

Imperial College Alaska Expedition

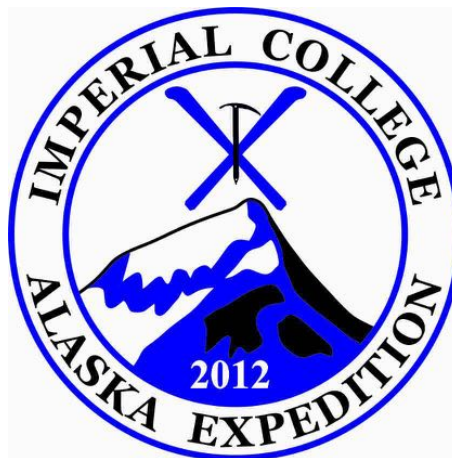
Submitted on behalf of:

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Chapter 1

Introduction

In September 2011 a team of four climbers, all members of the Imperial College Outdoor Club (ICOC), started organising an expedition with the aim of combining good skiing with good alpine climbing. Thus, the team was looking for an area with the following characteristics:

- Remote with potential to attain 1st ascents.
- Relatively easy access in order to maximise the stay on the Glacier.
- Peaks that could be summited in 1 day.
- A region that was 'in season' in June due to exam constraints.

These conditions lead the team to consider Alaska as the final destination for the expedition. In order to determine the region within Alaska the weather was the primary factor taken into account.

1.1 Aims: Planned and achieved

The overall aim of the expedition was to live for month, unsupported, on the ice and rock of the rarely explored territories of the Saint Elias Range in Alaska. More specifically, the Jeffries Glacier and the Fraser Glacier.

None of the members had been to Alaska before. The expedition provided a great opportunity for all of us to learn how to adapt to the conditions there.

Our general objectives before departure were:

- To return home safely having enjoyed the challenges and unique environment of Alaska.
- To explore rarely visited territories of the Wrangell-St Elias National Park and Preserve.
- To attain first ascents of previously unclimbed peaks using both ski mountaineering and alpine climbing techniques.
- To identify other potential objectives in the area for future expeditions.
- To obtain relevant aerial photographic material both of the objectives and the glaciers.
- To inspire other members of Imperial College, as well as the wider mountaineering community, to explore Alaska.
- To extend the ski mountaineering, alpine and expedition experience of all members.

After the trip the team considers that all the objectives have been met except for the Kite Aerial Photography, which will be further discussed in section 4.1.6

1.2 Final Itinerary

The expedition dates were chosen in order to maximise the probability of reasonably stable weather conditions (i.e. long days, good snow quality for ski touring and ski mountaineering practice, minimal precipitation...) while meeting expedition members' personal circumstances constraints.

In order to maximise the stay in the field the expedition departed in 2 teams. Sam Thompson and Sara Arbós departed on the 1st of June while Arnaud Sors and Boris Korzh departed on the 4th of June, due to exam constraints.

The expedition chose to depart for Alaska in early June 2012 and return in early July to avoid snow degradation due to the temperature increase during the summer. A summary of the final itinerary is detailed below.

1th June → Flight from Heathrow to Anchorage via Washington and Seattle. Sam and Sara.

1th – 4th June → Anchorage. Buy missing supplies. Finalise Logistics.

4th June → Flight from Heathrow to Anchorage via Houston. Boris and Arnaud.

4th – 5th June → Car Journey from Anchorage to Chitina.

5th June → Charter Plane Chitina-Jeffries Glacier. Begin exploration.

5th June – 5th July → Ski touring exploration. Climb objectives. Live unsupported between Fraiser glacier and Jeffries glacier.

23th June → Pick-up charter flight. Sara's evacuation.

23th – 28th June → Sara waits in Anchorage.

28th June → Sara flies back to the UK.

5th July → Pick-up charter flight from Jeffries Glacier.

7th – 10/11th July → Rest days in Anchorage.

10th July → Flight from Anchorage to London Heathrow. Arnaud

11th July → Flight from Anchorage to San Francisco. Sam and Boris.

Chapter 2

Expedition Team

The team was comprised of four Imperial College Students, between 20 and 25 years of age. Including both post-graduates and undergraduates all in different scientific disciplines. All the members had notable mountaineering experience.

Sara Arbos Torrent

Team Leader

Large and intensive skiing experience, piste and touring, mostly in the Pyrenees and the French and Italian Alps. Including the 4000ers Bernese Oberland route. Continental ice climbing up to WI3. Scottish winter Climbing up to grade III. Alpine Climbing up to D. Regular practice of trad Climbing (VS) and sport climbing (F6a).

Boris Korzh

Equipment and Finance Officer

Good ski touring experience in the European Alps, with over 30 day tours in France, Germany, Switzerland and Slovenia, highlight being the completion of the Haute route. Continental ice climbing up to grade WI6 and Alpine climbing up to ED1, with over 25 alpine routes completed. Scottish winter mixed climbing up to grade V, 6. Member of the Imperial College Obra Valley Expedition in 2010, completing 3 first ascents up to 5877m with difficulties of up to D-.

Sam Thompson

Logistics and Medical Officer

Substantial ski touring experience in the European Alps and Canada. Completed several classic multi-day ski tours including: the Haute Route, Tour de Soleil, Wapta Ice Fields Traverse (BC) and touring in Rodgers Pass (BC). Scottish Winter climbing up to grade grade VI, with over 15 routes completed at grade V. UK rock climbing up to E2 5c, with 25 routes completed above E1. Ice cascade climbing in Europe and Canada (BC) up to WI 6. Over 30 alpine and mountaineering routes completed up to TD. Member of an expedition to Himachal Pradaesh (India).

Arnaud Sors

Photography and Communications Officer

Large experience and intensive practice of ski mountaineering mostly in the French, Swiss, Italian alps and Corsica. Regular practice of rock and ice climbing. Mountaineering up to TD. 8 months in the French Alpine troops. Expedition to the Tadjik Fann Mountains.



Figure 2.1: From left to right, Arnaud Sors, Sam Thompson, Sara Arbos and Boris Korzh.

Chapter 3

Planning and Preparation

3.1 Previous Expeditions

Extensive research was carried out in order to be able to determine, as accurately as possible, the previously climbed mountains in the region of interest. Information about the logistics used for this type of expedition was also sought.

In order to conduct the research several archives were consulted including the Royal Geographical Society, the Alpine Club, the American Alpine club and the Mount Everest Foundation. In addition web pages such as www.summitpost.org were reviewed. Steve Gruhn, member of the Alaska Mountaineering Club and responsible for the peak ascents record, was also consulted.

Three relevant expeditions were found.

3.1.1 Baldwin Glacier

A crew of four American climbers flew into the glacier and set a base camp at 8000ft in order to climb several peaks in the area including a first ascent of peak 10460ft, 'Hudson peak'. Their programme consisted of reasonably difficult alpine climbing and ski mountaineering. They started their glacier stay on the 14th of June, a little bit later in the year than when we went. However, similar snow and ice conditions were found.

3.1.2 Mount Hope

A second team also went to the Fraser Galcier area and managed to attain the first ascent of a 11900ft unclimbed peak, now named Mount Hope. They set their basecamp at 8500ft on the Fraser glacier. The expedition took place in June 1998 and the push to the summit took place on the 30th of that month. Their ascent mainly consisted of snow and ice climbing.

3.1.3 Jeffries Glacier

A British team of 2 attained three 1st ascents in the Western most part of the Jeffries Glacier. Stuart Howard and David Swinburne reported good snow conditions even in late July. The report also included information about the pilot Paul Claus and hinted that the area had high climbing potential. The expedition also stated that extensive sections of exceedingly loose rock were found on all of the ridges the pair attempted. The expedition members provided us with invaluable information about the logistics required, including contacts to arrange the hostel stay in Anchorage, several notable food and gear suppliers in Alaska...

Figure 3.1 shows the map of the area of interest with all the information gathered prior departure about the potential objectives.

It should be noted that when doing the initial research the team assumed that the drop off would be possible on the Fraser Glacier itself. However, in reality this was not feasible due to varying glacier conditions. Instead, the eastern most part of the Jeffries Glacier was chosen as it provided a secure pick up and drop off point at all times.

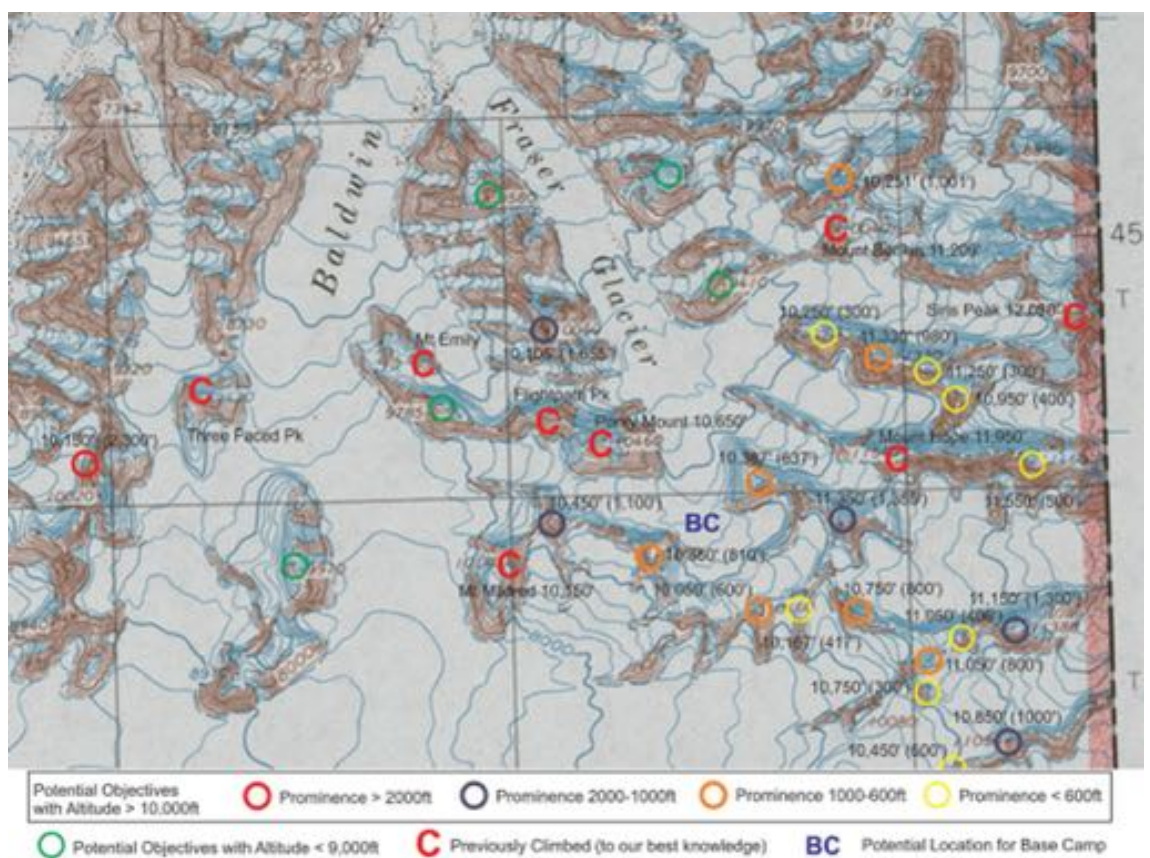


Figure 3.1: Map of potential objectives in the Fraser Glacier area compiled before departure.

Chapter 4

Logistics and Administration

4.1 Logistics

The team decided to organise all the logistics themselves. This included travelling arrangements, planning and gathering of the equipment required when on the glacier, arranging the cooking systems, i.e. stoves, gas, fuel as well as sorting and shopping all the food.

4.1.1 Travelling

The travelling arrangements can be divided into two distinct parts. One which involves the intercontinental travel and one which involves the travelling within the Alaskan territories.

Intercontinental Travelling. *From London to Alaska.*

Travelling from London to Alaska was done using commercial airliners. We flew from London to Anchorage. The routes were diverse and we opted for United Airlines who offered the lowest fair and the highest cargo allowance. However, this resulted in many stop overs.

Within Alaska. *From Anchorage to the Glacier.*

Roads in Alaska are scarce and in poor conditions due to the harsh winters experienced. Hence, the main means of transport within Alaska are bush planes. There are many companies that provide these services but each of them specialises in one particular region. The region we visited can only be reached by flying with *Ultima Thule*.

Ultima Thule is, in actual fact, a luxury lodge situated in the middle of the Alaskan Wilderness hundreds of miles away from any road; hence, it can only be reached by plane. The lodge is run by Paul Claus and his family. The lodge was constructed by Paul Claus' father under the Homestead Act in 1958 and later when the federal Protection came to the Wrangells a special exemption was granted to the lodge and its airstrip to allow its maintenance. Thus, making it one of the very few private properties of the heart of the National Park.

Paul Claus, is an excellent pilot specially when regarding glacier landings, he is also an avid climber who has claimed most of the 1st ascents of the climbed mountains in the area. As a side business he runs charter flights to and from remote areas for climbers.

4.1.2 Permissions

In order to enter the United States as a tourist visitor (i.e. stay for less than 90 days) the ESTA visa is required. This is easily obtainable on-line at a cost of \$14. No further permits were required as the Wrangall-St. Elias National Park is one of the few parks that does not require any fees or permits to enter. However, as a safety measure our plans were notified to the Park Rangers as well as Paul Claus.

4.1.3 Insurance

The insurance was contracted via the BMC. The insurance has been utilised and has proven to be quite disappointing in both efficiency and coverage. As of today the Insurer has not yet paid the hospital nor the pilot who performed the initial evacuation. It is also refusing to pay the calls that were necessary in order to arrange the casualty's accommodation and repatriation to the UK. These calls amount to about 800GBP.

4.1.4 Communications



Figure 4.1: Sara pretending to call with the Satellite Phone.

Within the glacier

Whenever the team operated in pairs each pair carried a large range radio which allowed inter-team communication. This system was implemented to ensure that help could be provided should something happen to any of the party members.

Beyond the glacier

The communications to the outside world were done via a satellite phone. Coverage was sometimes low and sparse although we always managed to establish connection.

The team made a special effort to keep frequent communication with the outside world and daily satellite messages were sent to a previously set up twitter account.

Daily weather reports were sent to our satellite phone thanks to the invaluable help of Jonathan Phillips.

4.1.5 Photography

The team as a whole brought three cameras, in order to make sure there would be at least one per team of two climbers, even if one of them broke down or ran out of battery. We used two compact cameras and one Nikon D3100 DSLR, with a versatile 18-105mm stabilised lens.

Photographers often seek the fleeting moment when the sun is appearing or disappearing on the horizon, and early-morning and late-evening lights are deemed ideal for photography. During the Alaskan summer, dusk and dawn last much longer thanks to the high latitude. As a result we came up with a number of interesting shots, on the few occasions when the weather and the sunset/sunrise would agree to cooperate.

We all had spare batteries or a charging adaptor to the Solar system for our cameras. With the addition of keeping a careful eye on remaining capacities we had no problems on that matter.

In addition, the team also had three Go-pro Hero2 cameras. These were used to record some ski descents as well as to capture slow processes such as the igloo building progress where a picture every minute was taken. Finally, these cameras were also used when trying to implement Kite Aerial Photography.

4.1.6 Kite Aerial Photography

We were eager to experiment with Kite Aerial Photography, KAP, whilst on the glacier. In order to try this technique, we brought a moderately big (about 1m²) lifting kite from *Unique Flying Objects*. It was a one-line lifting kite therefore it could not be guided. Such kites simply inflate and keep a stable position in the direction of the relative wind. Underneath the kite we attached a Go-Pro camera. The angle of the kite

line relative to the ground varies depending on the strength of the wind. Hence, it is subject to oscillations and bumps due to wind gusts. In order to minimise the impact of these instabilities to the camera we mounted it under a wooden rod cross structure attached to the kite line via a Picavet threading system (see figure reffig:kite1). This is a self adjustable system which allows the camera to maintain a steady angle with respect to the ground.

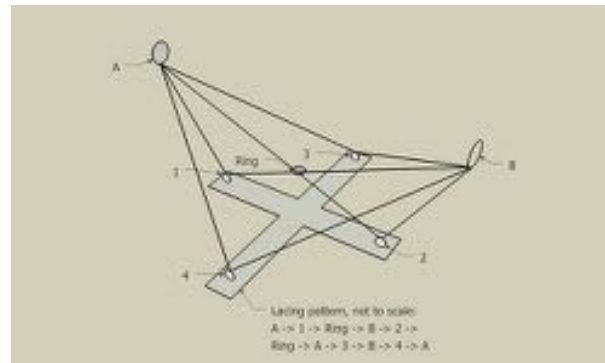


Figure 4.2: Kite Aerial Photography Set up.

The wooden cross-shaped structure was handmade beforehand and the final mounting of the camera and rigging of the platform to the kite line using nylon thread and metal parts was carried out whilst on the glacier. The picavet is not a simple system to rig up but is very well-thought and leads to great results.

Test and Results

We were not able to perform static pictures because of the general absence of stable wind. Most of the time we had no wind at all, or not enough to sustain the camera and its loading, even though the system had very good lifting capabilities. On rare occasions we witnessed stronger but irregular winds; thus, not able to provide good flying conditions for the kite. So we sought an alternative method in order to generate the required apparent wind. This was to fly the kite behind us whilst skiing, which would provide more than sufficient speed to lift the device and also the occasion to experiment on a new kind of filming !

Towards the end of our stay we skinned up until we were just below the summit of Whale peak. This provided a non-stop ski descent to the base camp with an altitude height difference of 700m. We pulled out our system, and arranged for a nice launch. We managed to film the whole descent which resulted in a 5 minute-long skiing aerial video.



Figure 4.3: Kite Aerial Photography Set up.

Chapter 5

Expedition Journal

Day 1 - 1st June

Sara and Sam departed for Alaska from Heathrow airport. Arnaud and Boris remained in the UK for a few more days due to exams which they had to complete. They had to transfer flights in Washington and Seattle, with their transit to Anchorage taking 20 hours. They arrived in Anchorage just before midnight and took a taxi to the hostel.

Day 2 - 2nd June

The pair treated themselves to a large American breakfast and then started to sort out all of the equipment. 4 boxes of Black Diamond equipment was picked up from the AMH shop along with the kite and the GoPro cameras which were posted there. They also bought the MSR stoves from the same shop.

Day 3 - 3rd June

Today was dedicated to food shopping with the majority being bought in Costco, providing good prices for bulk buy. It was possible to take Coleman fuel from the hostel, since many people leave their unused fuel there before flying home.

Day 4 - 4th June

Sara and Sam carried out the final packing and organisation of the equipment prior to Arnaud's and Boris' arrival, who left London at 9:30am. After changing in Houston, Texas, they arrived in Anchorage at 7pm, leaving some just enough time to do all of their packing. Unfortunately Arnaud forgot to bring a torex drive screw driver to adjust his ski bindings, so the pair spent the whole night scouring Anchorage in hope of finding a shop that was still open, to no success. Incredibly, that was the only piece of equipment that was missing.

Day 5 - 5th June

The team got picked up at 5am by Paul Claus' parents in a large van. Fortunately they were able to stop off in a DIY shop on the way to Chitina in order to buy the much needed torex screw driver. The weather was perfect for flying, so as soon as the team arrived at the Chitina airstrip, they loaded up the single Otter aeroplane. After a stern briefing from Paul Claus, we took off and got flown to the head of the Jefferies Glacier, with the basecamp being set up directly at the landing spot. This meant that Arnaud and Boris had transferred from London to the glacier in under 36 hours! As soon as the tents were set up, the team started to construct an igloo in order to have a communal area.

Day 6 - 6th June

There was hope for a ski tour today, but cloud and snow set in so the team remained at base camp and completed the igloo. An inventory of the food was carried out to check that everything was in order.

Day 7 - 7th June

The weather cleared and the whole team set off on their first ski tour/climb. A 10,2132 ft peak near base camp was targeted and the name of Peak Alopecia was the suggested due to the patchy snow on the rocky slopes. At the summit a white out had set in, but would occasionally break up, allowing Arnaud to carry out a full ski descent of the same route used for the ascent. Everyone was happy to reach the first summit



Figure 5.1: Sam standing next to the newly finished igloo.

so early on and celebrations with a little whiskey were in order upon return to basecamp.

Day 8 - 8th June

Bad weather returned and the team relaxed, starting the first of many books that would be read throughout the duration of the expedition. The temperatures warmed up significantly, causing the igloo to start dripping inside.

Day 9 - 9th June

Clear skies and the absence of any wind presented themselves in the morning allowing a ski ascent of the second peak, Whale Peak (10,730 ft), at the head of the Jefferies glacier. The view on the top was outstanding, presenting all of the surrounding peaks and Mount St Elias was also visible in the distance. What followed was an immaculate ski descent all the way back down to base camp.

Day 10 - 10th June

On the previous day, the team reccied several routes on a neighbouring peak, which came to be called Ocean Peak following ascents via two different routes. Sara and Arnaud (S&A) climbed together starting at about 3am, whilst Sam and Boris (S&B) started at 7am, summiting just after the first team, to perfectly clear skies. S&B took their skis to the summit, and after a traverse across the summit ridge could complete the same ski descent undertaken the previous day.

Day 11 - 11th June

With a good start of mountaineering near base camp, the team decided that it is time to start moving around to explore other areas with the plan to return to basecamp one week before the planned pick-up date. Heavy snow fall prevailed all day, with over 30cm of fresh snow settling, hence there was no reservation to spend the whole day resting and packing.

Day 12 - 12th June

Unfortunately the heavy wet snow did not relent, so the team remained at base camp for another day.

Day 13 - 13th June

Finally, the opportunity to move presented itself. The team relocated to the head of the Fraser Glacier, a journey which took over 8 hours with the last half being completed in a full white out. However this did not present too much of a problem with the use of a GPS.



Figure 5.2: Looking back at the heavy pulk as basecamp disappears in the distance.

Day 14 - 14th June

In the morning, it was decided to move the camp slightly further down the glacier to avoid the large crevasses and to be in a better position for returning from climbs. The tents were loaded erect on top of the pulks for the move, which saved a significant amount of effort. The weather was still unfavourable, so nothing else was done.

Day 15 - 15th June

Fed up of lying in tents, S&A went out for a ski tour to a col at the top of the glacier, even though there was a complete white out and progress was only made with a map, compass and GPS. A few hours after their return, at 7pm, the skies miraculously cleared and team got a full view of the area for the first time. Extremely excited, S&A decided to ski tour Bald Top peak via its West face. S&B had their sights set on the North Face of Mount Short (11,003 ft) which stood magnificently directly above the camp. However, before making an attempt on the route, they needed to reccie the descent route down the East side of the mountain. After successfully spotting a possible descent route, they returned to sleep before setting off in the morning.

Day 16 - 16th June

S&A summited Bald Top peak just after midnight and were rewarded by an outstanding sunset, they then proceeded to ski down the same face, which was the skiing highlight up to this point. S&B started climbing at 7am and summited Mount Short at 2pm, which proved to be a beautiful line, thus named "Thompson's Route". The full team united back at base camp at which point S&A set off again on another short mission to reach a point at about 9,600 ft. Once back for the night, everyone celebrated with a quick whiskey round.

Day 17 - 17th June

To take full advantage of the good weather, the full team did not rest and summited another peak, Eleanor Peak (10,153 ft). From here they traversed to the top of Bald Top peak to complete the exquisite descent of its West face.

Day 18 - 18th June

A few other peaks interested the team in this area, although everyone was ready to move down the glacier to the next location. In order too maximise the number of climbed peaks, the team split up once again. S&A went for a high peak which they subsequently named Cantaloupe Island peak and managed to complete half of the descent on skis. S&B focussed on two smaller peaks, linked by a ridge, which they traversed. Clear weather presented itself throughout the day.

Day 19 - 19th June

With a large number of peaks summited in the vicinity of the camp, the team was happy to move to the next location. This was to be further down the Fraser glacier, which would give access to the highest peaks in the area. On the way down, many inspiring routes are sighted along with what appeared to be the remains of a previous base camp from another team, who must have left recently. On the way back out, Paul Claus confirmed that the team was there for a very short time and did not actually climb anything. It was much hoped that Siri Peak would come into view, but it stayed hidden further up a subsidiary glacier, instead the North face of Mount Hope provided plenty to look at.

Day 20 - 20th June

Bad weather was right on cue, so the team had time to rest up.

Day 21 - 21st June

It was time to get to know the area better. S&A enjoyed a quick ski up part way up an East face opposite camp, followed by a skin up halfway up the two main subsidiary glaciers to get a better view of the available routes. S&B had their sights set once again, and this time as high as possible towards Siri Peak. It was obvious that it wasn't practical to attempt the climb starting from this camp, so the pair packed enough equipment for a couple of nights into the pulks and skied up to the base of the mountain, to enable an early start directly on the route. As they approached the mountain, it was soon obvious what route they would do the next day, a magnificent wide gully striking a direct line to the summit.

Day 22 - 22nd June

This proved to be a very eventful day. S&B set off at 5am on the route after a short approach. The route consisted of perfectly hard and sticky neve, meaning progress was exceptionally quick with the pair topping out at 7.40am. The view was magnificent, mainly dominated by Mount Logan, which now seemed very close since they were on the US/Canadian border. It was decided that the route name would be "Imperial Gully" as an acknowledgement of the expedition's main supporter and the grandeur of the route was also quite fitting to the name.

In the meantime, S&A climbed Flying Peak. Unfortunately, on the descent, one of the members had an accident, sustaining two lacerations on the leg. Further details of the accident are covered in Section 9.1. It was decided that the best course of action would be to evacuate the member. Messages were sent to the relevant parties as outlined in the pre-expedition safety plan.

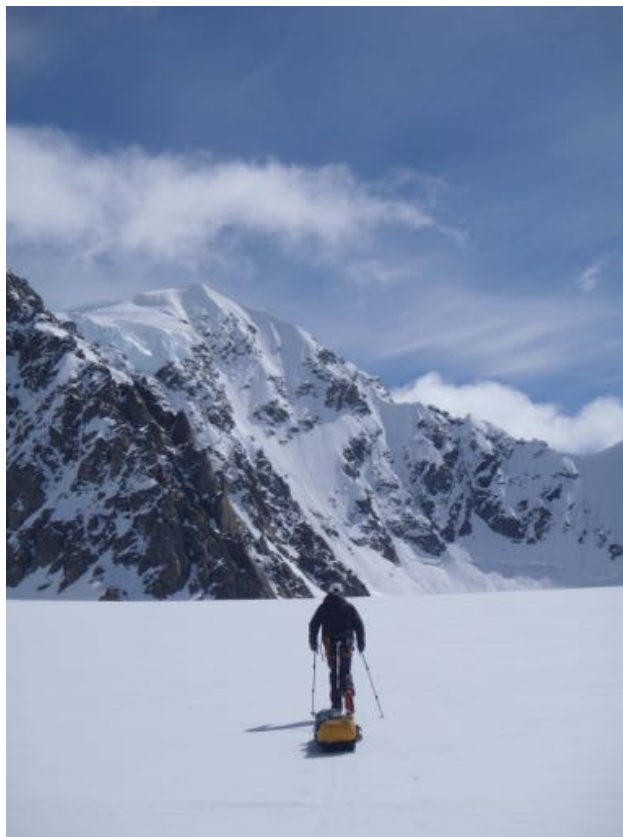


Figure 5.3: View of Siri Peak on approach.

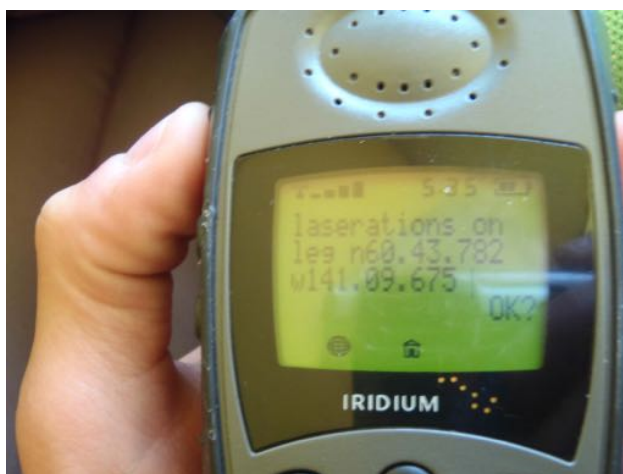


Figure 5.4: The only remaining picture from the period when the casualty was being treated.



Figure 5.5: Nighttime during the ascent of Forgotten Peak. Mount St Elias seen in the background.

Day 23 - 23rd June

Paul Claus arrived first thing in the morning to pick up the injured team member to get professional medical assistance in the hospital. It was decided that the other three members of the team should remain for the rest of the expedition.

Day 24 - 24th June

The team ski toured further down the Fraser glacier to reach another subsidiary glacier to it's east. From here, an ascent of the East Face of Mount Crystal was made. On the way to the mountain the team came across a glacier lake which was a pleasant change of scenery. Excitement rose to levels sufficient to undertake some water skiing across a section of the lake.

Days 25 - 25th June

The team wanted to make an ascent of a previously unclimbed M85, in the vicinity of the camp. However the weather conditions started to become very unstable so a day at camp was forced.

Day 26 - 26th June

It was now time to start heading back in the direction of the main base camp, due to the dehydrated food, its enjoyment and the departure date all coming to their end. The team moved the camp to Baldwin glacier from where they could spend another few days climbing in a new area and to be only a single days travel from the main base camp.

Day 27 to 29 - 27th to 29th June

Unfortunately all plans of climbing or skiing were thwarted by the shocking weather conditions for three days.

Day 30 and 31 - 30th June and 1st July

With the dehydrated meals almost finished, the team gave up hopes of climbing near the Baldwin glacier and moved back to base camp. The change of diet was much appreciated by everyone, the most popular ingredients being the smoked salmon and maple syrup. The weather still did not change it's mind even for the next day.



Figure 5.6: A happy Arnaud on the flight out from the glacier, sporting an impressive beard.

Day 32 and 33 - 2nd and 3rd July

Just when all hope was coming to the end, at 9pm, the skies miraculously cleared. Not willing to waste the opportunity, preparations were made to set off for a night climb. Even during the darkest time of the night, there was enough light to climb without a head-torch. The summit of Forgotten Peak was reached at 2am followed by an excellent ski descent of the main glacier back to basecamp at Dawn.

Day 33 - 3rd July

With acceptable visibility and the kite arial photography kit in hand, the group ski toured once more to the head of the Jefferies glacier. A successful video shoot was pulled off with a GoPro camera attached to a trailing kite during the ski descent.

Day 34 - 4th July

It was finally time get ready for departure, so the pilot was contacted to inform him of the current weather conditions. Unfortunately the St Elias Mountain Range hadn't seen enough of us yet and held on to us for one more day. To kill time, two of the team did some ice climbing in a crevasse, by lowering in and climbing back out on top rope.

Day 35 - 5th July

In the morning, the slightly changeable, but hopeful, conditions were sent to the pilot once again. Instructions were received to start packing up and henceforth we waited patiently, occupying the time with some video making. To our disbelief, just as we heard the plane approaching, cloud suddenly came in to surround us, shortly after which we could hear the engine sound distancing itself once again. Just as despair began to set in, not for the first time during the expedition, a miracle happened. Paul Claus was flying towards us, underneath the cloud, a gap of probably just 50m! Needless to say we soon had all of our equipment stacked inside the single Otter aircraft and were flying back to the Ultima Thule Lodge. There we experienced a wonderful Alaska Sauna, followed by a somewhat uplifting debrief with Paul Claus, compared to his introductory talk at the start of the expedition.

Another short flight to Chitina and a car transfer ensued, meaning we were back in Anchorage the same day.

Day 36 to Day 40 - 7th to 10th July

Contingency days were spent in Anchorage, with multiple visits to gear shops, bars and the supermarket. Flights back to London and San Francisco (two of the members headed straight to Yosemite after the

expedition) were caught on the 10th and 11th July respectively.

Chapter 6

Climbing

Climbing in such a remote and wild location was an amazing experience. The routes were not especially long but often had technical sections and could be descended by alternative routes. Half of the time we spent on the glacier (fifteen out of thirty days) was spent climbing or ski mountaineering. We climbed a total of thirteen peaks, eleven of which were previously unclimbed. We also established new routes on some of the peaks that had already been climbed via interesting unclimbed lines that offered great technical climbing. In general the rock was of a poor quality. We encountered some granite but generally the rock was loose and difficult to protect. We made the decision to pick our routes based on the quality of ice and snow on a particular line and avoided any long sections of rock (apart from ridges). There were a number of North faces that were in good condition. These offered the most technical climbing in the safest way. The grade of climbing ranged from facile to difficile, D. The majority of routes climbed were around assez-difficile, AD.

6.1 Climbing Ascents

Below is a description of each route that was climbed, in chronological order.

6.1.1 Alopecia Peak (3105 meters) - First Ascent, West Ridge.

The first peak we attempted was the one closest to our base camp and offered a straightforward ski approach and descent. It also gave us the opportunity to have a look at the area from a high point and assess the best routes up the neighbouring, more intimidating mountains.

We approached from the southeast side and skinned up two thirds of the peak. The gradient was quite manageable but increased significantly towards the top forcing us to complete the rest of the ascent without skis. This was when we experienced the common rock type of the area for the first time. A 50-degree slope of loose rocks had to be negotiated in order to reach the summit. Due to the poor and loose nature of the rock, for future ascents we decided to try and stick to routes that involved mainly ice or snow.



Figure 6.1: The first peak to be climbed, Alopecia Peak.



Figure 6.2: Ocean Peak with Korph Couloir clearly visible.

6.1.2 Whale peak (3262), West Face.

This peak was summited during the first few days of arriving at base camp. Apart from the last 100 meters, the ascent and descent was entirely made on skis via the west face. The snow conditions were excellent and enabled a thrilling ski descent. However, there were some extremely large crevasses where the slope flattened off in places. These became even larger as the expedition continued due to rising temperatures.

We were fortunate to have excellent weather on the summit and had panoramic views of the whole area. We were able to get a good view of Ocean peak (our next objective) and spotted good lines up the west facing couloir and north face.

6.1.3 Ocean peak (3359) - First Ascent

Sam and Boris, West facing couloir (Korph Couloir) What an awesome route! This was our first technical peak of the expedition. Team A skinned to the bottom of the main couloir (Korph couloir) and climbed approximately 600 meters to the summit. An early start meant that the snow had formed hard neve and was in perfect condition. Towards the top we reached the west ridge that was reminiscent of Scottish winter â swimming and proved quite difficult. It was relatively steep powder without much protection. We had carried our skis and were able to make a ski descent via an alternative route for the descent.

Arnaud and Sara, 'Swimming Lesson' Route, North face and West ridge. This peak was located relatively close to our base camp. The West face and North-West ridge, that we climbed, directly faced base camp which allowed good observation in the previous days when the weather allowed it. A rather big cornice dominated the summit slopes, so in anticipation of being a little slow the team chose to climb only the beginning of the couloir and then steer left toward the ridge that offered shielding in the eventuality of an avalanche due to a cornice fall. The base of the couloir was reached in less than an hour from base camp and skis were left just near the bergschrund. Great snow conditions were encountered on the west face, but on the North-oriented parts of the arete the team often struggled a bit more and had to 'swim' in the deep powdery snow. Hence the name 'Ocean peak'. Note that the ridge was awkward and by far the most difficult part of the route. Toward the top we found out that climbing with an ice axe and a shovel worked just as well, if not better than with two axes in this kind of conditions! As a result the ascent took us longer than the direct climb via the couloir that Sam and Boris performed. Then the team descended along the North-East ridge and the upper Baldwin glacier. The descent was done in very poor visibility conditions.



Figure 6.3: Descent from Ocean Peak.



Figure 6.4: North Face of Mount Short.

6.1.4 Mount Short (3345) - First Ascent, Thompson Route.

After the first week we moved camps and spent a day touring to the Frasier glacier. We carried pulks and travelled relatively light, leaving the remainder of our equipment at base camp. One of the most technical routes climbed was the north face of Mount Short. It was one of the most dominating peaks in the area and had a steep and icy north face. We climbed this in about seven hours, encountering a large ice bulge half way up that proved quite difficult to negotiate. The ice became quite poor towards the top, and especially near the cornice. A few dodgy ice screws were placed beneath the cornice and it was eventually overcome, albeit, with a large sigh of relief. The descent was made via the southeast ridge, which formed a nice loop back to our camp.

6.1.5 Bald Top Peak (3123) - Midnight Express, West Face

Undoubtedly one of the skiing highlights of the expedition. The east face offered excellent skiing, a long steep descent from the summit right down to the glacier. This peak was climbed twice. Once straight up the east face (Arnaud and Sara) during the night, summiting at Midnight. Snow conditions were excellent but visibility of the terrain on the descent was slightly poor. The second ascent was performed by the whole team and was done via the northeast ridge. The descent route was also slightly different tending more towards

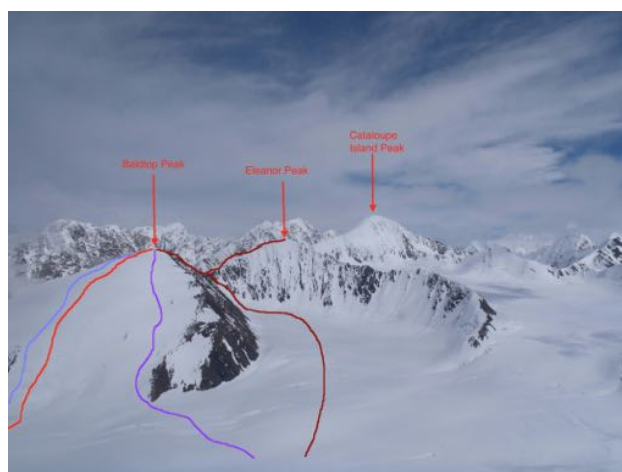


Figure 6.5: Baldtop Peak with the two ascents and the two descents marked. Light Colours indicate the Midnight express ascent (red) descent (purple), Dark Colours indicate the full team ascent (dark red) including the ascent to Eleanor Peak and the full team descent (dark purple). Also in the background Cantaloupe Island Peak.



Figure 6.6: Baldtop Peak, Midnight express ascent.

the south side where the slope was less steep.

6.1.6 Sam Peak (3074) - First Ascent, North Face

This was a short technical peak climbed by the north face. The face rose up approximately 300 meters from the glacier. We then descended by the north ridge to join the base of Boris Peak.

6.1.7 Boris Peak (3108) - First Ascent, West Ridge

We carried on from Sam Peak to the shoulder in the ridge. The ridge proved quite difficult in sections due to sizeable gendarmes that were difficult to traverse. The main difficulty came from all the loose rock on each side of the gendarmes. Steep aretes rose up all along the ridge that made traversing below the ridge difficult. Once past the tricky section we reached the summit and then carried on along the ridge to meet a low point where it was possible to down climb back to the foot of the glacier. After down climbing fifty meters we reached the bergshrund. Unfortunately, this is where Boris suddenly vanished from sight and the rope went very tight, very quickly! How Sam managed to stay on the slope is quite remarkable but as Sam took the fall he subsequently saw the ends of Boris' ice axes peering out of the bergshrund trying to gain a



Figure 6.7: Sam Peak in the distance with the descent ridge clearly visible.



Figure 6.8: North Face of Boris Peak.



Figure 6.9: Bald Top Peak (left) and Mount Elenor (right).



Figure 6.10: Cantaloupe Island Peak, or big skiing peak, with ascent and descent routes marked

purchase on the downward slope! Once out it was Sam's turn, he decided that a leap of faith was a better idea and avoided the man-eating bergshrund that way.

6.1.8 Eleanor Peak (3087) - First Ascent

We took the East ridge rising up to the summit. There had recently been quite a large snowfall so it was quite hard going. After descending the ridge we continued on to make a ski descent of Bald Top peak.

6.1.9 Cantaloupe Island Peak (3450) - First Ascent , North Face

This peak was the furthest away from our base camp and additionally its South face that we wanted to climb was separated from the main glacier by a small ridge that was not difficult but involved removing skis and passing a small col with crampons. As a result the approach took us easily two hours. Then we climbed the south face through its most evident route. We started by ascending a snow couloir at a good pace thanks to the perfect snow conditions. Then the slope steepened and we had to climb a few pitches of ice and mixed terrain, with occasional deeper snow. Never very difficult and steep but the extensive snow coverage only allowed scarce protection and dictated care. The last bit of the ascent was less steep but still demanding because of the deeper snow and the need to work our way around a big cornice underneath the summit and make sure the route was safe. To go down we followed the North-West Ridge. A possible option would have

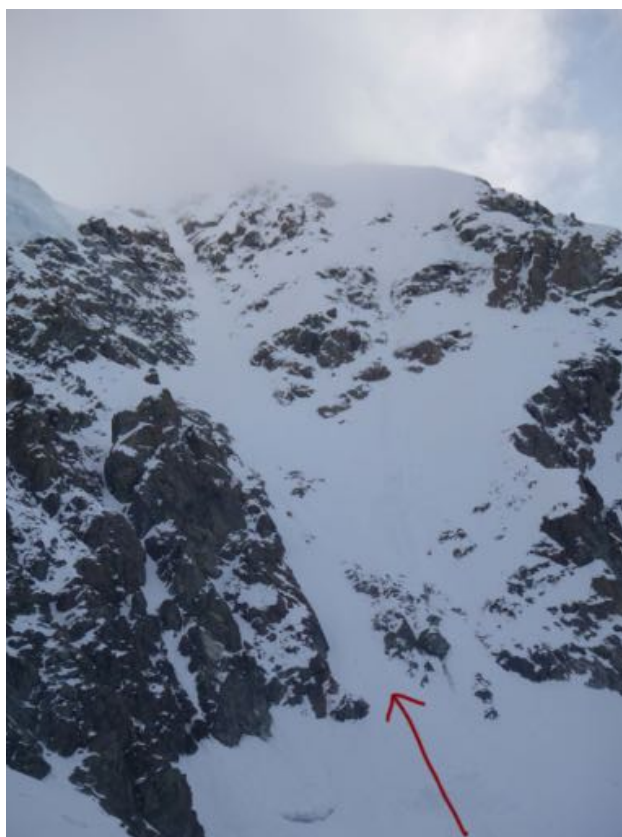


Figure 6.11: Imperial Gully on Siri Peak.

been to put skis on from the summit, ski down the upper slopes and reach the main obvious couloir that would lead us to the bottom. However these slopes were extremely steep and we chose to walk down the ridge and follow it to another couloir that also offered some great skiing, 300m down to the glacier.

6.1.10 Siris Peak (3681), Imperial Gully

This is the highest summit in the area and is one of the few that has previously been climbed. However, there are still a number of excellent unclimbed lines on the mountain. The obvious line is seen directly from the glacial approach and takes a couloir directly from the glacier all the way to the summit ridge. We named this Imperial Couloir. Boris and Sam approached the route the previous day and bivied near the couloir in anticipation of an early start the following day. We reached the base of the couloir the following day around 6 a.m. and started directly up the route. The first 400 m were hard neve and ice but at the top we encountered powder. Getting established on the ridge was quite precarious in all of the deep snow. We reached the summit after 2 and half hours of continuous climbing. It was extremely cold at the top so we did not hang around for long and hastily made our descent down the north side of the mountain that followed the original ascent route. After negotiating some rather large crevasses and bergshrunds we were back at our bivy site for lunch.

6.1.11 Flying Peak (3444) - First Ascent, West Ridge

The day before we climbed this peak we travelled all the surrounding glaciers to view the route and the different faces of the mountain. An early start (00.00am) was agreed in order to reach the summit early enough. Indeed, the end of the descent route was a very hot South couloir that we did not want to descend too late. The approach was very straightforward and we left skis at the bottom of the foreseen descent



Figure 6.12: Flying Peak Ascent

route. After a short additional walk we reached the bottom of the couloir that constituted our ascent route. For the first half of the face we climbed a traditional snow and ice couloir. It is noticeable (and may be useful for potential future climbs in the area) that the rock on our left seemed of very reasonable quality, unlike what we witnessed in the rest of the range!) We did not climb any pure rock pitch though. The couloir led us to a gorge and a gully and we had the privilege to climb a beautiful 60m ice-pitch. This led us to steep snow slopes on top of which the terrain seemed much more difficult, so we traversed to the left by one or two hundred meters to find a more easily climbable line. The rest of the ascent was made of more featured terrain with occasional ice and more frequent deep snow. After the summit was reached we down-climbed the North-West ridge. It turned out to be quite substantially more serious and technical than expected. First we had to dig through a cornice from the summit to set foot on the underlying slopes. Then, as we progressed along the top of the ridge we came upon another wind-sculptured snow accumulation that included a cornice-like overhanging ledge. After digging through it again, we down-climbed 10 meters of ice and reached easier terrain which led us to the south col. At that point it was almost 2pm and the snow on all surrounding slopes had fallen down in superficial but wide avalanches in all of the south facing gullies. Given that our supplies of water and food were very limited at that point, we decided that the best option was to go down anyway, trying to be as fast as possible. We unroped because the slope was not very steep, but at some point Sara lost control, probably because of snow balling up under her crampons, and slid along the slope. Unfortunately an ice screw caught her leg and injured her. We manage to descent safely to base camp but then decided in a common agreement that it would be better for Sara to be evacuated.



Figure 6.13: Mount Crystal coming into view during the ascent of Siri Peak.



Figure 6.14: Imperial Gully on Siri Peak.

6.1.12 Mount Crystal (2930) - First Ascent, North Face

We reached this unclimbed peak by heading down (north) the Fraser glacier. As we descended down the glacier we encountered small glacial ponds where the melt water had begun to collect. On approaching the peak we then came to a small and very beautiful glacial lake. It felt strange seeing something that was not a mountain, person or a glacier for so long!

We continued on towards the peak contouring round its base. We then skinned directly up the north face and then moved onto a rock section, where the snow slope became quite steep and tricky to climb due to the depth of snow. On reaching the summit we followed the same route for the descent. Unfortunately by the time we started our descent the snow had become very heavy due to the heat and it was quite difficult to ski down.

6.1.13 Forgotten Peak (3339) - First Ascent, Main Ridge

This was the last peak we climbed and proved to be quite an experience. The poor weather had forced us to stay in base camp for around three days so we were all itching to get out. So when the weather and visibility finally improved around sunset, we were all very keen to get out! We started the approach at 11 pm and given the amount of light (Alaskan summer) the visibility was fine.

Camps				
Name	Coordinates		Altitude	Dates visited first
	W (Deg_Min)	N (Deg_Min)		
Base Camp	141 08.722	60 38.908	8,542	06.06.12
Upper Fraser Camp	141 05.821	60 39.377	8,500	15.06.12
Lower Fraser Camp	141 09.673	60 43.785	7,677	20.06.12
Siri Camp	141 02.823	60 44.115	9,372	21.06.12
Camp M99	141 21.561	60 42.449	7,500	25.06.12

Figure 6.16: Table showing the Coordinate locations of all the base camps.

Peaks								
Name	Proposed/Existing name	First Ascent/New Route (to our knowledge)	Route	Coordinates		Altitude	Date Summited	Summited by
				W (Deg_Min)	N (Deg_Min)			
Alopecia Peak	Proposed	FA	South Face	141 10.414	60 40.003	10,213	07.06.12	Sara, Amaud, Sam, Boris
Whale Peak	Proposed	FA	West Face	141 03.973	60 39.803	10,730	09.06.12	Sara, Amaud, Sam, Boris
Ocean Peak	Proposed	FA	"Korzh Colouir" (West Face)	141 04.860	60 39.576	11,050	10.06.12	Sara, Amaud, Sam, Boris
Mount Short	Proposed	2nd, New Route	"Thompson's Route" (North Face)	141 11.318	60 41.321	11,003	16.06.12	Sam, Boris
Eleanor Peak	Proposed	FA	North West Ridge	141 07.992	60 41.649	10,153	17.06.12	Sara, Amaud, Sam, Boris
Bald Top Peak	Existing		West Face, East Ridge	141 09.260	60 41.886	10,273	17.06.12	Sara, Amaud, Sam, Boris
Sam Peak	Proposed	FA	North Face	141 09.360	60 40.226	10,112	18.06.12	Sam, Boris
Boris Peak	Proposed	FA	West Ridge	141 08.310	60 40.372	10,223	18.06.12	Sam, Boris
Cantaloupe Island Peak	Proposed	FA	South Face	141 07.032	60 41.343	11,350	18.06.12	Sara, Amaud
Siris Peak	Existing	New Route	"Imperial Gully" (South West Face)	141 00.828	60 44.049	12,109	22.06.12	Sam, Boris
Flying Peak		2nd, New Route	Ascent: "Inception" (South Face), Descent: NW ridge	141 06.120	60 43.500	11,330	22.06.12	Sara, Amaud
Mount Crystal	Proposed	FA	East Face	141 11.357	60 45.866	9,639	24.06.12	Amaud, Boris
Forgotten Peak	Proposed	FA	East Ridge	141 06.753	60 40.193	10,985	02.07.12	Amaud, Boris

Figure 6.17: Table showing all the coordinate locations and information of all the Peaks Climbed

6.2 Navigation

Navigation was not a problem most of the time. We took two GPS devices and had accurate maps. We also used snow wands to mark out each camp in case of a white out.

We rarely ventured out when the weather was in white out conditions. However, given the unpredictable weather, we were sometimes caught in a white out. The GPS devices we used (Garmin etrex) were very good and made accurate waypoints. In general, navigation was straightforward.

6.3 Weather

The weather was extremely mixed over the course of the 31 days we spent on the glacier. This was mainly due to the maritime weather system that operated in the area. Half of the days we spent on glacier had high pressure and clear skies, the other half were poor and accompanied with snow and high winds.

We had updates on fronts approaching via satellite communications and could generally plan accordingly. High or low pressure would stay for around three to four days before a new front would come in. The longest period of sustained high pressure was four days. This was similar for low pressure.

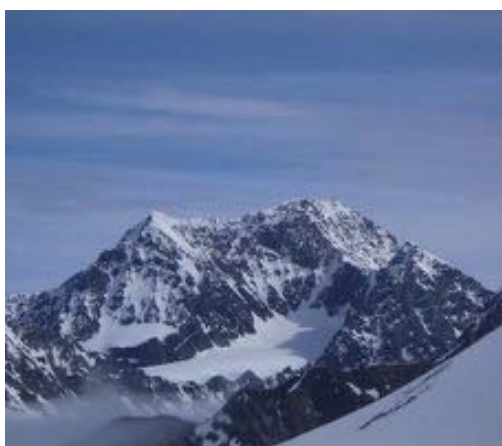
We had occasional 20 cm dumps of snow over night. When followed by a warm spell this made certain slopes highly avalanche prone and we heard several naturally triggered avalanches.

The maximum wind speed we experienced was around 50 mph. In general, aside from on the ridges, the wind did not pose a problem.

6.4 Future Potential

We identified a number of unclimbed faces and peaks that could form part of a future expedition to the area.

- **M-85 (10, 251 ft)** - This was the most northern of the main surrounding peaks. We came close to it climbing Mount Crystal and had a good view of the various ascent and descent lines. The most obvious route takes the South-East ridge to the summit, which would be climbable with skis (boot packing). There appeared to be a descent down the north side for an alternative route, which would be skiable. There were several climbable gullies going straight up to the summit of M-85 from the south side that appeared to have relatively little objective danger. See figure 6.18.



(a) M-85 Overview



(b) M-85 Suggested Face

Figure 6.18: M-85 Peak, South face and possible line

- **Mount Hope (11,560ft)** - Mount Hope is one of the dominant peaks in the area and although it has already been climbed via the easiest but longest route (following the western ridge starting from the Fraser Glacier) it still offers some more technical unclimbed routes. Below two of the most appealing ones.

The North Face - This would be a 'real' undertaking. Parts of North Face are covered in seracs and there was a lot of snow on the face. However, there were some climbable lines that lead to the summit. See figure 6.19

The North-West Face - Which offers challenging yet appealing ice lines. See figure 6.19

- **North Ridge of Flight Path Peak (10,930ft)** - The North ridge remains unclimbed and is an iconic feature of the area. It is used as a marker for pilots due to its distinct ridge line. It looks like a 'miniature Matterhorn' and would no doubt be a great route. The only hindrance could be the quality of rock near the top. Where it steepens towards the summit parties would have to do some mixed climbing, perhaps technical in places. The descent would follow the original route up/down the south ridge. See figure 6.20



(a) North Face of Mount Hope

(b) North-West face of Mount Hope

Figure 6.19: Mount Hope possible new lines.



Figure 6.20: Flight Path Peak.

Chapter 7

Skiing

7.0.1 Descents achieved

As pioneers in the Alps stated it, ski touring is the best way to travel the mountain in the winter. June is not quite winter any longer in the northern hemisphere, but at the latitudes encountered in the Wrangells it might as well be. We encountered almost exclusively snow terrain, and skis proved to be a huge asset during travel on the glaciers; to move camp, access routes, and to make rapid descents from mountains. On soft or crusty snow that would break under the pressure of a bare shoe, skis allowed much faster access to all summits and generally saved a lot of time on the way down. Thanks to the skis, the fact that glaciers were enormous, did not cause any problems. Depending on the foreseen difficulty of the mountaineering routes and on whether the ascent and descent routes were identical or whether a traverse was more suitable, skis were either left at the bottom of the mountain or carried on the sides of our backpack. For camp moving days and whilst travelling with pulks, skins under our skis proved to have enough grip to support the backwards traction of the heavy loads, the limit was more our human traction potential! Downhill skiing was also successfully tested with pulks. However, skis were not only used as a tool for approach and descent to carry out regular mountaineering ascents or move camp. We also ascended some of the mountains using ski-touring techniques such. For example, the West Face of Bald Top Peak was ascended completely with skis, whilst on Peak Alopecia, Forgotten Peak and Whale Peak, most of the climb was made with skis on, with the skis coming off only on the final sections. Subsequently, full ski descents of those peaks were completed from the summit. The Wrangells appear to have great potential for ski mountaineering especially when it comes to steep technical descents. We did not fail to understand why Alaska is a world-class destination for freeride skiers!



Figure 7.1: Sam and Sara skiing down BaldTop Peak

7.0.2 Terrain and Snow conditions

The area of the Wrangell mountains that we explored is mainly composed of large glaciers which are not very steep. Mid sized mountains emerge alongside the glaciers, most of which are steeper than those one is used to in the Alps, on average. This makes ski touring very easy and fast on the large glaciers, however these are often heavily crevassed. Whereas skiing the actual mountains can prove very challenging and technical: steep



Figure 7.2: Boris Skiing

couloirs are often encountered. Snow conditions that we came across were often similar to those encountered in the European Alps at the beginning of spring, except that most of the time the snow layer was much thicker. Bad weather was quite frequent, and over the duration of our stay in snowed between eight to ten times. However, most of the time the quantities of fresh snow were quite small. Usually it is considered that a few days after a snowfall, a high number of small layers of snow are more dangerous than one big layer because there are more interfaces susceptible to break and give rise to an avalanche. However this is based on winter temperatures, whereas we regularly witnesses temperatures of 5 degrees Celsius above zero. This allowed much faster transformation of the snow and safe skiing conditions. What we were confronted with most of the time, was wet snow conditions. Since nights were so short, these conditions were most frequent after periods of warm weather, comparatively to more southerly ranges: usually, a long clear night after a period of bad weather allows all melted snow to freeze, pack, and turn into a safe and solid layer in the morning. This effect was not so clear in our case.

7.0.3 Future potential

The potential for skiing in the Wrangells for good skiers is infinite. Some of the summits, such as Baldtop peak or Flightpath peak are a 'frequent' destination suggested by Paul Claus for his clients, but virtually everything else, especially if it is technical, has never been done before. Even around the four base camps we operated from, there are a number of steep couloirs that have not been skied yet, especially on west sides, that also offer the advantage of not heating up too much in the morning. Below we present a few examples of nice lines accessible from our different base camps. Additionally, walking to the surrounding valleys can also offer potential great new first ski descents, including less steep slopes.

- **Forgotten peak, West couloir:** Easily accessible from SE ridge, reasonably steep. Abseiling or downclimbing the first few meters may be necessary. See figure 7.3
- **Whale peak, Korzh couloir:** Still to be skied! 45/50 degrees on the top part. Needs good snow pack to ski the top part. Major descent.
- **West couloirs of Eleanor peak, and all couloirs starting from its south ridge.** Excellent-looking steep descents, substantial exposition for a direct descent from Eleanor peak. Slopes from the south ridge are steep but less exposed. See figure 7.4
- **Cantaloupe Island peak, West face direct.** The descent starts by a moderately steep but very impressive slope from which the couloir is hidden. 500 meters of 45 degrees skiing lead to the glacier.



Figure 7.3: West Col Forgotten Peak on the background.

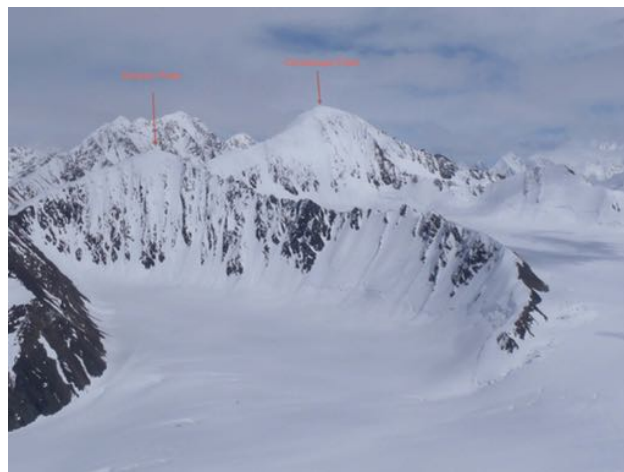


Figure 7.4: West faces of Eleanor peak and Cantaloupe Island peak.

Chapter 8

Equipment and Campcraft

8.1 Climbing Equipment

Aside from the essentials such as harness, helmet, ice axes (pair), crampons, half ropes the selection of climbing equipment carried depended ultimately on the inspection of the routes encountered. Most of the chosen routes took snow and ice lines, due to the generally poor nature of the rock encountered. Ice-screws were used extensively. Black Diamond supplied a large amount of climbing equipment for the expedition, such as ice axes (Fusion), crampons (Cyborg), ice screws (Express) and cams (Camalot C3 and C4), all of which performed to the highest standard. All of the climbing was done in rope teams of two, using half ropes.

8.2 Ski Equipment

We used mid-fat (82mm) but very light (1250g each) skis from ZAG. Wide skis are becoming trendy even for ski touring today and allow better ski in difficult snow conditions. The ZAG-ski company was founded by a snowboarder and the first ZAG skis were already wide and based on snowboard designs. The company has always been oriented on freeride skis, that have a longer than usual tip, and are easy to maneuver. Today the company also manufactures touring skis in the same spirit.



Figure 8.1: Zag Thor Skis

We used Dynafit-style bindings, which are the one and only standard for touring and freeski today. Given that the Dynafit patent for front pins and heelers has now gone public, a number of alternative brands offer similar products. PLUM is a small French company that produces modern-style bindings that are light and versatile but robust. They are the same weight as standard Dynafits (TLT Speed) but more robust. Skins are another essential piece of gear. They allow walking uphill with skis without sliding back. We used High Trail skins which were sold together with the ZAG skis. Ski crampons are very useful in icy-snow traverses. We did not use them much during the trip, as this type of condition was only encountered a couple of times.



Figure 8.2: Using the Zag Skis

8.3 Glacier Travel



Figure 8.3: Preparing the Pulks

Due to the glaciated nature of much of the terrain, the team always used skis for glacier travel and most of the time roped up with a single half. Each member carried ice screws and some basic crevasse rescue equipment, although thankfully, these were never needed. Finding crevasses was relatively undramatic, with perhaps a ski sinking slightly into the snow at worst. Some members of the team were supplied with Julbo sunglasses as part of the Lyon Award. They found the glasses to be an ergonomic and comfortable fit with supreme UV protection.



Figure 8.4: Glacier Travel

During the relocation of camps, when large amounts of food and equipment had to be transported, the team used plastic pulk sleds which could be attached directly a haul loop of the harness with 6mm cord. These were supplied free of charge by Paul Claus from his lodge. Moving on flat sections was very straightforward, but as soon as the gradient increased even slightly, pulling the "pig" became very difficult. Also, skiing down proved to be a rather amusing challenge. One possible technique involved bringing the pulk along side the skis and holding the cord like a dog leash, whilst a more aggressive approach relied of the requirement to maintain a speed fasted than that of the pulk.

8.4 Clothing

Clothing systems were similar to those used for Alpine climbing, with a layered approach for maximum versatility. Due to the unpredictable and fast changing weather patterns, plenty of insulating and waterproof layers were carried at all times. For drier but colder weather, in which wind chill is a major consideration, down jackets were be used. In particular most of the team used PHD Designs down jackets (Yukon and Alpine Ultra), which are made to the highest quality possible and possess an unmatched warmth to weight ratio. Extremities were kept well protected using mitts/balaclavas, in particular most of the expedition members used Black Diamond gloves, such as the Soloist, Lobster mit and Enforcer.



Figure 8.5: Down Jackets Used, PHD Yukon and PHD Alpine Ultra

The full team was supplied with Quechua Inuit Warm jackets, which were decorated with sponsors logos. The synthetic materials in these jackets preserve their insulating qualities even whilst wet, which made them very practical for use at basecamp and during ski descents. Softshell salopettes were used for leg cover since they are windproof, water resistant and provide excellent insulation. Such trousers normally have an internal gaiter which works well with climbing/ski boots. Woollen leggings were worn as a base layer.

8.5 Boots

The team used ski mountaineering boots for all of the skiing and climbing throughout the expedition. Such boots have a Vibram sole which enables them to be used as climbing boots and they also accept crampons. The main difference from standard ski boots is that they can be switched between a ski mode (stiff) and a walk mode (flexible). The double boot design is ideal for expedition use since it

provides a warm system and it is possible to put the inner boots inside the sleeping bag whilst sleeping, to prevent them from freezing over night. The only issue with such boots is that they can be quite heavy compared to standard mountaineering boots, however, modern boots are becoming significantly lighter. For example, Scarpa Maestrale ski boots, as used by two of the expedition members, weigh about 1.5kg per boot compared to 1.2kg (La Sportiva Spantik). Standard mountaineering boots (La Sportiva Spantik and Batura) were also taken but were only used for walking around base camp, since they are more comfortable compared to ski boots.

8.6 Tents and Sleeping

Two similar 2-man expedition mountain tents were used (Terra-Nova Ultra-Quasar and Super-Quasar). This type of tent is just about large enough to fit all four team members if one is irreparably damaged for some reason. These tents were borrowed from the Imperial College Union Outdoor Club.

PHD designs supplied the sleeping bags for the expedition, specifically the Hispar 500 and 600 versions. Even during night-time temperatures down to -15°C , a comfortable temperature was maintained inside the sleeping bags, in addition they are very light and pack easily. Any thoughts of the cold and miserable weather were immediately forgotten as soon as the team members saw the welcoming, high-loft, sausage shaped, yellow sleeping bag inside the tent!



Figure 8.6: Quasar Tents used to camp on the Glacier and new uses of the skis as structural support for a trap set up as a communal area

For ground insulation each member will use an Exped DownMat which were supplied through the Lyon Award. Such mats lose 3X less heat than regular mats and are extremely comfortable. Whilst sleeping on snow and ice, a lot of condensation collects on the underside of mats and to avoid the downmats getting excessively wet, Thermarest Z-rest mats were also placed underneath them. This proved to be an essential item, since the Z-rests also doubled as seat insulation throughout the time at basecamp.

8.7 Avalanche Rescue Equipment

Since the team spent a lot of time on snow and ice, each member always carried the appropriate avalanche safety equipment. This included an avalanche transceiver, snow shovel and a snow probe. A few of the members borrowed this equipment from the the Exploration Board and the ICU Outdoor Club.

8.8 Communications

Two-way radios were used for communication between the climbing pairs. For communication with the outside world (twitter feed and calls) and Paul Claus, a satellite phone was held at base camp and also taken to the other mobile camps. An Iridium pre-paid SIM card was obtained. To provide flexible charging options a Power Monkey battery was used, which could be charged using a dedicated solar panel. The Satellite phone also had its own solar panel, which meant that the Power Monkey was a back up charging source which would be used during night time or overcast periods. The Power Monkey was also used to charge personal mp3 devices.

For emergency purposes, an EPIRB (emergency position-indicating radio beacon) was taken to assist evacuation in extreme situations. The EPIRB, satellite phone and solar panel were borrowed from the Imperial College Exploration Board.

8.9 Cooking

Whilst at basecamp we used 2 MSR XGK stoves with Coleman liquid fuel, which is often referred to as "white gas", especially in North America. This fuel is highly recommended since it burns very clean and pretty much removes the requirement to clean the stoves after use as would be the case whilst using conventional petrol. These stoves proved to be very reliable and powerful for melting snow and general cooking. We specifically took two stoves of the same model in case we needed to repair them, however this was not an issue. The stoves were purchased at AMH in Anchorage, where the staff were extremely helpful. This method of cooking was used for a total of 15 days in which time we used up about 3 US gallons of Coleman fuel, although we brought a total of 6 gallons to cover contingency. We brought two large (approximately 10-15 litre) conventional pans, reserving one for melting snow and the other one for cooking, to avoid an unpleasant taste in the water.



Figure 8.7: Cooking at base camp

During the 14 days away from base camp, the only cooking requirement was to melt and boil water for the Mountain House meals and to make tea. For this purpose we used Jetboil Sol stoves with gas canisters. The stoves were supplied through the Lyon Award scheme and proved extremely reliable, efficient and melted snow with unprecedented speed. This meant that we could leave the heavy MSR stoves, liquid fuel and large pans at basecamp, a welcoming prospect when transporting equipment on

pulks. Two jetboils were used, one for each tent and a total of 14 250ml gas canisters were used up. Hence as a rule of thumb we found that when eating Mountain House meals and using Jetboils, one 250ml canister is enough for 2 people for 2 days.



Figure 8.8: Cooking at advanced camps

8.10 Environmental Considerations

We tried to be as environmentally conscious as possible and took all our litter and waste out with us. This was subsequently burnt at Paul Claus' lodge.

Whilst at base camp we also created a lavatory that could be removed on leaving the glacier. All our human waste whilst at base camp was taken out with us and disposed of at Paul Claus' lodge.

Chapter 9

Medicine

9.1 Accident

An accident occurred on the evening of the 22nd of June. It occurred on the final part of the descent of Flying Peak, (60°43.500'N ,141°06.120' W). Sara took a fall and suffered 2 lacerations on the upper thigh caused by an ice-screw cut. No bleeding was present at the time of injury and she was able to safely return to base camp on her own account. First aid treatment was performed upon arrival at base camp. Although the injuries were not life threatening evacuation was considered necessary in order to avoid infection and provide better stitching. Emergency protocol was followed and evacuation took place on the following morning. The evacuation consisted of three parts. The first part was performed by Paul Claus who flew to the Fraser glacier to evacuate the casualty and then drop Sara off in Kennicott where the Ranger's took over the evacuation process. From Kennicott Ranger's Station the insurance as well as Dr. Lorraine Craig (Exploration Board Chair) and the family were contacted to reassure that the casualty was not in a critical situation. The Rangers helped deal with the insurance company and provided the means to go from Kennicott airfield to Anchorage Hospital. A charter flight was needed. This was contracted with Wrangall Air. The flight took 2 hours with a small stop over in Chitina to be able to collect Sara's Passport and some equipment which had been deposited in Paul Claus' air field.

Hospital treatment was received in Anchorage, Providence Hospital, on the 23rd afternoon. The emergency and contingency plans showed good performance when implemented. The rest of the team remained on the glacier until the established pick up date, 5th of July.

No other medical problems occurred.

All team members had Expedition First Aid Qualifications, covering all the basics as well as some more complex scenarios of lifesaving in a remote and mountainous environments. A comprehensive first aid kit was taken that included a main base camp kit and two smaller climbing packs.

An evacuation plan was drawn up prior to departure in case of injury while in the glacier. If good weather was present and there was pilot availability, note that only 1 pilot can fly to the area where the base camp was set.

The team would like to thank the Exploration Board with a very special mention for Dr. Lorraine Craig for their help and support during the evacuation process. We would also like to specially thank Martin Boniek, the pilot from Wrangall Air who, in his own spare time, took Sara to the Hospital waited while the treatment was taking place and then kindly helped Sara finding a suitable place to sleep. There are no words that can describe the kindness and generosity he showed.

Chapter 10

Flora, Fauna and Geology

10.1 Flora

There was no flora. Rocks and Ice only.

10.2 Fauna

We only saw one small Bird. But we did come across 2 traces. After some research upon return we believe that one of the trails corresponded to a Hare, which by the habits description and the location of the traces we think it would be the Alaskan Hare (*Leptus othus*) and the other the traces of an Arctic Fox (*Alopex lagopus*).

All in all, there isn't much visible life at all.



(a) Picture of small black bird



(b) Picture of Hare trace

Figure 10.1: Signs of wild life.

10.3 Geology: Snow and Rock Characteristics

The rock present in the area visited was very choosy, and rock fall was often observed. Accordingly, the team confined its climbing to couloirs and snow routes.

The snow conditions were extremely variable, from good powder to very soft, sticky snow. This was mainly due to the large temperature changes experienced. It should be noted that on the Fraser glacier snow conditions were poorer especially in the afternoon due to the lower altitude at which it is located.

Snow and ice conditions in early hours of the morning or during night time were generally good.

Wind was commonplace, and was usually quite strong, which resulted in very big cornices in all of the ridges, maximal care was and should be taken when near the summits.

Chapter 11

Finance

This section provides a summary of the finances for the expedition.

11.1 Income

The expedition was supported by grants from the following bodies:

Funding Body	Grant Amount (GBP)
MEF	1,650.00
BMC	400.00
Imperial College Explo Board	4,000.00
Old Centralians Trust	2,000.00
The Alpine Club	800.00
Augustine Courtland	250.00
Photonics Academy of Wales	300.00
Eagle Ski Club	300.00
ACMF	500.00
Gino Watkins	2,000.00
Imperial College Insurance	1,461.08
Total	13,661.08

11.2 Expenditure

The following is the summary of the expedition expenditure:

Description	Amount (GBP)
Commercial Flights	2,891.26
Charter Flights	2,849.40
Food	1,153.67
Accommodation during travel	355.83
Ski equipment	2,911.26
Climbing Equipment	3,220.47
Other Equipment	349.47
Team clothing	363.28
Down clothing and sleeping bags	1,395.55
First aid training and supplies	259.24
Sat Phone credit and accessories	864.39
Insurance	2,006.90
Misc	161.80
Total	18,782.52

11.3 Personal Contributions

Personal contributions were calculated on an individual basis, depending on equipment purchased, but were not less than £500 each and totalled the difference between income and expenditure as follows:

Total Expenditure - Total Income = £5121.44

Acknowledgements

The Team would like to thank the Imperial College Exploration Board for their invaluable help, support and advise, especially Dr. Lorraine Craig. We would also like to thank the financial support given to us by the Gino Watkins Memorial Fund, the Old Centralians Trust, the Mount Everest Foundation, the Alpine Club, the Andrew Croft Memorial Fund, the British Mountaineering Council, The Eagle Ski Club, the Photonics Academy of Wales and the Augustine Courtland trust.

A big thank you to all our equipment sponsors: Black Diamond, Go-Pro, PhD, Mountain House, Plum, Zag Skis, Lyon Outdoor, Ptzl, La Sportiva, JetBoil, Julbo, high trail, Exped and Light my Fire.

We would like to thank the IC Obra Vally, IC Reru Vally and IC Svalbard expeditions for their help and advise while planning this adventure. Thanks to David Swinburne, Stuart Howard for their advise on Anchorage hostels and general information on how to plan an expedition to Alaska. We are also indebted to Steve Gruhn for the invaluable information about the climbed and unclimbed mountains in the area visited.

Also we would like to send a very warm thank you to Paul Claus, the Kenicott rangers and specially Martin Boniek for their help and in Sara's evacuation.

Finally, and most importantly, a very especial thank you to Jonathan Phillips, without his invaluable help, advise and expertise as well as his daily weather reports this expedition would have never happened.

Appendix A

Important Locations

Camp Name	Coordinates (West)	Coordinates (North)
Base Camp	141° 08.722	60° 38.908
Upper Fraser Camp	141° 05.821	60° 39.377
Lower Fraser Camp	141° 09.673	60° 43.785
Siri Camp	141° 02.823	60° 44.115
Camp M99	141° 21.561	60° 42.449

Peak Name	Coordinates (West)	Coordinates (North)
Alopecia Peak	141° 10.414	60° 40.003
Whale Peak	141° 03.973	60° 39.803
Ocean Peak	141° 04.860	60° 39.576
Mount Short	141° 11.318	60° 41.321
Eleanor Peak	141° 07.992	60° 41.649
Bald Top Peak	141° 09.260	60° 41.886
Sam Peak	141° 09.360	60° 40.226
Boris Peak	141° 08.310	60° 40.372
Cantaloupe Island Peak	141° 07.032	60° 41.343
Siris Peak	141° 00.828	60° 44.049
Flying Peak	141° 06.120	60° 43.500
Mount Crystal	141° 11.357	60° 45.866
Forgotten Peak	141° 06.753	60° 40.193

Appendix B

Food List

In Anchorage we went to a Costco and bought the bulk of our food for the expedition. This was accompanied by 15 days of Mountain House (freeze dried) evening meals for days spent away from base camp.

Taking a glacial plane into base camp enabled us to take a considerable amount of food with us without being overly constricted by weight.

B.1 Food at base camp

Breakfast

Oats
Peanut Butter
Chocolate Spread
Flat Breads
Maple Syrup

Lunch

Cheese
Salami
Flat Breads / Tortillas

Dinner

Pasta
Rice
Tuna
Salmon (dried)
Various sauces
Various soups
Pre-cooked sausage and bacon
Mayonnaise (lots of)

Tinned fruit
Chocolate
Whiskey

Snacks

Cereal bars

Nuts

Chocolate and sweets

Energy drink (powder)

B.2 Food away from base camp**Breakfast**

Cereal bars

Lunch

Cheese

Salami

Flat Breads / Tortillas

Dinner

Mountain House meals (various)

Mountain House desserts (various)

Snacks

Cereal bars

Nuts

Chocolate and sweets

Energy drink (powder)

We brought the right amount of food for the duration of the expedition, although initially we feared that we might not have enough. On departing we only had an emergency supply of mountain house meals left over. The food was appropriate for the conditions faced and environment. We would not have changed an enormous amount.

Appendix C

Equipment List

C.1 Climbing - per member

Ropes
Harnesses
Screw carabiners
Simple carabiners
Quickdraws
Small slings
Long slings
Ice screws
Ice axes
Crampons
mountaineering boots
Overboots
Ski boots
Skis+bindings
Skins
Ski crampons
Poles
Repair kit (tape, metal wire, holder/pliers, screwdriver...)
File for crampons/axes
Cordelette
Extra small diameter rope for general purpose
Helmet
Avalanche transceivers
Snow probes
Shovels
Shock absorbant slings
Snow anchor
Belay device
Tibloc or similar
Cordelettes for absailing/crevasse rescue
Pitons
Cams/nuts
Glue/skins repair
1 pair extra skins

C.2 Clothes - per member

T shirts
Mountaineering pants
Other warm pants
softshell/jacket
down jacket
Gore tex jacket
Warm pullovers
Socks (many warm ones)
Underwear
Gaiters
Mountaineering gloves
Small gloves
Mittens
Very warm spare gloves
Hat
Sunglasses
Spare sunglasses
Scarf/buff
Ski mask
Normal outfit for travel days
Normal shoes
Sunscrean
Duvet footwear for inside the tent

C.3 Eating

See Appendix B for details

Mountaineering stoves
Fuel
Cooking pots
Bowls for eating
Dehydrated food
Normal food
Insulated bottles
Knives-forks
Lighters
Stove repair kit

C.4 Research and communication

Power Gorilla
Power Sled Kite
Picavet
Go Pro Camera
Tripod stand
Camera protection case
Spare battery
16GB memory card

C.5 Miscellaneous

Backpack (2 different sizes)
First aid kit
Maps and photocopies
Compasses
GPS
Altimeter/watch
Map transparent protector
Solar panel
Satellite phone
Connectors and adapters for different types of batteries
Plastic sleds for pulk system
Rigid tubes for pulk system
Bear proof containers
Bear spray
Flare gun + flares
Air horn
Expedition medicines
Headlamps
Lots of spare batteries for headlamps
Survival blanket
Many very resistant rubbish bags (for thrash but also for storage)
Needle+thread+...
Whistle
Light towels
Stuff to wash ourselves
Toothbrush
Toilet paper
Cameras
Camera batteries
Spare memory cards
Bags for travelling

Tape and treatment for blisters
Ultra thin cordelette for everything
Tissues
Notebook and pencil
Books for bad weather
6mm chord 20m/pers
Pall markers
Stove cleaning kit

C.6 Sleeping

Down mats
Down sleeping bags
Bivybag
Tents
Snow saw
Earplugs
Tarpauline
Down Mat puncture Repair kit

C.7 Repair kit

Duck tape
Metal wire
Super glue
Aroldite
Meltable ski sole+cold fart
Needles+thread
Screwdrivers
Allen keys

C.8 Grouped BD order

Snow saw
2 spare skins
Glue renew transfer (for skins)
Free glide skin care
Ski wax
ClipFix kit (for skins)

Appendix D

Compilation of Pictures From all the summits

This section presents a compilation of pictures taken while in the field including views from all the peaks summited. Figure ?? contains a series of arrows that indicate where the picture was taken from as well as the direction in which it was take. The arrows are numbered, these numbers act as labels lo be able to locate each picture in the subsequent pages.

This is just a selection of what the team feels are the more relevant sections. Thus, more images can be supplied upon demand.

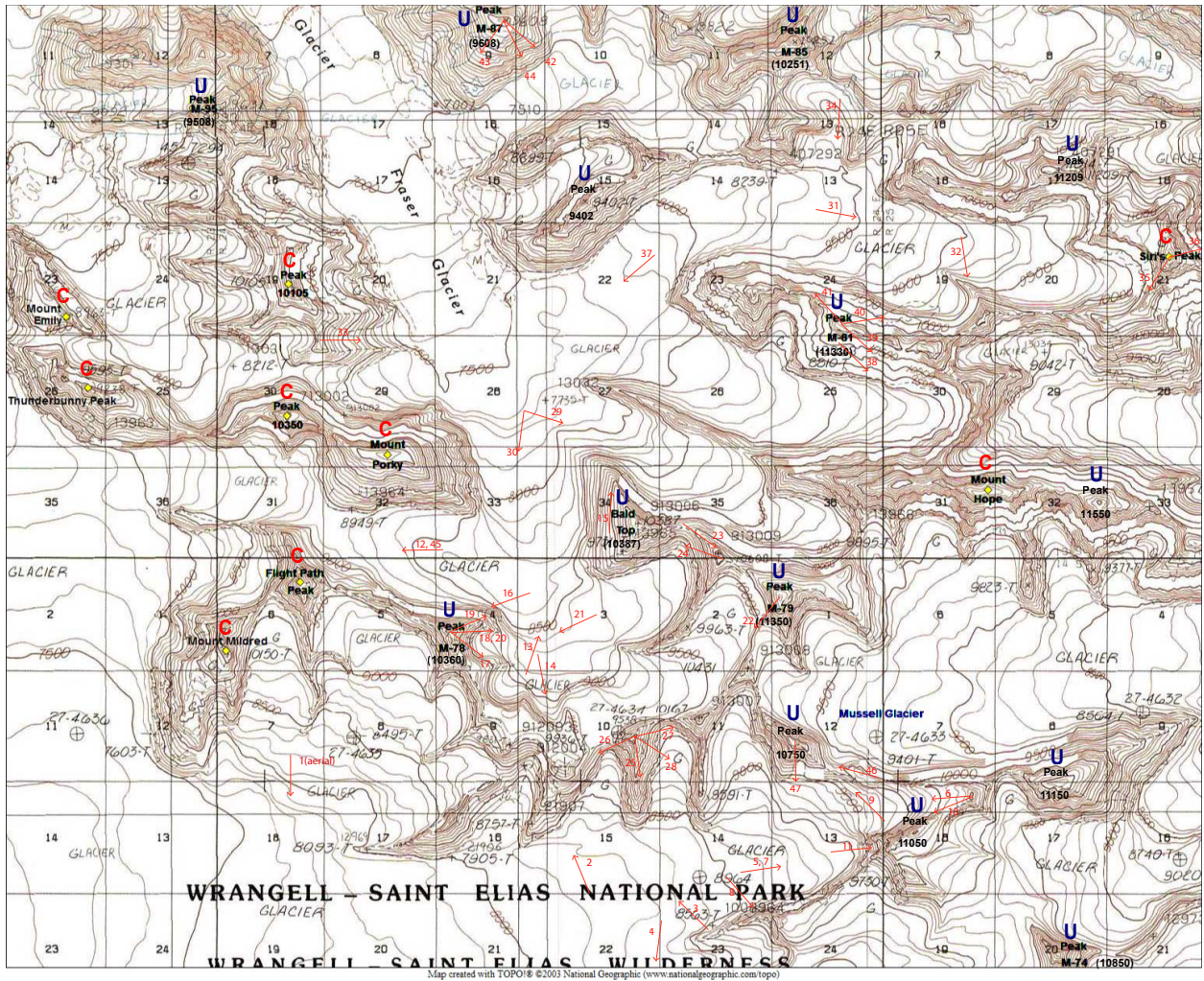


Figure D.1: Map showing the place and direction of the pictures taken.

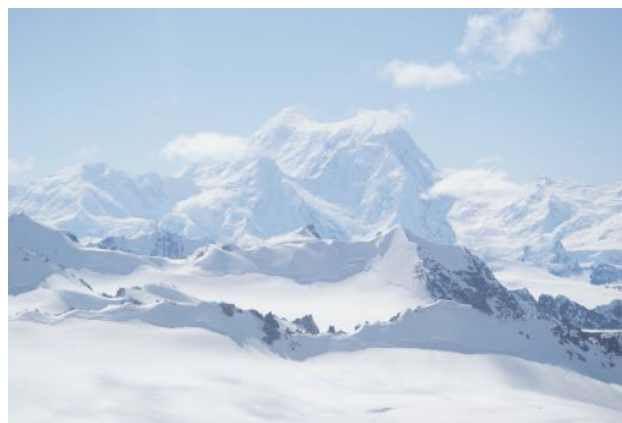


Figure D.2: Picture 1. Mount St. Elias.



Figure D.3: Picture 2. Alopecia Peak Route 1.



Figure D.4: Picture 3. Alopecia Peak Route 2.



Figure D.5: Picture 4. View



Figure D.6: Picture 5. Ocean Peak.



Figure D.7: Picture 6. View.



Figure D.8: Picture 7. Korzh Couloir



Figure D.9: Picture 8. Future Potential.



Figure D.10: Picture 9. Last Peak Route.



Figure D.11: Picture 10. Ocean Peak , way down.



Figure D.12: Picture 11. Bottom Korzh Couloir.



Figure D.13: Picture 12. View.



Figure D.14: Picture 13. View.



Figure D.15: Picture 14. Ski Peak Sara and Arnaud.



Figure D.16: Picture 15. View.



Figure D.17: Picture 16. Mount Short.

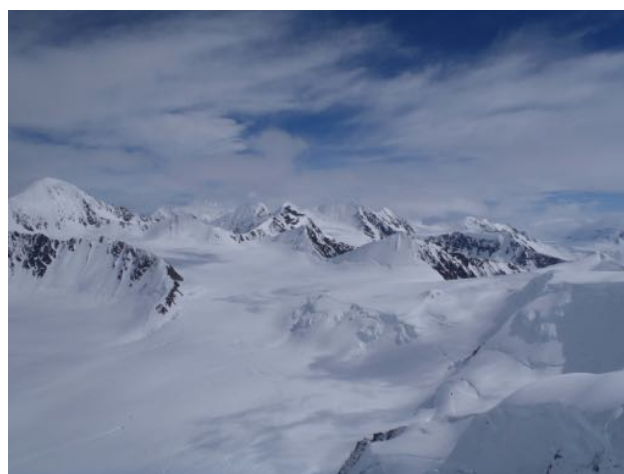


Figure D.18: Picture 17. Upper Fraser.



Figure D.19: Picture 19. M-81 and Siri's Peak



Figure D.20: Picture 20. M-79 (Cantaloupe Island Peak).



Figure D.21: Picture 21. Mount Short Descent.



Figure D.22: Picture 22. Sam Peak and Boris Peak from Cantaloupe Island Peak.



Figure D.23: Picture 23. Baldtop peak from col.



Figure D.24: Picture 24. Baldtop peak from Eleanor Peak.



Figure D.25: Picture 25. View of Main Base Camp from Sam peak.



Figure D.26: Picture 26. Alopecia Peak from Sam Peak.



Figure D.27: Picture 27. Boris Peak from Sam Peak.



Figure D.28: Picture 28. Ocean Peak from Boris Peak.



Figure D.29: Picture 29. Mount Hope.



Figure D.30: Picture 30. Mount Short.



Figure D.31: Picture 31. Siri's Peak.



Figure D.32: Picture 32. View.



Figure D.33: Picture 33. View.



Figure D.34: Picture 34. View.



Figure D.35: Picture 35. Mount Hope from Siri's Peak.

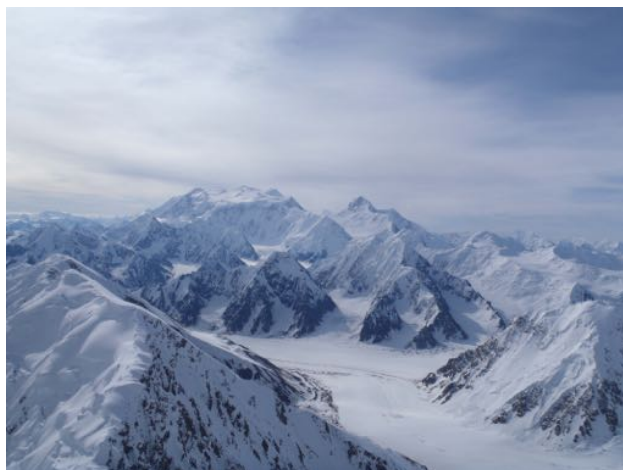


Figure D.36: Picture 36. Next valley from Siri's Peak.



Figure D.37: Picture 37. View.



Figure D.38: Picture 38. View.



Figure D.39: Picture 39. Mount Hope from Flying Peak.



Figure D.40: Picture 40. Siri's Peak from Flying Peak.



Figure D.41: Picture 41. M-87 from Flying Peak.



Figure D.42: Picture 42. Descent from Flying peak



Figure D.43: Picture 43. View.

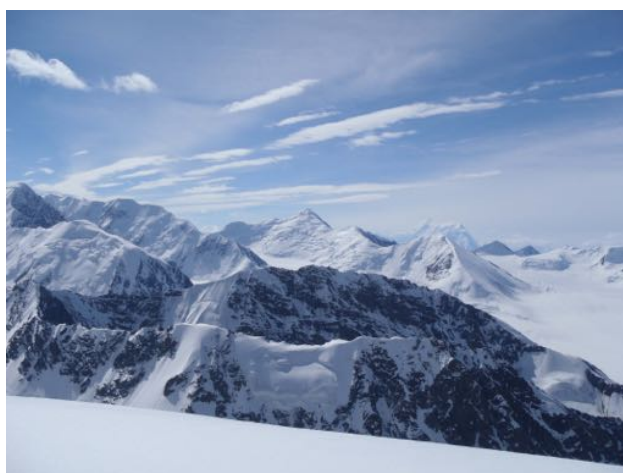


Figure D.44: Picture 44. View.



Figure D.45: Picture 45. View.



Figure D.46: Picture 46. Last Peak.



Figure D.47: Picture 47. Mount St. Elias from Last Peak.