

# LIFE in our Natural Environment

## LEADING INDICATORS

Current

Trend



Percent of days with good quality air



Miles of impaired surface waters

△ Good

▷ Fair

▽ Poor

--- Not Rated

### NATURAL ENVIRONMENT “EXCELLENCE” FOR BROWN COUNTY IS DEFINED AS:

Community leaders and members:

- + Value and practice conservation, stewardship, and protection of the natural environment
- + Have the opportunity to enjoy the outdoors
- + Experience clean air and water
- + Preserve green space and implement well-managed land development

# LIFE in our Natural Environment

## Status on Progress

The natural environment is important to the quality of life in Brown County and forms a foundation for economic activity, tourism, health, and recreation opportunities for visitors and residents alike. The Brown County area is home to wonderful natural resources, recreational opportunities, and beautiful natural surroundings.

Since the publication of the 2011 LIFE Study, there have been a number of positive developments in this sector. It was clear that both community leaders and community members maintained positive views about the quality of the natural environment in Brown County. In 2016, about 80% of community members and leaders rated the quality of the natural environment as excellent or good.

It is also worth noting that according to data from the Environmental Protection Agency, in 2015 there were 291 days with good air quality, 81 days with moderate air quality, one day that was unhealthy for sensitive persons, and no unhealthy days. Thus, the percentage of days (80%) in Brown County with good air quality was the highest on record since 2008. In the past few years there has been a slight decrease in the number of asthma-related hospitalizations in Brown County.

Water quality issues have been recognized and addressed by community leaders, a significant improvement because data from the 2016 community survey indicated 48% of people rated the quality of water in area lakes and rivers as fair or poor (a slight decrease from 54% in 2011). There have been a number of efforts to clean up local bodies of water. The Fox River Cleanup Project, for example, is an ongoing effort to address the presence of polychlorinated biphenyls in the Fox River. Since the 2011 LIFE Study, County Executive Troy Streckenbach established a Phosphorus Committee. According to the county, "The Phosphorus Committee's charge was to develop a strategy focusing on the attainment of a long-term sustainable Lower Fox and Bay of Green Bay watershed that was healthy and economically viable for agriculture, industry, tourism and residents in Brown County while looking for a long-term solution that mitigates compliance impacts and costs. A successful outcome will be for a partnership among industry, agriculture, municipalities and various units of government to find more cost-effective ways of developing solutions to reach the Environmental Protection Agency's mandated Total Maximum Daily Load (TMDL)." The committee membership included a broad selection of county stakeholders such as county, local, and tribal government, businesses, higher education, and utilities. Recommendations and a white paper were released in 2013 that included eight recommendations that focused on practices to prevent and incentivize better runoff control, investigate alternative ways to process waste, explore ways to protect croplands, and work with legislators to staff and enforce regulation of Concentrated Animal Feeding Operations (CAFOs), or large farms.

There have been a number of improvements in this area since the publication of the 2011 LIFE Study. Given the importance of the natural environment, it will be valuable to continually monitor indicators in this area. Collecting additional data in the future will allow the community to evaluate areas of improvement and to address emerging environmental issues and concerns.

# Perceptions of Environmental Quality

## Data Highlights

### Figure 1 Perceptions of the Quality of the Natural Environment

Both community leaders and community members had positive views about the quality of the natural environment in Brown County. In 2011, 76% of surveyed community members rated the quality of the natural environment as excellent or good. That number increased to 79% in 2016. In 2011, 82% of surveyed community leaders rated the natural environment as excellent or good. That number was nearly identical in 2016 (81%).

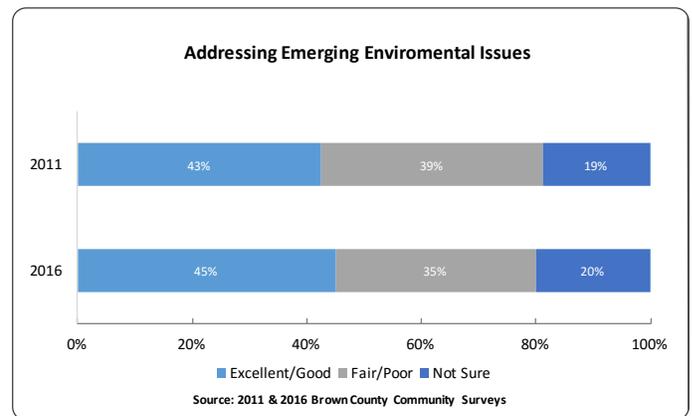
Figure 1



### Figure 2 Perceptions of Addressing Emerging Environmental Issues

Community members had split views about the extent to which Brown County addressed emerging environmental issues before they became significant problems. In 2016, 45% of community members rated Brown County as excellent or good on this issue. That same year, 35% of community members rated Brown County as being good or fair. A fairly large number of people in 2016 said they were not sure about this issue. Perceptions about addressing emerging environmental issues were nearly identical in 2011 compared to 2016.

Figure 2



# Air Quality

## Data Highlights

### Figure 1 Percent of Days with Good Quality Air

In 2015, there were 291 days with good air quality, 81 days with moderate air quality, one day that was unhealthy for sensitive persons, and no unhealthy days. In 2015, the percentage of days with good air quality was the highest on record since 2008. Small particulate (PM 2.5) was the major pollutant on 186 days, followed by ozone on 143 days. Trend analysis showed that the percentage of days in which ozone was the major pollutant increased (due in part to traffic) while small particulate as the major pollutant (from factory and coal discharge) held steady as the major pollutant roughly half of the days.

### Table 1 Pounds of Toxic Chemicals Released into Air

The Toxic Release Inventory (TRI) tracked the release by industrial facilities of toxic chemicals into the air, water, and land that may be harmful to public health. Of the 1.5 million pounds of toxic waste released in Brown County in 2014, 83% (1.23 million pounds) was released into the air. Figure 2 showed the top five toxic chemicals generated as production-related waste. Because these data were not readily available in 2010, cross-year comparisons were not possible.

### Figure 2 Age-Adjusted Hospitalization Rate for Asthma

The asthma rate is often used as an indicator of air quality for a region. In 2014, Brown County's rate of persons diagnosed with asthma dropped to 6.7 cases per 10,000 population according to the Wisconsin Department of Health Services. From that same source, Brown County had 461 hospital emergency room visits per 100,000 persons, compared to Wisconsin's much lower rate of 376.

### Perceptions of Air Quality in Brown County

Community members were asked to rate the quality of the air in Brown County in 2011 and 2016. In 2011, 62% of community members said air quality was excellent or good and 38% rated the air quality as fair or poor. In 2016, 72% of community members said the air quality in Brown County was excellent or good and 28% said it was fair or poor.

Figure 1

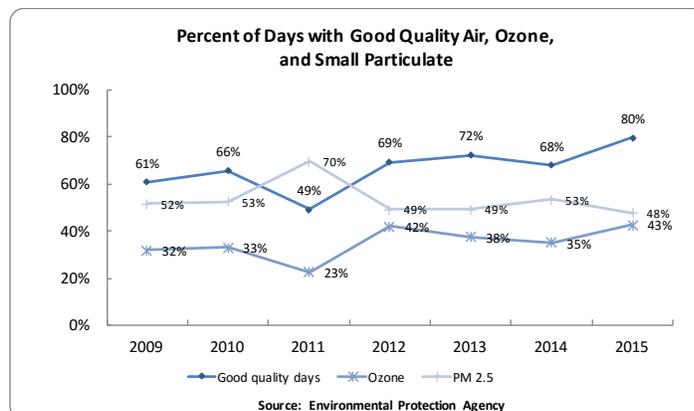


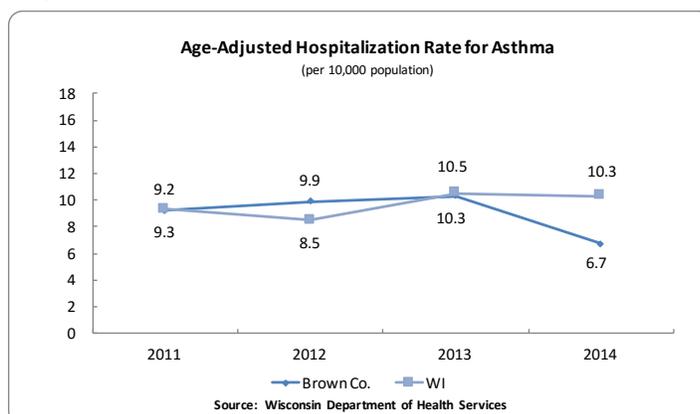
Table 1

Top Five Toxic Chemicals Released into Air  
Brown County, 2014

Chemical	Percent
Hydrochloric Acid	52%
Sulfuric Acid	20%
Ozone	6%
Hydrogen Fluoride	5%
Methanol	3%
Other	14%
<b>TOTAL</b>	<b>1.23 million lbs. (100%)</b>

Source: Environmental Protection Agency

Figure 2



# Drinking Water Quality

## Data Highlights

### Table 1 Brown County Environmental Health Water Summary

The Wisconsin Department of Health Services reported in 2016 that public water sources showed negligible levels of arsenic and nitrate. However, testing of a sampling of Brown County private wells paints a different picture: While nitrate levels were found acceptable [between 2.1-5 micrograms per liter (mg/L)], some private wells exceeded the maximum allowable limit for arsenic at 21 or more mg/L, substantially higher than the maximum concentration of 11 mg/L.

In 2016, both area water providers, Green Bay Water Utility (GBWU) and Central Brown County Water Authority (CBCWA, serving about half of Brown County residents), reported no contaminants that exceeded maximum limits. Both utilities have seen elevated lead concerns due to corrosion of household plumbing, although only GBWU exceeded contaminant levels in 2011. CBCWA reached the 90% threshold. The GBWU implemented an action plan with the Wisconsin Department of Natural Resources and Brown County Health Department titled "Operation: Get the Lead Out." In August, 2016, the city of Green Bay allocated \$300,000 of its stadium tax proceeds to replace lead water pipes in households.

### Figure 1 Perceptions of Drinking Water Quality

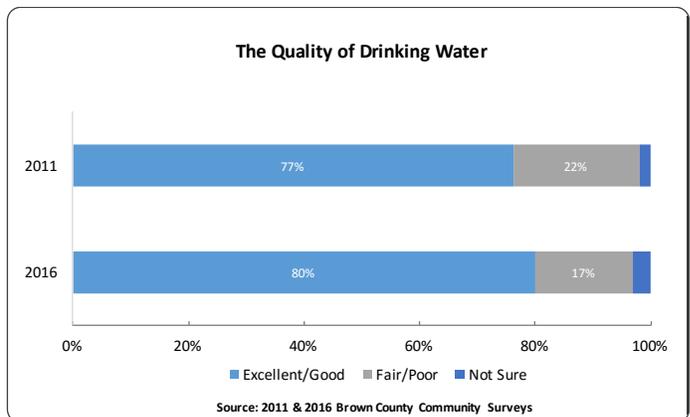
In both 2011 and 2016, surveyed community members had positive assessments about the quality of drinking water in the area. In 2011, 77% of community members said the quality of drinking water was excellent or good and 22% said it was fair or poor. In 2016, 80% of community members rated the quality of drinking water as excellent or good. That year, 17% of people said drinking water quality was fair or poor.

Table 1

Environmental Health Profile - Water Quality			
2016		Brown County	WI Average
Public Water	Arsenic concentration (mg/L)	1.2	1.3
	Nitrate concentration (mg/L)	0.1	1.5
Private Well Water	Arsenic concentration (mg/L)	21.0/above	Max=11.0
	Nitrate concentration (mg/L)	2.1-5.0	Max=10.1

Source: Wisconsin Department of Health Services

Figure 1



# Surface Water Quality

## Data Highlights

### Table 1 Impaired Surface Waters

The Wisconsin Department of Natural Resources (DNR) assesses water bodies on a continual basis. In 2010, the DNR changed the criteria for listing lakes, streams, and rivers as impaired and re-evaluated waterbodies according to new criteria, with a focus on Total Phosphorus. Between 2010 and 2016, 94 miles of rivers and streams were determined to be attaining optimal use (not impaired), and 241 miles were found to be impaired, often due to Total Phosphorus.

### Nonpoint Source Pollution of Lower Fox River

The majority of waterways in Brown County feed into the Lower Fox River and Bay of Green Bay, two waterbodies designated by the Environmental Protection Agency (EPA) as areas of concern (with impairment of beneficial use and threatened ability to support aquatic life) due to historical point-source pollution. According to the Brown County Planning and Land Services Department, “non-point source pollution (runoff) was considered the major source of impairment.” In 2012, the EPA reported that 63% of Total Phosphorus and 98% of Total Suspended Solids loadings in the Lower Fox River were from non-point sources.

### Table 2 State of the Bay Report: Status and Trend Assessment

The State of the Bay report was released in 2013 by the University of Wisconsin Sea Grant Institute. Since 1993, the last published report about the Bay, most fish populations improved, coastal wetlands remained in fair condition, beach closings due to bacterial contamination remained stable, and there were lower levels of ammonia and dissolved oxygen. The report identified the following areas as needing work: reducing concentrations of phosphorus, nitrate, suspended solids, and other toxic chemicals, such as polychlorinated biphenyls (PCBs); reducing excess growth of algae; improving water clarity; and reducing aquatic invasive species. According to the report, the Fox River Cleanup “from Little Rapids to De Pere was completed in 2011. The only segment left to complete was from the De Pere dam to Green Bay, which was expected in 2017. Since this part of the Fox River contains the largest mass of PCB contamination, it will take the longest to clean up.” The full report can be found at <http://www.newwater.us>.

### Figure 1 Perceptions of the Quality of Rivers and Lakes

Community members had divided views about the quality of water in lakes and rivers. In 2011, 45% of community members said the quality of water in rivers and lakes was excellent or good. In 2016, 50% of people rated the quality of rivers and lakes as excellent or good.

There were a number of efforts to clean up local bodies of water. The Fox River Cleanup Project, for example, is an ongoing effort to address the presence of PCBs in the Fox River.

Table 1

Assessment Cycle	Attaining Uses	Impaired	Total Assessed
2010	0	193	193
2016	94	241	335

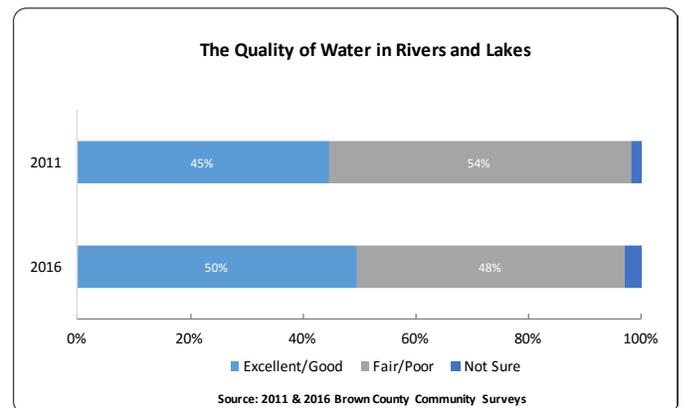
Source: Wisconsin Department of Natural Resources

Table 2

Indicator	Status	Trend
Total Phosphorus	Poor	Unchanging
Ammonia	Good	Unchanging
Nitrate	Fair-Good	Deteriorating
Suspended Solids	Poor	Unchanging
Chlorophyll a	Poor	Unchanging
Water Clarity (Secchi)	Poor	Unchanging
Dissolved Oxygen (DO)	Fair	Improving
Toxic Contaminants	Poor	Undetermined
Water Levels	Below Average	Declining
Beach Health	Fair	Undetermined
Aquatic Invasive Species	Poor	Deteriorating
Benthic Macroinvert.	Poor	Undetermined
Coastal Wetlands	Fair	Deteriorating
Walleye	Good	Unchanging
Yellow Perch	Mixed	Improving
Spotted Musky	Fair	Improving
Northern Pike	Fair	Unchanging
Lake Sturgeon	Recovering	Improving
Colonial Nesting Birds	Mixed	Improv. to Deteriorat.

Source: University of Wisconsin Sea Grant Institute, 2013 report

Figure 1



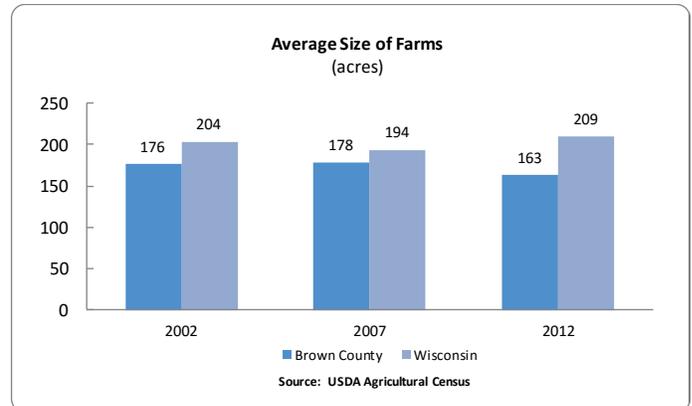
# Land Use and Quality

## Data Highlights

### Figure 1 Average Size of Farms (Acres)

In 2002, Brown County had 1,117 farms. In 2012, that number remained relatively unchanged at 1,111. However, the average acreage of Brown County farms shrank from 176 acres in 2002 to 163 acres in 2012. In all the years shown in Figure 1, the average size of farms in Brown County (in acres) was less than the state average.

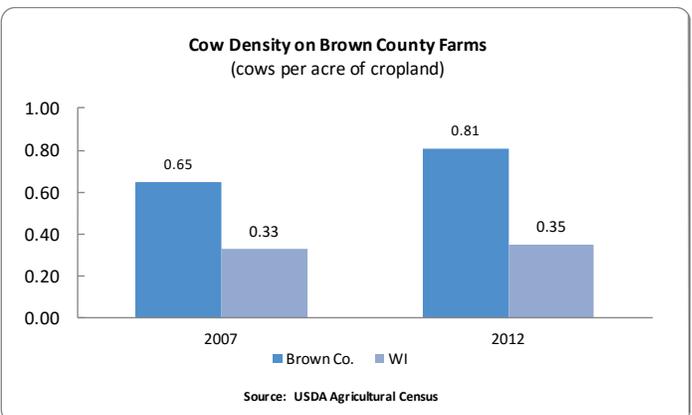
Figure 1



### Figure 2 Cow Density on Brown County Farms

In 2007, the U.S. Department of Agriculture (USDA) annual agricultural census counted 38 Brown County farms with 500 or more head of cattle, and that number grew to 57 in 2012. In 2007, the U.S. Census reported that Brown County farms had almost twice the rate of cow density (cows per acre of cropland) as the Wisconsin average: Brown County farms averaged 0.65 cows per acre of cropland compared to the state average, which was 0.33 cows per acre. The gap grew by 2012, when Brown County saw 0.81 cows per acre compared to the state average, which was 0.35 cows per acre.

Figure 2



### Table 1 Land Use by Category

Between 2000 and 2014, Brown County land use began to reflect a growing, urbanized environment. The largest change in land use occurred in the acreage used for agricultural purposes (a decline of 11,645 acres from 2000 to 2014).

Table 1

	2000	2014	Percent Change from 2000	Actual Acreage Change
Residential	44,657	45,465	1.81%	808
Commercial	4,740	5,105	7.70%	365
Industrial	6,050	6,661	10.10%	611
Transportation	25,339	26,509	4.62%	1,170
Utilities	1,526	1,546	1.31%	20
Government	3,590	3,657	1.87%	67
Outdoor recreation	10,939	10,992	0.48%	53
Agricultural	180,331	168,686	-6.46%	-11,645
Natural areas/vacant	65,458	74,009	13.06%	8,551
Total acreage	342,629	342,629	-	-

Source: Brown County Planning Commission

# Natural Resource Use and Conservation

## Data Highlights

### Figure 1 Residents Who Commuted Alone by Automobile to Work

The number of residents who commuted alone by car to work remained fairly stable in Brown County. In 2014, data from the U.S. Census revealed that 85% of people commuted to work alone. That number was higher than the state rate of 81% and the U.S. rate of 77%.

### Figure 2 Pounds of Material Recycled per Resident

The Wisconsin Department of Natural Resources tracked the amount of material recycled per resident. After a slight decline from 2007 to 2009, the amount in Brown County had been quite stable. In 2014, the number of pounds of material recycled per resident was 156.

### Table 1 Kilowatt Hours Consumed per WPS Customer

The last column in Table 1 calculates the percentage change in the number of kilowatt hours consumed per customer from 2009 to 2015. Residential and public lighting saw decreases in the amount of kilowatt hours consumed, while small commercial and industrial saw increases.

### Conservation by Business and Industry

In the 2011 LIFE Study, two Brown County businesses were participating in the Wisconsin Department of Natural Resources' Green Tier program, an initiative that helps businesses identify ways to become more sustainable. In 2016, four businesses were participating. Brown County was home to 16 Leadership in Energy and Environmental Design (LEED) Certified Buildings in 2016 according to the University of Wisconsin-Extension database, including a mix of public and private organizations representing health care, retail, office, and industrial purposes. LEED is an in-depth certification program to promote buildings that were resource efficient.

Figure 1

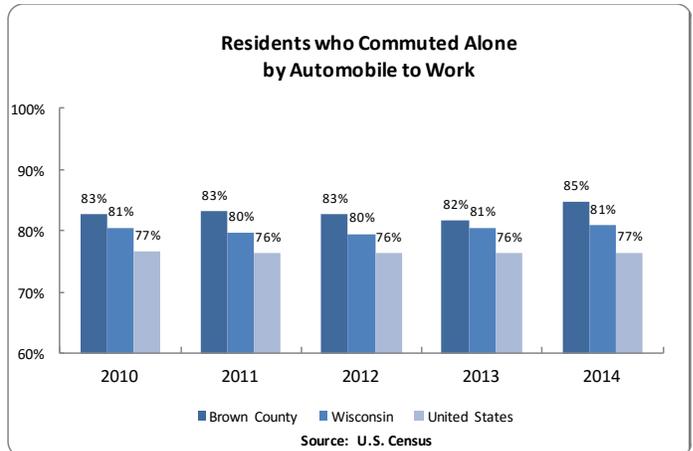


Figure 2



Table 1

KWH per customer	2009	2015	% change
Residential	7,257	7,067	-3%
Small commercial	71,081	72,951	3%
Industrial	17,434,522	18,274,380	5%
Public lighting	67,690	65,667	-3%

Source: Wisconsin Public Service Commission

# LIFE in our Natural Environment

## Challenges and Opportunities

The natural environment sector has experienced some positive changes since the 2011 LIFE Study, highlighted by collaborative efforts to improve water quality. However, the community may want to consider some challenges and concerns.

While the number of days with good quality air was the best it has been in a long time in Brown County, small particulate (PM 2.5) was the major pollutant on 186 days, followed by ozone on 143 days. The amount of ozone increased over the past several years. There may be health consequences associated with these air pollutants. It is also important to note the number of residents who commute alone (by car) to work has remained fairly stable in Brown County. The U.S. Census estimated that 85% of people in Brown County commuted to work alone. That was higher than the state rate of 81% and the U.S. rate of 77%.

Although the public had positive views about the quality of drinking water in the area, there were concerns about the quality of water in local rivers and lakes. In 2016, 48% of surveyed community members rated the quality of water in rivers and lakes as fair or poor. Objective indicators revealed there are some concerns with surface water quality in the Lower Fox River and Bay of Green Bay. Local bodies of water have been impacted strongly by non-point sources of runoff. The Total Phosphorus and Total Solid Sediment loads exceeded standards and could lead to algae growth, poor water clarity, and less dissolved oxygen. In the State of the Bay report, many water quality indicators were listed as being in “poor (unchanging)” or “fair and deteriorating” condition. Only two indicators were listed as being in “good” condition. Water quality issues can pose a long-term threat to the economy, recreation, tourism, and health.

Experts indicated that many water quality concerns stem from agricultural practices and the increasing density of farming activities. About half of Brown County land was used for agricultural purposes in 2014, which is a decline of more than 11,000 acres since 2000. Yet the extent of agricultural activity has grown, putting a great deal of pressure on Brown County’s ability to manage cattle waste, and threatens the surface water and air quality in the region. The number of large farms (with 500+ cattle) grew from 39 in 2007 to 57 in 2012. In recent years, Brown County farms averaged 0.81 cows per acre compared to Wisconsin, which had 0.35 cows per acre. The pressure on local cropland and waste disposal systems has increased dramatically. According to the Green Bay Press-Gazette (August 2, 2016), the Wisconsin Department of Natural Resources has “scaled back proposed rules regulating factory farms’ manure spreading amid complaints [about cost] from the dairy industry.” The policy would have reduced the amount of manure that could be applied per acre and would have limited spraying of manure. Brown County will be impacted perhaps more than any other Wisconsin county by these policy changes due to the nature of agriculture in this area. The actions of local community leaders will become more important than ever to water quality. Local government leaders have begun to show willingness to act on the problem with the work of the Brown County Phosphorus Committee, a varied group of business, academic, and government leaders. Continued attention to these issues by leaders will be important to making progress on environmental practices that will reduce and prevent pollution.

It was also important to note that ozone grew as the major pollutant. In 2009, ozone was the major pollutant found on 117 days compared to 156 days in 2015 — a high point in the last six years. Ozone, or smog pollution, was caused by emissions from power plants, factories, and cars. When inhaled, ozone irritates lungs and airways and increases the risk of serious lung and heart disease.

Overall, there are a number of important issues the community should continue to discuss and monitor. Although there were a number of existing data sources that have helped the community understand many issues mentioned in this section, governments, nonprofits, and businesses should continue to collect data in order to understand environmental problems, track progress, and address emerging issues.

# LIFE in our Natural Environment

## Data Sources

### The following sources were used in the Environment section:

- o [www.dhs.wisconsin.gov/publications/p0/p00719-brown.pdf](http://www.dhs.wisconsin.gov/publications/p0/p00719-brown.pdf)
- o [www.epa.gov/outdoor-air-quality-data](http://www.epa.gov/outdoor-air-quality-data)
- o [iaspub.epa.gov/triexplorer/tri\\_factsheet.factsheet?&pstate=WI&pcounty=Brown&pyear=2014&pDataSet=TRIQ1](http://iaspub.epa.gov/triexplorer/tri_factsheet.factsheet?&pstate=WI&pcounty=Brown&pyear=2014&pDataSet=TRIQ1)
- o [iaspub.epa.gov/triexplorer/errelease\\_chemp\\_view=COCH&trilib=TRIQ1&sort=\\_VIEW\\_&sort\\_fmt=1&state=55&county=55009&chemical=All+chemicals&industry=ALL&year=2014&tab\\_rpt=1&fld=RELLBY&fld=TSFDSP](http://iaspub.epa.gov/triexplorer/errelease_chemp_view=COCH&trilib=TRIQ1&sort=_VIEW_&sort_fmt=1&state=55&county=55009&chemical=All+chemicals&industry=ALL&year=2014&tab_rpt=1&fld=RELLBY&fld=TSFDSP)
- o [www.dhs.wisconsin.gov/wish/brfs/form.htm](http://www.dhs.wisconsin.gov/wish/brfs/form.htm)
- o [www.dhs.wisconsin.gov/stats/phprofiles/brown.htm](http://www.dhs.wisconsin.gov/stats/phprofiles/brown.htm)
- o [ephtracking.cdc.gov/reports/OneState/M00103\\_WI.html](http://ephtracking.cdc.gov/reports/OneState/M00103_WI.html)
- o [gbwater.org/water-quality/consumer-confidence-reports](http://gbwater.org/water-quality/consumer-confidence-reports)
- o [www.mpu.org/images/pdfs/2015ConsumerConfidenceReport.pdf](http://www.mpu.org/images/pdfs/2015ConsumerConfidenceReport.pdf)
- o [www.co.brown.wi.us/departments/page\\_e4ea08e83d92/?department=2317176c7f00&subdepartment=bc2d35fa4859](http://www.co.brown.wi.us/departments/page_e4ea08e83d92/?department=2317176c7f00&subdepartment=bc2d35fa4859)
- o [www.newwater.us/media/100800/state%20of%20the%20bay-sea%20grant%20report.pdf](http://www.newwater.us/media/100800/state%20of%20the%20bay-sea%20grant%20report.pdf)
- o [wi.water.usgs.gov/gwcomp/find/brown/index\\_full.html](http://wi.water.usgs.gov/gwcomp/find/brown/index_full.html)
- o [www.dhs.wisconsin.gov/publications/p0/p00719-brown.pdf](http://www.dhs.wisconsin.gov/publications/p0/p00719-brown.pdf)
- o [www.public.applications.co.brown.wi.us/plan/planningfolder/ComprehensivePlans/DRAFT%20Land%20Use%20Chapter%20%2012082014.pdf](http://www.public.applications.co.brown.wi.us/plan/planningfolder/ComprehensivePlans/DRAFT%20Land%20Use%20Chapter%20%2012082014.pdf)
- o [www.stateenergyoffice.wi.gov/section.asp?linkid=1451&locid=160](http://www.stateenergyoffice.wi.gov/section.asp?linkid=1451&locid=160)
- o [psc.wi.gov/apps40/IOU/default.aspx](http://psc.wi.gov/apps40/IOU/default.aspx)
- o [www4.uwm.edu/shwec/](http://www4.uwm.edu/shwec/)
- o [psc.wi.gov/apps40/annlreport/default.aspx](http://psc.wi.gov/apps40/annlreport/default.aspx)
- o [dnr.wi.gov/lakes/invasives/AISLists.aspx?species=ZM&location=ANY](http://dnr.wi.gov/lakes/invasives/AISLists.aspx?species=ZM&location=ANY)
- o [dnrx.wisconsin.gov/swims/public/reporting.do?type=11&action=post&format=html&stationNo=053228](http://dnrx.wisconsin.gov/swims/public/reporting.do?type=11&action=post&format=html&stationNo=053228)
- o Other sources: Brown County Environmental Health Report 2011-2013, Environmental Protection Agency (EPA), Envirofacts, Wisconsin Department of Natural Resources (Ashley Beranek), Wisconsin Department of Health Services–Environmental Health Profile, Census of Agriculture (number and size of farms), Brown County Planning Commission, American Community Survey 1-Year Estimates (energy use and conservation), Wisconsin Department of Natural Resources Division of Air and Waste (Steve Drake–pounds recycled per capita),