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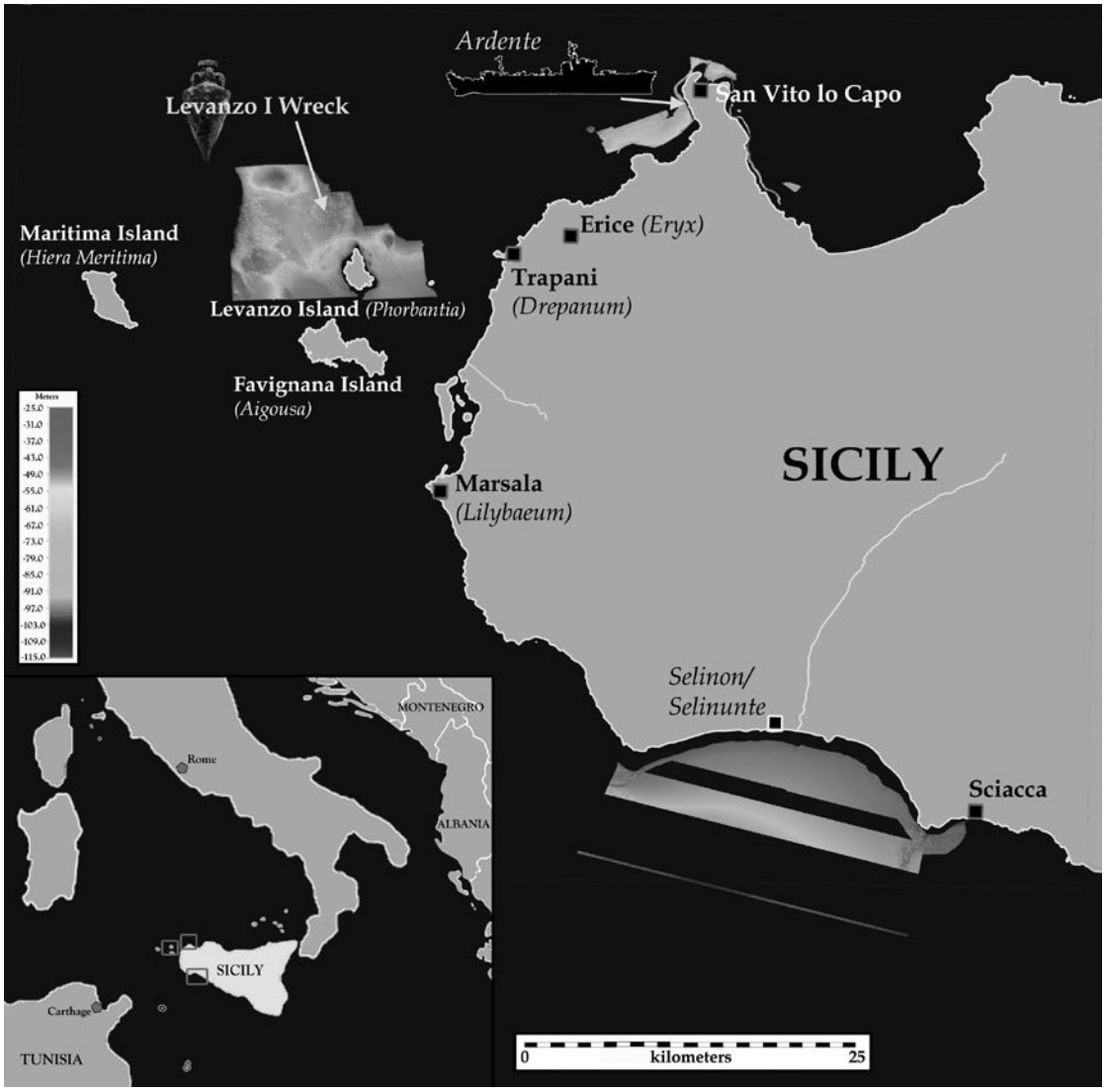
2009 Expeditions in Sicily



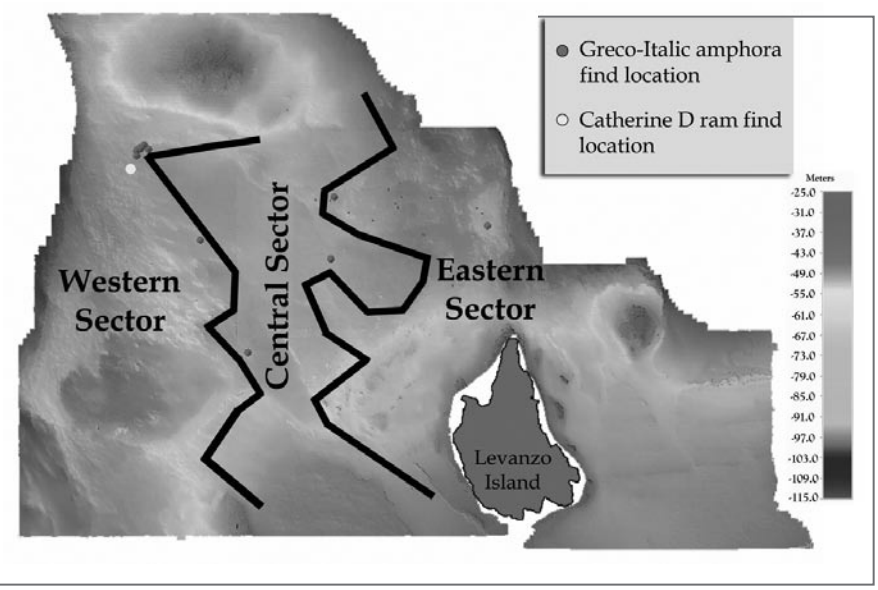


FIG 1 previous page
Multibeam survey coverage in the three Sicilian project areas. Map by J. Royal, RPMNF.

FIG 2 right
The Egadi Islands survey area demarcating seafloor topography sectors and *find* locations for Greco-Italic amphoras and the Catherine D ram. Map by J. Royal, RPMNF.

Since 2005, RPM Nautical Foundation (RPMNF) and the Superintendent's Office of Underwater Archaeology in Sicily (Ufficio di Soprintendenza del Mare) have conducted a survey of coastal waters off the NW Sicilian coast. Over these past years, several areas have undergone intensive multibeam survey with ROV verification of anomalies (Figure 1). Efforts around the island of Levanzo, one of the Egadi Islands NW off of Trapani, have continued from 2005. In 2009, a project ventured into the southern coast, in the bay of Selinunte, to ascertain the efficacy of work in this region. A small survey was also conducted around Capo San Vito in 2007 and verification took place in 2009.

Egadi Islands

With a large amount of multibeam coverage completed from 2005–08, no additional multibeam survey was conducted during the 2009 season. A result of completing a considerable coverage area is a large number of anomalies that require verification. Although the number of anomalies is re-adjusted as new criteria and reviews are made, the number of unverified anomalies remains substantial. Based on experience and an evolving knowledge of the area's seafloor topography, two strategies have developed for ROV operations. The majority of the survey area's western sector (Figure 2) features closely-spaced, low, and relatively small rock outcrops that observations have shown to ensnare drag nets. As such, this area is largely undisturbed by fishing nets except on its periphery where material is dumped when nets are snagged. The densely-packed anomalies and protection from drag nets often require area searches in the western sector. A rather clear and abrupt demarcation exists between the rocky western sector and the sandy seafloor of the central sector. As the central sector is largely devoid of rock outcrops, drag nets have flattened the sand cover and little biological or cultural material survives. All that is left is a barren, flat landscape; the only features are long drag marks that criss-cross the seafloor and an occasional flat rock outcrop protruding from the sand. Any cultural material deposited here in antiquity has been recovered by fishing nets and/or moved to rocky areas and dumped. The survey area's eastern sector is a patchwork of rock outcrops and open sandy stretches; hence, dragging has impacted to some degree this area as well. Although the few anomalies explored in the central sector indicate little probability of surviving material, the western and eastern sectors hold potential. The Levanzo I wreck, discussed below, is located in the eastern sector.

During the anomaly verification and area searches, random ceramic finds were located in the western and eastern sectors. A Roman-era commonware bowl and the upper portion of a Dressel 14 amphora were discovered in the eastern sector. Numerous random finds since 2006 have been found throughout this sector, the vast majority from the Roman era. Other finds noted but not recovered during operations in 2006-8 included the upper portions of Greco-Italic amphoras. Most of these amphoras were located on the edges of survey area's central sector lying near rock outcrops (Figure 2); in a few instances the remains of snagged fishing nets were nearby. During the 2009 field season an intact Greco-Italic amphora was located here as well, and the decision was made to collect examples for analysis. Each of the amphora's collected at the edge of the western sector were of the same type,—Greco-Italic—and possessed comparable dimensions and an asymmetry of their handles (Figure 3). This may indicate that these amphoras were produced at or near the same workshop, and at certainly a common time period. Once the locations of these amphoras from all seasons were plotted, there was a noticeable concentration in the NW section of the survey area where the rocky western section begins. Interestingly this is just slightly north of the Catherine D ram find location. The most likely

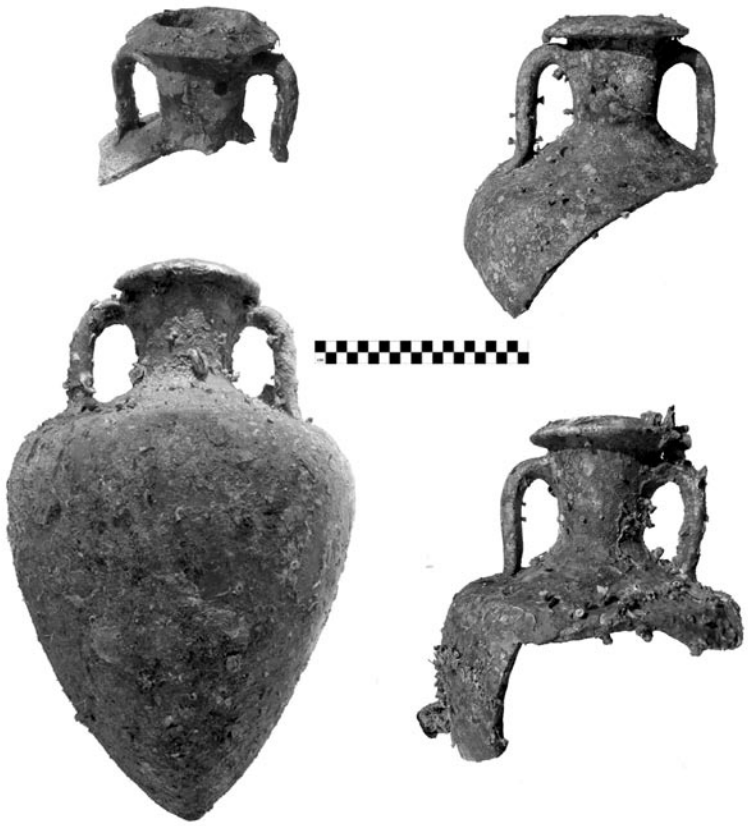


FIG 3 right
Greco-Italic amphoras retrieved during the 2009 field season. Photographs by J. Royal, RPMNF

FIG 4 below
View of Levanzo I wreck site during sonar imaging, note the flatness of the site and a temporary datum. Photograph courtesy RPMNF.

scenario for these amphora finds is that they were dragged from somewhere in the flat central sector and deposited when the fishing nets snagged on rocks. Given the great similarity of the damaged amphoras, they likely originated from a single wreck site that settled in the central sector during the 4th-century BCE. Unfortunately, the site has been razed by nets and there may be nothing left of the site. Unlike near shore environments, the shallow sediments of deeper off-shore waters do not afford wreck sites the same protection; this is shown empirically in the Levanzo I wreck site investigation discussed below.

One of the anomalies in the eastern section of the survey area was a relatively modern wreck site (Sulfur Wreck, SI09-AA). This site lies in c. 50 m of water and it was therefore possible to deploy divers as well as the ROV on the site. The primary visible remains of this wreck is a cargo of raw sulfur ore that forms a low, flat deposit. All of the sulfur cargo was fist- to head-sized chunks; many were rough hewn but others appear to have regular edges associated with their being quarried. Generally the deposit was 1–2 layers thick. One sample chunk was raised and a sample was taken for analysis by the Superintendant's Office. Some wood, possibly ceiling planks, was visible just beneath the shallow covering of sulfur ore as were several unidentified iron objects. The condition of the wood and the degree of encrustation, as well as form of the iron objects indicate a relatively modern date for the site. Based on the flat and relatively shallow nature of the surviving wreck site, it has likely been scrapped by fishing nets.

Levanzo I Wreck site SI06-AA

In addition to anomaly investigation, efforts were undertaken to further investigate the Levanzo I wreck site. This site, discovered during 2006 at the edge of the survey area's eastern sector, c. 6 km N of Levanzo Island (Figure 1), was a 4th-century AD

Roman merchantman laden with food stuffs and construction materials enroute from N Africa to the Italian mainland when it met its demise. At the time of discovery, little was known about the nature of deeper-water sites compared to that known about sites near shore. At a depth of 90 m and out of practical diver depth, it would seem such a site was safe from human exploitation and/or damage, particularly to the illegal collecting by recreational divers that plagues shallow-water sites. Initial investigation of the site documented the damaged artifacts dispersed around the surface of this relatively flat site; it remained unclear as to how far the material extended into the sandy bottom (Figure 4).

The wreck was mapped with various video/still camera combinations over the subsequent years. Additionally, a small number of artifacts were collected during the 2006 season in order to provenience the site, but no additional artifacts were collected until the 2009 season. During anomaly verification in the first two seasons, it became apparent that many parts of the survey area had been severely impacted by drag-net fisherman as discussed previously. By the beginning of the 2009 field season, it became clear that the Levanzo I site had likely suffered drag-net hits as well, which resulted in the scattered artifacts on the surface of a very slight mound. Considering the situation, Co-Director of the Project Dr. Sebastiano Tusa, Superintendent of Underwater Archaeology for Sicily, agreed the site required mitigation and arranged conservation support for artifact retrieval. Comparatively little is still known about the nature of the deep-water sites; however, with such projects as these, more is being discovered about these sites and the threats to them. Between discovery and the 2009 field season appropriate equipment, software, and methodologies were developed in order to properly map and test excavate the site to archaeological standards. The Levanzo I site's particular characteristics also make it ideal for testing such equipment and methodologies that can later be applied to other sites.

Although largely disturbed, every effort was made to control and record the provenience of artifacts thorough various methods of site mapping. A primary stratagem was the control of artifacts' x and y coordinates because of the site's greater scale and that the site is primarily surface finds. The initial step was to place pvc pipe and cement datums of 1 m in height around the site in order to provide reference points for measuring. These datums were integral in mapping artifacts and positioning imagery within Site Recorder software. Two methods were used for measuring the datums' positions on the site: absolute and inter-datum measurements. Absolute positions were obtained by placing a beacon fitted with a hook on each of the datums with the ROV. The beacon positions were recorded on *Hercules* and displayed upon the surface model of the seafloor with IVS Fledermaus software. Once the positions were plotted on the seafloor model in Fledermaus, the depths at those positions could be ascertained from the bathymetric data. These beacon positions also provided real-world location and orientation for the wreck site.

Inter-datum measurements facilitated by a high-frequency sonar fitted to the ROV were also used to ascertain datum positions. This sonar clearly images the datums and small objects within a 180° sweep that covers the entire site as it is relatively flat. In the sonar's software, sweep images are recorded and precision measurements are possible between or along any visible object. In order to increase the accuracy of measurements, the ROV was placed in three different vantage points around the site. Additional recordings and measurements were made during subsequent positioning for measuring temporary datums, or at any time the ROV was at rest on the periphery of the site. With each datum identified in the various sonar recordings, between 5 and 10 measurements were made between any two datums. Statistical outliers of measurement values were ignored and the remaining cluster of measurements was averaged; this inter-datum distance value was used in Site Recorder. Both the inter-datum and beacon positions were interpolated in Site Recorder, and along with bathymetric depth data provided a good representation of the datum positions (Figure 5).

With the datum positions plotted on the seafloor model in Fledermaus, it was possible to ascertain the site's height profile. A 30-m transect was taken on the surface map across the SE portion of the site, between datums D1 and D6, at a right angle to the site's long axis (Figure 6). Over this 30-m distance, the highest point on the site rises less than 30 cm, some of which is likely due to the rock outcrops that lie beneath the surface and are exposed around the site.[1] These rock outcrops rise to c. 35–40 cm off the seafloor around the site, and are undoubtedly the direct reason for any part of the wreck surviving as they deflected drag nets slightly over the site. However, any of the material above the height of the rocks when the shipwreck first settled here was now gone. The result is a flat, shallow site ideal for a trial of mapping and excavation methodologies.

Further recording of the site included video with a downward facing camera in order to document the site with datums in place and produce a photo mosaic. The ROV remained 4–5 m over the site to obtain good contextualized images. For the mosaic, the wider-scale images from 2009 were used to formulate the general image of the site area; afterwards, the more detailed still photograph images of artifact groupings obtained in 2006 and 2008 were overlain. The mosaic was then imported into Site Surveyor and aligned according to the matching of datum positions. A combination of recording methods were now available to ascertain the locations of surface artifacts, and allowed the measurement of the features and objects in the mosaic.[2] With the mapping and provenience under control for the site, it was

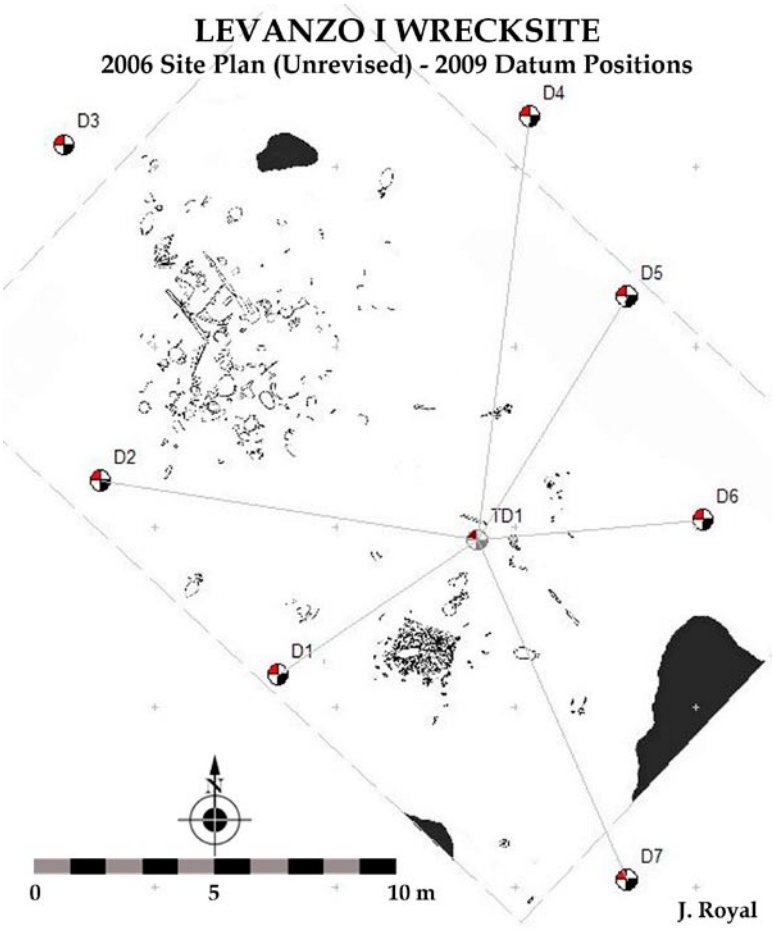
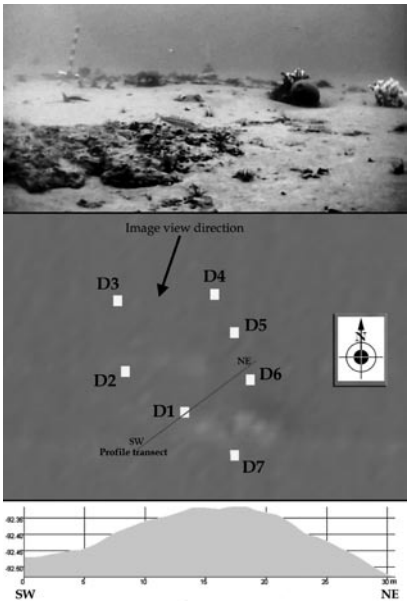


FIG 5 left
Image of data placed in 3-H Consulting's Site Surveyor 4 software showing the 2009 datum positions around the Levanzo I wreck site; the site plan is one produced in 2006. Plan by J. Royal, RPMNF.

FIG 6 below
ROV view of the Levanzo I site while sitting on bottom, between datums 3 and 4; Center: datum positions in IVS Fledermaus software and transect position over site; Bottom: profile of transect showing cross-section of seafloor. Graphic by J. Royal, RPMNF.



possible to proceed with the collection of surface artifacts for analysis; the majority of which were intact or fragmentary amphoras (Figure 7).

As a final experiment in the ongoing assessment of the Levanzo I wreck site, two small test excavations were conducted. Excavation was limited to two 1-m squares at the center of the site where it was largely free of surface artifacts. A form constructed from flat aluminum and painted red/white in 25-cm increments, and bolts attached through the corners to resist shifting after placement (Figure 8). Based on the method commonly utilized when recording sites in dive operations, the square was segmented into four 50-cm^2 quadrants, A–D, and each quadrant further subdivided into four 25-cm^2 sub-quadrants, designated 1–4. Hence, during excavation the notations made record artifact positions based on this quadrant system. Once placed on the seafloor, a video flyover recorded its relative position. Additionally, temporary datums were placed on two opposing corners and their positions were recorded with the sonar and measured in relation to the seven datums; the position of the square was then interpolated in Site Surveyor.

A water dredge on the ROV performed the excavation duties (Figure 9), with all dredged material run through a mesh bag that was examined on deck. The dredge featured a collar specially designed to shoot short bursts of water from six 2-mm holes in order to break up or move sediment for easier dredge operations, akin to hand-fanning. However, the jets were not required in the upper layer of easily-removed loose sand. The jet collar was necessary in order to remove the underlying dense mud layer excavated to a limited degree in order to test for the presence of artifacts, which

included a 15-cm deep sondage in one quadrant. Depths of sediment layers and artifacts were ascertained with scales held in the ROV manipulator arm or by those affixed to the dredge. When artifacts were encountered in the square, and noted in the log, they were removed with the manipulators, or more often through the suction of the dredge, to a small basket next to the excavation square. A description of individual finds from the excavation, along with their analysis and implications, will be detailed in an upcoming publication.

Video recording provided a second, and important, record of all excavation. With real-time video of excavation it is possible to recreate and review all work performed, as well as creating a permanent record of the event. As such, the provenience of artifacts within a square can be determined and rechecked if necessary, and any assessment of sediment in relation to the artifacts is also reviewable. This recording utilized three separate cameras: a down cam, a pilot cam, and a manipulator cam; thus, it was possible to obtain a plan view, a forward perspective view, and close-ups of the work performed. Furthermore, video was facilitated by two powerful lamps attached to the ROV's deployment cage (TMS) and pointed downward. With the TMS positioned above the excavation square, a much improved image was attained with truer colors and much less particulate visible in the water column.

Based on excavation in both squares the upper sediment layer on the site is a medium-grained, light-color sand 5–7 cm thick that was mixed with shells and small rock fragments. Below this layer is a harder packed mud layer slightly darker in color. This underlying layer density required mechanical break-up in most cases to dredge. All artifacts were found either on the surface or in the loose upper sand layer; the 15-cm deep sondage extended approximately 10 cm into the dense layer with no artifacts encountered.

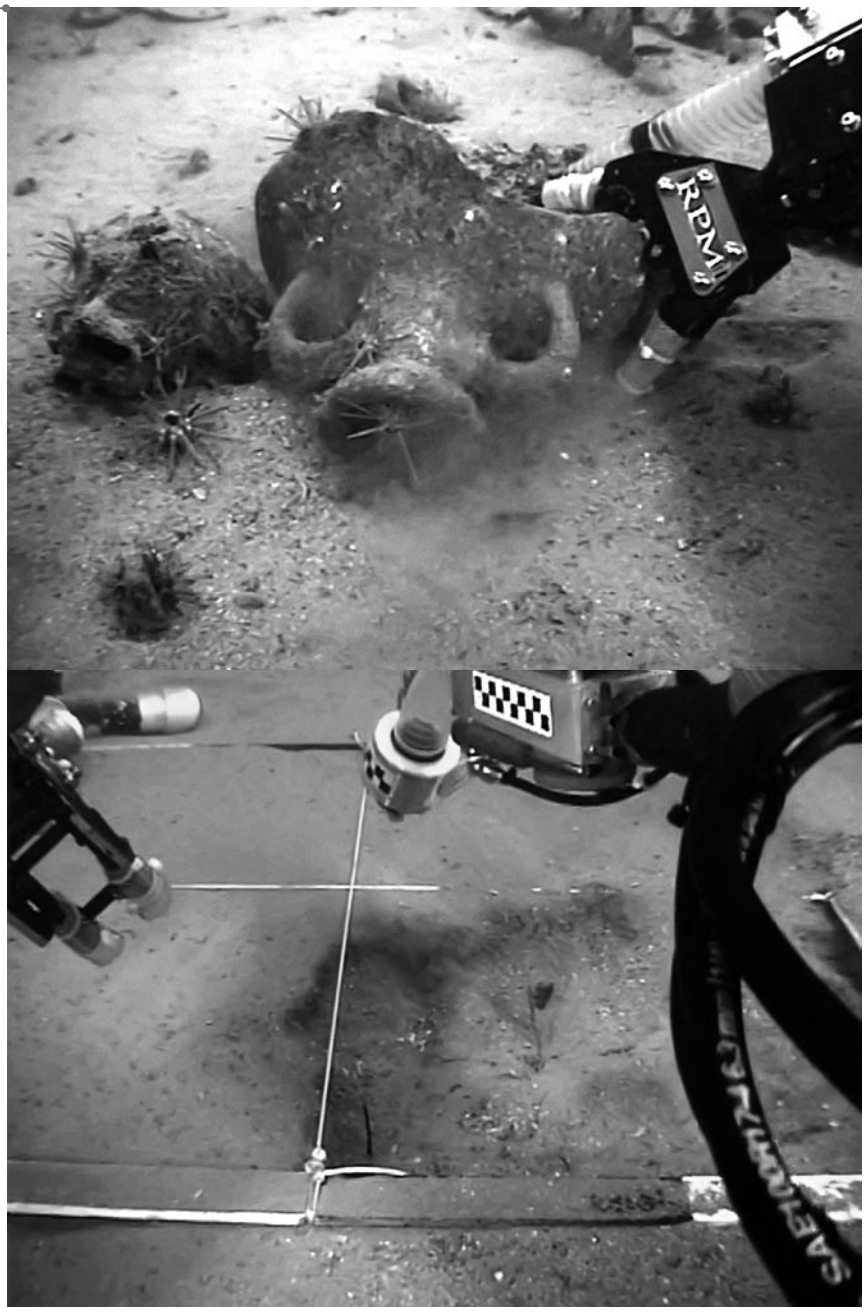


Fig 7 top
Retrieval of surface artifacts with ROV. Photograph courtesy RPMNF.

Fig 8 above
Excavation on the Levanzo I site utilizing the metal square and the ROV's water dredge. Photograph courtesy RPMNF.

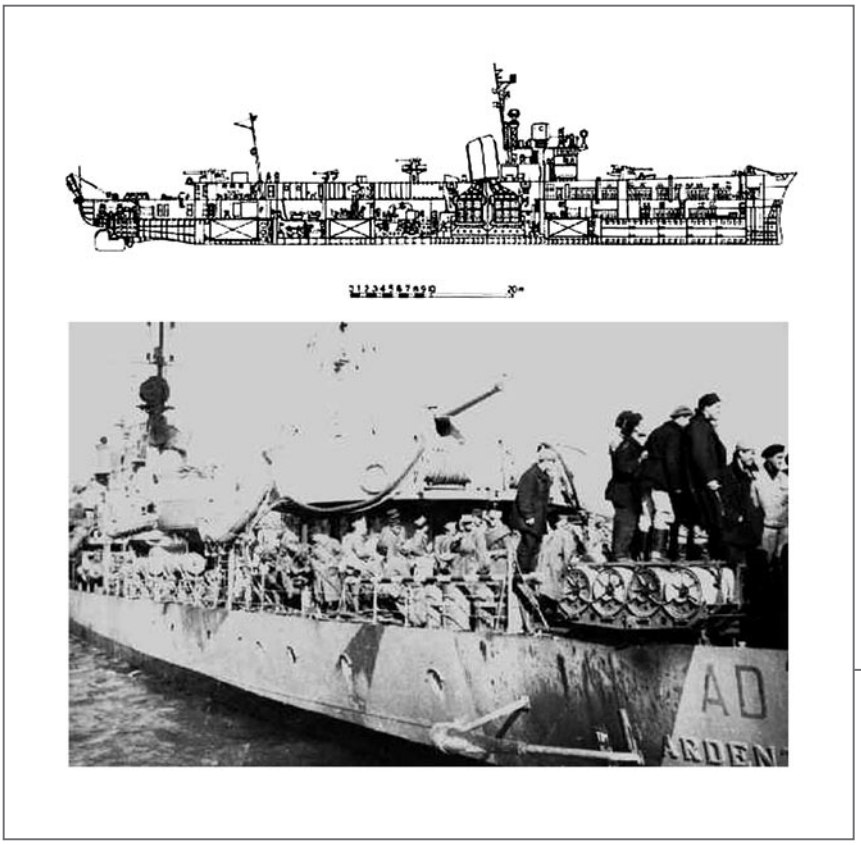


Fig 9
Cross-section of Italian Cyclone class ship and image of Ardente with crew. Images courtesy S. Zangara, Ufficio di Soprintendenza del Mare, Sicilia.

As the test squares were in the central portion of the site that is largely devoid of ceramic concentrations, the sandy upper layer is slightly thicker on the NW and SE portions of the site. The depth reached 10–15 cm where a slightly buried amphora was removed on the SE end of the site.

This shallow sand cover on the site provides virtually no protection to the artifacts from further drag net incursions. Consequently, the ceramics exposed on the seafloor upon discovery were almost all that remained of the cargo due to the devastation of the drag nets. This reaffirmed the necessity for mitigation for this site, and illustrates the peril that offshore sites face. The Levanzo I wreck is similar to many others in deeper waters, where sedimentation rates are lower than those at the shore and can leave wreck sites largely exposed. In fact, this may be the norm rather than the exception for sites further offshore. The particular threat of drag nets is amplified as they dig into the sandy surface layer, and given the lack of sand cover for offshore sites, the damage they do is catastrophic. Unfortunately it is probably too late for an untold number of wrecks throughout the Mediterranean.

South Sicilian Coast

The opening mission for the 2009 field season brought the RPMNF research vessel *Hercules* and crew to the SW coast of Sicily (Figure 1). This ambitious project entailed a survey of the SW coast with the goal of moving eastward; however, one also undertakes the task of assessment during the initial season in any previously unexplored area. For 2009, the survey centered in the elongated bay of Selinunte that spans between Capo Granitola to the west and Capo San Marco to the east; just east of Capo San Marco is the port town of Sciacca out of which the team operated. The bay is named for the ancient town of Selinunte, Greek Selinon, that is now a 1740-km^2 archaeological park. As one of the most important Greek cities in Sicily, Selinunte thrived during the 6th–5th centuries BCE when numerous temples were constructed on and around its acropolis situated between the two small rivers Cottone and Modione. The city was founded in 7th Century BCE by colonists from Megara Hyblaea, a town located near Syracuse to the SE, and was largely destroyed in 409 BCE by the Carthaginians. In c. 250 BCE, during First Punic War, the Carthaginians abandoned the city, destroyed most of it, and consolidated in Lilybaeum to the west. Major damage to the temples was probably a result of an earthquake in the Byzantine era.

In addition to the Cottone and Modione rivers, the mouth of the 77-km long Belice River located 4 km E of Selinunte empties into the bay; recently this river is seasonally active due to agricultural demands. Geologic investigation around Selinunte and the bay indicate a complex and active past due to the numerous faults running through the area. This section of coast

has experienced subsistence and uplift, and the bay is filled with sediments from the last marine ingression that followed the latest glacial era.[3] Adding to this sedimentation are the outflows of the Belice, Cottone, and Modione rivers.

Although three productive weeks were completed, results of the survey are limited to an assessment for further work. Analysis of multibeam data produced few anomalies and showed a largely featureless seafloor. Limited ROV verification operations were attempted, and together with a small number of dives on shallow targets, problems with this area for survey were confirmed. The rivers empting into the sea have created a sand build-up near shore that may preclude the detection of ancient-medieval shipwrecks. Divers reported a modern sailboat sitting upright on the seafloor and buried to its sheerwale in soft sediment. Hence, it is likely that ancient-medieval material is buried within the bay and will have to await storm action for the opportunity to detect. Survey moved further out from the bay and a few test lanes were run at the outermost edge. ROV prospection beyond diver depth noted this sediment cover likely decreases with distance from shore; however, there was evidence of drag net incursions on the seafloor. Assessment indicates the area mirrors that of the central portion of the Egadi Islands Survey area; in such areas were drag nets have been frequently used, further work will have little use. This finding was somewhat unexpected as the chart of the area provides a caution in or near the bay for ships not to anchor, dredge, trawl, lay cables, etc. due to obstructions and unexploded ordnance.

A strategic plan for future work would include monitoring the bay for the impact of large storms that could remove sand cover, even temporarily. Other areas on the southern coast should be assessed as well, particularly those reported to have enjoyed protection because of pipeline, fishery, etc. in the zone. Likewise, areas that have significant rock outcrops that would also deter drag net operations. Prospection with the ROV between the 50- and 120-meter contours to assess for the amount of sand accumulation and geologic features may be an efficient first step on the southern Sicilian coast. The early 5th-century BCE Gela shipwreck discovery, over 800 m from shore at c. 5 m of depth, highlights the importance of this stretch of coast, particularly given the presence of ancient Greek cities such as Selinute, Agrigento, Gela, and Syracusa. Heavy sediment cover helped preserve the Gela wreck, yet also compounds the detection of such wrecks. Corinthian trade was heavy in Sicily, however, as with Albania and Montenegro little is known of the offshore waters on this portion of the Sicilian coast and what sites are present to address such research questions.

San Vito Lo Capo

In the course of the 2007 field season, multibeam survey was conducted around Capo San Vito at the request of the Superintendent's Office of Underwater Archaeology to the search for a WWII-era British submarine Thunderbolt reportedly lost in the vicinity (Figure 1). As the area was promising on several levels, the survey circumscribed the cape. The multibeam data was examined for the presence of the submarine alone; a promising anomaly was located and its location transmitted to the Superintendent's Office of Underwater Archaeology at the end of the 2007season. The most promising anomaly was comprised of two large sections near one another, the larger over 50 m in length. A brief attempt to verify the anomaly was halted that season due to equipment problems, and the ram discovery of the following season precluded a return. Special efforts were made during the 2009 field season to verify this anomaly that was clearly the remains of a large, modern vessel.

In August, the team moved from Levanzo to the site's position and the ROV was deployed. Video of the site clearly indicated there were two large sections of a single WWII-era naval vessel present, separated by approximately 75 meters. Upon viewing the superstructure it was clear the vessel was not a submarine, but a type of torpedo ship. As in other areas investigated, fishing nets were tangled in the wreckage. Observations and notes were taken by Dr. James Delgado of INA and Stefano Zangara of the Superintendent's Office of Underwater Archaeology. Dr. Delgado's experience with WWII-era vessels assisted in the initial identification of vessel type, as well as noting the massive damage the vessel incurred. Subsequently, Mr. Zangara's research[4] provided an identification for the vessel: *Ardente*, a cyclone-class torpedo ship in the Italian navy (Figure 10). Deployed in 1942, the 910-ton *Ardente* was one of 16 vessels of this class with a length of 87 m, a 9.9-m beam, and a draft of 3.7 m. These torpedo boats were armed with anti-aircraft guns, depth charge throwers, and four torpedo tubes. *Ardente* sank the submarine HMS *P48* in December of 1942, and shortly thereafter on January 12, 1943, official reports indicate it struck the Italian destroyer *Grecale* while in convoy. However, the location for *Ardente's* sinking was reported near Punta Barone, on the island of Salina, one of the Aeolian Islands, on the NE coast of Sicily. The work by the Superintendent's office has clarified this chapter in Italian naval history.

Even with the rather narrow band of depth contours for which the multibeam system can effectively survey, the amount of sediment coverage is minimal compared to the southern coast. Sediments from the high peaks near shore along the N coast are undoubtedly settling slightly further

offshore at depths over 300 m. Whereas the 100-m contour is often over 25 km offshore off the southern coast, it is not uncommon to reach depths of 300–800 m, 5 km off the northern coast. As such, the 2010 survey plan will focus new multibeam survey from Capo San Vito towards Cap Gallo at Palermo, and eventually to Capo Zafferano at the eastern point that forms the Bay of Palermo.

Works Cited

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Notes

1 The exposed rock outcrops were not included in the transect. A slight amount of sand has certainly built up around the artifacts, but their scant presence due to drag net incursions would not provide significant sediment traps.

2 Some of the larger artifact and natural features of the site were discernable in the sonar data, and were measured in relation to datum positions and one another as a check on the overlay positions generated in Site Recorder. Although gross measures, they did confirm the efficacy of integrating the mosaic and datum measurements.

3 Piro, S., and L. Versino 1995.

4 Zangara, S. 2009.

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Great Lakes Steamboat Archaeology:

The Anthony Wayne Shipwreck Survey 2009 Report

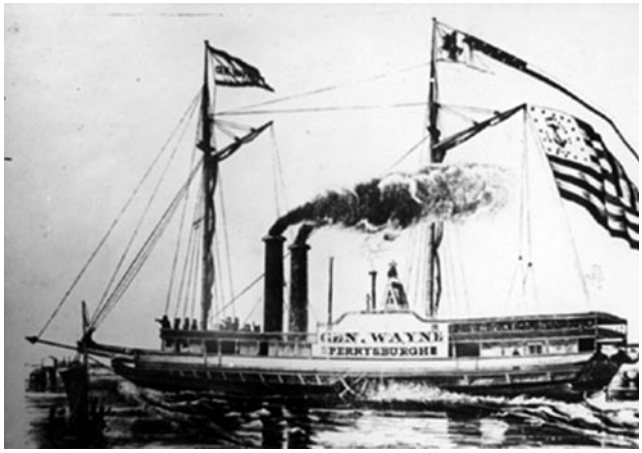

FIG 1
The only known contemporary image of *Anthony Wayne*, from an 1838 lithograph. Courtesy of the Clarence S. Metcalf Great Lakes Maritime Research Library of the Great Lakes Historical Society, Vermilion, OH.

Introduction

The cold waters of the Great Lakes hold a great many secrets. On the bottom of Lake Erie, six miles north of Vermilion, Ohio, the remains of *Anthony Wayne* rest quietly. This side-wheel passenger and cargo steamer met its end in the spring of 1850 as the result of a devastating boiler explosion. Fate decreed that the steamer's afterlife should be spent entombed within the spongy lake bottom, lost from the people who built, manned, and sailed aboard this once opulent steamboat. In the fall of 2006, remote sensing technology was successful in penetrating the watery nether to locate the remnants of this steam-powered leviathan. At last, after being lost for over 150 years, the steamboat *Anthony Wayne* had been discovered, making it one of the earliest archaeological examples of a steamboat in all the Great Lakes.

In 2007, the Great Lakes Historical Society partnered with Texas A&M University and the Cleveland Underwater Explorers (CLUE) to record the remains of *Anthony Wayne.* After a very successful preliminary season in 2008 in which the site was mapped and the wreck recorded, it was decided that much could be achieved by excavating key locations on the site. Upon learning of this project and its significance to the maritime history of the Great Lakes, the Institute of Nautical Archaeology offered to lend its support to the project so that fieldwork could resume in the