

# **Tribal Warfare**

## **The 1935 Tribal Class Destroyer Design in Commonwealth Service**

**By Ian Pfennigwerth**

By the 1920s, the design of destroyers for the Royal Navy had essentially stabilised around proven principles– they were smallish, sturdy ships with good sea keeping capabilities and a modest range, adequately armed with surface weapons and torpedoes, and with a relatively fast speed. The genre also had the advantages of being of relatively simple design which made them easy and cheap to construct, useful qualities when they were regarded as ‘expendable’. However, by the 1930s some British rethinking of the characteristics of an ‘ideal’ destroyer was prompted by the appearance of newer and bigger models in the orders of battle of other navies. These were not only larger in size, with enhanced range and seakeeping qualities, but they were able to mount more and larger guns. As well, other navies were showing interest in improved defence against air attack, something that had been neglected in contemporary British destroyers.

The British Admiralty was an interested bystander to these developments, many examples of which were being built in Britain for other navies. Both Thornycroft and Yarrow had designed and built ‘super destroyers’ for Dutch, Yugoslav and Polish clients, and the French had produced their own super destroyer class.<sup>1</sup> Since these were regarded as ‘friendly’ navies, it was not until the details and performance of the Japanese *Fubuki* became known that the Admiralty took serious notice of this trend.<sup>2</sup> That class mounted six 5-inch [127mm] guns and nine ‘Long Lance’ torpedoes in a 1750 ton displacement hull capable of 35 knots.<sup>3</sup>

The reason for building larger destroyers (with a heavy gun armament at the expense of torpedoes) was to match the gun power of the larger destroyers being built by foreign powers, especially the 23 Japanese destroyers of the “Fubuki” class.<sup>4</sup>

Finally, in 1934 the decision was taken that a new class of ‘V Leaders’ – larger ships to act as the leader of flotillas of other destroyers - should be constructed. The principal characteristics were to be a displacement of 1850 tons – within the extant

naval arms limitation treaty limits, ten 4.7-inch [119 mm] guns in twin mountings, torpedo tubes, good communication and plotting arrangements, a top speed of 36 knots and a range of about 5,500 nm at 15 knots. The main armament was to be able to be elevated to 40°, so that it could be used against aircraft, a good short range anti-aircraft outfit was to be provided, the ship was to carry ASDIC, and a communications DF set was to be fitted. This design seemed to cover all the foreseen roles of destroyer leaders into the next decade, which were spelled out as:

Patrol work, shadowing, screening, close support of destroyer flotillas and, in conjunction with cruisers, reconnaissance and escort duties. It is further required, though not as a primary function, that the V leader be able to contribute to the AA defence of the Fleet, convoys and harbours. <sup>5</sup>

By March 1935 the Director of Naval Construction had prepared five variants of the design for the new ships, of which two – one with five 4.7-inch mountings and another with four - went forward for Admiralty Board consideration. The desire for better AA protection won the day, and the fifth mounting was deleted in favour of additional short range weapons. The final agreed configuration was four twin 4.7-inch so-called ‘high altitude’ (40° elevation) mountings in the A, B, X and Y positions, with one quadruple 2-pound pompom mounting forward of the mainmast. Two quadruple 0.5-inch machine gun mountings were sited between the funnels. A quadruple launcher for Mk IX torpedoes was carried on the upper deck abaft the after funnel; the deletion of a fifth tube was to allow for the additional as-built weight of the 4.7-inch mountings over their design weight.

The ships were to be fitted with a retractable Asdic at the bow. Depth charge throwers were mounted on the superstructure on either side of the mainmast and two depth charge racks at the stern completed the ships’ armament. Size, displacement, speed and fuel consumption requirements dictated, to a major extent, the amount of ammunition that could be carried for these weapons. The designed capacity of the main armament magazines was for 2,400 rounds and AA capacity was 14,400 rounds of 2-pdr and 10,000 rounds of 0.5-inch. 30 depth charges could be carried, but there were no reloads for the torpedo tubes. Experience in wartime operations was to

demonstrate deficiencies in these capacities, particularly in AA, nor did the fire control system match the threat that was to materialise. As one author expressed it:

The system worked quite well provided the ship remained steady, the target aircraft flew straight and level, the guns did not have to fire at more than 40° elevation, and that the attacks did not total more than five minutes, otherwise all the AA ammunition would have been used up.<sup>6</sup>

Unfortunately, the enemy was singularly unobliging in meeting these parameters and British AA weapons were as singularly unsuccessful in destroying aircraft.

All this weaponry and the 190 men to man it, keep the machinery running and feed and administer the ship and her company were to be borne in a hull 377 feet long [114.9 m], with a maximum beam of 36.5 feet [11.1m] and a maximum draft of 9 feet [2.7m]. The displacement came in neatly at 1854 tons. The ship was to be propelled by the steam from three Admiralty three-drum boilers operating at 300psi and the turbines would convert this to 44,000 shaft horsepower, which would drive her at 36 knots flat out. The 540 tons of furnace fuel oil carried would enable her to steam 5,700 nm to endurance at 20 knots, but her range would diminish rapidly if higher speeds were maintained. The concept of unitised engineering plant was not proceeded with, nor was a single funnel. Both would have been more expensive but better for the ship in damage control and fire direction.

All in all, the naval staff got a pretty impressive ship which met or exceeded all their requirements. Not only that, but in a marked departure from some British ship designs of the period, the designer 'had in mind the desirability of having a good-looking ship in the hope that the officers and men would be proud of her appearance'. Most would agree that he met this criterion admirably. The new commanding officer of an RAN Tribal was moved to record his, perhaps not totally unbiased, view:

Over and above the material facts shone out the appearance of the ship. Whichever way you looked at a Tribal class destroyer, she was not just handsome – she was beautiful. The balance between hull and superstructure and the proportions of her two funnels were perfect. Add to this the strong

clipper bow with a graceful sheer, running back to the break of the fo'c'sle, and you have a word picture that does not do justice to the actuality of the best looking destroyers ever built.<sup>7</sup>

Finally, the design price estimate had been around £S340,000, but in practice this was exceeded by a wide margin of around 50 per cent, with most of the ships being delivered at around £S515,000. However, that would not be discovered until the contracts for building the ships were put out to tender: there's nothing new in defence acquisition cost blowouts! The 1935 Naval Estimates had funding for seven ships and tenders for this first batch were let on 10 March 1936. The orders for the second batch of nine, part of the 1936 estimates, were placed in June the same year. Seven yards were involved - Vickers-Armstrong Tyne, William Denny at Dumbarton, Fairfield and Alexander Stephen, both at Govan, Scotts Greenock, Swan Hunter at Wallsend and Thornycroft in Southampton. The first ship of the class to be delivered was HMS *Afridi*, launched by Vickers in June 1937 and commissioned on 3 May 1938. As first of class she was subjected to the full range of acceptance trials and, when all the ships had been delivered, the British Tribal project was virtually complete.

Wartime experience showed some defects in the design and armament of the Tribals. They were not the more stable gun platforms that their boosters had predicted, and the deficiencies in the AA armament became very evident once the Stukas of the *Luftwaffe* entered the picture. Moreover, there appeared to be a weakness in the structure of the forward part of the ship, especially around the break in the forecastle, with cracking frequent and damage from operations in rough weather routinely requiring dockyard repairs. Perhaps the ships were pushed too hard, but the fact remains that repairs for damages caused by adverse weather was a regular feature in ships of the class until remedial action was taken. A former RN Tribal sailor recalled that:

They were good ships alright, but it was the men that mattered. You don't know what it was like, with the cold and the wet and all. Sometimes, every time you jumped out of your hammock you'd land in water up to your knees.

You were cold and wet and tired and hungry and scared and sick. You were always being thrown about. Sometimes you couldn't stand upright for weeks on end. It was awful.<sup>8</sup>

Without seeking to launch any controversial discussion or arcane naval architecture debate over the merits of various ship construction schools of thought, the cracking problem could have been in the adoption of the longitudinal framing as opposed to the more commonly-used transverse framing method. The designers also expected the shell plating to provide more support for the frames structure than was normal, hence the requirement for special, high-tensile steel. Tank testing had shown that the worst speeds for pounding and shipping water over the bow for Tribals was between 20 and 25 knots, which was very probably the speed at which they were required to operate for much of the time.<sup>9</sup> From late 1940 the hulls of surviving RN ships were stiffened, and these alterations were built into the Australian and Canadian-built ships.

The failure of the ships' AA weaponry led to 'X' 4.7-inch mounting being replaced with a twin 4-inch [104 mm] mount, commencing in the latter half of 1940, and the fitting of 20mm Oerlikon guns on the Bridge superstructure. Other changes included the lopping of 1.3m from the after funnel to provide better A arcs for the AA weapons, the replacement of the tripod foremast with a lattice and the fitting of 'goalposts' in place of the original mainmast. Underwater, the bilge keels were enhanced to improve their stability

Australian interest in the Tribal Class arose out of a process of tedious dickering over the replacement of the WW1- vintage light cruiser *Brisbane*. The cash-strapped Commonwealth Government was interested in finding ways to escape from its commitment to maintain the cruiser as part of the Empire total allowed under naval arms limitations treaties, which had been negotiated by the British. The Admiralty – and the Australian Commonwealth Naval Board – (ACNB) – were equally keen that this should not happen. The politicians called for options for ships to be constructed in Australia; the Admiralty suggested sloops, while conceding that these would not replace a cruiser. ACNB used its back-channel with the Admiralty to promote a better option and for the first time, Tribal Class destroyers were mentioned. ACNB was excited at the prospect, the Government less so. The Minister for External Affairs

suspected – correctly – that collusion between the Admiralty and ACNB was dictating the flow of the discussion, and had the Chief of Naval Staff sent to London with extremely narrow riding instructions to find a solution.<sup>10</sup> What actually happened was that Australia wound up buying all three Modified Leander Class light cruisers from the RN and committed itself to building both sloops and Tribals, but to tell how that all came about is a long story and not part of this discussion.

One Australian yard, Cockatoo Island Dockyard in Sydney, had the capacity to build destroyers, having assembled *Brisbane* and then constructed her sister *Adelaide* - at such a leisurely pace that she was christened 'Ever delayed'. Nevertheless, the capacity, skill and managerial ability were all present, as were the steel mills and boiler shops. Cockatoo Island had also enjoyed a long association with Vickers, and many of its skilled craftsmen had been trained at Barrow-in-Furness before coming to Australia. In 1937 Vickers took a small financial stake in the company and in 1938 gained a seat on the Board.<sup>11</sup> All this was very advantageous to Cockatoo Island, as it eased the exchange of information, particularly drawings, required to build the destroyers. At that time, Admiralty practice was for the builders to do most of the detailed design, and hence to produce their own drawings.

Cockatoo Island was not immune from a general shortage of skilled labour in Australia at the time, nor from the union militancy which was to dog shipbuilding and other industrial activities throughout the war, but it did have the experience and skills to construct the major parts of a Tribal Class destroyer, except the armament and some of the auxiliary machinery and sensors. These had to come from the UK, and delays in delivery did impact upon the commissioning of these ships. Nevertheless, the Government was keen to start, and in December 1938 invited Cockatoo Island to tender for the work of building two destroyers, advising as well that preliminary work was authorised in advance of the tender being accepted.

The Company's tender was submitted on 10 July 1939, on a fixed price incentive basis, with a maximum price of £A720, 000 each. The order was placed on 6 October 1939, and the first ship, *Arunta* was laid down on No.1 slipway on 15 November 1939. The keel of *Warramunga* was laid on the new

No.2 slipway on 10 February 1940, the day HMAS *Warrego* [the final sloop order of four] was launched by Mrs Menzies, wife of the Prime Minister.<sup>12</sup>

The names chosen for the two ships, and a third ordered in February 1940, were those of Australian aboriginal tribes, in keeping with the tribal theme adopted by the British, and the same convention was later followed by the RCN in naming their ships. There was, however, to be a departure from the convention for the third Australia Tribal, to be recounted later.

On 30 November 1940, *Arunta* was launched by the wife of the Australian Governor-General. It was a day of filthy weather and the official party had been delayed in getting to the Island until well past the high tide. She slid obediently down the slipway and then stopped, to much embarrassment, having missed the tide. However, she finally entered the water the following day, without damage. Given her subsequent career, this hitch in her launch certainly brought no ill-omen with it. Her fitting out was delayed by the late arrival of some British equipment but she finally commissioned on 30 April 1942. Sister *Warramunga* commissioned on 22 December 1942. These ships had the new standard armament of three twin 4.7-inch mounts in A, B, and Y positions and a twin 4-inch [102mm] mount in X position. Depth charge throwers, 2-pounder pom pom mounts 20 mm Oerlikons and torpedo tubes completed their weapons suites. On trials *Arunta* recorded a speed of 35 knots but her sister registered 36.65 knots; *Warramunga*, even now, remains the fastest monohull ship the RAN has ever owned.

Canada's entry into the exclusive club of Tribal owners was even more dramatic than that of the RAN. Although Canada had been represented at the 1909 Imperial Conference which finally gave the go ahead for the Dominions to have their own navies, the 'fleet unit' concept was not adopted to build a Canadian navy. While the Australians had operated a battle cruiser and light cruisers, together with destroyers and submarines, during WW1, and was now the possessor of two heavy and four light cruisers plus an expanding number of destroyers and smaller escorts, the RCN had played little part in the first war and had been reduced almost to invisibility after that conflict ended. The reasons for this disparity are complex but include the Quebec factor in any discussion on Canada's contribution to imperial defence, the fact that

Ottawa is a long way from the sea, that the threat was thought to be limited to the North Sea, and that relatively few Canadians have much to do with maritime affairs. But the upshot was that Canadians had no warm glow of reminiscences of the Great War at sea – no recall of the expulsion of the Germans from New Guinea under the guns of the Australian Fleet, no pride in owning the first Empire warship to penetrate the Dardanelles, no image of a Sopwith Pup lurching off the forward turret of an Australian light cruiser in a world's first, no recollection of their battle cruiser *Australia* leading a column of German warships into Scapa Flow to surrender. And Canadian housewives did not make their scones, cakes and biscuits from flour out of a packet on which the image of the nation's favourite cruiser was displayed – *Sydney* Choice Flour in Every Home!

By 1938, two old destroyers were the main element of the RCN order of battle, but the Canadian Chief of Naval Staff, Vice Admiral Nelles, was intent on changing that situation as soon as possible. It is said that when he saw a photograph of the Tribals he exclaimed; 'I want those for my Navy!'<sup>13</sup> This was, as things turned out, a lot easier said than done. The Canadian Government was extremely concerned that Canadians should not be drawn into fighting in Europe as they had been in 1914, and was intent on retaining control over its forces, including the RCN, rather than seeing them pass into the hands of the British. Acquiring or building ships that would be attractive to the British as reinforcements for their own forces around the British Isles was to be avoided, if possible. However, at the time, the main threat to Canadian sovereignty and trade was seen to be the commerce raider, a prediction which proved correct as far as it went.

Half again as big as big as the RCN's existing destroyers, and mounting a gun armament fully twice as heavy, the new ships were virtually light cruisers that would stand a fighting chance against any but the heaviest Axis raiders. They also carried anti-submarine weapons, Canada's other main requirement, and yet were considerably smaller and cheaper than full fledged cruisers. Unlike cruisers, moreover, there was a realistic possibility that construction of Tribals might be within the capacity of Canadian yards.<sup>14</sup>

A serious brake on any Canadian Tribals program was the inability of Canadian yards to undertake any construction of significantly complex ships and the extremely small base of skilled manpower on which to develop the necessary manpower and skills. This became moot when the British asked for and got Canadian commitments to construct and man a range of smaller and simpler anti-submarine escort ships for North Atlantic convoy protection. The program absorbed the available manpower and demanded extreme measures to train more, and also tied up the limited Canadian shipbuilding capabilities. One consideration which did not have to enter into Australian or British ship construction planning was the fact that many of the best-equipped Canadian shipyards were situated on the Saint Lawrence River, which ices over in winter.

Admiral Nelles was clearly undeterred. His concern, and that of his senior staff, was that if the RCN was to end the second conflict with a fleet of low-technology, low cost corvettes and the like it would be condemned to the same near-death experience that had followed the first war. The possession of substantial modern fighting ships in the RCN order of battle would, it was believed, stay the Government's hand because they would have 'involved too much investment in time and money to be scrapped easily', especially if the Canadian navy had gained for itself a reputation for effectiveness and gallantry, and had demonstrated its utility as a fighting service in defending Canadian interests. Leaping ahead and out of this story for a moment, by the end of the war the RCN had got itself involved in not just big destroyers but cruisers and aircraft carriers as well although, unfortunately, except for the destroyers, without much of the glory that had been hoped for.

But in January 1939, CNS had the Canadian Government on side and had persuaded the politicians to fund new construction to build up the RCN to a force of eighteen destroyers, eight anti-submarine vessels, eight motor torpedo boats, and two 'parent' vessels. This force included two Tribal Class. By late 1939, Nelles had added 46 additional ASW escorts to the bill. How to actually produce, equip and man all these ships became a major problem for the Navy, the Canadian Government and Canadian industry, but to Nelles must go the credit for steering this ambitious program past the rocks and shoals of Canadian political and fiscal realities – a significant achievement with ramification for both the wartime and post-war RCN.<sup>15</sup>

The Admiralty was keen to get its hands on any ships the Canadians might construct, and would certainly welcome some more Tribals. The class had been fully involved in the various aspects of the war, with some successes and some losses. Even before hostilities began, three of the ships had been involved in the search for and rescue of survivors from the sunken submarine HMS *Thetis*. When the war broke out they had been deployed, largely with the Home Fleet, and engaged in convoy escort, searches for German raiders and blockade runners, and sweeps trying to locate German capital ships. *Somali* was the first British ship to seize a prize in World War 2, while in February *Gurkha* sank a German submarine. Germans weren't the only quarry. In June 1940 *Tartar* and *Mashona* 'seized control of' two Swedish destroyers, which were later released. The Tribals were fully engaged in the operations in Norway during which *Gurkha* and *Afridi* were lost to bombing – the first British warships sunk by aircraft - and *Punjabi* and *Eskimo* were damaged, the latter having her bows blown off back to B turret. Norway was also the scene of one of the most famous incidents of the war when in February 1940 *Cossack* rescued Allied prisoners from the German supply ship *Altmark* by boarding in the Hornblower tradition.

The class later took part in the operationally important tracking down and destruction of German weather ships, and the seizure of their code and cipher machines. *Tartar* caught two in March and June 1941, and *Somali* captured another in May, with *Bedouin* and a repaired *Eskimo* in company. *Matabele* and *Punjabi* caught and sank another in October. The Enigma machines and settings were priceless in the war against the *Kriegsmarine* for the codebreakers. *Punjabi* was involved in the evacuation of British French and Polish forces from France in August 1940, and in the attack on Dakar. But *Mashona* was lost to German aircraft off Ireland while returning from the hunt for and destruction of the German battleship *Bismarck*, an operation in which no fewer than six Tribals took part. In October 1941, *Cossack* was sunk by a German submarine while on convoy duties near Gibraltar.

The Tribals were also fully involved in operations in the Mediterranean where several were lost, but not before extracting a price. *Nubian* took part in the British victories over the Italians at Calabria in July 1940 and at Matapan in March 1941. She was fully involved in the reinforcement of and then withdrawal from Greece and Crete,

and in the latter operation lost her stern to a German bomb. She was saved and repaired to fight another day. *Mohawk* was in the Calabria and Matapan operations but was torpedoed by an Italian submarine in April 1941. Four Tribals were involved in earlier Malta relief operations and in December 1941 *Sikh* and *Maori* and two other destroyers sank two light Italian cruisers in what became known as the Battle of Cape Bon.

But to Canadian requests for skilled technical and managerial manpower, and the infrastructure necessary for the Tribal project, the British had no answer. Their own shipbuilding demands had absorbed all the talent they could muster.<sup>16</sup> Prime Minister Churchill even suggested to his Canadian counterpart that the RCN would be better off to select American designs, and this was indeed examined by a technical mission. Its conclusion was that the concept was both practical and advisable, although the American contemporary destroyer design – the Fletcher Class – had yet to enter the water and was thus unproven. The Tribal was also seen to be cheaper and simpler to build. Nelles once more came down on the side of the Tribal, essentially on the grounds of commonality with the British, an important consideration.<sup>17</sup> But his experts also advised him that the destroyers could not be built in Canada within an acceptable timeframe. Nelles went back again to the Admiralty – could the first flight of Canadian Tribals be built in the UK, with the *quid pro quo* that they would be assigned to the British for operations? The Canadians, for their part, would build corvettes and frigates for the Admiralty. Nelles had a deal – ten corvettes for one Tribal!<sup>18</sup> And that is how the first four RCN Tribals – *Iroquois*, *Athabaskan*,<sup>1</sup> *Huron*, and *Haida* were built by Vickers in Newcastle-on-Tyne. Orders were placed in 1940; *Iroquois* was laid down in September 1941 and commissioned on the last day of November 1942. During their construction, the Canadian Tribals benefitted from the experience of their British predecessors, and their hulls were stiffened, radar was fitted and improved fire control systems were installed.<sup>19</sup> The other three followed in February, July and August 1943. Although the RCN was the last and junior member of the Tribal club, its ships would serve much longer than in either of the other two navies.

Moreover, the contract with Vickers led to the promise of technical and personnel assistance with a home-grown Canadian construction program. In June 1941 orders

for two Tribals were placed with a Halifax shipyard, with a second pair ordered in early 1943. The decision was, in great part, a political one, and the difficulties in gearing up this yard and keeping the pressure on it to advance the Tribals' construction consumed a great deal of financial and staff effort. The program was delayed almost from its inception; the first two keels were not laid until May 1942, and the first hull was launched in September 1943. Even when launched there were delays in providing the engines for the ships. It soon became apparent that delivery of the first ships would not occur until 1945 and the last of the four on order would not be commissioned until 1948!<sup>20</sup> These two ships featured a Canadian variation which was to be applied to all future ships of the class – the replacement of the 4-7-inch mountings with 4-inch. This had the disadvantage of reducing the ship's range and hitting power, but it did standardise the ammunition to be carried and the maintenance and spares issues.

While these ships were under construction in Britain and Canada, the RN Tribals continued to bear the hurts of the battle. *Maori* was sunk at her moorings in Valletta Harbour Malta by German aircraft in February 1942. *Matabele* was sunk with the loss of all but two of her crew by a German submarine on a convoy run to Murmansk in January 1942, and *Punjabi* was cut in two by the battleship *King George V* during another Arctic convoy operation that May. *Bedouin* was lost during another Malta resupply attempt in June after having been damaged in a night engagement with Italian cruisers. *Tartar* joined the escort force for the successful Operation Pedestal to relieve Malta in August. September 1942 was bad month for the Tribals. A raid on Tobruk cost the RN *Sikh*, hit and destroyed by shore batteries with the loss of half her crew and *Zulu*, with *Sikh* survivors onboard, sunk the next day by Italian aircraft. *Somali* was torpedoed in the Arctic and sank while under tow by *Tartar*. Only four of the sixteen ships remained, but they would all survive the war and continue in its prosecution.

On the other side of the world, the RAN Tribals were also making their mark. *Arunta* was employed in protecting the vital Australian east coast convoys carrying raw materials, troops and supplies to the north in preparation for the coming assault on Papua and New Guinea, in the process of which she sank a Japanese submarine in August 1942 during the defence of Milne Bay. In October she was engaged in

operations to clear nearby Goodenough Island of Japanese. *Warramunga* joined her shortly in the joint RAN-USN Task Force 44 under Australian command. Then in January 1943, *Arunta* made a successful evacuation of the guerrillas of Lancer Force from the island of Timor.

While the battle was about to begin in the Pacific, it was well on its way to being won in the Atlantic and in the Mediterranean. The British Tribals were assigned to Operation Torch, the landings in North Africa in October 1942 and then entered the Mediterranean as a screen to prevent the escape of Axis forces back to Europe in early 1943. *Tartar*, *Nubian* and *Eskimo* took part in the invasion of Sicily and *Ashanti* joined them for the Allied landings at Salerno. For a change of scenery, in December *Ashanti* with the Canadian *Athabaskan* were escorts for the Arctic convoy which lured the German battleship *Scharnhorst* out to her destruction off North Cape. *Athabaskan* had been damaged in August by the new German glide bombs in the Bay of Biscay and had spent three months under repair. Her newly-commissioned sisters, *Haida* and *Huron*, were also assigned to the Arctic convoy task, rather than to Atlantic convoys, as these were where their heavier gun power was most likely to be needed against the threat of German surface units.<sup>21</sup>

1943 was a year of intense activity for the Australian Tribals of TF 44 (TF74 from May 1943), culminating in the assault on Cape Gloucester in New Britain on Boxing Day. In the interim, they had supported operations in the Solomons and continued their convoy escort work, as well as covering the unopposed landings on Kiriwina and Woodlark islands to the east of Papua in July. In October the Task Force moved forward to Milne Bay and the destroyers engaged in a series of attacks on targets in western New Britain: they were at last firing their guns in anger. After providing night cover for the operations area, in January 1944 *Arunta* and *Warramunga* provided naval gunfire support for the assault on Saidor in New Guinea.

Thus as 1943 ended there were ten Tribals at sea in the Atlantic and the Pacific, and five building, four in Canada and one in Australia. The original RAN plan for eight Tribals had been quietly shelved and shipbuilding effort was being devoted to modifications and repairs of battle damage, the assembly of the vast numbers of

landing craft which would be required by General MacArthur, and the construction of a force of 24 ASW frigates. Progress on the third RAN Tribal, now named *Bataan* in honour of the heroic stand of MacArthur's forces in the Philippines, slowed. She was launched at Cockatoo in January 1944, but not commissioned until May 1945. The RCN had decided that the last two of its Tribals under construction would incorporate modifications to weapons and sensors similar to those of the new British V and W class, although the 6 x 4-inch gun configuration would be retained. These ships also benefitted from a visit to Halifax by HMCS *Iroquois*, which had a history of storm-induced damage, during which the possibilities for modifying the Canadian build to obviate these issues could be assessed.<sup>22</sup>

1944 saw a surge of activity in all theatres of war, with the Combined Chiefs of Staff in Washington endorsing the two-pronged plan of assault on the Japanese empire through the Central and Southwest Pacific and the Allies completing their preparations for Operation Overlord. For the Tribals in the Home Fleet, this involved a series of operations directed at eliminating German surface and submarine opposition, including sweeps by destroyers backed by light cruisers along the French coast. These generated a number of spirited encounters, in which the British generally came off best, but German resistance was determined and, on occasion, effective. At the end of April *Athabaskan* was stuck in the stern by a torpedo from a German destroyer being engaged and subsequently suffered a secondary explosion which sealed her fate. Only 42 survivors were able to be rescued by *Haida* before she had to manoeuvre clear, and another 80-odd became prisoners of war. During the invasion itself, six Tribals were involved, sinking a number of German ships. *Haida* and *Eskimo* accounted for a U-boat to add to the score. After that, there was little substantive employment for the Tribals, except for the endless escorting task.

In the Southwest Pacific TF74 was involved in all of MacArthur's relentless 'leapfrog' assaults along the coast of New Guinea and offshore islands. Madang and Finschhafen were attacked in late January and then in February and March the destroyers were in the thick of MacArthur's hazardous 'reconnaissance in force' of the Admiralty Islands where, had it not been for their gunfire, his forces would almost certainly have been overwhelmed by the defenders. The following month *Arunta* and

*Warramunga* were at the landings at Tanamerah Bay for the capture of Hollandia. The pace did not slacken: Wakde Island was assaulted on 17 May and the larger Biak ten days later.

These operations imposed somewhat different conditions on the Australian Tribals than the Admiralty designers had in mind. The ships were operating away from major bases and repair facilities for more than two months at a time, refuelling and replenishing at sea until forward bases could be established in recaptured territory. As the CO of *Arunta* reported in December 1943:

By the end of the month the Ship's Company had been aboard continuously for 60 days. Conditions are not easy, but there is no drop in keenness or efficiency. I attribute this to the quality of the men themselves, and to the fact that the ship has been taking an active part in offensive operations.<sup>23</sup>

The ships and their companies were also operating in weather conditions not contemplated by the designers. It was hot and steamy on deck, and even worse below with the ship closed up at Action Stations. A member of *Warramunga's* crew remarked:

These destroyers were not built for tropical conditions and with all 'X' and 'Y' openings [doors and hatches crucial to the ship's watertight integrity] shut, the conditions below deck were similar to a Turkish bath. All the crew were in bomb blast clothing, which meant that long trousers and long sleeved shirts had to be worn. In addition to this, everyone had to wear his 'Mae West' [kapok lifejacket], and guns crews had to wear anti-flash gear which covered the complete head, face and hands.<sup>24</sup>

The assault on Biak provoked the Japanese Combined Fleet into motion; the super-battleships *Yamato* and *Musashi* were ordered to steam to the aid of the Japanese garrison while additional land forces were to be landed by cruisers and destroyers. It was as well that the US 5th Fleet operation against the Marianas diverted the main forces to the central Pacific, because MacArthur and the 7<sup>th</sup> Fleet had nothing to contest it with, except TF74. The destroyers were employed in challenging the

landing attempt, but the Japanese ships fled. After a short break in June, the destroyers were back on the coast of New Guinea in July aiding the US 6<sup>th</sup> Army in defending its positions at Aitape against a Japanese counter-assault.

After Biak and three other relatively minor landings, in Morotai in September MacArthur announced that the next would be at Leyte Gulf in the Philippines – in four weeks. Resistance was expected to be determined and *Warramunga*, in Sydney for a short refit period, was fitted with 40mm Bofors guns in preparation. The actual landing went well and enemy reaction was light, but on 21 October the crash of a Japanese aircraft into HMAS *Australia* revealed a new Japanese weapon, the *kamikaze*. While there was never an entirely satisfactory counter to this, blasting the aircraft to pieces was found to be the only sure way to deflect it. Bofors guns sprouted on ships like mushrooms after rain.

The Japanese naval response to Leyte was an elaborate plan involving deception and an attack on the landing force through two straits debouching into the Philippines Sea. The Australian ships were deployed with the force countering the threat from Surigao Strait and it was there on 25 October that HMAS *Arunta* led a column of Allied destroyers against the Japanese battleships in the last ever battle line action.

Leyte was followed by the assault on Lingayen Gulf on Luzon in early January 1945. Both Australian Tribals were engaged and *Arunta* was hit by a *kamikaze* although fortunately with repairable damage and light casualties. The destroyers supported the amphibious assaults and helped to fight off the incessant and determined *kamikaze* attacks which left few undamaged ships in the Allied force. This was the peak demonstration of their designed role in ‘contributing to the AA defence of the Fleet’.

Meanwhile, *Eskimo*, *Nubian*, and *Tartar* were given minor refits to ‘tropicalise’ them – as if one could – and despatched to join the British Eastern Fleet, then engaged in supporting operations in Burma and raids on Japanese positions in Sumatra. There they were involved in operations similar to the RAN Tribals, including the last surface actions of the war for the RN. The RCN Tribals remained on Arctic convoy duties until the German surrender in May. *Iroquois* was part of the force to escort

surrendered German cruisers into Kiel – a mini-HMAS *Australia* moment 27 years after the first. Then they too were sent home for tropicalisation in preparation for Pacific service.

Right at the end of the war the RAN Tribals were engaged in supporting the landings at Wewak in May and in Borneo in May and June, and in July TF74 was gathered in Subic Bay to prepare for the assault on the Japanese home islands planned for October. Here *Bataan* joined and *Arunta* went south for refit, thus missing the opportunity of witnessing the official Japanese surrender ceremony in Tokyo Bay. Even so, there were three Tribals there – *Nubian*, *Warramunga* and *Bataan*, one a veteran of all the fighting with thirteen battle honours to her credit, and another yet to fire her first shot in anger. They had commissioned six and a half years apart at the opposite ends of the earth.

With the shooting now stopped, but not the work of the navies in restoring and policing the peace, it was possible to sit back and discuss whether the Tribals had proven to be an effective design for the three Commonwealth navies in which they had served. For the British, there was no question that they had played their part fully and actively in operations. They had been effective escorts and scouts, they had engaged enemy surface forces with generally superior results, and they had sunk submarines. Within the limitations of the systems with which they were fitted, they had contributed to AA defence, and their capabilities had been progressively upgraded. They were no more or less vulnerable to air attack than any British warship. Design flaws had been revealed by operational service and fixes had been applied. But the survivors were old and worn out and, in any case, newer designs were available to do the work now required of the RN. All four British Tribals were initially paid off into reserve and then scrapped.

For the Australians, while *Arunta* and *Warramunga* had acquitted themselves with great distinction and had gained many plaudits for their contributions to Seventh Fleet operations, there were some question marks over the Tribals – which might have been a factor in the lack of priority given to the completion of *Bataan*. Their relatively ‘short legs’ was an issue in an operating area distinguished by its vastness and long

distances between replenishment points. Second, the ships were uncomfortable in tropical operations. But the third point is the most telling. Having carried out his inspection of the two ships in October 1944 – yes; that tradition was maintained even though there was a world war going on – Commodore John Collins commanding the Australian Squadron made the following remarks:

In the General Section of my report on both ships I have stated that they are efficient fighting units. This statement is made with the reservation, not promulgated to the ships concerned, that this applies within the limits of their design. It is a hard fact that the “tribals” show up badly against U.S. 2100 ton destroyers, particularly observing the latters’ ability efficiently to engage aircraft targets with their 5-inch guns in both direct and blind fire.<sup>25</sup>

This was, of course, an observation made after the fact. The prospect of the RAN adopting a US destroyer design in 1939 was extremely remote and was never even considered. However, the reduction of the planned total from eight to three, even given wartime pressures on the capacities of Australian yards, reflects at least a degree of rethinking about the value of the Tribals to the RAN. The Australians had successfully operated both the N and Q Class destroyers during the war, so there was a range of British designs against which the evaluation of the Tribals could be made, quite apart from what the US Navy was fielding. The RAN would keep its three ships, but only until something better replaced them. In the meantime, service in the British Commonwealth Occupation Force in Japan would provide plenty of employment for them. *Arunta* and *Warramunga* both served two tours in this role.<sup>26</sup>

In Ottawa, an objective evaluation of the Tribals was more difficult. Nelles and his successor had demanded Tribals from the Admiralty and from their own Government, and had got them. They could hardly now suggest that these were not the ships they had really wanted. Moreover, there were four more in the process of being delivered, at a slow rate, to the RCN. A Canadian capability thought impossible in 1941 had actually been developed and was delivering a product to Canadian specifications; in that sense, the Tribal Class in Canada was at least as important an industrial project as it was a ship design. The project had its critics who, probably correctly, pointed to the diversion of scarce manpower and skill resources into the Tribals and away from what

was the Canadian navy's principal contribution to the war effort – oceanic escorts.<sup>27</sup> But it has to be remembered that the RCN top brass needed their high-value ships to preserve the navy after peace had been declared, and they had certainly achieved that.

As for the performance of the ships, the Tribals were the bright sparks in what had been a pretty gloomy war for the RCN. They had provided escort protection to important ships and convoys, they had sunk submarines, and they had engaged the enemy very closely off the French coast and, with the exception of the sad loss of *Athabaskan*, had emerged triumphant. That was glory, and the Tribals had won it for Canada; their officers would go on to more senior commands with reputations for having driven Tribals streaming like a banner before them. The defects in design and the inadequacy of the armament and control systems could be glossed over, and had not been a particular problem for the Canadians anyway. Even the fact that the ships might now be regarded as somewhat obsolete did not deflect the RCN from its conviction that the effort had been worth the result. And, as events transpired, that was arguably correct. But the immediate response to the end of the war was to terminate the tropicalisation refits of the surviving British-built Tribals and to place them into reserve.

The strategic directions of the defence policies of both Canada and Australia after WW2 were towards collective defence; for Canada this meant membership and obligations under NATO, and the role assigned the RCN was escorting, with a heavy slant towards ASW.<sup>28</sup> Australia worked hard to establish and to gain a key role in British plans for the defence of the Far East, which resulted in 1948 in the ANZAM agreement for the defence of Malaya and Singapore. Based on the intelligence reaching the Governments and defence planners, this also involved a heavy commitment for the RAN in ASW. These decisions had clear and immediate impacts on force structure planning for both navies, with ASW frigates assuming a higher priority than the big-gun destroyers, at least in Canada. The RAN had already been committed to an ambitious naval reequipment program, involving aircraft carriers and two new classes of destroyer, as well as the conversion of Q Class destroyers to the fast ASW frigate role.

It soon became very clear to the RAN that its reequipment program was in serious trouble on two grounds. First, the Government's national reconstruction program was draining skilled trades out of shipbuilding and sequestering resources for other purposes. Second, many permanent-service navy personnel were heading in the same direction for better conditions and more pay. The stopgap measures adopted until the new ships could be completed and more men recruited saw ships paid off into reserve and a renewed prominence for the Tribals in future plans

Canada took similar measures, with an upgrading of the ASW capabilities of the Canadian-built Tribals to fill the gap until the new St Laurent Class frigates appeared. The first of these ASW conversions was *Nootka*, which had commissioned in August 1946 and underwent conversion work in 1949-50, and *Iroquois* emerged as an ASW destroyer in 1951.<sup>29</sup> *Micmac*, the first of the Halifax ships, and which served her entire career in the RCN as a training ship, was fully converted in 1952. *Haida* was recommissioned in a training role in 1947, and this was also the function of *Athabaskan II*, the last of the Halifax-built Tribals, which commissioned in January 1948. The principal changes to the original designs were the replacement of X mounting with a US 3-inch/50 twin mounting with its own separate fire control system, the removal of depth charges and the replacement of Y mounting with a bomb room, handling gear and two Mk IV 'Squid' ASW mortars.<sup>30</sup> *Haida* completed the major modernisation and ASW conversion program in 1952 before deploying to Korea for the first of two tours. *Cayuga* and *Huron* followed her in 1952, and *Athabaskan* in 1954.

Thus, when the North Koreans crossed the border into South Korea on 25 June 1950, both navies had at least one Tribal Class destroyer, modified or unmodified, available for service with the United Nations. The Australian Government committed both the BCOF duty ship the frigate *Shoalhaven*, and *Warramunga* which sailed from Sydney on 6 August, and commenced operations on 25 August.

The Canadians were quicker off the mark with their Tribals. The RCN's West Coast Command had three ships in commission – two Canadian-built Tribals, *Cayuga* and *Athabaskan* and the V Class destroyer *Sioux*, the two former just emerging from refit or going into it.<sup>31</sup> However, by 5 July all three were ready for deployment and sailed

for Korea, calling at Pearl Harbor and Guam before reaching Sasebo in Japan on 30 July.<sup>32</sup> They were soon in action convoying ships from Japanese ports to Korea, and on 15 August Cayuga fired her first shot in anger, and the first Canadian gun of the Korean War.

A principal concern for both the RAN and RCN was logistics support for their ships which, in large part, had to come from the British, and from a reserve of ammunition and stores built up at the BCOF naval base in Kure. Neither accepted RN food, the Australians supplying their own and the RCN taking USN rations.<sup>33</sup> As most of the British ships had 4-inch guns, ammunition supplies for the RCN Tribals were not a problem, but the Australian 4.7s were orphans. One advantage the Canadian Tribals had over the other Commonwealth ships was a superior high-definition surface warning radar,<sup>34</sup> especially useful in spotting the mines which the North Koreans became adept at laying, especially off the west coast.

Neither navy had a great part in General MacArthur's amphibious masterstroke at Inchon, which halted and then drove back the North Koreans. Indeed, at the time the RCN ships were released for R&R in Hong Kong in November 1950, there were plans for them to be sent home.<sup>35</sup> These were rapidly cancelled when the Chinese threw their weight behind the Koreans later that month, and the pattern of operations for the UN naval forces then settled into a succession of high-value asset protection tasks against a perceived submarine threat – especially for aircraft carriers from the UK, USA and Australia, coastal patrol and inspection, harassment of enemy forces, interdiction of enemy transportation, searching for and eliminating mine-laying junks – at which *Nootka* was particularly successful, and guerrilla warfare, especially on the shallow west coast with its myriad of islands. The Canadian ships were also involved in the long-running blockade of Wonsan by the UN forces.

High points for the Tribals were few, except for the evacuation and destruction of Chinnampo ahead of the advancing Chinese in December 1950.<sup>36</sup> The demolition of railway bridges and rolling stock on the east coast – 'train-busting' - became the principal excitement and task for the destroyers' guns, although *Warramunga* had a torrid few weeks off the coast close to the Soviet border engaged in duels with Korean shore batteries at Chongjin in February/March 1952.<sup>37</sup> The RCN Tribals were also

used in this role, and in October 1952 off Songjin an enemy shell found its mark on B mounting in *Iroquois*, killing three men and injuring ten others. The ship continued her mission.

HMAS *Bataan* provide the naval gunfire support and the operational control for a large-scale raid by Korean guerrillas in the Haeju Gulf in May 1952, which demonstrated that the ships could be most effective in these kinds of isolated and localised operations.<sup>38</sup>

All of the Tribals, except *Micmac* served in Korea for at least one tour, with *Athabaskan* claiming the honour of firing the last shot on 20 July 1953.<sup>39</sup> Both *Warramunga* and *Bataan* had served on operations with the UN forces in rotation with the new Battle Class destroyers *Anzac* and *Tobruk* with their twin 4.5-inch radar-directed turrets, and *Arunta* also served in Korea but only as part of the Patrol Force after the Armistice had been signed.

The Tribals of both navies proved their utility in Korea. Versatile ships with the firepower to take on shore batteries and a draft shallow enough for them to be used in almost every circumstance, they were a valuable addition to the forces of the commanders of naval forces on both east and west coasts. Their fuel consumption was not a problem, given the short distances involved and the availability of afloat support. Indeed the RCN ships set records for underway replenishment never since equalled.<sup>40</sup> They also had a ship's companies big enough to be involved in raiding parties in support of Korean guerrilla bands, a sport indulged in particularly by the Canadians.

*Arunta* had been the first RAN Tribal to undergo a modernisation and ASW conversion similar to the Canadian ships, although the RAN ships retained their 4-inch mountings. She recommissioned in November 1952. *Warramunga* was converted and modernised in 1952-4, but *Bataan* was not, paying off into reserve in October 1954 and being sold for scrap in May 1958. There were more modern ships of the Daring Class to replace her, and her crew was needed to man them.

That would have seemed to have been the final operational deployment for the Tribal class, except for the Malayan Communist Party. Australia was slow to become

involved militarily in the Malayan ‘Emergency’ but was finally tempted in under the cover of the Far East Strategic Reserve, formed in 1955. The old warhorses *Arunta* and *Warramunga* were the first Australian units on station in June 1955, and were relieved six months later. They had been involved in exercising, patrolling the waters offshore of the Malayan Peninsula, and training with Malayan and Singaporean marine forces, but were not required to fire on enemy positions. *Arunta* finally paid off into reserve in July 1956. Sold for scrap, she sank while under tow to Taiwan in February 1969. *Warramunga* remained in commission, with one more tour in FESR in 1958; while deployed she clocked up her half-millionth mile underway since commissioning. In 1959 she was decommissioned and left Sydney under tow for scrapping in May 1961.

The RCN Tribals steamed on for a few more years, involved in NATO exercises and training tasks generally. *Iroquois* played a role in the deployment undertaken by the RCN in support of the US blockade of Cuba during the October 1962 missile crisis,<sup>41</sup> but for most their days of excitement were over. In October 1962 *Iroquois* paid off and was scrapped four years later. *Huron* paid off in April 1963 and was broken up two years later. *Micmac* and *Cayuga* went in 1964 and finally *Athabaskan* in April 1966 – the last of the tribe to decommission. However, one still survives – *Haida*. Paid off in October 1963, she was rescued from the breakers by a group of private citizens and is now a museum ship in Hamilton, Ontario. To walk onboard this beautifully-preserved vessel is to step back into naval design concepts of the 1930s, when ships were tough and their ships’ companies tougher – a reminder of how much has changed.

So, how should a 21<sup>st</sup> Century observer recall and assess the Tribal Class destroyers? They were highly regarded in their day but, as with all ship designs – especially in wartime, they soon passed their peak of effectiveness. As the nature of warfare changed, particularly with regard to AAW, adjustments to their armament were made but, as Commodore Collins noted in 1944, not as fast as required by the threat. The toll of British Tribals bombed to destruction is a telling point, as is the rapid ‘acquisition’ of additional Bofors guns by the Australian Tribals to meet the *kamikaze* menace. At the inception of the Cold War, attention was turned to their ASW capabilities. The modifications made were never tested in battle, but the Tribals

mounted at least as effective an ASW suite as the early 'fast ASW' frigates. And just to show that navies always plan to fight the last war, it was their gunnery systems which were in such demand in Korea.

There is ample evidence that the design of their forward hull structure was insufficient to withstand the hard pounding that the ships received initially in operational circumstances. Once recognised and corrected, this was less of a problem; when damage did occur it was possibly due to insufficient care on the part of commanding officers eager to impress. There were a sufficient number of incidents of damage inflicted on Tribal hull and machinery by the enemy, by wharves, shoals and other ships to show that otherwise they were a hardy platform. Their longevity points to this conclusion as well. *Iroquois* gave the RCN twenty years of service in peace and war, and many others almost achieved this as well. *Warramunga's* half a million miles adds lustre to the story.

Moving away from the operational and technical to the emotional, each of the three navies which operated Tribal Class destroyers thought sufficiently well of them to use their names for new ships. That should not be surprising. Their operational records and the legends which have grown out of them, and the esteem in which their officers and men held them, almost demand that their names and the battle honours won be perpetuated. The British Tribals set the pace in operational performance and achievement. For the Australians and Canadians they were the first modern world-class destroyers they had owned, and they tried hard to live up to the standard set by the British. Thus it wasn't just the appearance of their ships that Tribal destroyer men were proud of, and one could not ask any more of any warship design.

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<sup>1</sup> David Lyon, 'The British Tribals 1935', in Anthony Preston (ed), *Super Destroyers: the big destroyers built in the 1930s for Britain, France, Germany, Italy, Japan and the United States*. London : Conway Maritime Press, 1978,

<sup>2</sup> 'Japanese destroyer Fubuki (1927), on Website <http://en.wikipedia.org/wiki> read 29 July 2009.

<sup>3</sup> United Kingdom National Archives (UKNA) ADM 116/3734 - Tribal and I Class Destroyers: Disposition and Function.

<sup>4</sup> UKNA, ADM116/3734- Tribal and I Class Destroyers: Disposition and Function, letter M02506/27.

<sup>5</sup> UKNA, ADM138/732, 'Ships Cover' Tribal Class destroyers.

<sup>6</sup> Martin H. Brice, *The Tribals: biography of a destroyer class*, London: Allen, 1971, 15.

<sup>7</sup> John Alliston, *Destroyer Man*, Melbourne: Greenhouse Publications, 1985, 136-7.

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- <sup>8</sup> Anonymous, cited in Brice, *The Tribals*. 251.
- <sup>9</sup> UKNA, ADM226/38 – Tribal Class Destroyers - Seaworthiness
- <sup>10</sup> National archives of Australia (NAA) A5954, Item 1005/15 – Visit of CNS to London: Brief Relating to Government's Naval Policy
- <sup>11</sup> John Jeremy, *Cockatoo Island: Sydney's Historic Dockyard*, Sydney: University of New South Wales Press, 19xx 41-2.
- <sup>12</sup> Jeremy, *Cockatoo Island*, 85.
- <sup>13</sup> Michael Whitby, 'Instruments of Security: The Royal Canadian Navy's procurement of the Tribal – Class Destroyers, 1938-1943' in *The Northern Mariner*, 11.3 (1992): 1-15, 1.
- <sup>14</sup> Cited in Marc Milner, *Canada's Navy: The First Century*, Toronto: University of Toronto Press, 1999, 80.
- <sup>15</sup> Roger Sarty, 'Admiral Percy W. Nelles' in Whitby, Gimblett & Haydon (eds), *The Admirals: Canada's Senior Leadership in the Twentieth Century*, Toronto: Dundurn Press, 2006, 77-8, 80-1.
- <sup>16</sup> Dean Chappelle, 'Building a Bigger Stick: Then Construction of Tribal Class Destroyers in Canada, 1940-1948', in *The Northern Mariner*, 5.1 (1995): 1-17, 3.
- <sup>17</sup> Whitby, 'Instruments of Security', 5-6
- <sup>18</sup> Whitby, 'Instruments of Security', 4.
- <sup>19</sup> 'HMCS HURON – Tribal Class Destroyer', at <http://www.naval-history.net/xGM-Chrono-10DD-35Tribal-Huron.htm>, read 17 July 2009.
- <sup>20</sup> Chappelle, 'Building a Bigger Stick', 6-9.
- <sup>21</sup> The Canadians wanted their Tribals to be engaged in the shooting war as destroyers, and not as convoy escorts across the Atlantic. This course of action was most passionately advocated by the RCN Director of Plans in a December 1942 paper, cited in Whitby, 'Instruments of Security', 9-10.
- <sup>22</sup> 'HMCS Iroquois History', on Website <http://jproc.ca/Iroquois/history.html>, read 17 July 2009.
- <sup>23</sup> Australian War Memorial (AWM) 78, Item 40/1 Pt 2, HMAS *Arunta* Report of Proceedings, December 1943.
- <sup>24</sup> Sam Whyte, *HMAS Warramunga*, 42. XXXXXX
- <sup>25</sup> National Archives of Australia (NAA) MP1049, Item 2026/4/172 – Inspection of HMAS *Warramunga* by CCAS 1944.
- <sup>26</sup> G.G.O. Gatacre, *Reports of Proceedings*, 192-205.
- <sup>27</sup> Chappelle, 'Building a Bigger Stick', 10-11, 13.
- <sup>28</sup> Milner, *Canada's Navy*, 199-200.
- <sup>29</sup> 'Nootka's History' at <http://jproc.ca/nootka/history.html>, read 17 July 2009.
- <sup>30</sup> Milner, *Canada's Navy*, 20809
- <sup>31</sup> Meyers, Edward C., *Thunder in the Morning Calm: The Royal Canadian Navy in Korea 1950-1955*, St Catherines Ont.: Vanwell Publishing, 1991, 27-9.
- <sup>32</sup> Thor Thorgrimmson & E.C. Russell, *Canadian Naval Operations in Korean Waters 1950-1955*, Ottawa: Department of National Defence, 1965, 4-5.
- <sup>33</sup> Milner, *Canada's Navy*, 208-9.
- <sup>34</sup> Meyers, *Thunder*, 132.
- <sup>35</sup> Meyers, *Thunder*, 86.
- <sup>36</sup> Meyers, *Thunder*, 98-102.
- <sup>37</sup> Field, James, *History of United States Naval Operations Korea*, Washington DVC. : Department of the Navy, 1962, 425-6.
- <sup>38</sup> Anthony Cooper, 'Commander Warwick Bracegirdle in Korea 1952', in *Journal of Australian Naval History*, 6.2 (2009): 18-50, 25-30.
- <sup>39</sup> Meyers, *Thunder*, 203.
- <sup>40</sup> Meyers, *Thunder*, 119-122.
- <sup>41</sup> Milner, *Canada's Navy*, 233-5.