

# The Impact of German Technology on the Royal Canadian Navy in the Battle of the Atlantic, 1942-1943

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The Royal Canadian Navy (RCN) destroyed five German U-boats in two months during the summer of 1942, after sinking only two enemy submarines in the first three years of the war. Canadian anti-submarine escorts then hit a dry spell, which lasted almost four months before they sank their next U-boat. To date, this brief period of success has been thought of largely as a coincidence or something of an anomaly. Many naval historians have observed this phenomenon but no one has adequately explained the reason for this brief surge in sinkings by the RCN, or considered the implications of German technological advances for Canadian warships.

Joseph Schull's *The Far Distant Ships*, a popular history of the RCN during the Second World War, devoted eight pages to the "summer successes," but glossed over the period of failure from September-December in two pages.<sup>1</sup> Tony German's survey history of the RCN provided more balanced treatment but offered no explanation for the downturn in its fortunes after the summer kills.<sup>2</sup> Marc Milner's *North Atlantic Run* observed that in September the Canadian escort groups' record "of at least balancing losses with U-boat kills came to an end." But this seminal book was primarily a study of convoy and escort policy and operations rather than U-boat sinking and did not speculate on the reasons behind this turn of events. Instead, Milner demonstrated the impact the lack of U-boat kills and the heavy losses of merchant ships in Canadian-escorted convoys had on British decision-makers.<sup>3</sup> His following book, *The U-boat Hunters*, is a study of U-boat killing, but is almost exclusively focused on the last two years of the war. It does not deal with the summer and autumn of 1942 in depth.<sup>4</sup>

Looking at this period from the perspective of sinking U-boats rather than convoy defence — still the escort's primary task at this stage — reveals that the period of failure from September to December 1942, when the RCN did not sink a U-boat, was in fact the anomaly. This challenges the conventional wisdom. The predominant factor in assessing patterns in U-boat sinking by the RCN is the degree of contact between Canadian warships and enemy submarines. This is directly related to two variables: the number of U-boats and escorts at sea, and their geographical deployment. Obviously, if there were not many U-boats at sea and they were operating in different theatres from Canadian naval forces, the latter would have few opportunities to sink them.

This last scenario existed from the outbreak of war until the summer of 1941. The RCN started the war with only six destroyers and the corvette building program took some time to get on track. The U-boat fleet was also small. Still, the destroyers were deployed overseas in the thick of the action after the fall of France in June 1940. This led to the RCN's first kill - shared with HMS *Harvester* - in November 1940. HMCS *Ottawa* did not receive credit for sinking the Italian submarine *Faa di Bruno* until forty years after the fact.<sup>5</sup> This kill was an exception. Few Canadian escorts encountered enemy submarines before the autumn of 1941. The lack of more tangible results during the first two years of war can largely be attributed to the relatively small number of RCN warships engaged in anti-submarine warfare.

During 1941 new construction began to increase the size of the German U-boat fleet, while the first corvettes increased the size of the RCN dramatically. The RCN had thirteen corvettes at the beginning of 1941, but their number had risen to sixty-six by the end of the year. The Germans had twenty-one U-boats available for operations in February 1941, but by the end of the year the number had increased to ninety-one. Evasive routing based upon special intelligence kept Allied convoys safely clear of the wolf packs through much of 1941. While there were few chances for the new escorts to attack and sink U-boats, this changed in September and October 1941 when a series of convoy battles gave the RCN corvettes their first taste of action on a large scale. The passage of convoy SC 42 — though otherwise a disaster with the loss of sixteen merchant ships — produced the first confirmed U-boat kill for the RCN. HMCS *Chambly* and *Moose Jaw* sank *U-501* as they joined the convoy to reinforce the close escort. The sinking represented a remarkable achievement for the inexperienced corvettes, but the feat was not soon duplicated: the Canadian escort groups of September and October 1941 were too small — usually only one destroyer and three corvettes — to hunt U-boats to a kill.<sup>6</sup> Furthermore, changes in the deployment of U-boats in late October 1941 kept them well clear of the RCN.

German U-boats operated mainly in the Mediterranean and Gibraltar theatres during the last two months of 1941, providing the RCN with little opportunity to atone for the defeat of SC 42 or to duplicate its success in sinking *U-501*. Enemy submarines moved into the coastal waters of the western hemisphere in early January 1942 as part of Operation Drumbeat. For several months, they operated close inshore from St John's, Newfoundland, south along the US eastern seaboard to the Caribbean Sea. The U-boats preyed on the abundant independent shipping, avoiding encounters with escorts and convoys at all costs.<sup>7</sup> Thus, despite increasing numbers of Canadian escorts at sea, not to mention the growing U-boat fleet, the RCN had little chance to prove itself during the first half of 1942. The creation of convoys off the North American coast and in the Caribbean Sea left U-boat Command no choice but to resume attacks on convoys. The Germans began wolf pack operations against transatlantic convoys again in July 1942 and, as well, made half-hearted attempts to attack coastal convoys.<sup>8</sup>

The resumption of wolf pack operations produced an almost continuous string of convoy battles between July 1942 and May 1943, when Allied forces ultimately defeated the wolf packs. The RCN destroyed five U-boats in the space of six weeks in the summer of 1942 to begin this campaign. The first kill, *U-90*, was by HMCS *St Croix* on 24 July with the westbound convoy ON 113. HMCS *Skeena* and *Wetaskiwin* destroyed *U-588* one

week later with convoy ON 115. HMCS *Assiniboine* rammed and sank *U-210* with the eastbound SC 94 on 6 August. HMCS *Oakville* and an American aircraft sank *U-94* in the Caribbean Sea on 28 August with convoy TAW 15. The fifth kill, *U-756*, was by HMCS *Morden* on 1 September with SC 97.<sup>9</sup> There were no patterns apparent in the five kills, which were made both at night and by day, by both destroyers and corvettes, and by both professional and reserve escort captains. The means of detection included eyesight, asdic, and radar. The means of destruction included both ramming and depth charges. The victims included both inexperienced and veteran U-boat commanders. All the killers, however, formed part of the close escort of a convoy.

After the sinking on 1 September by HMCS *Morden*, the RCN did not sink a single submarine for almost four months. This was not for a lack of opportunities, in contrast to the dry spell before the summer of 1942. During the autumn, Canadian escort groups defended several convoys against huge wolf packs. German U-boats torpedoed eleven merchantmen from ON 127 in September and fifteen merchant ships from SC 107 in November. In addition, several minor convoy battles, such as SC 100, HX 212, ON 137 and ON 139, placed the RCN at the forefront of the action. The quality of defence provided by the Canadian escort groups varied greatly from battle to battle. In some cases the escort had to abandon promising contacts after only a few attacks to protect the endangered convoy. Still, the frequent engagement with the enemy provided numerous opportunities for counter-attacks. Yet Canadian naval escorts did not sink a single U-boat until HMCS *St Laurent* destroyed *U-356* on 27 December during the battle for ONS 154.

German U-boats torpedoed fourteen ships from ONS 154, making it another disaster for the RCN. But it was also a turning point in terms of U-boat kills, which has often been overlooked by historians because of the magnitude of the losses, and perhaps because the exact identity of the killer was not clearly known until after the war. The sinking of *U-356* by *St. Laurent* kicked off another period of success for the RCN in its boom or bust cycle of anti-submarine warfare. It was the first of six enemy submarines sunk by Canadian warships in less than three months and marked the end of the drought. Next, HMCS *Ville de Quebec* destroyed *U-224* on 13 January 1943 and four days later HMCS *Port Arthur* sank the Italian submarine *Tritone*. HMCS *Regina* followed these two quick kills by sinking another Italian submarine, *Avorio*, on 8 February. HMCS *St. Croix* and *Shediac* destroyed *U-87* on 4 March — the second kill for *St Croix* — and HMCS *Prescott* destroyed *U-163* on 13 March. The RCN did not receive credit for this last kill until long after the war.<sup>10</sup>

Changes in the deployment of Canadian escorts affected the geographical distribution of the six U-boat kills from late December 1942 to March 1943. Only the first, on 27 December, occurred on the transatlantic convoy routes between North America and Great Britain. The assignment of sixteen RCN corvettes to Operation Torch in the Mediterranean Sea in November 1942 was the first move to shift resources out of the North Atlantic theatre. " The transfer, in January and February 1943, of three of the four Canadian mid-ocean escort groups from the transatlantic convoy run to the route between Gibraltar and Great Britain furthered this shift to the eastern Atlantic and Mediterranean theatres.<sup>11</sup> The following five U-boat kills took place, as a result, in the Mediterranean or between Britain and Gibraltar. This change of theatre has caused many historians to view the two periods as distinct episodes in which vastly different conditions prevailed and

accounted for the better results in the new area. The perception was that the RCN could perform well in a secondary theatre but not in the North Atlantic where the brunt of the battle was borne. But the change in fortunes in U-boat sinking (initiated by *St. Laurent*) preceded the wholesale transfer to the eastern Atlantic.

The degree of enemy contact experienced by the RCN - and therefore the opportunity to sink submarines — is the first variable to be considered when comparing the autumn drought and the periods of success that preceded and followed it. It is clear that the RCN encountered the heaviest action in the autumn, and the high frequency of contact with the enemy should have translated into more (or at least some) U-boat kills. The periods before and after were by no means idle, and indeed were quite active by earlier standards, but did not rival the September-December months in terms of engagement by enemy submarines. The vicious convoy battles of the drought — ON 127, SC 100, HX 212 and SC 107 - provided excellent opportunities to engage and destroy U-boats. The RCN failed to capitalize on them until ONS 154. Viewed in these terms, the autumn dry spell stands out as the anomaly, not the periods of success.

What happened between August and December 1942 to reduce the RCN's ability to destroy enemy submarines? Or was it just chance or bad luck? Several factors stand out as potential causes of the autumn drought. First, there was the atrocious weather in the North Atlantic in the autumn of 1942. A series of unrelenting gales swept the transatlantic convoy routes almost continuously from October to December. Rough seas played havoc with asdic conditions and made the RCN's outdated radar virtually useless. While the weather was abnormally bad for autumn, the winter months that followed were not much better. A winter gale slowed the progress of ONS 154 but its southerly route carried it close to the Azores, and more moderate weather prevailed when *St. Laurent* sank *U-356* on the night of 26/27 December. The Mediterranean climate spared the Torch corvettes, and Canadian escorts on the Britain-Gibraltar run, from some of the worst excesses of the North Atlantic. Still, the weather is not sufficient in itself to explain the complete failure to destroy enemy submarines between September and December 1942. Nor does it explain the revival of Canadian fortunes during the winter of 1942-1943.

Some historians have speculated that the strong performance by the Torch corvettes in January and February was brought about by improved equipment - specifically type 271 radar.<sup>15</sup> There is no denying that the new technology was far superior to previous Allied radars for detecting surfaced submarines. Still, this explanation is not entirely satisfactory for a number of reasons. First, type 271 radar played a role in only two of the five sinkings in the Mediterranean and eastern Atlantic: *Avorio* and *U-163*\*. Second, the successes of the summer of 1942 were achieved by Canadian escorts without type 271 radar. Indeed, the outdated metric radar played a role in two of the five sinkings during that summer. Thus, the presence of type 271 radar, while it did assist in the destruction of Axis submarines in the winter of 1942-1943, does not offer an explanation as to why the RCN was able to sink U-boats in the summer of 1942 but not in the autumn.

German technological developments were, perhaps, the hidden cause of the autumn drought. In August, as the RCN basked in the glory of its recent successes, U-Boat Command acquired the first prototypes of the *Funkmessbeobachtung 1* (FuMB 1) radar detector.<sup>15</sup> The Germans commonly called it Metox, after its French manufacturer.

It contained French, German, and even American parts. In addition to the search receiver, it included a wooden aerial in the shape of a cross, known as the "southern cross" or "Biscay cross." The aerial had a horizontal and a vertical antenna and had to be detached and taken below before submerging. FuMB 1 intercepted radar transmissions from both air and surface escorts on wavelengths between 1.25 and 2.5 metres.<sup>16</sup> Thus, Allied radar types which used wavelengths of 1.4 and 1.5 metres — such as the Canadian naval radars SW1C and SW2C, British naval type 286, and the airborne ASV Mark II — were vulnerable to Metox. Moreover, it could not detect the 9.7-centimetre transmissions produced by newer British naval type 271 radar.<sup>17</sup>

The introduction of the radar detector gave U-boats an advantage over Canadian escorts which they did not enjoy over British escorts. During the summer of 1942 most Canadian escorts had SW1C or SW2C radar, modifications of type 286, and a few had type 286 itself. Most British escorts already had the superior type 271 radar which could not be detected by FuMB 1<sup>18</sup>. In addition to being vulnerable to Metox, the older metric radar was not good at discriminating between objects on the surface and waves. It could detect a trimmed-down submarine at ranges of one to 1.5 miles in good conditions, but anything approaching rough seas made metric radar useless except for station-keeping.<sup>19</sup> The superior type 271 radar had a much sharper level of discrimination, and could pick up a submarine at ranges of 3.5 miles or more in optimum conditions.<sup>20</sup> Only four Canadian corvettes, but no destroyers, had type 271 radar by September 1942.<sup>21</sup>

The Germans pressed FuMB into service quickly. Most of the submarines sailing from the French bases in September carried it, and German and Norwegian ports also had supplies for installation by the end of the month. By October virtually the entire German U-boat fleet sailed with Metox.<sup>22</sup> The search receiver was primitive, did not give the bearing or range of a contact, and only warned that radar was in operation nearby. Experienced operators, however, could make rough estimates of range and bearing based on signal strength and the rotation of the aerial.<sup>23</sup> FuMB could intercept airborne radar signals from distances up to thirty miles, well in excess of the five-ten mile range of ASV Mark II. Its effective range against shipborne radar seems to have been in the neighbourhood of six-ten miles, which still offered a significant advantage over the very limited ranges achieved by Allied shipborne metric radar.<sup>24</sup>

The obsolescence of the search receiver relative to British surface radar type 271 has led most historians of the war at sea to discount its effectiveness, except against Allied aircraft.<sup>25</sup> The similar (though changing) tendency to minimize or ignore the role of the RCN in the Battle of the Atlantic has caused historians to overlook the impact of Metox on the performance of Canadian warships. FuMB gave the U-boat ample warning of the approach of a Canadian escort in the autumn of 1942. In effect, in the deadly game of cat and mouse between the escorts and the U-boats, the cats had been belled. The RCN's string of summer successes came to an abrupt end with the advent of Metox. None of the Canadian escorts that sank U-boats in the summer of 1942 had been fitted with type 271 radar. From September 1942, only RCN escorts with centimetric radar would destroy enemy submarines.

It is often stated that U-boats did not rig Metox during convoy operations because of the need to take down the aerial quickly before crash diving.<sup>26</sup> Indeed, German prisoners of war possibly gave Allied interrogators this impression.<sup>27</sup> While this may be

true of a later period, and of some German captains at this time, it is clear from war diaries that most used the search receiver in the midst of convoy battles during the autumn of 1942. Some examples of the performance of FuMB against Canadian escort groups during the convoy battles of September-December 1942 will illustrate its impact. It first seems to have been used against the RCN with success on 18 September, just a few weeks after the sinking of *U-756*. On that day *U-599* made the initial contact with SC 100, escorted by Canadian and American warships of escort group A3 (the American ships did not have centimetric radar either). The U-boat sighted the convoy and made a contact report which referred to the detection of "additional radars to the Northeast." The boat's war diary has not survived, so no further details are available. Some of the other U-boats in the wolf pack had FuMB and used it during the battle around SC 100, but it does not seem to have played a dominant role. Most of the pack had been at sea since August and had not yet had the equipment installed. Still, they sank five merchant ships from SC 100, without the loss of a U-boat.<sup>28</sup>

During the operation against ONS 137, escorted by escort group C4, *U-258* used FuMB to avoid surface escorts on 16 and 17 October. *U-71* made a Metox detection on the 1.4-metre wavelength on the seventeenth in visibility of only 200 metres. The sub crash dived where it heard hydrophone effect and asdic noises but was not detected. *U-437* evaded attack on 19 October thanks to its search receiver. The wolf pack, however, sank only two merchant ships from ONS 137.<sup>29</sup> The Germans made even greater use of FuMB in the operation against HX 212 in late October. By this time most, if not all, the subs operating in the North Atlantic had the search receiver. *U-575* detected an escort on 27 October and took evasive action. *U-602* even used Metox to maintain contact with an escort in poor visibility. During the night of 28/29 October, *U-624's* search receiver measured the range of an escort as 1500 metres, again in poor visibility. The high seas made the escort's radar useless, except to the U-boat, which penetrated the screen and torpedoed SS *Pan New York*, a large tanker. Metox not only allowed U-boats to evade escorts but also made it easier for them to sink merchant ships in convoy. The wolf pack sank six merchantmen from HX 212 under combined Canadian and American escort, again without any losses.<sup>30</sup>

The Germans also found FuMB invaluable during the large wolf pack operation against SC 107 in early November. Canadian escort group C4 failed to exact retribution for the fifteen merchant ships torpedoed by the U-boats. The experience of *U-71* during the night of 2/3 November shows the value of FuMB in evading a surface escort equipped with metric radar. The war diary reads:

Surface detection 142 cm. Horizontal. Initially this was a very audible constant oscillating sound. It was repeated at irregular intervals.... Dived when signal was loud and constant. Subsequently heard rapidly moving asdic noises and listening noises.

*U-71* escaped without being detected or attacked. During the following night, while being driven off by an escort, the captain of the same U-boat wrote in his war diary:

Brought FuMB on to the bridge to establish whether radar detection signals were present. Two detections on 142 and 143 cm horizontal which commenced and then decreased following which there was a steady, fairly loud signal for ten seconds. Range is 3-4 n[autical ]m[iles]. The searching units appear to still be fairly inexperienced. Sent FuMB back down below when the visibility improved.

Afterwards *U-71* slipped past the screen for an unsuccessful attack.<sup>31</sup>

The pack used its Metox to good effect to avoid detection by the surface escort. *U-571* intercepted three surface escort radars during the night of 1/2 November. The following night, in visibility which varied between 500 and 1000 metres because of fog and rain, the boat received signals on its FuMB which grew steadily louder. *U-57Ts* war diary reads:

[attempted] to open out on the port side at half speed and on course 020 but in this process the signals become screamingly loud (they can be heard from the listening room as far as the bow compartment and the control room) and the signal is joined by a second and then by a third one which can clearly be differentiated by their different notes. I conclude from this that I was on the starboard bow of the convoy and that I am now passing close ahead on my course of 020. The visibility does not increase more than 1,000 m[etres].<sup>32</sup>

The sensors available to C4 - metric radar and eyesight — had little hope of detecting the U-boat in the prevailing rough seas and poor visibility. These conditions would not have been such a problem for type 271 radar, which possibly would have detected the U-boat long before the Germans sighted the escort — rough weather trials showed that 271 radar could pick up a surfaced sub at 2.1 miles or more — providing its bearing and range.<sup>33</sup>

Other U-boats also used FuMB to detect surface escorts and avoid attack during the battle for SC 107.<sup>34</sup> Still, the search receiver did not have the dominant role it might have had if it had been more reliable. Almost one-half of the members of the wolf pack reported that their FuMB was unserviceable or had broken down at some point during the action.<sup>35</sup> The captain of *U-704* suspected that he had been detected by radar when an escort forced him off the convoy on 2 November. He complained that the FuMB was unserviceable, implying that he would have been using it to guard against surprise if it had been in working order.<sup>36</sup> In spite of its poor reliability (something from which metric radar suffered as well), it is clear that Metox greatly assisted a number of U-boats to evade detection by surface escorts during the battle, especially at night or in poor visibility. The battle was not a complete failure for Canada, however, since RCAF aircraft (not using radar) sank two U-boats in daylight attacks.<sup>37</sup>

The Germans faced a different outcome two weeks later when they engaged convoy ONS 144. All the British and Norwegian escorts had type 271 radar and used it to intercept U-boats repeatedly as they closed to attack. Escort group B6's solid defence held the losses to five merchant ships and one corvette. The failure of Metox to warn of surface radar in this operation alarmed the U-boat captains who had taken part in the

successful operation against SC 107. When escorts arrived overhead after *U-521* submerged during the night of 15/16 November, the German captain observed:

Nothing had been heard on FuMB. Despite this I suspect radar detection or measurement as it cannot be considered probable that the escorts would steer such courses randomly but rather would only do so when something had been detected.<sup>38</sup>

Two nights later, an escort suddenly closed on *U-522*, which could not possibly have been sighted by the Allied warship in the prevailing conditions. The captain, Herbert Schneider, entered in the war diary: "Suspect radar detection. Turn away and rig FuMB. Nothing to be heard in this device." Similar incidents of detection led Schneider to conclude after the battle that "The escort force of this last convoy was more experienced and more difficult to prevail against than that of the previous convoy [SC 107]." He attributed this to the "difference between British and American escort forces." The perceptive submariner was close to the mark, but of course it was the difference between British and Canadian escorts. American escorts, if they had been present in larger numbers at this stage of the Battle of the Atlantic, would have suffered a fate similar to the Canadians: their ships also lacked centimetric radar. Finally, Schneider considered that the lack of warning provided by Metox for these incidents suggested that the detections were not made by radar. He speculated that Allied escorts had some new device — perhaps infra-red detection — for locating U-boats on the surface.<sup>39</sup>

In the battle for SC 104 a month earlier, this same British and Norwegian escort group had destroyed two enemy subs at a cost of eight merchantmen. The losses of merchant ships in B6's two convoy battles did not differ that much from Canadian convoy battles of the autumn 1942, but the sinking of the U-boats did.<sup>40</sup> Indeed, it is possible that FuMB briefly engendered a false sense of security in the U-boats: if radar was operating nearby, surely the search receiver would detect it? There was no mention of the failure of Metox to detect the escort's radar in the U-boat Command War Diary at this time.

Allied authorities realized by November that the Germans had developed a radar detector. Intelligence revealed that FuMB (known as the German Search Receiver, or GSR to the Allies) could only detect metric radar transmissions.<sup>41</sup> Western Approaches Command issued a general order to that effect which escort group C3 incorporated into its standing orders. Thus, during the pursuit of SC 109 from 16 to 19 November, the Senior Officer, Lieutenant-Commander K. L. Dyer, RCN, ordered strict radar silence for three of his six escorts — those without centimetric radar. His move was sound because the shadower, *U-43*, had FuMB rigged. It made a number of detections against aircraft before the convoy moved out of the range of Newfoundland-based aircraft. Dyer considered the risk of detection by Metox greater than the chances of SW2C or type 286 radar uncovering the U-boat.<sup>42</sup> Later in the month, HMS *Broadway*, the Senior Officer of escort group C2 with ON 149, ordered HMS *Sherwood* not to operate its type 286 radar.<sup>43</sup> In effect, FuMB had neutralized metric radar, and escorts equipped with it basically operated without anti-submarine radar by late November.

The fact that two of the five Canadian escorts with SC 109 actually carried type 271 radar revealed that the RCN had made some progress in fitting it. The RCN had



begun to install centimetric radar in larger numbers in early November. Whereas only four RCN corvettes had it at the end of the summer, forty corvettes and destroyers had it by 22 December 1942, the lion's share having had it installed in November and December.<sup>44</sup> The sixteen RCN corvettes assigned to Operation Torch received type 271 in Great Britain in preparation for the Torch convoys, while the rest of the escort fleet began to fit it piecemeal in the UK, Halifax, and New York from late October. The installation usually required two lay-overs in Britain for the mid-ocean escorts but by the end of December 1942 about thirty-four percent of Canadian corvettes and destroyers operating in the North Atlantic and western Atlantic had centimetric radar (while all of those with Operation Torch had it).<sup>45</sup> When C3 sailed with ONS 152 on 10 December it was probably the first Canadian escort group in which every escort had centimetric radar, and both of its destroyers had been fitted with shipborne High Frequency/Direction Finding as well.<sup>46</sup>

Through the debriefing of U-boat commanders after their return to base, the Germans too had become aware of some of the limitations of Metox. During the operation against ONS 152, U-Boat Command warned the wolf pack "that the enemy uses his location gear [radar] very cautiously and when he picks up a target he gradually reduces his signal strength to mask his approach."<sup>47</sup> It may have conjectured this unlikely Allied tactic to explain the inability of FuMB to detect radar transmissions during the battles with the type 271-equipped escorts of B6. It is also possible, though less likely, that it had learned that some Allied escorts were observing radar silence. The Germans, however, were still unaware that the Allies had developed a centimetric radar which operated on wavelengths outside the range of Metox.<sup>48</sup> By this time (mid-December), a clear majority of the escorts in the Mid-Ocean Escort Force (if not a majority of Canadian escorts) had type 271 radar. In any event, the U-boats now recognized the limitations of Metox just as surface escorts realized the dangers of metric radar.

The period of German technological advantage conferred by FuMB corresponds closely with the drought experienced by the RCN, as it does with the longer dry spell suffered by Allied aircraft equipped with metric radar. Nighttime sightings by anti-submarine aircraft in the Bay of Biscay offensive tailed off in the last two weeks of September and dropped to almost nil during October 1942. Daytime sightings also fell, but less sharply. The Northern Transit Offensive between the Shetland Islands and Iceland also dried up at this time. Winston Churchill informed Harry Hopkins on 20 November that Metox "had reduced the efficiency of our day patrols in the Bay and defeated the night patrols altogether." Not until Coastal Command aircraft began to receive centimetric radar in large numbers in mid-March 1943 did the campaign revive.<sup>49</sup>

The RCN drought finally ended during the night of 26/27 December when HMCS *St. Laurent* destroyed *U-356*. The destroyer's type 271 radar, fittingly, picked up the U-boat at a range of 2500 yards.<sup>50</sup> The destruction of *U-356* was the lone bright spot for the Allies in the battle for ONS 154, which witnessed the torpedoing of fourteen ships. All the corvettes had type 271 radar installed before the passage but were still inexperienced in its use and had no time to train before sailing. Indeed, some of the corvettes continued to use their SW1C or SW2C metric radar because the U-boats made several FuMB detections against surface escorts during the battle. *U-260*, the only sub in contact during the night of 27/28 December, shadowed ONS 154 in visibility of 1500 metres through the use of Metox. The U-boat obtained a radar signal on 138-cm horizontal,

turning away whenever the signal grew louder. The German captain, Hubertus Purkhold, proceeded on a steady course alongside the escort "whose approaches were announced by radar signal." He kept a distance such that the radar signal remained constant at strength 0-1, estimating the escort's range as 5000-6000 metres. Purkhold maintained contact for over seven hours during the night with FuMB and transmitted hourly homing signals and contact reports for the rest of the pack. He reported that "Radar signals were detected every 2-6 min. and were up to 30 sec. in length." During the following day *U-260* held contact in thick fog through use of the hydrophones until late in the afternoon when the visibility improved and eleven other U-boats closed on the convoy. That night the wolf pack torpedoed nine ships from ONS 154 in a few hours, a feat made possible by *U-260's* superb shadowing. One of the worst disasters in Canadian naval history could have been averted if the escort group had not been using metric radar.<sup>51</sup>

The RCN followed up the lone success of ONS 154 - the sinking of *U-356* — by destroying five more U-boats during the winter of 1942-1943, making it another period of concentrated success. The Torch corvettes accounted for three enemy submarines in January and February. HMCS *Ville de Quebec*, *Port Arthur*, and *Regina* had all received type 271 before taking part in Operation Torch. In any event, the two Italian submarines, *Avorio* and *Tritone*, probably did not have the search receiver. Similarly, the RCN escorts that destroyed *U-87* and *U-163* in March, HMCS *St. Croix*, *Shediac*, and *Prescott*, had centimetric radar.<sup>52</sup>

The spring and summer of 1943 proved to be another "bust" in the RCN's cycle of U-boat killing. Canadian escorts shared in the certain destruction of only one U-boat during this period when the Allies achieved a decisive victory over the wolf packs. HMCS *Drumheller*, a type 271-equipped corvette, shared in the sinking of *U-753* on 13 May 1943 with other Allied forces. *Drumheller* possibly also shared in the sinking of *U-338* in September 1943, but the evidence was not conclusive enough for credit to be given. The RCN's failure to take part in the heavy U-boat sinkings of the spring and summer had more to do with the deployment of its escort fleet than with its state of readiness. Allied special intelligence permitted the Canadian-escorted convoys to evade the wolf packs or meet them on favourable terms, with British support groups reinforcing the close escort. The clashes that did take place did not involve RCN ships for the most part.<sup>53</sup>

Allied aircraft and support groups supplanted close escort groups as the prime U-boat killers during the summer of 1943. Centimetric radar enabled aircraft to take the offensive again by neutralizing Metox. Aircraft claimed most of the kills during this phase, the golden age of maritime air.<sup>54</sup> The RCN now needed to form support groups and/or acquire escort carriers — surface forces assigned to hunt submarines as their primary task — if it wanted to become a major U-boat killer again. Its next official kill did not come until November 1943, when the Canadian support group EG 5 destroyed *U-536* to lead off yet another intensive period of U-boat killing by the RCN during the winter and spring of 1944.<sup>55</sup>

Traditional interpretations have blamed the drought in the autumn of 1942 on a lack of training or equipment, and have considered it characteristic of Canadian inefficiency throughout the early years of the war. Naval historians have been unaware of the role of Metox in preventing Canadian warships from sinking German U-boats, revealed only through a careful reconstruction of convoy battles using available Allied and

German sources. The revelation of the underlying cause of the drought has permitted a re-evaluation of the anti-submarine performance of the RCN in a more favourable light. Except for this brief period of technological inferiority, Canadian naval escorts were more than capable of destroying enemy submarines when circumstances afforded them the opportunity. Unfortunately, the events of the autumn of 1942 had a decisive impact on the reputation of the RCN, shaping the impressions of Allied naval officers and historians of the war at sea.

## NOTES

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1. Joseph Schull, *Far Distant Ships: An Official Account of Canadian Naval Operations in World War II* (Ottawa, 1950), 131-141.

2. Tony German, *The Sea is at Our Gates: The History of the Canadian Navy* (Toronto, 1990), 124-130.

3. Marc Milner, *North Atlantic Run: The Royal Canadian Navy and the Battle for the Convoys* (Toronto, 1984), 151.

4. Marc Milner, *The U-boat Hunters: The Royal Canadian Navy and the Offensive against Germany's Submarines* (Toronto, 1994), 11-13.

5. Directorate of History, National Defence Headquarters (DHist), 90/437, R. M. Coppock to Giovanni Corsetti, 15 December 1982.

6. W. A. B. Douglas and Jurgen Rohwer, "The Most Thankless Task Revisited: Convoys, Escorts, and Radio Intelligence in the Western Atlantic, 1941-3," in James A. Boutillier (ed.), *The RCN in Retrospect, 1910-1968* (Vancouver, 1982), 193-207.

7. DHist, 79/446, "Befehlshaber der U-Bootes (BdU) War Diary," November-December 1941 and January-February 1942. See also Michael Gannon, *Operation Drumbeat* (New York, 1990); and Michael Hadley, *U-boats against Canada: German Submarines in Canadian Waters* (Kingston, 1985).

8. Robert C. Fisher, "Return of the Wolf Packs: The Battle for ON 113, 23-31 July 1942," *American Neptune*, LXI, No. 1 (Winter 1996), 45-62.

9. Robert C. Fisher, "Axis Submarine Losses to Canadian Forces," appendix in David Bercuson and J. L. Granatstein, *Dictionary of Canadian Military History* (Toronto: 1992), 246-248.

10. Fisher, "Axis Submarine Losses," 246-248.

11. Shawn Cafferky, "'A Useful Lot, These Canadian Ships': The Royal Canadian Navy and Operation Torch, 1942-1943," *The Northern Mariner/Le Marin du nord*, III, No. 4 (October 1993), 1-17.

12. Milner, *North Atlantic Run*, 220-229. Canadian escort groups withdrew from the mid-ocean because of British concerns about the level of training on Canadian ships (96-97).

13. See, for example, G. N. Tucker, *The Naval Service of Canada: Its Official History* (2 vols., Ottawa, 1952), II, 457.

14. Cafferky, "'A Useful Lot'" 6-12.

15. Great Britain, Ministry of Defence (Navy), *The U-boat War in the Atlantic, 1939-1945* (3 vols., London, 1989), II, 42-43.

16. Great Britain, Admiralty, Naval Intelligence Division, Interrogation of Survivors of *U-353*, 13-14, DHist, 80/582, Item 14. Some sources say FuMB 1 intercepted signals on wavelengths between 1.3 and 2.6 metres.

17. Derek Howse, *Radar at Sea: The Royal Navy in World War II* (Annapolis, 1993), 142-143.

18. Approximately 102 of 113 British and British-controlled corvettes (mostly Norwegian and Free French) had type 271 radar by September 1942.
19. Norman Friedman, *Naval Radar* (Annapolis, 1981), 195-196 and 201-202.
20. Howse, *Radar at Sea*, 116 and 277-278.
21. The corvettes were HMCS *Barrie*, *Bittersweet*, *Trillium*, and *Eyebright*.
22. *The U-boat War in the Atlantic*, II, 42-43; and DHist 79/599, Great Britain, Air Ministry, Air Historical Branch, "The RAF in Maritime War," III, 487.
23. DHist, 80/582, Item 14.
24. "The RAF in Maritime War," III, 487; and DHist, 80/582, Items 14 and 16.
25. See for example, Stephen Roskill, *The War at Sea, 1939-1945* (4 vols., London, 1954-1961), II, 205; John Terraine, *The U-boat Wars, 1916-1945* (New York, 1989), 479; and "The RAF in Maritime War," III, 487.
26. See, for example, "The RAF in Maritime War," III, 487, which makes this claim.
27. DHist, 80/582, Items 14 and 16.
28. DHist, 83/665, *U-599*, War Diary (Signals only), 18 September 1942; and BdU War Diary, 17-18 September 1942. *U-258* also used FuMB against SC 100. Two of the escorts, HMCS *Trillium* and HMS *Nasturtium*, had type 271 radar.
29. DHist, 83/665, *U-258*, *U-71*, and *U-437*, War Diaries, 16-19 October 1942. One of the escorts, HMS *Celandine*, had type 271 radar.
30. DHist, 83/665, *U-602*, *U-575*, and *U-624*, War Diaries, 27-29 October 1942.
31. DHist, 83/665, *U-71*, War Diary, 2-4 November 1942.
32. DHist, 83/665, *U-571*, War Diary, 1-3 November 1942.
33. Howse, *Radar at Sea*, 86.
34. DHist, *U-84* and *U-521*, War Diaries, 14 November 1942.
35. *U-89*, *U-132*, *U-438*, *U-454*, and *U-704* reported technical problems with their FuMB during the battle.
36. DHist, 83/665, *U-704*, War Diary, 2 November 1942.
37. W. A. B. Douglas, *The Creation of a National Air Force: The Official History of the Royal Canadian Air Force* (2 vols., Toronto, 1986), II, 527-528.
38. DHist, 83/665, *U-521*, War Diary, 16 November 1942.
39. DHist, 83/665, *U-522*, War Diary, 18-19 November 1942. The possibility of Allied infra-red detection preoccupied the Germans through 1943-1944.
40. It has been generally believed that B6 also sank a U-boat, *U-184*, during the battle for ONS 144, but recent research has disproved this claim. The submarine radioed base hours after it was supposedly destroyed.
41. "The RAF in Maritime War," III, 522. The RAF narrative cites a letter from Winston Churchill to Harry Hopkins on 20 November 1942 which pointed out that centimetric radar "could not be detected by the enemy device."
42. National Archives of Canada (NAC), RG 24, Vol. 11335, NSS 8280-SC109, HMCS *Skeena*, Report of Proceedings, SC 109, 1 December 1942; and DHist, 83/665, *U-43*, War Diary, 16-19 November 1942. HMS *Winchelsea*, HMCS *Gait*, and HMCS *Wetaskiwin* had type 271 radar. The two Canadian corvettes had it installed in Halifax before sailing with SC 109.
43. NAC, RG 24, Vol 11320, NSS 8280-ON 149, HMS *Broadway*, Report of Proceedings, ON 149, 7 December 1942.
44. NAC, RG 24, Vol 6796, NSS 8375-4, Commander G. A. Worth, RCN, to Chief of the Naval Staff, 24 December 1942.

45. David Zimmerman, *The Great Naval Battle of Ottawa* (Toronto, 1989), 84. Forty of the RCN's eighty-six destroyers and corvettes carried type 271 by 24 December 1942.
46. HMCS *Skeena*, *Sackville*, and *Arvida* had centimetric radar installed during the lay-over between SC 109 and ONS 152.
47. BdU War Diary, 17 December 1942. See also Karl Doenitz, *Memoirs: Ten Years and Twenty Days* (Annapolis, 1990), 231-232.
48. Doenitz, *Memoirs*, 266-267 and 339.
49. "The RAF in Maritime War," III, 487-494 and 522.
50. NAC, RG 24, Vol 11332, NSS 8280-ONS154, HMCS *St Laurent*, Report of Proceedings, ONS 154, 3 January 1943; and HMCS *St Laurent*, Report of Attack on U-boat, 27 December 1942.
51. DHist, 83/665, *U-260*, War Diary, 27-28 December 1942; and Jurgen Rohwer, *Axis Submarine Successes. 1939-1945* (Annapolis, 1983), 143-144. *U-664* and *U-203* also made FuMB detections during the battle.
52. See Cafferky, "'A Useful Lot,'" 1-17, for more details of these sinkings.
53. Milner, *U-boat Hunters*, 37-39; Milner, *North Atlantic Run*, 239-240; and DHist, 90/437, R. M. Coppock, "Loss of *U-338* in September 1943."
54. See Milner, *U-boat Hunters*; and David Syrett, *The Defeat of the German U-boats* (Columbia, SC, 1994), for a description of this period.
55. Milner, *U-boat Hunters*, 78-84.