

Back from Oblivion: Deep Water Wrecks of World War II, Commemoration and Protection

¹ Blair Atcheson (Naval History and Heritage Command, Underwater Archaeology Branch Program Manager)

² Frank Thompson (Naval History and Heritage Command, Deputy Director of Collection Management Division)

ABSTRACT

The paper as part of Session 4, Underwater Cultural Heritage of World War II in the Asia-Pacific Region: Discoveries, Opportunities & Challenges, provides an overview of some of the recent high-profile, deep-water World War II shipwreck discoveries in the Pacific and how studying the data collected supports the Naval History and Heritage Command's long-term management strategies, approaches to policy and protection, and commemorations. The case studies under consideration are the Battle of Midway Japanese aircraft carriers, USS *Juneau*, and USS *Indianapolis*. The resources available to conduct the work include the data from surveys conducted by Vulcan LLC and reviewed by the U.S. Navy's cultural resource managers for sunken military craft. The data set provides a unique opportunity for research and scientific analysis of deep-water wrecks that are remarkably well-preserved and raises questions on how to address, through policy or practice, the new challenges facing submerged cultural resource managers. The results provide an overview of the information learned from reviewing the ROV footage of the wreck sites and how that informs the management approach for other and future deep water U.S. Navy wreck discoveries by third-party researchers.

ABBREVIATIONS

AUV – Autonomous Underwater Vehicle
DON – Department of the Navy
NHHC – Naval History and Heritage Command
ROV – Remotely Operated Vehicle
UA – Underwater Archaeology Branch
U.S. – United States of America

FIGURES

Figure 1. Aerial photograph of the Midway Atoll, 24 November 1941. (Credit: U.S. Navy, 80-G-451086)

Figure 2. Image of one of the eight 8inch guns on the wreck of the Japanese carrier *Kaga*. (Credit: Vulcan LLC)

Figure 3. USS *Indianapolis*, 10 July 1945, with inset wreck images. (Credit: U.S. Navy, Vulcan LLC)

Figure 4. A comparison between the ship plan for USS *Juneau* and the wreck. (Credit: NHHC, Vulcan LLC)

INTRODUCTION

In recent decades, the rapid advance and increased accessibility of ocean exploration technology have made public ship wreck discoveries, particularly in deep water environments, more common. One of the more successful groups was the ocean exploration team of Vulcan LLC, founded by Microsoft co-founder Paul Allen to locate and identify World War II ship wrecks. From 2015 to 2020, the team discovered some of the United States (U.S.) Navy's most iconic ships, such as USS *Indianapolis* (CA-35) and USS *Lexington* (CV-2). The Vulcan exploration team was forthcoming, cooperative, and responsible in their approach to locating WWII shipwrecks and provided the survey data to the responsible government agency or museum. For U.S. Navy wrecks, the data was provided to the Naval History and Heritage Command's (NHHC) Underwater Archaeology Branch (UA) as the managers of the U.S. Navy's sunken military craft.

The mission of the NHHC UA is to manage, interpret, preserve, and protect the Department of the Navy's (DON) sunken and terrestrial military craft, which includes over 3,000 shipwrecks and 15,000 aircraft wrecks located world-wide and which date from the American Revolution through to the Nuclear Age. In accordance with customary international policy and practice, the United States retains right, title, and interest in and to any U.S. sunken state vessel regardless of location or the passage of time. The U.S. government passed the Sunken Military Craft Act in 2004 to codify into law these existing principles and, primarily, to preserve and protect from unauthorized disturbance all sunken military craft that are owned by the United States, as well as foreign sunken military craft that lie within U.S. waters. U.S. Navy policy recognizes these wreck sites as fit and final resting places for its service members and, as such, prefers non-intrusive, *in situ* research on sunken military craft. However, the Navy recognizes that disturbance and/or artifact recovery may be justified or become necessary for archaeological, historical, or educational purposes. Therefore, the NHHC established a permitting program to allow for controlled site disturbance.

Researchers are not required to obtain a permit from NHHC for non-intrusive, remote-sensing data collection, but are encouraged to coordinate such activities with NHHC. With such a large, global collection of submerged cultural resources, the NHHC is reliant on responsible divers and third-party researchers to provide invaluable information on these wreck sites. The data is closely reviewed to confirm the identity of a wreck, to document the state of preservation of a site, and/or to enhance our understanding and tell the story of the ship and its crew. The search and data reviews of the Japanese wrecks at Midway, USS *Indianapolis*, and USS *Juneau* have expanded our understanding of each site and continue to inform NHHC's submerged resource management approach.

MIDWAY

In the remote reaches of the western Hawaiian Archipelago sits a small atoll consisting of two islands and a lagoon. The atoll gets its name, Midway, from its location roughly equidistant from North America and Asia. Given its central location, the atoll was an important U.S. Navy base for aircraft and ships traversing the Pacific, and would become the spot of one of the most important confrontations between the Imperial Japanese Navy and the United States Navy - the Battle of Midway.



Figure 1. Aerial photograph, looking just south of west across the southern side of Midway atoll, 24 November 1941. Eastern Island, the site of Midway's airfield, is in the foreground. Sand Island, location of most other base facilities, is across the entrance channel. Official U.S. Navy Photograph, now in the collections of the U.S. National Archives. (US Navy Photograph #80-G-451086).

In 1941, the Imperial Japanese Navy wielded one of the most awesome instruments of warfare the world had ever seen, the Kido Butai - a strike force made up of six aircraft carriers and their air groups supported by escorts of battleships, cruisers, and destroyers. Under the command Vice Admiral Chuichi Nagumo, the Kido Butai swept all enemies aside as it conducted operations across the Pacific and Indian Oceans (Fuchida and Okumiya 1955). Until 4 June 1942, when the Kido Butai, downed two carriers damaged at the Battle of the Coral Sea, faced an American force of three carriers and their escorts, plus land-based aircraft operating from Midway. By the end of the day, the U.S. Navy had won a major victory; all four of the Kido Butai's aircraft carriers and their air groups were destroyed against the loss of one U.S. carrier and a destroyer. With this victory, the U.S. began to turn the tide of war in the Pacific. To the U.S. Navy, the Battle of Midway remains a pivotal moment in its history and is the subject of yearly commemorations.

Only one carrier wreck, USS *Yorktown* (CV-5), had previously been located from the battle, alongside possible debris from the Japanese carrier *Kaga* (Ballard 1999). In 2019, Vulcan launched a survey to locate the Japanese wrecks of *Kaga*, *Akagi*, *Soryu*, and *Hiryu*. The expedition cast off on 31 August 2019 from Honolulu Harbor aboard the R/V *Petrel*, a 3400-ton vessel measuring 76.45 meters (m) in length with a 15 meter beam. *Petrel* deployed with a crew of twenty and ten project team members, which included a subject matter expert from the NHHHC. The vessel embarked with an autonomous underwater vehicle (AUV), a REMUS 6000, and a custom built remotely operated vehicle (ROV), an ARGUS Bathysaurus XL79 equipped with two high-resolution forward-facing cameras and a forward-mounted Kongsberg MS 1171 scanning sonar unit to aid navigation. Both vehicles were rated for 6000 m.

With records collected from years of archival research and study of secondary sources, the expedition team decided to concentrate the search on *Akagi*, *Kaga*, and *Soryu*. As they were disabled at the same time during the battle, it was possible that their wrecks would be close to each other. Here, the book “Shattered Sword” proved invaluable (Parshall and Tulley 2005). The authors provided accounts from surviving crewmen on each carrier during and after the air attacks. *Soryu*, the smallest carrier in the Kido Butai, was heavily hit by three bombs and left a drifting wreck. *Kaga*, the largest of the carriers, was hit by five bombs which destroyed the flight deck and hangars. However, there was evidence that the propulsion plan was able to maintain steam up to a speed of about four knots. Furthermore, the war patrol report from the submarine USS *Nautilus* (SS-168), which fired a torpedo at *Kaga* after the dive bombing attack, provided a location reference that was used to plot the search area (DON 1942). *Akagi*, the flagship, suffered one direct hit and a near miss that disabled the steering gear. The direct hit destroyed the carrier’s primary firefighting system, preventing her crew from quenching the growing conflagration in her hangars and flight deck. Later in the morning, the ship’s engines came back on, leaving the ship steaming in circles. Taking all of these factors into account, the search began on 7 September 2019.



Figure 2. Video image of one of the eight inch guns on the wreck of the Japanese carrier *Kaga*. (Credit: Vulcan LLC).

The AUV was programmed to run a series of five tracks over 13 hours. Unfortunately, a software glitch created a vibration in the AUV that caused some distortion in the data readout. Despite updates from the manufacturer, the problem was never fully resolved, but the data remained decipherable. However, the seafloor ensonification proved deceptive. Instead of presenting a clear debris trail, the contacts in the data did not point in any one direction to follow (Paul Mayer pers comm 2023). On 13 September, after running a search of over 600 nautical square miles (nm²), a promising contact was noted on the bottom at about 5,500 m. A high resolution side-scan pass revealed the impression of a carrier. The dimensions of the contact eliminated *Soryu* as a candidate. The tethered ROV was deployed to investigate the target starting on the aft starboard side quarter of the wreck. The wreck had plowed into the bottom and buried itself up to the degaussing cable. One of the first noticeable features was the barrel of an eight-inch gun. That image confirmed that the wreck was either *Akagi* or *Kaga*. According to the ship’s data, *Akagi* had six such guns, mounted three on each side. *Kaga*, slightly larger, had 10 total, five on each side (Skwiot and Jarski 2015). Three eight-inch guns or associated empty barbette were noted on each side, which originally suggested the site was *Akagi*. However, what the video did not show, the side-scan sonar did; debris covered a couple of the mounts

bringing the total guns to eight. The site was confirmed as the wreck of *Kaga*. Reviewing the plot, the team noted that *Kaga* was 16 kilometers (km) from the initial calculated search position. The condition of the site and battle damage, including the collapsed flight deck and superstructure, corroborated the survivor accounts published in “Shattered Sword” (Parshall and Tulley 2005).

The search for *Akagi* and *Soryu* continued, but the survey was dogged by troubles with the AUV, while AUV missions that were successfully launched kept concluding without result. Finally, on 20 October, a large debris field lit the data screen at a depth of about 5,500 m. Unfortunately, the cable system on the ROV had failed and so no video data could be collected. However, the high resolution side-scan clearly indicated a carrier wreck and the dimensions matched the Kido Butai flagship, *Akagi*. The expedition ended before locating the wrecks of the *Soryu* and *Hiryu*. The atoll, now under the jurisdiction of the U.S. Department of the Interior, is slowly being restored to its pre-human habitation environment. While little will remain of the land side of the Midway battle, the wrecks of the American and Japanese carriers will stand in testament to the mighty clash of these two naval forces and as memorials to the service and sacrifice of the servicemen of both nations.

INDIANAPOLIS

Shortly after midnight on 30 July 1945, an explosion severed the bow of the heavy cruiser USS *Indianapolis* (CA-35). Seconds later, another explosion rocked the starboard side of the ship and engulfed the superstructure in flames. The ship had been hit by two torpedoes from Japanese submarine *I-58*. The damage was catastrophic to ship and crew. In less than 15 minutes, the decorated warship would come to rest 3.5 miles (5,500 m) at the bottom of the Philippine Sea. The loss of *Indianapolis* would not be reported for another four days when the first of the survivors were spotted and pulled from the sea. An estimated 900 men of a crew of 1,195 went in to the water, but only 316 survived. The ship had a commendable record before and during WWII, but ‘the proud legacy of the ship would forever be marred by the controversial circumstances of her loss, the Navy’s failure to rescue her stranded crew in a timely manner, and the treatment of her skipper’ (Hulver and Atcheson 2019, 13).

The wreck of *Indianapolis* was located by the Vulcan exploration team aboard R/V *Petrel* on 19 August 2017 utilizing their AUV and ROV systems. The side-scan sonar of the wreck site revealed the bow, broken and separated from the main hull by nearly 2 km. The speed at which the ship sank and landed keel-first on the seafloor is evidenced by the impact crater left in the sediment; a remarkable sight given the 72 years that had passed since its sinking. After the torpedo strikes, one engine kept running so the ship circled to port while going down at the bow with an increasing starboard list. At 12 minutes from impact, the ship almost completely capsized before going vertical and disappearing under the waves. The side-scan image of the wreck and the arrangement of the debris field confirmed the sinking event transpired just as described by survivors in the Navy’s 1945 report (DON 1945).

Damage from the second torpedo is marked by a large hole in the shell plating on the starboard side at the top of the first platform; an exit blast is evident on the deck of the communication platform behind the barrette of Turret Two. The visible damage seems modest in comparison to survivor accounts of ruptured decks with flames coming through and scorching hot walls and floors that burned hands and feet. However, the 1945 report believed that the heavy longitudinal bulkhead likely deflected the force of the torpedo detonation upward into the crew’s spaces, something confirmed by the exit blast on the communication platform. The most striking feature of the wreck site is its remarkable preservation, highlighted through the clear paint and stenciling from the hull number 35 on the bow, a lone box in the debris field labelled “USS INDIANAPOLIS, PARTS AND TOOLS”, the 2-tone grey paint on the hull with the intact teak decking, or the bureau number visible on the tail of a Curtiss SC-1 Seahawk.

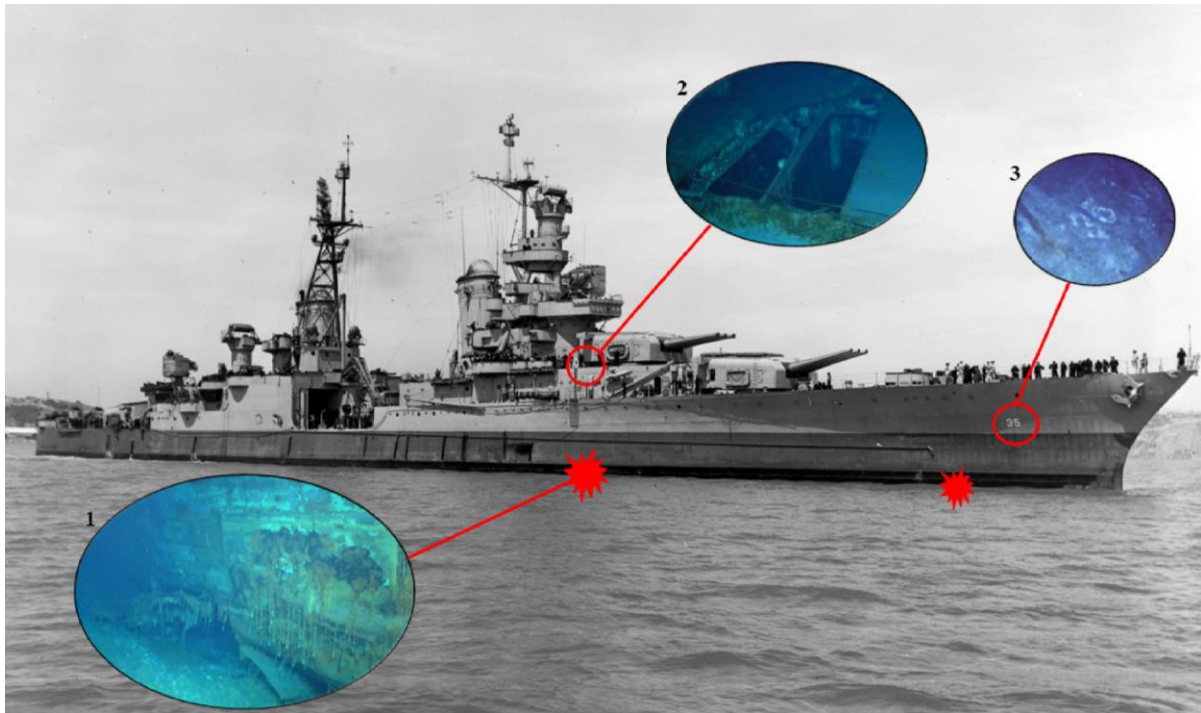


Figure 3. *Indianapolis* off Mare Island, California, 10 July 1945, after her final overhaul and repair of combat damage, Bureau of Ships Collection, National Archives #19-N-86911. Inset images: 1) shell damage from the second torpedo hit, 2) exit blast damage on the deck of the communication platform, 3) bow hull number. (Credit: U.S. Navy, Vulcan LLC)

The upright positioning of the wreck, and pristine condition of the site, allowed the Navy to reinvestigate the sinking and corroborate the historical records with the actual wreckage. In general, the Navy's 1945 report on the loss (DON 1945), was remarkably accurate given the chaotic nature of *Indianapolis*'s last moments and trials of the survivors at sea. One of the more surprising results from each site reviewed thus far is the accuracy of survivor accounts, with a few discrepancies, which highlights the importance of collecting oral histories.

JUNEAU

USS *Juneau* (CL-52), a 6,000-ton *Atlanta*-class light cruiser commissioned on 14 February 1942 had a short, but notable career largely conducting carrier escort duty in the Pacific theater until the Naval Battle of Guadalcanal. During an unexpected close-quarters engagement between an Allied task force and Japanese bombardment fleet shortly after midnight on 13 November 1942, *Juneau* was hit in the port forward fire room by a torpedo from a Japanese destroyer. The impact caused significant damage and *Juneau* withdrew from the skirmish to conduct emergency repairs. In the morning, the injured cruiser joined with the remainder of the Allied task force. At 11:01, *Juneau* was hit by a torpedo from the Japanese submarine *I-26*. The torpedo struck just forward of amidships on the port side very near the torpedo hit from the earlier night battle causing a catastrophic explosion that sank the ship in a minute. Eyewitnesses did not believe any of the crew survived the violent explosion or rapid sinking. However, an estimated 115 sailors of a crew of 693 survived the initial sinking only to endure seven days at sea. Only 14 of *Juneau*'s crew would ultimately survive. While loss of *Juneau* itself is haunting, the ship is most remembered for the death of the five Sullivan brothers; the story of service and sacrifice of one family resonated deeply with the Navy and the nation, then as it does today.

Using positions from the war diaries of two ships near *Juneau* at the time of the sinking, the Vulcan research team aboard R/V *Petrel* developed a search grid and deployed their AUV to scan the seafloor for anomalies in March 2018. A high frequency side-scan target revealed a large hull-shaped object and a concentrated debris field. An ROV investigation confirmed the wreck as the remains of *Juneau*. Once the data was received, NHHC (2018) archaeologists conducted a close review of survivor

accounts, official Navy records, and secondary sources to determine any lingering questions from the historical record. For *Juneau*, historical accounts of the sinking were generally consistent.

The wreck of *Juneau* lies at a depth of over 4,000 m in the waters of the Solomon Sea southwest of the island of San Cristobal. The site is broken up in two sections: the intact main hull and a debris field which includes a portion of the bow and stern. The main hull section is approximately half of the 542 ft (165 m) long ship and is sitting proud on seafloor buried in sediment up to the bilge keel. Approximately 600 m to the southeast is the main debris field which includes, rather perplexingly, a portion of the bow resting on its port side with a portion of the stern (fantail) on top of the bow. The name plate on the stern with the letters “uneau” are visible confirming the wreck’s identity.

The entire wreck site bears witness to the cataclysmic explosion that rocked the ship on the morning of 13 November 1942. The degree of destruction made it a challenge to grasp how much of the ship remained. Although the video was not collected systematically, NHHC archaeologists experimented with processing the video through photogrammetric software. While imperfect, the three-dimensional model that was produced provided significant insights into understanding the site. The scene is that of great violence. Half of the ship essentially evaporated upon impact; what little remains is because it was immersed so quickly that it did not have time to explode or burn.

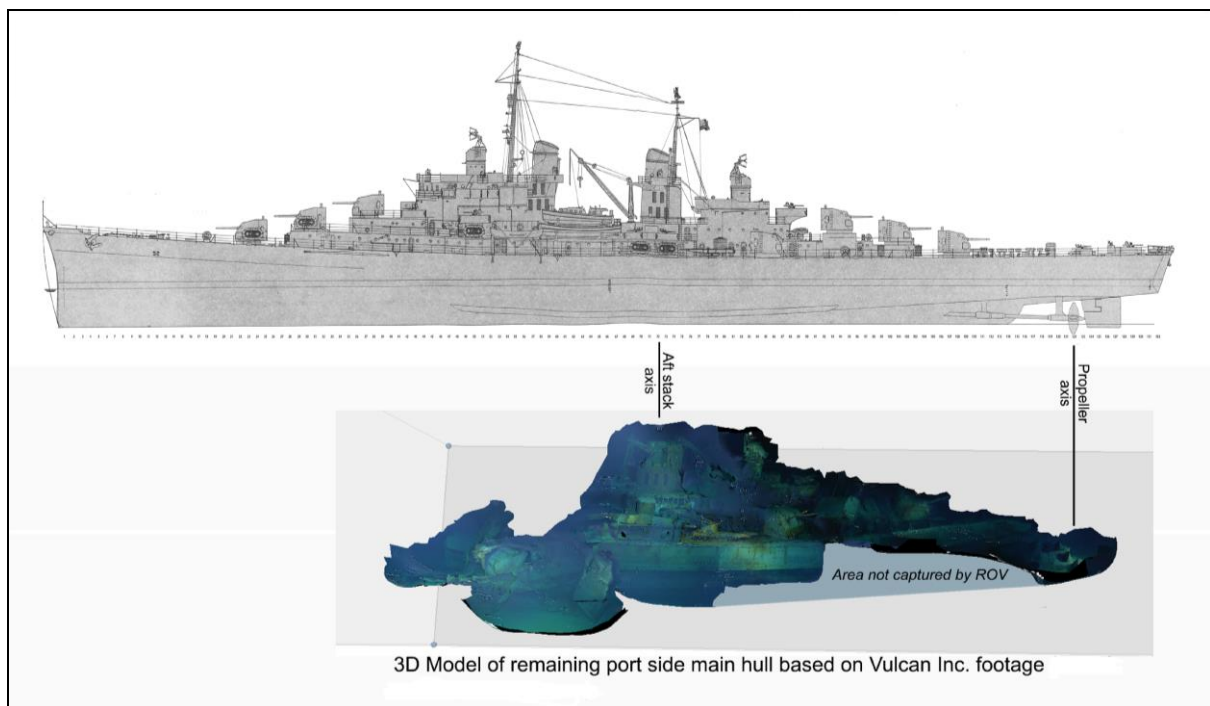


Figure 4. A comparison between the ship plan profile for USS *Juneau* and remaining wreckage. The 3D model, developed from Vulcan’s video data, shows the most intact portion of the main hull from the aft stack to the propellers, portside. (Credit: NHHC, Vulcan LLC)

In the debris field, the detached rudder was the first indication of a possible second torpedo hit in the stern. Returning to the historical records, one survivor and one witness from a nearby ship believed a second torpedo from *I-26* struck in the fantail (O’Neill 1942). The distinct shockwave damage on the rudder provides some credence to an adjacent external explosion, likely near the vessel’s propellers. While further, systematic, documentation of the wreck site, particularly near the rudder and stern, would help to interpret the damage, the level of destruction is so severe that even with further documentation it is unlikely that a conclusive determination could be made about the possible second torpedo strike. However, the ship’s official record has now been amended to indicate that *Juneau* was likely struck by three torpedoes in all, one during the night battle and two later the following morning.

CONCLUSION

The many discoveries by Vulcan LLC provide the Navy with a unique opportunity to study multiple well-preserved and undisturbed wreck sites of a similar age, type, and environment. While the data was not collected systematically nor with archaeological research in mind, NHHC has extracted substantial information from the data reviews, allowing archaeologists to compare historical records with the extant wrecks, providing baseline documentation for resource management purposes, informing future site visits and research questions, and supporting NHHC's mission to preserve and present an accurate history of the U.S. Navy.

Prior to the twenty-first century, the deep ocean, much like outer space, was explored mostly by governments and academia. There is now an ever-increasing interest in deep-water shipwreck visitation, spanning from the privately-funded researcher to individuals wishing to merely explore the seafloor with private submersibles. Based on the knowledge gained from analyzing the site data provided by Vulcan LLC and other partners, NHHC has been in a better position to develop policies to address deep-water wreck site visits, in particular those involving the use of submersibles. As wrecks continue to be found and depth becomes less of a protecting factor, the more knowledge gained on each site that is responsibly studied, the better positioned NHHC and other submerged cultural resource managers are to create best practices and policies that preserve these untouched resources and honor those lost onboard.

ACKNOWLEDGEMENTS

The NHHC Underwater Archaeology Branch is grateful to Vulcan LLC for many years of dedicated and responsible surveying and documenting of WWII shipwrecks and for subsequently providing this key data to the appropriate cultural resource managers. We anticipate the information will continue to produce significant findings as data analysis continues and be used to protect and commemorate these wreck sites for many decades. The authors would like to thank all the Navy researchers that contributed to the analysis of the wrecks sites addressed in this paper: Heather Brown, Ken Nahshon, Richard Hulver, Jason Griffin, and George Huss.

BIBLIOGRAPHY

Ballard, Robert D., Archbold, Rick. *Return to Midway*. Washington DC: National Geographic/Madison Press Books, 1999.

Department of the Navy [DON]. Loss of USS Indianapolis, 2 October 1945, RG 19, Entry P1, Boxes 30-32, National Archives and Records Administration [NARA] II, College Park, MD.

Department of the Navy [DON]. USS Nautilus First War Patrol Report, 1942, RG 19, NARA II, College Park, MD.

Fuchida, Mitsuo and Okumiya, Masatake, *Midway: The Battle that Doomed Japan, The Japanese Navy's Story*. Naval Institute Press, 1955

Hulver, Richard A. and Atcheson, Blair. "USS Indianapolis Discovered! Now What? – Analysis of a Wrecksite" Proceedings of Preserving U.S. Military Heritage: World War II to the Cold War, Fredericksburg, Texas, June 4-6, 2019.

Naval History and Heritage Command [NHHC]. "Juneau I (CL-52)." United States: Dictionary of American Naval Fighting Ships. Accessed December 12, 2018. <https://www.history.navy.mil/research/histories/ship-histories/danfs/j/juneau-i.html>

O'Neill, Rodger MC-V(G), U.S. Navy Reserve. Report of USS Juneau Activity from November 11 to 13, 1942, inclusive. PacFlt Conf. Ltr. 24CL-42. Textual Reference Branch, National Archives and Records Administration, College Park, MD.

Paul Mayer, Personal communication with Frank Thompson, NHHC, April 21, 2023.

Parshall, Jonathan B., and Tully, Anthony P. *Shattered Sword: The Untold Story of the Battle of Midway*. United States: Potomac Books, 2005.

Skwiot, Miroslaw and Jarski, Adam. *Kaga 1920-1942: The Japanese Aircraft Carrier*. Poland: Kagero, 2015.