2019 Annual Report

EARTH SCIENCES museum
UNIVERSITY OF WATERLOO

ENGAGING COMMUNITIES SINCE 1967

Highlights of 2019

The Earth Sciences Museum's 52nd year has been half full speed ahead and half take a step back. You will see what I mean after reading the highlights for 2019:

- The Reimer Family Gallery is off to a great start! Cabinets have been built, lights are installed, existing displays have been retrofitted. Other displays have been re-located and/or developed to make way for pending displays such as, moving Deinonychus and creating a new interactive Tyrannosaurus display. I am happy to say that the foundation of the gallery is taking shape in preparation for mineral specimens, new signage and the Laboratory of Life exhibit.

- The Museum, with the help of the University of Waterloo's Information System Technology group, has implemented a new security system to ensure that we are doing everything possible to deter thefts or damage.

- This year I have been given the go ahead to further educate myself on the operations, policies and procedures of a museum. Starting in June I took the first three of nine courses provided by the Ontario Museum Association. The courses were "Artifacts", "Collections Management" and "Education Programming". After successfully completing all nine courses I will get my Certificate in Museum Studies. I was also invited to take a day course on philanthropy, taught by Lorna Summers. While taking these courses I pressed pause on a few things so that I could absorb information.

- Continued support from volunteers and Science staff have been very beneficial for the online collection database. That said, because I took a course on Collections Management, we all hit pause half way through the year so that I could determine if our database was headed in the right direction or if it could be improved in any way with the information from this course. With new insight I look forward to starting up this project again in 2020.

Museum Acquisitions

With the addition of the Anne Burton collection, the Museum gained just over 30 new acquisitions this year. Some minerals to note include clear fluorite, celestite and sulphur from Amherstburg, ON.

Education

As in previous years the majority of ESM public programs have drawn student groups from elementary aged groups. This year we are seeing an increase in secondary participation. The Waterloo Region District School Board is advertising

our co-developed Geochemistry program to Chemistry teachers throughout the public board. Because this program was also developed by Levi Moore, an outdoor education teacher in the WRDSB, the board has approved covering the cost of bussing for those schools wishing to attend the Geochemistry program. This partnership has greatly increased the number of secondary students and enabled experiential education throughout the public board.

Engagement from the Earth Sciences Museum reached close to 49,186 this year. Education programs brought in 5963 students from Kitchener-Waterloo-Cambridge 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 16 separate outreach events this year, reaching 27,873 people. Over 15,350 visitors were tracked visiting the museum through University events and walk throughs.

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. 2019 brought in 7 full and part-time and inter staff as well as 131 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, 2019 was steady year. I am really looking forward to what's to come in 2020!

Sincerely,

Corina McDonald
Earth Sciences Museum Curator
cmmcdona@uwaterloo.ca

Table of Contents

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

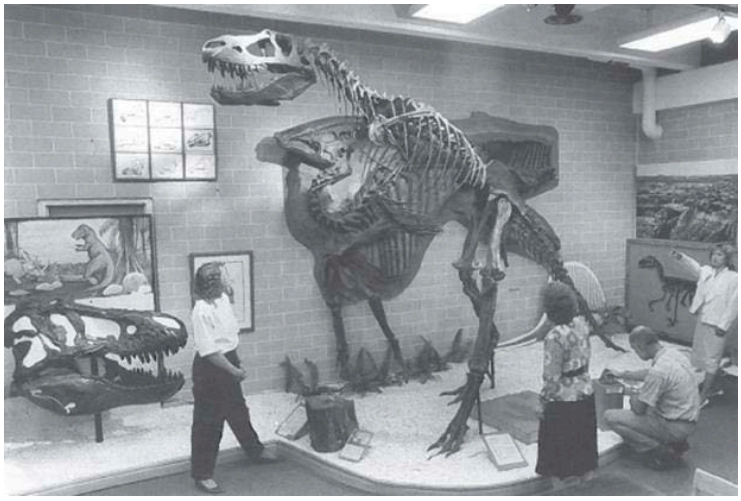

Photo: 1982 Earth Sciences Museum in Biology 1, Room 370

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.

Role in Science

The Earth Sciences Museum is the longest standing science outreach initiative at the University of Waterloo. Over the last 52 years the museum has grown in relevance, educational importance, reputation and its capacity to engage and educate our local and greater community.

The operation of the Earth Sciences Museum is aligned with the University of Waterloo's mission statement. It also aims to achieve many of the current goals and objectives set by the University and the Faculty of Science 5-year Strategic Plan:

- To advance learning and knowledge through teaching, research, and scholarship, nationally and internationally, in an environment of free expression and inquiry (UW's mission)
- Intentionally develop programming to inspire collaboration for shared research, teaching, learning and community building opportunities among our students, faculty, staff and alumni. (one of UW's objectives under the third themed area)
- Broaden our understanding and engagement of communities on our campuses and with our alumni, external partners, regional, national and international communities. (one of UW's objectives under the third themed area)
- Educate global citizens for the future of work and learning to thrive in an age of rapid change by putting learners at the center of everything we do. (one of UW's goals under the third themed area)
- Find new ways to work together and remove barriers to collaboration, interdisciplinarity and the integration of knowledge. (one of UW's objectives under the third themed area)
- 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 and the Faculty of Science. The Earth Sciences Museum has an advisory board whose primary role is to give advice and assistance to ensure programs, exhibits, policies 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

Peter Gray
Senior Hydrogeologist and Vice President
MTE Consultants

Peter Russell
Curator Emeritus
Earth Sciences Museum

Jeff Sage
Retired Earth Science Teacher
Waterloo Regional District School Board

John Johnston
Assistant Professor Sedimentology/ Stratigraphy
University of Waterloo

Peter Morris
Geologist
Consultant

Cynthia Davis
Environmental Scientist
Stantec

Laura Scaife
Geologic Consultant and Educator
Scientists in Schools

David Chin-Cheong
Retired from
BluMetric Environmental Inc.

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

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

Jean Richardson
Director Science and Business
University of Waterloo

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 documents are posters 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: Dino days

Photo: Learning about the Great Lakes

Photo: Mastodon marvels

Photo: Applied Geochemisty

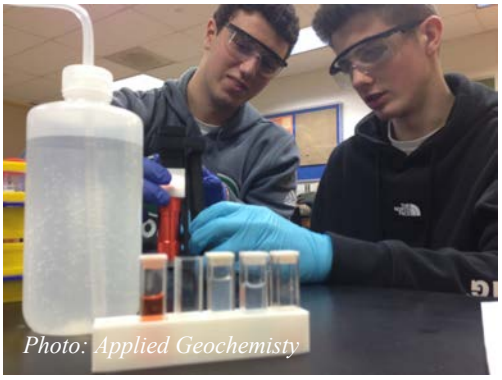

Photo: Applied Geochemisty

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

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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

Follow us on Instagram **@UWEarthSciMuseum**

Follow us on Twitter **@EarthSciMuseum**

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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

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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

EARTH SCIENCES museum

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Year in Review

Outreach

Date	Event
January 16	Campus Life Fair
March 4 - 5	PDAC – Mining Matters
April 6 - 7	Brantford Gem & Mineral Show
April 29 – May 2	Whitefish First Nations
May 4	KW Gem and Mineral Show
May 5	Jane's walk-rock around Kitchener
May 24 – 30	Waterloo Wellington Children's Groundwater Festival
May 31	Curiosity Fair
July 19 - 21	Sudbury Gem and Mineral Show
September 15	Geology talk
September 18	Campus Life Fair
September 21 - 22	Scarborough Gem Show
October 4 - 6	Ancaster Gem Show
October 9 - 12	Detroit Gem Show
October 25 - 26	Waterloo Gem and Mineral Show and Science Open House
November 16 - 17	London Gem Show
December 1	PhysiXX - Girls Matter

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 a few 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 participate 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. 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

Every year the Brantford Lapidary & Mineral Society holds a gem and mineral show hosting close to 30 venders 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. For the third year the Earth Sciences Museum brought hands on activities to the bands Elementary School and Community. Last year the school children and teachers requested a program on fossils which we delivered. The focus was on local fossils to the Whitefish River First Nations land.

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 the Peter Russell Rock Garden'. Peter lead the walk through the rock garden.

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 the fossil fish activity for the day.

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 programing 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 where 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 Diamond display. Sudbury provided a great place to network with potential students and industry from Northern Ontario. Many local geologists where very interested in the Rock Core Explore model and provided great feedback and input with the core logging activity.

Scarborough Gem and Mineral Show

At the request of the show organizers and to help celebrate the 50th anniversary of the Scarborough gem show, staff and volunteers from the museum ran the gold panning activity. It has been requested that we return next year. Due to a lower attendance than most other gem shows, it is not likely that the museum will allocate continued time and resources to this event.

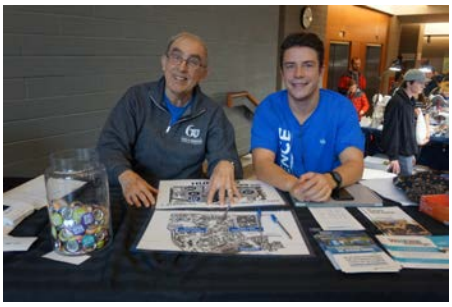
Ancaster Gem and Mineral Show

The Ancaster gem and mineral show takes place from Friday to Sunday each year. On Friday various local elementary schools attend children's activities at the show focused on gem and mineral resources. Museum staff and volunteers provided the rock cycle game and mineral presentation to school groups on Friday and then fossil fish and rock core explore on Saturday and Sunday.

Detroit Gem and Mineral Show

To help celebrate the 75th anniversary of the Detroit Gem and Mineral show, museum volunteers provided the rock core explore activity to the show attendees. This show is a great place to network with North American contacts, especially south of the boarder. Attendance will be considered again next year.

University of Waterloo Gem and Mineral Show and Science Open House



The annual gem show and science open house was held on Oct 25th and 26th 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 25th and the 26th. The museum organized Earth Science related activities in the Environmental and Information Technology building for the Science Open House on the 26th. The museum had a great team of 55 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, 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 Rock Core Explore activities to visitors. There were approximately 500 visitors to our activity booth over the weekend.

PhysiXX: Girls Matter – Geophysics Activity

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 26 students. Below are a few student quotes from the Geophysics activity presented on December 1st:

"Physics Rocks was my favourite part of the day! We got to play and fiddle with things, and the workshop was very hands-on, which really helped me learn and understand everything better."

"SO AWESOME, couldn't have been better. All stations were very well thought out, and we could all immediately understand what was going on."

Exhibits and Projects

Start Date	***Estimated Completion Date***	***Completion Date***	***Project***
May 2012	Apr. 2013	May 2013	Interactive Groundwater Driven Mineralization Exhibit
Nov. 2012	Apr. 30th, 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	Feb. 2015	Nov. 2015	Petrified Wood 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
Jan. 2015	Jan. 2018	Aug. 2018	Beyond Walls Exhibits
Dec. 2016	Dec. 2017	Dec. 2018	Projector Installation Project
Apr. 2017	May 2018	May 2018	UW Blueprint – WWCGF App Project
June 2017	May 2018	May 2018	Digital Watershed Sandbox – Reconstruction Exhibit
Oct. 2017	Jan. 2018	Apr. 2018	Porosity & Permeability Display 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
Jan. 2018	Jan. 2020	May 2019	Museum Security project
Nov. 2017	Postponed to 2022	TBD	Peter Rocks – Around the Museum Project
Nov. 2017	Postponed to 2022	TBD	Volcano! Exhibit
Aug. 2013	Postponed to 2022	TBD	Interactive Mine Tunnel Exhibit
Oct. 2018	Postponed to 2022	TBD	Peter Russell Rock Garden Signage Update project

Sept. 2015	Ongoing	Ongoing	Photographing the Collection Project
Jan. 2018	Ongoing	Ongoing	Online Collection Database project
Sept. 2018	Ongoing	Ongoing	Strategic Planning project
Mar. 2013	June 2020	TBD	Gold Scale exhibit - Revised
May 2014	May 2021	TBD	Laboratory of Life Exhibit *
Aug. 2017	May 2021	TBD	Reimer Family Gallery *
Apr. 2017	Apr. 2021	TBD	School Program Assessment Project
Sept. 2017	Sept. 2022	TBD	GGR Outreach – Travelling Exhibit *
Apr. 2018	Feb. 2020	TBD	Tyrannosaurus Rex exhibit - Revised
Apr. 2019	Apr. 2020	TBD	Epirock Drill Bit Exhibit

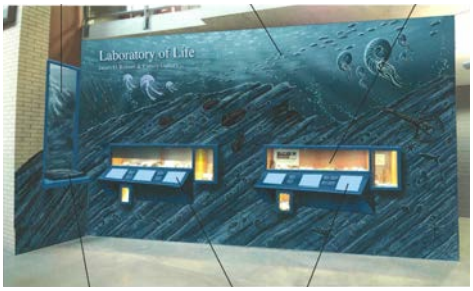
Complete Exhibits and Projects

Ongoing Exhibit Descriptions:

Gold Scale Revival

Sometimes it is less expensive to get two things done at the same time. Because a glass case is being installed around the T-rex skeleton it will be less costly to get a glass case installed around our gold scale at the same time. The gold scale has been on display for decades but has not been on display with all of its parts. This is due to the fact that the parts could easily walk away. With the glass case installed the gold scale will now be able to show off the scales, its weights and a few 'gold bars'.

Laboratory of Life Exhibit



A part of the Reimer Family Gallery project (below) - this exhibit 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 will also 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. The gallery space will involve 4 wall spaces in the museum; Wall 1 will focus on groundwater mineralization, Wall 2 will be a compete exhibit on the Laboratory of Life (see above), Wall 3 will focus on fossilized plants and Wall 4 will display minerals collected by Jim and his father. This past year saw the installation of new mineral display units for the gallery space. This year and the next will be focused on the design and installation of signage to accompany the display units as well as the Laboratory of Life exhibit.

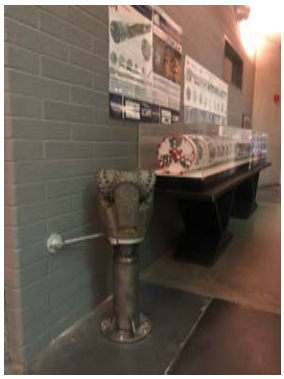
GGR Outreach – Travelling Exhibit

The Groundwater Geochemistry and Remediation (GGR) group applied for an 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, Mining Matters and the Earth Sciences Museum. The GGR group received the grant and the museum was notified this past year. Over the next year all participants will define the project goals and assign tasks.

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 paleo-artist Mark Rehkopf created three T-rex images; one of a T-rex skeleton, one of a T-rex dinosaur with skin and one of a T-rex dinosaur with skin and feathers. The three images have been used to create a lenticular image (transition image) behind the T-rex skull. This coming year will see this exhibit installed with glass surrounding the image as well as the skull.

Epirock Drill Bit



This 300 lb drill bit was donated by Epirock. The donation process was started from a Geological Engineering student who wanted to see more information about geological engineering in the Earth Sciences Museum so that other students and visitors could be inspired to learn more about the field. This is the first installation on the wall that will become our geological engineering wall. Information about the drill bit itself and geological practices will follow.

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

Programs offered in 2017 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 and Waterloo Region District School Board staff. 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.

So far, the Geochemistry program has increased in popularity, Natural Disasters has not had a single request and the Water Resources program started with good numbers and then fizzled. The museum will continue to advertise and monitor these programs.

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.

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 are hoping to start this process again early January.

In December of 2019 the board met and started this strategic planning exercise by first looking at the University mission statement and then the museums. In January of 2020 the board will met again to define the vision and mission of the museum. We will then move forward to define the museums goals for the future. In the meantime museum staff are working off of a temporary strategic plan composed by the curator.

2019 Completed Exhibits or Projects:

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 the Universities Information Technology System team about the liability of theft. Early in 2019, cameras, glass breakage devices and door breaks were installed in almost all areas of the museum. The museum will need to budget in security replacements on a 5-year rotation and budget to increase the number of cameras in the building. It has been recommended that we install at least 4 more cameras.

Postponed Exhibits or Projects:

Due to the time commitments needed for the Reimer Gallery, Laboratory of Life exhibit and GGR travelling exhibit many other projects will be temporarily postponed until there is more time and funding secured.

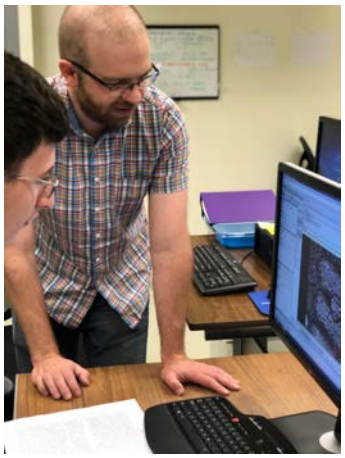
Acquisitions

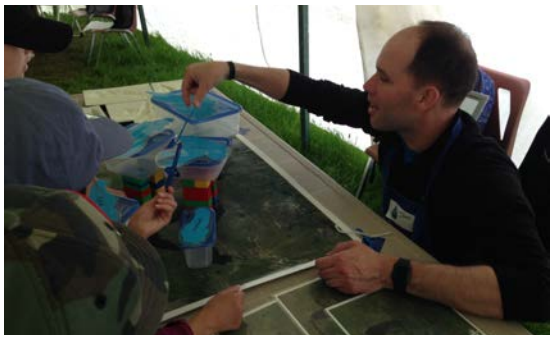
Item	**Donor**	**Number of Items**
Cave bear jaw bone	*Peter Russell via Frank Brookfield*	1
Drill bit	*Epirock*	1
Baryte – Spicers Cove Nova Scotia	*Purchased by museum*	1
Anne Burton collection	*Anne Burton*	30
Personal letters	*Carolyn Smith*	10

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. 2019 brought in 7 full and part-time staff and interns and 131 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 131 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 40 Years, Volunteer 7 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 16 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 updating dated displays in the museum. He volunteers 1 day a week.

Jeff Sage – Volunteer 7 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 5 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.

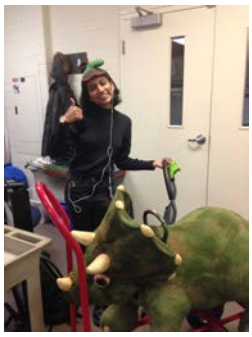
Janine La Marre and David Chin-Cheong – Volunteer 2 Year

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 2 years 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:
Photos and their quotes about themselves or working at the museum

Sana Ahmed – 2nd year Environmental Science – Geoscience



"I am a second-year Environmental Science student at the University of Waterloo pursuing a specialization in Geoscience. I have always loved learning about our planet and its stunningly complex geology, so I cannot wait to share that passion with our visitors."

Keana Iocca – 3rd year Environmental Science – Water Science

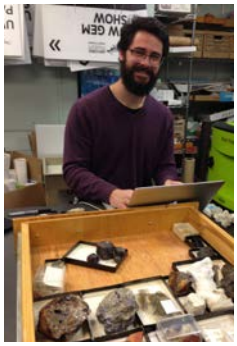
"I am a third-year Environmental Science student with a specialization in Water Science and a minor in Geography and Environmental Management. What I love about studying the earth and our environment is that it includes many other fields of science and can be observed in our everyday lives."

Gavin MacDougall – 3rd year Earth Sciences – Geology

"I am a third-year student in the earth sciences program specializing in geology. I enjoy the great outdoors and collecting rocks and minerals, especially in the Bancroft area. I look forward to sharing my passion for geology and earth sciences through the educational programs offered by the Earth Sciences Museum."

Part-time work-study students:

Jacob Whitehouse – 4th Year Biology – Environmental Science



The winter term (January to April, 2019) was Jacobs third term working with the museum. He primarily worked on the museum collection database and helped run many school tours with Sana Ahmed, our winter term coop student.

Dylann Simmonds – 3rd Year Biology – Environmental Science

"Do you like rocks? I like rocks, that's why I work here. Geology is a discipline which allows me to best understand the Earth and its resources. Whether teaching kids about geology or working with the museum's collection, my affinity for this field is always growing. Currently a second-year geology student, I hope to one day enter the mineral exploration industry. I hope you enjoy the Earth Science Museum as much as I do!"

Jessica Verschoor – 3rd year Earth Sciences – Geology

Jessie is a 3rd year geology student. She has been working with the museum from September to December of this year as a program assistant. Jessie has been running tours with Gavin and attending gem shows.

Student Teacher Interns:

David O'Reilly – Student Teacher from Western University

David is a second-year bachelor of education student from the University of Western Ontario that volunteered with the museum in for 3 weeks in December. While here he worked on developing a new high school program aimed at grade 9 Geography. David also helped run museum programs including dinosaurs, rock & minerals, geochemistry and natural disasters.

Website

Figure 1 displays data for the Earth Sciences Museum website from 2015 to 2019. This data is collected annually from January 1st to mid-December. There has been a 9% increase in Total Page Views and a 41% increase in Unique Page Views (people visiting the website for the first time) since mid-December 2018. Social media, *Figure 2,* has played a role in bringing the museum into the community. Our followers for twitter and Instagram have increased annually and it has helped to have a regular posting each week.

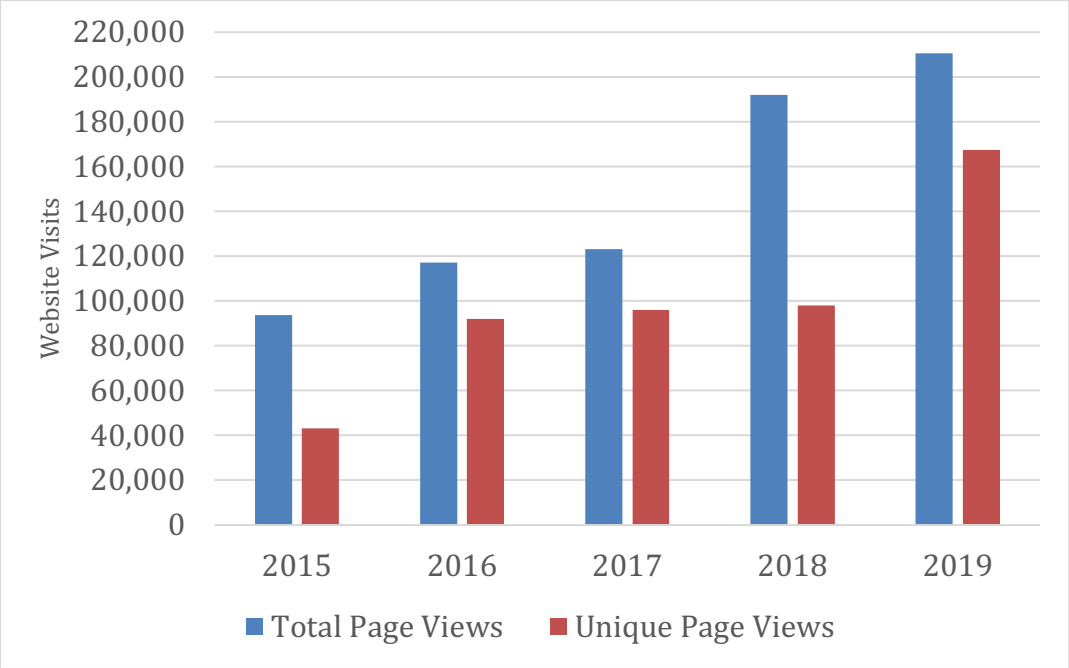


Figure 1 – Annual Earth Sciences Museum website traffic.

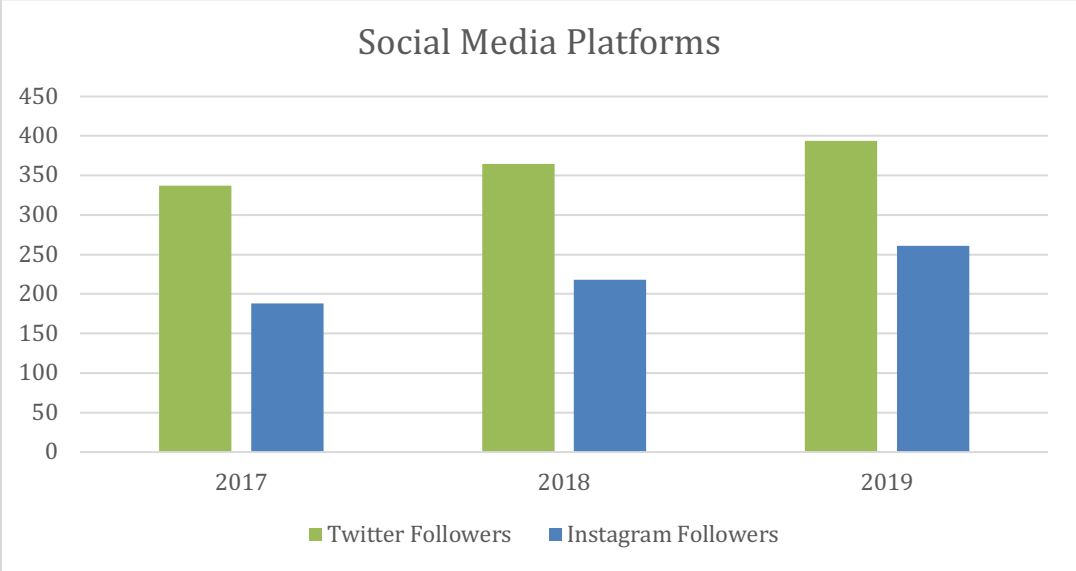


Figure 2 – Annual Earth Sciences Museum social media traffic.

Visitor Data

The Earth Sciences Museum reached a minimum of **49,186** 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 15.5% this year from 2018 numbers. *Figure 3* provides the annual total Museum engagement data from 2015 to 2019. Engagement has seen a good increase from 2018 to 2019. According to the data presented in *Figure 4* this increase is largely due to an increase in Outreach and Museum Tours.

The museum participated in 16 separate outreach events this year, reaching 27,873 people. Over 15,350 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.

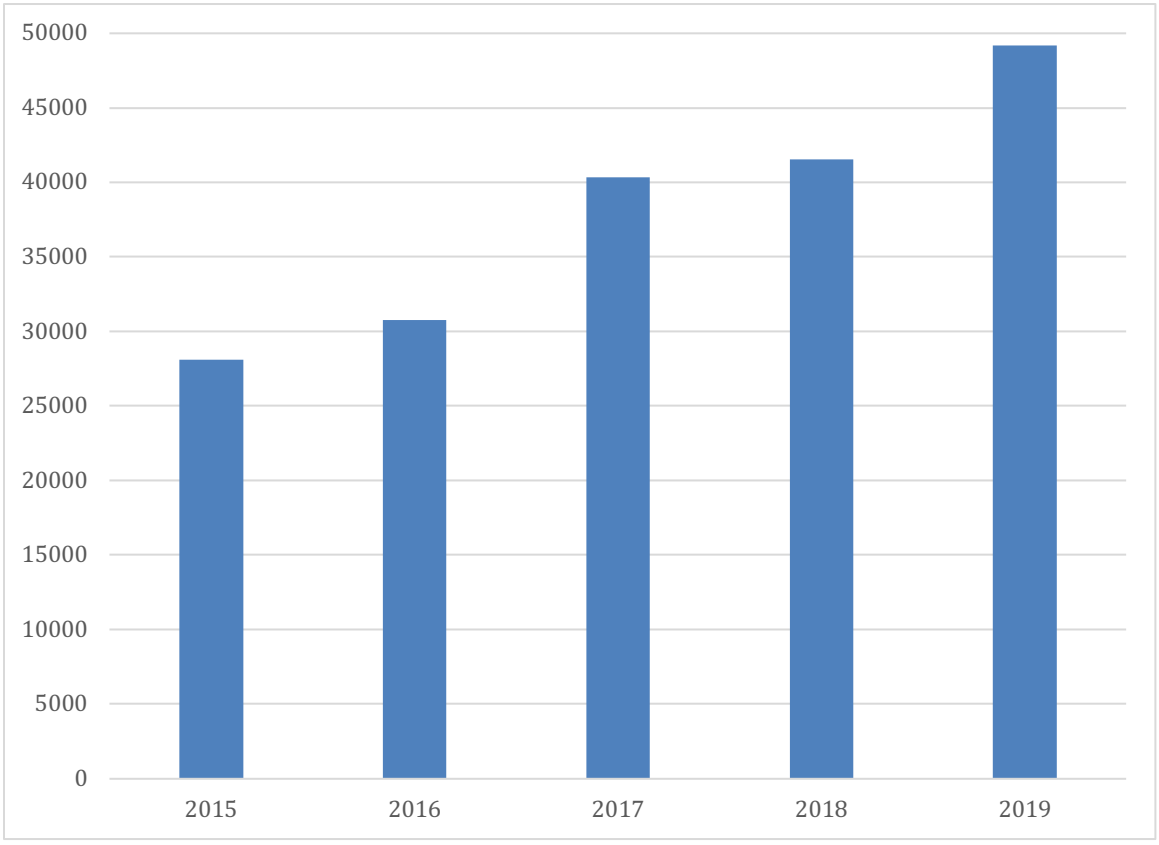


Figure 3 – Total Annual Engagement

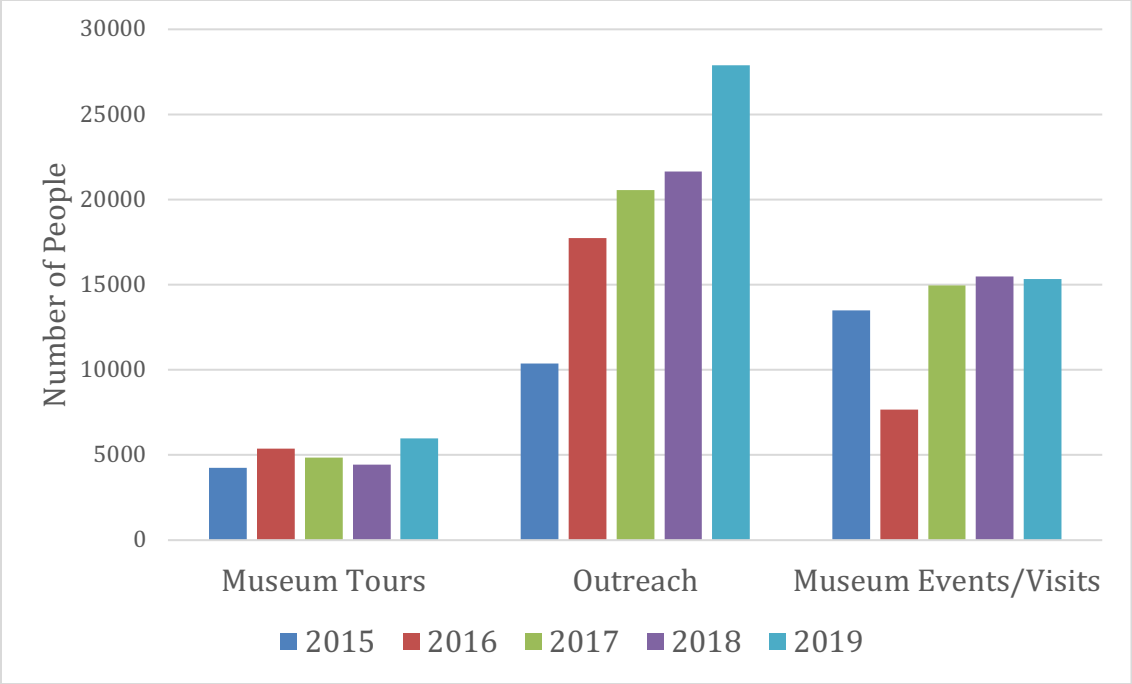


Figure 4 – Type of Engagement

In 2019 our internal education programs brought in **5963** students from Kitchener-Waterloo-Cambridge and surrounding regions. This includes elementary, secondary, post-secondary schools, community groups (such as Girl Guides of Canada or the KW-Nature) and general visitors. Visitors range in age from 3 years of age to adult. *Figure 5* describes where in the region groups are sourced and *Figure 6* defines the visitor demographics.

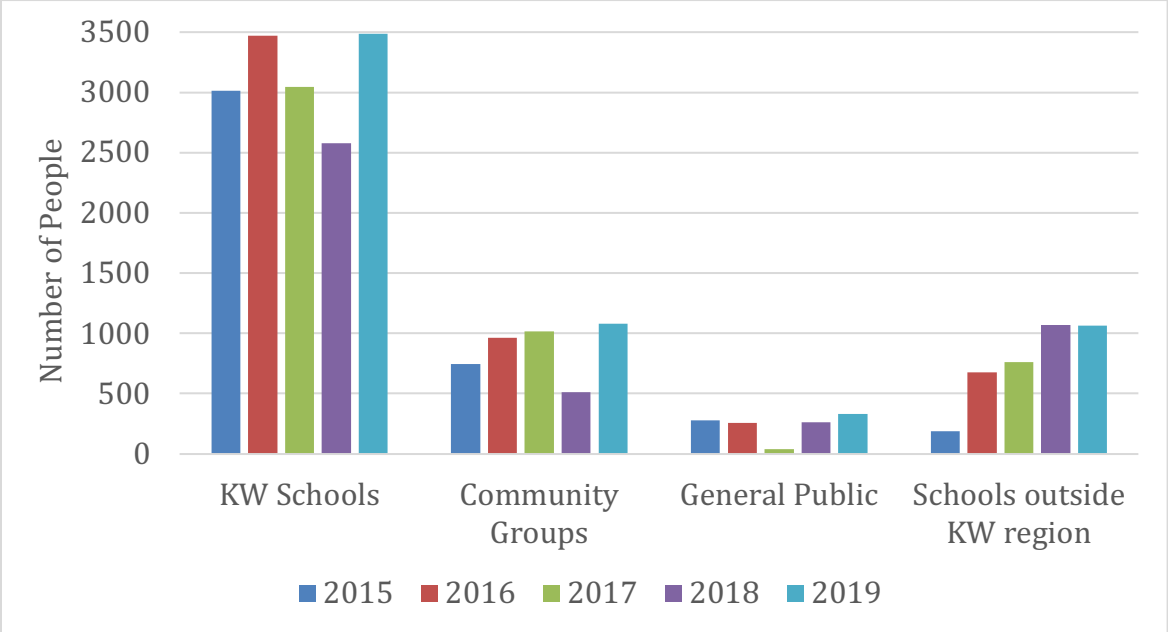


Figure 5 – Visitor Source Location

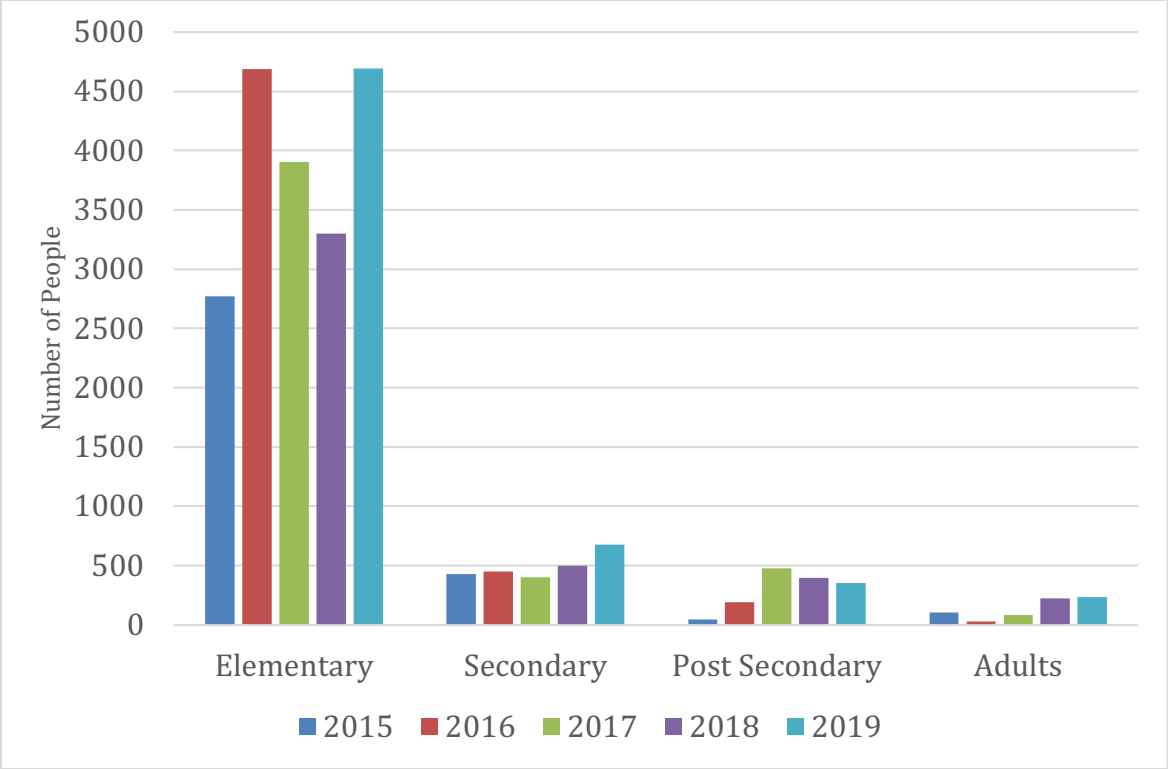


Figure 6 – Visitor Demographics

Community Outreach

Supporters

CONESTOGA-ROVERS & ASSOCIATES | A GHD company

ROM Royal Ontario Museum

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J.P. Bickell Foundation

Canadian Geological Foundation · Fondation Géologique du Canada · 1968

Cobalt Mining Museum

Brantford Lapidary and Mineral Society — Established 1964

Program Partners