Aquatic Life Benchmarks**¹¹: CF = 25,700 ppb; AV = 11,900 ppb; ANV = 12,100 ppb
- glyphosate is ranked as low to very low for leaching potential and high for both soluble and adsorbed runoff potential.
- Glyphosate use has increased dramatically over the last couple of decades given the advent of glyphosate-tolerant crops such as corn, soybeans, and sugar beets (for example, compare the 1993 USDA NASS estimate of 96,000 pounds to the 2010 estimate of 7.7 million pounds of glyphosate (and derivatives) on corn). USGS estimates approach 16 million pounds of glyphosate for all agricultural crops in 2009.
- Glyphosate use will likely remain high unless larger or more widespread populations of glyphosate resistant weeds are found, and unless dicamba- and 2,4-D-tolerant corn and soybeans lessen its use.
- No groundwater samples have been analyzed for glyphosate in the Clearinghouse, as well as in NWIS.
- Two detections out of 3300 samples were documented in two separate public water supplies from the NDHHS data in 2011, both at approximately 6 ppb.
- Public water supplies were not checked for new data for this most recent evaluation.
- Glyphosate is now analyzed more frequently in surface water than in the past, and detection frequency is also higher than many of the other active ingredients included in this review. But the concentrations are relatively low, with the highest concentration at 11 ppb and most detections less than 1 ppb.
- Remains a Pesticide of Interest: based on data analysis, concentrations did not approach or exceed human health or ecological reference points or other environmental factors.

hexazinone (herbicide, CAS 51235-04-2); Pesticide of Interest; 2010, 2022.

- **MCL**⁹: 400 ppb; **Aquatic Life Benchmarks**¹¹: ANV = 7 ppb, AV = 37.4 ppb
- 0 detections in 885 ground water samples in the Clearinghouse. Most were taken after 2000, though only in two areas representing, in general, the Upper Republican, Lower Elkhorn, Lower Platte South, Lower Platte North, and the Pappio-Missouri NRDs.
- All GW samples in NWIS were generally at or below the reporting limit .05 ppb.
- All surface water samples were at or below the method reporting limit and did not approach aquatic life benchmarks.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

imazamethabenz (herbicide, CAS 100728-84-5); Pesticide of Interest; 2010.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- No ground water samples analyzed
- No surface water samples analyzed

- There is only one registered product for Nebraska currently and has barley, sunflower, and wheat use sites²¹.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

imazapyr (herbicide, CAS 81334-34-1); Pesticide of Interest; 2011, 2022.

- **HHBP**¹⁰: 15,000 ppb; **Aquatic Life Benchmarks**¹¹: ANV = 12,200 ppb, AV = 24 ppb
- Zero analyses in the Clearinghouse.
- Was not analyzed as part of the Safe Drinking Water Act monitoring requirements for Nebraska public water supply systems in 2011. Public water supplies were not checked for new data for this most recent evaluation.
- Was not analyzed in any of the USGS stream or groundwater samples contained in NWIS.
- Leaching potential is high (WIN-PST).
- Solution runoff potential is high, and soil adsorbed runoff potential is intermediate (WIN-PST).
- Some formulations and products are labeled for aquatic uses.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

imidacloprid (insecticide, CAS 138261-41-3); Pesticide of Interest; 2011 & 2015.

- **HHBP** = 360 ppb; CI = 1.05 ppb; AI = 34.5 ppb
- Nebraska DHHS did not do analysis for SDWA.
- Leaching potential is high; solution and adsorbed runoff potential is high and intermediate, respectively.
- There has been a steady increase in agricultural use over the last decade, largely from uses on soybeans. There are many uses, including residential, fruits and vegetables, and agricultural seed treatments.
- There were no detections in approximately 200 USGS groundwater samples from 2002-2004 (0.007 ppb reporting limit) or from 2013 and 2015 (0.011 ppb).
- Approximately 90 surface water samples were analyzed between 2001 and 2013, with no detections (majority had reporting limits of 0.08 and 0.007 ppb)
- Approximately 400 USGS surface water samples were analyzed between 2012 and 2017 using another method. Most samples were less than the reporting limit of 0.016 and 0.011 ppb, however a handful of samples were between 1 and 2 ppb and a dozen samples or more were between 0.1 and 1 ppb.
- Remains a Pesticide of Interest given the low benchmarks and the fact that these benchmarks are generally below the method reporting limit. Additionally, the unknowns regarding this active ingredient's effects in mixtures²² warrants further scrutiny. Based on data analysis, concentrations did not approach or exceed human health or ecological reference points or other environmental factors; no effect from exposure is expected.

isoxaflutole (herbicide, CAS 141112-29-0) – Pesticide of Interest; 2007.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- only 10 detections from two locations (one with multi-level samples) contained detections of isoxaflutole degradates, out of 2,991 total records of isoxaflutole and its two degradates in the Clearinghouse.
- no SW sampling from USGS thru 2005 sampling season
- surface water contamination potential exists, based on 2000-2004 conditional registration studies nationwide, and should be monitored regularly.

lambda-cyhalothrin (insecticide, CAS 91465-08-6); Pesticide of Interest; 2011 & 2015.

- 0 groundwater analyses in the Clearinghouse.
- Nebraska DHHS did not do analysis for SDWA.

- All the surface water samples analyzed at 4 USGS sites were recorded as less than the minimum reporting limit for the method used, which was between 0.004 and 0.01 ppb. The chronic invertebrate benchmark for this AI is 0.002 ppb; and the acute invertebrate benchmark is 0.0035 ppb.
- Leaching potential is very low; solution and adsorbed runoff potential is low and intermediate, respectively.
- Remains a Pesticide of Interest: based on data analysis, concentrations did not approach or exceed human health or ecological reference points or other environmental factors; no effect from exposure is expected.

lindane (insecticide, CAS 58-89-9); Pesticide of Interest; 2008.

- **MCL**⁹: 0.2 ppb; **Aquatic Life Benchmarks**¹¹: AI = 0.5 ppb; CI = 1.0 ppb
- 0 detections in 742 samples analyzed in historical record, with roughly 25% of these sampled after 2000.
- There have been no detections in over 2,625 public water supply samples for approximately 315 cities/locations since 1997.
- Lindane was analyzed in samples from 11 of 12 surface water sites, with 0.03 as the maximum concentration.

malathion (insecticide, CAS 121-75-5); Pesticide of Interest; 2009 & 2013.

- **Lifetime HA**⁹: 100 ppb; **Aquatic Life Benchmarks**¹¹: AF = 16.4 ppb; CF = 8.6 ppb; AI = 0.3 ppb; CI = 0.035 ppb; and ALC continuous = 0.1 ppb.
- 0 detections from 442 samples in ground water. Most of the samples were collected prior to 2005.
- No samples were analyzed for malathion in public water supplies between 2000 and 2013.
- The aquatic life benchmarks have increased significantly since the last review, meaning that concentrations seen in Nebraska waters aren't as critical, that is, the perceived risk isn't as high.
- There have been recorded concentrations exceeding the chronic insect benchmark of 0.035 ppb, but most if not all of these were at least 10 years ago.
- Products containing malathion have been and are still being restricted by EPA through label changes and discontinuation of uses. Mosquito control products having aquatic or near aquatic use sites are available.
- Malathion is ranked as low for leaching, soluble runoff, and adsorbed runoff potential.
- There are no USDA NASS estimates for malathion in corn or soybeans in the reporting period. USGS estimates show a general decline, from a high of 50,000 pounds in 1995 and 1997, to approximately 21,000 and 10,000 pounds in 2008 and 2009, respectively.
- Remains a Pesticide of Interest: based on data analysis, concentrations did not approach or exceed human health or ecological reference points or other environmental factors.

MCPA (herbicide, CAS 94-74-6); Pesticide of Interest; 2011.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- Zero detections out of 222 analyses in ground water, but there have been no analyses since 2004.
- No detections were found above the minimum reporting limit in USGS surface water samples, which ranged from 0.02 to 0.05 ppb, while the acute benchmark for nonvascular and vascular plants is 300 and 170 ppb, respectively.
- Leaching potential is intermediate (WIN-PST).
- Solution runoff potential is intermediate and soils adsorbed runoff potential is low (WIN-PST).
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

MCPB (herbicide, CAS 94-81-5); Pesticide of Interest; 2011.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.

- 0 detections out of 222 analyses in ground water, but there have been no analyses since 2004.
- Was not analyzed as part of the Safe Drinking Water Act monitoring requirements for Nebraska public water supply systems.
- No detections were found above the minimum reporting limit in USGS surface water samples, which ranged from 0.01 to 0.20 ppb, while the acute benchmark for vascular and nonvascular plant life is 210 and 380 ppb, respectively.
- Leaching potential is low (WIN-PST).
- Solution runoff potential is high and soil adsorbed runoff potential is low (WIN-PST).
- There are currently no products with this active ingredient registered²⁰.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

mecoprop (MCP) (herbicide, CAS 7085-19-0); Pesticide of Interest; 2011.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- Zero analyses in the Clearinghouse;
- Was not analyzed as part of the Safe Drinking Water Act monitoring requirements for Nebraska public water supply systems.
- Was not analyzed in any of the USGS stream samples contained in NWIS.
- Leaching potential is high (WIN-PST).
- Solution runoff potential is intermediate and soil adsorbed runoff potential is low (WIN-PST).
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

mecoprop-P (herbicide, CAS 16484-77-8); Pesticide of Interest; 2011.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- Zero analyses in the Clearinghouse.
- Was not analyzed as part of the Safe Drinking Water Act monitoring requirements for Nebraska public water supply systems.
- Was not analyzed in any of the USGS stream samples contained in NWIS.
- Leaching potential is intermediate (WIN-PST).
- Solution runoff potential is intermediate and soil adsorbed runoff potential is low
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

mesotrione (herbicide, CAS 104206-82-8); Pesticide of Interest; 2010.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- No ground water samples analyzed
- No surface water samples analyzed
- Registered in 2001, several products containing mesotrione are registered in Nebraska²¹, including products for corn, soybeans, sorghum, turf, and sod use sites. In 2005, the latest use statistic for mesotrione, it was applied at approximately 2 ounces/acre on approximately 18% of the corn acres that year.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

metalaxyl (insecticide/fungicide, CAS 57837-19-1); Pesticide of Interest; 2010.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- Zero detections out of 287 analyses in the Clearinghouse, though most samples were collected prior to 2005.

- All surface water samples at selected sites (as well as all sites statewide) were at or below the method reporting limit.
- Registered in several products for a variety of use sites²¹, including soils and seed treatment on soybeans and turf sites.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

metolachlor (herbicide, CAS 51218-45-2), s-metolachlor (an isomer, CAS 87392-12-9) and degradates – Pesticide of Interest; 2007 & 2013.

- **Lifetime HA⁹**: 700 ppb; **Nebraska Aquatic Life Criteria¹³**: Acute: 390 ppb; chronic: 100 ppb. **Aquatic Life Benchmarks¹¹**: CI = 1 ppb; ANV = 8 ppb; AV = 21 ppb. (Minnesota has adopted a 23 ppb aquatic life standard²⁰.)
- There were 4,004 detections from approximately 704 wells (out of a total of 16,988 records in the Clearinghouse). Nine samples representing 7 wells exceeded 20 ppb – all were late 1990s samples that may have been point source events, although this is unknown. Approximately 2,200 samples have been analyzed since 1/1/2000 with good spatial distribution, although sampling has been limited to Lower Elkhorn, Lower Platte, and Pappio-Missouri basins since 2005.) Approximately 30 wells had a detection of metolachlor since 2000; a majority of those also had a detection of a metolachlor degrade. However, all concentrations combined in any well was below 3 ppb and all but three wells were less than 1 ppb.
- 216 detections from 38 public water supplies were documented from 2000-2013. In general, the highest concentrations occurred earlier in that period with a large majority of detections being below 5 ppb.
- Concentrations of metolachlor in surface water, in general, have declined since the late 1990s and early 2000s, however, there are spikes that approach the aquatic life benchmark of 21 ppb.
- Metolachlor/s-metolachlor use estimates from both USDA and USGS show steady use for the state between 2 and 4 million pounds annually.
- Both metolachlor and s-metolachlor are ranked as high for leaching and soluble runoff potential, and intermediate for adsorbed runoff potential.
- Remains a Pesticide of Interest: based on data analysis, concentrations did not approach or exceed human health or ecological reference points or other environmental factors.

metribuzin (herbicide, CAS 21087-64-9); Pesticide of Interest; 2008.

- **Lifetime HA⁹**: 70 ppb; **Aquatic Life Benchmarks¹¹**: ANV = 8.7 ppb, AV = 130 ppb
- 95 historical detections in ground water from 16,935 samples, ranging from 0.05 ppb to 2 ppb; only one sample exceeded 0.7 ppb, however.
- There have been only 6 detections at approximately 3 locations since 1/1/2000 (out of 2,192 samples).
- For surface water, only one sample (at 5 ppb) approached the nonvascular plant benchmark. Most samples were at 0.2 ppb or less.

metsulfuron methyl (herbicide, 74223-64-6); Pesticide of Interest; 2011.

- Zero detections out of 167 analyses in ground water, but there have been no analyses since 2004.
- Was not analyzed as part of the Safe Drinking Water Act monitoring requirements for Nebraska public water supply systems.
- No detections were found above the minimum reporting limit in USGS surface water samples, which ranged from 0.03 to 0.14 ppb, and there is no benchmark for aquatic life available.
- Leaching potential is high (WIN-PST).
- Solution runoff potential is high and soil adsorbed runoff potential is intermediate (WIN-PST).
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

MSMA (methanearsonic acid, sodium salt) (herbicide, CAS 2163-80-6); Pesticide of Interest; 2010, 2022.

- **HHBP¹⁰**: 200 ppb; **Aquatic Life Benchmarks¹¹**: ANV = 5,630 ppb; CI = 53,000 ppb

- No ground water samples analyzed in the Clearinghouse.
- No surface water samples analyzed.
- Registered in several products for golf courses, sod farms, and highway rights-of-way²¹.
- MSMA is low for leaching potential but is rated as high for both solution runoff and adsorbed runoff.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

napropamide (herbicide, CAS 15299-99-7); Pesticide of Interest; 2010.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- 0 detections from 300 ground water samples collected from 1995 to 2003.
- Only 1 detection in surface water above the method reporting limit (0.058 ppb in 1992)
- There is only one registered product in the state²⁰, and its use is subjectively estimated to be limited.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

norflurazon (herbicide, CAS 27314-13-2); Pesticide of Interest; 2010.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- 0 detections from 222 ground water samples collected from 1997 to 2004.
- All surface water samples were at or below the method reporting limit.
- There is only one registered product in the state, and its use is subjectively estimated to be limited²⁰.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

pendimethalin (herbicide, CAS 40487-42-1) – Pesticide of Interest; 2007.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- 16 detections (all < 0.4 ppb) in a handful of locations in ground water out of 4,442 records.
- only 2 USGS SW sites w/ data - <=0.2 ppb detects;
- ~15% soybean acres treated, 500K to 1M # annually applied.
- Acute AL benchmark for nonvascular plants is 5.4 ppb.

permethrin (insecticide, CAS 52645-53-1); Pesticide of Interest; 2015.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- 2,520 groundwater analyses mostly in Upper Elkhorn and Lower Elkhorn basin areas; 7 detections ranging from 0.08 to 0.2 ppb. EPA has a human health benchmark level of 1,750 ppb.
- cis-permethrin (CAS 59042-49-8), an isomer, had 402 groundwater analyses covering most of the state, with no detections. Most of these were collected from 2002-2007.
- Nebraska DHHS did not do analysis of either permethrin or cis-permethrin for SDWA.
- Surface water samples were collected and analyzed at varying frequencies for cis-permethrin at 7 USGS sites. All the samples were estimated to be less than the minimum reporting limit, which ranged from 0.005 ppb to 0.01 ppb. These are greater than the chronic invertebrate benchmark (0.0014 ppb) and the acute invertebrate benchmark (0.0106 ppb).
- Twelve samples using a method to estimate concentrations at nanograms per liter were taken from two sites (Maple Creek and Little Papillion Creek). One sample at Little Papillion Creek was measured at 10 parts per trillion or 0.01 ppb; the remaining samples were estimated at less than the minimum reporting limit of 0.0034 ppb.

- Leaching potential is very low; solution and adsorbed runoff potential is low and intermediate, respectively.
- Categorized as a Pesticide of Interest: because actual concentrations may be greater than aquatic benchmark levels and there is potential for bed sediment concentrations to impact aquatic life. However, based on data analysis, concentrations did not approach or exceed human health or ecological reference points or other environmental factors; no effect from exposure is expected.

phosmet (insecticide, CAS 732-11-6); Pesticide of Interest; 2010.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- Zero detections from 66 ground water samples from 2004 analyzed in the Clearinghouse, though geographic and temporal coverage is very limited.
- All surface water samples were at or below the method reporting limit (0.008 – 0.2 ppb)
- There is only one agricultural use product in the state (2 others are pour on products for livestock), and use is subjectively estimated to be limited.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

picloram (herbicide, CAS 1918-02-1) – Pesticide of Interest; 2007, 2022.

- **MCL**⁹: 500 ppb; **Aquatic Life Benchmarks**¹¹: CF = 550 ppb, CI = 11,800 ppb; ANV = 34,900 ppb.
- Only 2 detects out of 222 records in the Clearinghouse (0.02 & 0.67 ppb). These samples closely match those found in USGS' NWIS.
- Only three of the approximately 200 samples for surface water in NWIS were greater than 0.2 ppb.
- Picloram has a high leaching potential and a high potential to runoff in solution.
- Remains a Pesticide of Interest: based on data analysis, concentrations did not approach or exceed human health or ecological reference points or other environmental factors.

picoxystrobin (CAS 117428-22-5); Pesticide of Interest; 2017.

- **HHBP** = 290 ppb; AI = 12 ppb, CI = 1 ppb, ANV = 4 ppb.
- USGS use estimates for Nebraska are only for 2013-2014, 43K and 22K pounds statewide, respectively.
- Leaching potential is low, and solution runoff and adsorbed runoff potential is high and intermediate, respectively
- There were no analyses in the Clearinghouse
- No USGS groundwater samples analyzed
- No USGS surface water samples analyzed in Nebraska

prometon (herbicide, CAS 1610-18-0); Pesticide of Interest; 2008.

- **Lifetime HA**⁹: 100 ppb; **No aquatic life benchmarks** (benchmarks have since been posted at bit.ly/EPAaqlbm)
- 175 historical detections out of 12,922 samples, ranging from 0.02 to 2.9 ppb, with a mean of 0.29 ppb.
- There have been only 3 detections from approximately 2,093 samples since 1/1/2000.
- For surface water, only one site exceeded 1 ppb (two samples at Spring Creek, spring 1998 and 1999). An aquatic life benchmark has not officially been made, but 1 ppb was used by NDA as the comparison value, based on a review of the 2008 prometon RED (EPA-HQ-OPP-2007-1078)

prometryn (herbicide, CAS 7287-19-6); Pesticide of Interest; 2010.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- 1 detection from 2,153 ground water samples collected from 1984 to 2011 (0.05 ppb in 1991).

- Only 2 surface water samples (from 1990s) were above the method reporting limit (both were less than 1 ppb)
- No end use products are currently registered in Nebraska²¹.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

propazine (herbicide, CAS 139-40-2); Pesticide of Interest; 2008.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- 1,112 detects in historical record out of 12,568 samples, but these are limited to a relatively few number of wells sampled by UNL and USGS (likely research-related). Detections ranged from 0.05 to 0.71 ppb with a mean 0.08 ppb.
- There have been no detects since 1/1/2000, but geographical extent of samples has been limited since that time
- For surface water, the maximum sample concentration was 1.22 for all sites and 0.48 for the 12 evaluation sites. No aquatic life benchmark exists and no environmental effects info was found in the TRED.

propiconazole (fungicide, CAS 60207-90-1); Pesticide of Interest; 2011, 2022.

- **HHBP**¹⁰: 600ppb; **Aquatic Life Benchmarks**¹¹: CF = 15ppb; CI = 180ppb; ANV = 21ppb; AV = 3500 ppb
- Zero detections out of 197 analyses in ground water, but there the last analyses were in 2004. NWIS data are likely the same samples.
- Was not analyzed as part of the Safe Drinking Water Act monitoring requirements for Nebraska public water supply systems in 2011, and public water supplies were not checked for new data for this most recent evaluation.
- Of the approximately 100 samples in NWIS for surface water, all were below the minimum reporting limit and well below aquatic life benchmarks.
- Leaching potential is intermediate (WIN-PST); Solution runoff potential and soil adsorbed runoff potential are both high (WIN-PST).
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

pyraclostrobin (fungicide, CAS 175013-18-0); Pesticide of Interest; 2017.

- **HHBP** = 220 ppb; **Aquatic Life Benchmarks**¹¹: CF = 2.35 ppb; CI = 4 ppb; ANV = 1.5 ppb
- Pyraclostrobin use has steadily increased in the last decade, mainly from corn and soybean uses.
- Pyraclostrobin has a very low leaching potential, and intermediate potential for both solution runoff and adsorbed runoff
- There are no analyses in the Clearinghouse.
- Approximately a dozen groundwater samples from 2013 and 2015 contained no detections at a 0.003 ppb reporting limit.
- Over 400 SW samples were analyzed between 2012 & 2017. Approximately 70 had reported detections, and only 13 were greater than 0.01 ppb.
- 8 stream sediment samples were analyzed in 2013 – all being less than the reporting limit of 1.1 ug/kg
- Three degradates of pyraclostrobin have also been assessed for aquatic life benchmarks but were not analyzed in samples in Nebraska. These benchmark values are much greater than the parent benchmark, and consequently, that much greater than the pyraclostrobin values found thus far in Nebraska surface waters.

quizalofop (herbicide, CAS 76578-14-8); Pesticide of Interest; 2011.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.

- Zero analyses in the Clearinghouse.
- Was not analyzed as part of the Safe Drinking Water Act monitoring requirements for Nebraska public water supply systems.
- Was not analyzed in any of the USGS stream samples contained in NWIS.
- Leaching potential is high (WIN-PST).
- Solution runoff potential is intermediate, and soil adsorbed runoff potential is high (WIN-PST).
- There is only one product having the p-isomer of this active ingredient registered in Nebraska²¹.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

quizalofop-p-ethyl (herbicide, CAS 94051-08-8); Pesticide of Interest; 2011.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- Zero analyses in the Clearinghouse
- Was not analyzed as part of the Safe Drinking Water Act monitoring requirements for Nebraska public water supply systems.
- Was not analyzed in any of the USGS stream samples contained in NWIS.
- Leaching potential is intermediate (WIN-PST).
- Solution runoff potential is intermediate and soil adsorbed runoff potential is high (WIN-PST).
- There is only one product having this active ingredient registered in Nebraska²¹.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

simazine (herbicide, CAS 122-34-9); Pesticide of Interest; 2008.

- **MCL**⁹: 4 ppm; **Aquatic Life Benchmarks**¹¹: ANV = 36 ppb, AV = 140 ppb
- For ground water, only 636 records with detects out of over 13,000 samples – and detects were found in a relatively few number of wells.
- Detections ranged from 0.01 to 2 ppb, with a mean of 0.08 ppb.
- There have been only 12 detects out of 2,191 samples collected since 2000; only 10 detects 1,634 out of samples since 2002; and two since 2003.
- However, sampling has been limited to the eastern and southwestern parts of the state since 2000.
- For surface water, maximum concentration found was 0.49 but majority of samples were 0.2 ppb or less.

sulfometuron (herbicide, CAS 74223-56-6); Pesticide of Interest; 2011.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- Zero detections out of 197 analyses in ground water, but there have been no analyses since 2005.
- Was not analyzed as part of the Safe Drinking Water Act monitoring requirements for Nebraska public water supply systems.
- There were very few detections above the minimum reporting limit in USGS surface water samples, which ranged from 0.009 to 0.06 ppb, and there are no aquatic life benchmarks listed.
- Leaching potential is intermediate (WIN-PST).
- Solution runoff potential is high and soil adsorbed runoff potential is low (WIN-PST).
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

tebuthiuron (herbicide, CAS 34014-18-1); Pesticide of Interest; 2009, 2022.

- **Lifetime HA**⁹: 500 ppb; **Aquatic Life Benchmarks**¹¹: ANV = 50 ppb; AV = 130 ppb
- Only 4 detections from 402 historical ground water samples in the Clearinghouse, collected from 1995 to 2004, with concentrations of 0.35, 0.02, 0.01, and 0.01 ppb. Groundwater samples in NWIS are likely the same as the Clearinghouse.

- Surface water samples in NWIS were largely less than the method reporting limit, with fewer than 2 dozen detects all less than 0.2 ppb.
- Leaching potential and surface runoff potential are high; soil adsorbed runoff is intermediate.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

tefluthrin (insecticide, CAS 79538-32-2); 2015

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- 0 groundwater analyses in the Clearinghouse.
- Nebraska DHHS did not do analysis for SDWA.
- Surface water samples were collected at 4 USGS sites, with all samples recorded as being less than the minimum reporting limit ranging from 0.003 and 0.014 ppb. Both the CI (0.008 ppb) and AI (1.55 ppb) are greater than the minimum reporting limit.
- Leaching potential is very low; solution and adsorbed runoff potential is low and intermediate, respectively.
- Categorized as a Pesticide of Interest: based on data analysis, concentrations did not approach or exceed human health or ecological reference points or other environmental factors; no effect from exposure is expected.

terbacil (herbicide, CAS 5902-51-2); Pesticide of Interest; 2009, 2022.

- **Lifetime HA⁹**: 90 ppb; **Aquatic Life Benchmarks¹¹**: ANV = 11 ppb; AV = 140 ppb; CI = 50 ppb
- 0 detections from 500 historical ground water samples in the Clearinghouse collected from 1995 to 2019.
- USGS NWIS samples in groundwater were all at the method reporting limit, and likely were many of the same as in the Clearinghouse.
- All surface water samples were at the method reporting limit, which ranged from 0.004 to 0.05 ppb, well below any standard.
- Terbacil is high for both leaching and solution runoff potential.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

thiamethoxam (insecticide, CAS 153719-23-4); Pesticide of Interest; 2011 & 2015.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- Nebraska DHHS did not do analysis for SDWA.
- Thiamethoxam has a high leaching potential, and solution runoff and adsorbed runoff potential are high and low, respectively.
- Thiamethoxam use has increased steadily in the last decade, from 44K pounds in 2008 to 112K in 2014.
- No analyses are recorded in the Clearinghouse and no USGS groundwater samples were analyzed.
- Seven surface water samples were analyzed in 2013; 4 were less than the reporting limit of 0.0039 ppb and the remainder were less than 0.02 ppb

tralkoxydim (herbicide, CAS 87820-88-0); Pesticide of Interest; 2010.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- No ground water samples analyzed in the Clearinghouse.
- No surface water samples analyzed.
- Only 2 products currently registered (for wheat and barley), but they are being discontinued²¹.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

triallate (herbicide, CAS 2303-17-5); Pesticide of Interest; 2010, 2022.

- **HHBP**¹⁰: 150 ppb; **Aquatic Life Benchmarks**¹¹: CI – 14 ppb; ANV = 21; AV = 2400
- 0 detections in the Clearinghouse from over 2,000 groundwater samples collected from 1995 to 2019.
- No detections above the reporting limit in USGS NWIS groundwater samples, many of which are likely also included in the Clearinghouse.
- All surface water samples were at or below the method reporting limit (< 0.008 ppb).
- Triallate has high potential for both solution and soil adsorbed runoff.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

triclopyr (herbicide, CAS 55335-06-3) - Pesticide of Interest; 2011.

- See page 6 in the evaluation logic narrative and/or the references section for links to the toxicity information for this active ingredient.
- Zero detections out of 222 analyses in ground water, but there have been no analyses since 2005.
- Was not analyzed as part of the Safe Drinking Water Act monitoring requirements for Nebraska public water supply systems.
- There were no detections above the minimum reporting limit in USGS surface water samples, which ranged from 0.02 to 0.08 ppb, while the acute benchmark for aquatic nonvascular plant life is 100 ppb.
- Leaching potential is high.
- Solution runoff potential is high and soil adsorbed runoff potential is intermediate.
- Some formulations and products have aquatic uses.
- Remains a pesticide of interest: no effect from exposure is expected and/or an insignificant level of use is estimated.

trifloxystrobin (fungicide, CAS 141517-21-7); Pesticide of Interest; 2017.

- Trifloxystrobin use has increased in the last decade, ranging from 130K pounds in 2012 to 24K in 2008. Corn, Soybeans, and wheat are the main ag uses.
- Leaching potential is low; solution runoff and adsorbed runoff are both intermediate.
- There were no analyses in the Clearinghouse.
- Approximately a dozen groundwater samples from 2013 and 2015 contained no detections at a 0.002 ppb reporting limit.
- Chronic fish = 4.3 ppb; chronic invert = 2.76 ppb
- Over 400 SW samples were analyzed between 2012 & 2017. Approximately 17 had reported detections, and only 2 were greater than 0.01 ppb.
- 8 stream sediment samples were analyzed in 2013 – all being less than the reporting limit of 1 ug/kg
- One degradate of trifloxystrobin has also been assessed for aquatic life benchmarks, but these values are much greater than the parent benchmark, and consequently, that much greater than the trifloxystrobin values found thus far in Nebraska surface waters.

trifluralin (herbicide, CAS 1582-09-8); Pesticide of Interest; 2008.

- **Lifetime HA**⁹: 10 ppb; **Aquatic Life Benchmarks**¹¹: ANV = 7.5 ppb, AV = 43.5 ppb
- Only 38 detections in ground water from historical record, compared to ~ 16,500 samples analyzed.
- Detections ranged from 0.008 to 1.56 ppb, with a mean 0.2 ppb.
- No detections found since 1/1/2000 out of 2,179 samples analyzed, but sampling has been limited mainly to the eastern and southwestern parts of the state.
- For surface water, 11 of 12 sites had trifluralin samples. The maximum concentration found was 0.112 but most samples were 0.02 ppb or less.

Human Health Risk Definitions Used in the Narrative Above

HA (Health Advisory) - An estimate of acceptable drinking water levels for a chemical substance based on health effects information; a Health Advisory is not a legally enforceable Federal standard, but serves as technical guidance to assist Federal, State, and local officials.

Lifetime HA - The concentration of a chemical in drinking water that is not expected to cause any adverse non-carcinogenic effects for a lifetime of exposure. The Lifetime HA is based on exposure of a 70-kg adult consuming 2 liters of water per day. The Lifetime HA for Group C carcinogens includes an adjustment for possible carcinogenicity.

Human Health Benchmark for Pesticides (HHBP) – The chronic or lifetime, non-cancerous HHBP is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

DWEL (Drinking Water Equivalent Level) HA - A lifetime exposure concentration protective of adverse, noncancerous health effects that assumes all the exposure to a contaminant is from drinking water.

MCL (Maximum Contaminant Level) - The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLG as feasible using the best available analytical and treatment technologies and taking cost into consideration. MCLs are enforceable standards.

Aquatic/Environmental Risk Definitions Used in the Narrative Above

Acute invertebrates (AI) - Benchmark = Toxicity value x Level of Concern (LOC). For acute invertebrate, toxicity value is usually the lowest 48- or 96-hour EC₅₀ or LC₅₀ in a standardized test (usually with midge, scud, or daphnids), and the LOC is 0.5.

Chronic invertebrates (CI) - Benchmark = Toxicity value x LOC. For chronic invertebrates, toxicity value is usually the lowest NOAEC (no observable adverse effect concentration) from a life-cycle test with invertebrates (usually with midge, scud, or daphnids), and the LOC is 1.

Acute nonvascular plant (ANV) - Benchmark = Toxicity value x LOC. For acute nonvascular plants, toxicity value is usually a short-term (less than 10 days) EC₅₀ (usually with green algae or diatoms), and the LOC is 1.

Acute vascular plant (AV) - Benchmark = Toxicity value x LOC. For acute vascular plants, toxicity value is usually a short term (less than 10 days) EC₅₀ (usually with duckweed) and the LOC is 1.

Acute Fish (AF) - Benchmark = Toxicity value x LOC. For acute fish, toxicity value is generally the lowest 96-hour LC₅₀ in a standardized test (usually with rainbow trout, fathead minnow, or bluegill), and the LOC is 0.5

Chronic Fish (CF) - Benchmark = Toxicity value x LOC. For chronic fish, toxicity value is usually the lowest NOAEC (no observable adverse effect concentration) from a life cycle or early life stage test (usually with rainbow trout or fathead minnow), and the LOC is 1.

Aquatic Life Criteria (ALC maximum and ALC continuous) – EPA Office of Water uses aquatic toxicity data to develop ambient water quality criteria that can be adopted by states and tribes to establish water quality standards under the Clean Water Act. Criteria are available for roughly 16 pesticides. Procedures for deriving the criteria are described in Guidelines for Deriving Numerical National Water Quality Criteria for the Protection of Aquatic Organisms and Their Uses. (EPA PB85-227049), and require, for acute criteria, that data be available for at least 8 families of organisms.

Figure 1. Surface water bodies listed as impaired by atrazine in Nebraska (from the [2020 Integrated Report \(IR\)](#)).

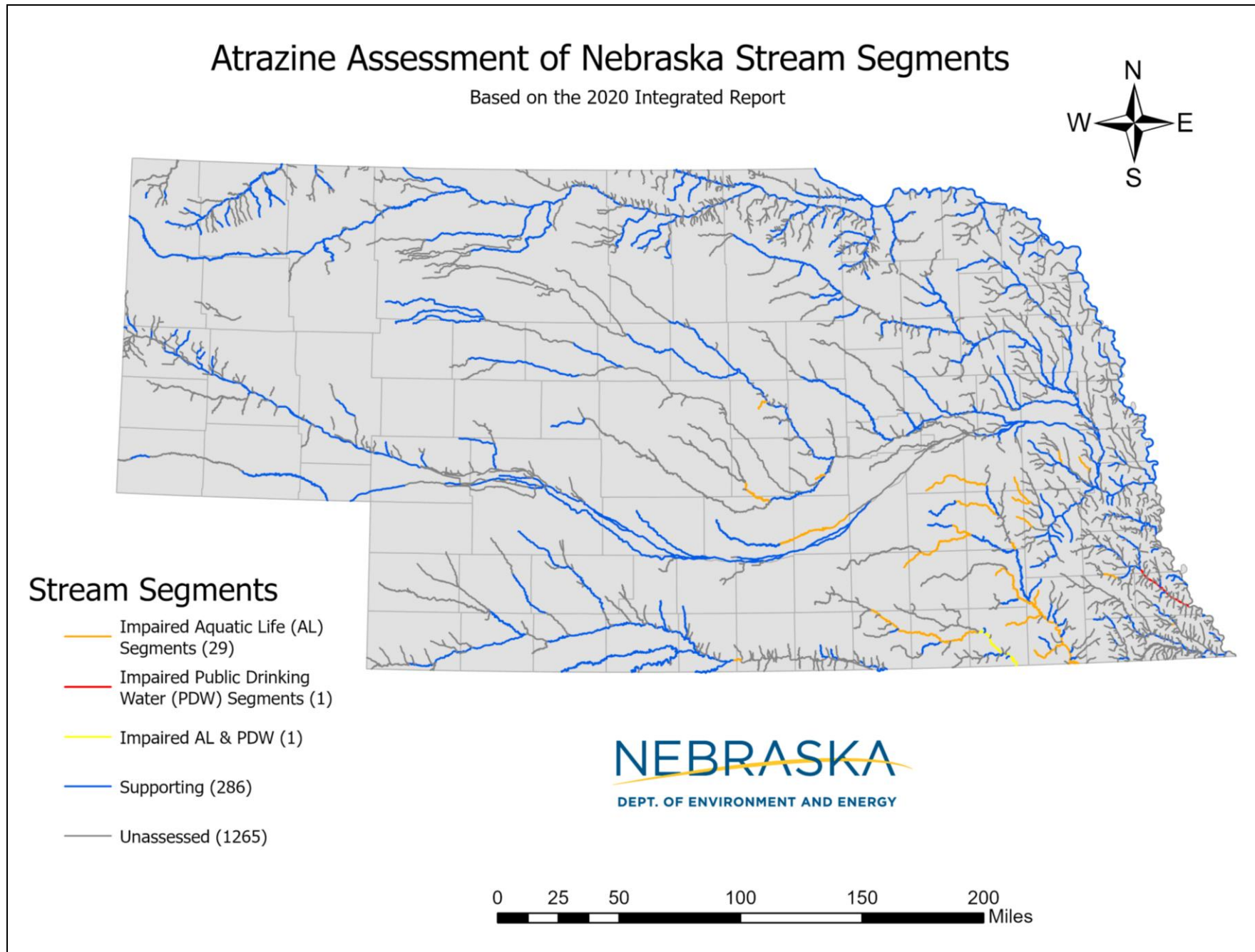


Table 3. Summary statistics of atrazine data assessed for the Integrated Report in Nebraska (from the [2020 Integrated Report](#)).

Stream Segment	Stream Name	2020 IR Classification*	Impairments (Causes)	Comments/Actions	Beneficial Use**
BB1-10000	Big Blue River, south of Turkey Creek to Kansas Border	5	Recreation (E. coli), Aquatic Life (May-June Atrazine)	Atrazine & E. coli TMDLs approved 12/13, Fish Consumption Assessment completed	AL
BB1-10100	Mission Creek	4a	Recreation (E. coli), Aquatic Life (May-June Atrazine)	Atrazine & E. coli TMDLs approved 12/13	AL
BB1-10800	Big Indian Creek, lower half of river	4a	Recreation (E. coli), Aquatic Life (May-June Atrazine)	Atrazine & E. coli TMDLs approved 12/13, Fish Consumption Assessment completed, Aquatic Community Assessment completed	AL
BB1-10900	Big Indian Creek, upper half of river	5	Recreation (E. coli), Aquatic Life (May-June Atrazine)	Atrazine TMDL approved 12/13	AL
BB1-11900	Cub Creek	5	Aquatic Life (May-June Atrazine)		AL
BB1-12000	Soap Creek	5	Aquatic Life - Impaired Aquatic Community (Unknown), (May-June Atrazine)	Aquatic Community Assessment completed	AL
BB2-10000	Turkey Creek, near Dewitt NE	5	Recreation (E. coli), Aquatic Life - Impaired Aquatic Community (Unknown), (May-June Atrazine)	Atrazine and E. coli TMDL approved 12/13, Aquatic Community Assessment completed	AL
BB2-20000	Turkey Creek, near Wilber NE	4a	Recreation (E. coli), Aquatic Life (May-June Atrazine)	Atrazine and E. coli TMDL approved 12/13	AL
BB2-20100	Spring Creek	5	Aquatic Life (May-June Atrazine)		AL
BB3-10300	Beaver Creek	4a	Aquatic Life (May-June Atrazine)	Atrazine TMDL approved 12/13	AL
BB3-20000	West Fork Big Blue River, between Beaver Creek and Big Blue	5	Recreation (E. coli), Aquatic Life - Impaired Aquatic Community (Unknown), (May-June Atrazine)	Atrazine and E. coli TMDL approved 12/13	AL
BB3-20100	School Creek	5	Aquatic Life (May-June Atrazine)		AL
BB4-10000	Big Blue River, Between Blue Bluff Dam and West Fork Big Blue	4a	Recreation (E. coli), Aquatic Life (May-June Atrazine)	Atrazine and E. coli TMDL approved 12/13	AL

Stream Segment	Stream Name	2020 IR Classification*	Impairments (Causes)	Comments/Actions	Beneficial Use**
BB4-40000	Big Blue River, Headwaters to North Fork of Big Blue	5	Aquatic Life - (May-June Atrazine), Dissolved Oxygen (Unknown)	Atrazine TMDL approved 12/13	AL
LB1-10000	Little Blue River, between Big Sandy Creek and Kansas border	5	Recreation (E. coli), Aquatic Life - Fish Consumption Advisory (Mercury), (May-June Atrazine, Lead, Aluminum), Public Drinking Water Supply (Atrazine, Arsenic, Aluminum)	Atrazine & E. coli TMDLs approved 2/13, Fish Consumption Assessment completed	AL & PDW
LB2-10000	Little Blue River, between Spring Creek and Big Sandy Creek	4a	Recreation (E. coli), Aquatic Life (May-June Atrazine)	Atrazine & E. coli TMDLs approved 2/13, Aquatic Community Assessment completed	AL
LB2-20000	Little Blue River, Liberty Creek to Spring Creek	4a	Recreation (E. coli), Aquatic Life (May-June Atrazine)	Atrazine & E. coli TMDLs approved 2/13, Aquatic Community Assessment completed, Fish Consumption Assessment completed	AL
LO2-10900	Dane Creek	2	Aquatic Life (May-June Atrazine)	Aquatic Community Assessment completed, results were inconclusive - site will be reassessed?	AL
LO3-10200	Turkey Creek	5	Aquatic Life (May-June Atrazine)		AL
LO4-10100	Mud Creek	5	Recreation (E. coli), Aquatic Life - Impaired Aquatic Community (Unknown), (May-June Atrazine)	E. coli & Atrazine TMDLs approved 5/12	AL
LP2-10121	Johnson Creek	5	Aquatic Life - Impaired Aquatic Community (Unknown), (May-June Atrazine)		AL
LP2-10160	Sand Creek	5	Aquatic Life (May-June Atrazine)		AL

Stream Segment	Stream Name	2020 IR Classification*	Impairments (Causes)	Comments/Actions	Beneficial Use**
LP2-20710	Middle Oak Creek	5	Aquatic Life (May-June Atrazine)		AL
LP2-20800	Oak Creek	5	Aquatic Life (May-June Atrazine)		AL
LP2-21100	Middle Creek	4a	Aquatic Life (May-June Atrazine)	Atrazine TMDL approved 9/07	AL
MP2-10200	Wood River	5	Aquatic Life - Impaired Aquatic Community (Unknown), (Ammonia, May-June Atrazine), Agricultural Water Supply (Conductivity)		AL
NE2-10750	Little Muddy Creek	5	Recreation (E. coli), Aquatic Life (May-June Atrazine)		AL
NE3-10000	Little Nemaha River	5	Recreation (E. coli), Public Drinking Water Supply (May-June Atrazine, Arsenic)	E. coli TMDL approved 9/07, Public Drinking Water Supply use assigned 6/19	PDW
NE3-20400	South Fork Little Nemaha River	5	Aquatic Life (May-June Atrazine)		AL
RE1-50000	Republican River	5	Recreation (E. coli), Aquatic Life (May-June Atrazine), Dissolved Oxygen (Unknown)		AL

* Category 2 – Waterbodies where some of the designated uses are met but there is insufficient information to determine if all uses are being met.

* Category 4A – Waterbody assessment indicates the waterbody is impaired, but all of the required TMDLs have been completed.

* Category 5 – Waterbody where one or more beneficial uses are determined to be impaired by one or more pollutants and all of the TMDLs have not been developed. Category 5 waters constitute the Section 303(d) list subject to EPA approval/disapproval.

** AL = Aquatic Life; PDW = Public Drinking Water

Reported samples were collected during the May 1- June 30 application season and year-round for public drinking water supplies.

NDEE, per the CWA section 303(d), must assess all available data that meets EPA's data quality standards from the last five years, unless the data set is continuous, in which case the last ten years of data is assessed.

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