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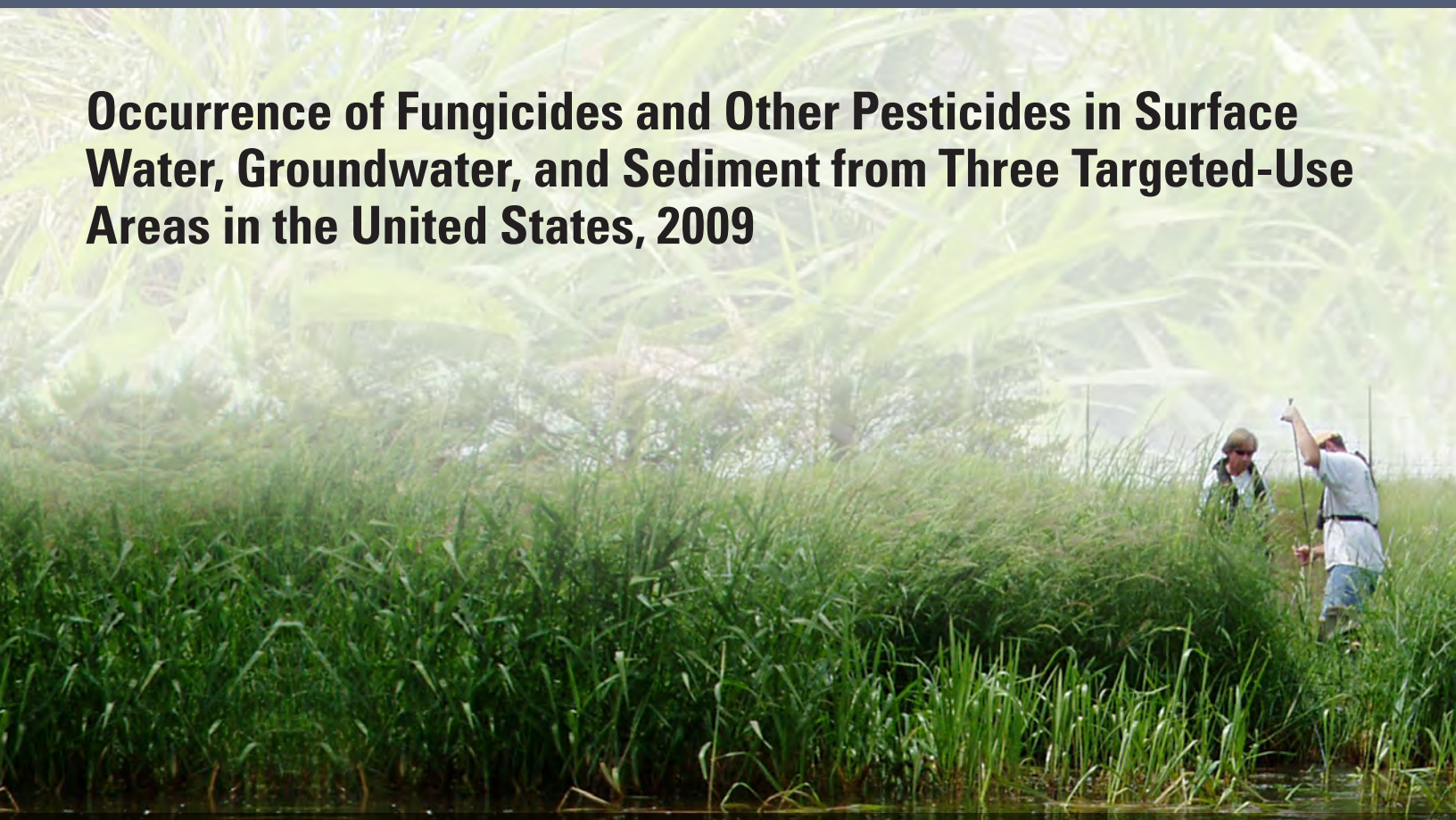
Occurrence of Fungicides and Other Pesticides in Surface Water, Groundwater, and Sediment from Three Targeted-Use Areas in the United States, 2009



Data Series 797

U.S. Department of the Interior
U.S. Geological Survey

Front Cover Suspended sediment samplers deployed in an agricultural drain in Wisconsin.

Back Cover Collage (Top to Bottom)

Personnel from the USGS Wisconsin Water Science Center constructing a shallow temporary well near Hancock Wisconsin
Personnel from the USGS Idaho Water Science Center collecting a surface water sample from Sand Run Gulch near Parma, Idaho
Potato field near Presque Isle, Maine

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U.S. Department of the Interior
SALLY JEWELL, Secretary

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Suzette M. Kimball, Acting Director

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Conversion Factors

Inch/Pound to SI

Multiply	By	To obtain
	Length	
foot (ft)	0.3048	meter (m)
mile (mi)	1.609	kilometer (km)
	Flow rate	
inch per year (in/yr)	25.4	millimeter per year (mm/yr)
	Mass	
pound, avoirdupois (lb)	0.4536	kilogram (kg)
	Area	
acre	4,047	square meter (m^2)
acre	0.4047	hectare (ha)
acre	0.4047	square hectometer (hm^2)
acre	0.004047	square kilometer (km^2)
	Pressure	
pound per square inch (lb/in^2)	6.895	kilopascal (kPa)

SI to Inch/Pound

Multiply	By	To obtain
	Length	
centimeter (cm)	0.3937	inch (in.)
millimeter (mm)	0.03937	inch (in.)
micrometer (µm)	0.00003937	inch (in.)
meter (m)	3.281	foot (ft)
	Area	
square meter (m^2)	0.0002471	acre
	Volume	
microliter (µL)	0.000001057	quart (qt)
milliliter (mL)	0.001057	quart (qt)
liter (L)	1.057	quart (qt)
liter (L)	0.2642	gallon (gal)
	Flow rate	
cubic meter per second (m^3/s)	35.31	cubic foot per second (ft^3/s)
	Mass	
kilogram (kg)	2.205	pound avoirdupois (lb)
milligram (mg)	0.0003527	ounce, avoirdupois (oz)
gram (g)	0.03527	ounce, avoirdupois (oz)

Temperature in degrees Celsius (°C) may be converted to degrees Fahrenheit (°F) as follows:

$°F=(1.8\times°C)+32$

Horizontal coordinate information is referenced to the North American Datum of 1983 (NAD 83)

Specific conductance is given in microsiemens per centimeter at 25 degrees Celsius (µS/cm at 25°C).

Concentrations of chemical constituents in water are given either in milligrams per liter (mg/L) or micrograms per liter (µg/L).

Abbreviations

AMPA	amino phosphonic acid
ASE	accelerated solvent extractor
DCM	dichloromethane
GC/MS	gas chromatograph/mass spectrometer
GPC	gel-permeation chromatography
MDL	method detection limit
ND	not detected
ng/L	nanogram per liter
°C/min	degrees celsius per minute
SD	standard deviation
SPE	solid-phase extraction
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
v/v	volume to volume
µA	microampere
µg/kg	microgram per kilogram
Θ	Bragg angle, glancing angle (2Θ is twice the glancing angle in X-ray diffraction)

Acknowledgments

We would like to acknowledge personnel from the Parma Research and Extension Center, Idaho, Hancock Agricultural Research Station, Wisconsin, and the University of Maine Aroostook Farm, Maine, for their invaluable support during this project.

The authors would like to acknowledge Alexandra Etheridge, Brent Olsen, and Charlie Culbertson from the U.S. Geological Survey Idaho, Wisconsin, and Maine Water Science Centers for their many hours of sample collection and processing. We also thank Kristi Jones and Ryan Todd of the USGS California Water Science Center for their many hours of laboratory work. This project was funded by the U.S. Geological Survey Toxics Substances Hydrology Program.

Occurrence of Fungicides and Other Pesticides in Surface Water, Groundwater, and Sediment from Three Targeted-Use Areas in the United States, 2009

By James L. Orlando, Kelly L. Smalling, Timothy J. Reilly, Neil S. Fishman, Adam Boehlke, Michael T. Meyer, and Kathryn M. Kuivila

Abstract

Surface-water, groundwater, and suspended- and bed-sediment samples were collected in three targeted-use areas in the United States where potatoes were grown during 2009 and analyzed for an extensive suite of fungicides and other pesticides by gas chromatograph/mass spectrometry and liquid chromatography with tandem mass spectrometry. Fungicides were detected in all environmental matrices sampled during the study. The most frequently detected fungicides were azoxystrobin, boscalid, chlorothalonil, and pyraclostrobin. Other pesticides that were detected frequently included amino phosphonic acid (AMPA), atrazine, metolaclor, and the organochlorine insecticide *p,p*'-DDT and its degradates *p,p*'-DDD and *p,p*'-DDE.

A greater number of pesticides were detected in surface water relative to the other environmental matrices sampled, and at least one pesticide was detected in 62 of the 63 surface-water samples. The greatest numbers of pesticides and the maximum observed concentrations for most pesticides were measured in surface-water samples from Idaho. In eight surface-water samples (six from Idaho and two from Wisconsin), concentrations of bifenthrin, metolachlor, or malathion exceeded U.S. Environmental Protection Agency freshwater aquatic-life benchmarks for chronic toxicity to invertebrates.

Thirteen pesticides, including seven fungicides, were detected in groundwater samples. Shallow groundwater samples collected beneath recently harvested potato fields contained more pesticides and had higher concentrations of pesticides than samples collected from other groundwater sources sampled during the study. Generally, pesticide concentrations were lower in groundwater samples than in surface-water or sediment samples, with the exception of the fungicide boscalid, which was found to have its highest concentration in a shallow groundwater sample collected in Wisconsin.

Thirteen pesticides, including four fungicides, were detected in suspended-sediment samples. The most frequently detected compounds were the fungicides boscalid, pyraclostrobin, and zoxamide, and the degradates *p,p*'-DDD and *p,p*'-DDE. Twenty pesticides, including six fungicides, were detected in bed-sediment samples. The most frequently detected compounds were pyraclostrobin, *p,p*'-DDT, *p,p*'-DDD, and *p,p*'-DDE.

Introduction

Data that document the fate and effects of fungicides in the aquatic environment are limited despite decades of agricultural and urban use, and even less is known about the presence of these compounds in groundwater and sediments. Fungicides are applied to numerous crops, including staples such as corn, peanuts, potatoes, rice, and wheat, as well as fruit tree and vegetable crops. Typically, a single fungicide or combinations of different fungicides are applied repeatedly throughout the growing season, unlike herbicides and insecticides, which are applied less frequently. In 2002, agricultural fungicide applications (not including sulfur or copper) in the United States exceeded 30 million pounds, and, at just less than 6 million pounds, potatoes had the highest fungicide use of any crop (Gianessi and Reigner, 2006). The fungicides used most frequently on potatoes are chlorothalonil and organometallic compounds.

Fungicides have been detected in various aquatic, terrestrial, and atmospheric environments, including surface water (Berenzen and others, 2005; Scribner and others, 2006; Smalling and Orlando, 2011), air (Coscolla and others, 2010), rainfall (Aulagnier and others, 2008), and sediment (Bermudez-Couso and others, 2007). Additionally, fungicides are routinely applied to crops, such as potatoes and peanuts, that are grown in well-drained soils, which can result in transport to groundwater systems. Despite extensive use, fungicides are often underrepresented in monitoring programs (Gilliom and others, 2006; Kuivila and Hladik, 2008).

Recent studies have indicated that strobilurin and conazole fungicides pose a risk to fresh-water algae, certain invertebrates, and amphibians (Ochoa-Acuna and others, 2009; Warming and others, 2009; Belden and others,

2010), and fungicides, alone or in combination with other pesticides, have the potential to cause genotoxic effects in fish and other organisms (Bony and others, 2008; Bony and others, 2010). Certain fungicides have also been shown to have anti-androgenic effects (Martinovic and others, 2008; Orton and others, 2011). On the whole, however, studies of the effects of fungicides on organisms are limited compared to the existing literature on the environmental effects of insecticides and herbicides.

Purpose and Scope

This report describes the methods and procedures used to measure dissolved and sediment-bound pesticide concentrations in samples collected from sites in Idaho, Wisconsin, and Maine during June through November 2009. Results are presented for a suite of 92 pesticides in surface and groundwater and 91 pesticides in suspended and bed sediment. Concentrations of nutrients and inorganic constituents, sediment organic carbon and nitrogen, and sediment particle size and mineralogy are presented for selected samples.

Study Design

This study was designed to characterize the occurrence of agricultural fungicides and other pesticides in three targeted-use areas of the United States where potatoes are grown (fig. 1). Fungicide use in the U.S. was evaluated by using county-level data on agricultural land and chemical use. Candidate areas were selected on the basis of potato production and the use of selected fungicides. Counties with high fungicide use were further prioritized on the basis of the following

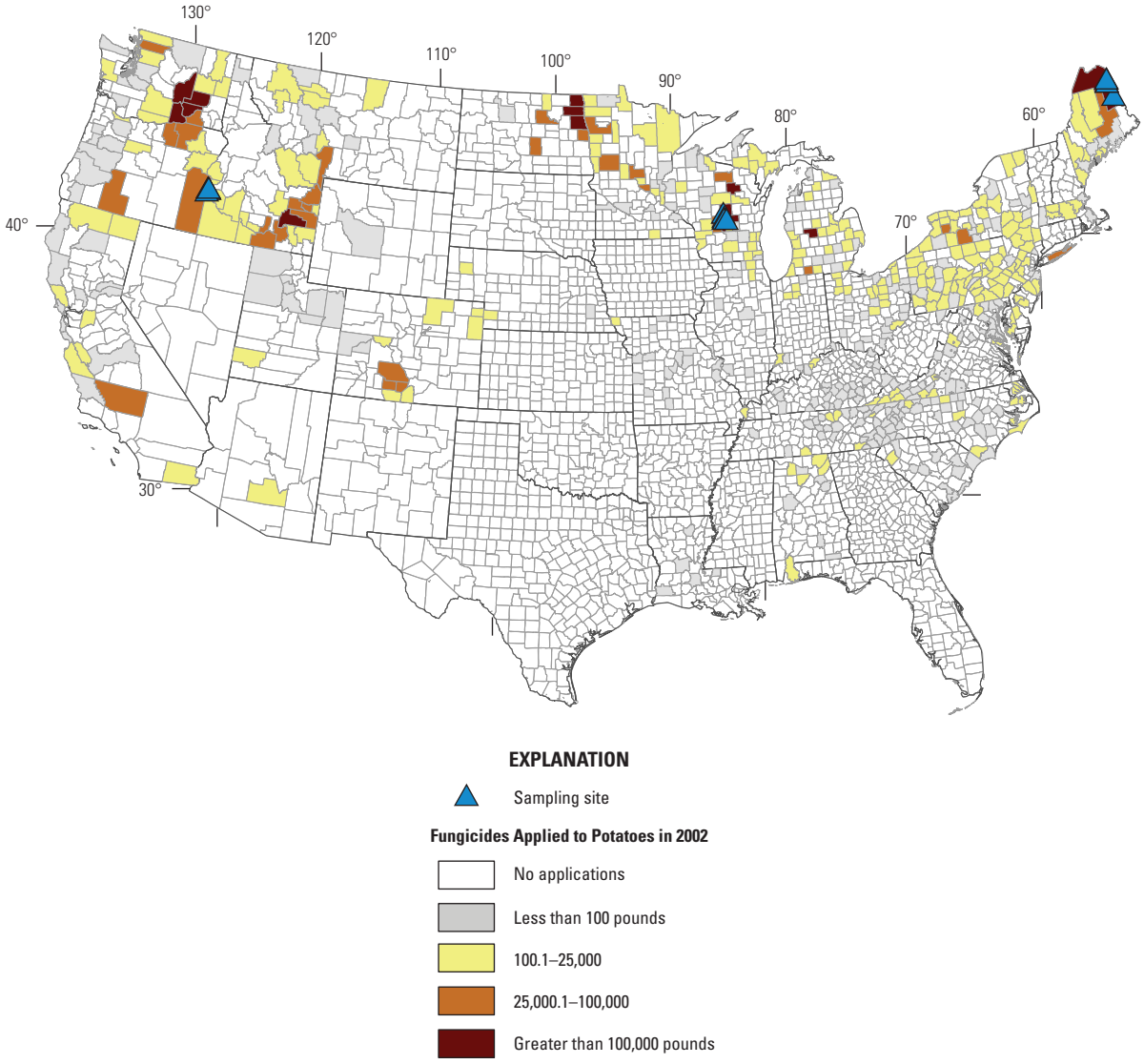

Figure 1. Study-area locations and fungicide amounts applied to potatoes in the United States (fungicide application data from Gianessi and Reigner, 2006).

factors to ensure the selection of a nationally relevant group of sites: hydrologic and climatological setting, proximity to sensitive resources and environments, agricultural and irrigation practices, and availability of pesticide application data. Sampling sites were selected in Idaho, Maine, and Wisconsin either on or in proximity to university agricultural research farms that perform focused research on potatoes and other locally grown crops in an effort to collaborate with local researchers. Pesticides were analyzed in four major environmental matrices: surface water, groundwater, suspended sediment, and bed sediment. Samples were collected beginning at the start of fungicide applications in each targeted-use area and continued until just after potato harvest.

Surface-water samples were collected at three primary sites in each state, approximately every 3 weeks during the potato growing season, and at one secondary site in each state, where samples were only collected at the beginning and end of the study. In Wisconsin, one primary site (unnamed ditch on 2nd Avenue, north of County Road C near Hancock, Wis.) went dry at the end of July and, as a result, additional samples were collected at the secondary site (unnamed ditch at Beaver Avenue near Hancock, Wis.), although the two sites are not hydrologically connected (table 1). At the beginning of the study, groundwater samples were collected from a spring, a domestic well, and a monitoring well (in Maine, Idaho, and Wisconsin, respectively), and from shallow wells that were drilled at the end of the study on the research farms in each state (table 2). Suspended-sediment samples were collected approximately every 3 weeks at one site in each state (table 1). These sites were chosen on the basis of the suitability of the site for deployment of the sampler and of the suspended-sediment content in the stream water. Bed-sediment samples were collected at the beginning and end of the study at sites where surface water was collected (table 1). The study design also called for additional surface-water storm-runoff samples to be collected in each state; however, because there was insufficient rainfall in Maine and Wisconsin, this sampling only took place in Idaho.

Characteristics of the Targeted-Use Areas

Idaho

Study activities were carried out on farmlands near the Snake and Boise Rivers in southwestern Idaho (fig. 2*A*). The landscape in this area consists mainly of broad alluvial terraces and low hills, which are farmed for a variety of crops, including potatoes, corn, sugar beets, and alfalfa, as well as specialty crops, such as hops, onions, and vegetables. Temperatures range from below freezing in winter to over 90 degrees Fahrenheit (°F) in the summer, and mean annual precipitation, which falls mainly in the winter and spring as either snow or rain, is just over 11 inches (National Oceanic Atmospheric Administration, 2002a). Soils in the area are loamy to sandy and are typically well drained with high infiltration rates (National Resources Conservation Service, 2011b). With the exception of the Snake and Boise Rivers, there are few natural perennial streams in the area. The area has an extensive irrigation and drainage network, with water supplied primarily from the Boise River, and although surface water is the primary water source for agriculture in the region, groundwater is used in areas not served by the canal system or to augment the canal supplies during times of drought (Urban, 2004). Flood irrigation is a common practice in the area, although other methods are used depending on the crops grown. This area is underlain by a deep, generally confined, regional aquifer system and a shallow, unconfined aquifer system [less than 250 feet (ft) deep]. Recharge to the shallow system is primarily through infiltration from flood-irrigated agricultural lands and seepage from the canal system (Berenbrock,1999; Urban, 2004).

Maine

Investigations in Maine were focused near the town of Presque Isle near the Canadian border. The landscape in this area is predominantly rolling hills separating scattered lowlands. In the immediate study area, agriculture generally takes place on the uplands, and the lowlands are occupied by woody wetlands. Temperatures are cold to mild and range from near 0°F in the winter to the mid 70s in the summer, with an annual mean of 40°F. Precipitation falls year-round and averages just over 35 inches per year (in/yr; National Oceanic Atmospheric Administration, 2002b). Soils on the farmed uplands are loamy to sandy, well drained, and have moderate infiltration rates (National Resources Conservation Service, 2011b). Perennial streams, lakes, ponds, and springs are common in the area. The study area is generally underlain by regional carbonate bedrock aquifers, although smaller, linear, glacial-outwash aquifers are found beneath valley floors in the area. These aquifers are susceptible to contamination as a result of openings in the carbonate rock, which create pathways for flow and transport of contaminants through direct connection from surface water or from shallow groundwater to the unconfined outwash aquifers (National Resources Conservation Service, 2006).

Wisconsin

The physiography of the area is characterized by large, low relief plains separated by forested ridges that rise less than 500 ft above the plains. Agriculture is prevalent in the lowland plains where field and row crops (potatoes, corn, beans, and forage grasses) are the principal crops (National Resources Conservation Service, 2011a). Average temperatures range from just above 0°F in winter to the 80s in summer, and precipitation averages around 31 in/yr, with the highest monthly averages in the spring and summer months (National Oceanic Atmospheric Administration, 2002c). Soils in the study area are sandy to mixed, range from poorly to well drained, and generally have moderate to high infiltration rates (National Resources Conservation Service, 2011b).

Table 1. Surface-water and sediment sampling sites in Idaho, Maine, and Wisconsin and associated watershed characteristics.

[Horizontal datum: North American Datum 83 (NAD 83). **Abbreviations**: Ave, avenue; Hwy, highway; ID, Idaho; ME, Maine; N, north; nr, near; WI, Wisconsin; Xing, crossing; °, degree; ’, minute; ”, second; —, not applicable; #, number]

USGS station number	USGS station name	Latitude	Longitude	Samples collected	Site description	Watershed area (acres)	Agricultural land in watershed (percent)	Agricultural land planted in potatoes (percent)
13210360	Sand Run Gulch at Hwy 95 Xing nr Parma, ID	43°45’51”	116°54’40”	Surface water, suspended sediment, bed sediment	Primary	50,877	39	3
13213008	Ditch nr Wanstad Road nr Parma, ID	43°46’49”	116°57’14”	Surface water, bed sediment	Primary	760	86	3
13213064	U of I Farm Ditch at Hwy 95 nr Parma, ID	43°48’12”	116°57’07”	Surface water, bed sediment	Primary	57	92	9
13173550	Allen Drain nr Wilder, ID	43°41’24”	117°01’34”	Surface water, bed sediment	Secondary	6,875	83	9
01017058	Glidden Brook nr Caribou, ME	46°46’49”	67°59’43”	Surface water, suspended sediment, bed sediment	Primary	2,803	54	25
01017060	Hardwood Brook below Glidden Brk nr Caribou, ME	46°47’01”	67°59’21”	Surface water, bed sediment	Primary	3,654	54	27
463904068010401	Unnamed Trib to Aroostook Pond nr Presque Isle, ME	46°39’04”	68°01’04”	Surface water, bed sediment	Primary	17	50	31
463902068011201	Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	46°39’02”	68°01’12”	Surface water, bed sediment	Secondary	—	—	—
05400839	Ditch #4 on Lake Road nr Kellner, WI	44°21’59”	89°40’54”	Surface water, suspended sediment, bed sediment	Primary	32,076	63	12
05401086	Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	44°11’57”	89°39’28”	Surface water, bed sediment	Primary	934	89	41
05401538	Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	44°07’09”	89°34’59”	Surface water, bed sediment	Primary	1,440	78	39
05401519	Unnamed Ditch at Beaver Ave nr Hancock, WI	44°08’28”	89°39’14”	Surface water, bed sediment	Secondary	4,208	79	15

Table 2. Groundwater sampling sites in Idaho, Maine, and Wisconsin.

[Horizontal datum: North American Datum 83 (NAD 83); **Abbreviations**: ME, Maine; nr, near; Rd, road; —, not applicable to site; °, degree; ’, minute; ”, second]

USGS station number	USGS station name	State	Latitude	Longitude	Site type	Well depth below land surface (feet)
434920116591701	6N/5W-30CDC1	Idaho	43°49’19”	116°59’24”	Domestic well	62.0
434824116572501	I027003-- Parma Field M3-Shallow	Idaho	43°48’24”	116°57’25”	Shallow temporary well	18.0
434812116572301	I027001-- Parma Field M10-Shallow	Idaho	43°48’12”	116°57’23”	Shallow temporary well	9.5
434812116572302	I027002-- Parma Field M10-Deep	Idaho	43°48’12”	116°57’23”	Shallow temporary well	18.5
460624067523901	Spring at Porter-Sett Rd nr Moose Brook Houlton, ME	Maine	46°06’24”	67°52’39”	Spring	—
464712068000601	M003002-- MicMac Doyle Rd Field	Maine	46°47’12”	68°00’06”	Shallow temporary well	9.0
463907068010001	M003001-- Presque Isle Field AF13	Maine	46°39’07”	68°01’00”	Shallow temporary well	9.0
440713089320801	WS-19/08E/15-0008	Wisconsin	44°07’13”	89°32’08”	Monitoring well	18.0
440708089325601	W137003-- Hancock Field K1-Shallow	Wisconsin	44°07’08”	89°32’56”	Shallow temporary well	19.2
440708089325602	W137004-- Hancock Field K1-Deep	Wisconsin	44°07’08”	89°32’56”	Shallow temporary well	24.2
440703089323701	W137001-- Hancock Field S16-Shallow	Wisconsin	44°07’03”	89°32’37”	Shallow temporary well	24.0
440703089323702	W137002-- Hancock Field S16-Deep	Wisconsin	44°07’03”	89°32’37”	Shallow temporary well	29.0

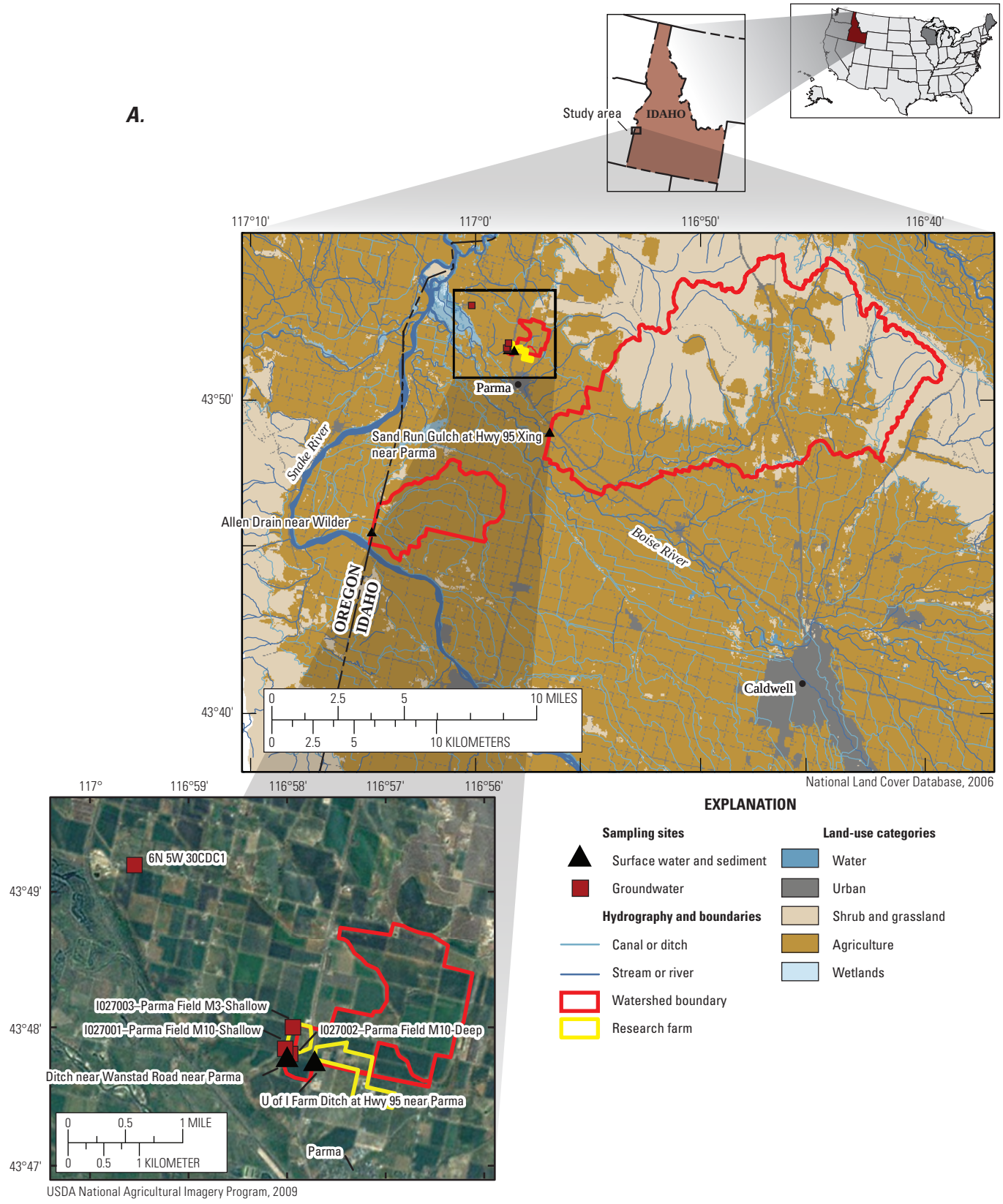

Figure 2. Sampling sites, watersheds, and land use for *A*, Idaho; *B*, Maine; and *C*, Wisconsin.

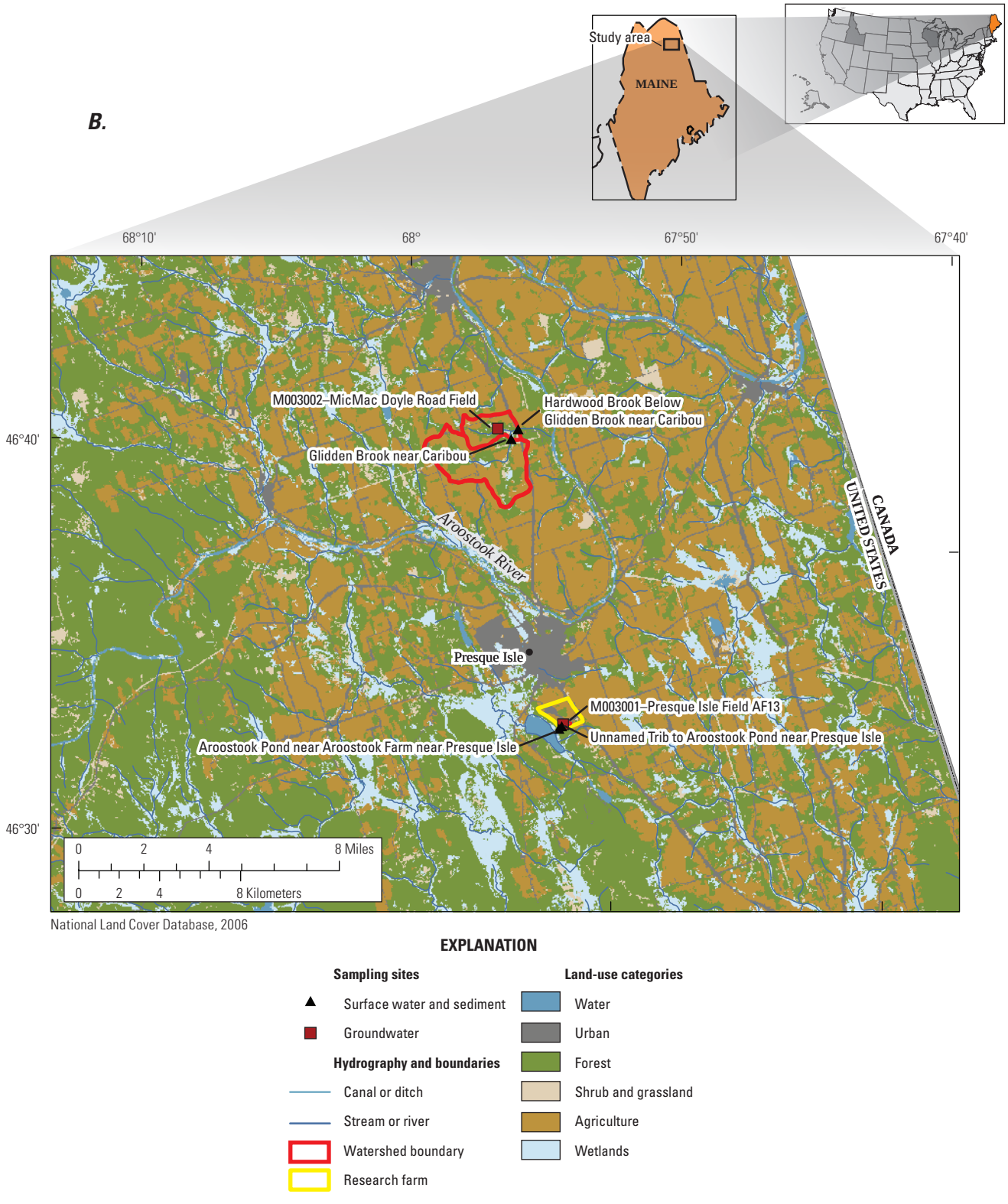

Figure 2. Continued

C.

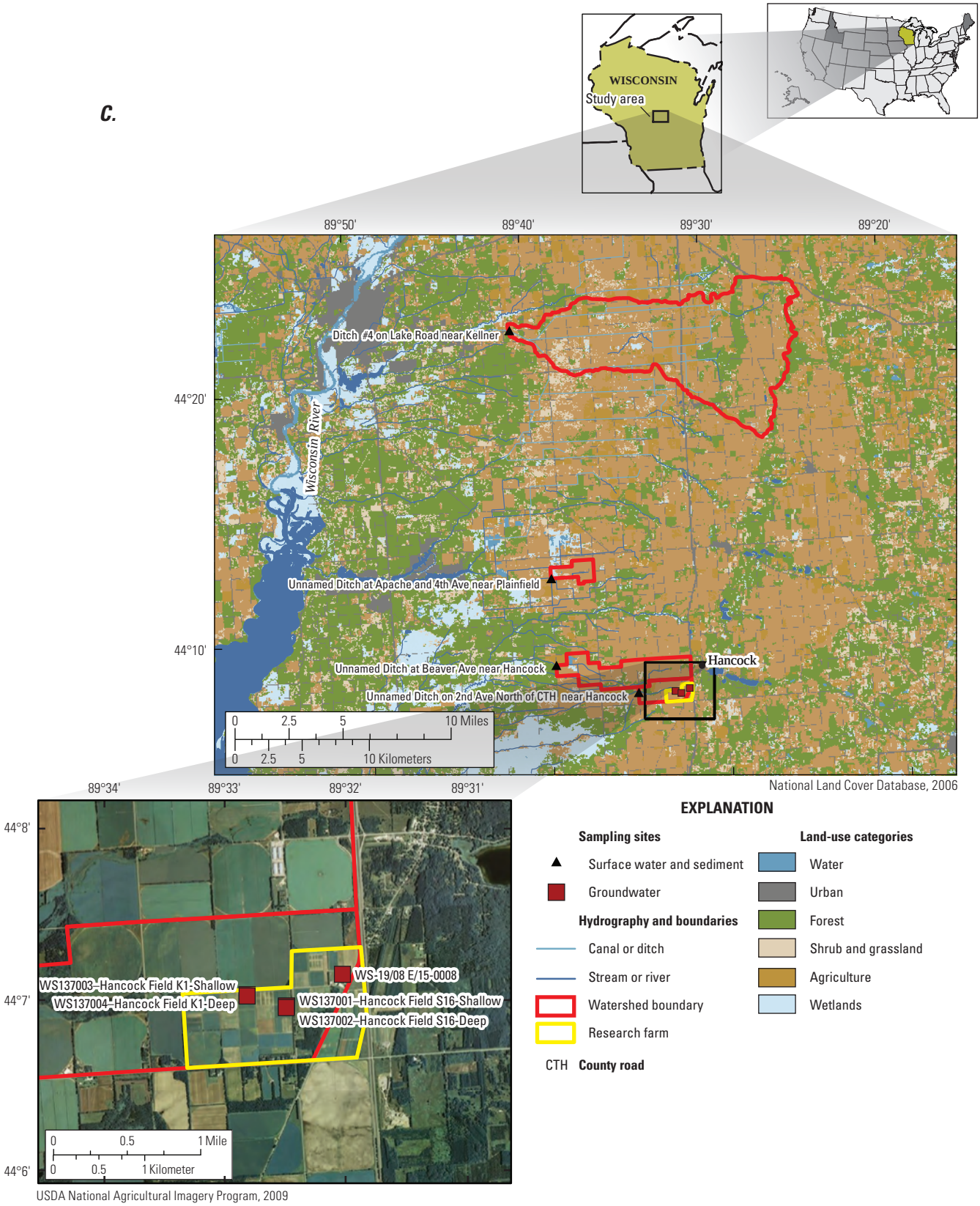

Figure 2. Continued

Few perennial streams exist in the area; however, the farmlands are serviced by an extensive network of drainage ditches, which convey runoff east toward the Wisconsin River. Irrigation for farms is supplied almost entirely by groundwater (National Resources Conservation Service, 2006). The area is underlain by multiple sand and gravel aquifers, and the depth of the water table can be very shallow in some areas (less than 3 ft), necessitating the active drainage of farmland (National Resources Conservation Service, 2006).

Descriptions of Sampling Sites and Watersheds

Idaho

Samples (surface water, sediment, and groundwater) were collected from four agricultural drainage ditches, one domestic well, and three shallow temporary wells near Parma Idaho (tables 1 and 2). Two surface-water and sediment sampling sites (ditch near Wanstad Road near Parma, Idaho, and University of Idaho farm ditch at Highway 95 near Parma, Idaho) located on two relatively small ditches (less than 3 ft wide), and each of the shallow temporary wells, were on lands operated by the Parma Research and Extension Center. The remaining sites were on neighboring farmlands (fig. 2*A*). Watersheds for all surface-water sites ranged from 57 to 50,877 acres in size, with the smallest watersheds associated with sites at the research farm (table 1). Watershed areas and statistics for this study were calculated in a geographic information system (ArcGIS, ESRI, Redlands, Calif.). Sampling sites associated with the largest watersheds were on large drainage canals (greater than 10 ft wide), which receive input from many smaller drainage ditches.

The study area is prime farmland, and land use within three of the four watersheds was greater than 83 percent agricultural (table 1). Potatoes accounted for a relatively small amount of the total acres planted in 2009 (4 to 651 acres) and accounted for less than 10 percent of the total agricultural lands in each watershed (table 1). Although potatoes accounted for a small percentage of the crops grown, this area is one of the few potato-growing regions in Idaho with an extensive surface-water irrigation network. Other major crops in the study area included alfalfa, beans, corn, and wheat. Data about crop types were derived from the Natural Resources Conservation Service's Cropland Data Layer for 2009 (Natural Resources Conservation Service, 2011a).

Groundwater samples were collected from three shallow temporary wells drilled on the research farm and one nearby domestic well. The shallow temporary wells were constructed in fields that were planted with potatoes in 2009 and were harvested just prior to drilling. Depths for these wells ranged from 9.5 to 18.5 ft (table 2). The domestic well that was sampled has a total depth of 62 ft, and land use surrounding this site is primarily agricultural with scattered residences.

Maine

Samples were collected from three perennial streams, one pond, one natural spring, and two shallow temporary wells near Aroostook Maine (tables 1 and 2). Two surface-water and sediment sampling sites (unnamed tributary to Aroostook Pond near Presque Isle, Maine, and Aroostook Pond near Aroostook Farm near Presque Isle, Maine), and one of the shallow groundwater wells, were on the University of Maine Aroostook Farm (fig. 2*B*). The remaining two surface-water sites and shallow temporary well were on farmlands owned by the Aroostook Band of Micmac Indians. Watersheds for the surface-water sites ranged from 17 to 3,654 acres in size (table 1). The Aroostook Pond near Aroostook Farm near Presque Isle, Maine, site is a groundwater-fed pond with no surface inlets or outlets, so no watershed area was determined for this site.

The area studied is a mixture of farmland and forest. Land use within the watersheds was 54 percent or less agriculture (table 1). Potatoes made up a substantial percentage (25 to 31 percent) of the agriculture in these watersheds (Natural Resources Conservation Service, 2011a). Other crops grown in the study area were barley, oats, and rye.

Groundwater samples were collected from two shallow temporary wells and one spring. Depths for both temporary wells were 9.0 ft (table 2). The spring is approximately 40 miles (mi) south of the research farm (not included in fig. 2*B*). It was sampled at its point of origin at the surface and was considered representative of the local shallow groundwater system. This site was selected because it has a history of nitrate contamination (*http://nwis.waterdata.usgs.gov/me/nwis/qwdata/?site_no=460624067523901*).

Wisconsin

Surface-water and sediment samples were collected from four agricultural drainage ditches near Hancock, Wisconsin (table 1). One of these sites (unnamed ditch on 2nd Avenue north of county road C near Hancock, Wis.) was on a small drainage ditch that received runoff from the Hancock Agricultural Research Station, whereas the monitoring well, and each of the shallow temporary wells, was on the research station property. The remaining surface-water and sediment sampling sites were adjacent to nearby farmlands (fig. 2*C*). Watersheds for the surface-water sites ranged from 934 to 32,076 acres in size (table 1). The sampling site associated with the largest watershed (ditch number 4 on Lake Road near Kellner, Wis.) was on a large (greater than 20 ft wide) drainage channel that receives input from many smaller drains, and the other sites were on roadside drainage ditches that are less than 5 ft wide.

The study area is prime farmland, and agriculture within the watersheds accounted for 63 to 89 percent of the total watershed area (table 1). Potatoes accounted for between 12 and 41 percent of the total agricultural acerage in each watershed in 2009, and other major crops were beans, corn, and soybeans (Natural Resources Conservation Service, 2011a).

Groundwater samples were collected from a monitoring well and four shallow temporary wells on the research station farm. The monitoring well is near structures on the research farm, but within 100 ft of actively farmed fields, and is 18.0 ft deep. Depths for the shallow temporary wells ranged from 19.2 to 29.0 ft (table 2).

Pesticide Use

In 2002, agricultural fungicide applications (not including sulfur or copper) in the U.S. exceeded 30 million pounds annually, of which, approximately 6 million pounds were applied during potato production (Gianessi and Reigner, 2006). Figure 1 depicts fungicide applications to potatoes by county for the year 2002 (the latest year for which data were publicly available) and shows that areas of high use coincide with the areas sampled in this study.

Procedures and Methods

The procedures and methods for this study include sample-collection methods in the field, sample-processing methods in the field or laboratory, and laboratory analytical methods for pesticides, nutrients and inorganic constituents, sediment organic carbon and nitrogen, and sediment particle size and mineralogy. Prior to sample collection, sampling equipment was cleaned by rinsing with pesticide-grade organic-free blank water, followed by a methanol rinse, then a final rinse with pesticide-grade organic-free blank water. Equipment was triple rinsed with native water immediately prior to sample collection. To ensure that the samples represented the water in the aquifer at depth, the wells were purged prior to sampling, and the water-quality field parameters were measured to provide context for the data obtained from the discrete samples, as described in the following sections.

Sample Collection Methods

Surface-water and suspended-sediment samples were collected approximately every 25 days from June through November 2009. Additional surface-water samples were collected at three sites in Idaho on August 7, 2009, following a large rainfall. Groundwater and bed-sediment samples were collected only during the first and last sampling events in each state. Field quality-assurance samples (blank, replicate, and matrix spike) were collected for surface water and groundwater concurrent with the environmental samples. Samples were collected for the analysis of pesticides, nutrients and inorganic constituents, sediment organic carbon and nitrogen, and sediment particle size and mineralogy.

Surface Water

Surface-water samples were collected at 12 sites (4 sites in each state) during the course of the study. At 11 of the sites, grab samples were collected by immersing a 14-liter (L) Teflon churn splitter in the stream at the center of flow. This sampling method was chosen because of the small size of the streams and ditches that were sampled (generally 3 ft wide or less), the low flows, and the large volumes of sample water required. Samples from Allen Drain near Wilder, Idaho, were collected by the equal-width-increment method using a DH-95 isokinetic depth-integrating sampler following standard U.S. Geological Survey (USGS) protocols (Wilde and others, 1998). Samples were collected differently at this site because there were safety considerations specific to the site. Water-quality field parameters (temperature, specific conductance, pH, dissolved oxygen concentration, and turbidity) were measured at the time of sample collection by using a multi-parameter meter (YSI model 6920V2), which was calibrated with appropriate standards immediately prior to sampling and then placed in the center of flow at each site.

Ground Water

Groundwater samples were collected by following procedures described in the USGS field manual for the collection of water-quality data (U.S. Geological Survey, 2006). At the beginning of the study, water was collected from a domestic well, a spring, and a monitoring well, in Idaho, Maine, and Wisconsin, respectively, to characterize water quality in the primary aquifers underlying the three study sites. Water samples from the domestic well in Idaho were collected by attaching a fitting and pre-cleaned Teflon tubing to a spigot as close to the wellhead as feasible. The spring in Maine consisted of a pipe protruding from a hillside, and water was collected in a 14-L Teflon churn as close to the end of the pipe as possible. The monitoring well in Wisconsin was purged until measurements of temperature, specific conductance, and pH were stable for five consecutive readings taken 3 to 5 minutes apart, and then sampled by using a peristaltic pump and pre-cleaned Teflon tubing.

At the end of the sampling season, shallow temporary wells were constructed in fields that were planted in potatoes in 2009 and that had been harvested just prior to drilling (table 2). These wells were constructed by using a direct push system. The altitude of the water table was determined by driving a 60-cm-long (2 ft) slotted drilling rod to depth and measuring the water level with a steel measuring tape. Temporary wells were created at each site by driving a pre-cleaned (methanol and deionized water), 4-ft-long Geoprobe retractable stainless-steel 10-slot well screen (Geoprobe model SP-15) to a depth appropriately targeted to span the desired screened interval at the top of the water table. Well development criteria included purging fine particles from the screen, removal of at least three casing volumes of water, and pumping until temperature, specific conductance, and

pH readings had stabilized for five consecutive readings taken 3 to 5 minutes apart. Groundwater samples were then collected by inserting a pre-cleaned, 0.64-centimeter (cm)-internal-diameter (i.d.) Teflon tube through the annular space of the driving rod to the bottom of the screen. The temporary wells were developed and sampled at 1 liter per minute using a peristaltic pump. Sample water was pumped into a 14-L Teflon churn splitter prior to processing.

Suspended Sediment

Samples were collected by using an integrating, passive, suspended-sediment sampler based on a design described by Phillips and others (2000). Each sampler consisted of narrow [4 millimeter (mm)] stainless-steel inlet and outlet tubes attached to a larger, Teflon-lined, aluminum tube [98-mm diameter by 1 meter (m) long]. Each assembly was installed horizontally in the stream below the water surface at approximately three-quarters of the total depth, with the inlet tube oriented into the flow. Water entered the inlet tube proportional to ambient flow velocity, but the larger tube drastically reduced flow velocity and caused suspended sediment to be deposited in the collection tube. A sampler was placed in one stream in each state for a period of 3 weeks. The sampler was then retrieved from the stream and immediately replaced with an identical unit that collected suspended sediment for the following 3 weeks. After retrieval, each unit was placed on ice in a large cooler and shipped within 24 hours to the USGS New Jersey Water Science Center for processing. Over the course of the study, five samples were collected in Idaho and Wisconsin. Suspended-sediment concentrations at the sampling site in Maine were low, and the amount of suspended sediment required for analysis (approximately 5 grams) was only collected during two of the five sampling periods.

Bed Sediment

Bed-sediment samples were collected at the beginning and end of the study period in each state, with the exception of two sites, Allen drain near Wilder, Idaho, and unnamed ditch on 2nd Avenue, north of County Road C near Hancock, Wis., that were only sampled at the beginning of the study because of safety considerations and a lack of water, respectively. Samples were collected from areas of active sediment deposition by using a stainless-steel scoop to sample the top 2 cm of bed material from multiple points within a roughly 1-square-meter (m^2) area. Sediment was passed through a 4-mm mesh sieve into a pre-cleaned stainless-steel bowl, homogenized, and transferred to 500-milliliter (mL) baked glass jars.

Sample Processing

Sample processing was performed either in the field or in the laboratory shortly after receipt of the samples, depending on the sample matrix and analyses to be completed. Sample processing methods included homogenization of the sample matrix and preservation through various forms of filtration, acidification, and or refrigeration, or a combination thereof.

Surface Water and Groundwater

Water samples were processed by using a 14-L Teflon churn splitter to homogenize samples while filtering and filling bottles according to procedures outlined in Wilde and others (2004), unless otherwise noted. Unfiltered samples collected for total nitrogen and phosphorus analyses were preserved with 1 mL of 4.5 Normal (N) sulfuric acid. Water for pesticide analyses was filtered through baked 0.7-micrometer (µm) glass-fiber filters (Whatman, Florham Park, New Jersey) into 1-L and 125-mL amber glass bottles (to be analyzed by the USGS Organic Chemistry Research Laboratory, Sacramento, California, and the USGS Organic Geochemistry Research Laboratory, Lawrence, Kansas, respectively). Glass ampules containing premeasured mixtures of pesticides were opened and added to one replicate 1-L pesticide sample and one replicate 125-mL pesticide sample to be analyzed as field spikes. Additional sample water for nutrient and inorganic constituent analyses was filtered through a 0.45-µm glass-fiber capsule filter into three plastic sample bottles, one of which was preserved by acidifying with nitric acid to a pH less than 2. All samples were stored on ice at approximately 4 degrees Celsius (°C) prior to shipment to the appropriate laboratory.

Suspended and Bed Sediment

To collect the suspended sediment from the passive samplers, a Teflon bottle filled with reagent-grade blank water was attached to the end cap on the sampling tube, and the sediment was re-suspended by repeatedly inverting the sampling tube. Suspended sediment settled from the sampling tube into the Teflon bottle. Sample processing was typically completed within 24 hours of receipt of samples in the USGS New Jersey Water Science Center. Both suspended and bed sediments were then shipped on ice to the USGS Organic Chemistry Research Laboratory, in Sacramento, California. The sediment samples were further dewatered by using a high-speed refrigerated centrifuge operating at 10,000 revolutions per minute and stored frozen at -20°C until analysis.

Analytical Methods

The analytical methods for this study included sample extraction for dissolved and sediment-associated pesticides, instrumental calibration, and the calculation of pesticide method detection limits (MDLs). Analytical methods are also described for nutrients and inorganic constituents, sediment organic carbon and nitrogen, and sediment particle size and mineralogy.

Pesticides

Sample Extraction for Dissolved Pesticides

Filtered surface-water and groundwater samples (1 L) were analyzed for a suite of 89 pesticides at the USGS Organic Chemistry Research Laboratory, in Sacramento, California, by extracting 1 L of sample water onto an Oasis HLB solid-phase extraction (SPE) cartridge (6 cubic centimeters, 500 milligram, 60 µm; Waters Corporation, Milford, Mass.). Filtered water samples were held for no longer than 48 hours at 4°C prior to extraction. All samples were spiked with $^{13}C_3$-atrazine and diethyl-d_{10} diazinon (Cambridge Isotopes, Andover, Mass.) as recovery surrogates. Following extraction, the SPE cartridges were dried, eluted with 12 mL of ethyl acetate, and reduced under nitrogen. After extraction, approximately 1 gram (g) of sodium sulfate (Na_2SO_4) was added to each of the sample bottles to remove any residual water, and the bottles were rinsed three times with dichloromethane (DCM). The bottle rinses were reduced to 1 mL under nitrogen and combined with the ethyl acetate fraction. The entire sample (bottle rinse plus SPE elution) was reduced to a final volume of 200 µL for analysis. Internal standards and (acenaphthene-d_{10} and pyrene-d_{10}) were added to the sample extracts prior to analyses.

Surface-water and groundwater samples (125 mL) were also analyzed for glyphosate, its major degradate aminomethylphosphonic acid (AMPA), and glufosinate by the USGS Organic Geochemisry Research Laboratory in Lawrence, Kansas. Filtered water samples were derivatized within 5 days of collection by using a 5 percent borate buffer to adjust the pH to 9.0, followed by the addition of 2.5 millimolar (mM) 9-fluorenylmethylchloroformate in acetonitrile. Derivatization was carried out in the dark in a water bath at 40°C for approximately 24 hours. Following derivatization, the samples were extracted onto SPE cartridges, and the SPE cartridges were rinsed with 500 µL of deionized water.

Sample Extraction for Sediment-Associated Pesticides

Sediment samples were extracted for a suite of 91 pesticides on the basis of methods described in Smalling and Kuivila (2008) and Smalling and others (2013). Sediment was stored frozen at −20°C and held for no longer than 1 year prior to extraction and analysis. Prior to extraction, sediment samples were spiked with trifluralin-d_{10}, ring-^{13}C-*p*,*p*'-DDE, and phenoxy-^{13}C-*cis*-permethrin (Cambridge Isotopes, Andover, Mass.) as recovery surrogates. Wet sediments were homogenized with Na_2SO_4 by using a solvent-rinsed mortar and pestle and extracted by pressurized liquid extraction (PLE) by using a Dionex 200 Accelerated Solvent Extractor (ASE; Dionex, Sunnyvale, Calif.). Samples were extracted three times with DCM at 100°C and 1,500 pounds per square inch of pressure. Following extraction, sample extracts were dried over Na_2SO_4 and reduced to 0.5 mL by using a Turbovap II (Zymark Corporation, Hopkinton, Mass.). Sulfur was removed by using a 300 by 21.2 mm Phenogel (10 µm, 100 angstrom; Phenomenex, Torrance, Calif.) gel-permeation chromatography (GPC) column with DCM: methanol, at 98:2 volume-to-volume (v/v), as the carrier solvent. Samples were again reduced to 0.5 mL, split in half, and subject to two different clean-up methods, depending on the compounds of interest.

In the first clean-up step, the sample matrix was removed by using stacked pre-packed carbon/alumina SPE cartridges containing 500 milligrams (mg) of nonporous, graphitized carbon (Restek Corporation, Bellefonte, Va.) and 500-milligram alumina (Varian Inc., Palo Alto, Calif.). The cartridges were washed in tandem with 10 mL of DCM prior to the addition of sample extracts. Compounds of interest were eluted off both SPE cartridges with 10 mL of DCM and collected as fraction 1. The carbon SPE was removed and the alumina SPE was eluted with 10 mL of ethyl acetate and DCM (50:50 v/v) and collected as fraction 2. Both fractions were kept separate and reduced to 200 µL and analyzed for 57 pesticides (Smalling and others, 2005).

All fungicides were subjected to a separate clean-up step using Florisil (Smalling and Kuivila, 2008). A solvent-rinsed 200-mL glass column (400 mm length by 10 mm i.d.) was dry packed with 6 percent water (volume to weight) deactivated Florisil (60–100 mesh chromatographic grade; Thermo-Fisher Scientific, Waltham, Mass.), which had been previously activated at 550°C in a muffle furnace for 16 hours. The Florisil was washed with 100 mL of hexane, and 0.5 mL of the sample was added. All fungicides were eluted with 100 mL of 60 percent ethyl acetate in hexane. The sample extract was reduced to approximately 0.2 mL under a gentle stream of nitrogen, and prior to instrument analysis, an internal standard was added.

Instrumental Calibration and Analysis for Pesticides

Following sample extraction and clean-up, all sample extracts for pesticides were analyzed by the USGS Organic Chemistry Research Laboratory, in Sacramento, California, as described in this report, except for the analyses for glyphosate, AMPA, and glufosinate, which were done by the USGS Organic Geochemisry Research Laboratory in Lawrence, Kansas, by using liquid chromatography and tandem mass spectrometry (LC/MS/MS) with electrospray ionization in negative-ion mode using multiple reaction monitoring (MRM) as described in Meyer and others (2009).

Instrument calibration in the Organic Chemistry Research Laboratory in California was achieved using standards that spanned the linear range of instrument response. An 8-point calibration standard was developed with concentrations ranging from 0.025 to 5.0 nanogram per microliter (ng/µL), and calibration curves were considered acceptable if the coefficient of determination (R^2) for each compound was greater than 0.995. The responses of the instruments were monitored every six to eight samples with mid-level check standards. The instruments were considered to be stable if the recovery of the check standards fell within the range of 80 to 115 percent of the nominal standard concentration. All environmental sample concentrations fell within the linear range of the instruments.

Water and sediment extracts [1-microliter (µL) injection volume] were analyzed for herbicides and insecticides on a Varian Saturn 2000 (Varian Inc., Palo Alto, Calif.) gas chromatograph (GC)/ion-trap mass spectrometer (IT-MS). Analyte separation on the GC/IT-MS was achieved by using a 30-m by 0.25-mm i.d., 0.25 µm DB-5ms fused silica column (Agilent Technologies, Folsom, Calif.) with helium as the carrier gas. The temperature of the splitless injector was held constant at 275ºC. The temperature program was 80ºC (hold 0.5 minutes), increase to 120ºC at 10ºC per minute, increase to 200ºC at 3ºC/min (hold 5 min), followed by a third increase to 219ºC at 3ºC/min, and a final increase to 300ºC at 10ºC/min (hold 10 min). The transfer line and ion-trap temperatures were 280ºC and 220ºC, respectively. The IT-MS was operated in electron ionization (EI) mode with an emission current of 15 microampere (µA) and no offset, when run in full scan mode, and an emission current of 45 µA with a multiplier offset of 300 volts, when using selected ion storage (SIS) windows. Data were collected in full scan and SIS modes. Complete details of the analytical method are described in Crepeau and others (2000), LeBlanc and others (2004), and Smalling and Kuivila (2008).

Water and sediment sample extracts (1 µL) were analyzed for fungicides on an Agilent 5975 GC with an electron-ionization mass spectrometer (EI-MS; Agilent Technologies, Folsom, Calif.). Analyte separation was achieved by using a 30-m 0.25-mm i.d., 0.25-µm DB-5ms fused silica column (Agilent Technologies, Folsom, Calif.) with helium as the carrier gas. The temperature of the splitless injector was held constant at 275ºC. The temperature program was 80ºC (hold 0.5 min), increase to 180ºC at 10ºC/min, increase to 220ºC at 5ºC/min (hold 1 min), increase to 280ºC at 4ºC/min (hold 1 min), with a final increase to 300ºC at 10ºC/min (hold 10 min). The transfer line, quadrupole, and source temperatures were 280°C, 150°C, and 230°C, respectively. Data for all fungicides were collected in selective-ion monitoring mode with each compound having one quantifier ion and one or two qualifier ions. Additional details are given in Reilly and others (2012) and Smalling and others (2013).

Method Detection Limits for Pesticides

Surface-water and sediment MDLs were validated in previous studies (Hladik and others, 2008; Reilly and others, 2012; and Smalling and others, 2013) by using the U.S. Environmental Protection Agency (USEPA) procedure described in 40 CFR Part 136 (U.S. Environmental Protection Agency, 1992). Water samples used to determine the MDLs for insecticides and herbicides were collected in 2005 from the Sacramento River at Miller Park, Calif., and water samples for fungicide MDLs were collected in 2008 from the American River near the California State University, Sacramento, campus. For insecticide and herbicide analyses, sediment samples were collected in 2004 from the Cache Creek inflow to the settling basin near Woodland, Calif. (USGS site identification number 384340121434401). In 2009, fungicide MDLs were determined by using sediment collected from the Yolo Bypass near Woodland, Calif. (USGS site identification number 11453000). The MDLs were calculated for each compound by using the following equation:

$$MDL = S \times t_{(n-1,\ 1-\alpha=0.99)} \quad (1)$$

where

MDL is the method detection limit in microgram per kilogram (µg/kg) or nanogram per liter (ng/L),

S is the standard deviation of replicate samples,

t is the value of Student's t statistic at 6 degrees of freedom and 99 percent confidence level, and

n is the number (n) of replicates.

MDLs for water ranged from 0.9 to 12.1 ng/L, and sediment MDLs ranged from 0.6 to 10.2 µg/kg (tables 3 and 4). Analytes can be identified at concentrations less than the MDL or limit of detection with less confidence in the actual value; therefore, concentrations of compounds detected below these limits are reported as estimates and are shown in parentheses in the data tables.

MDLs for glyphosate, AMPA, and glufosinate in water were determined by the USGS Organic Geochemistry Research Laboratory following procedures outlined in Meyer and others, 2009. The MDLs for these compounds were each determined to be 20 ng/L. Analyses of sediment for glyphosate, AMPA, and glufosinate were not done.

Nutrients and Inorganic Constituents

Nutrients and other inorganic constituents were analyzed in filtered and unfiltered surface-water and groundwater samples by the USGS National Water Quality Laboratory following procedures described in Fishman (1993) and Patton and Kryskalla (2003). MDLs for these analytes are listed in table 5. Laboratory quality-assurance methods for these analyses, including participation in third-party blind reference sample programs and certification by the National Environmental Laboratory Accreditation Conference, are described by Maloney (2005).

Sediment Organic Carbon and Nitrogen

Bed- and suspended-sediment samples were analyzed at the USGS Organic Chemistry Research Laboratory, in Sacramento, Calif., for organic carbon and nitrogen content by using a Perkin Elmer CHNS/O analyzer (Perkin Elmer Corporation, Norwalk, Conn.) according to a modified version of USEPA 440.0 (Zimmerman and others, 2007). Sediments (3 to 5 g per sample) were dried at 100°C for 3 hours in an oven and then homogenized. The sediment samples were then exposed to concentrated hydrochloric acid fumes in a

Table 3. Method detection limits for fungicides in water and sediment measured by the U.S. Geological Survey Organic Chemistry Research Laboratory.

[**Abbreviations**: ng/L, nanogram per liter; µg/kg, microgram per kilogram; —, not analyzed]

Compound	Water method detection limit (ng/L)	Sediment method detection limit (µg/kg)	Compound	Water method detection limit (ng/L)	Sediment method detection limit (µg/kg)
Azoxystrobin	3.1	1.1	Iprodione	4.4	0.9
Boscalid	2.8	1.7	Kresoxim-methyl	4.0	0.6
Chlorothalonil	4.1	1.2	Metconazole	5.2	0.7
Cyproconazole	4.7	1.5	Myclobutanil	6.0	2.9
Cyprodinil	7.4	2.4	Pentachloronitrobenzene (PCNB)	3.1	1.2
Difenoconazole	10.5	0.6	Propiconazole	5.0	1.6
Dimethomorph	6.0	2.0	Pyraclostrobin	2.9	1.6
Famoxadone	2.5	2.4	Pyrimethanil	4.1	1.2
Fenarimol	6.5	1.5	Tebuconazole	3.7	1.6
Fenbuconazole	5.2	2.2	Tetraconazole	5.6	1.3
Fenhexamid	7.6	3.2	Triadimefon	8.9	3.8
Fluazinam	4.4	—	Triadimenol	8.0	1.6
Fludioxinil	7.3	3.7	Trifloxystrobin	4.7	1.4
Fluoxastrobin	4.2	1.8	Triflumizole	6.1	0.6
Flusilazole	5.1	3.0	Triticonazole	6.9	2.4
Flutriafol	4.5	1.3	Vinclozolin	—	1.8
Imazalil	10.5	2.5	Zoxamide	3.5	1.1

Table 4. Method detection limits for insecticides and herbicides in water and sediments measured by the U.S. Geological Survey (USGS) Organic Chemistry Research Laboratory and the USGS Organic Geochemistry Research Laboratory.

[All compounds were measured by the USGS Organic Chemistry Research Laboratory in Sacramento, Calif., except those noted with the * symbol, which were measured at the USGS Organic Geochemistry Research Laboratory in Lawrence, Kansas. **Abbreviations**: ng/L, nanogram per liter; —, not analyzed; µg/kg, microgram per kilogram]

Compound	Water method detection limit (ng/L)	Sediment method detection limit (µg/kg)
Alachlor	1.7	1.0
Allethrin	6.0	1.5
Amino phosphonic acid (AMPA)*	20.0	—
Atrazine	2.3	1.7
Bifenthrin	4.7	2.2
Butylate	1.8	1.6
Carbaryl	6.5	1.8
Carbofuran	3.1	1.5
Chlorpyrifos	2.1	2.0
Clomazone	2.5	2.5
Cycloate	1.1	1.0
Cyfluthrin	5.2	2.0
λ-Cyhalothrin	2.0	2.4
Cypermethrin	5.6	2.6
DCPA	2.0	2.5
p,p′-DDD	4.1	1.4
p,p′-DDE	3.6	1.4
p,p′-DDT	4.0	1.3
Deltamethrin	3.5	2.5
Diazinon	0.9	2.0
3,4-Dichloroaniline	8.3	2.5
3,5-Dichloroaniline	7.6	3.0
Disulfoton	—	1.9
EPTC	1.5	0.9
Esfenvalerate	3.9	2.1
Ethalfluralin	3.0	1.3
Etofenprox	2.2	2.5
Fenpropathrin	4.1	2.1
Fipronil	2.9	1.9
Fipronil desulfinyl	1.6	2.8
Fipronil sulfide	1.8	2.2
Fipronil sulfone	3.5	1.1
τ-Fluvalinate	5.3	2.6
Glufosinate*	20.0	—
Glyphosate*	20.0	—
Hexazinone	8.4	1.2
Malathion	3.7	1.1
Methidathion	7.2	2.9
Methoprene	6.4	2.4
Methyl parathion	3.4	1.2
Metolachlor	1.5	1.3
Molinate	3.2	1.1
Napropamide	8.2	1.3
Oxyfluorfen	3.1	3.6
Pebulate	2.3	1.4
Pendimethalin	2.3	1.0
Pentachloroanisole (PCA)	4.7	1.4
Permethrin	3.4	1.0
Phenothrin	5.1	1.3
Phosmet	4.4	1.4
Piperonyl butoxide	2.3	1.6
Prometon	—	3.4
Prometryn	1.8	2.8
Propanil	10.1	3.2
Propyzamide	5.0	1.5
Resmethrin	5.7	1.9
Simazine	5.0	1.5
Tefluthrin	4.2	1.1
Tetramethrin	2.9	1.4
Thiobencarb	1.9	0.6
Trifluralin	2.1	1.7

Table 5. Method detection limits for nutrients and inorganic constituents measured in water by the U.S. Geological Survey National Water Quality Laboratory.

[**Abbreviations**: mg/L, milligram per liter; N, nitrogen; P, phosphorus; +, plus; µg/L, microgram per liter]

Parameter	Sample processing	Method detection limit	Method reporting level	Parameter units
Total nitrogen	Unfiltered	0.05	0.1	mg/L
Ammonia (as N)	Unfiltered	0.01	0.02	mg/L
Nitrite (as N)	Unfiltered	0.001	0.002	mg/L
Nitrite + Nitrate (as N)	Unfiltered	0.008	0.016	mg/L
Phosphorus (as P)	Unfiltered	0.004	0.008	mg/L
Phosphorus (as P)	Filtered	0.003	0.006	mg/L
Orthophosphate (as P)	Unfiltered	0.004	0.008	mg/L
Calcium	Unfiltered	0.01	0.02	mg/L
Magnesium	Unfiltered	0.006	0.012	mg/L
Sodium	Unfiltered	0.06	0.12	mg/L
Potassium	Unfiltered	0.03	0.06	mg/L
Chloride	Unfiltered	0.06	0.12	mg/L
Sulfate	Unfiltered	0.09	0.18	mg/L
Fluoride	Unfiltered	0.04	0.08	mg/L
Silica	Unfiltered	0.1	0.2	mg/L
Copper	Unfiltered	1	2	µg/L
Iron	Unfiltered	2	4	µg/L
Manganese	Unfiltered	0.1	0.2	µg/L

desiccator for 24 hours to remove inorganic carbon and then combusted at 925°C in silver boats. The instrument was calibrated with blanks and acetanilide standards prior to sample analysis. Standards were required to be within 98 percent of the nominal value. Blanks, replicates, and standards were analyzed every 10 samples. Method detection limits for carbon and nitrogen were 0.01 percent.

Sediment Particle Size and Mineralogy

Particle-size distribution in bed-sediment samples was characterized by using a Coulter LS-230 particle size analyzer. The analyzer measures particle sizes from 0.04 to 2,000 µm, and the range was divided into 116 separate size categories. Any particles larger than 2,000 µm were sieved out and later integrated into the size-distribution results. The fraction smaller than 2,000 µm was carefully disaggregated and homogenized by using a mortar and pestle. Each sediment sample (0.5 to 2.0 g) was put into suspension within a fluid module, which is attached to an optical bench outfitted with a laser and detectors. A pump within the fluid module circulates the sample in suspension through a lens within the optical bench through which a laser beam passes. The detected pattern of deflection is then used by the accompanying software to calculate a particle-size distribution by using a built-in model. A detailed desription of the method can be found in Gee and Or (2002). Particle-size distribution was then used to determine soil texture on the basis of the standard USDA soil-texture classification system.

Bed-sediment samples collected as part of this study were characterized by visual observational and instrumental techniques. Visual observation was used to determine overall color of the samples by comparison with the Munsell Soil Color Charts (2000). Analytical techniques used to determine the mineralogical composition of the samples included clay-mineral determination and quantitative mineralogy. For qualitative clay mineralogy, the X-ray diffraction (XRD) techniques of Pollastro (1982) were followed for sample preparation and data acquisition on representative samples from each state. Building upon the clay mineral determinations, quantitative whole-rock mineralogy was performed to describe the volume of the various minerals present. For whole-rock mineralogy, XRD data were collected on randomly oriented powdered samples by using $CuK_{(alpha)}$ radiation; scans were run from 5° to 65° 2Θ, with a step size of 0.02° and 2-second count time per step. Quantitative mineralogy from the whole-rock XRD data was determined by using the automated technique developed by Eberl (2003).

Quality-Assurance/Quality-Control Methods and Results

Pesticide concentrations in water and sediments were validated against a comprehensive set of performance based quality-assurance/quality-control (QA/QC) criteria, including field and laboratory blank samples, surrogate recoveries, replicate samples, field and laboratory matrix-spike samples, and standard reference material for sediment. QA/QC for the analyses of dissolved organic carbon, nutrients and inorganic constituents, and sediment organic carbon and nitrogen included field and laboratory blank samples, replicate samples, and field and laboratory matrix-spike samples.

Dissolved Pesticides

Twenty-three field blanks and two equipment blanks consisting of pesticide-grade organic-free blank water were processed during the study. Field blanks were collected to test the cleanliness of sampling equipment and procedures. Additionally, these samples were collected and processed in areas where pesticides were actively being applied, and as such, they also test for atmospheric contamination. Equipment blanks only test the cleanliness of the sampling and processing equipment and were processed in a pesticide-free environment prior to a sampling event. All blanks were processed in the same manner as the environmental samples.

Pesticides were detected in eight field blanks and one equipment blank (table 6), although only five surface-water field blanks and one equipment blank contained pesticides at concentrations above the MDLs listed in tables 3 and 4. No pesticides were detected above the MDLs in field blanks collected at groundwater sites. The pesticides azoxystrobin,

bifenthrin, and chlorothalonil were detected above their respective MDLs in one sample each, and boscalid was detected above its MDL in four samples (two collected in Idaho and two collected in Maine). Pyraclostrobin and pyrimethanil were detected, but only at concentrations less than their respective MDLs. The presence of these compounds in the blank samples was most likely due to insufficient cleaning of sampling and processing equipment between environmental samples.

Boscalid was detected in multiple blank samples, and as a result, the environmental data for this pesticide have been treated differently than data for other pesticides described in this report. For environmental surface-water samples collected in Idaho and Maine, concentrations less than the average concentration of boscalid in the blanks from each state plus one standard deviation are reported as not detected (ND). Therefore, with regard to environmental surface-water samples collected in Idaho, concentrations less than 16.2 ng/L were reported as ND, and in Maine samples, concentrations less than 4.6 ng/L were reported as ND. Additionally, boscalid data for Idaho and Maine surface-water samples that could be biased high are noted with asterisks if the concentrations attributable to blank contamination made up greater than 30 percent of the concentration detected in the environmental sample. Therefore, boscalid concentrations in samples from Idaho were noted with an asterisk if they were less than 54.1 ng/L, and, for samples from Maine, boscalid concentrations were noted if they were less than 15.4 ng/L. Boscalid values noted with an asterisk in this report are reported with the "v" remark code (value affected by contamination) in the National Water Information System (NWIS) database. Boscalid concentrations for samples collected in Wisconsin were not censored because boscalid was not detected in any blank samples collected in that state.

Ring-$^{13}C_3$-atrazine and diethyl-d_{10} diazinon were used as recovery surrogates to assess the efficiency of sample extraction. The recovery percentage of surrogates for all samples analyzed (including QC samples) ranged from 72 to 119 percent, with mean recoveries for ring-$^{13}C_3$-atrazine and diethyl-d_{10} diazinon of 94 percent and 90 percent, respectively. Surrogate recoveries met the data-quality objective of 70 to 120 percent recovery for all samples.

Twenty-eight replicate samples were collected to test the reproducibility of results, and there were 103 paired detections of pesticides above the respective MDLs. The relative standard deviation between replicate samples was less than the control limit of 25 percent in all cases (table 7 at back of report). There were no instances where a pesticide was detected in either the environmental or replicate sample and not in the corresponding sample.

Thirty field matrix-spike samples were analyzed for the suite of 89 pesticides analyzed by the USGS Organic Chemistry Research Laboratory. At least one sample was analyzed from each surface-water site, the domestic well in Idaho, the monitoring well in Wisconsin, the spring in Maine, as well as one of the shallow temporary wells in each state. Average recovery percentages for these compounds ranged from 83 to 104 percent, with relative standard deviations of 7 to 20 percent. The average recovery percentages for each compound were within the acceptable range of values of 70 to 130 percent. Minimums, maximums, average recoveries, and relative standard deviations of the recoveries for all pesticides are shown in table 8.

Glyphosate, AMPA, and glufosinate were not detected in any of the 23 field-blank or 29 laboratory-blank samples processed during the study. Twenty-nine field replicate samples were analyzed; glyphosate and AMPA were detected in eleven replicate pairs. The relative standard deviation between replicate samples was less than the control limit of 25 percent in all cases (table 9). There were no instances where a pesticide was detected in either the environmental or replicate sample and not in the corresponding sample. Glufosinate was not detected in any of the samples.

Twenty-seven field matrix-spike samples were analyzed for glyphosate, AMPA, and glufosinate by the USGS Organic Geochemistry Research Laboratory. At least one sample was analyzed from each surface-water site, the domestic well in Idaho, the monitoring well in Wisconsin, the spring in Maine, as well as one of the shallow temporary wells in each state. The average recovery percentages and relative standard deviation for all samples for glyphosate was 103±24.4 percent (23 samples); for AMPA, 102± 25.9 percent (21 samples); and for glufosinate, 100±30.3 percent (27 samples). Spike recoveries were excluded for four spiked samples of glyphosate because the concentration in either the environmental sample or spiked sample exceeded 2.0 micrograms per liter (µg/L). At such high concentrations, the difference that can be attributed to the amount of glyphosate that was spiked is within the analytical uncertainty of the measurement itself; thus, the spike recoveries could not be reliably measured. In five of the field matrix-spike samples collected in Wisconsin and one sample collected in Maine, AMPA either was not detected or was detected at concentrations close to the reporting limit of 0.02 µg/L, but in these same samples, recoveries of glyphosate and glufosinate were 56 percent or greater. Neither field nor laboratory procedural errors accounted for these anomalous AMPA results, and these samples were excluded from the AMPA recovery statistics. Fifteen laboratory matrix-spike samples were analyzed, and the average recovery percentages and relative standard deviations were 104±21.5 percent, 108±11.5 percent, and 103±13.2 percent for glyphosate, AMPA, and glufosinate, respectively.

Sediment-Associated Pesticides

Four laboratory blanks, consisting of approximately 5 g of baked Na_2SO_4 as a sediment substitute, were analyzed with every batch of 18 samples. No pesticides were detected in any of the laboratory-blank samples. Average recoveries (+ relative standard deviation) of the surrogates trifluralin-d^{10}, ring-$^{13}C_{12}$-*p,p'* DDE, and phenoxy-$^{13}C_6$-*cis*-permethrin were

Table 6. Dissolved-pesticide concentrations measured in field-blank water samples collected in Idaho, Maine, and Wisconsin, June–November 2009.

[Numbers in brackets are U.S. Geological (USGS) Survey National Water Information System (NWIS) parameter codes. Concentrations are in nanograms per liter. Results in parenthesis ( ) are less than method detection limits and are estimates. The following compounds were analyzed but not detected in any samples: alachlor, allethrin, atrazine, butylate, carbaryl, carbofuran, chlorpyrifos, clomazone, cycloate, cyfluthrin, λ-cyhalothrin, cypermethrin, cyproconazole, cyprodinil, DCPA, *p*,*p*′-DDD, *p*,*p*′-DDE, *p*,*p*′-DDT, deltamethrin, diazinon, 3,4-DCA, 3,5-DCA, difenocanazole, dimethomorph, EPTC, esfenvalerate, ethalfluralin, etofenprox, famoxadone, fenarimol, fenbuconazole, fenhexamid, fenpropathrin, fipronil, fipronil disulfinyl, fipronil sulfide, fipronil sulfone, fludioxinil, fluoxastrobin, flusilazole, flutriafol, τ-fluvalinate, hexazinone, imazalil, iprodione, kresoxim-methyl, malathion, metconazole, methidathion, methoprene, methyl parathion, metolachlor, molinate, myclobutanil, napropamide, oxyflurofen, PCA, PCNB, pebulate, pendimethalin, permethrin, phenothrin, phosmet, piperonyl butoxide, prometryn, propanil, propiconazole, propyzamide, resmethrin, simazine, tebuconazole, tefluthrin, tetraconazole, tetramethrin, thiobencarb, triadimefon, triadimenol, trifloxystrobin, triflumizole, trifluralin, triticonazole, and zoxamide. **Abbreviations**: Brk, brook; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; nr, near; rd, road; WI, Wisconsin; Xing, crossing; #, number; —, not detected]

USGS station same	Sample type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Azoxystrobin [66589]	Bifenthrin [65067]	Boscalid [67550]	Chlorothalonil [65071]	Pyraclostrobin [66646]	Pyrimethanil [67717]
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Field blank	06/23/2009	11:53	—	—	—	—	—	—
6N 5W 30CDC1	Field blank	06/24/2009	13:00	—	—	—	—	—	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Equipment blank	07/13/2009	16:50	—	—	—	—	—	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Field blank	08/04/2009	08:40	—	5.1	—	—	—	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Field blank	08/07/2009	09:48	8.5	—	12.6	—	(0.8)	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Field blank	08/25/2009	09:10	—	(1.9)	—	—	—	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Equipment blank	09/14/2009	14:15	—	—	15.6	—	—	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Field blank	10/05/2009	10:15	—	—	—	—	—	—
I027002– Parma Field M10-Deep	Field blank	10/07/2009	09:30	—	—	—	—	—	(0.1)
Hardwood Brook below Glidden Brk nr Caribou, ME	Field blank	07/14/2009	10:35	—	—	—	—	—	—
Spring at Porter-Sett Rd nr Moose Brook Houlton ME	Field blank	07/16/2009	10:55	—	—	—	—	—	—
Glidden Brook Nr Caribou, ME	Field blank	08/06/2009	14:30	—	—	—	—	—	—

Table 6. Dissolved-pesticide concentrations measured in field-blank water samples collected in Idaho, Maine, and Wisconsin, June–November 2009.—Continued

[Numbers in brackets are U.S. Geological (USGS) Survey National Water Information System (NWIS) parameter codes. Concentrations are in nanograms per liter. Results in parenthesis ( ) are less than method detection limits and are estimates. The following compounds were analyzed but not detected in any samples: alachlor, allethrin, atrazine, butylate, carbaryl, carbofuran, chlorpyrifos, clomazone, cycloate, cyfluthrin, λ-cyhalothrin, cypermethrin, cyproconazole, cyprodinil, DCPA, *p,p′*-DDD, *p,p′*-DDE, *p,p′*-DDT, deltamethrin, diazinon, 3,4-DCA, 3,5-DCA, difenocanazole, dimethomorph, EPTC, esfenvalerate, ethalfluralin, etofenprox, famoxadone, fenarimol, fenbuconazole, fenhexamid, fenpropathrin, fipronil, fipronil disulfinyl, fipronil sulfide, fipronil sulfone, fludioxinil, fluoxastrobin, flusilazole, flutriafol, τ-fluvalinate, hexazinone, imazalil, iprodione, kresoxim-methyl, malathion, metconazole, methidathion, methoprene, methyl parathion, metolachlor, molinate, myclobutanil, napropamide, oxyflurofen, PCA, PCNB, pebulate, pendimethalin, permethrin, phenothrin, phosmet, piperonyl butoxide, prometryn, propanil, propiconazole, propyzamide, resmethrin, simazine, tebuconazole, tefluthrin, tetraconazole, tetramethrin, thiobencarb, triadimefon, triadimenol, trifloxystrobin, triflumizole, trifluralin, triticonazole, and zoxamide. **Abbreviations**: Brk, brook; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; nr, near; rd, road; WI, Wisconsin; Xing, crossing; #, number; —, not detected]

USGS station same	Sample type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Azoxystrobin [66589]	Bifenthrin [65067]	Boscalid [67550]	Chlorothalonil [65071]	Pyraclostrobin [66646]	Pyrimethanil [67717]
Glidden Brook nr Caribou, ME	Field blank	08/24/2009	13:20	—	—	—	—	—	—
Glidden Brook nr Caribou, ME	Field blank	09/15/2009	13:25	—	—	—	—	—	—
Glidden Brook nr Caribou, ME	Field blank	10/06/2009	15:15	—	—	4.4	—	(0.4)	(0.3)
M003001-- Presque Isle Field AF13	Field blank	11/02/2009	10:45	—	—	—	—	—	—
Glidden Brook nr Caribou, ME	Field blank	11/04/2009	08:35	—	—	3.5	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	Field blank	06/16/2009	12:23	—	—	—	—	—	—
WS-19/08E/15-0008	Field blank	06/17/2009	17:03	—	—	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	Field blank	07/07/2009	10:00	—	—	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	Field blank	07/28/2009	08:44	—	—	—	7.3	—	—
Ditch #4 on Lake Road nr Kellner, WI	Field blank	08/18/2009	09:29	—	—	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	Field blank	09/08/2009	09:39	—	—	—	(0.2)	—	—
Ditch #4 on Lake Road nr Kellner, WI	Field blank	09/28/2009	09:05	—	—	—	—	—	—
W137001-- Hancock Field S16-Shallow	Field blank	09/30/2009	12:45	—	—	—	—	—	—

Table 7. Dissolved-pesticide concentrations measured in environmental and field-replicate water samples collected in Idaho, Maine, and Wisconsin, June–November 2009.

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Table 8. Pesticide recoveries in field matrix-spiked water samples expressed as the minimum, maximum, average, and relative standard deviation for 30 spiked samples.

[Number of samples analyzed = 30. **Abbreviation**: %, percent]

Compound	Minimum recovery (%)	Maximum recovery (%)	Average recovery (%)	Relative standard deviation (%)
Alachlor	77	112	98	8
Allethrin	75	121	92	11
Atrazine	76	157	98	19
Azoxystrobin	73	121	91	13
Bifenthrin	42	124	83	17
Boscalid	72	127	93	15
Butylate	73	113	88	10
Carbaryl	75	105	96	9
Carbofuran	74	119	88	13
Chlorothalonil	77	116	87	10
Chlorpyrifos	76	115	86	12
Clomazone	86	120	99	9
Cycloate	77	118	91	13
Cyfluthrin	69	126	89	16
λ-Cyhalothrin	42	110	86	12
Cypermethrin	56	105	87	14
Cyproconazole	80	109	94	11
Cyprodinil	80	111	96	10
DCPA	80	115	95	8
p,p′-DDD	75	109	90	8
p,p′-DDE	75	99	85	7
p,p′-DDT	74	103	89	8
Deltamethrin	46	118	86	9
Diazinon	79	128	93	16
3,4-Dichloroaniline	77	102	87	7
3,5-Dichloroaniline	75	105	87	8
Difenoconazole	75	111	93	11
Dimethomorph	79	120	100	11
EPTC	75	111	86	11
Esfenvalerate	46	106	86	10
Ethalfluralin	75	114	97	13
Etofenprox	48	108	87	10
Famoxadone	74	114	86	14
Fenarimol	77	122	97	15
Fenbuconazole	80	115	93	13
Fenhexamid	71	122	89	10
Fenpropathrin	69	124	88	14
Fipronil	81	120	97	15
Fipronil desulfinyl	74	109	96	10
Fipronil sulfide	74	111	99	8
Fipronil sulfone	78	124	101	9
Fluazinam	71	99	85	12
Fludioxinil	65	121	91	9
Fluoxastrobin	73	125	95	14
Flusilazole	82	123	95	14
Flutriafol	79	122	99	12
τ-Fluvalinate	47	114	88	14
Hexazinone	74	124	100	11
Imazalil	75	119	96	11
Iprodione	74	118	86	14
Kresoxim-methyl	77	117	95	12
Malathion	79	112	93	12
Metconazole	76	118	98	10
Methidathion	72	125	94	15
Methoprene	77	124	92	12
Methyl parathion	78	121	104	10
Metolachlor	75	140	95	14
Molinate	76	111	94	12
Myclobutanil	74	111	92	10
Napropamide	76	120	96	14
Oxyfluorfen	80	125	99	12
Pentachloroanisole (PCA)	73	114	87	11
Pentachloronitrobenzene (PCNB)	75	121	91	11
Pebulate	76	105	89	9
Pendimethalin	85	126	102	12
Permethrin	64	115	87	12
Phenothrin	61	113	86	12
Phosmet	80	124	93	16
Piperonyl butoxide	80	121	101	12
Prometryn	82	126	103	11
Propanil	75	113	85	10
Propiconazole	73	125	95	12
Propyzamide	84	115	100	10
Pyraclostrobin	71	130	96	20
Pyrimethanil	74	125	99	12
Resmethrin	41	124	89	19
Simazine	77	115	95	12
Tebuconazole	79	115	100	11
Tefluthrin	72	102	87	8
Tetraconazole	85	115	97	8
Tetramethrin	22	121	86	18
Thiobencarb	76	121	89	12
Triadimefon	73	122	93	14
Triadimenol	69	117	92	14
Trifloxystrobin	75	124	95	14
Triflumizole	75	124	88	12
Trifluralin	82	124	98	10
Triticonazole	75	125	92	13
Zoxamide	75	125	98	12

Table 9. Glyphosate and amino phosphonic acid (AMPA) concentrations measured in environmental and field-replicate water samples collected in Idaho, Maine, and Wisconsin, June–November 2009.

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. Concentrations reported as micrograms per liter. Glufosinate was analyzed but was not detected in any samples. **Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; N, north; nr, near; RSD, relative standard deviation; Trib, tributary; U of I, University of Idaho; WI, Wisconsin; Xing, crossing; *, storm event sample; —, not detected; %, percent]

USGS station name	Sample type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	AMPA [62649]	Glyphosate [62722]
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Environmental	06/23/2009	11:50	0.28	0.78
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Field replicate	06/23/2009	11:51	0.28	0.61
	RSD			0%	17%
Sand Run Gulch at Hwy 95 Xing nr Parma, ID*	Environmental	08/07/2009	09:45	0.46	1.18
Sand Run Gulch at Hwy 95 Xing nr Parma, ID*	Field replicate	08/07/2009	09:45	0.49	1.25
	RSD			4%	4%
Ditch nr Wanstad Road nr Parma, ID	Environmental	06/23/2009	19:10	1.53	5.50
Ditch nr Wanstad Road nr Parma, ID	Field replicate	06/23/2009	19:11	1.63	5.56
	RSD			4%	1%
Ditch nr Wanstad Road nr Parma, ID	Environmental	07/14/2009	13:42	0.44	8.13
Ditch nr Wanstad Road nr Parma, ID	Field replicate	07/14/2009	13:43	0.44	8.33
	RSD			0%	2%
Ditch nr Wanstad Road nr Parma, ID*	Environmental	08/07/2009	10:35	0.66	3.23
Ditch nr Wanstad Road nr Parma, ID*	Field replicate	08/07/2009	10:35	0.69	2.9
	RSD			3%	8%
Ditch nr Wanstad Road nr Parma, ID	Environmental	08/25/2009	13:30	0.48	1.78
Ditch nr Wanstad Road nr Parma, ID	Field replicate	08/25/2009	13:31	0.47	1.46
	RSD			1%	14%
U of I Farm Ditch at Hwy 95 nr Parma, ID	Environmental	06/25/2009	09:40	0.20	0.50
U of I Farm Ditch at Hwy 95 nr Parma, ID	Field replicate	06/25/2009	09:40	0.19	0.54
	RSD			4%	5%
U of I Farm Ditch at Hwy 95 nr Parma, ID*	Environmental	08/07/2009	12:10	0.64	2.75
U of I Farm Ditch at Hwy 95 nr Parma, ID*	Field replicate	08/07/2009	12:10	0.64	2.63
	RSD			0%	3%
Allen Drain nr Wilder, ID	Environmental	06/24/2009	09:00	0.13	0.65
Allen Drain nr Wilder, ID	Field replicate	06/24/2009	09:00	0.11	0.52
	RSD			12%	16%
Allen Drain nr Wilder, ID	Environmental	10/06/2009	08:50	0.09	0.49
Allen Drain nr Wilder, ID	Field replicate	10/06/2009	08:50	0.1	0.53
	RSD			7%	6%
6N/5W-30CDC1	Environmental	06/24/2009	15:00	—	—
6N/5W-30CDC1	Field replicate	06/24/2009	15:01	—	—
I027001-- Parma Field M10-Shallow	Environmental	10/07/2009	11:50	—	—
I027001-- Parma Field M10-Shallow	Field replicate	10/07/2009	11:51	—	—
Glidden Brook nr Caribou, ME	Environmental	07/14/2009	12:55	0.07	—
Glidden Brook nr Caribou, ME	Field replicate	07/14/2009	12:55	0.06	—
	RSD			11%	
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	07/14/2009	10:45	0.05	0.02
Hardwood Brook below Glidden Brk nr Caribou, ME	Field replicate	07/14/2009	10:46	0.05	0.02
	RSD			0%	0%

Table 9. Glyphosate and amino phosphonic acid (AMPA) concentrations measured in environmental and field-replicate water samples collected in Idaho, Maine, and Wisconsin, June–November 2009.—Continued

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. Concentrations reported as micrograms per liter. Glufosinate was analyzed but was not detected in any samples. **Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; N, north; nr, near; RSD, relative standard deviation; Trib, tributary; U of I, University of Idaho; WI, Wisconsin; Xing, crossing; *, storm event sample; —, not detected; %, percent]

USGS station name	Sample type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	AMPA [62649]	Glyphosate [62722]
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	08/06/2009	19:55	0.03	—
Hardwood Brook below Glidden Brk nr Caribou, ME	Field replicate	08/06/2009	19:56	0.03	—
	RSD			0%	
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	09/15/2009	16:40	0.02	—
Hardwood Brook below Glidden Brk nr Caribou, ME	Field replicate	09/15/2009	16:41	0.02	—
	RSD			0%	
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	Environmental	07/15/2009	11:48	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	Field replicate	07/15/2009	11:49	—	—
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	Environmental	07/15/2009	11:15	—	—
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	Field replicate	07/15/2009	11:16	—	—
Spring at Porter-Sett Rd nr Moose Brook Houlton, ME	Environmental	07/16/2009	10:55	—	—
Spring at Porter-Sett Rd nr Moose Brook Houlton, ME	Field replicate	07/16/2009	10:56	—	—
M003001-- Presque Isle Field AF13	Environmental	11/02/2009	10:40	—	—
M003001-- Presque Isle Field AF13	Field replicate	11/02/2009	10:41	—	—
Ditch #4 on Lake Road nr Kellner, WI	Environmental	06/16/2009	12:20	—	—
Ditch #4 on Lake Road nr Kellner, WI	Field replicate	06/16/2009	12:21	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Environmental	06/16/2009	18:00	0.03	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Field replicate	06/16/2009	18:01	0.03	—
	RSD			0%	
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Environmental	07/07/2009	12:40	0.02	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Field replicate	07/07/2009	12:41	0.02	—
	RSD			0%	
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Environmental	08/18/2009	11:30	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Field replicate	08/18/2009	11:31	—	—
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	Environmental	06/17/2009	11:30	—	—
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	Field replicate	06/17/2009	11:31	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	Environmental	06/17/2009	10:50	0.02	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	Field replicate	06/17/2009	10:51	0.02	—
	RSD			0%	
Unnamed Ditch at Beaver Ave nr Hancock, WI	Environmental	10/01/2009	10:45	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	Field replicate	10/01/2009	10:46	—	—
WS-19/08E/15-0008	Environmental	06/17/2009	17:00	—	—
WS-19/08E/15-0008	Field replicate	06/17/2009	17:01	—	—
W137003-- Hancock Field K1-Shallow	Environmental	09/29/2009	12:15	—	—
W137003-- Hancock Field K1-Shallow	Field replicate	09/29/2009	12:16	—	—

89 + 10 percent, 91 +10 percent and 86 + 12 percent, respectively. Eleven laboratory-replicate sediment samples (five suspended sediment and six bed sediment) were analyzed to test sample homogenization and the reproducibility of results, and there were 36 paired detections of pesticides above the respective MDLs. Relative standard deviation between the replicate samples ranged from 0.4 to 23.8 percent and met the control limit of 25 percent. There were no instances where a pesticide was detected in either the environmental or replicate sample and not in the corresponding sample.

Eleven sediment samples were spiked in the laboratory with a suite of 91 pesticides, and the average recovery percentages for these compounds ranged from 73 to 108 percent, which met the control limit of 70–130 percent. Standard reference material (SRM) 1941b, Organics in Marine Sediment (National Institute of Standards, Gaithersburg, Md.) was chosen as the most appropriate reference material for this study because no standard reference material was available for the current-use pesticides. Average recoveries (+ standard deviation) of *p*,*p*'- DDD and *p*,*p*'- DDE in SRM 1941b were 87 + 7 and 92 + 10 percent, respectively. Concentrations for all compounds fell within the 95 percent confidence intervals for the certified values.

Nutrients and Inorganic Constituents

Field blanks and replicate samples were analyzed to assess sample collection and processing and laboratory instrument QC performance. In the six field blanks analyzed by the NWQL, results for all inorganic constituents and nutrients were less than MDLs listed in table 5, with the exceptions of manganese and ammonia, which were detected in two and one of the blank samples, respectively (table 10). Five replicate sample pairs were analyzed, and all analytes detected above MDLs showed relative standard deviations between the environmental and replicate sample of less than the control limit of 25 percent, with the exception of one sample pair collected from Hardwood Brook below Glidden Brook near Caribou, Maine, on November 3, 2009, which showed substantial differences in two nutrient analytes (nitrite and phosphorus). There were no instances where a compound was detected above the MDL (not estimated) in either the environmental or replicate sample and not in the corresponding sample (table 10).

Sediment Organic Carbon and Nitrogen

Two replicate samples (one suspended sediment and one bed sediment) were analyzed to assess instrument performance. The relative percentage differences between the environmental and replicate samples for percentages of organic carbon and nitrogen were both less than the control limit of 25 percent (tables 11 and 12).

Results

Results are presented for pesticides in surface water, groundwater, and suspended and bed sediments. Pesticide detection frequencies in each of these matrices are presented in table 13. Results are also presented for nutrients and inorganic constituents in water, sediment organic carbon and nitrogen concentrations, sediment particle size and mineralogy, and basic water-quality parameters.

Dissolved Pesticides

Surface Water

During the study, 27 pesticides, including 10 fungicides, were detected in surface-water samples. Detection frequencies ranged from 2 to 70 percent. The most frequently detected compounds were the fungicides azoxystrobin, boscalid, chlorothalonil, and pyraclostrobin, along with the herbicides atrazine, metolachlor, and glyphosate and its degradate AMPA (table 13). Concentrations ranged from less than the MDLs to as much as 8.13 µg/L for glyphosate (tables 14–16).

In Idaho, 21 pesticides were detected in 23 samples collected in Idaho. As many as 16 pesticides were present in a single sample (ditch near Wanstad Road near Parma, Idaho, August 4, 2009). Glyphosate and AMPA were detected in every sample from sites in Idaho (table 16), and glyphosate concentrations were typically higher than AMPA concentrations. Other pesticides detected frequently in Idaho were atrazine, azoxystrobin, boscalid, metolachlor, pendimethalin, and pyraclostrobin (figs. 3 and 4). Of the 23 Idaho samples, 3 were collected following a large storm event (approximately 1 in. of rainfall in the 24 hours preceding sampling). Fourteen pesticides, including five fungicides, were detected in these storm-event samples. Concentrations of five pesticides (atrazine, boscalid, carbofuran, hexazinone, and methyl parathion) in these storm-event samples were the highest of any of the surface-water samples collected in Idaho during the study (tables 14–16).

In Maine, 14 pesticides, including 7 fungicides, were detected in 21 samples; AMPA and boscalid, in 55 percent and 43 percent of the samples, respectively, were the most frequently detected pesticides (figs. 3 and 4). Concentrations of AMPA and boscalid were less than 100 ng/L, whereas concentrations of the other 12 pesticides detected were generally near their respective MDLs (tables 14–16).

In Wisconsin, 14 pesticides, including 9 fungicides, were detected in 19 samples. The herbicides atrazine and metolachlor, which were detected in 100 percent and 89 percent of samples, respectively, and the fungicides boscalid, at 74 percent, and chlorothalonil, at 58 percent, had the highest detection frequencies (figs. 3 and 4). In surface-water samples from Wisconsin, atrazine and metolachlor concentrations ranged from 13.1 to 132 ng/L and less than 1.5 to 1,100 ng/L, respectively (table 15). Boscalid concentrations ranged from less than 2.8 to 38.4 ng/L, whereas chlorothalonil concentrations ranged from less than 4.1 to 86.9 ng/L (table 14).

Table 10. Nutrient and inorganic constituent concentrations measured in field blank and replicate water samples collected at sites in Idaho, Maine, and Wisconsin.

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. **Abbreviations**: Ave, avenue; Brk, brook; $CaCO_3$, calcium carbonate; CTH C, county road; E, estimated or having a higher degree of uncertainty; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mg/L, milligram per liter; mm/dd/yyyy, month/day/year; N, north; NC, relative percent differences not calculated for estimated values; nr, near; P, phosphorus; RSD, relative standard deviation; WI, Wisconsin; Xing, crossing; µg/L, microgram per liter; µS/cm, microsiemen per centimeter; %, percent; <, less than; —, none; #, number]

USGS station name	Sample type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Total nitrogen (unfiltered) mg/L [62855]	Ammonia mg/L as Nitrogen [00608]	Nitrite mg/L as Nitrogen [00613]	Nitrite + Nitrate mg/L as Nitrogen [00631]	Phosphorus (unfiltered) mg/L as Phosphorus [00665]	Phosphorus (filtered) mg/L as Phosphorus [00666]	Orthophosphate mg/L as Phosphorus [00671]
Field-blank samples										
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Field blank	06/23/2009	11:55	<0.1	<0.020	<0.002	<0.016	<0.008	<0.006	<0.008
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Field blank	10/05/2009	10:15	<0.1	<0.020	<0.002	<0.016	<0.008	<0.006	<0.008
Glidden Brook nr Presque Isle, ME	Field blank	11/04/2009	08:35	<0.1	0.024	<0.002	<0.016	<0.008	<0.006	<0.008
Hardwood Brook below Glidden Brk nr Caribou, ME	Field blank	07/14/2009	10:35	<0.1	E0.017	<0.002	<0.016	E0.006	<0.006	<0.008
Ditch #4 on Lake Road nr Kellner, WI	Field blank	09/28/2009	09:05	<0.1	<0.020	<0.002	<0.016	<0.008	<0.006	<0.008
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	Field blank	06/17/2009	11:35	<0.1	<0.020	<0.002	<0.016	<0.008	<0.006	<0.008
Environmental and replicate sample pairs										
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Environmental	06/23/2009	11:50	2.54	<0.020	0.016	2.20	0.326	0.183	0.170
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Field replicate	06/23/2009	11:51	2.67	<0.020	0.017	2.13	0.325	0.180	0.173
	RSD	—	—	4%	NC	4%	2%	0%	1%	1%
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	07/14/2009	10:45	1.05	<0.020	E0.001	0.705	0.025	0.018	0.010
Hardwood Brook below Glidden Brk nr Caribou, ME	Field replicate	07/14/2009	10:46	1.03	E0.010	E0.001	0.709	0.025	0.016	0.011
	RSD	—	—	1%	NC	NC	0%	0%	8%	7%
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	11/03/2009	14:00	1.44	E0.011	0.008	1.19	0.014	0.008	<0.008
Hardwood Brook below Glidden Brk nr Caribou, ME	Field replicate	11/03/2009	14:01	1.43	E0.017	0.004	1.12	0.069	0.007	<0.008
	RSD	—	—	0%	NC	45%	4%	93%	8%	NC
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	Environmental	06/17/2009	11:30	23.3	<0.020	0.026	23.0	0.009	E0.004	E0.005
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	Field replicate	06/17/2009	11:31	23.4	<0.020	0.026	22.6	0.010	E0.004	E0.005
	RSD	—	—	0%	NC	0%	1%	7%	NC	NC
Unnamed Ditch at Beaver Ave nr Hancock, WI	Environmental	10/01/2009	10:45	13.9	<0.020	0.041	13.0	0.012	E0.004	E0.006
Unnamed Ditch at Beaver Ave nr Hancock, WI	Field replicate	10/01/2009	10:46	13.8	<0.020	0.050	13.1	0.013	E0.005	E0.006
	RSD	—	—	1%	NC	14%	1%	6%	NC	NC

Table 10. Nutrient and inorganic constituent concentrations measured in field blank and replicate water samples collected at sites in Idaho, Maine, and Wisconsin.—Continued

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. **Abbreviations**: Ave, avenue; Brk, brook; $CaCO_3$, calcium carbonate; CTH C, county road; E, estimated or having a higher degree of uncertainty; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mg/L, milligram per liter; mm/dd/yyyy, month/day/year; N, north; NC, relative percent differences not calculated for estimated values; nr, near; P, phosphorus; RSD, relative standard deviation; WI, Wisconsin; Xing, crossing; µg/L, microgram per liter; µS/cm, microsiemen per centimeter; %, percent; <, less than; —, none; #, number]

USGS station name	Sample type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Calcium mg/L [00915]	Magnesium mg/L [00925]	Sodium mg/L [00930]	Potassium mg/L [00935]	Chloride mg/L [00940]	Sulfate mg/L [00945]	Fluoride mg/L [00950]
Field-blank samples										
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Field blank	06/23/2009	11:55	<0.02	<0.012	<0.12	<0.06	<0.12	<0.18	<0.08
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Field blank	10/05/2009	10:15	<0.044	<0.016	<0.1	<0.064	<0.12	<0.18	<0.08
Glidden Brook nr Presque Isle, ME	Field blank	11/04/2009	08:35	<0.044	<0.016	<0.1	<0.064	<0.12	<0.18	<0.08
Hardwood Brook below Glidden Brk nr Caribou, ME	Field blank	07/14/2009	10:35	<0.02	<0.012	<0.12	<0.06	<0.12	<0.18	<0.08
Ditch #4 on Lake Road nr Kellner, WI	Field blank	09/28/2009	09:05	<0.02	<0.012	<0.12	<0.06	<0.12	<0.18	<0.08
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	Field blank	06/17/2009	11:35	<0.02	<0.012	<0.12	<0.06	<0.12	<0.18	<0.08
Environmental and replicate sample pairs										
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Environmental	06/23/2009	11:50	33.8	8.67	32.2	2.97	11.5	33.6	0.380
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Field replicate	06/23/2009	11:51	35.0	8.96	33.1	3.03	11.5	33.6	0.400
	RSD	—	—	2%	2%	2%	1%	0%	0%	4%
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	07/14/2009	10:45	51.4	7.34	3.87	0.631	11.9	12.7	E0.07
Hardwood Brook below Glidden Brk nr Caribou, ME	Field replicate	07/14/2009	10:46	51.2	7.25	3.79	0.626	12.0	12.7	E0.06
	RSD	—	—	0%	1%	1%	1%	1%	0%	NC
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	11/03/2009	14:00	47.9	6.05	3.61	1.00	12.1	21.6	<0.08
Hardwood Brook below Glidden Brk nr Caribou, ME	Field replicate	11/03/2009	14:01	47.5	6.01	3.54	0.944	12.0	21.5	E0.06
	RSD	—	—	1%	0%	1%	4%	1%	0%	NC
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	Environmental	06/17/2009	11:30	52.0	25.5	2.89	4.58	29.6	42.4	<0.08
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	Field replicate	06/17/2009	11:31	52.0	25.1	2.74	4.57	29.7	42.4	<0.08
	RSD	—	—	0%	1%	4%	0%	0%	0%	NC
Unnamed Ditch at Beaver Ave nr Hancock, WI	Environmental	10/01/2009	10:45	53.8	25.1	2.77	4.02	22.7	49.5	0.082
Unnamed Ditch at Beaver Ave nr Hancock, WI	Field replicate	10/01/2009	10:46	54.5	25.5	2.79	4.08	22.2	49.5	0.081
	RSD	—	—	1%	1%	1%	1%	2%	0%	1%

Table 10. Nutrient and inorganic constituent concentrations measured in field blank and replicate water samples collected at sites in Idaho, Maine, and Wisconsin. —Continued

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. **Abbreviations**: Ave, avenue; Brk, brook; $CaCO_3$, calcium carbonate; CTH C, county road; E, estimated or having a higher degree of uncertainty; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mg/L, milligram per liter; mm/dd/yyyy, month/day/year; N, north; NC, relative percent differences not calculated for estimated values; nr, near; P, phosphorus; RSD, relative standard deviation; WI, Wisconsin; Xing, crossing; µg/L, microgram per liter; µS/cm, microsiemen per centimeter; %, percent; <, less than; —, none; #, number]

USGS station name	Sample type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Silica mg/L [00955]	Copper µg/L [01040]	Iron µg/L [01046]	Manganese µg/L [01056]	Specific conductance µS/cm [90095]	Acid neutralizing capacity mg/L $CaCO_3$ [90410]	pH [00403]
Field-blank samples										
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Field blank	06/23/2009	11:55	<0.20	<2	<4	<0.2	<5	<8	8.2
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Field blank	10/05/2009	10:15	<0.20	<2.8	<6	E0.11	<5	<8	8.4
Glidden Brook nr Presque Isle, ME	Field blank	11/04/2009	08:35	<0.20	<2.8	<6	1.06	<5	<8	8.3
Hardwood Brook below Glidden Brk nr Caribou, ME	Field blank	07/14/2009	10:35	<0.20	<2	<4	<0.2	<5	<8	8.2
Ditch #4 on Lake Road nr Kellner, WI	Field blank	09/28/2009	09:05	<0.20	<2	<4	0.30	<5	<8	8.3
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	Field blank	06/17/2009	11:35	<0.20	<2	<4	<0.2	<5	<8	7.8
Environmental and replicate sample pairs										
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Environmental	06/23/2009	11:50	25.6	<2	12.9	14.0	394	137	8.0
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Field replicate	06/23/2009	11:51	25.6	<2	13.6	13.8	395	137	7.9
	RSD	—	—	0%	NC	4%	1%	0%	0%	1%
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	07/14/2009	10:45	2.32	<2	44.4	24.5	334	133	8.0
Hardwood Brook below Glidden Brk nr Caribou, ME	Field replicate	07/14/2009	10:46	2.31	<2	38.0	24.5	334	133	8.2
	RSD	—	—	0%	NC	11%	0%	0%	0%	2%
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	11/03/2009	14:00	3.37	<2.8	29.6	12.2	306	113	7.7
Hardwood Brook below Glidden Brk nr Caribou, ME	Field replicate	11/03/2009	14:01	3.34	<2.8	29.1	12.4	306	113	7.9
	RSD	—	—	1%	NC	1%	1%	0%	0%	2%
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	Environmental	06/17/2009	11:30	7.99	<2	4.80	1.20	531	78	7.5
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	Field replicate	06/17/2009	11:31	7.99	<2	4.50	1.17	529	78	7.5
	RSD	—	—	0%	NC	5%	2%	0%	0%	0%
Unnamed Ditch at Beaver Ave nr Hancock, WI	Environmental	10/01/2009	10:45	9.54	E1.3	30.1	34.5	498	117	7.8
Unnamed Ditch at Beaver Ave nr Hancock, WI	Field replicate	10/01/2009	10:46	9.65	E1.5	29.2	34.7	497	117	7.8
	RSD	—	—	1%	NC	2%	0%	0%	0%	0%

Table 11. Percentages of organic carbon and nitrogen measured in suspended-sediment samples collected at sites in Idaho, Maine, and Wisconsin, June–November 2009.

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. **Abbreviations**: Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; nr, near; WI, Wisconsin; Xing, crossing; %, percent; #, number]

USGS station name	Sample type	Sample begin date (mm/dd/yyyy)	Sample end date (mm/dd/yyyy)	Organic carbon (%) [50465]	Organic nitrogen (%) [63509]
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Environmental	06/23/2009	07/14/2009	1.6	0.12
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Environmental	07/14/2009	08/04/2009	1.1	0.09
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Environmental	08/04/2009	08/25/2009	1.9	0.18
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Environmental	08/25/2009	09/15/2009	0.9	0.07
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Environmental	09/15/2009	10/05/2009	0.6	0.06
Glidden Brook nr Caribou, ME	Environmental	07/14/2009	08/06/2009	7.8	0.59
Glidden Brook nr Caribou, ME	Environmental	10/06/2009	11/04/2009	9.1	0.64
Glidden Brook nr Caribou, ME	Laboratory replicate	10/06/2009	11/04/2009	9.7	0.66
Ditch #4 on Lake Road nr Kellner, WI	Environmental	06/16/2009	07/07/2009	13.9	1.1
Ditch #4 on Lake Road nr Kellner, WI	Environmental	07/07/2009	07/28/2009	16.4	1.2
Ditch #4 on Lake Road nr Kellner, WI	Environmental	07/28/2009	08/18/2009	13.6	1.1
Ditch #4 on Lake Road nr Kellner, WI	Environmental	08/18/2009	09/08/2009	3.2	0.32
Ditch #4 on Lake Road nr Kellner, WI	Environmental	09/08/2009	09/28/2009	15.1	1.2

Table 12. Percentages of organic carbon and nitrogen measured in bed-sediment samples collected at sites in Idaho, Maine, and Wisconsin, June–November 2009.

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. **Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; N, north; nr, near; Trib, tributary; U of I, University of Idaho; WI, Wisconsin; %, percent]

USGS station name	Sample type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Organic carbon (%) [62461]	Organic nitrogen (%) [63510]
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Environmental	06/23/2009	12:05	1.8	0.16
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Environmental	10/05/2009	08:50	0.9	0.05
Ditch nr Wanstad Road nr Parma, ID	Environmental	06/23/2009	18:55	1.5	0.08
Ditch nr Wanstad Road nr Parma, ID	Laboratory replicate	06/23/2009	18:55	1.2	0.06
Ditch nr Wanstad Road nr Parma, ID	Environmental	10/05/2009	11:47	0.83	0.02
U of I Farm Ditch at Hwy 95 nr Parma, ID	Environmental	06/25/2009	09:30	0.77	0.08
U of I Farm Ditch at Hwy 95 nr Parma, ID	Environmental	10/05/2009	10:48	1.1	0.10
Allen Drain nr Wilder, ID	Environmental	06/23/2019	08:45	0.95	0.08
Glidden Brook nr Caribou, ME	Environmental	07/14/2009	11:50	8.8	0.55
Glidden Brook nr Caribou, ME	Environmental	11/05/2009	08:00	7.8	0.47
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	07/14/2009	10:00	4.1	0.28
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	11/05/2009	08:00	8.0	0.40
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	Environmental	07/15/2009	11:45	6.1	0.50
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	Environmental	11/05/2009	09:00	15.8	1.1
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	Environmental	07/15/2009	11:00	2.8	0.16
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	Environmental	11/05/2009	09:15	1.1	0.08
Ditch #4 on Lake Road nr Kellner, WI	Environmental	06/16/2009	12:15	7.9	0.67
Ditch #4 on Lake Road nr Kellner, WI	Environmental	09/28/2009	09:00	0.69	0.07
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Environmental	06/16/2009	17:15	16.9	1.3
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Environmental	09/28/2009	10:50	0.41	0.06
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	Environmental	06/17/2009	11:10	0.28	0.03
Unnamed Ditch at Beaver Ave nr Hancock, WI	Environmental	06/17/2009	10:40	0.46	0.10
Unnamed Ditch at Beaver Ave nr Hancock, WI	Environmental	10/01/2009	11:00	3.2	0.29

Table 13. Pesticide detection frequencies by environmental matrix for all samples collected in Idaho, Maine, and Wisconsin, June–November 2009.

[Fungicides are shown in ***bold italics***. **Abbreviations**: n, number of samples; NA, not analyzed; —, not detected; %, percentage of samples with compound detected; *, AMPA and glyphosate analyzed in 62 surface-water samples]

Compound	Detected in surface water samples (n=63)	Detected in groundwater samples (n=12)	Detected in suspended sediment samples (n=12)	Detected in bed sediment samples (n=22)
Amino phosphonic acid (AMPA)*	60%	8%	NA	NA
Atrazine	54%	67%	—	—
Azoxystrobin	***59%***	***17%***	**—**	***18%***
Bifenthrin	10%	—	42%	32%
Boscalid	***70%***	***58%***	***58%***	***45%***
Carbofuran	3%	—	—	—
Chlorothalonil	***40%***	***50%***	***33%***	***45%***
Chlorpyrifos	24%	—	17%	27%
Cypermethrin	—	—	—	5%
Cyprodinil	***6%***	**—**	**—**	**—**
DCPA	3%	—	—	—
p,p′-DDD	—	—	58%	55%
p,p′-DDE	10%	—	58%	77%
p,p′-DDT	—	—	33%	50%
Diazinon	2%	—	—	—
3,5-Dichloroaniline	—	—	8%	—
Dimethomorph	**—**	***8%***	**—**	**—**
EPTC	6%	—	—	—
Esfenvalerate	—	—	—	5%
Ethalfluralin	11%	—	—	9%
Fenhexamid	**—**	***8%***	**—**	**—**
Fipronil	—	8%	—	—
Fipronil sulfide	—	—	—	5%
Fludioxinil	***3%***	**—**	**—**	**—**
Glyphosate*	39%	8%	NA	NA
Hexazinone	2%	—	—	—
Malathion	2%	—	—	—
Methyl parathion	14%	—	—	5%
Metolachlor	62%	33%	33%	23%
Pendimethalin	21%	—	17%	23%
Permethrin	—	—	—	14%
Pyraclostrobin	***44%***	***33%***	***83%***	***64%***
Pyrimethanil	***30%***	***8%***	**—**	***18%***
Simazine	—	8%	—	—
Tetraconazole	***2%***	**—**	**—**	**—**
Trifluralin	14%	—	17%	36%
Triticonazole	***2%***	**—**	**—**	**—**
Zoxamide	***5%***	**—**	***50%***	***5%***

Table 14. Fungicide concentrations measured in surface-water samples collected at sites located in Idaho, Maine, and Wisconsin, June to November, 2009.

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. All samples taken were environmental samples. Concentrations are in nanograms per liter. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: cyproconazole, difenoconazole, dimethomorph, famoxadone, fenarimol, fenbuconazole, fenhexamid, fluazinam, fluoxastrobin, flusilazole, flutriafol, imazalil, iprodione, kresoxim-methyl, metconazole, myclobutanil, PCNB, propiconazole, tebuconazole, triadimefon, triadimenol, trifloxystrobin, and triflumizole. **Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; N, north; ND, not detected; nr, near; Trib, tributary; U of I, University of Idaho; WI, Wisconsin; Xing, crossing; *, value potentially biased high; **, storm event sample]

USGS station name	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Azoxystrobin [66589]	Boscalid [67550]	Chlorothalonil [65071]	Cyprodinil [67574]	Fludioxinil [67640]	Pyraclostrobin [66646]	Pyrimethanil [67717]	Tetraconazole [66654]	Triticonazole [67758]	Zoxamide [67768]
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	06/23/2009	11:50	6.1	17.6*	—	—	—	—	—	—	—	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	07/14/2009	08:40	8.0	18.7*	—	—	—	10.1	—	—	—	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	08/04/2009	09:22	16.3	27.2*	(0.4)	—	—	15.2	(1.2)	—	—	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID**	08/07/2009	09:45	15.9	109	4.1	—	—	60.1	(0.9)	—	—	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	08/25/2009	09:20	38.2	73.2	(0.2)	—	—	—	—	—	—	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	09/15/2009	09:18	34.5	26.4*	(0.2)	—	—	9.6	(1.3)	—	—	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	10/05/2009	10:10	—	23.9*	—	—	—	21.5	—	—	—	—
Ditch nr Wanstad Road nr Parma, ID	06/23/2009	19:10	18.6	94.2	—	—	—	—	—	—	—	—
Ditch nr Wanstad Road nr Parma, ID	07/14/2009	13:42	34.6	100	—	—	—	43.8	(2.9)	—	—	—
Ditch nr Wanstad Road nr Parma, ID	08/04/2009	13:10	24.4	107	228	—	—	49.7	(1.6)	—	—	23.8
Ditch nr Wanstad Road nr Parma, ID**	08/07/2009	10:35	24.0	246	(0.5)	—	—	85.6	—	—	—	—
Ditch nr Wanstad Road nr Parma, ID	08/25/2009	13:30	31.5	109	5.9	—	—	239	—	—	—	22.2
Ditch nr Wanstad Road nr Parma, ID	09/15/2009	11:45	41.7	52.8*	—	—	—	64.1	—	—	—	—
Ditch nr Wanstad Road nr Parma, ID	10/05/2009	11:53	—	21.6*	—	—	—	21.4	—	—	—	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	06/25/2009	09:40	7.6	—	—	—	—	—	—	—	—	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	07/14/2009	12:38	16.4	22.6*	—	—	—	—	(4.0)	—	—	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	08/04/2009	12:22	—	—	—	—	—	—	—	—	—	—
U of I Farm Ditch at Hwy 95 nr Parma, ID**	08/07/2009	12:10	25.9	78.8	(0.7)	—	—	53.8	(1.2)	—	—	—

Table 14. Fungicide concentrations measured in surface-water samples collected at sites located in Idaho, Maine, and Wisconsin, June to November, 2009.—Continued

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. All samples taken were environmental samples. Concentrations are in nanograms per liter. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: cyproconazole, difenoconazole, dimethomorph, famoxadone, fenarimol, fenbuconazole, fenhexamid, fluazinam, fluoxastrobin, flusilazole, flutriafol, imazalil, iprodione, kresoxim-methyl, metconazole, myclobutanil, PCNB, propiconazole, tebuconazole, triadimefon, triadimenol, trifloxystrobin, and triflumizole. **Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; N, north; ND, not detected; nr, near; Trib, tributary; U of I, University of Idaho; WI, Wisconsin; Xing, crossing; *, value potentially biased high; **, storm event sample]

USGS station name	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Azoxystrobin [66589]	Boscalid [67550]	Chlorothalonil [65071]	Cyprodinil [67574]	Fludioxinil [67640]	Pyraclostrobin [66646]	Pyrimethanil [67717]	Tetraconazole [66654]	Triticonazole [67758]	Zoxamide [67768]
U of I Farm Ditch at Hwy 95 nr Parma, ID	08/25/2009	12:45	59.8	65.0	—	—	—	84.3	—	—	—	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	09/15/2009	10:35	29.1	22.6*	—	—	—	20.9	(1.2)	—	—	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	10/05/2009	11:10	(0.5)	23.0*	(0.4)	—	—	—	—	—	—	—
Allen Drain nr Wilder, ID	06/24/2009	09:00	6.9	21.1*	—	—	—	—	—	—	—	—
Allen Drain nr Wilder, ID	10/06/2009	08:50	27.5	26.9*	—	—	—	12.9	—	—	—	—
Glidden Brook nr Caribou, ME	07/14/2009	12:55	—	—	—	—	(4.1)	—	—	—	—	—
Glidden Brook nr Caribou, ME	08/06/2009	15:24	29.4	17.6	—	—	—	—	(1.6)	—	—	—
Glidden Brook nr Caribou, ME	08/24/2009	14:50	29.2	18.6	—	—	—	—	—	—	—	—
Glidden Brook nr Caribou, ME	08/25/2009	14:30	32.7	17.0	—	—	—	—	—	—	—	—
Glidden Brook nr Caribou, ME	09/15/2009	14:45	—	16.2	(1.5)	—	—	—	(0.4)	—	—	—
Glidden Brook nr Caribou, ME	10/06/2009	16:06	—	20.0	—	(1.4)	—	(1.1)	(0.6)	—	—	—
Glidden Brook nr Caribou, ME	11/04/2009	08:30	(0.5)	—	(0.1)	—	—	—	—	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	07/14/2009	10:45	6.6	—	—	—	(4.2)	23.5	—	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	08/06/2009	19:55	—	—	—	—	—	—	—	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	08/24/2009	16:48	30.6	—	—	—	—	—	—	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	09/15/2009	16:40	—	8.6*	—	—	—	—	—	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	10/06/2009	17:30	—	—	—	(5.8)	—	—	(0.4)	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	11/03/2009	14:00	—	—	(0.2)	—	—	—	(0.4)	—	—	—

Table 14. Fungicide concentrations measured in surface-water samples collected at sites located in Idaho, Maine, and Wisconsin, June to November, 2009.—Continued

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. All samples taken were environmental samples. Concentrations are in nanograms per liter. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: cyproconazole, difenoconazole, dimethomorph, famoxadone, fenarimol, fenbuconazole, fenhexamid, fluazinam, fluoxastrobin, flusilazole, flutriafol, imazalil, iprodione, kresoxim-methyl, metconazole, myclobutanil, PCNB, propiconazole, tebuconazole, triadimefon, triadimenol, trifloxystrobin, and triflumizole. **Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; N, north; ND, not detected; nr, near; Trib, tributary; U of I, University of Idaho; WI, Wisconsin; Xing, crossing; *, value potentially biased high; **, storm event sample]

USGS station name	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Azoxystrobin [66589]	Boscalid [67550]	Chlorothalonil [65071]	Cyprodinil [67574]	Fludioxinil [67640]	Pyraclostrobin [66646]	Pyrimethanil [67717]	Tetraconazole [66654]	Triticonazole [67758]	Zoxamide [67768]
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	07/15/2009	11:48	—	—	—	—	—	—	—	—	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	08/07/2009	09:00	57.5	18.8	—	—	—	—	(0.5)	—	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	08/24/2009	19:27	45.1	22.9	—	—	—	—	—	—	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	09/15/2009	18:57	—	—	—	—	—	—	—	—	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	10/06/2009	20:15	—	20.1	(1.1)	(2.1)	—	12.4	(2.0)	—	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	11/04/2009	10:20	—	—	(0.1)	—	—	6.9	(0.2)	—	—	—
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	07/15/2009	11:15	—	—	—	—	—	—	—	—	—	—
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	11/04/2009	10:35	—	—	—	—	—	(2.3)	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	06/16/2009	12:20	—	—	—	—	—	—	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	07/07/2009	09:15	—	—	(1.8)	—	—	—	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	07/28/2009	08:45	—	17.4	7.4	—	—	—	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	08/18/2009	09:30	—	36.4	—	—	—	(1.5)	(1.4)	(0.1)	—	—
Ditch #4 on Lake Road nr Kellner, WI	09/08/2009	09:40	32.5	25.2	76.1	—	—	—	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	09/28/2009	09:15	41.2	22.6	7.0	—	—	—	—	—	66.8	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	06/16/2009	18:00	—	—	—	—	—	—	—	—	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	07/07/2009	12:40	—	22.7	(2.2)	—	—	—	—	—	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	07/28/2009	11:15	—	16.5	4.6	—	—	—	—	—	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	08/18/2009	11:30	32.0	37.7	—	—	—	5.9	—	—	—	—

Table 14. Fungicide concentrations measured in surface-water samples collected at sites located in Idaho, Maine, and Wisconsin, June to November, 2009.—Continued

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. All samples taken were environmental samples. Concentrations are in nanograms per liter. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: cyproconazole, difenoconazole, dimethomorph, famoxadone, fenarimol, fenbuconazole, fenhexamid, fluazinam, fluoxastrobin, flusilazole, flutriafol, imazalil, iprodione, kresoxim-methyl, metconazole, myclobutanil, PCNB, propiconazole, tebuconazole, triadimefon, triadimenol, trifloxystrobin, and triflumizole. **Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; N, north; ND, not detected; nr, near; Trib, tributary; U of I, University of Idaho; WI, Wisconsin; Xing, crossing; *, value potentially biased high; **, storm event sample]

USGS station name	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Azoxystrobin [66589]	Boscalid [67550]	Chlorothalonil [65071]	Cyprodinil [67574]	Fludioxinil [67640]	Pyraclostrobin [66646]	Pyrimethanil [67717]	Tetraconazole [66654]	Triticonazole [67758]	Zoxamide [67768]
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	09/08/2009	12:40	31.8	34.9	—	—	—	—	—	—	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	09/28/2009	10:25	40.3	30.3	(0.6)	—	—	129	—	—	—	—
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	06/17/2009	11:30	—	—	—	—	—	—	—	—	—	—
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	07/07/2009	12:10	—	—	(1.4)	—	—	—	—	—	—	—
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	07/30/2009	08:30	34.0	34.5	86.9	179	—	26.1	(0.2)	—	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	06/17/2009	10:50	—	38.4	5.3	—	—	101	—	—	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	08/18/2009	14:30	31.5	30.6	—	—	—	11.7	(2.8)	—	—	493
Unnamed Ditch at Beaver Ave nr Hancock, WI	09/08/2009	13:00	31.5	31.7	—	—	—	9.8	—	—	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	10/01/2009	10:45	(0.5)	22.5	(0.3)	—	—	8.7	—	—	—	—

Table 15. Insecticide and herbicide concentrations measured in surface-water samples collected at sites in Idaho, Maine, and Wisconsin, June to November 2009.

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. Concentrations are in nanograms per liter. All samples taken were environmental samples. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: alachlor, allethrin, butylate, carbaryl, clomazone, cycloate, cyfluthrin, λ-cyhalothrin, cypermethrin, *p,p′*-DDD, *p,p′*-DDT, deltamethrin, 3,4-DCA, 3,5-DCA, esfenvalerate, etofenprox, fenpropathrin, fipronil, fipronil disulfinyl, fipronil sulfide, fipronil sulfone, τ-fluvalinate, methidathion, methoprene, molinate, napropamide, oxyflurofen, PCA, pebulate, permethrin, phenothrin, phosmet, piperonyl butoxide, prometryn, propanil, propyzamide, resmethrin, simazine, tefluthrin, tetramethrin, and thiobencarb. **Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; N, north; nr, near; Trib, tributary; U of I, University of Idaho; WI, Wisconsin; Xing, crossing; **, storm event sample; —, not detected]

USGS station name	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Atrazine [65065]	Bifenthrin [65067]	Carbofuran [65070]	Chlorpyrifos [65072]	DCPA [65076]	*p,p′*-DDE [65095]	Diazinon [65078]	EPTC [65080]
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	06/23/2009	11:50	—	—	—	—	—	—	—	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	07/14/2009	08:40	9.1	—	—	—	—	—	—	39.8
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	08/04/2009	09:22	8.7	10.1	—	2.4	—	—	—	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID**	08/07/2009	09:45	12.7	—	—	—	—	—	—	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	08/25/2009	09:20	—	—	—	—	—	—	—	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	09/15/2009	09:18	6.0	—	—	—	—	—	—	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	10/05/2009	10:10	4.0	—	—	—	—	—	—	—
Ditch nr Wanstad Road nr Parma, ID	06/23/2009	19:10	—	—	—	65.0	—	(3.2)	—	—
Ditch nr Wanstad Road nr Parma, ID	07/14/2009	13:42	10.1	—	94.0	7.8	—	—	—	45.7
Ditch nr Wanstad Road nr Parma, ID	08/04/2009	13:10	7.7	11.0	—	5.1	—	(1.8)	—	—
Ditch nr Wanstad Road nr Parma, ID**	08/07/2009	10:35	8.5	—	117	—	—	—	—	—
Ditch nr Wanstad Road nr Parma, ID	08/25/2009	13:30	4.3	7.0	—	3.3	—	(2.7)	—	—
Ditch nr Wanstad Road nr Parma, ID	09/15/2009	11:45	5.2	—	—	(1.9)	—	(1.0)	—	—
Ditch nr Wanstad Road nr Parma, ID	10/05/2009	11:53	(2.0)	—	—	—	—	—	—	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	06/25/2009	09:40	—	—	—	2.9	—	(1.1)	—	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	07/14/2009	12:38	8.8	(3.6)	—	4.0	—	—	—	56.3
U of I Farm Ditch at Hwy 95 nr Parma, ID	08/04/2009	12:22	—	—	—	—	—	—	—	—
U of I Farm Ditch at Hwy 95 nr Parma, ID**	08/07/2009	12:10	—	—	—	—	—	—	—	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	08/25/2009	12:45	—	—	—	—	—	—	—	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	09/15/2009	10:35	4.6	—	—	2.6	—	—	—	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	10/05/2009	11:10	—	(4.5)	—	(0.6)	—	(1.0)	—	—
Allen Drain nr Wilder, ID	06/24/2009	09:00	—	—	—	—	—	—	—	—
Allen Drain nr Wilder, ID	10/06/2009	08:50	3.8	—	—	(1.8)	—	—	—	—
Glidden Brook nr Caribou, ME	07/14/2009	12:55	—	—	—	12.6	6.5	—	—	—
Glidden Brook nr Caribou, ME	08/06/2009	15:24	—	—	—	6.3	—	—	—	—
Glidden Brook nr Caribou, ME	08/24/2009	14:50	—	—	—	—	—	—	—	—
Glidden Brook nr Caribou, ME	08/25/2009	14:30	—	—	—	—	—	—	—	—
Glidden Brook nr Caribou, ME	09/15/2009	14:45	—	—	—	—	—	—	—	—
Glidden Brook nr Caribou, ME	10/06/2009	16:06	—	—	—	(1.5)	—	—	—	—
Glidden Brook nr Caribou, ME	11/04/2009	08:30	—	—	—	—	—	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	07/14/2009	10:45	—	—	—	10.8	5.7	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	08/06/2009	19:55	—	—	—	—	—	—	—	—

Table 15. Insecticide and herbicide concentrations measured in surface-water samples collected at sites in Idaho, Maine, and Wisconsin, June to November 2009. —Continued

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. Concentrations are in nanograms per liter. All samples taken were environmental samples. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: alachlor, allethrin, butylate, carbaryl, clomazone, cycloate, cyfluthrin, λ-cyhalothrin, cypermethrin, *p,p′*-DDD, *p,p′*-DDT, deltamethrin, 3,4-DCA, 3,5-DCA, esfenvalerate, etofenprox, fenpropathrin, fipronil, fipronil disulfinyl, fipronil sulfide, fipronil sulfone, τ-fluvalinate, methidathion, methoprene, molinate, napropamide, oxyflurofen, PCA, pebulate, permethrin, phenothrin, phosmet, piperonyl butoxide, prometryn, propanil, propyzamide, resmethrin, simazine, tefluthrin, tetramethrin, and thiobencarb. **Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; N, north; nr, near; Trib, tributary; U of I, University of Idaho; WI, Wisconsin; Xing, crossing; **, storm event sample; —, not detected]

USGS station name	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Atrazine [65065]	Bifenthrin [65067]	Carbofuran [65070]	Chlorpyrifos [65072]	DCPA [65076]	*p,p′*-DDE [65095]	Diazinon [65078]	EPTC [65080]
Hardwood Brook below Glidden Brk nr Caribou, ME	08/24/2009	16:48	—	—	—	—	—	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	09/15/2009	16:40	—	—	—	—	—	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	10/06/2009	17:30	—	—	—	—	—	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	11/03/2009	14:00	—	—	—	—	—	—	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	07/15/2009	11:48	—	—	—	—	—	—	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	08/07/2009	09:00	—	—	—	—	—	—	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	08/24/2009	19:27	—	—	—	—	—	—	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	09/15/2009	18:57	—	—	—	—	—	—	2.1	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	10/06/2009	20:15	3.5	—	—	—	—	—	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	11/04/2009	10:20	—	—	—	—	—	—	—	—
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	07/15/2009	11:15	—	—	—	—	—	—	—	—
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	11/04/2009	10:35	—	—	—	—	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	06/16/2009	12:20	22.6	—	—	—	—	—	—	44.2
Ditch #4 on Lake Road nr Kellner, WI	07/07/2009	09:15	16.5	—	—	—	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	07/28/2009	08:45	14.6	—	—	—	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	08/18/2009	09:30	16.3	—	—	—	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	09/08/2009	09:40	16.4	—	—	—	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	09/28/2009	09:15	16.1	—	—	—	—	—	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	06/16/2009	18:00	35.9	—	—	—	—	—	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	07/07/2009	12:40	17.7	—	—	—	—	—	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	07/28/2009	11:15	14.7	—	—	—	—	—	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	08/18/2009	11:30	14.7	—	—	—	—	—	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	09/08/2009	12:40	13.1	—	—	—	—	—	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	09/28/2009	10:25	21.4	—	—	—	—	—	—	—
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	06/17/2009	11:30	132	—	—	—	—	—	—	—
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	07/07/2009	12:10	100	—	—	—	—	—	—	—
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	07/30/2009	08:30	63.6	—	—	—	—	—	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	06/17/2009	10:50	51.2	—	—	—	—	—	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	08/18/2009	14:30	28.2	(4.5)	—	—	—	—	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	09/08/2009	13:00	28.7	—	—	—	—	—	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	10/01/2009	10:45	22.7	—	—	—	—	—	—	—

Table 15. Insecticide and herbicide concentrations measured in surface-water samples collected at sites in Idaho, Maine, and Wisconsin, June to November 2009. —Continued

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. Concentrations are in nanograms per liter. All samples taken were environmental samples. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: alachlor, allethrin, butylate, carbaryl, clomazone, cycloate, cyfluthrin, λ-cyhalothrin, cypermethrin, *p,p′*-DDD, *p,p′*-DDT, deltamethrin, 3,4-DCA, 3,5-DCA, esfenvalerate, etofenprox, fenpropathrin, fipronil, fipronil disulfinyl, fipronil sulfide, fipronil sulfone, τ-fluvalinate, methidathion, methoprene, molinate, napropamide, oxyflurofen, PCA, pebulate, permethrin, phenothrin, phosmet, piperonyl butoxide, prometryn, propanil, propyzamide, resmethrin, simazine, tefluthrin, tetramethrin, and thiobencarb.**Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; N, north; nr, near; Trib, tributary; U of I, University of Idaho; WI, Wisconsin; Xing, crossing; **, storm event sample; —, not detected]

USGS station name	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Ethalfluralin [65082]	Hexazinone [65085]	Malathion [65087]	Methyl parathion [65089]	Metolachlor [65090]	Pendimethalin [65098]	Trifluralin [65108]
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	06/23/2009	11:50	4.4	—	—	—	234	38.3	2.1
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	07/14/2009	08:40	—	—	—	65.4	146	12.1	(0.8)
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	08/04/2009	09:22	(1.6)	—	—	19.2	37.3	31.0	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID**	08/07/2009	09:45	—	—	—	52.7	60.1	—	(0.8)
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	08/25/2009	09:20	—	—	—	—	25.1	—	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	09/15/2009	09:18	—	—	—	—	9.6	—	(0.2)
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	10/05/2009	10:10	—	—	—	—	9.8	4.8	(0.2)
Ditch nr Wanstad Road nr Parma, ID	06/23/2009	19:10	(2.6)	—	249	41.6	1,750	54.2	(0.8)
Ditch nr Wanstad Road nr Parma, ID	07/14/2009	13:42	34.4	—	—	53.5	664	57.4	—
Ditch nr Wanstad Road nr Parma, ID	08/04/2009	13:10	(1.8)	—	—	39.8	120	42.1	—
Ditch nr Wanstad Road nr Parma, ID**	08/07/2009	10:35	—	54.9	—	72.6	141	31.9	—
Ditch nr Wanstad Road nr Parma, ID	08/25/2009	13:30	—	—	—	—	49.1	27.7	—
Ditch nr Wanstad Road nr Parma, ID	09/15/2009	11:45	—	—	—	—	52.9	—	—
Ditch nr Wanstad Road nr Parma, ID	10/05/2009	11:53	—	—	—	—	26.6	—	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	06/25/2009	09:40	4.0	—	—	—	133	49.5	(1.3)
U of I Farm Ditch at Hwy 95 nr Parma, ID	07/14/2009	12:38	15.0	—	—	59.7	216	34.4	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	08/04/2009	12:22	—	—	—	26.9	88.3	—	(0.6)
U of I Farm Ditch at Hwy 95 nr Parma, ID**	08/07/2009	12:10	—	—	—	—	—	—	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	08/25/2009	12:45	—	—	—	—	30.8	—	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	09/15/2009	10:35	—	—	—	—	17.8	—	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	10/05/2009	11:10	—	—	—	—	21.7	—	—
Allen Drain nr Wilder, ID	06/24/2009	09:00	—	—	—	—	27.6	23.4	—
Allen Drain nr Wilder, ID	10/06/2009	08:50	—	—	—	—	7.0	2.4	—
Glidden Brook nr Caribou, ME	07/14/2009	12:55	—	—	—	—	—	—	—
Glidden Brook nr Caribou, ME	08/06/2009	15:24	—	—	—	—	—	—	—
Glidden Brook nr Caribou, ME	08/24/2009	14:50	—	—	—	—	—	—	—
Glidden Brook nr Caribou, ME	08/25/2009	14:30	—	—	—	—	—	—	—
Glidden Brook nr Caribou, ME	09/15/2009	14:45	—	—	—	—	—	—	—
Glidden Brook nr Caribou, ME	10/06/2009	16:06	—	—	—	—	—	—	—
Glidden Brook nr Caribou, ME	11/04/2009	08:30	—	—	—	—	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	07/14/2009	10:45	—	—	—	—	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	08/06/2009	19:55	—	—	—	—	—	—	—

Table 15. Insecticide and herbicide concentrations measured in surface-water samples collected at sites in Idaho, Maine, and Wisconsin, June to November 2009. —Continued

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. Concentrations are in nanograms per liter. All samples taken were environmental samples. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: alachlor, allethrin, butylate, carbaryl, clomazone, cycloate, cyfluthrin, λ-cyhalothrin, cypermethrin, *p,p′*-DDD, *p,p′*-DDT, deltamethrin, 3,4-DCA, 3,5-DCA, esfenvalerate, etofenprox, fenpropathrin, fipronil, fipronil disulfinyl, fipronil sulfide, fipronil sulfone, τ-fluvalinate, methidathion, methoprene, molinate, napropamide, oxyflurofen, PCA, pebulate, permethrin, phenothrin, phosmet, piperonyl butoxide, prometryn, propanil, propyzamide, resmethrin, simazine, tefluthrin, tetramethrin, and thiobencarb.**Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; N, north; nr, near; Trib, tributary; U of I, University of Idaho; WI, Wisconsin; Xing, crossing; **, storm event sample; —, not detected]

USGS station name	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Ethalfluralin [65082]	Hexazinone [65085]	Malathion [65087]	Methyl parathion [65089]	Metolachlor [65090]	Pendimethalin [65098]	Trifluralin [65108]
Hardwood Brook below Glidden Brk nr Caribou, ME	08/24/2009	16:48	—	—	—	—	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	09/15/2009	16:40	—	—	—	—	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	10/06/2009	17:30	—	—	—	—	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	11/03/2009	14:00	—	—	—	—	—	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	07/15/2009	11:48	—	—	—	—	—	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	08/07/2009	09:00	—	—	—	—	—	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	08/24/2009	19:27	—	—	—	—	—	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	09/15/2009	18:57	—	—	—	—	—	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	10/06/2009	20:15	—	—	—	—	—	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	11/04/2009	10:20	—	—	—	—	—	—	—
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	07/15/2009	11:15	—	—	—	—	—	—	(0.8)
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	11/04/2009	10:35	—	—	—	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	06/16/2009	12:20	—	—	—	—	8.4	—	—
Ditch #4 on Lake Road nr Kellner, WI	07/07/2009	09:15	—	—	—	—	7.1	—	—
Ditch #4 on Lake Road nr Kellner, WI	07/28/2009	08:45	—	—	—	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	08/18/2009	09:30	—	—	—	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	09/08/2009	09:40	—	—	—	—	4.2	—	—
Ditch #4 on Lake Road nr Kellner, WI	09/28/2009	09:15	—	—	—	—	4.3	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	06/16/2009	18:00	—	—	—	—	94.5	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	07/07/2009	12:40	—	—	—	—	36.0	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	07/28/2009	11:15	—	—	—	—	12.3	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	08/18/2009	11:30	—	—	—	—	11.4	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	09/08/2009	12:40	—	—	—	—	15.9	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	09/28/2009	10:25	—	—	—	—	24.1	—	—
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	06/17/2009	11:30	—	—	—	—	900	—	—
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	07/07/2009	12:10	—	—	—	—	1,100	—	—
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	07/30/2009	08:30	—	—	—	—	21.4	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	06/17/2009	10:50	—	—	—	—	56.1	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	08/18/2009	14:30	—	—	—	—	38.5	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	09/08/2009	13:00	—	—	—	—	44.1	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	10/01/2009	10:45	—	—	—	—	49.8	—	—

Table 16. Glyphosate and amino phosphonic acid (AMPA) concentrations measured in surface-water samples collected at sites in Idaho, Maine, and Wisconsin, June to November 2009.

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. Concentrations reported as micrograms per liter. Glufosinate was analyzed but was not detected in any samples. **Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; mm/dd/yyyy, month/day/year; ME, Maine; N, north; NA, not analyzed; nr, near; Trib, tributary; U of I, University of Idaho; WI, Wisconsin; Xing, crossing; **, storm event sample; —, not detected]

USGS station name	Sample type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	AMPA [62649]	Glyphosate [62722]
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Environmental	06/23/2009	11:50	0.28	0.78
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Environmental	07/14/2009	08:40	0.23	0.49
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Environmental	08/04/2009	09:22	0.64	1.9
Sand Run Gulch at Hwy 95 Xing nr Parma, ID**	Environmental	08/07/2009	09:45	0.46	1.2
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Environmental	08/25/2009	09:20	0.30	1.4
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Environmental	09/15/2009	09:18	0.17	0.18
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Environmental	10/05/2009	10:10	0.14	0.76
Ditch nr Wanstad Road nr Parma, ID	Environmental	06/23/2009	19:10	1.5	5.50
Ditch nr Wanstad Road nr Parma, ID	Environmental	07/14/2009	13:42	0.44	8.1
Ditch nr Wanstad Road nr Parma, ID	Environmental	08/04/2009	13:10	0.63	5.1
Ditch nr Wanstad Road nr Parma, ID**	Environmental	08/07/2009	10:35	0.66	3.2
Ditch nr Wanstad Road nr Parma, ID	Environmental	08/25/2009	13:30	0.48	1.8
Ditch nr Wanstad Road nr Parma, ID	Environmental	09/15/2009	11:45	0.27	0.45
Ditch nr Wanstad Road nr Parma, ID	Environmental	10/05/2009	11:53	0.12	0.46
U of I Farm Ditch at Hwy 95 nr Parma, ID	Environmental	06/25/2009	09:40	0.20	0.50
U of I Farm Ditch at Hwy 95 nr Parma, ID	Environmental	07/14/2009	12:38	0.25	4.9
U of I Farm Ditch at Hwy 95 nr Parma, ID	Environmental	08/04/2009	12:22	0.58	3.4
U of I Farm Ditch at Hwy 95 nr Parma, ID**	Environmental	08/07/2009	12:10	0.64	2.8
U of I Farm Ditch at Hwy 95 nr Parma, ID	Environmental	08/25/2009	12:24	0.44	0.42
U of I Farm Ditch at Hwy 95 nr Parma, ID	Environmental	09/15/2009	10:35	0.19	0.36
U of I Farm Ditch at Hwy 95 nr Parma, ID	Environmental	10/05/2009	11:10	0.18	0.81
Allen Drain nr Wilder, ID	Environmental	06/24/2009	09:00	0.13	0.65
Allen Drain nr Wilder, ID	Environmental	10/06/2009	08:50	0.09	0.49
Glidden Brook nr Caribou, ME	Environmental	07/14/2009	12:55	0.07	—
Glidden Brook nr Caribou, ME	Environmental	08/06/2009	15:24	0.04	—
Glidden Brook nr Caribou, ME	Environmental	08/24/2009	14:50	0.06	—
Glidden Brook nr Caribou, ME	Environmental	08/25/2009	14:30	NA	NA
Glidden Brook nr Caribou, ME	Environmental	09/15/2009	14:45	0.03	—
Glidden Brook nr Caribou, ME	Environmental	10/06/2009	16:06	—	—
Glidden Brook nr Caribou, ME	Environmental	11/04/2009	08:30	0.02	—
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	07/14/2009	10:45	0.05	0.02
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	08/06/2009	19:55	0.03	—
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	08/24/2009	16:48	0.03	—
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	09/15/2009	16:40	0.02	—
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	10/06/2009	17:30	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	11/03/2009	14:00	0.02	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	Environmental	07/15/2009	11:48	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	Environmental	08/07/2009	09:00	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	Environmental	08/24/2009	19:27	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	Environmental	09/15/2009	18:57	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	Environmental	10/06/2009	20:15	0.04	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	Environmental	11/04/2009	10:20	—	—
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	Environmental	07/15/2009	11:15	—	—
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	Environmental	11/04/2009	10:35	—	—

Table 16. Glyphosate and amino phosphonic acid (AMPA) concentrations measured in surface-water samples collected at sites in Idaho, Maine, and Wisconsin, June to November 2009.—Continued

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. Concentrations reported as micrograms per liter. Glufosinate was analyzed but was not detected in any samples. **Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; mm/dd/yyyy, month/day/year; ME, Maine; N, north; NA, not analyzed; nr, near; Trib, tributary; U of I, University of Idaho; WI, Wisconsin; Xing, crossing; **, storm event sample; —, not detected]

USGS station name	Sample type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	AMPA [62649]	Glyphosate [62722]
Ditch #4 on Lake Road nr Kellner, WI	Environmental	06/16/2009	12:20	—	—
Ditch #4 on Lake Road nr Kellner, WI	Environmental	07/07/2009	09:15	—	—
Ditch #4 on Lake Road nr Kellner, WI	Environmental	07/28/2009	08:45	—	—
Ditch #4 on Lake Road nr Kellner, WI	Environmental	08/18/2009	09:30	—	—
Ditch #4 on Lake Road nr Kellner, WI	Environmental	09/08/2009	09:40	—	—
Ditch #4 on Lake Road nr Kellner, WI	Environmental	09/28/2009	09:15	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Environmental	06/16/2009	18:00	0.03	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Environmental	07/07/2009	12:40	0.02	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Environmental	07/28/2009	11:15	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Environmental	08/18/2009	11:30	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Environmental	09/08/2009	12:40	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Environmental	09/28/2009	10:25	—	—
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	Environmental	06/17/2009	11:30	—	—
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	Environmental	07/07/2009	12:10	—	—
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	Environmental	07/28/2009	10:55	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	Environmental	06/17/2009	10:50	0.02	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	Environmental	08/18/2009	14:30	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	Environmental	09/08/2009	13:00	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	Environmental	10/01/2009	10:45	—	—

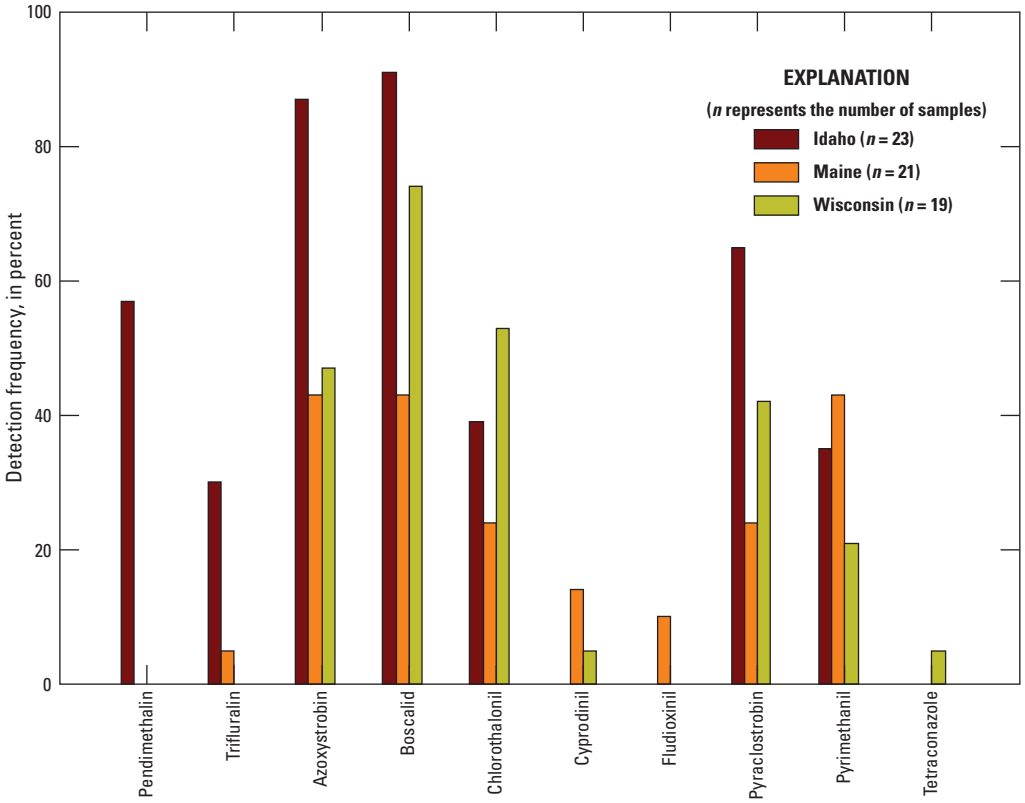

Figure 3. Detection frequencies for fungicides in surface-water samples collected at sites in Idaho, Maine, and Wisconsin, June–November 2009.

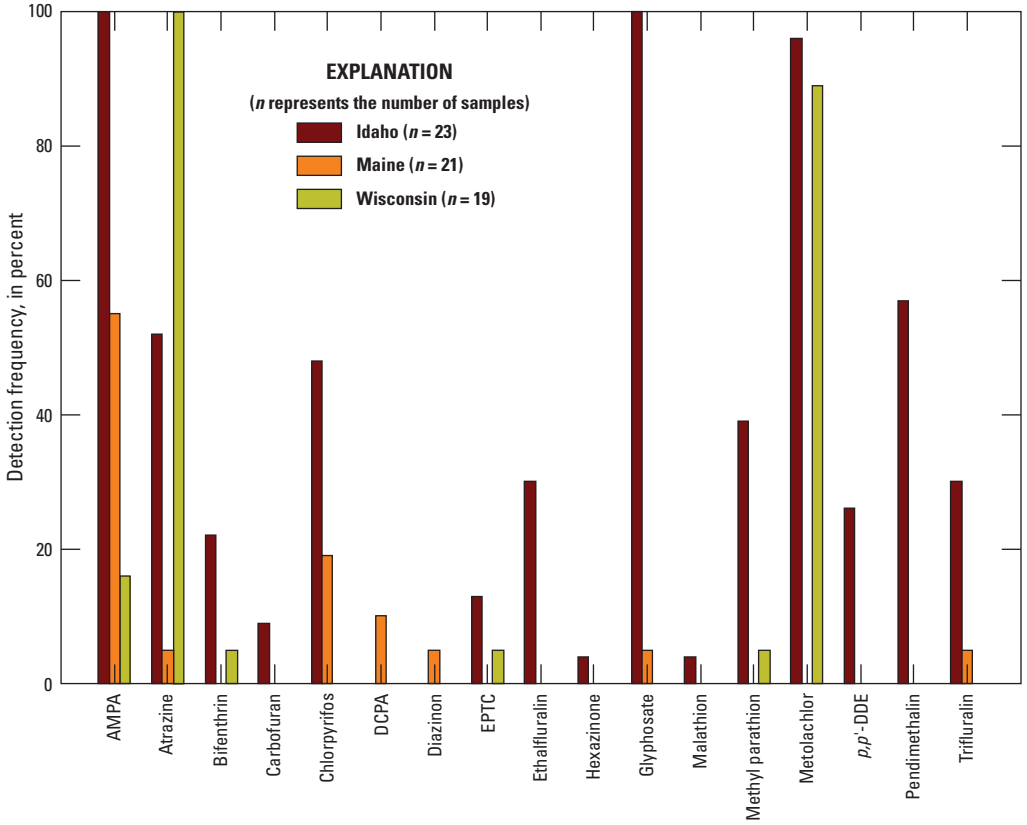

Figure 4. Detection frequencies for insecticides and herbicides in surface-water samples collected at sites in Idaho, Maine, and Wisconsin, June–November 2009.

USEPA freshwater aquatic-life benchmarks were exceeded in one sample collected in Idaho (ditch near Wanstad Road near Parma, Idaho, June 23, 2009) that had chlorpyrifos at 65.0 ng/L (acute toxicity to invertebrates at 50 ng/L), metolachlor at 1,750 ng/L (chronic toxicity to invertebrates at 1,000 ng/L), and malathion at 249 ng/L (chronic toxicity to invertebrates at 35 ng/L; U.S. Environmental Protection Agency, 2012a). One sample collected in Wisconsin (unnamed ditch on 2nd Avenue north of CTH C near Hancock, Wisconsin, July 7, 2009) that had a metolachlor concentration of 1,100 ng/L also exceeded the chronic invertebrate-toxicity benchmark. All detections of bifenthrin in surface water (five samples in Idaho and one sample in Wisconsin) exceeded the USEPA chronic invertebrate-toxicity benchmark of 1.3 ng/L.

Ground Water

Groundwater was sampled from multiple sources, including a domestic well, a spring, a monitoring well and nine temporary wells installed to sample the top of the water table. No pesticides were detected in either the domestic well or the spring, and only one pesticide (metolachlor) was detected in the monitoring well in Wisconsin. Thirteen pesticides, including seven fungicides, were detected in the samples collected from the temporary wells (tables 17–19). The most frequently detected pesticides in groundwater were atrazine, boscalid, and chlorothalonil at 67 percent, 58 percent and 50 percent of the samples, respectively (table 12). For those compounds detected in both surface-water and groundwater samples, maximum concentrations were higher in surface water for all compounds, except the fungicide boscalid (tables 14–19).

Sediment-Associated Pesticides

Suspended Sediment

Twelve suspended-sediment samples, from Idaho (n=5), Wisconsin (n=5), and Maine (n=2), were analyzed for pesticides. Thirteen pesticides, including four fungicides, were detected (tables 20–21). As many as nine compounds were detected in a single sample (Glidden Brook near Caribou, Maine, October 6, 2009–November 4, 2009). The most frequently detected compounds were the fungicides boscalid, pyraclostrobin, and zoxamide and the *p,p*'-DDT breakdown products *p,p*'-DDD and *p,p*'-DDE (table 13). Fungicide concentrations ranged from less than the respective MDLs to as much as 56.7 µg/kg dry weight for pyraclostrobin (table 20). Insecticide and herbicide concentrations were near their respective MDLs, with the exceptions of *p,p*'-DDT and its breakdown products, which were found in concentrations that ranged from 24.3 to 122 µg/kg dry weight in samples collected in Maine (table 21).

Table 17. Fungicide concentrations measured in groundwater samples collected at sites in Idaho, Maine, and Wisconsin, June–November 2009.

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. All sample taken were environmental samples. Concentrations are in nanograms per liter. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: cyproconazole, cyprodinil, difenoconazole, famoxadone, fenarimol, fenbuconazole, fluazinam, fludioxinil, fluoxastrobin, flusilazole, flutriafol, imazalil, iprodione, kresoxim-methyl, metconazole, myclobutanil, PCNB, propiconazole, tebuconazole, tetraconazole, triadimefon, triadimenol, trifloxystrobin, triflumizole, triticonazole, and zoxamide. **Abbreviations**: hh:mm, hour:minute; mm/dd/yyyy, month/day/year; nr, near; Rd, road; —, not detected]

USGS station name	Site type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Azoxystrobin [66589]	Boscalid [67550]	Chlorothalonil [65071]	Dimethomorph [67587]	Fenhexamid [67622]	Pyraclostrobin [66646]	Pyrimethanil [67717]
				Idaho						
6N/5W--30CDC1	Domestic well	06/24/2009	15:00	—	—	—	—	—	—	—
I027003-- Parma Field M3-Shallow	Shallow temporary well	10/06/2009	14:20	—	—	—	—	—	—	—
I027001-- Parma Field M10-Shallow	Shallow temporary well	10/07/2009	11:50	—	14.7	—	—	—	4.8	—
I027002-- Parma Field M10-Deep	Shallow temporary well	10/07/2009	15:05	—	—	—	—	—	—	—
				Maine						
Spring at Porter-Sett Rd nr Moose Brook Houlton, ME	Spring	07/16/2009	10:55	—	—	—	—	—	—	—
M003002-- MicMac Doyle Rd Field	Shallow temporary well	11/03/2009	11:05	(0.9)	16.8	8.7	33.3	116	4.8	—
M003001-- Presque Isle Field AF13	Shallow temporary well	11/02/2009	10:40	(0.7)	6.5	6.0	—	—	(0.9)	(1.6)
				Wisconsin						
WS-19/08E/15-0008	Monitoring well	06/17/2009	17:00	—	—	—	—	—	—	—
W137003-- Hancock Field K1-Shallow	Shallow temporary well	09/29/2009	12:14	—	14.3	(0.4)	—	—	—	—
W137004-- Hancock Field K1-Deep	Shallow temporary well	09/29/2009	15:10	—	16.0	(0.5)	—	—	—	—
W137001-- Hancock Field S16-Shallow	Shallow temporary well	09/30/2009	11:02	—	2,120	(0.4)	—	—	—	—
W137002-- Hancock Field S16-Deep	Shallow temporary well	09/30/2009	13:45	—	102	(0.2)	—	—	(1.4)	—

Table 18. Insecticide and herbicide concentrations measured in groundwater samples collected at sites in Idaho, Maine, and Wisconsin, June–November 2009.

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. All samples taken were environmental samples. Concentrations are in nanograms per liter. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: alachlor, allethrin, bifenthrin, butylate, carbaryl, carbofuran, chlorpyrifos, clomazone, cycloate, cyfluthrin, λ-cyhalothrin, cypermethrin, DCPA, *p,p′*-DDD, *p,p′*-DDE, *p,p′*-DDT, deltamethrin, diazinon, 3,4-DCA, 3,5-DCA, EPTC, esfenvalerate, ethalfluralin, etofenprox, fenpropathrin, fipronil disulfinyl, fipronil sulfide, fipronil sulfone, τ-fluvalinate, hexazinone, malathion, methidathion, methoprene, methyl parathion, molinate, napropamide, oxyflurofen, PCA, pebulate, pendimethalin, permethrin, phenothrin, phosmet, piperonyl butoxide, prometryn, propanil, propyzamide, resmethrin, tefluthrin, tetramethrin, thiobencarb, and trifluralin. **Abbreviations**: hh:mm, hour:minute; mm/dd/yyyy, month/day/year; nr, near; Rd, road; —, not detected]

USGS station name	Site type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Atrazine [65065]	Fipronil [66604]	Metolachlor [65090]	Simazine [65105]
			Idaho				
6N/5W--30CDC1	Domestic well	06/24/2009	15:00	—	—	—	—
I027003-- Parma Field M3-Shallow	Shallow temporary well	10/06/2009	14:20	9.8	—	—	—
I027001-- Parma Field M10-Shallow	Shallow temporary well	10/07/2009	11:50	(1.4)	—	—	—
I027002-- Parma Field M10-Deep	Shallow temporary well	10/07/2009	15:05	(1.6)	—	—	—
			Maine				
Spring at Porter-Sett Rd nr Moose Brook Houlton, ME	Spring	07/16/2009	10:55	—	—	—	—
M003002-- MicMac Doyle Rd Field	Shallow temporary well	11/03/2009	11:05	—	(2.2)	—	—
M003001-- Presque Isle Field AF13	Shallow temporary well	11/02/2009	10:40	6.2	—	—	—
			Wisconsin				
WS-19/08E/15-0008	Monitoring well	06/17/2009	17:00	—	—	107	—
W137003-- Hancock Field K1-Shallow	Shallow temporary well	09/29/2009	12:14	3.4	—	—	—
W137004-- Hancock Field K1-Deep	Shallow temporary well	09/29/2009	15:10	33.5	—	120	140
W137001-- Hancock Field S16-Shallow	Shallow temporary well	09/30/2009	11:02	26.2	—	29.3	—
W137002-- Hancock Field S16-Deep	Shallow temporary well	09/30/2009	13:45	12.9	—	2.6	—

Table 19. Glyphosate and amino phosphonic acid (AMPA) concentrations measured in groundwater samples collected at sites in Idaho, Maine, and Wisconsin, June–November 2009.

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. Concentrations are in micrograms per liter. Glufosinate was analyzed but was not detected in any samples. **Abbreviations**: hh:mm, hour:minute; mm/dd/yyyy, month/day/year; nr, near; Rd, road; —, not detected]

USGS station name	Site type	Sample type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	AMPA [62649]	Glyphosate [62722]
		Idaho				
6N/5W--30CDC1	Domestic well	Environmental	06/24/2009	15:00	—	—
I027003-- Parma Field M3-Shallow	Shallow temporary well	Environmental	10/06/2009	14:20	0.04	—
I027001-- Parma Field M10-Shallow	Shallow temporary well	Environmental	10/07/2009	11:50	—	—
I027002-- Parma Field M10-Deep	Shallow temporary well	Environmental	10/07/2009	15:05	—	—
		Maine				
Spring at Porter-Sett Rd nr Moose Brook Houlton, ME	Spring	Environmental	07/16/2009	10:55	—	—
M003002-- MicMac Doyle Rd Field	Shallow temporary well	Environmental	11/03/2009	11:05	—	—
M003001-- Presque Isle Field AF13	Shallow temporary well	Environmental	11/02/2009	10:40	—	—
		Wisconsin				
WS-19/08E/15-0008	Monitoring well	Environmental	06/17/2009	17:00	—	—
W137003-- Hancock Field K1-Shallow	Shallow temporary well	Environmental	09/29/2009	12:14	—	—
W137004-- Hancock Field K1-Deep	Shallow temporary well	Environmental	09/29/2009	15:10	—	—
W137001-- Hancock Field S16-Shallow	Shallow temporary well	Environmental	09/30/2009	11:02	—	0.02
W137002-- Hancock Field S16-Deep	Shallow temporary well	Environmental	09/30/2009	13:45	—	—

Table 20. Fungicide concentrations measured in suspended-sediment samples collected at sites in Idaho, Maine, and Wisconsin, June–November 2009.

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. All samples taken were environmental samples. Concentrations are in micrograms per kilogram. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: azoxystrobin, cyproconazole, cyprodinil, difenoconazole, dimethomorph, famoxadone, fenarimol, fenbuconazole, fenhexamid, fluazinam, fludioxinil, fluoxastrobin, flusilazole, flutriafol, imazalil, iprodione, kresoxim-methyl, metconazole, myclobutanil, PCNB, propiconazole, pyrimethanil, tebuconazole, tetraconazole, triadimefon, triadimenol, trifloxystrobin, triflumizole, triticonazole, and vinclozolin. **Abbreviations**: Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; nr, near; WI, Wisconsin; Xing, crossing; —, not detected; #, number]

USGS station name	Sample begin date (mm/dd/yyyy)	Sample end date (mm/dd/yyyy)	Boscalid [67551]	Chlorothalonil [65119]	Pyraclostrobin [66647]	Zoxamide [67769]
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	06/23/2009	07/14/2009	2.0	—	3.2	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	07/14/2009	08/04/2009	4.1	(0.2)	6.3	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	08/04/2009	08/25/2009	4.4	(0.3)	11.9	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	08/25/2009	09/15/2009	2.6	(0.2)	5.5	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	09/15/2009	10/05/2009	—	—	—	—
Glidden Brook nr Caribou, ME	07/14/2009	08/06/2009	—	—	18.1	3.2
Glidden Brook nr Caribou, ME	10/06/2009	11/04/2009	—	3.8	20.3	2.2
Ditch #4 on Lake Road nr Kellner, WI	06/16/2009	07/07/2009	—	—	28.1	(0.3)
Ditch #4 on Lake Road nr Kellner, WI	07/07/2009	07/28/2009	33.0	—	56.7	1.4
Ditch #4 on Lake Road nr Kellner, WI	07/28/2009	08/18/2009	18.6	—	21.4	(0.5)
Ditch #4 on Lake Road nr Kellner, WI	08/18/2009	09/08/2009	2.9	—	7.0	(0.3)
Ditch #4 on Lake Road nr Kellner, WI	09/08/2009	09/28/2009	—	—	—	—

Table 21. Insecticide and herbicide concentrations measured in suspended-sediment samples collected at sites in Idaho, Maine, and Wisconsin, June–November 2009.

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. All samples taken were environmental samples. Concentrations are in micrograms per kilogram. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: alachlor, allethrin, atrazine, butylate, carbaryl, carbofuran, clomazone, cycloate, cyfluthrin, λ-cyhalothrin, cypermethrin, DCPA, deltamethrin, diazinon, disulfoton, EPTC, esfenvalerate, ethalfluralin, etofenprox, fenpropathrin, fipronil, fipronil disulfinyl, fipronil sulfide, fipronil sulfone, τ-fluvalinate, hexazinone, malathion, methidathion, methoprene, methyl parathion, molinate, napropamide, oxyflurofen, PCA, pebulate, permethrin, phenothrin, phosmet, piperonyl butoxide, prometon, prometryn, propanil, propyzamide, resmethrin, simazine, tefluthrin, tetramethrin, and thiobencarb. **Abbreviations**: Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; nr, near; WI, Wisconsin; Xing, crossing; —, not detected]

USGS station name	Sample begin date (mm/dd/yyyy)	Sample end date (mm/dd/yyyy)	Bifenthrin [63415]	Chlorpyrifos [65120]	3,5-DCA [67537]	*p,p′*-DDD [63124]	*p,p′*-DDE [63125]	*p,p′*-DDT [63126]	Metolachlor [04020]	Pendimethalin [65142]	Trifluralin [04019]
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	06/23/2009	07/14/2009	—	—	—	(0.6)	5.6	—	4.2	6.5	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	07/14/2009	08/04/2009	—	—	—	(1.0)	6.6	(0.6)	3.6	5.3	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	08/04/2009	08/25/2009	—	—	—	(1.1)	7.3	(0.5)	2.0	—	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	08/25/2009	09/15/2009	—	—	—	(0.3)	2.1	—	(0.5)	—	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	09/15/2009	10/05/2009	—	—	—	(0.3)	2.0	—	—	—	—
Glidden Brook nr Caribou, ME	07/14/2009	08/04/2009	—	13.0	—	24.3	72.6	46.5	—	—	1.9
Glidden Brook nr Caribou, ME	10/06/2009	11/04/2009	—	26.8	4.9	27.2	93.7	122	—	—	3.6
Ditch #4 on Lake Road nr Kellner, WI	06/16/2009	07/07/2009	7.4	—	—	—	—	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	07/07/2009	07/28/2009	10.4	—	—	—	—	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	07/28/2009	08/18/2009	10.6	—	—	—	—	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	08/18/2009	09/08/2009	10.0	—	—	—	—	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	09/08/2009	09/28/2009	10.7	—	—	—	—	—	—	—	—

Bed Sediment

In 22 bed-sediment samples, 20 pesticides, including 6 fungicides, were detected (tables 22–23). As many as 12 compounds were detected in a single bed-sediment sample (ditch near Wanstad Road nr Parma, Idaho, June 23, 2009). The most frequently detected compounds were pyraclostrobin (64 percent of samples), *p,p*'-DDT (50 percent), *p,p*'-DDD (55 percent), and *p,p*'-DDE (77 percent; table 13). These compounds, along with the insecticide chlorpyrifos, were also detected at the highest concentrations (tables 22 and 23).

Nutrients and Inorganic Constituents

Surface-water and groundwater samples collected at the beginning and end of the study were analyzed for nutrients and other inorganic constituents (table 24). At all surface-water sites, nitrite plus nitrate as nitrogen concentrations were higher at the end of the sampling season, with one exception— the unnamed ditch at Apache and 4th Avenue nr Plainfield, Wis. In general, surface-water sites in Wisconsin had higher nitrite plus nitrate concentrations compared to sites in the other states (table 24). Three groundwater samples were analyzed for nitrite plus nitrate, and the highest concentration, 25.4 milligrams per liter (mg/L), was detected at the domestic well in Idaho (6N/5W-30CDC1), whereas the monitoring well in Wisconsin (WS-19/08E/15-0008) showed the lowest concentration at 0.384 mg/L. Concentrations in six samples (five surface-water samples from Wisconsin and the groundwater sample in Idaho) were greater than the USEPA maximum contaminant level for nitrate in drinking water of 10 mg/L as N (U.S. Environmental Protection Agency, 2012b).

Table 22. Fungicide concentrations measured in bed-sediment samples collected at sites in Idaho, Maine, and Wisconsin, June–November 2009.

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. All samples taken were environmental samples. Concentrations are in micrograms per kilogram. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: cyproconazole, cyprodinil, difenoconazole, dimethomorph, famoxadone, fenarimol, fenbuconazole, fenhexamid, fluazinam, fludioxinil, fluoxastrobin, flusilazole, flutriafol, imazalil, iprodione, kresoxim-methyl, metconazole, myclobutanil, PCNB, propiconazole, tebuconazole, tetraconazole, triadimefon, triadimenol, trifloxystrobin, triflumizole, triticonazole, and vinclozolin. **Abbreviations:** Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; N, north; nr, near; Trib, tributary; U of I, University of Idaho; WI, Wisconsin; Xing, crossing; —, not detected]

USGS station name	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Azoxystrobin [66591]	Boscalid [67552]	Chlorothalonil [62904]	Pyraclostrobin [66648]	Pyrimethanil [67719]	Zoxamide [67770]
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	06/23/2009	12:05	—	4.9	—	9.1	—	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	10/05/2009	08:50	—	2.1	(0.5)	25.4	—	—
Ditch nr Wanstad Road nr Parma, ID	06/23/2009	18:55	1.6	(1.3)	(0.2)	8.4	(0.3)	(0.3)
Ditch nr Wanstad Road nr Parma, ID	10/05/2009	11:47	1.1	(0.9)	(0.2)	8.7	—	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	06/25/2009	09:30	—	—	(0.1)	—	—	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	10/05/2009	10:48	—	2.1	—	20.1	—	—
Allen Drain nr Wilder, ID	06/24/2009	08:45	—	—	—	—	—	—
Glidden Brook nr Caribou, ME	07/14/2009	11:50	5.9	—	—	—	—	—
Glidden Brook nr Caribou, ME	11/05/2009	08:00	—	—	—	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	07/14/2009	10:00	—	—	(0.3)	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	11/05/2009	08:00	—	—	(0.6)	70.7	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	07/15/2009	11:45	—	—	—	37.9	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	11/05/2009	09:00	—	—	(0.8)	198	—	—
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	07/15/2009	11:00	—	(0.3)	—	—	—	—
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	11/05/2009	09:15	—	—	—	18.1	—	—
Ditch #4 on Lake Road nr Kellner, WI	06/16/2009	12:15	—	—	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	09/28/2009	09:00	—	—	—	51.2	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	06/16/2009	17:15	—	44.4	—	—	(0.4)	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	09/28/2009	10:50	—	1.9	—	59.6	(0.3)	—
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	06/17/2009	11:10	—	—	(0.1)	7.3	(0.1)	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	06/17/2009	10:40	—	4.9	4.2	18.4	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	10/01/2009	11:00	3.5	13.4	3.1	81.1	—	—

Table 23. Insecticide and herbicide concentrations measured in bed-sediment samples collected at sites in Idaho, Maine, and Wisconsin, June–November 2009.

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. All samples taken were environmental samples. Concentrations are in micrograms per kilogram. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: alachlor, allethrin, atrazine, butylate, carbaryl, carbofuran, clomazone, cycloate, cyfluthrin, λ-cyhalothrin, DCPA, deltamethrin, diazinon, 3,4-DCA, 3,5-DCA, disulfoton, EPTC, etofenprox, fenpropathrin, fipronil, fipronil disulfinyl, fipronil sulfone, τ-fluvalinate, hexazinone, malathion, methidathion, methoprene, molinate, napropamide, oxyflurofen, PCA, pebulate, phenothrin, phosmet, piperonyl butoxide, prometryn, prometon, propanil, propyzamide, resmethrin, simazine, tefluthrin, tetramethrin, and thiobencarb. **Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; N, north; nr, near; Trib, tributary; U of I, University of Idaho; WI, Wisconsin; Xing, crossing; —, not detected; #, number]

USGS station name	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Bifenthrin [64151]	Chlorpyrifos [81404]	Cypermethrin [64156]	*p,p′*-DDD [39311]	*p,p′*-DDE [39321]	*p,p′*-DDT [39301]	Esfenvalerate [64159]
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	06/23/2009	12:05	—	—	—	(1.0)	8.0	(1.2)	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	10/05/2009	08:50	—	—	—	(1.1)	7.1	(0.7)	—
Ditch nr Wanstad Road nr Parma, ID	06/23/2009	18:55	—	—	—	2.1	14.6	4.0	—
Ditch nr Wanstad Road nr Parma, ID	10/05/2009	11:47	—	(0.6)	—	(1.3)	7.5	1.7	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	06/25/2009	09:30	—	234	—	1.4	13.0	(1.1)	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	10/05/2009	10:48	—	—	—	—	6.4	—	—
Allen Drain nr Wilder, ID	06/24/2009	08:45	—	—	—	—	2.4	—	—
Glidden Brook nr Caribou, ME	07/14/2009	11:50	—	444	—	54.0	127.7	75.0	—
Glidden Brook nr Caribou, ME	11/05/2009	08:00	—	50.3	—	28.2	76.1	44.6	—
Hardwood Brook below Glidden Brk nr Caribou, ME	07/14/2009	10:00	—	22.3	—	5.1	26.0	16.7	—
Hardwood Brook below Glidden Brk nr Caribou, ME	11/05/2009	08:00	—	27.7	—	15.4	44.7	23.7	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	07/15/2009	11:45	—	—	—	174	475	202	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	11/05/2009	09:00	—	—	—	82.5	263	88.5	—
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	07/15/2009	11:00	—	—	—	—	2.0	—	—
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	11/05/2009	09:15	—	—	—	—	(0.7)	—	—
Ditch #4 on Lake Road nr Kellner, WI	06/16/2009	12:15	2.3	—	—	(0.8)	(1.4)	—	—
Ditch #4 on Lake Road nr Kellner, WI	09/28/2009	09:00	2.9	—	—	—	—	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	06/16/2009	17:15	20.2	—	14.9	—	—	—	11.3
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	09/28/2009	10:50	(0.7)	—	—	—	—	—	—
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	06/17/2009	11:10	(0.5)	—	—	—	(1.1)	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	06/17/2009	10:40	(1.9)	—	—	—	—	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	10/01/2009	11:00	21.7	—	—	—	—	—	—

Table 23. Insecticide and herbicide concentrations measured in bed-sediment samples collected at sites in Idaho, Maine, and Wisconsin, June–November 2009.—Continued

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. All samples taken were environmental samples. Concentrations are in micrograms per kilogram. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: alachlor, allethrin, atrazine, butylate, carbaryl, carbofuran, clomazone, cycloate, cyfluthrin, λ-cyhalothrin, DCPA, deltamethrin, diazinon, 3,4-DCA, 3,5-DCA, disulfoton, EPTC, etofenprox, fenpropathrin, fipronil, fipronil disulfinyl, fipronil sulfone, τ-fluvalinate, hexazinone, malathion, methidathion, methoprene, molinate, napropamide, oxyflurofen, PCA, pebulate, phenothrin, phosmet, piperonyl butoxide, prometryn, prometon, propanil, propyzamide, resmethrin, simazine, tefluthrin, tetramethrin, and thiobencarb. **Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; N, north; nr, near; Trib, tributary; U of I, University of Idaho; WI, Wisconsin; Xing, crossing; —, not detected; #, number]

USGS station name	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Ethalfluralin [64160]	Fipronil sulfide [66612]	Methyl parathion [39601]	Metolachlor [04005]	Pendimethalin [64167]	Permethrin [64168]	Trifluralin [62902]
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	06/23/2009	12:05	(0.3)	—	3.5	5.2	17.5	—	(0.3)
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	10/05/2009	08:50	—	—	—	3.3	—	—	—
Ditch nr Wanstad Road nr Parma, ID	06/23/2009	18:55	—	—	—	3.6	16.4	1.4	—
Ditch nr Wanstad Road nr Parma, ID	10/05/2009	11:47	(0.3)	—	—	3.4	—	—	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	06/25/2009	09:30	—	—	—	4.8	16.6	—	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	10/05/2009	10:48	—	—	—	—	—	—	—
Allen Drain nr Wilder, ID	06/24/2009	08:45	—	—	—	—	—	—	—
Glidden Brook nr Caribou, ME	07/14/2009	11:50	—	—	—	—	—	—	7.6
Glidden Brook nr Caribou, ME	11/05/2009	08:00	—	—	—	—	—	—	2.8
Hardwood Brook below Glidden Brk nr Caribou, ME	07/14/2009	10:00	—	—	—	—	—	4.8	(1.0)
Hardwood Brook below Glidden Brk nr Caribou, ME	11/05/2009	08:00	—	—	—	—	—	—	(1.5)
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	07/15/2009	11:45	—	—	—	—	—	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	11/05/2009	09:00	—	—	—	—	—	—	—
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	07/15/2009	11:00	—	—	—	—	—	—	—
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	11/05/2009	09:15	—	—	—	—	—	—	(0.3)
Ditch #4 on Lake Road nr Kellner, WI	06/16/2009	12:15	—	—	—	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	09/28/2009	09:00	—	—	—	—	—	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	06/16/2009	17:15	—	(1.4)	—	—	122	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	09/28/2009	10:50	—	—	—	—	3.1	—	—
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	06/17/2009	11:10	—	—	—	—	—	(0.9)	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	06/17/2009	10:40	—	—	—	—	—	—	(0.4)
Unnamed Ditch at Beaver Ave nr Hancock, WI	10/01/2009	11:00	—	—	—	—	—	—	(0.7)

Table 24. Nutrient and inorganic constituent concentrations measured in surface-water and groundwater samples collected at sites in Idaho, Maine, and Wisconsin, June–November 2009.

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. **Abbreviations**: Ave, avenue; Brk, brook; $CaCO_3$, calcium carbonate; CTH C, county road; E, estimated value; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mg/L, milligram per liter; mm/dd/yyyy, month/day/year; N, north; nr, near; Rd, road; Trib, tributary; U of I, University of Idaho; WI, Wisconsin; Xing, crossing; µg/L, microgram per liter; µS/cm, microsiemen per centimeter; <, less than, #, number; +, plus]

USGS site name	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Total nitrogen (unfiltered) mg/L [62855]	Ammonia mg/L as Nitrogen [00608]	Nitrite mg/L as Nitrogen [00613]	Nitrite + Nitrate mg/L as Nitrogen [00631]	Phosphorus (unfiltered) mg/L as Phosphorus [00665]
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	06/23/2009	11:50	2.54	<0.020	0.016	2.20	0.326
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	10/05/2009	10:10	3.06	<0.020	0.015	2.96	0.256
Ditch nr Wanstad Road nr Parma, ID	06/23/2009	19:10	4.20	<0.020	0.023	3.74	0.395
Ditch nr Wanstad Road nr Parma, ID	10/05/2009	11:53	7.69	E0.016	0.017	6.68	0.302
U of I Farm Ditch at Hwy 95 nr Parma, ID	06/25/2009	09:40	0.73	<0.020	0.009	0.486	0.152
U of I Farm Ditch at Hwy 95 nr Parma, ID	10/05/2009	11:10	1.62	<0.020	0.008	1.13	0.222
Allen Drain nr Wilder, ID	06/24/2009	09:00	2.20	<0.020	0.023	1.83	0.127
Allen Drain nr Wilder, ID	10/06/2009	08:50	2.34	0.020	0.011	1.96	0.147
6N/5W-30CDC1	06/24/2009	15:00	26.2	<0.020	<0.002	25.4	0.306
Glidden Brook nr Presque Isle, ME	07/14/2009	12:55	0.61	E0.017	E0.001	0.248	0.030
Glidden Brook nr Presque Isle, ME	11/04/2009	08:30	1.07	<0.02	0.008	0.799	0.014
Hardwood Brook below Glidden Brk nr Caribou, ME	07/14/2009	10:36	1.03	E0.01	E0.001	0.709	0.025
Hardwood Brook below Glidden Brk nr Caribou, ME	11/03/2009	14:00	1.44	E0.01	0.008	1.19	0.014
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	07/15/2009	11:48	2.79	E0.012	0.003	2.27	0.123
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	11/04/2009	10:20	3.49	<0.02	0.004	3.26	E0.0077
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	07/15/2009	11:15	1.49	E0.013	0.023	1.07	0.033
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	11/04/2009	10:35	2.56	0.04	0.046	2.05	E0.0066
Spring at Porter-Sett Rd nr Moose Brook Houlton, ME	07/16/2009	10:55	6.21	<0.020	<0.002	6.04	<0.008
Ditch #4 on Lake Road nr Kellner, WI	06/16/2009	12:20	5.58	0.040	0.027	4.76	0.035
Ditch #4 on Lake Road nr Kellner, WI	09/28/2009	09:15	5.61	0.042	0.022	4.81	0.030
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	06/16/2009	18:00	14.9	E0.015	0.009	13.3	0.010
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	09/28/2009	10:25	12.3	<0.020	0.004	12.0	0.030
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	06/17/2009	11:30	23.3	<0.020	0.026	23.0	0.009
Unnamed Ditch at Beaver Ave nr Hancock, WI	06/17/2009	10:50	12.0	0.084	0.046	10.7	0.010
Unnamed Ditch at Beaver Ave nr Hancock, WI	10/01/2009	10:45	13.9	<0.020	0.041	13.0	0.012
WS- 19/08E/15-0008	06/17/2009	17:00	0.44	<0.020	0.010	0.384	0.019

Table 24. Nutrient and inorganic constituent concentrations measured in surface-water and groundwater samples collected at sites in Idaho, Maine, and Wisconsin, June–November 2009.—Continued

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. **Abbreviations**: Ave, avenue; Brk, brook; $CaCO_3$, calcium carbonate; CTH C, county road; E, estimated value; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mg/L, milligram per liter; mm/dd/yyyy, month/day/year; N, north; nr, near; Rd, road; Trib, tributary; U of I, University of Idaho; WI, Wisconsin; Xing, crossing; µg/L, microgram per liter; µS/cm, microsiemen per centimeter; <, less than, #, number; +, plus]

USGS site name	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Phosphorus (filtered) mg/L as Phosphorus [00666]	Orthophosphate mg/L as Phosphorus [00671]	Calcium mg/L [00915]	Magnesium mg/L [00925]	Sodium mg/L [00930]
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	06/23/2009	11:50	0.183	0.170	33.8	8.67	32.2
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	10/05/2009	10:10	0.201	0.193	39.4	11.1	39.8
Ditch nr Wanstad Road nr Parma, ID	06/23/2009	19:10	0.114	0.106	35.5	10.9	29.2
Ditch nr Wanstad Road nr Parma, ID	10/05/2009	11:53	0.104	0.090	49.7	17.4	45.4
U of I Farm Ditch at Hwy 95 nr Parma, ID	06/25/2009	09:40	0.075	0.075	14.9	2.90	9.77
U of I Farm Ditch at Hwy 95 nr Parma, ID	10/05/2009	11:10	0.127	0.123	22.3	5.20	17.2
Allen Drain nr Wilder, ID	06/24/2009	09:00	0.064	0.050	38.4	13.4	27.5
Allen Drain nr Wilder, ID	10/06/2009	08:50	0.104	0.092	33.3	11.4	25.3
6N/5W-30CDC1	06/24/2009	15:00	0.300	0.315	110	44.2	41.1
Glidden Brook nr Presque Isle, ME	07/14/2009	12:55	0.018	0.010	49.5	7.14	3.24
Glidden Brook nr Presque Isle, ME	11/04/2009	08:30	0.008	<0.008	44.2	5.61	2.78
Hardwood Brook below Glidden Brk nr Caribou, ME	07/14/2009	10:36	0.016	0.011	51.2	7.25	3.79
Hardwood Brook below Glidden Brk nr Caribou, ME	11/03/2009	14:00	0.008	<0.008	47.9	6.05	3.61
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	07/15/2009	11:48	0.008	0.010	74.9	6.15	2.32
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	11/04/2009	10:20	E0.004	<0.008	73.5	5.76	2.19
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	07/15/2009	11:15	<0.006	<0.008	36.2	8.09	3.10
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	11/04/2009	10:35	<0.006	<0.008	71.3	8.46	2.93
Spring at Porter-Sett Rd nr Moose Brook Houlton, ME	07/16/2009	10:55	<0.006	E0.005	76.4	7.46	1.82
Ditch #4 on Lake Road nr Kellner, WI	06/16/2009	12:20	0.008	0.009	54.2	25.0	3.78
Ditch #4 on Lake Road nr Kellner, WI	09/28/2009	09:15	0.008	0.009	52.1	24.2	3.41
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	06/16/2009	18:00	0.007	E0.006	63.2	25.1	3.61
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	09/28/2009	10:25	0.011	0.008	60.9	23.9	3.21
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	06/17/2009	11:30	E0.004	E0.005	52.0	25.5	2.89
Unnamed Ditch at Beaver Ave nr Hancock, WI	06/17/2009	10:50	E0.004	<0.008	51.8	25.3	2.75
Unnamed Ditch at Beaver Ave nr Hancock, WI	10/01/2009	10:45	E0.004	E0.005	53.8	25.1	2.77
WS- 19/08E/15-0008	06/17/2009	17:00	0.016	0.018	19.2	11.7	0.86

Table 24. Nutrient and inorganic constituent concentrations measured in surface-water and groundwater samples collected at sites in Idaho, Maine, and Wisconsin, June to November, 2009.—Continued

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. **Abbreviations**: Ave, avenue; Brk, brook; $CaCO_3$, calcium carbonate; CTH C, county road; E, estimated value; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mg/L, milligram per liter; mm/dd/yyyy, month/day/year; N, north; nr, near; Rd, road; Trib, tributary; U of I, University of Idaho; WI, Wisconsin; Xing, crossing; µg/L, microgram per liter; µS/cm, microsiemen per centimeter; <, less than, #, number; +, plus]

USGS site name	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Potassium mg/L [00935]	Chloride mg/L [00940]	Sulfate mg/L [00945]	Fluoride mg/L [00950]	Silica mg/L [00955]	Copper µg/L [01040]
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	06/23/2009	11:50	2.97	11.5	33.6	0.38	25.6	<2.0
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	10/05/2009	10:10	4.31	14.7	39.2	0.46	30.4	<2.8
Ditch nr Wanstad Road nr Parma, ID	06/23/2009	19:10	3.75	11.4	38.2	0.37	27.4	<2.0
Ditch nr Wanstad Road nr Parma, ID	10/05/2009	11:53	5.29	18.6	60.8	0.41	38.4	<2.8
U of I Farm Ditch at Hwy 95 nr Parma, ID	06/25/2009	09:40	1.27	3.00	8.72	0.32	13.9	<2.0
U of I Farm Ditch at Hwy 95 nr Parma, ID	10/05/2009	11:10	2.32	6.48	13.8	0.43	16.5	E1.80
Allen Drain nr Wilder, ID	06/24/2009	09:00	4.22	9.21	27.5	0.49	23.7	<2.0
Allen Drain nr Wilder, ID	10/06/2009	08:50	3.93	8.64	26.1	0.49	30.5	<2.8
6N/5W-30CDC1	06/24/2009	15:00	7.42	55.1	53.8	0.44	61.9	E1.50
Glidden Brook nr Presque Isle, ME	07/14/2009	12:55	0.63	10.2	11.4	E0.08	1.7	<2.0
Glidden Brook nr Presque Isle, ME	11/04/2009	08:30	1.00	9.97	21.3	E0.05	3.1	<2.8
Hardwood Brook below Glidden Brk nr Caribou, ME	07/14/2009	10:36	0.63	12.0	12.7	E0.06	2.3	<2.0
Hardwood Brook below Glidden Brk nr Caribou, ME	11/03/2009	14:00	1.00	12.1	21.6	<0.08	3.4	<2.8
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	07/15/2009	11:48	0.59	5.38	9.16	<0.08	6.4	<2.0
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	11/04/2009	10:20	0.68	6.53	10.9	<0.08	6.5	<2.8
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	07/15/2009	11:15	0.47	2.33	10.5	E0.04	3.8	<2.0
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	11/04/2009	10:35	0.62	3.18	13.3	E0.05	8.1	<2.8
Spring at Porter-Sett Rd nr Moose Brook Houlton, ME	07/16/2009	10:55	2.71	9.09	36.1	<0.08	6.7	<2.0
Ditch #4 on Lake Road nr Kellner, WI	06/16/2009	12:20	1.25	15.1	42.4	0.16	10.2	E1.1
Ditch #4 on Lake Road nr Kellner, WI	09/28/2009	09:15	1.70	15.8	41.7	0.17	13.1	<2.0
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	06/16/2009	18:00	5.98	24.2	46.4	E0.07	5.1	3.3
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	09/28/2009	10:25	8.27	25.3	46.7	E0.07	12.6	2.7
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	06/17/2009	11:30	4.58	29.6	42.4	<0.08	8.0	<2.0
Unnamed Ditch at Beaver Ave nr Hancock, WI	06/17/2009	10:50	3.98	21.6	52.7	E0.04	8.0	<2.0
Unnamed Ditch at Beaver Ave nr Hancock, WI	10/01/2009	10:45	4.02	22.7	49.5	0.08	9.5	E1.3
WS- 19/08E/15-0008	06/17/2009	17:00	2.90	0.97	1.17	<0.08	3.3	<2.0

Table 24. Nutrient and inorganic constituent concentrations measured in surface-water and groundwater samples collected at sites in Idaho, Maine, and Wisconsin, June to November, 2009.—Continued

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. **Abbreviations**: Ave, avenue; Brk, brook; $CaCO_3$, calcium carbonate; CTH C, county road; E, estimated value; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mg/L, milligram per liter; mm/dd/yyyy, month/day/year; N, north; nr, near; Rd, road; Trib, tributary; U of I, University of Idaho; WI, Wisconsin; Xing, crossing; µg/L, microgram per liter; µS/cm, microsiemen per centimeter; <, less than, #, number; +, plus]

USGS site name	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Iron µg/L [01046]	Manganese µg/L [01056]	Specific conductance µS/cm [90095]	Acid neutralizing capacity mg/L $CaCO_3$ [90410]	pH [00403]
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	06/23/2009	11:50	12.9	14.0	394	137	8.0
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	10/05/2009	10:10	27.1	8.70	465	169	8.0
Ditch nr Wanstad Road nr Parma, ID	06/23/2009	19:10	11.9	23.8	393	124	7.9
Ditch nr Wanstad Road nr Parma, ID	10/05/2009	11:53	11.5	41.5	589	188	7.9
U of I Farm Ditch at Hwy 95 nr Parma, ID	06/25/2009	09:40	46.6	2.45	151	57.6	8.7
U of I Farm Ditch at Hwy 95 nr Parma, ID	10/05/2009	11:10	25.1	3.47	236	92.0	8.3
Allen Drain nr Wilder, ID	06/24/2009	09:00	5.6	7.36	420	161	7.8
Allen Drain nr Wilder, ID	10/06/2009	08:50	258	15.7	393	157	7.9
6N/5W-30CDC1	06/24/2009	15:00	<4.0	<0.2	1,080	316	7.4
Glidden Brook nr Presque Isle, ME	07/14/2009	12:55	46.8	15.9	322	130	8.0
Glidden Brook nr Presque Isle, ME	11/04/2009	08:30	29.7	11.8	281	105	7.8
Hardwood Brook below Glidden Brk nr Caribou, ME	07/14/2009	10:36	38.0	24.5	334	133	8.2
Hardwood Brook below Glidden Brk nr Caribou, ME	11/03/2009	14:00	29.6	12.2	306	113	7.7
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	07/15/2009	11:48	10.6	70.7	414	186	8.0
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	11/04/2009	10:20	E4.60	8.55	409	175	7.9
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	07/15/2009	11:15	41.5	3.64	259	112	8.2
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	11/04/2009	10:35	E5.50	3.35	422	189	7.8
Spring at Porter-Sett Rd nr Moose Brook Houlton, ME	07/16/2009	10:55	<4.0	E0.17	446	164	7.4
Ditch #4 on Lake Road nr Kellner, WI	06/16/2009	12:20	550	142	474	164	7.9
Ditch #4 on Lake Road nr Kellner, WI	09/28/2009	09:15	627	111	469	161	7.8
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	06/16/2009	18:00	26.2	14.1	540	134	7.8
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	09/28/2009	10:25	33.9	15.0	534	143	7.5
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	06/17/2009	11:30	4.8	1.20	531	77.7	7.5
Unnamed Ditch at Beaver Ave nr Hancock, WI	06/17/2009	10:50	33.1	40.4	499	115	7.8
Unnamed Ditch at Beaver Ave nr Hancock, WI	10/01/2009	10:45	30.1	34.5	498	117	7.8
WS- 19/08E/15-0008	06/17/2009	17:00	<4.0	E0.12	194	95.3	8.0

Concentrations of all inorganic constituents, except calcium, iron, and manganese, were generally lower in Maine surface waters than in surface-water samples collected in Idaho or Wis. (table 24). Concentrations of chloride, manganese, magnesium, potassium, and sulfate were generally greatest at sites in Wisconsin, whereas concentrations of fluoride, silica, and sodium were greatest in Idaho samples. Copper was detected above the MDL in two samples from one surface-water site in Wisconsin (unnamed ditch at Apache and 4th Avenue near Plainfield, Wis., June 16, 2009, and September 28, 2009). Two samples from one surface-water site in Wisconsin (ditch number 4 on Lake Road near Kellner, Wis.) had concentrations greater than the USEPA Secondary Drinking Water Regulations for iron (300 µg/L) and manganese (50 µg/L; U.S. Environmental Protection Agency, 2012c). In groundwater samples, all inorganic constituents detected above the MDLs were considerably higher in the sample from the domestic well in Idaho compared to all other sites (table 24).

Sediment Organic Carbon and Nitrogen

In suspended-sediment samples, the percentage of organic carbon was greatest in samples from Wisconsin and least in samples from Idaho (table 11). Organic nitrogen percentages followed the same pattern. Organic carbon and nitrogen percentages in bed sediments varied considerably among sites in each state and among states (table 12). In general, samples from Idaho had the least bed sediment organic carbon and nitrogen percentages, whereas the samples from had the greatest (table 12).

Sediment Particle Size and Mineralogy

Twenty-two bed-sediment samples were analyzed for particle size. Of these, 5 samples were classified as sand, 4 as sandy loam, 8 as loamy sand, and 5 as silt loam (table 25). Samples collected from the same state tended to have similar texture and grain size (fig. 5).

In Idaho, sediment samples were classified as sandy loam, loamy sand, and silt loam, and the median percentages of clay (less than 0.0005–0.0040 mm), silt (0.0040–0.0625 mm), and sand (0.0625–2.0000 mm) were 6.0, 45.3, and 48.0, respectively. Allen Drain near Wilder was the only site in Idaho classified as loamy sand and had the greatest percentage of sand (81.4 percent), whereas the percentages of sand at the other three sites ranged from 29.9 to 50.9 (table 25). Quartz and feldspars were the dominant minerals, and there were minor amounts of the clay minerals smectite and illite/muscovite (table 26).

Sediment samples from Maine were classified as sandy loam, loamy sand, or silt loam, and the median percentages of clay, silt, and sand were 3.9, 27.7, and 68.5, respectively. Samples collected from Aroostook Pond at Aroostook Farm near Presque Isle were classified as silt loam and had the highest percentages of silt (table 25, fig. 5). Samples from Maine contained the widest variety of minerals and the greatest proportions of clay minerals among the three states sampled.

Samples collected from Wisconsin had the greatest median percentage of sand (88.7 percent) and were classified as sand or loamy sand. Clay and silt percentages ranged from 1.2 to 2.8 and 4.4 to 25.2, respectively. Wisconsin samples were predominantly made up of quartz and feldspars (table 26).

Water-Quality Parameters

Water-quality parameters (water temperature, specific conductance, dissolved oxygen, pH, and turbidity) measured in surface water at sites in Idaho, Maine, and Wisconsin are shown in table 27.

Table 25. Results of particle-size analysis of bed-sediment samples collected in 2009 from sites in Idaho, Maine, and Wisconsin.

[Values are in percent. **Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm, millimeter; mm/dd/yyyy, month/day/year; N, north; nr, near; Trib, tributary; U of I, University of Idaho; USGS, U.S. Geological Survey; WI, Wisconsin; Xing, crossing; <, less than; #, number]

USGS station name	Date (mm/dd/yyyy)	Time (hh:mm)	Texture	Very fine clay (<0.0005 mm)	Fine clay (0.0005–0.001mm)	Medium clay (0.001–0.002 mm)	Coarse clay (0.002–0.004 mm)
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	06/23/2009	12:05	Silt loam	1.71	1.14	1.75	2.14
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	10/05/2009	08:50	Silt loam	1.29	0.94	1.61	2.13
Ditch nr Wanstad Road nr Parma, ID	06/23/2009	18:55	Sandy loam	1.41	1.08	1.92	2.53
Ditch nr Wanstad Road nr Parma, ID	10/05/2009	11:47	Sandy loam	1.34	0.91	1.49	1.86
U of I Farm Ditch at Hwy 95 nr Parma, ID	06/25/2009	09:30	Silt loam	1.66	1.26	2.18	2.90
U of I Farm Ditch at Hwy 95 nr Parma, ID	10/05/2009	10:48	Sandy loam	1.25	0.96	1.67	2.16
Allen Drain nr Wilder, ID	06/23/2009	08:45	Loamy sand	0.56	0.40	0.69	0.93
Glidden Brook nr Presque Isle, ME	07/14/2009	11:50	Loamy sand	0.93	0.58	1.03	1.64
Glidden Brook nr Presque Isle, ME	11/05/2009	08:00	Loamy sand	0.97	0.58	0.88	1.25
Hardwood Brook below Glidden Brk nr Caribou, ME	07/14/2009	10:00	Loamy sand	0.71	0.48	0.85	1.26
Hardwood Brook below Glidden Brk nr Caribou, ME	11/05/2009	08:00	Loamy sand	0.68	0.41	0.67	0.99
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	07/15/2009	11:45	Sandy loam	1.11	0.73	1.15	1.62
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	11/05/2009	09:00	Loamy sand	0.75	0.46	0.73	1.07
Aroostook Pond at Aroostook Farm nr Presque Isle, ME	07/15/2009	11:00	Silt loam	2.48	1.86	3.70	5.47
Aroostook Pond at Aroostook Farm nr Presque Isle, ME	11/05/2009	09:15	Silt loam	3.10	2.69	5.40	7.82
Ditch #4 on Lake Road nr Kellner, WI	06/16/2009	12:15	Loamy sand	0.75	0.45	0.66	0.92
Ditch #4 on Lake Road nr Kellner, WI	09/28/2009	09:00	Sand	0.31	0.20	0.29	0.37
Unnamed Ditch at Apache and 4th Ave nr Owens Rock, WI	06/16/2009	17:15	Sand	0.38	0.21	0.27	0.35
Unnamed Ditch at Apache and 4th Ave nr Owens Rock, WI	09/28/2009	10:50	Sand	0.30	0.19	0.29	0.30
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	06/17/2009	11:10	Sand	0.35	0.25	0.40	0.51
Unnamed Ditch at Beaver Ave nr Hancock, WI	06/17/2009	10:40	Sand	0.39	0.24	0.37	0.50
Unnamed Ditch at Beaver Ave nr Hancock, WI	10/01/2009	11:00	Loamy sand	0.50	0.30	0.45	0.64

Table 25. Results of particle-size analysis of bed-sediment samples collected in 2009 from sites in Idaho, Maine, and Wisconsin. —Continued

[Values are in percent. **Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm, millimeter; mm/dd/yyyy, month/day/year; N, north; nr, near; Trib, tributary; U of I, University of Idaho; USGS, U.S. Geological Survey; WI, Wisconsin; Xing, crossing; <, less than; #, number]

USGS station name	Date (mm/dd/yyyy)	Time (hh:mm)	Texture	Very fine silt (0.004–0.008 mm)	Fine silt (0.008–0.016 mm)	Medium silt (0.016–0.031 mm)	Coarse silt (0.031–0.0625 mm)
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	06/23/2009	12:05	Silt loam	3.55	8.70	19.38	31.80
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	10/05/2009	08:50	Silt loam	3.26	6.47	11.98	24.36
Ditch nr Wanstad Road nr Parma, ID	06/23/2009	18:55	Sandy loam	3.67	6.89	12.03	22.72
Ditch nr Wanstad Road nr Parma, ID	10/05/2009	11:47	Sandy loam	2.77	5.24	9.74	26.01
U of I Farm Ditch at Hwy 95 nr Parma, ID	06/25/2009	09:30	Silt loam	4.45	9.12	17.29	28.56
U of I Farm Ditch at Hwy 95 nr Parma, ID	10/05/2009	10:48	Sandy loam	3.16	6.13	11.79	24.08
Allen Drain nr Wilder, ID	06/23/2009	08:45	Loamy sand	1.42	2.61	4.00	8.01
Glidden Brook nr Presque Isle, ME	07/14/2009	11:50	Loamy sand	2.84	5.33	7.21	9.85
Glidden Brook nr Presque Isle, ME	11/05/2009	08:00	Loamy sand	2.42	5.70	8.97	12.76
Hardwood Brook below Glidden Brk nr Caribou, ME	07/14/2009	10:00	Loamy sand	2.14	4.20	6.21	8.96
Hardwood Brook below Glidden Brk nr Caribou, ME	11/05/2009	08:00	Loamy sand	1.72	3.54	5.58	8.62
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	07/15/2009	11:45	Sandy loam	3.05	7.10	11.15	15.15
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	11/05/2009	09:00	Loamy sand	2.00	4.62	7.70	11.31
Aroostook Pond at Aroostook Farm nr Presque Isle, ME	07/15/2009	11:00	Silt loam	7.90	12.12	15.23	17.94
Aroostook Pond at Aroostook Farm nr Presque Isle, ME	11/05/2009	09:15	Silt loam	11.31	17.93	21.32	17.32
Ditch #4 on Lake Road nr Kellner, WI	06/16/2009	12:15	Loamy sand	1.81	4.34	7.60	11.44
Ditch #4 on Lake Road nr Kellner, WI	09/28/2009	09:00	Sand	0.59	1.05	1.37	2.06
Unnamed Ditch at Apache and 4th Ave nr Owens Rock, WI	06/16/2009	17:15	Sand	0.69	1.82	3.44	7.03
Unnamed Ditch at Apache and 4th Ave nr Owens Rock, WI	09/28/2009	10:50	Sand	0.47	0.91	1.21	1.76
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	06/17/2009	11:10	Sand	0.84	1.69	2.57	3.87
Unnamed Ditch at Beaver Ave nr Hancock, WI	06/17/2009	10:40	Sand	0.95	2.08	2.80	3.96
Unnamed Ditch at Beaver Ave nr Hancock, WI	10/01/2009	11:00	Loamy sand	1.29	3.16	5.08	8.63

Table 25. Results of particle size analysis of bed-sediment samples collected in 2009 from sites in Idaho, Maine, and Wisconsin. —Continued

[Values are in percent. **Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm, millimeter; mm/dd/yyyy, month/day/year; N, north; nr, near; Trib, tributary; U of I, University of Idaho; USGS, U.S. Geological Survey; WI, Wisconsin; Xing, crossing; <, less than; #, number]

USGS station name	Date (mm/dd/yyyy)	Time (hh:mm)	Texture	Very fine sand (0.0625–0.125 mm)	Fine sand (0.125–0.25 mm)	Medium sand (0.25–0.5 mm)	Coarse sand (0.5–1 mm)	Very coarse sand (1–2 mm)
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	06/23/2009	12:05	Silt loam	19.81	7.09	2.65	0.32	0.00
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	10/05/2009	08:50	Silt loam	21.64	10.76	10.55	4.75	0.27
Ditch nr Wanstad Road nr Parma, ID	06/23/2009	18:55	Sandy loam	19.28	10.24	10.53	7.14	0.56
Ditch nr Wanstad Road nr Parma, ID	10/05/2009	11:47	Sandy loam	24.52	10.69	8.40	6.49	0.48
U of I Farm Ditch at Hwy 95 nr Parma, ID	06/25/2009	09:30	Silt loam	18.61	8.42	5.56	0.00	0.00
U of I Farm Ditch at Hwy 95 nr Parma, ID	10/05/2009	10:48	Sandy loam	21.14	10.07	9.77	5.92	1.91
Allen Drain nr Wilder, ID	06/23/2009	08:45	Loamy sand	18.97	28.95	19.76	8.99	4.68
Glidden Brook nr Presque Isle, ME	07/14/2009	11:50	Loamy sand	16.05	19.75	18.27	11.70	4.80
Glidden Brook nr Presque Isle, ME	11/05/2009	08:00	Loamy sand	18.02	17.74	16.59	11.78	2.38
Hardwood Brook below Glidden Brk nr Caribou, ME	07/14/2009	10:00	Loamy sand	14.08	17.28	23.95	16.49	3.37
Hardwood Brook below Glidden Brk nr Caribou, ME	11/05/2009	08:00	Loamy sand	13.99	15.30	17.69	14.94	15.84
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	07/15/2009	11:45	Sandy loam	18.90	16.16	11.68	10.55	1.69
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	11/05/2009	09:00	Loamy sand	15.31	16.80	20.73	13.96	4.60
Aroostook Pond at Aroostook Farm nr Presque Isle, ME	07/15/2009	11:00	Silt loam	14.41	7.54	6.78	4.31	0.32
Aroostook Pond at Aroostook Farm nr Presque Isle, ME	11/05/2009	09:15	Silt loam	12.16	0.92	0.00	0.00	0.00
Ditch #4 on Lake Road nr Kellner, WI	06/16/2009	12:15	Loamy sand	19.49	16.87	15.70	18.85	1.13
Ditch #4 on Lake Road nr Kellner, WI	09/28/2009	09:00	Sand	4.71	14.70	40.42	31.90	1.98
Unnamed Ditch at Apache and 4th Ave nr Owens Rock, WI	06/16/2009	17:15	Sand	14.44	15.97	33.07	20.33	2.01
Unnamed Ditch at Apache and 4th Ave nr Owens Rock, WI	09/28/2009	10:50	Sand	4.23	26.59	48.95	12.53	2.29
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	06/17/2009	11:10	Sand	6.45	12.76	34.03	30.70	5.57
Unnamed Ditch at Beaver Ave nr Hancock, WI	06/17/2009	10:40	Sand	6.41	14.16	49.75	17.88	0.54
Unnamed Ditch at Beaver Ave nr Hancock, WI	10/01/2009	11:00	Loamy sand	15.92	17.57	26.22	14.84	5.40

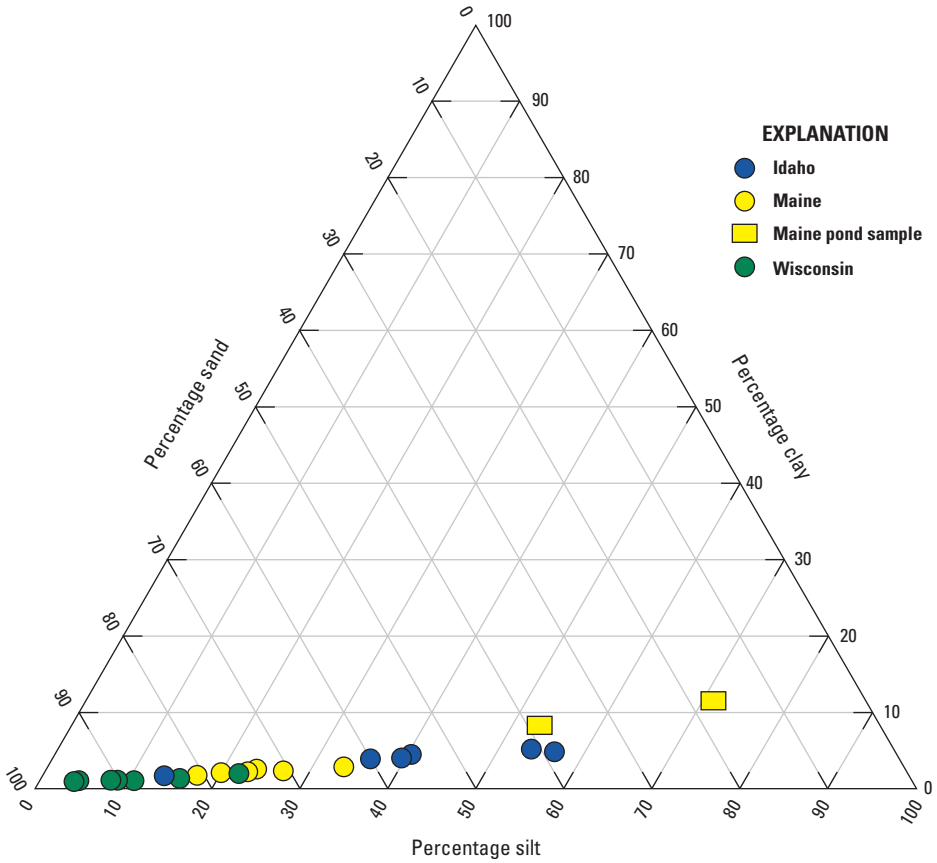

Figure 5. Bed-sediment particle-size fractions for samples from Idaho, Maine, and Wisconsin.

Table 26. Results of mineralogical analysis of bed-sediment samples collected in 2009 from sites in Idaho, Maine, and Wisconsin.

[Values are in percent. (2M1) and (1Md) are polytypes of the associated minerals. Munsell refers to Munsell Soil Color Charts, 2000: Grand Rapids, Mich., X-rite Inc. **Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm, millimeter; mm/dd/yyyy, month/day/year; N, north; NE, not evaluated; nr, near; Trib, tributary; U of I, University of Idaho; USGS, U.S. Geological Survey; WI, Wisconsin; Xing, crossing; —, not present]

USGS station name	Date (mm/dd/yyyy)	Time (hh:mm)	Munsell color code	Munsell color name	Quartz
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	06/23/2009	12:05	2.5Y - 6/3	Light yellowish brown	37.3
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	10/05/2009	08:50	2.5Y - 7/3	Pale yellow	41.3
Ditch nr Wanstad Road nr Parma, ID	06/23/2009	18:55	NE	NE	39.9
Ditch nr Wanstad Road nr Parma, ID	10/05/2009	11:47	2.5Y - 6/2	Light brownish gray	45.0
U of I Farm Ditch at Hwy 95 nr Parma, ID	06/25/2009	09:30	2.5Y - 5/3	Light olive brown	42.5
U of I Farm Ditch at Hwy 95 nr Parma, ID	10/05/2009	10:48	2.5Y - 6/2	Light brownish gray	41.0
Allen Drain nr Wilder, ID	06/23/2009	08:45	2.5Y - 5/1	Gray	55.6
Glidden Brook nr Presque Isle, ME	07/14/2009	11:50	2.5Y - 5/2	Grayish brown	47.3
Glidden Brook nr Presque Isle, ME	11/05/2009	08:00	10YR - 4/2	Dark grayish brown	46.4
Hardwood Brook below Glidden Brk nr Caribou, ME	07/14/2009	10:00	10YR - 5/2	Grayish brown	50.3
Hardwood Brook below Glidden Brk nr Caribou, ME	11/05/2009	08:00	2.5Y - 5/2	Grayish brown	51.7
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	07/15/2009	11:45	10YR - 5/3	Brown	42.6
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	11/05/2009	09:00	10YR - 4/1	Dark gray	43.3
Aroostook Pond at Aroostook Farm nr Presque Isle, ME	07/15/2009	11:00	2.5Y - 7/1	Light gray	50.5
Aroostook Pond at Aroostook Farm nr Presque Isle, ME	11/05/2009	09:15	2.5Y - 6/2	Light brownish gray	43.3
Ditch #4 on Lake Road nr Kellner, WI	06/16/2009	12:15	10YR - 3/2	Very dark grayish brown	80.0
Ditch #4 on Lake Road nr Kellner, WI	09/28/2009	09:00	10YR - 3/4	Dark yellowish brown	87.2
Unnamed Ditch at Apache and 4th Ave nr Owens Rock, WI	06/16/2009	17:15	5YR - 2.5/1	Black	92.9
Unnamed Ditch at Apache and 4th Ave nr Owens Rock, WI	09/28/2009	10:50	10YR - 5/3	Brown	94.3
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	06/17/2009	11:10	10YR - 4/2	Dark grayish brown	90.0
Unnamed Ditch at Beaver Ave nr Hancock, WI	06/17/2009	10:40	10YR - 5/1	Gray	94.4
Unnamed Ditch at Beaver Ave nr Hancock, WI	10/01/2009	11:00	10YR - 4/2	Dark grayish brown	88.5

Table 26. Results of mineralogical analysis of bed-sediment samples collected in 2009 from sites in Idaho, Maine, and Wisconsin. —Continued

[Values are in percent. (2M1) and (1Md) are polytypes of the associated minerals. Munsell refers to Munsell Soil Color Charts, 2000: Grand Rapids, Mich., X-rite Inc. **Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm, millimeter; mm/dd/yyyy, month/day/year; N, north; NE, not evaluated; nr, near; Trib, tributary; U of I, University of Idaho; USGS, U.S. Geological Survey; WI, Wisconsin; Xing, crossing; —, not present]

USGS station name	Date (mm/dd/yyyy)	Time (hh:mm)	Munsell color code	Feldspar minerals				Calcite	Pyroxene
				Potassium feldspar	Albite	Andesine	Anorthite		
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	06/23/2009	12:05	2.5Y - 6/3	—	—	29.7	7.8	3.1	2.1
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	10/05/2009	08:50	2.5Y - 7/3	—	—	33.5	8.0	2.4	1.6
Ditch nr Wanstad Road nr Parma, ID	06/23/2009	18:55	NE	—	—	26.7	6.6	5.3	5.2
Ditch nr Wanstad Road nr Parma, ID	10/05/2009	11:47	2.5Y - 6/2	—	—	26.4	11.6	4.5	3.0
U of I Farm Ditch at Hwy 95 nr Parma, ID	06/25/2009	09:30	2.5Y - 5/3	—	—	29.6	7.8	1.6	2.8
U of I Farm Ditch at Hwy 95 nr Parma, ID	10/05/2009	10:48	2.5Y - 6/2	—	—	34.7	7.3	2.0	1.7
Allen Drain nr Wilder, ID	06/23/2009	08:45	2.5Y - 5/1	—	—	23.8	9.2	2.0	3.7
Glidden Brook nr Presque Isle, ME	07/14/2009	11:50	2.5Y - 5/2	1.2	15.8	—	—	—	—
Glidden Brook nr Presque Isle, ME	11/05/2009	08:00	10YR - 4/2	2.5	15.3	—	—	1.3	—
Hardwood Brook below Glidden Brk nr Caribou, ME	07/14/2009	10:00	10YR - 5/2	2.3	18.7	—	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	11/05/2009	08:00	2.5Y - 5/2	3.0	16.7	—	—	2.2	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	07/15/2009	11:45	10YR - 5/3	1.8	16.6	—	—	1.5	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	11/05/2009	09:00	10YR - 4/1	1.7	15.0	—	—	0.6	—
Aroostook Pond at Aroostook Farm nr Presque Isle, ME	07/15/2009	11:00	2.5Y - 7/1	2.1	16.1	—	—	—	—
Aroostook Pond at Aroostook Farm nr Presque Isle, ME	11/05/2009	09:15	2.5Y - 6/2	2.1	16.8	—	—	2.0	—
Ditch #4 on Lake Road nr Kellner, WI	06/16/2009	12:15	10YR - 3/2	8.2	8.2	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	09/28/2009	09:00	10YR - 3/4	6.0	5.1	—	—	—	—
Unnamed Ditch at Apache and 4th Ave nr Owens Rock, WI	06/16/2009	17:15	5YR - 2.5/1	3.5	2.7	—	—	—	—
Unnamed Ditch at Apache and 4th Ave nr Owens Rock, WI	09/28/2009	10:50	10YR - 5/3	2.7	2.0	—	—	—	—
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	06/17/2009	11:10	10YR - 4/2	4.0	3.8	—	—	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	06/17/2009	10:40	10YR - 5/1	2.7	1.8	—	—	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	10/01/2009	11:00	10YR - 4/2	4.3	4.1	—	—	—	—

Table 26. Results of mineralogical analysis of bed-sediment samples collected in 2009 from sites in Idaho, Maine, and Wisconsin. —Continued

[Values are in percent. (2M1) and (1Md) are polytypes of the associated minerals. Munsell refers to Munsell Soil Color Charts, 2000: Grand Rapids, Mich., X-rite Inc. **Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm, millimeter; mm/dd/yyyy, month/day/year; N, north; NE, not evaluated; nr, near; Trib, tributary; U of I, University of Idaho; USGS, U.S. Geological Survey; WI, Wisconsin; Xing, crossing; —, not present]

USGS station name	Date (mm/dd/yyyy)	Time (hh:mm)	Munsell color code	Goethite	Clay minerals				
					Kaolinite	Smectite	Chlorite	Illite/ Muscovite (2M1)	Illite (1Md)
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	06/23/2009	12:05	2.5Y - 6/3	—	1.0	10.5	—	8.7	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	10/05/2009	08:50	2.5Y - 7/3	—	0.5	5.0	—	7.7	—
Ditch nr Wanstad Road nr Parma, ID	06/23/2009	18:55	NE	—	0.0	9.7	—	6.6	—
Ditch nr Wanstad Road nr Parma, ID	10/05/2009	11:47	2.5Y - 6/2	—	0.0	2.2	—	6.3	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	06/25/2009	09:30	2.5Y - 5/3	—	0.8	6.7	—	8.1	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	10/05/2009	10:48	2.5Y - 6/2	—	0.7	4.2	—	8.4	—
Allen Drain nr Wilder, ID	06/23/2009	08:45	2.5Y - 5/1	—	0.0	2.4	—	3.3	—
Glidden Brook nr Presque Isle, ME	07/14/2009	11:50	2.5Y - 5/2	0.3	—	—	8.5	14.9	12.0
Glidden Brook nr Presque Isle, ME	11/05/2009	08:00	10YR - 4/2	—	—	—	9.4	12.4	12.7
Hardwood Brook below Glidden Brk nr Caribou, ME	07/14/2009	10:00	10YR - 5/2	0.2	—	—	9.0	12.0	7.5
Hardwood Brook below Glidden Brk nr Caribou, ME	11/05/2009	08:00	2.5Y - 5/2	—	—	—	8.8	9.8	7.8
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	07/15/2009	11:45	10YR - 5/3	—	—	—	9.0	12.9	15.7
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	11/05/2009	09:00	10YR - 4/1	0.3	—	—	8.4	14.5	16.2
Aroostook Pond at Aroostook Farm nr Presque Isle, ME	07/15/2009	11:00	2.5Y - 7/1	—	—	—	6.8	10.3	14.2
Aroostook Pond at Aroostook Farm nr Presque Isle, ME	11/05/2009	09:15	2.5Y - 6/2	0.2	—	—	9.2	14.4	12.0
Ditch #4 on Lake Road nr Kellner, WI	06/16/2009	12:15	10YR - 3/2	—	—	—	—	3.6	—
Ditch #4 on Lake Road nr Kellner, WI	09/28/2009	09:00	10YR - 3/4	—	—	—	—	1.7	—
Unnamed Ditch at Apache and 4th Ave nr Owens Rock, WI	06/16/2009	17:15	5YR - 2.5/1	—	—	—	—	1.0	—
Unnamed Ditch at Apache and 4th Ave nr Owens Rock, WI	09/28/2009	10:50	10YR - 5/3	—	—	—	—	0.9	—
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	06/17/2009	11:10	10YR - 4/2	—	—	—	—	2.2	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	06/17/2009	10:40	10YR - 5/1	—	—	—	—	1.0	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	10/01/2009	11:00	10YR - 4/2	—	—	—	—	3.0	—

Table 27. Water-quality parameter data (temperature, specific conductance, dissolved-oxygen concentration, pH, and turbidity) measured in surface water at sites in Idaho, Maine, and Wisconsin, June–November 2009.

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. **Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mg/L, milligram per liter; mm/dd/yyyy, month/day/year; N, north; nr, near; NTU, nephelometric turbidity units; Trib, tributary; U of I, University of Idaho; WI, Wisconsin; Xing, crossing; °C, degree Celsius; µS/cm, microsiemen per centimeter; **, storm sample; #, number; —, data not collected]

USGS station name	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Water temperature (°C) [00010]	Specific conductance (µS/cm) [00095]	Dissolved oxygen (mg/L) [00300]	pH [00400]	Turbidity (NTU) [63680]
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	06/23/2009	11:50	14.7	380	9.3	7.9	57.9
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	07/14/2009	08:40	16.6	418	7.4	7.9	50.8
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	08/04/2009	09:22	19.9	467	6.8	7.8	57.0
Sand Run Gulch at Hwy 95 Xing nr Parma, ID**	08/07/2009	09:45	17.3	452	6.4	7.7	42.0
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	08/25/2009	09:20	17.4	477	9.8	7.7	33.3
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	09/15/2009	09:18	17.7	348	8.2	7.9	35.8
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	10/05/2009	10:10	10.8	805	—	7.8	9.3
Ditch nr Wanstad Road nr Parma, ID	06/23/2009	19:10	20.9	381	7.7	7.9	62.2
Ditch nr Wanstad Road nr Parma, ID	07/14/2009	13:42	21.5	270	7.2	8.1	410.0
Ditch nr Wanstad Road nr Parma, ID	08/04/2009	13:10	24.3	302	7.0	8.3	207.0
Ditch nr Wanstad Road nr Parma, ID**	08/07/2009	10:35	17.6	318	7.6	7.9	186.0
Ditch nr Wanstad Road nr Parma, ID	08/25/2009	13:30	21.7	405	6.8	7.9	142.1
Ditch nr Wanstad Road nr Parma, ID	09/15/2009	11:45	20.7	343	7.7	8.2	34.7
Ditch nr Wanstad Road nr Parma, ID	10/05/2009	11:53	11.5	1,010	—	7.5	43.8
U of I Farm Ditch at Hwy 95 nr Parma, ID	06/25/2009	09:40	19.0	147	11.3	9.0	18.8
U of I Farm Ditch at Hwy 95 nr Parma, ID	07/14/2009	12:38	22.1	229	8.6	8.4	196.0
U of I Farm Ditch at Hwy 95 nr Parma, ID	08/04/2009	12:22	24.3	242	9.0	8.6	90.1
U of I Farm Ditch at Hwy 95 nr Parma, ID**	08/07/2009	12:10	18.3	268	8.4	8.1	278.3
U of I Farm Ditch at Hwy 95 nr Parma, ID	08/25/2009	12:45	24.0	242	11.6	9.3	10.3
U of I Farm Ditch at Hwy 95 nr Parma, ID	09/15/2009	10:35	21.0	257	10.6	8.9	19.6
U of I Farm Ditch at Hwy 95 nr Parma, ID	10/05/2009	11:10	10.3	407	—	8.4	24.8
Allen Drain nr Wilder, ID	06/24/2009	09:00	17.5	410	9.6	7.8	—
Allen Drain nr Wilder, ID	10/06/2009	08:50	11.2	644	—	7.9	18.4
Glidden Brook nr Caribou, ME	07/14/2009	12:55	17.4	295	9.4	8.0	1.4
Glidden Brook nr Caribou, ME	08/06/2009	15:24	21.1	305	7.4	7.7	1.6
Glidden Brook nr Caribou, ME	08/24/2009	14:50	21.0	352	10.0	7.7	1.0
Glidden Brook nr Caribou, ME	08/25/2009	14:30	13.7	350	11.3	7.6	1.2
Glidden Brook nr Caribou, ME	09/15/2009	14:45	13.7	350	11.2	7.6	1.3
Glidden Brook nr Caribou, ME	10/06/2009	16:06	—	270	—	6.8	—
Glidden Brook nr Caribou, ME	11/04/2009	08:30	3.8	111	12.4	7.9	0.0
Hardwood Brook below Glidden Brk nr Caribou, ME	07/14/2009	10:45	15.5	309	9.0	8.1	3.0
Hardwood Brook below Glidden Brk nr Caribou, ME	08/06/2009	19:55	19.2	323	7.3	7.8	3.3
Hardwood Brook below Glidden Brk nr Caribou, ME	08/24/2009	16:48	20.1	365	9.0	8.0	1.0
Hardwood Brook below Glidden Brk nr Caribou, ME	09/15/2009	16:40	13.2	370	10.3	8.0	2.0
Hardwood Brook below Glidden Brk nr Caribou, ME	10/06/2009	17:30	—	284	—	7.4	—
Hardwood Brook below Glidden Brk nr Caribou, ME	11/03/2009	14:00	5.2	120	12.5	8.0	0.2
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	07/15/2009	11:48	11.4	382	9.6	7.8	0.9
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	08/07/2009	09:00	11.9	429	9.7	7.1	3.7
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	08/24/2009	19:27	14.0	428	9.2	8.0	3.3

Table 27. Water-quality parameter data (temperature, specific conductance, dissolved-oxygen concentration, pH, and turbidity) measured in surface water at sites in Idaho, Maine, and Wisconsin, June–November 2009.—Continued

[Numbers in brackets are U.S. Geological Survey (USGS) National Water Information System (NWIS) parameter codes. **Abbreviations**: Ave, avenue; Brk, brook; CTH C, county road; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mg/L, milligram per liter; mm/dd/yyyy, month/day/year; N, north; nr, near; NTU, nephelometric turbidity units; Trib, tributary; U of I, University of Idaho; WI, Wisconsin; Xing, crossing; °C, degree Celsius; µS/cm, microsiemen per centimeter; **, storm sample; #, number; —, data not collected]

USGS station name	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Water temperature (°C) [00010]	Specific conductance (µS/cm) [00095]	Dissolved oxygen (mg/L) [00300]	pH [00400]	Turbidity (NTU) [63680]
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	09/15/2009	18:57	9.1	414	10.4	7.1	4.2
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	10/06/2009	20:15	—	414	—	7.0	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	11/04/2009	10:20	5.3	16	11.8	7.8	0.2
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	07/15/2009	11:15	14.8	322	14.5	7.7	—
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	11/04/2009	10:35	6.0	167	6.3	7.5	0.2
Ditch #4 on Lake Road nr Kellner, WI	06/16/2009	12:20	14.8	478	8.0	7.6	—
Ditch #4 on Lake Road nr Kellner, WI	07/07/2009	09:15	21.4	442	10.0	8.4	—
Ditch #4 on Lake Road nr Kellner, WI	07/28/2009	08:45	—	425	—	8.2	—
Ditch #4 on Lake Road nr Kellner, WI	08/18/2009	09:30	15.6	492	10.0	7.5	—
Ditch #4 on Lake Road nr Kellner, WI	09/08/2009	09:40	13.6	465	8.0	7.7	—
Ditch #4 on Lake Road nr Kellner, WI	09/28/2009	09:15	11.2	470	—	7.6	8.9
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	06/16/2009	18:00	14.7	545	8.5	7.6	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	07/07/2009	12:40	15.5	541	6.0	8.1	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	07/28/2009	11:15	—	502	—	7.8	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	08/18/2009	11:30	14.2	553	4.0	6.9	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	09/08/2009	12:40	11.9	518	3.0	7.4	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	09/28/2009	10:25	11.3	540	—	7.1	1.4
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	06/17/2009	11:30	11.9	535	5.9	7.3	—
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	07/07/2009	12:10	14.5	530	5.0	8.1	—
Unnamed Ditch on 2nd Ave N of CTH C nr Hancock, WI	07/30/2009	08:30	—	—	—	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	06/17/2009	10:50	11.5	501	8.2	7.5	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	08/18/2009	14:30	15.7	515	11.0	7.6	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	09/08/2009	13:00	12.7	484	9.0	7.9	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	10/01/2009	10:45	8.8	507	—	7.9	0.1

Summary and Conclusions

This study examined the concentrations of fungicides and other pesticides in four environmental matrices—surface water, groundwater, and suspended and bed sediments—in three targeted-use areas across the United States. The most frequently detected fungicides were azoxystrobin, boscalid, chlorothalonil, and pyraclostrobin. Pyraclostrobin was the only fungicide detected in all environmental matrices in all three areas. Other frequently detected pesticides included atrazine, glyphosate and its degradate amino phosphonic acid (AMPA), metolachlor, and, specifically in sediments, the organochlorine insecticide *p,p*'-DDT and its degradates *p,p*'-DDD and *p,p*'-DDE.

The greatest numbers of pesticides were detected in surface water compared to the other matrices, and at least one pesticide was detected in 62 of the 63 surface-water samples. The maximum number of pesticides detected in a single surface-water sample was 16, and the greatest numbers of pesticides (21) for a given state were detected in samples collected in Idaho. For most pesticides, the maximum concentrations were also observed in samples from Idaho. Concentrations of bifenthrin, chlorpyrifos, metolachlor, or malathion exceeded U.S. Environmental Protection Agency freshwater aquatic-life benchmarks for chronic toxicity to invertebrates in eight surface-water samples.

The fewest numbers of pesticides were detected in groundwater samples, but of the 13 pesticides detected, 7 were fungicides. No pesticides were detected in either the domestic well in Idaho or the spring in Maine, and only one pesticide (metolachlor) was detected in the monitoring well in Wisconsin. For compounds detected in surface water and groundwater, concentrations were generally lower in groundwater, with the exception of the fungicide boscalid, which was detected at its highest concentration in a shallow groundwater sample from Wisconsin.

Thirteen pesticides, including four fungicides, were detected in suspended-sediment samples. As many as nine compounds were detected in a single sample (Glidden Brook near Caribou, Maine). The most frequently detected compounds in suspended sediments were boscalid, pyraclostrobin, zoxamide, *p,p*'-DDD, and *p,p*'-DDE. Twenty pesticides were detected in bed-sediment samples, and the most frequently detected compounds were pyraclostrobin, *p,p*'-DDT, *p,p*'-DDD, and *p,p*'-DDE.

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Table 7. Dissolved-pesticide concentrations measured in environmental and field-replicate water samples collected in Idaho, Maine, and Wisconsin, June–November 2009.

[Numbers in brackets are U.S Geological Survey (USGS) National Water Information System (NWIS) parameter codes. Values are in nanograms per liter. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: alachlor, allethrin, butylate, carbaryl, clomazone, cycloate, cyfluthrin, λ-cyhalothrin, cypermethrin, cyproconazole, cyprodinil, *p,p'*-DDD, *p,p'*-DDT, deltamethrin, diazinon, 3,4-DCA, 3,5-DCA, difenocanazole, dimethomorph, esfenvalerate, etofenprox, famoxadone, fenarimol, fenbuconazole, fenhexamid, fenpropathrin, fipronil, fipronil disulfinyl, fipronil sulfide, fipronil sulfone, fluoxastrobin, flusilazole, flutriafol, τ-fluvalinate, imazalil, iprodione, kresoxim-methyl, metconazole, methidathion, methoprene, molinate, myclobutanil, napropamide, oxyflurofen, PCA, PCNB, pebulate, permethrin, phenothrin, phosmet, piperonyl butoxide, prometryn, propanil, propiconazole, propyzamide, resmethrin, simazine, tebuconazole, tefluthrin, tetraconazole, tetramethrin, thiobencarb, triadimefon, triadimenol, trifloxystrobin, triflumizole, and triticonazole. **Abbreviations**: Ave, avenue; Brk, brook; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; NC, relative standard deviation not calculated; nr, near; RSD, relative standard deviation; Trib, tributary; WI, Wisconsin; Xing, crossing; %, percent; —, not detected]

USGS station name	Sample type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Atrazine [65065]	Azoxystrobin [66589]	Bifenthrin [65067]	Boscalid [67550]	Carbofuran [65070]	Chloro-thalonil [65071]	Chlorpyrifos [65072]	DCPA [65076]	*p,p'*-DDE [65095]	EPTC [65080]	Ethalflu-ralin [65082]
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Environmental	06/23/2009	11:50	—	6.1	—	17.6	—	—	—	—	—	—	4.4
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Field replicate	06/23/2009	11:50	—	5.7	—	16.0	—	—	—	—	—	—	4.5
	RSD				5%		7%							2%
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Environmental	08/07/2009	09:45	12.7	15.9	—	109	—	4.1	—	—	—	—	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Field replicate	08/07/2009	09:45	11.1	12.5	—	114	—	5.4	—	—	—	—	—
	RSD			10%	17%		3%		19%					
Ditch nr Wanstad Road nr Parma, ID	Environmental	06/23/2009	19:10	—	18.6	—	94.2	—	—	65.0	—	(3.2)	—	(2.6)
Ditch nr Wanstad Road nr Parma, ID	Field replicate	06/23/2009	19:11	—	19.0	—	94.2	—	—	64.2	—	4.6	—	(2.5)
	RSD				2%		0%			1%		NC		NC
Ditch nr Wanstad Road nr Parma, ID	Environmental	07/14/2009	13:42	10.1	34.6	—	100	94.0	—	7.8	—	—	45.7	34.4
Ditch nr Wanstad Road nr Parma, ID	Field replicate	07/14/2009	13:43	8.6	29.0	—	85.1	78.4	—	6.7	—	—	37.8	27.8
	RSD			11%	12%		11%	13%		11%			13%	15%
Ditch nr Wanstad Road nr Parma, ID	Environmental	08/07/2009	10:35	8.5	24.0	—	246	117	(0.5)	—	—	—	—	—
Ditch nr Wanstad Road nr Parma, ID	Field replicate	08/07/2009	10:35	9.7	21.8	—	222	121	(0.3)	—	—	—	—	—
	RSD			9%	7%		7%	2%	NC					
Ditch nr Wanstad Road nr Parma, ID	Environmental	08/25/2009	13:30	4.3	31.5	7.0	109	—	5.9	3.3	—	(2.7)	—	—
Ditch nr Wanstad Road nr Parma, ID	Field replicate	08/25/2009	13:31	5.1	33.3	6.2	108	—	4.6	3.5	—	(2.6)	—	—
	RSD			12%	4%	9%	1%		18%	4%		NC		

Table 7. Dissolved-pesticide concentrations measured in environmental and field-replicate water samples collected in Idaho, Maine, and Wisconsin, June–November 2009. —Continued

[Numbers in brackets are U.S Geological Survey (USGS) National Water Information System (NWIS) parameter codes. Values are in nanograms per liter. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: alachlor, allethrin, butylate, carbaryl, clomazone, cycloate, cyfluthrin, λ-cyhalothrin, cypermethrin, cyproconazole, cyprodinil, *p,p'*-DDD, *p,p'*-DDT, deltamethrin, diazinon, 3,4-DCA, 3,5-DCA, difenocanazole, dimethomorph, esfenvalerate, etofenprox, famoxadone, fenarimol, fenbuconazole, fenhexamid, fenpropathrin, fipronil, fipronil disulfinyl, fipronil sulfide, fipronil sulfone, fluoxastrobin, flusilazole, flutriafol, τ-fluvalinate, imazalil, iprodione, kresoxim-methyl, metconazole, methidathion, methoprene, molinate, myclobutanil, napropamide, oxyflurofen, PCA, PCNB, pebulate, permethrin, phenothrin, phosmet, piperonyl butoxide, prometryn, propanil, propiconazole, propyzamide, resmethrin, simazine, tebuconazole, tefluthrin, tetraconazole, tetramethrin, thiobencarb, triadimefon, triadimenol, trifloxystrobin, triflumizole, and triticonazole. **Abbreviations**: Ave, avenue; Brk, brook; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; NC, relative standard deviation not calculated; nr, near; RSD, relative standard deviation; Trib, tributary; WI, Wisconsin; Xing, crossing; %, percent; —, not detected]

USGS station name	Sample type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Atrazine [65065]	Azoxystrobin [66589]	Bifenthrin [65067]	Boscalid [67550]	Carbofuran [65070]	Chloro-thalonil [65071]	Chlorpyrifos [65072]	DCPA [65076]	*p,p'*-DDE [65095]	EPTC [65080]	Ethalflu-ralin [65082]
U of I Farm Ditch at Hwy 95 nr Parma, ID	Environmental	06/25/2009	09:40	—	7.6	—	6.9	—	—	2.9	—	(1.1)	—	4.0
U of I Farm Ditch at Hwy 95 nr Parma, ID	Field replicate	06/25/2009	09:40	—	6.9	—	7.8	—	—	3.3	—	(0.6)	—	4.3
	RSD				7%		9%			9%		NC		5%
U of I Farm Ditch at Hwy 95 nr Parma, ID	Environmental	08/07/2009	12:10	—	25.9	—	78.8	—	(0.7)	—	—	—	—	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	Field replicate	08/07/2009	12:10	—	25.6	—	84.1	—	(0.5)	—	—	—	—	—
	RSD				1%		5%		NC					
Allen Drain nr Wilder, ID	Environmental	06/24/2009	09:00	—	6.9	—	21.1	—	—	—	—	—	—	—
Allen Drain nr Wilder, ID	Field replicate	06/24/2009	09:00	—	6.3	—	18.4	—	—	—	—	—	—	—
	RSD				6%		10%							
Allen Drain nr Wilder, ID	Environmental	10/06/2009	08:50	3.8	27.5	—	26.9	—	—	(1.8)	—	—	—	—
Allen Drain nr Wilder, ID	Field replicate	10/06/2009	08:50	3.0	30.4	—	28.9	—	—	(1.6)	—	—	—	—
	RSD			17%	7%		5%			NC				
6N/5W-30CDC1	Environmental	06/24/2009	15:00	—	—	—	—	—	—	—	—	—	—	—
6N/5W-30CDC1	Field replicate	06/24/2009	15:01	—	—	—	—	—	—	—	—	—	—	—
	RSD													
I027001-- Parma Field M10-Shallow	Environmental	10/07/2009	11:50	(1.4)	—	—	14.7	—	—	—	—	—	—	—
I027001-- Parma Field M10-Shallow	Field replicate	10/07/2009	11:51	(1.2)	—	—	15.2	—	—	—	—	—	—	—
	RSD			NC			2%							
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	07/14/2009	10:45	—	6.6	—	—	—	—	10.8	5.7	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	Field replicate	07/14/2009	10:46	—	5.7	—	—	—	—	11.2	5.3	—	—	—

Table 7. Dissolved-pesticide concentrations measured in environmental and field-replicate water samples collected in Idaho, Maine, and Wisconsin, June–November 2009. —Continued

[Numbers in brackets are U.S Geological Survey (USGS) National Water Information System (NWIS) parameter codes. Values are in nanograms per liter. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: alachlor, allethrin, butylate, carbaryl, clomazone, cycloate, cyfluthrin, λ-cyhalothrin, cypermethrin, cyproconazole, cyprodinil, *p,p′*-DDD, *p,p′*-DDT, deltamethrin, diazinon, 3,4-DCA, 3,5-DCA, difenocanazole, dimethomorph, esfenvalerate, etofenprox, famoxadone, fenarimol, fenbuconazole, fenhexamid, fenpropathrin, fipronil, fipronil disulfinyl, fipronil sulfide, fipronil sulfone, fluoxastrobin, flusilazole, flutriafol, τ-fluvalinate, imazalil, iprodione, kresoxim-methyl, metconazole, methidathion, methoprene, molinate, myclobutanil, napropamide, oxyflurofen, PCA, PCNB, pebulate, permethrin, phenothrin, phosmet, piperonyl butoxide, prometryn, propanil, propiconazole, propyzamide, resmethrin, simazine, tebuconazole, tefluthrin, tetraconazole, tetramethrin, thiobencarb, triadimefon, triadimenol, trifloxystrobin, triflumizole, and triticonazole. **Abbreviations**: Ave, avenue; Brk, brook; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; NC, relative standard deviation not calculated; nr, near; RSD, relative standard deviation; Trib, tributary; WI, Wisconsin; Xing, crossing; %, percent; —, not detected]

USGS station name	Sample type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Atrazine [65065]	Azoxystrobin [66589]	Bifenthrin [65067]	Boscalid [67550]	Carbofuran [65070]	Chloro-thalonil [65071]	Chlorpyrifos [65072]	DCPA [65076]	*p,p'*-DDE [65095]	EPTC [65080]	Ethalflu-ralin [65082]
	RSD				10%					3%	5%			
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	08/06/2009	19:55	—	—	—	—	—	—	—	—	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	Field replicate	08/06/2009	19:56	—	—	—	—	—	—	—	—	—	—	—
	RSD													
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	09/15/2009	16:40	—	—	—	8.6	—	—	—	—	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	Field replicate	09/15/2009	16:41	—	—	—	8.8	—	—	—	—	—	—	—
	RSD						2%							
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	11/03/2009	14:00	—	—	—	3.4	—	(0.2)	—	—	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	Field replicate	11/03/2009	14:01	—	—	—	(2.7)	—	(0.2)	—	—	—	—	—
	RSD						NC		NC					
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	Environmental	07/15/2009	11:48	—	—	—	—	—	—	—	—	—	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	Field replicate	07/15/2009	11:49	—	—	—	—	—	—	—	—	—	—	—
	RSD													
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	Environmental	07/15/2009	11:15	—	—	—	—	—	—	—	—	—	—	—
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	Field replicate	07/15/2009	11:16	—	—	—	—	—	—	—	—	—	—	—
	RSD													

Table 7. Dissolved-pesticide concentrations measured in environmental and field-replicate water samples collected in Idaho, Maine, and Wisconsin, June–November 2009. —Continued

[Numbers in brackets are U.S Geological Survey (USGS) National Water Information System (NWIS) parameter codes. Values are in nanograms per liter. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: alachlor, allethrin, butylate, carbaryl, clomazone, cycloate, cyfluthrin, λ-cyhalothrin, cypermethrin, cyproconazole, cyprodinil, *p,p'*-DDD, *p,p'*-DDT, deltamethrin, diazinon, 3,4-DCA, 3,5-DCA, difenocanazole, dimethomorph, esfenvalerate, etofenprox, famoxadone, fenarimol, fenbuconazole, fenhexamid, fenpropathrin, fipronil, fipronil disulfinyl, fipronil sulfide, fipronil sulfone, fluoxastrobin, flusilazole, flutriafol, τ-fluvalinate, imazalil, iprodione, kresoxim-methyl, metconazole, methidathion, methoprene, molinate, myclobutanil, napropamide, oxyflurofen, PCA, PCNB, pebulate, permethrin, phenothrin, phosmet, piperonyl butoxide, prometryn, propanil, propiconazole, propyzamide, resmethrin, simazine, tebuconazole, tefluthrin, tetraconazole, tetramethrin, thiobencarb, triadimefon, triadimenol, trifloxystrobin, triflumizole, and triticonazole. **Abbreviations**: Ave, avenue; Brk, brook; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; NC, relative standard deviation not calculated; nr, near; RSD, relative standard deviation; Trib, tributary; WI, Wisconsin; Xing, crossing; %, percent; —, not detected]

USGS station name	Sample type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Atrazine [65065]	Azoxystrobin [66589]	Bifenthrin [65067]	Boscalid [67550]	Carbofuran [65070]	Chloro-thalonil [65071]	Chlorpyrifos [65072]	DCPA [65076]	*p,p'*-DDE [65095]	EPTC [65080]	Ethalflu-ralin [65082]
Spring at Porter-Sett Rd nr Moose Brook Houlton, ME	Environmental	07/16/2009	10:55	—	—	—	—	—	—	—	—	—	—	—
Spring at Porter-Sett Rd nr Moose Brook Houlton, ME	Field replicate	07/16/2009	10:56	—	—	—	—	—	—	—	—	—	—	—
	RSD													
M003001-- Presque Isle Field AF13	Environmental	11/02/2009	10:40	6.2	(0.7)	—	6.5	—	6.0	—	—	—	—	—
M003001-- Presque Isle Field AF13	Field replicate	11/02/2009	10:41	5.6	(0.6)	—	6.4	—	6.9	—	—	—	—	—
	RSD			7%	NC		1%		10%					
Ditch #4 on Lake Road nr Kellner, WI	Environmental	06/16/2009	12:20	22.6	—	—	—	—	—	—	—	—	44.2	—
Ditch #4 on Lake Road nr Kellner, WI	Field replicate	06/16/2009	12:21	25.8	—	—	—	—	—	—	—	—	34.1	—
	RSD			9%									18%	
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Environmental	06/16/2009	18:00	35.9	—	—	—	—	—	—	—	—	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Field replicate	06/16/2009	18:01	36.4	—	—	—	—	—	—	—	—	—	—
	RSD			1%										
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Environmental	07/07/2009	12:40	17.7	—	—	22.7	—	(2.2)	—	—	—	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Field replicate	07/07/2009	12:41	19.1	—	—	24.0	—	(1.8)	—	—	—	—	—
	RSD			5%			4%		NC					
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Environmental	08/18/2009	11:30	14.7	32.0	—	37.7	—	—	—	—	—	—	—

Table 7. Dissolved-pesticide concentrations measured in environmental and field-replicate water samples collected in Idaho, Maine, and Wisconsin, June–November 2009. —Continued

[Numbers in brackets are U.S Geological Survey (USGS) National Water Information System (NWIS) parameter codes. Values are in nanograms per liter. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: alachlor, allethrin, butylate, carbaryl, clomazone, cycloate, cyfluthrin, λ-cyhalothrin, cypermethrin, cyproconazole, cyprodinil, *p,p′*-DDD, *p,p′*-DDT, deltamethrin, diazinon, 3,4-DCA, 3,5-DCA, difenocanazole, dimethomorph, esfenvalerate, etofenprox, famoxadone, fenarimol, fenbuconazole, fenhexamid, fenpropathrin, fipronil, fipronil disulfinyl, fipronil sulfide, fipronil sulfone, fluoxastrobin, flusilazole, flutriafol, τ-fluvalinate, imazalil, iprodione, kresoxim-methyl, metconazole, methidathion, methoprene, molinate, myclobutanil, napropamide, oxyflurofen, PCA, PCNB, pebulate, permethrin, phenothrin, phosmet, piperonyl butoxide, prometryn, propanil, propiconazole, propyzamide, resmethrin, simazine, tebuconazole, tefluthrin, tetraconazole, tetramethrin, thiobencarb, triadimefon, triadimenol, trifloxystrobin, triflumizole, and triticonazole. **Abbreviations**: Ave, avenue; Brk, brook; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; NC, relative standard deviation not calculated; nr, near; RSD, relative standard deviation; Trib, tributary; WI, Wisconsin; Xing, crossing; %, percent; —, not detected]

USGS station name	Sample type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Atrazine [65065]	Azoxystrobin [66589]	Bifenthrin [65067]	Boscalid [67550]	Carbofuran [65070]	Chloro-thalonil [65071]	Chlorpyrifos [65072]	DCPA [65076]	*p,p'*-DDE [65095]	EPTC [65080]	Ethalflu-ralin [65082]
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Field replicate	08/18/2009	11:31	17.7	35.3	—	41.7	—	—	—	—	—	—	—
	RSD			13%	7%		7%							
Unnamed Ditch at Beaver Ave nr Hancock, WI	Environmental	06/17/2009	10:50	51.2	—	—	38.4	—	5.3	—	—	—	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	Field replicate	06/17/2009	10:51	46.6	—	—	38.1	—	5.0	—	—	—	—	—
	RSD			7%			1%		4%					
Unnamed Ditch at Beaver Ave nr Hancock, WI	Environmental	10/01/2009	10:45	22.6	(0.5)	—	22.5	—	(0.3)	—	—	—	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	Field replicate	10/01/2009	10:46	28.3	(0.4)	—	24.9	—	(0.4)	—	—	—	—	—
	RSD			16%	NC		7%		NC					
WS-19/08E/15-0008	Environmental	06/17/2009	17:00	—	—	—	—	—	—	—	—	—	—	—
WS-19/08E/15-0008	Field replicate	06/17/2009	17:01	—	—	—	—	—	—	—	—	—	—	—
	RSD													
W137003-- Hancock Field K1-Shallow	Environmental	09/29/2009	12:14	3.4	—	—	14.3	—	(0.4)	—	—	—	—	—
W137003-- Hancock Field K1-Shallow	Field replicate	09/29/2009	12:15	3.6	—	—	14.5	—	(0.4)	—	—	—	—	—
	RSD			4%			1%		NC					

Table 7. Dissolved-pesticide concentrations measured in environmental and field-replicate water samples collected in Idaho, Maine, and Wisconsin, June–November 2009. —Continued

[Numbers in brackets are U.S Geological Survey (USGS) National Water Information System (NWIS) parameter codes. Values are in nanograms per liter. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: alachlor, allethrin, butylate, carbaryl, clomazone, cycloate, cyfluthrin, λ-cyhalothrin, cypermethrin, cyproconazole, cyprodinil, *p,p′*-DDD, *p,p′*-DDT, deltamethrin, diazinon, 3,4-DCA, 3,5-DCA, difenocanazole, dimethomorph, esfenvalerate, etofenprox, famoxadone, fenarimol, fenbuconazole, fenhexamid, fenpropathrin, fipronil, fipronil disulfinyl, fipronil sulfide, fipronil sulfone, fluoxastrobin, flusilazole, flutriafol, τ-fluvalinate, imazalil, iprodione, kresoxim-methyl, metconazole, methidathion, methoprene, molinate, myclobutanil, napropamide, oxyflurofen, PCA, PCNB, pebulate, permethrin, phenothrin, phosmet, piperonyl butoxide, prometryn, propanil, propiconazole, propyzamide, resmethrin, simazine, tebuconazole, tefluthrin, tetraconazole, tetramethrin, thiobencarb, triadimefon, triadimenol, trifloxystrobin, triflumizole, and triticonazole. **Abbreviations**: Ave, avenue; Brk, brook; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; NC, relative standard deviation not calculated; nr, near; RSD, relative standard deviation; Trib, tributary; WI, Wisconsin; Xing, crossing; %, percent; —, not detected]

USGS station name	Sample type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Fludioxinil [67640]	Hexazinone [65085]	Malathion [65087]	Methyl parathion [65089]	Metolachlor [65090]	Pendi-methalin [65098]	Pyraclos-trobin [66646]	Pyrimethanil [67717]	Trifluralin [65108]	Zoxamide [67768]
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Environmental	06/23/2009	11:50	—	—	—	—	234	38.3	—	—	2.1	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Field replicate	06/23/2009	11:50	—	—	—	—	274	38.0	—	—	(2.0)	—
	RSD							11%	1%			NC	
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Environmental	08/07/2009	09:45	—	—	—	52.7	60.1	—	60.1	(0.9)	(0.8)	—
Sand Run Gulch at Hwy 95 Xing nr Parma, ID	Field replicate	08/07/2009	09:45	—	—	—	46.1	56.5	—	59.2	(1.1)	(0.6)	—
	RSD						9%	4%		1%	NC	NC	
Ditch nr Wanstad Road nr Parma, ID	Environmental	06/23/2009	19:10	—	—	249	41.6	1750	54.2	—	—	(0.8)	—
Ditch nr Wanstad Road nr Parma, ID	Field replicate	06/23/2009	19:11	—	—	249	43.1	1750	53.1	—	—	(0.9)	—
	RSD					0%	3%	0%	1%			NC	
Ditch nr Wanstad Road nr Parma, ID	Environmental	07/14/2009	13:42	—	—	—	53.5	664	57.4	43.8	(2.9)	—	—
Ditch nr Wanstad Road nr Parma, ID	Field replicate	07/14/2009	13:43	—	—	—	44.7	612	44.1	39.8	(2.9)	—	—
	RSD						13%	6%	19%	7%	NC		
Ditch nr Wanstad Road nr Parma, ID	Environmental	08/07/2009	10:35	—	54.9	—	72.6	141	31.9	85.6	—	—	—
Ditch nr Wanstad Road nr Parma, ID	Field replicate	08/07/2009	10:35	—	59.9	—	84.1	133	26.4	68.2	—	—	—
	RSD				6%		10%	4%	13%	16%			
Ditch nr Wanstad Road nr Parma, ID	Environmental	08/25/2009	13:30	—	—	—	—	49.1	27.7	239	—	—	22.2
Ditch nr Wanstad Road nr Parma, ID	Field replicate	08/25/2009	13:31	—	—	—	—	48.1	27.5	256	—	—	23.1
	RSD							1%	1%	5%			5%

Table 7. Dissolved-pesticide concentrations measured in environmental and field-replicate water samples collected in Idaho, Maine, and Wisconsin, June–November 2009. —Continued

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USGS station name	Sample type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Fludioxinil [67640]	Hexazinone [65085]	Malathion [65087]	Methyl parathion [65089]	Metolachlor [65090]	Pendi-methalin [65098]	Pyraclos-trobin [66646]	Pyrimethanil [67717]	Trifluralin [65108]	Zoxamide [67768]
U of I Farm Ditch at Hwy 95 nr Parma, ID	Environmental	06/25/2009	09:40	—	—	—	—	133	49.5	—	—	(1.3)	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	Field replicate	06/25/2009	09:40	—	—	—	—	130	56.3	—	—	(1.2)	—
	RSD							2%	9%			NC	
U of I Farm Ditch at Hwy 95 nr Parma, ID	Environmental	08/07/2009	12:10	—	—	—	—	—	—	53.8	(1.2)	—	—
U of I Farm Ditch at Hwy 95 nr Parma, ID	Field replicate	08/07/2009	12:10	—	—	—	—	—	—	53.1	(1.1)	—	—
	RSD									1%	NC		
Allen Drain nr Wilder, ID	Environmental	06/24/2009	09:00	—	—	—	—	27.6	23.4	—	—	—	—
Allen Drain nr Wilder, ID	Field replicate	06/24/2009	09:00	—	—	—	—	25.1	23.5	—	—	—	—
	RSD							7%	0%				
Allen Drain nr Wilder, ID	Environmental	10/06/2009	08:50	—	—	—	—	7.0	2.4	12.9	—	—	—
Allen Drain nr Wilder, ID	Field replicate	10/06/2009	08:50	—	—	—	—	6.7	2.8	9.9	—	—	—
	RSD							3%	11%	19%			
6N/5W 30CDC1	Environmental	06/24/2009	15:00	—	—	—	—	—	—	—	—	—	—
6N/5W 30CDC1	Field replicate	06/24/2009	15:01	—	—	—	—	—	—	—	—	—	—
	RSD												
I027001-- Parma Field M10-Shallow	Environmental	10/07/2009	11:50	—	—	—	—	—	—	4.8	—	—	—
I027001-- Parma Field M10-Shallow	Field replicate	10/07/2009	11:51	—	—	—	—	—	—	4.6	—	—	—
	RSD									3%			
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	07/14/2009	10:45	(4.2)	—	—	—	—	—	23.5	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	Field replicate	07/14/2009	10:46	(3.8)	—	—	—	—	—	25.3	—	—	—

Table 7. Dissolved-pesticide concentrations measured in environmental and field-replicate water samples collected in Idaho, Maine, and Wisconsin, June–November 2009. —Continued

[Numbers in brackets are U.S Geological Survey (USGS) National Water Information System (NWIS) parameter codes. Values are in nanograms per liter. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: alachlor, allethrin, butylate, carbaryl, clomazone, cycloate, cyfluthrin, λ-cyhalothrin, cypermethrin, cyproconazole, cyprodinil, *p,p′*-DDD, *p,p′*-DDT, deltamethrin, diazinon, 3,4-DCA, 3,5-DCA, difenocanazole, dimethomorph, esfenvalerate, etofenprox, famoxadone, fenarimol, fenbuconazole, fenhexamid, fenpropathrin, fipronil, fipronil disulfinyl, fipronil sulfide, fipronil sulfone, fluoxastrobin, flusilazole, flutriafol, τ-fluvalinate, imazalil, iprodione, kresoxim-methyl, metconazole, methidathion, methoprene, molinate, myclobutanil, napropamide, oxyflurofen, PCA, PCNB, pebulate, permethrin, phenothrin, phosmet, piperonyl butoxide, prometryn, propanil, propiconazole, propyzamide, resmethrin, simazine, tebuconazole, tefluthrin, tetraconazole, tetramethrin, thiobencarb, triadimefon, triadimenol, trifloxystrobin, triflumizole, and triticonazole. **Abbreviations**: Ave, avenue; Brk, brook; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; NC, relative standard deviation not calculated; nr, near; RSD, relative standard deviation; Trib, tributary; WI, Wisconsin; Xing, crossing; %, percent; —, not detected]

USGS station name	Sample type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Fludioxinil [67640]	Hexazinone [65085]	Malathion [65087]	Methyl parathion [65089]	Metolachlor [65090]	Pendi-methalin [65098]	Pyraclos-trobin [66646]	Pyrimethanil [67717]	Trifluralin [65108]	Zoxamide [67768]
	RSD			NC						5%			
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	08/06/2009	19:55	—	—	—	—	—	—	—	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	Field replicate	08/06/2009	19:56	—	—	—	—	—	—	—	—	—	—
	RSD												
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	09/15/2009	16:40	—	—	—	—	—	—	—	—	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	Field replicate	09/15/2009	16:41	—	—	—	—	—	—	—	—	—	—
	RSD												
Hardwood Brook below Glidden Brk nr Caribou, ME	Environmental	11/03/2009	14:00	—	—	—	—	—	—	—	(0.4)	—	—
Hardwood Brook below Glidden Brk nr Caribou, ME	Field replicate	11/03/2009	14:01	—	—	—	—	—	—	—	(0.5)	—	—
	RSD										NC		
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	Environmental	07/15/2009	11:48	—	—	—	—	—	—	—	—	—	—
Unnamed Trib to Aroostook Pond nr Presque Isle, ME	Field replicate	07/15/2009	11:49	—	—	—	—	—	—	—	—	—	—
	RSD												
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	Environmental	07/15/2009	11:15	—	—	—	—	—	—	—	—	(0.8)	—
Aroostook Pond nr Aroostook Farm nr Presque Isle, ME	Field replicate	07/15/2009	11:16	—	—	—	—	—	—	—	—	(0.6)	—
	RSD											NC	

Table 7. Dissolved-pesticide concentrations measured in environmental and field-replicate water samples collected in Idaho, Maine, and Wisconsin, June–November 2009. —Continued

[Numbers in brackets are U.S Geological Survey (USGS) National Water Information System (NWIS) parameter codes. Values are in nanograms per liter. Results in parenthesis ( ) are below method detection limits and are estimates. The following compounds were analyzed but were not detected in any samples: alachlor, allethrin, butylate, carbaryl, clomazone, cycloate, cyfluthrin, λ-cyhalothrin, cypermethrin, cyproconazole, cyprodinil, *p,p′*-DDD, *p,p′*-DDT, deltamethrin, diazinon, 3,4-DCA, 3,5-DCA, difenocanazole, dimethomorph, esfenvalerate, etofenprox, famoxadone, fenarimol, fenbuconazole, fenhexamid, fenpropathrin, fipronil, fipronil disulfinyl, fipronil sulfide, fipronil sulfone, fluoxastrobin, flusilazole, flutriafol, τ-fluvalinate, imazalil, iprodione, kresoxim-methyl, metconazole, methidathion, methoprene, molinate, myclobutanil, napropamide, oxyflurofen, PCA, PCNB, pebulate, permethrin, phenothrin, phosmet, piperonyl butoxide, prometryn, propanil, propiconazole, propyzamide, resmethrin, simazine, tebuconazole, tefluthrin, tetraconazole, tetramethrin, thiobencarb, triadimefon, triadimenol, trifloxystrobin, triflumizole, and triticonazole. **Abbreviations**: Ave, avenue; Brk, brook; hh:mm, hour:minute; Hwy, highway; ID, Idaho; ME, Maine; mm/dd/yyyy, month/day/year; NC, relative standard deviation not calculated; nr, near; RSD, relative standard deviation; Trib, tributary; WI, Wisconsin; Xing, crossing; %, percent; —, not detected]

USGS station name	Sample type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Fludioxinil [67640]	Hexazinone [65085]	Malathion [65087]	Methyl parathion [65089]	Metolachlor [65090]	Pendi-methalin [65098]	Pyraclos-trobin [66646]	Pyrimethanil [67717]	Trifluralin [65108]	Zoxamide [67768]
Spring at Porter-Sett Rd nr Moose Brook Houlton, ME	Environmental	07/16/2009	10:55	—	—	—	—	—	—	—	—	—	—
Spring at Porter-Sett Rd nr Moose Brook Houlton, ME	Field replicate	07/16/2009	10:56	—	—	—	—	—	—	—	—	—	—
	RSD												
M003001-- Presque Isle Field AF13	Environmental	11/02/2009	10:40	—	—	—	—	—	—	(0.9)	(1.6)	—	—
M003001-- Presque Isle Field AF13	Field replicate	11/02/2009	10:41	—	—	—	—	—	—	(1.1)	(2.0)	—	—
	RSD									NC	NC		
Ditch #4 on Lake Road nr Kellner, WI	Environmental	06/16/2009	12:20	—	—	—	—	8.4	—	—	—	—	—
Ditch #4 on Lake Road nr Kellner, WI	Field replicate	06/16/2009	12:21	—	—	—	—	7.7	—	—	—	—	—
	RSD							6%					
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Environmental	06/16/2009	18:00	—	—	—	—	94.5	—	—	—	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Field replicate	06/16/2009	18:01	—	—	—	—	99.0	—	—	—	—	—
	RSD							3%					
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Environmental	07/07/2009	12:40	—	—	—	—	37.0	—	—	—	—	—
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Field replicate	07/07/2009	12:41	—	—	—	—	38.2	—	—	—	—	—
	RSD							2%					
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Environmental	08/18/2009	11:30	—	—	—	—	11.4	—	5.9	—	—	—

Table 7. Dissolved-pesticide concentrations measured in environmental and field-replicate water samples collected in Idaho, Maine, and Wisconsin, June–November 2009. —Continued

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USGS station name	Sample type	Sample date (mm/dd/yyyy)	Sample time (hh:mm)	Fludioxinil [67640]	Hexazinone [65085]	Malathion [65087]	Methyl parathion [65089]	Metolachlor [65090]	Pendi-methalin [65098]	Pyraclos-trobin [66646]	Pyrimethanil [67717]	Trifluralin [65108]	Zoxamide [67768]
Unnamed Ditch at Apache and 4th Ave nr Plainfield, WI	Field replicate	08/18/2009	11:31	—	—	—	—	13.4	—	4.8	—	—	—
	RSD							11%		15%			
Unnamed Ditch at Beaver Ave nr Hancock, WI	Environmental	06/17/2009	10:50	—	—	—	—	56.1	—	101	—	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	Field replicate	06/17/2009	10:51	—	—	—	—	60.3	—	101	—	—	—
	RSD							5%		0%			
Unnamed Ditch at Beaver Ave nr Hancock, WI	Environmental	10/01/2009	10:45	—	—	—	—	49.7	—	8.7	—	—	—
Unnamed Ditch at Beaver Ave nr Hancock, WI	Field replicate	10/01/2009	10:46	—	—	—	—	49.0	—	10.5	—	—	—
	RSD							1%		13%			
WS-19/08E/15-0008	Environmental	06/17/2009	17:00	—	—	—	—	107	—	—	—	—	—
WS-19/08E/15-0008	Field replicate	06/17/2009	17:01	—	—	—	—	115	—	—	—	—	—
	RSD							5%					
W137003-- Hancock Field K1-Shallow	Environmental	09/29/2009	12:14	—	—	—	—	—	—	—	—	—	—
W137003-- Hancock Field K1-Shallow	Field replicate	09/29/2009	12:15	—	—	—	—	—	—	—	—	—	—
	RSD												

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