Logan Bartholow Portfolio

Contents

1. The Cathedral of Santa Maria del Fiore

A photo taken during a trip to Florence, Italy.

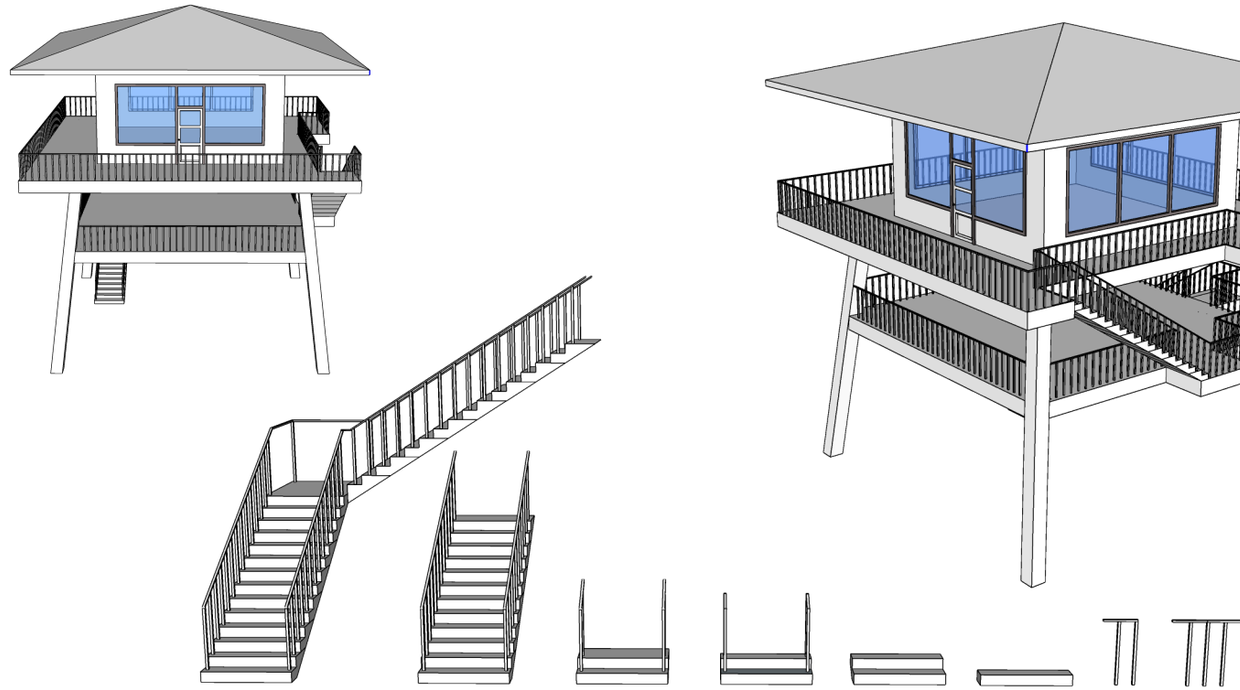
MEDIA: CAMERA - SONY α5000 | SOFTWARE - ENLIGHT

2. Cabin Design

The task for this project was to design a summer house in SketchUp that played with verticality while still maintaining daily function. The height of this cabin allows for an unobstructed view of the lake without the need to remove trees.

The design for this cabin takes heavy influence from the Fire Watchtowers throughout Canada. With a small physical footprint this building does little to impact the surrounding environment. An open bottom floor is protected by the floor above it and is intended to be the space where the majority of time is spent for relaxation. The top floor has a large balcony for enjoying the view of the lake and an open floor plan inside the structure to promote family interactions.

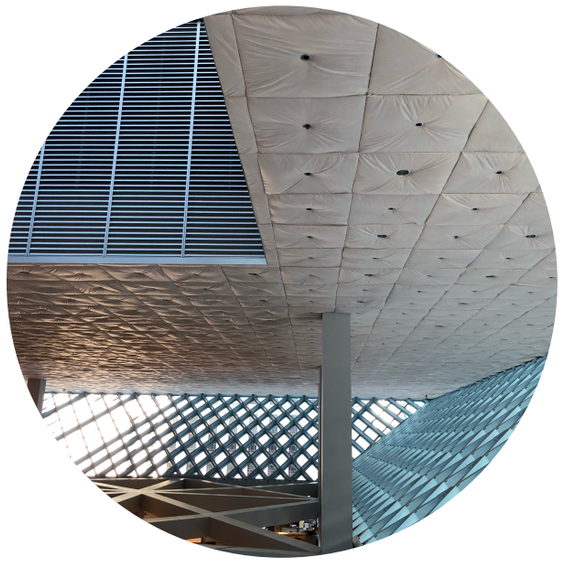
MEDIA: SKETCHUP



3. Seattle

My trip to Seattle was probably one of the most influential trips I have taken, not because I found it the most culturally enriching or the most grandeur but because it was one of the few cities I've traveled to where it felt like it was truly designed for humans. During my time in the Downtown area I realized that, unlike many downtown's in North America, it played to it's strengths and did not fall into the problem of trying to recreate a suburban scenario. Instead, the Downtown and surrounding area leaned on the area's interconnectedness as well as it's potential for high-density and mixed uses. In addition to this, the city did not try to hide it's industry but instead celebrated it and left it in plain view, the public buildings were architecturally beautiful yet also simple and functional, and there was an obvious effort at place making with calling out culturally significant areas like the Pike Place Market.

MEDIA: CAMERA - SONY α5000



4. Cutlery

In 2018 I began the hobby of knife making and the knife depicted on this page is my most recent creation.

The hobby of knife making has challenged me in more ways that I could have expected. Not only does one have to work with many different kinds of metal but different woods and their various properties also need to be considered. Tiny subtleties in the curves and lines must be taken into account to ensure comfortability in the hand while also maintaining the proper balance point of the blade.

Practicing the art of knife making has given me an increased attention for detail and has taught me that functional objects can also be beautiful.

Medium: 1095 Steel, Brass (Bolster & Pins), Wenge

5. Plane Crash

The Solheimasandur Plane crash is located on The west Coast of Iceland as a result of an accident during WWII.

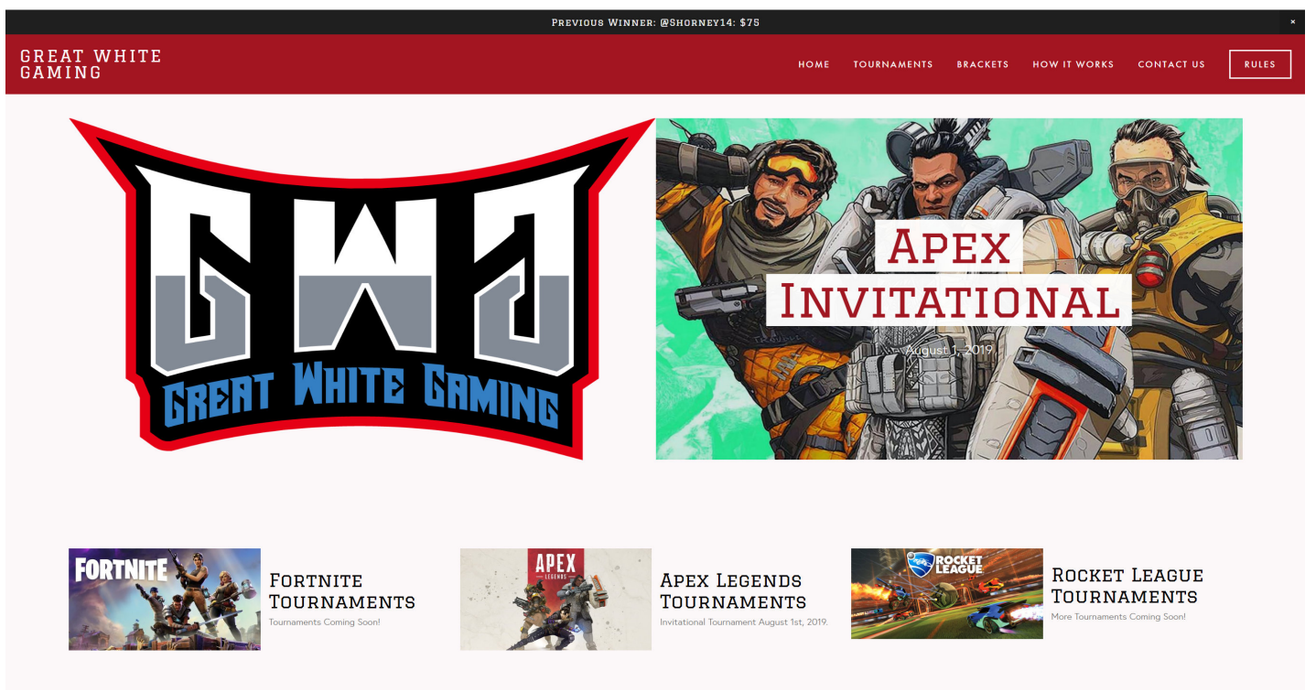
Media: Camera - Sony α5000 | software - Enlight

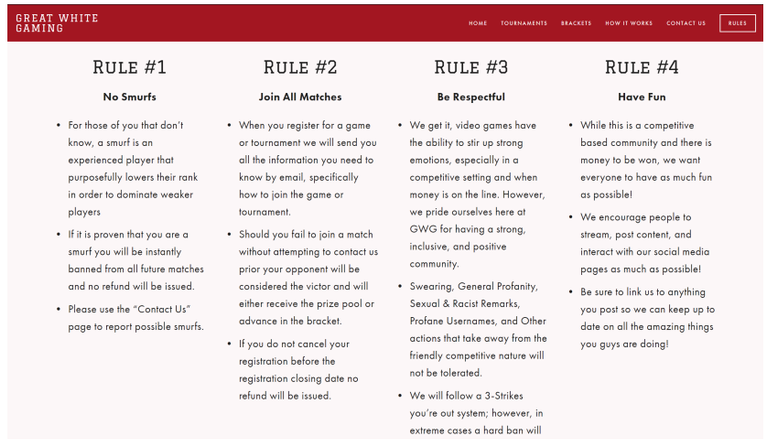
6. Website

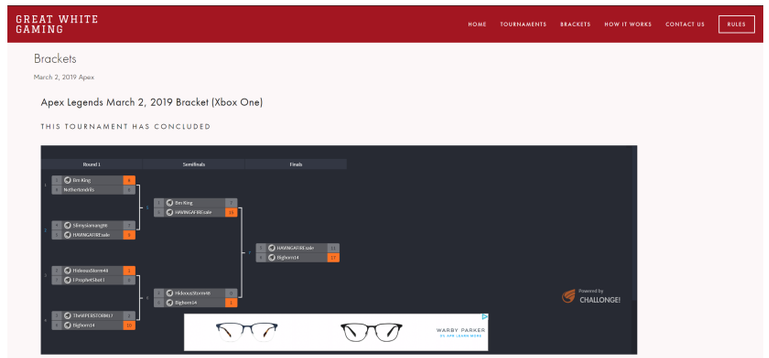
This website was designed to organize online video game tournaments where participants would be able to purchase an entry fee and then participate in said tournaments for prize money.

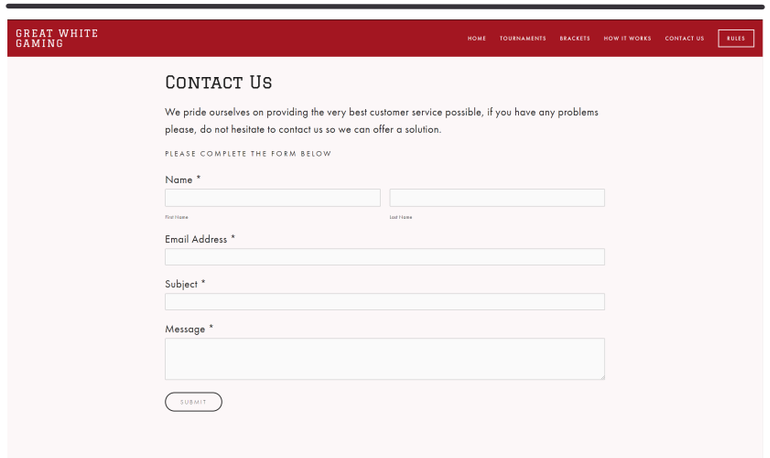
The main pages of this website included information on the specific tournaments, rules, tournament brackets, how the tournaments worked, and a contact page.

MEDIA: SQUARESPACE









8. Energy

During my Glaciology class I was tasked with designing an academic poster on some topic related to glaciers.

For my project I decided to analyze the impacts that glacial retreat can have on Hydroelectric production. This topic especially interested me because a large portion of our energy generation in Canada comes from hydroelectric means. Although, many people do not take into account what might happen to our energy mix if we were to lose our glaciers and the precious meltwater that they produce.

This is important knowledge for ensuring that we are able to meet the energy needs of the future.

MEDIA: MICROSOFT POWERPOINT

Geography-3060-A University of Lethbridge Logan Bartholow

Implications of Glacier Retreat on Hydroelectric Production in Bridge River

Introduction

Since 1991 Bridge Glacier has seen a rapid retreat and if the models are correct it doesn't appear this retreat will be slowing anytime soon (figure 3). This retreat poses a problem for the Bridge River Hydroelectric Complex, just downstream, that is responsible for producing between 6 and 8% of British Columbia's electricity[3]. As the glacier continues to retreat and the local climate begins to warm, BC Hydro will be required to deal with the challenges that come along with a changing melt regime and earlier spring. This poster will go into the implications that these changes have had, and will have, on the discharge of Bridge River and thus the energy production at the Hydroelectric Complex.

Literature Findings

Current Bridge River Ablation Trends

Bridge River is considered a Southern Coastal glacier (figure 1) in which the area is expected to lose between about 60-80% of the total ice surface area and volume (figure 2). While many of the glaciers in this area have recently began shrinking at an accelerated rate, Bridge Glacier is far ahead of model predictions[1]. This unexpected retreat is thought to be primarily due to increased calving as the glacier has retreated over the deepest part of Bridge Lake as a result of climate change[1]. This increase in calving is responsible for up to a 49% increase in discharge during the winter months[1]. As the glacier retreats further and becomes land-terminating this will decrease winter calving and thus winter discharge of the river[1].

It was found that winter runoff, while largely increased, is still extremely small when compared to summer runoff[6]. Moyer et. al, hypothesized that the Bridge Glacier's retreat was actually already causing a decrease in summer discharge[6]. Once they accounted for inter-annual climatic change and increased precipitation in the area since 1984, it was found that river discharge in the melt season had decreased by about $4 m^3 s^{-1}$ - August saw the river discharge decrease by 9% and September saw a decrease of 11%[6].

Melting Glaciers & Hydropower

BC Hydro is already experiencing problems on Vancouver Island as glaciers are retreating. More precipitation is falling as rain, and current storage isn't large enough to hold what was once stored as snow and ice which is now causing more overflow; a problem Bridge River will no doubt face[1].

Figure 1. The different areas of British Columbia used in the modelling of figure 2[2]

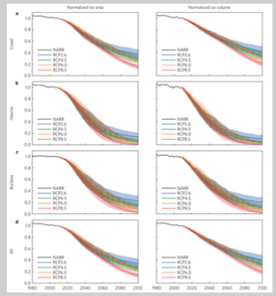


Figure 2. Modelled decrease in ice area and volume of glaciers for British Columbia[2]

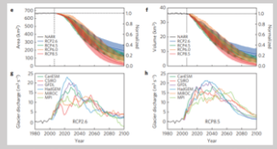


Figure 3. The first two graphs show how area and volume of glaciers in BC will decrease while the last two graphs show the modelled discharge of these glaciers as they melt (two separate models)[2]

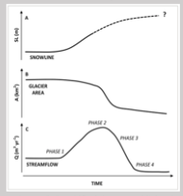


Figure 4. A basic model for glacier retreat and discharge[4]

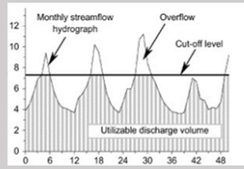


Figure 5. An example of maximum discharge and hydroelectric capacity [Discharge $[m^3 s^{-1}]$ Vs Time [months]][4]

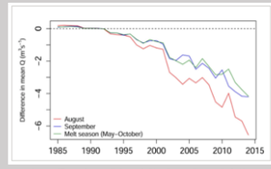


Figure 6. Difference in mean discharge of Bridge River as a direct result of Bridge Glacier retreat[4]

Swiss Case Study

Electricity production potential in the Swiss Alps is closely studied to determine the locations of future dam and reservoir projects. Using various models, they found that as the glacier retreated the total river discharge would decrease as glacial stock decreased (figure 8), production cost of the facility would increase (figure 9), and the peak discharge would occur almost one month sooner in the year (Figure 7) by 2099[7].

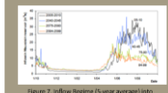


Figure 7. Inflow Regime (5-year average) into Mauvoisin Reservoir (ETH-Z scenario)[7]

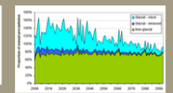


Figure 8. River discharge makeup percentages[7]

Figure 9. Production costs and yearly operation hours of the different schemes.[7]

Implications For Bridge River

From the literature and observations, it is obvious that Bridge Glacier has been shrinking significantly since the late 1980's; however, it is much less obvious how this shrinking has been affecting meltwater discharge from the glacier as it is currently being masked by increased temperatures and increased precipitation. However, once these factors have been accounted for there has been a reduction in streamflow by about $4 m^3 s^{-1}$ during the melt season[6].

Europe has also experienced this problem and models predict that most of Europe will see a decrease in hydropower potential of up to 25% and more. Western Canada, and Bridge Glacier, will also see similar trends as the current infrastructure is unable to handle the change in meltwater regime and as more and more overflow begins to occur[4].

Conclusion

It is important for us to understand how glacier retreat is affecting river discharge. More specifically, how the retreat of Bridge Glacier is affecting the flow of Bridge River and the energy production at the Bridge River Hydroelectric Complex operated by BC Hydro. This complex is responsible for 6-8% of the province's entire electricity production and as meltwater, the melting season length, and precipitation increases Bridge River Hydroelectric Complex will see a decrease in production as the glacier retreats and river discharge changes.

Decreased water storage also poses a problem for nuclear generation (cooling) which requires much more research[8].

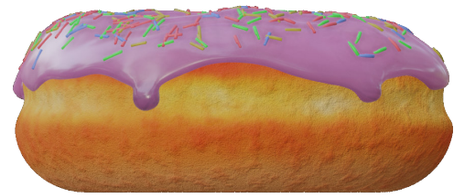
References

1. Chernos, M., Koppes, M., Moore, R. D., (2016). Ablation from calving and surface melt at lake-terminating Bridge Glacier, British Columbia, 1984-2013, *The Cryosphere, 10*, 87-102
2. Clarke, G. K., Jarosch, A. H., Anslow, F. S., Radic, V., Menounos B. (2015). Projected Deglaciation of western Canada in the twenty-first Century, *Nature Geoscience, 8*, 372-377
3. Holdsworth, P., (2017). Troubled waters ahead for shrinking Bridge Glacier in southwestern B.C., *Specilo to the Globe and Mail*
4. Lehner, B., Czisch, G., Vassolo, S., (2005). The impact of global change on the hydropower potential of Europe: A model-based analysis, *Energy Policy, 33(7)*, 839-855
5. Michael, J. S., (2010). Regional-Scale Distributed Modelling of Glacier Meteorology and Melt, Southern Coast Mountains, Canada, *UBC Theses and Dissertations*
6. Moyer, A. N, Moore, R. D., Koppes, M. N., (2016). Streamflow response to the rapid retreat of a lake-calving glacier, *Hydrological Processes, 30(20)*
7. Terrier, S., Jordan, F., Schleiss, A. J., Haeberli, W., Huggel, C., Kunzler, M., (2011). Optimized and adapted hydropower management considering glacier shrinkage scenarios in the Swiss Alps, *Dams and Reservoirs under Changing Challenges*
8. Van Vliet, M. T. H, Yearsley, J. R., Ludwig, F., Vogele, S., Lettenmaier, D. P., Kabat, P., (2012). Vulnerability of US and European Electricity Supply to Climate Change, *Nature Climate Change 2*, 676-681
9. Vicuna, S., Leonardson, R., Hanemann, M. W., Dale, L. L., Dracup, J. A., (2007). Climate change impacts on high elevation hydropower generation in California's Sierra Nevada: a case study in the Upper American River, *Climatic Change, 87*, 123-137

8. Donut

A 3-D modeling project designed during an online class taught by Andrew Price

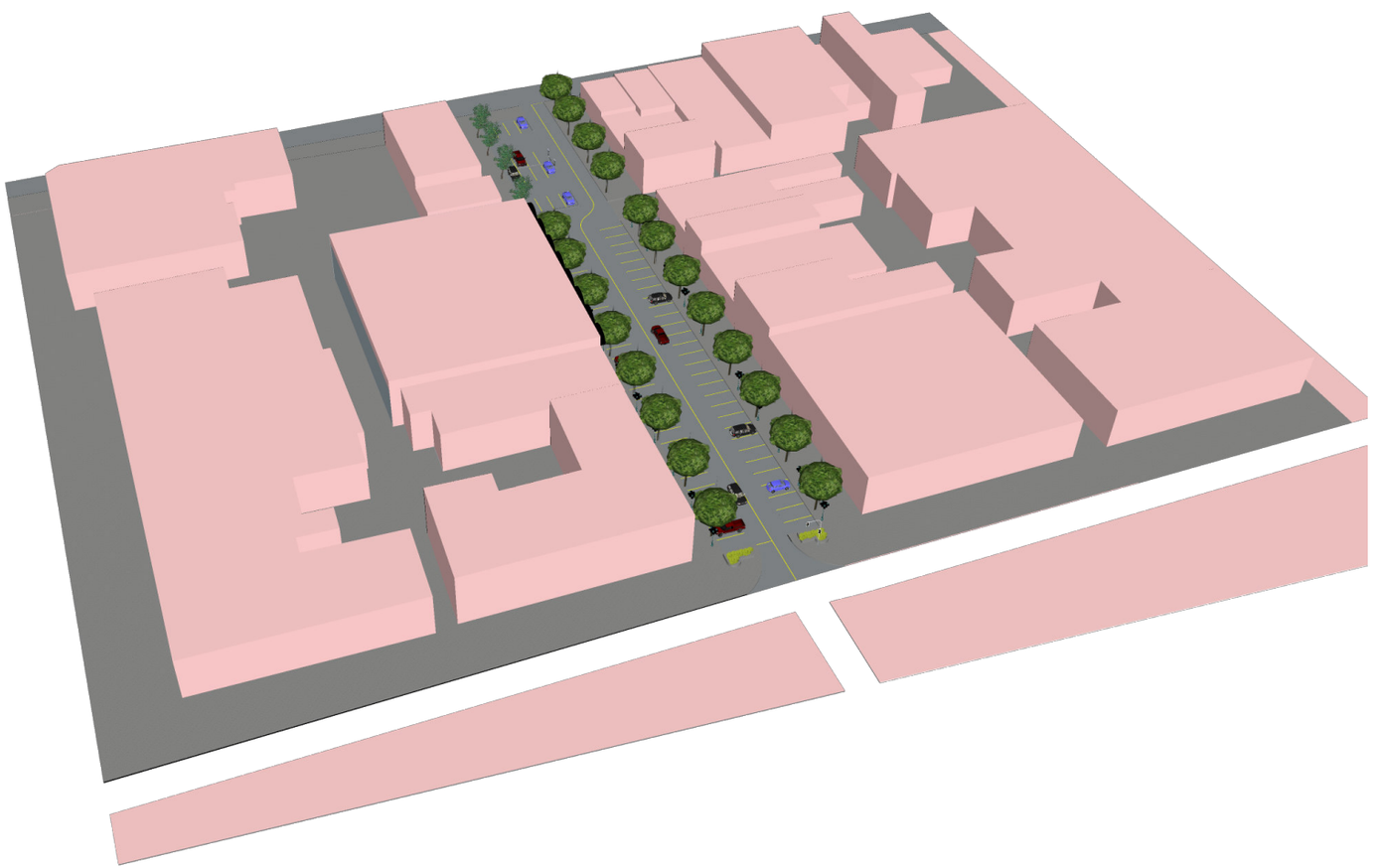
Media: Modeled in Blender | Rendered in Cycles



9. 6th Street

This 1:1 model of downtown Lethbridge was created to help me analyze the 6th street area for my Intro to Planning project which aimed at turning the area into a Pedestrian-Only zone. To build this model an aerial reference was used from Google Earth as well as ground level photos.

MEDIA: SKETCHUP




Thank You