The keel of the USS PILOTFISH (SS386) was laid 15 May 1943, in the building basin, U.S. Navy Yard, Portsmouth, New Hampshire, alongside that of the USS BANG. With Mrs. Martha Szelmeczka Schuotz of Chicago, Illinois, as sponsor, PILOTFISH was launched 30 August 1943. During the construction period the officers and crew were assembled at Portsmouth and given all schooling and training available. Basic instruction was given all new recruits, "school of the boat" held for all hands, and key personnel were sent to manufacturers' plants, Naval Torpedo Station, Newport, Rhode Island, and Submarine School, New London, Connecticut for specialized and advanced training.

At 1030, 16 December 1943, Lieutenant Commander Robert H. Close, USN, accepted the ship from Captain J. W. Reper, USN, Captain of the Yard, and the USS PILOTFISH hoisted her colors, the last submarine to be completed by Portsmouth Navy Yard in 1943, under the administration of Rear Admiral T. Withers, USN, Commandant of the Navy Yard.

All Navy Yard work was completed 31 December 1943 and the ship commenced her underway trials, training, and shakedown in the Portsmouth area. Torpedo tube trials were combined with experimental torpedo firing conducted by PILOTFISH on the testing range at the Naval Torpedo Station, Newport, Rhode Island, and under direction of the Chief of Naval Operations, PILOTFISH fired 355 torpedoes during the period 22 January to 14 March 1944. In the New London area, during the period 15-29 March, additional training was accomplished, and all uncompleted trials conducted. On 29 March PILOTFISH departed New London for the Pacific area, via the Canal Zone. The Panama Canal was transited on 7 April, and on 10 April PILOTFISH reported to Commander in Chief, U.S. Pacific Fleet, for duty and joined Submarine Force, Pacific Fleet, attached to Submarine Division 202, Submarine Squadron 20.

Upon arrival Pearl Harbor on 26 April 1944, further intensive advanced training commenced and on 16 May, PILOTFISH departed on her first war patrol in company with PINTADO and SHARK, under the tactical command of Captain L. N. Blair, USN, in PINTADO. This patrol was begun in the area west of the Marianas Islands. The first week in the area, just prior to the Saipan invasion operation, was especially active but escort and plane activity effectively combined with a streak of hard luck to frustrate all attacks made by PILOTFISH. At the end of this week the task group was ordered to the area south of Formosa, where a strategic patrol was conducted across a probable route of reinforcement or retirement of the Japanese forces engaged in the Battle of the Philippine Sea. This proved fruitless and PILOTFISH set course for Majuro Atoll, Marshall Islands, arriving 4 July and forty-nine days at sea.

Refit was acomplished by USS BUSHNELL while the officers and crew recuperated at the rest camp on Myrna Island. Following local training operations, PILOTFISH departed on her second war patrol 27 July, which she spent in the vicinity of the Bonin Islands. In addition to offensive patrol, lifeguard duty was performed for Fifth Fleet carrier-based aircraft during the Fourth Bonins Raid, 4-5 August, and again for Third Fleet aircraft during the Volcano-Bonin Raids 31 August - 1 September. No successful attacks were completed, nor were lifeguard services required. PILOTFISH arrived at Submarine Base, Pearl Harbor, via Midway Island 14 September, having spent 52 days on patrol.

On 1 October 1944, Commander K. G. Schnable, USN, relieved Commander R. H. Close, USN, as Commanding Officer. On completion of refit and extended training, PILOTFISH departed 14 October via Midway Island on her third war patrol, again in the Bonins area. On 31 October, northwest of Muko Shima, she contacted a 4,000-ton cargo ship, later identified as similar to the TAIAN MARU. PILOTFISH dove while it was yet dark, and at dawn made her torpedo attack, which resulted in a hit aft. Escort activity prevented making sure of this target, and it was later learned that she had limped into port, badly damaged. On 2 November PILOTFISH proceeded to the Nansei Shoto area for the balance of the patrol. A three-ship convoy was encountered, but subsequent escort activity was determined enough to prevent PILOTFISH from closing her attack. After 57 days of patrol, she returned to Midway Island for refit, arriving on 10 December.

Materiel difficulties extended the third refit alongside USS AEGIR, and it was not until 20 January 1945, that PILOTFISH departed on her fourth war patrol, in Company with FINBACK and RASHER, with the Commanding Officer, PILOTFISH as Group Commander of a coordinated-attack group. The group proceeded via Saipan to the East China Sea area, where a long and tiring patrol was spent with no contacts save a hospital ship and small craft. A close bomb attack before dawn on 26 February, while not resulting in any major damage, was notable in that it hit the jackpot on the slot machine. The Jap pilot responsible is invited to call for his winnings at any time. Famous last words of the Officer of the Deck to the Commanding Officer, just before the explosion, "I don't think he saw us, Captain." Employment in this area was strategically essential to the success of the Iwo Jima campaign and PILOTFISH was therefore credited with participation in this operation. PILOTFISH returned to Submarine Base, Pearl Harbor, via Midway Island, after 66 days at sea, arriving 25 March.

The readiness for sea date was delayed to accomplish modernization alterations, and again delayed due to materiel difficulties, and on 21 May 1945, PILOTFISH finally departed for her fifth war patrol, proceeding to the area via Midway Island. Fifteen days were spent on lifeguard duty off Marcus Island, after which PILOTFISH proceeded to Tanapag Harbor, Saipan, for fuel and overnight voyage repairs alongside USS ORION. On 20 June, PILOTFISH left for the second half of a lifeguard patrol, the latter period spent in the vicinity of the Nanpo Shoto and the Empire. No opportunity for rescue was presented, nor were any ship contacts made. PILOTFISH arrived at Apra Harbor, Guam, on 14 July after a patrol of fifty-five days duration.

USS SPERRY completed the refit in the usual time, and on 9 August 1945, PILOTFISH departed on her sixth war patrol, again to lifeguard duty. Only two days had been spent in the patrol area, southeast of the Empire, when on 15 August, the "cease firing" order was received from Commander Submarine Force. Pacific Fleet. PILOTFISH was ordered to remain on station off Kii Suido for continued lifeguard duty, and neutrality patrol. On 30 August PILOTFISH passed to operational control of Commander Third Fleet, and the following morning rendezvoused and joined formation with RUNNER, ARCHERFISH, MUSKALLUNGE, CAVALLA, HAKE, GATO, TIGRONE, RAZORBACK, HADDO and SEA CAT, with the Commanding Officer, RUNNER, as Officer-in-Tactical-Command. The formation proceeded to Tokyo Kaiwan in order to participate in the initial occupation of Japan and the formal surrender ceremonies. The afternoon of 31 August, all submarines of the formation moored alongside USS PROTEUS in Yokasuka Naval Basin. Vice Admiral Lookwood, flying his flag in USS PROTEUS, represented all submarine units present at the formal surrender signed on board USS MISSOURI 2 September 1945.

On 3 September 1945, operational control of PILOTFISH reverted to Commander Submarines, Pacific Fleet, and in company with the previously named submarines of the occupation force, less the SEA CAT, PILOTFISH, got underway for Pearl Harbor arriving at the Submarine Base 12 September. Commander F. E. Hayler, USN, relieved Commander Schnable as Commanding Officer on 13 September and the following day PILOTFISH was underway for San Francisco, California, after 18 months duty beyond the continental limits of the United States, which duty covered 75,075 miles underway during 313 days on war patrol. The homing pennant flying from the periscope as the PILOTFISH enters the Golden Gate will probably mean most to those of her commissioning personnel who still remain aboard after six war patrols.

PILOTFISH was used in the Bikini atom bomb experiments in 1946. She was stricken in 1947.