Organic land management, including agriculture and the production of organic food, utilizes a system that seeks to maintain and improve the environment. Organic standards, codified in the Organic Food Productions Act (OFPA), are subject to independent public review and oversight of practices and allowed inputs, assuring that toxic, synthetic pesticides used in conventional, chemical-intensive agriculture are replaced by methods focused on soil biology, biodiversity, and plant health. This ensures that pesticides that contaminate our water and air, hurt biodiversity, harm farmworkers, and kill bees, birds, fish and other wildlife are reduced or eliminated completely.

Current laws to protect water quality under the Clean Water Act (CWA) are limited by risk calculations that offer limited public health and environmental protection. Meanwhile, the nation as a whole still relies on toxic inputs to grow food and manage landscapes. These chemicals, like atrazine, 2,4-D, and glyphosate, are linked to a myriad of human and environmental health concerns, including cancer, birth defects, reproductive and sexual dysfunction, and neurological/learning problems. The high rates of cancer, learning and behavioral effects, and infertility call for a serious reevaluation of the way food is grown and waterways protected. Organic farming and landscape management provide the model for transitioning from chemical-dependent to sustainable practices.

### Conventional Farming Threatens Waterways

Conventional, chemical-intensive agriculture in the U.S. and its reliance of toxic, synthetic inputs, such as insecticides, herbicides, and synthetic nitrogen and phosphorus fertilizers, have affected the quality of surface and groundwater for decades. According to data from the U.S. Geological Survey (USGS) and the Environmental Protection Agency (EPA), of the over 300 food production pesticides with tolerances registered—allowable levels of pesticide residue on food—52 are known surface or groundwater contaminants. (See Beyond Pesticides’ Eating with a Conscience (EWAC) at www.eatingwithaconscience.org.) The overwhelming majority of the most popular pesticides used in the U.S. have been detected in surface and groundwaters, including the popular herbicides atrazine, glyphosate, and 2,4-D.¹ (See Table 1.)

### Ten Most Toxic Crops to Produce

Corn and soybeans are the most widely grown crops in the U.S. and as such contribute overwhelmingly to pesticide contamination, especially in the Midwest where these crops are predominantly grown, and pollution of the Mississippi River watershed and the Gulf of Mexico. Ninety percent of corn and soybeans are genetically engineered, which also correlates to an increase in herbicide use. The EWAC database indicates that of the 84 pesticides with established tolerances for corn, 22 are known to contaminate streams or groundwater. Of the 83 pesticides registered for use on soybeans, 26 contaminate streams or groundwater.

Conventional, chemical-intensive farming of bell peppers, potatoes, tomatoes, and wheat are the biggest contributors to water contamination after corn and soybeans. Asparagus, peaches, pears,
and hot peppers round off the top 10 dirty crops that are grown with the most water contaminating pesticides. (See Tables 2 and 3 for foods with most toxic production practices.)

**Pesticides Most Frequently Detected**

*Urban vs. Agricultural*

According to USGS’ *Pesticides in the Nation’s Streams and Ground Water,* the herbicide atrazine is the most frequently detected pesticide in surface and groundwater. The others most frequently detected nationwide are the herbicides metolachlor, simazine, prometon, and the insecticide diazinon. For insecticides, the most frequently detected are chlorpyrifos, carbaryl, malathion, diazinon, and carbofuran. For herbicides, atrazine, metolachlor, acetochlor, trifluralin and cyanazine are the five most frequently detected. These pesticides are registered for use mostly on agricultural sites, but trifluralin, simazine, and prometon also have residential uses, while cyanazine’s uses have been cancelled since 1999. 2,4-D is overwhelmingly detected in urban areas, due to its prevalence in lawn care products. Simazine and diuron are also detected in urban areas.

While the vast volume of pesticide runoff comes from agricultural areas, urban uses of pesticide products contribute to water contamination. Lawn applications, uses on rights-of-way, and mosquito control applications lead to pesticide runoff into streams and rivers. One California monitoring study of urban creeks (2009) found pyrethroid insecticides in every sample collected. Bifenthrin is identified as the pyrethroid of greatest toxicological concern, followed by cypermethrin and cyfluthrin. Pyrethroids are commonly formulated in over-the-counter pesticide products for consumers or professional pest control operators. However, seasonal patterns of discharge of these chemicals into waterways are more consistent with professional use as the dominant source of bifenthrin.³

**Water Monitoring Continually Detects Pesticides**

According to USGS, 56 percent of streams sampled have one or more pesticides in water that exceed at least one aquatic-life benchmark set by EPA. Benchmarks, developed by EPA through baseline risk assessments, are estimates of the chemical concentrations that establish “acceptable” risks associated with harm to aquatic life. Urban streams have concentrations that exceed one or more benchmarks at 83 percent of sampled sites —mostly by the insecticides diazinon, chlorpyrifos, and malathion. Agricultural streams have concentrations that exceed one or more benchmarks at 57 percent of sites —most frequently by chlorpyrifos, azinphosmethyl, atrazine, p,p’-DDE, and alachlor.⁴ Pesticide compounds analyzed in most water by USGS include many of the most heavily used herbicides and insecticides, and one or more pesticides or their degradates are detected in water more than 90 percent of the time during the year in agricultural streams, urban streams, and mixed-land-use streams.⁵

Atrazine shows consistent patterns of high levels in U.S. waterways, as shown in Table 2.

### Table 2.

**Ten Most Toxic Crops to Produce**

<table>
<thead>
<tr>
<th>Crops</th>
<th>2,4-D</th>
<th>Atrazine</th>
<th>Chlorothalonil</th>
<th>Glyphosate</th>
<th>Malathion</th>
<th>Metolachlor</th>
<th>Paraquat</th>
<th>Pendimethalin</th>
<th>Permethrin</th>
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</tr>
<tr>
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</tbody>
</table>

Top ten most toxic crops to produce based on number of allowed pesticides. Source: Eating with a Conscience Database, Beyond Pesticides.

### Table 3.

**Crops Associated with Surface and Groundwater Contamination**

- Source: Eating with a Conscience Database, Beyond Pesticides.
When we purchase over-the-counter pesticide products, we may be contributing to water contamination and the degradation of unique aquatic ecosystems. One prime example is the Chesapeake Bay, where toxic contamination remains widespread, with severe impacts in some places, despite federal mandates for cleanup. A 2013 report, Technical Report on Toxic Contaminants in the Chesapeake Bay and its Watershed: Extent and Severity of Occurrence and Potential Biological Effects, finds that nearly three-fourths of the Bay’s tidal waters are “fully or partially impaired” by toxic chemicals, with people warned to limit fish consumption from certain areas. Contamination is severe in a handful of “hot spots” around the Bay, including Baltimore’s harbor, also related to a legacy of past industrial and shipping activity.

Non-Point Pesticide Sources Trouble the Nation’s Largest Estuary

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Atrazine has been found to act as an endocrine disruptor that can cause complete sex reversal in male frogs. In fact, research led by Tyrone Hayes, PhD at the University of California, Berkeley finds that male frogs exposed to atrazine can become so completely female that they can mate and lay viable eggs. In 2008, atrazine, along with chlorpyrifos, endosulfan, and metolachlor, were identified by USGS, with other contaminants, as possible suspects in the alarming discovery of “intersex” fish — male fish producing eggs — in the Potomac River, which flows through downtown Washington, DC. These pesticides are noted endocrine disruptors capable of affecting hormones in wildlife. Alarming research (2011) shows that women who drink water containing low levels of atrazine, which has been detected in drinking water, may be more likely to have irregular menstrual cycles and low estrogen levels, even at concentrations far below federal drinking water standards considered safe by the EPA.

In Connecticut, a state-sponsored study (2012) detected residues of mosquito control pesticides in lobsters pulled from Long Island Sound. Three common mosquito control chemicals — malathion, methoprene, and resmethrin — were found in the lobsters tested. These chemicals, and their chemical classes, organophosphates, insect growth regulators, and synthetic pyrethroids, respectively, are frequently used for mosquito control, and are known to be toxic to many aquatic species, including crustaceans.

Conclusion
Growing food with a reliance on toxic pesticides has resulted in the nation’s waterways being heavily contaminated with toxic chemicals. Organic farming demonstrates clearly that relying on toxic chemical inputs for crop yields is not only unnecessary, but serves to protect waterways and public health from chemical pollution. Creating healthy soils, which is the foundation of organic systems, conserves water, nurtures fertility, leads to less surface runoff, and reduces the need for nutrient input. With less toxic pesticide use, organic farming helps to protect the quality of the nation’s waterways.

How Does Organic Farming Protect Water Quality?

- **Reduces/Eliminates Pesticide Runoff**— Organic farming and land management reduces or eliminates water pollution and helps conserve water and soil. According to the Food and Agriculture Organization (FAO), several countries in Europe compel or subsidize organic farmers to use organic techniques specifically to combat water pollution problems.

- **Reduces Nutrient Runoff**— Organic standards stipulate that soil fertility and crop nutrients can be managed through tillage and other cultivation practices, such as crop rotation, which preserve and maintain the fertility of the soil so that synthetic inputs become unnecessary. Organic therefore eliminates the need and use of synthetic nitrogen/phosphorus-based fertilizers, thereby significantly reducing the threats that nitrogen and phosphorus runoff have on aquatic ecosystems and the prevalence of algal blooms and eutrophication.

- **Prohibits the Use of Sewage Sludge/Biosolids**— Organic does not allow the use of sewage sludge, which is often contaminated with a host of chemicals, including heavy metals, pharmaceuticals, and pesticides. These can all re-enter the aquatic environment once the sludge is recycled on land.

- **Prohibits Genetic Engineering**— Genetic engineering that incorporates the popular herbicide-tolerant, Roundup Ready corn and soybeans, or insecticidal genes into plants, is prohibited in organic. Genetically engineered (GE) crops have led to an increase in herbicide use, as farmers are able to apply these chemicals without killing their crop, and weed and insect resistance.

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Endnotes