ANNAPOLIS – WARSHIP TO REEF

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Figure 1: HMCS Annapolis (DND photo)

EVOLUTION OF A WARSHIP

A familiar sight in Esquimalt Harbour for the last decade is the stripped out hull of the former ***HMCS Annapolis***. Paid off in 1998, she has been tied up to the Fleet Diving Unit jetty in Esquimalt, BC for 8 years; a reminder to many of us of the days when steam powered ships dominated the world's navies.

Annapolis was the last of the West Coast based steam powered, Helicopter Destroyers (DDH). Her design can be traced back to the successful *ST LAURENT* Class Destroyer Escorts (DDE), which, in addition to being the first postwar destroyer design in the world, was also the first major class of warship designed and built entirely in Canada (7 built between 1955 and 1957). Ordered in 1948, the *ST LAURENT* design was similar to the British Type 12 *WHITBY* Class frigate but used more American equipment. Of note were such innovations as the incorporation of an operations room from which the Captain fought the ship and the provision of chemical, biological & radiation/nuclear (CBRN) protection. With the advances in fighting capabilities and the crew comfort that were integrated into the Class, these ships were commonly referred to as the "Cadillac of Destroyers" by the sailors who sailed in them.

Being a successful design, a further seven anti-submarine ships were ordered in 1951 by the Canadian Government. Referred to as the *RESTIGOUCHE* Class, they were built between 1953 and 1959. Wishing to capitalize on the investments made in building these two Classes of ships, the Government decided in 1958 to order an additional six ships which were similar in design to the *RESTIGOUCHE* Class and referred to as the

MACKENZIE Class DDE. This final flight of destroyers gave the Navy a combined Fleet of 20 modern anti-submarine destroyers.

The advent of the nuclear submarine during the early days of the Cold War posed a significant problem to any Navy with an anti-submarine capability. With an adversary that could travel submerged at speeds that far exceeded any surface vessel of the day, a new capability needed to be developed. The solution was to mount the ability to search out and engage a submerged target into a helicopter that operated in concert the anti-submarine destroyer. At the time, the concept of operating a large Anti Submarine Warfare (ASW) helicopter the size of the CH124 Sea King off a small deck was not considered practical. That changed after the Navy partnered with Canadian industry to develop a haul down and securing device (known within the Navy as the "*Bear Trap*"). Once it was shown that it was possible to operate a large helicopter off a small deck, a major conversion programme was started in 1962 to convert the *ST LAURENT* Class from DDE's to DDH's. At the same time, the decision was also made to modify the design of the last two ships of the *MACKENZIE* Class and **build them from the keel up as DDH's**. These two ships (***Annapolis*** and ***Nipigon***) became the *ANNAPOLIS* Class.

Typical of all these ships, the machinery plant featured compact twin boilers, steam turbines, hardened ground gearing and two shafts driving fixed pitch propellers. With a propulsion plant rated at 30,000 shaft horsepower, these ships were capable of speeds of about 28 knots. Fitted with twin rudders, the result was a fast, highly manoeuvrable platform. When commissioned in December 1964, ***Annapolis*** and her sister ship ***Nipigon***[1], were considered the most capable anti-submarine destroyers in the world.

In 1985, ***Annapolis*** had a major overhaul to extend her service life and enhance combat capabilities. Known as the Destroyer Life Extension Programme – DELEX/265 the major changes included the removal of the variable depth sonar system and Mark 10 Limbo mortars so that the Canadian Towed Array Sonar System (CANTASS) could be installed. As well, the mast was changed and the ship fitted with "Masker" noise suppression system. This latter system consisted of two underwater belts below the engine and boiler rooms that released blankets of compressed air to attenuate machinery noises entering the water.

Built in Halifax, ***Annapolis*** served on the East Coast until she was transferred to the West Coast. Arriving in Esquimalt on 25 September 1989, she was the first towed array ship to be stationed on the West Coast. Although intended to remain in service beyond 2000, ***Annapolis*** was laid up into Extended Readiness on 19 December 1996. Over her 32 year service life, ***Annapolis*** steamed over 750,000 nautical miles (1,389,000 km) participating in numerous taskings, including the NATO Standing Naval Force Atlantic, Royal Yacht Escort, Great Lakes deployments, United Nations Embargo duties off Haiti and major exercises on both coasts.

[1] Commissioned 30 May 1964 and sunk 26 July 2003 as an artificial reef by the *Récifs Artificiels de l'Estuaire du Québec* in the St. Lawrence River off of Sainte-Luce-sur-Merin

Following de-commissioning ceremonies in 1996, ***Annapolis*** was berthed alongside on the Colwood side of Esquimalt Harbour and held in Reserve until she was finally paid off[2] the Navy's rolls in 1998. She remained there awaiting de-militarization prior to disposal. The demilitarization was carried out in 2001 by the Fleet Maintenance Facility in Esquimalt and involved over 8,000 hours of work over six months to remove in excess of 80 tonnes of materials (weapons, petroleum products, hazardous materials and serviceable equipment). Once completed, the ship was then turned over to Crown Assets for disposal. This proved to be a lengthy process but in the end, the Artificial Reef Society of British Columbia (ARSBC) was the successful bidder for the ship and took possession of ***Annapolis*** on the 1st of April 2008. She left Esquimalt Harbour at sunrise on June 8, 2008 when the ARSBC towed her to Long Bay on Gambier Island in Howe Sound for final preparations before being sunk.

Figure 2 - ex ANNAPOLIS Departing Esquimalt Harbour 8 June 2008
Source: POESB, CFB Esquimalt

CREATION OF AN ARTIFICIAL REEF

The Artificial Reef Society of British Columbia (ARSBC) was founded in 1989 and is a provincially registered Canadian non-profit society dedicated to enhancement of the marine environment and to the advancement of sport diving through public education and the creation and preservation of artificial reefs. ***Annapolis*** will be the ninth artificial reef the Society has created and the seventh warship that they have taken on. That being said, the effort required to prepare a warship is a lengthy and complicated evolution and requires a level of expertise not readily available. In fact, ARSBC is considered a pioneer in this highly specialized activity and has a worldwide reputation for excellence.

The sinking is the start of a new long term mission for the ship as an artificial reef which will in time become a new habitat for rock fish species and other marine animals some of

[2] Canadian warships are paid off into one of three categories: Major refit/conversion; Reserve; or Disposal

which have been seriously depleted due to over fishing and destruction of habitat over the past few decades.

An artificial reef can be defined as any man-made object intentionally placed in the marine environment which is often associated with an accumulation of aquatic life. Also referred to as Fish Attracting Devices (or FADs), they provide a habitat where schooling fish and invertebrates such as stars and sea anemones thrive[3]. A variety of fish are then attracted to the solid substrate and protection afforded by the convoluted structure of an artificial reef, as well as the abundant food source, eventually creating a viable and self-sustaining habitat. Based on the experience gained from the previous seven projects in British Columbia, the outer hull and parts of the interior becomes extensively encrusted with invertebrates within months. Within three years, close to 100 species including filter feeders, various varieties of fish and invertebrates have colonized the reefs created. These include:

- Rock fish
- Barnacles
- Shrimp
- Ling cod
- Scallops
- Sea cucumbers
- Wolf eels
- Corals
- Sea stars
- Octopus
- Crabs
- Anemones

Canada regulates disposal at sea programmes through a permit system under the Canadian Environmental Protection Act (CEPA). Under Schedule 5 of the Act, a ship cannot be sunk until "all material that can create floating debris or other marine pollution has been removed to the maximum extent possible if, in the case of disposal, those substances would not pose a serious obstacle to fishing or navigation after being disposed of"[4].

Figure 3: Annapolis off Gambier Island, Howe Sound
Source: Artificial Reef Society of British Columbia

With ***Annapolis*** moored off Gambier Island, a further 17,000 person-hours on the part of over 1,000 volunteers was spent preparing the vessel for the sinking event. Preparation included:

[3] Rust is a particularly rare by-product in salt water that creates an environment where anemones and other filter feeders thrive.
[4] The Canadian Environmental Protection Act, 1999

- Salvage operations to remove as much recyclable material as possible. This provides funds needed to finance the project;
- Removal of residual hydrocarbons and other possible contaminants (e.g. grease and lubricating oils);
- Removal of objects that potentially could interfere with diver access and safety;
- Providing cleared access to most compartments for divers certified in wreck training
- Removal of all doors and hatches;
- Numerous vertical and horizontal diver access holes throughout the ship interior and exterior to allow for ambient light as a diver safe feature.

Another major consideration is the site selection for a new reef. The optimum location must meet accepted criteria for depth, substrate, topography and marine life. The perfect bottom depth would be between 95-110 feet which would allow for navigable clearance to the surface dictated by *Navigable Waters Protection Act*[5]. Ideally, the bottom should be flat, featureless sand/mud mix that sustains very little marine life. Light currents should also be present so that the placing a large convoluted object like a ship would allow for embryonic marine life to be deposited on the ship. A balance must be sought here as too much current would make diving on the wreck much more difficult. Creatures that crawl along the sea floor will eventually start to climb in search of food, ultimately living off the new reef as a new habitat.

Once cleanup efforts were completed in 2014, Environment Canada inspectors came onboard to ensure that all the Schedule 5 criteria had been met. This was the final authorization needed as the other regulatory agencies (Canada Coast Guard, the Department of Fisheries and Oceans and BC Parks) had already issued their approvals, meaning that all the necessary permits were in place for the Society to proceed with reefing the ship.

Surveys were carried out at a number of potential sites in the Vancouver area and Halkett Bay Marine Park in Howe Sound, north of Vancouver, BC was selected for the location of this new artificial reef. Detailed mapping of the bottom was then completed so that the optimum location and orientation of ship could be determined. Not only is this essential in planning the sinking and placement of the ship on the bottom, it is also a legal requirement so that charts of the area can be updated.

By late 2014, with the permit requirements complete, the actual sinking operation became the project focus, culminating more than six years of intense effort. The ship is sunk in a controlled manner using linear shape charges placed low in the ship below the water line. These holes then become diver access points for entry and exit. In December, preparations were made to pre-flood the ship in order to lower its centre of gravity. Once completed, vent holes were cut into the hull to facilitate the escape of air and prevent air pockets from forming while the ship is flooding. The aim is to achieve a rapid sink and to keep the ship upright until it lands on the sea floor. Once settled on the bottom,

[5] Navigable Waters Protection Act (NWPA) (R.S., 1985, c. N-22), administered by Transport Canada (TC)

specialist divers will go down to carry out a safety inspection to ensure that all charges have detonated. Once declared safe, the site is then marked with a buoy system to clearly identify the location of the reef and facilitate tie-up moorings.

Figure 4: HMCS Mackenzie sinking September 1995
Source: Artificial Reef Society of British Columbia

The sinking of ***Annapolis*** is scheduled to take place in 2015.

For more information on the ANNAPOLIS PROJECT as well as the Artificial Reef Society of British Columbia, contact the author or visit http://www.artificialreef.bc.ca

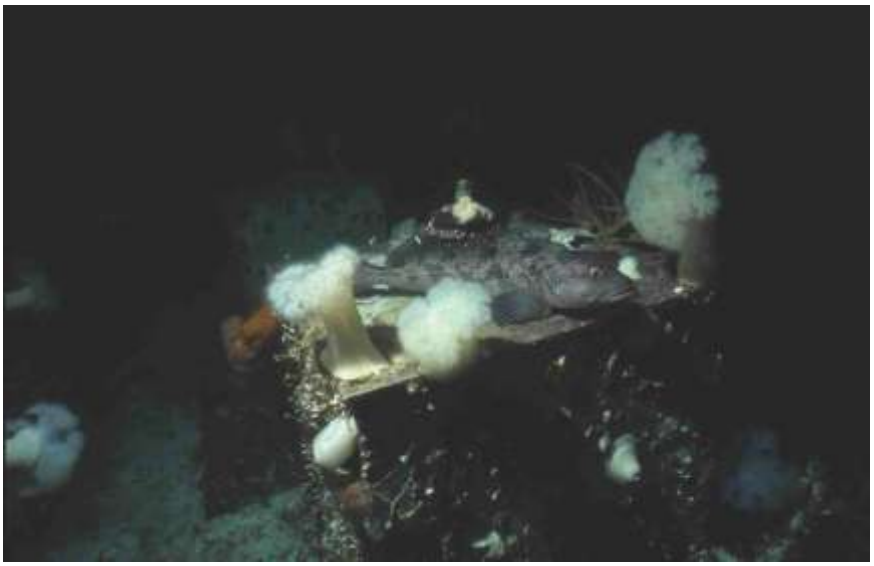

Figure 5 - HMCS Mackenzie (sunk September, 1995)
Source: Artificial Reef Society of British Columbia

Acknowledgements

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Bibliography

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Commanding Officers of HMCS ANNAPOLIS

Cdr R.C.K. Peers, RCN	19 Dec 64 to 6 Sep 66
Cdr. D.N. Mainguy, RCN	6 Sep 66 to 18 Dec 67
Cdr. D. Ross, RCN	4 Jan 68 to 21 Aug 69
Cdr. A.G. Lowe	21 Aug 69 to 20 Feb 71
Cdr A.P. Campbell	1 Apr 71 to 8 Sep 72
Cdr. J. Drent	8 Sep 72 to 18 Jul 75
Cdr. R.A. Willson	8 Aug 75 to 14 May 77
Cdr. A.R.H. Wood	14 May 77 to 16 Apr 79
Cdr. W.P. Dumbrille	16 Apr 79 to 1 Oct 80
Cdr. J.C. Braconnier	1 Oct 80 to 28 Jun 82
Cdr. J.C. Bain	28 Jun 82 to 23 Apr 84
Cdr. G. O. Hurford	23 Apr 84 to 1 Aug 85
LCdr R.J. Kerr	1 Aug 85 to 16 Dec 85
LCdr. D.G. McNeil	16 Dec 85 to 26 Jul 86
Cdr B.F. Beaudry	26 Jul 86 to 4 Jul 88
Cdr R.J. Neveu	4 Jul 88 to 28 Sep 89
Transfer to Esquimalt, BC	25 September 1989
Cdr A.L. Vey	28 Sep 89 to 27 Sep 90
Cdr J.D. Fraser	27 Sep 90 to 25 Jan 91
Cdr R.R. Town	25 Jan 91 to 26 Jul 93
Cdr S.C. Bertrand	26 Jul 93 to 4 Jan 95
Cdr D.W. Robertson	4 Jan 95 to 22 Jul 96
Cdr J.W. Hayes	22 Jul 96 to 19 Dec 96
Decommissioned	19 December 1996

Source: "The Ship's of Canada's Naval Forces 1910-2002" by Ken Macpherson and Ron Barrie (courtesy of CFB Esquimalt Naval & Military Museum)

Background Information:

Other West Coast warships sunk by ARSBC:

HMCS Chaudière – sunk December 5, 1992 off Kunechin Point, Porpoise Bay, Sechelt, BC
HMCS Mackenzie – sunk September 16, 1995 off Gooch Island, Sidney, BC
HMCS Columbia – sunk June 22, 1996 off Maude Island, Campbell River, BC
HMCS Saskatchewan – sunk June 14, 1997 off Snake Island, Nanaimo, BC
HMCS Yukon – sunk July 14, 2000 off Mission Beach, San Diego, California
HMCS Cape Breton – sunk October 20, 2001 off Snake Island, Nanaimo, BC

Source: http://www.artificialreef.bc.ca/OurReefs/index.htm

HMCS ANNAPOLIS

Description:

Blazon: *Gules, a bend wavy Argent charged with a like bendlet Azure, and over all a Cypher of the letters AR entwined in ornamental script ensigned by an Ancient Crown, all gold.*

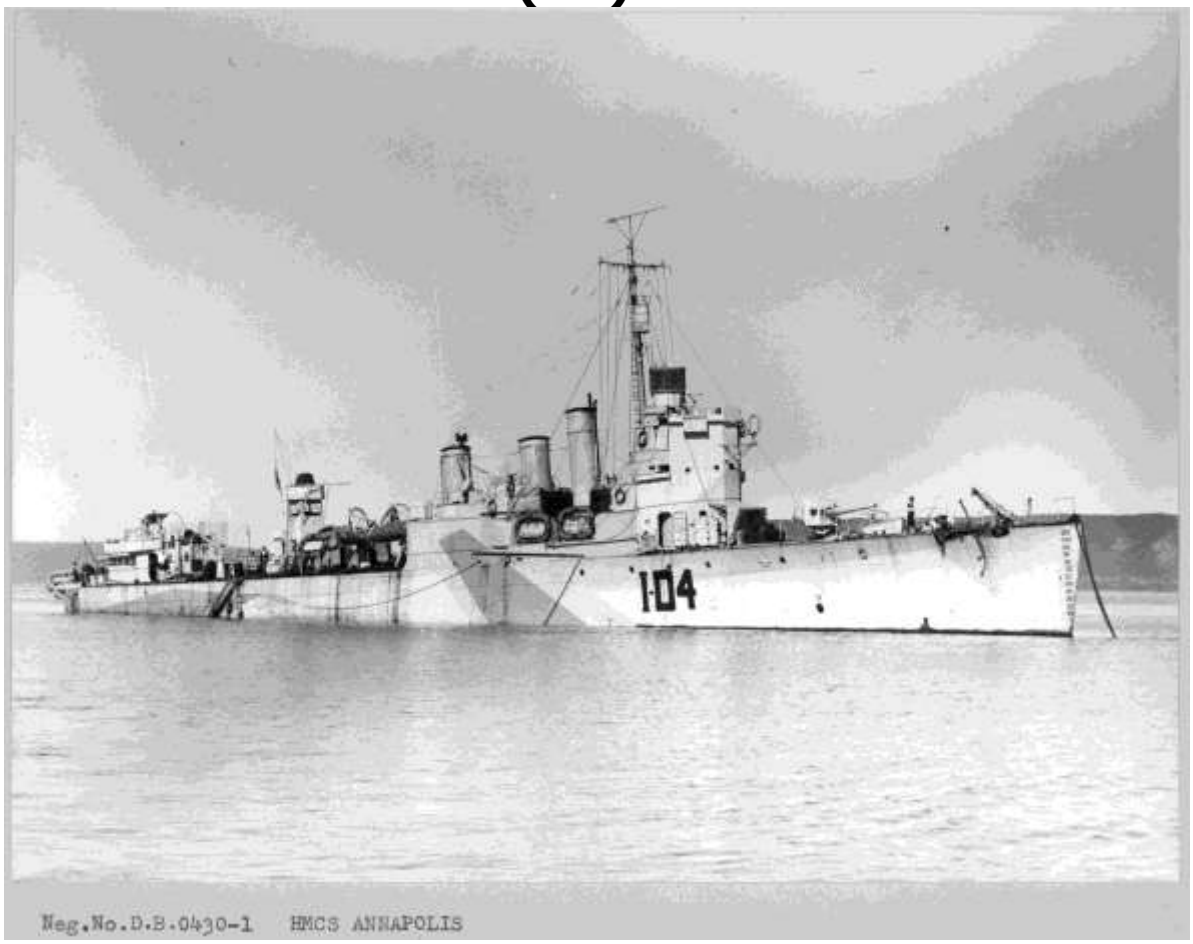
Significance: *This ship derives its name from the Annapolis River in Nova Scotia, which is symbolized by the white and blue wavy diagonal. The crowned Cypher of the letters AR has a treble significance in that it suggests Annapolis Royal in Nova Scotia from which settlement the river got its name; Annapolis, Maryland, the site of the US Naval Academy; and Queen Anne in whose honour these places were named. The original HMCS Annapolis in the Second World War was formerly the American "four stacker" destroyer, USS MacKenzie (built in 1919), one of seven such ships that were turned over to the Royal Canadian Navy in 1939.*

Colours: *Gold and scarlet*

Motto: *To excel*

Battle Honours: *Atlantic, 1941-1943*

HMCS ANNAPOLIS (1st)



Source : DND photo

HMCS ANNAPOLIS (2nd)

Type: Helicopter Destroyer (DDH)
Class: Annapolis
Displacement: 2,400 tonnes Standard, 2,900 tonnes full load
Length: 371 ft.
Width: 42 ft.
Draught: 14' 4"
Cruising Speed: 14 knots
Top Speed: 28 knots
 # Officers: 12
 # Crew: 234
Machinery: Geared turbines, 2 Shafts, SHP: 30,000
Boilers: Twin Babcock & Wilcox Y100 water tube
Weapons: 2 - 3"/50 Mk 33 gun, 1 Mk 10 Limbo 3 barrel ASW Mortar, 2 triple barrel Mk. 32 torpedo launchers, Mk 46 ASW Homing Torpedoes, 1 CH124 Sea King ASW Helicopter
Pendant (Hull Number): 265
Builder: Halifax Shipyards Ltd., Halifax, NS
Laid Down: 2-Sep-61
Launched: 27-Apr-63
Commissioned: 19-Dec-64
De-Commissioned: 19-Dec-96
Paid Off: 1-Jul-98

HMCS Annapolis – post DELEX/265 Conversion
Source : DND photo