

Admiralty Orders for Canadian Shipyards: Trawlers, Drifters, and the Urgency of Coastal Defence during the Great War

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La perturbation des importations transatlantiques de Grande-Bretagne par les sous-marins allemands pendant la Grande Guerre a conduit l'Amirauté à construire de petits navires et dragueurs de patrouille côtière, dont 60 chalutiers en acier et 100 dériveurs en bois construits au Canada. Géré par le ministère du Service naval du Canada, ces ordres ont été remplis par les chantiers navals sur la rivière des Grands Lacs et du Saint-Laurent entre 1917 et 1919. Bien que ce programme ait contribué au développement de l'industrie de la construction navale au Canada, la concurrence sur l'acier et la main-d'œuvre qualifiée a eu un impact significatif sur la productivité et les relations de travail.

After years of building dreadnoughts in anticipation of pitched battles on the North Sea, naval hostilities during the First World War were dominated by localized engagements intended to sever supply lines, erode the will to fight, and bring an end to protracted conflict on the continent. In response to Britain's blockade of its ports, German submarines attacked Allied and Neutral merchant ships to prevent imports of over 60 percent of Britain's food, and 80 percent of its wheat.² By September 1915, Germany had sunk about 570,000 gross tons of shipping. A year later, British losses had risen to almost 640 merchant vessels with a capacity of 2,295,329 gross tons, and losses by allies and neutral countries added over 1,000 ships and more than 1,563,650 gross tons to these totals.³ By May 1916, Germany had developed U-cruisers that could cover 12,000 nautical miles and would take the campaign against Allied commerce to the coast of the Americas. The shortage of merchant ships and expansion of the German submarine fleet created a serious challenge to feeding

¹ This work was supported by York University Libraries (research grants and leave); and a Nova Scotia Museum Research Grant.

² L. Margaret Barnett, *British Food Policy During The First World War* (Boston, 1985), xiv.

³ Norman Friedman, *Fighting the Great War at Sea: Strategy, Tactics and Technology* (Barnsley, 2014), 70; Christopher Addison, *Politics from Within, 1911-1918, Including Some Records of a Great National Effort*, vol. 2 (London, 1924), 9-10.

Britain's civilians. The gravity of the situation was summarized by Admiral Sir John Jellicoe, commander of the Grand Fleet, in October 1916: at the current rate of shipping losses, reductions in imports of essential materials, including food, would force the Allies to accept Germany's peace terms by the summer of 1917 regardless of the military situation on the continent.⁴

One of the principal reasons for this crisis was that German submarine design and production outpaced the development of technology to locate and destroy them. Prior to the introduction of convoys in May 1917, British anti-submarine measures largely focused on using a substantial number of slow, lightly-armed steel trawlers to patrol coastal waters in the company of fast yachts and destroyers in an attempt to take the war to the enemy.⁵ Auxiliary patrol groups were considered by the Royal Navy to be its most offensive weapon against submarines, particularly as the approach evolved from patrolling to hunting after the introduction of hydrophones.⁶ Trawlers swept for German mines, and when Britain established "controlled sailings" for Norwegian tonnage travelling to England in December 1916, trawlers provided an escort, a function they would serve close to the coasts on both sides of the Atlantic when transatlantic convoys were introduced the following year.⁷ In addition to towing submarine nets, trawlers patrolled net barriers set across the straits of Dover and Otranto by wooden drifters, which were even smaller coastal vessels used in the herring fishery.

Trawlers were given these roles not just because of their suitability, but because they were readily available as a result of Britain's strength as a fishing nation. The stock of trawlers, however, was quickly depleted. Of the 1,800 trawlers that sailed from British harbours in 1914, the Admiralty requisitioned 1,300 by September 1916, the year that saw a drop in Britain's annual catch of fish by more than a third at a time when domestic food supply was becoming more constrained.⁸ War took a considerable toll on the fishing vessels used by the Royal Navy, with 264 trawlers and 130 drifters lost to submarine attacks, mines, and collisions.⁹ Many more trawlers were needed in response to the expanding German submarine presence and mounting losses. Production could not keep pace with demand, which led the Admiralty to initiate a program in October 1916 to construct 500 new trawlers in Britain by the close of 1918. Plans were amended after the Admiralty recognized that drifters could be used for minesweeping, anti-submarine patrol, and releasing trawlers from servicing the fleet. The final request approved by the War Cabinet in

⁴ Barnett, *British Food Policy*, 69-70, 87.

⁵ C.I. Hamilton, *The Making of the Modern Admiralty: British Naval Policy-Making 1805-1927* (Cambridge, New York, 2011), 250.

⁶ Friedman, *Fighting the Great War*, 272.

⁷ *Ibid.*, 276.

⁸ The National Archives of the United Kingdom (hereafter TNA), Records of the Admiralty, ADM 1/8597/1, Director of Naval Construction Department, "Admiralty Trawlers and Drifters. 1916-1921," 1921, 5; Barnett, *British Food Policy*, 88.

⁹ "War Losses of the Royal Navy Admiralty Return," *Marine Engineering and Canadian Merchant Service Guild Review* 9:10 (October 1919), 338.

1918 set the Admiralty's program at 540 trawlers and 335 drifters at a projected cost of almost £11,960,000.¹⁰

Growing concern over the transatlantic reach of U-cruisers led to Canada's direct involvement in the construction of trawlers and drifters. On 2 February 1917, the Dominion government approved construction of twelve steel trawlers for patrol work with Canada's Department of Naval Service on the Atlantic coast. Contracts for six of the vessels went to Canadian Vickers Limited of Montreal (which then subcontracted two hulls to the Kingston Shipbuilding Company), and the remainder to the Polson Iron Works in Toronto. Keels for the Battle class trawlers (named after engagements in France that involved the Canadian Corps) were laid in 1917, but delays in the arrival of engines and machinery prevented delivery until 1918. This decision was soon followed by a request from the Admiralty on 5 February 1917 for the Dominion government to administer the construction of thirty-six Castle class trawlers¹¹ and one hundred drifters at the expense of Britain, with a supplementary order for an additional twenty-four trawlers, known as Lot B, placed by the Admiralty in December 1917. Although all work on the trawlers was to be completed by the end of 1918, delivery of several vessels in Lot B did not occur until the summer of 1919.

The construction of trawlers and drifters has been the focus of study and commentary for almost a century. A detailed overview of the program appeared in *Canadian Railway and Marine World* in February 1919.¹² It was likely written by Commander Joseph William Skentelbery, an engineer with the Royal Navy Volunteer Reserve who was loaned to the Department of Naval Service on 23 February 1917 to supervise the construction of trawlers and drifters, and who stayed with the program until his return to England for demobilization on 30 August 1919.¹³ The article was strong on technical details set in the context of British requirements for minesweeping and coastal patrol, and provided an explanation for the reliance upon trawlers: being of comparatively low value with a crew of only twelve, losses had minimal impact. Trawlers and drifters received only passing mention in Gilbert Tucker's official history of the Naval Service.¹⁴ More detail was provided by Daniel G. Harris almost twenty-five years later in a pair of articles that have become the standard sources on this subject.¹⁵ Subsequent work by Michael Hadley, Roger Sarty, Brian Tennyson, and the authorial team of *The Seabound*

¹⁰ TNA, ADM 1/8597/1, 11-12.

¹¹ This name was taken from the type of vessel predominantly used by Castle Steam Trawlers Limited of Swansea, Wales, and built by its parent firm, Smith's Dock Company.

¹² "Trawler and Drifter Construction in Canada for British Government, Through the Canadian Naval Service Department," *Canadian Railway and Marine World*, February 1919, 89-95.

¹³ TNA, Records of the Admiralty, ADM 337/123/261, RNVR officers service record, 131.

¹⁴ Gilbert Norman Tucker, *The Naval Service of Canada: Its Official History. Volume 1: Origins and Early Years* (Ottawa, 1962), 237-238, 254-261.

¹⁵ Dan G. Harris, "Canadian Warship Construction on the Great Lakes and Upper St. Lawrence," *Inland Seas* 42:2 (Summer 1986), 115-126, which was republished with minor changes as "Canadian Warship Construction 1917-19: The Great Lakes and Upper St. Lawrence River Areas," *The Mariner's Mirror* 75:2 (1989), 149-158.

Coast focused on operational demands for patrols that led to the program, criticism of the Admiralty's decision to build small, slow vessels instead of faster destroyers, and the impact of defective construction upon coastal defence.¹⁶ However, the impact of Admiralty orders upon Canadian shipyards is largely missing from these studies. An analysis of the trawler and drifter program using records from the shipyards in Port Arthur, Collingwood, and Kingston, as well as correspondence between other shipbuilders and the Department of Naval Service, offers useful insights into the relationship between procurement management and corporate ownership, the industrial capacity of Canada during the Great War, and the impact of overheated demand for new vessels upon labour relations.

The Admiralty calls upon Canada

The first two years of the war brought the large-scale mobilization of Canadian industry to fill orders for high-explosive shells and other essential supplies placed by the Imperial Munitions Board, Britain's purchasing agent in Canada, but no similar requests were forthcoming from the Admiralty. It was not for lack of trying. Robert Borden's initial inquiry to the Admiralty regarding cooperation on naval defence in October 1914 was met with advice that Canada's assistance should concentrate on the army.¹⁷ Proposals to build destroyers and submarines to enhance the defence of Halifax were put forward in November by Canadian Vickers Limited of Montreal, only to be told by Winston Churchill, first lord of the Admiralty, that there was no immediate need for such construction in the face of more pressing imperial requirements. Despite Canadian Vickers' assemblage of ten British submarines in 1915 on behalf of the Electric Boat Company of Connecticut to avoid American neutrality laws, the Admiralty refused to build additional submarines in Canada because they would take too long to complete and cost twice as much as vessels constructed in Britain.¹⁸

Instead of new builds, coastal patrols were begun by Canada's Department of Naval Service but it was impossible to secure a sufficient number of suitable vessels

¹⁶ Michael L. Hadley and Roger Sarty, *Tin-Pots and Pirate Ships: Canadian Naval Forces and German Sea Raiders 1880-1918* (Montreal and Kingston, 1991), 187-190, 220-222, 235-236, 278; Brian Tennyson and Roger Sarty, *Guardian of the Gulf: Sydney, Cape Breton and the Atlantic Wars* (Toronto, 2000), 148-165, 176-180; and William Johnston, William G.P. Rawling, Richard H. Gimblett, and John MacFarlane, *The Seabound Coast: The Official History of the Royal Canadian Navy, 1867-1939*, Volume 1 (Toronto, 2010), 395-416.

¹⁷ Library and Archives Canada (hereafter LAC), Sir Robert Borden fonds, MG 26 H, reel C-4318, vol. 76, 39492, G. Perley to R. Borden, 10 October 1914. Although the file "Canadian Coast Patrol 1916-1917" appears to consist of only a single page in LAC's Finding Aid No. 18, Part 1, it is actually a 168-page compendium of correspondence, memoranda, cables, and other documents created between 1914 and 1918 that outline negotiations between the Dominion government and the Admiralty regarding the defence of Canada's Atlantic coast and orders for trawlers and drifters. It is available online at http://heritage.canadiana.ca/view/oocihm.lac_reel_c4318/17?r=0&s=4, Images 17-184.

¹⁸ *Ibid.*, memorandum by G.H. Perley, 2 July 1915.

that could offer a modicum of protection for increasing shipments of munitions and troops. An offer by the Dominion government in May 1916 to construct two or three torpedo boat destroyers brought the Admiralty's suggestion that Canadian shipyards would be better employed building merchant ships, "as at present additional mercantile tonnage is of equal imperial necessity to naval tonnage."¹⁹ U-boat activity in the North Atlantic increased in November 1916, leading the Admiralty to urge Canada and Newfoundland to augment the number of armed patrol vessels from twelve to thirty-six.²⁰ The Canadian response was blunt and to the point. The Dominion government regretted that such vessels were not available because all of Canada's trained seamen who could serve as crew had already been sent to England, and the Royal Navy was still recruiting in the country. The Admiralty discouraged the idea of building destroyers earlier in the year, and the War Office had been allowed to purchase or charter vessels in Canada that might have been useful for patrol work; hence, adequate protection of Canada's coast was the responsibility of the Admiralty.²¹ There was no answer from London until 10 January 1917, when the Admiralty confirmed that the situation was urgent, but that no patrol vessels would be forthcoming. It recommended that the Dominion obtain low-speed trawlers with good sea-keeping characteristics. Borden's government approved the purchase of ten trawlers from New England on 17 January (although only five would be available when Naval Service officials finalized the purchase) and ordered the construction of twelve Battle class trawlers. The situation changed dramatically, however, when the Admiralty sent word on 5 February 1917 that Canadian shipyards should be used to build thirty-six steam trawlers and one hundred wooden drifters under the direction of the Dominion government.²²

While the request marked a significant policy shift when compared with the Admiralty's previous rejection of overtures by Borden and Canadian Vickers, it likely did not come as a surprise. The Admiralty inquired about the capacity of Canadian shipyards in August 1915, which led the Dominion government to collect information on numbers of employees, average cost per deadweight ton, restrictions on vessel size (such as length of canal locks), and sources of construction material.²³ A year later, the general manager of Canadian Vickers contacted his counterpart at the Collingwood Shipbuilding Company to ask how many trawlers could be built before the close of navigation in 1916, since his principals had inquired about constructing between 200 and 300 such vessels. Upon meeting in Montreal in August 1916, they agreed that only sixty might be built in Canada due to the size of the workforce and existing orders from other clients, with work distributed between Canadian Vickers, Collingwood, the shipyard in Kingston, the Polson Iron Works, and Davie Shipbuilding & Repairing Company in Levis, Quebec. John Leitch,

¹⁹ *Ibid.*, paraphrase of cypher telegram from A. Bonar Law to the governor general, 26 May 1916.

²⁰ *Ibid.*, 11 November 1916.

²¹ *Ibid.*, governor general to A. Bonar Law, 19 November 1916.

²² *Ibid.*, Long to governor general, 5 February 1917.

²³ LAC, Department of External Affairs fonds, RG 25 G-1, vol. 1166, file 1722, A. Bonar Law to the governor general, 13 August 1915 and 10 November 1915.

Collingwood's general manager, remarked to one of his directors that, "This would be lovely business as there is not much to the little hulls ... I am afraid, however, that nothing much will come out of it."²⁴ Regardless of Leitch's doubts, prospects of such work continued to percolate, fuelled by inquiries such as the notice published by the Submarine Boat Corporation of New York in December 1916, looking for a Canadian agent to build 200 trawlers worth \$30,000,000.²⁵

The Admiralty's change of mind to build in Canada was likely influenced by Joseph Flavelle, a wealthy Toronto businessman who chaired the Imperial Munitions Board. Working through the Ministry of Munitions, the board's parent organization, the Admiralty asked Flavelle on 21 December 1916 to obtain quotations for building self-trimming colliers, as well as prices for general cargo ships that could alleviate the deficit of merchant tonnage. Flavelle engaged the services of Joseph W. Norcross, whose report on 28 December outlined the capacity of steel shipyards across Canada, and recommended that Britain embark on a program of new construction on the basis of cost plus overhead, with a percentage for profit. The report languished in London, and Flavelle turned to Robert Brand, an English financier representing the board in London, to lobby imperial officials for a decision regarding merchant shipbuilding. The urgent need for patrol vessels and the great difficulty in getting answers to Canadian inquiries were brought to Brand's attention, and he met with imperial officials on 25 January 1917. The Admiralty was open to constructing trawlers and drifters in Canada, but it was uncertain who would administer this program. A clear statement was required from the Admiralty. Brand's first draft of this communication on 27 January gave all responsibility for construction to the Imperial Munitions Board, and he hammered out the details in subsequent meetings with Sir Edward Carson, first lord of the Admiralty. In the meantime, Flavelle pressed ahead with the program as Norcross drafted plans for drifters with the assistance of Philip Miller, general manager of Canadian Vickers. Miller was familiar with the dimensions and shear of drifters through his professional experience in Scotland.

J.W. Norcross and the alignment of procurement and corporate ownership

Arrangements were well in hand by the time the Admiralty sent its cable of 5 February 1917. It is not clear why management of construction was taken away from the Imperial Munitions Board (perhaps the Admiralty preferred that naval shipbuilding be supervised by naval officials), but Flavelle and Brand were successful in putting the trawler and drifter program on the same financial footing as Canadian-built merchant ships for Britain's Shipping Controller: payment was an imperial responsibility. Regardless of this change, Norcross would manage the

²⁴ Collingwood Museum (hereafter CM), John Leitch letter books, Acc. No. X974.995.1, Leitch to A. McDougall, 21 August 1916.

²⁵ *The Financial Post of Canada*, 30 December 1916, 15.

program, a role for which he was well suited. He began working on steamships on Lake Ontario's Bay of Quinte in 1890, and by 1905 he was captain of the *Augustus B. Wolvin*, the largest vessel on the Great Lakes. The *Wolvin* was owned by the Acme Steamship Company of Duluth and managed by Roy Mitchell Wolvin. In 1907, Norcross and Wolvin embarked upon several mergers and acquisitions of shipping companies that were a major factor in the formation of Canada Steamship Lines in 1913.²⁶ While Wolvin preferred to keep a low profile, Norcross assumed a more public role as the company's vice president and managing director. As Flavelle pointed out to the Ministry of Munitions in December 1916, Norcross was "looked upon as probably the ablest steamship manager in Canada."²⁷

Norcross's involvement in the marine sector had already expanded into shipbuilding, taking advantage of a Canada Steamship Lines' bylaw that permitted its directors to become a shareholder or director in any company in which the steamship lines had an interest as vendor or purchaser without any accountability for benefits received.²⁸ He was appointed a director of Canadian Vickers Limited in spring 1916,²⁹ but the year would be dominated by the aggressive accumulation of its competitors. Norcross and Wolvin had been involved with the Western Dry Dock and Shipbuilding Company since 1912, when they gave the company shares in Canadian Interlake Line to complete payment for building the cargo ship *Hamiltonian*.³⁰ They acquired the shipyard in 1916, and reincorporated the firm as the Port Arthur Shipbuilding Company in November. A month later, the Collingwood Shipbuilding Company was taken over by Norcross, Wolvin, and Horace Smith, a lawyer turned furniture manufacturer, with the formal transfer of ownership taking place on 2 January 1917.³¹ Smith served as president, with Norcross and Wolvin as vice presidents and other shareholders drawn from the senior management of Canada Steamship Lines.³² The purchase included Collingwood's subsidiary, the Kingston Shipbuilding Company, which was established in 1910 with Smith as one of its original shareholders. Norcross's network extended east to the Sorel Shipbuilding and Coal Company in Quebec. Established in 26 May 1916 to build, repair, and own ships, it was a subsidiary of Canada Steamship Lines. Its name was changed to Tidewater Shipbuilders Limited

²⁶ M. Stephen Salmon, "'This Unsatisfactory Condition:' The Formation and Financing of Canada Steamship Lines, 1910-1915," *International Journal of Maritime History*, 12:1 (June 2000), 165-175.

²⁷ LAC, MG 26 H, reel C-4318, vol. 76, 39492, J.W. Flavelle to Ministry of Munitions, 28 December 1916.

²⁸ The author wishes to thank Maurice Smith, Curator Emeritus of the Marine Museum of the Great Lakes at Kingston, for pointing out this bylaw.

²⁹ *Marine Engineering of Canada* 6:4 (April 1916), 92.

³⁰ The author is indebted to James Pritchard for generously sharing his research on the business relationship between Roy Wolvin and Joseph Norcross. Unfortunately Dr. Pritchard passed away in 2015 before his work could be completed.

³¹ *The Globe* (Toronto), 7 December 1916, 12.

³² Marine Museum of the Great Lakes at Kingston (hereafter MMGLK), Canada Steamship Lines fonds, 1996.0039.0015, box 1, "Canadian Shipbuilding & Engineering Ltd., Copy of company's by-laws," By-law No. 4, 8 January 1917.

in 1917 when the company was moved to Trois-Rivières, with Norcross as president.³³

Norcross came to the management of trawler and drifter construction with considerable professional experience and not a little self-interest. He met with J.D. Hazen, minister of Naval Service, and his deputy minister, George Desbarats, in Ottawa on 10 February 1917, and was asked to take on supervision of the program since the department did not have resources to take on this role, and the British government was pressing for quick deliveries. It was an arrangement consistent with the Dominion government's propensity to appoint private-sector capitalists to head up procurement initiatives instead of relying upon departmental officials – an approach similar to the appointment of Sir Eric Geddes, one of British Prime Minister David Lloyd George's "men of push and go," as controller of the navy and then first lord of the Admiralty to bring energy and innovation to shipbuilding in 1917.³⁴ As Norcross later recalled, the role required someone with knowledge of the business who would not be hampered by red tape in making decisions.³⁵ Hazen accepted Norcross's offer to donate his services and those of Canada Steamship Lines, and the sixth floor of the company's building in Montreal was turned over to newly formed departments devoted to traffic, labour, purchasing, production and accounting, each headed by managers from the steamship line. This arrangement was confirmed by an order-in-council on 27 February 1917, which recognized that, "The construction of such a large number of vessels at the present time, when it is extremely difficult to obtain delivery of steel, wood and machinery, necessitates special methods of administration and of purchase."³⁶

Calling upon his connections with the United States Steel Corporation and Lukens Steel Company in Pennsylvania, Norcross quickly placed an order for 3,000 tons of steel with plans to obtain another 2,000 tons, paying a premium of a cent a pound to ensure prompt delivery. Associated Mills in British Columbia completed the order for Douglas fir within thirty days to get work started on drifters. Canada's boiler and machinery makers were canvassed to take on new work despite the conversion of many shops to producing munitions. Norcross met with most of Ontario and Quebec's large shipbuilders, engine and boiler makers in Montreal on 15 February to explore the capacity of each plant, and waited upon final plans and specifications from the Department of Naval Service. It was Norcross's preference that drifter contracts be placed with one large company since they were not

³³ LAC, Department of Consumer and Corporate Affairs fonds, RG 95-1, vol. 2775, "Tidewater Shipbuilders, Limited," Application for incorporation under the Companies' Act, 18 May 1916, and Declaration of J.W. Norcross for the application for supplementary letters patent under the Companies' Act, 22 January 1918.

³⁴ Craig Heron and Myer Siemiatycki, "The Great War, the State, and Working-Class Canada" in Craig Heron, ed., *The Workers' Revolt in Canada, 1917-1925* (Toronto, 1998), 14-15; Keith Grieves, *Sir Eric Geddes: Business and Government in War and Peace* (Manchester and New York, 1989), 14, 40-45.

³⁵ LAC, Department of National Defence fonds, RG 24, vol. 5605, N.S.S. 29-16-1, part 3, J.W. Norcross to C.C. Ballantye, 12 January 1918.

³⁶ *Ibid*, part 1, Order-in-Council P.C. 516, 27 February 1917.

complicated vessels, and it would be just as easy to lay out a hundred keels as it would be for one.³⁷ Norcross recommended that the work go to Canadian Vickers, the Collingwood Shipbuilding Company, or Canada Steamship Lines' shipyard at Sorel to achieve economies of scale, but he recognized the political importance of spreading around the contracts.

The work was allocated by mid-March, with orders for drifters going to seven builders in three Quebec communities along the St. Lawrence River: thirty hulls to Montreal, twenty hulls to Sorel, and fifty hulls to Levis (see the appendix and the map in figure 1 for the companies involved in the program and their location). These shipyards were less than 250 kilometres apart. Their relatively close proximity to Norcross's offices in Montreal meant that Commander J.W. Skentelbery, the Admiralty's advisor, could maintain a close involvement with drifter construction. Orders for steel trawlers were distributed among eight shipyards that ranged from Port Arthur on Lake Superior to Levis. Contracts for engines and boilers covered an even larger area. Norcross placed as much work in Canada as possible with manufacturers in Winnipeg, Galt, Goderich, St. Catharines, Lachine, Quebec City, and Amherst, but the shortage of Canadian capacity led to contracts for forty-seven engines and forty-two boilers given to American firms in Chicago, Hoboken, Brooklyn, and Jersey City. Work was split between many shipyards and suppliers to achieve maximum production before the close of navigation in order to enhance anti-submarine patrols; as was pointed out to the Collingwood Shipbuilding Company, "Time is of the essence in this contract."³⁸

Figure 1: Location of companies manufacturing hulls, engines, and boilers for Admiralty trawlers and drifters, 1917-1919



Map by C. King, Cartographic Lab, Department of Geography, York University

³⁷ Ibid., J.W. Norcross to J.D. Hazen, 8 February 1917.

³⁸ MMGLK, Collingwood Shipbuilding Company fonds, 1982.0168.0001, box 1, "Contracts for hulls 44, 46-47, 49-60," Contract between the King in the right of Canada and Collingwood Shipbuilding Company, 10 May 1917.

This strategy stimulated a broad range of industries beyond the shipyards, such as Goldie & McCulloch of Galt, Ontario. Established in 1844 as a foundry and machine shop, it specialised in stationary engines and boilers (although the boiler shop had closed to forge shells).³⁹ Norcross's orders created new opportunities that included larger and more complicated castings, heavier forgings, and linkages to other systems such as air handling and bilge pumps. The company produced forty compound expansion engines for the drifters "complete from main stop valve to propeller," as well as two trawler engines.⁴⁰ This experience put Goldie & McCulloch in a position to build engines for steam barges ordered by the French government, as well as triple expansion engines for three freighters in the Canadian Government Merchant Marine. Known for the quality of its work and the stability of its long-serving workforce, the trawler and drifter program stimulated the company's diversification. The downside to Norcross's decision to distribute orders across a wide area, however, was that it depended upon railways throughout Canada and the United States to transport many of the engines, boilers, and machinery to shipyards for installation. Shortages of rolling stock frequently led to delays in the delivery of steel to manufacturers and components to shipbuilders, adding another obstacle to efforts to complete the vessels in time to join coastal patrols.

The division of production by components was reflected in a bifurcated approach to negotiating the terms of contracts. Suppliers of engines and boilers were given a fixed price that varied from vendor to vendor, based on the best possible deal that could be negotiated by Norcross (see the appendix for the considerable range in unit prices by manufacturer). Shipbuilders were given a more fluid arrangement. Since the Naval Service was providing most of the material required to build trawlers, Norcross used a variable surcharge on labour to cover a shipyard's overhead: forty percent for drifter hulls, 55 percent for trawler hulls, and 65 percent for trawlers delivered with boilers, engines, and machinery installed by the builder. A profit of 10 percent was then applied to the total of labour and overhead.⁴¹ Cost plus overhead plus a percentage for profit was the formula recommended by Norcross in his report to the Ministry of Munitions in December 1916, the "most satisfactory and cheapest scheme for the Government to adopt, as shipbuilders in this country have had so little experience in the building of ocean ships, and combined with uncertainty of labour they feel price must be high enough to cover all possible contingencies."⁴²

³⁹ LAC, RG 24, vol. 5605, N.S.S. 29-16-1, part 6, A.A. Wright to G.J. Desbarats, 18 September 1918.

⁴⁰ T.H. Fenner, "Developing the Marine Engine and Auxiliary," *Marine Engineering of Canada*, 9:12 (December 1919), 379-381.

⁴¹ LAC, RG 24, vol. 5604, N.S.S. 29-16-1, part 1, "Contracts for construction of trawlers and drifters for Imperial Government," n.d.

⁴² LAC, MG 26 H, reel C-4318, vol. 76, 39492, J.W. Flavelle to Ministry of Munitions, 28 December 1916.

This approach stood in stark contrast to the flat price per deadweight ton used by the Imperial Munitions Board.⁴³ As the cost of steel and labour rose during 1917 and 1918, shipbuilders who accepted the board's contracts eventually operated at a deficit. While the Port Arthur Shipbuilding Company made a profit of \$152,000 on the *War Dance* in May 1918, it lost more than \$17,400 on the *War Karma* less than seven months later.⁴⁴ Its combined profit on eight trawlers (including engines and boilers) delivered between August 1918 and June 1919 as part of the Lot B order, on the other hand, was almost \$193,800.⁴⁵ One of the reasons for this favourable return was that Norcross adjusted the payment formula to take into account the unsettled state of labour: trawler hulls received an overhead of 60 percent, 70 percent on the completed boat, and 70 percent on engines.⁴⁶ Construction of trawlers and drifters offered a more reliable source of profit for shipbuilders in the inflationary economy of the day than orders from the Imperial Munitions Board. It was an arrangement that also worked to Norcross's advantage. Contracts for thirty-four trawlers and thirty-four drifters went to companies in which Norcross had an interest as shareholder, director, or office-holder, but unlike other Canadian business leaders involved in the war effort, his involvement does not appear to have drawn allegations of personal benefit or profiteering from his contemporaries. Work was allocated to every shipbuilding company active in Ontario and Quebec at the beginning of 1917, and the prompt completion of the construction program took priority over any perceptions of conflict of interest in the procurement process.

Obstacles to timely deliveries

When the Admiralty reported on the trawler and drifter construction program in 1921, it identified four significant impediments to completion of this urgent initiative: a shortage of steel, delays in clearing orders from private interests, interference of repair work, and the shortage of skilled labour.⁴⁷ Despite being separated from the Admiralty's program by an ocean, Norcross and the Department of Naval Service faced similar challenges in Canada. His prompt orders of steel from the United States created expectations of an early start to the first Admiralty order, but the mills failed to ship when promised. Although orders for Lot B were placed in June 1917, the last shipment of steel did not arrive until August 1918, a delay of fourteen months. Similar complaints were made about the vessels' components. Many machinists were not familiar with making marine boilers, valves,

⁴³ MMGLK, Collingwood Shipyard fonds, 1982.0168.0001, box 1, Contract for steamships 51 and 52 [*War Wizard* and *War Witch*], 25 April 1917.

⁴⁴ Ibid., Port Arthur Shipyards fonds, 1983.0129.0050, box 1, "Naval architect's notebook on the costs of construction, repair, engines, yard costs & profits, etc."

⁴⁵ Ibid., 1983.0129.0043, folder 2, "Construction cost, eight trawlers complete," n.d.

⁴⁶ LAC, RG 24, vol. 5604, N.S.S. 29-16-1, part 2, J.W. Norcross to G.J. Desbarats, 10 October 1917.

⁴⁷ TNA, ADM 1/8597/1, 11.

fittings, and similar material, particularly on the scale required for trawlers and drifters, and often had to deal with pressing orders from the Imperial Munitions Board and other clients. These challenges were compounded by a shortage of experienced workers, as noted by the Dominion Bridge Company of Montreal: "It is almost impossible to secure or retain boiler-makers, who are acquainted with this class of work, so new to Canadian industry."⁴⁸ Approximately 40 percent of the drifters' engines and boilers were built in the United States, often by workers of German or Irish sympathies. Wrenches and nuts were found in cylinders and valves when machinery arrived in Quebec, requiring an overhaul of engines, replacement of rivets, and re-caulking of boilers.⁴⁹ Such problems also occurred in Canada, but in the context of labour relations turned sour. The strike at the John McDougall Calendonian Iron Works of Montreal, for example, held up the delivery of trawler *TR 57* when the Kingston shipyard found sabotaged engine parts during the summer of 1919.⁵⁰

Orders by other clients and repair work presented significant distractions for most shipyards. As the Port Arthur Shipbuilding Company laid the keels for the first three of its Lot B trawlers in late May and early June 1917, it was also preparing to launch the freighter *Ugelstad* for Norwegian owners. Vessels entering the dry dock for repairs and undergoing dock trials competed for labour, materials, and space with not only trawlers, but also with six steel freighters started in June 1917 for the Imperial Munitions Board. Collingwood faced a similar predicament as the shipyard completed the tanker *Reginolite* for Imperial Oil Limited with dock walls crowded with trawlers (see figure 2). When the Kingston shipyard began work on trawler hulls in 1917, progress was often hindered by the assignment of workers to repair freighters *H.M. Pellatt* and *A.E. Ames* for the Canada Steamship Lines. It was difficult to turn away such work not only because of the pressing need to keep lake tonnage in operation during navigation season, but because repairs were more profitable than building trawlers. In 1918, the company's net profit was \$189,180, with \$98,746 coming from repairs and \$86,345 from trawler construction. The trend continued in 1919: \$43,380 was made from trawler construction, but repairs generated \$78,534.⁵¹ Norcross's formula yielded a reasonable profit for the Kingston shipyard, but revenues from repairs were more significant and, in the long run, more reliable than contracts for new construction.

The successful completion of the trawler and drifter program largely depended on the ability of companies to recruit and retain an effective workforce. Prior to the onset of war, many steel shipbuilding companies in eastern Canada attracted highly trained managers with international experience. George Duncan Davie, general

⁴⁸ LAC, RG 24, vol. 5605, N.S.S. 29-16-1, part 6, P.L. Pratley to G.J. Desbarats, 17 September 1918.

⁴⁹ *Ibid.*, A.A. Wright to G.J. Desbarats, 18 September 1918.

⁵⁰ MMGLK, Kingston Shipyard fonds, 1987.0072.0012, Collingwood Shipbuilding Company, Kingston Yard to T.M. Casey, 23 September 1919.

⁵¹ Queen's University Archives (hereafter QUA), coll. 2246, box 4, "Shipyard finance, 1919," "Statement of Profits, etc.," 31 December 1918 and 1919.



Figure 2 Trawlers TR 7, 8, and 9 under construction at the Collingwood Shipbuilding Company, 26 September 1917. Work continues on the tanker Reginolite in dry dock following its launch in June. Source: Collingwood Museum, Acc. No. 983.60.30.

manager of the Davie Shipbuilding & Repairing Company, was one of the few executives born in Canada, and while he learned mechanical engineering and shipbuilding from firms in Levis, a contemporary writer noted that, “A study of shipbuilding methods on the Clyde and also in American yards has enabled Mr. Davie to impart a high degree of efficiency to his plant and practice.”⁵² Most other companies in Ontario and Quebec recruited directly from Great Britain or the United States. The first to arrive was John Shearer Leitch, who was hired as general manager of the Collingwood Shipbuilding Company in 1912. He graduated with honours in naval architecture from South Kensington (now the Imperial College), London, and learned his trade in shipyards on the Clyde, the Tyne, and in Belfast. His appointment was soon followed by the arrival of Philip Leslie Miller as general manager of Canadian Vickers Limited in 1913. Born and trained in Dundee, Scotland, Miller won an open competition for a three-year course in naval construction at the Royal Naval College, Greenwich. After graduating in 1901,

⁵² *Marine Engineering of Canada* 7:9 (September 1917), 223.

Miller was appointed to the Royal Corps of Naval Constructors, and worked in dockyards at Portsmouth, Hong Kong, Malta, and the Clyde before heading to Montreal.⁵³ In Kingston, Hugh Welch came highly recommended from the Naval Construction Works of Vickers Limited in England when hired as manager in 1914.⁵⁴

Other shipyards turned to American expertise. Louis Dahlgren filled several roles at the Superior Shipbuilding Company in Superior, Wisconsin, from 1893 to 1912 before becoming the general superintendent of the Western Dry Dock and Shipbuilding Company, but he left Port Arthur in 1916 to manage the Thor Iron Works in Toronto.⁵⁵ His departure created an opening for James Fraser Paige, a marine engineer born in Pictou, Nova Scotia, and educated in Truro and London, England. Paige apprenticed as a machinist in Nova Scotia and the United States, and served as a marine engineer on steamships sailing out of Yarmouth and New York. He joined the Fore River Shipbuilding Company of Quincy, Massachusetts, in 1904, and spent several years in Japan and Italy while supervising the installation of turbine propelling machinery in warships.⁵⁶ He was recruited by Paul Chace, vice president of the Port Arthur Shipbuilding Company's office in New York, and appointed general manager in January 1917.⁵⁷ The Admiralty's shipbuilding program would be well served by highly capable managers with significant experience in naval architecture and marine engineering who remained well connected with former associates in Britain and the United States.

Skilled workers, however, were much more difficult to attract and retain. This was a problem that pre-dated the war, when John Leitch looked to Cleveland and Detroit for riggers, platers, and joiners for the Collingwood shipyard despite their reluctance to stay long.⁵⁸ The situation became more difficult as the war progressed; in 1917, for instance, 105 workers – many of them skilled machinists – enlisted to fight overseas. Losses to the army were compounded by the attraction of Toronto. Openings at the Polson and Thor shipyards drew workers south despite an offer of increased pay because their wives were unhappy living in Collingwood, and recent arrivals from Halifax also talked of heading to Toronto.⁵⁹ Leitch's recruiting eventually paid dividends as the payroll increased from 794 workers in January 1914 to more than 950 – and some days over 1,000 – in 1917,⁶⁰ but numbers of

⁵³ *Ibid.*, 4:8 (August 1914), 179.

⁵⁴ MMGLK, Kingston Shipyard fonds, 1983.0129.0034, Minutes of the annual meeting of shareholders, 3 September 1914.

⁵⁵ *Marine Engineering of Canada* 9:1 (January 1919), 18.

⁵⁶ Nova Scotia Archives (hereafter NSA), James Fraser Paige fonds, MG 1, vol. 3307, file 12, International Press, Limited, "Advance Press Service of James Fraser Paige," n.d.

⁵⁷ *Ibid.*, vol. 3305, file 4, P.G. Chace to J.F. Paige, 23 December 1916 and 29 January 1917.

⁵⁸ CM, John Leitch letter books, X973.9.1, Leitch to A. McDougall, 4 June 1913. Later that year, Leitch observed that "Collingwood is a nice Town to live in, but on account of it being 'dry' the Shipyard workers seem to be very loath to remain for any length of time, as, you know, they like to have something strong to drink"; Leitch to H.B. Wortley, 26 August 1913.

⁵⁹ *Ibid.*, X974.995.1, Leitch to T. Long, 23 October 1916.

⁶⁰ *Ibid.*, Leitch to A. McDougall, 3 January 1914 and 30 January 1917.

workers constantly fluctuated while the shipyard worked on trawlers and freighters between 1917 and 1919 (see figure 3). Decreases were occasionally caused by the company releasing workers if a ship was not ready for trades such as electricians, joiners, carpenters, and painters, or if the shipyard was between projects. More often it was the workers who left; within a week of the meeting in Montreal on 15 February 1917 to discuss the Admiralty's shipbuilding program, Leitch lost a fifth member of his drafting department and two of his best riveters to the Canadian army. While Leitch held a glimmer of hope that writing to military officials could result in the return of these men, he realized that the only way to stem the loss was a general wage increase.⁶¹ Money was again the root of the problem in March, when his attempt to recruit boilermakers in Halifax was unsuccessful in response to a low hourly rate.⁶²

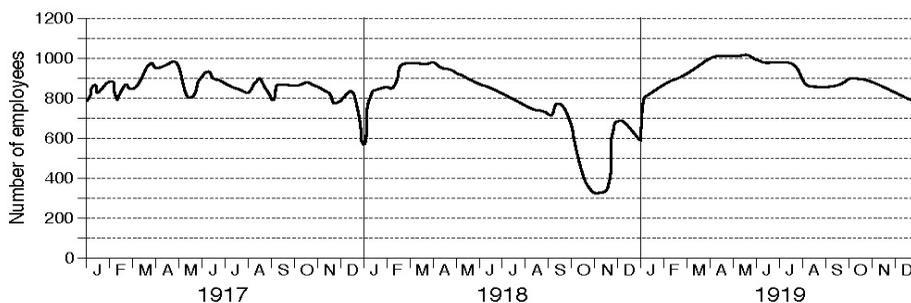


Figure 2: Number of workers on payroll of Collingwood Shipbuilding Company by month, 1917-1919. Source: LAC, Department of Public Works fonds, RG 11, vol. 4207, file 470-D-1 (Chart by C. King, Cartographic Lab, Department of Geography, York University)

A similar situation existed in Port Arthur, where James Paige struggled against the incursions of the American Ship Building Company. A worker would accept Paige's offer of \$3,600 a year, only to wire a few days later that he was given \$4,000 to work in Buffalo. As Paige observed, "They are in each case getting a substantial increase, and being Americans they are desirous of returning to the American side."⁶³ Paige was unwilling to give American workers a financial incentive to stay for fear of alienating local personnel who were equally capable, which encouraged him to promote employees from within the shipyard to supervisory positions instead of looking for external expertise. Much like Leitch's search for boilermakers, Paige had difficulty recruiting skilled trades from the area of Port Arthur, but had some success securing machinists from Minneapolis and was

⁶¹ Ibid., Leitch to H.B. Smith, 20 February 1917.

⁶² Ibid., Leitch to H.B. Smith, 24 March 1917.

⁶³ NSA, MG 1, vol. 3305, file 4, J.F. Paige to James Whalen, 8 May 1917.

able to boost the shipyard's workforce from 400 to a monthly average of 1,325 in 1918. Contracts for trawlers as well as freighters for the Imperial Munitions Board and Dominion government, however, created a requirement for between 1,600 and 2,000 workers, leading to long hours of overtime for those who Paige could attract to the shipyard.⁶⁴

These challenges were also felt at the Kingston shipyard, although to a lesser degree. The company had not built new vessels since 1913, and the contracts for trawlers required a quick influx of labour. Hugh Welch increased his workforce from less than fifty to approximately 300 in twelve months, but "they are coming and going the whole time and we are also losing [sic] quite a number of both skilled and unskilled young men they being taken for Military Service."⁶⁵ As many as twenty to thirty men left each week, making it difficult to develop sufficient expertise among the workforce to expedite shipbuilding. As Welch observed, "the unskilled help do not stay long enough with us to get useful."⁶⁶ Fitters were "about as scarce as a snowball would be in hades,"⁶⁷ leaving riveters unoccupied and the shipyard unable to move ahead with production. Roy Wolvin exhorted Welch to increase Kingston's workforce to at least 500 workers, particularly since the Department of Naval Service was dissatisfied with Kingston's lack of progress and seriously considered relocating some of the work to Collingwood. The problem was compounded by a bottleneck in the punch shop caused by a lack of experienced men; despite adding a night shift, it could handle no more than three trawlers at a time. The shipyard's chief source of labour supply was Kingston and neighbouring districts, and it relied upon advertisements in local newspapers after futile attempts to secure workers through the National Service Board and Montreal's Labour Bureau, only to find that the shipyard was not paying high enough wages to attract skilled personnel. A foreman was sent to Sorel and the surrounding areas to induce families, especially those of ship carpenters, to relocate to Kingston, but to no avail. The shortage of workers meant that extortionate wages would have to be paid to get men to leave their current places, which "would only result in one yard trying to outbid the other."⁶⁸

Competition for that most precious commodity – skilled labour – increased during 1917 and into 1918 as the Imperial Munitions Board's orders for steel and wooden freighters and contracts from the French government to build trawlers led to the establishment of several new shipyards, demands for higher wages to retain workers, and rising expenses. Horace Smith, president of the Kingston shipyard, placed the blame on the Dominion government for not controlling labour by using

⁶⁴ Ibid., file 3, Port Arthur Board of Trade, *Address Delivered by the President, A. W. Roberts, Esq., at the Annual Meeting of the Board held 28 th of January, 1919*, 9.

⁶⁵ MMGLK, Kingston Shipyard collection, 1987.0072.0006, "Correspondence with Roy Wolvin, 1917-1919," Wolvin to Welch, 13 May 1918, and Welch to Wolvin, 14 May 1918.

⁶⁶ Ibid., 1987.0072.0007, "Correspondence with H.B. Smith 1918," H.C. Welch to Smith, 8 February 1918.

⁶⁷ QUA, coll. 2246, box 2 "Shipyard correspondence, H.B. Smith, 1916-1918," Smith to H.C. Welch, 13 October 1917.

⁶⁸ MMGLK, 1987.0072.0006, H.C. Welch to R.M. Wolvin, 26 July 1917.

industrial conscription and wage controls to prevent the free movement of labour without a discharge certificate, similar to the restraints on labour movement, ban on strikes in controlled establishments, and relaxation of restrictive trade union practices that had been introduced in Britain in the spring of 1915.⁶⁹ Despite the Dominion government's introduction of the National Service Board and the registration and classification of workers in 1916, it was not sufficiently interventionist for Smith: "There are only so many shipbuilders in this country, and now with the extra heavy demand on the different Shipyards and because of the new yards that are starting, there are not enough skilled workmen to go around, and the result of course is disastrous to shipbuilding, and men can pretty much do as they please."⁷⁰ Commander J.W. Skentelbery, the Admiralty's advisor in Montreal, reported that competition for labour also prevented the Port Arthur Shipbuilding Company from meeting its commitments:

It is absolutely impossible to make any forecast as to the number of vessels which will [be] completed, owing to the fact that new yards are attracting the men from the other yards, by giving them higher rates of pay, and the result is, that several vessels are being launched which it is utterly impossible to complete for many months, whilst those which could have been completed, are delayed for want of Riveters, and their services will be lost to the Country.⁷¹

Steel shipbuilding was not the only part of the program forced to deal with poachers. Shortly after Canadian Vickers began construction of the wooden drifters, work ground to a halt when its entire crew of plankers was lured away by the William Lyall Shipbuilding Company of North Vancouver to build wooden freighters for the Imperial Munitions Board. As Norcross remarked, "this is a very poor business, as I understand that the British Government is paying for both Drifters and ships, and Builders are bidding against each other for men."⁷² Flavelle had pledged that the board would not interfere with the work of the Naval Service, but it was difficult to control the actions of contractors striving to meet deadlines. Norcross was advised to seek out ship carpenters in New Brunswick, Nova Scotia, and along the shores of the Bay de Chaleur and St. Lawrence River below Sorel.

The requirements of shipbuilding, ancillary industries, and military enlistment created heated competition for workers who sought relief from inflationary prices and often arduous working conditions. Labour unrest was common in the shipyards of Ontario and Quebec, and action was spurred by large-scale repair orders that needed quick completion during the navigation season. Just as the Port Arthur

⁶⁹ David French, *British Strategy & War Aims 1914-1916* (London, 1986), 117-120.

⁷⁰ QUA, coll. 2246, box 2, "Shipyard correspondence, Smith, H.B., 1917-1918," Smith to H.C. Welch, 20 July 1917.

⁷¹ LAC, RG 24, vol. 5605, N.S.S. 29-16-1, part 7, J.W. Skentelbery to Department of Naval Service, 24 September 1918.

⁷² *Ibid.*, vol. 5604, N.S.S. 29-16-1, part 2, J.W. Norcross to G.J. Desbarats, 18 July 1917.

Shipbuilding Company was preparing to lay the keel for its first trawler, workers withdrew their services after a steamer needing repairs entered its dry dock. James Paige pushed for arbitration, but the men held out for a settlement based on their original demands. Paige finally convinced the workers to accept an increase of five cents an hour, and to withdraw the riveters' demand for an allowance. Military intervention was considered a last resort. As Paige later observed, "I am of the opinion that they will carry on their work with a greater willingness than otherwise would have been possible, had we resorted to arbitrary measures."⁷³ Despite this conciliatory approach, labour unrest spilled over into the following year. An investigation into the dispute between the company and its boilermakers and iron shipbuilders in February 1918 found that there was every indication that a strike would be called within the next few weeks to force what Paige expected to be exorbitant demands upon the company. In response to the report's reference to a daily absentee rate of approximately ten percent, Paige informed the deputy minister of Labour that when overtime was worked during the previous week, an average of 235 workers failed to report each day. This loss of productivity was experienced by other employers in the area, "the general consensus of opinion being that the men are so prosperous that they can well exist on less than a full week's work."⁷⁴ The situation was by no means restricted to Port Arthur, as employers throughout the country attributed high rates of absenteeism and resistance to admonishments to work harder to increased wages and a growing sense of workers' independence.⁷⁵

Labour unrest was an important issue in Kingston, where Hugh Welch and his workers battled over paid overtime for Saturday afternoons. Early in 1917, the company agreed to pay its employees time-and-a-half for working on Saturdays during June, July, and August. A return to regular hourly rates in September led to only one-sixth of the men reporting to work, and a demand for time-and-a-quarter for the entire year. Talk began of forming a union, and labour relations deteriorated. Three days were lost as between eighty and ninety riveters held up repairs to the *H.M. Pellatt* to press home their wage demands, causing Welch to take the ringleaders to court under the Industrial Disputes Act. The charges were withdrawn a week later after the men returned to work with no concessions made by the company, and the issue of Saturday overtime festered into the fall with a third of the workforce not showing up on Saturday afternoons into late September and October. Leitch experienced the same problem at the Collingwood shipyard, and there was regular communication between members of the ironworkers union in both locations to ensure a consistent approach to management. The struggle over Saturday hours was a prelude to the larger debate over union recognition within the Ontario shipyards involved in trawler construction. Horace Smith expected the union issue to resurface in December 1917, and he hoped that if Collingwood and Kingston stood firm with the Port Arthur Shipbuilding Company in not recognizing the

⁷³ NSA, MG 1, vol. 3305, file 4, J.F. Paige to James Whalen, 27 May 1917.

⁷⁴ *Ibid.*, J.F. Paige to F.A. Acland, 16 February 1918.

⁷⁵ Heron and Siemiatycki, "The Great War," 19-20.

organization of labour in their shipyards, “we should be able to break the Union up and keep our yards running as open shops.”⁷⁶ With demand for labour far outstripping supply, Smith was advocating a lost cause. Welch constantly dealt with wage demands throughout 1918, an issue complicated by comparisons with hourly rates offered by the Canadian Locomotive Company in Kingston. Labour negotiations, particularly involving trades such as machining, carpentry, and boiler making that could move across industrial sectors, were influenced as much by local competition with other industries as by the rates paid by shipbuilding establishments.

The shortage of skilled labour was also suspected to have a negative impact on the quality of vessel construction. After Commander Skentelbery visited Port Arthur, he reported to Admiral Sir Charles Kingsmill, director of the Naval Service, that the shipyard was making very satisfactory progress and the vessels were being finished with much greater speed, “but it is difficult with the class of men in this country to get satisfactory work.”⁷⁷ Norcross was more diplomatic when he addressed this issue a year later, attributing shortcomings to “what could be expected in new vessels, particularly when such a number have been constructed in a Country where skilled labour is so scarce.”⁷⁸ Aside from issues of design and supply involving compasses, the layout of crew accommodation, and gypsies for the windlasses,⁷⁹ most of the complaints involved leaks. When the trawlers *TR 5* and *TR 6* arrived in Montreal from Port Arthur on 15 May 1918, the decks leaked so badly that the crews’ quarters had flooded during passage through the Great Lakes. A knife could be inserted the whole depth of the deck planks, as well as in many of the seams and butts.⁸⁰ The drifters were particularly prone to leaks along decks and hull planks, and the navy yard in Halifax required twenty-six days to carry out repairs. The work to complete assembly of the trawlers and drifters and make them seaworthy swamped shipyards on the Atlantic coast, and the deteriorating condition of these vessels had a negative effect on the morale of their crews.⁸¹ Climate, however, played a role in many of the situations attributed to unskilled labour. Exposure of wooden decks and caulking to sunlight and heat led to shrinkage, and a need to re-caulk the seams upon arrival at the coast.

⁷⁶ QUA, Kingston Shipyards collection, coll. 2246, box 2, “Shipyard correspondence, H.B. Smith, 1916-1918,” Smith to H.C. Welch, 17 December 1917.

⁷⁷ LAC, RG 24, vol. 5605, N.S.S. 29-16-1, part 4, J.W. Skentelbery to C.E. Kingsmill, 15 October 1917.

⁷⁸ *Ibid.*, part 5, J.W. Norcross to G.J. Desbarats, 31 July 1918.

⁷⁹ Information on these problems can be found in *ibid.*, vol. 5657, N.S.S. 58-9-1, and in Harris, “Canadian Warship Construction 1917-19,” 153.

⁸⁰ MMGLK, Port Arthur Shipbuilding Company fonds, 1983.0129.0053, box 2, folder 1, H. Black to Port Arthur Shipbuilding Company, 15 May 1918.

⁸¹ Tennyson and Sarty, *Guardian of the Gulf*, 158.

Conclusion

Writing to the deputy minister of Naval Service in September 1918, Norcross's assistant, A.A. Wright, recalled the urgent demand for thirty-six trawlers and one hundred drifters, "which in my judgement, at the time, was entirely beyond the capacity of the Canadian Shipyards between Quebec and Port Arthur, to build in less than three years, working at their limit, according to their records in the past."⁸² Norcross's strategy of distributing orders throughout eastern Canada and the United States to achieve maximum output in minimal time initially met with limited success; only three trawlers and thirty-eight drifters were delivered to naval officials by late November 1917. A year later, the remainder of the drifters and the Admiralty's first order of trawlers were in service but delays in the delivery of steel, engines, and boilers held up the completion of Lot B trawlers. Tidewater Shipbuilders, which produced the most costly hulls in Lot B, was the only firm expected to complete its orders by the end of November 1918. The remaining trawlers were completed during the following months, leaving out gun platforms and other components related to naval requirements. The last of the Castle class trawlers, *TR 57*, finally arrived in Halifax on 14 October 1919 to await its disposition by the British government. While there were several expressions of interest by Canadians to purchase small numbers of trawlers to take the place of fishing schooners sunk by German U-boats, the British government engaged the Anderson Company of New York and Montreal to broker the sale of the vessels. Many wound up working in the fisheries of Newfoundland and Nova Scotia, while others sailed for France, Portugal, Italy, Texas, Mexico, Ecuador, and Peru. Some returned to service in the Second World War.

The cost estimate provided by the Department of Naval Service in February 1917 for building thirty-six trawlers and one hundred drifters was \$10,400,000, which was increased to \$14,000,000 after the Admiralty requested the department to construct an additional twenty-four trawlers in Lot B. By January 1920, the program's expenditures had risen to \$18,744,786.⁸³ The preliminary figures were very rough estimates based on market conditions as they existed at the time, and did not include equipment or commissioning charges. Costs advanced rapidly as a result of increases in wages and prices for material, issues that had a similar impact on Britain's building program. While allowances were made for these factors, Canada's Naval Service was unable to foresee the unprecedented advancement of expenditures that were, in the view of its deputy minister, "quite unavoidable in the circumstances."⁸⁴

The impact of these influences was not felt uniformly across the country, as seen in the unit prices listed in the appendix. Toronto's Polson Iron Works produced the

⁸² LAC, RG 24, vol. 5605, N.S.S. 29-16-1, part 6, A.A. Wright to G.J. Desbarats, 18 September 1918.

⁸³ *Ibid.*, part 11, F.G. Gordon to Secretary to the High Commissioner for Canada, 19 September 1921.

⁸⁴ *Ibid.*, G.J. Desbarats to the Secretary to the High Commissioner for Canada, 8 November 1921.

most expensive steel hulls in the first lot of trawlers, with Thor Iron Works placing a close third. High labour costs contributed toward the companies' uncompetitive position, and both Polson and Thor's successor, the Dominion Shipbuilding Company, were bankrupt not long after the war's end. The Kingston shipyard was the second most expensive builder in the first lot of trawlers as it developed a capacity for building ships as well as repairing them, but by the time it received orders for Lot B, efficiencies reduced the cost of production by almost twelve percent despite rising expenditures on labour and material. This trend was more pronounced at Port Arthur, where the price of hulls rose more than eight percent between the two lots of orders. Its labour costs at the region's periphery, however, were almost 28 percent lower than those of Polson Iron Works for Lot A, and even though this advantage was eroded by inflationary factors, Port Arthur's unit price for Lot B hulls still only fell in the mid-range of builders' charges. Much like the situation in Toronto, the location of Canadian Vickers Limited in Canada's largest city contributed to high construction costs, whereas the Davie Shipbuilding & Repairing Company, situated on the region's eastern periphery, was a more cost-effective shipyard, producing drifter hulls at a price that was nineteen percent less than its rival in Montreal. The drifter program also demonstrated that Canadian manufacturers could compete with their counterparts in the United States when it came to marine engines and boilers, with most domestic suppliers charging less than machine shops in New York and New Jersey.

Admiralty orders to build trawlers and drifters in Canadian shipyards were a response to the pressing imperial need for coastal defence created by developments in German U-boat range and capability. The sense of urgency never abated during the war. As late as September 1918, Admiral Kingsmill exhorted his deputy minister to apply all possible pressure to firms that were delinquent in delivering coastal patrol vessels, since "at any time a submarine may sink a whole division."⁸⁵ While steel shipbuilding was an established industry on the Great Lakes and St. Lawrence River by 1917, the revenue generated by these imperial orders stimulated the development of Canadian shipyards, including extensions to punch and boiler shops, and installation of plate furnaces. In the case of Kingston, infrastructure improvements required for constructing trawlers put the shipyard in a position to start building two freighters for the Canadian Government Merchant Marine starting in 1918. Profits from this program allowed many of the companies to create depreciation accounts that could be used to replace equipment and modernize plants in the lean years ahead, when depression and the glut of commercial tonnage led to the large-scale retrenchment of Canada's shipbuilding industry after 1920. Prior to that calamity, shipbuilders and their suppliers advertised their involvement in building trawlers and drifters to establish their credibility with potential clients. These companies, however, had been hard pressed to cope with imperial orders for trawlers, drifters, and freighters that strained the dwindling supply of skilled labour, suggesting that Canada's industrial capacity was limited more by a constricted

⁸⁵ *Ibid.*, part 6, C.E. Kingsmill to G.J. Desbarats, 6 September 1918.

workforce than by technology, opportunity, or capital. As demand outstripped supply and inflation ran rampant, shipyards faced growing independence among workers, rising production costs, and delays in the completion of vessels urgently required for coastal defence. Regardless of these complications, J.W. Norcross's distribution of orders for trawlers and drifters across a network of inland shipyards with relatively little experience building steel vessels demonstrated a capacity for naval shipbuilding that would be called upon again at the outset of the next world war.

Appendix: Companies involved in building trawlers and drifters for the Admiralty

Company	Hulls	Price/hull	Engines	Price/engine	Boilers	Price/boiler
Castle Class Trawlers						
Lot A						
Collingwood Shipbuilding Company	6	\$138,313	5	\$29,146	2	\$27,320
Davie Shipbuilding & Repairing Company, Levis	2	\$136,887				
Dominion government shipyard, Sorel	3	\$139,832	3	\$43,583	3	\$30,020
Kingston Shipbuilding Company	2	\$152,717				
Polson Iron Works, Toronto	4	\$153,343	4	\$46,651	4	\$21,805
Port Arthur Shipbuilding Company	6	\$124,271	6	\$29,562	5	\$19,667
Port Arthur Shipbuilding Company, extra					4	\$17,724
Thor Iron Works, Toronto	2	\$148,104				
Canadian Vickers Limited, Montreal	11	\$147,734	8	\$51,214	8	\$29,468
National Shipbuilding Company, Goderich			8	\$22,420		
Edward P. Farley, Chicago			2	\$21,176		
Canadian Allis-Chalmers Company, Toronto					3	\$20,381
John Inglis Company, Toronto					5	\$19,146
Canada Steamship Lines, Montreal					2	\$23,000
Lot B						
Davie Shipbuilding & Repairing Company, Levis	6	\$139,909				
Dominion government shipyard, Sorel	3	\$133,695	2	\$50,898		
Kingston Shipbuilding Company	4	\$134,610				
Port Arthur Shipbuilding Company	8	\$136,322	8	\$34,425	6	\$26,199
Tidewater Shipbuilders Limited, Trois-Rivières	3	\$159,374				
Canadian Marine Engineering Company, Montreal			1	\$27,249		
Dominion Bridge Company, Montreal			6	\$26,108	9	\$25,184
Goldie & McCulloch Company, Galt			2	\$25,854		

John McDougall Caledonian Iron Works, Montreal	2	\$28,293						
Sorel Mechanical Shops	3	\$26,683						
Canadian Allis-Chalmers Company, Toronto	7	\$23,686						
Jenckes Machine Company, St. Catharines	2	\$24,738						
Drifters								
Davie Shipbuilding & Repairing Company, Levis	50	\$36,775						
Dominion government shipyard, Sorel	3	\$49,077						
Montreal Harbour Commissioners	4	\$29,290						
Leclaire & Sons, Sorel	6	\$46,686						
James Sheppard & Sons, Sorel	5	\$40,913						
Sorel Shipbuilding & Coal Company	6	\$39,017						
Canadian Vickers Limited, Montreal	26	\$45,347						
W. & A. Fletcher Company, Hoboken, NJ	12	\$16,544						\$10,994
Goldie & McCulloch Company, Galt	40	\$13,400						\$8,447
John McDougall Caledonian Iron Works, Montreal	6	\$13,678						\$11,704
Sorel Mechanical Shops	5	\$16,619						\$9,680
Todd Shipyard Corporation, Brooklyn, NY	30	\$16,210						\$15,008
Vulcan Iron Works, Jersey City, NJ	5	\$15,008						\$8,723
Dominion Bridge Company, Montreal	13	\$8,723						\$9,267
Farande & Delorme, Montreal	4	\$9,267						\$8,441
Jenckes Machine Company, St. Catharines	6	\$8,441						\$8,494
International Engine Company, Amherst	8	\$8,494						\$9,778
Alex McKay, Quebec City	2	\$9,778						\$10,194
National Shipbuilding Company, Goderich	7	\$10,194						\$5,594
Roy M. Wolvin, Winnipeg	2	\$5,594						

Source: LAC, RG 24, vol. 5605, N.S.S. 29-16-1, part 10, Ship Construction Branch, "Final Statement," 12 January 1920