



## Evolved Seasparrow Missile Development

The advent of the high-speed jet aircraft equipped with sea-skimming, antiship missiles in the late 1950s posed a clear threat to U.S. and allied naval vessels, and exacerbated the inadequacy of the gun-based naval air defenses of the era.

Following the sinking of the Israeli destroyer *Elath* in 1967 by a Russian antiship cruise missile, NATO allies saw an increased need

for a reliable self-defense missile to protect their navies. In 1968, four countries (Denmark, Italy, Norway, and the United States) signed a memorandum of understanding (MoU) to jointly develop the NATO Seasparrow Surface Missile System (NSSMS). These countries also formed the NATO Seasparrow Consortium, which has grown to 12 countries today

<b>Consortium Member</b>	<b>Year Joined</b>
Denmark	1968
Italy	1968
Norway	1968
United States	1968
Belgium	1970
Netherlands	1970
Germany	1977
Canada	1982
Turkey	1986
Portugal	1988
Australia	1990
Spain	1991

Membership in the consortium gives states a seat on the Project Steering Committee, allowing them to give input on the direction and management of the project. Consortium members also share the financial burden of developing new variants of the weapon system.<sup>1</sup> Three non-Consortium states have also acquired ESSM through foreign sales: Japan, Thailand, and the United Arab Emirates.

In April 1991, the NATO Seasparrow Project Office submitted a proposal to the NATO Seasparrow Project Steering Committee to upgrade the NSSMS to improve performance against faster and more maneuverable low-altitude threats. This led to the development of the ESSMs deployed today.<sup>2</sup> The first production ESSM was delivered to the U.S. Navy in 2002, and the missile has been in operational use since 2004.<sup>3</sup>

Ten of the twelve SeaSparrow Consortium members currently participate in the ESSM development program. These include: Australia, Canada, Denmark, Germany, Greece, Norway, Spain, Turkey, Netherlands, and the United States.<sup>4</sup>

#### Evolved Seasparrow Missile Block II

Currently in development is the Evolved Sea Sparrow Missile Block II (ESSM Blk 2), which is expected to feature an active guidance system that both sends and receives electromagnetic (EM) signals to improve its flight. This active guidance system will reduce ESSM's dependence on ship-based illuminator guidance systems, such as the U.S. Navy's SPG-62 radar. Illuminators bounce EM signals off targets to "paint" them to provide terminal guidance for the interceptor. Equipping the ESSM Blk II with its own active illuminator system will make it more capable against maneuvering threats. Australia, Canada, Denmark, the Netherlands, Norway, Turkey, and the United States are jointly acquiring Block II, which is scheduled to be fully operational by 2020.<sup>5</sup>

#### Evolved Seasparrow Missile Specifications



ESSM is an atmospheric, surface-to-air interceptor missile. It is 3.64 m in length and 0.254 m in diameter, with a range of around 50 km. Using solid fuel, ESSM travels at Mach 4, relying on inertial and semi-active radar for guidance. In the Aegis Weapon System variant, an S-band transceiver allows for guidance from the Aegis SPY-1D S-band radar. The missile uses Thrust Vector Control (TVC) to enable tail

control, allowing the missile to obtain the high speeds and maneuverability required to defend against advanced aerial threats.<sup>6</sup>

ESSM was designed to be fired from various launchers including the NSSMS Mark 29 trainable launcher, Mk 57 Vertical Launching System (VLS), Mk 41 VLS, Mk 48 Guided VLS, and the Mk 56 Dual Pack ESSM launcher.<sup>7</sup>

Additionally, ESSM can interface with all NSSMS systems, as well as the Aegis Weapons System. On Aegis-equipped ships, ESSMs are typically fired from the Mk 41 VLS, with four interceptors “quad-packed” into a single launch cell.<sup>8</sup>

### **Evolved Seasparrow Missile Service History**

The ESSM was used in combat for the first time on October 9, 2016 by the U.S. Navy off the coast of Yemen. The USS Mason (DDG-87) fired two SM-2 Block IV interceptors, one ESSM, and deployed a Nulka-class antiship decoy to counter two antiship cruise missiles launched by Iranian-backed Houthi forces in Yemen. One of the Houthi missiles crashed into the sea, the cause of which is unclear. It is also unclear whether the ESSM, the second SM-2, or Nulka decoy defeated the other Houthi missile. The USS Mason was unharmed.<sup>9</sup>

LAST UPDATED: 07.12.2018