VKØEK Heard Island 2016

Robert W. Schmieder KK6EK and the VKØEK Team

THE CHALLENGE ND THE VISION

There's a good reason why there was no radio operation from Heard Island for the past 20 years: It's arguably the most difficult destination of any DXCC entity. What makes it hard is not just its ferocious weather, nor its distance from civilization (almost 2500 miles across the Southern Ocean), nor the formidable effort of obtaining a permit to visit, nor the requirement to spend almost two months away from home, nor the near-impossibility of finding appropriate vessel transportation, nor the cost to the participants, nor the necessity to raise the total project financing, nor the requirement for Public Liability Insurance, nor the need to travel extensively to seek partners and coordinate plans, nor the extensive investment in creating and maintaining websites and other social media, nor even the need to spend more than three years of planning to put together a safe and effective team with all the tools and requirements in place. In fact, what makes it hard is *all* these factors, which combined together make Heard Island probably the "most difficult" DX destination in the world. It's no wonder that activations take place there only about every 20 years.

I was one the organizers of the previous DXpedition in 1997 (VKØIR). My obsession with the island is well-documented in my book *VKØIR Heard Island*. But my vision of a return expedition was based on something else: no less than a major evolutionary change in how we do DXing and DXpeditions, to provide more of what DXers and DXpeditioners want and are coming to expect. My belief, described in my various expedition books, is that everyone involved wants the same thing: a successful expedition (for DXers, this principally means their callsign in the log). My 25-year strategy was to introduce new technology and techniques to provide tools to assist that effort. In 1995, the Easter Island DXpedition XRØY/Z was the first to involve the internet (e.g., the online log server). Ten years later, the 2005 Kure Atoll DXpedition K7C was the first to provide real-time internet connection (DXA). And now, after another decade, I envisioned an expedition to Heard Island in which social media would provide an extensive set of new tools. All these developments were designed to provide assistance to the DXer to enhance his chances of success and to enable attracting and satisfying a new range of sponsorship for the project.

PREPARATION

After a long incubation time, in May, 2012, I announced plans to organize and lead an expedition to Heard Island. It would prove to be much harder than I imagined. My strategy included the following: (1) A multi-disciplinary project, including radio, science, and information technology. (2) Completely open planning; (3) Extensive outreach via social media; (4) Significant commercial sponsorship; and (5) The highest ethical standards, including legal and fiscal soundness, and risk management.

My first realization, and ultimately perhaps the most important, was that the radio community alone could not raise the finances for such an expedition. My solution was to combine the radio operation with two other activities: field science and advanced communications technology. None of the three activities alone could muster sufficient support for such an ambitious project, but together they could. Automatically, inevitably, it would be multi-disciplinary.

The project would be organized with the standards I had developed and practiced over the past 35 years under my nonprofit organization Cordell Expeditions. A major boost to the project occurred when Rich Holoch KY6R enthusiastically agreed to be the co-organizer of the project. His creative contributions and extraordinary hard work would be central to the realization of project.

One of the biggest challenges was finding transportation to get to Heard Island. For various reasons, three vessels that had made pre-contractual agreements with us failed to keep their commitments, so in mid-2015 I contacted Nigel Jolly, owner-operator of the Braveheart, who agreed to do the trip. In retrospect, it was the best of all possible developments.

For fundraising, we contacted all the major DX foundations and clubs, and set up a website that provided extensive information. We obtained the support of more than 100 organizations and more than 5000 individuals. HDT Global provided AirBeams (mili-

tary-grade tents that erect by inflation in about 15 minutes), Inmarsat provided four BGAN satellite terminals and unlimited air time, and Disc-O- Bed provided high-quality bunks. In rough numbers, foundations and clubs contributed about $80,000, individuals about $100,000, corporations about $40,000, and the team about $280,000. Thus, the total cost was roughly a half-million dollars.

Obtaining the permit was a major effort. A lot has changed since 1997: Heard Island has been added to the World Heritage List, a major Australian scientific expedition in 2000-2003 highlighted the fragile and rapidly changing environment, and the Australian government had reduced support for Antarctic operations. I made two separate trips to the Australian Antarctic Division (AAD) in Tasmania to negotiate the permit, and I and wrote hundreds of pages of detailed description and justification for the project.

All members of the team were licensed radio operators. Dave Lloyd K3EL took the major responsibility as Radio Team Leader. Arliss Thompson W7XU came in as the doctor. Two members (Gavin Marshall and Fred Belton) were experienced mountaineers and volcano explorers, and I designated them to carry out the field work. Of the 1997 VKØIR team, I was the sole survivor.

The equipment included major contributions from Elecraft, DX Engineering, Array Solutions, Spiderbeam, and many other companies. Some equipment and supplies (e.g., coax) was provided by Cordell Expeditions. The cargo was consolidated in Virginia, and shipped in one 20-ft. container to Cape Town, South Africa, where it was delivered to a warehouse on the dock near the Braveheart.

THE EXPEDITION

The team of 14 men converged on Cape Town the first week of March, 2016. They spent most of their time cleaning and repacking the gear. The permit from the AAD required that the cargo be exhaustively cleaned and inspected, and the vessel be inspected for rats and possible infestation by insects, seeds, spores, and fungus. Anticipating the need for a vehicle to move the cargo on the island, I purchased an All-Terrain-Vehicle (ATV) and it was loaded with everything else aboard the vessel.

We sailed from Cape Town aboard the Braveheart on March 11, 2016. The voyage was long, but we were very active on the radio, and we deployed a series of scientific buoys provided by NOAA and the Woods Hole Institute. After a 12-day voyage, we arrived at Heard Island and were greeted with the extraordinary sight of Big Ben, the 9000-ft. live volcano dominating the island. Our long lenses captured images of the smoking crater near the peak, but we didn't see any streaming lava. We made a quick reconnaissance trip to the planned site for our camp, near the ruins of the 1947 Australian research station (ANARE), but we found it to be unsatisfactory for our AirBeam tents.

Early the next day, the team found a perfect campsite: a 20x60 ft. flat area about a quarter mile from the beach. Within an hour the ATV began delivering our gear, and by mid-morning the tents were up. Several four-square vertical array antennas were erected on flat ground in front of the camp, and several Yagi antennas were put on the elevated rocks around the camp. Within 15 hours of landing, we had several stations completed, and we activated VKØEK. To our great surprise, we heard not a single SSB station, a pattern that was to be frustratingly common during our entire stay. CW it was, then, and thereafter. Within 48 hours of landing we had 6 operational stations.

The BGAN satellite terminals provided direct access to the internet. This meant that we could use our special software, DXA, to provide real-time online confirmation of QSOs. Once each minute it uploaded the log updates, and anyone with a browser anywhere in the world could get confirmation of his QSO within 2 minutes of making it. Almost always there were 10,000 people watching DXA. We also used the BGANs for email, Skype interviews, and for personal and expedition business.

By the third day we fell into a routine: The ops worked the pileups, and the field team explored the area around Atlas Cove, making extended treks to document the plants, animals, glaciers, and the trash that accumulates from the ocean. The crew from the Braveheart brought gasoline, water, food, clean kitchenware, and laundry, usually around noon. One day we carried out the first ever remote radio operation. I spent considerable time handling email and filing required daily reports to the AAD. Outside, the temperature was around zero centigrade, but the wind chilled it to much lower, and we found it difficult to be outside for much longer than required to service the generators and go to the bathroom.

On April 4, three of the team (Gavin, Fred, and myself) were taken on the Braveheart to the opposite end of the island, 20 miles from Atlas Cove, to inspect the area around Spit Bay and to explore the recently created Stephenson Lagoon. We had thought that the Spit Bay area might help with propagation to the North America west coast, but we were quickly dis-

suaded from that: the surf was unworkable. In fact, the radio log actually showed that the operation was unnecessary. We did have a brief weather window, and we burst through the high surf to enter the 2-mile-wide lagoon. For 3 hours we excitedly documented what we found with photographs and specimens. It was a "lost continent" experience: we were the first people to observe and document the changes due to global warming.

COMPLETION

Near the end of our stay, propagation dwindled to somewhere between terrible and none. On April 11, we had a short window of reasonable weather, and it was decided to strike camp and leave. Good thing—as we were departing, a front arrived that almost certainly would have stranded us on the island for another week at least. The voyage from Heard Island to Fremantle, Western Australia, was another 11 days. We mostly spent the time resting and watching the ocean, but we did continue to work DXers maritime mobile and we deployed another set of scientific buoys.

We arrived in Fremantle early on April 22, and were greeted by customs, immigration, and biosecurity officials, as well as a representative from the AAD, who flew over from Tasmania specifically to look at our specimens. Apparently she was satisfied, and we hammered the lids on the buckets and prepared to ship them. The rocks went to the University of Tasmania and the water and soil samples came to me in California, to be distributed to specialists in museums and universities. The next day the Northern Corridor DX Group threw us a celebratory BBQ, and we began to prepare to disperse.

My transition back to civilization was moderated by two delightful days in Sydney with Grahame Budd, the legendary explorer of Heard Island. Grahame was the first to summit Big Ben (in 1965, done only twice since), and is probably the world's living authority on the island. We toasted the current project with a 50-year-old whiskey from his summiting expedition.

RETROSPECTION

So has this project changed DXing, as we hoped? I think, *potentially*, yes. I claim that the first three initiating events were: (1) Introduction of the Internet (XRØY/Z, 1995); (2) Implementation of real-time (K7C, 2005); and (3) Extensive use of social media (VKØEK, 2016). What's next? I believe it will be "Systems integration." This could include remote operation, software-defined radio, adaptive signal processing, automatic logging, integrated station operation, signal optimization, cooperative activities, new digital modes, and other techniques. Clearly, there is plenty of richness for another major step forward. I believe this step will inevitably happen, so long as DXing and DXpeditions exist.

Disappointments? I have a few. The weather and duties prevented me from doing much of the exploration I had dreamed of for 20 years, and as I left I was pensive, knowing that I would probably never again see this island I had come to know and love. But the satisfaction of a successful project, the pride and admiration I have in the superb team, the appreciation to the sponsors for making it financially feasible, the anticipation of potential discoveries in the specimens … these moderate the disappointments. And to be honest, I know that, in spite of the difficulties and criticism and frustration
and disappointments, we delivered a successful and significant project, as promised, and that is a source
of pride for all who can say "I helped make it happen."

ACCOMPLISHMENTS

The 2016 Heard Island Expedition was multidisciplinary. As such, there were many innovations and accomplishments that went far beyond a normal "pure radio" DXpedition. We list some of these here:

Radio

- VKØEK: more than 75,000 QSOs, about 4000/day
- DXA: More than 70,000 unique callsigns entered in the online real-time radio log
- Maritime mobile operations: more than 10,000 QSOs, about 400/day
- WSPR operation during the voyages from Cape Town to Heard Island to Fremantle
- More than 3200 QSOs on 160m using a special antenna
- First remote radio radio operation (ever)
- First JT65 operation on a DXpedition

Environmental science

- Buoy deployment (15 total) for the National Oceanic and Atmospheric Administration and Woods Hole Oceanographic Institute
- Geological samples for the University of Tasmania
- Exploration of the Laurens Peninsula
- First entry into Stephenson Lagoon: Photodocumentation of glacial retreat and erosion, samples of shoreline sediments and lagoon water, documentation of the degradation of the two breakwaters that formerly isolated the lagoon from the ocean
- First flight of a drone on Heard Island
- First use of a GigaPan camera for ultra-high-resolution photographs of the environment
- Deployment of a weather station at the campsite for the duration of the visit
- Deployment of temperature and illumination sensors around Atlas Cove
- Recording of cloud patterns for a cooperating class

- Observation of skeletons from a mass dolphin death
- Collection of an insect of undetermined species
- Collection of streamwater samples and soil samples

Outreach

- Websites: www.heardisland.org (static) and www.vk0ek.org (dynamic)
- Social media (Facebook, Twitter, etc.)
- Newsletter (distributed electronically roughly monthly)
- Help desk ("Contact us") developed and operated by KY6R and the Diablo DXers
- GPS trackers on the voyage and in the Stephenson Lagoon
- Audio Log recorded daily from Heard Island
- Repair of the AAD refuge shelters and deposition of emergency food
- Tests of the AirBeam tents and Disc-O-Bed bunks in extreme conditions.

The amount of information and material collected will require some years to examine and interpret. One immediate result is the documentation of the major and rapid effects of global warming on the glaciers of Heard Island, and its inevitable effects on the landscape and the biological communities. The almost instantaneous creation of the Stephenson Lagoon by glacial melting and the destruction of the breakwater barriers present us with an invaluable opportunity to document the effects of incursion of seawater into a glacial landscape. Among the long-term projects is examination of the soil and water samples, which could contain undescribed species that will alter the known biodiversity.

STATISTICS OF THE VKØEK OPERATION

The following table shows the mode/frequency distribution of QSOs logged by VKØEK. Of the total 75,034, there were 21,220 different callsigns and 174 DXCC entities.

MHz	CW	RTTY	SSB	QSOs	%
1.8	3225	0	13	3238	4.3
3.5	5902	0	0	5902	7.9
7	8956	1279	1562	11797	15.7
10	9898	933	0	10831	14.4
14	5774	0	3238	9012	12.0
18	7047	0	2957	10004	13.3
21	7643	1183	4498	13324	17.8
24	5015	0	2342	7357	9.8
28	2419	1	1149	3569	4.8
Total	**55879**	**3396**	**15759**	**75034**	

The following table shows the continent/frequency distribution of QSOs logged by VKØEK.

MHz	AF	AS	EU	NA	OC	SA
1.8	24	483	2376	293	56	6
3.5	50	922	3410	1383	104	31
7	132	1789	6420	3205	167	81
10	63	1488	4807	4165	211	94
14	207	2160	3268	2680	628	68
18	153	3508	4842	952	383	153
21	206	3315	7789	1344	353	316
24	98	2285	4308	475	112	76
28	48	1126	2277	82	29	6
CW	456	12221	30626	10901	1097	554
RTTY	36	663	1389	1182	71	54
SSB	489	4192	7482	2496	875	223
QSOs	**981**	**17076**	**39497**	**14579**	**2043**	**831**
%	1.3	22.8	52.6	19.4	2.7	1.1

APPRECIATIONS

The onsite team consisted of Robert Schmieder KK6EK (Expedition Organizer/Leader), David Lloyd K3EL (Radio Team Leader), Adam Brown K2ARB, Alan Cheshire VK6CQ, Arliss Thompson W7XU, Bill Mitchell AEØEE, Carlos Nascimento NP4IW, Dave Farnsworth WJ2O, Fred Belton KM4MCD, Gavin Marshall VK2BAX, Hans-Peter Blattler HB9BXE, Jim Colletto N6TQ, Kenneth Karr NG2H, and Vadym Ivliev UT6UD.

Rich Holoch KY6R was the offsite co-Organizer. Rich created and led the West Coast support group "Diablo DXers", including Jack Burris K6JEB, Elliot Medrich N6PF, Daniel Brock WB4RFQ, Peter Hoffman W6DEI, and others. Especially important were Pete Bouget W6OP, who developed DXA Version 3; Mike Coffey KJ4Z, who implemented the remote radio operation and the AudioLog; and Tim Beaumont MØURX, who was the QSL manager. Additional support teams included the East Coast support group, led by Manny Rodriguez K4MSR; the Cape Town, South Africa, support group, led by Paul Johnson ZS1S; and the Northern Corridor DX Group in Perth, Western Australia, led by Keith Bainbridge VK6RK.

Scientific collaborators and advisors included Jodie Fox and Eric Woehler (University of Tasmania), Mary McGann (U. S. Geological Survey), Grahame Budd (University of Sydney), Erik van Sebille (Imperial College London), Steve Smith (OceanEarth), and numerous others.

Expedition honors included Prof. E. O. Wilson (Harvard University, Principal Scientist), Prof. Joseph Taylor K1JT (DXpedition Leader), Jean-Michel Cousteau (Expedition Leader), Jim Smith VK9NS and Kirsti Jenkins-Smith VK9NL (DXpedition Dedication), and the "Fourteen Men" of the 1947 ANARE Expedition (Expedition Dedication).

Corporations making major donations in kind included HDT Global, Inmarsat, Inmarsat, Inmarsat Government, Disc-O-Bed, Sound Seal, Acoustical Solutions, Elecraft, DX Engineering, Array Solutions, Arlan Communications, Spiderbeam, K1NSS Design, and numeous others.

Major funding support was provided by the Northern California DX Foundation, German DX Foundation, Oceania Amateur Radio DX Group, European DX Foundation, Danish DX Group, Northern California DX Club, Central Texas DX and Contest Club, Clipperton DX Club, GM DX Group, Twin Cities DX Association, Swiss DX Foundation, Tokyo 610 DX Group, Southeastern DX Club, International DX Association, Twin Cities DX Association, Lone Star DX Association, CDXC The UK DX Foundation, Southwest Ohio DX Association, ARRL Colvin Award, Mediterraneo DX Club, Isle of Man DX Organization, Dayton Amateur Radio Association, the W. A. Tucker Foundation, and many others.

We are especially appreciative of the extremely generous contribution made by the German DX Foundation.

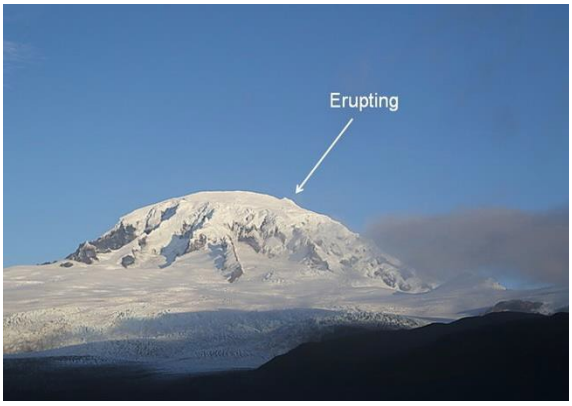
More than 5000 individuals made contributions to the project. Among the largest individual donors were Jan Poniwas DG2AT, Dave Anderson K4SV, Steve Hammer K6SGH, John and Cheryl Muhr KTØF/NØWBV, Zorro Miyazawa JH1AJT, Kan Mizoguchi JA1BK, Kip Edwards K6SZN, David Bower K4PZT, and Craig and Maria Hauger. More than 200 people donated more than $100, and more than 30 people donated $300 or more.

ADDITIONAL INFORMATION

The main website www.heardisland.org contains extensive documentation of the project, including the permit, radio license, biographies of the team members and other participants, news releases, Newsletters, the AudioLog, QSL information, order forms for souvenirs, detailed descriptions of the scientific projects, and FAQ, information for sponsors and participants, policies, a Heard Island library, a full copy of *VKØIR Heard Island* by KK6EK, and various other documents. Full listings of the contributors is on the main website www.heardisland.org (links /TEAM/ and /SPONSORS/). Information on Cordell Expeditions can be found on the website www.cordell.org. All the VKØEK Newsletters can be downloaded from www.heardisland.org/HD_pages/HD_newsletter_back_issues.html. You can download the full poster of the team and logistics on the world map from www.heardisland.org/HD_documents/HD_Poster_2.5.pdf.

The blog website for the DXpedition is https://vk0ek.org. On Facebook go to https://www.facebook.com/heardisland2015/ and on twitter go to https://twitter.com/vk0ek. Souvenir mugs and shirts can be obtained through the web page https://shop.vk0ek.org/souvenirs.html. You can hear the daily verbal reports made during the expedition on the AudioLog at https://media.vk0ek.org/.

I would welcome your personal experiences, and with your permission I might share them in publications about the expedition. Please send your stories to me at schmieder@cordell.org.

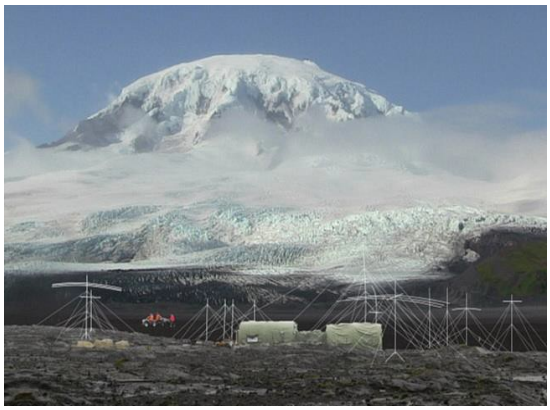


Big Ben, the active volcano on Heard Island, seen on March 23, 2016.

View of Atlas Cove from Mt. Drygalski. The 2016 campsite is at far right, 1.2 miles away.

Transport of the equipment between the beach and the campsite, using the ATV.

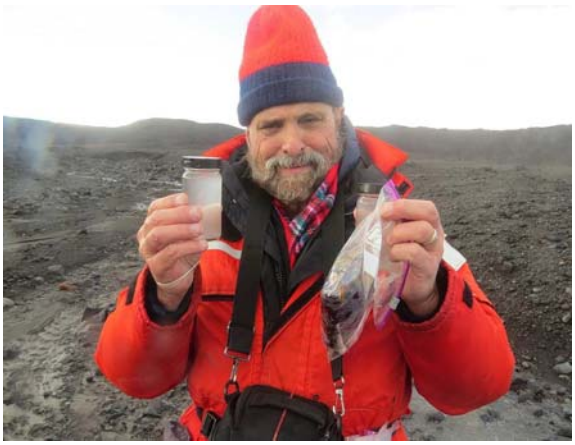
The author, Robert Schmieder KK6EK, at one of the VKØEK stations.



The 2016 Cordell Expeditions campsite, with Big Ben in the background. The summit is at 9000 ft.high.

The terminus of the formerly huge Stephenson Glacier, now almost entirely melted to form the Stephens Lagoon, 2 miles across.

The AirBeam tents at the VKØEK campsite. The operations tent is at left, dormitory at right.



The author with the first environmental specimens ever obtained from the Stephenson Lagoon

Operations: Radio at right, internet communications far left, galley near left.

The Cordell Expeditions team, on the day of departure, with their national flags.

The VKØEK QSL card.

Edited for GDXF by Prof. Dr. Uwe Jaeger, DJ9HX