

# 2017 Annual Report



ENGAGING COMMUNITIES SINCE 1967

## Highlights of 2017

The Earth Sciences Museum (ESM) turned 50 this year! I'm so glad that I didn't miss the entire year. After coming back to work from a 15-month maternity leave I was pleased to still have nine months left to celebrate. To delight in this momentous occasion there were two celebrations held throughout the year; the first was a Family Day celebration to honor the public community that has been the Museum audience for generations. The second was as Peter Russell Rock Garden tour conducted by Peter Russell himself and Museum tour held on Farvolden Day to celebrate with staff, faculty, students and alumni. The Museum also received a new slogan "Engaging Communities Since 1967" which I think is very fitting considering we have been around for this long. Mind you, geologically speaking 50 years is maybe one hair on an entire Mastodon!



Over and above the festivities the museum continued to support on campus and community events throughout the year with participation in gem and mineral shows, festivals and conventions. Museum exhibits were continued with a few more coming to light and new acquisitions have been incorporated into the museum collections.

Some of the highlights this year include:

- Reaching the near end of a 3 year long project. Beyond Walls - 3D Augmented Reality exhibits with interactive Dinosaur Puzzles and a Water Cycle game will be completed mid-January 2018;
- The Laboratory of Life exhibit is starting to take form with Museum staff researching, planning and designing the exhibit while reaching out to other organizations to create a visually stimulating and interactive display;
- Jeff Sage's Geophysics activity as an expansion to the 3D geologic exploration model was very successful and well received as a workshop at the PDAC Teachers Day in March;

- Thanks to the support of the Faculty of Science and Department of Earth and Environmental Science the Museum is starting to move into a new office/storage space in EIT 2022.

### **Museum Acquisitions**

The Peter Russell rock garden expanded with the addition of 3 new rocks from Southern Ontario, Nova Scotia and Prince Edward Island. Personal donations of petrified wood, volcanic rock, sand, silver and lead have been incorporated into displays as well as the collection and a donation of historical geophysical equipment from the Cobalt Historical Society has been displayed in the Cobalt Mine tunnel.

### **Education**

Historically the majority of ESM public programs have drawn student groups from elementary aged groups. This year there was an increase in post-secondary participation. Several university groups from across campus participated in our Ontario Geology – Rock Garden tour and many UW courses have started to incorporate museum resources like the 3D Sandbox, Geologic Time line, 3D printed Great Lakes models and Groundwater Model into their lectures.

Engagement from the Earth Sciences Museum reached over 40,000 this year. Education programs brought in 4867 students and supervisors from the Kitchener-Waterloo and surrounding regions. This includes students from the public and Catholic elementary and secondary schools as well as community groups such as brownies, beavers, home schools, libraries, special needs groups and birthday groups. The museum participated in 19 separate outreach events this year, reaching 20,544 people. Over 14,947 visitors were tracked visiting the museum through University wide events.

### **Volunteers**

It is always a pleasure being part of the University of Waterloo Earth Sciences Museum but without our dedicated staff and volunteers this Museum would not be operational. 2017 brought in 11 full and part-time staff and 98 volunteers from our community (both KW and UW communities). Our staff and volunteers are the ones who provide and maintain the frame for this Museum. Thank you so much for supporting the Earth Sciences Museum.

Overall, 2017 was an exciting, and very busy year. I was happy to return to such a wonderful work environment. Looking forward to another successful year in 2018!

Sincerely,

Corina McDonald  
Earth Sciences Museum Curator  
cmmcdona@uwaterloo.ca

## TABLE OF CONTENTS

|   |    |
|---|----|
| <i>Museum Overview</i> .....  | 1  |
| Vision Statement .....  | 1  |
| Mission Statement.....  | 1  |
| History.....  | 1  |
| Role in Science .....   | 2  |
| Authority .....   | 2  |
| Advisory Body .....   | 2  |
| Board Members .....   | 3  |
| Programs and Tours .....  | 4  |
| <i>Year in Review</i> .....   | 6  |
| Outreach & Events.....  | 6  |
| Event Descriptions .....  | 6  |
| <i>Campus Life Fair</i> .....   | 6  |
| <i>Family Day at the Museum</i> .....   | 6  |
| <i>PDAC - Mining Matters</i> .....  | 6  |
| <i>Brantford Gem &amp; Mineral Show</i> .....                                   | 7  |
| <i>Whitefish River First Nations Visit</i> .....                                | 7  |
| <i>Jane's Walk – Peter Russell Rock Garden Walk</i> .....                       | 7  |
| <i>KW Gem and Mineral Club Annual Show</i> .....                                | 7  |
| <i>Waterloo Wellington's Children's Groundwater Festival (WWCGF)</i> .....      | 8  |
| <i>50<sup>th</sup> Anniversary Family Day</i> .....                             | 8  |
| <i>Discovery Square</i> .....   | 8  |
| <i>Sudbury Gem and Mineral Show</i> .....                                       | 8  |
| <i>Ancaster Gem and Mineral Show</i> .....                                      | 8  |
| <i>50<sup>th</sup> Anniversary Rock Garden &amp; Museum Tour</i> .....          | 9  |
| <i>University of Waterloo Gem and Mineral Show and Science Open House</i> ..... | 9  |
| <i>Paul Karrow Lecture Series</i> .....   | 9  |
| <i>London Gem and Mineral Show</i> .....  | 9  |
| Exhibits and Projects.....  | 10 |
| Ongoing Exhibit Descriptions:.....  | 11 |
| <i>Laboratory of Life Exhibit</i> .....   | 11 |
| <i>Beyond Walls Exhibits</i> .....  | 11 |
| <i>Digital Watershed Sandbox - Restructuring</i> .....                          | 11 |
| <i>Reimer Family Gallery</i> .....  | 12 |

|  |    |
|--|----|
| <i>GGR Outreach – Travelling Exhibit</i> .....                             | 12 |
| <i>Edward Burtynsky – Photo Exhibit</i> .....                              | 12 |
| <i>Volcano!</i> .....  | 12 |
| Ongoing Project Descriptions:.....   | 12 |
| <i>Photographing the Collection</i> .....                                  | 12 |
| <i>Projector Installation</i> .....  | 13 |
| <i>UW BluePrint – WWCGF App</i> .....                                      | 13 |
| <i>Porosity and Permeability Display</i> .....                             | 13 |
| <i>School Program Assessment</i> .....                                     | 13 |
| <i>Peter Rocks - Around the Museum</i> .....                               | 14 |
| Acquisitions.....  | 15 |
| New Office!.....   | 15 |
| Student, Employee and Volunteer Support.....                               | 15 |
| <i>Full-time cooperative students:</i> .....                               | 16 |
| Alina Bielak – 4 <sup>th</sup> year Honours Science .....                  | 16 |
| Julia Lentil – 3 <sup>rd</sup> year Environment and Resource Studies ..... | 16 |
| Courtney Bagshaw – 4 <sup>th</sup> year Geography .....                    | 16 |
| <i>Part-time Contract Employees:</i> .....                                 | 17 |
| Sam Qorbani – Project Manager – Beyond Walls Exhibit .....                 | 17 |
| Nick Fagan – Computer Programmer – Beyond Walls Exhibit.....               | 17 |
| Frank Flitton – Graphic Designer – Beyond Walls Exhibit .....              | 17 |
| Chelsea Barta – Graphic Designer – Beyond Walls Exhibit .....              | 18 |
| Jean-Christoph (JC) Robertson – Beyond Walls Exhibit .....                 | 18 |
| Lara Jeftic – Computer Programmer – Beyond Walls Exhibit.....              | 18 |
| <i>Student Teacher Interns:</i> .....                                      | 19 |
| Roseangela Capellano – Student Teacher from Western Universtiy .....       | 19 |
| Lauren Randall – Student Teacher from Western Universtiy .....             | 19 |
| <i>Volunteers:</i> .....   | 20 |
| Website .....  | 21 |
| Visitor Data.....  | 22 |
| <i>Program Partners</i> .....  | 26 |

# Museum Overview

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## Vision Statement

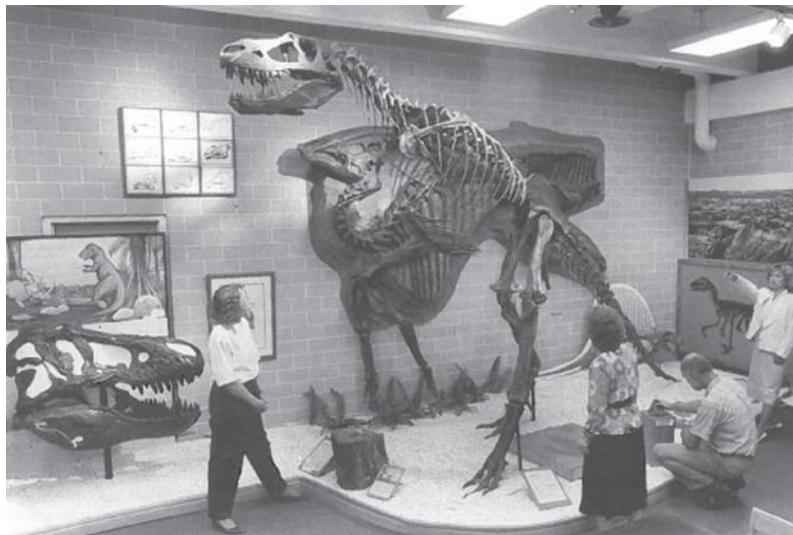
Bringing the science of planet Earth into the lives and careers of all by sharing knowledge and raising awareness of the Earth, its history, its resources, and the environmental issues facing society.

## Mission Statement

The museum, through its collections, displays and programs, aims to foster a broad and diverse appreciation for all features and processes of planet Earth for all ages both within and outside the university community.

## History

The Earth Sciences Museum started as a Centennial Project in 1967 together with what was called the Earth Sciences-Biology Museum. By the mid-1990s, the biology part of the museum ceased its activities, which left only the Earth sciences part of the museum, henceforth being referred to as the Earth Sciences Museum. The Earth Sciences Museum moved from its original location in the Biology 1 Building and was relocated in 2002 to its present position in the new EIT (Centre for Environmental and Informational Technology) Building. The Peter Russell Rock Garden was added in 1982 to commemorate the 25<sup>th</sup> anniversary of the University of Waterloo and as an outdoor extension to the indoor collections in the Museum. Over the years, the Earth Sciences Museum continued to expand its collections that are primarily on display for educational purposes and for the general public.



*Photo: 1982 Earth Sciences Museum in Biology 1, Room 370*

## Role in Science

The Earth Sciences Museum is the longest standing science outreach initiative at the University of Waterloo. Over the last 50 years the museum has grown in relevance, educational importance, reputation and most importantly its capacity to engage and educate our local and greater community.

The operation of the Earth Sciences Museum works to achieve many of the current objectives set by the University and the Faculty of Science 5-year Strategic Plan:

- To be recognized as one of the most innovative universities in the world. (UW's primary goal)
- Ensure that students have an engaging, purposeful and relevant experience and serve as a model for the future of higher education. (UW's sixth area of strength)
- Increase visibility for our academic programs in order to attract the highest quality students by increasing involvement of faculty and students in on and off campus academic events and outreach activities, and by strengthening ties to high schools to support undergraduate recruitment (Science Strategic Goal 6: Visibility and Reputation)
- To foster meaningful relationships and a strong track record of engagement with alumni, on-campus partners and external stakeholders. (Science Strategic Goal 7: Community and Engagement and UW's Primary goal)

## Authority

The Earth Sciences Museum is a component of the Department of Earth and Environmental Sciences within the Faculty of Science and the University of Waterloo. It operates as a unit reporting directly to the Department of Earth and Environmental Sciences. The Earth Sciences Museum has an advisory board whose primary role is to give advice and assistance to ensure programs and research remain relevant and effective. The Department of Earth and Environmental Sciences employs a curator to manage the operation and day-to-day maintenance of the museum. The Chair of the Department of Earth and Environmental Sciences attends the museum's advisory board. Both the department chair and the museum coordinator are responsible for communications between the museum's advisory board and the Department of Earth and Environmental Sciences. The curator organizes and maintains relations with subcommittees, volunteers and paid staff of the Earth Sciences Museum.

## Advisory Body

The Earth Sciences Museum advisory board is composed of persons who are associated with or have expertise in various disciplines of Earth and Environmental sciences or museology. Board members are non-paid and oversee the museum's functions and provide expertise and insight towards the museum's development.



## Board Members



**David Rudolph**  
*Department Chair*  
Earth &  
Environmental  
Sciences



**Corina McDonald**  
*Curator*  
Earth Sciences  
Museum  
Earth &  
Environmental  
Sciences



**Ken Dardano**  
*Entrepreneur –*  
*The Gneiss Guy*  
Business Owner &  
Gem and Mineral  
Vendor



**Brian Kendall**  
*University of*  
*Waterloo Professor*  
Earth &  
Environmental  
Sciences



**John Motz**  
*Museum Volunteer*  
*of 10 years*  
Retired from the  
KW Record



**Carol Ptacek**  
*University of*  
*Waterloo Professor*  
Earth &  
Environmental  
Sciences



**Peter Gray**  
*Senior*  
*Hydrogeologist*  
MTE Consultants  
Vice President



**Peter Russell**  
*Curator Emeritus*  
Earth Sciences  
Museum



**Jeff Sage**  
*Retired Earth*  
*Science Teacher*  
Waterloo  
Regional District  
School Board



**Tiffany Svensson**  
*Senior*  
*Hydrogeologist*  
BluMetric  
Environmental Inc.



**Barry Warner**  
*University of*  
*Waterloo*  
*Professor*  
Earth &  
Environmental  
Sciences



**Kathy Waybrant**  
*Museum Volunteer*  
University of  
Waterloo Alumni  
Earth &  
Environmental  
Sciences



**Laura Scaife**  
*Earth Sciences*  
*Museum and*  
*Outreach*  
*Coordinator*  
(Feb. 2016 to Mar.  
2017)



**Peter Morris**  
*Geologist*  
Consultant



## Programs and Tours

The museum offers curriculum based programming to elementary and high school level classes. The same programs are accessible to University visiting groups, community organizations and focus groups.



Programs offered include:

*Photo: Children visiting the Cobalt Discovery Mine*

| <b>Age Group</b>    | <b>Tour Program</b>   | <b>Description</b>   |
|---------------------|-----------------------|--|
| Kindergarten and up | Dinosaurs and Fossils | Learn about Albertosaurus, Parasaurolophus, Tyrannosaurus and many other Cretaceous dinosaurs. You will see full sized skeletons and be able to touch real dinosaur fossils. (1.5 hours)   |
| Grade 4 and up      | Rocks and Minerals    | Learn about minerals, rocks, and erosion. Includes touchable specimens and hands on activities. This program includes the exploration of our mine tunnel (where students get to dress up like miners) and your choice of digging for fossil fish or panning for real gold. (2 hours) |
| Grade 5/6           | Natural Disasters     | From volcanoes and earthquakes, through tornadoes, hurricanes, massive rainfall and drought. Children's groups can build their own building and we will simulate an earthquake to see how it stands up! (1.5 hours)  |

| <b>Age Group</b>                 | <b>Program</b>  | <b>Brief description</b>   |
|----------------------------------|---|--|
| Grade 9/10<br>SNC1D or SNC2D     | The Energy Game   | This action packed game teaches students about Canada's energy: type, transportation, and use. (90 minutes)  |
| Grade 9-12<br>Any SNC/SVN or SES | WATER-loo conservation: Exploring surface and groundwater in the region | Waterloo Region is the largest community in Canada that is reliant on groundwater for drinking water. We show how the water is extracted, purified and distributed. Interactive components include a water-use demo, taste test and groundwater model. (120 minutes) |

| <b>Age Group</b>  | <b>Program</b>   | <b>Brief description</b>  |
|-------------------|--|---|
| Grade 12<br>SES4U | Groundwater:<br>Explore,<br>Understand, and<br>Protect | A full-day program focused on Groundwater taking place in the field at one of the Waterloo Regional Outdoor Education Centers and in the lab at the University of Waterloo. Students will use seepage meters, conduct a stream study, log a soil core and examine a groundwater model. Document package is included. (Full-day program) |
| Grade 12<br>SES4U | Rocks, Minerals<br>and Microscopes                     | A hands-on, noses-in, wide-eyed survey of minerals and their unique chemical structures and properties. Use your five senses to determine the identity of minerals, view minerals through powerful microscopes, and learn about their unique chemical structures. (90-120 minutes)  |
| Grade 12<br>SES4U | Geology of Ontario                                     | Touring the replica mine tunnel and the Peter Russell Rock Garden, learn about the Geology of Ontario, the variety of minerals that are found in this province, and the history of mining and how it has shaped the communities in northern Ontario. (60 minutes)   |

The Earth Science Museum offers extended high school programs to include one or many of the following options: a campus tour, science tour and/or the option of sitting in on a 1<sup>st</sup> year lecture.

This year programs will be assessed by popularity to determine where our human resources should be directed. The museum will also be creating 2 or 3 new high school level programs with the help of teacher interns. These programs will target Grade 9 Geography, Grade 11 Geography and Grade 11 Chemistry courses. The reasoning behind this is out of the 22 public and catholic high schools in the KW Region only 3 of them offer an Earth & Space Science course and most focus on Space with the excitement of Chris Hadfield in Canadian media. To bring Earth Science education into the lives of high school aged students the Museum aims to demonstrate how Earth Sciences integrates with Geography and Chemistry studies.

The new Grade 9 Geography program will be called Watersheds and Water Resources. This program will focus on water movement in the Water Cycle and how humans affect and manage this resource. The new Grade 11 Geography program will be called Natural Disasters and focus on Earthquakes, Landslides and Volcano's. The new Grade 11 Chemistry program will be called Chemistry - Tracing Pollution in our Water and will focus on how we use geochemistry to track pollution in surface and groundwater systems.

# Year in Review

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## Outreach & Events

| Date   | Event   |
|--|---|
| January 11 <sup>th</sup>                             | Campus Life Fair  |
| February 20 <sup>th</sup>                            | Family Day at the Museum  |
| March 5 <sup>th</sup> to 8 <sup>th</sup>             | PDAC – Prospectors and Developers Association of Canada – Mining Matters Branch |
| April 1 <sup>st</sup> to 2 <sup>nd</sup>             | Brantford Gem & Mineral Show  |
| May 4 <sup>th</sup> to 6 <sup>th</sup>               | Whitefish River First Nations Visit   |
| May 5 <sup>th</sup>                                  | Janes Walk Kitchener  |
| May 6 <sup>th</sup>                                  | KW Gem and Mineral Show   |
| May 10 <sup>th</sup>                                 | Campus Life Fair  |
| May 26 <sup>th</sup> – June 2 <sup>nd</sup>          | Waterloo Wellington's Children's Groundwater Festival                           |
| June 10 <sup>th</sup>                                | 50 <sup>th</sup> Anniversary Family Day   |
| July 11 <sup>th</sup>                                | Discovery Square Kitchener  |
| July 21 <sup>st</sup> – 23 <sup>rd</sup>             | Sudbury Gem and Mineral Show  |
| September 20 <sup>th</sup>                           | Campus Life Fair  |
| September 29 <sup>th</sup> – October 1 <sup>st</sup> | Ancaster Gem and Mineral Show   |
| October 20 <sup>th</sup>                             | 50 <sup>th</sup> Anniversary Rock Garden & Museum Tour                          |
| October 27 <sup>th</sup> to 28 <sup>th</sup>         | UW Gem and Mineral Show & Science Open House                                    |
| November 16 <sup>th</sup>                            | Paul Karrow Lecture Series  |
| November 18 <sup>th</sup> to 19 <sup>th</sup>        | London Gem and Mineral Show   |

## Event Descriptions

### *Campus Life Fair*

Each semester the University Student Life Center holds a fair in the SLC building to introduce students to various groups, organizations and clubs which they can participate in throughout their career as a university student. The Earth Sciences Museum holds a booth there three times a year to encourage students to get involved and volunteer.

### *Family Day at the Museum*

The Museum was open to the public this year to welcome Families on Family Day.

### *PDAC - Mining Matters*

The Prospectors & Developers Association of Canada (PDAC) represents the interests of the Canadian mineral exploration and development industry. Each year the PDAC conference, held in Toronto, brings in over 25,000 attendees.

Mining Matters is a national branch of PDAC that broadens students understanding of Earth science and the vital role rocks, minerals and metals play in everyday life. It also exposes students to career opportunities in the minerals industry.

Museum staff participates with Mining Matters in teaching over 150 Greater Toronto Area elementary children about rocks and minerals at the annual conference in Toronto. This year the museum was also asked to be a key presenter in the annual Teachers Day workshop introducing the museums Geophysics 3D Model Exploration activities. The museum also has a presence at the Earth & Environmental Sciences Department booth and reception where many UW alumni visit and reminisce.

#### ***Brantford Gem & Mineral Show***

The Brantford Lapidary & Mineral Society Award, which provides 4 hardworking undergraduate students with \$750 in their 2<sup>nd</sup> or 3<sup>rd</sup> year, is made possible through the generosity of The Brantford Lapidary and Mineral Society, a long time partner and friend of the Faculty of Science. Every year the Society holds a gem and mineral show hosting close to 30 vendors and bringing in more than 1,000 people over two days. For the past 44 years the museum has provided outreach in the form of kids' activities and a mineral display case.

#### ***Whitefish River First Nations Visit***

The Earth & Environmental Sciences Department has had a relationship with the Whitefish River First Nations band on Manitoulin Island for 46 years. The band has provided access to their land to the Department's Earth 390 Mapping course. This year the Earth Sciences Museum and the Department brought hands on activities to the bands Elementary School and Community. This new step in our relationship will hopefully be the start of a new collaboration.

#### ***Jane's Walk – Peter Russell Rock Garden Walk***

Jane's Walk is a movement of free, citizen-led walking tours inspired by Jane Jacobs an urbanist and activist who believed in walkable cities. The Museum held two "Peter Russell Rock Garden Walk" tours presented by Peter Russell for a small crowd of people. Given the weather we were lucky to have anyone show up!!

#### ***KW Gem and Mineral Club Annual Show***

The Kitchener-Waterloo Gem & Mineral Club is a local club comprising mineral and fossil enthusiasts in the K-W region. Every year they run a show, which is attended by local gem & mineral vendors as well as museum staff. The museum provided an activity for the day that brought in approximately 400 people.

### ***Waterloo Wellington's Children's Groundwater Festival (WWCGF)***



*Photo: Students experimenting with Porosity and*

The Earth Sciences Museum has been in collaboration with the WWCGF since the inception of the festival in 1994. The festival educates grade 2 to 5 students about all aspects of water. The Earth Sciences Museum Curator sits on the festival committee as well as the programming committee. This year the museum, in collaboration with the department of Earth & Environmental Sciences Ecohydrology Group and Groundwater, Geochemistry and Remediation Group ran 5 activities for over 5,533 children and 1,198 adults over 5 days. 591 volunteers enabled the activities to run all week long. Of those volunteers, 22 were students from the University of Waterloo and Earth Sciences Museum volunteers.

### ***50<sup>th</sup> Anniversary Family Day***

This celebration invited families from the community to join us in the Peter Russell Rock Garden for a picnic, dinosaur cookie, kids activities and tour of the rock garden and museum. Approximately 100 people attended the mid day festivities.

### ***Discovery Square***

Each Tuesday for the summer months, the city of Kitchener holds children activities in Discovery Square. This past summer the University of Waterloo's Science Outreach Program provided science activities in which the Museum contributed a night of fossil digging, and gold panning.

### ***Sudbury Gem and Mineral Show***

Staff drove up to Sudbury for a 3-day Gem and Mineral show. We demonstrated and displayed the 'I Dig Fossil Fish' and 'Exploration Geology Model' activities and presented a Amethyst and Canadian Minerals display. Sudbury provided a great place to network with potential students and industry from Northern Ontario. Many local geologist were very interested in the Exploration model and provided great feedback and input with the core logging activity.

### ***Ancaster Gem and Mineral Show***

The Ancaster gem and mineral show took place during a weekend and a school day where various local elementary schools attended a variety of children's activities focused on gem and mineral resources. Museum staff and volunteers

had visitors participate in gold panning, fossil fish digging, identification of different rocks and minerals with mineral cards and learn about rock drilling, Ontario drill core and view a geology model. Corina McDonald presented 8 talks on the Fossil Snowflakes to visiting school classes on the Friday of the show.

#### ***50<sup>th</sup> Anniversary Rock Garden & Museum Tour***

This was the second celebration for the Museum's 50<sup>th</sup> Anniversary. A tour of the Peter Russell Rock Garden by Peter Russell himself and tour of the Earth Sciences Museum was held in conjunction with the Farvolden Day events. The weather was beautiful and Peter was in good voice. The tour was well attended.

#### ***University of Waterloo Gem and Mineral Show and Science Open House***

The annual gem show and science open house was held on Oct 28<sup>th</sup> and 29<sup>th</sup> this year. Approximately 2,000 families attended. The gem show is coordinated by the museum and the science open house is a collaboration between Faculty of Science outreach staff and other science departments. Nine vendors attended the gem show selling rocks, minerals, jewelry and gifts to visitors on both the 28<sup>th</sup> and the 29<sup>th</sup>. The museum organized Earth Science related activities in the Environmental and Information Technology build for the Science Open House on the 29<sup>th</sup>. The museum had a great team of 38 volunteers running activities for the science open house including "Gold Panning", "Rock Critters", "Great Lakes", "Mineral Cards", "Earthquake", "I Dig Fossil Fish", "Frosty Minerals", "Geology Model", and "Mineral ID". Volunteers also assisted with the KW rock and mineral table, All the Water in the World, Mining Matters and the Information booth. Many of the vendors were very pleased with the number of visitors they had during the show.

#### ***Paul Karrow Lecture Series***

The Paul Karrow Lecture Series was established in 2012 by Dr. Paul Karrow, a world renowned Quaternary Geologist and the first Department Chair in the Earth Sciences Department. This lecture series has a primary focus on soft rock geology. This year Dr. Matthew Lamanna from the Carnegie Museum in Pittsburgh was asked to speak about his research on Southern Hemisphere Dinosaurs.

#### ***London Gem and Mineral Show***

The London gem show is hosted at the Western Fair grounds each year. Museum staff and volunteers demonstrated and displayed the "I Dig Fossil Fish", "Gold Panning" and Exploration model activities to visitors. There were approximately 500 visitors to our activity booth. Jeff Sage presented a talk on Exploration and drilling to the public on the Saturday afternoon.

## Exhibits and Projects

| <b>Start Date</b> | <b>Estimated Completion Date</b> | <b>Completion Date</b> | <b>Project</b>  |
|-------------------|----------------------------------|------------------------|---|
| May 2012          | Apr. 2013                        | May 2013               | Interactive Groundwater Driven Mineralization Exhibit |
| Nov. 2012         | Apr. 30 <sup>th</sup> , 2013     | May 2013               | Mistaken Point Cast Exhibit                           |
| Nov. 2012         | May 2014                         | Oct. 2014              | GGR Outreach Project                                  |
| June 2013         | Jan. 2014                        | Apr. 2014              | Copper Display Project                                |
| Jan. 2013         | Mar. 2014                        | Sept. 2014             | Augmented Reality Mastodon Exhibit                    |
| Mar. 2013         | Postponed                        | TBD                    | Gold Scale Project                                    |
| Mar. 2013         | Feb. 2015                        | Nov. 2015              | Petrified Wood Exhibit                                |
| Aug. 2013         | Postponed                        | TBD                    | Interactive Mine Tunnel Exhibit                       |
| Dec. 2014         | Feb. 2015                        | Feb. 2015              | We Use That Much – Display Revision                   |
| Dec. 2014         | Feb. 2015                        | Sept. 2015             | Great Lakes Travel Display                            |
| Jan. 2015         | May 2015                         | July 2015              | Jade Display Update                                   |
| May 2015          | Oct. 2015                        | Dec. 2015              | Refurbished display cases                             |
| Mar. 2015         | Oct. 2015                        | July 2016              | New Velociraptor                                      |
| June 2016         | Dec. 2016                        | Sept. 2016             | Rapid Fossilization – Santana Display                 |
| June 2015         | Jan. 2016                        | Sept. 2016             | Eocene Display  |
| May 2014          | Sept. 2019                       | TBD                    | Laboratory of Life Exhibit *                          |
| Jan. 2015         | Jan. 2018                        | TBD                    | Beyond Walls Exhibits *                               |
| Sept. 2015        | Ongoing                          | Ongoing                | Photographing the Collection Project                  |
| Dec. 2016         | Dec. 2017                        | TBD                    | Projector Installation Project                        |
| Apr. 2017         | May 2018                         | TBD                    | UW Blueprint – WWCGF App Project                      |
| Apr. 2017         | Apr. 2018                        | TBD                    | School Program Assessment Project                     |
| June 2017         | May 2018                         | TBD                    | Digital Watershed Sandbox – Restructuring - Exhibit   |
| Aug. 2017         | Dec. 2019                        | TBD                    | Reimer Family Gallery *                               |
| Sept. 2017        | Sept. 2022                       | TBD                    | GGR Outreach – Travelling Exhibit                     |
| Oct. 2017         | July 2019                        | TBD                    | Edward Burtynsky – Photo Exhibit                      |
| Oct. 2017         | Jan. 2018                        | TBD                    | Porosity & Permeability Display Project               |
| Nov. 2017         | Jan. 2019                        | TBD                    | Peter Rocks – Around the Museum Project               |
| Nov. 2017         | Aug. 2018                        | TBD                    | Volcano! Exhibit                                      |

Complete Exhibits and Projects

\* Indicates Precedence



## Ongoing Exhibit Descriptions:

### *Laboratory of Life Exhibit*

This year and next the Museum is pushing to complete this new exhibit focused on Burgess Shale type deposits in Canada and worldwide. This exhibit will include many elements including; a digital display representing ocean life 505 Million Years ago, a time scale emphasising when in time this explosion of life occurred, a 2.5 m panoramic photo of the original Burgess Shale location taken by Charles Walcott, geologic maps of the Canadian Burgess Shale type areas as well as a World Map noting the international locations, real and 3D printed fossils from the sites and a piece of the Burgess Shale rock for visitors to touch.

Back in 2014, Manuel Arab, a 4<sup>th</sup> year Earth and Environmental Sciences student, was able to experience a paleontological dig at the new Burgess Shale site in Kootenay National Park, BC. The dig was led by Royal Ontario Museum curator Dr. Jean-Bernard Caron. The shale is a famous fossil bed known for its preservation of soft bodied animals dating back to the Cambrian Explosion about 505 million years ago. UW alumnus Jim Reimer supported the museum making it possible to send Manuel on this expedition. Jim's support will also contribute to a new permanent display that will showcase the various Burgess Shale sites, fossil specimens and field techniques.

Manuel Arab's field expedition at the Burgess Shale was documented in the UW Bulletin on December 12<sup>th</sup>, 2014. The article is titled "*Field experience unearthed life-long passion*" and can be found at [www.bulletin.uwaterloo.ca](http://www.bulletin.uwaterloo.ca) in the Dec. 12<sup>th</sup> archives.

### *Beyond Walls Exhibits*

The museum is reaching the close of a partnership with Equitable Life of Canada that has enabled the creation of two new augmented reality virtual exhibits that can be experienced physically at the museum, remotely in any classroom, or wherever there is access to a mobile device. These exhibits complement existing science curricula spanning the elementary and high school levels. There is a 'video game' now stationed in the Conestoga Rovers Learning Center, which encourages visitors to build one of five 3D dinosaur puzzles. In the next month a second 'video game' will be installed in the Museum atrium. This game will encourage visitors to explore the Water Cycle or build a city in balance with the local Water Cycle. Both of these games will be available in the New Year on the App store or on any Android device.

### *Digital Watershed Sandbox - Restructuring*

In May of 2017 the Grand River Conservation Authority supplied the Waterloo Wellington Children's Groundwater Festival with a Digital Watershed Sandbox. The Festival did not have a place to store the Sandbox for the duration of the year so it is on permanent loan to the Earth Sciences Museum except for the month of May where it will be brought down to the Brantford and Waterloo

Groundwater Festivals. This year and into 2018 the Sandbox is being restructured so that it can be made easily portable to high schools and when in the Museum can be used in our programs. In the future a student programmer will be asked to improve the software so that both contours and stratigraphy will be visible on the sand.

### ***Reimer Family Gallery***

The Reimer Family has been a major donor to the Earth Sciences Museum over the years, with major contributions of mineral specimens and display units. This year and next the Museum will push to create the Reimer Family Gallery on the 1<sup>st</sup> floor of the Museum atrium. The Gallery will display four areas: Groundwater Mineralization, Reimer Minerals, The Laboratory of Life and Petrified Wood.

### ***GGR Outreach – Travelling Exhibit***

The Groundwater Geochemistry and Remediation (GGR) group has applied for an Ontario Research Fund grant this year. As a portion of the grant 1% of the total funds would be directed towards Outreach. The Museum has been approached to fulfill that Outreach and provided an Outreach plan for the submitted proposal. The plan outlines the collaborative creation of a travelling exhibit between Carleton University, The Canadian Museum of Nature and the Earth Sciences Museum. If the GGR group receives the grant in 2018 this project will proceed.

### ***Edward Burtynsky – Photo Exhibit***

Edward Burtynsky is a photographer that creates discussion about how and to what scale we use the resources and land we live on. His photographs align very well with the subject matter we provide to our visitors as well as with the research that is completed in the Earth & Environmental Sciences department with which the Museum is a part of. In fact, one of his photos (Nickel Mine Tailings in Sudbury) contains an instrument installed by one of our researchers. The Museum is in discussion with the KW Art Gallery (who stores 49 of his photographs) and artist to determine if a number of his photographs could be displayed in the Earth Sciences Museum.

### ***Volcano!***

Dr. Alan Morgan donated many volcanic rock specimens to the Museum this year. These specimens will be used to describe the types of volcano's found worldwide and associated volcanic rocks.

## **Ongoing Project Descriptions:**

### ***Photographing the Collection***

What started as a small project to document current incoming specimens has turned into a project that has encompassed the entire Museum collection. Back in 2015 Peter and Gary were asked to take photos of many of the specimens to add and update the collection database. In 2016 Karen Fox was engaged to take

photos of the Museums specimens. She takes wonderful photos and will continue to help catalogue our collection this coming year.

### ***Projector Installation***

A permanent projector will be installed in the Conestoga Rovers Learning Center this year. This will significantly increase safety by eliminating the need to bring a cart down the stairs in the learning center to hold a projector. It will also decrease setup time for each presentation.

### ***UW BluePrint – WWCGF App***

The WWCGF with the help of the Earth Sciences Museum staff and UW Blueprint have teamed up to create an online App that will act as a virtual assistant to provide all the information needed by the 250 teachers and 1,200 parent volunteers to guide over 5,000 students through over 50 activities at the week-long event. UW Blueprint Started at UC Berkeley in 2012, Blueprint partners with not-for-profit organizations to create technology such as websites, mobile applications and analysis tools — all free of charge. You can read more about this collaboration at the Waterloo Stories site found here: <https://uwaterloo.ca/stories/building-tech-social-causes>

### ***Porosity and Permeability Display***

Many of the cylinders representing how water moves through clay, sand, gravel and bedrock were cracked or broken. The cylinders are currently being remade and then positioned in a stand so that each cylinder can flip over moving the water from one side to the other. This display is used often in the Water Conservation program.

### ***School Program Assessment***

This year programs will be assessed by popularity to determine where our human resources should be directed. The museum will also be creating 2 or 3 new high school level programs with the help of teacher interns. These programs will target Grade 9 Geography, Grade 11 Geography and Grade 11 Chemistry courses. The reasoning behind this is out of the 22 public and catholic high schools in the KW Region only 3 of them offer an Earth & Space Science course and most focus on Space with the excitement of Chris Hadfield in Canadian media. To bring Earth Science education into the lives of high school aged students the Museum aims to demonstrate how Earth Sciences integrates with Geography and Chemistry studies.

The new Grade 9 Geography program will be called Watersheds and Water Resources. This program will focus on water movement in the Water Cycle and how humans affect and manage this resource. The new Grade 11 Geography program will be called Natural Disasters and focus on Earthquakes, Landslides and Volcano's. The new Grade 11 Chemistry program will be called Chemistry -

Tracing Pollution in our Water and will focus on how we use geochemistry to track pollution in surface and groundwater systems.

### ***Peter Rocks - Around the Museum***

As we celebrate 50 years of education at the Earth Sciences Museum one cannot deny that the majority of those years were led by legend Peter Russell. Peter has offered more than time to this Museum he has encouraged inquisitiveness, nurtured learning, shared knowledge, resources and excitement for the Earth Sciences with decade after decade of students and above all placed education before everything else. He has done all of this while building this physical space we now know as the Earth Sciences Museum. While Peter was sharing knowledge and building this Museum he listened to others, experienced adventures and gathered stories. Today, Peter is a vault of stories. Those stories have built what we now know as the Earth Sciences Museum. If you have ever had the pleasure of hearing one or many of his stories you will know what I'm talking about. You will have had the Peter experience.

To celebrate the Museum and to celebrate Peter we are creating Peter Rocks around the Museum. This will start as a series of recorded videos of Peter telling stories about various topics in the Museum with the hopes of creating a walking Museum tour similar to Rock around Waterloo or Rock around Kitchener.

## Acquisitions

| <b>Item</b>                  | <b>Donor</b>                                    | <b>Number of Items</b> |
|------------------------------|---|------------------------|
| Silver specimen              | <i>Dr. Brewster Conant Jr.</i>                  | 1                      |
| Lead Ingot                   | <i>Bill Coram</i>                               | 1                      |
| Ore Mineral Collection       | <i>Unknown Collector</i>                        | 26                     |
| Petrified Wood               | <i>David Olsen</i>                              | 1                      |
| Geophysical Instruments      | <i>Cobalt Historical Society</i>                | 13                     |
| Volcanic Rock Collection     | <i>Dr. Alan Morgan</i>                          | 18                     |
| Big Island Hawaii Sands      | <i>Dr. Shaun Frape</i>                          | 3                      |
| Fossil and Mineral Specimens | <i>Dr. Alan Morgan</i>                          | 11                     |
| Eramosa Dolostone            | <i>David Slaine</i>                             | 1                      |
| Wallace Sandstone            | <i>Wallace Quarries Ltd. and Barry Warner</i>   | 1                      |
| P.E.I. Sandstone             | <i>Island Coastal Services and Barry Warner</i> | 1                      |

## New Office!

The Faculty of Science and the Earth and Environmental Sciences Department are supporting the development of a new Earth Sciences Museum Office in the EIT building that houses the Museum. The new office will be located on the 2<sup>nd</sup> floor of the EIT building in room 2022. Construction is underway already with hopes of moving in soon after the New Year.

## Student, Employee and Volunteer Support

It is always a pleasure being part of the University of Waterloo Earth Sciences Museum but without our dedicated staff and volunteers this Museum would not be operational. 2017 brought in 11 full and part-time staff and 98 volunteers from our community (both KW and UW communities). Our staff and volunteers are the ones who provide and maintain the frame for this Museum. Thank you so much for supporting the Earth Sciences Museum.

Many of the 98 volunteers are students that help out from one day to the next but we also have fantastic support from long-term volunteers who have been helping for years. I would like to take a moment to say how beneficial this long-term support is for the Museum's success. Thank you for sticking with us!!

## Full-time cooperative students:

### Alina Bielak – 4<sup>th</sup> year Honours Science



Alina worked for the museum from the start of January to the end of April. With a passion for learning and teaching science, Alina ran the educational programs offered at the museum. She attended the Prospectors & Developers Association of Canada (PDAC) conference in March to run workshops for elementary and high school teachers.

### Julia Lentil – 3<sup>rd</sup> year Environment and Resource Studies



In May, Julia was hired to run all of the school and camp tours throughout the spring and summer months. She participated in the Waterloo Wellington Children's Groundwater Festival and attended the Sudbury annual Gem & Mineral show to educate the public about Earth sciences.

### Courtney Bagshaw – 4<sup>th</sup> year Geography



In September, Courtney, was hired to run all of the school and camp tours throughout the fall. She attended the annual Ancaster and London Gem & Mineral Show to educate the public about Earth Sciences. Courtney was an integral part of the University's Gem and Mineral show and Science Open House.



## Part-time Contract Employees:

### Sam Qorbani – Project Manager – Beyond Walls Exhibit



Sam worked for the museum from May 2015 to June of 2017 as the project manager for the Beyond Walls – Augmented Reality Puzzle project. Sam led a team of talented individuals to implement an augmented reality puzzle game, “that allow us to extend the reach of the museum beyond its physical walls and enable you to put learning experiences directly into the hands of all children, educators, and families; literally everyone in our community”

He is now completing his PhD on User Design at Carlton University in Ottawa.

### Nick Fagan – Computer Programmer – Beyond Walls Exhibit



Nick Fagan was hired in September 2015 and continued to work at the Museum until June 2017. Nick worked with Sam and Frank as the computer programmer and augmented reality developer for the Beyond Walls – Augmented Reality Puzzle project. Nick was a talented programmer and was the ‘brains behind the screen’. He could fix just about any programming problem. Nick is now working full time in Stratford ON, for a user design company.

### Frank Flitton – Graphic Designer – Beyond Walls Exhibit



Frank Flitton was hired in September 2015 and continued to work at the Museum until June 2017. Frank worked with Sam and Frank as the computer programmer and augmented reality developer for the Beyond Walls – Augmented Reality Puzzle project. Frank (Funny Man) was a talented Graphic Designer and is now working for a computer company in the KW region.

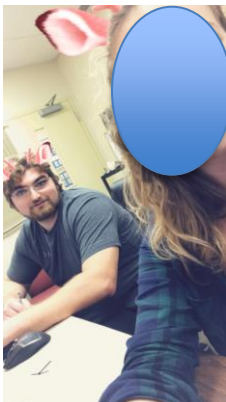


### **Chelsea Barta – Graphic Designer – Beyond Walls Exhibit**



Chelsea Barta is a Work Study student for the Museum who is also studying Computer Programming full time at the University of Waterloo while working on the Augmented Reality – Water Cycle game.

### **Jean-Christoph (JC) Robertson – Beyond Walls Exhibit**



Jean-Christoph Robertson is a Work Study student for the Museum who is also studying Physics full time at the University of Waterloo while working on the Augmented Reality – Water Cycle game. It is a unity based game aimed at educating high school students about the water cycle and our role within it.

### **Lara Jetic – Computer Programmer – Beyond Walls Exhibit**



Lara Jetic is a Work Study student for the Museum who is also studying Physics full time at the University of Waterloo while working on the Augmented Reality – Water Cycle game. Lara is also the vice-president of UW Blueprint.

## Student Teacher Interns:

### Roseangela Capellano – Student Teacher from Western University



Rose was a student teacher from Western University. As a part of her second year teaching requirements Rose worked at the Museum for the month of April assisting our coop student with tours and creating a new Grade 11 Geography program on Natural Disasters. Thanks to Rose for all of her hard work!

### Lauren Randall – Student Teacher from Western University



Lauren a second year bachelor of education student from the University of Western Ontario that volunteered with the museum in December. While here she completed the Water Resource Workshop with a Geography focus. She also worked on the Water Resource Workshop that had a Chemistry focus. She helped facilitate workshops (i.e. Rocks and minerals, Water Resources-Chemistry and Natural Disasters).

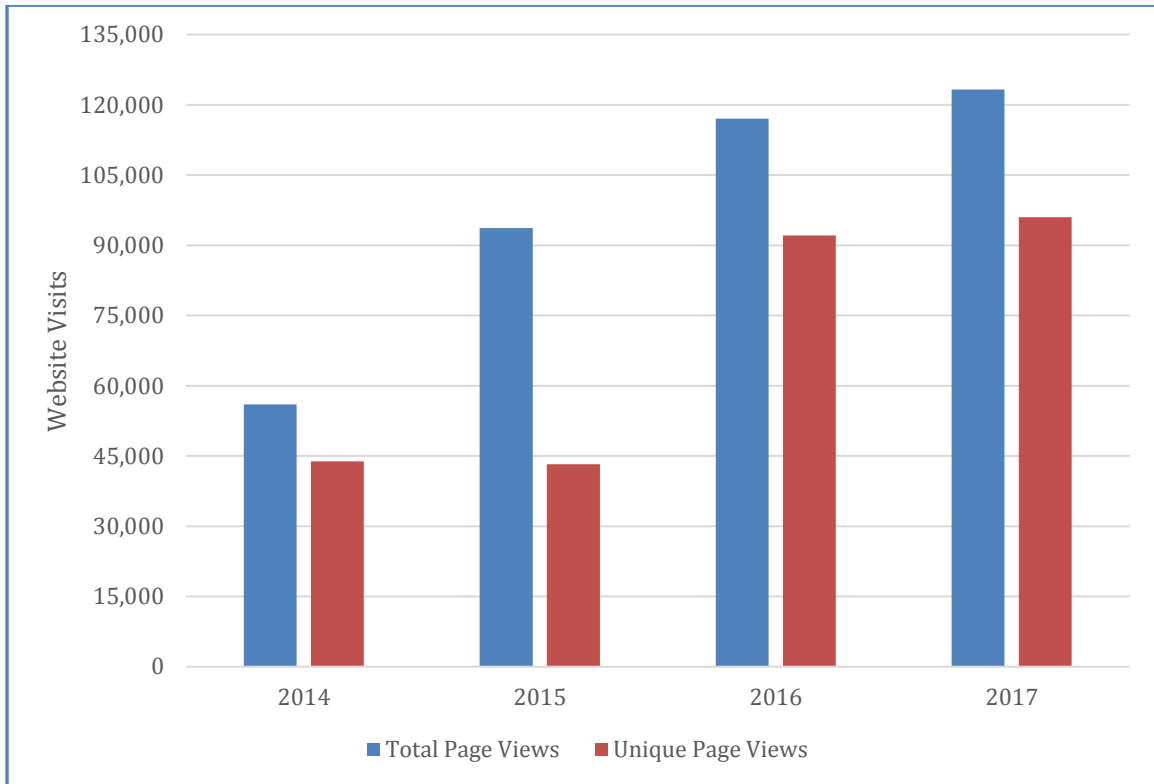
Volunteers:





## Website

*Figure 1* displays data for the Earth Sciences Museum website from 2014 to 2017. This data is collected annually from January 1<sup>st</sup> to mid-December. There has been a 5% increase in Total Page Views and a 4.1% increase in Unique Page Views (people visiting the website for the first time) since mid-December 2016. According to Science Communications the Earth Sciences Museum website analytics are on a positive trend despite a growing trend in alternative social media outlets like Instagram.

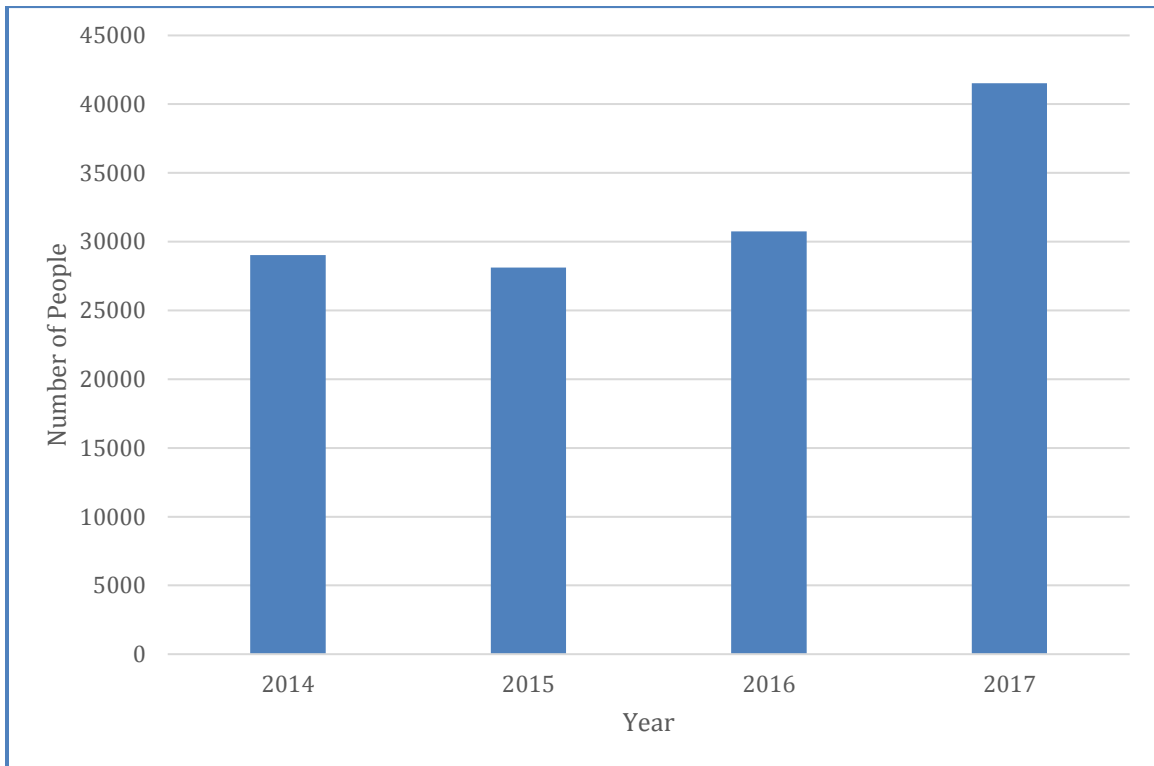


*Figure 1 – Annual Earth Sciences Museum Website Traffic.*

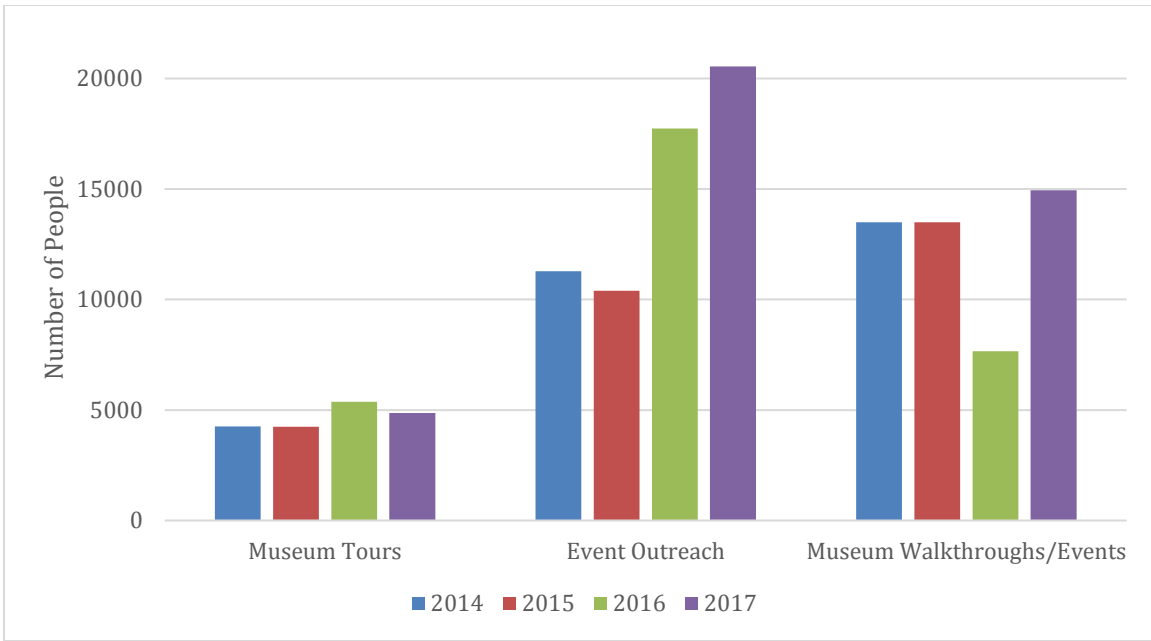
## Visitor Data

The Earth Sciences Museum reached a minimum of **41,523** people this year. This data includes participants of educational programs, outreach events, campus tours and campus events. Because of the unique location of the museum in the heart of the University of Waterloo campus many students and visitors explore the museum but are not recorded officially. The total number of people engaged this year is up 26% this year from 2016 numbers. *Figure 2* provides the annual total Museum engagement data from 2014 to 2017. Engagement has seen a significant increase from 2016 to 2017. According to the data presented in *Figure 3* this increase is largely due to an increase in Event Outreach and a slight increase, when compared to 2014 and 2015 data, in external events hosted by the Museum.

The museum participated in 19 separate outreach events this year, reaching 20,544 people. Over 14,947 visitors were tracked visiting the museum through University wide events.

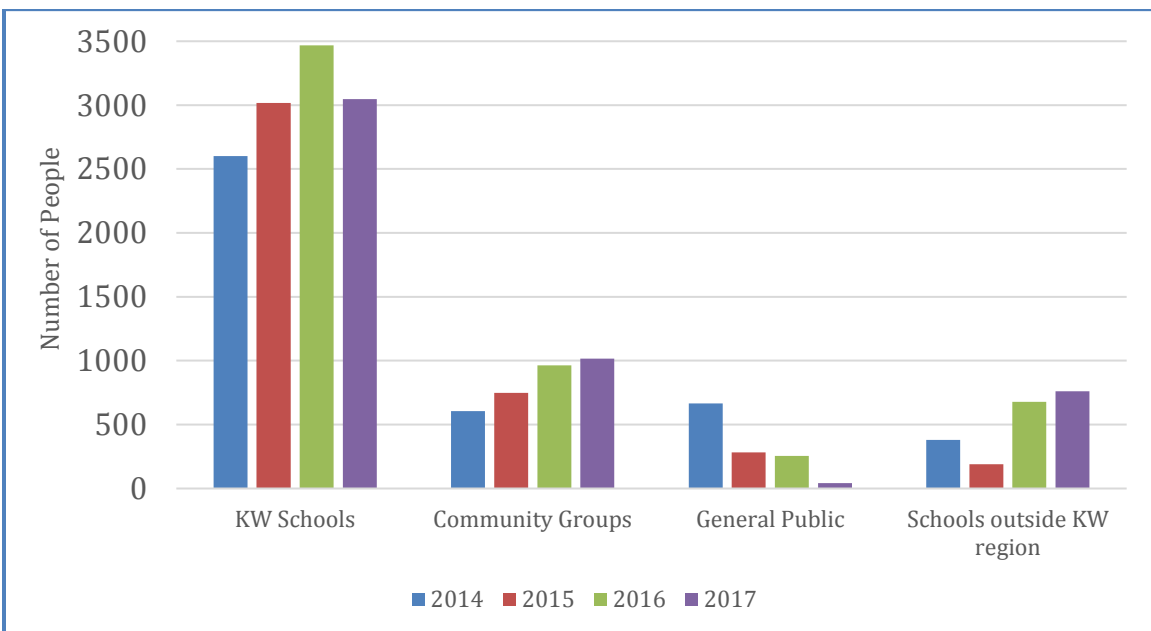


*Figure 2 – Total Annual Engagement*

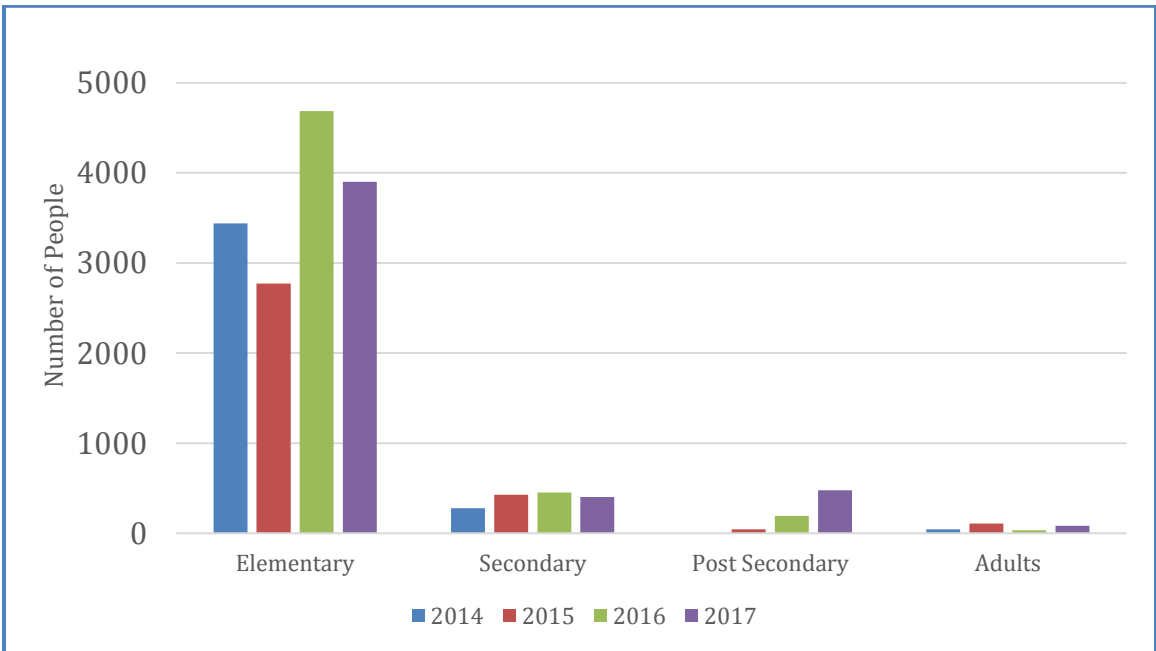


*Figure 3 – Type of Engagement*

In 2017 our internal education programs have brought in **4867** students from Kitchener-Waterloo and surrounding regions. This includes elementary, secondary, post-secondary schools, community groups (such as Girl Guides of Canada or the Naturalists) and general visitors. The visitors range in age from 3 years of age to adult. *Figure 4* describes where in the region groups are sourced and *Figure 5* defines the visitor demographics.



*Figure 4 – Visitor Source Location*



*Figure 5 – Visitor Demographics*



## Community Outreach

### Supporters



J.P. Bickell Foundation



Cobalt Mining Museum



Program Partners



Region of Waterloo

