Thesis for the Degree of Doctor of International Area Studies

An Interdisciplinary Study on the wreck of the USS *Kearsarge* in Roncador Cay

Directed by Professor Jeong, Moon-Soo

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The Graduate School of Korea Maritime & Ocean University

Department of International Area & Cultural Studies,

William Gomez Pretel

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By
William Gomez Pretel

Directed by Ph.D. Moon Soo Jeong

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William Gomez Pretel

Department of International Area & Cultural Studies,
The Graduate School of Korea Maritime and Ocean University

Abstract

1. Roncador Cay is located in the western Caribbean within the Colombian maritime territory, a place with complex environmental conditions that have been a ship trap for centuries. On February 2, 1894, the United States Ship *Kearsarge*, a renowned warship for outstanding participation in the American Civil War, wrecked in the Cay. The ship was abandoned with the armament, and its memory lost for years. For the United States and Colombia, the remains of the USS *Kearsarge* are considered underwater cultural heritage with extensive historical data. However, the wreck site has not been studied to identify or localize the remains. This research aims to estimate the location of the wreck site in geographical information systems from an interdisciplinary study combining qualitative and quantitative data. Also, for a better understanding of the shipwreck and its relationship with the maritime cultural landscape, the environmental conditions and the sociocultural factors are characterized. As with most historical shipwrecks studies, the research design is

subject to limitations arising from the geographical isolation of the site, ambiguous information, and the confidentiality of Colombian law; however, the study addressed different methods and assumptions to review the location.

2. Although this dissertation does not accurately localize the remains, it estimated the location by generating geographic points of an area of uncertainty within one square nautical mile. Finally, to determine the possible future of the remains an analysis of the legal framework of the flag state and coastal state was conducted. The data collected and findings are expected to be used in an international cooperation project looking for capacity building as a critical element for sustained development among maritime researcher. This study is an example of interdisciplinary research that demonstrates the relevance of fieldwork to identify the remains, protect the wreck site, and highlight the shared underwater cultural heritage.

Keywords: USS *Kearsarge*, shipwreck, Roncador, underwater cultural heritage, interdisciplinary study

Ⅰ. Introduction

1. Introduction

On February 2, 1894, the United States Ship *Kearsarge* shipwrecked during a military operation, and was abandoned with the armament on board in Roncador Cay, the Caribbean Sea.[1] This vessel is considered among the most important historical ships in the United States for its outstanding participation in the American Civil War.[2] Also, its encounter with the Confederate State Ship *Alabama* in 1864 off the coast of Cherbourg, France, was a remarkable naval action known as the Battle of Cherbourg, which ended in the sinking of the famous confederate ship.[3] For years, the wreck of the USS *Kearsarge* was largely forgotten, and at the end of the twentieth century, when technology made it possible to approach wreck sites, the United States considered its remains as having great naval heritage value.[4] The mimportance of this wreck in Colombia comes from the country's national law, which considers it an underwater cultural heritage. However, past maritime culture has not been studied in detail despite the enormous potential to do so, and some events that are expected as having significant historical and cultural relevance are partially unknown.[5] Additionally, the underwater heritage has been threatened by commercial salvage companies looking to explore sunken Spanish galleons, adding to controversy national submerged heritage law[6] Therefore, urgent actions is needed to reveal, preserve and

1) *Marine Journal*, 1925:24
2) Marvel, 2007
3) Robinson, 1924
4) Dudley, 1991; 1993; 1998
5) García and Del Cairo, 2003:698-702; Delgadillo-Garzón, and Zapata-Ramírez, 2007:61-62; Da Silva, and Tovar, 2017:151; Martin et al., 2019

protect Colombian underwater cultural heritage.

This dissertation presents an interdisciplinary study[7] to approach the identity and estimates the location of the USS *Kearsarge* in Roncador Cay using different methods and assumptions. To pursue this objective, Chapter II provides an overview of shipwrecks by analyzing contexts, causes, and concepts with a comprehensive view of sunken military vessels and their status as underwater cultural heritage and sovereign immunity. Also, it examines military wrecks from an international legal framework and compares national law from both the United States and Colombia, and the importance considering their maritime power and national development. Finally, it presents the current state of the underwater cultural heritage from military wrecks in the United States and Colombia with analysis and conclusions from a legal perspective and the implications in the case of the USS *Kearsarge*.

Chapter III makes an interpretation of the maritime cultural landscape[8] of the wreck site, including all the environmental conditions, a historical description of the region, and the scientific and nautical approaches from colonial powers such as Spain, Britain, and the United States. Also, it presents the social context of the USS *Kearsarge*. The study traces the armament during its service by analyzing the logbooks to establish the main armament abandoned after the wreck event and its characteristics. Furthermore, it analyzes narratives on the USS *Kearsarge* and Roncador Cay in the late nineteenth century and early twentieth century to obtain a general feeling of society, geographical information, and nautical description of the area to better understand the maritime cultural landscape and its relationship with the

6) Piazzini, 2017; Martin et al., 2021
7) Klein and Newell, 1997; Aboelela et al., 2007
8) Westerdahl, 1992:5; 1994:266

shipwreck.

The wreck event's causes and responsibilities are covered in Chapter IV, examining all records from the court-martial with a particular focus on influencing factors such as geomorphology and the nautical analysis done during the process. Finally, essential information was collected to obtain the circumstances of the shipwreck and the site after the accident, including the salvage attempts to confirm the main armament abandoned in Roncador Cay.

During chapter V, assumptions and methodologies are applied to estimate and approach the location of the wreck site. For this purpose, a visual review is done of nautical charts from 1894 to 2021 of Colombia, the United States, and the United Kingdom that aim to find wreck symbols associated with the USS *Kearsarge*. This was also attempted by interpreting and processing data collection from oral interviews and remote sensing images with coordinates from 1894. The processed images did not present the expected results; however, coordinates from 1894 were used with assumptions from an oral interview resulting in a distance difference of 1.14 nautical miles (2.100 meters). The data obtained served to validate and estimate a one square nautical miles area of uncertainty for the remains with coordinates on the geographical information system. Moreover, the chapter examines and interprets assumptions based on some images from the cannons collected in the oral interview and coming from a possible area near the reported coordinates during the wreck event.

The data analysis interpretations should be used with caution. The research question is not accurately solved but makes clear that the only option to identify the wreck site is fieldwork and in situ measurement of the cannons. However, the importance of the results obtained was quantifying the

uncertainty of the area of the wreck site. This result is the unique potential to approach the remains of the USS *Kearsarge*. Also, the analysis of the legal status of the wreck and the information presented in this study can serve as necessary support for further international cooperation projects or research in the wreck site pursuing location and identification to protect the shared underwater cultural heritage.

2. Motivation

There are over 3 million shipwrecks globally[9] many containing unique information about the ship and past societies. Establishing the identity or location of a shipwreck is one of the most complex challenges of maritime history and nautical archeology involving many methods for positive results.[10] Colombia has a unique location on the American continent. The country is located in the north-west corner South America, close to the Isthmus and south of the Caribbean Sea. Its maritime territory in the Caribbean includes the Archipelago of San Andres, Old Providence, and Santa Catalina (ASPSC) comprises islets, banks, and cays, with an extensive territory bordering Jamaica, the Dominican Republic, Haiti, Honduras, Nicaragua, Costa Rica, Panama, and Venezuela.[11] For its strategic geographical location, the area was influenced by colonial powers during the last centuries and disputed by Spain and Britain and later by the United States. Also, it covers one of the most critical sea routes of the Caribbean Sea, explaining its active maritime past.[12]

The Caribbean Sea, including the Archipelago, is characterized by extreme weather conditions.[13] The first half of the year is influenced by cold fronts

9) UNESCO, 2021
10) Orser, 2002:500-501; Adams, 2013
11) DIMAR 2005; Gomez and Castro, 2020; Ramírez-Cabrales et al., 2021:11-12
12) Gomez and Carvajal, 2011; Bassi, 2016; Fajardo et al., 2020:5-6

with strong winds, waves height, and cloud cover, and the second half of the year is affected by tropical storms known as hurricanes which carry intense energy and are difficult to predict.[14] The environmental conditions of the region have, historically, made it a problematic place for navigation.[15] During colonial times, the geographical area comprising the Archipelago documented hundreds of shipwrecks as disappeared between Cartagena de Indias and Havana, generating ambiguity due to the lack of knowledge of the territory when registering information.[16] However, better details on shipwrecks were afforded in the nineteenth century due to the improvement of communications and a better understanding of the territory.[17]

This area is considered a trap for ships[18] with many historical shipwrecks considered underwater cultural heritage that have, up until now, been without rigorous analysis. One reason for this is that most of the research on historical shipwrecks have been conducted on territorial waters in the continent, and limited research in the Archipelago.[19] Also, the Colombian law of submerged heritage of 2013, was the result of a long dispute between the Colombian Government and a salvage company over the rights and location of the Spanish galleon *San Jose*.[20] Unfortunately, the law does not include rights to sunken military ships, making it a problematic scientific approach in wreck sites when international cooperation is required.[21] Therefore, the wreck of the USS *Kearsarge* in Roncador Cay offers an exciting opportunity for a interdisciplinary study, with the primary goal being to estimate the locations of

13) Andrade and Barton, 2000:29.191-26.192
14) Ortiz-Royero et al., 2013:2797-2798
15) Peterson,1965:2-4
16) Lugo-Fernández et al., 2007; Gomez and Jeong, 2021
17) Kennedy, 1971
18) Throckmorton, 1964: 51-61; Orser, 2002:501; Gould, 2011: 82-83
19) Romero and Pérez, 2005; Pérez, 2019
20) Martin et al., 2021
21) Da Silva and Tovar, 2017:151; Rengifo and Castellanos, 2019:43-44

the remains from the information available from primary sources and access to the knowledge of local people for oral material.[22] Also, it is important to conduct a legal analysis assessing the future of the remains expecting policies changes to enhance education and research with international cooperation. Additionally, the complexity of the area can be analyzed from nautical digitalized information of archives from Spain and the United Kingdom to determine the causes of shipwrecks in the Archipelago during the eighteenth and nineteenth centuries.

As a consequence of the political and economic difficulties in the country and the region, this study is an opportunity to provide information for future research and cultural projects, seeking capacity building with international agencies and cooperation with other countries as a critical element for sustained development of the maritime research in Colombia. Furthermore, the study reveals interesting cultural heritage information for islanders. A final motivation is to facilitate instruments to local authorities to protect the wreck site and be declared an archaeological site in the near future.

22) Westerdahl, 1980:311

Ⅱ. Methodology and Shipwrecks

1. Analysis Methodology

1.1. Problem Statement

Previous studies have revealed problems in identifying and locating shipwrecks.[23] Most of them during the survey research have been problematic, with limitations arising from ambiguous information and are not found where expected.[24] Hundreds of shipwrecks are waiting to be discovered worldwide, including one of the most famous, Christopher Columbus' *Nao Santa Maria,*[25] in the Caribbean Sea, a perfect example of ambiguity and limitations reflecting the challenges to locating shipwrecks at sea.[26] On this subject, Harpster analyzed over 250 articles from the *International Journal of Nautical Archeology* covering approximately 200 underwater sites worldwide and stated the difficulties between wreck sites and identification or affiliation due to factors such as ambiguous information and methodology.[27] However, from the second half of the nineteenth century, historical records present much more information on ships and voyages, including ordnance and cannons providing valuable information for identification. Consequently, tracing the armament has been one of the most feasible methods to interpret the wreck's remains and identity.[28]

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23) O'Shea, 2004:1533-1534
24) Peterson, 1965:78; Westerdahl, 1992:6-8
25) Davies, 1953
26) Cazorla, 2016
27) Harpster, 2013
28) Peterson, 1965:94-96; Guilmartin, 1988:35-47; Roth, 1989

Colombia possesses hundreds of historical shipwrecks from an active maritime past; however, studies of shipwrecks are limited. One difficulty has been in identifying wreck sites, due to the lack of systematic studies on maritime history and nautical archaeology. In addition, some sites' geographic isolation and Colombia's underwater cultural heritage law confidentiality help explain the relative lack of prior research.[29] In particular, one of the most significant warships from the United States, the USS *Kearsarge*, which played a significant role during the American Civil War, lies on Colombia's maritime territory. This wreck is protected by the Sunken Military Craft Act of 2004[30] and is considered underwater cultural heritage of the United States. The USS *Kearsarge* has primary sources of information from the archives during the ship's services and the subsequent court-martial. The United States is very conscious of its naval and military heritage. At the end of the twentieth century, much attention was paid to the USS *Kearsarge* by the Naval History and Heritage Command (NHHC), without any approach to the Colombian government.[31] However, Colombia has no reports to confirm such a wreck in its waters or the armament in the Cay. No records confirm or deny the wreck's existence by official documents, research, databases, or government agencies.

Furthermore, for years, fishermen from Old Providence Island spread rumors about old cannons in the islets, banks, and cays from Spanish galleons that attracted the attention of salvage companies with private interests, threatening the underwater heritage. In recent years, Colombian scientists have focused on Spanish archives and documents from colonial times, and only a few research studies have considered navigation or shipwrecks during the

29) Pérez, 2019
30) U.S. Congress, 1987
31) Dudley, 1998

nineteenth and twentieth century. Consequently, it can be said that the shipwreck of the USS *Kearsarge* in Colombia is an extremely under-documented event in its maritime history. Also, in situ studies of shipwrecks are often problematic in Colombia due to legal limitations. The fundamental reason is that throughout the last thirty years, the Colombian government has had a protracted legal dispute against the treasure hunter company Glocca Morra for the location of the Spanish galleon *San Jose*. This warship sank in Colombian waters in 1708 along with its cargo and 600 crew members as well as passengers, during an engagement with a British warship near Cartagena de Indias.[32] As a result, in 2013, the Colombian heritage legislation was modified with the Law 1675 of 2013 to include salvage companies' participation in any approach to shipwrecks or underwater cultural heritage. Consequently, in 2015, the Government of Colombia hired a private contractor called Maritime Archaeology Consultants (MAC), which identified the S*an Jose's* remains without public results or publications.[33] Furthermore, the same law in Article 17 declares confidential any coordinates and elements of the submerged cultural heritage.[34] Therefore, it is urgent to study and reveal information, identify and estimate the wreck site's location and the partially unknown maritime cultural landscape of Roncador Cay. The data is expected to be used in situ shipwreck surveys to establish the state of preservation of the USS *Kearsarge*.

1.2. Research Questions

This research intends to estimate the location of the wreck site of the USS *Kearsarge* which is located in an isolated site, difficult to access. The study includes an analysis of all types of information available from diverse sources

32) Rahn et al., 2008
33) Martin et al., 2021
34) Diario Oficial de Colombia, 2013

by applying mixed methods to estimate the area of the wreck site using geographical information systems (GIS). Also, it analyzes and interprets the sociocultural factors and environmental conditions of the shipwreck to better understand the wreck site and its relationship with the maritime cultural landscape. The main research question is:

1. How does this research estimate the location and the identity of the USS *Kearsarge* wreck site conducting a interdisciplinary study?

Other research questions are:

1. Does triangulation of information collected from different sources and assumptions estimate the location of the wreck site on geographical information system applying mixed methods?
2. Could archival, oral information and accidental discoveries provide accurate information to identify the cannons?
3. Does remote sensing analysis identify the wreck site?
4. What is the legal status of the USS *Kearsarge* by the law of coastal state and flag state?

1.3. Aims and Objectives

The dissertation aims to analyze different sources to identify and provide qualitative and quantitative data to estimate the location of the USS *Kearsarge* wreck site.

Objectives

Conduct an interdisciplinary study to estimate the location of the wreck site with the USS *Kearsarge's* identity and affiliation in Roncador Cay, the Caribbean Sea.

Develop a methodology that interprets collected data between qualitative and processed geographical information to estimate the wreck site identity and its relationship with the maritime cultural landscape revealing information to contribute to the underwater cultural heritage in the Archipelago.

1.4. Research Design and Methodology

After recognizing the research problem, the methodological process and research design emerge from difficulties in identifying the wreck site of the USS *Kearsarge* from ambiguous information and assumptions. Gomez and Jeong (2021) classified 23 shipwrecks without previous studies in Roncador Cay. However, the study will require a work field to identify the wreck sites. One of the reasons is that a large percentage of shipwrecks were not entirely associated with the Cay, establishing an area of uncertainty in the Cay's east zone. Consequently, a wreck in 1675 from a Dutch warship in Roncador was confirmed[35] without further details and might imply two wrecks from warships. Nevertheless, despite limited information and ambiguity, it was confirmed that one of the wrecks corresponded to the USS *Kearsarge.*[36]

Therefore, the current situation of the wreck site of the USS *Kearsarge* and the underwater cultural heritage of the Colombian Caribbean Sea can be perceived on the one hand by different studies within the framework of similar scientific research. On the other hand, by extensive historical data of the USS *Kearsarge,* oral tradition among locals[37] and the hundreds of shipwrecks in the area. The study is partially based on the author's perception of his background in maritime affairs, marine sciences, and military experience as a former navy officer on board Colombian warships. Another

35) Gomez and Jeong, 2020
36) Gomez and Jeong, 2021
37) Westerdahl, 1980:311

factor is the expertise and knowledge sailing in the geographical area, including Roncador Cay, and access to the local communities for oral testimonies or additional information. Also, the study is connected to a historical investigation where a large number of records and files allow an overview of the social factors, starting from the ship' s construction to the shipwreck, subsequent information from different sources, and assumptions after the accident. Of the most valuable sources are the logbooks and the court-martial, which provide geographic coordinates of the wreck event and other relevant details to estimate a location. In addition, the ordnance abandoned onboard should support preliminary information along with other sources. In these circumstances, the armament is unique for wreck identification. In light of this, it should be traced from the ship' s construction, changes, and modifications with accurate information to interpret the cannons abandoned on board and review the heretofore fruitless attempts to salvage the main armament. Another critical factor for this research is the location of the military record of one of the crew members who died in the Cay during his performance in the wreck event, which can bring additional information and contribute to the cultural heritage in Roncador Cay.

This research, however, is subject to some limitations arising from the existing confidentiality in Colombia's submerged cultural heritage law, ambiguous information, and the isolation of Roncador Cay. Therefore, it is essential to establish different criteria based on a methodology and assumptions that estimate wreck site identification. One of the priorities is deciphering the anonymity of the wreck based on elements such as the armament, images of the site, archival and oral information applying triangulation from all sources to make the ship's identity emerge and reveal new information. The proposed methodology should resolve the dissertation's problem, which is to estimate the wreck site's location. For this purpose, an

approach is required to answer the research question based on different techniques. Therefore, the research is the subject of interdisciplinary study with mixed methods to examine and describe results from diverse sources covering areas such as nautical sciences, oceanography, hydrography, maritime history, maritime law, and military history, combining a quantitative study analyzing spatial and geographic information. Additionally, it is imperative to understand the shipwreck from social factors and environmental conditions, applying a case study with a descriptive approach and converging with a mixed method involving quantitative data to provide more accurate information and a comprehensive analysis of the research problem.

A qualitative study aims to interpret and comprehend providing a detailed description of the USS *Kearsarge* from its construction to the wreck event, involving the active maritime past that has defined the hundreds of shipwrecks that occurred by several causes in the area. Initially, an approach to maritime history must be made, classifying the different existing shipwrecks in the Cay. Subsequently, it will delve into the USS *Kearsarge* case, from the American Civil War framework, the history, and services record of the ship and the possible causes of its wreck. Furthermore, it is important to research the environmental conditions in Roncador Cay and the sociocultural factors for a better comprehension of the maritime cultural landscape.[38] Also, the study clarifies aspects of the armament abandoned in the wreck site and compares the flag state and coastal state law of historical and military shipwrecks to predict the future of the wreck site from a legal perspective.

A variety of maritime and navy primary text sources will be examined for this study, starting from the US National Archives, and including logbooks, court-martials, and testimonies of the shipwreck. Also, other primary and

38) Westerdahl, 1992:5; 1994:266

secondary sources such as testimonies, photographs, and press information are used. The wreck location will be validated by three main methods: nautical charts, satellite images, and information about cannons.

Nautical charts are critical elements for shipwreck site identification.[39] Since 1835, wreck sites have been detailed on charts, and this study aims to examine this area during the period 1894 to 2021. from a quantitative study, The coordinates obtained by different sources will be validated with nautical charts and geographical information system (GIS) to estimate the location of the wreck site. Consequently, it is necessary to review archival geographical information from the United Kingdom, Spain, and the United States related to Roncador Cay, primarily hydrographic surveys and nautical charts. This will providing valuable information to validate the wreck. Similarly, due to the extremely shallow water reported during the wreck event, satellite and air images from a specific period of the year will be processed to find cylindrical shapes associated with cannons or remains to support and validate the identification. These tasks require special software to process the images and detail any clue to localize and confirm the wreck's remains. Furthermore, it is crucial to analyze all the relevant environmental processes affecting Roncador, including hurricanes. In order to achieve these goals, an entire analysis will be validated by applying triangulation of sources,[40] with elements and data from qualitative research and quantitative data information. Finally, given the difficulties of interpreting information from the nineteenth century, such as data coordinates and assumptions coming from ambiguous information and oral interviews, diverse sources will be correlated and triangulated to answer the question. Consequently, it is expected to estimate an area of the wreck site, providing valuable information for future research.

39) Peterson, 1965:19,71
40) Hussein, 2009

2. Overview on Historical Shipwrecks and Underwater Cultural Heritage

In order to better comprehend this study, it is essential to define the term shipwreck, which can be thought of as the loss of a ship during a marine accident that, in most cases of wrecking events, comprises a series of complex aspects as sociocultural and environmental conditions. Hence, their status as a time capsule is particularly important to provide information and evidence of past cultures and details of their relationships with society and the environment.[41] However, the main concern here is why historical shipwrecks are important. This was solved after many years of interest in Underwater Cultural Heritage (UCH) by the UNESCO Convention on the Protection of the Underwater Cultural Heritage, adopted in 2001, whose main objective is to protect and manage world heritage, and consider shipwrecks as having essential value for a more solid understanding of maritime history.

The role of ships in developing civilizations has been essential for the simple reason that Earth is covered mainly by water and has an estimated 3 million wrecks, primarily studied by maritime archaeologists.[42] Moreover, ships have essential characteristics like naming, descriptions according to their services, commercial activities or war, and other human associations denoting this critical role.[43] Also, it indicates a special relationship with societies as the primary cause for investigating the past through shipwrecks covering its construction, use, and way of loss, creating a historical and archeological context. Ships have significantly contributed to civilized history as the most reliable method to move materials, goods, and human cargo. Consequently, shipwrecks offer essential information, marking moments of history[44] and

41) Muckelroy, 1998; Gould, 2011; Luckman, 2019:103-104
42) Bass, 1972; Gibbins and Adams, 2001; UNESCO, 2021
43) Bass, 2013
44) Leshikar-Denton, 2010:86

providing remains from past cultures. Notable research includes that of the *Wasa*, the USS *Monitor*, the *Titanic*, not to mention recent findings in the Black Sea.[45] The second half of the twentieth century represented significant changes in shipwrecks research. The development of maritime technology marked a new era in underwater exploration, reaching out to some shipwrecks supposedly lost forever.[46] During the 1980s, scientists started to use remotely operated underwater vehicles (ROV) for deep-water and recently for ultra-deep-water wrecks, revealing the vast potential of wreck sites around the world to contribute to history and science fields.

In order to evaluate the underwater cultural heritage and shipwrecks' importance, national and international laws would be taken into consideration, and the existing conventions and international agreements promoting science, technology, and the protection of heritage.

2.1. Shipwrecks Approaches

Shipwrecks have been of considerable interest in understanding humanity. During the middle ages or medieval period, causes were often associated with the supernatural. Likewise, the causes of some wrecks were attributed to religious interpretations, such as storms being the wrath of God, for example. Although, for this reason, there was a general fear of navigation, oceans were considered a place of chaos, mystery, and a place for ships' disappearances for years. During the early modern period, these theories were still popular among sailors.[47] Only at the beginning of the nineteenth century had attention shifted to wrecks' prevention. The first pronouncement originated from the Ship-owners of Great Britain and the Committees of the House of Commons from the United Kingdom Parliament on shipwrecks in 1836, 1841, and 1842 debates with an outcome of causes wrecks and

45) Ballard, 1987; Cederlund, 2006; Delgado, 2019; Peev et al., 2020
46) Muckelroy, 1978
47) Pérez-Mallaína, 1997:64-68

recommendations.[48] Following these debates, some reports of wrecks were analyzed to prevent accidents. As a result, it was determined that the frequency of accidents occurred during the coast approach.[49] In early eighteenth and nineteenth century Europe, shipwrecks gained considerable interest, with publications on this topic including narratives of the wrecks, analyses, and lists of shipwrecks.[50] This included leading publications during the eighteenth century in France[51] and the nineteenth century from the Royal Navy[52] and Spanish Armada.[53]

In the twentieth century, following the HMS *Titanic* accident an international convention concerning the safety of ships and the protection of life at sea was adopted.[54] Thus, the concept of maritime safety was developed to prevent marine accidents. Furthermore, other codes and international laws focusing on human life and prevention of pollution were developed through analysis of causes, mainly on human factors as one of the leading causes.[55] Additionally, some studies of shipwrecks from an archaeological perspective originated at the end of the nineteenth century and increased during the second half of twenty century with scuba efforts and new technologies that generated methodologies for this approach.[56] Consequently, for a better understanding and study of shipwrecks, there are two holistic approaches: "historic shipwrecks" and "modern shipwrecks" which have no exact definitions of the time period (Fig. 1). However, modern shipwrecks are

48) U.K. Parliament, 1848
49) *Nautical Magazine*, 1836:747-749; *Mechanics Magazine Journal*, 1839:236-240; Bell and Ballingall, 1848:27-38; Ballingall, 1857; Kelly et al., 2021
50) Rodríguez Morín, 2019
51) Deperthes, 1789; translation into Spanish by Marqués y Espejo, 1803
52) Gilly, 1851
53) Fernández-Duro, 1897
54) IMO, 2021
55) King, 1995:469-475; Chauvin, 2011; Corovic and Djurovic, 2013
56) Bass, 2013

considered after World War II during this study taking into reflection new research interests on safety life at sea, pollution, and prevention.[57]

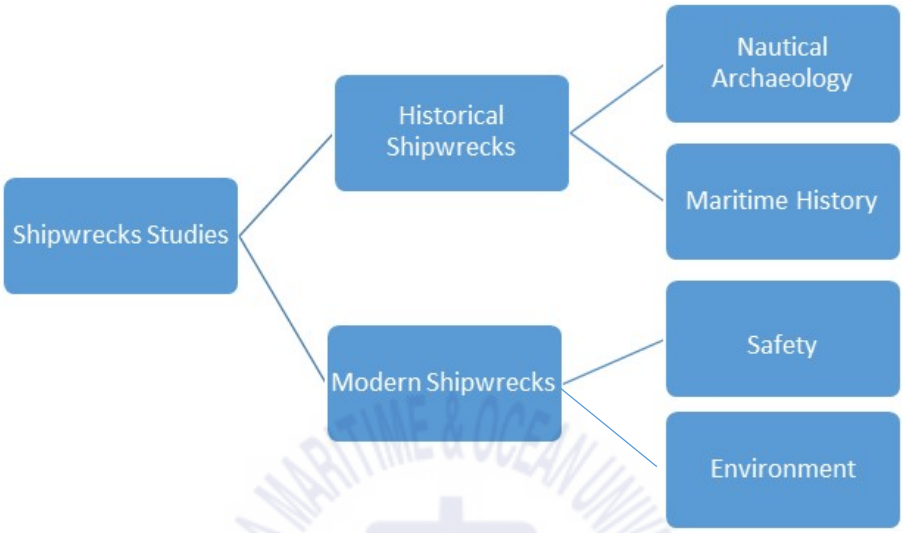

Fig. 1 *Approach to the study of shipwrecks*. Own elaboration.

Contemporary shipwrecks have been studied to protect human life and prevent marine pollution with special care from governments and international agencies with scientific approaches toward maritime safety and the environment. However, for this dissertation, the approach comes from researching historical shipwrecks, their causes, and identification of the wreck site to understand past maritime culture and societies. Furthermore, the study of shipwrecks can be traced to the end of the nineteenth century, including all craft and wreck sites from a geographical or physical approach.[58] Therefore, the research of shipwrecks requires an understanding of the physical relationship between ships' construction, the sailing process, and the context of the wreck site. Ship design is a complex technological and scientific process. It must take into consideration the nautical elements and

57) Monfils et al., 2006; Hansen et al., 2012
58) Bass, 2013

materials in the context of a society's development of transportation, war, and other sociocultural factors. Additionally, oceanographic, geographical, and meteorological conditions (environmental conditions) must be understood to comprehend the wrecking event and how it affects the site's remains.[59] After the accident, shipwrecks exist in a natural environment and thus are subject to disintegration over time, the extent and speed of which will depend on the site's physical conditions as a natural process and ship design materials. The degree to which remains can be preserved depends on oceanographic factors such as stratification, salinity, and turbulence. In addition, water column and location of the wreck at different depths and geographical location are factors to be considered in wreck site preservation.[60] The ship's characteristics and construction material are affected by environmental conditions and anthropogenic processes once they are on the seafloor.

One of the initial methodologies was established by Muckelroy (1976) for a holistic study of shipwrecks and applied to the *Kennemerland*, a Dutch East Indiaman sailing ship lost in Scotland in 1664 and found in 1971. He defined five processes influencing the shipwreck for maritime archaeology: the processes of wrecking, salvage operations, the disintegration of perishables, seabed movement, and the method of excavation[61] (Fig. 2). Also, the geomorphological process is an important research component to interpret the wreck on the seabed and is a crucial component in researching the origins of historical shipwrecks when primary sources are limited to approach the causes or in attempting to interpret them. Also, the site formation process includes ocean conditions and sediment in the marine environment contributing to the wreck site.[62]

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59) Muckelroy, 1998; Gould, 2011; Luckman, 2019
60) Parker, 1981
61) Muckelroy 1976; 1998
62) Keith and Evans, 2016:44-69

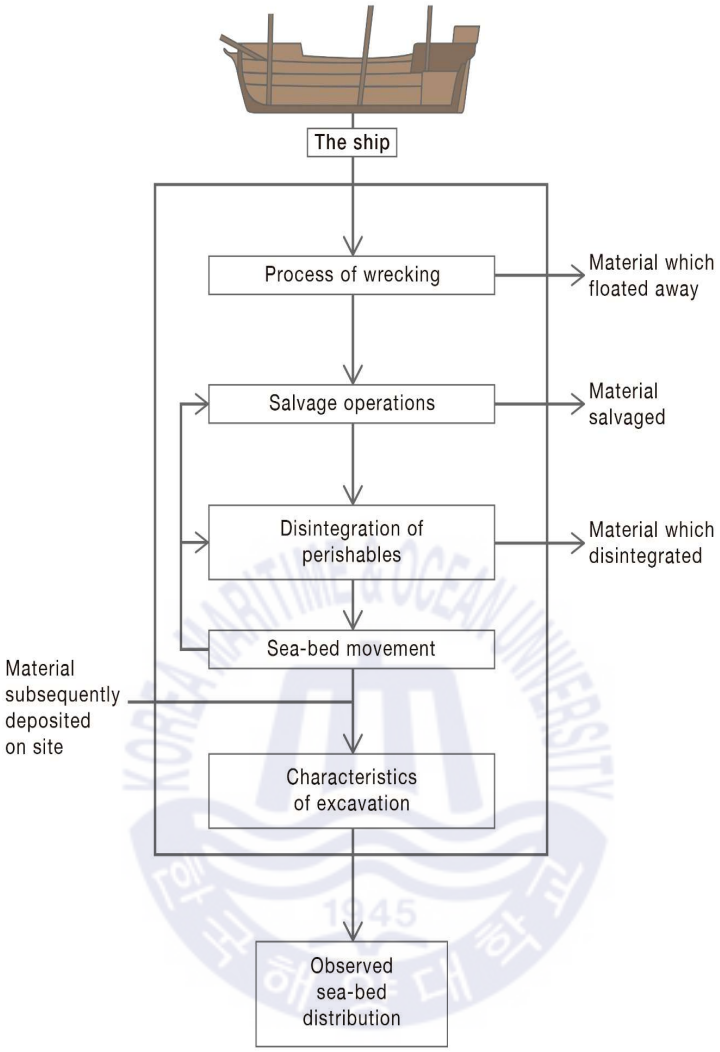

Fig. 2 *Flow diagram representing the evolution of a shipwreck*. Based on Muckelroy, 1998:269.

2.2. Shipwrecks: Causes and Their Relationship with Cultural Factors and Environmental Conditions

The dramatic loss of ships and human life at sea at the beginning of the nineteenth century was a big concern to the Parliament of the United Kingdom, and the House of Commons investigated and the causes of

shipwrecks. As a result, a series of debates were held with recommendations for the government, especially to ships' masters and mates, to improve the situation. The first report of 1836 dealt with the operation of ships and the prevention of casualties, the outcome being that *"carelessness, ignorance, and a variety of other causes of that nature"* were the primary reasons for shipwrecks.[63] Also, it recommended nautical improvement and better classification.[64]

From sunken military ships, similar causes were described according to each event. The compilation from the Royal Navy[65] and the Spanish Armada[66] analyzed several accidents and causes. Some of these reasons were human error and lack of experience of the crews, absence of geographical knowledge of the territory, fire, explosions, and naval battles, among other natural and human causes detected in the compilation list from the sunken warships. The concern about accidents during the nineteenth century and its initial proposals brought about a scientific perspective of shipwrecks, associated with two factors: natural causes and human errors, since ships operating in different regions are subject to unique environmental conditions and sociocultural factors. In this context, authors have distinct views on marine accidents or shipwrecks, and there are many approaches and concepts for this. However, shipwrecks mainly occurred for causes related to human factors, such as navigation or collision, piracy, fire or explosions, and inadequate stowage cargo. In addition, intentional reasons like naval battles or warfare, mutiny, poor design, and insufficient maintenance due to economic factors are considered. These sociocultural factors are classified by Luckman (2019) as economic, technological, hydrographic, navigation, problems with cargo and

63) U.K. Parliament, 1836
64) King, 1995
65) Gilly, 1851
66) Fernández-Duro, 1897

vessel employment, and significant component of culture. Also, environmental conditions, such as seasonal weather patterns, extreme weather events, geomorphology, tide, currents, and geomagnetism, are critical components.[67] Some authors stated that storm or extreme events such as hurricanes or typhoons were the past's leading causes of shipwrecks. However, this can be observed only by region and after a detailed study in a specific area (Fig. 3).

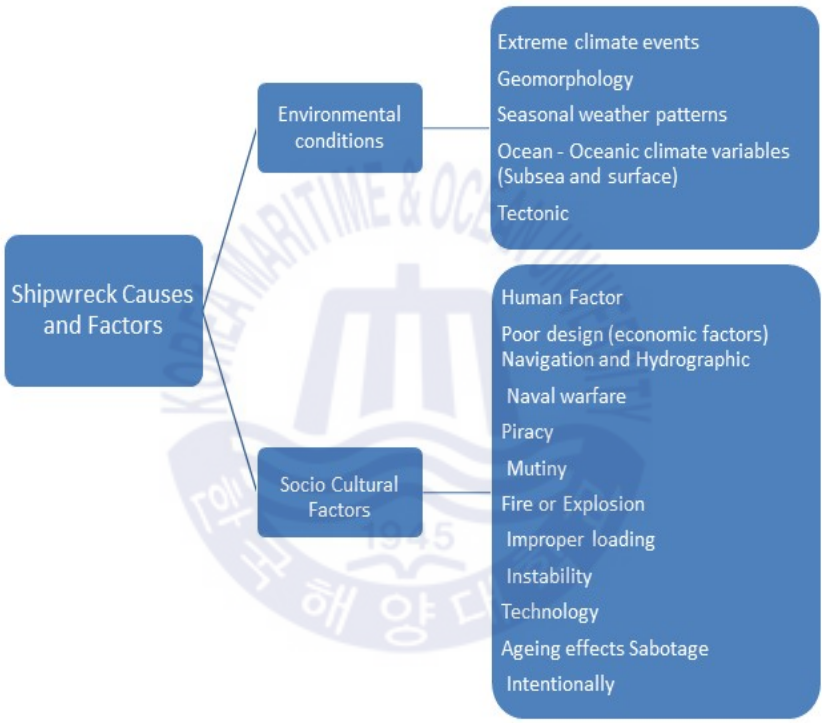

Fig. 3 *Shipwreck causes and factors.* Own elaboration.

2.3. Possible Causes of Shipwrecks in the Area of Study

Historical shipwrecks in the Caribbean Sea and the area of interest of this research have specific causes. On the one hand, some authors attributed

67) Luckman, 2019:104-108

historical accidents to hurricanes or storms.[68] In deed, there is extensive evidence in the Caribbean provided by Spanish and British documents as early as 1492 with one of the highest extreme whether activities globally.[69] On the other hand, certain authors have stated that shipwrecks originated from local geomorphology during navigation,[70] especially on San Andres and Old Providence Island.[71] However, Perez-Mallaina (1991) and Serrano (1991), in their analysis of shipwrecks during the monopoly navigation system established by the Spanish crown in their colonies and called *"Carrera de Indias"* (colonial fleet system), determined other causes. After reviewing some accidents between the American continent and Europe, they concluded that (among other reasons) overloading cargo, lack of experience of sailing, inexperienced pilots, extreme events in the ocean, fire, and explosion as the main causes of shipwrecks in the Caribbean Sea,[72] though these have been correlated with social cultural factors and environmental conditions.

2.4. Shipwrecks Identity

Shipwrecks are a mystery, and their identification requires an extensive process by idiographic approach. Initially, maritime historians review a large number of archives and documents, and other necessary work is made by a nautical archaeologist who excavates the wreck site, and studies the artifacts to predict and determine the ship name or identity.[73] Additionally, there is the legal process to establish owners' identities due to the property rights and immunity coming sunken military ships and the flag States.[74]

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68) Rappaport and Fernández-Partagás, 1997:97-98; García-Herrera et al., 2005; Lugo-Fernández et al., 2007:38; Trouet et al., 2016:3173
69) Poey, 1855; Chenoweth, 2006; Millas, 1968
70) Peñaflores, 2018
71) Gomez and Jeong, 2021
72) Pérez-Mallaína, 1991:65-70; Serrano, 1991
73) Gibbins and Adams, 2001; Bass, 2013
74) Dromgoole and Gaskell, 1993:225-226; Huang, 2014

For a complete identification of a shipwreck, excavation is required to determine details on artifacts and archaeological evidence; however, every wreck site is different from the information provided, the state of preservation, and the depth.[75] Harpster (2013) analyzed the content of approximately 250 articles from 1972 to 2008 of the *International Journal of Nautical Archaeology* to understand the process and methodology in underwater archaeology to create an affiliation or determine the identity of a shipwreck through a sample of data to reveal patterns using during excavations and fieldwork[76]. He found many words associated with the identification as a nation, affiliation, origin identity, and the methodology determined four possible methods for determining to identify or affiliation:

A. First, the name comes from historical sources, and an investigation is conducted in the wreck site perceiving the characteristics of the identity.
B. The wreck site is found first, and the shipwreck's identity is recognized through historical sources.
C. The identity is associated with a historical presence of empire or culture linked to a historical narrative.
D. Modern construct with no links to historical narratives, empire, or nation associated with a region or a century.

In view of this study of a warship from the late nineteenth century, there is enough information from the archives and secondary sources to estimate the wreck's location.

75) Bass, 2013
76) Harpster, 2013

2.5. Definition and Legal Framework of Shipwrecks

Defining some concepts from a legal framework under both international and national law during this study is imperative. The principal reason for this is that the remains of the USS *Kearsarge*, as a warship during a military operation by the United States government, were wrecked in Roncador Cay, Colombia's Maritime territory, more than one hundred years ago. However, before defining the term shipwrecks from a legal perspective, an interpretation from a scientific understanding related to nautical archaeology is given. Parker (1981) defined the term as "the remains of a wrecked ship and its content," the concept of a wreck as "a site where a ship has been badly damaged or destroyed," and the site as "a place investigated by archaeologists." [77] Another concept of shipwrecks comes from Muckelroy (1998) who states, "the shipwreck is the event by which a highly organized and dynamic assemblage of artifacts is transformed into a static and disorganized state with long-term stability." [78]

According to international and national law, definitions are required from military shipwrecks or wrecks and underwater cultural heritage considering jurisdictions rights from the coastal states and rights of the flag state over the warship. However, some definitions depend on the circumstances and jurisdiction with arguable definitions.[79] Consequently, the remains of the USS *Kearsarge* and artifacts are located in Colombia's maritime territory, and the United States holds the rights and title of the ship. Additionally, according to the national laws of both nations, the wreck includes the category of underwater cultural heritage. This research does not pretend to make a

77) Parker, 1981:309
78) Muckelroy, 1998:267
79) Dromgoole, 1999

comparative law analysis process. However, it would intend to show different national views according to their maritime and naval interest, science, technology, cooperation development, and the high-risk implications for the underwater cultural heritage. Also, it will define the concepts of "underwater cultural heritage" and "shipwreck" from international and national law to interpret the term under United States law (as flag state of the USS *Kearsarge* and its rights over this historical shipwreck), and Colombia (where the wreck site lies in their territorial waters). Consequently, the word shipwreck in English and *naufragio* in Spanish will be defined according to their national legal frameworks.

2.5.1. International Law

A vessel or ship (a concept used interchangeably by UNCLOS) becomes a wreck in causality, accident, or unpredictable circumstances, losing navigation, and totally abandoned by the crew.[80] The concept from the international law is not commonly accepted; however, the most satisfactory definition in the existing international law comes from the International Maritime Organization (IMO), "Nairobi International Convention on the Removal of Wrecks," of 2007. This Convention provides legal bases for coastal states to remove wrecks for safety purposes. The Convention defines shipwrecks in Article 1, n.4:

> *"Wreck,"following upon a maritime casualty, means (a) a sunken or stranded ship; or (b) any part of a sunken or stranded ship, including any object that is or has been on board such a ship; or (c) any object that is lost at sea from a ship and that is stranded, sunken or adrift at sea; or (d) a ship that is about, or may reasonably be expected, to sink or to strand, where*

80) Gregori, 2016

effective measures to assist the ship or any property in danger are not already being taken." [81]

This definition provides a broad definition that includes ships that are not sunken but "expected," which makes a complex meaning not entirely accepted by the international community being the most accurate by international law, but leaving a grey area in its definition. Also, the UNESCO Convention on the Protection of the Underwater Cultural Heritage in its Article 1-Definitions.

1. (a) "Underwater cultural heritage" means all traces of human existence having a cultural, historical or archaeological character which have been partially or totally underwater, periodically or continuously, for at least 100 years such as:
(…) (ii) vessels, aircraft, other vehicles or any part thereof, their cargo or other contents, together with their archaeological and natural context.[82]

This definition does not make mention essentially of shipwrecks but considered vessels underwater for "*at least 100 years*," partially filling the requirements of a wreck definition. However, it can be arguable and open to interpretation the concept of shipwrecks, which has no clear definition by international law.

2.5.2. National Law

From a national interpretation, the term has different meanings. One of the oldest concepts originating from the United Kingdom in the Merchant Shipping Act 1854 is, *"wreck shall include jetsam flotsam lagan and derelict found in or on the shores of the sea or any tidal water."* [83] Also, the United Kingdom's Merchant Shipping Act 1894 defined the concept thusly: *"Includes jetsam,*

81) IMO, 2007
82) UNESCO, 2001
83) U.K. Parliament, 1854:B2

flotsam, lagan, and derelict found in or on the shores of the sea or any tidal water," and the more recent Merchant Shipping Act 1995 used the exact definition.[84] This primary concept comes from commercial activities.

The United States. The concept of shipwrecks was defined more simply in the Abandoned Shipwreck Act of 1987 (Public Law 100-298; 43 U.S.C. 2101-2106) of 1987, signed by the United States President on April 28, 1988. In Section 3-Definitions, *(d) the term shipwreck means a vessel or wreck, its cargo, and other contents*[85]. The Act conferred jurisdiction to the States to manage and preserve abandoned shipwrecks in their territorial waters of three categories: those embedded in submerging land; those embedded in coralline formations protected by a State on its submerged lands; and those located on submerged lands of a state and included in or determined eligible for inclusion in the National Register of Historic Places.

Colombia. The concept shipwreck or *naugrafio* in Spanish is quite complex and not clearly defined. The law comprises the term under the concept of *"especies naufragas"* (shipwrecked species), a term from the Civil Code promulgated by Law 57 of 1887. Articles 710 mentioned payment procedures during "shipwrecked species" salvage and declaring derelict or abandoned vessels that had been left unattended for a period of thirty days. Also, Article 711 states that Colombian authorities determine the salvage reward; however, government salvage operations have to be restored to the interested parties without salvage compensation.[86] The Colombian Law 397 (Law of Culture) in Art. 9 used the term "shipwrecked species" from the civil Code of 1887 and defined the concept with the following translation from Spanish to English:

84) U.K. Parliament, 1894:402; 1995:140
85) U.S. Congress, 1987
86) Código Civil Colombiano, 1895:114

(…) The ships and their equipment, and other personal property lying inside these, or scattered on the seafloor, or under the sea floor's territorial sea, continental shelf, or exclusive economic zone, whatever its nature or state and the cause or time of the sinking or shipwreck. The remains or artifacts of ships, equipped or goods found in similar circumstances also have the nature of shipwrecked species.[87]

The civil Code of 1887 and the Law of Culture of 1997 do not expressly define the concept of "shipwrecked species" or shipwrecks. Vélez et al., (2006) concluded that "shipwrecked species" is not considered a legal concept but describes a situation where all elements that comprise a shipwreck are classified and included in the concept (artifacts, elements, or goods). Also, they listed shipwrecked species into two groups based on national law. One which includes cultural interest, according to Law 397 of 1997, Law of Culture and describes them as "shipwrecked species with cultural interest." However, shipwrecks belonging to this cultural category are considered public property. On the other hand, those that lack cultural interest are ruled by the civil Code of 1887 as private property or derelict (two categories) and named "shipwrecks species without cultural interest." [88] The above considerations are valid because the Code and the Law definition is not a clear concept.

The Colombia submerged heritage law (Law 1675 of 2013) for the protection of underwater cultural heritage was designed by the Government two years before the official find of the Spanish galleon *San Jose*, on November 27, 2015, in the Caribbean Sea near Cartagena de Indias.[89] The Law in its Art. 2 defined "shipwrecked species," with a concept coming from the Civil Code and the Law of Culture with the following translation from Spanish to English:

87) Congreso de la Republica, 1997
88) Vélez et al., 2006:101-138
89) Mincultura, 2015

(…) shipwrecked species composed by ships or naval craft and their equipped, their remains or artifacts, goods or elements lying within these, whatever their nature or state, whatever the cause of the immerse, sink, wreck, or jetsam.[90]

This a clear definition covering and evolving definitions by the Civil Code from 1887 and the Law of Culture of 1997, also involving concepts from the International Law as is UNESCO, 2001 conventions in its definitions. However, it can be concluded that concepts of shipwrecks (*naufragio* in Spanish) from the national laws have different meanings subject to discussion and interpretation.

2.5.3. Definition of warships and sunken military ships immunity

The problem with sunken military ships emanates from the recovery or salvage by the coastal State or salvage companies when remains are sunken foreign military vessels in territorial waters. Remarkably, this problem includes the ambiguity from concepts of warships, their regimen as sunken state-owned vessels, sovereignty immunity, and the interpretation of international law by coastal States and flag States. For a better understanding, some critical cases involving sunken military ships in territorial water of other countries will be reviewed, and examples from the United States and Colombia.

In addition, understanding the rights of coast States regarding the ocean division, maritime delimitations, and the legal status of boundaries is highly needed for this research concerning sovereignty rights in the territorial sea. According to the United Nations Convention on the Law of the Sea UNCLOS, 1982, Part II - Territorial sea and contiguous zone, Articles 2 and 3 defined the legal status of the territorial sea and set a limit not exceeding 12 nautical

90) Diario official de Colombia, 2013

miles.[91] These Articles grant rights to the coastal State within the 12 nautical miles with sovereignty and territorial jurisdiction. Also, other legal boundaries are defined in Part V – Exclusive economic zone, Part VI – Continental shelf, and Part VII – High seas (Fig.4).

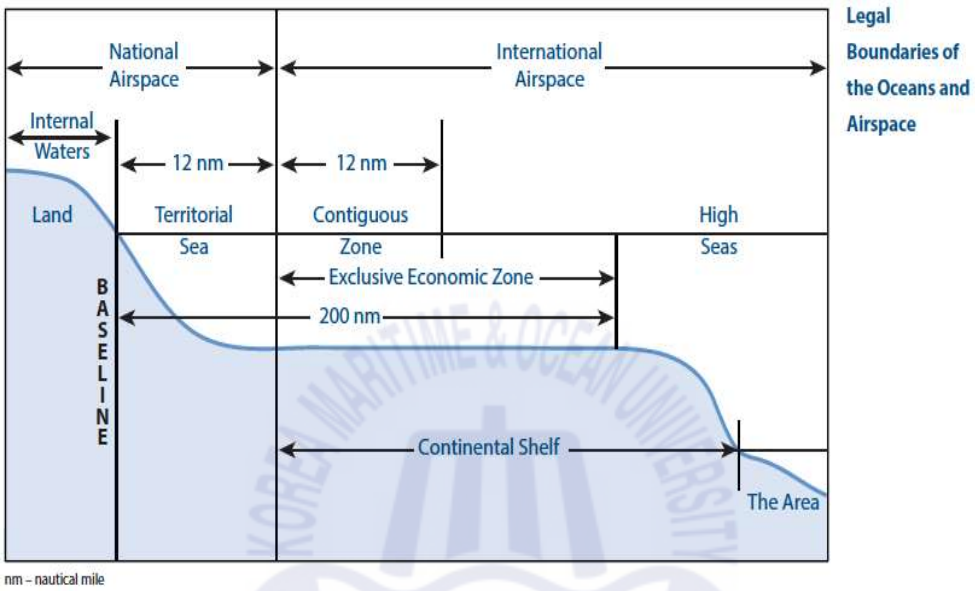

Fig. 4 *Legal Boundaries of the Ocean.*
International Institute for Law of the Sea Studies (ILSS, 2021).

The concept of a warship, military ship, or naval ship by international law is defined by the United Nations on the Law of the Sea based on customary international law principles. It was described for the first time in the Convention on the High Seas from 1958, Article 8, Paragraph 2. [92] A more solid concept using the 1958 definition is in the "*United Nations Convention on the Law of the Sea*" of 10 December 1982 (UNCLOS, 1982), which defined warships in Subsection C. rules applicable to warships and other Government Ships Operated for Non-commercial Purposes, Article 29:

91) UNCLOS, 1982
92) UNCLOS, 1958

Definition of warships. For the purposes of this Convention, "warship" means a ship belonging to the armed forces of a State bearing the external marks distinguishing such ships of its nationality, under the command of an officer duly commissioned by the government of the State and whose name appears in the appropriate service list or its equivalent, and manned by a crew which is under regular armed forces discipline[93].

This definition includes auxiliary ships operated by the government in non-commercial activities not only by the navy but also by other Government organizations such as the coast guard. However, the concept has not yet been established and defined for military shipwrecks, leaving a "grey area" for the reason that sunken ships or shipwrecks are no longer "under the command of an officer duly commissioned by the government of the State." As a result, a broad interpretation is possible depending on States' interests. In addition, sunken military ships' immunity in foreign internal waters under the coastal state's sovereignty can be arguable generate cases as we know today. [94]

Roach (2021) expressed reservations about the current situation of warships. He stated that international law explicitly recognizes States vessels in non-commercial activities and their associated artifacts entitled to sovereign immunity whether or not sunken and coastal States have not righted ownership of any sunken military ship in its jurisdiction. Furthermore, it confirms that the title of sunken military ships is not lost by time but lost by customary and well-established practices being possible only by surrender or capture during a battle.[95]

Article 303 of the UN Convention on the Law of the Sea, 1982 recognizes the rights of coastal States to protect, cooperate or remove objects of a

93) UNCLOS, 1982
94) Migliorino, 1985:251-252
95) Roach, 2021:658-659

historical or archaeological nature, as follows:

Article 303

Archaeological and historical objects found at sea

1. *States have the duty to protect objects of an archaeological and historical nature found at sea and shall cooperate for this purpose.*
2. *In order to control traffic in such objects, the coastal State may, in applying article 33, presume that their removal from the seabed in the zone referred to in that article without its approval would result in an infringement within its territory or territorial sea of the laws and regulations referred to in that article.*
3. *Nothing in this article affects the rights of identifiable owners, the law of salvage or other rules of admiralty, or laws and practices with respect to cultural exchanges.*
4. *This article is without prejudice to other international agreements and rules of international law regarding the protection of objects of an archaeological and historical nature.*[96]

This article does not provide the date and criteria to establish archaeological or historical elements or artifacts of interest. Also, Article 149 provides that:

Article 149

Archaeological and historical objects

All objects of an archaeological and historical nature found in the Area shall be preserved or disposed of for the benefit of mankind as a whole, particular regard being paid to the preferential rights of the State or country of origin, or the State of cultural origin, or the State of historical and archaeological origin. [97]

This Article makes an explicit exclusion of commercial salvage, preserving historical or archeological finds of cultural interest. Despite flag States maintaining rights to sunken warships according to international practices, any

96) UNCLOS, 1982
97) UNCLOS, 1982

of these two articles provide the flag States' role or any consideration that can grant legal status on the wreck. However, coastal States have no reason to claim the property or ownership but must follow international law according to their maritime territory. Over the past years, governments and private entities have organized salvage or recovery operations in view of new submerged technologies capacities. On the one hand, this demonstrates international and States' practices, suitable methods and respect for underwater cultural property, war graves, and historical shipwrecks through bilateral agreements and cooperation. On the other hand, it has generated international incidents, and motivated salvage companies whose primary interest is recovering commercial cargo or artifacts economic ends and, in some cases, with disregard for archaeological standards.[98] Many incidents demonstrate that both practices involved bilateral agreements, international cooperation, and case-law arising by ownership and salvage companies.

2.6. Definition of Underwater Cultural Heritage and their relation with shipwrecks

The process and significance of defining Underwater Cultural Heritage (UCH) are necessary from international and national Law. The main reason for this specific explanation is the tremendous risk of exposure from shipwrecks from commercial activities that destroy historical and archaeological contexts. Due to the considerable protection efforts of UNESCO and national law, definitions, interpretations, and relationships with historical shipwrecks will be presented, analyzing their scope and arguments, particularly from the United States and Colombia.

In the past few years, new technologies have allowed high development of

98) Dromgoole and Gaskell, 1993: 220-222; Roach, 2021:659, 674

underwater exploration in shipwrecks through scientific studies, but also involving commercial activities such as salvage practices that have generated new problems in keeping the underwater heritage safe. Moreover, it is highly recognized that a significant part of the underwater cultural heritage comprises shipwrecks and covers objects and elements submerged at sea, in lakes, and in rivers. The main concern is the demand by salvage companies for historical shipwrecks' cargo. As a result, it has become a subject of controversy among groups with diverse interests, whether preservation in situ, museum exhibits, historical, archaeological, sport diving, or commercialized artifacts.[99)]

One of the most striking cases is that of the Spanish galleon *Nuestra Señora de Atocha* that occurred in the early 1980s, involving commercial activities in historical shipwrecks in the United States. Although the Spanish government made no claim, the situation led to one of the most critical pieces of legislation on protecting shipwrecks within the United States territorial seas, the *US Abandoned Shipwreck Act of 1987*.[100)] Today, with simple research on the internet, it is possible to find some elements and items from the *Atocha* on sale. Despite UNESCO regulations, underwater heritage and shipwrecks are still at risk, particularly in Colombia.[101)]

2.6.1. International Law

There is no accepted standard definition for underwater cultural heritage; one of the reasons is that it derives from domestic definitions and protection from a national perspective. The term underwater means something submerged or covered by water; culture is related to social and human

99) Kaoru and Hoagland, 1994
100) Mathewson, 1998; Dromgoole and Gaskell, 1993:229-230
101) Martin et al., 2021

behavior, and heritage implies an inherent legacy tangible and intangible passing to future generations.[102]

The process to define "underwater cultural heritage" from international law started with the definition of cultural property in the 1954 Hague Convention. Since then, notable discussions on the concept's definition include at UNCLOS in 1982 with Articles 149 and 303, and the UNESCO Convention on the Protection of the Underwater Cultural Heritage in 2001, which has been the most important agreement to protect underwater cultural heritage.[103] The 2001 Convention defined underwater cultural heritage and established fundamental principles to preserve the heritage, promote cooperation between states parties, and implemented practical rules for heritage management, treatment, and research. However, the Convention is still far from being recognized worldwide. By 2021, only 67 of UNESCO's 194 states parties, had ratified the 2001 Convention. Of the 67, many were from the Caribbean.[104] One of the reasons for the lack of participation in the convention from maritime powers or blue water navies lies in the concept of warships challenging to apply to ancient ships and does not involve ownership rights. However, in the case of the United States and Colombia, neither is part of the 2001 Convention.

The 2001 Convention provides a definition of the UCH in Article 1.1 (a):

> *"Underwater cultural heritage" means all traces of human existence having a cultural, historical or archaeological character which have been partially or totally underwater, periodically or continuously, for at least 100 years, such as (1) sites, structures, buildings, artefacts and human remains, together with*

102) Peltokorpi, 2016:28-30
103) UNESCO, 2001; Forrest, 2002:5-8
104) UNESCO, 2001

their archaeological and natural context; (2) vessels, aircraft, other vehicles or any part thereof, their cargo or other contents, together with their archaeological and natural context; and (3) objects of prehistoric character.[105]

Also, the International Maritime Organization (IMO) in the International Convention on Salvage, from 1989, presented some reservations for archeological and historical ships.

Article 30, Reservations

Any State may, at the time of signature, ratification, acceptance, approval or accession, reserve the right not to apply the provisions of this Convention:
(d) when the property involved is maritime cultural property of prehistoric, archaeological, or historic interest and is situated on the sea-bed.[106]

Furthermore, Articles 149 and 303 of UNCLOS, 1982 refer to submerged antiquities but do not provide a timeline to define its archeological interest and protect the site. Also, UNCLOS emphasized objects instead of archeological sites.[107] Finally, the 2001 Convention offers protection of the underwater cultural heritage for wrecks submerged for at least a hundred years, but lacks clarity and is arguable and open to interpretation in its definition.[108]

2.6.2. National definitions from Colombia and the United States

This chapter deals with the legal concept of underwater cultural heritage from the domestic legal framework of the United States and Colombia, and management and legal protection grants for these countries toward historical military shipwrecks.

105) UNESCO, 2001
106) IMO, 1989
107) Elia, 2000
108) Forrest, 2002

Colombia. The law on underwater cultural heritage has been subject to controversy. On the one hand, it is pretty protective; on the other hand, it has generated disagreement between the government, commercial salvage companies, and the scientific community represented by the University Network of Submerged Cultural Heritage composed mainly of professors from several Colombian universities. Colombia's legal framework on cultural heritage began with Law 163 of 1959 as one of the first countries of the American continent and the Caribbean to protect "cultural objects." In the last few years, the government has expressed its concern to protect the heritage.

Consequently, the Colombian Cultural Law of 1997 established protection to all evidence of human activates, whether terrestrial or underwater. In 2013, Law 1675 legally defined for the first time in Colombia the concept of UCH; however, the protection coming from this law is partial as it offers rights to commercial salvage with a process of public association. This method allows private entities to recover historical shipwrecks and artifacts as paying the salvage companies 50% of the recovered elements or artifacts that are not recognized as heritage by the government. Thus, the law created controversy in Colombia and the international community, endangering the UCH.[109] However, law 1675 of 2013 offers a clear concept of underwater cultural heritage. Article 2 defines and explains underwater cultural heritage status with a concept translated from Spanish to English as follows:

Article 2. Submerged Cultural Heritage

> *The Submerged Cultural Heritage in accordance with provisions of articles 63 and 72 of the Political Constitution belongs to the archaeological heritage and is the property of the Nation. Without prejudice to the provisions of Article 6 of Law 397 of 1997, the Submerged Cultural Heritage is made up of all*

109) Rengifo, 2009: 137-142; Piazzini, 2017:19-27

goods product of the human activity, which is representative of the culture and are permanently submerged in internal waters, rivers and lakes, territorial sea, contiguous zone, exclusive economic zone and the continental shelf and islands, and other areas delimited by baselines. Belongs to this heritage, the organic and inorganic remains, settlements, cemeteries, and all physical evidence of disappears human societies, human remains, shipwrecked species composed by ships or naval craft and their equipped, their remains or artifacts, goods or elements lying within these, whatever their nature or state, whatever the cause of the immerse, sink, wreck, or jetsam. Paragraph. Are not considered assets of Submerged Cultural Heritage product of subsidence, shipwrecks, or evictions that have not reached 100 years from the occurrence of the event, which are regulated by the rules of the Commercial Code and articles 710 and concordant of the Civil Code regarding its salvage, and other applicable national and international standards. Neither are considered those assets found in shipwrecks or spills that have reached more than 100 years from their occurrence and do not meet requirements to be considered Submerged Cultural Heritage. [110]

This article unquestionably defined the concept of UCH. Furthermore, it established the criteria of a one-hundred-year limitation period on permanently submerged shipwrecks, in addition to other legal aspects provided by the law. Additionally, it recognizes the underwater cultural heritage in the territorial sea, exclusive economic zones, and continental shelf. Consequently, the geographical area of the wreck site of the USS *Kearsarge* is regulated by law 1675 of 2013 (Colombia Submerged Heritage Law).

The United States. A significant part of its underwater cultural heritage is defined by historical and sunken military shipwrecks supported by two significant acts. First, the Abandoned Shipwreck Act of 1987 (ASA) deals with managing, recovering, and preserving abandoned shipwrecks and submerged cultural resources of the states in its waters. The Abandoned Shipwreck Act

110) Diario Oficial de Colombia, 2013

granted the federal government responsibility to manage historical shipwrecks; however, it includes no clear definition of underwater cultural heritage.[111] ASA covered and protected three categories of shipwrecks:

(1) embedded in submerged lands of a State;
(2) embedded in coralline formations protected by a State on submerged lands or a State; or
(3) on submerged lands of a State and is included in or determined to be eligible for inclusion in the National Register.[112]

The first two categories use the term embedded, defined in the ASA as firmly affixed in the submerged lands or coralline formations. In addition, to be considered historical shipwrecks, the Act defines criteria as significant contributions to history or any other distinctive characteristic of information in prehistory or history. Besides, respect sovereignty immunity of other ships in territorial waters.[113]

In 2004, the United States materialized its concern with sunken military ships to protect them from unauthorized disturbance of wrecks operated by the Government on noncommercial military activities worldwide. Consequently, solid federal legislation was enacted as the *"Sunken Military Craft Act"* (SMCA), on October 28, 2004, as Title XIV of the *"Ronald W. Reagan National Defense Authorization Act for Fiscal Year 2005."* The Act does not have any definition or category of underwater cultural heritage but includes a critical definition of sunken military craft as follow:

(A) any sunken warship, naval auxiliary, or other vessel that was owned or operated by a government on military noncommercial service when it sank;

111) Kaoru and Hoagland, 1994196-197; Elia, 200:46
112) U.S. Congress, 1987
113) Collins, 1989:311-317

(B) any sunken military aircraft or military spacecraft that was owned or operated by a government when it sank; and

(C) the associated contents of a craft referred to in subparagraph (A) or (B), if title thereto has not been abandoned or transferred by the Government concerned[114].

Bederman (2006) and Bleichner (2019) argued the definition of Military Craft because of the limitation to assess the types of sunken ships. Examples include the sunken Liberty ships operating during World War II, as in the case of the ship SS *Stephen Hopkins*, and sunken privateers during the Revolutionary war, among other similar cases not covered in this Act.[115]

The Act provides the right, title, and interest of the United States in its sunken military craft, giving immunity to all shipwrecks without exception of time as follows:

Right, title, and interest of the United States in and to any United States sunken military craft;

(1) shall not be extinguished except by an express divestiture of title by the United States; and

(2) shall not be extinguished by the passage of time, regardless of when the sunken military craft sank.

An essential section of the Act explicitly stated prohibitions and unauthorized activities to disturb the sunken military craft declaring violation with penalties to protect their heritage globally. However, the Act authorizes a permit for the United States sunken military craft for archaeological, historical, or educational purposes. In addition, it encourages international agreements to protect the sunken military craft and international reciprocity regarding sunken military ships. Finally, it is necessary to highlight the legal

114) U.S. Congress, 1987

115) Bederman, 2006; Bleichner,2019

frameworks to protect historic shipwrecks and the government's proper manner of managing them, including the remains of the USS *Kearsarge*.[116]

2.7. Problems with sunken warships

A number of significant issues arise from military shipwrecks in this research. First, it is essential to consider preservation and commercial salvage or exploitation affecting former colonial powers and modern sea powers of blue water navies representing flag states or ownerships and coastal states. Second, the high potential for underwater cultural heritage worldwide but, especially, the area of interest, the Caribbean Sea, which possesses one of the most considerable underwater cultural heritages in the world localized in territorial waters.[117] In addition, former colonial powers are part of this considerable heritage in the Caribbean. For example, Spain has about 1,500 naval wrecks worldwide.[118] Unfortunately, the database for these wrecks is not accessible, and the government of Spain is currently undertaking a project during this research. Also, one of the most extensive inventories of shipwrecks is from the United Kingdom. It provides open information in the "Royal Navy Lost List," a comprehensive database spanning 1512 to 2004, with a potential of more than 5,000 naval wrecks worldwide, including the Caribbean Sea, making it the country with the most naval wrecks.[119]

2.7.1. The United States Sunken Warships

This country holds considerable potential for sunken military ships and wreck sites globally during peace and war times. However, its government has displayed recent good practices to preserve and protect ships in its territory,

116) Catsambis, 2021
117) Leshikar-Denton, 2002:279
118) Fernández-Duro, 1867; Phillips, 2020
119) MAST, 2021

whether states vessels or foreign military ships, expecting reciprocal treatment in foreign territorial waters and cooperation between states.

The United States Navy (USN) was born with the "Continental Navy" during the American Revolutionary War. It was officially established by the Naval Act of 1794 with the first ships of the US Navy. John Adams, second president of the United States, stated that, "Naval power is the natural defense of the United States," a strong message for a new maritime power nation.[120] Consequently, shipwrecks from warships in the United States territory and outside are from different periods, mainly naval warfare. These wrecks are from colonial times, particularly from the British Navy and the American Revolutionary War. Other military shipwrecks from the nineteenth century are from the War of 1812 but especially from the American Civil War with wrecks outside the maritime territory. The nineteenth century was significant for the United States Navy as they established a blue water navy and new doctrine to influence global diplomacies[121]. Other wrecks are from the twentieth century, during World War I (Fig. 5) and notably World War II, with a massive component of sunken military ships, states vessels, and gravesites at sea in the United States[122] and worldwide.[123]

The United States' underwater cultural heritage is well protected and classified by the government, being one of the biggest in the world, following the United Kingdom[124]. On the one hand, the information presented by the National Oceanic and Atmospheric Administration (NOAA) stated that there are about 3,000 ships and submarines of the United States and other countries in

120) Miller, 2014
121) Mahan, 1892
122) Delgado, 2009; TRC Environmental Corporation, 2012:165-227
123) Neyland, 2014:7682-7684
124) Delgado, 2001; Neyland, 2002; 2014

the national marine sanctuary waters with four hundred sites discovered and protected. One such example of protecting the underwater heritage of military wrecks is the USS *Monitor*, the first national marine sanctuary in 1975.[125] Today NOAA protects 14 marine areas encompassing more than 170,000 square miles of marine and Great Lakes waters.[126] The Naval History and Heritage Command (NHHC) protect and research the potential of almost 2500 shipwrecks worldwide, from the American Revolution to the present[127].

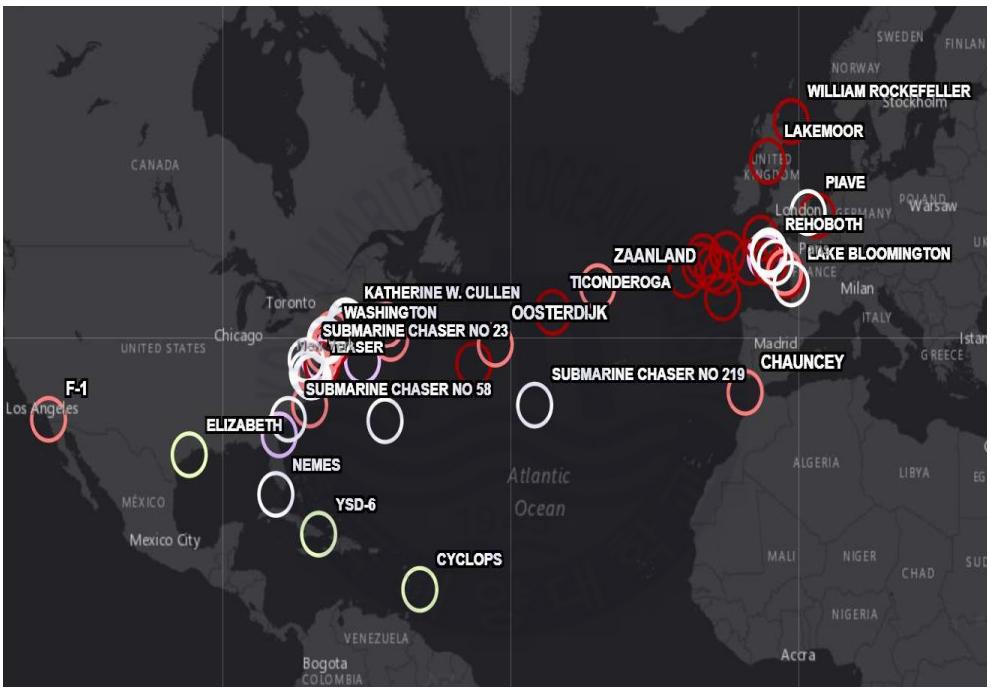

Fig. 5 *U.S. Navy Losses in World War I. An Interactive Map*. (NHHC, 2020).

U.S. naval shipwreck heritage is protected by the Sunken Military Craft Act of 2004 (SMCA) (10 U.S.C. § 113), preserving military ships and aircraft anywhere in the world as property of the United States. Any archaeological approach to this heritage outside of U.S. territory is possible only with

125) Delgado, 2019:229
126) NOAA, 2019; 2021a
127) Neyland, 2002:766; NHHC, 2021b

international cooperation and coordination between states with prior approval from the Naval History and Heritage Command.[128] Their comprehensive database is not open to the public. However, there are available resources such as the US Navy Losses in World War I, with interactive maps, information, pictures, and approximated locations of losses[129] (Fig. 5). Finally, all available information reflected the great interest in maritime history, cultural heritage and nautical archeology of the United States and its society as one of the biggest maritime countries in the world, and that currently has the world' s largest navy.

2.7.2. Colombian sunken warships

Although Colombia is a country with two oceans, it is not considered a traditional maritime country and naval wrecks from Colombia are limited because of the size of its navy and national interests.[130] An inventory from 2005 classified 119 shipwrecks on Colombian waters from different countries in the Caribbean Sea during the Colonial period;[131] however, there is no inventory or an official database of Colombia's warships wrecks on its waters. Other studies included military wrecks in Colombia of different periods from the Netherlands, United Kingdom, Spain, and the United States, but information is limited.[132]

The Colombian Navy is officially known as *Armada Republica de Colombia* (ARC) in Spanish. It had about 14 military wrecks during the nineteenth and twentieth century, including one during a naval battle of the Colombian Civil War known as the War of a Thousand Days (1899-1903),[133] and three

128) NHHC, 2021c
129) NHHC, 2020
130) Till, 2018:17-20; Gomez and Castro, 2020
131) Romero and Pérez, 2005
132) Gomez and Jeong, 2021
133) Demarest, 2001

warships sunk outside its jurisdiction. However, there are no records of shipwrecks during the War of Independence from the "Patriotic Navy of Gran Colombia," mainly because the files were lost or disappeared during the war.[134] This naval force had many naval units stationed in Cartagena de Indias, the Caribbean Sea, and commanded by Admiral Jose Padilla, one of the few naval heroes from the War of Independence who fought against Admiral Nelson in the Battle of Trafalgar.[135] One of the efforts of this research was to classify naval wrecks from Colombia in a database for future researchers in naval history or nautical archaeology (Table 1), but also to strengthen and contrast the number of wrecks and the interest to protect the cultural heritage from different countries according to the number of historical shipwrecks. The quantity of military wrecks makes a considerable distinction in protecting the cultural heritage by governments. Hundreds of sunken ships from different nationalities are in Colombian waters in unidentified places. Some of them were reported as lost at sea or between Cartagena de Indias and Havana during the colonial times.[136] Others were identified as the ship of the line *Conquistador*[137] or because of its cargo, as in the case of the galleon *San Jose.* [138] Also, the United Kingdom Royal Navy has some identified sunken military ships from the Colonial and Republican periods located in Colombian maritime territory, but most without research or an exact known location.[139]

134) Ferragut, 2012
135) Roman, 1993; Helg, 2003
136) Lugo-Fernández et al., 2007:38
137) Del Cairo et al., 2003
138) Martin et al., 2021
139) MAST, 2021

Table 1. Colombian Military Wrecks

No	Year of Loss	Name	Location	Sources
1	1867	*Rayo*	Cartagena Harbor	Plata, 1867:17-25; U.S Naval History Division, 1976:9
2	1867	*Cuaspad*	Near to Trinidad and Tobago	*Evansville journal*, 1867:1
3	1902	*Lautaro*	Naos Island, Panama.	Duzer, 1902:158; Akers,1904:600
4	1903	*Boyaca*	Panama.	*New York Times*, 1903:2; *San Francisco Call*, 1903:2
5	1936	*Bogota*	Cartagena Harbor.	ARC, 2015:44
6	1937	*Cordoba*	Salmedina Bank.	ARC, 2015:42
7	1944	*General Mosquera*	Cartagena Harbor.	ARC, 2015:43
8	1944	*Boyaca*	Near to Cuba.	ARC, 2015:44
9	1964	*Almirante Padilla*	Bolivar Cay, Archipelago of San Andres.	ARC, 2015:58
10	1972	*Almirante Brion*	Near to La Guajira.	ARC, 2015:68
11	1975	*Bahia Honda*	San Andres Island.	ARC, 2015:100
12	2004	*Sebastian de Belalcazar*	Intentionally sunk, Colombian Pacific Ocean.	ARC, 2015:102
13	2007	*Pedro de Heredia*	Intentionally sunk in front of Cartagena.	ARC, 2015:101; Moncada, 2010
14	2017	*Pascual de Andagoya*	Colombian Pacific Ocean.	ARC, 2019:120

World War II sunken ships in Colombia. In the case of the United States, the only military ship is the USS *Kearsarge*; however, there are a few wrecks from World War II in Colombian waters from the US Merchant Marine that sank with naval guns. These armed merchant ships, especially oil tankers, provided logistical support to the operations and were hunted and attacked by Germany's submarines in the Caribbean while sailing from Colombia to the United States with military casualties onboard acting as naval armed guards. Some losses were registered in 1942, presumably by the German submarine

U-159, including the Colombian schooner *Resolute* near Old Providence Island; the same occurred with schooner *Roamar* sailing between San Andres and Cartagena by the *U-505* and schooner *Ruby* in 1943 near to San Andres Island apparently by the *U-516.*[140] Another critical loss occurred in 1944 with the Steam tanker Esso Harrisburg probably sunk by the *U-516* with armed guard men and naval armament onboard near La Guajira, Colombia.[141]

2.8. Sovereign Immunity Incidents and the Tallinn Resolution 2015

For a more solid understanding of the legal doctrine of immunity, some cases concerning the United States and Colombia are discussed in this chapter. Also, the legal regime of wrecks of warships is explained and analyzed from the 2015 Resolution of The Institut de Droit International.

Submarine K-129 was a Soviet diesel submarine that disappeared in mysterious circumstances in 1968. This case is known as the "Glomar Explorer Incident," reflecting one of the sounded incidents of sunken ships involving immunity between the United States and Russia during the cold war. In 1974, the US Government recovered some remains from the wreck of the Soviet submarine that sank in the Pacific Ocean about 750 miles off Hawaii through an intelligence operation by the United States Central Intelligence Agency (CIA) using the ship *Glomar Explorer* built for that purpose. The incident clearly violated the flag state's sovereign immunity.[142]

Nuestra Señora de Atocha, known as *Atocha*, was a Spanish galleon sailing from Havana to Spain in a military fleet escort. It sank when a hurricane hit

140) U.S. Department of States, 1942:562; 1963:1-10; Gallery, 1956:156-159; Scheina, 1987:169; Friedman, 2000; Bertke et al., 2014:244-248

141) Browning, 1996:420

142) Collins, 1976; Migliorino, 1985:244-245; IDI, 2011:146-147

it in the Florida Straits in 1622. The wreck site was found in 1971 off the Florida Keys by the salvage company Treasure Salvors, Inc, funded by Mel Fisher and investors. After the discovery, Florida State initiated a legal case demanding ownership arguing that it was located on the state's submerged land, while the salvage company claimed that it was an abandoned wreck. After some years of litigation, in 1982, a court in the United States decided that the *Atocha* was an "abandoned vessel" under the salvage law and ruled in favor of the hunter treasure company.[143] By 1985 the *Atocha* was completely looted.

Nuestra Señora de las Mercedes, a case known as "Black Swan," was a Spanish Armada frigate sailing from Montevideo, Uruguay, to Cadiz, Spain, on commercial service. The ship was sailing in a convoy fleet when it was attacked by a British squadron and sank as a result of the naval battle with 249 persons onboard and all the cargo off Cape Santa Maria, south of Portugal, in 1804. The *Mercedes* carried gold and coins and was located in 2007 by Odissey Marine Exploration Inc, an American salvage and deep-ocean exploration company who transported the cargo to the United States. Odyssey requested ownership and rights under the law of finds over the cargo and the seventy tons of recovered coins on an unidentified shipwrecked vessel at the United States, Middle District of Florida, Tampa Division. Later, the Government of Spain established that the recovered remains were from the *Mercedes*, a warship with sovereign immunity as a vessel of the Spanish Navy (state vessel). Spain also claimed never to have abandoned the rights over the wreck, initiating a legal dispute. By 2009, the district judge recognized the frigate *Nuestra Señora de las Mercedes* as a naval vessel of Spain, declaring jurisdiction on the vessel, sovereign immunity, and patrimony of Spain. As a result, Odyssey was ordered to return the artifacts to Spain, and in 2012 the

143) IDI, 2011:148-149; Dromgoole, 2013: 185-187

Supreme Court denied an appeal by Odyssey.[144] The same year, all the recovered cargo returned to Spain to be exhibited in the naval museum for the general public under *"El último viaje de la fragata Mercedes. Un tesoro cultural recuperado"* (The last trip of the frigate Mercedes. A recovered cultural treasure).[145]

HMS *Erebus* and HMS *Terror*, both ships from the Royal Navy, sank in 1848 in Canadian territory during a scientific expedition to find a transit passage in the Arctic. In 1992, the Government of Canada declared the wreck sites as National Historic Sites and found the remains of the HMS *Erebus* in 2014 and the HMS *Terror* in 2016. On these shipwrecks, bilateral agreements started from 1997 with a Memorandum of Understanding (MoU) between the two countries for Canadian authorities to research and locate the wrecks and for the UK to maintain ownership. However, in 2018 a Deed of Gift was signed by the UK government who gave the *Erebus* and the *Terror* to their Canadian counterparts. The wreck held only a few artifacts, but gave Canada the rights over human remains, among other legal aspects.[146] The Deed of Gift is an excellent example of territory evolution and a legal agreement between states to preserve underwater cultural heritage.

CSS *Alabama*, the most famous confederate ship during the American Civil War which destroyed 65 northern vessels and sank during an engagement with the USS *Kearsarge* (Fig.6) during the American Civil War on 19 June 1864 off Cherbourg, France, in one of the most important and legendary naval battle of the War.[147] The French Navy discovered the CSS *Alabama* at

144) Aznar-Gómez, 2010:214-218; IDI, 2011:149; Ronzitti, 2011:149; Sinclair, 2020:326-331
145) Culturaydeporte, 2015
146) IDI, 2011:147; Bankes, 2020:47-81
147) Robinson, 1924:97-120

60 meters depth in 1984. The remains were identified in an archeological expedition by Captain Max Guérout, seven miles off the Normandy coast of Cherbourg[148]. The discovery emerged with high tension between France and the United States when the ownership was questioned due it being found in France's territorial sea. The United States had to assert the title based on the *Alabama* Captain's surrender to the *USS Kearsarge* and possessed the rights to all Confederate States of America after the War.

Fig. 6 *The Battle of the USS "Kearsarge" and the CSS "Alabama,"* 1864 by Edouard Manet. Oil and canvas, John G. Johnson Collection, 1917 (Philadelphia museum of art).

148) Guérout, 1988

Finally, after some years of negotiation in 1989, the two Governments signed an agreement protecting the wreck's site, recognizing the title to the vessel and its artifacts to the United States and the CSS *Alabama* as shared heritage of both nations, including scientific cooperation and archaeological research. Today, all the recovered artifacts are preserved by the Underwater Archeological Branch of the Naval History and Heritage Command and displayed in some museums for the public as a remarkable heritage of the American Civil War.[149)]

San Jose was a galleon from the Spanish Armada,[150)] sunk with almost six hundred people and a precious cargo composed of gold and silver sailing from Portobello to Cartagena de Indias in 1708 by a British fleet during a naval battle.[151)] In 1979, the salvage company Glocca Morra, Inc. obtained a license to explore an area near Cartagena de Indias (Baru Island) in the Caribbean Sea to localize and recover the remains of colonial shipwrecks. In 1983 the right was transferred by Glocca Morra to the salvage company Sea Search Armada (SSA), including the location of the possible remains of the galleon *San Jose*; however, in 1984, a lawsuit started between Sea Search Armada and the Colombian Government. At the time of this study, the case is still ongoing. It is one of the most prolonged legal conflicts of this type, highlighting vulnerabilities in recognizing sovereign immunity and protection to the underwater cultural heritage.[152)]

Regarding sovereign immunity between Colombia and the United States, there have been no incidents involving sunken ships, and the USS *Kearsarge* remains have not been part of any disagreement. However, Colombia is not

149) Roach, 1991, Dromgoole and Gaskell, 1993:227-228; IDD, 2011:145-146; Dromgoole, 2013:142-143; NHHC, 2021a

150) See https://elgaleonsanjose.com/

151) Phillips, 2007

152) Bendeck, 2003; Zenkiewicz and Wasilewski, 2019; Sinclair, 2020:332-333; Martin et al., 2021

part of the 2001 UNESCO Convention and is still far from agreements to research and preserve the underwater cultural heritage, as demonstrated in their lack of cooperation with the international community.[153]

Finally, the most recent incidents involving the sovereignty of warships do not include sunken ships, but a violation of sovereign immunity. Example cases include: the ARA *Libertad,* arrested by the Ghanaian Government in 2012; the US Navy Riverine Command Boats "*RCBS*", detained by Iranian Revolutionary Guard Corps Navy in 2016; and the detention of Ukrainian naval vessels by the Russian Federation in the Black Sea in 2019 and known as Kerch Strait Incident.[154]

The Tallinn Resolution-2015. For the reason of ambiguity and grey areas in international law on sunken warships, its legal regimen, and relationships between states, the Institute of International Law- Institut De Droit International (IDI) adopted a resolution in 2015 to resolve and illuminate matters concerning this complex topic. This work by the Institute of International Law includes an introductory report by Ronzitte as rapporteur of the Institute [155] and the Session de Tallinn in 2015 with the Resolution of *"The Legal Regime of Wrecks of Warships and Other State-owned Ships in International Law."* [156] The Tallinn Resolution of 2015 is fifteen articles clarifying these questionable subjects. Article 1 defined the concept of the wreck and sunken state ships and their cargos as follows:

153) Martin et al., 2021
154) Roach, 2021:652-654
155) IDI, 2011
156) IDI, 2015

Article 1
Definitions

For the purposes of this Resolution:

1. *"Wreck" means a sunken State ship which is no longer operational, or any part thereof, including any sunken object that is or has been on board such ship.*
2. *"A sunken State ship" means a warship, naval auxiliary or other ship owned by a State and used at the time of sinking solely for governmental non-commercial purposes. It includes all or part of any cargo or other object connected with such a ship regardless of whether such cargo or object is owned by the State or privately. This definition does not include stranded ships, ships in the process of sinking, or oil platforms.*

Article 2 of the Resolution protected the wrecks as cultural heritage, following the provision of the 2001 UNESCO Convention with a time limit of 100 years.

Article 2
Cultural heritage

1. *A wreck of an archaeological and historical nature is part of cultural heritage when it has been submerged for at least 100 years.*
2. *All States are required to take the necessary measures to ensure the protection of wrecks which are part of cultural heritage.*
3. *Where appropriate, wrecks of the nature referred to in paragraph 1 should be preserved in situ.*
4. *Wrecks of the nature referred to in paragraph 1 not preserved in situ should be recovered in accordance with appropriate archaeological practices and properly displayed.*
5. *States shall take the measures necessary to prevent or control commercial exploitation or pillage of sunken State ships, which are part of cultural heritage, that are incompatible with the duties set out in this Article as well as in applicable treaties.*

Articles 3, 4, and 5 confirm immunity of sunken states' ships as a property of the flag states along with its cargo, and any action on the wreck should have the consent of the flag state in the following terms:

Article 3

Immunity of sunken State ships

Without prejudice to other provisions of this Resolution, sunken State ships are immune from the jurisdiction of any State other than the flag State.

Article 4

Sunken State ships as property of the flag State

Sunken State ships remain the property of the flag State unless the flag State has clearly stated that it has abandoned the wreck or relinquished or transferred title to it.

Article 5

Status of the cargo

1. *Cargo on board sunken State ships is immune from the jurisdiction of any State other than the flag State.*
2. *Cargo owned by the flag State remains the property of that State.*
3. *Cargo owned by other States remains the property of those States.*
4. *The sinking of a ship has no effect on property rights concerning cargo on board. However, cargo may not be disturbed or removed without the consent of the flag State.*

In the view of this research, two more provisions of the Resolution should be mentioned. First, Article 7 deals with the geographical location of the wrecks or sunken state vessels in territorial water, providing rights and jurisdiction to the coastal state by controlling access and activities in the wreck site. This subject is an imperative concern of this dissertation as the USS *Kearsarge* remains are located in seas within the Colombian territory. Second, Article 12 indicates appropriate respect for human remains at the wreck site as war graves by implementing war cemeteries.

Article 7

Sunken State ships in internal waters, archipelagic waters and the territorial sea.

The coastal State, in the exercise of its sovereignty, has the exclusive right to regulate activities on wrecks in its internal waters, archipelagic waters, and territorial sea without prejudice to Article 3 of this Resolution.

Article 12

War graves

Due respect shall be shown for the remains of any person in a sunken State ship. This obligation may be implemented through the establishment of the wreck as a war cemetery or other proper treatment of the remains of deceased persons and their burial when the wreck is recovered. States concerned should provide for the establishment of war cemeteries for wrecks.

The Resolution is arguable. According to Dromgoole,[157] this initiative by IDI is exceptionally timely and contributes to defining international law on this subject. However, she argued that some key issues emerge from the Resolution, and more attention is needed on how the ship was lost, non-commercial or commercial services by state ships, and the coastal states' exact rights when a wreck is located within their jurisdiction. Likewise, Bankes[158] argues that the Resolution offers coastal states powers on its territory and immunity to the ownership and is consistent with the underwater cultural heritage preservation.

2.9. State of the Underwater Cultural Heritage and Shipwrecks Studies in Colombia

Colombia possesses an extensive maritime territory in the Caribbean Sea, which has suffered the influence of salvage companies. Therefore, the scientific studies are limited, while treasure hunters claim their activities are archaeological works.[159] However, a hundred shipwrecks from different periods in Colombian territory reflect the importance of its active maritime history and define its underwater cultural heritage. Unfortunately, Colombian

157) Dromgoole, 2016:200
158) Bankes, 2020:56
159) Delgado, 1997:398; Barstad, 2002:9; Padilla, 2011; Pérez, 2019

waters have been systematically looted over the past decades, especially those located near the continent. Also, the development of studies and research on shipwrecks has been slow over the last twenty years.[160]

The Archipelago of San Andres, Old Providence, and Santa Catalina, as a part of the Caribbean Sea, has been the target of commercial exploitation since the invention of scuba diving.[161] Robert F. Marx was one of the first to localize some artifacts and elements from historical shipwrecks in the area, including Roncador Cay, but without scientific rigor and reports.[162] However, Colombia's case, limited research and data on shipwrecks are public, and some of Marx's books[163] serve as one of the few sources of information in the Archipelago and cited in scientific articles and official reports.[164] Other recent research on shipwrecks include that of Phillips (2007 and 2008)[165] on the galleon *San Jose,* with a broad analysis of primary sources such as the logbooks, using a methodology to approach a possible location of the remains of the *San Jose* near to Cartagena de Indias. Also, Segovia (2019)[166] and Muñoz (2019)[167] on the *San Jose* and Segovia (2007),[168] and Pajuelo (2019)[169] with an investigation on primary sources on the wreck of the 1605 Spanish fleet commanded by Luis Fernández de Córdoba, presenting a possible location for the shipwrecks. The first inventory on shipwrecks in Colombia was compiled by Romero and Pérez, (2005),[170] collecting and classifying shipwrecks

160) García and Del Cairo, 2003:698-702; Leshikar-Denton and Erreguerena, 2016:26; Martin and Rivera, 2020:294-297
161) Da Silva, and Tovar, 2017:150
162) Marx, 1976:90-107; California State Land Commission, 1987:56; Padilla, 2010
163) Marx, 1987; Sandz and Marx, 2006
164) Hoyt, 1984; Trouet et al., 2016
165) Phillips, 2007; Phillips et al., 2008
166) Segovia, 2019
167) Muñoz, 2019
168) Segovia, 2007
169) Pajuelo, 2019
170) Romero and Pérez, 2005; Pérez, 2019

in the Colombian Caribbean Sea during the colonial period. This work produced two maps with some wrecks' locations, again indicating the region's active maritime past.

Among the leading study periods by researchers in maritime history and nautical archaeology in Colombia corresponded to the British attack on Cartagena de Indias in 1741, known as the Battle of Cartagena and led by Admiral Edward Vernon, who commanded the naval fleet. During the defense of the port, part of Admiral Blaz de Lezo's strategy was to sink Spanish warships to interrupt the British advance and navigation in two of the straits. On account of the magnificent defense of the Spanish, the event became one of the most distinguished naval battles in the Caribbean Sea.[171] This event has relevant research by Del Cairo in the archaeological sites, Manzanillo 15 and San Felipe in Cartagena de Indias, with a high probability that some remains correspond to the *Conquistador*, one of the Spanish warships participating in the engagement.[172] Del Cairo's investigation is perhaps the most valuable and important underwater archaeological and maritime history research on shipwrecks in Colombia for the methodology, the importance of the event, and the published results.[173]

Another study on shipwrecks was on the *Prinz August Wilhelm,* a German steamship sunk by their Captain in Puerto Colombia Bay in the Caribbean Sea during World War I [174]. Other studies conducted on shipwrecks are focusing on Roncador Cay, with the wreck of the USS *Kearsarge*, and a database of shipwrecks and their relationship with hurricanes in the region.[175]

171) Robertson, 1919; Nowell, 1962; Del Cairo, 2011
172) Del Cairo, 2003; 2016a; 2016b; Del Cairo et al., 2020
173) Martin et al., 2019; Argüeso and Ciarlo, 2017:189-191
174) Martin et al.,2017
175) Gomez and Jeong, 2020;2021

During this research, the Colombian Institute of Anthropology and History-*Instituto Colombiano de Antropologia e História* (ICANH) was consulted about shipwrecks studies. They informed of the non-existence of the database regarding shipwrecks and shared archeological reports and books for this study.[176] In Colombia, the most well-known shipwreck is the galleon *San Jose*, but until now, without any published results, other than the studies mentioned above (Fig. 7). The relatively small number of research studies reflected Colombia's national maritime science and technology' s slow development, in part due to a lack of international cooperation and national education in maritime issues. However, one of the agencies capable of producing a high standard of research is the Colombian Navy, through its oceanographic and hydrographic vessels and its research centers in the Caribbean Sea and the Pacific Ocean with significant contribution to the maritime science.[177] Also, the Marine and Coastal Research Institute José Benito Vives de Andréis (INVEMAR) primarily focused on marine biology.[178] In addition, some technological development from universities concerning maritime subjects, such as the Research Group A+D of Automatic and Design of Universidad Pontificia Bolivariana. Amongst the most preeminent initiatives to protect the UCH is a postgraduate course diploma of one-year duration by the Universidad Externado named *Especialización en Patrimonio Cultural Sumergido* (Specialization in Submerged Cultural Heritage), designed to protect and manage the underwater cultural heritage. This academic program began in 2019 with the support of ICANH and DIMAR.[179]

176) M. Galviz, personal communication, March 17, 2021
177) CIOH, 2021
178) Minciencias, 2021a
179) Da Silva and Tovar, 2017:157; Uexternado, 2021

Fig. 7 *Planimetric composed of 6000 photography taken from the discovery of the galleon San Jose*. Image property of ICANH (Mincultura, 2021).

Legally, there are gaps in domestic Colombian law, particularly the feasibility of Law 1675, regarding underwater cultural heritage management standards. Also, there is a lack of academic research due to Article 17, which states all information associated with data or coordinates of historical shipwrecks is declared confidential. Therefore, to guarantee and improve the protection of the UCH in Colombia is needed to develop policies by the Ministry of Culture supported by the new Ministry of Science, Technology, and Innovation looking for capacity building with international agencies to enhance the research capacity.[180] Consequently, it is imperative to find international assistance focusing on three central concepts: science, maritime law, and subsea technology' s application to maritime research.[181]

Regarding the USS K*earsarge*, existing support for the cooperative and bilateral practice by the United States is conceivable through the Naval History and Heritage Command (NHHC), Underwater Archaeology Branch (UA

180) Minciencias, 2021b
181) Martin et al., 2021

B)[182] and *NOAA 216-107: NOAA Policy on Cooperative Institutes in the United States*[183] that support scientific cooperation. This should be viewed as a genuine opportunity, given the positive diplomatic relations between Colombia and the United States. In the same way, due to vast archeological potential with colonial shipwrecks coming from Spain,[184] the *"Plan Nacional de Protección del Patrimonio Arqueológico Subacuático"* of 2007 (National protection plan of underwater cultural heritage), by the Spanish government through the Ministry of Culture, integrated cooperation, protection of underwater cultural heritage, and scientific development for Latin American countries.[185]

2.9.1. State of Underwater cultural heritage in Roncador Cay

The underwater cultural heritage in Roncador Cay is defined by numerous shipwrecks from several nations and historical periods, immense cultural heritage in such a small portion of land. However, its quantification is challenging, and was especially so before the eighteenth century, with ambiguous information and poorly preserved documents. As a result, information was minimal before this century. The nineteenth century was an active period for shipwrecks in Roncador.[186] There are many reasons for this, including guano production. This encouraged navigation into the Cay, and some temporary settlements for its extraction were set in Roncador. In addition, the sailing route between the east coast and west coast of the United States through Panama was particularly active with navigation near the Cay.[187]

182) NHHC, 2021b
183) NOAA, 2021b
184) Pérez, 2019
185) Culturaydeporte, 2021
186) Gomez and Jeong, 2021
187) Delgado, 1990

Surprisingly, it was not possible by archival research to localize any wreck from Colombia as a flag state or military ships during this study. Gomez and Jeong (2021) presented a database of shipwrecks in Roncador Cay from 1492 to 1920 (Table 2). This research compiled accidents from different sources, and due to the ambiguous information during colonial times, it generated an area of uncertainty.[188] However, there are other registered shipwrecks in the area, but the rate of accidents decreased after 1920. A single justification was that the United States' government installed a lighthouse to aid navigation in this area. Subsequently, the initial database is followed by the steamship *Knut Hamsun*, a Norwegian cargo vessel of 5,300 tons, which sank about 30 miles southwest of Roncador after its cargo of nitrate caught fire. The crew was rescued in the lifeboat near Cuba, but one of the crew members perished as a result of the fire onboard.[189] It is assumed that the remains of the *Knut Hamsun* are well preserved at the bottom of the Caribbean Sea.

There is more evidence of shipwrecks from the analysis of nautical charts to find the USS *Kearsarge's* wreck site, with some remains at the southern part of Roncador (chart OCB 1218 A22, UK Hydrographic Office). However, the identity was not established. Another wreck was found south of the Cay, identified as the *Respite*, a modern cargo vessel with no apparent reason for the accident in 2013.[190] Consequently, the Cay requires imminent field research to be done by archaeologists not only underwater but onshore, where some of the survivors of the accidents stayed for weeks while they were rescued, as in the cases of the *Golden Rule* and the USS *Kearsarge* with temporary settlements during the nineteenth century. Also, some structures were built and abandoned at the Cay during the Guamo period, like a

188) Gomez and Jeong, 2021
189) *New York Times*, 1934a; 1934b
190) CIOH, 2013

warehouse and a plank cabin built for extraction.[191] Other workers were marooned in different periods of guamo extraction, probably by the Petrel Guano Company, especially workers from Jamaica with some casualties in the Cay. A famous incident was presented in a US Court in 1885 for the alleged marooning of some employers in Roncador Cay for months after being rescued by the USS *Powhatan*.[192]

One of the most striking cases was investigated by the Royal Navy stationed in Jamaica, when there were "some rumors reporting men marooned on Roncador." The HMS *Partridge* was sent to the Cay to investigate the rumors. Once in Roncador, the officers found a horrific scene of human remains inside a plank cabin. The officers reported they maintained water and some food rations. One was identified as a Dutch citizen from his documents, and the other was probably of African descent who became a Jamaican citizen. The human remains were interred in the Cay by the crew of the Partridge. This event was covered by British newspaper the *Graphic* (Fig. 8) with a complete description of the Cay's natural life and sketches representing Roncador, and the horrific scene of the human remains.[193] The story of the maroon in Roncador Cay raises doubts about the veracity of the well-documented story of Pedro Serrano surviving for seven years on the Island of Serrana, in the vicinity of Roncador Cay.[194]

191) U.S. Departament of State, 1932:117-128; Burnett, 2005:780-782
192) *New York Times*, 1885:2
193) *Graphic*, 1892:452,472
194) Juan, 1782; Domènech, 2020

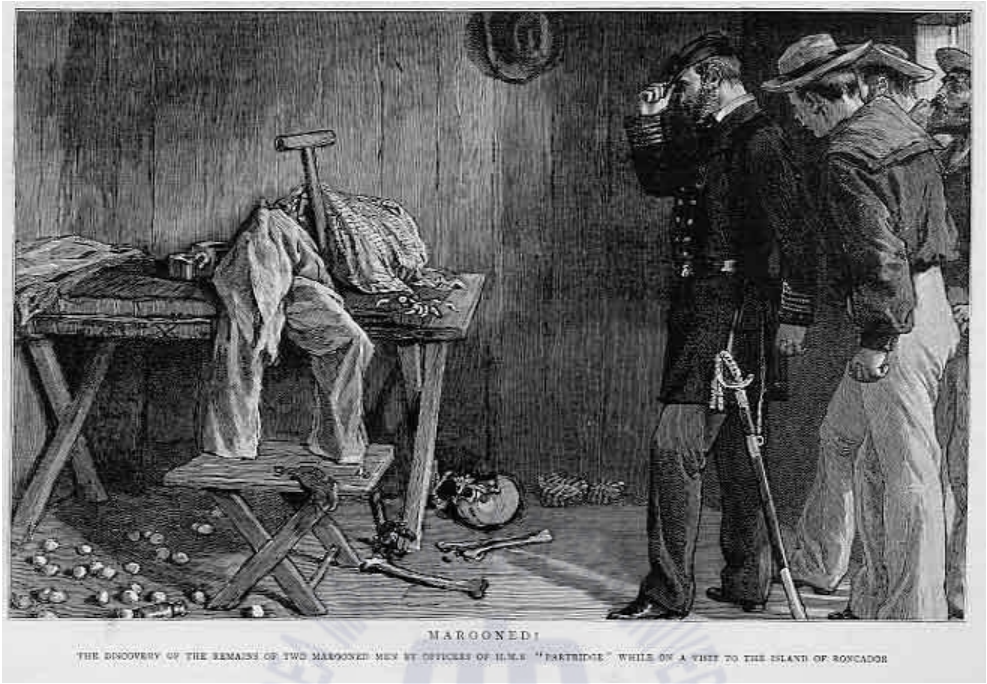

Fig. 8 *Marooned! The discovery of two marooned men by the officer of HMS Partridge while the visit to the island of Roncador.* Remains on Roncador, 1892. Possible draw by Mr. A.G. Wildey from the Royal Navy (*Graphic*, 1892:452).

Furthermore, prior to World War I, the Japanese empire surveyed the area and disembarked in Roncador Cay, seeking to install a naval station, but providing no further details.[195] Finally, the state of UCH of Roncador Cay reflected the active maritime past. This area undoubtedly has rich maritime history involving many countries and empires, with a high probability to find archaeological evidence onshore and underwater. Consequently, Roncador Cay requires collaborative fieldwork to reveal evidence and to be declared a protected archaeological area.

195) *Alexandria Gazette*, 1913:4; *New-York Tribune*, 1913:2; Parsons, 1956:25

Table 2 Database on Roncador Cay (Gomez and Jeong, 2021).

No	Year of Loss	Name	Type	Constr. Material	Gross Ton	Cargo	Voyage from/to	Manner of Loss	Location on Roncador	Nation	Casualties
1	1531	Unidentified	N/A	Wood	N/A	N/A	Unknown	Unidentified	Area of uncertainty	Spain	N/A
2	1605 Nov.11	*San Roque*	Galleon	Wood	600	Silver bars Gold bars	Cartagena de Indias-Havana	Hurricane	Area of uncertainty	Spain	339
3	1605 Nov.11	*Santo Domingo*	Galleon	Wood	747	Silver bars Gold bars	Cartagena de Indias-Havana	Hurricane	Area of uncertainty	Spain	263
4	1605 Nov.11	*Nuestra Señora de Begoña*	Galleon	Wood	500	Silver bars Gold bars	Cartagena de Indias-Havana	Hurricane	Area of uncertainty	Spain	240
5	1605 Nov.11	*San Ambrosio*	Galleon	Wood	450	Gold bars Silver bars	Cartagena de Indias-Havana	Hurricane	Area of uncertainty	Spain	220
6	1636	Unidentified	Shallop	Wood	60	N/A	Old Providence-Mosquitia Coast	Unidentified	West Area	Britain	3
7	1659	*Santiago*	Galleon	Wood	450	N/A	Cartagena de Indias-Havana	Human error	Area of uncertainty	Spain	N/A
8	1675	*Unidentified*	Warship	Wood	N/A	N/A	N/A	Unidentified	N/A	Dutch	N/A
9	1801	*El Paysano*	Merchantman	Wood	260	N/A	Kingston-San Juan (Greytown)	Unidentified	Area of uncertainty	Spain	N/A
10	1837 July	*Dolorita*	Schooner	Wood	120	N/A	Kingston-San Juan (Greytown)	Unidentified	N/A	Spain	1
11	1840 March	*Amity*	Schooner	Wood	60	N/A	Cape Gracias a Dios-Black River (settlement)	Unidentified	N/A	Britain	0
12	1852 Feb.27	*Clarendon*	Schooner	Wood	308	General Cargo	New York-San Juan (Greytown)	Unidentified	N/A	Britain	0
13	1857 Sept.	Unidentified	Vessel	Wood	N/A	N/A	San Juan (Greytown)	Unidentified	N/A	N/A	N/A
14	1865 May.30	*Golden Rule*	Paddle steamer	Wood	2267	Passengers	New York-San Juan (Greytown)	Heavy rain	North-East Area	United States	0
15	1870 Jul.5	*CC Clark*	Schooner	Wood	80	General Cargo	Aspinwall (Colón)-Baltimore	Unidentified	N/A	United States	0
16	1886 Feb.12	*Hiram*	Bark	Wood	N/A	General Cargo	Aspinwall (Colón)-Pensacola	Unidentified	N/A	Norway	0
17	1889	Unidentified	Steamship	N/A	N/A	N/A	Savannah-Bluefields	Unidentified	North-East Area	N/A	N/A
18	1890 Feb.12	*Ydun*	Steamship	Steel	362	Fruits	Bluefields- Savannah	Unidentified	South Area	Norway	8
19	1891 Feb.26	*Aguan*	Steamship	Steel	1618	Passengers	New York- Kingston-San Juan (Greytown)	Strong currents-trade winds	North-East Area	Britain	0
20	1892 Feb.2	USS. *Kearsarge*	Sloop of War	Wood	960	Seven Guns	Port Prince -Bluefields	Strong currents	North-East Area	United States	1
21	1902 Nov.19	*Kitty*	Steamship	Steel	1000	Fruits	Charleston-Bocas del Toro	Unidentified	N/A	Norway	0
22	1904 Dec.12	*Buckingham*	Steamship	Steel	2879	General Cargo	Baltimore-Bocas del Toro	Unidentified	N/A	Britain	0
23	1920 Jan.25	*Mayport*	Steamship	Wood	2551	Ballast	Norfolk- Colón	Unidentified	N/A	United States	0

2.10. State of Underwater Cultural Heritage in the United States and the USS *Kearsarge*

Maritime territories play a significant role in managing underwater cultural heritage. The United States, possesses an essential underwater cultural heritage within its territory and around the world. In recent years, their actions toward heritage indicate enormous respect for war graves and other heritage, as demonstrated by international practices, such as the French *La Belle* and the Spanish *Mercedes.*[196] The United States' preservation of the its navy's shipwrecks can be traced from the second half of the twentieth century, with the USS *Monitor*[197] (Fig.9). The effort to preserve come from the Naval History and Heritage Command (NHHC), notably during the 1980s by William Dudley, former director of The Naval History and Heritage Command. He recognized the value of the underwater cultural heritage of shipwrecks and the prominent role played by the Navy with a notable concern over the US Navy wrecks and how new technologies could facilitate the approach to them. Dudley mentions the remains of the USS *Kearsarge* and its relocation and the collaborative effort needed to protect it, recognizing that the site is in Colombian maritime territory.[198]

Other historical wrecks are protected and have been part of significant research.[199] Some were lost without relevant information, such as some submarines. Others were localized recently, an example being the USS *Grayback* (SS-208) in 2019 as part of the "Lost 52

196) Le Gurun, 2006:53-69
197) NOAA, 2021a
198) Dudley, 1991; 1993:2-8; 1998; Catsambis, 2021
199) Delgado et al., 2020; Delgado, 2021

Project" founded by privates to research US Navy lost submarines during World War II.[200]

Among the thousands of historical military wrecks are USS *Somers*, USS *Cumberland,* USS *Tecumseh*, CSS *Alabama*, USS *Huron*, USS *Arizona*, and USS *San Diego* (Fig.10). The Underwater Archaeological Branch duly researched USS *Conestoga*, USS *Huston* (Franklin Roosevelt was the first American president to visit Colombia in 1934, and during 1938, Old Providence Island onboard the USS *Houston*), USS *Macon*, and the USS *Indianapolis* in 2017.[201] Additionally, there are some specific wreck sites as a consequence of Operation Neptune during World War I, with an archaeological survey from the NHHC from 2000 to 2002, including Omaha Becah, Utah Beach, Banc du Cardone, and Pointe du Hoc and Pointe et Raz de la Percee.[202]

Also, the war graves are another crucial concern for the United States to preserve and protect, examples being USS *Lagarto*, USS *Wahoo*, and USS *Grunion*. The memorial in Pearl Harbor summarizes the importance and sense of a "war grave" as maritime heritage in the United State s.[203] A significant component of military shipwrecks in the United States is the historical information and records from later in the eighteenth century. Several documents and materials were produced and maintained to interpret wrecks with a historical analysis supporting the maritime archaeological work.[204]

200) Lost52project, 2021
201) Pan American Union, 1934:631-632; Lawrence, 2003; Catsambis, 2021; NHHC, 2021c
202) Neyland, 2011:713-721
203) Neyland, 2002:774-775
204) Gould, 2011:9-10; TRC Environmental Corporation, 2012:165-227

Fig. 9 *USS Monitor* Getting a Clear View of the USS Monitor (NOAA).

The United states preserve and protect the archives and records of military wrecks. Some of the information about sunken state vessels is partly restricted due to public privacy laws like the database managed by NHHC. However, the United States government has primary source records related to shipwrecks in the National Archives and Records Administration (NARA). The archives compile information from thousands of records such as logbooks, courts-martial, naval officers' reports, in the Navy Maritime Records in Washington DC. These are located at the Navy & Marine Corps Record Group and classified as follows: *Record Group 19: Records of the Bureau of Ships, Record Group 24: Records of the Bureau of Naval Personnel, Record Group 37: Records of the Hydrographic Office, Record Group 38: Records of the Office of the Chief of Naval Operations, Record Group 45: Naval Records Collection and Library, Record, Record Group 71: Records of the Bureau of Yards and Docks, Record Group 74: Records of the Bureau of Ordnance,*

Record Group 80: General Records of the Department of the Navy, Record Group 125: Records of the Office of the Judge Advocate General (Navy/Marine Corps), Record Group 313: Records of Naval Operating Forces.[205] Also, the Maritime & Coast Guard Record in the National Archives at Chicago Groups includes *Record Group 26: Records of the U.S. Coast Guard, Record Group 36: Records of the U.S. Customs Service.*[206]

These impressive military records are freely accessible for research purposes. In addition, the Library of Congress (LOC) classified other records from state vessels of the United States government and foreign military wrecks on US territory in published books, databases, and websites. This heritage is of free access in the section of Ships and Ship Registers: Sources of Information, including websites with databases or information from different sources.[207] Also, Texas A&M University's library has sources available in the Nautical Archaeology section with the Shipwreck Directories and Military Ship Registers, Directories and Lists (USA) and Military Ship Registers, Directories, and Lists (Foreign) recommending books and websites.[208]

205) NARA, 2021a
206) NARA, 2021b
207) LOC, 2021
208) TAMU, 2021

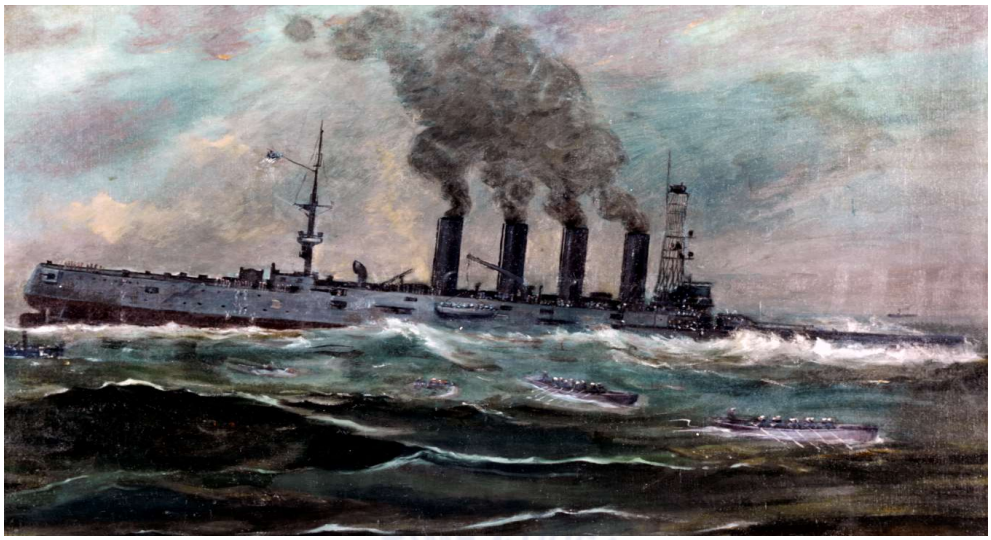

Fig. 10 *USS San Diego (Armored Cruiser No. 6*). Painting by Francis Muller, 1920. It depicts ship sinking off Fire Island, New York, after she was torpedoed by the German submarine *U-156*, 19 July 1918 (NHHC, 2021).

For the United States, the USS *Kearsarge* represented one of the most prominent historical ships. It is a source of maritime history and nautical archaeology, and is widely considered one of the most valuable shipwrecks in the Caribbean Sea, located in Colombian maritime territory. Moreover, the vessel is part of the underwater cultural heritage of both the United States and Colombia,[209] representing a shared legacy between the two nations. Of significance to the wreck is the death of one crew member. The Second Class Fireman *Anderson Robbins* was drowned by the strong currents of Roncador Cay trying to find a channel for loading boats.[210] Robbins was born in 1861 in Greenville, South Carolina, and enlisted in the US Navy as Coal Heaver in 1892. After a short training onboard the USS *Wabash*, he served onboard the USS *Kearsarge* until his death in Roncador on February 3,

209) Neyland, 2011:713
210) Lemly, 1894

1894, with good professional qualifications and conduct registered in his record.[211] Unfortunately, primary source information about Robbins is limited. An inquest was held in the Cay by Admiral Stanton on February 5, 1894, ajudging that "he was drowned while in the performance of duty." [212] There were just a few allusions in the newspaper;[213] however, this sensible loss of life was not presented during the court-martial. There are a probable two reasons for this: one, because of his low status in the US Navy; two, the lack of rights of Africans in the United States during this period. Unfortunately, official documents during the incident have no relevant information about this episode. It is not clear if he was buried at Roncador. Still, it is the most probable option considering no mention of transportation of his body during the crew rescue on board the Steamer *City of Para* (Fig.11) or in the naval surgeon medical notes.[214]

Finally, the wreck of the USS *Kearsarge* is an excellent opportunity for international cooperation similar to the case of the CSS *Alabama* wreck protection agreement in 1989 between France and the United States.[215]

211) U.S. Department of the Navy, 1894
212) Kelley, 1894:62
213) *Illustrated American*, 1894:255; *Morning Call,* 1894:1
214) Barnum,1894:822-823
215) Roach, 1991

Fig. 11 *Happy tars landing in New York after an unpleasant experience on Roncador reef.* The return of the *Kearsarge* crew from Roncador Cay onboard the Steamship *City of Para* to New York City (*Illustrated American,* 1894:255).

2.11. Conclusion with Respect to the USS *Kearsarge*, Colombia, and the United States

This chapter provides a holistic comprehension of shipwrecks and cultural heritage by reviewing terms and concepts of national and international laws, finding that definitions depend on circumstances, interests, and jurisdictions. Also, some good practices of cooperation management among countries were examined, reflecting the interested parties' benefits, whether state flags or coastal states, with a unique purpose to preserve, protect, and reveal the maritime past. It is clear that Colombia and the United States have different views toward shipwrecks and their cultural heritage. Despite the vast underwater cultural heritage of military shipwrecks in Colombia, every case is unique. Therefore, different aspects should be analyzed, such as military

ships in commercial or non-commercial activities; sunken military ships resulting from an engagement or naval battle; wrecks; and accidents from different periods with better identification and information available, including war graves at the wreck site. After identifying the remains, the cooperation and responsibility of both flag states and coastal States is imperative. The USS *Kearsarge* has implications as a navy ship during a military operation that was abandoned due to salvage limitations with armament on board. Also, it is located in territorial waters with full sovereignty during the accident in 1894 and today. Although the 2004 Act protects the remains of the USS *Kearsarge*, it is also considered underwater cultural heritage according to the Law 1675 of 2013, since it has been submerged in Colombia territory for more than a hundred years. However, neither Colombia nor the United States is a party to the UNESCO 2001 Convention.

This raises the question of whether it is possible to cooperate in this case? Or is there a genuine interest from Colombia? In the view of this research, Colombia has sovereignty as a coast state and the United States has the ownership. However, the USS *Kearsarge* is a solid case and an enticing prospect for an international cooperative project considering it was a military ship in non-commercial activities. Moreover, the wreck has no cargo on board, thus avoiding being targeted by salvage companies, treasure hunters, or other third parties.

During this study, active communication was established with the Colombian government requesting information of the USS *Kearsarge* and the historical shipwrecks database. For this purpose, the Colombian Institute of the Anthropology and History (ICANH in Spanish) was

communicated with personally from March 2020 to September 2020 to access specific and general information and the shipwreck's database, or any other information concerning wrecks in Roncador Cay. Officially, they replied there exists a lack of access to specific information due to confidentiality in Article 17 in Law 1675, from 2013.[216] However, the library of ICANH shared limited information, primarily reports of archeological prospection and secondary sources, and indicated the non-existence of a database of shipwrecks in the agency.[217]

It is evident that any research involving shipwrecks is challenging not only because of legal restrictions, but due to the implications of the legal case of the Spanish galleon *San Jose* and the government's interests in commercial salvage from other wrecks, such as the case of the Spanish fleet of 1605.[218] In addition, recent bilateral agreements involving the United States military's sunken ships confirmed customary interest in protection through international cooperation. Consequently, any action on the wreck might be through an understanding between the governments involved.

Rengifo and Castellanos stated the importance of the United States in the future of the underwater cultural heritage worldwide. They emphasize the importance of prioritizing the identification of international dynamics and other countries' UCH legislation, especially the concept of states vessels and the rights of flag states to protect the Colombian underwater heritage.[219] Also, the United States, because of its

216) A. Caicedo, personal communication, September 17, 2020
217) M. Galvis, personal communication, March 16, 2021
218) Semana, 1998; Pérez, 2019
219) Rengifo and Castellanos, 2019:43-44

immense heritage and protection of its own national interest, is supporting countries such as Spain and France in historical and military shipwrecks.[220)]

Finally, the future of the USS *Kearsarge* is highly unpredictable. Colombia is still far from any agreement involving flag states with military or foreign wrecks on its territorial waters, whether for scientific purposes or commercial salvage. However, one of the advantages is that the *Kearsarge* lies far from the continent and other islands, making it difficult looters or amateur divers to access. This case and other significant shipwrecks demonstrate that only cooperation and bilateral agreements would encourage scientific development to reveal and protect the shared heritage in Colombian waters.

220) Sinclair, 2020:341-342

Ⅲ. Context of the Wreck Site and the USS *Kearsarge*

This chapter aims to present an overview of the wreck site and the maritime cultural landscape, describing the geography and the environmental conditions to understand the factors that influence accidents in the area. Also, it provides a better idea of the sailing conditions to understand wrecks in the area and the leading causes of accidents. Additionally, the most relevant characteristics of the USS *Kearsarge* are described and the ship's social context, including an analysis of the naval armament during its service. There are two reasons for this. First, it is imperative to confirm the armament onboard through primary sources for further analysis. Second, the description of the environmental conditions and characteristics of the ship offers a holistic perception of the area and the wreck event.

Additionally, a geographical and social interpretation of Roncador and the USS *Kearsarge* and its relationship is examined from several narratives from the late nineteenth century and early twentieth century. This interaction with the site offers different perceptions. Therefore, the objective is to obtain a better understanding of the relationship between the shipwreck and the maritime cultural landscape from social factors and environmental conditions.

1. Geographical Situation and Environmental Conditions of the Wreck site

Roncador Cay (also known as *Isla Roncador*) is a small island located in the west of the Caribbean Sea and is part of the Archipelago of San Andres, Old Providence, and Santa Catalina. It is located northwest of mainland Colombia, the country it belongs to, and about 77 nautical miles to the east of Old Providence Island and 45 nautical miles off Serrana Bank (Fig.12). The Archipelago comprises islets, cays, and banks forming atolls such as Serrana, Serranilla, Quitasueño, Albuquerque, Bajo Nuevo, and the populated oceanic islands of San Andres, Old Providence, and Santa Catalina, covering an area of 180,000 km2.[221] It was declared by United Nations Educational, Scientific and Cultural Organization (UNESCO) as a marine protected area, called the Seaflower Biosphere Reserve.[222] The region has complex environmental conditions during the year influenced by cold fronts, tropical storms, and strong currents. Also, its geomorphology is very particular; Roncador has a bank 15 km long and 7 km wide, about 4.87 meters above sea level, and two smaller cays above high tide.[223] The vegetation is formed of thickets and palm trees. These conditions make Roncador an isolated place, difficult to approach, and hazardous for sailing.

Currently, on the cay, there are military facilities operated by the Colombian Navy and a lighthouse installed at the beginning of the twentieth century by the US Government and managed by the

221) Coralina-Invemar 2012; Dimar 2005
222) Mow et al., 2003
223) Idárraga-García and León, 2019

Colombian Maritime Administration (DIMAR). There is no exact information about the discovery of Roncador Cay (snorer in English). However, its name was given due to the continuous noise made by the breakers and waves by Spanish mariners.[224]

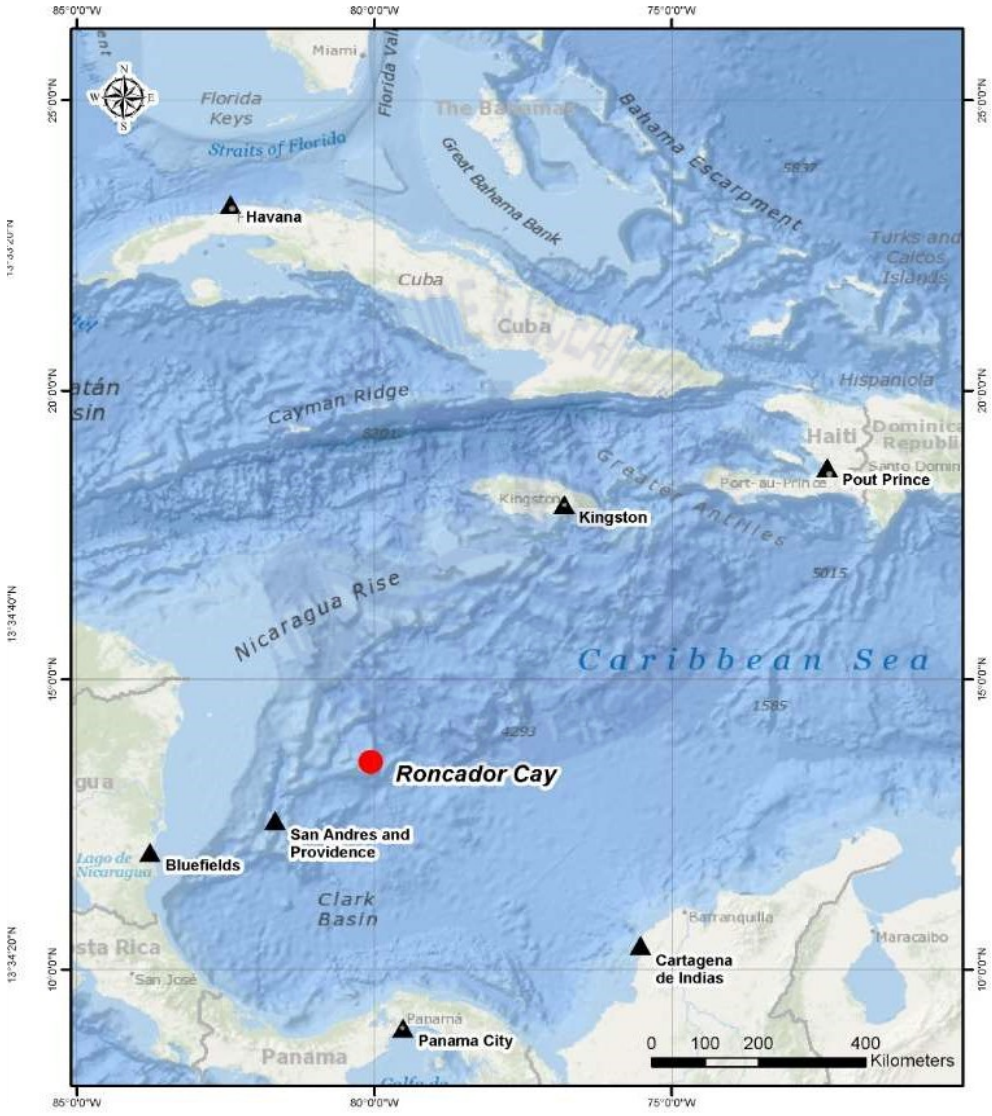

Fig. 12 *Roncador Cay and its location in the Caribbean Sea.* Own elaboration.

224) Newton, 1914:277; Geister and Díaz, 2007

1.1. Regional Geomorphology

The Archipelago, including the atolls, islands, and coral banks, formed by volcanic activity during the Early Cenozoic periods.[225)]

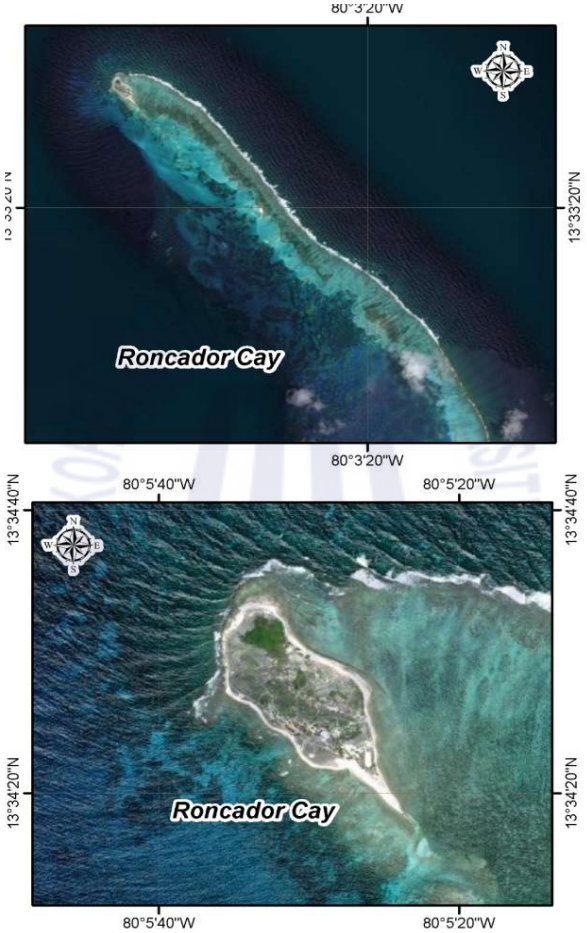

Fig. 13 *Geographic coordinate system of Roncador Cay.* Esri, GEBCO, NOAA, National Geographic, Garmin, HERE, Geonames.org, and other contributors Esri, HERE, Gamin, (c) OpenStreetMap contributors, and the GIS user community.

225) Geister and Díaz, 2007

The region shows complex oceanography conditions due to its interaction with topography submarines and different geoforms (Fig.13). It is composed of underwater valleys, mountains, abyssal plains, and depths ranging from 0 m at sites where barriers bank reefs partially emerge during low tides up to 3,292 m in the abyssal planes east of the Cay.[226)]

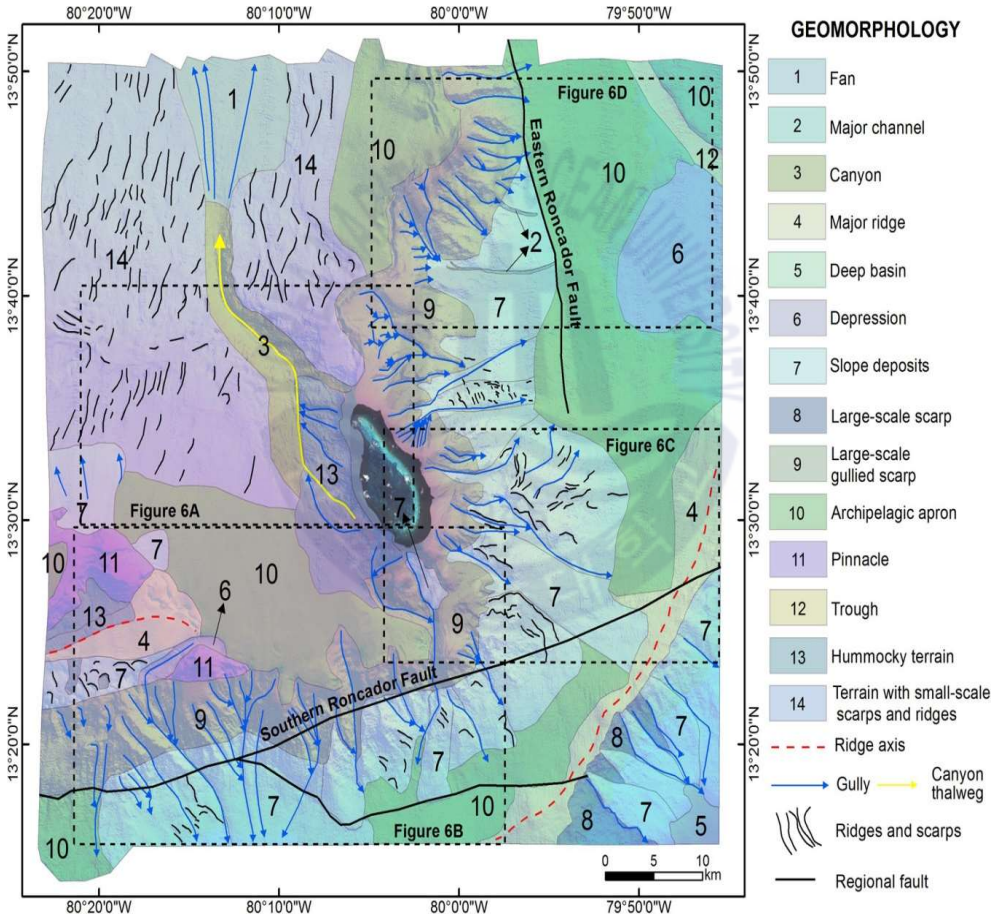

Fig. 14 *Submarine geomorphological map of Roncador Bank and adjacent areas.* (Idárraga-García and León, 2019).

226) Coralina-Invemar 2012; Ricaurte-Villota and Bastidas, 2017:64-65

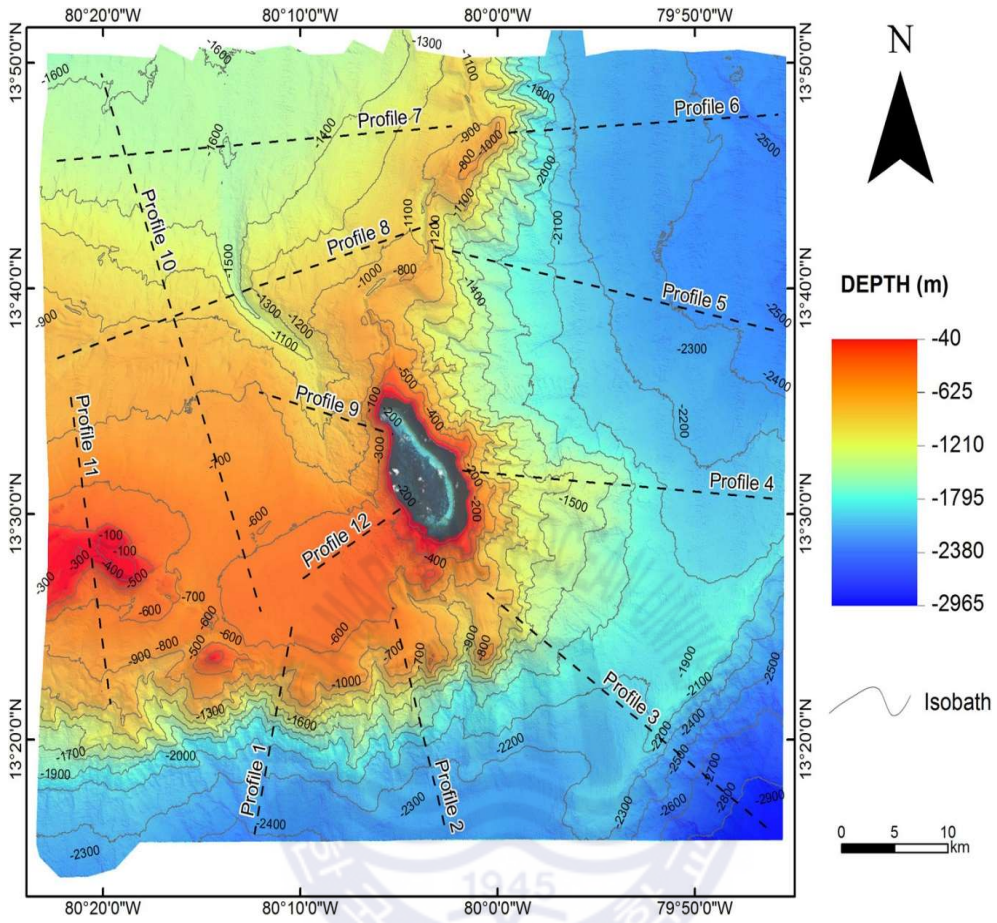

Fig. 15 *Bathymetric model, with gray scale hillshade behind, of Roncador Bank and adjacent areas* (Idárraga-García and León, 2019).

Roncador is characterized by its complex geomorphology features with a windward fore-reef terrace that is slightly thinner and develops faster than the other atolls in the area. Idárraga-García and León (2019) identified and mapped a series of geomorphological features in Roncador. As a result, it revealed evidence of volcanic, erosive, and depositional processes during its geological history, corresponding to a seamount that reached about 2,350m from the seafloor. Also, they presented a 3D bathymetric map (Fig.14 and Fig.15) of Roncador covering 4,800 km2, identifying depths diverging from -40 to -2,965m.

1.2. Climate and Weather Events

The climate of the Archipelago is defined by its tropical location accentuated by the Intertropical Convergence Zone (ITCZ), which defines mainly two seasonal periods with another short transitional period from May to July (Fig.16)[227]. One of the influential periods is the dry season, from December to April, determined by a regimen of northeast trade winds and extreme weather events, such as cold fronts. The trade winds affect the Caribbean Sea during the dry season with an average speed of 15 knots and daily variation peaks of up to 30 knots.[228] In addition, the cold fronts highly influence the Archipelago's permanent strong winds, wave height, cloud cover and an annual average of six events.[229]

The other influential period is the rainy season, from August to November, presenting intense precipitation and characterized by tropical storms (starting early June to late November) due to its location in the hurricane belt of the Caribbean Sea.[230] Some authors consider hurricanes one of the leading causes of shipwrecks in the Caribbean Sea.[231] However, Gomez and Jeong stated that the main causes of shipwrecks in the Archipelago are regional geomorphology and not tropical storms.[232] They compiled a list of hurricanes in Roncador Cay from historical sources and registered thirty-seven tropical storms as early as 1492 from British, and Spanish documents, and other sources.[233]

227) Andrade, 2000
228) Andrade and Barton, 2000
229) Ortiz-Royero et al., 2013:2797-2801
230) Ortiz-Royero, 2007; 2012:826
231) Rappaport and Fernández-Partagás, 1997:97-98; Trouet et al., 2016:3173
232) Gomez and Jeong, 2021
233) Poey, 1855; Millas, 1968; García-Herrera et al., 2005; Chenoweth, 2006

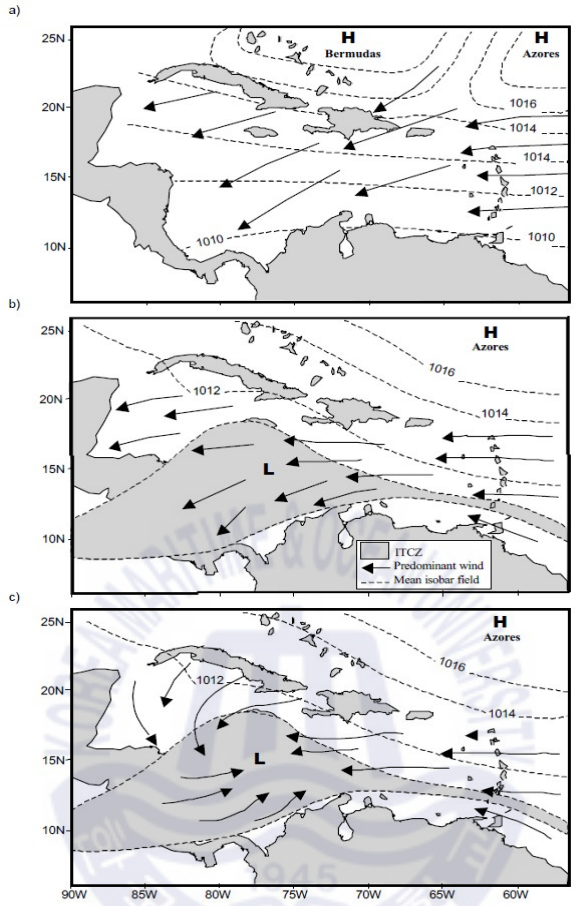

Fig. 16 *Inter-tropical Convergence Zone. Positions for a) windy, b) transition, and c) rainy seasons* (Andrade, 2000).

Furthermore, NOAA has recorded hurricanes in the Archipelago from 1852 to 2020 through "NOAA Historical Hurricane Tracks," and has an online tool for tracking the path of historic hurricanes with detailed information. The Hurricane Track tool reflected the high activity in the region and the continuous impact of hurricanes in the Archipelago.[234] In recent years, there is evidence of climate change, with higher energy

234) NOAA, 2021d

hurricanes striking the region, such as ETA and hurricane IOTA, which hit Old Providence Island in 2020, affecting 90% of the infrastructure.[235] However, there is no research on the effect of tropical storms on underwater heritage in Colombia.

1.3. Currents

The Archipelago is affected by prevailing surface currents in the northeast direction, known as the Caribbean Current, presenting high-speed flow (>25 cm/s) from E to W and a sizeable counterclockwise eddy in the southwestern sector of the Caribbean.[236] The Caribbean Current is distributed among the Banks and Cays and partially recirculates moving the southwestern Caribbean, producing the Colombia-Panama Gyre and other parts that continue toward the Cayman Sea. The surface currents in the area are modified by eddies rotating in both directions and moving with the Caribbean Current, affecting navigation (Fig.17). The eddies are distorted between the escarpments of the seamounts in the Archipelago as a result of its complex geomorphology.[237] Also, between Roncador Cay and Serrana Bank, strong currents predominate in the northwest direction.[238]

235) Garcés-Ordóñez et al., 2021; Shultz et al., 2021
236) Andrade, 2001; Geister and Díaz, 2007
237) Andrade, 2000; Coralina-Invemar, 2012
238) Garay et al., 1988:3-4

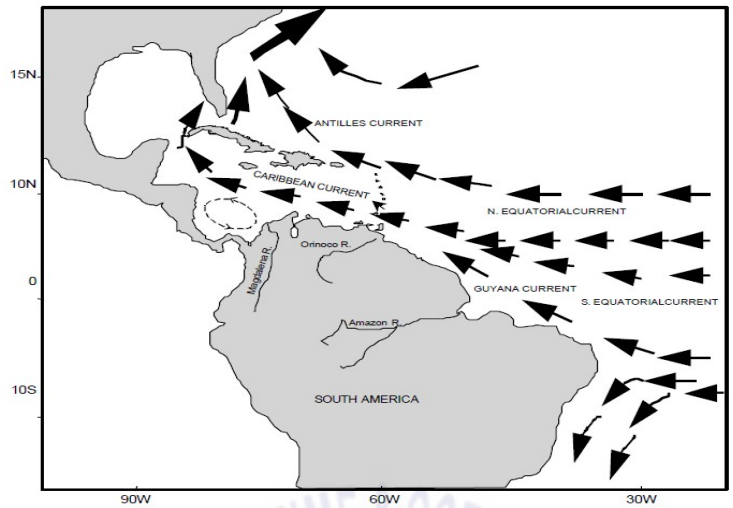

Fig. 17 *Surface currents in the Western Tropical Atlantic* (Andrade, 2000).

1.4. Ship Trap-Roncador Cay(Conclusion of the Environmental conditions)

The complex environmental conditions of the Archipelago, including Roncador Cay, are affected by geomorphology, cold fronts, and hurricanes, making this area unique to navigate the western Caribbean Sea and hazardous for sailors. Throckmorton (1964) was the first to use the term "ship trap" for a particular area in Yassi Ada between Greece and Turkey due to its environmental conditions being the leading cause of wrecks.[239] Recent studies have shown this phenomenon in some areas with challenging environmental conditions containing many wrecks in Bermuda, North Carolina-Cape Hatteras, and Dry Tortugas in the strait of Florida, among other areas in the world.[240]

239) Throckmorton, 1964:51-61
240) Gould, 20011:80-87; Orser, 2002:501

Historically, Roncador Cay was described as a hazardous area by Spanish sailors and later in the nineteenth century dubbed "the graveyard of the Caribbean" by Americans.[241] Its location in a remote sailing zone in the western Caribbean, composed of islets, banks, and cays, has been historically considered one of the most treacherous areas, operating as a ship trap in the middle of a critical route.[242] The main hazards in Roncador Cay are geomorphology, cold fronts, and tropical cyclones and have been the predominant factors for wrecks.[243] Also, strong currents influence navigation, causing ships to drift off-course between Roncador Cay and Serrana Bank, making this area hard to sail, especially before the pre-industrial period.[244]

1.5. Historical Hydrographic Surveying and Nautical Description of Roncador Cay

Since the fifteenth century, the Caribbean Sea has been considered hazardous to sail. Therefore, it was challenging to accurately describe some geographical areas, including the Archipelago and Roncador Cay. Before the nineteenth century, the depths and description of the coastline were not accurate due to hydrography as a science being under-developed. Also, some nautical difficulties were experienced because of the lack of geographical knowledge of Roncador's tiny size. The first map of the Caribbean by Juan de la Cosa at the beginning of the sixteenth century did not specify banks or islands of the Archipelago. However, Diogo Ribeiro's 1529 map covers this area with a

241) Hobson, 1894:164
242) Herrera y Tordesillas, 1601:12-36
243) Gomez and Jeong, 2021; Parsons, 1956:4
244) Coralina-Invemar, 2012:36-59; Richardson, 2005

comprehensive nautical description a few years later [245]. Although the area was starting to be mapped, its geomorphology was still unclear and continued to cause many accidents. The territory was usually mapped by Spanish and Dutch hydrographers, albeit with the limited available resources of the period. The Archipelago was one of the main navigation routes in the Caribbean,[246] although colonial powers never mapped with the same accuracy as other regions, continuing to cause accidents in the late nineteenth century and early twentieth century, notably the wreck of the USS *Kearsarge*.

This chapter aims to examine the nautical scientific development of the area by Spain and England and the late nineteenth century by the United States to describe the territory and be associated with the wreck of the USS *Kearsarge*. The main objective is to recognize geomorphology as one of the leading causes of wrecks and a better understanding of the maritime cultural landscape[247] during this study. One of the reasons is that Roncador and the Archipelago was a problematic area for hydrographic surveys due to the tiny dispersed islands and banks and the region's physical environmental conditions that made it a ship trap. Another reason is that part of the hydrographic survey information has not been revealed before and contributes to recognizing the causes of wrecks.

1.5.1. Spanish survey "Fidalgo Expedition" in Roncador

At the end of the eighteenth century, the Spanish Crown implemented an ambitious hydrographic plan along the most crucial Spanish navigation

245) Vigneras 1962; Sutton and Yingling, 2020
246) Bassi, 2016:23-54
247) Westerdahl, 1992:5; 1994:266

routes such as the Gulf of Mexico, Florida, Tierra Firme (northern coast of South America), and the Antilles. One of the priorities was obtaining geographical knowledge of the Caribbean, which was partially unknown. The expedition was composed of two separate Spanish Armada divisions: one, from Trinidad to Cuba, led by Captain Cosme Damian de Churruca, including all the islands; the second, by Captain Joaquin Francisco Fidalgo, including the coast of South America in the Caribbean, Central America and the Gulf of Mexico. The expedition used four brigantine class ships (two-masted sailing vessels) of 250 tons, equipped with six cannons and designed for hydrography tasks.[248] Captain Fidalgo was in charge of two brigantines; Empresa (San Serrando), and Alerta (San German). These new ships set sail from Spain in 1792 and arrived at the naval station of Cartagena de Indias in 1794. In 1802, Prime Minister Manuel Godoy ordered the Viceroyalty of the New Kingdom of Granada in Bogota (Formerly Santa Fe) to recognized and detailed the navigation route between Cartagena de Indias to Havana. The route was critical to connect *Tierra Firme* with Cuba, but until that moment, without rigorous review or description of the banks, cays, or currents as the most significant treacherous shipping passage faced by sailors. Captain Fidalgo started surveying the area near the Archipelago in 1803, recognizing the Viber Bank (San Pedro Bank) or Placer de la Víbora, by Spanish mariners and las Ranas (Morant Cays) with an accurate latitude partially facilitating navigation in this area.[249]

To collect data, locate and describe Serrana, Serranilla, Bajo Nuevo,

248) Lucena-Giraldo, 1991:201-205; Martín-Merás, 2008:26-28; González-Ripoll Navarro, 1990:767-769

249) Arias de Greiff, 1984a:147-148; 1984b:252-255; Lucena-Giraldo, 1991:207-208; Domínguez et al., 2012:43-45

and Roncador Cay, Captain Fidalgo appointed Commander Manuel del Castillon. From December 1804 to February 1805, del Castillo sailed from Cartagena onboard the *Alerta* with the private schooner *San Jose* (Industria). The survey was conducted in adverse weather conditions (strong currents and winds).[250]. After returning to the naval station of Cartagena de Indias, on February 9, 1805, commander Manuel del Castillo made a report to Captain Fidalgo detailing the survey in the Archipelago with the following translation from the original Castilian:

> *"On January 1 of the present year, we sighted the Bajo Nuevo from its northern part whose latitude we observed on the same day close to it by the meridian height of the Sun, and that afternoon, we anchored in its bank to the West. The following day we sailed past its cay or islet of sand, which measured the base and the most remarkable points of the reef blowouts, and the latitude and longitude were observed onshore. The unsheltered state of the ships was to withstand a Northwest threatened by season and appearance; it made me abandon the shoal and sent the brigantine to observe the latitude in the southernmost part, and from there, to go to Serrana to survey and locate it, while I was on the schooner with Lieutenant Don Torcuato Piedrola of his crew with the chronometer No 383 sailed to Serranilla with the same purpose. On day 4, I was able to locate the eastern part of the Serranilla in Latitude and Longitude without going into further survey because I had no pilot of this bank, and its appearance was terrifying with the strong wind was blowing. From there, I moved to the Serrana after having sailed four days looking for it due to its wrong position, and it was surveyed and located mainly in its northern and southern ends and eastern part; but having seen the brigantine in it as a sign of been there, I moved to the Roncador and once surveyed and located it, I went to the island of Santa Catalina where I found the brigantine dismasted of its mainmast its log worn out at the*

250) Arias de Greiff, 1984a:148-150; Lucena-Giraldo, 1991:209-210

top with a loss of its shroud due to their having been missing as well as the top of the lower mast, main-top-mast and its rig. From that point, I only tried to enable the brigantine to sail back to Cartagena, having to ply to windward over a hundred leagues to that effect and, consequently, the main shallows were located. And from Santa Catalina and San Andres islands, there were private charts; I only tried to locate them in Latitude and Longitude verified on the second island when I sent off the schooner soon after my arrival at Santa Catalina. Once the brigantine was enabled, I set sail from Santa Catalina at the beginning of February, and on the 8th, I was able to reach the Rosario islands where, by corresponding observation, the longitude of Santa Catalina with regard to Cartagena was only one minute of difference established by chronometers from the sailing out." [251]

Due to the adverse weather events such as strong trade winds, currents, and cold fronts,[252] the data collected was not as accurate as other regions surveyed by Fidalgo. The depths in some banks and cays were minimal, including Roncador Cay (Fig.18). Also, the accuracy of its location by the Spanish survey was questioned by British sailors (see *United Kingdom Hydrographic Office Survey of the Roncador Cay and the Archipelago*).

Among the most valuable outcomes were the nautical charts; *Carta Esferica De los Bajos que hacen cuidadosa la Navegación del Puerto de Cartagena de Yndias al Cabo de Sn. Antonio de la Ysla de Cubade la Ysla de con inclusión de las Yslas de Jamayca, Sta. Catalina y San Andres (Fig.20)* and *Plano Particuar de los Bajos Las Ranas, Nuevo, Serranilla, Serrana, Roncador, and Pedro del Placer de la Vívora* (Fig.21). The nautical information collected was an impressive hydrographic

251) Cuervo, 1892:367-369
252) Andrade and Barton, 2000; Andrade, 2001; Ortiz-Royero et al., 2013:2797-2801

survey considered the first scientific charts of this area to navigate from Cartagena de Indias to Havana or the West Caribbean. In addition, part of the information resulted in the publication of *Derrotero de las islas Antillas, de las costas de Tierra Firme y de las del Seno Mexicano,*[253] including geographical information of the Archipelago, descriptions and observations of Roncador Cay, complemented by previous information from Spanish sources as follows:

> *Roncador Its most N part is at latitude 13 35 7 and longitude 4 36 3 west of Cartagena de Indias It has five miles of extension in the direction of N 28 W and S 28 E has an islet in its part of the N and a cay to the south of the islet.*[254]

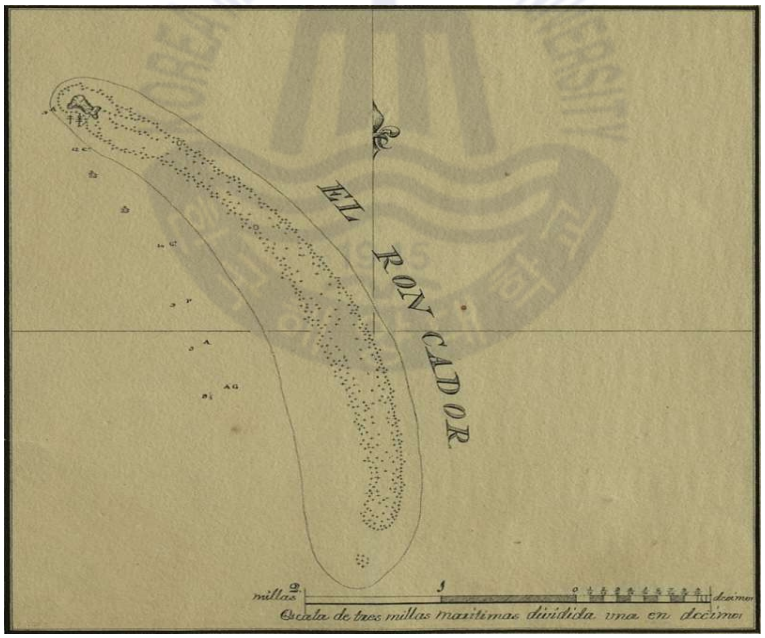

Fig. 18 *Extract from Roncador Cay from Spanish survey by Capt. Fidalgo 1804.* Carta Esferica De los Bajos (Biblioteca Virtual de Defensa).

253) Direccion de trabajos hidrográficos, 1810
254) Ibid.,p,355

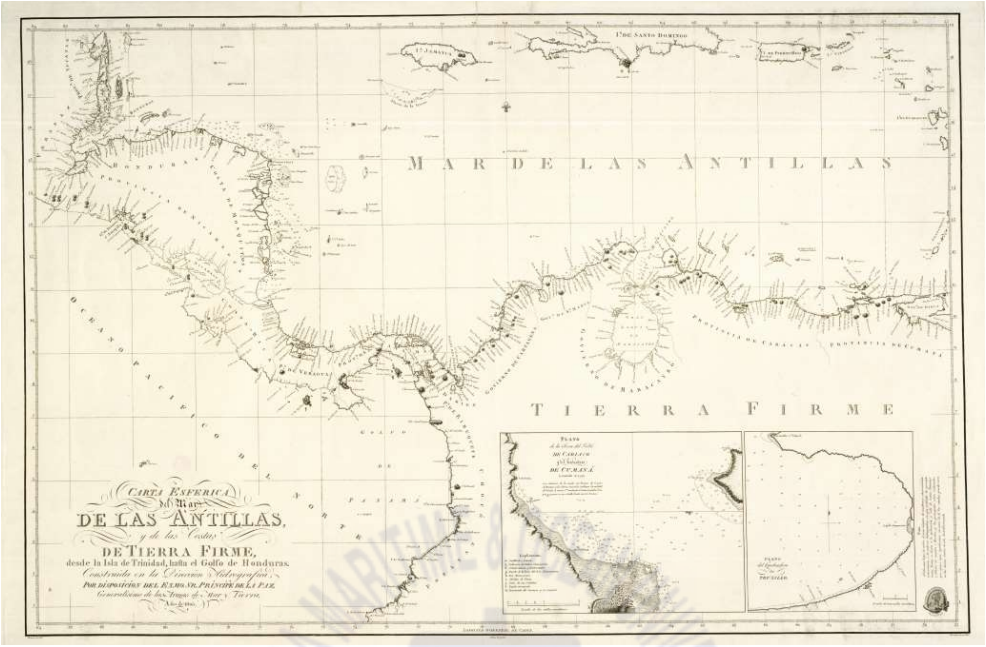

Fig. 19 *Carta Esférica del Mar de las Antillas y de las Costas de Tierra Firme, desde la Isla de Trinidad, hasta el Golfo de Honduras. Año de 1805.* Direccion de Trabajos Hidrográficos (Nautical chart of Antilles Sea and South America from Trinidad Island to Gulf of Honduras). Original copy from 1805 (Biblioteca Nacional de España, MV/29 C. 09 N. 012).

Also, the nautical chart, from 1805, covering the Caribbean, Central America and South America titled *Carta Esférica del Mar de las Antillas y de las Costas de Tierra Firme, desde la Isla de Trinidad, hasta el Golfo de Honduras,* (Fig.19) was corrected and published with new information by the *Direccion de Trabajos Hidrográficos* in 1810. This map combined survey information from the two divisions, covering and detailing the Archipelago of San Andres and Old Providence.[255] Captain Fidalgo's expedition was mentioned by Humboldt in a letter from Cumana, Venezuela, in 1799 describing the astronomical observations comparing them with Captain Fidalgo's observations.[256]

255) Martín-Merás, 2008
256) De Humboldt, 1980:21-27

In 1801, Humboldt met Fidalgo in Cartagena de Indias, reported his hydrographic survey.[257] Additionally, in one of his letters, Humboldt described the voyage onboard a schooner between Havana and Cartagena de Indias as: "a disastrous voyage of twenty-one days (that) intimidated us." [258] Humboldt's letter revealed and confirmed the dangers of sailing this route in March, during the dry season (December to April), a period of the year with uninterrupted northeast trade winds and impacted by cold fronts[259] of more than 30 knots. [260]

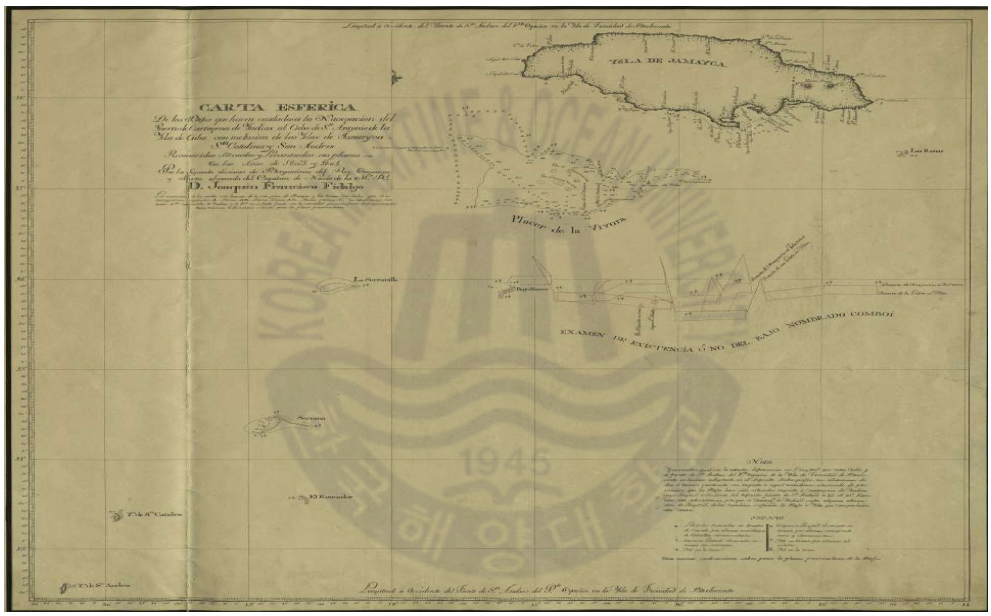

Fig. 20 *Carta Esferica De los Bajos que hacen cuidadosa la Navegación del Puerto de Cartagena de Yndias al Cabo de Sn. Antonio de la Ysla de Cubade la Ysla de con inclusión de las Yslas de Jamayca, Sta. Catalina y San Andres, 1803 y 1804. Segunda división de Bergantines del Rey Empresa y Alerta. Capitan de Navío D. Joaquin Francisco Fidalgo.* Chart that makes careful the Navigation from Cartagena de Indias to Cabo de Sn. Antonio, Cuba including Jamaica, Sta. Catalina and San Andres, 1803 and 1804. Second division Capt D. Joaquín Francisco Fidalgo (Biblioteca Virtual de Defensa).

257) De Humboldt, 1980:83
258) Löwenberg et al., 1873:291-293; Minguet, 1969
259) Ortiz-Royero et al., 2013:2797-2801
260) Andrade and Barton, 2000

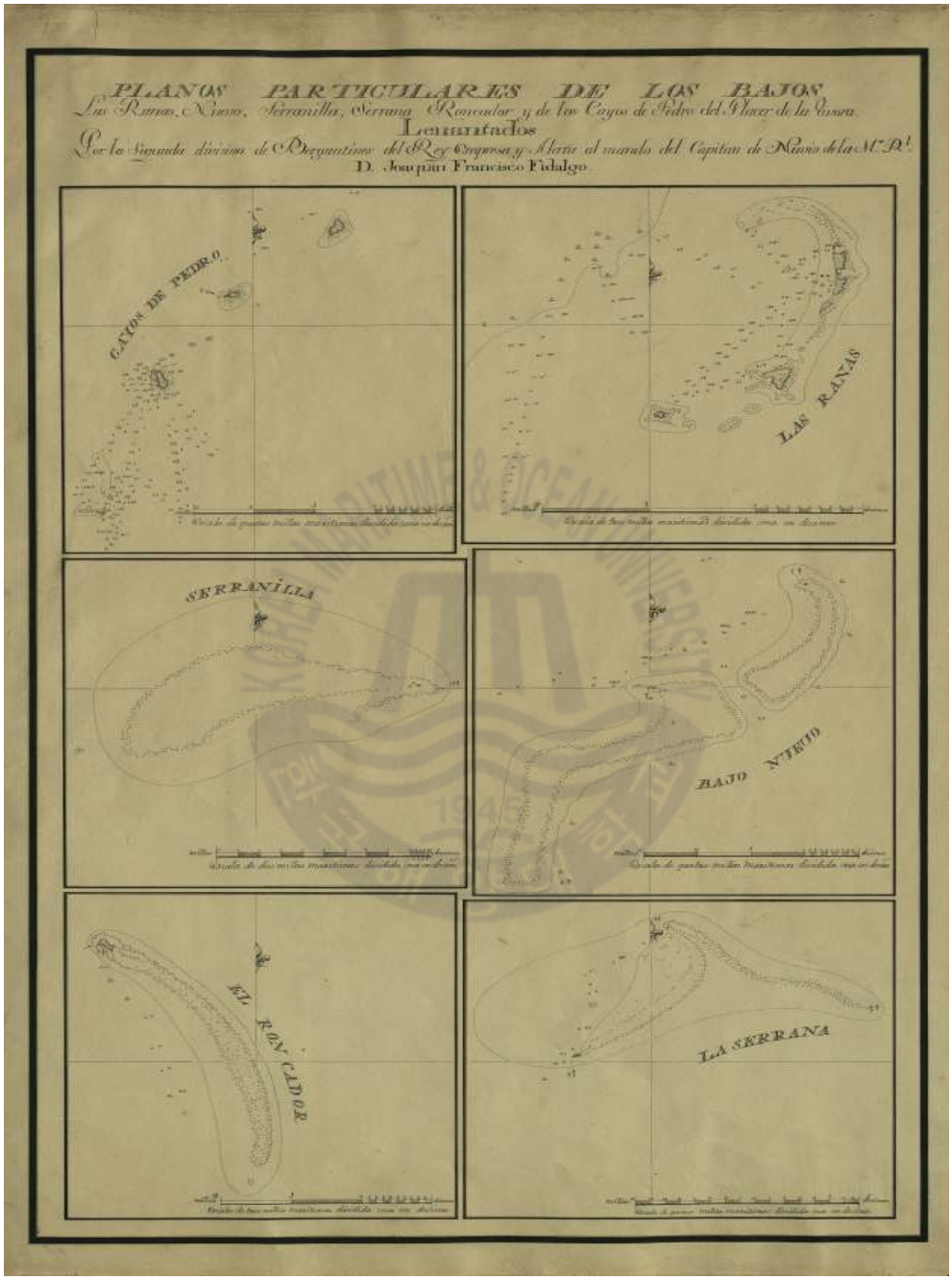

Fig. 21 *Planos Particulares de los Bajos, 1804.* Nautical Chart of Low Islands: Las Ranas, Nuevo, Serranilla, Serrana, Roncador, and Pedro del Placer de la Vívora Cay by Capt. Joaquin F. Fidalgo, 1804 (Biblioteca Virtual de Defensa).

1.5.2. The United Kingdom hydrographic survey of Roncador

Although geographical knowledge was an essential tool for navigators, especially in the Caribbean, with a high-intensity conflict among colonial powers, only privates made nautical charts, and maps remained highly confidential.[261] By 1795, the United Kingdom founded its Hydrographic Office (UKHO), setting high standards and the most important legacy in hydrography worldwide.[262] Francis Beaufort considered an eminence in modern nautical charts, was appointed as Hydrographer of the Royal Navy from 1829 to 1855. Under his instruction, the Archipelago was surveyed with the new wind force scale and high technology available at the moment.[263] Beaufort introduced the most critical improvements in cartography information on wrecks with abbreviations, symbols, and the year of the accident and started to be included from 1830. Also, other features of interest to mariners were covered, such as navigations aids, depth in fathoms, sandbanks, currents, and the compass rose with a magnetic north indicator and detailed information depictions of topography coasts, churches, towns, and fortification. In addition, Admiralty charts numbers were assigned and continuously updated.[264] From 1829 onwards, a survey in every remote area of the world started under Captain Beaufort's instructions. He sent several letters and kept active communications with the explicit instruction to the officers in charge to collect detailed information, mainly depths, currents, tides, variation of the compass, winds, and all valuable meteorological information for nautical purposes.[265]

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261) Stommel, 2017
262) Wainwright, 1991:55-56
263) Robinson, 1952:128-129; Robinson, 1953; David, 2008:11-13
264) National Library of Scotland, 2021
265) Friendly, 1977; Wainwright, 1991

In May 1829, the HMS *Blossom* was commissioned by British Royal Navy to initiate a nautical survey in West Indies. First, it was pretending to cover Cuba, the Bahamas, and Haiti, and second the coast of Honduras (British Honduras) and Yucatan (Gulf of Mexico) to Porto Bello (Panama), including Black River and British settlement, comprising the coast of Guatemala and Mosquitia and the Archipelago of San Andres, Old Providence, and Santa Catalina.[266] Captain Richard Owen and Lieutenant Edward Barnett serving in the Royal Navy were appointed as Commanders to achieve this goal. Therefore, from 1829, Captain Owen was assigned as a commander officer of the HMS *Blossom* and, after 1833 of the HMS *Thunder* (Fig.22), a Hecla-class bomb vessel of 372 tons. ten guns and sixty men converted in survey ship in that year. Its tender was the HMS *Jackdaw* (Fig.23 and Fig.24), a two-mast schooner, Lark class, and wooden sailing vessel of 107 tons. four guns, and thirty men commanded by Lieutenant Barnett.[267]

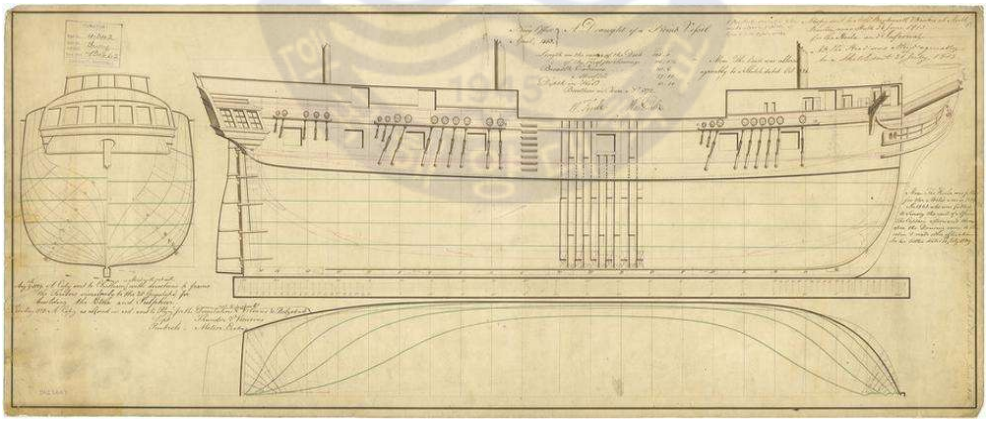

Fig. 22 *Lines and profile plan of HMS Fury, a Hecla-class bomb vessel (1814).* Same class of the HMS *Thunder*. Author unknown (National Maritime Museum, 1814, reference: J1413, Greenwich, London).

266) Owen, 1838:B; Royal Geographical Society, 1841; Kupperman, 1991:355-356
267) Dawson, 1885:124-126; Morris, 1986:390; Lyon, 1993:148,167

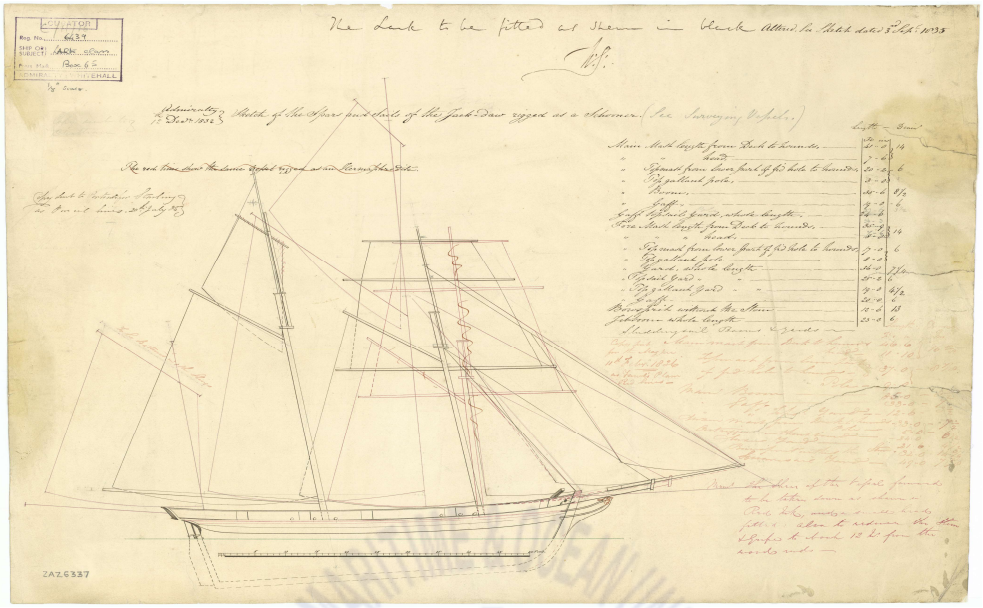

Fig. 23 *Sail plan for the Jackdaw* (1830), *Lark* (1830), *Magpie* (1830), *Raven* (1829). Author unknown (National Maritime Museum, 1830b. Image reference: J8071, Greenwich, London).

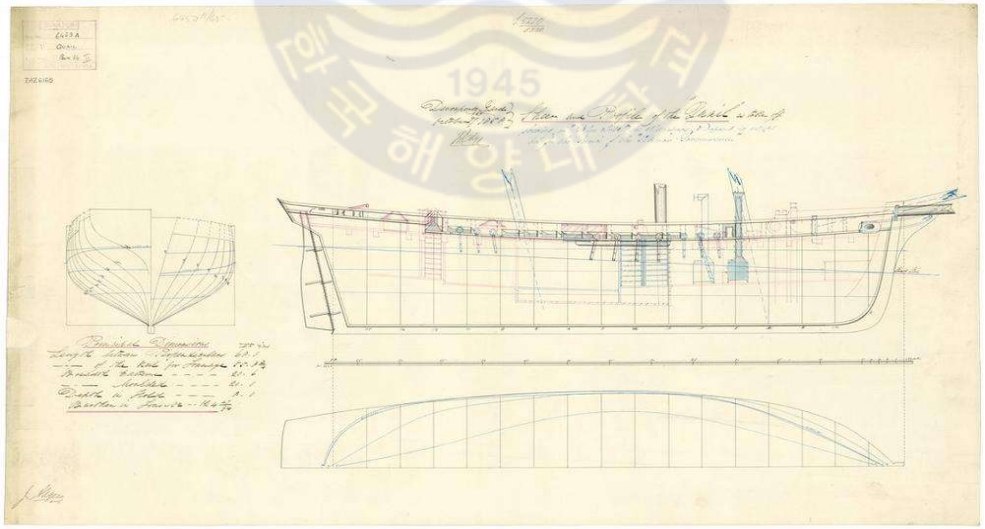

Fig. 24 *Design lines plan from the HMS Quali (1830) a schooner, Cutter Tender "Lark Class," same class as the HMS Jackdaw*. Signed by William Edye (National Maritime Museum, 1830a. Image reference: J8071, Greenwich).

The ships were furnished with eight chronometers No 114.[268] Capt. Owen connected Spanish longitude with Jamaica and Havana observations and other areas such as Old Providence Island. The survey started at the north-east of Yucatan following the Spanish chart *Mapa Marítimo del Golfo de México e Islas de la América, para el uso de los Navegantes en esta parte del Mundo* (Fig.25) published in 1755.[269]

Fig. 25. *Mapa Marítimo del Golfo de México e Islas de la América, para el uso de los Navegantes en esta parte del Mundo. Construido sobre las mexores memorias, y observaciones Astronómicas de Longitudes y Latitudes.* (Tomás López y Juan de la Cruz, 1755). Map partially used by Capt. R. Owen during the survey in West Indies, including the Archipelago from Spanish survey, Madrid,1755. (Biblioteca Virtual del Patrimonio Bibliografico).

268) Owen, 1838:B
269) Allen, 1841

From 1834 to 1836, Captain Owen and Lieutenant Barnet mapped the Archipelago,[270] producing a high quality of nautical charts used for more than one hundred years by the United Kingdom and the United States,[271] and was the nautical chart used during the wreck event of the USS *Kearsarge* (Fig.26 and Fig.27). To accomplish the tasks, British officers used information from "*Derrotero de las Islas Antillas, de las Costas de Tierra Firme y de las del Seno Mexicano*" (1810) and "*Portulano de la America Setentrional: dividido en quatro partes*" (1809), included some nautical information and charts from the Spanish. However, limited information and no nautical charts from the Archipelago. Also, they had to utilize nautical charts with many years of edition because of the geographical confidentiality in the territory due to disputes between colonial powers.[272]

During the hydrographic survey, one of the most significant events was the wreck and loss of the HMS *Jackdaw* commanded by Lt. Edward Barnet.[273] The *Jackdaw* sailed from Serrana Bank to Old Providence Island when struck a coral reef in the north of the island at 4 am on 11, March, 1835 without loss of life and all nautical material safe, including the logbook.[274] The same year, a court-martial on board of HMS *Victory*, found Lieutenant Commander Edward Barnett not guilty of the loss of the HMS *Jackdaw*. According to the court-martial, the accident was caused by the lack of information of the reef extending several miles in the north not laid down in the chart, and strong currents to the southwest being unmapped.[275]

270) Owen, 1838:99-111; Kupperman, 1993:355-356
271) Gomez and Jeong, 2020
272) González-Ripoll Navarro, 2003:83-86
273) Gilly, 1851:322
274) Barnett, 1835b

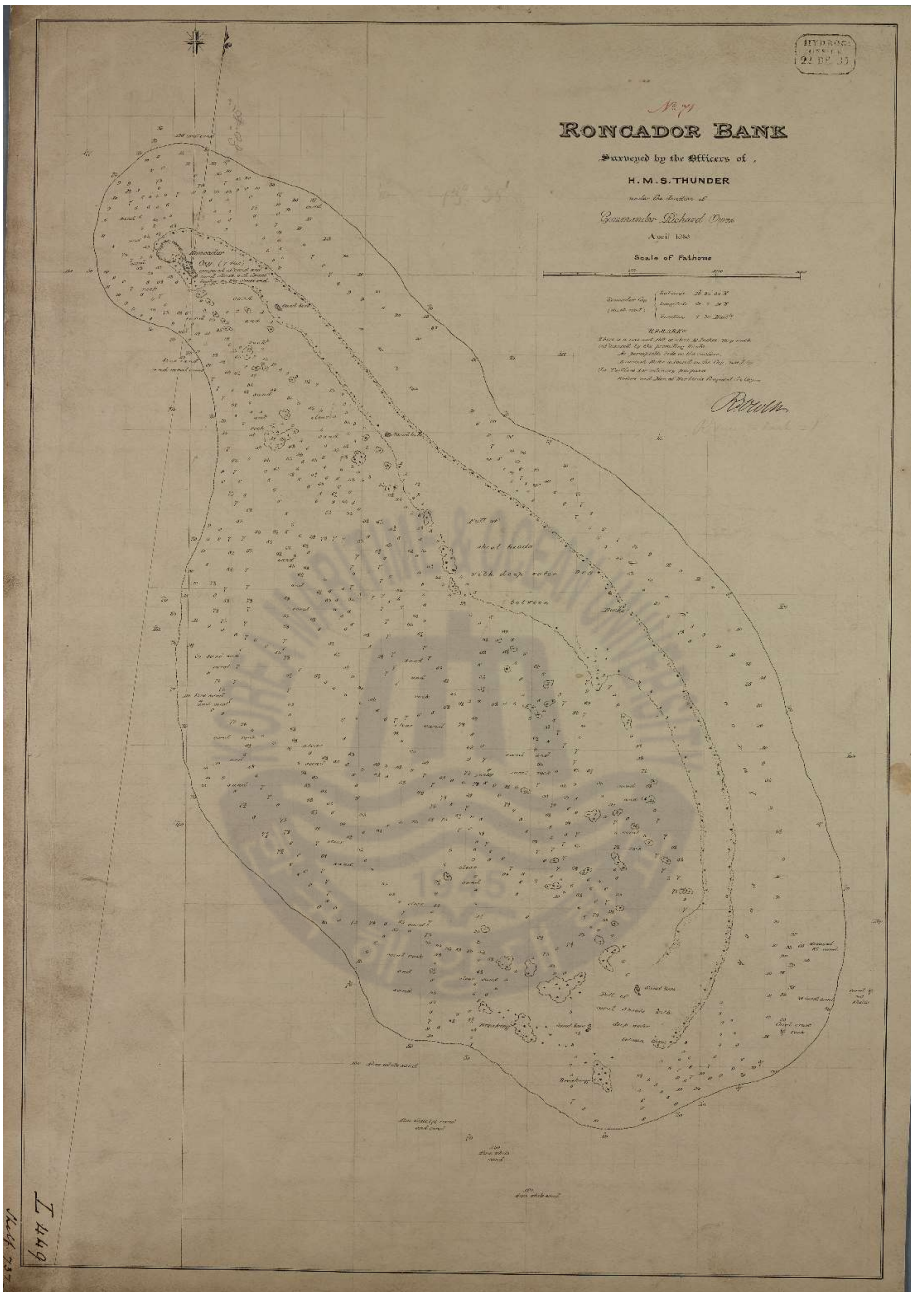

Fig. 26 *L449 Surveyed by the officer of HMS Thunder. UK Hydrographic Office, 1835.*

275) *Nautical Magazine,* 1835:435,563; *United Service Journal*, 1835:128; Brooker, 2009:43-45

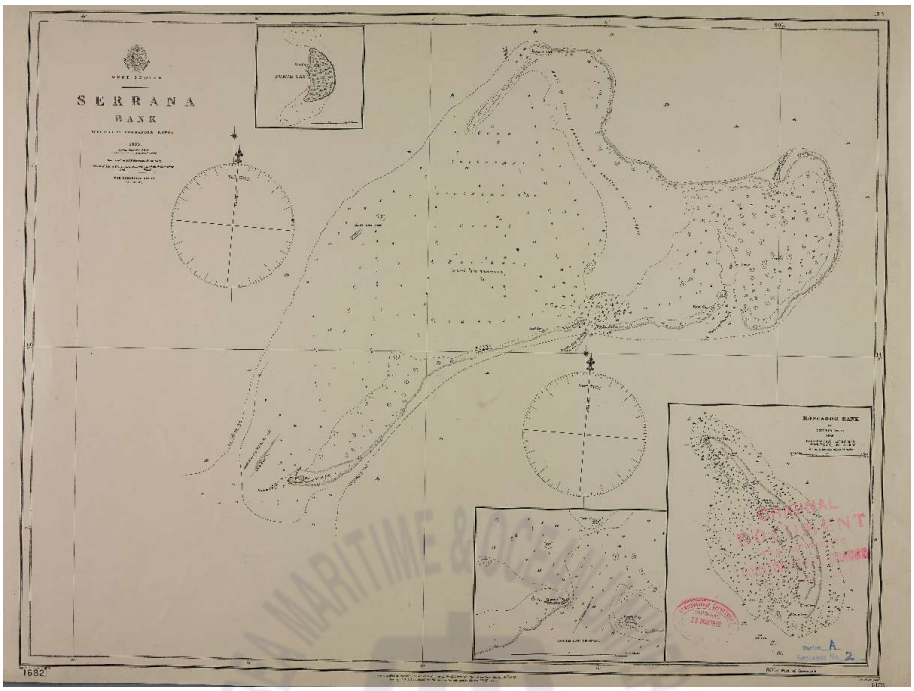

Fig 27 *OCB 1478 A2 West Indies Serrana Bank-Roncadro Bank. Surveyed by Commander R. Owen. 1844*

However, it is not clear if the chart was used during the navigation to Old Providence Island. The two most probable options are the *"Mosquito Coast, Old Providence and Santa Catalina Island Map"* from 1800 by Francisco Valega, Escuela Náutica Española (Fig.30), or "*Carta Esférica del Mar de las Antillas y de las Costas de Tierra Firme, desde la Isla de Trinidad, hasta el Golfo de Honduras"* from 1805 and corrected in 1809. In the latter, the reef in the north part of Old Providence was not fully covered, as Barnett stated in the court-martial. The nautical chart *OCB 1334-A2-Old Providence Island* (Fig.32) published in 1840 showed the wreck of the HMS *Jackdaw* in 1835 and detailed information of the currents in the area. George Bernard Lawrence from the Royal Navy represented the accident in a pencil drawing (Fig.28).

Fig. 28 *The wreck of the HMS Jackdaw, in the coral reef of Old Providence Island,* March 11, 1835. *"All Saved."* Pencil drawing by George Bernard Lawrence, RN. Fay and Geoffrey Elliott. Collection at the Bermuda National Trust. Copy from the original.

Among the problems faced by the British was the lack of information wich seems to emerge because of diverse factors. First, the accuracy of the Spanish nautical charts survey by Captain Fidalgo was not published or available.[276] Second, the charts used held limited information and notable latitude errors. These were found by Commander Nicholls onboard HMS *Shearwater* during an observation in 1819, based on two chronometers using the *"Derrotero de las Antillas, de las Costas de Tierra de Tierra Firme y del Seno Mexicano,"* published in 1810 in Madrid, and the Spanish chart of 1805 *"Carta Esferica del Mar de Las*

276) Lucena Giraldo, 1991; Martín-Merás, 2008

Antillas y de la Costas de Tierra Firme, desde la Isla de Trinidad, hasta el Golfo de Honduras Construida en la Direccion Hidrografica y pubicada de orden superior en Mardrid ano 1805" that represent Roncador Cay more eastward than his nautical observations;

> *"The kay on the west end of Roncador reef, which is about 6 feet above water, lies in 13 33 N and 80 7 W the south end of Roncador Reef in 13 28 N and 80 4 W and the centre of Providence Island, commonly called Old Providence in 13 22 N and 81 26 W."* [277]

At the beginning of 1835, the survey of Roncador Cay started onboard HMS *Thunder* (Fig.31) with an impressively detailed account of the tiny coral bank with oval form, its length, and the geomorphology. The south part was described as full of dangerous rocky heads for navigators and the bank called "Musquitero" following the name in the Spanish chart "*Carta Esférica del Mar de las Antillas y de las Costas de Tierra Firme, desde la Isla de Trinidad, hasta el Golfo de Honduras"* of 1805. Also, Barnett reported the biodiversity, particularly the man-of-war bird, and the direction of the currents to the north-westward. The result of this survey was the most accurate information of the time such as the nautical chart of Roncador Cay (Fig. 26), with accurate records of depths and currents,[278] later used by the United States. This expedition collected the most valued geographical and social information of the Archipelago at that moment as the report presented by C.F Collet titled "*On the Island of Old Providence*" [279] and the book *"A Nautical Memoir: Descriptive of the Surveys Made in HM Ships Blossom and Thunder, from 1829-1837"* by Captain Richard Owen.[280]

277) Purdy, 1820:53-54
278) Owen, 1838:105-107
279) Collet, 1837

Fig. 29 *HMS Thunder, Royal Naval Dockyard at Bermuda.* The *Thunder* was the survey ship at the Archipelago, between 1834 and 1836. Pencil drawing by George Bernard Lawrence, RN. Fay and Geoffrey Elliott Collection at the Collection at the Bermuda National Trust.

Also, other documents with nautical information from the West Indies is found in *"A provisional catalogue of logs, journals, documents, letters, record copies of books and pamphlets"* [281] with documents as *"Mosquito gulf and the adjacent banks and islands Captain R Owen HMS BLOSSOM and THUNDER 1830. Directions apparently written by Mr. Thompson, Master RN"*, and *"A journal with title Data for the Surveys with an explanation of the method of survey, observations for variation, errors of Massey's sounding machine, Chart symbols, theodolite angles and positions etc. for various places, Lieut E Barnett, Jackdaw (1833-36)."*

280) Owen, 1838
281) U.K. Hydrographich Departament 1974

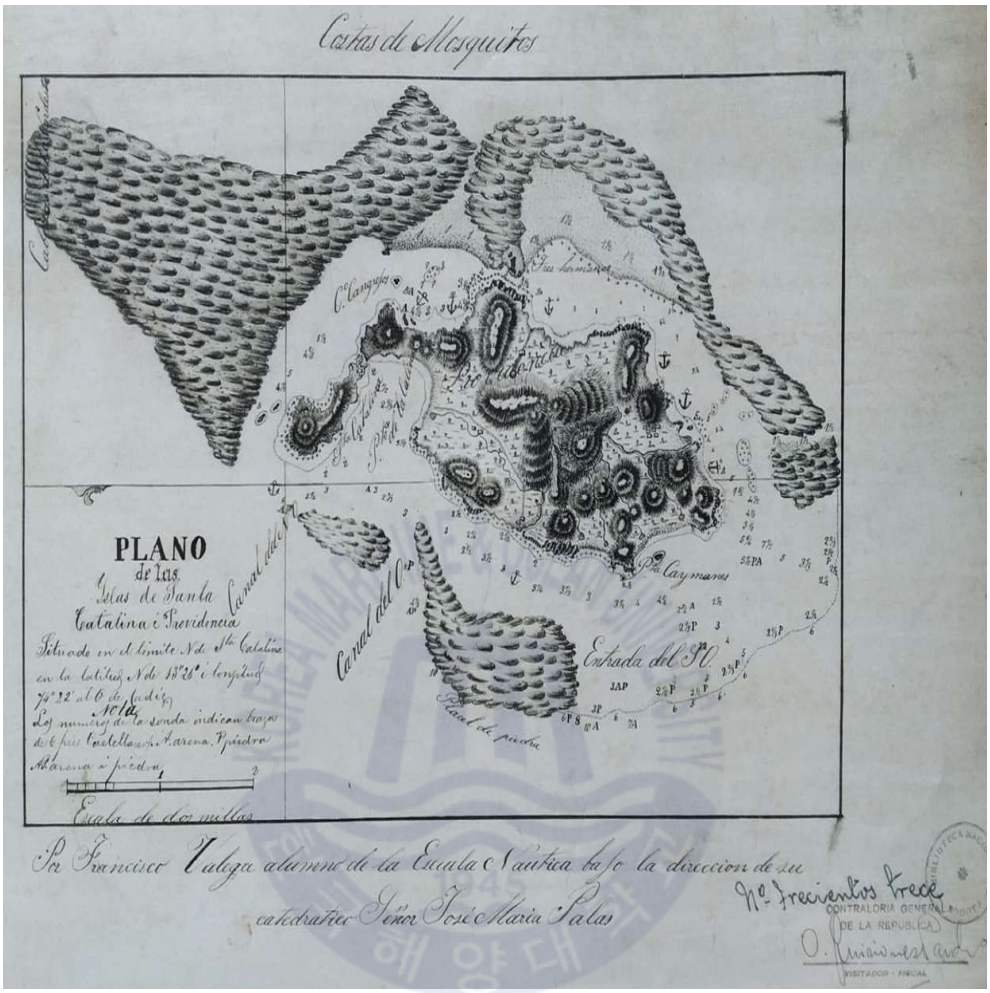

Fig. 30 *Costa de Mosquitos, plano de las Isla de Santa Catalina i Providencia, 1800.* (Mosquito Coast, Old Providence and Santa Catalina Island Map). Francisco Valega, Escuela Náutica española (Sala de Libros Raros y Manuscritos. Luis Ángel Arango. Banco de la República, Colombia).

Additionally, the information served mariners for more than a century to due to the charts' accuracy.[282] The Royal Navy compiled comprehensive meteorological data, following Captain Francis Beaufort's instructions[283] and British Admiralty in *"Regulations and Instructions*

282) Gomez and Jeong, 2020

Relating to His Majesty's Service at Sea." [284] This information and observations collected in the Archipelago by Lt. Edward Barnett (Fig. 33) onboard the HMS *Jackdaw*[285] and the "*Hydrographic Correspondence between Lieutenant Barnett and others and the Hydrographic Department*" [286] are vital to monitoring climate change and be used for historical reanalysis in the area for a better understanding of extreme weather events.[287]

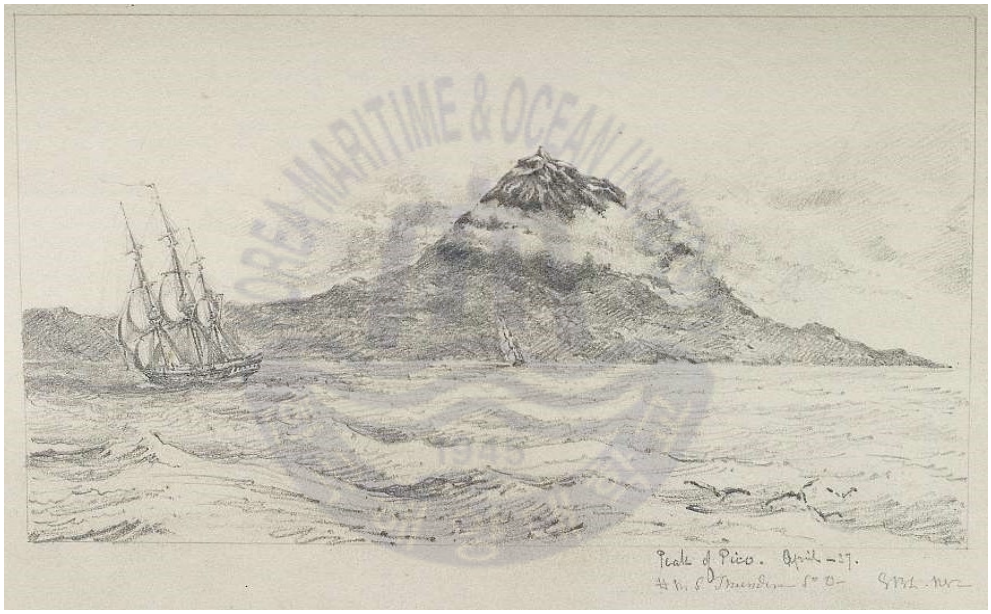

Fig. 31 *Peak of Pico 1837.* HMS *Thunder* during the survey in the Caribbean Sea, the Gulf of Mexico with the Pico de Orizaba. Pencil drawing by George Bernard Lawrence, RN. Fay and Geoffrey Elliott Collection at the Collection at the Bermuda National Trust.

283) Friendly, 1977:142
284) Privy Council, 1808; Naylor, 2015:777-779
285) Barnett, 1835a
286) Barnett, 1836
287) Wheeler, 2004; Brohan et al., 2009

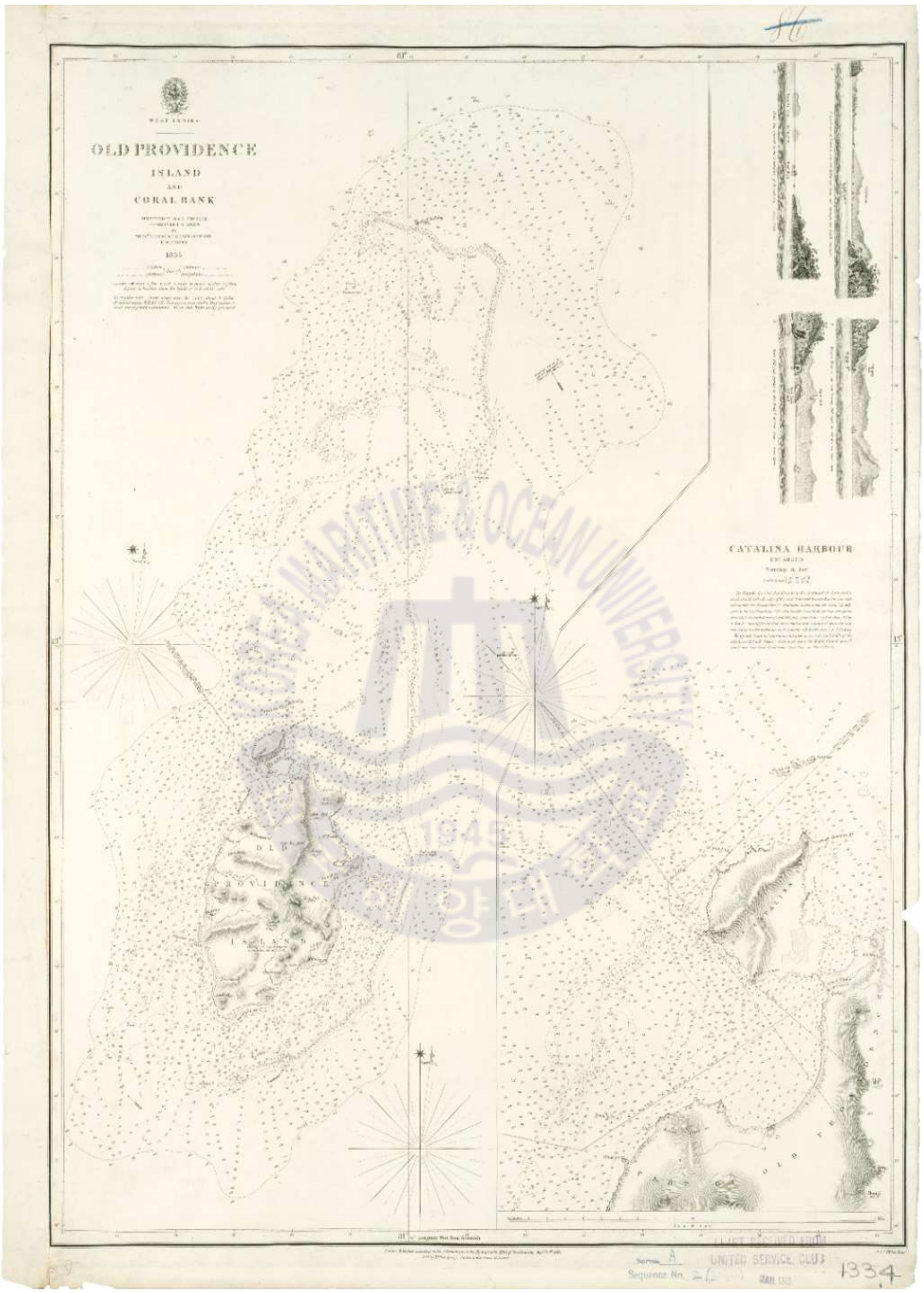

Fig. 32 *Old Providence Island and Coral Bank. OCB 1334-A2. Surveyed in HMS Thunder, Commander R. Owen.* With the wreck of the HMS *Jackdaw* (UKHO). Original copy from 1840.

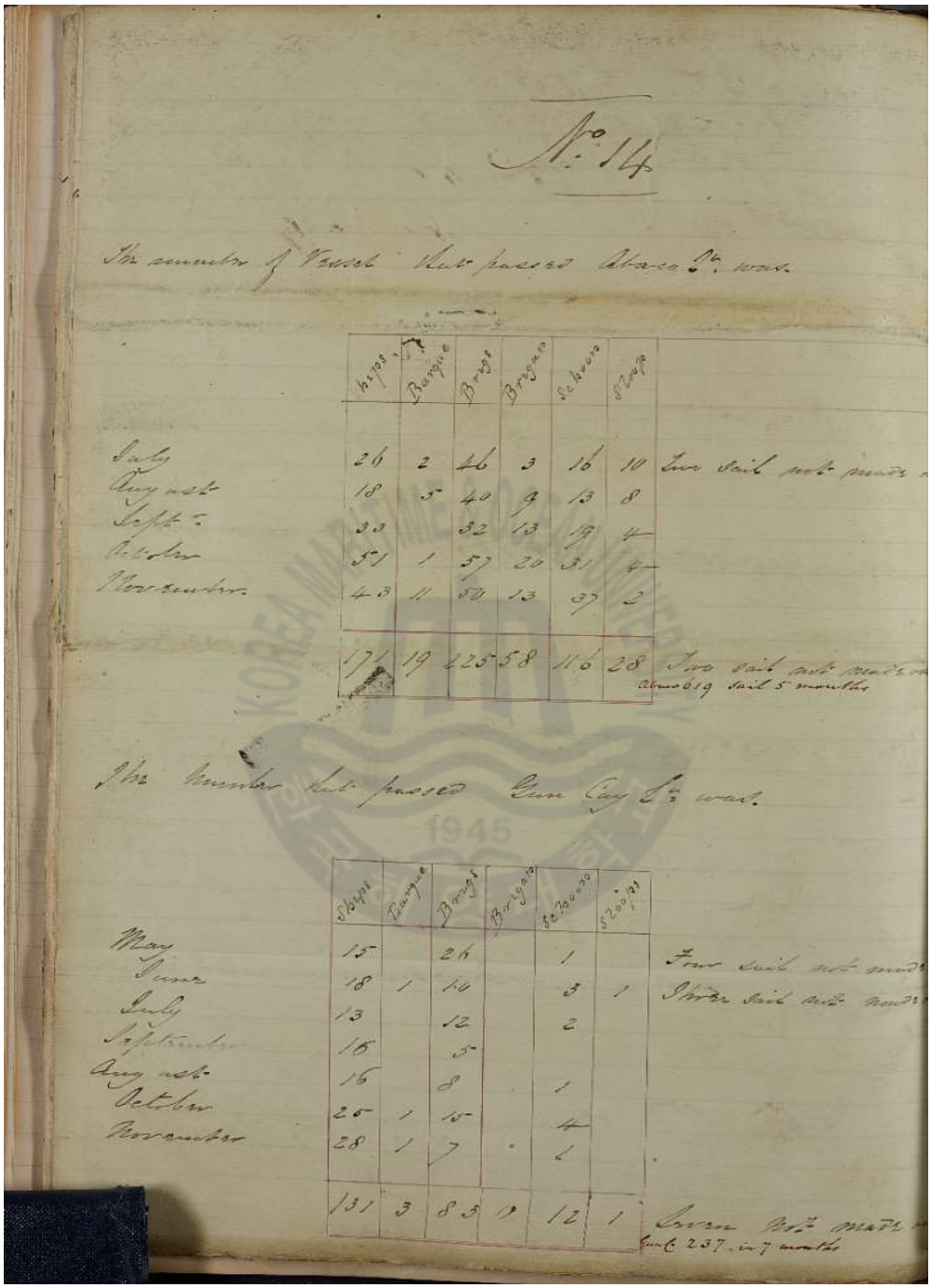

Fig. 33 *West Indies - Hydrographic Correspondence between Lieutenant E Barnett and the Hydrographic Department.* Vessel observations, UKHO Archive. Date: 1836.

1.5.3. The United States hydrographic information of Roncador

The Western Caribbean Sea was one of the top priorities of the United States at the end of the ninetieth century based and influenced by the US Navy Captain Alfred T Mahan, a cornerstone of the strategic thinking of the maritime Americans interest. Mahan, with his book *"The Influence of Sea Power Upon History, 1660-1783,"* highlights the importance of the control of the sea and trade routes to expand the country through elements of the concept "Sea Power" employing the "the great highway" in the oceans.[288] Thus, expanding the Navy and control of geographical territory was a United States priority. However, the concern in the Western Caribbean and Central America was the California Gold Rush in the middle of the nineteenth century, causing the most remarkable mass migration process within the United States.[289] Also, another factor was the interest in the interoceanic channel.

During the Gold Rush, navigation highly increased through the Isthmus of Panama, connecting New York with Colon, Panama (formerly known as Aspinwall), and sailing through the Archipelago was one of the principal routes to reduce distances[290]. During the second half of the nineteenth century, wrecks from the United States increased in the Archipelago, with some famous cases as the shipwreck of the *Golden Rule* (Fig. 54) in Roncador Cay in May 1865.[291] For the Government, mapping this territory was a priority. However, the Hydrography Office was part of the observatory since 1830, and during the California Gold

288) Mahan, 1892:25-89
289) Rohrbaugh, 1997:1
290) Kemble, 1949:45-46; Delgado, 1990:65-66
291) Gomez and Jeong, 2021

Rush period, the effort was focused on the Civil War.

In 1866, the United States Congress reorganized and established the Hydrographic Office in the Bureau of Navigation, Department of the Navy, with new hydrographic tasks.[292] This Office started new surveys and nautical charts based on British and Spanish surveys. In the case of the Archipelago, information was based on American sailors and British charts.[293] The problem of longitude was partially solved by the US Navy in the 1870s, using Greenwich England 0 meridian for all nautical calculations and the basis for all navy chronometers. In 1872 a survey on Nicaragua in the Caribbean was a priority for the Office in finding a suitable route for an interoceanic channel using the USS *Kansas* for this purpose. Another survey in the area was part of the "Darien Expedition" in Panama, including Cartagena de Indias, to collected information for a canal route at this location from 1870 to 1875 with the USS *Guard* USS *Nipsic* and the USS *Nyack Groundwork.*[294]

Most essential nautical information from the Archipelago of San Andres, Old Providence, and Santa Catalina Island before the USS *Kearsarge* accident in 1894 was found in the *Nautical Chart East Coast of Central America-Cape Gracias a Dios (Nicaragua) to Gulf of Darien (Colombia),* No 945.US Hydrography Office, of 1885 and *Nautical Chart Serrana Bank*. No 1374. By 1893, the US Hydrographic Office included Roncador Cay, and provided the dangers to navigation in the area with extensive detail and accuracy. Both nautical charts were based on the British survey of 1835.[295]

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292) U.S Hydrographic Office, 1866
293) Heynen, 1978:1-3
294) Ammen, 1876:192-196; Pinsel, 1982:19-20

Also, a very accurate description of the area, including Roncador, was in the *Navigation of the Gulf of Mexico and the Caribbean Sea* (1890), describing the anchoring areas, water, and the strong currents between Serrana and Roncador.[296] One concerns of the US Hydrographic Office was the danger of navigation in the Archipelago that caused several marine accidents, especially at Roncador Cay, and the remarkable necessity of navigation aids. After the USS *Kearsarge's* wreck, a lighthouse became a priority for the Navy Department, and an official requirement was sent to the Colombian government.[297] However, it was established by the Bureau of Lighthouses under the US Department of Commerce on June 1919 in Roncador Cay,[298] by *Proclamation N° 1522-A, 5 June 1919 of the reservation for Lighthouse Purposes of Roncador Cay* (Fig.34, Fig.35 and Fig.36), by the President of the United States of America Woodrow Wilson.[299]

Other lighthouses were established in the Archipelago by the United States, in Serrana Bank and Quitasueno Bank. Additionally, an improvement in the new edition of the *nautical chart No 945 of Cape Gracias a Dios to Gulf of Darien,* was made in August 1919. The chart displayed the new navigational aids, with a special note emphasizing the strong currents in the area of Roncador Cay and Serrana Bank: "*The general westerly set of the current varies from the northwest to about southwest necessitating great caution when passing Roncador Reef.*"

295) U.S. Bureau of Navigation, 1891:26
296) U.S. Hydrographic Office, 1890:120-121
297) Lemaitre, 1993:237
298) U.S. Department of Commerce, 1920:1407
299) U.S. Government, 1925:2166

Fig. 34 *Placing Tower at Roncador, June 20, 1919* (NARA Identifier No 45704039)

Fig. 35 *Taking ashore and blasting the channel of Roncador Cay, June 1919* (NARA Identifier No 45704031).

Fig. 36 *Roncador light from distance and a shell dated 1882 found at Roncador.* It probably corresponds to the shell onboard of USS *Kearsarge* magazine (NARA identifier No 45704049).

2. The Social Context of the USS *Kearsarge*

The USS *Kearsarge* is one of the most famous ships in the United States. It is well known for its engagement during the Civil War with the Confederate raider CSS *Alabama* off the coast of France, near Cherbourg, on June 19, 1864. This encounter resulted in the sinking of the famous Confederate warship.[300] However, its wreck in 1894 on Roncador Cay was a tragic event for the US Navy. In addition, the loss of the *Kearsarge* was felt by American society, too, for whom the old wooden vessel held a certain sentimental attachment. Some of its cannons, artifacts, and elements are exhibited in United States museums.

300) Barbert, 1926; Marvel, 2007

After the wreck, the Navy decided to keep the name. Thus, following the old wooden sloop of war, four warships have been named *Kearsarge* with outstanding participation during World War I and World War II, the Korean War, and currently with an active amphibious class from 199 3.[301]This chapter explores the maritime cultural landscape, including the social context before and after the wreck and the main characteristics of the USS *Kearsarge*, for an understanding of its history, relationship with society, and its main characteristics centered on the armament. Therefore, the goal of this literature review was to focus on the armament as a primary aspect of this study, complemented by analysis of descriptions in literature and narratives of the USS *Kearsarge* and Roncador Cay.

There exists a considerable body of literature on the USS *Kearsarge*. During the nineteenth century, six books[302] and three articles[303] were published about the vessel, mostly covering the Civil War. Over time, an extensive literature, including the wreck event, has been published, and has garnered worldwide attention. The accident was mentioned in about 2080 articles in 1894. However, only the *New York Times* published more than 82 articles that year reporting specific details, particularly during the court-martial. During the last two centuries, a series of studies present comprehensive information with about seven books[304] and nine articles[305] along with the shipwreck.

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301) NHHC, 2021D

302) Edge, 1864; Browne, 1868; Magge, 1873; McFarland, 1879; Badlam, 1894; Hobson, 1894

303) Scientific American, 1864:42; Burns, 1894; Barnum, 1894

304) Brady, 1909; Bradley, 1921; Musicant, 1995; Gindlesperger, 2003; Wilson-Bareau and Degener, 2003; Marvel, 2007; Lardas, 2011

305) Morrison, 1924; *Marine Journal,* 1925:24; Barbert, 1926; Nesser, 1927; Anderson, 1960; Dudley, 1998; Delaney, 2016; Roberts, 2000; Gomez and Jeong, 2020

2.1. The American Civil War and the USS *Kearsarge*

In 1855 the US Navy built the last sailing ship, the USS *Constellation*, and moved to a new design of steamships. This transition to steam started with the class *Hartford* and later the *Mohican* class. These innovative designs could carry more guns and access most ports in the United States, making them efficient as larger vessels with heavy guns for their size. The new designs represented a substantial evolution in American naval architecture, supporting twelve to six-pounder cannons and keeping a favorable speed. In 1858, by an Act of the Congress, the first seven sloops were authorized.[306] The disruption of the Civil War in the United States brought technological and industrial advancements in guns that were unique in the maritime industry. The ships started using iron and steam power, and the US Navy played an influential and significant role throughout this evolution.[307] During the war, the Confederate States' main strategies were to blockade the trade by managing a fleet of commerce raiders and attacking Union merchant ships, whether in the United States or other locations. The plan highly impacted the economy of the Union. Consequently, President Abraham Lincoln ordered the Secretary of the Navy, Gideon Welles, to set procedures based on the hunt of the rebel cruisers worldwide. Consequently, the US Navy initiated a fast plan to develop the Navy. At the end of the Civil War, the Union navy possessed about six hundred and seventy warships, as the most powerful navy globally.[308]

306) Baird, 1876:191-193; Caney, 1990; Musicant, 1995
307) Delgado, 2001; Symonds, 2011
308) Musicant, 1995; Lardas, 2011; Symonds, 2012

2.2. The USS *Kearsarge*

The *Kearsarge* was a Mohican-Class Slop of War designed by William L. Hanscom, with a new naval architecture design.[309] It was launched on September 11, 1861, and commissioned on January 24, 1862, and the first commander was Captain Charles W. Pickering. Its name came from a mountain in Merrimack County, New Hampshire. The word *"Kowasadchu"* is a term derived from the Passamaquoddy dialect of the Algonquin language. The indigenous words mean "pine mountain" or "greatest mountain." [310] The USS *Kearsarge* was built under the *"1861 Civil War Emergency Shipbuilding program"* at Portsmouth Navy Yard, Kittery, Maine, under the direction of Isaiah Hanscom. They used yellow pine, white oak, live oak, iron knees, brackets, and high quality stanchions.[311] One of the most striking features of the ship was its ability to a power speed, with an average of 13.5 knots because the full spread of canvas.[312] After its construction, the ship was assigned to a tactical task to blockade Confederacy ports and hunt their ships.[313]

2.3. Characteristics and Service

The USS *Kearsarge* represents a sloop built in the latter half of the nineteenth century. A small ship, three-masted and able to carry 16-gun added to the fast speed combining sail and steam with machinery of one two-cylinder horizontal back-acting engine-54 in diameter 30in stroke cylinder 822 NHP[314] (Table 3). For a better description of the

309) Canney, 1990
310) Gerard, 1898:19
311) Marvel, 2007
312) Badlma, 1894
313) Symonds, 2011
314) Canney, 1990

Kearsarge, the characteristics are shown from three angles in the plans from 1888 (Fig.37, Fig.38, and Fig.39).

Table 3 USS *Kearsarge* (1861)

Characteristics	Measurement
Length overall	220 ft.
Length of Keel	210ft.
Beam	33 ft.
Depth	16 ft.
Displacement	1,032 tons
Crew	166 men
Speed	11kn
Propulsion	Steam engine/Sail

Services. When the USS *Kearsarge* was available to operate in 1862, initially departed for the coast of Spain and Europe with primary orders to find Confederate ships. The ship was under the command of Captain John A. Winslow (Fig.40). In June 1864, the USS *Kearsarge* found the CSS *Alabama* on the coast of France with an engagement that ended in the sinking of the famous rebel ship. Through the Civil War, it captured several vessels at sea, gaining notoriety in American society. At the end of the war, it was decommissioned. However, in 1868 it was recommissioned in the South Pacific to watch over American interests, mainly in South America and Oceania. By 1870 was decommissioned for repairs and recommissioned again in 1873 to defend American affairs in East and South East Asia for almost five years. In 1879 was sent to the North Atlantic and the Caribbean Sea and, in 1883, served in Europe for nearly three years.

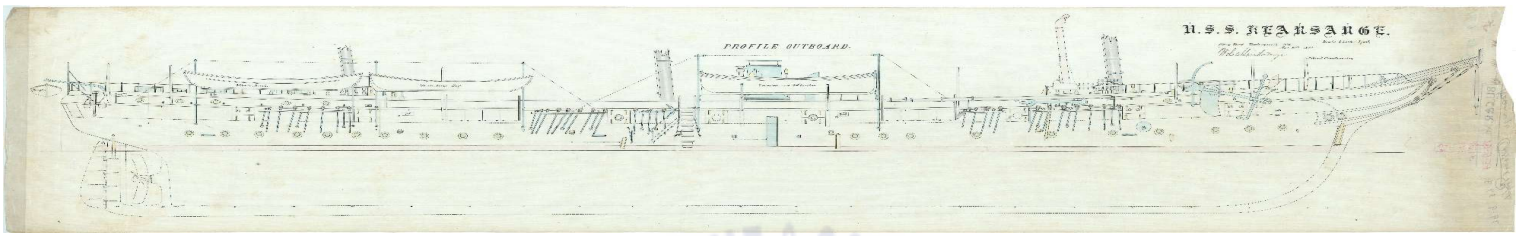

Fig. 37 *Plan for the USS Kearsarge-79-9-34F. Navy Yard, Portsmouth, NY. Dec 1888.* (National Archives at College Park).

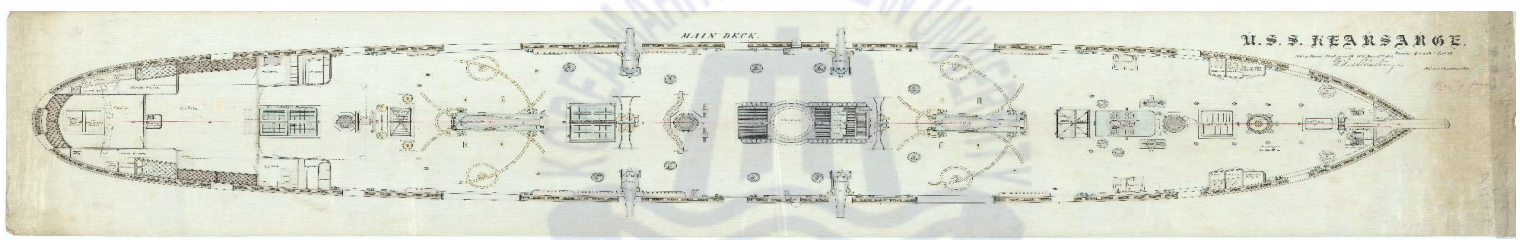

Fig. 38 *Plan for the USS Kearsarge-79-9-34E. Navy Yard, Portsmouth, NY. Dec 1888* (National Archives at College Park).

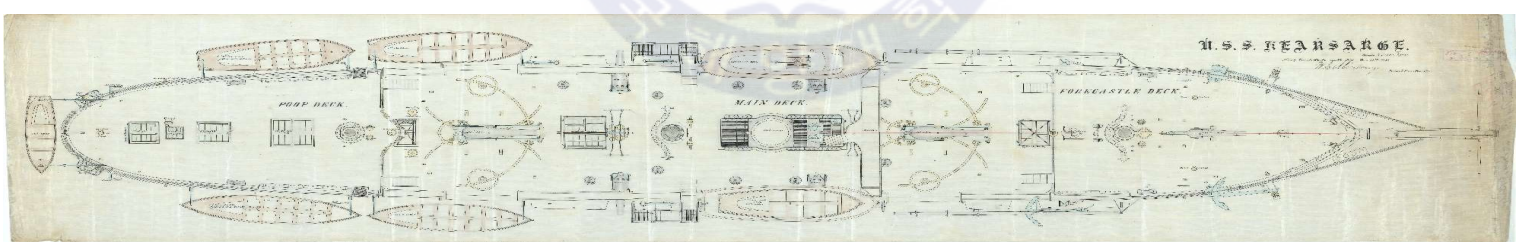

Fig. 39 *Plan for the USS Kearsarge-79-9-34D. Navy Yard, Portsmouth, NY. Dec 1888* (National Archives at College Park).

Fig. 40 *USS Kearsarge (1862-1894).* At the Portsmouth Navy Yard, Kittery, Maine, between 1879 and 1886, when she was rigged as a ship. U.S. NHHC Photograph. Catalog #: NH 86060.

It was decommissioned at the end of 1886 at Portsmouth Navy Yard and began a series of repairs. During this period, the ship suffered an intensive refurbish and was sent to Norfolk, Virginia, to change machinery and armament. In 1888 the USS *Kearsarge* returned to the North Atlantic Station at the West Indies, confronting complex circumstances that threatened the American commercial interest, particularly on Haiti Island with a military intervention. One of the most remarkable cases was the involvement in political affairs in Venezuela in 1892.[315] In addition, the USS *Kearsarge* operated in diverse military

missions participating in internal matters of some countries in the Caribbean region and Central America, progressing American Imperialism in the region. Finally, on February 2, 1894, sailing from Haiti to Bluefields, Nicaragua, Commanded by Commander Oscar Heyerman and with Admiral Oscar Stanton onboard as a Flagship of the Naval Force on the North Atlantic Station, it wrecked on Roncador Cay.[316]

3. Ordnance of the USS *Kearsarge*

One of the aim of this study is to accurately determine the armament left onboard the USS *Kearsarge* during the wreck event in 1894. This highly complex task covered more than thirty years of official documents and records. The first step was to research from primary sources the original armament installed during the construction on the ship and changes during the services years. This process required analysis of primary sources, such as logbook and naval ordnances, and secondary sources to clarify the development and technical characteristics of the armament. The logbooks from 1862 to 1894 are essential to determine possible ordnance changes and had to be examined in detail. It is intended that this complete analysis from the logbooks will associate the cannons with the interpretation of other primary sources, interviews, images, or any other information to the wreck site and the ship identification. Primary sources were determinant during the analysis; however, after reviewing secondary sources, a lack of clarity was detected with the armament, and some inconsistencies in the forecastle were found. For example, it was often confused as a

315) U.S. Naval History Division, 1968:609-610; 1971:370, Canney, 1990:75-78
316) Gomez and Jeong, 2020

28-pounder rifle or 30-pounder rifle.[317] Therefore, the aim of this chapter is to confirm the cannons abandoned onboard with all the information available to contribute to further analysis to approach the ship's identity as the main goal of this study. However, to better understand naval artillery and cannons, a basic explanation will be done from the Dahlgren naval armament interpretation of the guns onboard the USS *Kearsarge* during the accident.

3.1. Dahlgren: Cannons Descriptions

Naval artillery and ordnance are extensive and complex concepts. Consequently, for this research, cannons were defined from information based on armament from foundries in the United States and Dahlgren gun designs such as the cannons onboard on the USS *Kearsarge*.

Admiral John Dahlgren (1809-1870), the father of ordnance in the United States, developed many diverse weapons,[318] including the armament onboard the USS *Kearsarge* during the engagement with the CSS *Alabama*. Most important for this research are the guns onboard during the wreck. During his naval career, Dahlgren started the innovation and design of cannons supported by intensive writings and patents. By 1854, Dahlgren guns IX, X, and XI were constructed, and IX was successfully tested onboard in 1856. Dahlgren's designs were undoubtedly the most influential weapons during the nineteenth century in American naval ordnance and a key factor during the Civil War.[319]

317) Hobson, 1894; Chesneau, 1979; Roberts, 2000:85-89
318) Johnson, 1989
319) Olmstead et al., 1997:83

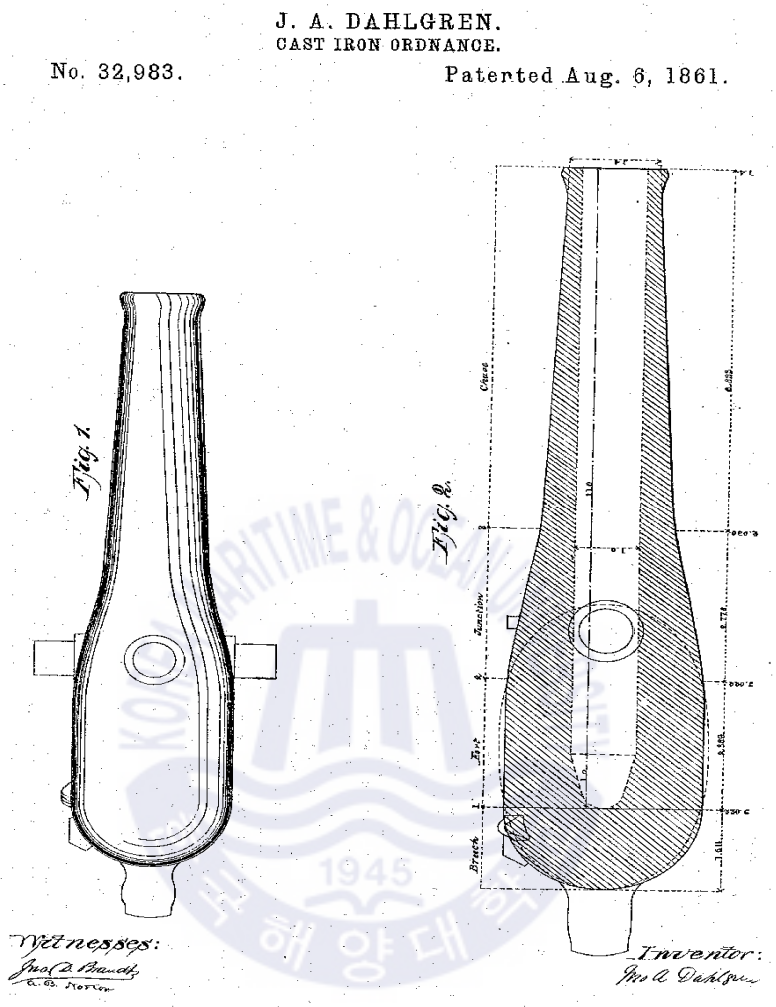

Fig. 41 A.DAHLGREN. *CAST IRON ORDNANCE. Specification of Letters Patent No. 32,983, dated August 6, 1861.*

Dahlgren's design was shell guns because of the high impact and damage they could inflict on wooden ships. Most cannons were cast in Fort Pitt Foundry and Annapolis of iron with great strength due to the processing and quality of iron during construction. They had a particular exterior shape with a hemispherical form and a curvilinear reinforcement and were called "soda water bottles" due to their similar

shapes. Dahlgren developed and designed many weapons; however, this chapter reviews essential information about the IX-inch and 8-inch converted and details the *Kearsarge's* armament during the accident. The patent No 32,983-Cast Iron Ordnance presented in 1861 by John Dahlgren showed the shape of his cannons (Fig. 41). As the image shows, Dahlgren cannons have a particular form different from other cannons of the nineteenth century and previously.

3.2. IX-Inch Dahlgren Shell Guns

The gun was installed and proved in 1857 with a positive result. onboard, the cannons were easily controlled by the crew and could be used in any weather. A total of 1,201 were produced by 1864. Some of the essential characteristics are a weight of 9.200 pounds, a bore of 9 inches, length of 107, 325 inches, a breech of 24,65 inches, trunnions of 7.2 inches in diameter, and length (Fig.42). The guns were operated by a crew of seventeen when in pivot or single use.[320)]

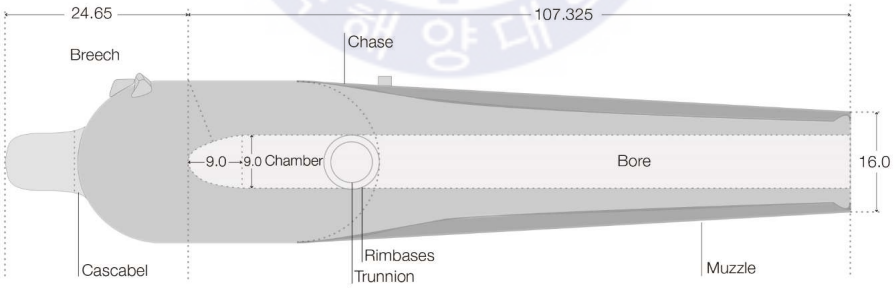

Fig. 42 *IX-inch Dahlgren shell Gun*. Own elaboration. Based on Olmstead et al., 1997:88.

320) Olmstead et al., 1997:87

3.3. 8-Inch Rifles Converted

These guns were initially XI-inch Dahlgren shell guns of 16000 pounds and are the most extensive design patent by Dahlgren. They had a length of 131.2 inches, a breech of 28.5 inches, trunnions of 10 inches in diameter, and 9 inches long (Fig.43 and Fig.44). However, between 1876 and 1880, they were converted by insertion to 8-inch rifles. Original marks remain except trunnions altered by letter "P," signifying proofed and year of alteration on the left side. On the right side, trunnions were marked as 8IN RIFLE and the weight in pounds (lbs). Also, a number corresponding to the registry was altered.[321)]

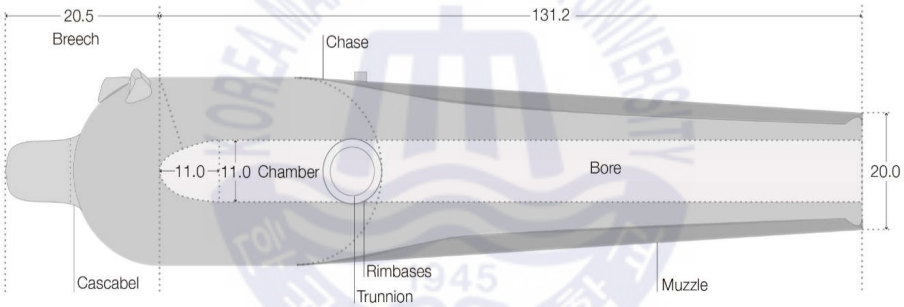

Fig. 43 *8-inch Dahlgren shell Gun.* Own elaboration. Based on Olmstead et al., 1997:90.

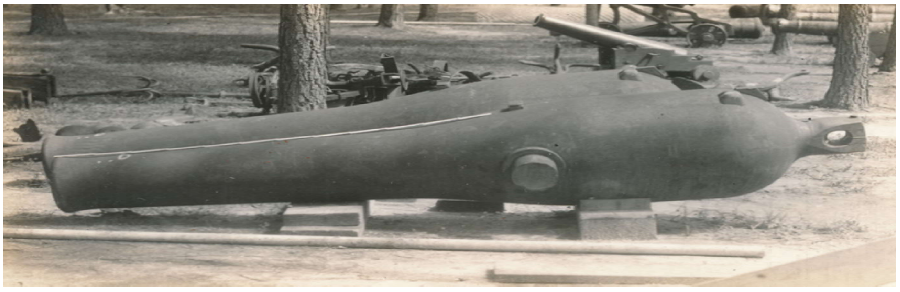

Fig. 44 *Dahlgren Cannon, IX-inch. Media. Ac21-22* (Mariners' Museum and Park, 2021).

321) Olmstead et al., 1997:89-90

3.4. Historical Reconstruction of the Armament of the USS *Kearsarge*, 1862-1894

The challenge to determine and reconstruct the armament history and trace changes arise from the difficulties of interpreting and analyzing logbooks from the nineteenth century. The procedure to establish the main armament during the wreck in 1894 was to find evidence by tracing all changes during the USS *Kearsarge* years of service. This task included a review into the logbooks from 1862 to 1894 to find technical information on the main armament. However, only after 1868, do the logbooks register information such as crew list and armament. This particular page includes details of the armament number, weight, description, carriages, and other information. To reconstruct the armament during the wreck event and trace changes during the services was a challenging task, made easier with digitalized logbooks from the National Archives in *Record Group 24: Records of the Bureau of Naval Personnel, 1798 - 2007 Series: Logbooks of U.S. Navy Ships, ca. 1801 - 1940. File Unit: USS Kearsarge* (Fig.45 and Fig.46).

However, following the logbooks was especially difficult since they were handwritten. Given the difficulties of interpreting the logbooks, information from 1862 to 1868 was not clear and only possible by reconstructing and following the armament from secondary sources with no accurate information. Nevertheless, the information from logbooks during the services was validated with the original ship plans and during repair periods. This was a critical factor to identifying the precise armament with information from logbooks, particularly during the wreck event.

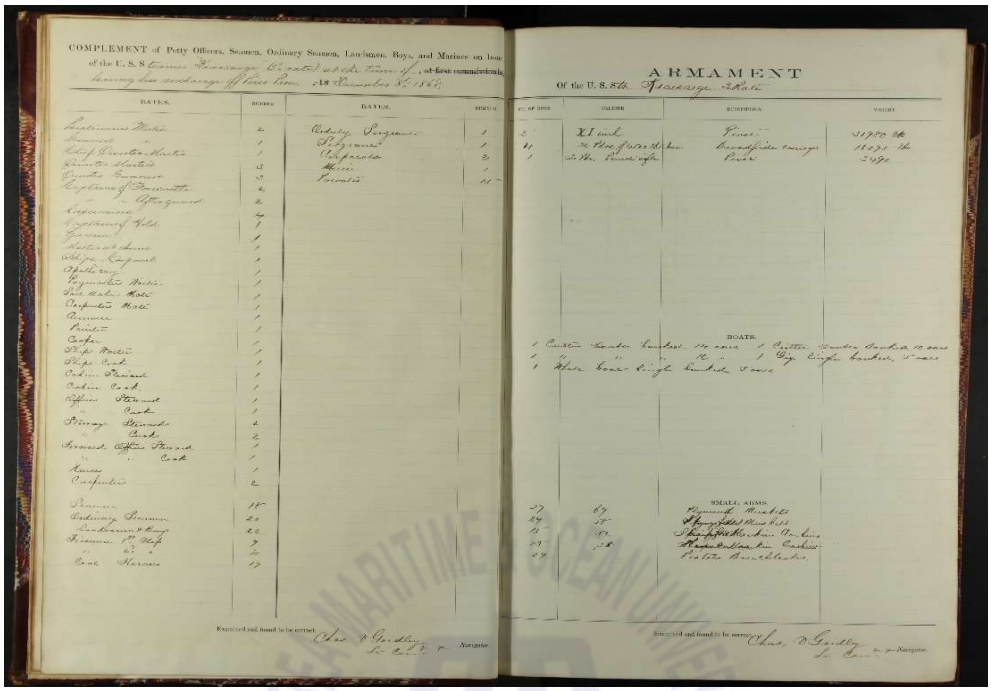

Fig. 45 *Kearsarge, 06/24/1868 - 12/07/1868.* Armament description in the logbook (NARA).

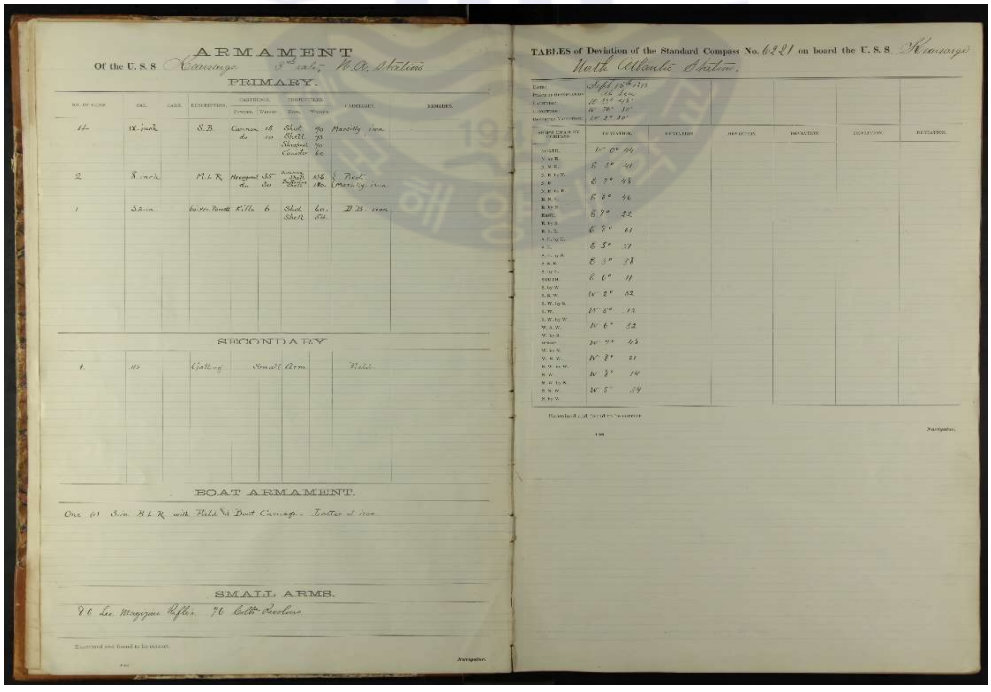

Fig. 46 *Kearsarge, 07/13/1893 - 01/27/1894.* Armament description in the logbook (NARA).

The USS *Kearsarge's* original armament was two 11-inch Dahlgren smoothbores (cast-iron) mounted on centerline pivots. These were massive guns with a weight of 15,700lbs and being 160 inches long, supported by four 32-pounder smoothbore cannons on trucked carriages[322]. All this armament was located in the main deck. In early 1862, one 30 pounder Parrot rifle with a bore of 4.2 inches weighing 3,550 lbs was added on the forecastle. In 1864 the four 32-pounders were replaced by IX-inch Dahlgren, and at the end of 1889, the ship was placed out of commission in Portsmouth Yard, where it began a series of repairs.[323] Table 4 contains the original armament of the USS *Kearsarge.*

Table 4 Original Armament of the USS *Kearsarge*

No of Guns	Calibre	Description	Weight
2	XI-inch	Pivot Guns-Smoothbore	31980 Lbs.
4	32-pounder (4500 lbs.)	Broadside	18075 Lbs.
1	30-pounderParrot Rifle	Pivot	3490 Lbs.

From 1868 the USS *Kearsarge* logbooks allowed complete identification of the armament (Table 5). The reason was the introduction of armament registration.[324]

Table 5 1868 Armament of the USS *Kearsarge*

No of Guns	Calibre	Description	Weight
2	XI-Inch	Pivot Guns-Smoothbore	31980 Lbs.
4	32-pounder (4500 lbs)	Broadside	18075 Lbs.
1	30-pounderParrot Rifle	Pivot	3490 Lbs.

322) Tucker, 2013:1055
323) U.S. Naval History Division, 1971:370
324) Logbook USS Kearsarge, 1868

Between 1872 and 1873, a significant change was made in the armament (Table 6). Four IX-inch broadsides replaced the four 32-pounders, and the 30-pounder in the forecastle was replaced by two 20- pounder riffles.[325]

Table 6 1873, Armament Changes, USS *Kearsarge*

No of Guns	Calibre	Description	Weight
2	XI-inch	Pivot Guns	31980 Lbs.
4	IX-inch	Broadside	36865 Lbs.
2	20-Dahlgreen Rifle	Hotwaiser	2690 Lbs.

In 1879 the armament included a registered number, which corresponded to the foundry (Table 7). For the USS *Kearsarge,* a significant change of primary armament was detailed this year when the two 20-pounder were replaced in the forecast by a 60 pounder Parrott rifle.[326]

Table 7 1879, Armament Changes, USS *Kearsarge*

No of Guns	Calibre	Description	Registry No	Years	Foundry
2	XI-inch	Pivot Guns	16, 17	1856,57,59 -1862	West Point
4	IX-inch	Broadside	522,523,524,525	1861-1864	Fort Pitt
1	5.3-inch (60-pounder breechloading)	Parrot rifle Pivot	89	N/A	N/A

Following the next year's logbooks, the vessel was repaired at the Navy Yard, Brooklyn, New York, after participating in the Brooklyn Bridge inauguration. The armament was replaced on June 05, 1883. The

325) Logbook USS Kearsarge, 1872
326) Logbook USS Kearsarge, 1879

two XI-inch guns were taken out and converted to 8-inch ones. These XI -inches were used during the engagement with the CSS *Alabama*. Also, the 60-pounder was replaced.[327] The reason to convert the XI-inch to an 8-inch was to double the power of the cannons (Table 8). The idea was from Commodore William Nicholson, the chief of Bureaus of Ordnance in 1876.[328]

Table 8 1883, Armament Changes in the Brooklyn Navy Yard

No of Guns	Calibre	Description	Registry No	Years	Foundry
2	8-inch	Pivot Guns	30, 31	1859-1862	West Point
4	IX-inch	Broadside	522,523,524,525	1861-1864	Fort Pitt
1	5.3-inch (60-pounder breechloading)	Parrot rifle Pivot	61	N/A	N/A

Finally, in 1889 at the Brooklyn Navy Yard, the 5.3-inch (60-pounder breech-loading) Parrot rifle was replaced by a 5.3-inch (60-pounder) Parrot rifle[329] (Table 9).

Table 9 1889, Armament Changes in the Brooklyn Navy Yard

No of Guns	Calibre	Description	Weight	Registry No	Years
2	8-inch	Pivot Guns	31980 lbs.	30, 31	1859 1862
4	IX-inch	Broadside	36150 lbs.	522,523, 524,525	1861 1864
1	5.3-inch (60-pounder rifle)	Pivot	5415 lbs.	99	1864 -1865

327) Logbook USS Kearsarge, 1883:189
328) Hamersly, 1881:405
329) Logbook USS Kearsarge, 1889

The armaments in the table above were the same guns registered in the logbook from January 1894, and left on board after the accident.[330] One of the 8-inch converted guns was thrown overboard by 40 men during the effort to maneuver the ship out of the Cay; the rest of the armament remained onboard.[331] Also, the cartridge and projectiles were left on board the ship due to difficulties taking them out. The following image (Fig.47) compared the Parrot and Dahlgren shell guns showing a visual difference between them.

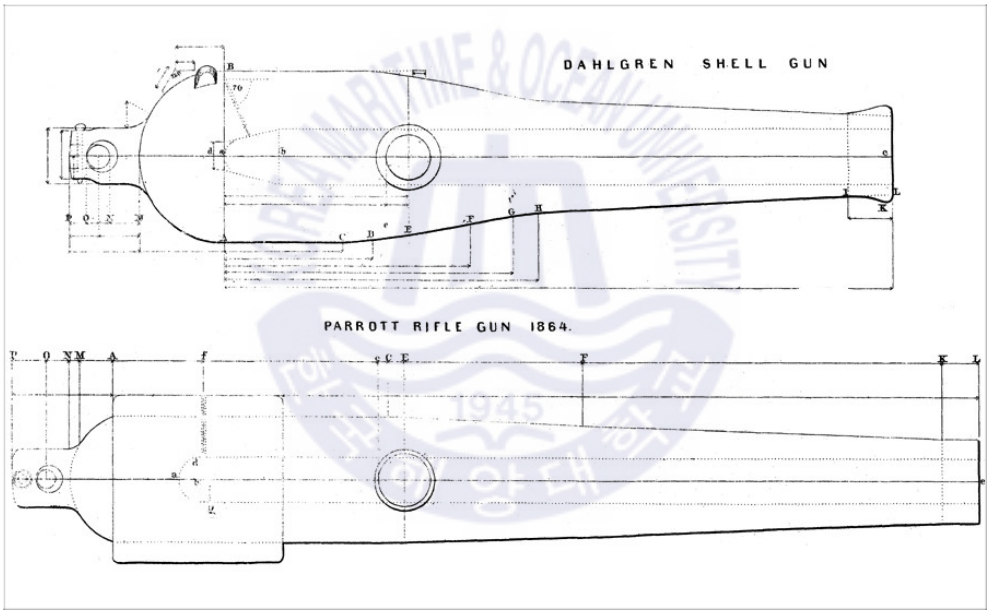

Fig. 47 *D. Van Nostrand Publisher.* Dahlgren and Parrot cannons (U.S. Bureau of ordnance, 1866:9).

To validate the last armament's information changed onboard the USS *Kearsarge*, it was necessary to find the plans from the last repairs in 1889. These were obtained at the National Archives (NARA). The files

330) Logbook USS Kearsarge, 1893-1894
331) Kelley, 1894; Burns, 1894

were elaborated during the shipyard repairs period reflecting and confirming the cannons' modification information. The interpretation of logbooks and plans is one of the most critical parts of this chapter, confirming the last naval armament modifications. These cannons remained on board the ship and were abandoned in Roncador in 1894. Consequently, the findings of the review and analysis of the plans unquestionably showed a 60 pounder rifle in the forecastle (Fig.48), the four IX-inch canons (Fig.50), and the two 8-inch cannons converted (Fig.49), validating logbooks information.

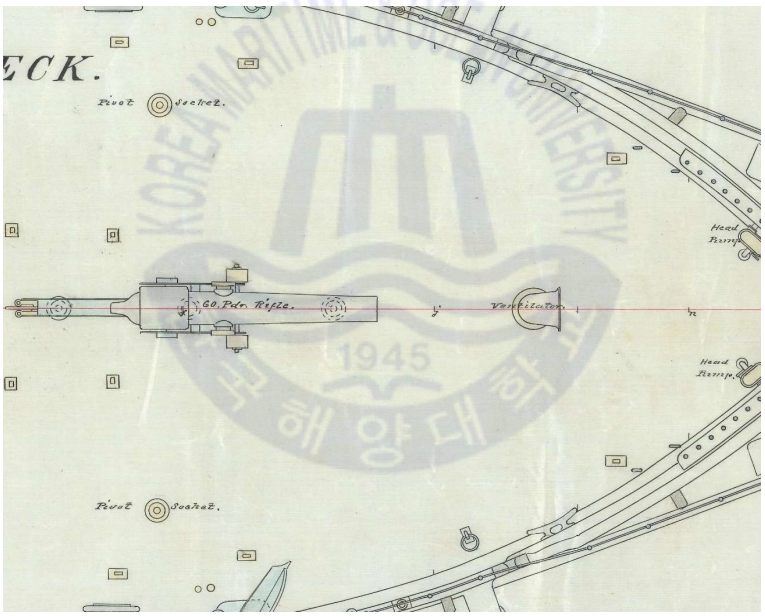

Fig. 48 USS *Kearsarge, plan 79-9-34-E, Navy Yard, 1889.* Extract from the forecastles with the 60 Pounder rifle.

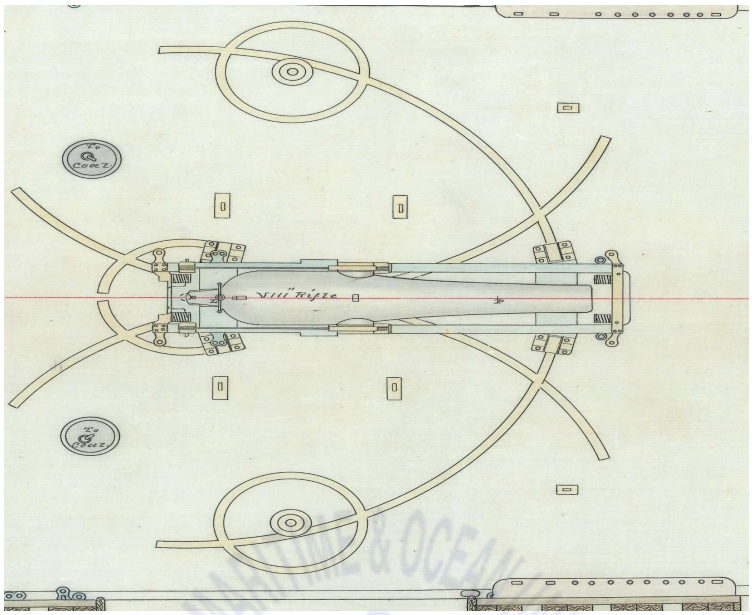

Fig. 49 USS *Kearsarge, plan 79-9-34-D, Navy Yard, 1889*. Extract of the 8- inch.

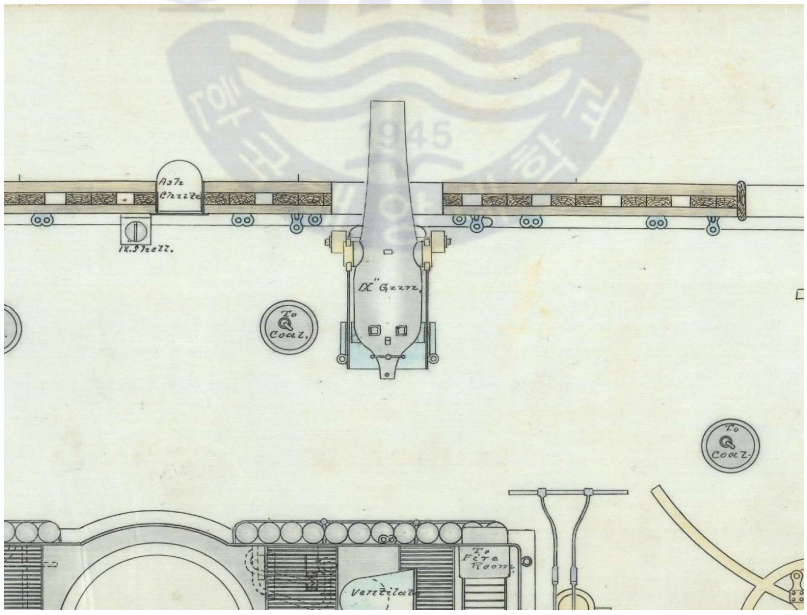

Fig. 50 USS *Kearsarge, plan 79-9-34-D, Navy Yard, 1889*. Extract of an IX-inch.

During the analysis of the plan *79-9-34-D* and *79-9-34-D* from 1889, Brooklyn shipyard, the four IX-inch extract images presented the same number. The inscription or mark was not possible to identify or associate with the foundry. After 1889, the ship served in the Caribbean Sea with the same armament, participating in several naval operations. It was confirmed that the armament was not used in action and remained until the wreck event. However, the main concern of the Secretary of the Navy after the wreck was rescuing the ship and the armament due its to outstanding participation in the Civil War. Finally, the following tables (Table 10 and Table 11) contains comprehensive information for further research on the wreck site, based on primary sources.[332)]

Table 10 Armament Details during the Accident-1894

No of Guns	Caliber	Description	Weight	Registry No	Years	Foundry
1	8-inch	Muzzle-loading rifle	15990 lbs.	30	1859 -1862	West Point
1	8-inch	Muzzle-loading rifle	15990 lbs.	31	1859 -1862	West Point
1	IX-inch	Smoothbore	9037 lbs.	522	1861 -1864	Fort Pitt
1	IX-inch	Smoothbore	9037 lbs.	523	1861 -1864	Fort Pitt
1	IX-inch	Smoothbore	9037 lbs.	524	1861 -1864	Fort Pitt
1	IX-inch	Smoothbore	9037 lbs.	525	1861 -1864	Fort Pitt
1	5.3-inch	60-pounder Parrot rifle	5415 lbs.	99	1864 -1865	West Point

332) Logbook USS Kearsarge, 1893-1894; Olmstead et al., 1997

Table 11 Munition and Carriages Details during the Accident-1894

No of Guns	Caliber	Cartridge Powder	Cartridge Weight	Projectiles Kind	Projectiles Weight	Carrieges
1	8-inch	Hexagonal	35	Shell (Common)	156	Marsilly Iron
1	8-inch	Hexagonal	30	Shell (Battering)	180	Marsilly Iron
1	IX-inch	Cannon	13	Shot	90	Pivot-Marsilly Iron
1	IX-inch	Cannon	10	Shell	73	Pivot-Marsilly Iron
1	IX-inch	Cannon	10	Shrapnel	70	Pivot-Marsilly Iron
1	IX-inch	Cannon	10	Canister	60	Pivot-Marsilly Iron
1	5.3-inch	Rifle	6	Shot and Shell	60 and 64	DB-Iron

4. Social Context of Roncador Cay and the USS *Kearsarge* in the Narrative

Although narrative implies fiction,[333] there are relevant elements in this research to be considered, especially before the twenty century when some geographical territories in the Caribbean Sea lacked accurate information from hydrography and navigations perspectives. Notwithstanding the western Caribbean being an essential area of navigation during colonial times and in the nineteenth century, with much interest by Britain and the United States, there was, however, a lack of geographical knowledge, especially of the maritime territory. This area, included the coastline in Central America (Yucatan to Panama), the Islands, and the Archipelago of San Andres, Old Providence, and Santa

333) Coulter and Smith, 2009

Catalina Island. The territory was included in numerous novels and narratives by adventurers and scientists, principally in the United States, due to the proximity to the Isthmus of Panama and Nicaragua.[334] Likewise, Britain with British Honduras had similar interests.[335] Roncador Cay inclusion in literature corresponded to the USS *Kearsarge*. The literature review shows the sentiment of American society after the accident with details on the ship and the cultural landscape. It also revealed a significant period of American maritime history with many accidents sailing from coast to coast through the Isthmus of Panama.

The area started to get attention by the second half of the nineteenth century with the book *"Incidents of travel in Central America, Chiapas, and Yucatan"* by John Lloyd Stephens in 1841.[336] He generated a new concept and perception of this area in the United States, especially with the high maritime traffic connecting California with the Caribbean Sea and the Atlantic Ocean through Panama during the California Gold Rus h.[337] Moreover, the increased interest in an interoceanic canal through Panama or Nicaragua and the Caribbean Islands of Haiti caught the attention of the United States society.[338] Also, the massive guano deposits in the Banks and Cay in the Archipelago resulted in the *Guano Island Act of 1856*.[339] The influence of the United States in this region, especially in Panama during the second half of the nineteenth century, can be noticed in the literature for the American citizens residing in the isthmus.

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334) Frenkel, 1996
335) Craig, 1969
336) Stephens, 1841
337) Kemble, 1949
338) Mahan, 1890; Bosch 2009:7-11
339) Burnett 2005; Ratter, 2018:100-101

Roncador Cay descriptions in the narrative. The Cay is the subject of several narratives and novels by British and Americans authors describing the dangers of sailing in the area, not only by geomorphology or hurricanes but by buccaneers and pirates in the region. Some are ambiguous and lack geographical information and toponymical problems, as in the case of *"Sir Edward Seaward's narrative of his shipwreck and consequent discovery of certain islands in the Caribbean sea."* [340] Ms. Porter used the diary of Sir Edward Seaward from 1733 to 1749 to publish the narrative making a geographical description of the area in the "neighborhood of the Serranillas" with all navigation risks, including the hurricane of 1733. Millas (1968) recognized some of these hurricanes mentioned by Ms. Porter in her narrative. One impacted St. Kitts' island and other tropical cyclones affecting the Southern Bahamas and Cuba.[341]

In 1841, a new edition of Ms. Porter's narrative was released, with the introduction discussing the Island of Old Providence as experiencing a wreck event. It also included evidence of the report made by C.F. Collett in 1837. The scientific information of Collett's report on Old Providence Island was collected during a survey of the island in 1835, titled *"On the Island of Old Providence,"* [342] onboard HMS *Thunder*, the same survey ship of Roncador Cay and the other islets and banks of the Archipelago. Mr. Collett made a geographical and social description of the Island, and the Archipelago, mentioning Roncador Cay as one of the community's leading places for turtling.[343]

340) Porter, 1831
341) Poey, 1855:297; Millas, 1968:192-193
342) Collectt, 1837
343) Porter, 1841:iii-xiv

Another geographical description, including the geomorphology, is made by T. Young (1842) in *"Narrative of a residence on the Mosquito Shore, during 15 the years 1839, 1840 & 1841."* He published his shipwrecking in March of 1840 on a bank (conceivably Roncador Cay) while sailing from Cape Gracias a Dios to Black River's British settlement on board the schooner *Amity*.[344] One of the most impressive descriptions is made by Ephraim G. Squier under the pen name *Samuel Bard* in his fictional book of 1855, *"Waikna; or, adventures on the Mosquito shore,"* a very controversial book promoting American interest in Central America.[345] Included in his narrative account of sailing to Mosquito Coast aboard the schooner *Prince Albert*, Bard describes the area as "a hell of water, from which there was no escape. El Roncador!" (Fig. 51 and Fig.52).

Fig. 51 *"The Shipwreck."* The image shows the wreck of the schooner *Prince Albert* on Roncador Cay and the dangers of the reef (Bard, 1855:35).

344) Young, 1842:37-51; Olien, 1988:32
345) Olien, 1985

Fig. 52 *"Ow long I remained insensible."* The wreck of the schooner *Prince Albert* (Bard, 1855:36).

The most striking part is chapter eleven, which makes a complete geographical description of "*El Roncador*," the Snorer, and its notoriety by turtle-fishers from Old Providence Island. Squier described how they survived and the situation after the wreck event. The castaways spent two weeks in the Cay before being rescued by a fisherman schooner from the Old Providence Island (Fig.53), who *"asked us why we were there?"* claiming that *"this Island was the property of the people of Catarina."* [346]

During this chapter, the author makes a social description of Old Providence Island inhabitants and their ancestral relationship with the Archipelago.[347] The book has sixty illustrations by John William Orr, including five of the wreck and their days as castaways in Roncador. Ephraim G. Squier was a respectable American anthropologist of the

346) Bard, 1855:49
347) Ibid., pp,34-55

nineteenth century, well known for his accurate and objective letters and writings of Central America, including the islands.[348]

Fig 53 *"El Roncador." As it recede in the distance, it looked very beautiful-an opal in the sea.* (Bard, 1855:52).

Another The following poem dedicated to Roncador Bay is found in the 1901 book *"Panama Patchwork"* [349] by James Stanley Gilbert, known as the Poet of Panama:

> *On Roncador. No more the boatswain's pipe shall call. To quarters on her deck! On Roncador, on RoncadorShe lies — a lonely wreck! No more shall bugler colors sound. Nor tuneful taps shall play! On Roncador, on Roncador, In silence ends the day!*
> *No more shall curious visitor. Be shown her famous gun! On Roncador, on Roncador, Her guerdon she hath won! Haul down the flag left flying there—No record let there be of how we lost on Roncador our veteran of the sea!*
> *'Tis better thus to lay away A memory of the past, whose strife hath ended in a peace Forevermore to last! Rest on, thou brave old Kearsarge, rest! The waves that round thee surge shall on the shore of Roncador for ages chant thy dirg.*[350]

348) Olien, 1985:111
349) Gilbert, 1901

Finally, in 1907, Tracy Robinson published the book titled *Panama: A Personal Record of Forty-six Years, 1861-1907*, which contain detailed information about the shipwreck Golden Rule, which ran aground in Roncador Cay on May 30, 1865, with 632 passengers[351] (Fig.54). The castaways were rescued days later by USS *State of Georgia* and USS *Huntsville.*[352] The accident's causes were regional geomorphology and heavy rain.[353] By 1924 Thornton Jenkins Hains had published *"Bahama Bill, mate of the wrecking sloop Sea-horse,"* highlighting the danger of the area for navigators and describing the strong currents and drift with a chapter called *"The Edge of the Roncador."* [354]

The USS *Kearsarge* in the narrative. After the wreck event, the USS *Kearsarge* gained a lot of attention. S. Hobson, a US Marine Corps who served aboard the *Kearsarge*, published *"The Famous Cruise of the Kearsarge"* in 1894. He participated during the engagement that sank the CSS *Alabama* off the coast of France. Hobson was one of the co-founders of the USS *Kearsarge* Survivors Association, supporting his passion for the "old wooden ship." The book was dedicated to the vessel and veterans during the annual meeting of the Association in 1894. Unfortunately, just weeks before the meeting, the *Kearsarge* wrecked on Roncador. The book is written in two parts; the first part is a poem, and the second is the history of the USS *Kearsarge*. In this part, Hobson presented a summary of the dangers in Roncador as:

350) Gilbert, 1901:57
351) Robinson, 1907
352) *Harper's Weekly. A Journal of Civilization,* 1865:420; Naval Historical Center, 1976:609
353) *New York Times*, 1865:5
354) Hains, 1924:323-337

The roar of the surf can be heard for miles, but on a calm night a vessel can approach until it is impossible to retreat, without the slightest warning of peril. The island owes its danger to the fact that a current sets toward it which runs at a rate varying from one to four knots an hour.[355]

He described the courage and bravery of the warship and the carelessness of the officers involved during the accident as follows:

She survived the guns of the enemy and the perils of the deep for thirty years — only to lay her bones upon the surf-beaten shore of an "ocean grave- yard." Not conquered by the storm, but run upon well-known rocks in fine j weather: a victim to the careless navigation of her own officers (Hobson, 1894:1).

Also, the location is represented in the Caribbean Sea, and states that Roncador Cay was referred to as "the graveyard of the Caribbean" among American seafarers.[356] After the USS *Kearsarge* accident, the wreck site expanded in popularity among American residents of Panama. The event and Roncador were included in *"Ballads of Blue Water and Other Poems,"* with a poem dedicated to the USS *Kearsarge:*

The Kearsarge

In the gloomy ocean bed. Dwelt a formless thing, and said, In the dim and countless eons long ago," I will build a stronghold high, Ocean' s power to defy, And the pride of haughty man to lay low. "

Crept the minutes for the sad,Sped the cycles for the glad, But the march of time was neither less nor more. While the formless atom

355) Hobson, 1894:64
356) Ibid., pp,64-65

died,Myriad millions by its side, And above them slowly lifted Roncador.

Roncador of Caribee,Coral dragon of the sea, Ever sleeping with his teeth below the wave ;Woe to him who breaks the sleep !Woe to them who sail the deep ! Woe to ship and man that fear a shipman's grave !

Hither many a galleon old, Heavy-keeled with guilty gold, Fled before the hardy rover smiting sore; But the sleeper silent layTill the preyer and his prey Brought their plunder and their bones to Roncador.

Be content, O conqueror !Now our bravest ship of war, War and tempest who had often braved before,All her storied prowess past,Strikes her glorious flag at last To the formless thing that builded Roncador.[357]

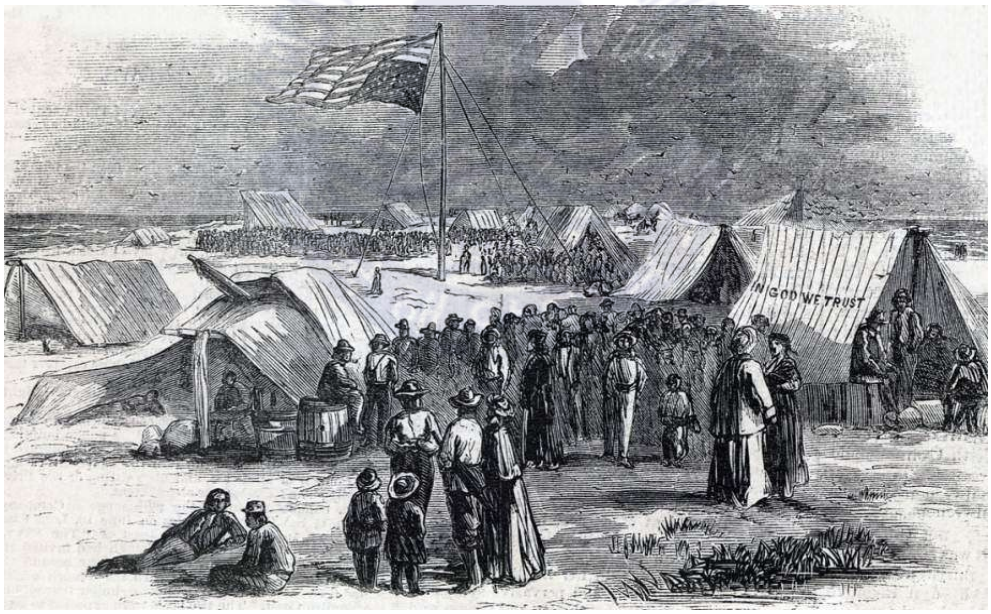

Fig. 54 *Survivors of the wreck of the steamer Golden Rule, on Caribbean coral island of El Roncador, May 1865, artist's impression* (House Divided: The Civil War Research Engine at Dickinson College, 2020).

357) Roche, 1895:8-9

Finally, it can be concluded that information extracted from narratives about the USS *Kearsarge* and Roncador Cay establish the social context; specifically from the perception of visitors, travelers, scholars, residents in the area, plus fictional histories based on oral tradition or personal perspectives during the nineteenth century. Also, it contributes to understanding the American society's sentiment and the maritime cultural landscape with complementaries details for this research.

Ⅳ. Factors of the Shipwreck

This chapter aims to provide an overview to interpret details of the accident's circumstances, responsibilities, and descriptions of the salvage attempts. A review of a considerable body of literature on primary and secondary sources was undertaken to accomplish these goals. The records and files of the *Kearsarge* are correctly preserved in NARA in the file *Court Martial Record. Vol 550, 1894 No 485. Inquiry in the loss of the USS Kearsarge*, allowing a detailed analysis of the circumstances, actions, and environmental conditions of the accident. All evidence and testimonies are compiled, supporting an appropriate reconstruction of the final moments. These include striking details from a nautical description, analyzed by the court-martial and describing the area's environmental conditions to better comprehend the accident. The procedures were held at the Navy Yard, New York, by Lieutenant Commander James J.D. Kelley as a judge advocate.

Additionally, it was complemented by secondary sources such as the publication by Lt. Burns (1894), as one of the officers during the accident. He described the wreck location in a nautical chart with an account of the final moments in the *Proceedings of the US Naval Institute.*[358] Also, Gomez and Jeong[359] presented an analysis of the wreck event. Finally, primary, secondary sources, and oral interviews were examined for the salvage attempts.

358) Burns, 1894
359) Gomez and Jeong, 2020

1. The Circumstances of the Wreck Event

By the end of 1893, Commander Oscar Heyerman was appointed to the command of the USS *Kearsarge*. His first operation was to protect American interests in Haiti and set sail from the United States to Haiti at the end of the year. In January of 1894 was ordered to sail to Bluefields, Nicaragua, with Admiral Oscar Stanton onboard as a flagship of the US Naval Force on the North Atlantic Station[360]. Before departing Haiti, Lieutenant Lyman, the officer with higher rank after Commander Heyerman, explained the navigational plan. After departing, the following days reported good metocean conditions. Lt. Lyman controlled the navigation process. Near Ronacador, he set the course by magnetic compass to make clear Roncador by the south part. However, due to strong currents that drifted the *Kearsarge* to the north, Commander Heyerman decided to change route. He planned to sight the Roncador Cay during the day and from the north part, not from the south as was initially established.[361]

On February 2, 1894, the day of the accident, a new course was established by compass in the morning. Apparently, Commander Heyerman had no experience sailing in the Caribbean Sea. However, officers were not consulted on this decision. Oddly, considering the hazardous nature of the area, he had not received any advice from the previous navigation officer. The *Kearsarge* sailed with favorable weather conditions (a moderate breeze from the northeast to the east with a force of 4 and 2 knots, stable barometric). Moderate waves for the last

360) Gomez and Jeong, 2020
361) Burns, 1894: 672-690

three days indicated that a cold front or strong winds did not influence the area. However, it was noticed from the logbook that metocean data for February 1st and 2nd, indicating a lack of control from the Commanding officer. During the navigation, the USS *Kearsarge* was supported by sails and steam with a speed average of 8 knots. The Commanding officer intended to sight Roncador Cay from the north before sunset and left the bridge; however, after sunset, and seconds before the accident, one lookout reported breaks at port and starboard at about 300 yards. Officers and the crew attempted to maneuver, trying to turn the ship around, but the vessel was inside the treacherous waters of Roncador Cay. Within seconds from the lookout information, the *Kearsarge* impacted the coral reef at speed that one of the IX-inch was misadjusted. The accident occurred at about 7 pm. The crew made many attempts to maneuver the ship out of the reef, including throwing overboard one of the IX-inch to minimize weight, but all attempts were fruitless. The next morning, a nearby bank was found, and the crew settled there for a few days before being rescued and returned to the United States.[362)]

2. Court-Martial

Various documents and records collected in the trial court detailed the high hydrographic and navigation standards procedures by the US Navy. Specifically, during the court-martial and court of inquiring loss of the USS *Kearsarge*, the Bureau of Navigation played an important role.[363)] This office was appointed to determine the accuracy of Roncador Cay in

362) Heyerman, 1894, February 4; Kelley, 1894:6, 82-91; Burns, 1894: 672–690; Gomez and Jeong, 2020

363) Kelley, 1894:25-27,74,82-84,88-91,274

the nautical chart, and establish all the nautical information available of Roncador and the Caribbean Sea, including journals and Pilot Charts. They also had the responsibility of determining hydrographic, oceanographic, and meteorological data. In addition, during the trial, the officer, Lt. Bowman, an expert navigator, was designated to testify about navigational issues in the area and experienced navy sailors in the Caribbean Sea.

Another factor for the US Hydrographic Office (HO) was to determine the exact latitude and longitude coordinates of the Cay on the nautical charts to find a human error from the navigation or a mistake made by a wrong position. During this review, the HO shared the document *"Relative to the Position of Roncador Reef"* to the court. In addition, the court examined charts and books issued to the USS *Kearsarge* by the Hydrographic Office that give the geographical position of Roncador Cay, South Point, as follows (Table 12):

Table 12 Charts Used during the Martial-Court

Chart	US. H.O coordinates from Roncador
H. O. Chart 35, published 1870	13° 34' 30" N. 80° 05' 00" W
H. O. Chart 945, published 1885	13° 34' 30" N. 80° 04' 05" W
H. O. Chart 1290, published 1892	13° 34' 30" N. 80° 04' 05" W
H. O. Chart 1374, published 1893	13° 34' 30" N. 80° 04' 05" W
H. O. Publication No. 64, Caribbean sea and Gulf of Mexico	13° 34' 30" N. 80° 05' 39 "W

The position was reviewed in *Bowditch's Navigator*, as 13° 34' 30" N. 80° 05' 00" W. Besides those mentioned above, the following files and charts were used by the Hydrographic office, to determine with

accuracy and compared the geographical position of the south point of Roncador cay is as stated below (Table 13):

Table 13 Others Charts and Information Used in the Martial-Court

Chart	Internat. coordinates from Roncador
B. A. Chart 1218, published 1844	13° 35' 00" N. 80° 04' 39" W
B. A. Chart 763, published 1877	13° 35’ 00" N. 80° 04' 05" W
B. A. Chart 1478, published 1844	13° 34' 30" N. 80° 05' 39 "W
Findlay's North Atlantic Memoir 1865	13° 34' 30" N. 80° 05' 05 "W
West India Pilot Vol. 1, 1883	13° 34' 30" N. 80° 05' 39 "W
List of geographical positions for navigators and others, 1883. U.S.N.	13° 34' 30" N. 80° 05' 21 "W

Commander Green from the US Navy was appointed to contribute with his expertise to the report of the geographical position of Roncador Cay and the exact location. He stated:

> *“The present longitudes of Roncador reef and other neighboring positions depend upon chronometric measurements made by Captains Owen and Barnett, R. N., from Port Royal, Jamaica. It has been my duty at various times to investigate the accuracy of chronometric measurements made by Captains Owen and Barnett, and I have found them without exception to be remarkably accurate.”* [364)]

It was noticed that some variations in seconds corresponded to 101 feet (31 meters) between some charts and the location of Roncador Cay. These second’s differences reflected the relative imprecision of the time’s hydrographic technology to identify location through coordinates. Furthermore, another of the outcomes of the navigational and geographical review by the court-martial was the statement of Lt.

364) Kelley, 1894:271

Bowman. He explained that generally, currents are set in the charts as northwest in the area. Also, he revealed that a recent marine survey by the USS *Enterprise* determined erratic information with the current direction set as west-northwest and other days eastward. Therefore, the Pilot Chart on board was an essential nautical element during the court-martial, and the Bureau made a deep analysis of current directions.[365] They mainly focused on the *Pilot Chart of the North Atlantic from January and February of 1894.*[366] During the reviewed process, it was described reversal currents from previous Pilot Charts during December. Also, other witnesses testified that the powerful winds and currents in the Caribbean exposed some examples of dragging anchors in the area several times.[367] Additionally, the USS *Kearsarge* navigator, Lt. Lyman, made a relevant observation about currents. He explained that the British made the last survey in 1835 without any other review in the region and how the *City of Para* (the rescue ship) drifted more than twenty miles off its course due to strong currents while sailing to assist the crew in Roncador.[368]

Finally, the court-martial confirmed that strong currents affected navigation in Roncador Cay and the nearby area; also, that some currents plotted in the pilot charts were incorrect and needed to be reviewed. Hence, the importance and necessity of a lighthouse to prevent accidents was noticed by the Bureau.

In order to reiterate the court-martial findings from more than one

365) Kelley, 1894:289-305
366) Ibid., p, 274
367) Ibid., p, 281
368) Ibid., pp, 81,139,265

hundred years ago, some recent oceanographic and meteorological studies in the area of Roncador Cay and Serrana Bank were examined. These research projects were based on scientific experiments, including data collected with accurate standards, demonstrating the currents' vulnerability depending on the period or season of the year. One of the findings was the influence of the increasing speed of winds and currents during the dry season (corresponding to the month of the accident, February). Cold fronts and cyclonic eddy also heavy influence a current's speed and direction.[369]

3. Responsibilities for the loss of the USS *Kearsarge*

After reviewing the nautical material available and taking testimonies, the court-martial declared the commanding officer guilty of negligence and inefficiency in performance duty in the loss of the USS *Kearsarge*. They established as the central reason lack of observation and the change in the initial course, added to the strong currents and the ship's drift of about two knots per hour. Also, the court-martial determined the navigation officer's lack of support added to the commander's decision to change course, passing through the north part of the Cay instead of the south as planned without a precise geographical analysis. He was found him guilty of neglect of duty.[370] This analysis confirms the difficulties of sailing near Roncador Cay and the Archipelago. Therefore, the USS *Kearsarge* accident (Fig.55) associated environmental conditions, mainly the geomorphology of the area, and unquestionably the human factors as reasons. Furthermore, the navigation officer never

369) Garay et al. 1988:3-4; Andrade and Barton, 2000; Andrade, 2001; Ortiz-Royero et al., 2013:2797-2801

370) Kelley, 1894

knew precisely Roncador's location and did not take astronomical observations. Finally, despite not sailing in-home water and unknown geography and hydrography, the commanding officer did not take the measure of correlating the position. Therefore, the accident was generated by the captain's lack of awareness (human factor) added to the environmental conditions (geomorphology). By the end of 1894, Commander Oscar Heyerman was retired from service.

Fig. 55 *Watercolor by an unidentified artist, depicting Kearsarge wrecked on Roncador Reef, in the Caribbean Sea, on 2 February 1894.* Courtesy of President Franklin D. Roosevelt, 1936. U.S. Naval History and Heritage Command Photograph.Catalog #: NH 52030.

4. Salvage Attempts

After the wreck event, the USS *Kearsarge* was the subject of a salvage attempt by the US Navy and the Congress of the United States, that included the armament left onboard. However, the ship could not be salvaged; on the contrary, it was looted and partially destroyed by

wreckers during 1894, and the remains were affected by consecutive years of frequent hurricanes and cold fronts. Also, during the twentieth century, treasure hunters in the Archipelago, more interested in finding the cargo of colonial ships, accidentally encountered the remains of the *Kearsarge*. Finally, at the end of the twentieth century, Dr. William S Dudley made a call to save the remains in Roncador Cay. He researched the USS *Kearsarge* as Director of Naval History and Heritage Command, intending to highlight the naval heritage.[371] However, the effort was fruitless because of the lack of interest in Colombia.

4.1. Salvage Attempt during the Nineteenth Century

Right after the incident, the secretary of the Navy, Admiral Herbert, based on the report of Admiral Stanton, submitted a letter to House of Representative, Chairman Naval Committee, supporting the bill providing for the salvage of the USS *Kearsarge* by the congressman Blain, explaining the importance of salvaging such a historic ship, the current state of the wreck, the costs involved in the operation due to the distance and the possibilities to salve the ship.[372] The report by Admiral Oscar Stanton, Commanding officer of the US Naval Force on the North Atlantic Station on February 23, 1894, stated that the *Kearsarge* could be saved, along with the armament, guns, and some equipment because of the excellent state of the hull. He also explained, based on his last inspection of February 8, 1894, that the wreck's depth would allow the rescue.[373] Admiral Stanton stayed several days on Roncador (Fig.56) while the crew was rescued.

371) Dudley, 1998:107
372) Stanton, 1894, February, 23; Herbert, 1894, February 24
373) Kelley, 1894:23

Based on the report from the Committee On Naval Affairs and the request from the Secretary of the Navy, the United States Congress on its *53d Report No 503 2d from the House Of Representatives Session*, on February 27, 1894, approved *"Rescue of the Armament and Wreck of the US War Ship Kearsarge"* under House Bill *"HR 5833"* and appropriated $45,000 in case the ship was rescued and only $10,000 if the effort were not successful. The report stated the historical record and importance of the ship during the American Civil War, highlighting the battle of Cherbourg with patriotic sentiment with the phrase *"It felt that a portion of living American history had passed away."* [374] It is important to mention the effort of the Navy not only to save the ship but the seven guns on board, as is mentioned in the bill *"HR 5833."*

Fig. 56 *Admiral Stanton's Headquarters on Roncador Reef.* Admiral Oscar Stanton, Commanding officer of the US Naval Force on the North Atlantic Station, stayed on Roncador Cay for some days (Frost, 1894:815).

374) House of Representatives, 1894

The "Boston Towboat Company" and its steamer *Orion* were selected for the salvage based on the terms by Congress. On March 16, 1894, the steamer Orion departed from Newport News, Virginia, with a Navy officer representing the US Navy but without hope. The reason was the proximity of Old Providence Island, whose inhabitants knew about the shipwreck, and doubts from the US Navy to recover any relics or armament based on previous experiences involving US Navy warships accidents. For example, the case of the USS *San Jacinto* wrecked on Cay no Name, the Bahamas, on January 1, 1865, which was looted and burned by wreckers who stole the copper.[375] Also, the USS *Despatch* wrecked on Assateague Island, off the Virginia coast, on October 10, 1891, and looted by wreckers.[376] The steam *Orion* arrived at Roncador on March 22 and found three small sloops anchored. They identified the wreck of the USS *Kearsarge* and realized that it was looted and burned by wreckers. The Navy officer issued orders to collect pieces of live-oak timber and relics on board or on the bank near the wreck. Also, they took a picture of the remains with the wreckers trying to take the timber (Fig. 57 and Fig. 58). The next day, the *Orion* returned to the United States.[377]

375) U.S. Naval War Records Office, 1903:789
376) U.S. Navy Department, 1892:87
377) Frost, 1894:816-817; *New York Times*, 1894a:5; Brown, 2013

Fig. 57 *Another portion of the wreck.* The crew of the steam tugs Orion with some remains of the USS Kearsarge during salvage operation (Frost, 1894:816).

There was no accurate information available about ordnance on board, one of the main reasons for the salvage operation, apparently because of the confidentiality of the armament. However, the cannons were too heavy for the wreckers to take, and the only official information was that one of the 8-inch cannons was thrown overboard by the crew following commanding officer instructions in one of the attempts to save the ship during the wreck event.[378)]

One of the events that characterized the court-martial was the recovery of the logbook serving as a source of information in the court, and some essential relics in the Cayman Islands, including the ship's bell, the Union Jack, and the brass plate commemorating the engagement with the CSS *Alabama* in France in May 1894.[379)] These elements were

378) Kelley, 1894:6

recovered by Captain Lloyd Phoenix using his steam yacht *Intrepid* with the support of the United States Consul G.O. Eckford settled on Kingston, Jamaica. He sailed onboard the *Intrepid* to Cayman Island. In addition, many other items such as the mast, uniforms, and some rifles were collected later that year in Cayman by the USS *New York.*[380]

When the yacht *Intrepid* arrived at Roncador Cay, the wreck had been looted by wreckers from Old Providence Island and Cayman Islands. These practices were typical of the fishermen of those islands with shipwrecks in the small banks and islets in the Archipelago.[381] The first ship to arrive with wreckers after the accident was the two-mast schooner *ocean flower* from Cayman, who looted paintings and officers' uniforms, among other relics. One of the wreckers was Captain Semmes Borden, named after Raphael Semmes, the Confederate admiral and the commanding officer of the CSS *Alabama*. He set fire on the *Kearsarge* as he attempted to get the copper out of the hull. The ship was partially destroyed by the explosion on the magazine due to fire.[382] Finally, one of the wreckers took the USS *Kearsarge* capstan and brought it to Cayman Brac to use in a schooner, and is supposedly still on the shoreline at the west end of the island.[383]

379) *Wilmington Messenger*, 1894:4
380) *New York Times,* 1894b:21, Secretary of the Navy, 1894:9-10,184; Brown, 2013
381) *Herald*, 1895:1
382) *Evening Star*, 1894:2; Barney, 1938:16, 80-82; Brown, 2013
383) Wood, 2004:164

Fig. 58 *First piece of the wreck.* The crew of the steam tugs *Orion* on the port side of the USS Kearsarge during salvage operation (Frost, 1894:815).

4.2. Salvage Attempts during the Twentieth Century

On November 11, 1605 the *Armada de la Guardia* (Spanish fleet) composed of seven galleons commanded by Captain-General Luis Fernández de Córdoba was struck by a hurricane sailing between Cartagena de Indias and Havana. The fleet lost four ships, including the Capitana-*San Roque* (flag ship).[384] According to the report made by *San Gregorio,* one of the fleet's ships reported the incident was located at 15.5º between Serrana Bank and Serranilla Bank[385]. Due to the lack of knowledge of the territory at that moment, the incident has ambiguous information.[386] The shipwreck was located in an "area of uncertainty," including Serrana Bank, Serranilla, and Roncador Cay, and the site remain undetermined.[387] However, because of the valuable

384) Segovia, 2007:163-170; Pajuelo, 2019:188
385) Valdés, 1605; Fernández-Duro, 1897:253
386) Segovia, 2007:188-192
387) Gomez and Jeong, 2021:11

cargo on board, the wreck became famous and the target of commercial salvage, who for years have been trying to localize the remains in the Archipelago.

In 1985, a local Honduran fisherman, Miguel Dixon, found a bronze spike among wood and other artifacts in Roncador Cay. Thinking he had found a Spanish galleon full of gold, Dixon, contacted an American company in Brus Lagoon, Honduras, led by Steve Morgan, an American entrepreneur and chief executive officer of the "Hollywood Adventure Films and Galleon Hunters Corporation."[388] Morgan, a recognized treasure hunter, believed Dixon found the wreck of the galleon *San Roque,* and in March 1986 launched an expedition from Honduras to Roncador Cay. During the search of the fleet of Captain-General Luis Fernández de Córdoba, Morgan localized the remains found by Dixon. He took some elements such as pieces of oak, wooden gaskets, porcelain cup, and pictures (Fig.60) and sent them to the United States for analysis. One of the pieces was muntz metal that was commercialized by 1832, and it was suggested to Morgan that it could be from the USS *Kearsarge*. He returned to Roncador in December 1986, took some pictures, including of an iron circle that may correspond to the carriage pivot-marsilly iron from an IX-inch.[389]

388) *New York Times*, 1987:31; Maugh, 2000; Dudley, 1998:107
389) Dean, 1987

Fig. 59 Possible location of the USS *Kearsarge* with a ship spike founded in Roncador Cay in 1986 (Personal archives, family Morgan).

Despite no scientific confirmation of possible remains of the USS *Kearsarge*, the following year, he attempted an expedition to locate and recover some artifacts and the cannons, but had no results.[390] For this research, direct communication with Morgan was not possible due to his ill-health. However, an interview with his family members was conducted.

390) *New York Times,* 1987:31; Humphreys and Guenther, 1989:xix-xx

Fig. 60 Remains found at Roncador. The picture was taken in 1986 by Steve Morgan (Personal archives, family Morgan).

During the interview, they confirmed the information in the newspapers, shared some pictures and the location that Steve took in 1986 with a possible spike from the *Kearsarge* (Fig. 59).

Finally, not being able to rescue the guns by the US Navy during the nineteenth century, confirmed that the armament was left onboard, and the information from the twentieth century is not conclusive and can be argued.

V. Approach to the Location and Shipwreck Identity

This chapter aims to estimate the USS *Kearsarge* location based on several sources and assumptions. However, determining where the cannons and remains are located in Roncador Cay is challenging due to much of the information being ambiguous and confidential under Colombian law, plus the site being so isolated. Therefore, cases are given as "likely" locations based mainly on assumptions. The Caribbean Sea has two significant examples of shipwrecks with estimated locations. In 2008, Phillips analyzed the British logbooks from Wager's Action of 1708 and located a possible area where the galleon *San Jose* was sunk, based on assumptions and ambiguous information.[391] Likewise, in 2016, Cazorla analyzed the shipwreck of Christopher Columbus' *Nao Santa Maria*, and mapped its last navigation for a possible location based on primary sources and assumptions.[392]

Past research has noted that wrecks tend to have drifted and are not found where expected.[393] The attempts to estimate the locations of the remains of the *Kearsarge* is likely possible by, initially, describing the methodology and guidelines proposed by maritime historians, hydrographers, and nautical archaeologists to identify a wreck and associate it with the site. Other estimates at *Kearsarge's* location might involve partially using traditional methods, based on three concepts: first,

391) Phillips et.al., 2008
392) Cazorla, 2016
393) Westerdahl, 1992:7-8

analyzing evidence from the nautical charts of 1894 to 2021 to find wreck symbols validating the wreck site; second, localizing the remains using satellite imagery on a geographical area from the coordinates obtained from 1894 and information from the interview of 2020; and, third, analyzing material collected from archival research and interviews to clarify the armament abandoned. This data analysis is based on assumptions but permits an armament validation through the images obtained in the interview. Finally, this information is connected and triangulated with the coordinates of the wreck event in 1894 and the map created by Lt. Burns in 1894 (without coordinates) to estimate the wreck site location in an area of uncertainty.

1. Validation of the Wreck site in Nautical Charts

Nautical charts represent the physical description of an area in oceans and seas based mainly on hydrography with the primary purpose of safety of navigation.[394] The charts are of rich maritime heritage and a valuable tool of information not only for navigation but for maritime history and nautical archaeology.[395] One of the methodologies used for interpreting and locating wrecks is the analysis of nautical charts.[396] However, these are, in the majority of cases, ineffective at solving the problem of identity. One reason is that wrecks are considered an obstruction to the safe passage of ships and few historical wrecks have been recorded accurately by hydrographers.[397]

394) I.H.O., 2021
395) Alonso et al., 2011
396) Peterson, 1965:19,71
397) Alonso and Marquez, 2013; Firth, 2018; NOAA, 2021c

In modern times charts are regulated and standardized by the International Hydrographic Organization (IHO) as an international authority on hydrographic surveys established in 1921.[398] For safety purposes, wrecks are represented as cautionary notes of easy identification and deployed in the chart with different symbols using the international abbreviation "Wk." According to the accident, location and depth symbols are different. For example, in shallow waters, stranded wrecks are represented as a hull emerging. Wrecks with masts have the legend "Mast," among other symbols. For IHO, historic wrecks of historical or cultural importance are denoted as "Historic Wk." These symbols can be found in the same chart with an explanation.[399] The United Kingdom Hydrographic Office (UKHO) has a significant influence on hydrography around the world. It was officially founded in 1795. By 1830, under Captain Francis Beaufort, charts incorporated the standardization of features and information of interest to mariners. This new information included sandbanks, rocks, depths, navigation aids, wrecks, topographic information, and essential buildings like towers or churches.[400] One such example is in the study of the wreck of the HMS *Thetis* at Cabo Frio, Brazil, which was included in some nautical charts showing the point of the accident of the warship.[401]

The research aims to identify and locate the USS *Kearsarge* by one of the proposed methodologies that examines historical and contemporary nautical charts in the Archipelago of San Andres and Old Providence. Despite the event being in 1894, this study investigated and analyzed

398) IHO, 2021
399) IHO, 2018:B-420, B-240
400) National Library of Scotland, 2021
401) Driver and Martins, 2006

charts in the Caribbean before the accident. This was to recognize the territory and evolution of the charts starting from the beginning of the nineteenth century, from when adequate symbols and the new techniques were adopted by hydrographers. The analysis focused on the location of wreck symbols in Roncador after 1894, mainly in the area described by primary sources from the court-martial and interview data. For this purpose, the charts selected correspond to those surveyed with accurate scientific procedures from Spanish, British, American, and Colombian hydrographic offices. The most consulted hydrographic archive was the UKHO. They maintain an organized record from nautical charts with the *Catalogue of Admiralty Charts* from different periods and the *Listing of Admiralty Chart Series held in the UKHO Archive "Old Copy Bundle" O.C.B., Series, 1800-2016* as one of the most complete maritime records in the world. Another reason for this was the accurate and relevant information presented in the charts of the UKHO.[402] During the research, active communication was established with UKHO Archive Service and the United Kingdom Hydrographic Office, who replied to all inquiries, providing the requested charts and guidance.

In addition, other archives were consulted, such as the National Archives and Records Administration (NARA) with well-organized records of the Hydrographic Office and information relevant to this study in the *"Record Group 38: Records of the Office of the Chief of Naval Operations, 1875 - 2006 Series: Records Relating to Naval Strategy, 1915 - 1985. File Unit: Western Hemisphere - Gulf of Mexico"* and *Record Group 37: Records of the Hydrographic Office*[403]. Also, the *"Preliminary*

402) National Archives, 2021a; 2021b; U.K.H.O. Archives, 2021
403) NARA, 2021c

Inventories No 85" [404] and *"United States Hydrographic Office Manuscript Charts in the National Archives 1838-1908"* [405] were examined. Unfortunately, no pertinent information was obtained; however, it was noticed that for years the United States Hydrographic Office used the survey information from the UKHO in its nautical charts in the Archipelago before and many years after the shipwreck of the USS *Kearsarge.*[406]

From Colombia, the Maritime Administration (DIMAR) holds recent records from Rocandor Cay such as *"Isla Cayos de Roncador,"* charts covering its maritime territory and adjacent areas. In the area of interest, some sea charts from Roncador in different scales were examined with other banks and islands in the area. This information is organized in public records[407]. Furthermore, an extensive collection of historical nautical charts for the national maritime history was done by the Colombian Ocean Commission (CCO) in the *"Atlas Histórico Marítimo de Colombia Siglo XVI-XVIII"* [408] (Maritime Historical Atlas of Colombia) and reviewed in detail. Another document was the *"Carta Historica Naval de la Bahia de Cartagena,"* COL 1010, from 2000 (Nautical historical naval chart of Cartagena), an archaeological nautical chart with historical records of wrecks. However, there was no relevant information. Finally, the Archivo General de la Nacion (Colombian central archive) and the most extensive library in the country, "Biblioteca Luis Ángel Arango," were consulted with some limited information on

404) Ashby, 1955
405) Heynen, 1978
406) Gomez and Jeong, 2020
407) DIMAR, 2018
408) Fuentes, 2015

Roncador Cay, but without relevance to identifying wrecks.

One of the outcomes of this analysis was the identification and location of the wreck of the HMS *Jackdaw* in the nautical chart O*CB 1334-A2-Old Providence Island* (Fig.32), along with other wrecks and heritage information in the region. For example, the nautical chart O*CB. 1511-St Andrews Island* (*San Andres Isla*), surveyed in 1834 by the UKHO, has an inscription of a military battery on the coastline but has, up until now, been without rigorous analysis. In addition, other wrecks were detected and located in Quitasueno, Serrana, Bajo Nuevo, and Old Providence in the Nautical charts *OCB 1218 A22 West Indies San Juan Nicaragua to C. Gracias* from 1932 and *OCB 1218 B4 West Indies San Juan Nicaragua* from 1993, among other wrecks in the area (Fig. 61; Fig. 62 and Fig. 63). The identities of the wrecks were not determined due to the lack of information. Although the primary purpose of finding a USS *Kearsarge* wreck symbol was not feasible when examining the nautical charts, several wrecks were found in Roncador, albeit without specific information such as the year of the event or ship's name. The following table (Table 14) compiles the findings from analyzing nautical charts, including wrecks in Roncador Cay viable for future research.

Table 14 Relation of Nautical Charts of Roncador Cay for Wreck Symbol Validation

Year	Nautical Chart	Nation	Wreck info.
1912	OCB 1478-A3 Serrana Bank- Roncador corrected to 1912. UK Hydrographic Office	Britain	No information
1922	OCB 762-C9 West India Islands and the Caribbean UK Hydrographic Office	Britain	Lighthouse information
1924	OCB 1478-A4 corrected to 1924. UK Hydrographic Office	Britain	No information
1932	OCB 1218-A14 West Indies with large correction 1932. UK Hydrographic Office	Britain	No information
1937	OCB 1478-A5 Serrana Bank- Roncador corrected to 1937. UK Hydrographic Office	Britain	Lighthouse information
1973	OCB 1218-A22 West Indies with small correction 1973	Britain	One wreck at the south of Roncador
1987	OCB 1218-A29 West Indies with small correction 1987	Britain	One wreck at the southeast from 1981
1993	OCB 1218-B3 with small correction 1993	Britain	No information
1993	OCB 1218-B4 Cuba to Miskito Bank new edition 1993	Britain	No information
1894	No 1374. Serrana Bank-Plan of Roncador Bank correction 1894 US Hydrographic Office	United States	No information
1919	No 1374. Serrana Bank-Plan of Roncador Bank correction 1919 US Hydrographic Office	United States	Information on the lighthouse
1919	No 945 of Cape Gracias a Dios to Gulf of Darien US Hydrographic Office	United States	Information on strong currents and the lighthouse
1942	No 20-26670 - RG 38 PI 85 Chief of Naval Operations. US Hydrographic Office	United States	No information
2017	Carta 211 Isla Cayos de Roncador 4ta. Ed. DIMAR	Colombia	Four wreck
2017	Carta 420 Aproximación a Isla Cayos de Roncador. DIMAR	Colombia	Three wrecks at the south of the Cay
2017	Carta 021 INT 4124 Cabo Gracias a Dios a Isla de San Andrés. DIMAR	Colombia	One wreck from 1981
2018	Carta 008 INT 4025 Cabo Gracias a Dios a Santa Marta. DIMAR	Colombia	No information
2020	Carta 004 Archipielago de San Andrés y Providencia. DIMAR	Colombia	No information

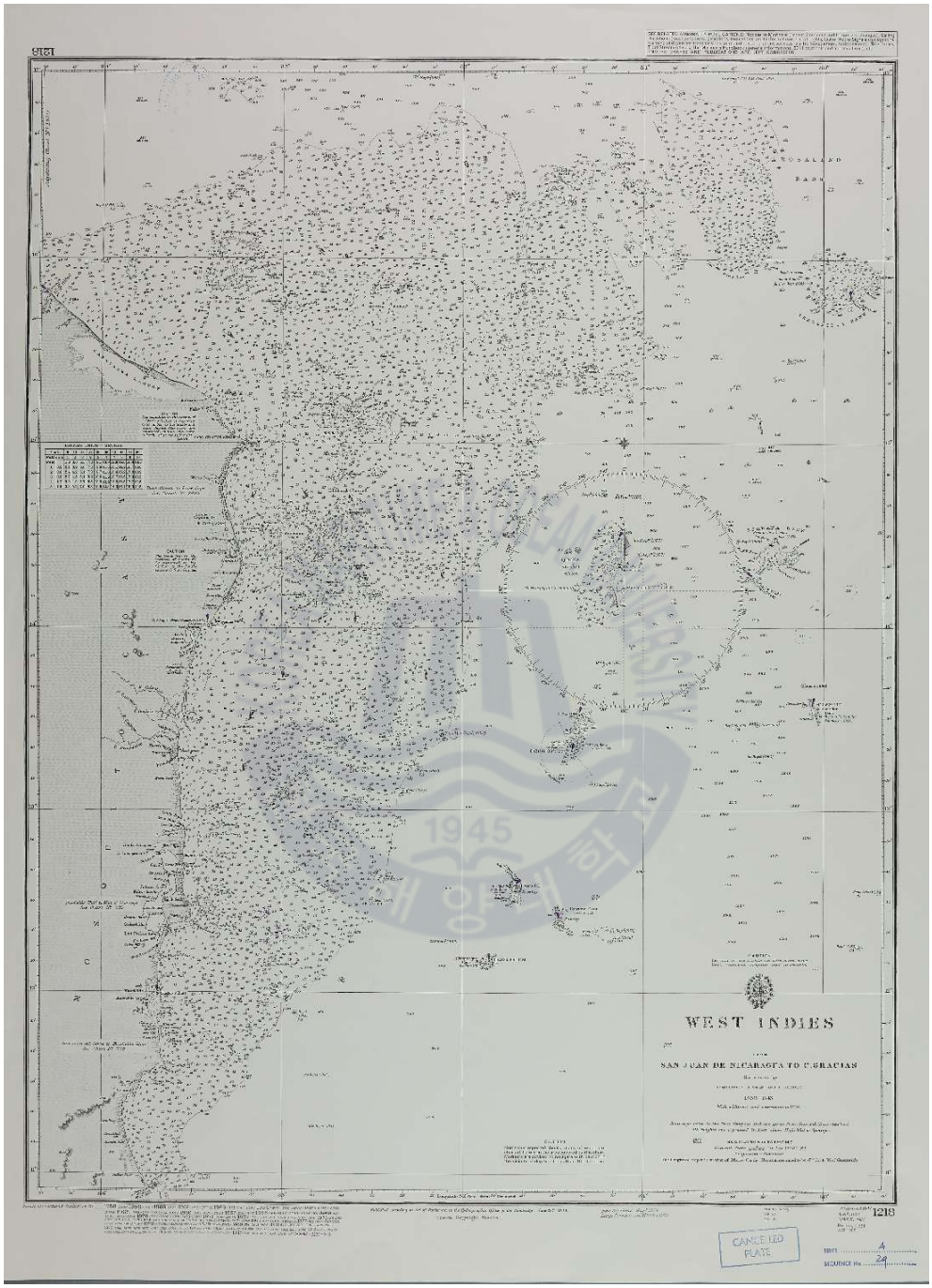

Fig. 61 *OCB 1218 A29 West Indies 1987. UK Hydrographic Office*. A wreck was noticed at the south of the Cay from 1981.

Fig. 62 *OCB 1218 B4 West Indies. UK Hydrographic Office, 1993.* No wreck information.

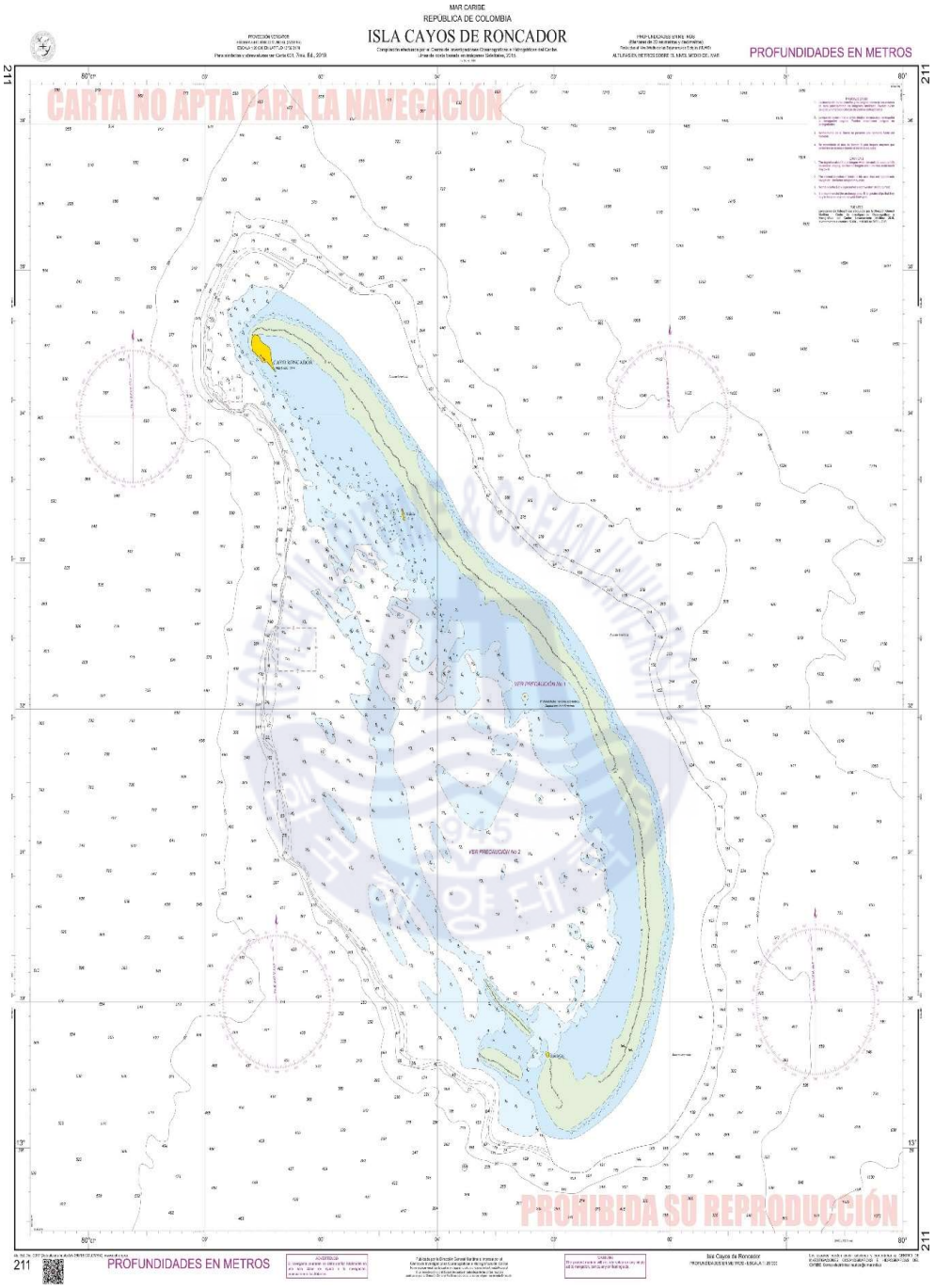

Fig 63 *Carta 211 Isla Cayos de Roncador 4ta. Ed. DIMAR.2017* (Nautical Chart from Roncador, 2017). Four wrecks were noticed at the south of the Cay.

2. Images interpretation, remote sensing and estimated location of the wreck site

In recent years, remote sensing has been implemented in shipwreck detection.[409] Principally from Light Detection And Ranging (LiDAR) and satellite images from Landsat-8, a satellite that operates with a high spatial resolution by the National Aeronautics and Space Administration (NASA). The data analysis can accomplish the detection of wrecks to find different features and geoforms. However, this process is restricted in some cases due to the cost of images or sonar detection acquired data. The main challenge arises from the isolated location of Roncador Cay and developing a non-invasive methodology. For that reason, this chapter's goal is to analyze images to find evidence of the remains or armament through the data obtained to approach and estimate the location of the wreck site, using: the coordinates during the shipwreck in 1894; the location from Lt. Burns of 1894 without coordinates; information and assumptions from the oral interview of 2020. First, these coordinates are approached, set, and displayed on the images in a Geographical Information System (GIS) to compare the distance, intending to generate an area of uncertainty of the wreck. Once the coordinates are set, the study focuses on the area obtained by processing images and visually analyzing possible geoforms associated with the Dalhgrens cannons forms. This process aims to generate a potential area with geographic points of the remains of the USS *Kearsarge* within an area of uncertainty in Roncador Cay.

409) Plets et al.,2011; Delgado et al., 2016; Baeye et al., 2016; Davis et al., 2020; Character et al., 2021; Janowski et al., 2021

2.1. Data and Methodology

The methodology comprised two main activities, data collection, and processing in Geographical Information System. A single reference point was adopted that allowed superimposition of the data (digital photographs, remote sensor images, LiDAR, and bathymetry of the area).[410] The digital transformation was done to a single horizontal reference system MAGNA (Reference system in Spanish), cartographic origin MAGNA Colombia West West - (4 ° 35 '46.3215" N; 80 ° 04' 39. 0285" W) according to the official coordinate system of Colombia implemented by the Agustín Codazzi Geographic Institute (IGAC), in 2005.[411] For the digital transformation to MAGNA, the ArcGis 10.6.1 software was applied. Also, the coordinates from 1894 and the information from 2020 were used to analyze those areas.

The following tables (Tables 15 and Table 16) contain the metadata and information collected;

Table 15 Metadata of Digital Aerial Photographies and Remote Sensing Images

Source	Date	Spatial resolution	Radiometric resolution	Bands	Reference system
Digital Aerial Phtograhies (DIMAR)	2009	25 cm	8 Bit	RGB	Colombia_west_west _zone
Landsat-8	2014	30 m	16 Bit	11 band	WGS84-UTM-zone 17N
Ikonos	2007	1 m	8 Bit	RGB	Magna_Colombia_ Oeste_oeste
Aerial Phtograhies Colombia Air Force	2013	7.5 m	16 Bit	RGB	Magna_Colombia_ Oeste_oeste

410) Afanadorand and Carvajal, 2009
411) IGAC, 2021

Table 16 LiDAR Metadata and Bathymetric Information

Source	Date	Spatial resolution	Radiometric resolution	Bands	Reference system
LiDAR (DIMAR)	2009 2009	25 cm	N/A	N/A	Colombia_west_west_zone
Bathymetric Landsat-8 (IGAC)	20010	N/A	N/A	N/A	WGS_1984_UTM_zone_17N

In order to define and limit the study area, digital treatments were performed on the Landsat-8 image (Fig.64). However, atmospheric and water column correction, which requires specialized procedures, was not implemented in the remote sensing images process.

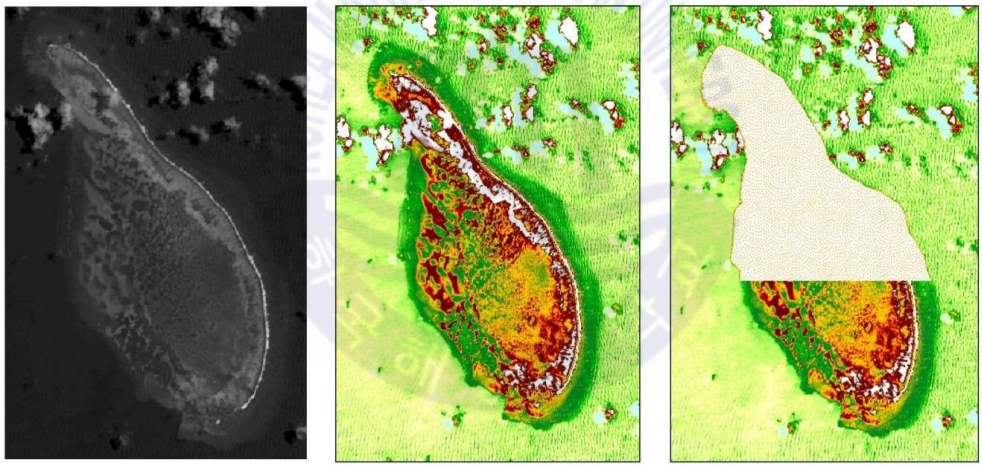

Fig. 64 *Left. Landsat- 8 band image without digital treatment. Central. Image digitalized according to procedures described. Right. Process image used for Roncador Cay polygon (beige color).* Own elaboration.

Also, to create a specific area to search, coordinates from 1894 during the wreck event were used. This data was complemented using an approach from Lt. Burns' location from 1894, a map without coordinates, and assumptions from the interview of 2020, to obtain an estimated location using GIS (Table 17).

Table 17 Geographical Coordinates of the USS *Kearsarge* Wreck and Possible Remains

Year	Geographical coordinates	Event	Source
1894	13° 34' 30 " N 80° 03' 30" W	Wreck coordinates from 1894.	Initially report/Court martial (1894)
1894 -2020	13°34'081" N 80°04.589 W	Estimated coordinates using information by Burns and assumptions from the oral interview.	Burns (1894) Howard (2020)

2.2. 3D Bathymetric Model

By processing of the Landsat ETM + image at level 2 (Orthorectified) - path/row: 014 /, from July 26, 2001, IGAC completed bathymetry data of 2014; composed of isobaths from San Andres and Old Providence Island, Roncador, Serrana, Serranilla, Quitasueño, Alburquerque, and Bajo Nuevo, from images from remote sensors IKONOS and Landsat to determine the depth of the sub-littoral zone of the Archipelago.[412] The Bathymetry data of 2014 was loaded in ArcGis 10.6.1 to selected Roncador Cay, for 3D Bathymetric Model the following steps: Arc Toolbox \ 3D analyst tools \ Data management \ TIN \ Output TIN (Output file name) - Coordinate (Magna_Colombia_Oeste_Oeste) \ Input feature (Filename to load). This method generated some triangulated irregular networks based on Landsat images, which allowed a 3D Bathymetric Model (Fig.65). Finally, it obtained the Roncador Cay bathymetry and digital transformation to the MAGNA West Colombia West West cartographic horizontal reference system.

412) Ariza et al., 2014

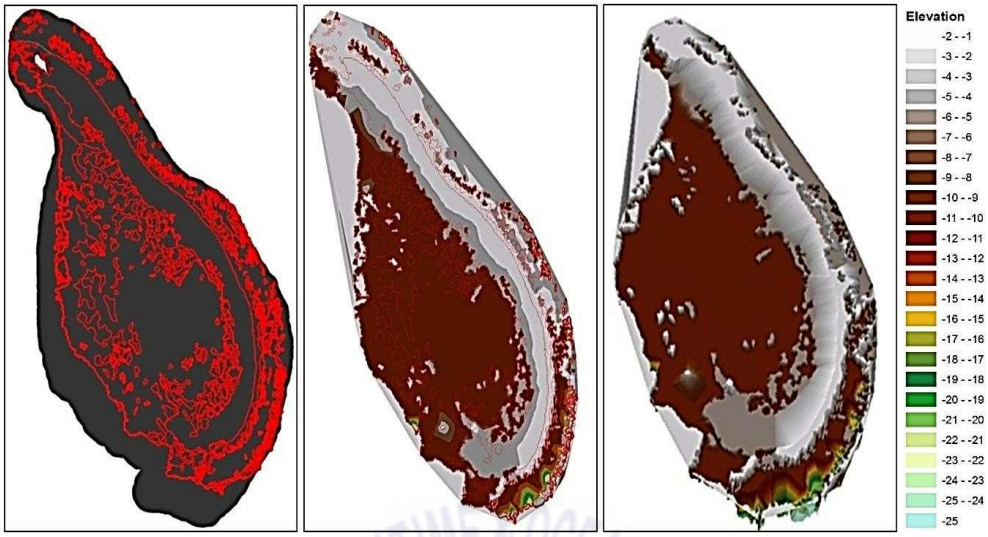

Fig. 65 Left. Bathymetry 2014 (IGAC) loaded in ArcGis 10.6.1. Middle. Triangulated irregular networks based on the previous image. Right: 3D Bathymetric Model in ArcScene 10.6.1. Own elaboration.

2.3. Superimposition Images, Visual Interpretation, and Analysis

The Landsat-8 images and digital aerial photographs were superimposed with the 3D bathymetric model to interpret the area. (Figure 66) This superimposition process aimed to verify aspects such as shapes, patterns, color, and texture. Using the available coordinates from 1894 and the approach to the area from the oral material, trying to find geophorms, especially cylinder shapes similar to cannons, similar to the cannons of the USS *Kearsarge* (Fig. 66). Also, an analysis was carry out based on the digital terrain model proceeds in ArcGIS software to generate perspective views, terrain slope map of Roncador Cay (Fig.67). [413]

413) Wiens, 1992

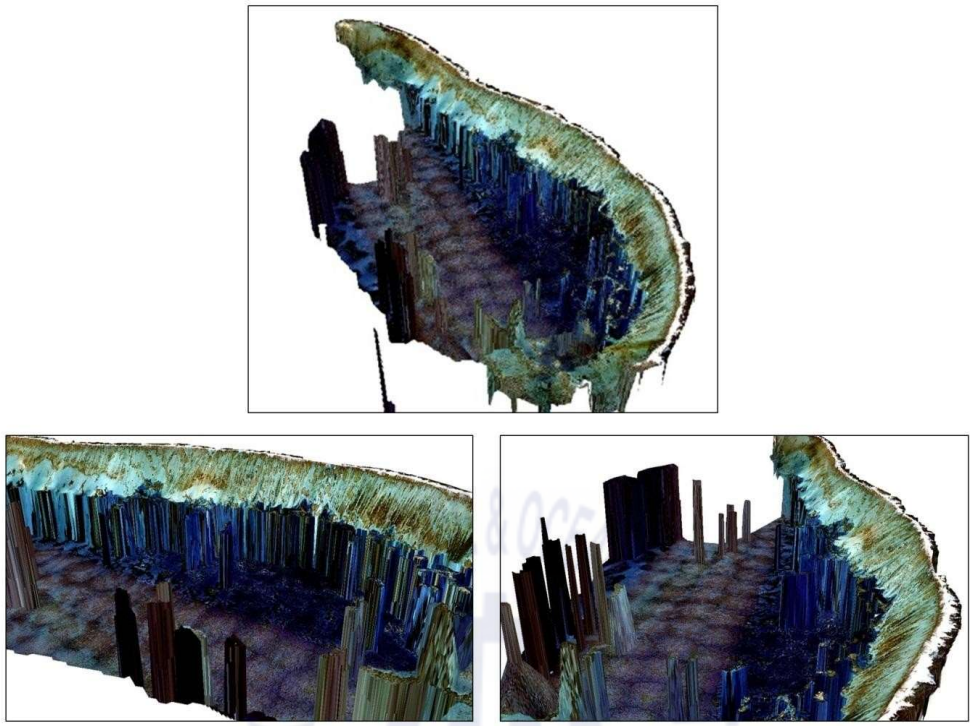

Fig. 66 *Images from different observation points of the superposition of digital aerial photography and 3D Bathymetric Model in Roncador Cay.* Own elaboration.

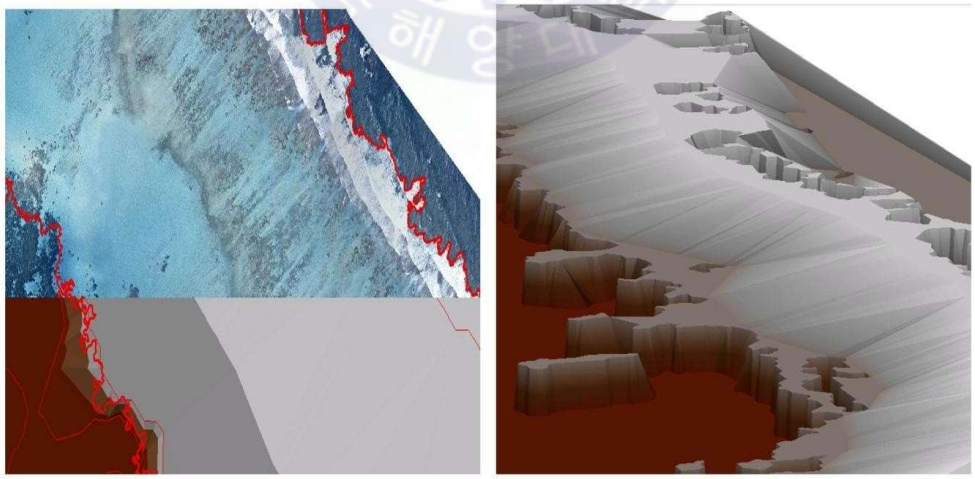

Fig. 67 *Image visualization of the bathymetry and 3D Bathymetric Model, locating the shape of the coral reef.* Own elaboration.

The images were processed to detect the different shapes of the coral that could be associated with wreck remains or cylinder forms similar to cannons in clear and shallow waters. However, the detection was not possible for three main reasons. First, the images are low-resolution, which does not permit the precise analysis of shapes associated with the depth of the site. Second, despite information from 1894 of the depth in the wreck event nearly three and four meters, it was not possible to find relevant shapes in that area. Third, a key reason was the abundant coral reef.

2.4. Probable Area Where USS *Kearsarge* Wrecked

As noted earlier, evidence presented in this dissertation does not contain pertinent data to determine an accurate location of the remains of the USS *Kearsarge*. Also, reconstructing the nautical navigation and vessel trajectory in a chart was impossible because the last two days in the logbook had no entries. Therefore, determining a likely location was only possible in an area of uncertainty based on ambiguous information and assumptions. Nevertheless, an interesting graphic of the wreck event by Lt. Burns in 1894[414] was considered for careful analysis. This study used the British hydrographic survey of the Cay of 1835 to indicate with the letter "A" the USS *Kearsarge's* wreck location (Fig.68). However, this location has no coordinates but was processed in GIS with limited accuracy. Additionally, intending to compare the coordinates from the accident in 1894, the plate made by Burns, and the interview information from 2020 with a probable location, the data were set in a geographic information system -ArcGIS- with the following results.

414) Burns,1894:680-681

First, coordinates from 1894 were set with a likely location on Burns illustration, and assumptions from the interview of 2020 resulted in a distance of about 1.14 nautical miles between these possible locations and less than one nautical mile from point "A" of Lt. Burns (Fig.69). Second, the original coordinates from 1894 taken onboard were set in GIS in an image showing a degree of imprecision due to the limited accuracy of the celestial navigation process (Fig.70). Third, the assumptions of the location of the remains from the interview of 2020 were estimated in GIS (Fig.71). This information resulted in a distance of 1.14 nautical miles from the location of 1894 (Fig. 72). Unfortunately, the evidence to locate the remains of the USS *Kearsarge* with accuracy by this method does not prove the exact location (Fig. 70, Fig.71 and Fig.72).

In an attempt to discover the location and after considering the data set consisting of two possible locations on GIS, it was possible to calculate an area of uncertainty between the points consistent with all the evidence examined, including the study of Lt. Burns in 1894. Consequently, it resulted in an area of uncertainty consisting of four geographical points of one square nautical miles of an estimated location covering information of 2020 and the location of Lt. Burns (Table 18). However, the square does not cover coordinates from 1894 because depth does not correspond to the information during the wreck. Finally, this estimated area covers a square of one nautical mile providing data for future approaches to the wreck site (Fig.73), pursuing positive identification with non-intrusive methodology using multibeam or sonar to detect the wreck and protect the site.

Table 18 Geographical Coordinates of the Area for a Possible Location

Point	Latitude	Longitude
1	13°33'40,605"N	80°04'17,08"W
2	13°34'28,945"N	80°05'1,025"W
3	13°34'58,389"N	80°04'8,73"W
4	13°34'13,784"N	80°03'26,982"W

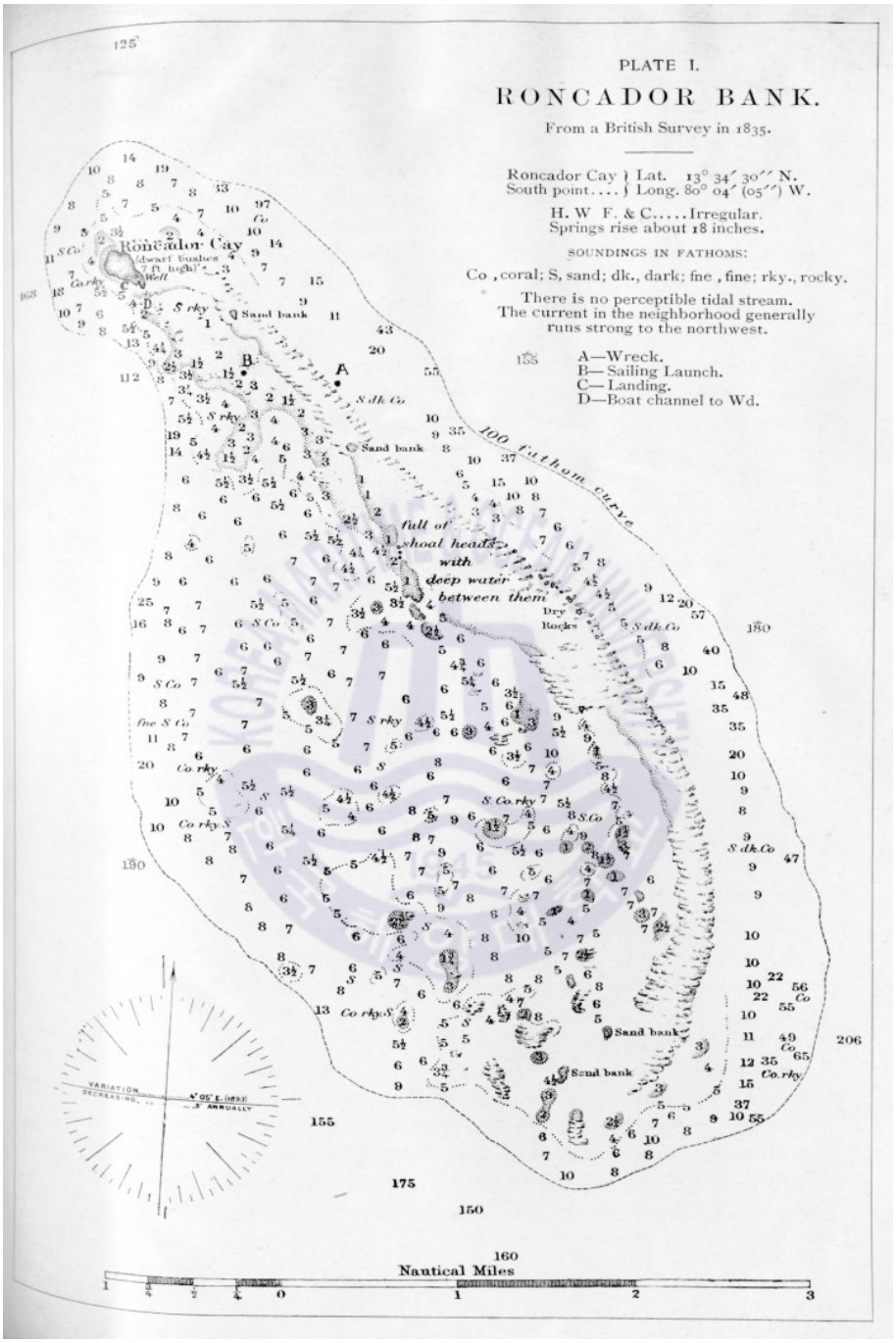

Fig. 68 *Plate I. Roncador Bank. From a British Survey in 1835.* The location of the wreck has the letter **A** (Burns, 1894).

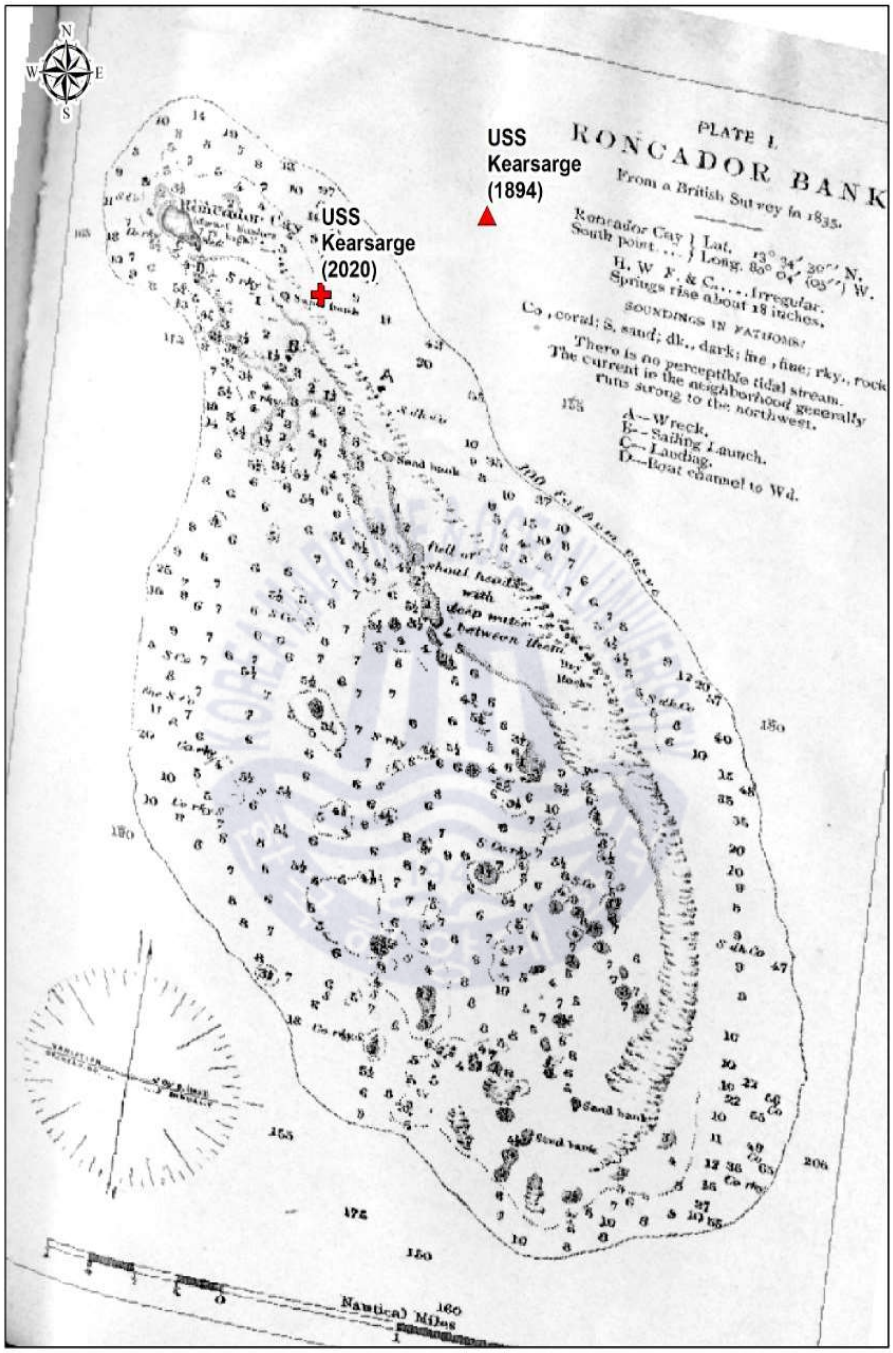

Fig. 69 *Plate I Roncador Bank. From a British Survey in 1835.* The plate was processed in GIS with an approach of the images from 2015 and the oral interview from 2020.

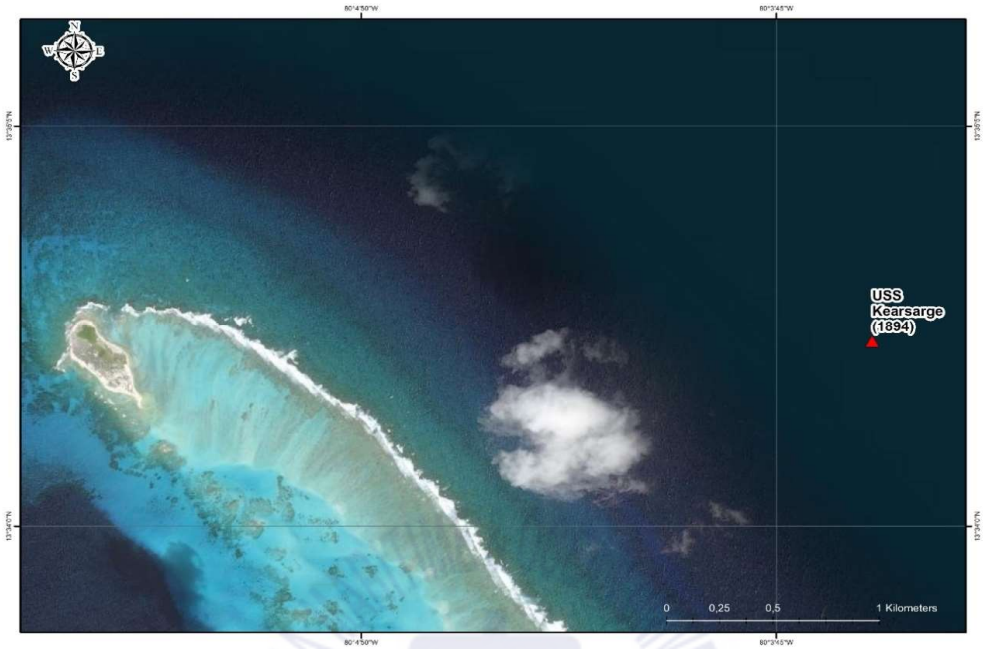

Fig. 70 Location-based on coordinates from 1894. Own elaboration.

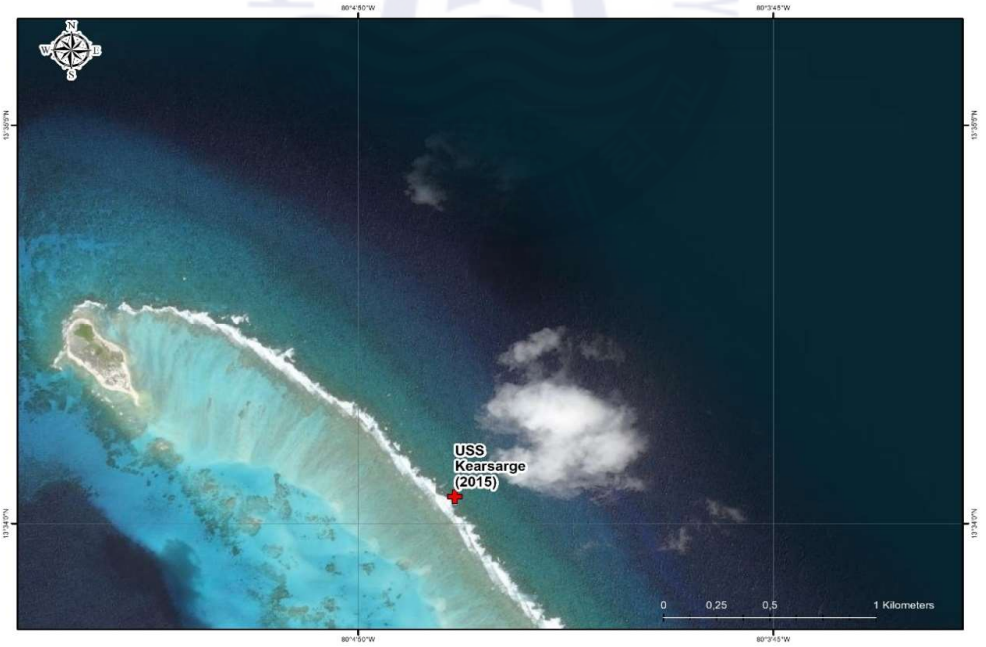

Fig. 71 Location-based on an oral interview of 2020. Own elaboration.

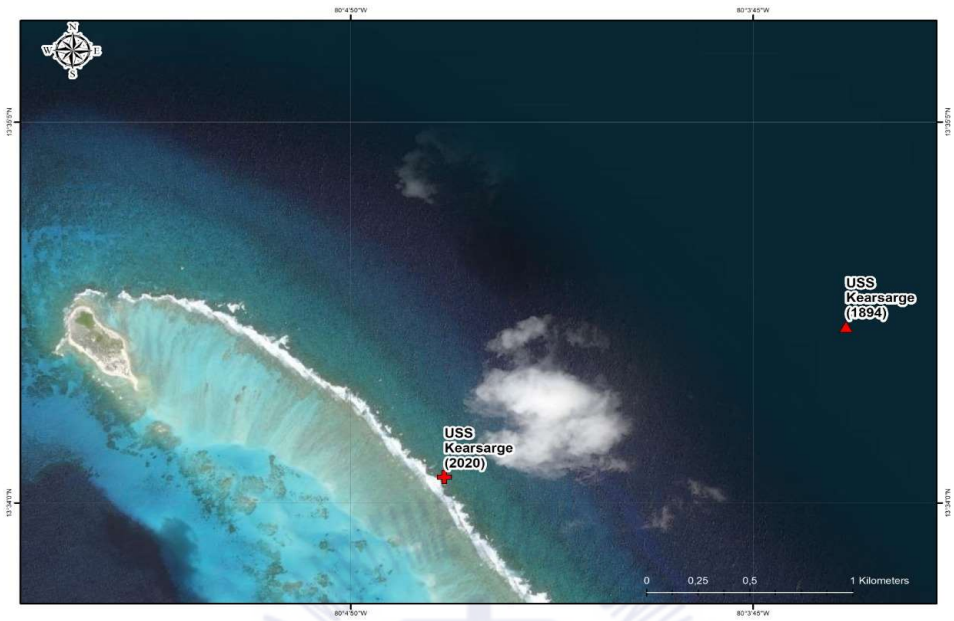

Fig. 72 Location-based on coordinates from 1894 and interview from 2020. Own elaboration.

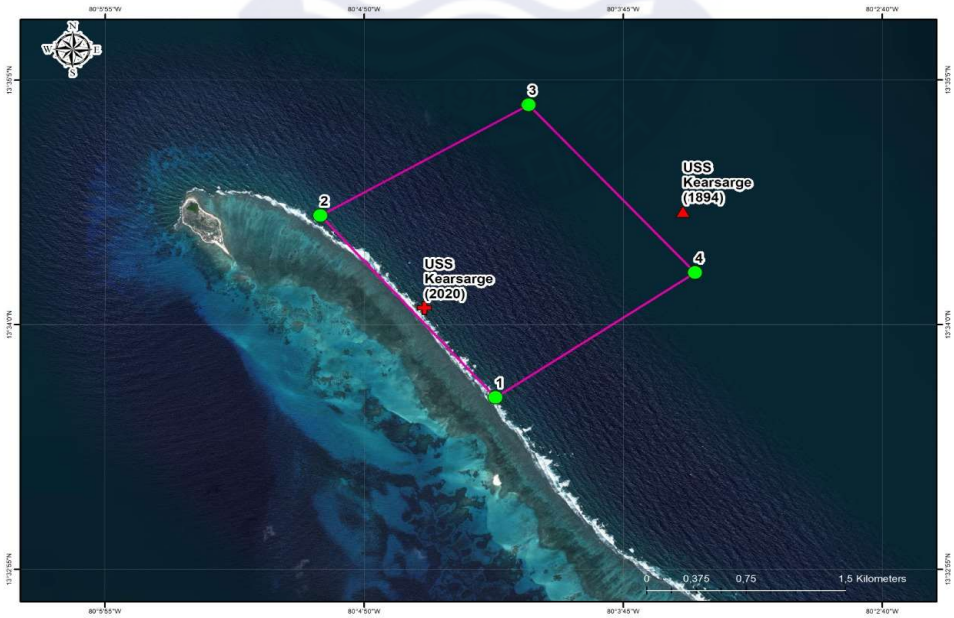

Fig. 73 Area of uncertainty of the USS *Kearsarge*. Own elaboration

3. Approach to Identity by Interpreting the Armament

The objective of this chapter is to approach the identity of the seven guns abandoned on board. Given the challenges of determining the identity of wreck sites, historical records play a key role, albeit with a degree of uncertainty.[415] For this purpose, the analysis is based on archival records, oral testimony, and images. In addition, information available near the potential area of the wreck was examined. Initially, the literature review was undertaken of relevant cases involving shipwrecks' identification through armament to acquire guidelines and methodology used by research in nautical archaeology, and diverse techniques to approximate and interpret wrecks sites based on naval armament. Therefore, sources and methodologies are examined that allow the analysis of the images. However, results are based on assumptions, due to the lack of coordinates in images and measurement of cannons in situ.

3.1. Cannon Identity Methodology

Identification of shipwrecks is a complex process that proceeds from a complete analysis of the characteristics and technology of the vessel and the process that affects the wreck site.[416] Generally, this study process requires historical archives investigation and archaeological site reports. However, establishing identity through artifacts simplified this task, especially the armament, and played an essential role in the identity process. Naval ordnance comes from different backgrounds, materials,

415) O'Shea, 2004:1533-1535
416) Harpster, 2013

ages, styles, and different technologies. During the early modern period and the age of revolution, including the American Civil War, shipwrecks are mostly identify due to the employment of naval artillery, which provides more identification characteristics than ships from earlier periods. In addition, some designs were based on the amount of fire power and number of cannons.[417] In this respect, ordnance was a critical technological advance that influenced warships' design and classification. Also, the use of documentation of artillery, including early ships guns, helped in ship identification.[418]

Guilmartin (1989) established guidelines for cannon analysis procedures. Initially they should be based on physical evidence and the operational context of the military ship, the background of the area, and the influences of maritime powers. Then, underlying factors are composed of elements such as the ship, the guns, the human element, spatial relationship, and geographical factors during a military operation of a warship. Also, artifacts as physical evidence, quantity, and coherence to interpret the ship, antiquity, and high quality. the operational context is considered, such as its military use during a period of war, or other operations such as a blockade, an escort, or for exploration purposes.[419]

Cannons on the seabed are very common method of ship identification, due to their material preservation. The design and material are significant factors. A guideline for proper reporting of historic artillery in shipwrecks was proposed by Roth (1989) with a five-part formula for a specific gun including; (a) material, (b) design, (c) caliber,

417) Lavery, 1987; Martin, 2011; Pomey, 2011:35-40
418) Peterson, 1965:73-74; Cipolla, 1966; Howard, 1986; Canney, 1990; Lyon, 1993
419) Guilmartin, 1988:35-47

(d) length, (e) weight[420]. The details of these guidelines are compiled in three separate groups to extend this formula to its correct identification.

Table 19 Proposed Guidelines for Reporting and Analysis of Cannons

Information	Data
General	Discovery, history, conservation material, location
Essential	All markings, coat of arms, on trunnion face, founder, numbers, weight, length of the gun, the diameter of bore and diameter at the vent, structural description
Relevant	Diameter of the muzzleswell, least diameter, length of the bore, bottom of the bore, lifting rings, and other features designation at the geographical location

Based on Roth (1989:191).

Following Roth's proposal[421] for the analysis of cannons displayed in the table above, General Information covers principally (a) material and (b) design of the cannon for an initial idea of its identity. The material provides a very particular separation of iron or bronze and design and the standards used by the founders to set the dimensions. This information should be based on archival research. Second, Essential Information is concerned with (c) caliber, (d) length, (e) weight. The bore diameter grants the Caliber. This procedure can be complex caused by the environmental conditions that affect submerged cannons, depending on the geographical area, depth, and the influence of corrosion. The bore diameter is one of the characteristics useful in identifying the cannon's nationality. The exact length measurement is decisive and should be taken from the face of the muzzle to the back of the base ring. Weight is helpful in making a clear distinction among

420) Roth, 1989
421) Ibid., p,191

cannons, and is a complex process that should be done in the laboratory. Finally, related information such as the diameter of the muzzle swell, length, and bottom of the bore is not essential; however, it presents additional data that may help during the cannon's identification process.[422]

Particular attention should be paid to marks made by founders, commonly trunnion marks that can include specific information such as the founder's date.[423] Other conventional guidelines during the identification process include cannon images. This method requires different angles, several photos of the whole cannons, and specific images from the cascabel, breech, bore, trunnion and including any other inscription, whether in situ or in the laboratory.[424] Another tool is the use of 3D digital models. Recently, the application of underwater photogrammetry surveys and modeling has increased, yielding positive results. Photogrammetry is based on a set of images, whether by divers, remote sensing (Lidar, sides scan sonar, multibeam echo sounder, or acoustic backscatter) or using an autonomous underwater vehicle (AUV) or a remotely operated underwater vehicle (ROV) to obtain the images for the model in situ.[425]

However, the physical conditions of oceans impact the material (bronze or iron) of wrecks and cannons, within decades of immersion on the sea bed. In some cases, corrosion and concrete marine covering cannons impede the reading of inscriptions and other features.[426] Materials of

422) Roth, 1989:192,193-201,202
423) Peterson, 1965:94-96; Brown, 1989
424) Ciarlo, 2017:29-33; Farrel, 2018
425) Balletti et al., 2015
426) MacLeod, 1996

long-term submerged wrecks are gradually affected by the marine environment, biodiversity, ecosystem, and oceanographic conditions such as water temperature, acidification, storm frequency, currents, and depths. Also, meteorological parameters influence the structure of submerged elements. Other factors influencing cannons are increased surface temperate, climate change, and anthropogenic modification of oceans.[427] To obtain accurate information for identity it is necessary to mechanically remove material from the cannons making features visible, and take appropriate measurements. An appropriate procedure should be used that minimizes impact on the artifact.[428] In summary, ordnance, cannons, and general naval artillery artifacts give clues for shipwreck identification, whether in situ or in the laboratory, significantly determining the ship's size depending on the cannon size and materia l.[429]

There are cases of wrecks having been identified by their cannons. An example from the United States is the *La Belle*, a French shipwreck of 1686, found in Matagorda Bay, the Gulf of Mexico, on the coast of Texas. In 1995 a bronze cannon (artifact No 00753) was raised from the archaeological site and provided the major clue for the wreck's identification. During the analysis, the measure of weight and length provided the diameter, inscriptions, and the decorations in the cannons for complete identification of the *La Belle*[430]. Another example is from Colombia, with the successful identification of the galleon *San Jose*. Photos captured by an autonomous underwater vehicle (AUV) helped

427) Tyrrell, 2011
428) Farrell, 2020
429) Camidge et al., 2017
430) Keith et al., 1997; Selden and Jones, 2021

recognize features and inscriptions on the cannons for its identity with underwater photogrammetry.[431] Despite this wreck having no published results, the press released the government and the salvage company information.[432] Thus, there are many cases of identity-based on naval armament, especially in the Caribbean Sea's geographical area of interest.[433] However, not all research has been able to identify wrecks by armament or cannons. There have been fruitless attempts, such as the Manilla wreck site discovered in 1975 off Bermuda in the Caribbean Sea, where it was impossible to find any link with the cannons and other artifacts found on the site.[434] Other cases found necessary evidence on the armament to attach the wreck site to an empire, date, or context, including its activity but no identification of the ship.[435]

3.2. Methodology to Approach the Cannons of the USS *Kearsarge*

As noted in this study, during the last forty years, some guidelines have been set for researchers to find the best way to approach or attach cannons or naval armament from a wreck site to a ship identity. Cannons have been considered the leading artifact to identify a ship. However, it was not possible to follow the conventional method during this analysis. The lack of access due to the isolated location of Roncador Cay is one of the main impediments to review in situ, in addition to the immunity of the *Kerasrage* as a State vessel from the United States. Therefore, the main concern is finding a process to identify the cannons with the sources available, an intricate method from an archive

431) WHOI, 2018
432) Mincultura, 2015
433) Guilmartin, 1988
434) Karklins, 1991
435) Bernier, 1997; Harris and Richards, 2018; Ridella, 2004; Waddell, 1997

perspective without the standard procedures of measurements in-situ or in the laboratory, which would result in better information.[436] However, a possible approach would be an agreement of cooperation with the United States, though that this would be an unlikely outcome at present. Another impediment to study is the Colombian submerged law's lack of provision of information about underwater heritage. This informed the choice to use alternative methods and assumptions.

In the case of the USS *Kearsarge* armament, the approach is conducted by analyzing images obtained to find any mark or feature intending to link the seven cannons left onboard. A determining and decisive factor for this method is the analysis of the coordinates reported during the wreck event by combining and approximating data assumptions from the oral interview and secondary sources in GIS. In this regard, the initial step was to review the armament history. The reconstruction of the cannon's history has a key role in compiling all data and details from the ship's services, including changes and modifications from the original ordnance, installed in 1862, until 1894. This information is crucial to support image analysis.[437]

3.3. USS *Kearsarge* Armament Data Collection on Roncador

Failure to find information about the wreck incident of the USS *Kearsarge* in Colombia archives, a valuable methodology was to approach local communities in the Archipelago. Therefore, interviews were the best method to obtain oral data and information, considering an

436) Farrell, 2018
437) E. Farrel, personal communication, February 2, 2020

analytical technique to explore others' understanding and knowledge of the shipwreck and the location of the wreck site.[438] Furthermore, the study sought to obtain from local communities, explicit data related to the USS *Kearsarge* wreck site.[439]

During the search of oral information at the Archipelago, it was recommended among locals to contact Nicasio Howard, a seventy year's old experienced local fisherman from Old Providence Island. He shared an oral testimony about the geographical zone, the best time of the year to approximate the banks and cays, his expertise fishing in Roncador, and shipwrecks in the area. He also shared his experiences participating in the annual Colombian national expedition to the Seaflower Biosphere Reserve, especially on Roncador Cay in 2015.[440] Howard gave his testimony during a one-time telephone exchange. Interview questions were formulated on the maritime area, shipwrecks on Roncador, and his knowledge about maritime past activity and understanding of underwater cultural heritage. He answered the questions and shared some personal images of the incidental discovery of cannon remains found in Roncador Cay. Howard's testimony is dates back to September 1979, when he accidentally discovered some cannons during a search for lobsters. For years, Roncador Cay was a popular place for turtles and lobster fishing for the Old Providence Island natives. After this accidental finding, he compared the images obtained with some cannons at the fortress of Old Providence Island, confusing the remains with a possible old Spanish treasure galleon or the wreck of a Dutch warship wrecked in Roncador in 1675, he had seen in a book.[441]

438) Westerdahl, 1980:311
439) Punch, 2005:144-152; Young et al. 2018
440) Sánchez, 2019

Finally, in 2015, during the Seaflower Expedition organized by the Colombian government and navy, Howard guided researchers to the site of the remains found in 1979 that he thought were an old Spanish galleon. Besides the cannons, the site includes an anchor, shells, coiled wire, and copper alloys embedded in coral.[442] This fortuitous discovery was officially included the same year in a confidential report by the environmental agency of San Andres, Old Providence, and Santa Catalina Islands (CORALINA in Spanish). This study requested the report from ICANH and DIMAR in 2020. Unfortunately, it was not available for scientific purposes because of the confidentially set in Article 17 of Law 1675 of 2013, which states that the government considers any discovery of submerged heritage as classified.[443] In spite of this, Howard's testimony of a possible location and images were essential in being the only evidence of the USS *Kearsarge* wreck found in Colombia. Also, it was important in intending to discover the cannon's identity and estimate the location of the wreck by using the coordinates from 1894 and some assumptions from the interview.

3.4. Data Collection Analysis

Considering the reasons explained above, and without any other possible method or established guidelines to apply in this research, the photography records were analyzed to obtain an approach to the cannons of the *Kearsarge* with the images shared by Howard in 2020

441) Marx, 1987:416; Gomez and Joeng, 2021
442) N. Howard, personal communication, October 15, 2020
443) DIMAR, personal communication, August 31, 2020; N. Loaiza, personal communication, 16 September, 2020

without geographical coordinates. However, Howard showed a point near the coordinates reported in the court-martial in 1894 and the map by Lt. Burns in 1894. Therefore, given the point's proximity, a decision was made to analyze the USS *Kearsarge's* armament images into the proposed area of uncertainty (Fig, 73 and Table 18).

Consequently, the following pictures revealed some features, possibly Dahlgren's cannons. The images were taken without any methodology. However, from visual analysis, features details can be compared with some similarities and characteristics of Dahlgren, including shapes. Similar details have been analyzed recently using scientific procedures and methodology to identify Dahlgren guns, as in the case of the Mariners' Museum and Park. The museum has researched Civil War armament, including Dahlgren cannons.[444)]

Images obtained were intended to interpret the cannons of the USS *Kearsarge* as follows;

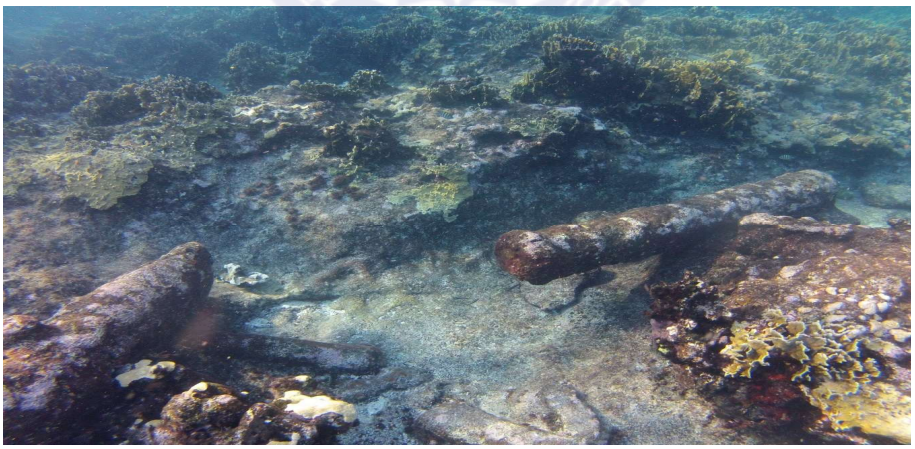

Fig. 74 Two cannons in Roncador Cay (N. Howard, personal archives).

444) E. Farrel, personal communication, January 19, 2021

Despite the images not having an accurate measurement of the depth of the wreck site, an approximate measure of between three to four meters was recorded during the accident.[445] Roncador Cay is part of the Seaflower Biosphere Reserve, a protected area with a vast coral reef and favorable conditions for marine growth.[446] Whether organic or inorganic, shipwreck remains are hugely affected by the physical conditions of the sea, including the growth of coral reefs on the remains. Also, extreme weather events have affected the area, especially in Roncador Cay, where hurricanes and cold fronts could impact the remains in the wreck site. For example, the following year of the accident, an intense hurricane was recorded, affecting Roncador Cay and, therefore, the remains of the *Kearsarge.* [447]

Undoubtedly, climate change has increased the frequency and intensity of hurricanes. An example is hurricane Iota, a category-five tropical storm on the Saffir-Simpson scale, which impacted the Archipelago. Iota was the strongest recorded storm of the last 500 years.[448] However, the anthropogenic process's impact is minimal due to the isolation of the area, and for it being a marine protected area with a coral reef conservation project planned and managed by the local environment agency.[449] Figure 74 shows how coral reef is problematic in identifying submerged cannons' special marks and features. The bottom left of the photo illustrates how the cannon is only partially visible and, therefore, difficult to accurately determine its size. However, based on the cannon's shape, it would be reasonable to assume that it is a

445) Kelley, 1894; Burns, 1894
446) Millan and García-Valencia, 2021
447) Gomez and Jeong, 2021
448) Trenberth and Fasullo, 2007; Garcés-Ordóñez et al., 2021
449) CORALINA, 2008

Dahlgren. Also, the cylindrical shape on the right may correspond to that of the 5.3-inch rifle (60-pounder). Based on the proximity of the two cannons, it is possible it is a Dahlgren IX-inch of the forecastle.

Fig. 75 A possible 60-pounder in Roncador Cay (N. Howard, personal archives).

Figure 75 provides a better image of a possible 60-pounder. It is reasonable to assume that the cannon (right Fig. 74) is a 60-pounder since it is small compared to the other. This armament could be part of the *Kearsarge's* forecastle.

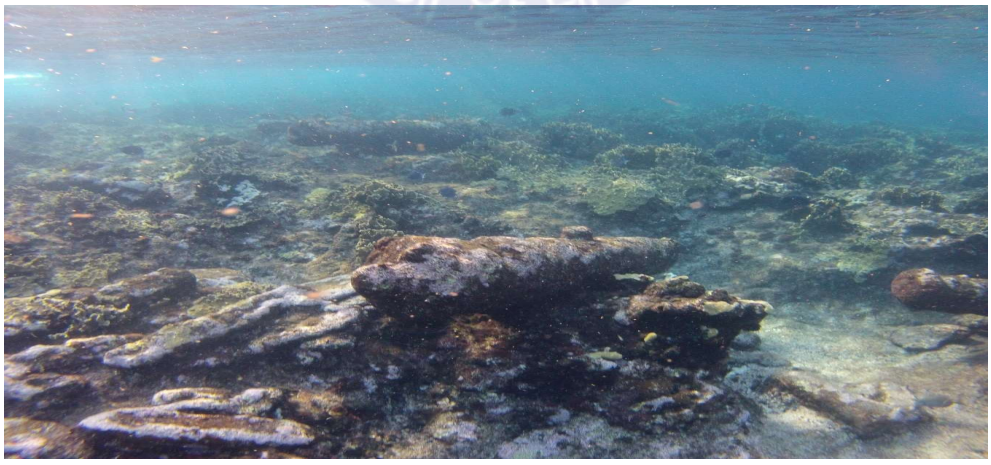

Fig 76 A possible IX-inch in Roncador Cay (N. Howard, personal archives).

Fig 77 Another angle of the possible IX-inch in Roncador Cay (N. Howard, personal archives).

Figure 76 and Figure 77 show an alternative angle of the artifacts embedded in the coral reef which may correspond to an IX-inch located in the forecastle and near the potential 60-pounder rifle. The two images below have different angles of the same site, and the artifacts are comparable to the 60-pounder rifle and the two IX-inch canons located in the forecastle near the bow of the USS *Kearsarge.*

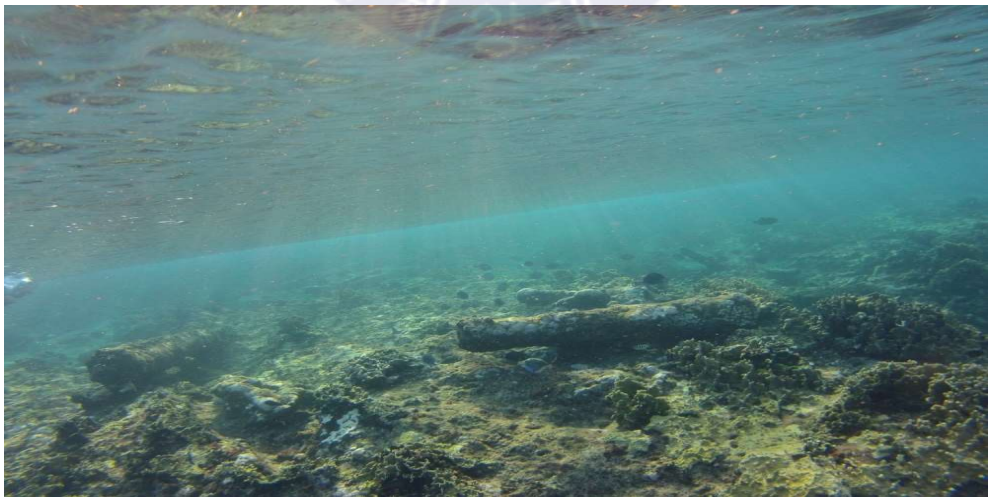

Fig 78 Three cannons in Roncador Cay (N. Howard, personal archives).

Fig 79 One cannon in Roncador Cay (N. Howard, personal archives).

Fig. 80 Three cannons in Roncador Cay (N. Howard, personal archives).

These image (Fig.80) show three guns whose shapes are consistent with that of Dahlgren shell guns. This analysis is further supported by the singular form of the cannons, which Admiral Dahlgren recognized as: *"the form of the breach may be hemispherical, hemispheroidal or ellipsoidal as a greater or less strength is required."* [450] Furthermore,

the cannons were recognized by their distinctive soda water bottle" form.[451] Consequently, the following pictures revealed some features, possibly Dahlgren's cannons. The three cannons at the bottom in Figure 80 appear similar. Therefore, these cannons could correspond to an IX-inch. However, one cannon could be an 8-inch due to differences in visual dimension perspective. The reason for this assumption is that primary sources validated that during the wreck event, one of the 8-inch cannons was thrown by the crew members from the port side as one of the Captain's desperate attempts to minimize the weight and maneuver out of the reef.[452]

Fig. 81 A cannon in Roncador Cay (N. Howard, personal archives).

Figure 81, could correspond to one of the IX-inch cannons near to the stern and starboard sides.

450) Olmstead et al., 1997:83
451) Dahlgren, 2018:20
452) Kelley, 1894:6; Burns, 1894:675-676

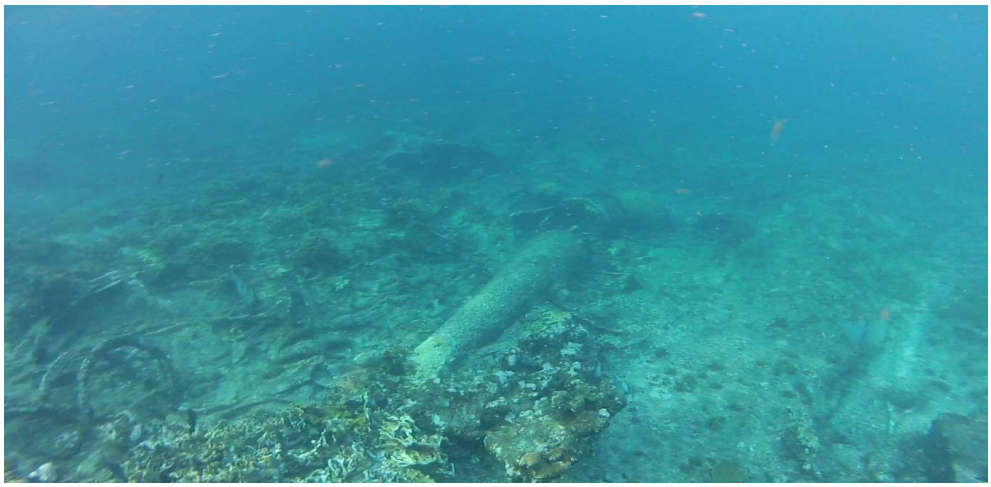

Fig. 82 A possible 8-inch in Roncador Cay (N. Howard, personal archives).

Fig. 83 Another angle of the image. Possible 8-inch (N. Howard personal archives).

Identification of the artifacts in figures 82 and 83 is easier since there is less marine concrete. When compared with other images and Dahlgren guns, the size difference would indicate the cannon is an 8-inch, probably one that was located closest to the stern.

Unfortunately, during the oral interview, the number of cannons was not accurately determined.

3.5. Conclusions on the Armament Analysis

In spite of the difficulties performing a proper analysis, from examining the images, it is possible that there were Dahlgren cannons in Roncador Cay in an area near the accident's coordinates. One significant factor in the images' analysis was the difference in shape and proportion of the naval artillery of colonial powers, such as Spain and England, in the Caribbean during the colonial period. For centuries, such powers sailed the Caribbean Sea and registered military shipwrecks from the sixteenth century to the beginning of the nineteenth century. Also, this can reflect the evolution of modern cannons and new imperialism in the region.[453] However, among other factors, the lack of coordinates from the images and the marine concrete covering remains made it difficult to find the difference between Dahlgren and other cannons. Therefore, in situ measurement would be necessary for positive identification.

Finally, the analysis of images provided a possible approach and similarities to Dhalgren cannons based on assumptions. However, measuring the length and assessing essential parts of the cannons are straightforward procedures to determine or deny this armament as the USS *Kearsarge* cannons in Roncador Cay.

453) Padfield, 1973; Manucy, 1985; Torrejón, 1997; Ciarlo, 2017

Ⅵ. Discussion and Conclusions

This research aimed to find and interpret evidence to approach the USS *Kearsarge* identity and estimate the wreck site location. Although the goals were accomplished, the study was the subject of interdisciplinary research, which allowed the analysis of information from different sources, methodologies, and assumptions. In addition, the research presented an analysis of the sociocultural factors and environmental conditions to obtain the relationship between the shipwreck and the maritime cultural landscape and the legal status of the USS *Kearsarge's* remains. The legal analysis permitted determined the future of the remains. During the study, a critical piece of information was an accidental discovery by a local fisherman from Old Providence Island about forty years ago. Essential information on cannons was ascertained via the fisherman's oral testimony of the finding and images from the wreck site with a possible location.

The visual analysis used is not the conventional method of nautical archaeology to establish identity. However, due to the limitations presented and challenges of ambiguous information, assumptions were the only approach to interpret the cannons as possible Dahlgrens. Despite this, from primary sources, the study confirmed the main armament abandoned on Roncador Cay.; however, the results should be interpreted with caution.

Additionally, to find a likely location, logbooks were required to trace information and interpret the celestial coordinates, including the salvage

attempts and details of during and after the accident. In order to support this process, an examination of nautical charts covering almost two centuries was conducted to detect any wreck symbols associated with the USS *Kearsarge* near the coordinates of 1894 and the assumptions from the oral interview. Finally, to validate the information from the coordinates, the data were processed in a geographic information system (GIS) to estimate the location of the wreck site resulting from an area of uncertainty as to the main finding of this research.

1. Key Findings

Chapter II analyzed the most common causes of historical marine accidents to understand shipwrecks, their value as an underwater cultural heritage, and their relationship with the maritime cultural landscape. Consequently, environmental conditions, sociocultural factors, and the process of wreck site formation was reviewed. This chapter also deals with the importance of the term "shipwreck" and *"naufragio"* defined from an international and national legal framework from the United States as the flag state and Colombia as a coastal state. Legal cases in the United States and Colombia were analyzed to identify gaps in the form that laws are managed involving sovereign immunity as one of the main factors in the wreck of the USS *Kearsarge*. This study found that maritime power is a critical component in interpreting the maritime cultural heritage from both countries. In this regard, the United States, as a significant maritime country, has powerful tools, resources, and laws to manage wrecks coming from sunken military ships. Furthermore, they have deep respect for its heritage from worldwide wrecks, including foreign military wrecks in its territorial waters. In

contrast, Colombian law does not consider sunken military vessels, and the sovereign immunity of foreign wrecks is questionable.

To interpret and support the current position of the countries involved in the wreck site of the USS *Kearsarge*, a review of the state of shipwrecks was done mainly of military ships. For Colombia, an analysis of military shipwrecks was undertaken, compiling 14 wrecks in a database for future research. This new information reveals that Colombia possesses a few military shipwrecks, which can help determine its maritime power and naval size. Also, this chapter's other results were to collect shipwrecks from World War II in Colombian waters and to compile shipwreck studies of nautical archaeology and maritime history during the last 30 years in Colombia. It was found that studies from maritime history are limited. However, it was identified a lack of interest of the Colombian government to support research in historical shipwrecks and maritime culture with international cooperation.

In seeking to analyze a possible approach to future projects in the remains of the USS *Kearsarge* involving the United States as a flag state and Colombia as a coastal state, an analysis was done in progress toward underwater cultural heritage in both countries. For this purpose, their respective views on the underwater cultural heritage, the last actions undertaken by each government, and their capacity of cooperation were considered. Results showed restrictions from the Colombian Government. This included external legal situations, such as the case of the Spanish galleon *San Jose*, which added to the lack of international cooperation on this subject. In contrast, the United States in the last year has been more supportive of the study of military

shipwrecks with recent bilateral cooperation agreements to protect the heritage. All this suggests an unpredictable future for any cultural and scientific study to the USS *Kearsarge.*

Chapter III considers the maritime cultural landscape, the shipwreck's social context, and its relationship with environmental conditions in influencing the accident of the USS *Kearsarge*. This chapter analyzed the environmental conditions affecting the wreck event, including the geomorphology, climate, and currents of Roncador Cay as causes of the event. One of the findings of this chapter was that environmental conditions and historical descriptions of Roncador Cay and the Archipelago were conclusive evidence of Roncador as a "ship trap." This term has been used in specific sites with many wrecks, as is the central area of this study. Another significant result in this chapter was to reveal a Spanish scientific and hydrographic survey in the Archipelago with an English translation of the original records, including a geographical description of Roncador Cay by Spanish officers. Importantly, primary sources of the Royal Navy hydrographic survey in the Archipelago, and the material produced, were released for the first time. This valuable information was the first accurate scientific report in the Archipelago, in contrast to imprecise previous nautical information of the region. Also, during the nautical analysis, the location of the wreck of the HMS *Jackdaw* in Old Providence Island was identified, and an original copy of the nautical chart was displayed presenting the wreck location.

Furthermore, one of the most striking results was the armament's analysis and descriptions from its years of service. This study was

possible after examining the logbooks from the USS *Kearsarge* and other sources, such as the plans made during the ship's last period of repairs. The value of this information was to identify the cannons abandoned onboard and some technical details for future fieldwork. Also, it reviewed interesting descriptions of Roncador Cay and the USS *Kearsarge* in narrative form from the nineteenth century and the beginning of the twentieth century. The analysis' findings revealed this area's importance for the United States and Britain, other possible wrecks, as well as the sentiments toward the USS *Kearsarge* of American society.

Pursuing details of the wreck event, Chapter IV analyzed primary sources from the reports and the court-martial. A detailed review was done on the military reports focused on the nautical description and established the responsibilities for the loss of the USS *Kearsarge*. The findings of the salvage attempts contributed information about the armament and the wreck after the accident. Some conclusive elements confirm that the armament was abandoned on the ship during the rescued attempts and could not be removed by looters. Also, despite reviewing a possible accidental discovery of the USS *Kearsarge* in 1986 by a salvage company, the results are questionable and do not present conclusive evidence to confirm the information.

A method to validate the wreck site's estimated location was presented in Chapter V with an analysis of data from nautical charts from 1894 to 2021. Unfortunately, this analysis did not find any supporting information on the location of the wreck of the USS *Kearsarge*. However, some interesting findings were observed in the

charts, such as the lighthouse in service in 1920 and other wrecks from the twentieth and twenty-first centuries. Also, this method revealed significant numbers of wrecks in other banks and cays in the Archipelago, but it was impossible to find an identity. Furthermore, images of the cannons obtained from the interview were analyzed based on assumptions. However, the evidence presented is inconclusive. This study confirms that the proposed guidelines for measurement of the cannons in situ or in the laboratory, among other identification methods, as the only methodology for a positive identity.

Processing, LiDAR, and satellite images used a methodology to detect shapes associated with the remains of cannons. However, this process was ineffective in finding shapes associated with the location of the remains of the USS *Kearsarge*. Also, it confirmed that high-resolution images are required for this method, the financial cost of which are prohibitively high for this study. One of the main results of this chapter and the entire study was to generate an area of the uncertainty of the wreck site, using coordinates from 1894, oral interview information, and the location from Burns' 1894 illustration. Two of the coordinates showed a distance difference of 1.14 nautical miles (2,100 meters) and served to set the area of uncertainty on Roncador Cay as one square nautical mile, based on four geographical points as the possible location of the wreck. This result has the potential to estimate the likely location of the remains of the USS *Kearsarge*. Although not accurate, it may serve as a valuable tool for additional research to the wreck site pursuing the identification of the cannons.

2. Concluding Remarks

This study presented an analysis of several sources from qualitative and quantitative information on the wreck of the USS *Kearsarge*, highlighting the importance of the underwater cultural heritage and explaining the relationship of the environmental conditions of the wreck site and the sociocultural significance of the ship. Even though the data collected and the methods used to estimate the wreck's location were not accurate, the information obtained generated an area of uncertainty with a probability of applying this data for future identification of the remains and preservation of the cultural heritage.

It is concluded that the future of the USS *Kearsarge's* remains is unpredictable. Despite the high level of interest shown by the United States toward its sunken military vessels, it was demonstrated that one of the difficulties to conduct a work field in the wreck site arises from the Spanish galleons located in Colombian waters. Consequently, a cooperative approach between the United States and Columbia governments seems unlikely. Therefore, urgent capacity building is necessary for sustained development to enhance Colombia's underwater cultural heritage policies and research.

This research indicates substantial evidence of wrecks in Roncador Cay and the Archipelago of San Andres, Providence, and Santa Catalina, which must be reviewed in detail to obtain shipwrecks' identity and history. In addition, this study collected and classified crucial information of shipwrecks coming from Colombian military vessels and World War II. Also, historical and nautical evidence was presented from the Royal

Navy hydrographic survey in the Archipelago, with important details such as the wreck of the HMS *Jackdaw*.

Finally, the importance of revealing to Islanders its enormous potential of historical shipwrecks within the Archipelago of San Andres, Old Providence and Santa Catalina was recognized. The study is expected to facilitate and provide information to local authorities to protect the wreck site and preserve the underwater cultural heritage of the islands.

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