Submission of this four-year summary report provides the opportunity to reaffirm our sincere gratitude to Windward Prospects, Ltd. (formerly Arjo Wiggins Appleton) for your crucial role in developing and fostering the Lower Fox River Watershed Monitoring Program (LFRWMP).

Much progress was made as we expanded the program to monitor two additional watersheds and we increased the number of participants of high school, university undergraduates, and education students. We’ve also included more students from under-represented populations by working with key partners and organizations.

Through our outreach activities we have boosted program recognition within the community and we have strengthened our connections with potential community supporters. At the same time, we have increased community awareness of water quality issues affecting our local streams and watersheds. We hope you’ll find that we have been good stewards of your financial gift.

Our program:
The LFRWMP is a network of Northeast Wisconsin high school teachers and students collaborating with university scientists on a long-term watershed-monitoring program. Eleven high schools participate in our program and currently 17 teachers and over 80 students are involved in the project. More than 600 students have participated in the LFRWMP since the program began in 2003.

Thanks to the gift instrument provided by Windward Prospects Ltd. (Arjo Wiggins Appleton, Ltd.) LFRWMP continues as a shining educational star involving the successful collaboration of UW-Green Bay, area high schools, and community partners. This collaboration, in turn, has shown potential to make valuable contributions to regional environmental protection and public policy. The educational benefits of the project are obvious, but these wider applications set the program apart from most other innovative educational initiatives.

It is the mission of the LFRWMP to couple watershed education with the collection of top quality scientific data. Our program strengthens citizen knowledge of issues impairing the health of our fresh water resources and inspires community stewardship of the Fox-Wolf River Basin and Green Bay.

Our students and teachers monitor seven environmentally impaired streams in the Fox River watershed for water quality and ecological health. Our teams carry out monitoring activities and provide the community with crucial data about our water quality. This data provides a measurement of pollution that flows to the Fox River and Bay of Green Bay. This runoff pollution is the type of pollution that contributes to the much publicized “dead zone” in the bay of Green Bay. Scientists and the community can use this water quality data to assess long-term trends and evaluate restoration efforts.

Our goals focus on the three cornerstones of science, education, and community:
• Contribute to a long-term water quality database that can be used to educate the community and inform resource management actions
• Enhance teacher ability to teach watershed science
• Provide ongoing opportunities for high-school students to engage in hands-on science and to interact with community professionals
• Improve community understanding of watershed and land use impacts on water quality and stream ecosystems
Community Connections

Our work is significant to the broader community in two ways: We provide innovative hands-on environmental science opportunities for students and we add to a body of scientific data about our watersheds. The students take on the role of scientists and explore local streams and waterways, in partnership with the scientific community. When we engage high school students in the collection of water quality data, we begin to inspire and educate future water scientists, engineers, managers, policy makers, community leaders, and ultimately, future Great Lakes stewards.

Secondly, with over a decade of success, this established framework has produced more than 11 years of high quality baseline data to better inform us about the health of the Fox-Wolf River Basin. We use standardized methods and equipment and a data auditing process to assure scientifically robust results.

So beyond innovative educational benefits, the school-based teams contribute to an established database of water resource conditions that can be used to assess long-term trends and evaluate restoration efforts.

We envision that students involved in this program will go on to be our water planners, scientists, engineers, and leaders of the future. This evolution is already happening...past student participants have gone on to study and perform research on our campus and elsewhere. We even have a LFRWMP alumnus with an education degree from UW-Green Bay, is now a high school environmental science teacher and she is currently leading our Trout Creek monitoring team!

Watershed teams not only collect seasonal data, they also explore independent research projects about their watersheds that benefit their local communities directly.

Additionaly, our students work closely with the Area of Concern Citizen Advisory Committee on outreach projects. For example, our students created informational videos about water quality in our region and shared them at events like the Fox-Wolf Watershed Alliance Stormwater Conference.

Fox River Watershed Monitoring earns statewide recognition

The University of Wisconsin-Extension and the Wisconsin Department of Natural Resources recognized UW-Green Bay’s Lower Fox River Watershed Monitoring Program for its contributions to the state knowledge base about the health of Wisconsin’s streams at the annual Volunteer Stream Monitoring Symposium, on February 14, 2014.

Kris Stepenuk, of Water Action Volunteers presented the Lower Fox River Watershed Monitoring Program with the annual Wisconsin Stream Monitoring Award to recognize UW-Green Bay faculty and staff and program teachers and students for their commitment to monitoring, collecting data, raising awareness and sharing knowledge about Wisconsin streams. Professor Kevin Fermanich, long-time director of the program and Jill Fermanich, former outreach and school program coordinator, accepted the award on behalf of all the program partners.

The Wisconsin Stream Monitoring Award promotes awareness and participation in volunteer stream monitoring work in Wisconsin. Winners receive an engraved plaque and a certificate signed by the Secretary of the Wisconsin Department of Natural Resources.

EXAMPLES OF STUDENT RESEARCH TOPICS

- How does Duck Creek contribute to the Dead Zone?
- Buffers in the Baird Creek Watershed and phosphorus reduction
- Conductivity and city salting practices in the City of De Pere
- Runoff and its effects on turbidity and dissolved oxygen at Apple Creek
Program Growth

We expanded the program to monitor two additional watersheds and we increased the number of participants of high school, university undergraduates, and education students. We’ve also included more students from under-represented populations by working with key partners and organizations. Over the past three years, we have added

- Two new watersheds: Dutchman’s Creek & Trout Creek
- Five new schools: Appleton North HS, Ashwaubenon HS, Oneida Nation HS, Pulaski HS, GPS Education Partners (school-to-work program for at-risk and non-traditional learners through the Green Bay School District). Additionally, the GB Boys & Girls Club joined our program for two years, but is no longer able to participate.
- Eight new teachers: Dan Albret-Ashwaubenon HS, Dan Newel- Green Bay Area Public Schools, Jamie Sadogierski & Sheryl Stidham-Gebert of Appleton North HS, Becky Nutt-Oneida Nation HS, Allie Thut-Pulaski HS, Stefani Stainton-GPS Education Partners, Jessica Kuehn-Luxemburg-Casco HS. Long-time LFRWMP teacher Charlie Frisk retired, but will remain with the program as a technical advisor and community liaison.

We’ve also grown within the university and created linkages between our program and undergraduate student learning at UW-Green Bay. This partnership created a win-win experience for both our program and undergraduate students. Our program benefitted from student expertise and labor while the students gained experience for their resumes in a variety of program activities.

- Five future science teachers acquired service learning and student-teaching opportunities.
- Six undergraduate students added volunteer internships to their resumes for work on our bird data and curriculum materials. Through our program connections, two of these students earned paid summer internships: one at the Baird Creek Preservation Foundation, and one through UW-Extension/WDNR’s Area of Concern Aesthetics Monitoring Program. Additionally, our current intern, LFRWMP alum, plans to work for The Nature Conservancy this summer.
- One LFRWMP alum is currently a graduate student here at UWGB working in water quality research for Prof. Kevin Fermanich.
- Another LFRWMP Alumni worked for the Cofrin Center for Biodiversity on the summer 2013 Wabikon Forest Dynamics Plot funded by the Smithsonian and he was also invited to a Smithsonian-related conference in Washington DC.
- I worked directly with around 12 UW-Green Bay students on course projects: Env Sci 456, Remote Sensing and GIS, Pu En Af 428 Public and Non Profit Program Evaluation, Pu En Af Strategic Philanthropy, and two Design Arts students created new brochures for our program, and in the process added to their portfolios.
- Eleven LFRWMP High School students earned UW-Green Bay College Credit in High School (CCIHS) through UW-Green Bay Outreach department through participation in LFRWMP and through UWGB’s summer camp program, Eco U: Water Resources, a summer course we based on LFRWMP.

Attendance at our annual Watershed Symposium has grown steadily also.

LFRWMP Watershed Symposium Attendance: Number of Attendees

<table>
<thead>
<tr>
<th>Year</th>
<th>Attendees</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>70</td>
</tr>
<tr>
<td>2012</td>
<td>100</td>
</tr>
<tr>
<td>2013</td>
<td>116</td>
</tr>
<tr>
<td>2014</td>
<td>119</td>
</tr>
</tbody>
</table>

Almost one-third of LFRWMP students participate in the program for 2 years or more.
The Annual Watershed Symposium

Each year, our work culminates in a one-day Watershed Symposium held at UW-Green Bay. The symposium provides an opportunity for student-teacher teams, program partners, and community members to exchange ideas and share research findings with panel discussions, posters and presentations. Student teams can compare data from their streams with that of the other stream teams, in order to assess and improve stream health. The symposium provides high school students with a rare opportunity to interact with researchers in water quality fields. I’m pleased to report we held our Eleventh Annual Watershed Symposium on April, 2014, held at UW-Green Bay! We had a record number of 129 registered attendees, including over 90 teachers and students. Ashwaubenon High School, one of our newest schools, involved over 25 students this year. Another noteworthy addition was the participation of a group of students from GPS Education Partners, which increased our outreach to at-risk students.

Symposium activities over the past four years:
- **Student roundtable water quality data discussions** facilitated by UW-Green Bay faculty and staff - comparisons were made between streams and within watersheds.
- **Student research presentations and poster sessions** regarding water quality and habitat in each of our seven individual watersheds.
- **Water Resource and habitat tours** including Green Bay Packaging, Green Bay Metropolitan Sewerage District, and Pagel Ponderosa Dairy - a large CAFO dairy operation, and birding at Point Au Sable with Prof. Bob Howe. We also provided tours of the Richter Museum, Herbarium, and UW-Green Bay campus.
- **Presentations from professionals and graduate students** included topics like the Green Bay Northern Pike Habitat Restoration Project, skeletal abnormalities in frogs, Great Lakes freshwater estuaries, aquatic invasive species, a global perspective on water presented by guest students from Racine High School, phosphorus research in Green Bay and the Great Lakes, the Cat Island Chain Restoration Project, Water Resource Management - a UWGB Graduate’s Perspective, and What do Climate Change Projections Mean for our Streams?
- **Partnership with UW-Green Bay’s Environmental Management and Business Institute (EMBI)** for a joint LFRWMP symposium and conference. This partnership provided an opportunity for our students and teachers to interact with members of the business community and it gave our program greater visibility in the local community.

**SAVE THE DATE!**
Please join us at our twelfth Annual Watershed Symposium on **April 14, 2015**

**WHO’S DOING THE MONITORING? ABOUT THE STUDENTS...**
- Seven watershed teams each monitor a different tributary to the Lower Fox R.
- More than 600 students have participated in the program since 2003.
- Between 70 and 85 students and 17 leaders participate in the program each year.
- Students are from 11 area high schools.
- For most of the students, participation in the program is as an extracurricular activity as a club or research team.
- Majority of participating students are sophomores or juniors.
- Many (almost one-third) are involved in the program for more than two years.

Watershed Symposium--Tour of Pagel Ponderosa Dairy, April 27, 2017
Summer Teacher Workshops

Our teachers participate in annual teacher training workshops where they learn directly from scientists and enhance teacher ability to teach watershed science. Teachers develop competency and hands-on practice in lab and field aquatic ecosystem monitoring techniques.

The workshops provide a unique opportunity for teachers to work directly with scientists on environmental research and data interpretation. Field visits to local sites of interest are offered to provide teachers with a real-world view of watershed issues.

In 2011 we teamed with UW-Madison Arboretum’s Earth Partnership for Schools and planned a five-day summer teacher workshop focused on Great Lakes water resources. Around 25 teachers from throughout Northeast Wisconsin attended the workshop along with seven of our LFRWMP teachers. Activities included a tour of local rain gardens and native plants, a rooftop garden, and presentations on shoreline restoration, farm buffer strips, and a tour of the Mahon Creek USGS monitoring station. The LFRWMP teachers shared information about our program and demonstrated our stream monitoring techniques to the other teachers. Through EPS, our teachers had the opportunity to earn 5 graduate credits (tuition-free) upon completion of the 5-day workshop along with an ongoing school project. Several LFRWMP teachers took advantage of this opportunity to earn graduate credits.

At our 2012 workshop speaker Rob McLennan of the WDNR focused on water quality impacts of Lake Winnebago and the Upper Fox River on the Lower Fox and Green Bay. We traveled to our southern-most monitoring sites at Spring Book and trained new teachers in macroinvertebrate sampling procedures, and toured the biodigester at UW-Oshkosh. Prof. Emeritus Bud Harris gave a talk on the Historical Perspective of the Fox River. The LFRWMP teachers shared information and connected with the new teachers over lunch at a gazebo overlooking Lake Winnebago.

For the Summer Teacher Workshop of 2013, we partnered with the Oneida Nation. Highlights included watershed tours of Oneida restoration projects like the re-routing of Trout Creek around the Brown County Golf Course that will allow for fish passage, wetland restoration projects including Where the Waterbirds Nest, and native rice bed restoration projects. We concluded with a 10 year LFRWMP data review facilitated by Prof. Emeritus Bud Harris and UW-Green Bay Watershed Scientist Paul Baumgart at Oneida Nation High School with a traditional Oneida Nation opening ceremony and a welcome speech from Principal and former Oneida Tribal Chairman Art Skenedore.

Our new teachers received training from experienced teachers, especially Technical Advisor Kara Pezzi of Appleton East HS and Head Teacher Lynn Terrien of Green Bay Southwest HS. We utilized university and agency scientists like Jim Snitgen of the Oneida Nation Water Resources Department and Vicky Harris of Sea Grant to add expertise and enhance teacher capacity to teach watershed science.

FAST FACTS

77%

More than three-quarters of LFRWMP students discuss watershed-monitoring activities with family members!
Allie Thut has full-circle experience with watershed monitoring

Just eight years ago Preble High School student Allison Thut worked with teacher Chris Hansel and a team of other students to monitor Baird Creek as part of LFRWMP. Less than a decade later, Hansel and Thut are now peers, and Thut, a science teacher at Pulaski High School, works with her own students to monitor Trout Creek with a teacher and students from Oneida Nation High School. Hansel (pictured) continues to lead the program for Preble.

Annette Pelegrin, UW-Green Bay’s Watershed Outreach and Education Specialist and coordinator of the LFRWMP said it is great to see high school participants maintain continuity and passion for the program at a professional level.

“Allison (who graduated from UWGB in 2011) has passion and experience with water quality because for three summers she worked as an intern on the Green Bay Metropolitan Sewage District research vessel that monitors water quality in Green Bay (relating to the recent Green Bay Dead Zone stories),” Pelegrin said. “The program has come full circle!”

PROGRAM HISTORY

In the early 2000’s, government remedial actions focused on identifying responsible parties and developing cleanup plans for PCB contaminated sediments in the Lower Fox River. Local experts knew that, from an ecosystem standpoint, if we were going to have an impact on improving water quality, we needed to go beyond sediment cleanup, and address non-point sources of pollution. To that end, in 2003, a group of stakeholders led by Arjo Wiggins Appleton, Ltd and representing academia, water resource agencies, and local high schools, established the LFRWMP.
Outreach and Collaboration

Collaboration with other organizations is the key to moving forward. Our efforts to promote the program and seek partnerships will lead to continued funding. We've also partnered with organizations that serve minority, at-risk, and low-income students like the Green Bay Boys & Girls Club, Oneida Nation High School, and GPS Education Partners.

LFRWMP teachers, staff and students organized nine outreach events that reached approximately 700 members of the general public, including other high school students. Some key partnerships over the past four years included:

- Fox-Wolf Watershed Alliance partnered to develop a video and poster exhibit. Our Trout Creek team produced videos, scripted by high school students, to educate the community about our watersheds. The LFRWMP teams’ research posters were also part of the display. We shared the videos with all eleven LFRWMP schools, the Northeast Wisconsin Stormwater Consortium, UW-Extension, DNR’s AOC Committee, and other partner websites.
- Bay Beach Wildlife Sanctuary for “Water Appreciation Day.” Students and teachers provided hands-on monitoring activities to Sanctuary visitors, handed out brochures, and displayed our research posters and videos.
- Green Bay Metropolitan Sewerage District (NEW Water) and the Green Bay Water Utility—we displayed our posters and gave a presentation at the World Water Day event at the Jack Day Educational Center.

This partnership provided an opportunity for our students and teachers to interact with the business community.

- American Water Resources Association. We published an article about LFRWMP for the Water Resources Impact Journal: Aquatic monitoring program engages local high school students in restoration of the Green Bay watershed.
- Local TV news stations Fox 11, and WFRV Channel 5 showcased our stream monitoring activities to increase community awareness of our program.

**WHAT DO OUR TEACHERS SAY?**

“I plan to integrate this data into my freshman science class when we learn how to create graphs, analyze tables, etc. It will be a great way to use actual data acquired from our local community and learn how science and the community have changed over time.” — Dan Albrent, Ashwaubenon High School

“My students (and their parents) have told me that not only are they learning things for the first time, but they are taking that information home and actually having conversations with their families.” — Dana Lex, West De Pere High School

“Throughout my 12 years of involvement with the LFRWMP, I have seen many of the students involved in the program pursue careers in the field of Environmental Science.” – Lynn Terrien, Green Bay Southwest High School & Head LFRWMP Teacher.

“People have a strong instinctive reaction to their natural environment. It is profound to see this come alive in our students, some of who have spent very little time outdoors. It’s very rewarding to see a student reach into a net and pull out something squirming and alive and see how their faces light up.” — Kevin Hendricksen, Green Bay Preble High School

*Students from Green Bay Southwest High School measure flow at Duck Creek*
Project Findings

Over the past eleven years, our database has grown to include more than 2300 water quality measurements, 150 biotic indexes, 350 bird point counts and 120 amphibian observation points. We use this data to help inform decision-makers and stakeholders and to help study the effectiveness of runoff abatement techniques. For example, the Baird Creek Preservation Foundation uses our data to measure the success of rural stream buffers on downstream water quality at Baird Creek.

Side-by-side stream comparisons indicate that the streams with lower nutrients and sediment have a better biotic index, which means that for streams with better water quality, we found more biodiversity in macroinvertebrate populations, hence a healthier stream. This indicates that the environmental stress we are measuring in the streams (pollution and habitat change) is reflected in ecologically meaningful ways. Green Bay Preble High School Teacher Kevin Hendricksen sums it up best, “We have been working at this long enough now to have considerable useful data and to witness changes in our stream over time. We can convey this fact to our students, to our environment, and also to see how human action can impact the living things around us.”

In general for our five original sites, not much has changed over time in terms of water quality. However, now that we have completed over eleven years of monitoring, our data serves as a valuable baseline, especially as our region enters a period of increased emphasis on habitat restoration and increased interest in non-point source water pollution control practices.

For more information To see more results from our data, including stream by stream comparisons of water quality parameters, see our program website at http://www.uwgb.edu/watershed.
Challenges and Obstacles

Despite generous contributions, initial funding for the program is nearly exhausted. Fundraising has been a challenge, especially with the current political and economic landscape in the state of Wisconsin. Local school district and university funding cuts continue but nevertheless, we have a fantastic group of dedicated teachers that have stayed with the program without receiving a stipend payment as in the past. These committed teachers continue to collect field data and they find ways to cover transportation and substitute teacher costs in order to attend the Annual Watershed Symposium with their students. While more schools would like to join our program, first we have to secure long-term funding for our seven core teams.

We’ve had some success with a few small grant proposals, but at the same time foundation requests and grants are very competitive. Through a partnership with the Fox-Wolf Watershed Alliance, Oneida Nation High School, and Pulaski High School, we were awarded a Wisconsin Coastal Management Program grant to start our new Trout Creek team. And we’ve recently received a Cellcom Green Gift to purchase supplies for the upcoming year.

Recommendations and solutions

To build on the momentum of the project started by Dr. Fermanich, Dr. Harris and others, we took several organizational steps to institutionalize our program within the Cofrin Center for Biodiversity and established an advisory committee and goals for obtaining long term funding. As we seek to establish long term funding, oversight by the Cofrin Center will provide the necessary infrastructure.

Staff from UW-Green Bay’s Cofrin Center for Biodiversity and the Office of Advancement continues to track funding leads and look for innovative fundraising opportunities. We’ve recently had a successful introduction to a member of the business community who has a passion for water quality and has agreed to help us create a donor consortium—we have initial funding meetings set for January, 2015. And recently, our endowment fund received a generous donation. The Cofrin Center for Biodiversity is in the process of developing an online science course from which revenues will be used to fund a portion of the program. This introductory environmental science course targets high school student looking for college credit and focuses on water resources. At the same time, we continue to pursue grant opportunities and meet with strategic people from the community to garner any new funding ideas.

Kara Pezzi

In 2011, Kara Pezzi of Appleton East High School, received a Presidential Award for Excellence in Mathematics and Science Teaching. She was one of about 100 teachers nationwide to get that honor. Then again this year Kara was awarded an Einstein Distinguished Educator Fellowship and is on a year-long sabbatical while working at the Department of Energy, Office of Science in Washington, DC. Kara has been a part of LFRWMP since its inception in 2003.

Watershed Champion Award

NEW Water (GBMSD) and the Green Bay Water Utility presented the first annual “Watershed Champion Award,” to teacher Charlie Frisk and his students at Luxemburg-Casco High School for their research work on Baird Creek as part of the LFRWMP, Envirothon achievements, and contributions to community education. Charlie has been a part of LFRWMP since its inception in 2003.

Two Golden Apple Winners!

Dana Lex of West De Pere HS and Stefanie Stainton of GPS Education Partners (Formerly Pulaski HS) were Golden Apple Award winners in 2013, and the LFRWMP was an important factor in their professional success. The Golden Apple Awards are sponsored by the Greater Green Bay Chamber and recognize high standards of leadership and innovation in teaching.
In Closing…

With your support and vision for this innovative hands-on science program, our students have had the opportunity to engage in meaningful community issues—when our youth thrive our future thrives along with them! For the past four years we expanded the program to include more watersheds, increased student opportunities at the high school and college levels, and engaged more students from underrepresented populations. Our outreach activities have boosted program recognition and at the same time we have increased citizen knowledge of water quality issues affecting our communities.

We hope you have found us to be good stewards of your financial gift!

Thank you for this wonderful opportunity to foster scientifically literate citizens who have the potential to work together within businesses, industries, institutions and government to enhance the economic and social well being of our community by protecting our most valuable natural assets, the Fox-Wolf River Basin and Bay of Green Bay.

On behalf of the Cofrin Center for Biodiversity and UW-Green Bay in general, thank you again for generously supporting the Lower Fox River Watershed Monitoring Program.

FOR MORE INFORMATION

To learn more about the Lower Fox River Watershed Monitoring Program, see our program website at http://www.uwgb.edu/watershed

ON THE WEB

All student videos are available on the program website: http://www.uwgb.edu/watershed

Fox River Watershed Monitoring earns statewide recognition

Appleton Teacher receives national honor (Kara Pezzi)

2013 Golden Apple winner: Stefanie Stainton

2013 Golden Apple winner: West De Pere High School science team (Dana Lex)

Lower Fox Monitoring Program gets $20,000 grant to expand H.S. involvement

New video: Fox River Watershed Symposium, H.S. students, in spotlight

PHS Students Work to Finish Science Videos (Pulaski News Page 10)

Wisconsin watershed program involves high schools to collect, share data (Environmental Monitor national news article).

Watershed monitoring program receives $2,600-plus “Green Gift” from Cellcom

National Geographic Geostory featuring Elizabeth Braatz of Appleton North HS

Chemistry Club participates in Watershed Monitoring Symposium (Oshkosh North HS)

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