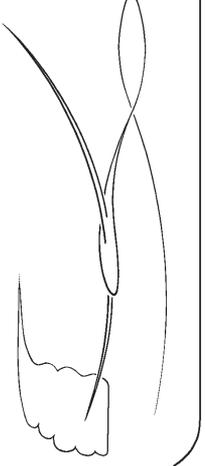


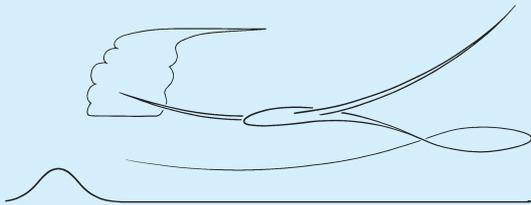
AScent

the journal of the Alberta Soaring Council



2019 Season

ASCent *the 2019 season*



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Cover

Saturday, 13 July, a beautiful cu nim lights up the sky at Cu Nim.

photo: Ben Hornett

Our pre-solstice 1000 km

Marta Wojnarowska, Cu Nim

Five days before my return from Poland, Chester announced over the phone – “Sunday, Monday, Tuesday, and Thursday” look good for flying. Surprisingly, and luckily for me, this long-term forecast held. On Thursday, 20 December 2018, a day before the winter solstice, with less than 8 hours of daylight, Chester and I flew 1,050.84 km for 7.3 hours in our Arcus M. This was a record flight for me (by far), and just 1.4 km short of Chester and Gerald’s personal best, set earlier this fall. This is my recounting of the day.

WE AROSE AT 5 AM, Chester immediately checking the forecast skew-T’s wind speed, direction, humidity, altitude of forming clouds... at different locations, every hour of the day. Verdict – green light – we were going. Time to put on a diaper...actually a double diaper – this is the ticket to fly.

We reached Cu Nim still in darkness. While Chester opened the hangar and started fueling the Arcus, I was adding more clothes layers, putting a parachute on, getting familiar with the flight computer, and straps – making sure I can get into the glider fast. With -7C outside, we needed to minimize the time between taking the glider out of the hangar and the takeoff to reduce icing of the glider’s wings (due to temperature difference between the hangar and outdoors). I certainly was not going to be a bottleneck – familiarity and readiness were the key.

At 8:06 am in the twilight, we were in the glider taking off. It was my third time in Arcus M – I like taking off in it – it is such a freeing experience. Unlike a classic glider there is no towplane to follow, and despite the frozen ground, the Arcus rose up gently. However, I was thankful for the ear muffs – motorgliders are so much louder during take-off.

With the sun rising behind us we headed west to the mountains to meet the legendary Rocky Mountains wave. This is the beauty of the Arcus – it can reach places a towplane could not without much difficulty. By the time Chester turned off the engine and retracted the propeller, we were over 11,000 feet.

I’m sitting comfortably in the back seat of the Arcus, in my Polish winter down parka, which I use in the mountains when it gets below -20C. I’m happy to wear an extra pair of long johns under my warmest ski pants, and two sets of *Hot Paws* in my winter boots. I am waiting to get cold but never do, although having down pants and a bit warmer feet would have made it just perfect.

The noise of the engine reminds me of a book which inspired me about a decade ago, “Cry of the Kalahari” by

Mark and Delia Owens, a couple who moved to Africa and studied hyenas. Mark eventually bought a plane, and learned how to fly to follow them. I was so impressed – how can anybody learn to fly a plane?! And here we go, my husband flying his very own motorglider, with me sitting behind, waiting for my turn to take the stick, “hunting” for something even more exotic than hyenas – the Rocky Mountain Wave.

The wall of clouds forming over the mountain range is now much closer. I look at the glider’s wings and see some icing. The canopy is starting to fog up. All this makes me really nervous. Time to do something about it. To contain the moisture I start directing my breath into my parka. This is the opposite of what we would do during winter camping, where the most important thing was to protect sleeping bags from getting moist by never breathing inside of them. As a result the inside tent walls would form a thick layer of hoarfrost which had to be scraped. Since scraping the canopy is not allowed, I breathe into my parka. I also open the vent – it brings in cold air, the cabin gets significantly noisier and colder, but the fog clears a moment later.

The rising sun dries out the wings, two out of three terrifying things gone, but clouds remain in sight. Chester confidently says this is great. Clouds show the wave, and it will be much easier to locate it having clouds around, rather than having a blue day as on our previous flight. Nevertheless I am nervous. To occupy my thoughts, I start reflecting on my various experiences in gliding, the very first flight with Wilf, struggle to master towing, first landing with Al Hoar, a fantastic flying week with Allan Wood, first incipient spin with Ab, a rather long spin with Jean Claude, and my only flight with Phil who helped me to stop using my entire body to turn the glider. This bit of diversion made me calmer and now I can focus my attention on the flight, but not ready yet to take the stick.

Meanwhile we are in wave and much, much closer to the mountains than during our previous flight. I could easily recognize Holy Cross, Mt. Head, the east side of Mt. Burns, mountains I scrambled on in the past. We crossed Hwy 40

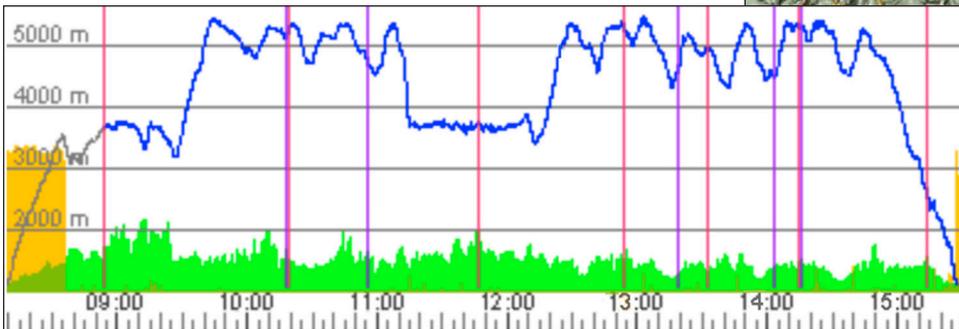
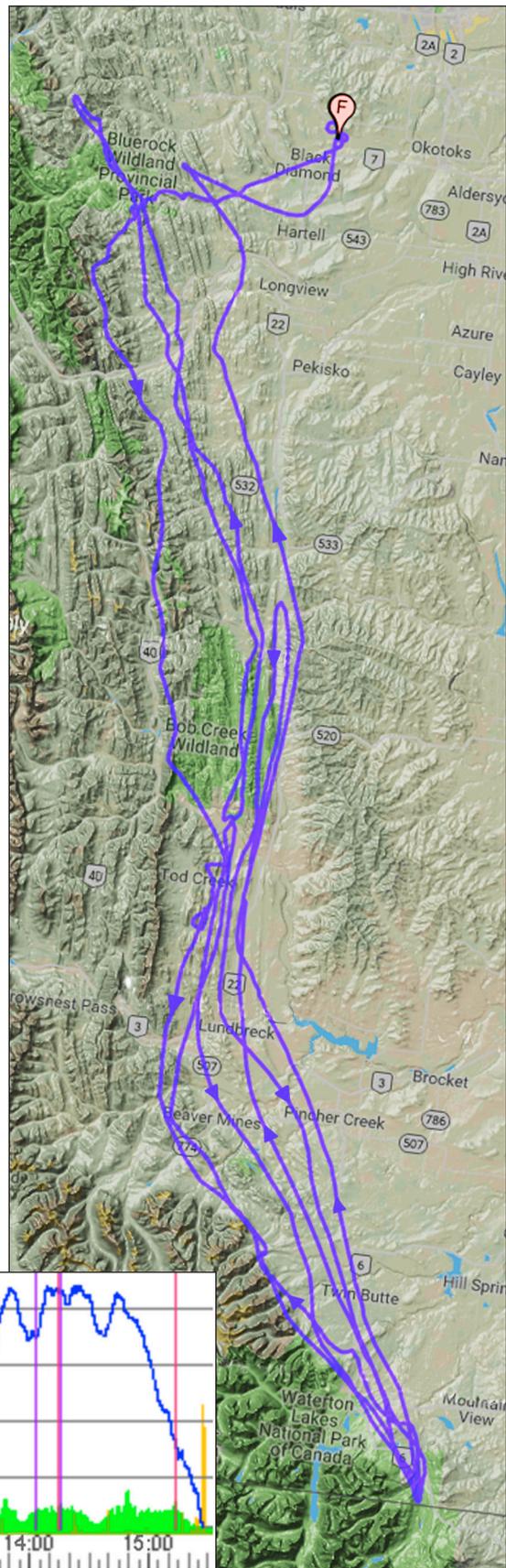
southbound with little effort. Unlike the previous flight, when it took us several tries, this time crossing was a piece of cake, as the wave was continuous at our altitude. A moment later we said good bye to the 12,500 foot airspace restriction. What a relief, now with oxygen we could continue to climb up to 18,000 feet. We crossed the gap, reaching the influence of the Livingstone Range.

Just east of Thunder Mountain, the most northern peak of the Livingstones (which I scrambled solo in the past), the glider seemed to hang motionless. We turned westward, and yet we were not moving forward although we were climbing up at 6 to 8 knots. What a bizarre feeling, just like surfing a kayak on a wave, the ground below us would not move a bit. We stayed in this 'surfing mode' for a while and this is when Chester handed the stick to me, and it was my turn to surf. Amazing, that after such long break, my muscle memory was still strong enough to fly! Thanks to my patient Cu Nim gliding instructors who invested 80 flights in me between 2012 and 2014! Clearly you are amazing as I still remember how to fly!

The clouds towards Waterton looked different, unfamiliar, most likely not promising. Nevertheless Chester decided to explore. He asked for clearance when over Highway 3. What a → 22



Spoilers out to keep the glider below 12,500, with early morning sun casting shadow of Chester's head on the wing. At the center of the photo is Patterson's Peak in the Highwood Range.



the BFFC

A May message from the president of the Bruce Friesen Fan Club

Steve Chihrin and Allendria Brunjes, ESC

SPRING IS HERE AGAIN IN CHIPMAN. The snow has melted, the gliders are rigged, and an eager cadre of pilots look to the skies with renewed aspirations. There has been much talk of cross-country flying with seminars and the introduction of “Proving Grounds” set short courses. But, of course, we cannot talk cross-country without looking to the man Bruce Friesen himself, who needs to prove nothing to no one.

Tony Burton was kind enough to send me a document compiled in 2006 of all prior trophy winners, including the Carling Trophy (a trophy perhaps better named the Tony Burton trophy). A close look would also reveal that, as provincial champion last year, Bruce may be eligible for the Bruce Trophy (that is actually what it is called – not the same Bruce though). Contest expert and prior BFFC contributor Chris Gough is investigating – stay tuned for details. You can read all about Alberta soaring champions of years past here. This month we caught up with Bruce live on location at Chipman airport as he readies his steeds for another record setting season, no doubt.

BFFC *Have you been up to any aviation activities over the winter?*

Yes, indeed, there has been lots of aviation in my life over the winter. With respect to gliding, I got to work on re-finishing the wings of the Austria, my Scarlet Lady. It has been almost 30 years since anything has been done to them, and they are getting pretty ratty looking. I have made good progress on one wing, and that should be painted by the time our Fan Club members read this. One wing? Ya, I know. I blame the cold winter, both in Vancouver and Edmonton. That is my excuse and I am going to stick with it.

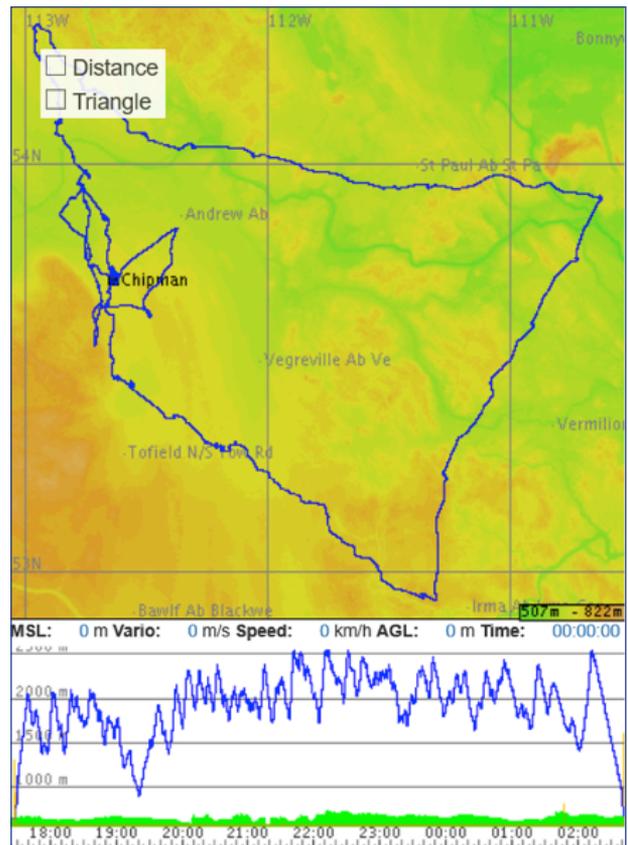
There is a much longer story about my new hangar at Pitt Meadows airport – my new man cave for potential aviation projects and other stuff. The purchase led directly to my flirtation with the Stemme motorglider – I told the hangar vendor I might buy a motorglider and store it there, and he said “do you want to buy mine?” After much excited contemplation of futures, I decided not a Stemme; I would go the route of the ‘elderly gentleman’s runabout’ and placed a deposit on a mini-LAK front electric (FESL) motorglider.

“Aviation” is also the Canadian Museum of Flight at Langley airport, my main ‘work’ since I retired. I had intended to polish old airplanes, but have wound up on the Board, and Librarian. Librarian is a really cool job. When books are donated to the museum, it is my job to put each one in the appropriate pile – artifact, lending library, or resale. Trouble is, it takes a long time to read each book to decide which pile it belongs in. I love old books.

BFFC *At the ASC Annual Meeting last year, you were awarded the 2018 Carling Trophy in recognition of best flight in Alberta. Can you tell us about the flight?*

I was really happy about that flight on 16 June last year. I always enjoy hopping in the old wooden glider, and communing with the sky in a comparatively slow, methodical fashion. It was a pure OLC flight, with no declaration and no intent for a record. Just go and fly. A good score on the OLC is helped immensely by a large triangle, using as much of the day’s soaring as possible. In that case, I visited some of my favourite terrain, heading northwest to plant a first corner of a triangle up there, then turned east, north of the river and south of the bush. Lots of beautiful lakes and stuff.

Early on that second leg, I had a low point. A very low point. It always feels good – nay, be honest, always feels lucky – to climb away from a looming landout. In the past, I have not done very well at that – better in the Discus than the Austria – so doing so on that flight was particularly satisfying. And then the remainder of the flight unfolded so well! East towards Elk Point, south towards Viking, and back. The decisions, of course, are where to turn and how far to press on to plant the furthest corners of a triangle. The triangle was over 429 km, respectable for the Austria. And then some more back and forth at the end of the day.



I confessed to Chris that I had a pretty good notion what was needed to supplant his then-reigning best flight of the year in Canada. My last 'forth' was just enough to squeak past Chris. Held up as best in Alberta, but was pipped at the post for best in Canada by Trevor Florence in his last long flight of the year, late July. I'm still pouting.

BFFC *Looking forward to this season, what are your personal flying goals?*

Hugely interesting this OLC year (October through September) is the outstanding flying being done by Chester Fitchett, flying his self-launching Arcus and contacting wave out of Black Diamond. For many years, pioneers in the use of Alberta wave for cross-country, such as Vaughan Allan and Tim Wood, have gradually increased our knowledge base. Now, Chester has nailed it, and it is so good to see. I encourage all my fan club members to take a look at the flights Chester posted on the OLC.

Last winter it was already clear that Chester would win the 2019 OLC listing with his best six flights. I did think he had left the window open a crack with his best score of 922 from the fall – perhaps a guy could try for the single best flight in Canada. Nope. In April, Chester flew 1224 km, for 1095 points. So, should I be Avis? Try to be #2 by trying harder? Perhaps, but I have chosen to put the emphasis on Canadian records. Well, a guy can dream and scheme, can't he?

I did get excited about doing more contest flying, putting my name down for four contests. In the event, I decided not to take the Austria all the way to Moriarty, New Mexico, for the Low Performance Contest. She is my home girl, even though I wanted to show her off to a bunch of old-glider guys. I was also accepted for the Canadian team for the Pan-American contest at SOSA this August, but decided the week's drive each way and two weeks of probably difficult soaring conditions did not add up for me. So the contest thing is back to my normal lower priority, just the Alberta contest at Cu Nim (missed) and the Region 8 contest at Ephrata.

BFFC *As you know, Jason has been working on developing cross-country training at the club, and new 50/100/150 km suggested triangles are being developed. Of course, beyond 150 km we turn to you! So, for members ready or dreaming of that, what are your preferred directions/routes out of Chipman?*

My favourite choice for flying 300 km out of Chipman for a Gold or Diamond flight remains the out and return to Kitscoty. Up and down the Yellowhead Highway, the navigation is easy, and the retrieve is easy. It may seem a retrieve is a retrieve, but a landing just off our major highway is far less time consuming than the same air distance back in the boonies.

If it is a 300 triangle one wants, for OLC reasons or whatever, I like two choices. First is a 'start on leg' task north to Newbrook, then east to Duvernay Bridge and finally southwest to a point just south of Tofield. I like to go north first,

because it is my observation that overdevelopment, if there is to be any, happens there first. Duvernay is great, because it is right on the correction line – easy to break off and come home. From there, the second half of the route has lots of airports. Although I hate to promote flying 'airport-to-airport,' it is a consideration. Another favourite route of mine is Chipman to Elk Point, then southwest. The 300 km triangle turn on that route is at Viking. If things are going great, the first leg is long enough to support a larger FAI triangle, so one can carry on a bit further.

BFFC *Can you describe a little your mindset/strategy when planning for a flight beyond 150 km?*

Oh, man. Mindset. Frankly, almost always on the morning of, even sitting in the cockpit, I am thinking "Do I really want to do this?" Meaning do I really want to tempt the landout, the long retrieve, the bother to other people, that any longer flight magnifies. Invariably, once in the air, once having tested a couple of thermals and understood the conditions are strong, the "Let's go" impulse sets in, and there are no further doubts. Until, that is, when already well down the track, Mother Nature humbles, and regret mixed with the welcome of a challenge sets in.

Careful study of the weather is an important source of comfort. The strategy is almost totally driven by the fit between the weather and the low hanging fruit on the Canadian records table. And the maximization of triangle length (without undue risk of handout) for OLC flights.

I rely on the math a lot. I am a technically-minded person. I know from experience how fast I can cover the ground; with a bit of adjustment for the expected conditions I can estimate how long I will be out on task. I can remind myself of soaring condition durations, and the times the lift has ended, on days I have seen in the past. With all that, and other factors, I can place comfort in "this is doable" which is for me a huge part of fostering a positive mindset.

BFFC *Can you tell us about a time you turned back from a planned task? Or a time you should have turned back?*

I will choose 'did turn back', thank you! Sounds so much better! Because, I do 'turn back' all the time, although I prefer to portray it as making the best of what nature gives us. Or, 'Indecision is the key to flexibility.' On OLC flights, I am always evaluating what would lead to the highest score, and landing out is definitely not the correct answer to that question. On record attempts, I am always open to defaulting to a good OLC flight rather than a failed record attempt.

One good example I can point to, because my decision is quite visible in the log, was on 6 June 2017. I had planted a first corner of a triangle, rather successfully I felt, south of Camrose, and things were going swimmingly. However, on my second leg, heading for someplace east of Two Hills, the sky off in that direction just did not look great. → 22

Chris' 500

15 May, making the very best of a difficult day

Chris Gough, Cu Nim

JUST BEFORE LAUNCH I asked for Tony Burton's take on the day's weather. He pointed out the converging clouds to the north in a NW to SE direction that indicated an approaching airmass change. The clouds to the east were noticeably lower, darker and more scraggly than to the southwest. I had a task of Taber AP/Waterton Park in my head, a 513 km FAI triangle.

I flew the club's DG-303 for the day. Jos dropped me in a nice thermal off tow at 11:45 and I started heading towards Taber and crossed into the eastern airmass. Cloud base went to around 9000 feet on this leg and I had to put on my sweatshirt. I flew a bit more conservatively keeping between 75-80 kt during the glide. Most thermals were 3-5 kt, although I did have one that averaged 7.6. I stayed high all the way to Taber.

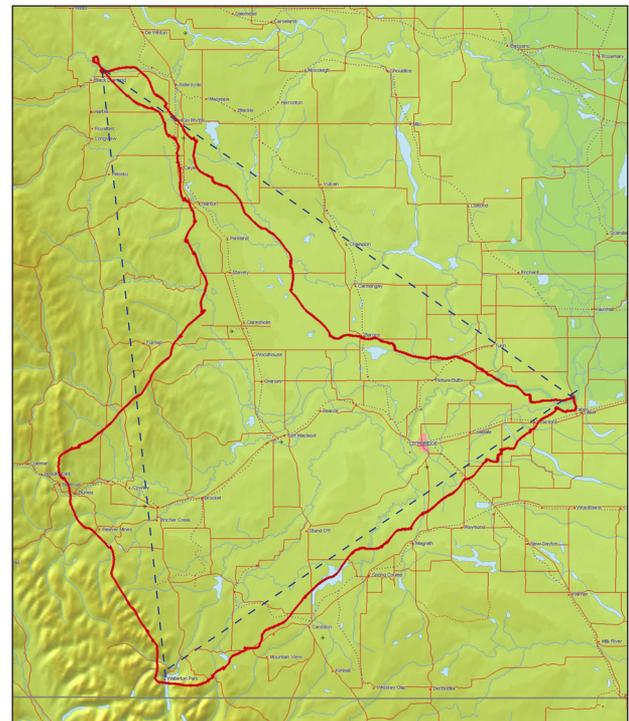
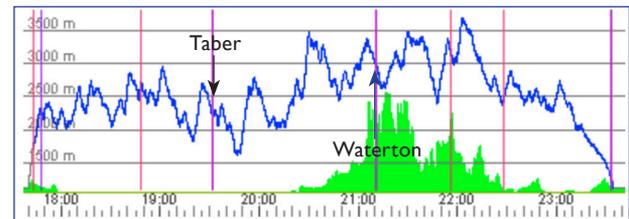
On the way west to Waterton Park the thermals were a bit tougher to work and the wind started changing direction to the NE. I had my lowest point of 5500 ft but in that area I was still around 2500 ft agl. Around Lethbridge I crossed the airmass boundary again to the stronger, higher clouds. I had to take weaker climbs than expected to get high but once above 7000 ft, the thermals picked up. I hit 11,500 ft in this new, warmer airmass and I didn't need my sweatshirt to stay warm any more.

There was a band of high cirrus cutting off the sun to the Waterton Park area. I climbed in good clouds 15 km to the east but then made a 30 km glide around the turnpoint in dead air, then connected with the next cloud street. The streets were running up the edge of the mountains and worked great. I was hoping to fly the mountains all the way home; however, after reaching the Livingstone Range, I noticed the sky to the north getting very dark. I could have headed another 20-30 km north along the mountains in good lift but I knew I would then have to cross unlandable terrain to get through the foothills in a darkening sky. I decided to start heading east right away to stay over landable areas around Cowley and then Claresholm, where the sky looked brighter.

I found good lift crossing east but the cloud base went down to 9000 ft again crossing back into the other airmass. The thermal strength went down to 3 kt until getting to High River where there were virtually no thermals I could center. Cu Nim was completely under a dark overcast and no signs of lift. I had a tight final glide back to the field. The wind had switched again on that leg to almost easterly which gave my final glide a bit of help. I always find final glides with tailwinds uncomfortable because the glide angle is much shallower than what I am used to. In this case, I had

a bit more confidence because I had just been checking out the fields on that path with a couple of Bronze badge students. We found there are surprisingly few on that path because of the rolling hills and many pastures, but I did know exactly where the good ones were. I made it back to Cu Nim at 17:35 with 800 ft to spare, enough height to cross the finish line and make a good circuit.

It was a surprisingly good day especially considering that many pilots decided not to fly. My friend Jay Allardyce from Winnipeg also had a nice flight covering 465 km in his ASW-19. He made it to High River about 25 minutes later than me, could not get final glide and landed there. It is surprising how far you can fly in these conditions. I re-evaluated my options a number of times during the flight including my major deviation east from Cowley to Claresholm which made it a particularly rewarding flight. ❖



the Provincials

Tony Burton, Cu Nim

Day 3, TZ on final glide towards the only strong rain cell in the area, exactly as predicted that morning.

Patrick McMahon

THIS ALBERTA PROVINCIAL SOARING CHAMPIONSHIP was held over the Canada Day long weekend at Cu Nim and was attended with pilots from three clubs eager for a great time. And, for the second time in a row, there were four days of flying! The competition had been planned for the May long weekend with 21 pilots signed up, but rain and cloud was all to be had then – now the soaring forecast looked promising. Only 9 gliders with 13 pilots showed up due to the rescheduling. Casey Brown, Ben Hornett, Steve Dammon, and Seth Thorson each experienced their first contest cross-country flights while being mentored in the DG-1000. Unfortunately, Chris and Rafal Dzwonek had the motor of their Arcus refuse to run and they dropped out.

Day 1 – Friday, 28 June

Al Hoar, Patrick McMahon and I consulted on the weather and tasked the grid with a 1.5 hour minimum Turn Area Task (TAT) with turnpoints at Connemara, Herronton, and Parkland. This allowed the turn circles to be quite close to each other, the concern being that the convections would be weak due to the very wet ground from the previous days of rain.

True – starts didn't begin until about 1400. The day turned out to be a grind, with a SW wind and bits of ratty cu to mark the thermals, although there was the occasional good one to be had. Only half the pilots got around. High River was in everyone's sight as a likely landout spot a lot of the time. I had a huge struggle but landed at 6:48 to the applause of the crowd after a five hour flight, 64 minutes after the previous last landing by John Gruber. My flight trace on the OLC was an utter rat's nest.

That evening I demonstrated in a very eye-opening way the result of not drinking anything like enough water during the

day, and passed out from the resulting dehydration during our tour of the Hard Knox Brewery (quite a delayed reaction) and spent the rest of the evening first with EMS and then at the Black Diamond ER. A sincere "thank you" to all my good and medically expert friends who took care of me. See Trevor's article on page 12.

Al, with Casey Brown in the front seat of the DG, won the day; here is Casey's version of the day:

As a relatively new pilot I was looking forward to seeing how a soaring competition worked. I had no expectation to fly in it, however a couple of days before the start I got a message from the contest organizer who said there might be a spot in the club DG-1000, and would I be interested? Of course I would! And the spot was mine, flying with the experienced Al Hoar; what an opportunity! The forecast was looking promising, with clear sunny skies after a colder and wetter Thursday. There was concern that the rain on Thursday might interfere with the forecast. Due to the uncertainty, a modest task was set with a nominal distance of 181 km and a 1.5 hour minimum.

Al said an interesting thing to me as we buckled in, "We might be landing out today, let's see!" It was only later that this came back to me as one of the things our senior pilots emphasize, that we should always be mentally prepared to land out. Having Al express this out loud, and knowing that he was in the aircraft with me, put me at ease with the idea. I might make a habit of verbalizing this to myself as I venture cross-country.

After launching I was exploring the sky around Cu Nim and getting guidance from Al on what to look for and where we wanted to be at the start time. After some discussion of



Contest Task Turnpoints / Area radius (km)

DAY 1 Connemara - 5 / Herronton - 15 / Parkland - 15

DAY 2 McGregor Dam - 25 / Granum - 10

DAY 3 Herronton - 10 / Parkland - 20

DAY 4 King Ranch - 2 / any TP after that - 2

strategy and given the forecast, Al suggested we might as well start on task as soon as the gate opened.

When the start gate opened we headed out towards the first turnpoint under blue skies. We made a few turns in the first light thermal we hit, but it wasn't very strong. We were down to 2500 agl, and I was taking a close look at fields when we got our first strong thermal where Al had suggested it might be. It carried us up to our max height of the flight at 9700. As we were climbing, FBO joined below us, and the sense increased that this was a competition. As we headed south towards the first turnpoint of Connemara, we found a couple of moderate thermals and were able to add 1000 feet battling a fairly strong headwind. A bit later I saw FBO at the turnpoint while we still had at least 10 km to go. I didn't see FBO again and at one point I said to Al, "I think he must be well ahead of us now." It turns out he'd been reaching for the big cumulus over the turnpoint, but couldn't make it work, and landed out. Al teased me later about thinking we were losing ground when we weren't. Not a bad lesson: fly first and worry about other stuff second (or not at all).

Al wasn't confident about the big cu over the turnpoint or that it was reachable so we just touched the turn cylinder and turned north towards the next turnpoint at Herronton. We were back down at 3000 agl after turning and getting less picky about thermals, still under blue sky. I wasn't getting anything to work, and was starting to feel that we were getting low. Wasn't it a nice option to say, "Hey Al, would you like to try for a while?" So he did, and found us a thermal which started pretty scratchy, but then carried us up, not super strong, but we added 1200 ft before again heading towards the second turnpoint. The path was leading us over Frank Lake, and I asked if we wanted to avoid it. Al agreed but said he often found good lift around its edge, and sure enough we got our second strong thermal of the day, gaining 2900 feet to 9400.

The height let us reach the turnpoint and turn towards the last one at Parkland to the southwest. The wind was reading 18 knots on our flight computers and we were heading directly into it. We stopped for a thermal, but while we were gaining altitude our flight computer said we were losing ground from the strong drift. So forget this thermal, just keep pushing on. Luckily we stumbled into what seemed to be a blue street, and we were able to close most of the distance to the last turnpoint without losing any further altitude. A quick excursion to touch the cylinder and we were ready to work on getting our final glide to the finish.

We headed towards the finish and found a thermal that got us on final glide with a good margin. After that it was just a race back to the finish cylinder. We finished with a distance of 136 km and a task time of just under two hours. We got a low finish penalty (my fault) which I attribute to not allowing sufficient margin for changes in local pressure and perhaps a bit of a sticky altimeter.

Pilot	glider	ID	hdcp	Day 1 (1.5 hr TAT)			Day 2 (1.5 hr TAT)			Day 3 (1.5 hr TAT)			Day 4 (1.5 hr MAT)			total pts									
				speed true	hdcp	pts	speed true	hdcp	pts	speed true	hdcp	pts	speed true	hdcp	pts										
1 Pat McMahon	ASW-19	TZ	0.97	55.4	57.2	129.1	2	546	0	0	248.4	4	564	61.8	63.7	137.6	1	743	88.5	85.8	137.7	3	501	2354	
2 John Gruber	Std. Cirrus	4E	1.00	51.8	51.8	142.4	3	510	53.5	53.5	254.2	2	706	42.5	42.5	121.6	3	511	86.9	86.9	153.7	2	508	2235	
3 ZH Team	Duo Disc.	ZH	0.89	0	0	75.7	5	178	61.8	69.4	253.5	1	814	*52.8	59.3	130.9	2	562	*86.3	76.8	226.4	4	449	2003	
4 NIM Team	DG-1000	IM	0.894	*62.1	69.4	122.0	1	596	49.7	55.7	256.0	3	656	33.1	37.1	105.7	4	399	53.1	47.5	97.8	6	277	1928	
5 Tony Burton	Russia	E2	1.17	^39.7	33.9	173.2	4	387	dnc	0	0	8	0	0	0	45.9	5	158	#83.9	98.2	169.0	1	574	1119	
6 Derek Jones	Discus	LG	0.92	0	0	0	7	0	0	0	221.0	5	508	0	0	0	6	0	0	0	130.5	7	208	716	
7 George Haeh	ASW-27	GH	0.88	0	0	0	7	0	0	0	4.9	7	5	0	0	0	6	0	82.5	72.5	155.3	5	424	429	
8 Ray Troppman	Jantar	BO	1.99	0	0	43.5	6	102	0	0	43.0	6	99	0	0	0	6	0	0	0	0	0	8	0	201
Penalties	# start error			* low finish		^ missed TP																			dnc = did not compete

The day was an unexpected and a wonderful experience. It was great to talk strategy while flying, and to have the opportunity to fly with an experienced pilot. Even the opportunity to pass off control periodically made for a pleasant flight. To fly on a blue day and have all these seemingly simple yet ultimately critical decisions make the difference was amazing to see. Al identified two particular spots to aim for, and those were the two strongest thermals that made the flight. He called it correctly not to battle a headwind towards that nice looking cumulus. He also told me to carry a bit more height into the finish cylinder, and he was right about that too. We reviewed the flight log and talked strategy after the flight, and how different decisions could possibly have improved our score.

When we train to licence it is about the skills to fly and to fly safely. This flight was something outside my training, and I'm thrilled to have had the opportunity to learn this way. I've read some of the books, but it all comes together so much better when you can see and feel it, and discuss it with an experienced pilot. I was happy that in the end the club managed to fly four new (to competition) pilots in the DG-1000 in this competition. Now I'm keen to get more cross-country experience!

Day 2 – Saturday *During the afternoon, Chester Fitchett took student Christian Fernandez on a 4.5 hour, 460 km wave flight down to the US border and back in the Arcus. Also notable was Derek Jones' very first landout after 30 years of flying (it was about time he enjoyed that aspect of our sport). The general consensus was that getting to the McGregor Dam was not too bad, but the into wind course west to Granum was difficult, with just half the field getting around. Here's Gerald's story about winning the day:*

Kerry and I discussed a plan for the perfect contest start. The plan failed miserably, twice. Lift, where you could find it, was cycling quickly. The first time we tried, we dove through the start cylinder but found nothing but sink which seemed to follow us everywhere we went. Kerry and I agreed that the first start was terrible, so we decided to climb back up to 9000 feet and restart. We did that, but found the sink even worse this time. Some contestants had landed back at Cu Nim and were taking their relight, so we decided to head out on course, even though we began our journey low and slow and no one to chase.

Leg 1 The first leg was a downwind to the McGregor Dam, but this direct course line southeast initially looked awfully blue. Cu seem to be popping ahead, so we headed out more or less in the direction of the High River airport. Heading eastwards towards several good looking clouds, we got below 5100 feet before connecting with a thermal that we worked hard. We spent almost 50% of this leg thermaling though not flying very efficiently, but we were drifting in the right direction. As the afternoon developed the thermals became more consistent and we were able to reach cloud base. We averaged 78 km/h on this leg, not

great considering the wind, but also a reflection of the fact that we started the leg low and climbed to over 11,000 by the time we reached the McGregor Dam.

Leg 2 The second leg was upwind into the blue to Granum. There were some nice looking clouds but they ended south of Claresholm, probably due to the wave influence from the strong west wind which was 22-29 knots depending on altitude. Progress was slow and any time we stopped to thermal the backwards drift was very apparent. It became clear that the best approach on this leg was to keep the speed up and only stop for really strong lift. We had only one climb of note which took us from 7700 to 11,300 about half way to Granum. From there we put the nose down and kept going with the real possibility that we would be landing at the Claresholm airport after making the turn. We started the leg at 11,100 and arrived at Granum with 6500. Our average speed of 68 km/h pushing upwind was good because we thermaled less than 30% of time, but we used up 4600 ft of altitude getting there.

Leg 3 Having made the second turnpoint at Granum, we fiddled with the flight computer which told us the altitude we had left was enough for final glide to Claresholm airport, which is the direction we headed. Looking around for anything on the ground which might be generating lift, we noticed a large feedlot south of town which we decided to try, as feedlots often seem to trigger thermals. Down to 5600 over the center of the feedlot we connected with a strong thermal into which we banked steeply – greenhouse gases aren't all bad! We worked this thermal for 15 minutes to 11,800 feet, averaging 413 ft/min over 6200. Again drifted several miles downwind while on the climb, a visible reminder we had to keep moving.

We were back up to cloud base, but given the wind, a long way from final glide. Lots of slow flying while surfing along invisible bands of wave in zero sink, followed by course and speed adjustments when we fell out into sink. We managed to stay high, and made only two stops to thermal until we finally had final glide to Cu Nim. It felt like a long, slow leg, but we stayed high and the flight computer was more or less bang on throughout, so there was little stress. We averaged 66 km/h on this leg – one big climb at the start followed by an hour and a quarter of stretching the glide back home.

In summary, a windy day with strong, elusive thermals and wave influence which favoured the bigger, heavier ships. We tried to be disciplined and only stop for the good lift given the strength of the wind. The leg home was unique in that by staying high we were able to use some of the wave influence to stretch our final glide and avoid having to thermal.

Day 3 – Sunday *Less wind, still mostly blue.*

Patrick's story: The day started early for me to help plan the task for a presumably strong, but not very high soaring day. Then, rig, the pilot meeting, race, then the Canada Day BBQ. The wind was not expected to be the factor it had

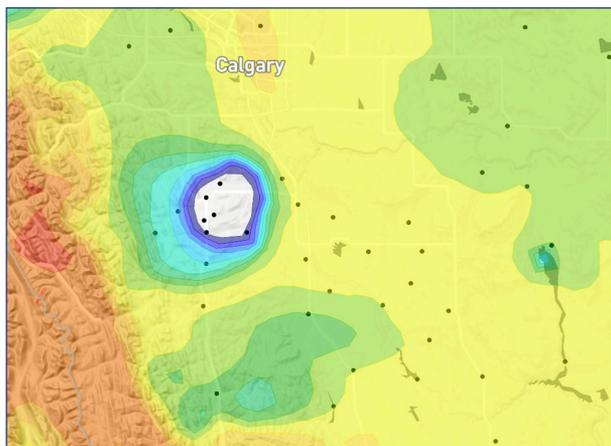
been on previous days – what a relief. The task was short to get everyone home for the party. Lift should be strong, but questionable low cu. A solitary weather cell was forecast to wipe out Longview to Okotoks at 1700 according to the cloud base graphic from Patrick's *Skysight* app (see the graphic). "*Impossible to predict that closely,*" scoffed Tony aloud! But it was right on time as the opening photo shows.

I was in a decent spot to the east of the start cylinder when it looked like LG, NIM and 4E left. I was a bit lower, but chased, expecting that I could make up the altitude with a marked climb. I stuck with 4E, but didn't get much altitude back following him into a weak climb. I went a bit south along Hwy 2 and grabbed a confidence-inspiring thermal to 7600 feet and committed to the first turnpoint, Herronton, about 30 km away. I crossed Hwy 2 and flew like a javelin, but soon felt low and started looking specifically at fields, switching a bit more into survival mode. Eventually, I willed a thermal into existence and it carried me to the high of the day – now 8700 feet ... golden.

I flew for clouds directly on course, but after one or two misses realized that anything you could see was dead already, so I started looking for little enroute wisps. That started to work, but I was losing altitude. I finally connected with the nastiest smelling, and maybe strongest thermal of the day, over a feedlot. I topped up, and pushed on. Surface triggers were better than clouds for defining a course, and I started overflying darker ground into the Parkland turnpoint. I wasn't comfortably high when I arrived at normally booming ol' Nanton within the cylinder – it wasn't booming. I meandered, then started working toward home. I grabbed a couple quick and dirty climbs and had achieved final glide in a nice thermal northwest of High River which I used to make sure I had energy in the tank. The cell which had been booming in the Rockies since the leg to Herronton was now into the foothills and developing as predicted. Air to the east of the cell was thankfully stable or better, and I was able to finish with a quick final glide.

The cell brought shade, but not rain to preface the pig BBQ, which dozens of people attended! It was a great day, which had better conditions than almost any Ontario XC day that I had experienced, probably my required edge three flying days into a competitive event. 141 km at 64 km/h took me from third to first overall for the contest.

Day 4 – Monday *Short, with beautiful cu, at last Finally a forecast of good soaring conditions, and a high cloud base, BUT a solid cold front was descending from the north and would get to us by about 4 pm. A short 1.5 hour Modified Assigned Task (MAT) was set with an earliest possible start and with a mandatory first TP of King Ranch followed by pilot choice TPs. That should get everyone home and sheltered before the weather strikes. The cu began looking good and first launch was around 11:45, but looks were deceiving and several pilots had relights before getting out on course again with good climbs.*



Tony's tale: I had a bit of difficulty finding a good climb in the start circle after my relight so I flew south, climbed, then reentered at 7900 and restarted at 7600 and (I thought) at 13:21. The cu now looked much better on the way to King Ranch, then onwards where I got the first really good one to 10,000 west of High River. There was now a great looking street heading east and off I went, hardly circling. It was wonderful! – 8 kt to 12,200 near Ensign, the same a bit north of Vulcan, then I turned to Vulcan, scooted back to the street and dolphined west to a 5-6 knotter near Blackie. From there I kept flying a bit southwesterly, estimating the best turnpoint before heading home, perhaps Longview. It was clear that I already had a final glide given the conditions, very unusual, given E2's performance.

Tactically thinking, it is much better for the achieved speed to just fly the minimum time on a short task since the final glide time (with the high speed) becomes a significant portion of the whole flight. Doing some mental math – I was now at the Cayley strip – I decided to run straight for home, and finished just 21 seconds under a perfect 1:30 timing. My speed of 98.2 km/h was 11.3 km/h over second place.

However – during my "howidunnit" at the evening presentations, I was surprised when Casey said my task time was actually 13 minutes longer than minimum. I found out later about the rule to stay two minutes in the start circle if one reenters above its top (which I had), so I was timed from my previous exit @#\$%^&*. That was a start rule that no one was made aware of. Hadidunnit correctly and got that 13 minutes back, my scoring speed would have been a lifetime best of 112.7 km/h, and like, "*totally awesome, dude!*"

The last pilot to call in was Derek, with his second(!) ever landout near Longview. Everyone waited anxiously for him to get back with his flight file so the final results could be scored by Casey and announced by Jos. Thanks to the hard work of all the other people who made the contest possible, enjoyable and safe: Chris Gough (contest manager), Jos Jonkers (Contest Director), Al Wood (grid boss), Trevor Finney (safety), All/Tony/Patrick (weather & tasking), Casey Brown (scoring) and all the other helpers. ❖

What must the EMS think?

Dr. Trevor Finney, ESC

THE FIRST DAY OF THE provincial competition was a challenge. The course was not easy and the start was delayed by an hour. At 1400 the start gate opened and everyone was off flying. Activity on the airfield slowed down and we all relaxed. As the day wore on, there was a landout or two who were retrieved. Finally, Tony completed the task, arrived back home an hour after the last finisher after being in the air for over five hours. Little did we know that he had only taken in about 500 ml of fluids since getting up in the morning.

Tony seemed pretty normal when we all went to attend a tour of the local brewery. It was now about two hours after he landed and it was midway through the tour when we noticed that he wasn't looking too good. He was pale and a little "spaced out" and then leaned against some empty kegs and toppled them over. He did not respond to questions, was sweating profusely, then vomited a little. We sat him down and called 911. The EMS techs arrived but Tony had partially recovered by then and could answer questions and was able to walk to the ambulance. After the techs left we still deemed it wise to transport him to the hospital at Black Diamond for a full evaluation for other possible causes. He was diagnosed with dehydration and possible heat exhaustion; the treatment was intravenous rehydration and rest, and he got back to the club at midnight.

Wisely, Tony decided to take the second day of the competition as a rest day. Later he remarked that if you're planning to pass out, it's good to have gliding friends like a doctor and nurse along with you!

Next was Al Hoar. He had spent five hours in the air the second day of the competition and a further four hours flying on the third day. He thought that he had taken sufficient fluids prior to and during the flight. He also finished his flight, had a little to eat with a beer. Soon after that he felt poorly and in trying to reach his RV, he collapsed much as Tony had done two days before. He too was perspiring profusely with a rapid, poor pulse. Once he was laid flat on the clubhouse patio with his feet elevated, he began to recover. The EMT's were called and responded very quickly, but by the time they arrived, Al was conscious and responding well. They assessed him, started him on intravenous fluids and took him to the hospital for further evaluation and treatment.

The doctor diagnosed Al as suffering from dehydration and heat exhaustion. Once again he received the necessary fluids and was discharged. Again wisely, he decided to take the fourth day of the competition as a rest day.

It is important to get yourself well hydrated *prior* to flying, then the water you fly with will *maintain* an adequate hydration level. The common feature to both of these occurrences was long flights with inadequate hydration. We don't realize how much fluid we lose while flying. We must remember that we are in a "greenhouse" environment while strapped in the cockpit. The sun warms us, the flying keeps us concentrating on things other than our hydration state. Add to this the increased altitude at which we are flying. Now have a little alcohol (known to dehydrate) after we land. The sum: heat, insufficient fluid intake, altitude, and finally a little alcohol – is a bad combination.

We must understand that the body is constantly *using* water and constantly *losing* water through breathing, perspiration, renal flow, through metabolizing food, and through taking on alcohol and caffeine. If we do not catch heat exhaustion in time, a more dangerous form of the condition is heat stroke, where sweating is no longer able to control core temperature. This is often fatal. Here are the similarities and differences between:

<i>Dehydration</i>	<i>Heat exhaustion</i>	<i>Heat stroke</i>
Signs/symptoms	Signs/Symptoms	Signs/Symptoms
Fatigue	Pale	Flushed
Confusion	Muscle cramps	
Thirsty	Fatigue	Fatigue
Dry skin	Confusion	Confusion
Dizziness		Hallucinations
Headache	Sweating	Dry skin
Dry mouth	Dizziness	Dizziness
	Headache	Headache
	Nausea & vomiting	Nausea & vomiting
	Fainting	Seizures
Dry skin	Skin cool & damp	Skin hot & dry
Rapid pulse	Rapid pulse	Rapid pulse
	Rapid shallow breath	Rapid shallow breath
Decreased urine o/p	Decreased urine o/p	Decreased urine o/p

Management Preventative measures first, but then shade, cool patient, give fluids. If in doubt call 911.

Prevention Hydrate using water and sports drinks. Reduce exercise in hottest part of the day. Wear light, loose clothing – wicking fabrics. Use sunscreen. Wear a hat with a brim. Feeling poorly? go to a cool shady spot. No alcohol or caffeine-containing drinks.

The most important takeaway point – BE ON THE LOOKOUT FOR YOUR FRIENDS – they may not be aware that they are entering the heat exhaustion stage, and heat stroke is potentially fatal. If *you* feel poorly, TELL SOMEONE, so that they can look after you. Can you imagine what could have happened if either of our two pilots had got as far as their trailers/RV, then collapsed inside? We need to prevent that. ❖



Au revoir

ON THE AFTERNOON of Friday 26 July, two of our friends perished during a routine instructional flight focused on returning young Adam Leinweber (18) to solo status, guided by former CFI, Allan Wood (68). This was a devastating loss for Cu Nim, with sympathy and empathy arriving from clubs across Canada and from other glider pilots around the world.

It was an unthinkable outcome with experienced hands at the controls of the towplane and the glider. Following release from tow, somehow the K21 and the towplane collided – the glider crashing with instant loss of life, while the damaged towplane was piloted safely back to the airfield. The next day a National Safety Board team arrived to conduct the investigation, and the Cowley summer camp, planned to begin that day, was cancelled.

That Sunday evening there was a large gathering of current and past club members, family, friends, and pilots from other clubs to share their sorrow and reflect on the fate of lost comrades and observe a moment of silence. Personal remembrances of Al and Adam were shared – it was a sober but deeply appreciated event, particularly by Adam's parents and Jo Wood, who were present.

At 18 years old, Adam already had great leadership and mentoring skills. He was focused and knew what he wanted in life and worked hard to pursue it. It was terrific to see him join Cu Nim to work toward his goal to be a glider pilot. Considering the effort and determination he put into other areas [like the Air Cadets] he would have been shooting for badges and records in no time.

Carey Fleming

Allan had been one of my main mentors in my aviation journey. I joined the club in 2016 and almost immediately

he introduced me to cross-country flying. He was the one to send me solo, fly my licensing checkflight, and was responsible for much of my Bronze badge mentoring and training.

Julian Li

Adam was a solo pilot and looking towards licensing soon with Cu Nim. He was very competitive, an honors student, Tae Kwon Do 2nd Dan Black Belt and decorated Air Cadet Warrant Officer, he would have made an excellent competition pilot! He will be so missed.

Kerry Stevenson

Allan was a fixture at Cu Nim, along with his wife Jo! She said to me recently that Allan and her always considered they had three homes, one in Calgary, one in Mexico, and one at Cu Nim! Being retired, he spent a lot of time at the field, frequently instructing, doing the odd jobs, and was a voice of reason and safety for so many. He was our CFI for many years and contributed immensely to our club culture in safety and in fun! I loved Allan's sense of humour and we shared a lot of it through the years.

Kerry Stevenson

Since I started flying, you were there to instruct me, advise me and teach me how to be safe and wise. You were one of my two main mentors. I am not sure in this case if the student will become better than the instructor, but I am surely trying.

Pablo Wainstein, CFI

A "Celebration of Life" for Al took place the evening of 7 September at Cu Nim, with some 200 people from all parts of Al's life, including pilots from all clubs in Alberta, even past members of Cu Nim. There was a display and slide show in the hangar, a beautiful tribute and toast from Jo, a flypast and scattering of ashes from the DG-1000 with a cellist accompaniment, food and drink and later, a fireworks finale. It was a perfect, SUPERB goodbye for Al. ❖

Perlan 2

how this 90,000 foot stratospheric glider was developed

Daniel Johnson, from SOARING



photo from tail camera during record 76,000 ft flight

ONE DAY, on a job as the test pilot of yet another stratospheric aircraft, you walk past a bulletin board on which is a lidar image showing atmospheric wave over the mountains of Sweden extending above 80,000 ft. What do you do? Of course, you walk into the office belonging to the bulletin board and have a detailed conversation with the physicist inside about these findings.

Your knowledge of aerodynamics and soaring lets you instantly realize it should be feasible to design a sailplane capable of climbing in that stratospheric wave. Einar Enevoldson is an engineer, test pilot, and glider pilot who was in exactly these circumstances and had exactly this epiphany more than 25 years ago. But being a retired NASA test pilot, he did not have the millions of dollars to bring this vision into reality.

On 2 September 2018, the Perlan 2 glider achieved a pressure altitude of 76,100 ft (that's the altitude that matters aerodynamically, though the lesser GPS altitudes are used for records nowadays).

Why build a bespoke glider for the task? The best answer is that if you want to succeed at any flying challenge, fly an aircraft that is optimized for the task.

- The air is really wispy up there. The "Reynolds number" varies with the density (and viscosity) of the air being flown through. At 100,000 ft, the Rey-

nolds number is bird-like rather than airplane-like. As you climb, the true airspeed begins to approach the speed of sound, and the air wafting over the wings might exceed it – what are you going to do about that?

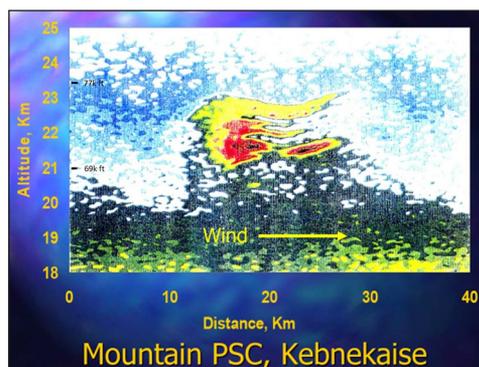
- It's severely cold up there. How will the materials of the glider, the control mechanisms, the avionics, the tire, the sealants, and the windows change their properties at -50 to -85C? How can you find out? Very few materials and completed equipment are tested in such conditions.

- It's really high. How are you going to get there? What is the most common form of lift at each of the altitudes that you must transition? The stratospheric mountain wave

must be connected to the tropospheric mountain wave that we're used to in order to climb in a glider into the stratosphere. Do such connections exist? How are they found?

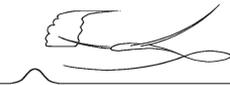
- What's the meteorology? When does stratospheric mountain wave develop? Where in the world do you find it? How can you predict it, so as not to waste effort and money?

- How do you keep the pilot safe? Above about 63,000 ft water turns to warm steam at body temperature, so a pressure suit or pressurized cockpit is essential.



The Bulletin Board image that showed stratospheric wave over Sweden and captured Einar Enevoldson's imagination.

It was anticipated that Perlan 2 would release from tow in mountain wave at mountaintop height, and would have to



climb through the tropopause to the stratosphere. This was the case until August 2018 when Perlan 2 began being towed with the Grob Egrett, a monster 750 HP turboprop aircraft capable of towing above 40,000 ft directly into the stratosphere. This bypassed what was found to be the relatively rare opportunities to transition from mountain to stratospheric wave systems.

Airframe design Obviously, the first step is to try to design a glider that can climb to and be flown in the stratospheric atmosphere. After Einar discovered stratospheric wave, he began a design study, what aeronautical engineers call a “preliminary sizing exercise.” This study concluded that the glider needed to have a wingspan of about 100 feet, aspect ratio of about 30:1, and best glide about 30:1. In about 2001, Einar discovered the *Sparrowhawk* glider at the Tehachapi annual soaring meeting and inspected it carefully. He then knew he’d found the guy who could build this dreamed-of glider – Greg Cole. But it was years before that could begin. When Greg was chosen to build the airplane, he was also given the design task. As he refined the design, he evolved to a shorter wing with a lower aspect ratio than the NASA-Perlan sizing study.

Einar judged that it should be a two-seat aircraft due to the expected high workload, the safety of the redundant pilot, and the need for support systems. Given the expense, complexity, and limitations of pressure suits, he judged that having a pressurized cockpit would be necessary. He had only recently retired from NASA, and was able to persuade someone to write a simulation (which refined the aerodynamics) and NASA engineers seized the opportunity to explore this unusual design challenge.

A test pilot named Helvey happened to have flown a U2 from Fresno, CA into Nevada and back across the Sierras at 60,000 ft in mountain wave conditions. He got the hell beat out of him but lots of data. The most “interesting” 15 miles of this flight was run in the simulator that had been designed for Perlan. This data indicated that +/- 3g would likely be the maximum experienced, so an airframe designed for +/- 8g seemed sufficient.

In the quarter-century since then, atmospheric modeling has advanced greatly. The Perlan meteorologist, Dr. Elizabeth Austin, notes that we have much better analysis input data and much better computing power to get to much higher resolutions.

In about 1999, Einar pitched the construction to a fellow glider pilot who had a bankroll, Steve Fossett. Steve preferred that they first obtain and modify a commercial glider (a DG) and fly in pressure suits to assess the feasibility of stratospheric flights before building a bespoke glider.

The next step was to determine where in the world they might most likely find stratospheric wave. This requires finding a location where the polar night jet crosses mountains at a favorable angle. The first three seasons, they flew from New Zealand and mainly found that the conditions did not quite meet their need. “Looking back,” Einar notes, “it

seems likely that we missed at least one chance in NZ, because we didn’t understand the configuration of the stratospheric wave.” They then changed to the Andes, and flew from El Calafate, the southernmost reasonable airport. The first season there, they failed to reach the stratosphere, but in the second season, in 2006, they reached 51,500 ft. This proved the concept, and demonstrated no loss of climb with increasing altitude, an important requirement to be able to go higher. Steve Fossett then agreed to build Perlan 2, on which Einar had been working for at least a decade.

Airfoil design Prof. Dr. Richard Eppler, of Universität Stuttgart, decades ago developed computer code that directly connects the boundary-layer development and the pressure distribution. Dan Somers, a student of Eppler and founder of Airfoils, Inc., was engaged to begin airfoil design studies.

Airfoil design challenges There are several special challenges to airfoil design for even slow flight in the stratosphere. A special challenge is that it must climb well from the traditional maximum towplane altitude – 10,000 ft or so – through the troposphere in mountain wave, then traverse the weak lift of the tropopause in order to connect to stratospheric wave, and then climb in progressively less dense air until the increasing true airspeed begins to converge with the decreasing speed of sound.

Why not try higher? It isn’t clear that it is feasible to build a wing that will climb well at lower altitude, fly well when airflow over the wing is transonic, and also fly safely and effectively when that flow is supersonic, above the transonic altitude. A supersonic wing should be thin and flat while a high-lift, slow-speed wing should be curved and have some thickness.

The design of Perlan 2 was somewhat simplified by designing the airfoil to fly at the same indicated airspeed at all altitudes (Perlan 2 is flown at 48 kt) – cross-country performance was not relevant.

The indicated airspeed is a pressure reading, with dial markings of speed. This is very important because lift is determined by pressure, and the most important speed instrument is therefore indicated airspeed, which is kept constant. True airspeed increases with altitude related mainly to the drop in static pressure.

Mach tuck As the curved airfoil ascends and the true airspeed increases, transonic flow begins to develop over the top of the airfoil. An angle in the airflow develops – a shock wave – which inconveniently moves the center of lift aft. This causes the nose to dip, which increases airspeed. This can develop very quickly, and the nose-dip is irrecoverable, especially if the lift under the horizontal tail has become transonic and shifted strength and location.

The Perlan 2 airfoil will develop transonic flow above 90,000 ft if the wing loading is more than 1 g – which means that straight and level flight is best above 90,000 ft. About 96,000 ft, the flow will be transonic at 1 g, which forms the

“coffin corner” where stall and V_{Ne} meet. (It’s useful to remember that these are theoretical and design considerations – the actual aircraft and the actual conditions have not been tested, and will be somewhat different from theory.)

Pressurized cockpit Steve Fossett, not at first convinced of the need for a pressurized cockpit, asked Einar to borrow pressure suits from NASA, and they agreed, seeing a research benefit. At 50,000 ft in Perlan 1, the suits were so stiff that moving the controls was fatiguing. Above 50,000, Steve’s pressure suit pushed him forward such that the stick could not be pulled fully back. This emphasized that a pressurized cockpit was necessary. (In any case, a specially designed glider was necessary because aerodynamically, the DG was not expected to be able to surpass 70,000 ft). The pilots do not wear backup pressure suits in Perlan 2 because they are prohibitively expensive, must be custom built for each pilot, and require their own maintenance crew on the ground.

The cockpit is double-walled carbon fiber with a foam core. It’s a space capsule: the prototype cockpit was tested to failure, at 23.5 psi. Sea level pressure is 14.7 psi, so Perlan could be maintained at sea level cockpit pressure safely. This is not done because it is unnecessary physiologically, and the inevitable air leakage at seals would shorten endurance. It is pressurized to 8.5 psi – about 18,000 ft altitude, which provides a large safety margin. Cabin air is stored in large SCUBA tanks.

Atmospheric pressures at representative altitudes

Altitude, ft	Temp °F	Press. lb/in ²
0	59	14.7
10,000	23	10.1
20,000	-12	6.76
30,000	-48	4.37
40,000	-70	2.73
50,000	-70	1.69
60,000	-70	1.05
70,000	-67	0.65
80,000	-62	0.41

Why not a canopy? A conventional canopy would require latches to resist a very large pressure load. A sufficient mechanism would be too heavy for the light structure that it served. The preferred solution were two circular hatches, sealed and kept in place by the pressure itself.

One winter in New Zealand, while waiting for wave, Einar got a NZ wooden-glider repair expert to build a mockup of the pressure cabin. They built side hatches and then top hatches in turn, and decided the top entry would work better, to avoid control passes and avoid pilot contortion during entry and exit. They are sized to permit wearing a parachute. In Perlan 2, pilots do not wear parachutes, mostly because actually bailing out above 20,000 ft is more harmful than staying in the cockpit, partly because it’s very difficult to exit Perlan 2 actually wearing a parachute, as was discovered in the first mockup.

Perlan has two rescue chutes: a drogue tail chute to be deployed at high altitudes, and a BRS ballistic chute to be deployed below about 12,000 ft. This is expected to result in a nose-first landing at about 25 km/h if the glider is uncontrollable. A bonus to using the BRS system is that it’s lighter than two parachutes and harnesses.

The round windows date from flights in an ASK-21, in which the canopy was masked and holes cut, with different window arrangements until satisfactory visibility with sturdy structure was feasible.

The visual backup is the tail cameras, with the image displayed on an iPad in each cockpit. In 2018, the forward-looking tail camera consistently failed, but the 360° VIRB was reliable.

The cabin is designed as a two-gas system – a normal atmosphere in the cabin, and closed-loop pure oxygen for the pilots to prevent decompression sickness if cabin pressure is lost. This arrangement conserves oxygen and keeps exhaled moisture out of the cabin. More important, there would be a fire risk as the cabin oxygen ratio rises progressively above 25%.

Aerodynamic challenges After Steve Fossett’s death in September 2007, Einar said to Greg Cole, “Let’s build the glider we really ought to have.” For years Greg worked all his spare time on the nuances of its design. Everything has to work. Meanwhile, they wrote one proposal after another for financing, with little result. Money was difficult to raise.

The mission and the materials drive design. The requirement to be able to climb through the tropopause was the most difficult challenge, because a design for high altitude has decreased climb performance at low altitude. If tows could have been planned to above the tropopause, it would have been possible to use wing profiles that permit higher Mach numbers.

Designing a subsonic aircraft able to fly to 90,000 ft was comparatively straightforward (though very complex). Going to 100,000 ft is a very difficult design challenge because of the expected transonic flows. The pressure at 90,000 ft is 0.25 psi, at 100,000 ft it’s 0.16 psi. As transonic flows develop, shock separation produces loss of control. Perlan was designed to be capable of Mach 0.6-0.65, to create some margin and ensure that the altitude goal of 90,000 ft was feasible. Ultimately, the wing was a blended transitional design with a series of airfoils. Greg Cole states:

Each part of the wing talks to every other part of the wing. The wing design is intended to minimize induced drag and parasitic drag at its relatively slow operating speed (or high coefficient of lift). The planform (chord distribution) combined with twist, geometric, and aerodynamic, are selected to accomplish this. The loop is getting airfoils to work at this design point consistent with structures. As we have pointed out, the Reynolds number (small and ever worse with the small tip chords) and Mach number are not helping us on this plane. So the wing outer area is driven by



these factors and a very important additional one. The low speed behavior of the aircraft (from near stall to stall) is strongly affected by the behavior of the outer wing. The lateral control devices are also located in this outer wing area.

The horizontal tail is very thin in order to be effective at the low Reynolds numbers at 90,000 ft. (At that altitude Perlan is operating with the Reynolds numbers of a bird.) There is a little sweep on the tail surfaces because this reduces the effective Mach number, delaying onset of Mach tuck and making less of a cliff. A T-tail would be unsatisfactory because of the torsional load this puts on the tail boom, increasing the airframe-flutter risk.

Flutter risk The entire aircraft is involved in flutter, with elasticity in all three dimensions, with both bending and twisting motions simultaneously. The control surfaces cannot be fixed, so their mass balance is critical to flutter response.

Flutter is related to the true airspeed – the speed of the molecules of air passing across the surfaces (remember, this varies with both temperature and pressure – density). Flutter occurs when at some point the elastic resonance of the airframe is matched by the harmonics of the turbulence in the flowing air. Because at that point, the turbulence is synchronous with the airframe response, very little force is required to trigger it. And flutter tends to develop abruptly. The flutter true airspeed in Perlan 2 is much higher at high altitude than at lower altitudes, so flutter testing is necessary at each high altitude. As Einar says, “There are no safe rules of thumb.”

Perlan has two measures to decrease this risk. One is massive control surface balance weights. The elevator horns are tungsten, a heavy metal. These actually tend to reduce the stick force, because they are forward of the hinges. The aileron mass balance is increased with small lead torpedoes attached at the hinge points, positioned in front of the hinges. The other is resonance detection. There is a collection of tiny accelerometers in the control surfaces that are monitored for vibration, and a test protocol is flown every few thousand feet in which wing vibrations are introduced briefly and resonant response can be detected.

Meteorological danger At these high altitudes, the thin air can result in odd loss-of-control modes. Stratospheric wave is known to break just as ocean waves do; this is a concern because the vertical velocities are very high and there are no wave-marking clouds there so you discover lift or turbulence only by entering it. The g-stresses at these car-crash velocities are not as great as if the air were dense, but Perlan would get severely banged around, though it’s designed to withstand this extreme turbulence. Yes, the pilots wear crash helmets. No, they have not encountered breaking wave. At altitude, the lift is broad and smooth. Downwind excursions have not been undertaken because of the limited airspace permitted in Argentina, and this helps avoid breaking wave. One of the purposes of having installed a tail-drogue chute is in case a breaking wave

creates loss of control, it can be deployed to prevent a damaging high speed excursion and keep the nose pointed forward. Wave-marking stratospheric clouds are known to exist – mother-of-pearl or “Perlan” clouds – but these are rare and have not been seen during the flights, either from the glider or from the ground.

Handling At low altitude, the lateral stick forces are high. On tow at 70 kt, the controls are heavy. If you find a cockpit video of a take-off, you may notice that the pilot then usually has both hands on the stick. The roll rate is slow and the ship feels somewhat sluggish. In general, Jim Payne says, the handling is like an Open class ship. He mentions the Nimbus 3D as being most like it. The wing loading is pretty light, close to 8.2 lb/ft², so the feel even down low is pretty good.

Stall characteristics are totally benign – we haven’t stalled it above 20,000 ft, but at low altitude, it is just like an ASK-21, with a slight break. With a forward CG, you may end up with the stick full back and mushing.

It’s very stable in a steep bank, no different from an Open class ship. Thermaling has been done only in rotor, which is always less pretty than in a standard smooth-ish thermal.

At high altitudes, the controls get light and the roll rate increases. “Up and away, you’re making small inputs, and Perlan 2 isn’t much different from the ASH-25. Control feel – this year in Argentina, we never saw any turbulence off tow, and up that high, the areas of lift are fairly big, so you don’t have any big transitions, so it’s pretty straight-forward.”

He observes that during the hands-off portion of flight testing there has been some gentle Dutch roll (yaw) with a period of about 4 seconds with a “snaky” motion involving small bank angle changes of <math><10^\circ</math> that has been easily controlled and not evident if either pilot is hands-on. Dutch roll is generally a problem with highly swept wings or high dihedral. As Perlan 2 goes higher, we expect the Dutch roll to have a lower damping ratio and maybe even become unstable. A yaw damper could be added, which would make the oscillations damp out sooner.

To point out the obvious, this ship has never been above 76,100 ft yet, so we really don’t yet know what its aerodynamic and handling qualities are above that.

Jim says Perlan 2 is satisfying to fly rather than “fun” because it’s a challenge – like the F-104, it takes pilot compensation to fly it well.

Why not just go to 90,000 ft? People have asked, “Why did they stop climbing, they were still in good lift.” And Greg Cole asked, “Why not, it’s designed to go there?”

There are two uncertainties. One is that the design is a model, based on assumptions and known aerodynamics. No matter how careful the design, the fact remains that no aircraft has ever flown in these extreme conditions of cold,

rarefied air, and (potential) turbulence. There is no track record of prior successes or known problems.

The Perlan test flight program is very carefully laid out to demonstrate that it handles safely at all design airspeeds and configurations – “expanding the [demonstrated] flight envelope.”

The other uncertainty is how well the as-built glider conforms to the design. This is not merely a matter of measurement and precise mold cutting. It is also related to the behavior of hinges, control rod connections, the elasticity of the soles of the pilots’ boots, the change of structural resonance frequency when the temperature decreases from +5C to -90C, and other physical factors. All these factors can change the handling qualities and stability.

Einar has a great deal of experience in high altitude test flight. He points out that there are always surprises, and they can develop quickly. The flight characteristics of the aircraft are also interdependent with piloting style, though we seldom think about this. For example, in 2006, Einar and Steve Fossett flew together in a modified DG to over 50,000 in a modified DG-1000. This altitude range was not part of the design specification for this aircraft and every high flight in it was a first-experience test flight.

Dutch roll is the tendency of an aircraft to wag its own tail. This is less well damped in a rarified atmosphere. Einar recalls that during the record flight, at one point, Fossett asked to fly. As soon as he took it, the airplane started sashaying around like a tugboat in high seas; Einar then realized that he had been subconsciously compensating without realizing that the phenomenon was occurring.

Perlan 2 is predicted to have an increasing Dutch roll tendency above 70,000 ft. It is impossible to know until it’s flown just how that will change as they go higher. It is known that the damping is negligible; aerodynamic models have indicated that at some altitude it may become dynamically unstable. Possibly uncontrollable Dutch roll is one reason for having a tail drogue chute that can be deployed to keep the glider’s nose pointed forward.

Einar recalls that NASA created a simulator of the Apex unpowered remotely piloted stratospheric sailplane and of his Perlan-concept design. Both showed Dutch roll divergence above about 75,000 ft and that it was marginally controllable. But Perlan 2 is different from each of these – yet how different? Only careful and incremental testing can reveal whether its Dutch roll characteristic is divergent. Should a yaw damper be added as insurance? This is a point of debate: it is added complexity, time, and cost. We can’t know whether it’s necessary without flying high.

Aerodynamic stability analyses have never been done, so it’s possible there are some surprises ahead.

Flight testing protocol For these and other reasons, Perlan 2 has followed a meticulous, incremental, disciplined,

and detailed test-flight protocol. There are two key features of this testing:

- One is flutter evaluation. There are three asymmetric small gyros in the junction between the wingtip extension and the main wing, one for each geometric axis. In a 15 second span, these are run from 1 to 20 Hz, during which time accelerometers in the ailerons send data to a cockpit recorder and telemetered to ground. The analysis evaluates whether resonance has occurred in any axis, at any frequency.
- The other is for handling and stability. For each flight, test points are set, with the glider being flown at selected speeds and altitudes during the flight. These tests of course include spoiler deployments. By this means, the known flight envelope is steadily expanded.

This is not thrilling work, and “success” for the glider is to have delivered no surprises. But it’s important work, for it defines limits within which the glider’s behavior is known.

Acknowledgements

This article was made possible by long discussions with Einar Enevoldson, whose idea this program was; Greg Cole, the designer of the Perlan 2; Morgan Sandercock, the engineer who ensured it endured and its systems functioned; and Jim Payne, Chief Pilot, a career test pilot who knows a great deal more than he lets on.

Other data

Date	Tow FL	GPS Ht (ft)	Pres. FL	Dur (hr)
26 Aug 18	422	60,699	620	5.6
28 Aug 18	402	63,776	638	5.1
2 Sep 18	443	74,298	761	5.1
12 Sep 18	451	60,538	629	3.0

On the 2 September record flight, Jim Payne and Tim Gardner reached a pressure altitude of 76,124 ft (23,203 m), which surpassed the 73,737 ft (22,475 m) attained by Jerry Hoyt on 17 April 1989 in a U2, the highest subsonic flight. A 3 minute video taken inside the cockpit is available at https://video.search.yahoo.com/yhs/search?fr=yhs-pty-pty_extension&hsimp=yhs-pty_extension&hspart=pty&p=perlan+2+glider#id=3&vid=5302d4f01bf06b76a7cbe2beabb77294&action=click

Fuselage	33.33 ft (10.16 m)
Height	7.25 ft (2.21 m)
Wingspan	83.83 ft (25.55 m)
Wing area	263 sq ft (24.4 m ²)
Aspect ratio	27:1
Gross weight	1800 lb (816 kg)
V _{NE}	377 kt TAS (434 mph / 698 km/h) (56 kt indicated)
Ceiling	90,000 ft (27,000 m)



Gone camping

Chester Fitchett, Cu Nim



Chester Fitchett

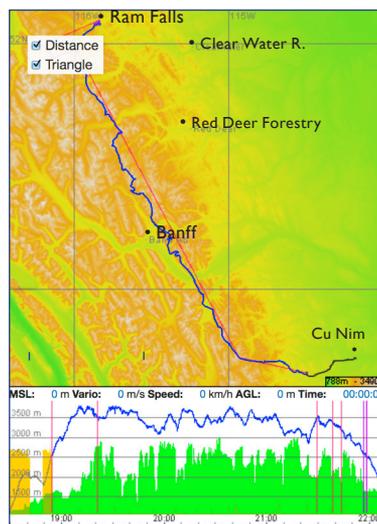
I STARTED THINKING about going camping on Wednesday; hike into a nice lake, chill out for a couple days, that would be perfect. That's the power of self-delusion. Anybody who knows me has figured out that I can chill out for about 90 seconds, and that's a *long* 90 seconds. Friday rolls around, I'm a little bit organized for camping, but my back is sore. Hmm, the soaring forecast in the mountains looks pretty decent.

It takes most of Saturday morning (3 August) to get everything together. I'm deliberately not rushing – at this time of the year there is no point in getting out of bed at 4 am. Thermals take time to start. After launching, a relight is required west of the Turner Valley airstrip to connect with good thermals, and I call Phil to tell him I might not be back today. Ram Falls is a nice stretch for a goal, and is one of a few airstrips that permits me to take off again. It is south of Nordegg along the Hwy 40 forestry road and about 62 km east of Saskatchewan River Crossing.

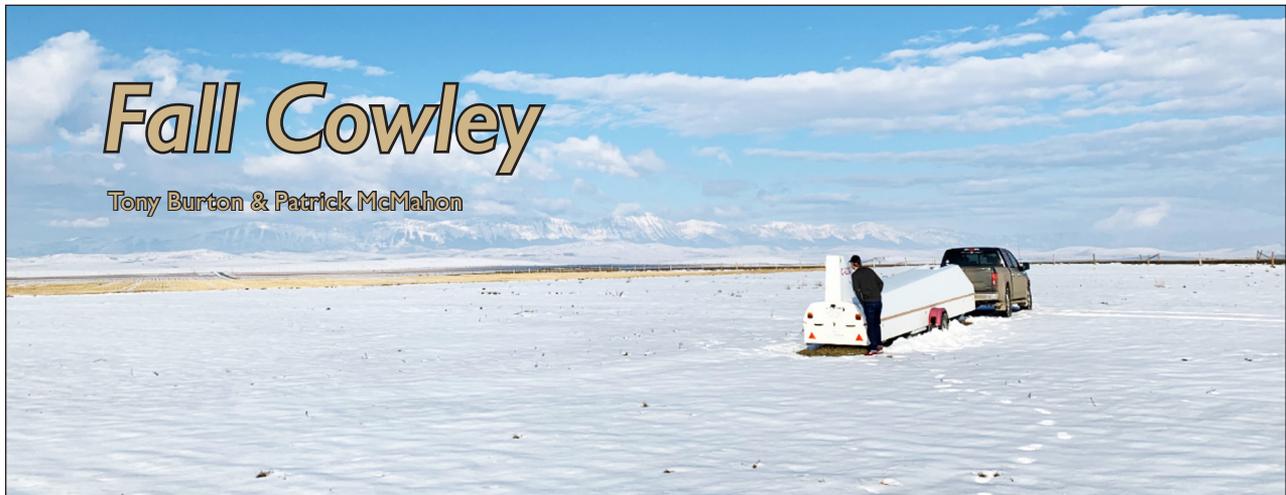
Thermals are strong and narrow, the cores less than 200 feet across. Why am I only getting 300 ft/min in a 900 ft/min netto thermal? I get to 12,500 frequently, but once north of Banff in 18,000 airspace, climbing is a struggle. The country from Mount Lougheed all the way to north of Nordegg is covered by three good strips: Banff, Red Deer and Ram Falls. Clearwater is too far out in the foothills to be much help. Any extra

thought goes into studying the watersheds to make sure I don't fly up a valley if I get low. The glide slope to a strip stays reasonable, I prefer 25:1 or less. After playing around in the Ram Falls watershed for a while I have to admit that the day is dying early.

I arrive over the 4000 foot, 5350 msl airstrip nice and high – lots of time to start doubting my plan. How wide is it? I must have checked, I've seen it from the ground. How long is that truck down there, and how many trucks would it take to span the runway? Landing down a tunnel of trees is not comfortable. Should I start the engine and do a power-on low pass? Eventually, I decide that I have to trust my processes, line up, and land – whew – I've done it!



I wasn't well prepared for camping and had to beg toilet paper from campers, and I'll bring a toothbrush next time. And why am I sleeping in a 1.2 kg tent and eating *Lipton Sidekicks*? With the weight capacity of ZWW, why am I not drinking champagne and eating steak? The frost the next morning was a couple mm thick. Mostly I feel a strong bond with the huge bird that gracefully carried me here, and kept me safe over thousands of kilometres of unlandable terrain with her amazing performance. The return journey feels completely reasonable, the terrain familiar. I look north toward Hinton, and decide that can wait for another day. I need to do more of this. ❖



WELL, AT LEAST we got one day of good flying compared to the completely snowed out camp last year.

Saturday, October 6 Pilots were out at Cu Nim around midday to load up and ship out equipment and aircraft for Cowley. Phil Stade hooked up the O₂ cart and chased Simon who was ferrying down PCK. Patrick McMahon and Ben Hornett grabbed two glider trailers and had a smooth trip down, with two interruptions to stock up with some beer from our friends at Hard Knox Brewing, and to use a drone to film a scene of the convoy down the Hwy 22 Cowboy Trail.

After checking in at the Chapel B&B in the village (it may become a pleasant camp fixture in the future), Ben and Patrick rendezvoused with Pat Pelletier for dinner. Pat (call sign *Peanut*) is now based in Cold Lake after an Exchange Officer tour in Texas and likes the 9 hour drive to Cowley compared to the 14 he once needed from Winnipeg. They talked a lot about oxygen deprivation, testing, experience, wave flying, and also listened to a few awesome stories about being a fighter pilot for good measure.

Sunday The winds were up, but the wave wasn't expected to be delivering. The fleet was rigged. Tony Burton arrived and gave us a lesson on correct use of the ASC oxygen cart, and all club gliders were equipped with charged cylinders, regulators, EDS systems, cannulas and face masks.

Several attempts were made at connecting to the wave early in the day without success. Patrick took Glen from LSC for a flight in the DG-1000 in the late afternoon and connected. Glen had the ride of his life and Patrick had his first taste of wave as PI after a couple earlier P2 flights with Chester Fitchett. Jeremy Bruns chased in GO and satisfied his Gold climb during the flight and had a chance to practise a rapid descent strategy that delivered a 10,000 descent in about four minutes.

Lessons were learned, O₂ was consumed, and after another dinner at Boston Pizza, they went back to the Chapel to join Tony for lots of laughs, old Cowley stories, configuration of flight recorders, and revelry that went on past midnight.

Monday Yippee, good looking wave and a dry field. The forecast was very exciting and the Cowley block was extended to FL350 from the normal 280 by camp manager Geoff Minors. Before the pilot meeting the O₂ was topped up, flight recorders were configured and pilots were ready to do the incredible.

Peanut was first off in his DG-303. He was prepared to get the height record, good since 1981. He needed to reach at least 34,745 feet (1% over the existing value). Too bad it didn't happen – conditions and especially timing is everything, and this time he got to about 23,200 feet after moving back to the secondary over the Porkies.

Tony was up next in E2, and soon made encouraging radio calls that his vario was pegged through much of the first part of the climb from a release at 7000, and was 1500 ft/min. for a short stretch. The strong lift tapered off towards 18,000 and the early fine-looking primary was now much more ragged. The flight topped off at 26,100 feet.

Chris took off in T7 and successfully achieved his missing Diamond climb to almost the exact same height as Tony, finishing off his Diamond badge and joining his father Andy and his grandfather (also an Andy) in achieving the milestone! Ben in the DG-1000 and Jeremy in GO were next, both with informative flights, but not successful on the Diamond attempts.

Patrick strapped into T7 after Chris landed and also used Cu Nim's newest (and oldest ASW-19) glider to achieve his Gold and Diamond gain with a flight to about 26,000. Peter Cromer hopped in next for a flight, but fought most of the



The well-dressed aviator – Patrick on his way to a Diamond.

time, unable to get over the rotor and stayed mostly below 10,000 while the rest of the fleet was derigged in anticipation of tomorrow's inclement weather forecast.

This day, six pilots broke through FL250 and Canada's Diamond mine produced two successful flights for Cu Nim, and one for Bruce from Vancouver.

Tuesday It snowed – about 8" came down with a lot of moisture in it. Just digging out around the vehicles was hard work. It's really going to have to warm up if there is any chance of it melting off by the weekend. The temperature was down to -13 overnight so we won't lose any snow today.

Wednesday With a cool forecast continuing for the next few days and little chance of the snow going quickly, Geoff closed the camp provisionally and confirmed it a couple of days later. ❖

Jeremy's adventures

WHAT A PRIVILEGE IT IS TO FLY AT COWLEY! This past weekend, I blew away my personal bests for wave flight, attaining a max altitude of 20,197 feet and 28,875 over two flights in the DG-303.

The first flight with a climb of 3286 m will qualify for the FAI Gold climb. I took a tow to just about 8300 feet east of the Livingstones late afternoon. I released and started my climb in the primary wave, but neglected to "notch" my flight recorder trace (by adding a short descent) until I got to 9416. The initial climb to 15,000 feet took only about seven minutes, during which I switched over from the cannula style oxygen delivery to a face mask, testing the different modes out. I went in search of other wave sets with no luck and settled in for a slower climb higher.

On the way down, I went eastwards to the secondary, which was a bit further away from the ridge than usual due to the high wind at altitude (wave spacing is proportional to the windspeed). There was little cloud to judge wave location. I practised a rapid descent of about 4000 ft/min that would serve as part of my descent plan from higher altitudes were I to experience symptoms of hypoxia.

Come Monday 7 Oct, we were up early and the wave was really rocking, but I spent the better part of the morning figuring out how to reprogram flight recorders for Ben and me. After launch and a rough tow, I released in fairly strong lift. Significant roll clouds marked the location of the wave and I flew about a half mile into wind to clear the cloud through some rough air. Once beyond, I established myself in strong and smooth lift that briefly reached 3100 ft/min. During this time, I had to increase speed if I wanted to make headway into the wind. Above 23,000, the stability

characteristics of the atmosphere changed as the wind lessened and the outside temperature settled in around -35C. In the sunshine with my heated socks it was quite comfortable up to my peak altitude. I spent about an hour above 18,000 before descending so the next pilot could fly. I noticed a few things and learned a few lessons:

- The wave bands became markedly wider and weaker the higher I went.
- Remember to notch the flight trace for your task attempts!
- Be careful about airspace, especially on the descent!
- The KISS principle applies when attempting badges and altitude. A simple, straightforward flight plan to attain your goal is best.
- It's pretty quiet at 30% atmospheric pressure. That and your ears don't work as well.
- Consistent with my modest experience with flying at high altitudes, focusing on oxygen delivery and breathing was crucial – at least half of my attention was on breathing integrity and minimizing unnecessary movement.
- More high altitude training and equipment might help me be safer at altitude. It's clearly an unforgiving zone.

Flying wave at Fall Cowley was an enthralling and humbling experience. A big thanks to the members of Cu Nim and Cowley who helped make the camp happen; especially Ben, Geoff, and Sheldon and the volunteers with the Alberta Soaring Council like Phil that make it all possible. The community was a real bonus and getting to know Patrick, Tony, Christopher, "Peanut" Patrick, and some of the others better was a real joy! ❖

the pre-solstice 1000 km

from page 4

great feeling not to be required to lose hard-gained elevation. Once the air traffic controller gave us a transponder code, we were set and proceeded south. To the south of Hwy 3 the conditions were not nearly as strong. *“To be expected”,* Chester explained, *“lots of energy is lost here – hence the windmills in the area. However”*– Chester pointed out a cloud in the distance – *“let’s head in this direction, we will catch lift just west of the cloud.”* This happened several times during our flight, we would be losing altitude and Chester would say – *“we’ll catch lift in a moment”,* and sure enough, the lift would magically appear.

We were flying over the Castle area, and I recognized Cloudy Ridge Junior that I climbed solo last August. Soon Waterton Lakes came into view, Sofa Mountain, and the US border. We made sure we did not cross 49° into the States. Then one turn and we headed northbound. The wave shifted significantly to the east. Crossing Hwy 3 again, flying north seemed much faster. To the north, there were much fewer clouds than in the morning. The plan now was to reach Moose Mountain (north of Bragg Creek), but north of Longview the wave became scrappy, and we abandoned the plan north of the Sheep River and turned back south. Chester did not want to overwhelm me with nasty stuff.

The clouds over Waterton looked even weirder this time, nevertheless Chester requested clearance and we tried our luck once more. Surprisingly, this time the wave was much stronger and we started seeing mountains in Glacier National Park with Chief and Divide Mountain dominating the horizon. I texted Sonny, a friend of mine with whom we scrambled on Divide Mountain last May. He knew we started our flight around 8 am, and responded surprised, *“How do you go to the washroom up there?”* *“You don’t.”* was my response, *“and ... you can watch FZWW soaring on www.flyhtradar.com.”* Sonny said, *“This is so cool – I see you over Pincher Creek!”*

We repeated the journey north-south-north one more time. North of Chain Lakes, the sky was completely blue, shortening our third leg to the north by almost 100 km. Around 3 pm, with the day being so short, the wave petering out to the north, and the fact that we were heading to Las Vegas the next morning and we could not risk outlanding, it was time to return. I am amazed how the wave shifted. In the morning lift was over Livingstone Range/Centre Peak – Cowley was visible from afar. On our final leg home the wave was just above the Cowley airstrip!

Flying over Chain Lakes, Chester obtained clearance to descend northbound through Calgary’s Control Area, but preferred to lower the sailplane to 15,000 feet. *“Let’s not overuse the hospitality of ATC.”* Full spoilers, wow! Rather exciting experience – the Arcus drops down at an incredible rate, reaching quickly the desired altitude of 15,000, good enough to comfortably reach Cu Nim. What a luxury

to be in a modern high performance glider with a terrific glide ratio, an amazing moving map display showing our destination with needed gliding ratio, and having ATC clearance.

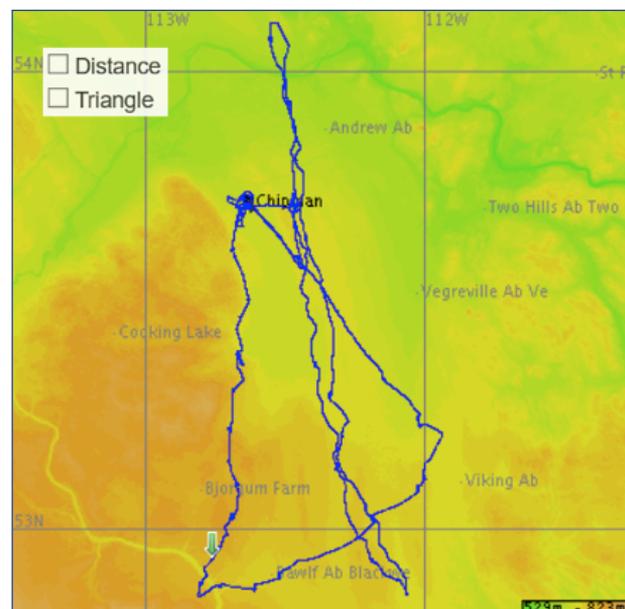
When flying back to Black Diamond we hit strong winds, and reaching Cu Nim was rather rough. The plane felt like a paper airplane thrown about easily in the wind. With the pressure change, the altimeter shifted on us significantly by 400 feet since the morning. Chester disregarded the instrument readings and landed visually. It was good to be on the ground after 7.3 hours in the air.

Matt and his dog Yukon showed up with perfect timing to help us get the Arcus into the hangar. Chester downloaded the flight log: at 1,050.84 kilometres it was the seventh longest flight of the day in the world, the longest in North America, and who knows – maybe the longest ever flight by a couple – still to be confirmed. ❖

the BFFC

from page 6

On the other hand, looking to the northwest, I saw a great cloud street leading straight back to Chipman. I decided the bird in the hand and all that, and took a sharp left turn.



The remainder of the flight, another five hours, saw me roaring up and down that cloud street, at rather respectable speeds for the Austria. In the end, the triangle was comparatively small, less than half the flight distance. But I had used the best air. I had almost certainly maximized my OLC score for the day. ‘Turning back’ was not giving up – although it felt a bit that way at the time. In hindsight, I am pretty pleased with that choice.

BFFC *Thank you again for your time and we look to speaking to you later in the season.* ❖

THE GREAT PILOT HIERARCHY

IT IS A WELL KNOWN FACT that a hierarchy exists among pilots. It crosses international and cultural boundaries and follows strict and logical rules that depend upon the type of aircraft and mission that each pilot flies. Among pilots, this hierarchy is widely recognized and is the chief determinant of status and respect. In an effort to make the details more generally comprehensible, here is the bottom-to-top ranking.

Astronauts Astronauts are at the bottom of the list for their job is quite easy. Not only is their every effort supported by a huge staff down at Mission Control, they don't even do much flying. They spend most of their time just floating around in orbit. Proof of their low status is shown by the small number of people who are willing to become astronauts: just a few dozen in the whole world.

Fighter pilots Fighter pilots only rank slightly above astronauts. They have big powerful engines to get them out of trouble, they are supported by teams of trained mechanics, and their aircraft have many conveniences – radars, missiles, guns – to make the pilot's job easier. Most modern fighter jets are even equipped with computers to help the pilot maintain control.

Other military pilots The aircraft these pilots fly may be more demanding than fighters, but their job is just as simple: drive the aircraft to a site, unload troops or bombs, then turn around and drive home. Like fighter pilots, other military pilots are supported by such an extensive bureaucracy that they have little need to be resourceful.

Airline pilots Their aircraft may be as luxurious and well maintained as those of their military brethren, but their job is somewhat more interesting, for unlike the bomber pilots, the airline pilots actually have to land when they arrive at their destination. Still, these landings are facilitated by such a wide variety of navigational aids that they are not particularly challenging, and can even be done by the computer.

General aviation pilots GA pilots rank ahead of airline pilots for their aircraft are more demanding – in many cases, these aircraft are powered by mere piston engines – they fly in a wider variety of conditions and to a wider variety of destinations. Still, they do use engines.

Sailplane pilots Sailplane pilots usually dispense with engines and depend upon their skills to stay aloft. Their status would be even higher if they didn't make so many compromises in the process. The capabilities these pilots demand of their aircraft – a 50:1 L/D, reclining seats, control surfaces, flight computers – all suggest some lack of commitment to pure flight.

Hang glider/paraglider pilots While there is some controversy as to which of the subspecies ranks the higher, there is no question that hang glider and paraglider pilots do rank at the top of the aviation hierarchy. Disdaining engines, control surfaces, tow vehicles, and the like, these pilots rely upon the power of their own living muscles and brains. Few in numbers because of the demands of their craft, these pilots fly head and shoulders above the rest ... especially if they fly supine! ❖

Sheldon Steinke

our new ASC Executive Director

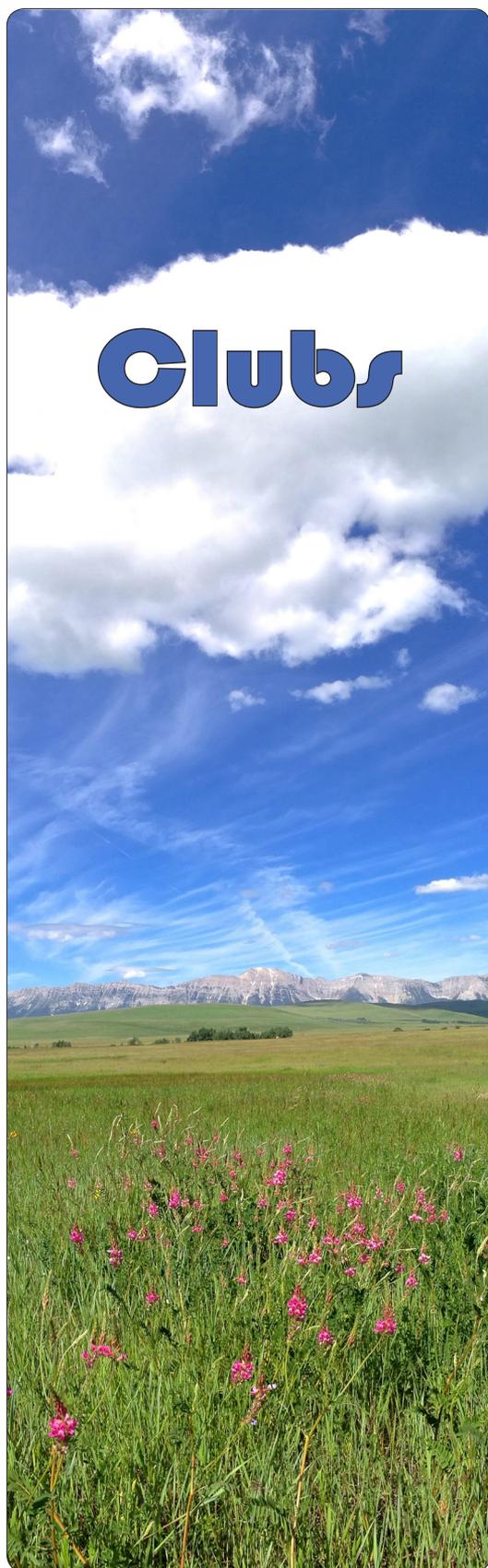
MY CAREER has consisted of two very rewarding concurrent careers, as a Municipal Chief Administrative Officer (CAO) and as a Lieutenant Colonel in the Canadian Armed Forces Reserve. As a CAO I worked with elected officials and staff to provide services within budget guidelines for the residents of the County of Lethbridge and the Town of Coaldale. As an officer in the Canadian Armed Forces I fulfilled the roles of Commanding Officer and Instructor, both in Canada and on international missions. I believe this knowledge and experience base has prepared me to fulfill the tasks of the position of ASC Executive Director.

I wish to express my thanks to the Alberta Soaring Council members for selecting me for the position and I wish to thank Phil Stade for his number of years he has given to the position of Executive Director and a significant contributor to the success of our sport in Alberta and beyond.

THE WINDS AT COWLEY, which make it a premier wave soaring site, took its toll on the LSC hangar. The huge sail of the west wall buckled at the top roof arch in 100 mph winds. We had to make a decision soon, and decided to strengthen the wall with guide wires outside and wooden joists inside. We rented a post pounder and pounded in two pairs of posts to anchor wires going to a high point on the wall. We also bolted 2x6 wood studs to the inside wall to strengthen it. This has given the wall much more rigidity to cope with the famous Cowley wind. All done one day in September by sacrificing a flying day. Big thank you to all who helped. Geoff Minors



Tony Burton



Phil Storde

Cu Nim

The start of our 2019 season began with great enthusiasm and a look forward to achieving some lofty goals. We set our sights on growing our club and our sport with more introductory glider flights, adding more members and ranking our club in the top 3 for OLC cross-country flying in Canada. A number of activities were planned to help us achieve those goals: hosting the Provincial Soaring Championships, a pre-season ground school held at Mount Royal University, promotional events with a local radio station, and a gliding display at the “Wings over Springbank” airshow. Also working with local schools and Air Cadet squadrons in presentations and events, we felt would propel our club and our sport forward.

Unfortunately what promised to be one of our best years ever, turned out to be the most tragic and challenging year in the club’s long history.

The start of our season... Before the snow was off the runway, our CFI Pablo Wainstein organized the ground school. It was well attended with an opportunity to teach our existing students and educate a host of potential students, it was a terrific way to start the year and attract new members.

Unsettled weather affected the momentum of our season, but many pilots were eager to brush up on their skills, and practise for the upcoming Provincial Championships. So there were several cross-country flights early in our year. Some were the spectacular (back before breakfast!) wave flights by Chester Fitchett in his Arcus M, and a few Cu Nim members had the joy of flying with him on these exhilarating excursions. Another Arcus popped up at the field with the father/son team of Chris and Rafal Dzwonek. They are feeling their wings as they get prepared for some spectacular flights!

What comes with expensive new gliders? Three new “T” hangars were hatched under the brilliant design and management of Chester and the workmanship of Gerald Ince, Guy Peasley, and Chris and Rafal. The two “Archi” have a nest as does the Duo Discus ZH.

In March we had an unfortunate land-out accident and lost our ASW-28. We were very thankful the pilot was not injured in the crash. The glider’s safety cockpit did its job and the pilot walked away from the accident. To meet the increased single-seater demand for our members, the club purchased Mark Bowman’s ASW-19, an oldie but goodie, and a beautifully handling sailplane that’s a pleasure to fly.

For the first time ever (or in recent memory) Cu Nim hosted the Provincial Championships and, thanks to Chris Gough our contest director and his team, it was a very successful competition. It was well organized with terrific support from our volunteers within the club, numerous sponsors, special events, and a Canada Day Pig Roast! There was even a tour at the Hard Knocks Brewery, our major sponsor! Eighteen contestants with 8-9 sailplanes competing all four days. For many it was their first contest with Patrick McMahon taking the first place trophy (flying the ASW-19!). Al Hoar and Allan Wood took turns in the DG-1000 to shepherd some pilots in their first cross-country competition flights.



Following the contest, a contingent of our pilots organized a Soaring Safari to Valemount BC to soar over the glacier-filled valleys of the Rockies and around Mount Robson. A few spectacular flights were recorded before poor weather shut down the week. Valemount is a treasure and has to be revisited annually!

Sadly, Cu Nim changed forever on the afternoon of 26 July when we lost promising student Adam Leinweber and senior instructor Allan Wood in an inexplicable mid-air collision between our towplane and the ASK-21. Only God knows how this happened. We may never know the why and how of this accident, however we do know how people responded to this horrible circumstance and we know what these individuals meant to us all...

Cu Nim held a vigil very soon after the accident, attended by over 70 past and present members and friends and family of the fallen pilots. I have never been so proud to be part of this club than on that day when our love was shared and our care for one another was so present. It continued when a large contingent of present and past Cu Nim members attended Adam's funeral, and it continued when Cu Nim hosted a *Celebration of Life* for Allan at the club; it was an incredible event with over 200 of Allan's family, friends, fellow and past members, and pilots from every Alberta club attended to pay their respects and share their love of this man with his family and friends. The outpouring of support came from all across Canada.

The evening featured a table of mementos of Allan, a slideshow of his accomplished life, a moving speech and poetry reading by his wife Jo that left us all in tears, yet strengthened us. With a live cello accompaniment, Allan's ashes were scattered into the western sky from the DG-1000 while the sun was setting. There were words spoken by many of us about the impact he had on our lives, and in the night an incredible fireworks display was a fitting conclusion to the celebration.

I don't think we ever get over the loss of friends like this. I think the pain subsides over time, but their memories, their impact on our lives, stay with us forever. And that's a good thing, their positive influence, Allan's contributions to our club over 18 years and Adam's passion for flying should stay with us. Let it influence us in the enjoyment we experience in our sport and in the caution and preparedness we bring each and every day, to ensure this never happens again. I am so proud of our members both past and present for their love, encouragement and respect during this time. We are Cu Nim strong...

Looking forward, the club has made a deposit on a new ASK-21B to be delivered in the spring of 2020. Our ASK-21 was a solid trainer for us and the executive was unanimous in the decision to purchase another one.

Kerry Stevenson

Central Alberta

In 2019 we started a bit late due to winter. There wasn't much flying to be done at all because of weather with the rain and snow. However, we did have some accomplishments. We had a good number of familiarization flights. We had fewer students this year who continued through the whole season. But we did licence one new pilot this year. As for the private ships, there was less flying this season. However, there were a few good cross-country flights. Membership was down slightly which we attribute to the economy. We also welcomed Jerry Mulder back to the tow pilot roster and me (Leo) to the flying roster after some brief medical issues.

Once again, one of our pilots, Nico Marais, flew his newly refurbished Ka6 and the plane looks fantastic. And one of the highlights of our season regarding aircraft was the maiden flight of Jerry Mulder's TES motorglider. Jerry and John Mulder (there should be a story on this one) have been working on this project for over 11 years and it is a thrill to see Jerry swell with pride when the aircraft takes to the air.

The COPA Western Convention was held at the Innisfail airfield this year. We lost a weekend of flying but many of the club members had volunteered at the event. The convention was deemed a huge success by COPA and the Innisfail Flying Club host, despite the marginal weather. Over 75 aircraft flew in. There was a movie night in the hangar, BBQs, seminars, camping and, of course, the nightly beer gardens where servers wore flight attendants gear and went up and down the aisles with old aircraft serving carts selling their beverages. A fun time had by all.

The other big change this year was Big Sky Dive merging with two other businesses to become Albert Skydive Central and continue their operations with two aircraft. We also had some airspace and radio changes that had a minor effect to the airport this year. These were implemented by NavCanada to accommodate the higher itinerant traffic from all around the Red Deer Airport, but mostly because of the high number of students at Montair. So, if you want an opportunity to sharpen aviation skills, navigation, and communication as well as being conscientious in doing a good lookout, then come on down and spend a day or two flying at Central Alberta Gliding Club. We offer some value-added pilot skill building you don't get to see at very many fields.

Overall the season was successful, and we are looking forward to a fantastic 2020.

Leo Deschamps

Lethbridge

THE LETHBRIDGE SOARING CLUB had an interesting year. We were fortunate to have our club ship, the Grob 103, refurbished over the winter months. Greg Flem-

ing was able to find us a heated hangar to work on it at the Lethbridge airport (thanks to a generous donor). Greg spearheaded the refurbishment with help from our members. We were able to have the upholstery replaced, interior painted, new FLARM installed, instrument panel refitted, new tire, a thorough cleaning, and a list of other items performed. We were excited when it was completed and when we were getting ready to load it in the trailer we had a mishap and the canopy was damaged. This set back our spring flying a few weeks, but fortunately we were able to fly our other club ship (the Schweizer 2-22).

We were also quite busy in the spring with our recruitment drive. We were set up at the Pincher Creek and Crowsnest Pass trade shows. We also had a great response at two presentations at the west side Lethbridge library. Pavan had an excellent presentation to a packed room of interested patrons. We gained four new members including two youth from these events! We also sold some fam flights and saw some excited people get behind the stick for the first time.

Our LSC summer camp was mostly fam flights and training flights. We are fortunate to have a high instructor-to-student ratio at the moment and glad to have good quality instructors. Jeff S. had a personal best flight of 1:20 hours! This was from the winch and he climbed to 9800 feet. The summer camp was cancelled when we lost our friend and colleague Allan and student Adam. On a personal note, I was fortunate to have been introduced to gliding when Allan gave me a ride in the DG-1000 at Cowley during a fall camp some years ago. I remember how professional he was and we flew for over an hour! I was hooked!

We were able to do some work to the hangar and airfield prior to the Fall camp including bracing the end wall which the wind had worked over during last winter (who knew it would get so windy at Cowley). We also replaced some shingles on the outhouses, and the fluid was drained from the toilets which took away the bidet feature! The camp saw a few flights before the snow hit. Bruce M. had an 80 minute flight to over 27,000. Sheldon got his first taste of wave flight (aka "rotor"), I also had a flight into the rotor and hit my head on the canopy. My second flight was smoother with Patrick in the DG-1000 and we got to

21,000. The Livingstone Range was brilliant with all the snow on them and it really made for a memorable flight. George had over 16 hours of flight time this year including a winch launch ending in wave to 18,000. The Grob had 107 flights (12 aero, 95 winch) with 31 hours total time. Our instructors mostly spent their flight time with students and the many familiarization flights this year.

I'm thankful for everyone in our club and their dedication to helping each other. We hope to keep growing and sharing our passion for soaring.

Glen Lowe

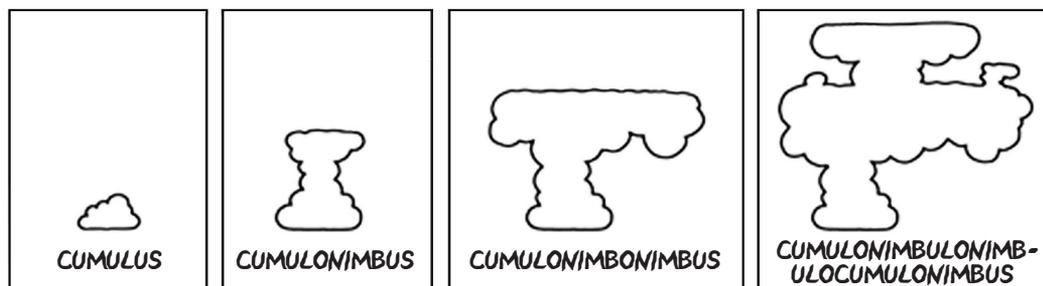
Edmonton

The 2019 season had some challenges, but also some great successes for the ESC. The key challenge was the weather – it was an unusually cold and wet season. Since our field sits on a big layer of clay, it takes a long time for the accumulated rain water to drain away. We lost many flying days because the timing of new rain was often such that the field was not useable even on sunny weekends.

The number of flights was similar to 2018, which was also a poor year. For both years, we're down about 1/3 from the long term annual average. Interestingly, total hours flown are up 22% over 2018, and incidents are down 5%, another very positive trend.

In early August, we had reached a point one weekend where we were prepared to move flying operations to the Vegreville airport, which has a paved runway. As it turned out, we managed to find enough dry spots on our field to operate from. We had a great day with 22 flights, and four gliders with five pilots attempting triangle A of the Proving Grounds program!

This new province-wide initiative was taken up with great enthusiasm by ESC members. We had five pilots complete Triangle 1 (59.3 km), and one completed Triangle 3 (169.3 km). It's a great way to introduce pilots to cross-country flying. Not surprisingly, we did experience an increase in landouts. Which confirms that landing out is a normal part of cross-country soaring!



The rarest cloud is the *altocumulenticulosratonimbolocirruslenticulomamanoclitucent* cloud, caused by the interaction between warm moist air, cool dry air, cold slippery air, cursed air, and a cloud of nanobots. [xkcd #2185]



Unfortunately, in July our small but tight soaring community in Alberta, indeed in Canada, was hit hard by a fatal accident that occurred at Cu Nim. ESC members acutely felt and shared the pain this terrible event caused the victims' families and all members of Cu Nim.

In late August the ESC held the annual Junior Development Camp with four pilots participating. The number of participants was affected by the fact that the Gimli Air Cadet Camp had a bad summer and was extended for an eighth week to complete more licences. Nonetheless, we did have a B badge and a C badge completed. A reporter from the local *Lamont Ledger* newspaper was out and did a story on the camp. She greatly enjoyed a familiarization flight!

We are continuing to upgrade the ESC fleet and facilities. Once we completed the import and certification requirements for WRT, our DG-1000S, we started introducing it to our members. It does pose some initial challenges for many pilots on take-off and landing because of its tall landing gear. It is beautiful to fly and will serve us well for advanced student and cross-country training, as well as fam flights. Several pilots also transitioned to the SZD Jantar we acquired from a club member last year.

We finally retired our old bunkhouse. It had served us many years, but had come to the end of its useful life. We found another one, much newer, bigger, and better equipped. It took a few work parties to remove the old structure and prepare the ground for the new one, but as always, members came together to do what was necessary. We're waiting for a crane and crew to set the bunkhouse on its foundation.

Which brings us to our final piece of news, the ESC will host the 2020 Canadian National Soaring Championship! We are very excited to bring this event to our soaring community. Most of the key positions for the contest have been filled. We have an excellent team of experienced and new members. A major soaring event like this cannot be organized by the ESC alone, and we have good representation from other Alberta clubs on our organizing committee. Mark your calendars, the event will take place from 25 May to 5 June. So far, we have entrants from Ontario, Alberta, BC, and the state of Washington.

Please visit the contest website at <http://cdnnats.soaringchampionships.ca/>, and consider registering to compete, or volunteer to support the event. There will be lots to do and experience! If you are interested in volunteering or have any questions or comments, please send an email to contest@edmonton-soaringclub.com. See you in 2020!

Thorsten Duebel

2019 pilot achievements

Licence, badge legs & badges

Al Bergen (CAGC) – solo and licence
 Joe Bowering (ESC) – licence
 Bill Cai (ESC) – solo and licence
 Casey Brown (Cu Nim) – Bronze badge
 Jeremy Bruns (Cu Nim) – Gold height
 Chris Gough (Cu Nim) – Gold/Diam. height & Diamond badge
 Taylor Rae Hemmings (ESC) – B and C badges
 Ben Hornett (Cu Nim) – C badge, Bronze badge, Silver distance & height
 Patrick McMahon (Cu Nim) – Gold/Diamond height
 Melanie Paradis (ESC) – C badge
 Doug Woytuik (ESC) – licence

Records

Chester Fitchett Free O&R distance (territorial) 838 km
 Free 3-turnpoint dist. (territorial) 1120 km

OLC – club results

Cu Nim	35,991 km	143 flights
	16 pilots	37,190 points
Edmonton	6,586 km	70 flights
	9 pilots	7,879 points
Central Alberta	1,586 km	20 flights
	3 pilots	1,917 points
Lethbridge	972 km	15 flights
	5 pilots	729 points

Top 10 pilots (OLC best 6 flts)

Chester Fitchett, Cu Nim	6122 points
Chris Gough, Cu Nim	2658 points
Bruce Friesen, ESC	2641 points
Gerald Ince, Cu Nim	1790 points
Tony Burton, Cu Nim	1673 points
Struan Vaughan, Cu Nim	1630 points
John Gruber, Cu Nim	1601 points
Patrick McMahon, Cu Nim	1321 points
Al Hoar, Cu Nim	1256 points
Ben Hornett, Cu Nim	683 points

What's your personal goal for 2020?
 It's hard to improve without having one.

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