

2018 Annual Report



ENGAGING COMMUNITIES SINCE 1967

Highlights of 2018

The Earth Sciences Museum's 51st year started off with new space and as we round the corner into 2019 the Museum is ending the year by promising more new space. Here are the highlights from 2018:

- The Museum was able to consolidate many of its office spaces into one large space on the second floor of the EIT building. Three offices were merged into one now located in EIT 2022.
- With the help of many volunteers and Science staff an online collection database is taking shape. This online database will become a private and public database housing all collection information. From what the specimen is, when a specimen came to the museum, who supplied it, what stories are associated with it, what the specimen's value is and where it is located today. This database will be the museum's inventory plus.
- The end of summer and all of Fall was a busy time gathering estimates and quotes to predict how much the proposed Reimer Family Gallery would cost. The work was well worth the effort though. Jim Reimer sent the Museum a generous donation to support the rest of the Gallery. With this donation 2019 will be full speed ahead building the Gallery walls.

Museum Acquisitions

The Museum gained close to 40 new acquisitions this year. The Peter Russell Rock garden hit 81 rocks with the addition of two rocks from the Yukon. There was a large beautiful Azurite that was added to the collection as well as many volcanic rocks, biotite, celestite, stilbite, chabazite and smoky quartz minerals. A number of these minerals have already been incorporated into the displays.

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 41,000 this year. Education programs brought in 4422 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 18 separate outreach events this year, reaching

21,658 people. Over 15,474 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. 2018 brought in 8 full and part-time and inter staff as well as 119 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, 2018 was an active, and exciting year. I am really looking forward to what 2019 will bring!

Sincerely,

Corina McDonald
Earth Sciences Museum Curator
cmmcdona@uwaterloo.ca

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Museum Overview

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 25th 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 51 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.

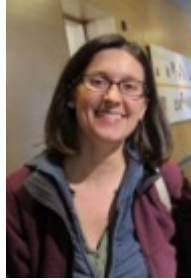
Advisory Body

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
*Science Museum
Curator*
**Earth Sciences
Museum
& Science Museum
and Galleries**



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



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



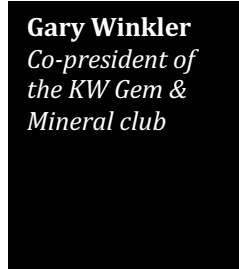
John Motz
*Museum Volunteer
of 10 years*
**Retired from the
KW Record**



Cynthia Davis
*Environmental
Scientist*
Stantec



Peter Gray
*Senior
Hydrogeologist and
Vice President*
MTE Consultants



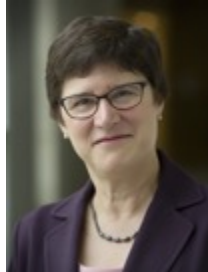
Gary Winkler
*Co-president of
the KW Gem &
Mineral club*



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



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



Jean Richardson
*Director Science
and Business*
**University of
Waterloo**



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



Laura Scaife
*Geologic
Consultant and
Educator*
**Scientists in
Schools**



Peter Morris
*Geologist
Consultant*

Programs and Tours

The museum offers curriculum-based programming to elementary and high school level classes at the museum but also in the classroom. The same programs are accessible to University visiting groups, community organizations and focus groups.

The programs that are offered through the museum are presented below on pages 5 to 8. The program posters are used to advertise at events. In September 2018, 4 new programs were established and advertised to the public.



Photo: Children loving prospecting for gold.



Photo: Learning about the Great Lakes



Photo: Dino days



Photo: Mastodon marvels



Photo: Applied Geochemistry

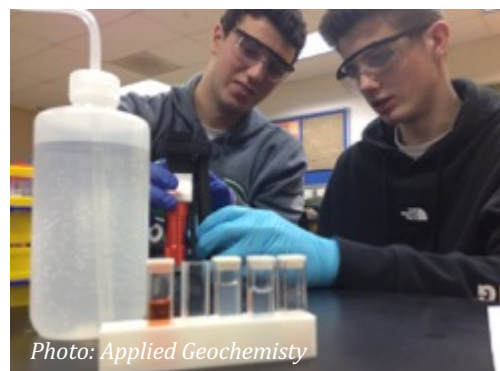


Photo: Applied Geochemistry



EARTH SCIENCES
museum

FREE
PROGRAMS

at the museum



ELEMENTARY SCHOOL PROGRAMS

PROGRAM	DESCRIPTION	AGE GROUP	TIME (HRS)
DINOSAURS AND FOSSILS	Learn about dinosaurs! Meet Albertosaurus, Parasaurolophus, Tyrannosaurus and the rest of their friends. You will see full sized skeletons and be able to touch real dinosaur fossils.	JK/SK and up	1.5
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 you get to dress up like a miner) and your choice of digging for fossil fish or panning for real gold.	Grade 4 and up	2
NATURAL DISASTERS	From volcanoes and earthquakes, through tornadoes, hurricanes, massive rainfall and drought. You can construct your own building and we will simulate an earthquake.	Grade 5/6 and up	1.5
WATER CONSERVATION	Follow Wally & Deanna and our instructor on an adventure to explore how we use, obtain, and conserve water. Compare a persons water use to how much fresh water is in the Great Lakes and on our Earth. Students will finish up by trying to tell the difference between bottled, tap and glacial water.	Grade 2 to 5	1.5

For more information, questions, or to book a school/group tour, contact us:

uwaterloo.ca/earth-sciences-museum

Phone: 519-888-4567, ext. 32469 Email: earthmuseum@uwaterloo.ca

Centre for Environmental and Information Technology (EIT)
200 University Avenue West, Waterloo, ON, Canada, N2L 3G1





SECONDARY SCHOOL PROGRAMS

PROGRAM	DESCRIPTION	CURRICULUM CONNECTION	TIME (HRS)
CANADIAN ENERGY RESOURCES	This action packed game first teaches students about Canadian energy: type, use, and transportation. The students then take charge and try to balance their provinces or territories needs with energy supply and demand. You will want to play this more than once!	CGC1D CGC1P SNC1D SNC1P	1
WATER RESOURCE SUSTAINABILITY	Students will learn about ground water/surface water interactions using a variety of learning tools, including a 3D sandbox, a groundwater model, and a Great Lakes Activity. Students will see and discuss the positive and negative impacts humans have on watersheds.	CGC1D CGC1P SNC1D SNC1P SVN3M SVN3E	2
FORCES OF NATURE	Earthquakes, volcanoes, and tsunamis! Students will learn about these dynamic processes and how they can impact nearby human populations and physical structures.	CGC1D CGC1P CGF3M SES4U SPH3U	2
GEOCHEMISTRY IN WATER RESOURCES	Waterloo Region is the largest community in Canada that relies on groundwater for drinking water. Explore where the water is stored in nature and how to protect and conserve this resource both chemically and physically. Students will test local water samples using lab equipment to determine the water quality.	SCH3U SCH4C SVN3M SVN3E SES4U	2
ROCKS, MINERALS AND MICROSCOPES	A hands-on, wide-eyed examination of where our Canadian rock and mineral resources come from, how we know what they are worth, and what products they are in. Students will investigate the properties and characteristics of rocks and minerals first hand through the microscope activity.	SES4U	2
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.	SES4U	2

When you book a tour to the Earth Sciences Museum, consider extending the University of Waterloo experience by adding one of the following options:

- › General Earth Sciences Museum tour (1 hour)
- › Campus tour (2 hour)
- › Faculty of Science tour (1 hour)
- › Observe a first year lecture (1 hour)
- › Peter Russell Rock Garden lunch with scavenger hunt (45 minutes)

Please note: All program times are suggested but can be flexible depending on your schedule

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 Follow us on Twitter @EarthSciMuseum





EARTH SCIENCES
museum

FREE
PROGRAMS

bring us
into your classroom

If you are unable to come to the museum for a tour, let us come to you! The following tables summarize the workshops we are able to bring into your classroom.



ELEMENTARY SCHOOL PROGRAMS

PROGRAM	DESCRIPTION	AGE GROUP	TIME (HRS)
DINOSAURS AND FOSSILS	Let's learn about dinosaurs! Meet Brachiosaurus, Parasaurolophus, Tyrannosaurus and the rest of their friends. You will be able to touch real dinosaur fossils and feed a baby Triceratops!	JK/SK and up	1.5
ROCKS AND MINERALS	Learn about minerals, rocks, and erosion. Includes touchable specimens and hands on activities. This program includes an activity of your choice: digging for fossil fish or panning for real gold.	Grade 4 and up	1.5
NATURAL DISASTERS	From volcanoes and earthquakes, through tornadoes, hurricanes, massive rainfall and drought. You can construct your own building and we will simulate an earthquake.	Grade 5/6	1.5

Book online today, or email us at earthmuseum@uwaterloo.ca

uwaterloo.ca/earth-sciences-museum





SECONDARY SCHOOL PROGRAMS

PROGRAM	DESCRIPTION	CURRICULUM CONNECTION	TIME (HRS)
CANADIAN ENERGY RESOURCES	This action packed game first teaches students about Canadian energy: type, use, and transportation. The students then take charge and try to balance their provinces or territories needs with energy supply and demand. You will want to play this more than once!	CGC1D CGC1P SNC1D SNC1P	1
WATER RESOURCE SUSTAINABILITY	Students will learn about ground water/surface water interactions using a variety of learning tools, including a 3D sandbox, a groundwater model, and a Great Lakes Activity. Students will see and discuss the positive and negative impacts humans have on watersheds.	CGC1D CGC1P SNC1D SNC1P SVN3M SVN3E	1
FORCES OF NATURE	Earthquakes, volcanoes, and tsunamis! Students will learn about these dynamic processes and how they can impact nearby human populations and physical structures.	CGC1D CGC1P CGF3M SES4U SPH3U	1
GEOCHEMISTRY IN WATER RESOURCES	Waterloo Region is the largest community in Canada that relies on groundwater for drinking water. Explore where the water is stored in nature and how to protect and conserve this resource both chemically and physically. Students will test local water samples using lab equipment to determine the water quality.	SCH3U SCH4C SVN3M SVN3E SES4U	1



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Centre for Environmental and Information Technology (EIT)

200 University Avenue West, Waterloo, ON, Canada, N2L 3G1

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Year in Review

Outreach & Events

Date	Event
January 11 th	Campus Life Fair
March 4 th – 7 th	PDAC – Prospectors and Developers Association of Canada – Mining Matters Branch
April 7 th , 8 th	Brantford Gem and Mineral Show
April 26 th to 28 th	Whitefish River First Nations Visit
May 4 th	Janes Walk Kitchener
May 5 th	KW Gem and Mineral Club Annual Show
May 9 th	Campus Life Fair
May 12 th	STEAM CIGI
May 25 th – 31 st	Waterloo Wellington's Children's Groundwater Festival
June 12 th	Public Talk – Elmira Library
July 14 th	Grey Roots Museum – Mastodon Talk
July 15 th - 17 th	Sudbury Gem and Mineral Show
August 21 st	Discovery Square Kitchener
September 11 th	Campus Life Fair
September 28 th – 30 th	Ancaster Gem and Mineral Show
October 26 th , 27 th	UW Gem and Mineral Show & Science Open House
November 19 th , 20 th	London Gem and Mineral Show
December 1 st	PhysiXX– Geophysics Activities

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.

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 and rock core investigation at the annual conference in Toronto. This year the museum was also asked to support Jeff Sage as a key presenter in the annual Teachers Day workshop introducing the concept of block modeling and ore grade. The museum also has a presence at the Earth & Environmental Sciences 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 \$500 in their 2nd 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 45 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 47 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 relatively new step in our relationship will hopefully be the start of a new collaboration in years come.

Jane's 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 one tour this year, 'Rock around Waterloo'. Corina and Peter were supposed to lead the walk but the weather and wind was so bad that we had to cancel the walk.

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 over 500 people.

STEAM CIGI



The city of Waterloo is promoting STEAM in our community and held an event at the CIGI building in uptown Waterloo with outreach partners throughout the Tri-cities area. The museum brought the 3D Sandbox, Minerals in your Materials and the Great Lakes activity to this half day event for grade 6 to 8 students.

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



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 and outreach coordinator 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 6458 children and 1,128 adults over 5 days. Over 500 volunteers enabled the activities to run all week long. Of those volunteers, 32 were students from the University of Waterloo and Earth Sciences Museum.

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, mineral match up, and Great Lakes activities.

Sudbury Gem and Mineral Show

Staff drove up to Sudbury for a 3-day Gem and Mineral show. They demonstrated and displayed the 'I Dig Fossil Fish' and 'Geology Model' activities and presented a Pyrite and Meteorite display. Sudbury provided a great place to network with potential students and industry from Northern Ontario. Many local geologists 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 water-based activities including the 3D sandbox, groundwater model and Great Lakes activity. Peter Russell presented 8 talks on Wally and Deanna's Groundwater adventure to visiting school classes on the Friday of the show.

University of Waterloo Gem and Mineral Show and Science Open House



The annual gem show and science open house was held on Oct 28th and 29th this year. Approximately 2,000 families attended. The gem show is coordinated by the museum and the science open house is 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 28th and the 29th. The museum organized Earth Science related activities in the Environmental and Information Technology build for the Science Open House on the 29th. 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.

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 Great Lakes activities to visitors. There were approximately 500 visitors to our activity booth over the weekend.

PhysiXX - Geophysics

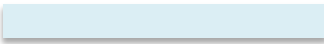


The faculty of Science hosted a workshop again this year to better introduce girls who are interested in Physics to physics. The workshop is called PhysiXX: Girls Matter. The Earth Sciences Museum was asked to participate in this one day event and provide a Geophysics workshop to 50 students.

Exhibits and Projects

<i>Start Date</i>	<i>Estimated Completion Date</i>	<i>Completion Date</i>	<i>Project</i>
May 2012	Apr. 2013	May 2013	Interactive Groundwater Driven Mineralization Exhibit
Nov. 2012	Apr. 30 th , 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. 2020	TBD	Laboratory of Life Exhibit *
Jan. 2015	Jan. 2018	Aug. 2018	Beyond Walls Exhibits
Sept. 2015	Ongoing	Ongoing	Photographing the Collection Project
Dec. 2016	Dec. 2017	Dec. 2018	Projector Installation Project
Apr. 2017	May 2018	May 2018	UW Blueprint – WWCGF App Project
Apr. 2017	Apr. 2021	TBD	School Program Assessment Project
June 2017	May 2018	May 2018	Digital Watershed Sandbox – Reconstruction Exhibit
Aug. 2017	May 2021	TBD	Reimer Family Gallery *
Sept. 2017	Postponed	TBD	GGR Outreach – Travelling Exhibit
Oct. 2017	Postponed	N/A	Edward Burtynsky – Photo Exhibit
Oct. 2017	Jan. 2018	Apr. 2018	Porosity & Permeability Display Project
Nov. 2017	Jan. 2020	TBD	Peter Rocks – Around the Museum Project
Nov. 2017	Postponed	TBD	Volcano! Exhibit

Jan. 2018	Ongoing	Ongoing	Online Collection Database project
Jan. 2018	Jan. 2020	TBD	Museum Security project
Feb. 2018	Aug. 2019	TBD	Robots, Rocks and Minerals project
Feb. 2018	Feb. 2020	TBD	3D Geologic Model project
Mar. 2018	Oct. 2018	Nov. 2018	Mastodon App Online project
June 2018	Sept. 2018	Sept. 2018	Women in Geology poster project
July 2018	Oct. 2018	Oct. 2018	Revised Victoria Park/Petrified Wood project
Sept. 2018	June 2019	TBD	Strategic Planning Committee project
Oct. 2018	Dec. 2019	TBD	Peter Russell Rock Garden Signage Update project
Apr. 2018	July 2019	TBD	Tyrannosaurus Rex exhibit - Revised



Complete Exhibits and Projects

Ongoing Exhibit Descriptions:

Laboratory of Life Exhibit

This year helped to better define the exhibit. The exhibit information will move through early life on the Planet with a focus on Burgess Shale type deposits in Canada and worldwide. Elements will include; 3 touch screen displays representing early life pre 508 MY, the earths tectonic plates and what they looked like between 3.8 BY and 508 MY ago and then information about Burgess Shale type fossil deposits. The exhibit also will house real and 3D printed fossils from the Burgess shale and Marble canyon sites and a piece of the Burgess Shale rock for visitors to touch.

Back in 2014, Manuel Arab, a 4th year Earth and Environmental Sciences student, was able to experience a paleontological dig at the new Burgess Shale site in Kooteny 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 12th, 2014. The article is titled "*Field experience unearthed life-long passion*" and can be found at www.bulletin.uwaterloo.ca in the Dec. 12th archives.

Reimer Family Gallery

The Reimer Family has been a major donor to the Earth Sciences Museum over the years, with contributions of support, mineral specimens and display units. In the next few years the museum will design and install four displays on four walls located on the 1st floor of the Museum, which will become known as the Reimer Gallery. The Museum will push to complete Reimer Family Gallery walls 1, 3 and 4 in 2019 and wall 2 in 2020 or 2021. Wall 1 will focus on groundwater mineralization, Wall 2 will be a complete exhibit on the Laboratory of Life (see above), Wall 3 will focus on fossilized plants and Wall 4 will display the rest of the minerals collected by Jim and his father.

Tyrannosaurus Rex Exhibit – Revised

In response to the Reimer family gallery and the changes happening to the 1st floor atrium the location of the Tyrannosaurus Rex skull will move from the 1st floor to the 2nd floor. To enhance this new location local paleo-artist Mark Rehkopf will create two T-rex images; one of a T-rex skeleton and one of a T-rex dinosaur. The two images will be used to create a lenticular image (holographic image) behind the T-rex skull.

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 has continued to help catalogue our collection this coming year.

School Program Assessment

Last year programs were assessed by popularity to determine where our human resources should be directed. The museum retired a few of our high school programs due to low enrollment and created 3 new high school level programs with the help of teacher interns. These programs target Grade 9 Geography, Grade 11 Geography and Grade 11 or 12 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 is called Water Resources and focuses on case studies of water movement through the Water Cycle and how humans affect and manage water as a public resource. The new Grade 11 Geography

program is called Natural Disasters and focuses on Earthquakes, Landslides and Volcano's. The new Grade 11/12 Chemistry program is called Geochemistry - Tracing Pollution in our Water focuses on how we use geochemistry to track pollution in surface and groundwater systems.

Online Collection Database

While photographing the collection museum volunteers started to notice that some of the specimens on display were not catalogued and so we started to update the excel database that already existed. In 2015 and 2016 specimens were being recorded in the program File Maker Pro. In 2017 volunteers realised that File Maker Pro was not the best software to store the collection data because many volunteers help to organize the collection and File Maker Pro had limitations on how many computers it could be associated with. This turned into a problem when we lost a significant amount of data due to this issue. In Jan. 2018 Science IST was contacted to determine if they could create an online database for the Earth Sciences Museum with hopes it could then be applied to the rest of science later. Since January museum staff and volunteers have been working with Science and Environment IST to create an online collection database.

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.

Robots, Rocks and Minerals

Edith Law in the Department of Computer Science at UW is conducting a project where robots are used to help teach kids about rocks and minerals. Edith requested that the museum provide advice to her student group on how rocks and minerals are commonly taught and then run through a few trials with the robot. The museum will also provide a means to test the robot during a number of school visits in 2019.

3D Geologic Model

This project started when Dr. John Johnston, approached the museum about creating a program for University students utilizing a new 3D Geological Model that was designed by the Geological Survey of Canada. The model encompasses all stratigraphic data available for all of Southern Ontario. The museum is collaborating with John, volunteers, students and the GSC to create the first working student program using a 3D geological model. John J., Jeff Sage and Quinn Worthington (as her 4th year thesis) have created and tested a program in one of the Earth Sciences department courses; Earth 235 – Stratigraphy, to better design and create this program.

Museum Security

October 27th, 2017 it was brought to light that the cameras in EIT are not functional and had not been functional since sometime in 2013. With this in mind museum staff spoke to campus police and UW IST about the liability of theft. It was recommended that 9 cameras be installed but the cost of ~\$15,000 would be applied to the museum. After speaking with faculty and department members it was recommended that museum staff look into alternative security devices that may be more pointed to deter theft. For example glass breakage alarms on all displays. Since then museum staff have been communicating with UW IST and external contractors to price out the most optimal security.

Strategic Planning Committee

In June of 2018 the Community Museum Operating Grant requested that the Earth Sciences Museum provide a strategic plan for the next 3 to 5 years. Considering that the museum had never gone through this process before and after chatting with the Ministries representative the Ministry provided the Earth Museum with more time and simply requested a strategic plan for the next year as the requirement for the Operating Grant given that in 2019 a more detailed strategic plan covering the next 5 years would be presented.

In September the first Strategic Planning committee meeting was held. It was clear that the committee needed to be sure the correct stakeholders were a part of the committee and decided to meet again to determine what was needed to create a strategic plan. The fall became too busy however and a second meeting was not held. Museum staff is hoping to start this process again early January.

Peter Russell Rock Garden Signage – Revision

2019 will mark the 20th anniversary of the naming of the Peter Russell Rock Garden. To mark this occasion the signage that is currently out in the garden will be removed and replaced with new signage. Currently the signs in the garden speak to the rocks that are only from Ontario. The new signage will include all of the rocks in the garden (from across Canada and the United States) and one sign to commemorate Peter Russell himself.

2018 Completed Exhibits or Projects:

Beyond Walls Exhibit

The museum has reached the end 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 in the elementary school level. There is a 'video game' now stationed in the Conestoga Rovers Learning Center, which encourages visitors to build one of five 3D dinosaur puzzles.

Projector Installation Project

For years staff and volunteers have had to lug a cart down the learning center stairs to set up a projector and computer to teach children's programs. This year we were given a free projector that has now been installed in the learning center.

UW Blueprint – WWCGF App Project

The WWCGF with the help of Earth Sciences Museum staff and UW Blueprint teamed up to create an online App that acts 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>

Digital Watershed Sandbox – Reconstruction Exhibit

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 the Sandbox was restructured so that it can be made easily portable to high schools and when in the Museum can be used in our programs.

Porosity and Permeability Display

Many of the cylinders representing how water moves through clay, sand, gravel and bedrock were cracked or broken in this display. The cylinders were 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.

Mastodon App Online Project

The mastodon mural and in house app was created back in 2014. To expand the app to the rest of the world the museum needed to jump through some UW hoops and cut some Apple tape to get the mastodon app online. The app is now available to anyone in the world!

Women in Geology Poster Project

There have been many women in science and in geology that worked 'behind the scenes'. John Motz put together 3 posters highlighting the work of Mary Anning, Alice Wilson, Inge Lehman and Marie Tharp. These posters are now up in the main atrium.

Victoria Park/Petrified Wood – Revision Project

A number of years ago a poster was put up in the museum that talked about climate change and how climate changes are recorded in the trees. There are two wooden tree cookie benches under the poster from large trees that were cut down in Victoria Park. The tree cookies show how climate affected the width of growth rings. The poster became very faded over the years and so the information was slightly revised, printed on a plaque and a piece of petrified wood was attached to the plaque noting that trees have recorded climate for eons.

Postponed Exhibits or Projects:

GGR Outreach – Travelling Exhibit

The Groundwater Geochemistry and Remediation (GGR) group applied for a Ontario Research Fund in 2017. As a portion of the grant 1% of the total funds were to be directed towards Outreach. The Museum was 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 this project will proceed. Due to government changes it is unclear as to whether or not this project will be continued.

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 had a discussion with the KW Art Gallery (who stores 49 of his photographs) and the artist's assistant to determine if a number of his photographs could be displayed in the Earth Sciences Museum. After this discussion it became clear that there was too much red tape to get through; first one photograph would have cost ~\$15,000, second according to the fine print we could not display the photograph for more than 5 years and three we could not present the photograph in a location with natural sunlight. All three of these limits were enough for the museum to forgo the project. Instead the museum plans to look for an different artist to present their photographs.

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.

Due to the alterations needed to complete the Reimer Gallery this project will be temporarily postponed until there is more time and funding secured.

Acquisitions

Item	Donor	Number of Items
Volcanic Rocks	<i>Wayne DeBrusk</i>	15
Stilbite	<i>Museum Purchase</i>	1
Chabasite	<i>Museum Purchase</i>	1
Azurite	<i>Museum Purchase</i>	1
Geologic Map Tube	<i>Carolyn Smith</i>	1
Mine Blue Prints	<i>Carolyn Smith</i>	10
Biotite	<i>Dr. Shaun Frape</i>	1
Celestite	<i>Dr. Shaun Frape</i>	1
Salt	<i>Max Salman</i>	3
Volcanic Bomb	<i>John Motz</i>	1
Smoky Quartz	<i>John Motz</i>	1
Map of Iceland	<i>Dr. Alan Morgan</i>	1
Historical Geologic Books	<i>Dr. Alan Morgan</i>	8

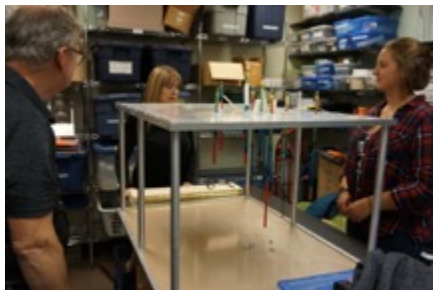
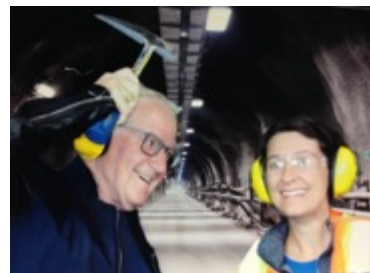
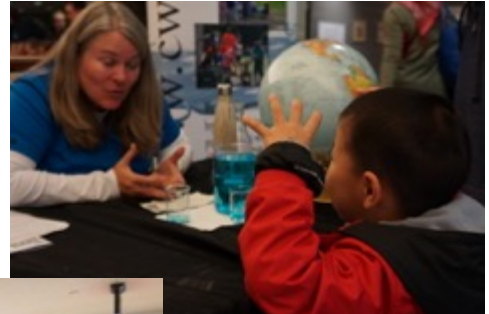
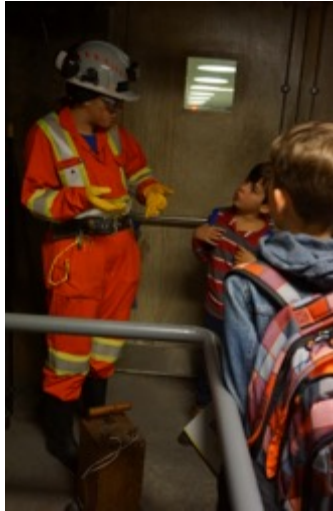
New Office

The Museum moved into a new office in February 2018. The Faculty of Science and the Earth and Environmental Sciences Department supported the development of a new Earth Sciences Museum office on the second floor of the EIT building. The new office is located in room 2022.

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. 2018 brought in 8 full and part-time staff and interns and 119 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 119 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!!



Volunteer Support

Long-term Project Based Volunteers:

Peter Russell – Curator Emeritus 39 Years, Volunteer 6 Years

Peter can and does indeed help with everything. Recently he has been helping with the collection database and the revision of the Peter Russell Rock Garden signs. Peter volunteers on average 1 day a week – but sometimes more.

John Motz – Volunteer 15 Years

John conducts background research, edits and accuracy checks on any topic that the museum is trying to present publicly. He has created almost every poster that exists in the museum. Currently he is working on the Peter Russell Rock Garden signs. He volunteers 1 day a week.

Barry Warner – Volunteer 8 Years

Barry has lead the charge and expanded our rock garden by collecting more than 13 rocks from across Canada and the U.S.A. He has also helped to support many displays in the museum with his keen eye for unique and educational specimens.

Jeff Sage – Volunteer 6 Years

Being a retired teacher Jeff helps with outreach at the museum assisting when needed to develop programs as well as run school programs. He also attends most, if not all, of our off campus events like gem and mineral shows. On average Jeff volunteers for 1 day a week.

Karen Fox – Volunteer 4 Years

Karen has been instrumental in moving the online collection database forward. She is a self-taught mineral/rock/fossil photographer and has captured almost all of the museum's collection. She is currently working on the organization and structure of the online collection database, which is no small feat. Karen volunteers on average 2 days a week.

Janine La Marre and David Chin-Cheong – Volunteer 1 Year

Janine and Dave are a retired couple that volunteer their time for one day a week. They have been helping with the collection database for the past year cataloguing a large number of specimens that are on display in the museum. Their work is helping to update the database.

Student Support

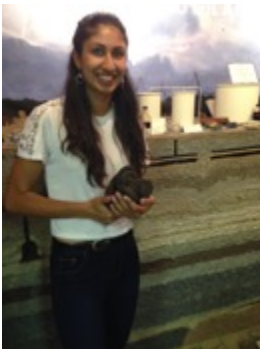
Full-time cooperative students:

Quinn Worthington – 3rd year Environmental Sciences – Geosciences



Quinn worked for the museum from the start of January to the end of August. With a passion for learning and teaching science, Quinn ran the educational programs offered at the museum. Quinn helped present the activities at the Prospectors and Developers Convention Teachers day in March, organize and present activities for the Children's Groundwater Festival and attended the Brantford, KW and Sudbury gem and mineral shows. For Quinn's coop report she researched and assist in creating design plans for a developing Volcanism display. With her passion for education Quinn has continued to volunteer for the museum.

Puneet Khaira – 2nd year Environmental Sciences – Geosciences



In September, Puneet was hired to run all of the school tours throughout the fall. She participated in the annual UW Gem & Mineral show and Science Open House and attended the London Gem & Mineral show to educate the public about Earth sciences.

Part-time work-study employees:

Jacob Whitehouse – 3rd Year Biology – Environmental Science



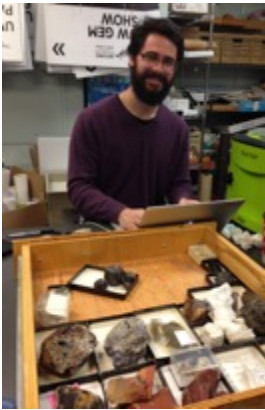
Jacob was asked to start working on the museum collection back in January of 2018 helping to organize fossils, minerals and rocks that have not yet been added to the museum collection database. He has also been instrumental in helping our team design an online database for the museum collection. Jacob paused his work in May to travel out west and make some serious cash planting trees.

Sarah Turner – 3rd year Environmental Sciences – Geosciences



In the summer of 2018 Sarah Turner picked up when Jacob left off and worked on organizing and labelling museum specimens for the online database. Sarah also helped run museum tours and events throughout the summer months. Sarah continues to volunteer at the museum. Her enthusiasm, knowledge and assistance has been much appreciated this Fall.

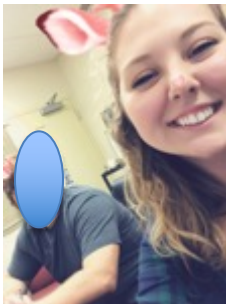
Jacob Whitehouse – 4th Year Biology – Environmental Science



Jacob continued working on the museum collection when he returned to campus in September of 2018. Since January he has organized and/or labelled close to 600 fossils, minerals and rocks in the back rooms of the museum. He also ran our Museum Family Days once a month to enable people to visit the museum on the weekends.

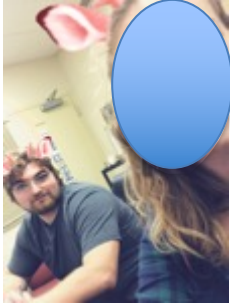
Part-time contract employees:

Chelsea Barta – Graphic Designer – Beyond Walls Exhibit



Chelsea Barta volunteered and worked part-time for the Museum while also studying Computer Programming full time at the University of Waterloo. Chelsea worked on the Augmented Reality – Water Cycle game.

Jean-Christoph (JC) Robertson – Beyond Walls Exhibit



Jean-Christoph Robertson volunteered and worked part-time for the Museum while also studying Physics full time at the University of Waterloo. He worked 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.

Student Teacher Interns:

Brennan Heptinstall – Student Teacher from Queens University



Brennan was a student teacher from Queens University. As a part of her second-year teaching requirements Brennan worked at the Museum for the month of April assisting our coop student with tours and creating teacher, student and facilitator documents for our high school programs. Thanks to Brennan for all of her hard work!

Bryanna Walker – Student Teacher from Western University



Bryanna is a first-year bachelor of education student from the University of Western Ontario that volunteered with the museum in December. While here she organized and facilitated all of the museum programs including dinosaurs, rock & minerals, geochemistry and groundwater programs.

Website

Figure 1 displays data for the Earth Sciences Museum website from 2014 to 2018. This data is collected annually from January 1st to mid-December. There has been a 35% increase in Total Page Views and a 2% increase in Unique Page Views (people visiting the website for the first time) since mid-December 2017. 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.

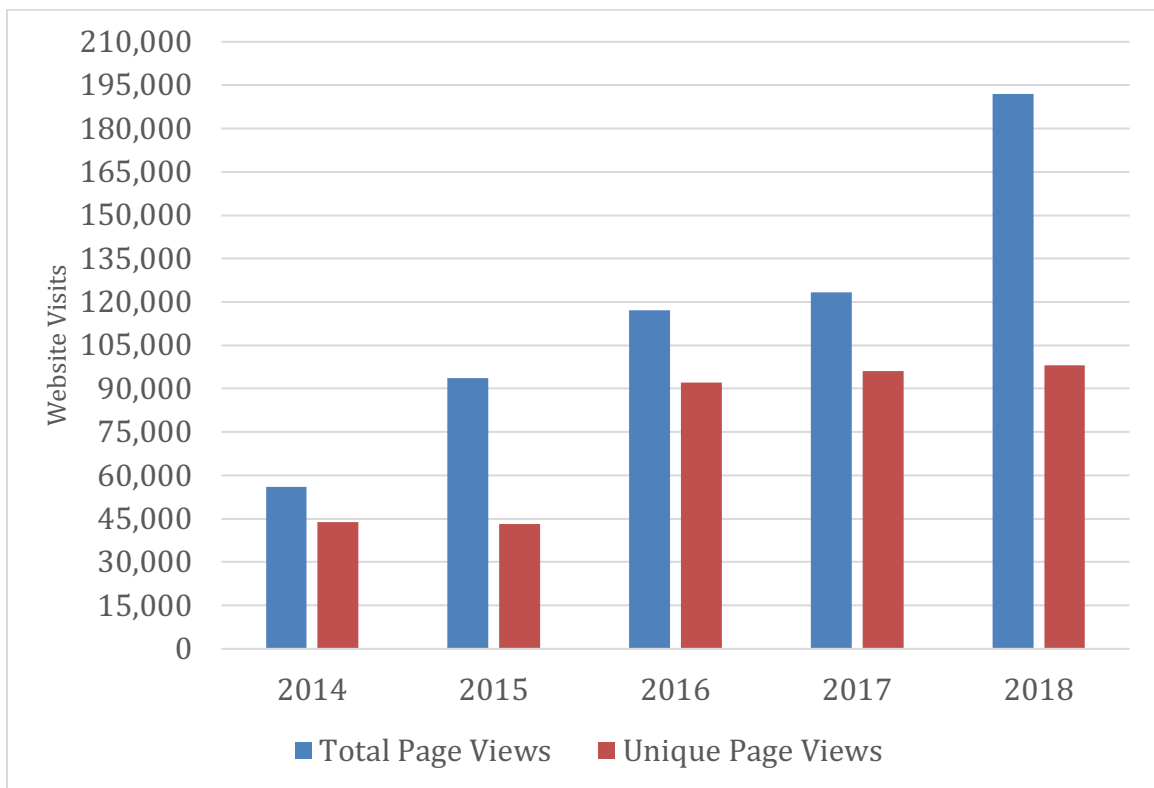


Figure 1 – Annual Earth Sciences Museum Website Traffic.

Visitor Data

The Earth Sciences Museum reached a minimum of **41,554** 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 is up 3% this year from 2017 numbers. *Figure 2* provides the annual total Museum engagement data from 2014 to 2018. Engagement has seen a slight increase from 2017 to 2018. 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 earlier data, in external events hosted by the Museum.

The museum participated in 18 separate outreach events this year, reaching 21,658 people. Over 15,474 visitors were tracked visiting the museum through University wide events and it is estimated that approximately 50 to 60,000 people visit the museum throughout the year. The later number is not easily tracked however because the building we are housed in has multiple entrances, there is no welcome desk and is open to students and visitors alike year round.

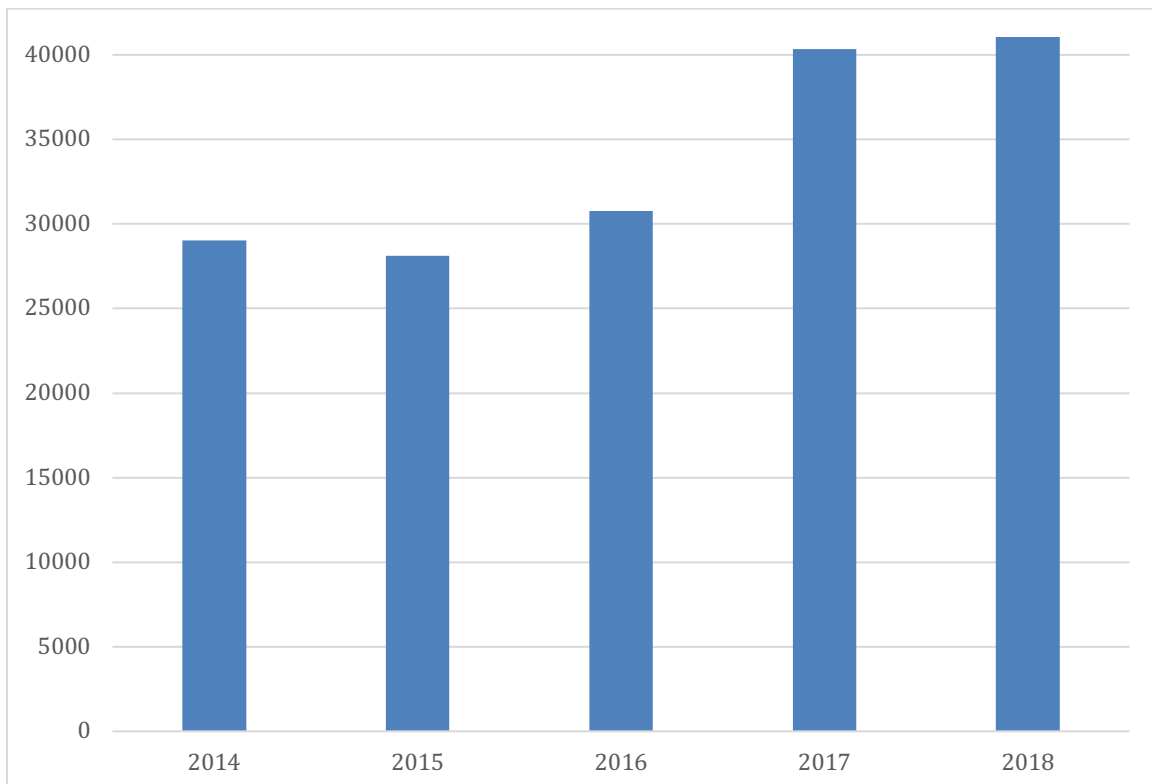


Figure 2 – Total Annual Engagement

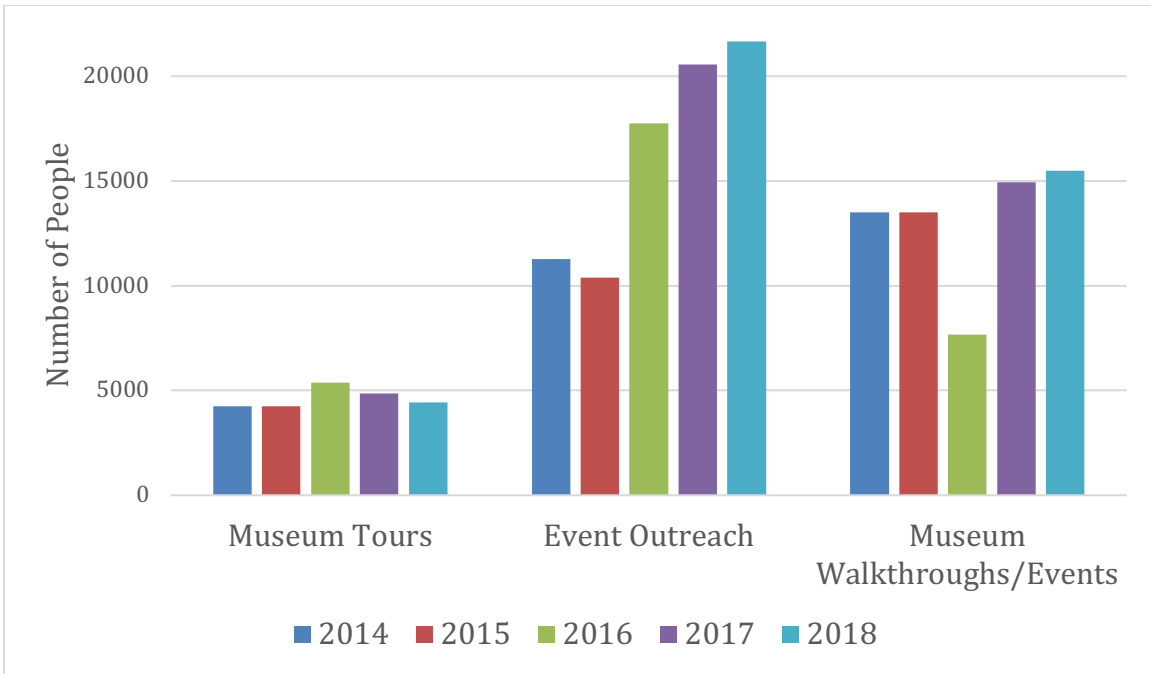


Figure 3 – Type of Engagement

In 2018 our internal education programs have brought in **4422** 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.

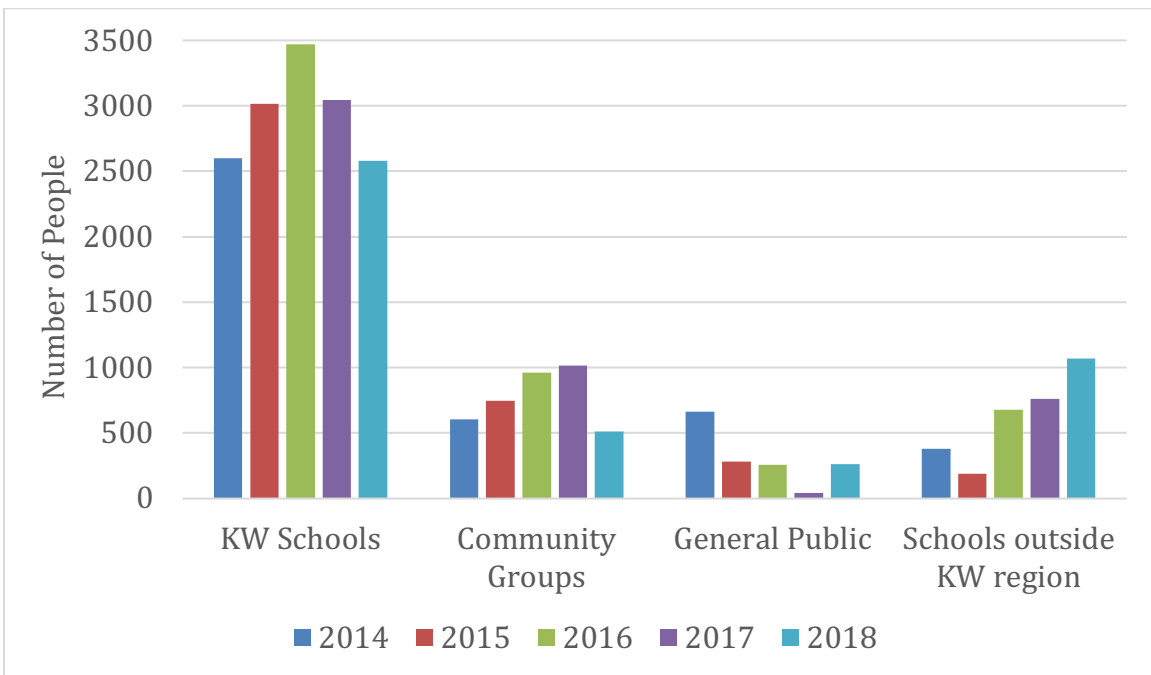


Figure 4 – Visitor Source Location

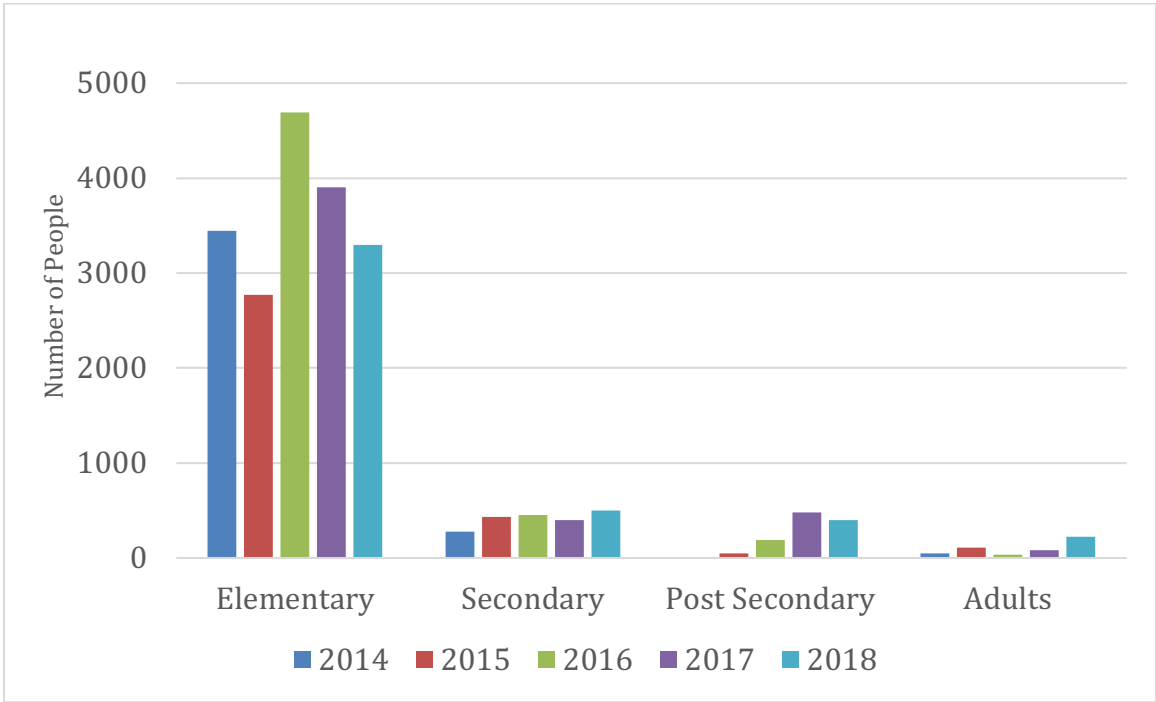


Figure 5 – Visitor Demographics

Community Outreach

Supporters



J.P. Bickell Foundation



Cobalt Mining Museum



Program Partners



Region of Waterloo

