

Prinz August Wilhelm (1918): Site Formation Processes and Preservation of a First World War Shipwreck in the Colombian Caribbean

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Abstract

This non-intrusive study presents the archaeological documentation and preservation assessment of the German steamship *Prinz August Wilhelm*, deliberately scuttled in Puerto Colombia Bay in 1918 during the final stages of the First World War. By integrating historical documentation, geophysical surveys, and direct underwater observations, this research highlights the methodological value of multi-source approaches to investigate twentieth-century shipwrecks. Furthermore, it contributes to broader theoretical discussions on site formation processes and underwater cultural heritage management in dynamic tropical coastal environments. The wreck remains largely intact, although significant deterioration was documented in the bow section because of corrosion and hydrodynamic activity.

Introduction

Over the last several decades, maritime archaeology has evolved considerably as a discipline, benefiting from advances in technology and theoretical approaches. Research has expanded beyond the narrow chronological and spatial boundaries that characterized its early development, moving past a primary focus on spectacular shipwreck discoveries. Contemporary maritime archaeology increasingly emphasizes the broader contexts in which maritime activities occurred, incorporating concepts such as the Maritime Cultural Landscape (Westerdahl 1992), as well as issues of conservation, public engagement, and heritage management in accordance with the principles promoted by the UNESCO 2001 Convention on the Protection of the Underwater Cultural Heritage.

In this framework, archaeological research is no longer limited to the documentation of submerged remains. Equal importance is now placed on understanding site formation processes, assessing preservation conditions, and ensuring that archaeological knowledge is effectively communicated to society (Martín-Bueno 2003; Harpster 2013).

In Colombia, however, maritime archaeology has developed under particular circumstances. Unlike many countries actively engaged in the implementation of UNESCO guidelines, Colombia has not ratified the 2001 Convention. Instead, underwater cultural heritage is regulated by Law 1675 of 2013, a piece of legislation that has generated significant debate because it excludes certain categories of material remains from heritage protection, particularly those considered to possess commercial value. Therefore, important sectors of the country's submerged cultural heritage remain vulnerable to commercial exploitation and unauthorized recovery (Martín et al. 2022; Martín & Bettencourt 2023; Rivera & Martín 2018).

Despite Colombia's extensive maritime and fluvial history, relatively little effort has been devoted to the systematic inventory, documentation, and assessment of underwater cultural heritage resources. Most investigations conducted to date have focused on the location and identification of shipwrecks and submerged archaeological remains (García and del Cairo 2002; Romero and Pérez 2005; del Cairo 2006; Martín et al. 2022; Martín et al. 2015). Comprehensive studies addressing site preservation, environmental threats, and long-term management strategies remain comparatively scarce.

The present study seeks to contribute to filling this gap through the investigation of the German steamship *Prinz August Wilhelm* -PAW-, which sank in Puerto Colombia Bay in 1918. The site constitutes an especially significant case study because of its historical importance, archaeological potential, and current state of vulnerability. More than one century after its sinking, the wreck qualifies as underwater cultural heritage under Colombian legislation. At the same time, it is exposed to intense coastal and oceanographic processes that accelerate structural deterioration. Strong currents, sediment transport, and coastal erosion affect the bay where the vessel lies, while its relatively shallow depth and proximity to shore make it highly accessible to unauthorized visitors and potential looting (Martín et al. 2017).

Understanding the current condition of the wreck and the natural and cultural processes affecting its preservation is therefore essential for developing effective conservation and management strategies. Furthermore, documenting the site contributes to a broader understanding of the maritime cultural landscape of Puerto Colombia, one of the most important port areas in the Colombian Caribbean during the late nineteenth and early twentieth centuries.

This article presents the results of an integrated historical and archaeological investigation of PAW. Combining archival research, a multibeam sonar survey, and underwater verification dives, the study documents the current condition of the wreck, evaluates the processes that have shaped its archaeological formation, and discusses future strategies for its conservation and long-term management (Fig. 1).

Historical and Geographical Context

The expansion of steam navigation during the nineteenth century transformed transportation networks throughout the Caribbean Basin and reshaped the economic geography of Colombia. These developments were closely linked to navigation along the Magdalena River, the country's principal transportation corridor, which connected the Caribbean coast with the political and commercial centers of the interior (Posada Carbó 1989; Poveda 1998).

The inauguration of the Puerto Colombia pier in 1893 marked a turning point in Colombian maritime commerce. Its exceptional length enabled ocean-going steamships to transfer passengers and cargo despite the shallow waters of the Colombian Caribbean coast, establishing Puerto Colombia as the country's principal gateway for international maritime traffic during the late nineteenth and early twentieth centuries. As the maritime outlet of Barranquilla, the port became a strategic node linking transatlantic shipping routes with the Magdalena River system and attracted the operations of numerous foreign shipping companies, including British, French, Dutch, Spanish, and German firms.

Among these companies, the Hamburg-Amerikanische Packetfahrt-Actien-Gesellschaft (HAPAG) played a major role in connecting Colombian ports with Europe and the wider Caribbean through regular passenger and cargo services. One of its vessels was *Prinz August Wilhelm* (PAW), a combined passenger and cargo steamship launched in 1903. Measuring 117.3 m in length and capable of carrying

approximately 5,000 tons of cargo and up to 791 passengers, the vessel operated regular services between New York and ports in the Caribbean, including Colombia, Panama, Costa Rica, Cuba, Haiti, and Jamaica (Yidi and Mendoza 2014).

The outbreak of the First World War abruptly disrupted these commercial networks. To avoid capture by Allied naval forces, many German merchant vessels sought refuge in neutral ports throughout the Americas. Colombia maintained its neutrality during the conflict, allowing several German ships to remain in its waters. Following this policy, PAW arrived in Puerto Colombia on 12 November 1915 after an initial stay in Santa Marta, where it remained immobilized for more than two years.

On the night of 22 April 1918, the vessel was deliberately set on fire and scuttled by its own crew under instructions transmitted by the German government through the German consul in Barranquilla¹. Contemporary accounts indicate that the decision was intended to prevent the recently acquired vessel from falling into the hands of the United States Shipping Board and potentially being incorporated into the Allied war effort (Yidi and Mendoza 2014). The destruction of the ship generated diplomatic tensions with the Colombian government, which regarded the action as incompatible with the country's neutral status, while local newspapers widely reported the incident and its political implications (Rausch 2015; Yidi and Mendoza 2014)².

Beyond its diplomatic significance, the sinking created practical difficulties for navigation within Puerto Colombia Bay. Historical documents record concerns that the wreck obstructed an area already affected by sediment accumulation and could further complicate maritime operations³. During the twentieth century, coastal engineering works, particularly the construction of the Bocas de Ceniza jetties in 1936, substantially modified regional sediment dynamics and shoreline evolution (Restrepo 2014). Although the specific effects of these processes on the archaeological site cannot presently be quantified, they provide an important environmental framework for understanding the long-term preservation of the wreck.

The deliberate scuttling of PAW transformed an active merchant vessel into a submerged archaeological site whose present condition reflects the combined effects of historical events and subsequent environmental processes. This historical context provides the framework for interpreting the archaeological evidence documented at the site and understanding the wreck as part of the maritime cultural landscape of Puerto Colombia (Fig. 2).

Materials and Methods

This research combined historical investigation and archaeological surveys to locate the wreck of PAW and assess its current state of preservation. Both lines of inquiry were developed in parallel and informed one another throughout the research process. Historical documentation provided information regarding the probable location and history of the vessel, while archaeological survey methods enabled

the verification of its position, documentation of its physical characteristics, and evaluation of its conservation status (Fig. 3).

Over the last several decades, remote sensing technologies have become essential tools in maritime archaeology. Acoustic survey systems use sound waves transmitted through the water column that are reflected by the seabed and submerged objects. The resulting data provide highly accurate information on the morphology, dimensions, and spatial distribution of underwater archaeological features (Green 2004; Murphy and Saltus 1990; Quinn et al. 2005; Plets 2012).

The archaeological survey was conducted using a high-frequency multibeam echo sounder operating between 170 and 220 kHz. The system provided a spatial resolution of 3.6 cm, a swath coverage of 120°, and a maximum operating depth of 250 m. Survey operations followed the standards established by the International Hydrographic Organization (IHO).

The multibeam system was integrated with differential positioning and heading correction instruments (DGPS and Hemisphere VS111 compass), a vessel-motion sensor capable of recording heave, roll, and pitch (DMS-05 Teledyne), and sound velocity profilers for both surface and water-column measurements (Digibar V and Digibar S). These instruments ensured the accuracy and reliability of the bathymetric dataset.

Based on historical sources and previous investigations (Yidi and Mendoza 2014), a survey area was defined within Puerto Colombia Bay. Eleven survey transects were subsequently completed in order to maximize coverage and ensure data redundancy. Transects were designed with sufficient overlap to guarantee complete seabed coverage and facilitate quality control during data processing. Data acquisition and visualization were conducted using Hypack software.

Following the geophysical survey, a series of verification dives was carried out to ground-truth the multibeam data and evaluate the integrity and preservation of the wreck. Underwater visibility at the site was generally poor, ranging from 0.3 m to 1.5 m during field operations. Strong currents also affected diving conditions, particularly around the bow section, where documentation proved more challenging.

Systematic archaeological inspection was conducted through a series of controlled transects. Divers began at the bow and proceeded along the starboard side toward the stern before returning along the port side. Parallel survey lines ensured complete visual coverage of the vessel's main deck. Additional dives focused on the lower portions of the hull to document structural preservation and identify evidence of deterioration or disturbance.

All observations were recorded photographically and subsequently analyzed to evaluate the state of conservation of the wreck. Attention was given to the effects of corrosion, sedimentation, biological colonization, hydrodynamic activity, and human intervention, all of which have contributed to the site's ongoing transformation since its sinking in 1918.

Understanding the current condition of *PAW* requires consideration of the cultural and natural processes that have shaped the site since its deliberate sinking in 1918. Shipwrecks are not static archaeological entities, but dynamic assemblages continuously modified by environmental forces and human activities. As maritime archaeologists have long recognized, the archaeological record of a shipwreck reflects not only the circumstances of its loss but also the cumulative processes that affect its preservation, alteration, and interpretation over time (Muckelroy 1978; Schiffer 1987).

Cultural formation processes encompass the range of human actions that contribute to the creation, modification, and transformation of archaeological sites. In the case of shipwrecks, these processes may include construction, operation, maintenance, salvage, abandonment, reuse, and eventual deposition within the archaeological record (Gibbs 2006).

PAW is a particularly valuable case study because its archaeological context originated not from a catastrophic maritime accident but from a deliberate act of scuttling. The vessel was intentionally destroyed by its crew under instructions from German authorities, transforming an operational steamship into an abandoned structure within Puerto Colombia Bay.

Subsequent human activities have continued to affect the site. Historical records and archaeological observations suggest that the wreck has been subjected to various forms of intervention, including the removal of structural elements and the recovery of materials of potential economic value. Such actions have altered the integrity of the vessel and contributed to the loss of archaeological information. These processes are consistent with patterns documented at other abandoned vessel sites, where salvage and reuse frequently modify the original archaeological assemblage (Richards 2013).

Following its sinking, the wreck became increasingly subject to environmental processes that continue to influence its preservation. Hydrodynamic activity, sedimentation, biological colonization, corrosion, and physical degradation have all contributed to the transformation of the site over the past century (Ward et al. 1998).

The environmental context of Puerto Colombia Bay is particularly significant in this regard. The proximity of the Magdalena River and the regional coastal dynamics generate substantial sediment transport, while strong currents periodically affect the stability of exposed structural elements. These processes influence both the burial and exposure of archaeological materials and contribute to the progressive deterioration of the vessel.

Corrosion constitutes one of the most significant factors affecting the preservation of the *Prinz August Wilhelm*. As an early twentieth-century steel steamship, the vessel has experienced more than a century of continuous exposure to a marine environment that promotes oxidation and structural weakening. Biological colonization by marine organisms has further modified the wreck, integrating it into the surrounding ecosystem while simultaneously accelerating certain deterioration processes (Fig. 4).

The archaeological evidence indicates that the current condition of *PAW* cannot be explained by a single event. Rather, the site represents the cumulative outcome of multiple cultural and natural formation processes operating over more than one hundred years.

This perspective is consistent with the rejection of the so-called “Pompeii Premise,” which assumes that archaeological sites represent frozen moments in time. Instead, the wreck should be understood as a continuously evolving archaeological assemblage whose present configuration reflects a long sequence of human decisions, environmental transformations, and preservation processes (Schiffer 1987).

The integration of historical documentation, geophysical survey, and direct archaeological observation demonstrates that *PAW* constitutes not merely the remains of a sunken vessel but an archaeological site embedded within the broader maritime cultural landscape of Puerto Colombia. Understanding the interactions between cultural and natural formation processes is therefore essential for interpreting the wreck and developing appropriate strategies for its long-term conservation and management.

Results and analysis

The archaeological survey successfully documented the entire extent of *PAW* wreck site, covering a total area of approximately 8,400 m². The multibeam survey provided a representation of the vessel and its surrounding seabed, allowing the assessment of its current state of preservation and the identification of environmental processes affecting the site.

Based on the high-resolution multibeam bathymetric data, the seabed morphology around the wreck suggests a differential hydrodynamic regime. The steep gradients and scour patterns documented on the eastern side of the hull suggest localized erosional processes that may be related to longshore hydrodynamic activity. Conversely, the smoother, low-relief contours on the western side point towards a depositional environment characterized by sediment accumulation. While direct oceanographic measurements (e.g., ADCP current profiles) were not conducted during this phase, these preliminary geomorphological indicators suggest that the area most affected by erosive processes is located around the bow, where depths reach 10.7 m and the multibeam imagery reveals evidence of scour associated with local current dynamics. The bow rail is situated at an average depth of 5.5 m. To the west of the wreck, the seabed reaches an average depth of 8.0 m, while to the east depths average approximately 6.0 m. The shallowest section of the site is located near the stern, where depths are as shallow as 2.2 m.

The geographic position of the wreck was established using the MAGNA-SIRGAS coordinate system referenced to the WGS84 ellipsoid (Table 1). Accurate positioning of the bow and stern provides a reliable baseline for future monitoring and conservation initiatives.

Table 1
Geographic coordinates of the *Prinz August Wilhelm* wreck (MAGNA-SIRGAS / WGS84).

Point	Easting (X)	Northing (Y)	Latitude (N)	Longitude (W)
Bow	900851.09	1707236.75	10° 59' 22.69"	74° 59' 4.81"
Stern	900835.56	1707350.61	10° 59' 26.40"	74° 59' 5.34"

From an archaeological perspective, direct inspection dives confirmed that the overall structural integrity of the vessel remains relatively good despite more than a century of exposure to marine conditions. Nevertheless, visual observations revealed significant deterioration in the bow section, where the combined effects of hydrodynamic activity and corrosion have weakened portions of the hull structure. Several anomalies identified through multibeam imagery and verified during diving operations suggest the displacement or collapse of structural components in this area (Fig. 5).

Evidence of human intervention was identified through the integration of archaeological observations, historical documentation, and local testimony. Bronze and copper fittings, along with other components of potential economic value, have reportedly been extracted from the site and dispersed among local collectors or sold within the region (Yidi and Mendoza 2014). These activities have contributed to the gradual loss of archaeological information and have affected the integrity of the assemblage.

The survey provided spatial evidence indicative of ongoing sedimentary and hydrodynamic processes. Based on the seabed topography, sediment accumulation appears to be more pronounced on the western side of the wreck, whereas erosional processes dominate the eastern sector, particularly around the bow. These environmental conditions continue to modify the site and represent a significant threat to its long-term preservation. The progressive weakening of exposed structural elements increases the likelihood of future collapse and material loss if no conservation measures are implemented. Although no oceanographic measurements were collected during the present study, the bathymetric data and archaeological observations suggest differential sedimentary and erosive processes acting across the site. Future geomorphological and hydrodynamic investigations would be required to quantify these processes and evaluate their influence on long-term site preservation.

In contrast, the stern section exhibits a higher degree of preservation. The rudder and propeller remain largely intact, although deterioration of the deck structures is evident, largely as a result of corrosion and the collapse of upper structural elements.

Discussion: Site Formation Processes and Environmental Threats

The archaeological survey demonstrates that the present condition of PAW reflects the cumulative effects of both cultural and natural formation processes operating since its deliberate scuttling in 1918. Unlike vessels lost through accidental shipwrecks, the archaeological signature of PAW was initially determined by a documented act of intentional destruction, followed by more than a century of exposure

to dynamic coastal conditions. The site therefore provides an opportunity to examine the interaction between historically documented events and subsequent post-depositional processes.

The multibeam survey and direct underwater observations reveal clear spatial differences in the preservation of the wreck. The bow exhibits greater structural deterioration and evidence of sediment removal, whereas substantial portions of the central and stern sections remain comparatively stable. These variations suggest that local hydrodynamic conditions have exerted a stronger influence on site evolution than corrosion alone. Although the absence of oceanographic data precludes a detailed assessment of sediment transport and current dynamics, the observed preservation pattern is consistent with differential exposure to erosion and sediment redistribution. These findings highlight the importance of considering local environmental variability when interpreting the archaeological record of shallow-water iron shipwrecks.

Human activities have also contributed to the site's formation history. Since its sinking, the wreck has remained within an active coastal environment affected by navigation, fishing, recreational diving, and coastal engineering works. Consequently, the archaeological record reflects the combined effects of environmental processes and anthropogenic disturbance, emphasizing the dynamic nature of twentieth-century underwater archaeological sites.

Historical Events and Archaeological Evidence

One of the principal contributions of this study lies in the close correspondence between historical documentation and the archaeological evidence. Archival sources describe the deliberate scuttling of the vessel following its prolonged internment in Puerto Colombia, while the archaeological survey documents the surviving structural remains produced by that event. Rather than functioning as independent datasets, documentary and archaeological evidence complement one another, allowing a more complete reconstruction of the vessel's transformation from an operational steamship into an archaeological site.

This integration also demonstrates the value of combining historical research with geophysical survey and direct archaeological recording. While documentary sources explain the political and military circumstances that led to the sinking, archaeological investigation provides insight into the subsequent evolution of the wreck and the long-term processes affecting its preservation. *PAW* therefore illustrates how archaeological evidence can extend historical narratives beyond the moment of loss by documenting more than a century of environmental and cultural change.

Prinz August Wilhelm within the Maritime Cultural Landscape

The significance of *PAW* extends beyond the remains of an individual vessel. The wreck formed part of the maritime infrastructure that supported the commercial development of Puerto Colombia during the late nineteenth and early twentieth centuries. Together with the historic pier, the railway connecting Barranquilla to the coast, shipping routes, and the commercial activities of foreign companies such as

HAPAG, the site represents an important component of the maritime cultural landscape of the Colombian Caribbean.

From this perspective, the wreck should not be interpreted as an isolated archaeological feature but as one element within a broader network of material and historical relationships. Its archaeological value derives not only from its physical preservation but also from its capacity to illustrate the interaction between international trade, regional transport systems, wartime events, and coastal environmental processes. This landscape perspective expands the interpretative framework of the site and highlights the importance of investigating associated submerged and terrestrial heritage as interconnected components of a single cultural system.

The study also demonstrates the archaeological potential of Puerto Colombia Bay, where additional submerged cultural resources are likely to survive. Future investigations integrating systematic survey, historical research, and environmental analysis may contribute to reconstructing the evolution of this maritime landscape and provide a broader understanding of the role of Colombian Caribbean ports within transatlantic commercial networks (Dunkley 2013; Gregory et al. 2022).

Implications for Heritage Management

The results have important implications for the long-term management of underwater cultural heritage in Puerto Colombia. Despite more than a century of exposure, *PAW* retains substantial archaeological integrity and constitutes one of the most significant surviving material testimonies of Colombia's early twentieth-century maritime history. Its preservation should therefore be based on the principle of *in situ* conservation, consistent with the recommendations of the 2001 UNESCO Convention.

Future management should prioritize comprehensive documentation, periodic monitoring, and non-invasive archaeological investigation (Bowens 2009). High-resolution recording techniques, including photogrammetry and repeat multibeam surveys, would provide an effective baseline for evaluating future changes in site condition (Richards 2013). Monitoring programmes should focus particularly on structural stability, sediment redistribution, biological colonization, and corrosion, thereby generating the information necessary to distinguish gradual environmental change from accelerated deterioration (Schiffer 1987; McCarthy 1996; Richards 2013).

Finally, *PAW* offers opportunities that extend beyond archaeological research. As one of the most visible remnants of Puerto Colombia's maritime past, the site provides a valuable platform for public archaeology, heritage interpretation, and community engagement. Integrated within the broader maritime cultural landscape, its conservation has the potential to strengthen public appreciation of underwater cultural heritage while supporting future research and sustainable cultural tourism initiatives.

Conclusions

The archaeological investigation of the *Prinz August Wilhelm* provides the first systematic high-resolution assessment of this early twentieth-century shipwreck and demonstrates the value of integrating archival research, high-frequency multibeam bathymetry, and direct underwater observation for documenting submerged cultural heritage. This multidisciplinary approach has enabled the reconstruction of the wreck's depositional history, the evaluation of its present state of preservation, and the identification of the principal natural and anthropogenic processes that have shaped the site since its deliberate scuttling in 1918.

The results show that, although the vessel retains substantial structural integrity after more than a century in a dynamic coastal environment, its preservation is spatially heterogeneous and strongly influenced by localized site formation processes. Differential hydrodynamic erosion, sediment redistribution, marine corrosion, and episodes of human salvage have produced distinct preservation patterns across the wreck, particularly in the bow section. These observations reinforce the importance of understanding shipwrecks as dynamic archaeological assemblages whose significance derives not only from the events that led to their loss but also from the long-term environmental and cultural processes that continue to transform them.

Beyond its archaeological value as an individual shipwreck, PAW forms an integral component of the maritime cultural landscape of Puerto Colombia Bay. Interpreted within this broader framework, the site reflects the interaction between maritime transport, port infrastructure, coastal transformation, and the geopolitical consequences of the First World War. Adopting a maritime cultural landscape perspective demonstrates that the wreck cannot be understood in isolation but as part of a wider network of submerged and terrestrial cultural resources that collectively document the historical development of one of the principal maritime gateways of the Colombian Caribbean.

This study also establishes a scientific baseline for future archaeological research and heritage management in Puerto Colombia Bay. Continued structural monitoring, geomorphological investigations, and the systematic documentation of associated submerged cultural resources will improve our understanding of site stability and support evidence-based conservation strategies. More broadly, the methodology and interpretative framework presented here contribute to ongoing discussions on the documentation, preservation, and sustainable management of twentieth-century shipwrecks in tropical marine environments, highlighting the potential of integrated archaeological approaches for advancing underwater cultural heritage research in the Caribbean.

Declarations

Author Contribution

A: Conceptualization, methodology, investigation and fieldwork, data analysis, supervision, funding acquisition, and writing—original draft and review & editing. B: Site formation process analysis, investigation and fieldwork, and writing—review & editing. C: Geophysical survey, data acquisition and

processing, formal analysis, and visualization.D: Historical research, investigation, and writing—review & editing.All authors reviewed the final version of the manuscript.

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Footnotes

1. "Captain August de Wall speaks. How and why he carried out the fire of the "Prinz August Wilhelm" ", On the day, April 24, 1918.
2. The German Minister in Bogotá to the Minister of Foreign Affairs, October 19, 1918. AGN: Ministry of Foreign Affairs. Second section. Box 88, 00336, T. 7.
3. Right of petition of Federico Castro Rodriguez addressed to the Minister of Foreign Affairs, Bogotá, February 11, 1919. AGN: Ministry of Foreign Affairs. Second section-claims. Germany. 1915.1925. Box 88. 00336 T 7

Figures

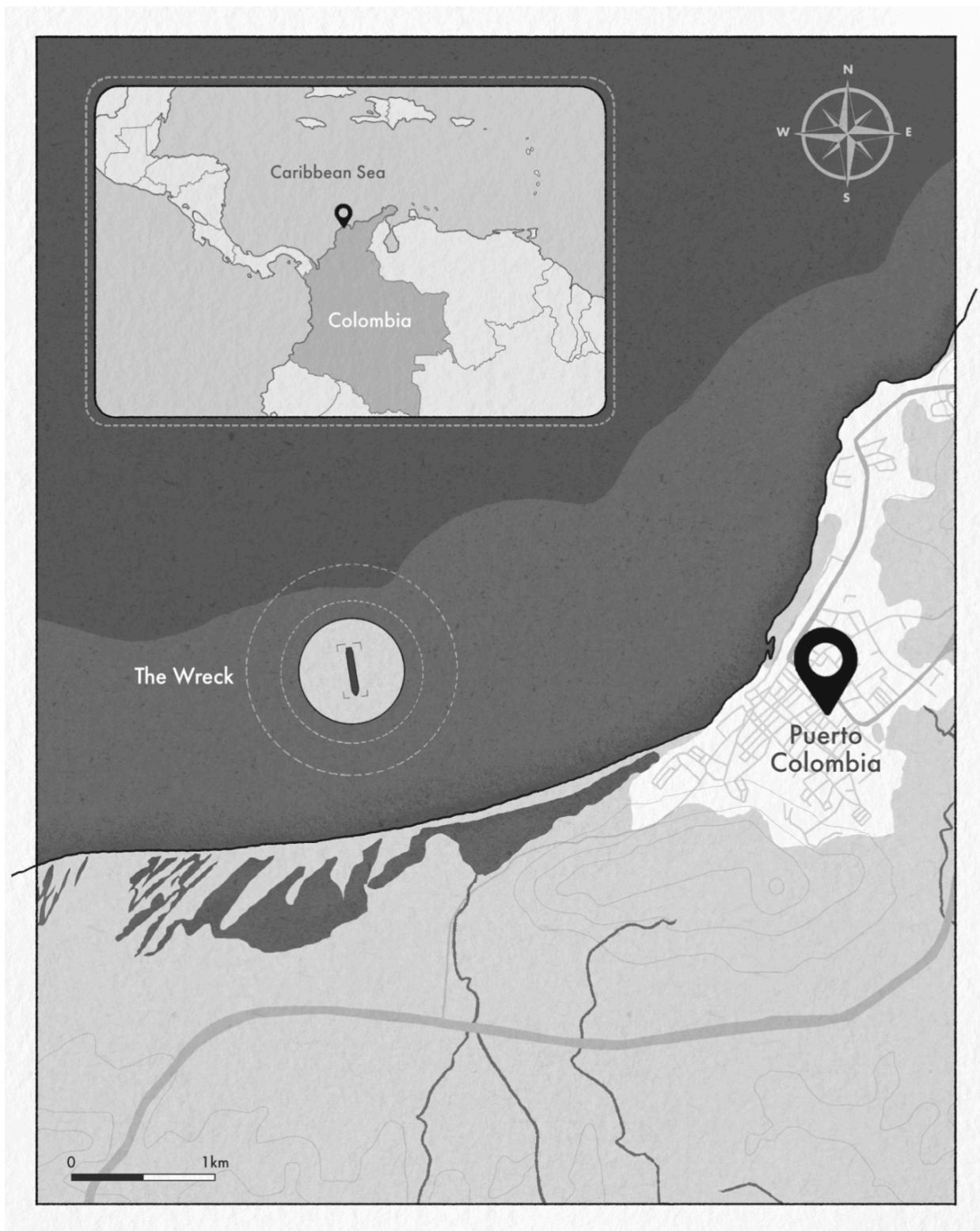


Figure 1

General location map of Puerto Colombia and the shipwreck site (Prepared by Manuela Martin).

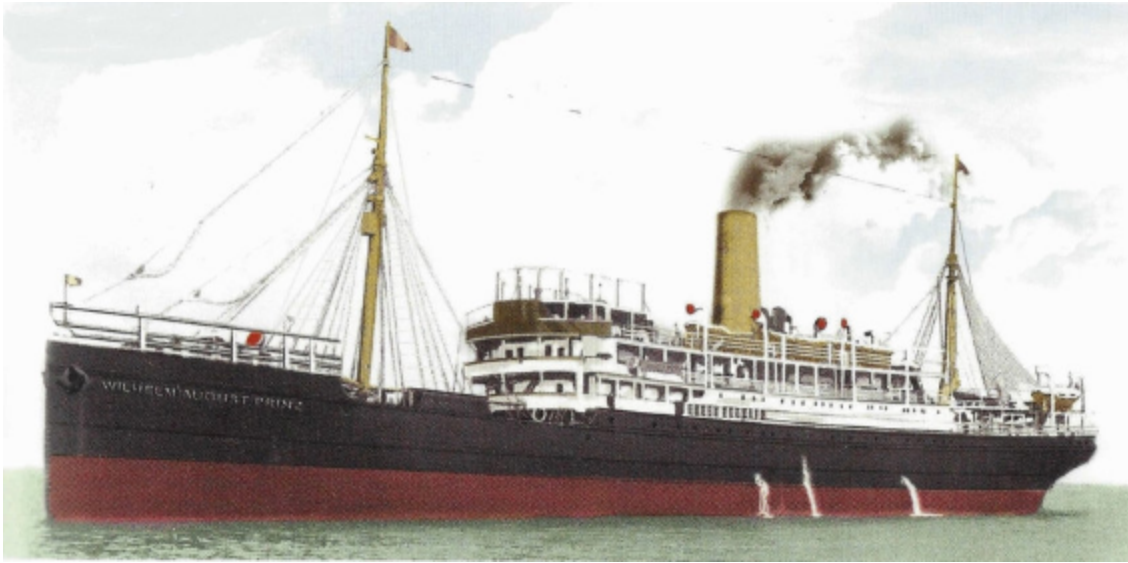


Figure 2

Postcard image of Prinz August Wilhelm (Reprinted from *Arqueología Subacuática en Puerto Colombia* by Martin et al. 2017:62).

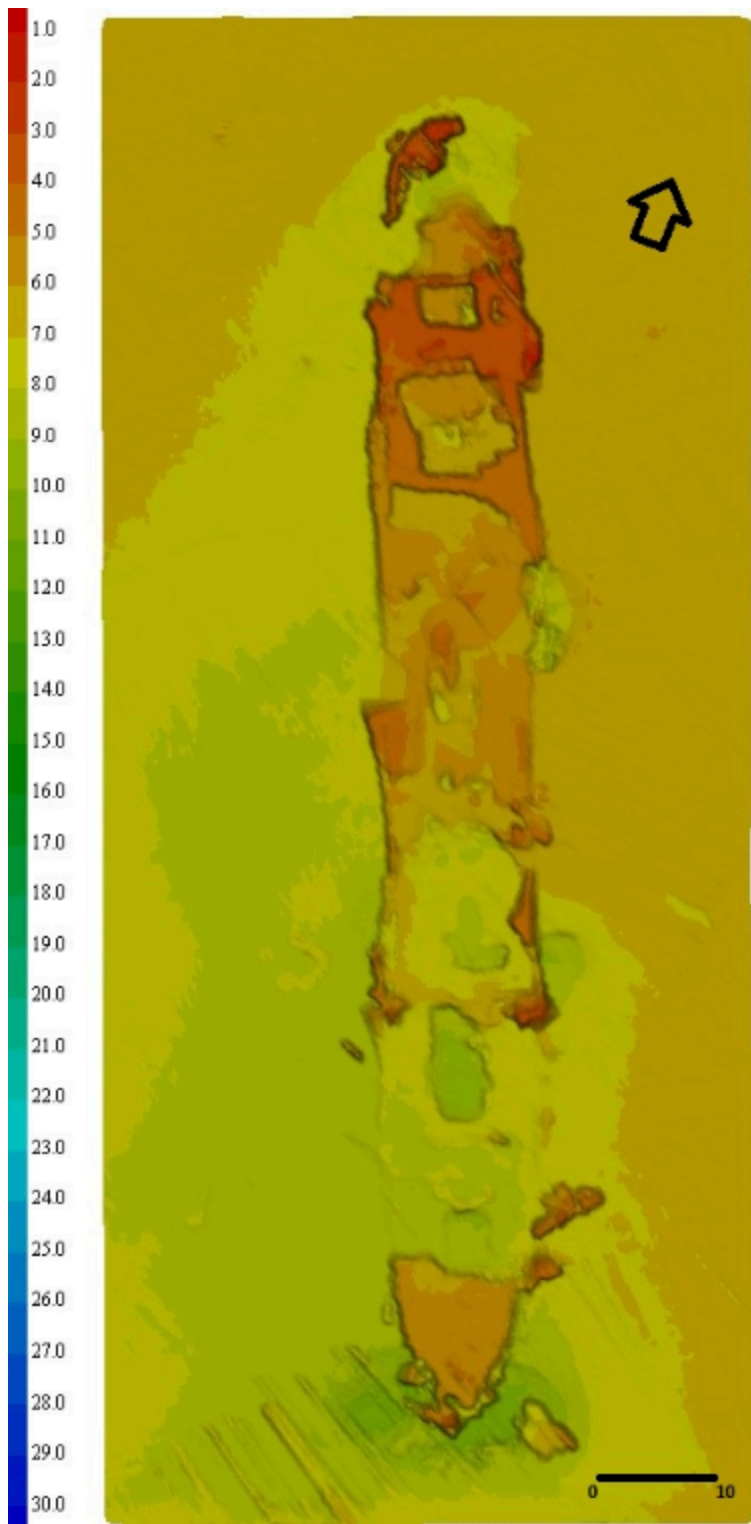


Figure 3

General view of PAW by geophysical survey of the study area (Prepared by Julián Blanco).



Figure 4

Verification dive revealing corrosion of the steamship's deck (Photo by Eduardo Roa).

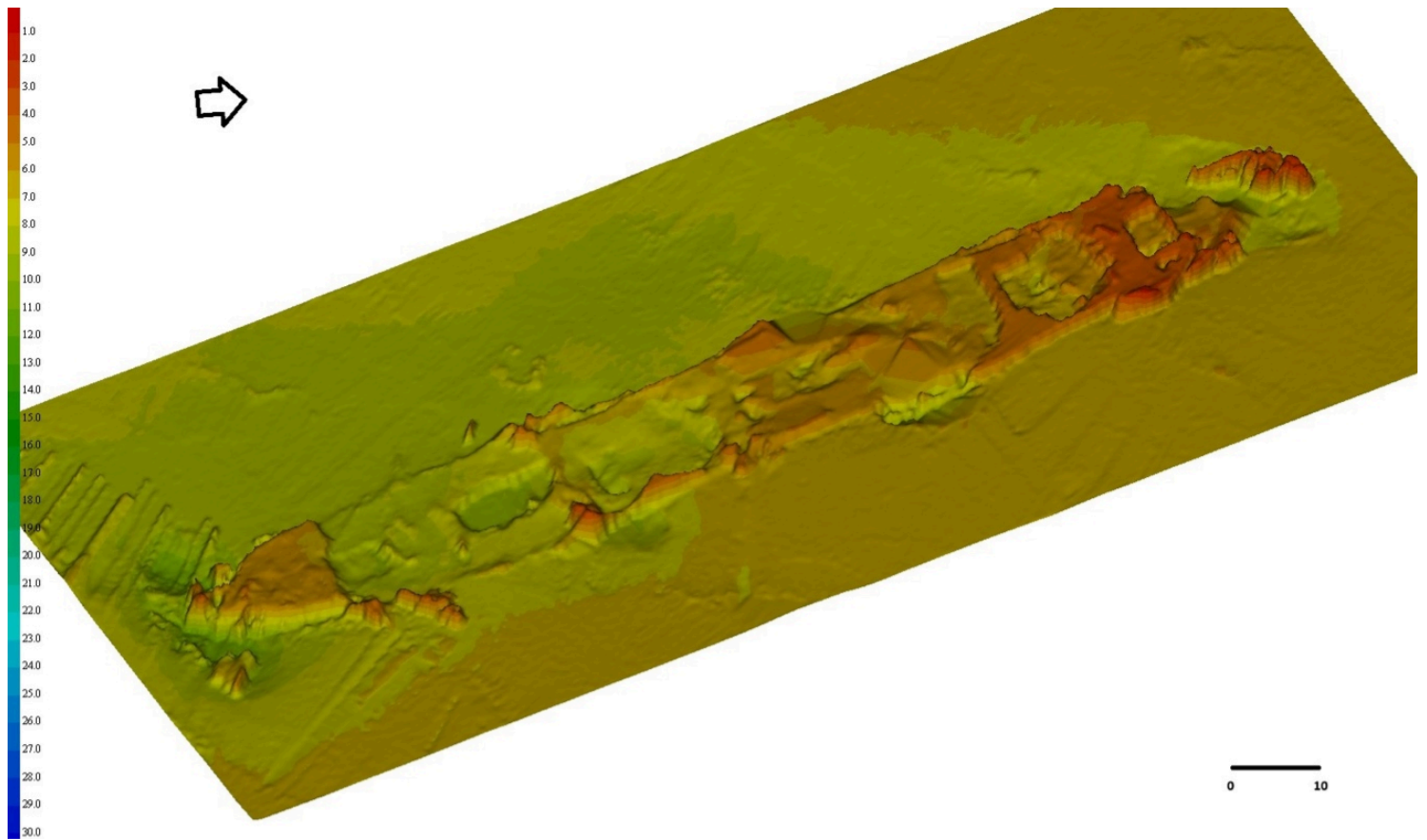


Figure 5

View of the PAW. Erosion at the bow can be observed, resulting from the strong current in Puerto Colombia Bay (Prepared by Julián Blanco).