The modern Northwest Passage

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ne would have to be the most sun-worshipping and mentally absent Canadian not to be aware of and share the nation's obsession with our closest polar region. This region excites more than modest nationalist fervor, bringing a little heat to a cold climate. The past decade has seen tempers raised over global warming and its obvious impacts in our own backyard, as well as by perceived encroachments, even on only notional territory (e.g., the famous Russian "staking" of a flag at the Polar seabed). Curiously, this tendency seems to be more inflamed by our nearest and closest friends than by others.

So clearly there was room for much more hot air to be blown into this arena

when Crystal Cruises of Los Angeles announced they would send a 68,870ton ship through the Northwest Passage in 2016. While many expedition yachts and small cruise ships have plied the Passage in recent years, the MV Crystal Serenity (CY), with about 1,000 passengers and 600 crew, would dwarf all previous voyagers to become the largest ship yet to navigate the NWP. The magnitude of the undertaking alone was enough for some to question the advisability or safety of such an enterprise. This "Doubting Thomas" carping from the sidelines, however, ignores the huge, conscientious effort that went into making the Serenity voyage safe and successful.

I was very privileged to have a ringside seat at this historic transit as assistant ice-navigator onboard the *RSS Ernest Shackleton*. While able to appreciate the risks, I was also in a position to observe the results of three long years of preparation and the care that was exercised in the execution of this voyage.

Successful strategy = logistics

As with most successful undertakings, this voyage resulted not just from brilliant intuition of a march-stealing strategy but from meticulous attention to the myriad details of executing a "cruise" in an austere environment. While Crystal Cruises prides itself in offering adventure-oriented excursions from a platform of unparalleled service and luxury, the conditions of going ashore in the Canadian Arctic required special support to manage large numbers of people for beach-landings.

This special support was found in the form of the *Royal Research Ship Ernest*

Shackleton (ES). ES combined the best attributes of an ice-breaking escort with the capability to host boat and helicopter operations for the cruise ship. Regularly employed for logistics resupply of British Antarctic Survey (BAS) scientific bases in the southern hemisphere, ES is available for charter during the off-season. For this voyage, ES was chartered on behalf of Crystal Cruises by Victoria-based Tactical Marine Solutions, whose principal, Dermot Loughnane, has long experience both in the charter business and in Arctic operations.

At about 5,000 tons displacement and built to DNV 1A1 ICE-05 standards, *ES* is rated for continuous operation in ice between one and 1.5 metres thick. For this voyage, she was given by Transport Canada a conservative rating of Type A, which is the highest of "ice-strengthened" ships but below the rankings of true icebreakers. Nonetheless, this ship is capable, and her officers experienced, in breaking through ice as thick as two to three metres.

Another key attribute of *ES* for this voyage was her independent logistics support capability. With under-deck capacity in two holds for up to 12 20-foot containers, she was able to carry the voluminous supplies of damage control gear, emergency rations, and expedition materials for both planned activities and worst-case contingencies. Included in this was a deck-reel of some 500 feet of oil containment boom and related SOPEP supplies (oil skimmer, absorbent materials, waste barrels, etc.)

Deck space on ES provided the ability to lash onboard the 15 boats (10 Zodiac Mk-5, 4 Zodiac Mk-6 and one 40-ft "fast boat") for boat excursions and shoretransfers, as well as 14 kayaks. Provided for each of the boats was the necessary safety equipment — from spare gas tanks to boarding ladders and rescue slings, as well as contingency "stranding" kits. The ship's own 50-, five-, and two-ton cranes enabled the launching of these boats and also of ES's own landing barge, which was instrumental for mid-voyage re-provisioning. ES's flight deck was temporary home to two Eurocopter AS-350 ("A-Star") helicopters, with refueling provided from ES's reserves of aviation fuel. And importantly, ES accommodated up to 36 expedition specialists (boat drivers, Inuit

guides, naturalists, divers, photographers, ice-navigators, oceanographic scientists) in addition to her core crew of 22.

BAS, as much as Crystal, leveraged their own expertise to guarantee success in this novel employment. With many years of service in the Antarctic (built in 1995, ES has been on long-term charter to BAS since 1999), this was nonetheless the first voyage of this ship into the Canadian Arctic. Accordingly, BAS rejigged their own crewing schedules to make their senior master available for this job: Captain John Harper has been with BAS since 1980. In order to build the base of experience for future taskings in the north, Captain Harper was, on this occasion, joined by his opposite number, Captain Will Whatley, who is well respected within BAS both as Captain of ES but also a member of the design review team for BAS's new-build, the RRS Sir David Attenborough. The furthering of Canadian Arctic experience was also helped along by BAS's generosity in accommodating two nautical cadets from the Marine Institute at Memorial University NL (MUN) for their senioryear sea-tours.

Prudence in execution

The planned itinerary of *ES* and *CY* provided for the best chances of success in what is traditionally a narrow window of free passage. *ES* visited St John's NL in early August to load supplies and to undergo port-state control inspections for the coast-wise route she would follow. During this stop, she was fitted with the "Ice-Nav" system supplied by Enfotec of Montreal, a subsidiary of Fednav.

Ice-Nav is a geographic information system which enables the layering of ice concentration charts in vectorformat (produced by the Canadian Ice Service - CIS and others) over the chart presentation of the ship's position and intended track. From this, the Ice-Nav system can calculate the "Ice Numeral" (IN) as required under Canada's AIRSS (Arctic Ice Regime Shipping System). The weighting of the ship's own ice-capability number by the proportional concentrations of different ice regimes to be encountered results in either a positive IN (i.e., "GO") or a negative number ("NO-GO"). This result is advisory and subject



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to the master's own experience and discretion in handling his ship in ice.

The Ice-Nav system also permitted the layering of other "products" on the ship's position. The ship's high-resolution X-band radar could be displayed by Ice-Nav, either in a separate screen with advanced processing controls, or superimposed on the ship-position plot. Another source of ice information onboard *ES* was direct observation from the ship's own drone, a DJI Inspire quad-copter; this device was available to provide real-time ice-reconnaissance from flights of up to 22 minutes within a couple kilometres of the ship.

The interpretation of this ice information was subject to the experience and expertise of the ship's master in conjunction with the embarked ice-navigators, provided for *ES* by Martech Polar of Victoria. *ES* was fortunate to have in



Expedition cargo on board the RSS Ernest Shackleton...

this regard the services of Captain Marc Rothwell, recently retired from the CCG as Master of the *CCGS Louis St-Laurent*, who has logged more than 22 trips to the Arctic. BAS also embarked in *ES* for this trip their own Geospatial Systems Architect, Mr Andreas Cziferszky, who brought with him considerable expertise in interpretation of remote-sensing images and ability to access BAS's own contracted sources of imagery. With this preparation, *ES* set forth from

With this preparation, *ES* set forth from St John's on August 9, stopping briefly in Pond Inlet and Cambridge Bay to runin the new boats, practice oil-recovery drills and pick up additional expedition staff. Following this, *ES* made her way to Ulukhaktok (Holman) on the west coast of Victoria Island, the first Canadian port of call for *CY*.

Enroute to the western Arctic, ES continued the long tradition of progressing science in conjunction with northern voyages. Two biologists from MUN joined the ship to conduct a series of plankton samples along the route. Collected through a combination of Continuous Plankton Recording (CPR) device and also more traditional Bongo net "vertical trawls," these samples will form the first-ever linear plankton profile of the NWP route. The ice-navigators, in conjunction with the ship's officers, provided the Canadian Hydrographic Service with the results of a confirmatory survey of depths in the approaches to King's Bay. And ES's own echo-sounder recorded a continuous trace of the depth under the ship to further contribute to the bathymetric data-base of Canadian waters.

An additional capability of the ES came into play several times along the passage. Originally built by Norwegian owners for use in the North Sea oil and gas industry, ES is a "DP-2" capability ship. With a single shrouded screw aft, she has also three forward bow thrusters and two stern thrusters. Linked in a Kongsberg Dynamic Positioning System which weights and averages inputs from up to three DGPS position inputs, this system can maintain the ship's heading and position within one to two-tenths of a metre, unaffected by up to two discrete system failures. ES used this system to advance slowly into tight areas and to hold position where there was not room to "swing" at an anchor.



The Crystal Serenity and RSS Ernest Shackleton — Cyrstal's Northwest Passage voyage is a first for a large passenger ship.

"Fortune smiles on the well-prepared..."

With *ES* in Ulukhaktok, and the helicopters having joined the expedition at this point, the stage was set for *CY's* grand entrance. The voyage had gone smoothly and easily to this point: temperatures were warm (10-15C in Cambridge Bay), and wind, sea and swell were generally low. Even though ice was in evidence for some 18 days of the 35-day voyage, this diminished steadily as *ES* made her way west and back. The only worry, within a few days of the appointed rendez-vous at Ulukhaktok, was the ice off Point Barrow, which had closed the margin of open water to about 10 miles. On the day, however, *CY* managed to ease past this obstruction and enter a largely ice-free passage.

Once *CY* joined *ES* on August 26, the serious work of the "expedition staff" began. A typical day of support at this stop, but also subsequently at Cambridge Bay, Beechey Island, Croker Bay, Tay Inlet, and Pond Inlet, started with boat launches at 0600 hours; deployments of shore parties at about 0800; helicopter excursions starting about 0900, coincident with landing passengers for community visits and hikes; then return of all shore parties about 1730; and recovery of boats by 2000. In a typical day-stop, *ES's* boats shifted upwards of 900 passengers from and back to *CY*, whether to shore excursions, kayaking, or boat and helo-rides. *ES's* flight deck became, momentarily, the busiest "airport" in the high Arctic, with 153 aircraft movements over 10 days.

Throughout the eastward transit of the NWP, it was evident that Crystal Cruises was anxious to deliver on the promise of Arctic splendour and novelty. Polar bears were highest on the list. Accordingly, after Cambridge Bay, *ES* led *CY* to the ice edge in Victoria Strait to search for wildlife. The crew in *ES* had previously commented on the lack of wildlife relative to the



Two-way transit of the Northwest Passage...



A low year for ice in the Northwest Passage.

profusion of seals and penguins they experience in the south. But here at least they found something the Antarctic cannot match: along the remnants of 2-3/10ths-thick first-year and some old ice, 10 bears, some mothers with cubs, were discovered feasting on recent kills. While keeping a respectful distance, *CY* passengers were treated to a cold day in the boats to get their prize photographs.

For this itinerary, the Canadian Arctic was best viewed from west to east. The barren prospect and relatively warm waters of south Victoria Island give way to the more likely ice-infested straits of Victoria and M'Clintock. Here, for history buffs, is the "dead-end" of the greatest Polar mystery, the blank spot in the map that the Royal Navy searched all-around until it was 10 years too late. The momentary thrill of passing just over North America's "Cape Horn" (the northern-most continental shore, the south side of Bellot Strait) then gives way to more spectacular topography of Baffin and Devon Islands, the historical cross-roads of Arctic exploration at Beechey Island, and the glacier-edge at Croker Bay, concluding the transit on

a high note. By this time, the *Serenity* passengers were quite thrilled with their investment.

The future...bright and warm?

So what of the future? Is this groundbreaking voyage of the *Crystal Serenity* going to set the standard and attract a rush of competitors?

Without a doubt, there is increasing traffic in the north. From *ES's* bridge we saw three other cruise ships and at one point had to adjust plans so as not to cramp others at points of interest. We also crossed paths with at least six cargo ships and two coast guard vessels, and we saw or spoke to four yachts – which all begins to look pretty busy in the immensity of the area and relative unlikelihood of vessels being within sight of each other.

There will definitely be more of all of this. But there might not be many more who choose to enter the game in Crystal's class. The enormous expense that this company has undertaken to plan and execute a successful passage, with special precautions and voyage support, has set the bar at a level that few without Crystal's premium clientele will choose to emulate.

Critics may point to ships such as *CY* as suggesting great potential for catastrophe. But others in fact may pose the more likely risk in terms of probability; between the huge ship which diligently assesses and mitigates all discernable risks, the smaller ship which takes liberties with routing, and the yacht which undertakes a world-saving environmental expedition without sailing directions or tide-tables, which one will the Coast Guard concern itself with most?

The summer of 2016 will probably rank as one of the lightest ice-coverage years on record. This made it all seem easy. But this is to ignore that all "luck" is built on good planning, and such was the case here.

There will be many more ships and boats in the Arctic, and they will not all be as well prepared as *Crystal Serenity* and *Ernest Shackleton*. Yet if they go with that kind of preparation, respecting the austerity and mercurial changeability of the environment, they too can add their part in filling in the bathymetric record while populating the public consciousness with the beauty, the attractions and the fragility of the north.

Weirdly, the morning of *ES's* return to Bay Bulls, NL, to off-load, brought news of the discovery of Franklin's second ship, *HMS Terror*, off the shores of King William Island. For me this was a salient reminder that the "golden age" of Arctic exploration was also commenced during a reported warming trend. Yet all of the subsequent significant successes of charting the NWP resulted from the search for one mission that failed in the face of unexpectedly harsh reality. Sobering...

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