# A SEA KAYAK CIRCUMNAVIGATION OF THE ISLE OF SKYE

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EXP 436: Senior Expedition

## Table of Contents

## Introduction

When I began my first semester in Expeditionary Studies, I did not have much outdoor experience. My repertoire of outdoor activities included three severely limited experiences. I hiked 8,600 feet to the top of Mt. Baldy with my grandfather when I was ten. I went on a five-minute kayaking adventure in Jamaica with my dad in a lagoon when I was twelve. The last, most influential outdoor experience I had was staying in a tent cabin for a few days in Yosemite when I was seventeen. However, sleeping on a cot hardly qualifies as an authentic camping experience. Despite my limited experience in the outdoors, I was inspired by National Geographic magazines to learn the skills necessary to go on my own outdoor adventures. The Expeditionary Studies program at Plattsburgh State University provided this opportunity.

I first found the program browsing through the school's majors because I was considering attending the university to play for the women's ice hockey team. However, I decided against it because it had always been my dream to play Division I college hockey, which is the highest level of competition. After just one year at Minnesota State University, I decided I wanted to transfer because I was unhappy. Coach Houle from Plattsburgh, who recruited me the previous year, called me immediately after finding out my status. Plattsburgh had a national-bound team, but it was a Division III school, which is one level down from Division I. I knew that I would have to sacrifice a dream that I have had since I was ten, but it had an outdoor program that would make up for this setback. Interestingly, there were times when I would fantasize about the Expeditionary Studies program while I was at Minnesota State. When those memories came back to me, it was a no-brainer decision; I was coming to Plattsburgh State University.

It didn't take long for my log book to fill up with outdoor activities that I lacked before starting the Expeditionary Studies program. In my first year, I had gone on three extended kayaking expeditions. The first was a five day class expedition on Lake Champlain and the second was a four day trip to Maine. The biggest dent in my portfolio came from a two week class expedition to the San Juan Islands in Washington. These adventures confirmed that my decision to come to New York was the right one. In fact, I am so satisfied that I wish I would have come here in the first place. It has been a year and a half since I joined the major and I have blazed through the curriculum rather quickly. But before I can graduate, I have to complete a capstone experience and execute my own expedition![1]

Executing my first expedition is a big step and improving my character is the most important goal that I have for myself, especially physically. I plan on increasing my endurance threshold, which is about twelve miles. I am capable of going farther, but I can't keep a four knot pace past that mileage point. My goal is to be able to paddle fifteen miles with ease, which I can test on my expedition. Personally, I do not care where specifically I go because every place, culture, and ecosystem that I am not familiar with is an adventure. However, factors such as the rate of difficulty and distance do matter in the professional world of the outdoor industry. For example, if an employer had to choose between a person who has kayaked 140 miles over a two week period in an ocean setting versus a person who has kayaked 100 miles on Lake Champlain, an employer would most likely choose the first candidate. With that being said, in order to give

[1] The capstone experience is called the Senior Expedition. It serves as the culmination of my academic career and will aid in my transition into a professional setting. There are a set of guidelines that have to be met in the form of a proposal, which have to be approved by my mentor, Steve Maynard, and the Department Head, Larry Soroka before I can set out on my expedition. These guidelines are outlined in Appendix A and details how I have applied them to my Senior Expedition.

myself the best chance possible of working in this field, I need to build up my log book with a variety of places that are respected in the discipline of kayaking. The West Coast of Scotland is one of those places.

Scotland serves as the meeting point between two bodies of water, the Atlantic Ocean on the west and the North Sea to the east. It is connected to England in the South and is a short ferry ride away from Ireland to the west. Scotland was described in the book, *Scottish Sea Kayaking: Fifty Great Sea Kayak* Voyages, to have some of the most dramatic and varied coastline in the world. There are towering cliffs that dominate the north and sea stacks and arches to the east.[2] The west coast is protected by an archipelago of islands called the Outer Hebrides, which I get to explore for my class expedition this summer. Since I was already going to be in another part of the world, it made sense to latch on my Senior Expedition there. I ruminated long and hard about where I wanted to go specifically, but my indecisiveness took over. As a result, I sought advice from my mentor Steve Maynard. He told me enthusiastically, "You should do the Isle of Skye."

I had never heard of this isle, which is another word for island, but I wanted to explore more because I'm insatiably curious. It didn't take long for me to decide that this was the place that I wanted to paddle. I couldn't resist the geological diversity, stacks and pinnacles dotting the coast, high cliffs, dramatic waterfalls, tiny villages, and Gaelic culture. Without a trace of doubt in my mind, I knew I wanted to paddle this breathtaking landscape.

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[2] Cooper, Doug, and George Reid. *Scottish Sea Kayaking: Fifty Great Sea Kayak Voyages*. 1st ed. Gwynedd: Pseda Press, 2005. 3. Print.

## Geography/Geology

The Isle of Skye is a part of an archipelago called the Inner Hebrides in the Atlantic Ocean, which is approximately a mile west off the coast of Scotland. It is separated from the mainland by a narrow straight called Loch Alsh. Skye is instantly recognizable because of the mountains that reach towards the sky from the island's center. These mountains collectively are known as the Cuillin Hills based on geography, but are broken up into the Black Cuillins and the Red Hills due to differences in geology.

The Black Cuillins were formed fifty million years ago as a result of volcanic activity. The rocks that formed were due to the solidification of molten magma, known as igneous rocks, which is one of the three main types of rock in the world of geology.[3] Activity underground pushed them upward until their current form was carved by glaciers. The Black Cuillins are mainly composed of gabbro, a dark, coarse-grained rock, which cooled slowly underneath the Earth's surface. In contrast, the Red Hills are predominately made of red granite, hence the name. The reason for this difference has to do with the minerals present in the magma when they cooled. To put it another way, the type of rock created is dependent on what chemicals are in the Earth when it is formed. For example, in order for gabbro to form, it needs magma rich in iron and magnesium, and poor in silica (quartz). Granite, on the other hand, needs magma rich in silica (quartz).[4] In addition to the difference of rock type, onlookers will notice the Black Cuillins are jagged and dramatic compared to the more rounded tops of the Red Hills. This is due to a process called weathering. Weathering, as defined by Dr. Pamela J. W. Gore of Georgia

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[3] Parkin, Dave, and Marilyn Parkin. "Types of Rock." *Zephyrus*. Net Intelect, n.d. Web. 12 Aug 2012. <http://www.zephyrus.co.uk/rocktypes.html>.

[4] Peck, Donald B.. "Igneous Rock." *The Rock Identification Key*. Donald B. Peck, 2001. Web. 12 Mar 2012. <http://www.rockhounds.com/rockshop/rockkey/

Perimeter College, is the breakdown of rocks as a result of contact with the atmosphere, biota, and water. It is similar to erosion, but doesn't require movement like erosion does. Over millions of years, the presence of oxygen caused the Red Hills to turn reddish-brown in the same way that iron rusts. This 'rusting' process caused the mountains to become softer and more porous, making it easier to fall away.[5] The Black Cuillins were victim to weathering as well, but since gabbro is harder, the outcome was not as drastic. So, it shouldn't be a surprise that the northernmost point of the Red Hills is smaller than that of the Black Cuillins. Glamaig is the northernmost point of the Red Hills, at 2,543 feet. It is one of only two Corbetts on Skye, which are peaks in Scotland that are between 2,500 and 3,000 feet.[6] The Black Cuillins house twelve peaks that are slightly higher, over 3,000 feet, called Munros. While these peaks are not extremely high, they are steep. Traversing the 21 peaks across the Cuillin Ridge has been compared to ascending and descending the Matterhorn in Switzerland, a mountain over 13,000 feet, by an online mountaineering community called Summit Post.[7] These mountains give Skye a dramatic appearance against the white sandy beaches. To add to the impressiveness of the area, Skye is also known as Scotland's Dinosaur Isle because it is one of the few places in the world where dinosaurs from the Middle Jurassic geological period, 180 to 160 million years ago, have been found.

A local named Cathie Booth found dinosaur tracks from this time period on the east side of the island while she was walking her dog on the beach. An online publication by *National*

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[5] Gore, Pamela. "Weathering." *Geology* . N.p., 05 2002. Web. 19 Sep 2012. <http://facstaff.gpc.edu/~pgore/geology/geo101/weather.htm>.

[6] "Skye Map." *Panoramic Earth*. Panoramic Earth, n.d. Web. 19 Sep 2012. <http://www.panoramicearth.com/593/Skye/Skye Map>.

[7] Bailey, Dan. "Cullin Ridge." *Summit Post*. Summit Post, 05 2010. Web. 19 Sep 2012. <http://www.summitpost.org/cuillin-ridge/152321>.

*Geographic* reported the footprints are "particularly significant because the tracks still lie in the rock strata in which they were formed."[8] In other words, scientists are able to identify how old the footprints are because of their location within the layers of rock. The tracks still reside in their natural setting, instead of a museum display, which is fascinating for onlookers but has negative consequences for scientists. All they can do is take molds of the tracks before they erode from the crashing and receding waves. Neil Clark, a paleontologist at the University of Glasgow's Hunterian Museum, believes the footprints belong to a Megalosaurus, which is a two-legged meat eater that stretches 10m (approximately 33ft).

The geological diversity of Skye from the Red Hills and Black Cuillins to dinosaur fossils is one of the prominent things about the isle. However, it is by no means the only thing. Skye's flora and fauna are equally as intriguing.

[8] Mayell, Hillary. "Dinosaur Tracks Preseved on Scottish Island." *National Geographic News.* National Geographic Society, 29 Aug 2002. Web. 13 Mar 2012. <http://news.nationalgeographic.com/news/2002/08/0829_020829_dinofootprint.html>.

## Flora and Fauna

Most of Scotland, including Skye has a fairly similar plant life, but it is all new to me. A part of the appeal of doing my expedition in Scotland was exploring a new landscape. I expect to see tons of heather, which is one of Scotland's legendary flower symbols. There are around 5 million acres of heather spread across the country. Heather is a low-lying, coarse shrub, which carpets Scotland twice a year with fragrant purple. The flower blooms in early and late summer, but the time of flowering is based on latitude and altitude. The plants further down and further south flower first. July and August have been said to be the best times to see heather in bloom, so I am just going to miss this fantastic display by less than a month.[9] There are plenty other botanical attractions that I am exciting to see, including bogland.

A bog simply put is a wetland, which is an abundant habitat in Scotland. Bogs form where water in the ground is acidic and low in nutrients. For this reason, plant growth is typically slow and results in peat, which is decayed vegetation. Bogs provide a habitat for other plants to flourish, such as bog cotton. Peat bogs also provide benefits for people too. Peat helps with flood management by maintaining steady flows of salmon rivers and preventing floods downstream. In addition, peat can be used as a fuel source for fires after it is dried out in a pyramid formation. Furthermore, peat has a role in Scottish whiskey production because it is a key ingredient that adds to the flavor.[10] While bogs provide many benefits, it certainly has its drawbacks. Bogs are a haven for a nasty little critter called midges that closely resemble a mosquito. While they do not

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[9] "When Does Heather Bloom In Scotland?." *Visit Lochness*. Destination Loch Ness , 29 2010. Web. 20 Sep 2012. <http://www.visitlochness.com/blog/environment/when-does-heather-bloom-in-scotland/>.

[10] "Peat Bogs." *Scottish Natural Heritage*. Scottish Natural Heritage, 18 2012. Web. 20 Sep 2012. <http://www.snh.gov.uk/about-scotlands-nature/habitats-and-ecosystems/mountains-heaths-and-bogs/peat-bogs/>.

bite, they are annoying in large numbers. Terry Marsh described them in her book *The Isle of Skye* as capable of "reducing the strongest of folk to tears."[11] This powerful one-liner was enough to convince me to purchase a bug net. However, it did not scare me away from executing my expedition. I learned that midges hate wind and heavy rain, which is common in coastal areas. With that being said, I do not expect to experience these nasty critters to the extent that people inland would. Even if they were, I would be on the water for most of the time anyway. It's obvious that midges are not the star attraction of Scotland, but grey seals are.

Marsh reported that 40% of the world's grey seals call Skye home. Their coats vary from grey to brown to silver, often with blotches. I envision seeing these creatures plopped on beaches and rocky outcroppings during low tide. There is so much to see in the way of wildlife, it is impossible to list them all. There are 224 different species of bird alone, including oystercatchers, gannets, and puffins.[12] Before I can try and experience all that Skye has to offer by kayak, I have to educate myself about the local weather patterns.

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[11] Terry, Marsh. *The Isle of Skye*. 3rd e. Cicerone Press , 2009. 24-25. eBook. <http://books.google.com/books?id=Au-YIX5DKAUC&pg=PA24&dq=isle of skye flora and fauna&hl=en&sa=X&ei=g_PRUPj3IOOWiALq2oGQCA&ved=0CDwQ6AEwAA

[12] Brown, Gordon. "Flora and Fauna." *Sea Kayaking on the Isle of Skye*. Gordon Brown. Web. 22 Sep 2012. <http://www.skyakadventures.com/isle_of_skye.html>.

## Weather

Weather conditions can make or break an expedition. For example, in kayaking, a tailwind can make paddling easier while a headwind can make paddling a nightmare. Checking the forecast before starting a day's paddle provides important information, such as wind direction and wind speed. Knowing the forecast is crucial in order to establish the best route plan. For example, a wind that blows out to sea may cause one to stay close to land and stay sheltered. On the other hand, a tailwind may cause one to make a crossing, since the extra help from the wind provides an advantageous opportunity. The second scenario reduces a significant amount of travel time and also requires less energy expenditure on the paddler's part. Why work harder if you don't have to? Checking the weather the day before departure and the morning of departure allows one to see weather patterns, which aids in making the best decision regarding a route plan. However, this requires using the right weather station. The Met Office, the UKs National Weather Service, takes hourly observations from 200 locations. It wouldn't be as helpful to get the weather forecast from the eastern side of Scotland, if I am paddling off the west coast of the country. The closest weather station is on Skye is on the southeastern part of the island, which is fortunately where I will be starting my expedition.

> *Climate History:* The table below, as provided by the website WindFinder, measured statistics based on observations taken between March of 2008 and March of 2012.[13] Since my expedition will take place in June, the relevant figures can be found directly below the month. The dominant wind direction is Southwest

[13] "Wind & weather statistic Skye/Lusa." *Wind Finder*. Wind Finder, Mar 2012. Web. 1 May 2012. < http://www.windfinder.com/windstats/windstatistic_skye_lusa.htm >.

(SW), look carefully at the key. Wind probability refers to the probability the wind speed will reach a 4 on the Beaufort skill, which is ranges from 11-16 knots. In June, the wind reaches this probability 65% of the time. The average wind speed is 13 knots and the average air temperature is 13◦C.

Wind Symbols:

- =North
- =North northeast
- =Northeast

| Month of year | Jan | Feb | Mar | Apr | May | **Jun** | Jul | Aug | Sep | Oct | Nov | Dec | SUM |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 01 | 02 | 03 | 04 | 05 | **06** | 07 | 08 | 09 | 10 | 11 | 12 | 1-12 |
| Dominant Wind dir. | | | | | | | | | | | | | |
| Wind probability > = 4 Beaufort (%) | 35 | 29 | 39 | 27 | 29 | **27** | 28 | 25 | 31 | 38 | 25 | 24 | **29** |
| Average Wind speed (Knots) | 9 | 9 | 10 | 8 | 9 | **8** | 8 | 8 | 9 | 10 | 8 | 8 | **8** |
| Average air temp. (°C) | 5 | 6 | 7 | 9 | 11 | **13** | 15 | 14 | 13 | 11 | 7 | 4 | **9** |

Since the dominate wind direction in June is southwest, it makes sense to circle Skye in a clockwise direction. However, weather patterns do not always follow what is expected because it is completely unpredictable. Bad weather is a threat that needs to be planned for. The most obvious option would be to wait it out. However, I only have twelve days to complete an expedition with a minimum of ten days. That leaves me with two extra days, which isn't much of a safety net. A single storm can wipe this clean. To give myself the best chance possible of completing the requirements for my senior expedition, I need an alternative to follow if the original plan cannot be executed. This is called a contingency plan.

## Contingency Plan

For my expedition, wind conditions are the most threatening factor that would prevent me from paddling my original route plan. Force 4 winds and above are too strong for my paddling ability. The Beaufort Wind Scale relates wind speeds to conditions at sea or on land. The National Oceanic and Atmospheric Administration (NOAA), details the criteria for each force. [14] A force 4 wind is a moderate breeze, which can move small branches, dust, and leaves on land. On the water, small waves ranging from 1-4 feet can form with the possibility of numerous whitecaps. To put in more concrete terms, a Force 4 wind ranges from 11-16 knots. Anything higher than a Force 4 wind is a definite no-go standard for me. If these conditions arise, I will wait out the weather for no more than two days and climb the only Munro on the Isle of Skye, a mountain over 3,000 feet in elevation. Evaluating the future weather forecast will be the determinant in deciding whether or not to wait out the weather or to utilize a preconceived backup plan.

If the weather proves to be too unrealistic, there are numerous lochs that I can pursue. There are at least sixteen lochs on Skye and four lochs on the mainland, which is less than a half mile away from Skye at its closest point. If I can't make the crossing to the mainland, there are two ferries I can take if I am on the east coast of Skye. The first is from Armadale to Mallaig. The second is from Kylerhea to Gleneig. I will carry a copy of the ferry schedules and fares and mark these points on my chart before I leave.

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[14] "Beaufort Wind Scale." *National Oceanic and Atmospheric Association*. National Oceanic and Atmospheric Association, 22 Mar 2012. Web. 22 Mar 2012. <http://www.spc.noaa.gov/faq/tornado/beaufort.html>.

As demonstrated above, the weather is one factor of an expedition that can pose as a threat. Fortunately, with planning and preparation, risk can be mitigated. Aside from the weather, there are numerous other threats that kayaking poses, which is why it is important to devise a risk management plan.

## Risk Management Plan

Risk is an inevitable part of life. For example, there is a chance a person crossing the street will be hit by a car. However, a person can reduce the risk by looking both ways before crossing the street and only doing so in a designated crosswalk zone. Placing a control on a risk in this way is called a risk management plan (RMP). A RMP requires thinking before action in order to make an activity safer. In the case of kayaking, there are numerous risks that need to be considered before setting out into the field, which are outlined with their controls in the table below.

| Category | Hazard | Risk Prior To Control (H/M/L) | Control Measures | Risk With Controls In Place (H/M/L) |
|---|---|---|---|---|
| **Personal Injury** | Hypothermia | M | I will be wearing a base and insulation layer underneath my drysuit to prevent the onset of hypothermia. In addition, I will always have access to a dry set of clothes, a | L |

| | | | | |
|---|---|---|---|---|
| | | | hot beverage, and shelter once on land. | |
| | Repetitive Wrist Injury | M | Repetitive motions can result in inflammation, which may prohibit paddling or make it more painful. I will mitigate this risk by practicing good technique. This includes having a loose paddle grip (thumb and two fingers) and keeping straight wrists. In addition, I will carry NSAIDs, and can take a rest day if needed. | L |
| | Dislocating Shoulder | M | Shoulder dislocations are a common kayaking injury. I will prevent it by staying within the paddler's box, which means not allowing the | L |

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| | | | hands to extend past the shoulders on either side. Rotation is key in keeping the hands in line with the shoulders. In addition, dislocations can occur from improper bracing or rolling technique. I will prevent dislocation by using proper technique. | |
| | Head Injury | M | I will wear a helmet in surf zones and rocky areas are tricky areas because a blow to the head can be fatal or impair decision making and functionality. | L |
| | Back Injury | M | I will use the gorilla stance whenever I carry a kayak, in order to prevent back injury. The gorilla | L |

| | | | | |
|---|---|---|---|---|
| | | | stance involves bending at the knees and using the leg muscles to lift. In addition, while doing a buddy carry, we will both count to three before we lift to prevent unnecessary strain. | |
| | Fatigue | M | My expedition requires endurance, but my partner is less experienced than me. This means our traveling pace will be largely determined by her limits. Fatigue will set in if either one of us goes higher than our threshold for a prolonged amount of time. As a preventative measure, we will practice on the water together prior to the trip | L |

| | | | | |
|---|---|---|---|---|
| | | | and come up with a suitable speed for both of our needs. | |
| | Sunburn | M | Since the sun reflects off water, sunburn is always possible while kayaking. To prevent sunburn, I will bring a stick of sunscreen and apply it to my face, ears, and hands everyday and reapply it every 2 hours. I will also bring a hat to protect my scalp and face. A drysuit will protect the rest of my limbs from sun exposure. | L |
| | Sun blindness/Eye Strain | M | Again, since the sun reflects off water, sun blindness is possible while kayaking. I will bring two sets of | L |

| | | | | |
|---|---|---|---|---|
| | | | sunglasses in case I lose a pair and use a float strap. | |
| | Blisters | M | Kayaking involves repetitive motions, which can develop hand blisters from friction. I will avoid this by using a light grip while paddling. Excessive moisture can also cause blisters, which is why I will use stick sunscreen to avoid excess buildup on the palm of the hands. In the event I do develop blisters, I will have antibacterial wipes to prevent infection and electrical tape to cover it, which is a better alternative to band-aids. | L |
| | Drowning | M | I have the ability to | L |

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|---|---|---|---|---|
| | | | perform an Eskimo Roll, should I capsize. If I fail, I have a few options: I can wet exit and perform a rodeo rescue, re-enter the boat filled with water and pump it out, or use a paddle float. Most importantly, I will wear a personal flotation device (PFD) at all times. | |
| | Dehydration | M | On average, I will drink 1.5L of water per day. I plan on carrying 6L, or 3 days amount of water. There are numerous freshwater lochs and streams where I can refill on water, as indicated by my topographical map. I will also carry electrolyte replacement powders to speed up the hydration | L |

| | | | | |
|---|---|---|---|---|
| | | | process in case I am severely dehydrated from lack of fluids, vomiting, or diarrhea. | |
| | Seasickness | M | I have never experienced seasickness, but I will carry ginger chews with me as a precautionary measure. Seasickness occurs when there is a disagreement between visual and auditory sense of movement, which causes nausea. Chewing helps restore balance and ginger prevents vomiting, which is a symptom of seasickness. In addition, it is important to look at the horizon, not the constant moving kayak. | L |
| | Slip/Fall/Trip | M | I will wear kayaking | L |

| | | | | |
|---|---|---|---|---|
| | | | shoes with traction to prevent these risks in slippery spaces. I will also have a pair of covered shoes for camp. | |
| | Bug Bites | M | Water and fog reflect light, which can strain the eyes. My partner and I will wear sunglasses with a float strap and carry and extra pair, in case we lose them. In addition, we will both use sunhats to lessen the exposure of the sun. | L |
| | Broken Paddle | M | Bug bites are not a big deal, but constant scratching can break open the skin, which makes infection a possibility. With that being said, I will carry | L |

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|---|---|---|---|---|
| | | | bite cream to relieve itching. | |
| **Equipment Failure** | Broken Hatch | M | I will carry a spare paddle with me if my primary paddle breaks. However, I will have hose clamps and duct tape to mend a broken paddle if need be. | |
| | Hole in Boat | M | If I lose a hatch cover, I know how to create an alternative with a contractor bag and bicycle inner tube. I will also carry a float bag, which I can inflate to prevent sinking. | L |
| | Drysuit Tear | M | I will carry a sheet of plastic or a contractor bag and duct tape, which I can apply on the water to prevent sinking. Once | L |

| | | | | |
|---|---|---|---|---|
| | | | on land, I can make a better repair with epoxy putty. | |
| | Tent Tear | M | I will carry aqua seal, which can mend a small puncture. | L |
| | Broken Tent Pole | M | I will carry aqua seal and a sewing kit to repair any leaks in the seams. In addition, I will carry a ripstop nylon patch. | L |
| | Run Out Of Fuel | M | I will carry a tent pole repair sleeve and secure it with duct tape or a hose clamp. | L |
| **Miscellaneous** | Becoming Lost | M | I will carry adequate fuel by calculating my needs beforehand. In addition, I know how to make a fire and will carry at least two different fire starters. | L |

| | | | | |
|---|---|---|---|---|
| | | | I will also carry two days worth of food that does not require heating up. | |
| | Capsize And Lose Boat | M | I know how to navigate using a chart. However, I am hugging the coast, so I would have to drift out to sea in order to be "lost." | L |
| | Stranded At Sea | M | In the unlikely event I fail to hold onto my boat after making a wet exit, I can signal on my SPOT personal tracker that I need immediate help. | L |

I wanted to gather information about weather and tides before devising a route and contingency plan. It didn't make much sense to me to do these prior to making a risk management plan, mostly because weather is a major risk. Following this succession, I couldn't construct a route plan, without knowing where or how far I wanted to paddle. With all of the prerequisites covered, I am ready to figure out how I am going to train to increase my chances of completing my expedition.

## Training

Adequate training can make the difference between having a joyous and successful expedition versus struggling for survival as a consequence for not being physically fit. While kayaking is a sport that involves the translation of power from your feet/knees through your body and hands to the paddle, the muscles that are predominately used are the back, torso, shoulders, and arms.[15] My training will focus on these muscle groups. However, I will still train other muscle groups, such as my legs, but not as much as the muscles previously mentioned. I used the program design continuum laid out by the National Academy of Sports Science (NASM)[16] to create a sixteen week training plan for a two week kayaking trip off the West Coast of Scotland.

The plan consists of four phases, which I will explain in chronological order. The first phase is stabilization/strength endurance. Stabilization refers to eliminating muscle imbalances, which are abnormal deviations in strength between **agonist-antagonist**[17] muscles. In other words, an agonist muscle is a contracting muscle, such as the biceps, that is counteracted by another muscle called an antagonist, which would be the triceps in this case. Muscles can only exert a pulling force, so they work in pairs. Below is a table outlining the ideal ratios between agonist-antagonist muscles. Before starting any new training plan, these ratios should be tested and will illuminate which muscles need to be more focused upon in order to restore the body back to a balanced state.

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[15]Schurman, Courtenay, and Doug Schurman. *The Outdoor Athlete*. Body Results Incorporated, 2009. 170-185. Print

[16] Clark, Michaeal, and Scott Lucett. NASM Essentials of Sports Performance Training. First. Philadelphia: Lippincott Williams & Wilkins, 2010. 341-369. Print.

[17] All the words written in bold text are defined in Appendix B: The Workout Glossary.

| Joint | Movement | Ratio |
|---|---|---|
| Ankle | **Plantar flexion/dorsi flexion** | 3:1 |
| Ankle | Inversion/eversion | 1:1 |
| Leg | **Extension/flexion** | 3:2 |
| Hip | Extension/flexion | 1:1 |
| Shoulder | Flexion/extension | 2:3 |
| Elbow | Flexion/extension | 1:1 |
| Lumbar | Flexion/extension | 1:1 |

Once the muscle imbalances are identified, a four week workout plan for each phase can easily be constructed by using the three tables listed under the sample plan section. Below, the function of each phase is also described.

*Stabilization/Strength Endurance:*

- Slow repetitions improve overall **neuromuscular efficiency**
- Prevents tissue overload and injury by preparing muscles, tendons, ligaments, and joints for the upcoming demands of training
- Establishes proper movement patterns and exercise technique
- Improves stability and muscular endurance

*Hypertrophy:*

- Specific for the adaptation of muscle growth
- Focuses on high levels of volume with minimal rest periods to force cellular changes that result in an overall increase in muscle size

*Strength:*

- Increases speed of muscle contraction
- Helps increase the benefits of power training
- Focuses on the increase of intensity
- Improves motor unit synchronization

*Power:*

- Increases speed of muscle contraction
- Focuses on high force and velocity through **supersets**

## Sample Plan

*Phase 1: Stabilization/Muscular Endurance*

This sample plan utilizes the information outlined under the stabilization/muscular endurance phase, which I highlighted in orange. The weekly plan table shows three days a week, a stabilization/muscular endurance full-body workout is required. In addition, a cardio workout has its only designated workout three days a week. Flexibility training through static stretching should conclude every workout, which is six days a week according to this plan. Every major muscle group should be stretched for thirty seconds. Each phase will follow the same guidelines, but with different criteria.

**Program Design Continuum**

| Phase of Training | Reps | Sets | Volume **(Reps X Sets)** | Intensity | Rest Interval |
|---|---|---|---|---|---|
| **Stabilization/Strength Endurance** | 12-20 | 1-3 | 36-75 | 50-70% | 0 sec.-1.5 min. |
| **Hypertrophy** | 6-12 | 3-5 | 27-36 | 75-85% | 45-90 sec. |
| **Strength** | 1-12 | 2-6 | 18-24 | 70-100% | 45 sec.-5 min. |
| **Power** | 1-10 | 3-6 | 12-20 | 30-45% of rep max | 3-5 min. |

**Tempo Continuum (Eccentric/Isometric/Concentric)**

| **Phase of Training** | **Speed** | **Eccentric** | **Isometric** | **Concentric** |
|---|---|---|---|---|
| **Stabilization/Strength Endurance** | Slow | 4 | 2 | 1 |
| **Hypertrophy** | Moderate | 2 | 0 | 2 |
| **Strength** | Moderate/Fast | | | |
| **Power** | Fast/Explosive | | | |

**Weekly Plan**

| Day | Mon | Tue | Wed | Thurs | Fri | Sat | Sun |
|---|---|---|---|---|---|---|---|

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Phase 1 | x | | x | | x | | |
| Phase 2 | | | | | | | |
| Phase 3 | | | | | | | |
| Phase 4 | | | | | | | |
| Cardio | | x | | x | | x | |
| Flexibility | x | x | x | x | x | x | |

After sixteen weeks of sweat equity, I will have turned my body into a kayaking machine. But even the greatest of machines need maintenance. That's how I like to think of nutrition, taking care of the body as a tool.

## Nutrition

Our bodies are like fires because they both require a constant fuel source in order to survive. In this analogy, wood is a fire's fuel, while food is a body's fuel. "When we eat food, our bodies convert the stored energy, known as calories, to chemical energy."[18] There are three primary macronutrients that the body converts into energy: carbohydrates, fats, and proteins.

Carbohydrates are the body's main source of energy. Vision Learning explains "all carbohydrates are made up of units of sugar (also called saccharide units). Carbohydrates that contain only one sugar unit (monosaccharides) or two sugar units (disaccharides) are referred to as simple sugar." Simple sugars are usually sweet in taste and broken down by the body first, which results in a quick burst of energy. That is why we feel a sugar high after eating a candy bar. But not all carbohydrates operate in this fashion. Complex carbohydrates "are long chains of simple sugar units bonded together," which is the reason they are called polysaccharides. "Starch is the principle polysaccharide and is found in foods such as rice, beans, wheat, corn, and potatoes." These complex carbohydrates take the body longer to break down than simple carbohydrates.[19] However, both forms of carbohydrates supply 4 calories. In other words, 1g of a carbohydrates supplies 4 calories of energy.

Everybody is notorious about eating fats because it is wrongly associated with gaining weight. However, a lot of people don't know fats are required to maintain the tissue in our bodies. The main purpose of fats is to serve as a storage system and reserve supply of energy. There are two types of fats, saturated (the bad kind) and unsaturated (the good kind). Saturated

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[18] "Burning Calories: The Energy In Food." *Tutu's House*. Friends of the Future, 2009. Web. 15 Apr 2012.

[19] Carpi, Anthony. "Carbohydrates." *Vision Learning*. Vision Learning, 2012. Web. 15 Apr 2012. <http://www.visionlearning.com/library/module_viewer.php?mid=61>.

fats are solid at room temperature and carry health risks because they have been linked with hardening the arteries. Unsaturated fats, on the other hand, are liquid at room temperature and are known to help reduce cholesterol.[20] Both types of fat yield 9 calories of energy and serve as a long-term energy supply.

Protein is the macronutrient most associated with body builders because they gulp down protein shakes at the end of every workout. However, extra protein doesn't mean extra strength. The truth is the body will use the extra protein the body doesn't need as energy, which is the same as a carbohydrate, 4 calories. Protein is required to build bones, muscles, cartilage, skin, and blood.[21]

Based on height, weight, age, and activity level, nutritional needs can be broken down. I used the Harris-Benedict equation to calculate my caloric needs by adding my basal metabolic rate to my activity.[22] My total amounted to approximately 2600. There are many formulas for macronutrient breakdowns as well, but I used trial and error. Endurance sports are not my strong suit, so I tend to lose a lot of energy near the middle of the day. For this reason, I knew that I wanted to have a higher fat content than in my every day diet. Carbohydrates will provide me with energy the quickest, so I also wanted the bulk of my calories to come from them. I have a lot of experience with nutrition due to training with USA Hockey and I have learned that what works for one person may not work for another. This is where my basis for trial and error comes

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[20] Carpi, Anthony. "Carbohydrates." *Vision Learning*. Vision Learning, 2012. Web. 15 Apr 2012. < http://www.visionlearning.com/library/module_viewer.php?mid=62>.

[21] Osterweil, Neil. "The Benefits of Protein." *WebMD*. WebMD, n.d. Web. 20 Aug 2012. <http://men.webmd.com/features/benefits-protein>.

[22] "Harris Benedict Equation." *BMI Calculator*. BMI Calculator. Web. 20 Aug 2012. <http://www.active.com/fitness/calculators/calories>.

from. As a result, I have devised a meal plan with at least 2600 calories and an estimated macronutrient breakdown of 48% carbs, 40% fat, and 12% protein.

# Meal Plan

| Meal | Meal Items | Calories | Fat (g) | Carbs (g) | Protein (g) |
|---|---|---|---|---|---|
| BREAKFAST | tortilla | 210 | 5 | 36 | 6 |
| | peanut butter | 190 | 18 | 7 | 7 |
| | nutella | 200 | 11 | 22 | 3 |
| **Meal Totals** | | **600** | **34** | **65** | **16** |
| LUNCH | tortilla | 210 | 5 | 36 | 6 |
| | hummus | 70 | 6 | 4 | 2 |
| | 1/2 pepper | 15 | 0 | 8 | 1 |
| **Meal Totals** | | **295** | **11** | **48** | **9** |
| DINNER (ONE OF THESE) | whole wheat pasta (x2 servings) | 360 | 2 | 74 | 14 |
| | couscous (x2 servings) | 360 | 0 | 72 | 12 |
| SAUCES (ONE OF THESE) | pesto | 270 | 27 | 4 | 3 |
| | tomato sauce | 100 | 0 | 21 | 3 |
| | cream of asparagus soup | 160 | 2 | 15 | 3 |
| **Meal Totals** | | **460-630** | **0-29** | **76-95** | **15-17** |
| SNACKS | cheese (100g) | 394 | 32 | 3 | 2 |
| | snack bar | 140 | 4 | 29 | 3 |
| | cup-o-soup | 160 | 2 | 15 | 5 |
| | digestives (dark chocolate) | 168 | 8 | 21 | 2 |
| | nuts (1oz) | 150 | 12 | 9 | 5 |
| | beans | 270 | 1 | 52 | 12 |
| **Meal Totals** | | **1282** | **59** | **129** | **29** |
| **DAY TOTALS** | | **2637-2807** | **104-133** | **318-337** | **69-72** |
| | | | 42% | 48% | 10% |

## Conclusion

Given all of the material presented above, I am confident that I will successfully complete my senior expedition. I owe all of my knowledge to the faculty of Expeditionary Studies, Laurence Soroka, Steve Maynard, Joan Kornecki, and Casey Henley. Because of them, I have grown into an avid outdoorsman. No longer am I confined by the boundaries set by other sports, like the boards of a hockey rink. The world is my playground. My parents and family will never know the joy I feel in my heart every day because they supported me in my dreams. I am ready to paddle around Skye and soon, it won't be the limit.

## Appendix A: Senior Expedition Guidelines

All expeditions must:

1) Follow Leave No Trace ethics

    a. Leave No Trace is a program which aims to help outdoor enthusiasts reduce their impacts on the environment. Through the use of education and ethics, the program stresses the individual and their role in preserving the outdoors they call their playground. Leave No Trace has seven key principles, which are described in detail below, as provided by their website.[23]

        i. Plan Ahead and Prepare:

        Ignorance of the law is no excuse for breaking the rules. This is why I have familiarized myself with the regulations of the area I will be visiting. One thing I need to be concerned about is camping. The Land Reform (Scotland) Act of 2003 established the right to camp over most of Scotland, if done responsibly. This means seeking an owner's permission before camping on private property, staying for no more than 3 nights in any one place, and keeping away from roads and buildings.[24] Since the area that I will be going to is remote, anywhere is fair game.

        ii. Travel and Camp on Durable Surfaces

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[23] "Principles." *Leave No Trace: Center For Outdoor Ethics*. Leave No Trace, 2008. Web. 15 Apr 2012. <http://www.lnt.org/programs/principles.php>.

[24] "Wild Camping In Scotland: Rights and Responsibilities." *The Mountaineering Council of Scotland*. The Mountaineering Council of Scotland, n.d. Web. 16 Apr 2012. <http://www.mcofs.org.uk/assets/wild camping advice 1011.pdf>.

While I can camp almost anywhere, that does not mean I shouldn't be conscientious about where I pitch my tent. Leave No Trace states, "good campsites are found, not made." Altering a site negatively impacts the area and is not necessary. With that being said, I will only camp on durable surfaces.

iii. Dispose of Waste Properly

Another big part of Leave No Trace ethics is carrying out what you take in. It is an important concept because trash doesn't pick itself up. I will do this and further minimize my impact by cleaning up spilled food. In addition, solid human waste should be put in catholes dug 6 to 8 inches deep and at least 200 feet from water, camp, and trails.

iv. Leave What You Find

Preserving the environment by leaving natural objects, such as plants, as they are found is important for a variety of reasons. For example, transporting non-native species to another area can be detrimental to an ecosystem. Throwing rocks and picking plants will also destroy the beauty of an area. I will observe nature with my eyes only, that way travelers who come after me will be able to enjoy the area as I did.

v. Minimize Campfire Impacts

I do not plan on building a fire, but if I have to in the event of an emergency, I will only use sticks from the ground that can be broken by hand. Breaking off branches from live trees harms the environment. I will

also make sure to put out the fire completely and scatter cool ashes, to prevent it from blazing back to life.

vi. Respect Wildlife

There is a big population of Atlantic grey seals on Skye. They bask in the sun during low tide, in order to digest their food. For this reason, I will steer clear of their path and observe them at a distance. Otters, red deer, and a variety of seabirds are other common wildlife. I will protect these animals by carefully storing my food and trash securely. I will also avoid feeding these animals because it has the potential to alter their natural behaviors and damage their health.[25]

vii. Be Considerate of Other Visitors

2) Follow minimalist equipment ethics

   a. Minimalist equipment ethics refers to only taking what is needed. For example, a team of two people does not need a 5-person tent. This would create an added footprint to a campsite unnecessarily. In addition, a 5-person tent would minimize the space available for other important stuff. This is not a car camping trip, it is an expedition meant to advance my skills.

3) Rely on limited support relevant to the individual expedition

   a. A big part of this expedition is to become self-reliant for an extended period of time. Limited support means the support is not critical enough for the expedition to be successful.

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[25] "Scottish Mammals." *Welcome to Scotland*. Visitor Centres Ltd, 2012. Web. 24 Mar 2012. <http://www.welcometoscotland.com/about-scotland/wildlife-around-scotland/scottish-mammals>.

4) Advance your skills
    a. This expedition, at the very least, will force me to become an independent paddler. My mentor won't be there to hint subtle changes in wind direction and tides. I have to be completely self-aware, which will aid in my decision making and becoming a better navigator.
5) Cover a span of time sufficient to establish self-reliance; ten full days is the baseline
    a. The senior expedition is the culmination of the Expeditionary Studies program, which requires the application of all of the concepts without any guidance from an instructor in the field. Attaining self-reliance in the planning and execution process of my own expedition is the requirement in order to successfully complete the capstone experience. I will do so by completing ten full days, which consists of 6 hours or more per day of paddling at an average speed of 3+ knots. In addition, I will stay at eight different primitive campsites, which is a requirement of all paddlesport proposals.
6) Be planned and executed by students, with a minimum of guidance from other parties
    a. The senior expedition represents my abilities and professionalism, both of which would not be adequately displayed with guidance from others. Doing so can be compared to doing secondary research and getting the credit for primary research.
7) Be of sufficient difficulty to make failure a possibility but also sufficiently flexible to allow dangers to be avoided when possible
8) Take place at a time and in a place when seasonal weather patterns are conducive to a successful expedition

   a. Skye is rainy during most of the year, but summer gives a better chance for clearer days. While rain wouldn't put my expedition on hold, it would be nice to air out gear every once in a while. The wind typically comes from the southeast during June at approximately 8 knots, which is well within my ability.

9) Not take place in areas with which you are already familiar
10) Take place outside a 100 mile exclusion zone around Plattsburgh and your family residence
   a. The distance from Plattsburgh, NY to Isle of Skye is 2,922 miles
11) Be justified based on the nature and explanation of identified outcomes
12) Exceed 300 level EXP course expeditions in level of challenge and duration
   a. 300 level EXP course require 6 hours or more per day at an average speed of 3+ knots.
13) Add value to your profile as a member of the adventure industry
   a. Having a solo-expedition under my belt would distinguish myself as a competent and independent paddler. Furthermore, Scotland is a respected paddling location in the kayaking community because of its strong tides. One of best sea kayakers in the world, Gordon Brown, also resides in this area.
14) Be completed with a publication or presentation

## Appendix B: The Workout Glossary

Agonist: Muscles that are the primary movers in a joint motion, *e.g. biceps in a bicep curl.*

Antagonist: Muscles that act in direct opposition to agonists, *e.g. triceps in a bicep curl.*

Concentric: The motion which occurs when a muscle shortens as it contracts, *e.g. the upward motion in a biceps curl.*

Dorsi Flexion: Movement that brings the top of the foot towards the lower leg, *e.g.* moving the front of the foot upward.

Eccentric: When the muscle is exerting less force than is being placed upon it, the muscle lengthens, *e.g. straightening the arm in a bicep curl.* This is also known as negative training or deceleration.

Eversion: A movement in which the inferior calcaneus (inside heal) moves laterally, *e.g. the left foot moves to the right.*

Extension: A straightening movement in which the relative angle between two adjacent segments increases, *e.g. the upward motion in a leg extension.*

Isometric: When a muscle is exerting force equal to the force being placed upon it, the joint angle and muscle length do not change during contraction, *e.g. pushing against a fence.*

Flexion: A bending movement in which the relative angle between two adjacent segments decreases, *e.g. the upward motion in a biceps curl.*

Neuromuscular Efficiency: The ability of the nervous system to properly recruit the correct muscles to control a specific movement, rather than overcompensating with other muscles, which

can lead to injury, *e.g. contraction of the quadriceps, hamstrings, and glutes in a lunge, not just the quadriceps.*

Repetition: One complete movement of a particular exercise, *e.g. one upward motion and one downward motion in a bicep curl.*

Repetition Tempo: The speed with which each repetition is performed. Movement occurs at different velocities in order to get the appropriate results from training, *e.g. slow during the power phase.*

Rest Interval: The time taken to recuperate between sets, exercises, or both. Each exercise requires energy and the primary type of energy used during training depends on the training phase, exercise intensity, and goal, *e.g. rest for 30-60 seconds after each set during the stabilization/strength endurance phase.*

Plantar flexion: Movement that brings the top of the foot away from the lower leg, *e.g. point the toes toward the ground like a ballerina.*

Set: A group of consecutive repetitions, *e.g. 12 repetitions during the stabilization/strength endurance phase.*

Superset: Utilizes two exercises performed in rapid succession of one another, *e.g. performing pushups then squats without any rest.*

Synergist: A muscle that assists another muscle to accomplish a movement, *e.g. the shoulder muscle during a press up, which targets the chest.*

Training Intensity: An athlete's level of effort compared to his or her maximum effort, *e.g. 50-70% during the stabilization/strength endurance phase.*

Volume: The number of repetitions multiplied by the number of sets in a total workout, *e.g. 36-75 (repetitions/exercise) during the stabilization/strength endurance phase.*

**Bibliography**

"Beaufort Wind Scale." *National Oceanic and Atmospheric Association*. National Oceanic and Atmospheric Association, 22 Mar 2012. Web. 22 Mar 2012. <http://www.spc.noaa.gov/faq/tornado/beaufort.html>.

"Burning Calories: The Energy In Food." *Tutu's House*. Friends of the Future, 2009. Web. 15 Apr 2012.

"Harris Benedict Equation." *BMI Calculator*. BMI Calculator. Web. 20 Aug 2012. <http://www.active.com/fitness/calculators/calories>.

"Peat Bogs." *Scottish Natural Heritage*. Scottish Natural Heritage, 18 2012. Web. 20 Sep 2012. <http://www.snh.gov.uk/about-scotlands-nature/habitats-and-ecosystems/mountains-heaths-and-bogs/peat-bogs/>.

"Principles." *Leave No Trace: Center For Outdoor Ethics*. Leave No Trace, 2008. Web. 15 Apr 2012. <http://www.lnt.org/programs/principles.php>.

"Scottish Mammals." *Welcome to Scotland*. Visitor Centres Ltd, 2012. Web. 24 Mar 2012. <http://www.welcometoscotland.com/about-scotland/wildlife-around-scotland/scottish-mammals>.

"Skye Map." *Panoramic Earth*. Panoramic Earth, n.d. Web. 19 Sep 2012. <http://www.panoramicearth.com/593/Skye/Skye Map>.

"When Does Heather Bloom In Scotland?." *Visit Lochness*. Destination Loch Ness , 29 2010. Web. 20 Sep 2012. <http://www.visitlochness.com/blog/environment/when-does-heather-bloom-in-scotland/>.

"Wild Camping In Scotland: Rights and Responsibilities." *The Mountaineering Council of Scotland*. The Mountaineering Council of Scotland, n.d. Web. 16 Apr 2012. <http://www.mcofs.org.uk/assets/wild camping advice 1011.pdf>.

"Wind & weather statistic Skye/Lusa." *Wind Finder*. Wind Finder, Mar 2012. Web. 1 May 2012. < http://www.windfinder.com/windstats/windstatistic_skye_lusa.htm >.

Bailey, Dan. "Cullin Ridge." *Summit Post*. Summit Post, 05 2010. Web. 19 Sep 2012. <http://www.summitpost.org/cuillin-ridge/152321>.

Brown, Gordon. "Flora and Fauna." *Sea Kayaking on the Isle of Skye*. Gordon Brown. Web. 22 Sep 2012. <http://www.skyakadventures.com/isle_of_skye.html>.

Carpi, Anthony. "Carbohydrates." *Vision Learning*. Vision Learning, 2012. Web. 15 Apr 2012. <http://www.visionlearning.com/library/module_viewer.php?mid=61>.

Carpi, Anthony. "Carbohydrates." *Vision Learning*. Vision Learning, 2012. Web. 15 Apr 2012. < http://www.visionlearning.com/library/module_viewer.php?mid=62>.

Clark, Michaeal, and Scott Lucett. NASM Essentials of Sports Performance Training. First. Philadelphia: Lippincott Williams & Wilkins, 2010. 341-369. Print.

Cooper, Doug, and George Reid. *Scottish Sea Kayaking: Fifty Great Sea Kayak Voyages*. 1st ed. Gwynedd: Pseda Press, 2005. 3. Print.

Gore, Pamela. "Weathering." *Geology* . N.p., 05 2002. Web. 19 Sep 2012. <http://facstaff.gpc.edu/~pgore/geology/geo101/weather.htm>.

Mayell, Hillary. "Dinosaur Tracks Preseved on Scottish Island." *National Geographic News.* National Geographic Society, 29 Aug 2002. Web. 13 Mar 2012. <http://news.nationalgeographic.com/news/2002/08/0829_020829_dinofootprint.html>.

Osterweil, Neil. "The Benefits of Protein." *WebMD*. WebMD, n.d. Web. 20 Aug 2012. <http://men.webmd.com/features/benefits-protein>.

Parkin, Dave, and Marilyn Parkin. "Types of Rock." *Zephyrus*. Net Intelect, n.d. Web. 12 Aug 2012. <http://www.zephyrus.co.uk/rocktypes.html>.

Peck, Donald B.. "Igneous Rock." *The Rock Identification Key*. Donald B. Peck, 2001. Web. 12 Mar 2012. <http://www.rockhounds.com/rockshop/rockkey/

Schurman, Courtenay, and Doug Schurman. *The Outdoor Athlete*. Body Results Incorporated, 2009. 170-185. Print

Terry, Marsh. *The Isle of Skye*. 3rd e. Cicerone Press , 2009. 24-25. eBook. <http://books.google.com/books?id=Au-YIX5DKAUC&pg=PA24&dq=isle of skye flora and fauna&hl=en&sa=X&ei=g_PRUPj3IOOWiALq2oGQCA&ved=0CDwQ6AEwAA