Underwater Archaeological Resources Phase 1B Work Plan for the Onondaga Lake Bottom, Subsite of the Onondaga Lake Superfund Site, Onondaga County, New York

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INTRODUCTION

The Lake Champlain Maritime Museum (LCMM) under subcontract to Parsons has prepared this Phase 1B Underwater Archaeological Resources Work Plan on behalf of Honeywell for the Onondaga Lake Bottom Subsite of the Onondaga Lake Superfund Site. The activities described in this work plan will be undertaken to document the existence and significance of underwater cultural resources that may be impacted during remedial activities in Onondaga Lake.

This work plan is designed to facilitate management and assessment of archaeological resources in Onondaga Lake consistent with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended; the Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation*;[1] the New York Archaeological Council's *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New York State*;[2] and the New York State Historic Preservation Office's *Phase I Archaeological Report Format Requirements*.[3]

The cultural resource assessment included in this work plan applies only to potential archaeological and architectural resources. LCMM understands that USEPA has initiated government-to-government consultations with the Onondaga Nation in compliance with 36 CFR Part 800.4(a)(b) regarding properties of religious and cultural significance. However, at this time, USEPA has not asked Honeywell, Parsons, or LCMM to address the task of identifying religious and cultural properties. Therefore, no analysis has been performed as to whether the remediation of the areas included in this work plan may have an effect on Properties of Cultural and Religious Significance.

PROJECT LOCATION AND DESCRIPTION

Onondaga Lake is located in Onondaga County, New York and is contained within the City of Syracuse, and the towns of Salina and Geddes (Figure 1 and Figure 2). The lake has an aerial extent of about 4.5 square miles, with a drainage basin of approximately 233 square miles.

The Onondaga Lake Superfund Site is comprised of the Onondaga Lake bottom, seven tributaries and upland sources of lake contamination. The remedy for the Onondaga Lake bottom subsite was selected in accordance with the requirements of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA) and documented in a Record of Decision.[4]

PREVIOUS SURVEYS

The basis of this work plan is found in the previous archaeological and geophysical work undertaken in and around Onondaga Lake. In 2004, the Public Archaeology Facility of SUNY Binghamton carried out a *Phase IA Cultural Resource Assessment* of the Onondaga Lake Site.[5] This work recommended a Phase IB archaeological survey be executed in Onondaga Lake and along the shoreline due to the high potential that those areas may contain historic cultural resources.[6] In 2005, CR Environmental of Falmouth, Massachusetts conducted a remote sensing survey of the lake bottom. This effort recorded side scan sonar, magnetometer, bathymetry,

and sub-bottom profiler data primarily in support of the remedial design effort. The survey located 755 sonar targets and 1256 magnetic anomalies on the lakebed.

WORK PLAN ORGANIZATION

This work plan contains two chapters and five appendices. The Introduction contains background material pertinent to the project. Chapter 2 presents a summary of the potential locations of archaeological resources in Onondaga Lake, and the work plan proposed for implementing the study of these sites. Appendix 1 contains the methodology and results of the analysis of the available archaeological, archival and geophysical data for Onondaga Lake. Appendix 2 presents the Shoreline Survey Work Plan proposed by the Public Archaeology Facility. Appendix 3 contains the resumes of key project personnel and Appendix 4 contains the New York State Historic Preservation office protocols for the inadvertent discovery of human remains. Appendix 5 contains the bibliography.

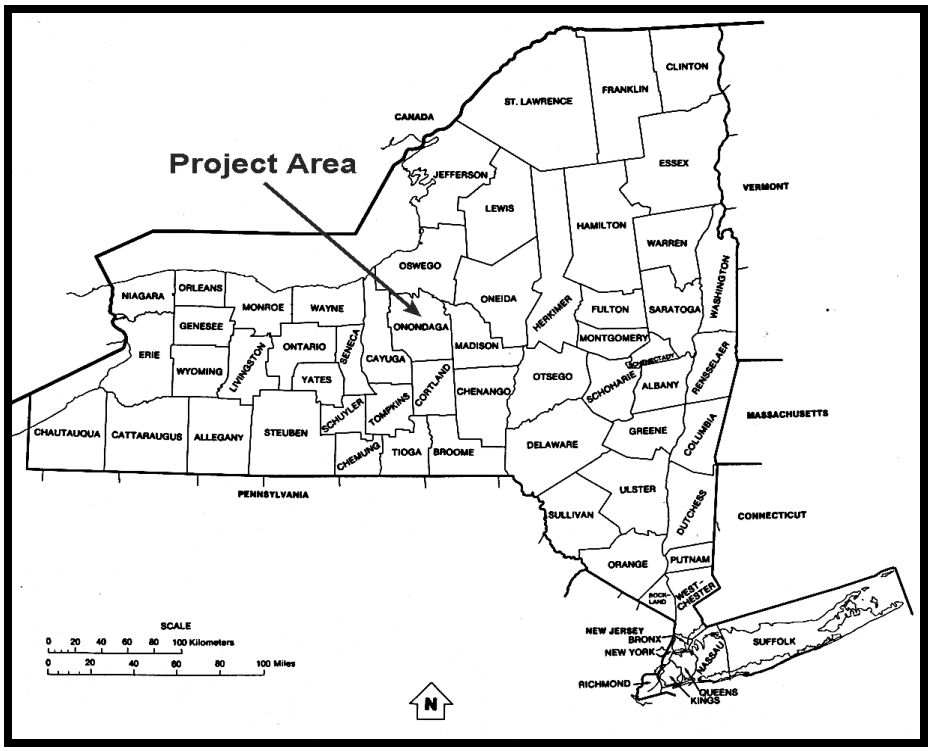


Figure 1. Map of New York State showing the Project Area.

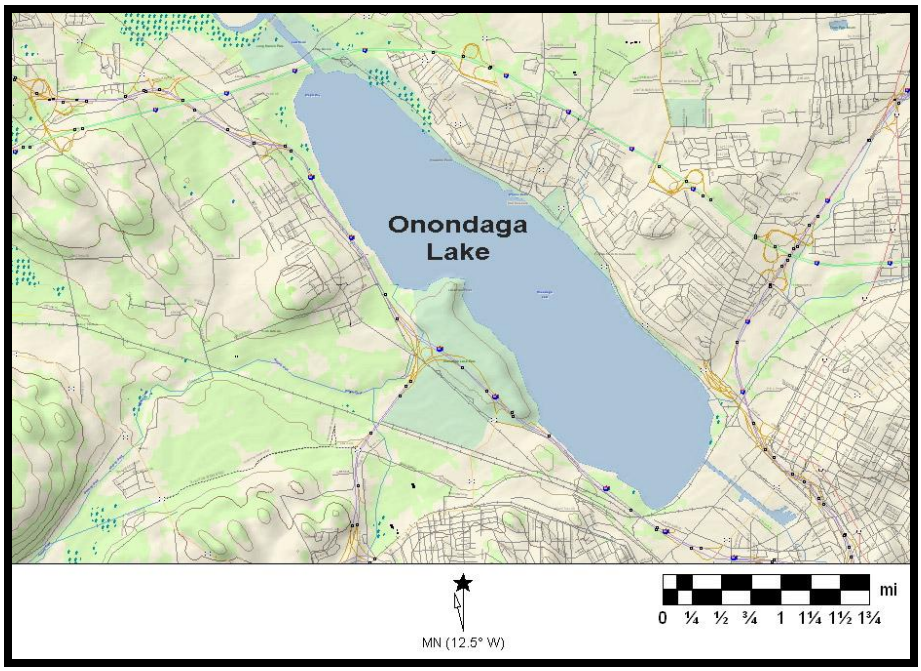


Figure 2. Topographic map showing Onondaga Lake.

WORKPLAN

UNDERWATER HISTORIC ARCHAEOLOGICAL RESOURCES

The analysis of the remote sensing data, previous archaeological surveys, archival information and aerial imagery located 52 areas within Onondaga Lake that could potentially represent historic archaeological resources. These 52 anomalies are areas of lake bottom or shoreline where one or more of the above referenced datasets indicates the potential presence of an archaeological resource.

Appendix 1 contains a full description of the anomalies located in Onondaga Lake and the methodological approach used to locate them. In summary, the analysis located the following potential archaeological resources (see also Table 1):

- 8 wrecks (locations where the data conclusively indicates the presence of a submerged vessel);[7]
- 9 possible wrecks (locations where the data is indicative of a submerged vessel, but the evidence is not conclusive);
- 20 areas of historic shoreline infrastructure (areas that contain docks, piers, footings, navigational aids or pipelines meeting the minimum 50 year threshold for NRHP eligibility);
- 1 iceboat;
- 1 aircraft;
- and 14 inconclusive anomalies (anomalies that have attributes consistent with archaeological resources, but cannot be clearly identified).

The total number of potential resources above is 53, one greater than the number of anomalies because Anomaly 4 consists of two barges.

Twenty-eight of the anomalies are located in or within 100ft of a currently anticipated remediation (e.g. dredge and/or isolation cap) area. These include:

- 4 wrecks[8] (see Figure 4 and Figure 5, Anomalies 4 [two barges], 12 and 20);
- 7 possible wrecks (see Figure 4 and Figure 5, Anomalies 1, 2, 3, 6, 8, 9 and 19);
- 9 areas of shoreline infrastructure (see Figure 4 and Figure 5, Anomalies 5, 7, 10, 11, 22, 30, 45, 51 and 52); and
- 9 inconclusive anomalies (see Figure 4 and Figure 5, Anomalies 33, 34, 35, 36, 37, 38, 43, 47 and 48).

The total number of potential resources above is 29, one greater than the number of anomalies because Anomaly 4 consists of two barges.

Table 1. Table of Anomalies in Onondaga Lake.

Anomaly Number	Sonar Contact	Magnetometer Anomaly	Aerial Photo	LCMM Analysis	In Remediation Area
1	0345, 0346	1013	Yes	Probable barge	Yes
2	348	0332, 0535, 0162	No	Probable canal boat or Salinas Pier remnants	Yes
3	343	260	No	Probable wreck	Yes
4	308	743, 777	Yes	Two barges, sonar shows only one barge, but aerial photos and charts suggest a second barge closer to the shoreline	Yes
5	2-6, 9-16	625, 248, 678, 275	No	Collection of acoustic and magnetic anomalies representing Geddes Pier and modern debris	Yes
6	30	1256	No	Possible wreck	Yes
7	130, 169, 150, 191, 202	819, 795, 220, 809, 794, 731	Yes	Structures related to the canal entrance; these may not meet 50 year threshold, additional research necessary	Yes
8	140	No	No	Inconclusive sonar image that CR identifies as a wreck	Yes
9	200	No	No	Inconclusive sonar image that CR identifies as a wreck	Yes
10	235	No	No	Possible small boat or structure on the end of a water suction pipe (see A51 [Anomaly 51])	Yes
11	254	776, 786	No	Possible barge or dock structure near shore and adjacent to A12	Yes
12	255	684, 629, 253, 618, 646, 671, 659, 265	No	Barge	Yes
13	264, 269, 267	202, 471, 472, 1232, 76, 477	No	Canal boat, dived on in 2007 by Hunt Diving. Edge fastened, stave bowed boat. Likely the vessel mentioned in a 1919 lawsuit.	No
14	355, 356, 357, 358	6	No	Tug *Stillwater*	No
15	431, 429, 428, 447	14	No	Wreck	No
16	444	1123, 1121, 1120, 1115, 299, 1119, 1111	No	Lakeview Resort	No
17	454	1097, 1098, 1095, 295	Yes	Barge	No
18	456	1090	Yes	Unknown shallow water structure	No
19	484	182, 187, 1073	No	Unknown, possible wreck	Yes
20	501	170, 178, 1066, 1065	No	Barge	Yes
21	521	340	Yes	Series of 20 pilings arranged in a square suggesting building or pier footings associated with Pleasant Beach Resort	No
22	No	314	Yes	Pleasant Beach Resort stone pier	Yes

Anomaly Number	Sonar Contact	Magnetometer Anomaly	Aerial Photo	LCMM Analysis	In Remediation Area
23	546, 544	89, 942, 939, 938, 934, 227, 98, 926	No	Debris associated with large magnetic signature	No
24	565, 567	No	No	Possible airplane, lack of magnetic signature is unusual for an aircraft. Consultations with CR suggest it is aquatic vegetation	No
25	601, 603	51, 85	No	Inconclusive sonar image that CR identifies as a wreck, between Manhattan and Rockaway beach resorts	No
26	622	317	Yes	Rockaway Beach pier remains	No
27	572, 573	No	Yes	Manhattan Beach pier remains	No
28	636, 634	52	No	Possible pier structure	No
29	642	No	No	Ice boat Blitz?	No
30	669, 667, 670	354, 355, 352, 351, 349, 346, 318, 86, 1241,	Yes	Maple Bay pier (southeastern)	Yes
31	700	No	No	Possible boat remains	No
32	No	7	No	1955 Air Force Jet	No
33	321, 326	947, 59, 949, 951, 953, 60, 955, 959,	No	Large magnetic anomaly with inconclusive sonar	Yes
34	No	672	No	Magnetic anomaly adjacent to A12 (barge) without sonar	Yes
35	No	604, 632, 617, 256, 645, 660	No	Magnetic anomaly between A12 and A4 (barges) without sonar	Yes
36	No	552, 73, 1007, 1009	No	Large multicomponent magnetic anomaly	Yes
37	No	499, 500, 276, 502, 503	No	Magnetic anomaly off of Geddes Pier	Yes
38	No	781, 747, 780, 779, 745, 778, 761	No	Near shore large magnetic anomaly in proximity to A4 (Barge) and near a charted wreck	Yes
39	No	91	No	Large magnetic anomaly with no sonar	No
40	No	375, 370, 364, 356, 361, 363, 363, 358, 357, 152	No	Multiple magnetic anomalies around former Maple Bay docks	No
41	No	No	Yes	Series of 32 pilings arranged in a square suggesting building or pier footings (similar to A21)	No
42	No	29, 50	No	Large magnetic anomaly between Pleasant Beach Resort and Manhattan Beach Resort	No
43	No	177, 1069	No	Magnetic anomaly adjacent to A20 (barge) without sonar	Yes
44	No	301, 300, 1049, 1051,	No	Magnetic anomalies likely associated with navigational markers	No

Anomaly Number	Sonar Contact	Magnetometer Anomaly	Aerial Photo	LCMM Analysis	In Remediation Area
		1079, 1052			
45	No	705, 796, 810, 817, 732, 773, 766, 712, 797, 811	Yes	Magnetic anomalies associated with former barge canal entrance dock	Yes
46	No	345, 338, 839, 337, 341	No	Near shore magnetic anomalies between Pleasant Beach Resort and Manhattan Beach	No
47	No	899, 896, 873, 871, 405, 404, 401, 402	No	Near shore magnetic anomaly near mouth of Nine Mile Creek	Yes
48	No	898, 897, 872, 406, 403	No	Near shore magnetic anomaly near mouth of Nine Mile Creek	Yes
49	532	No	Yes	Stone dock/pier structure	No
50	579	109, 127, 128	Yes	Stone dock/pier structure	No
51	278, 275, 280	479, 486, 480, 484, 1233, 200, 483, 201, 468. 459, 101, 99, 407, 412, 413, 419, 420, 465, 463, 433, 432, 428, 203, 434, 449, 204, 205, 450, 844, 843, 842, 841, 837, 836, 834, 835, 838, 839, 840	No	Three suction pipes (42in, 30in and 16in) related to the Solvay Process Company. The pipes are buried, but they appear to have an intakes on the ends. These structures appear on the 1908 Hopkins map.	Yes
52	333	1139, 285	No	Possible association with the historic Syracuse Yacht Club	Yes

Phase IB Plan for Historic Underwater Resources

The goals of the Phase 1B archaeological survey for historic underwater cultural resources are as follows: 1) undertake archival research to provide context for Onondaga Lake's historic archaeological resources; 2) determine presence/absence of archaeological resources at the anomalies selected for investigation; 3) collect detailed geophysical data and, where underwater visibility permits, videographic information on the anomalies which are determined to be archaeological resources; 4) to the extent possible, assess the NRHP eligibility of each archaeological resource; and 5) make recommendations.

Historic Context

As part of the Phase 1B underwater archaeological survey, a historic context for Onondaga Lake will be developed. Although the historic context will draw on the information collected in the *Phase 1A Cultural Resource Assessment* report, it will focus a new research effort on Onondaga Lake's maritime-history.

Specific research efforts to include:

- Historic research into shoreline infrastructure development
- Maritime uses of Onondaga Lake
- Typology of watercraft used on Onondaga Lake
- Research into identified resources which may be impacted during the remedial work

Collection of Additional Field Data

This Phase 1B work plan proposes using geophysical tools to record high-resolution remote sensing data and, wherever underwater visibility allows, a remotely operated vehicle (ROV) to record underwater video of anomalies located inside or within 100ft of a currently anticipated remediation area. This data will allow for an assessment of each anomaly's nature and, in most cases, its significance. Additional data will be collected from Anomalies 1-12, 19-20, 22, 30, 33-38, 43, 45, 47-48, and 51-52. Field work schedule is contingent upon the approval of this work plan, but it is anticipated that this work will take place in the Spring of 2010.

Multibeam Imaging Sonar

Anomalies resting in less than 10ft of water will be imaged with a Blueview 900 kHz Multibeam Imaging Sonar. This boom-mounted sonar will collect high definition (range resolution of 1 inch) streaming imagery of each anomaly. The Blueview sonar is typically used for hull inspections, and search and recovery operations, but will be particularly useful in recording near video-quality images in Onondaga Lake's shallow, low-visibility conditions.

Side Scan Sonar

Anomalies located in waters exceeding 10ft will be imaged with a Marine Sonics 1200 kHz Side Scan Sonar. This towed sonar will be used to record high-resolution (range resolution of 1.5in) side scan sonar imagery of each anomaly.

Remotely Operated Vehicle
Each anomaly that is located in waters where visibilities appear to exceed 5ft will also be documented with a Video Ray ROV w/Tritech SeaKing Scanning Sonar. The ROV will record color video footage of each anomaly.

Schedule of Deliverables
Upon completion of the field work deliverables will be submitted based upon this following schedule:

- **Delivery of Draft Phase IB report to Parsons/Honeywell**: 150 days
- **Delivery of Draft Phase IB report to NYSDEC**: 200 days
- **Delivery of Final Phase IB report**: 60 days after receiving NYSDEC comments on draft

PRECONTACT SUBMERGED ARCHAEOLOGICAL RESOURCES

None of the known precontact/contact period archaeological resources near the shoreline of Onondaga Lake will be impacted by the in lake remediation activities. However, the water level of Onondaga Lake may have fluctuated over the past 10,000 years, and precontact archaeological resources once located on lakeshore could now be submerged below lake bottom remediation areas. Specifically, Hohman in PAF's Phase IA report proposed that drier periods during the Late Archaic and AD 1000-1300 in the Late Woodland could have allowed for human use (and the creation of archaeological resources) in areas that are now submerged 1 to 3ft below the current lake level.[9] The currently available geophysical data collected from Onondaga Lake are being reviewed by a qualified geoarchaeologist from Geoarchaeology Research Associates Inc (GRA Inc) so that a more confident assessment of the potential for submerged precontact resources within the remediation areas can be made by LCMM archaeologists.

This section presents a brief discussion of Holocene lake level research in northeastern North America and current archaeological methods that are employed in identifying submerged precontact resources. These discussions provide a framework in which a future Phase IB work plan for the identification of submerged precontact resources in Onondaga Lake can be detailed. This work plan will be developed should the geomorphological analysis or shoreline archaeological studies suggest that it is warranted.

Post-glacial Lake Level Fluctuations in Northeastern North America

As part of the Great Lakes drainage basin, Onondaga Lake was formed during the deglaciation of northern North America circa 12,000 years before present (YBP). While similar post-glacial lakes and ponds in the northeastern United States have not been the subject of thorough archaeological study with regards to submerged precontact resources, many have been the subject of paleoenvironmental studies that evaluated the effects of Holocene climatic change on lake levels. These changes in the location and/or presence of shorelines and wetlands would have influenced precontact human settlement patterns and resource procurement strategies. Studies in the Great Lakes, Finger Lakes and smaller ponds of the northeastern United States and southern Ontario have demonstrated that climate change throughout the early and mid-Holocene (circa 10,000-4,000 YBP) had diverse effects on lake level fluctuations in the Northeastern section of the continent, as well as the distribution and formation of wetlands along the margins of these lakes and their tributaries (Figure 3).[10]

Sediment core studies in the Finger Lakes have shown that during what is called the Holocene Hypsithermal climatic period (9000-4000 YBP) lake levels were relatively high when compared to the drought conditions proposed for the Great Lakes and Mid-West region.[11] This study also indicated that there were a series of low stands during the Hypsithermal in the Finger Lakes region every 1800-2200 years (approximately 9,800, 7800, 6000, 4200 and 2000 YBP) with the highest relative lake levels occurring circa 8800 and 7000 YBP.[12] Sediment core and subbottom profiler data analyses at small closed basin ponds in Maine suggest that there was a 2-6 m decline in lake levels during the mid-Holocene, especially circa 6,000 YBP.[13] Sediment cores from Crawford Lake in southern Ontario indicate the most significant lake low stand was

between 4800 and 2000 YBP, which is consistent with other sites in southern Michigan and Ontario.[14] Within the Great Lake Basins there were several phases of drier climate and lake low stands, including a major event that spanned ca. 9,000-4,000 YBP.[15] During the Lake Stanley phase (7,900 YBP) water levels in the Lake Huron basin were up to 70-100 m *below* present and large areas of lake bed were exposed terrestrial landscapes.[16] While all of these studies demonstrate that lake level changes throughout the early to mid Holocene were prolific in the northeast, they also indicate that the impacts of climate change on lake levels varied depending upon the specific body of water in question.

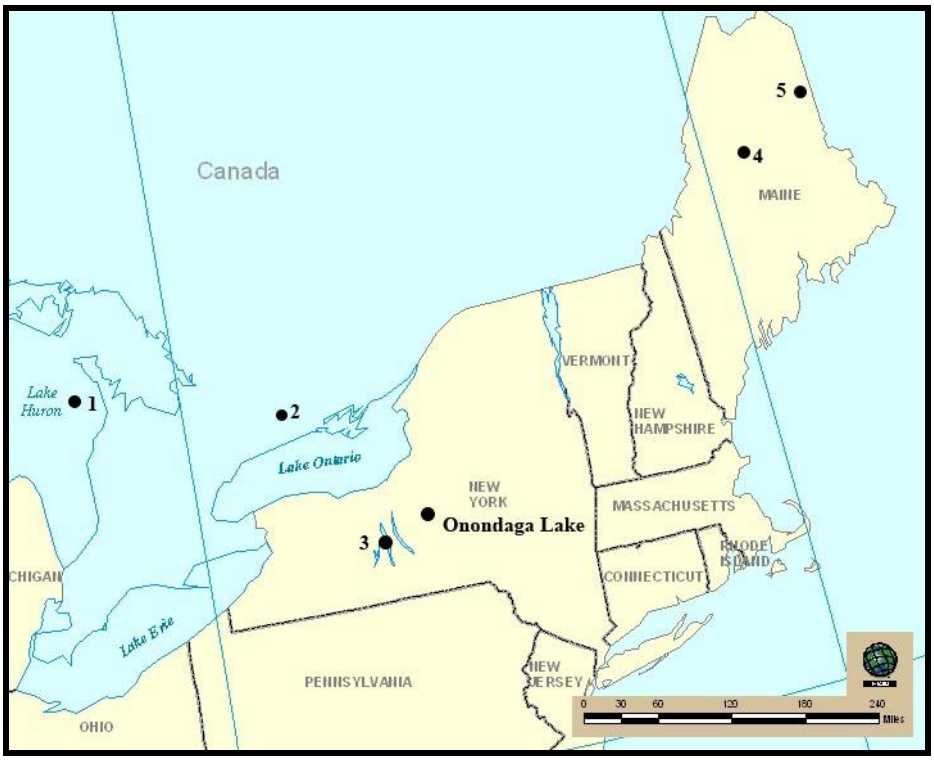


Figure 3: Map of the lakes and ponds discussed in this section: 1-Lake Huron; 2-Crawford Lake; 3-Finger Lakes; 4-Mattews Pond, Maine; 5-Whitehead Lake, Maine (Map adapted from Environmental Systems Research Institute [ESRI]).

Identifying Submerged Precontact Resources

Methodologies to test for submerged precontact archaeological resources in North America are relatively underdeveloped when compared to the archaeological methods used to identify terrestrial archaeological resources.[17] Initial survey techniques, such as bathymetric enhancement, subbottom-profiling and side-scan sonar remote sensing are used to reconstruct submerged topography and to identify now submerged paleoshorelines or other landscape features. They also assist in the predictive modeling process for submerged precontact resources based on landscape analysis.[18] Other underwater precontact site testing methods include diver survey with hand fanning, vibra-coring, and induction dredge test pit excavations.[19]

Long-term research projects in North America have located and mapped submerged precontact landscapes and resources off the Continental Shelves of the Atlantic and Pacific. These pioneering projects have helped to establish basic methodologies for the identification and study of submerged precontact landscapes. The Atlantic and Pacific coast lines became submerged by the rise in sea level brought about by the melting continental glaciers during the end of the last ice age (circa 11,000-9,000 YBP).[20] Sites dating to the Paleoindian and Early Archaic periods (circa 13,000-8,000 YPB) have been located along the submerged ancient margins of riverbeds and beaches off of Florida, New Jersey, Newfoundland, and British Columbia using side scan sonar, and subbottom profiler data in conjunction with diver verification and excavation methodologies.[21] Other archaeological projects in North America are centered on changes in post-glacial lake levels brought about by both glacial retreat and unstable early to mid Holocene climates in the Great Lakes region. For instance submerged precontact landscapes have been identified within Lake Huron and Lake Michigan that date to approximately 9,000-7,500 YBP when water levels were nearly 100 m lower than modern day. [22]

These current studies indicate that the ability to identify areas of potential submerged precontact resources relies upon an in-depth geophysical survey of the water body and its submerged landscape.[23] It is only with that knowledge that confident testing strategies can be formulated and precontact human land use can be understood within the context of the now submerged paleoenvironment and paleolandscapes.

Subsequent Underwater Work Plan for Submerged Precontact Resources

The potential for submerged precontact archaeological sites in Onondaga Lake will be better understood upon the analysis of available geophysical data and sediment cores by a Geoarchaeologist from GRA Inc and the archaeological data retrieved from the shoreline testing north and south of the current confluence of Nine Mile Creek and Onondaga Lake by PAF archaeologists. Should those studies suggest that submerged precontact sites could be extant within the lake's remediation areas, the LCMM will create a second Phase 1B underwater archaeological resources work plan specifically designed to archaeologically test for the presence/absence of these sites.

***Onondaga Nation's Spiritual and Cultural History of Onondaga Lake*[1]**

The region of Onondaga Lake and the Onondaga Lake watershed has been our homeland since the dawn of time. We have been a steward of Onondaga Lake since time immemorial and will continue to do so forever, as that is what has been mandated from the Gayanashagowa, the Great Law of Peace. In the 1794 *Treaty of Canandaigua the United States government recognized Onondaga Lake as part of our aboriginal territory. The Lake is the spiritual, cultural and historic center of the Haudenosaunee Confederacy. Over one thousand years ago, the Peacemaker brought the Mohawk, Oneida, Onondaga, Cayuga, and Seneca Nations together on the shores of Onondaga Lake. At the lakeshore, these Nations accepted the message of peace, laid down their arms, and formed the Haudenosaunee Confederacy. The Confederacy was the first representative democracy in the West.*

To symbolize the Confederacy, the Peacemaker planted a white pine, the Tree of Peace, on the shore of Onondaga Lake. It is understood that the Peacemaker chose the white pine because the white pine's needles are clustered in groups of five, just as the five founding Nations of the Confederacy clustered together for strength. The boughs of the white pine represent the laws that protect all the people. An eagle was placed at the top of the tree to watch for danger from without and within. Four white roots of peace reach out in the four directions towards anyone or any Nation who wishes to come under this tree of peace.

As the birth place of the Confederacy and democracy, the Lake is sacred to the Haudenosaunee. The Onondaga Nation has resided on the Lake and throughout its watershed since time immemorial, building homes and communities, fishing, hunting, trapping, collecting plants and medicine, planting agricultural crops, performing ceremonies with the natural world dependent on the Lake, and burying our ancestors - the mothers, fathers and children of the Onondaga Nation. The Onondaga Nation views its relationship to this area as a place where we will forever come from and will return to.

It brings great sadness to the people of the Onondaga Nation that despite our long stewardship of the Lake and its watershed, it took only one hundred years of abuse to wreak havoc to the Lake, its tributaries and all the plants, animals and marine life that depend on the Lake and its watershed. Industry interfered with the Onondaga Nation's relationship to the land and disturbed the ancestors that were interred throughout the watershed - either by direct excavation or contamination, or indirect efforts such as construction on top of grave sites. We wish to bring about a healing between us and all others who live within our homelands around the Lake. We must in order to protect the future generations "whose faces are looking up from the earth."

We are one with this land and this Lake. It is our duty to work for a healing of this land, and all of its waters and living things, to protect them, and to pass on a healthy environment to future generations - yours and ours.

[1] The Onondaga Nation requested that the oral tradition concerning the significance of Onondaga Lake to the Onondaga and Haudenosaunee Confederacy be included in this report. The Onondaga Nation's statement may not necessarily reflect the views of the Lake Champlain Maritime Museum, Parsons or Honeywell International Inc. Further, the inclusion of the Onondaga Nation's oral traditional shall not constitute an admission of any fact or law in any judicial or administrative proceeding. In addition, the statement and findings made in this report by Honeywell, Parsons and the Lake Champlain Maritime Museum may not reflect the opinions and views of the Onondaga Nation, and do not constitute an admission by the Onondaga Nation of fact or law in any legal or other proceeding.

APPENDIX 1: REMOTE SENSING DATA ANALYSIS

As part of this work plan the LCMM undertook an analysis of the extant archaeological, historic and geophysical data sets to determine the known and potential cultural resources in Onondaga Lake. This analysis was undertaken for the entire lake bed and all shoreline areas of Onondaga Lake. Although significant portions of the lake will not be directly affected by remedial activities, the remedial design as of January 2010 is still evolving. Based on the potential that the boundaries of environmental remediation activity areas could change, it was deemed appropriate to analyze the data set for the entire lake bottom rather than just the remedial areas as they currently exist.

DATA SOURCES

Remote Sensing Data

Remote Sensing Data for Onondaga Lake was collected by CR Environmental, Inc. in 2005.[24] This survey recorded four datasets: 1) bathymetry to identify the lake bottom surface; 2) side-scan sonar to characterize debris, obstructions and other surficial features of the lake bottom; 3) sub-bottom profiling to supplement the assessment subsurface stratigraphy; and 4) magnetometer data to identify debris and obstructions containing iron within or on top of the lake sediments.

Aerial Surveys

Aerial imagery for Onondaga Lake from Google Earth and Microsoft's Virtual Earth were examined to identify shoreline and shallow water features.

Previous Archaeological and Historic Research

In 2004 the Public Archaeology Facility conducted a Phase 1A archaeological resource assessment for the Onondaga Lake Superfund Site on the behalf of Honeywell.[25]

Additional Historic Research

Navigational charts of Onondaga Lake from 1915, 1926, 1932, 1937, 1942, and 1947 were examined for the locations of potential cultural resources.

DATA ANALYSIS METHODOLOGY

The following process was followed to locate potential submerged cultural resources in Onondaga Lake:

1. Using ArcView (a GIS viewer produced by ESRI) a multi-layered file was developed to assess the geo-spatial relationship of the following data sets:
    a. Contoured magnetometer data (a geo-referenced .tif file)
    b. Side scan sonar anomalies (.shp file marking the location of each sonar anomaly)
    c. Individual magnetometer anomalies (.shp files marking the location of each magnetic anomaly)
    d. Onondaga shoreline map (.shp file)
    e. Outline of the currently anticipated remediation areas (.shp file)
2. All correlations between sonar contacts and magnetometer anomalies revealed in step one above were recorded.

3. All 755 individual sonar contacts images were examined (as individual .tif files).
4. Simultaneous with 3 above, the locations of shallow water sonar anomalies were cross referenced with those locations on Google Earth and Microsoft Virtual Earth to determine if there were visible shoreline or shallow-water features that could shed light on the nature of the contact.
5. Simultaneous to 3 and 4 above historic navigational charts and maps were examined to determine if there were charted historic features that could yield such an anomaly.
6. The analysis resulting from steps 2-5 are located on Figures 4 and 5, and recorded in tabular form (see Table 1) and in expanded form (see remainder of Appendix 1).

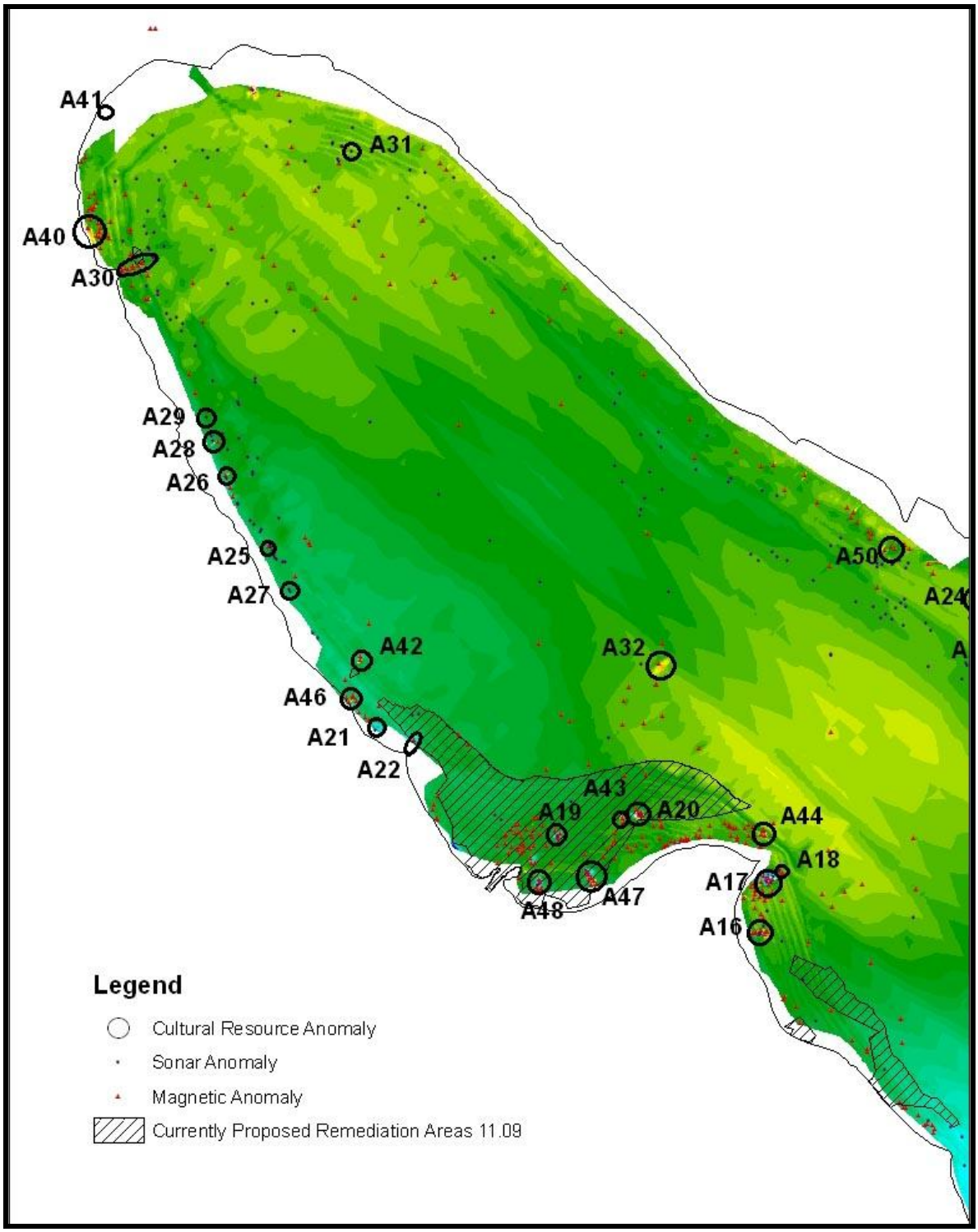


Figure 4: Magnetic intensity map of the northwestern half of Onondaga Lake showing individual magnetic anomalies, sonar anomalies, cultural resource anomalies, and remediation areas. (Note that remediation areas for SMUs 5 and 8 are not shown here as they are preliminary and will be refined during subsequent remedial design phases. Additionally areas of SMU 3 are slated for shoreline stabilization.)

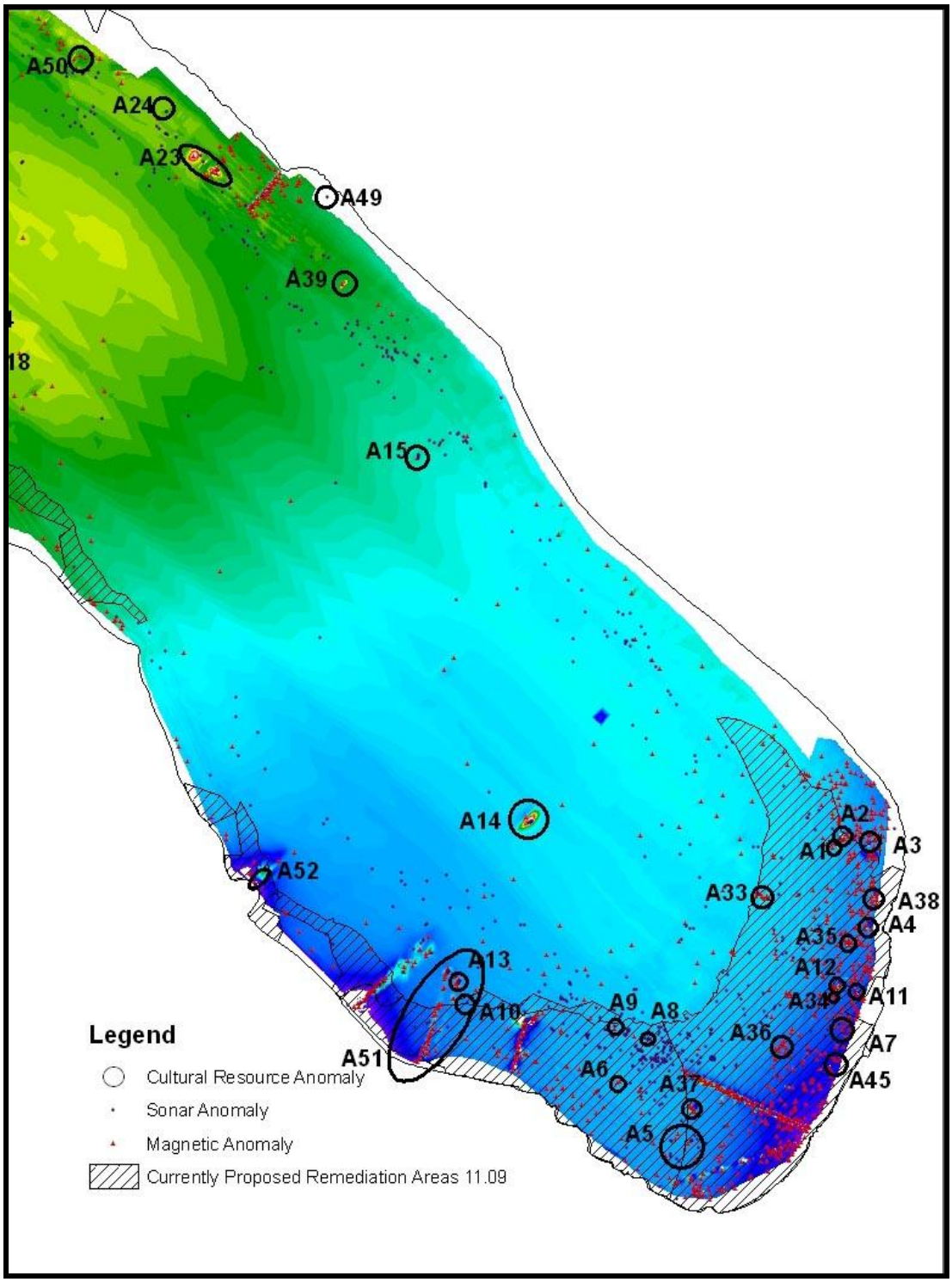
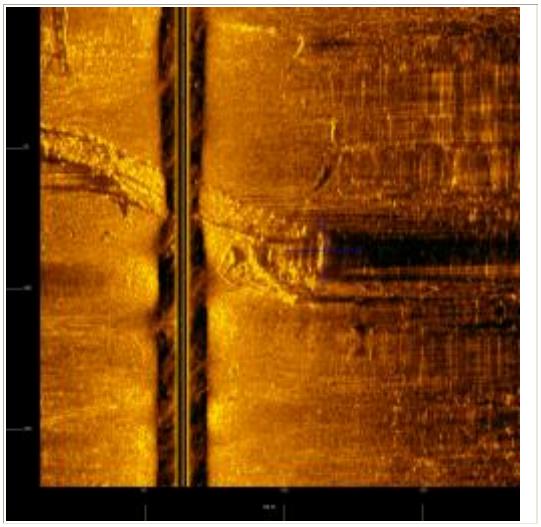


Figure 5. Magnetic intensity map of the southeastern half of Onondaga Lake showing individual magnetic anomalies, sonar anomalies, cultural resource anomalies, and remediation areas. (Note that remediation areas for SMUs 5 and 8 are not shown here as they are preliminary and will be refined during subsequent remedial design phases. Additionally areas of SMU 3 are slated for shoreline stabilization.)

Anomaly 1

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
1	0345, 0346	1013	Yes	Probable barge, near A2	Yes



Target: Contact0345 Target Click Position (GEO): 43° 04.46428' N 076° 10.75138' W Target Click Position (NY83-CF): N:1120452.72 E:928188.50	Target Description: N/A Target Height=8.60 US Feet Target Length: 111.25 US Feet Target Width: 27.58 US Feet Target Shadow: 71.50 US Feet Range to Target: 8.97 US Feet User Classification (1): Wreck

Figure 6. Sonar image of Anomaly 1 (courtesy CR Environmental, Inc).

Figure 7. Underwater structure faintly visible at the location of Anomaly 1 (courtesy Microsoft Virtual Earth).

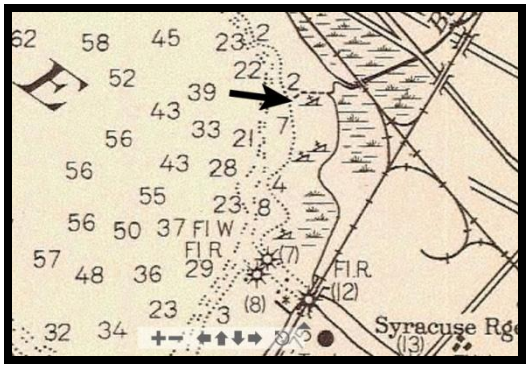
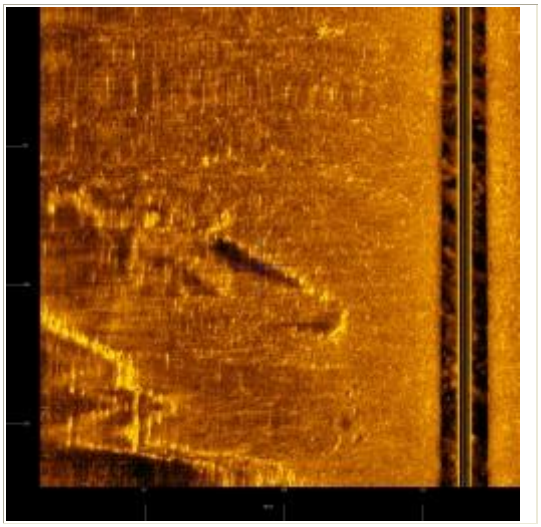


Figure 8. 1942 navigational chart showing a wreck in the general location of Anomaly 1.

Anomaly 2

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
2	348	0332, 0535, 0162	Yes	Possible canal boat, near A1 could also be remnants of Salinas Pier	Yes



Target: Contact0348 Target Click Position (GEO): 43° 04.47673' N 076° 10.74180' W Target Click Position (NY83-CF): N:1120528.56 E:928230.82	Target Description: N/A Target Height=0.86 US Feet Target Length: 45.50 US Feet Target Width: 4.52 US Feet Target Shadow: 8.42 US Feet Range to Target: 75.10 US Feet User Classification (1): debris

Figure 9. Sonar image of Anomaly 2 (courtesy CR Environmental, Inc).

Figure 10. Underwater structure faintly visible at the location of Anomaly 2 (courtesy Microsoft Virtual Earth).

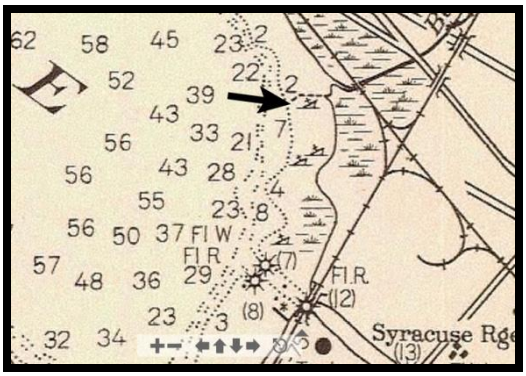
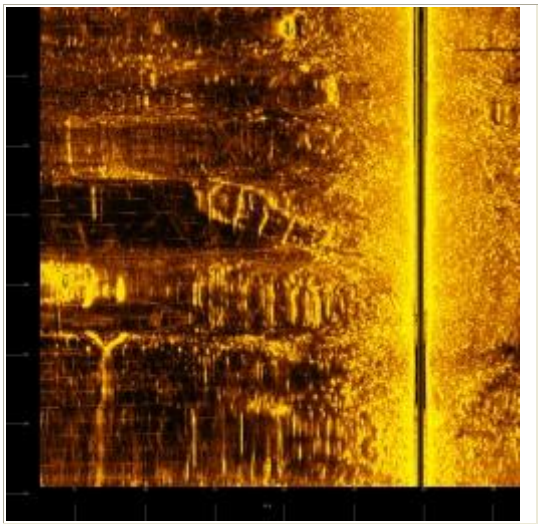


Figure 11. 1942 navigational chart showing a wreck and the Salinas Pier remnants in the general location of Anomaly 2.

Anomaly 3

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
3	343	260	No	Probable wreck	Yes



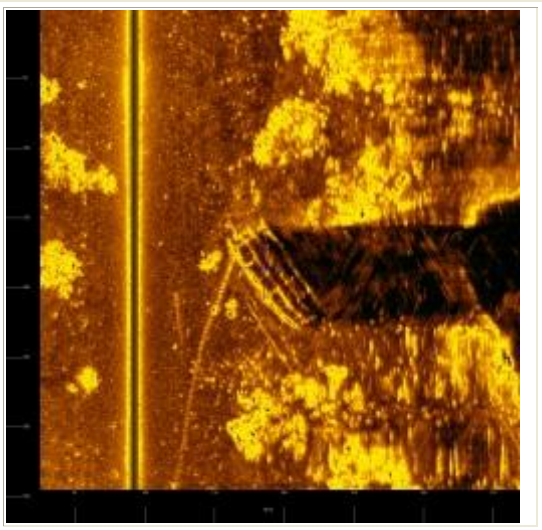
Target: Contact0343
Target Click Position (GEO): 43° 04.46289' N 076° 10.67812' W
Target Click Position (NY83-CF):
N:1120445.85
E:928514.73

Target Description: N/A
Target Height>=2.51 US Feet
Target Length: 91.80 US Feet
Target Width: 40.45 US Feet
Target Shadow: 157.96 US Feet
Range to Target: 111.33 US Feet
User Classification (1): Wreck

Figure 12. Sonar contact information showing Anomaly 3 (courtesy CR Environmental, Inc).

Anomaly 4

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
4	308	743, 777	Yes	Two barges, sonar shows only one barge, but aerial photos and charts suggest a second barge closer to the shoreline	Yes



Target: Contact0308
Target Click Position (GEO): 43° 04.30614' N 076° 10.66484' W
Target Click Position (NY83-CF):
N:1119493.95
E:928578.56

Target Description: N/A
Target Height>=2.89 US Feet
Target Length: 84.55 US Feet
Target Width: 39.04 US Feet
Target Shadow: 186.88 US Feet
Range to Target: 94.80 US Feet
User Classification (1): Wreck

Figure 13. Sonar contact information showing one clearly visible barge (courtesy CR Environmental, Inc).

Figure 14. Two barges visible at the location of Anomaly 4 (courtesy Microsoft Virtual Earth).

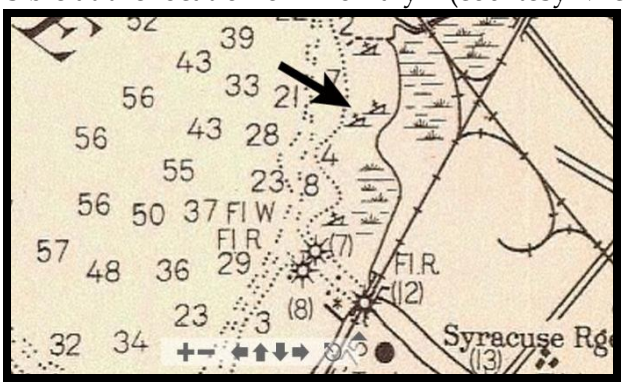


Figure 15. 1942 navigational chart showing two wrecks in the general location of Anomaly 4.

Anomaly 5

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
5	2-6, 9-16	625, 248, 678, 275	No	Collection of acoustic and magnetic anomalies representing Geddes Pier and modern debris	Yes

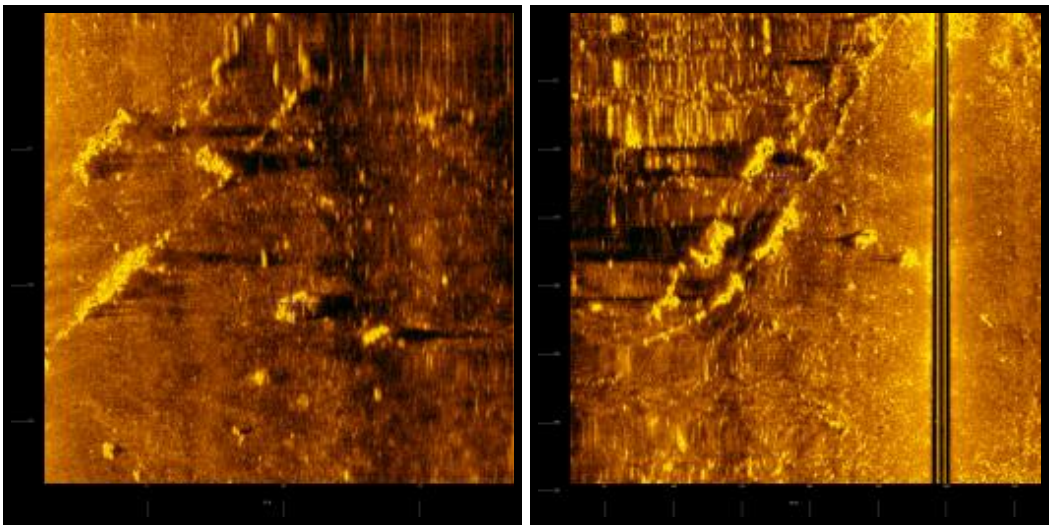


Figure 16. Sonar images showing linear acoustic anomalies in the area of the former Geddes Pier (courtesy CR Environmental, Inc).

Anomaly 6

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
6	30	1256	No	Possible wreck	Yes

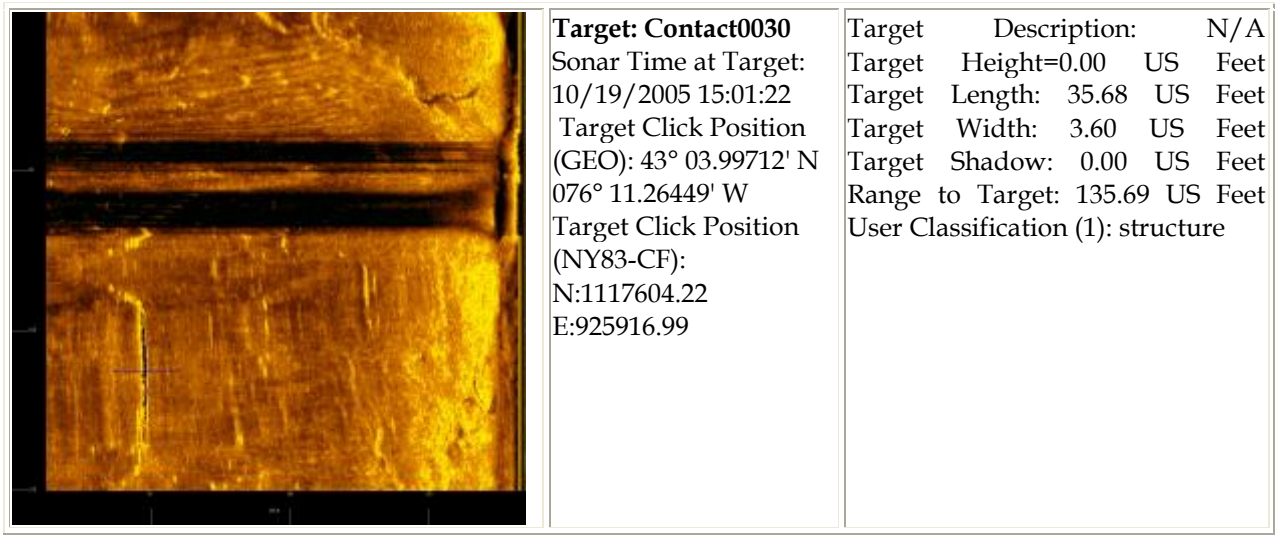
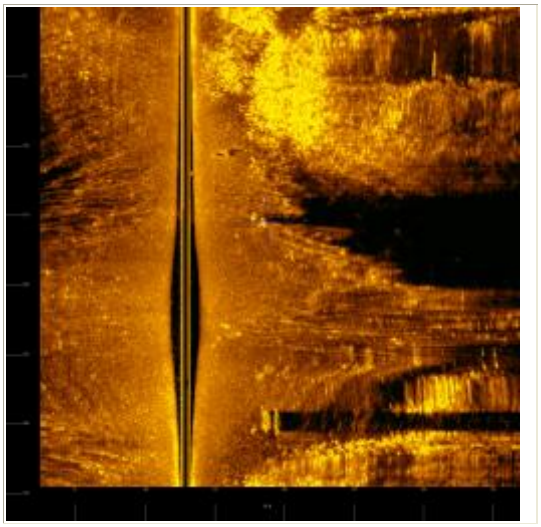


Figure 17. Sonar contact information from Anomaly 6 showing a linear acoustic anomaly (courtesy CR Environmental, Inc).

Anomaly 7

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
7	130, 169, 150, 191, 202	819, 795, 220, 809, 794, 731	Yes	Structures (dolphins?) related to the canal entrance	Yes



Target: Contact0130 Target Click Position (GEO): 43° 04.08198' N 076° 10.74975' W Target Click Position (NY83-CF): N:1118130.56 E:928206.96	Target Description: N/A Target Height>=2.33 US Feet Target Length: 12.40 US Feet Target Width: 4.78 US Feet Target Shadow: 65.88 US Feet Range to Target: 57.26 US Feet User Classification (1): debris (man-made)

Figure 18. Sonar contact information from Anomaly 7 (courtesy CR Environmental, Inc).

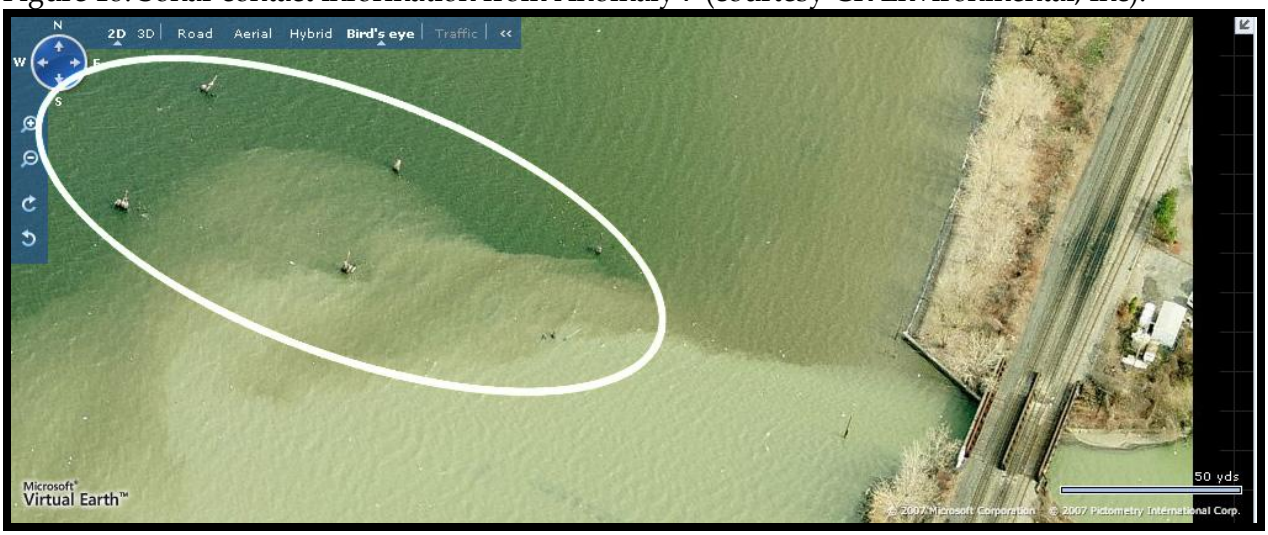
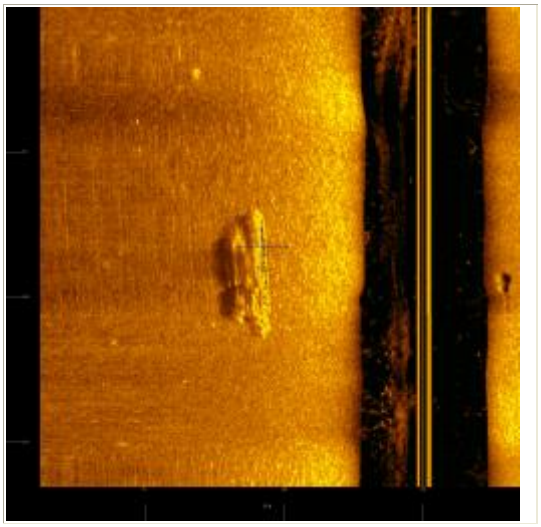


Figure 19. Canal entrance related structures creating Anomaly 7 (courtesy Microsoft Virtual Earth).

Anomaly 8

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
8	140	No	No	Inconclusive sonar image that CR identifies as a wreck	Yes

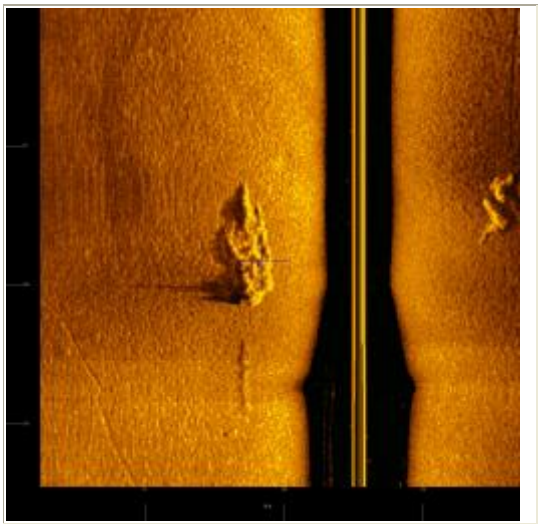


Target: Contact0140 Target Click Position (GEO): 43° 04.09171' N 076° 11.24856' W Target Click Position (NY83-CF): N:1118179.05 E:925985.22	Target Description: N/A Target Height=1.57 US Feet Target Length: 48.48 US Feet Target Width: 13.09 US Feet Target Shadow: 4.54 US Feet Range to Target: 62.39 US Feet User Classification (1): Wreck

Figure 20. Sonar contact information from Anomaly 8 (courtesy CR Environmental, Inc).

Anomaly 9

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
9	200	No	No	Inconclusive sonar image that CR identifies as a wreck	Yes

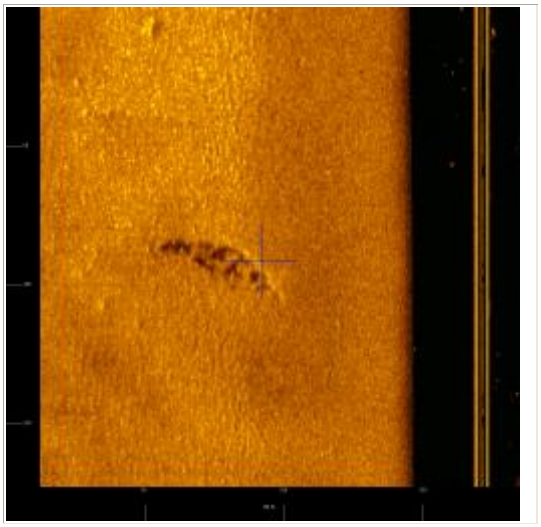


Target: Contact0200 Target Click Position (GEO): 43° 04.11722' N 076° 11.33457' W Target Click Position (NY83-CF): N:1118332.18 E:925601.45	Target Description: N/A Target Height=9.72 US Feet Target Length: 47.86 US Feet Target Width: 16.21 US Feet Target Shadow: 42.42 US Feet Range to Target: 34.85 US Feet User Classification (1): Wreck

Figure 21. Sonar contact information from Anomaly 9 (courtesy CR Environmental, Inc).

Anomaly 10

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
10	235	No	No	Possible small boat or could be related to the nearby 16in former water intake	Yes



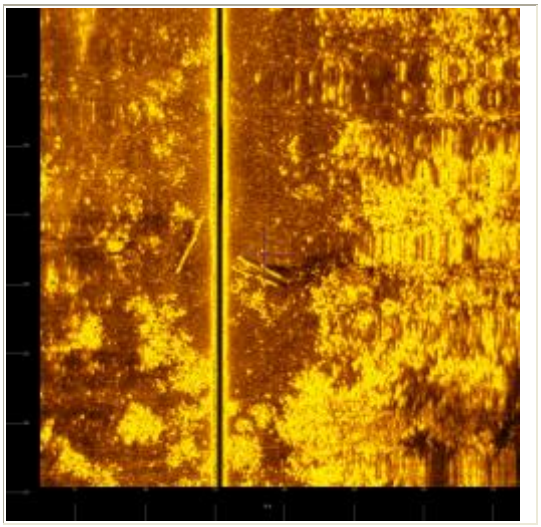
Target: Contact0235
Target Click Position (GEO): 43° 04.16305' N 076° 11.72281' W
Target Click Position (NY83-CF):
N:1118602.51
E:923871.18

Target Description: Debris with substantial portion in water column, casting irregular shadows.
Target Height=6.98 US Feet
Target Length: 19.32 US Feet
Target Width: 3.92 US Feet
Target Shadow: 33.43 US Feet
Range to Target: 83.83 US Feet
User Classification (1): debris

Figure 22. Sonar contact information from Anomaly 10 (courtesy CR Environmental, Inc).

Anomaly 11

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
11	254	776, 786	No	Possible barge or dock structure near shore and adjacent to A12	Yes



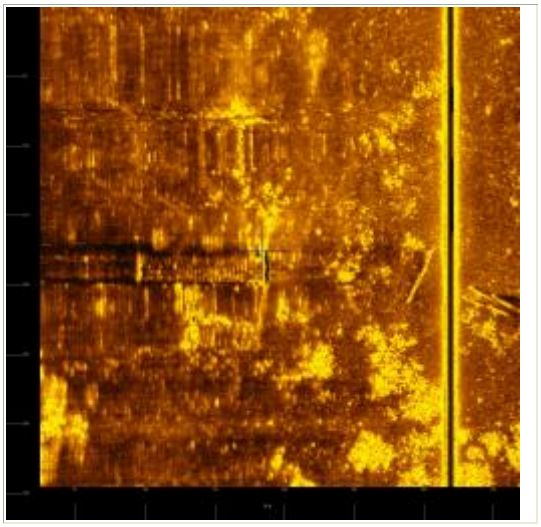
Target: Contact0254
Target Click Position (GEO): 43° 04.18021' N 076° 10.70146' W
Target Click Position (NY83-CF):
N:1118728.22
E:928419.16

Target Description: N/A
Target Height=1.44 US Feet
Target Length: 38.29 US Feet
Target Width: 9.63 US Feet
Target Shadow: 15.92 US Feet
Range to Target: 28.82 US Feet
User Classification (1): debris (man-made)

Figure 23. Sonar contact information from Anomaly 11 (courtesy CR Environmental, Inc).

Anomaly 12

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
12	255	684, 629, 253, 618, 646, 671, 659, 265	No	Barge	Yes



Target: Contact0255 Target Click Position (GEO): 43° 04.18245' N 076° 10.73919' W Target Click Position (NY83-CF): N:1118741.02 E:928251.07	Target Description: N/A Target Height>=1.46 US Feet Target Length: 92.72 US Feet Target Width: 25.86 US Feet Target Shadow: 69.43 US Feet Range to Target: 139.05 US Feet User Classification (1): Wreck

Figure 24. Sonar contact information from Anomaly 12 (courtesy CR Environmental, Inc).

Figure 25. Barge visible from aerial photography (courtesy Microsoft Virtual Earth).

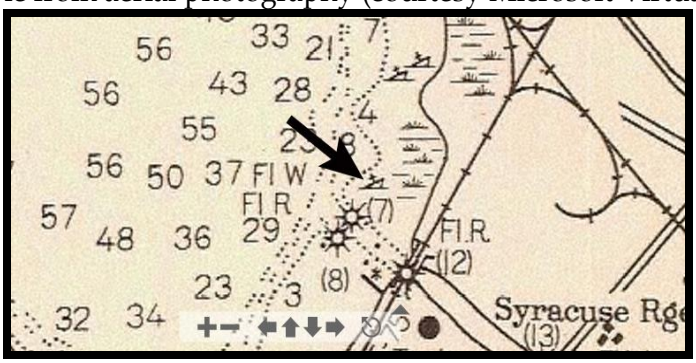
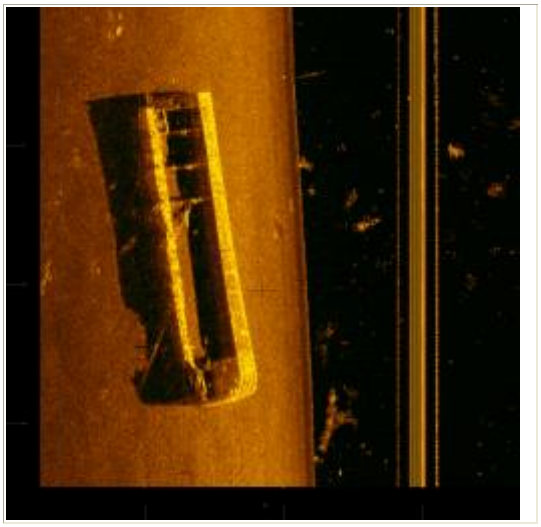


Figure 26. 1942 navigational chart showing a wreck in the general location of Anomaly 12.

Anomaly 13

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
13	264, 269, 267	202, 471, 472, 1232, 76, 477	No	Canal boat, possibly boat lost in 1919.	No

Additional notes: This vessel was examined by divers from Hunt Diving of Clayton, New York in October 2007. The video showed the vessel to be intact up to gunwales standing at least six feet proud of the bottom. The boat was built using edge fastening construction; a common canal boat building technique that used iron pins driven vertically into the planking to create a rigid longitudinal structure. The bow is stave built; another commonly used late nineteenth/early twentieth century canal boats building technique where the bow was constructed of vertically oriented planks. To the knowledge of LCMM researchers, no other stave bow canal boats have been archaeologically documented. Anomaly 13 is 250 feet outside of a remediation area.

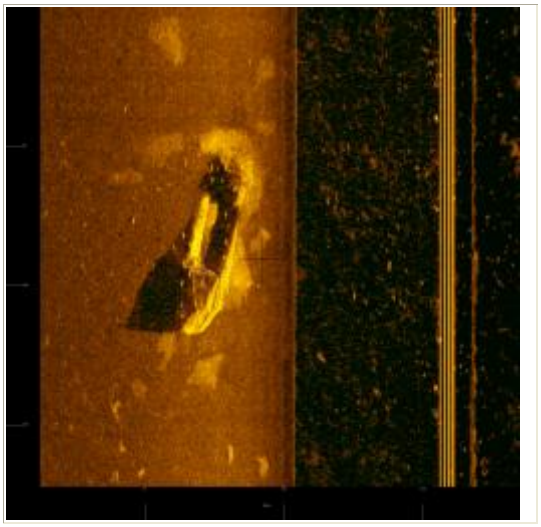


Target: Contact0267 Target Click Position (GEO): 43° 04.20292' N 076° 11.74359' W Target Click Position (NY83-CF): N:1118844.29 E:923777.49	Target Description: N/A Target Height=8.47 US Feet Target Length: 106.27 US Feet Target Width: 25.72 US Feet Target Shadow: 19.57 US Feet Range to Target: 24.68 US Feet User Classification (1): Wreck

Figure 27. Sonar contact information from Anomaly 13 (courtesy CR Environmental, Inc).

Anomaly 14

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
14	355, 356, 357, 358	6	No	Tug *Stillwater*	No



Target: Contact0355
Target Click Position (GEO): 43° 04.50946' N 076° 11.56030' W
Target Click Position (NY83-CF):
N:1120710.06
E:924585.10

Target Description: N/A
Target Height=12.02 US Feet
Target Length: 58.64 US Feet
Target Width: 16.27 US Feet
Target Shadow: 23.98 US Feet
Range to Target: 87.42 US Feet
User Classification (1): Wreck

Figure 28. Sonar contact information from Anomaly 14 (courtesy CR Environmental, Inc).

Once Proud Tug in Last Resting Place

The Stillwater Is Raised From Watery Grave And Junked

All that remains of the once proud tug The Stillwater, 20 years ago one of the finest craft on the Barge Canal, rest ignominiously today in a junkyard.

The last chapter in the colorful quarter-century history of the ship was written last week when workmen on State Derrick Boat No. 6 raised it from the bottom of the Canal Terminal, salvaged its valuables and sunk the rest in the middle of Onondaga Lake.

The Stillwater settled to the bottom last Feb. 11 for the second time in its history. Resting in the path of other craft, it was officially branded as a "menace to navigation." The State figuratively confiscated it and offered it for sale at public auction.

One shipper bid $1. It was the only bid that the auctioneer, Andrew R. Mulligan, assistant district State engineer, received. And it was one more bid than he expected. However, the lone bidder was rejected.

The State of New York then bid the craft in for a State-owned dollar bill, and William Robinson, district State engineer, ordered it raised, salvaged and resunk at some point where its hulk would not be in the way of passing ships.

Workmen under the leadship of Clarence Barber, terminal engineer, completed the three-day task of raising and dissecting the ship last week.

The old ship sank once before, back in 1935, at a point near Baldwinsville. The sinking was officially ascribed to "general debility."

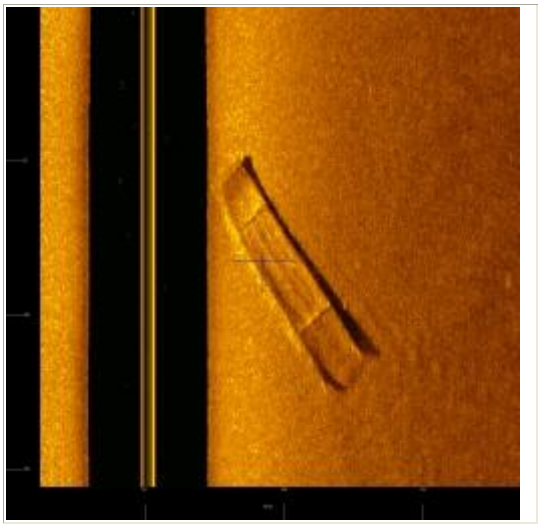
The State raised it and auctioned it off to Ross Coyne of Syracuse for $1. Coyne later sold it to William Rubenstein, who in recent years used it to haul salt.

At the close of the navigation season last fall the ship was anchored for the winter in the canal terminal. It proved to be a hard winter. Ice formed, melted and reformed several times around the hull. It pulled out the caulking, the cold waters of the canal seeped into the vessel and it sank —for the last time.

Figure 29. Newspaper article describing the disposal of the Tug *Stillwater* in 1940 (Syracuse Herald American, September 15, 1940).

Anomaly 15

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
15	431, 429, 428, 447	14	No	Wreck	No



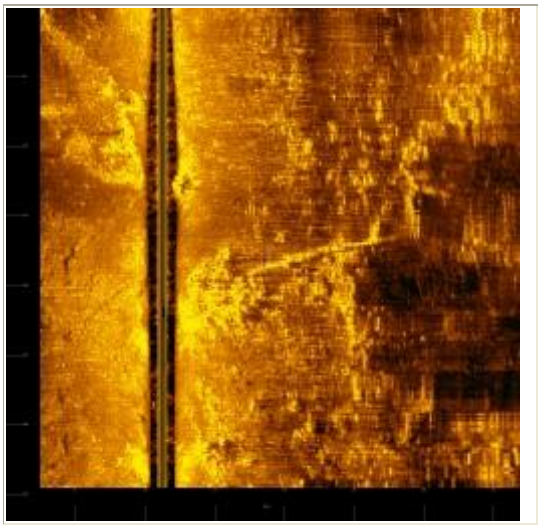
Target: Contact0429
Target Click Position (GEO): 43° 05.21687' N 076° 11.84234' W
Target Click Position (NY83-CF):
N:1125001.30
E:923309.37

Target Description: N/A
Target Height=3.60 US Feet
Target Length: 78.99 US Feet
Target Width: 20.20 US Feet
Target Shadow: 9.41 US Feet
Range to Target: 22.85 US Feet
User Classification (1): Wreck

Figure 30. Sonar contact information from Anomaly 15 (courtesy CR Environmental, Inc).

Anomaly 16

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
16	444	1123, 1121, 1120, 1115, 299, 1119, 1111	No	Lakeview Resort	No



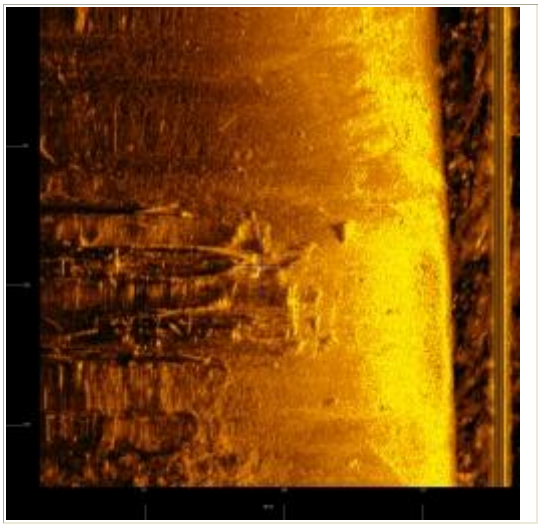
Target: Contact0444
Target Click Position (GEO): 43° 05.26269' N 076° 13.06429' W
Target Click Position (NY83-CF):
N:1125255.28
E:917867.87

Target Description: N/A
Target Height=0.00 US Feet
Target Length: 117.70 US Feet
Target Width: 3.97 US Feet
Target Shadow: 0.00 US Feet
Range to Target: 74.59 US Feet
User Classification (1): debris

Figure 31. Sonar contact information from Anomaly 16 (courtesy CR Environmental, Inc).

Anomaly 17

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
17	454	1097, 1098, 1095, 295	Yes	Barge	No



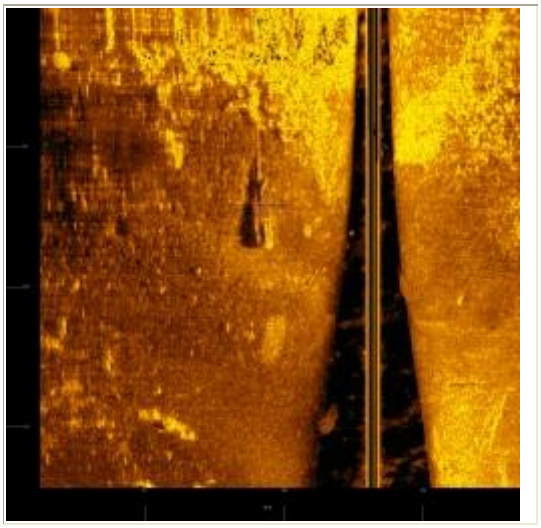
Target: Contact0454 Target Click Position (GEO): 43° 05.35721' N 076° 13.03724' W Target Click Position (NY83-CF): N:1125829.93 E:917985.81	Target Description: Debris field Target Height=5.05 US Feet Target Length: 79.84 US Feet Target Width: 50.50 US Feet Target Shadow: 42.14 US Feet Range to Target: 87.46 US Feet User Classification (1): debris (man-made)

Figure 32. Sonar contact information from Anomaly 17(courtesy CR Environmental, Inc).

Figure 33. Barge visible at the location of Anomaly 17 (courtesy Microsoft Virtual Earth).

Anomaly 18

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
18	456	1090	Yes	Unknown shallow water structure, near A17	No



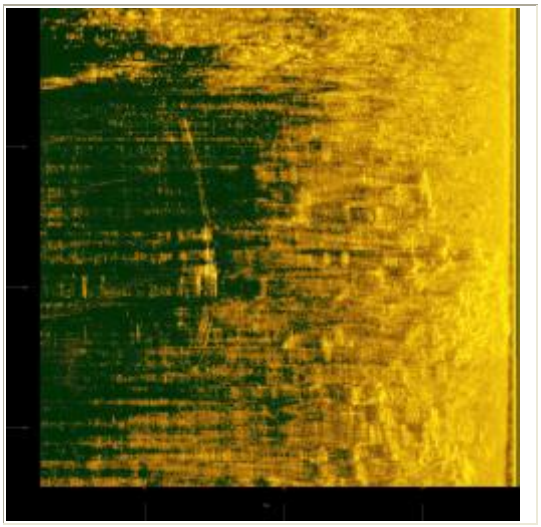
Target: Contact0456 Target Click Position (GEO): 43° 05.38069' N 076° 13.01464' W Target Click Position (NY83-CF): N:1125973.05 E:918085.80	Target Description: N/A Target Height=3.13 US Feet Target Length: 38.68 US Feet Target Width: 6.75 US Feet Target Shadow: 6.53 US Feet Range to Target: 42.07 US Feet User Classification (1): debris (man-made)

Figure 34. Sonar contact information from Anomaly 18 (courtesy CR Environmental, Inc).

Anomaly 19

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
19	484	182, 187, 1073	No	Unknown, possible wreck	Yes

Additional note: A19 may be in a previously dredge area.

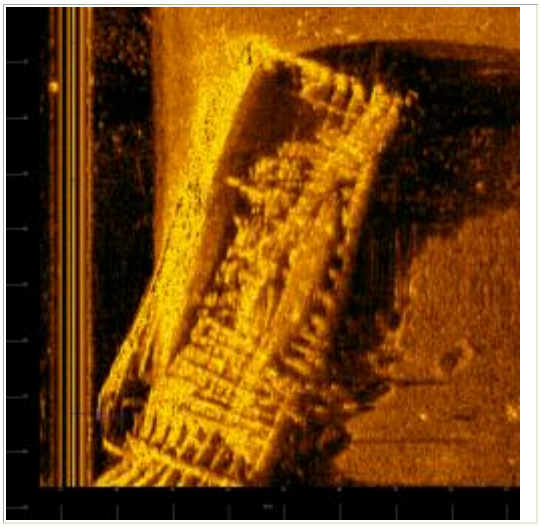


Target: Contact0484 Target Click Position (GEO): 43° 05.44656' N 076° 13.58271' W Target Click Position (NY83-CF): N:1126362.22 E:915555.07	Target Description: N/A Target Height=0.00 US Feet Target Length: 100.42 US Feet Target Width: 6.20 US Feet Target Shadow: 0.00 US Feet Range to Target: 109.96 US Feet User Classification (1): debris

Figure 35. Sonar contact information from Anomaly 19 (courtesy CR Environmental, Inc).

Anomaly 20

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
20	501	170, 178, 1066, 1065	No	Barge	Yes

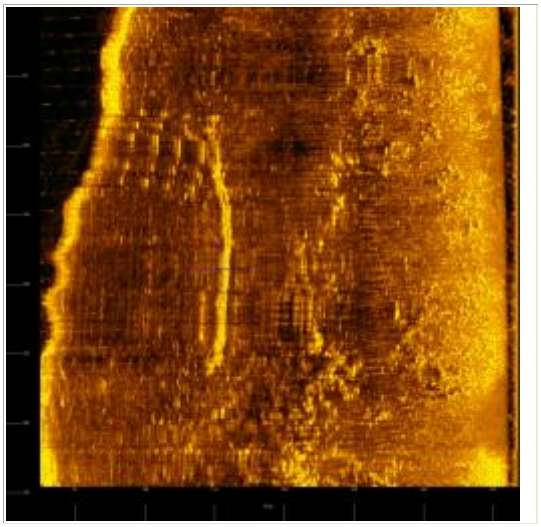


Target: Contact0501 Target Click Position (GEO): 43° 05.48701' N 076° 13.37278' W Target Click Position (NY83-CF): N:1126611.95 E:916488.59	Target Description: N/A Target Height=11.07 US Feet Target Length: 84.52 US Feet Target Width: 34.46 US Feet Target Shadow: 31.84 US Feet Range to Target: 5.60 US Feet User Classification (1): Wreck

Figure 36. Sonar contact information from Anomaly 20 (courtesy CR Environmental, Inc).

Anomaly 21

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
21	521	340	Yes	Series of 20 pilings arranged in a square suggesting building or pier footings associated with Pleasant Beach Resort	No



Target: Contact0521 Target Click Position (GEO): 43° 05.64636' N 076° 14.04727' W Target Click Position (NY83-CF): N:1127567.17 E:913481.89	Target Description: N/A Target Height>=0.00 US Feet Target Length: 152.34 US Feet Target Width: 7.67 US Feet Target Shadow: 0.00 US Feet Range to Target: 213.49 US Feet User Classification (1): structure

Figure 37. Sonar contact information from Anomaly 21 (courtesy CR Environmental, Inc).

Figure 38. Aerial view showing footings and adjacent linear comprising Anomaly 21 (courtesy Microsoft Virtual Earth).

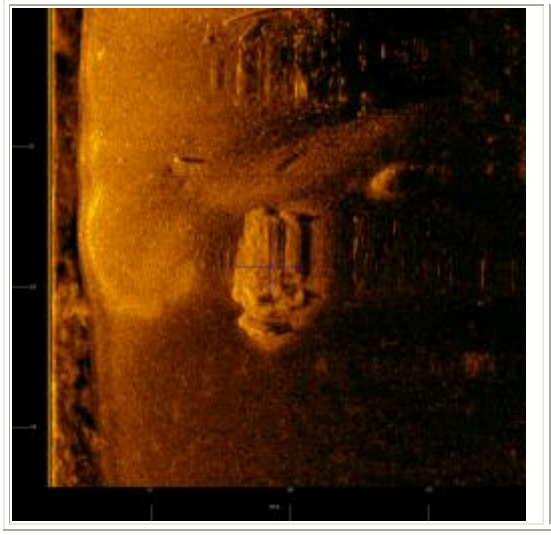
Anomaly 22

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
22	No	314	Yes	Pleasant Beach Resort stone pier	Yes

Figure 39. Aerial view showing pier remnants comprising Anomaly 22 (courtesy Microsoft Virtual Earth).

Anomaly 23

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
23	546, 544	89, 942, 939, 938, 934, 227, 98, 926	No	Debris associated with large magnetic signature	No

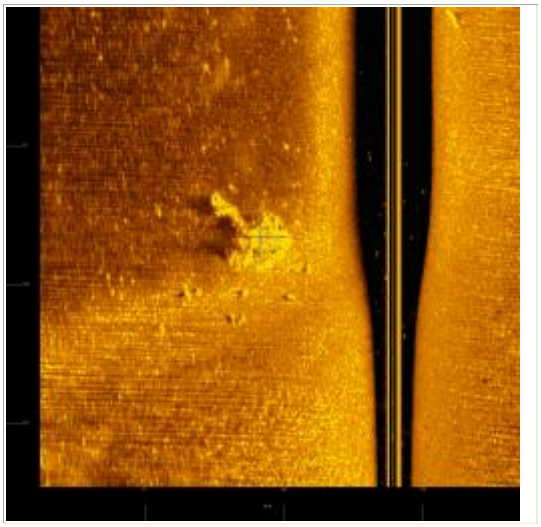


Target: Contact0546 Target Click Position (GEO): 43° 05.79484' N 076° 12.41004' W Target Click Position (NY83-CF): N:1128500.63 E:920766.14	Target Description: N/A Target Height=1.31 US Feet Target Length: 51.34 US Feet Target Width: 24.48 US Feet Target Shadow: 5.14 US Feet Range to Target: 80.90 US Feet User Classification (1): mound

Figure 40. Sonar contact information from Anomaly 23 (courtesy CR Environmental, Inc).

Anomaly 24

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
24	565, 567	No	No	Possible airplane, lack of magnetic signature is unusual. Consultations with CR Environmental suggest that this anomaly is aquatic vegetation rather than an aircraft	No

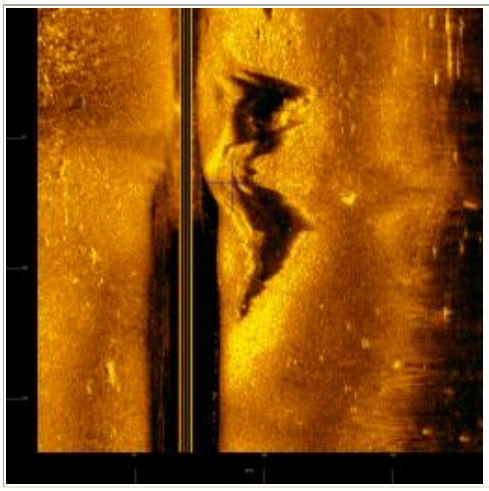


Target: Contact0565 Target Click Position (GEO): 43° 05.88072' N 076° 12.49972' W Target Click Position (NY83-CF): N:1129020.47 E:920364.59	Target Description: N/A Target Height=1.21 US Feet Target Length: 34.09 US Feet Target Width: 25.30 US Feet Target Shadow: 13.02 US Feet Range to Target: 47.91 US Feet User Classification (1): debris (man-made)

Figure 41. Sonar contact information from Anomaly 24 (courtesy CR Environmental, Inc).

Anomaly 25

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
25	601, 603	51, 85	No	Inconclusive sonar image that CR identifies as a wreck, between Manhattan and Rockaway beach resorts	No

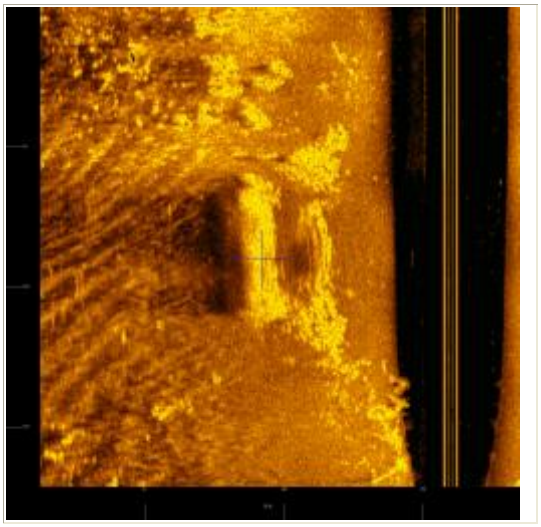


Target: Contact0601 Target Click Position (GEO): 43° 05.99322' N 076° 14.31487' W Target Click Position (NY83-CF): N:1129669.15 E:912281.97	Target Description: N/A Target Height=7.32 US Feet Target Length: 97.73 US Feet Target Width: 30.97 US Feet Target Shadow: 24.69 US Feet Range to Target: 15.68 US Feet User Classification (1): Wreck

Figure 42. Sonar contact information from Anomaly 25 (courtesy CR Environmental, Inc).

Anomaly 26

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
26	622	317	Yes	Rockaway Beach pier remains	No



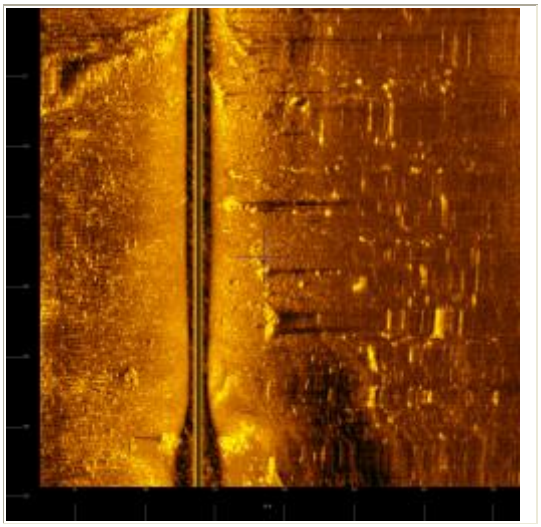
Target: Contact0622 Target Click Position (GEO): 43° 06.12033' N 076° 14.42395' W Target Click Position (NY83-CF): N:1130439.30 E:911793.27	Target Description: N/A Target Height=4.33 US Feet Target Length: 33.37 US Feet Target Width: 15.32 US Feet Target Shadow: 40.26 US Feet Range to Target: 69.24 US Feet User Classification (1): debris (man-made)

Figure 43. Sonar contact information from Anomaly 26 (courtesy CR Environmental, Inc).

Figure 44. Aerial view showing pier remnants comprising Anomaly 26 (courtesy Microsoft Virtual Earth).

Anomaly 27

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
27	572, 573	No	Yes	Manhattan Beach pier remains	No



Target: Contact0572 Target Click Position (GEO): 43° 05.90744' N 076° 14.26305' W Target Click Position (NY83-CF): N:1129149.06 E:912514.76	Target Description: May be patch of vegetation. Target Height=7.89 US Feet Target Length: 11.98 US Feet Target Width: 10.04 US Feet Target Shadow: 47.93 US Feet Range to Target: 44.38 US Feet User Classification (1): debris

Figure 45. Sonar contact information from Anomaly 27 (courtesy CR Environmental, Inc).

Figure 46. Aerial view showing pier remnants comprising Anomaly 27 (courtesy Microsoft Virtual Earth).

Anomaly 28

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
28	636, 634	52	No	Possible pier structure	No

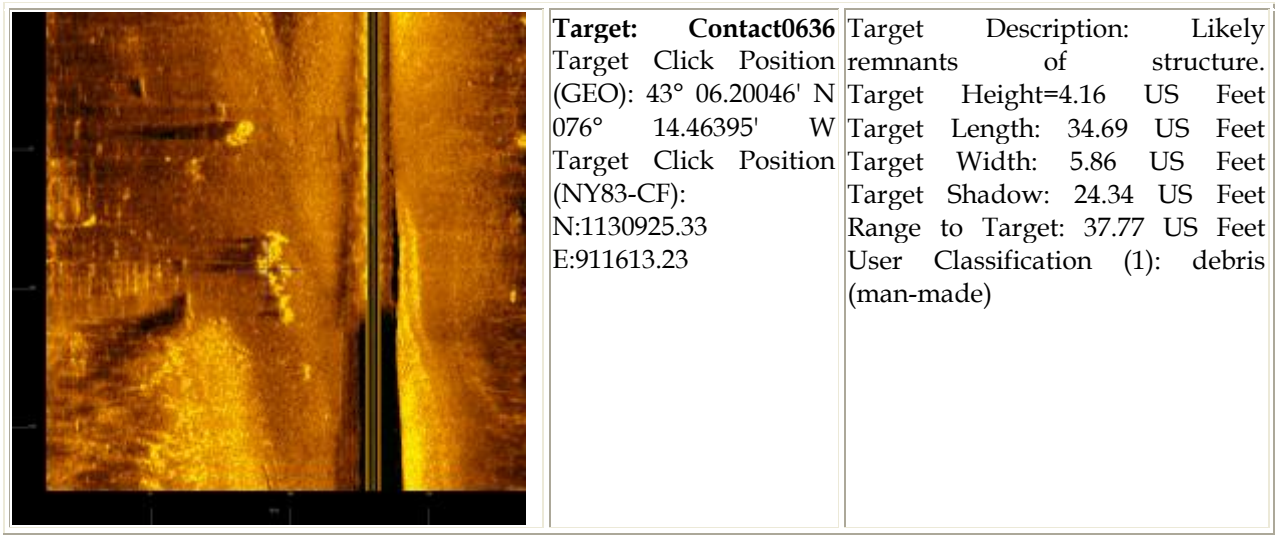


Figure 47. Sonar contact information from Anomaly 28 (courtesy CR Environmental, Inc).

Anomaly 29

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
29	642	No	No	Ice boat *Blitz*?	No

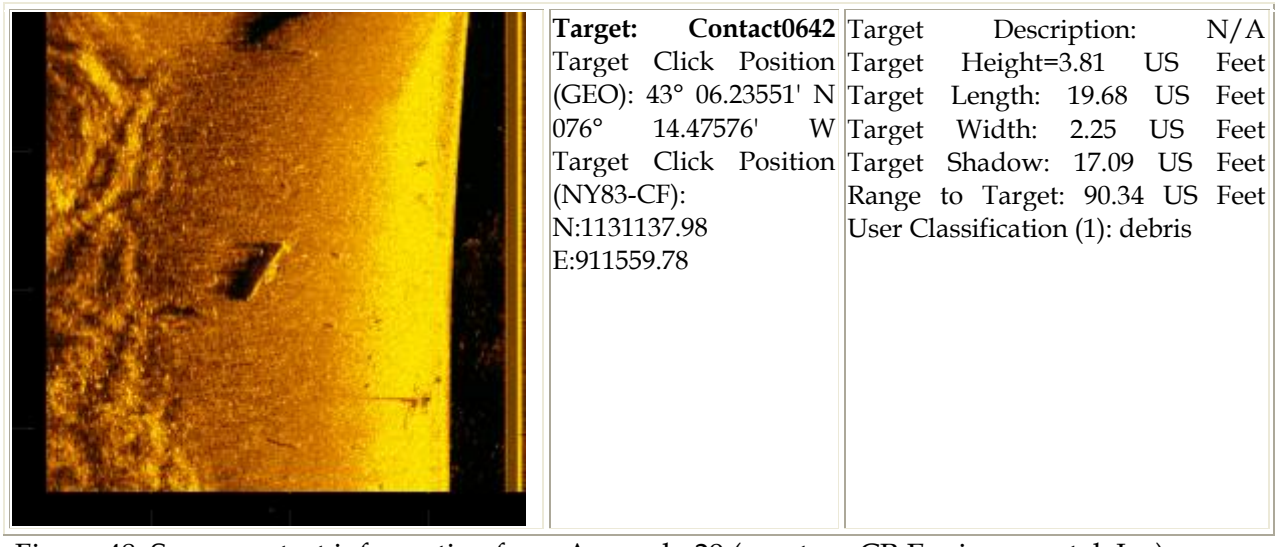
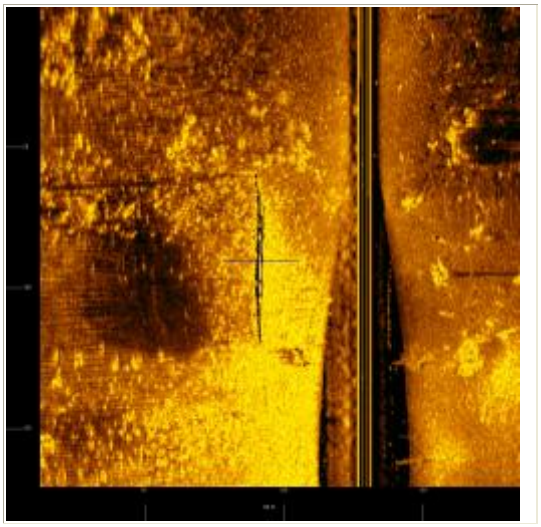


Figure 48. Sonar contact information from Anomaly 29 (courtesy CR Environmental, Inc).

Anomaly 30

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
30	669, 667, 670	354, 355, 352, 351, 349, 346, 318, 86, 1241,	Yes	Maple Bay pier (southeastern)	Yes



Target: Contact0670 Target Click Position (GEO): 43° 06.53634' N 076° 14.61272' W Target Click Position (NY83-CF): N:1132962.86 E:910942.79	Target Description: Likely remnants of metallic retaining wall with piling at upper limit. Target Height>=0.67 US Feet Target Length: 63.10 US Feet Target Width: 1.91 US Feet Target Shadow: 1.64 US Feet Range to Target: 36.98 US Feet User Classification (1): debris (man-made)

Figure 49. Sonar contact information from Anomaly 30 (courtesy CR Environmental, Inc).

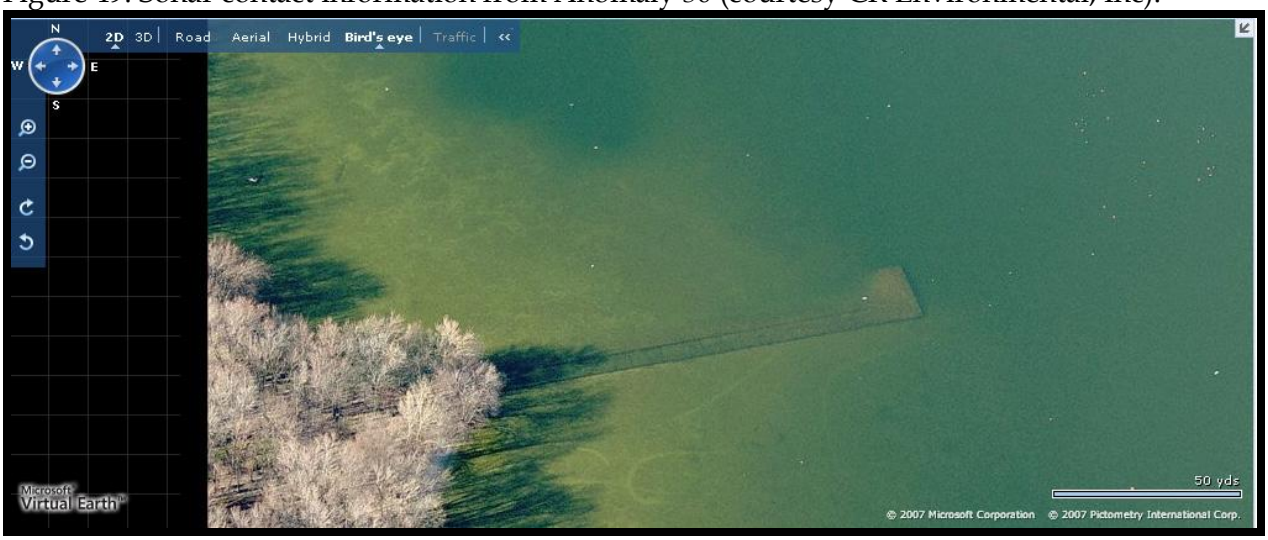
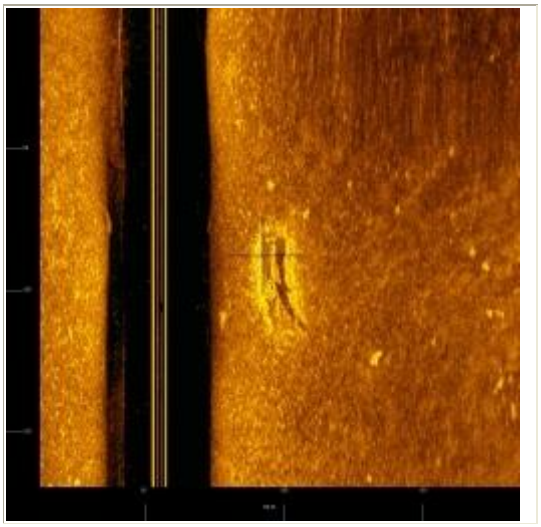


Figure 50. Aerial view showing pier remnants comprising Anomaly 30 (courtesy Microsoft Virtual Earth).

Anomaly 31

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
31	700	No	No	Possible boat remains	No



Target: Contact0700 Target Click Position (GEO): 43° 06.73361' N 076° 14.10351' W Target Click Position (NY83-CF): N:1134170.43 E:913204.09	Target Description: N/A Target Height>=2.13 US Feet Target Length: 37.41 US Feet Target Width: 9.01 US Feet Target Shadow: 5.48 US Feet Range to Target: 39.09 US Feet User Classification (1): debris (man-made)

Figure 51. Sonar contact information from Anomaly 31 (courtesy CR Environmental, Inc).

Anomaly 32

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
32	No	7	No	1955 Air Force Jet, no sonar. Wreckage is likely completely buried	No

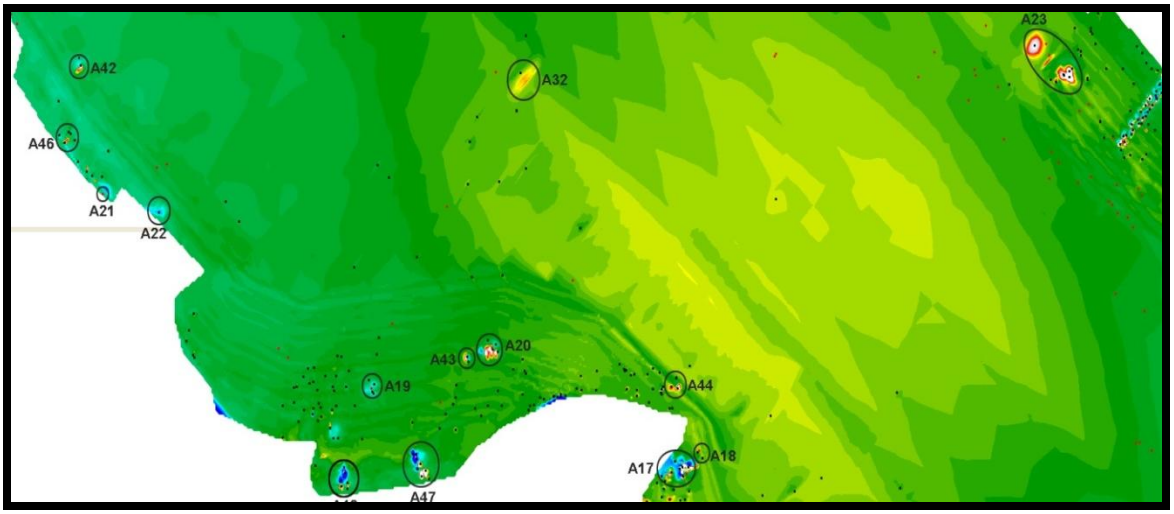
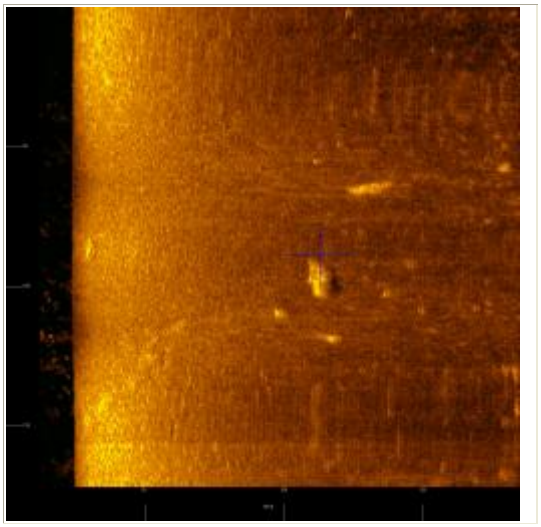


Figure 52. Magnetic intensity map of Onondaga Lake showing a magnetic anomaly (A32) in the general location of a 1955 jet crash.

Anomaly 33

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
33	321, 326	947, 59, 949, 951, 953, 60, 955, 959,	No	Large magnetic anomaly with inconclusive sonar	Yes



Target: Contact0321 Target Click Position (GEO): 43° 04.35895' N 076° 10.93195' W Target Click Position (NY83-CF): N:1119809.06 E:927387.48	Target Description: N/A Target Height=0.80 US Feet Target Length: 14.90 US Feet Target Width: 7.87 US Feet Target Shadow: 3.88 US Feet Range to Target: 104.51 US Feet User Classification (1): debris

Figure 53. Sonar contact information from Anomaly 33 (courtesy CR Environmental, Inc).

Anomaly 34

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
34	No	672	No	Magnetic anomaly adjacent to A12 (barge) without sonar	Yes

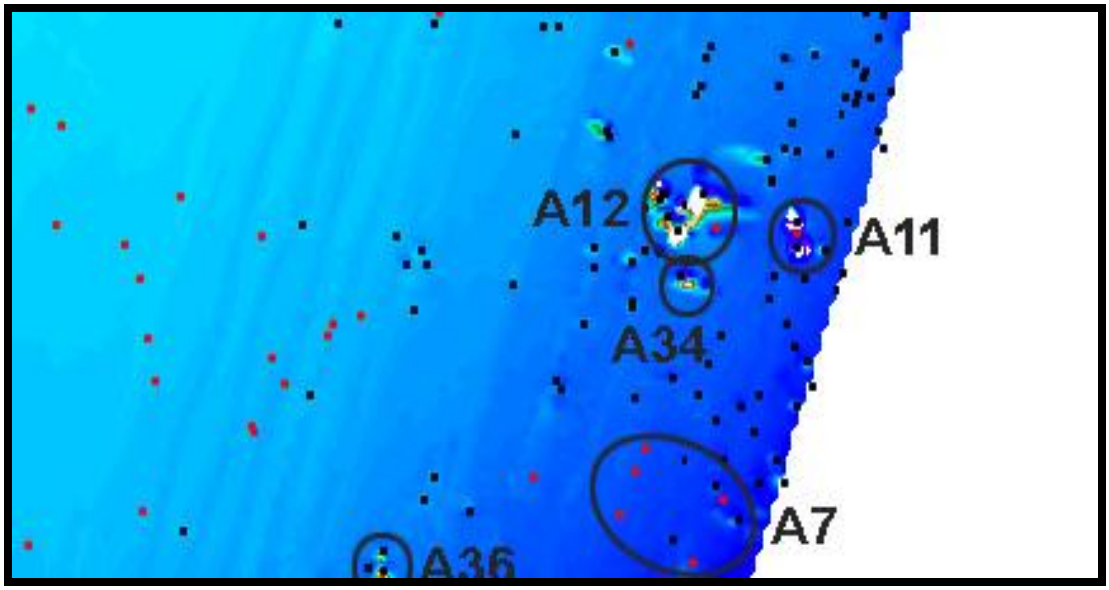


Figure 54. Magnetic intensity map of Onondaga Lake showing A34 adjacent to a barge (A12).

Anomaly 35

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
35	No	604, 632, 617, 256, 645, 660	No	Magnetic anomaly between A12 and A4 (barges) without sonar	Yes

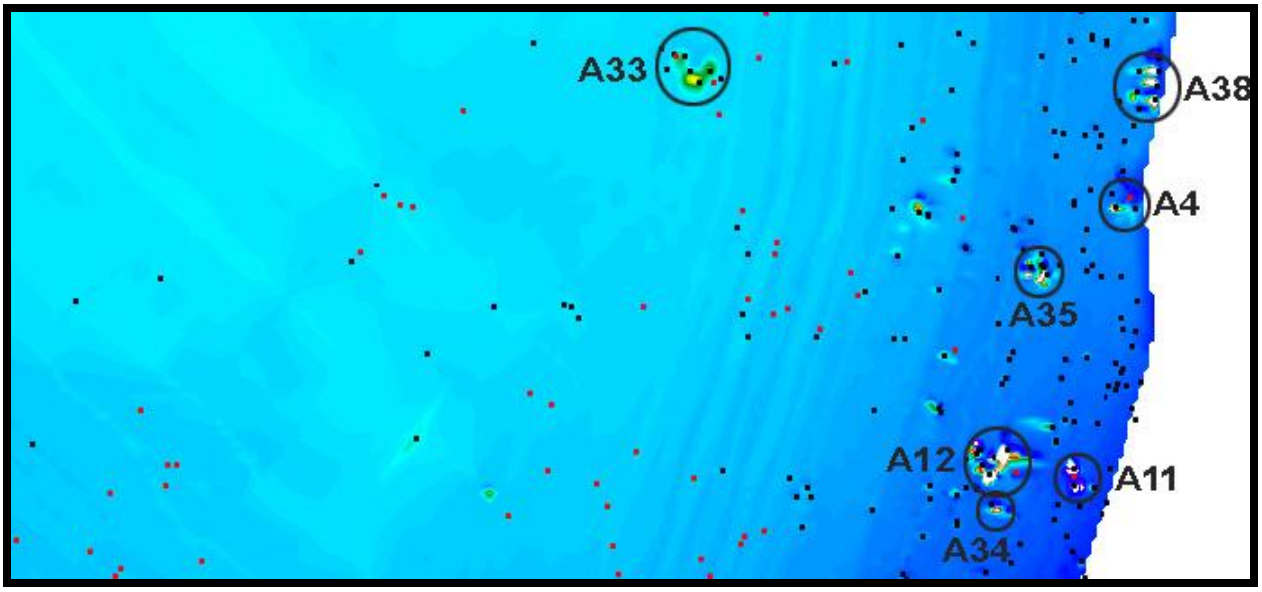


Figure 55. Magnetic intensity map of Onondaga Lake showing A35 between two barge wrecks (A12 and A4).

Anomaly 36

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
36	No	552, 73, 1007, 1009	No	Large multicomponent magnetic anomaly	Yes

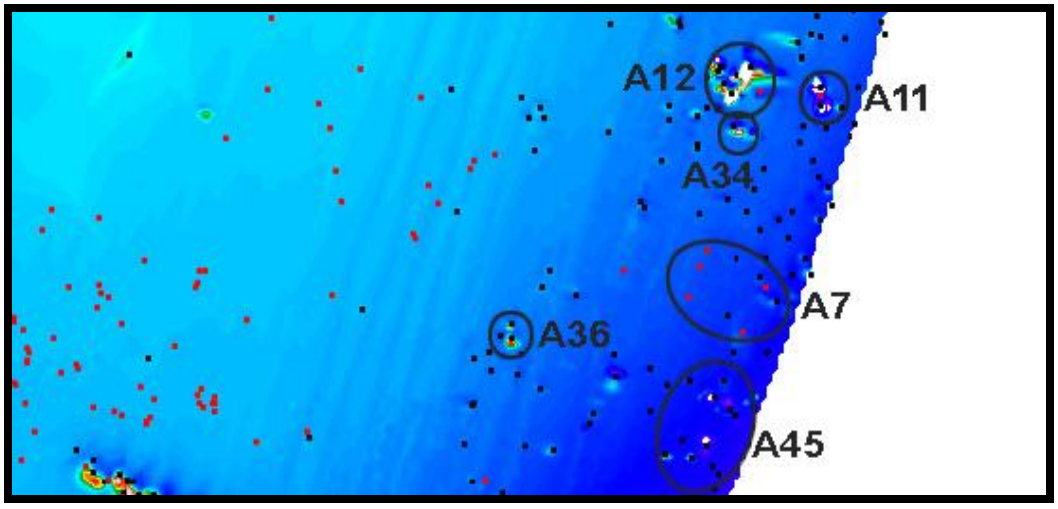


Figure 56. Magnetic intensity map of Onondaga Lake showing A36.

Anomaly 37

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
37	No	499, 500, 276, 502, 503	No	Magnetic anomaly off of Geddes Pier	Yes

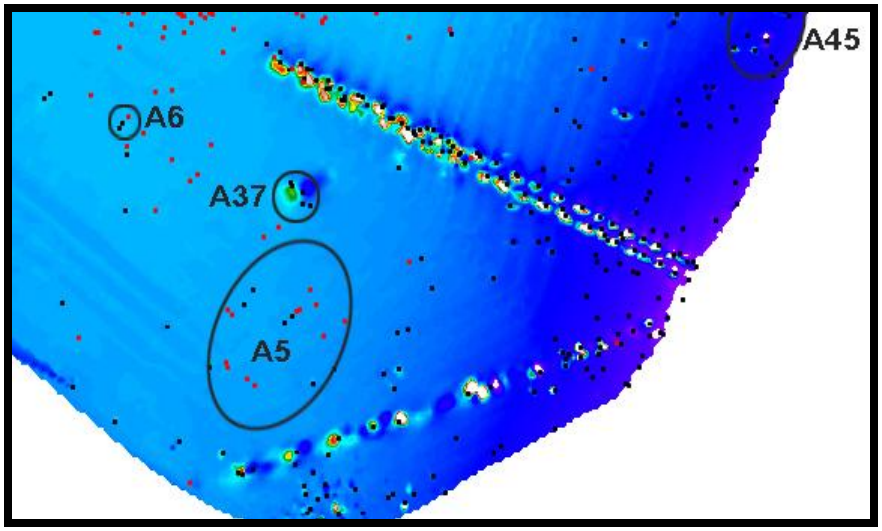


Figure 57. Magnetic intensity map of Onondaga Lake showing A37 located off of Geddes Pier.

Anomaly 38

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
38	No	781, 747, 780, 779, 745, 778, 761	No	Near shore large magnetic anomaly in proximity to A4 (Barge) and near a charted wreck	Yes

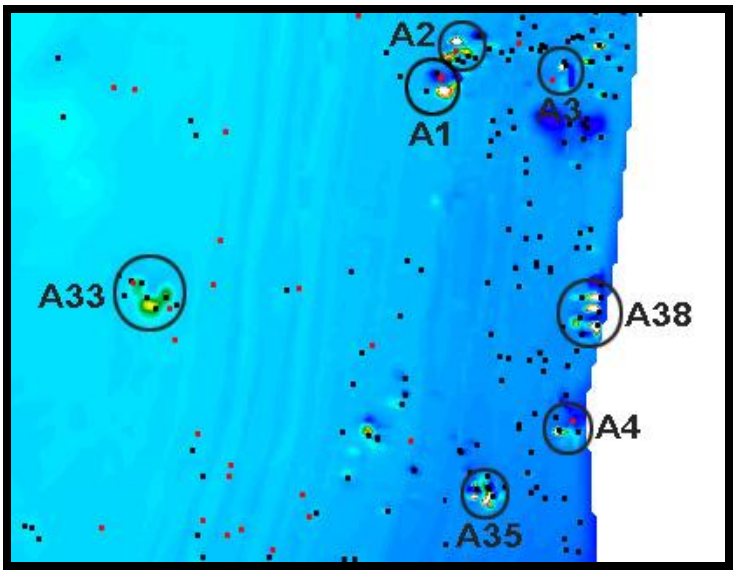


Figure 58. Magnetic intensity map of Onondaga Lake showing A38.

Anomaly 39

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
39	No	91	No	Large magnetic anomaly with no sonar	No

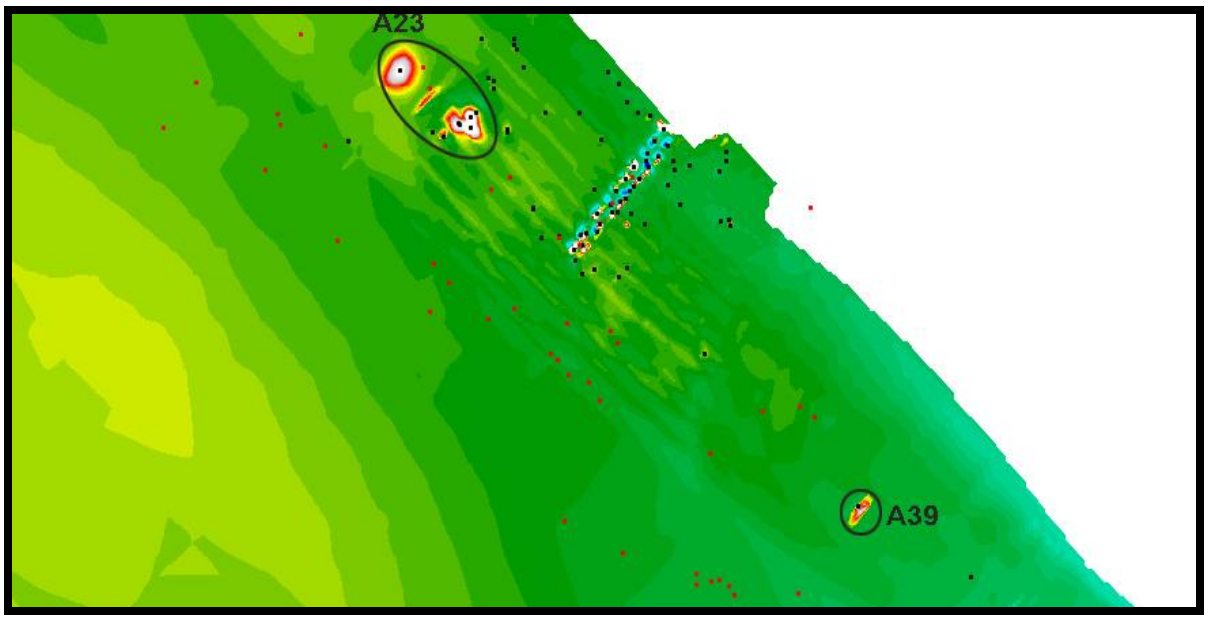


Figure 59. Magnetic intensity map of Onondaga Lake showing A39.

Anomaly 40

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
40	No	375, 370, 364, 356, 361, 363, 363, 358, 357, 152	No	Multiple magnetic anomalies around former Maple Bay docks	No

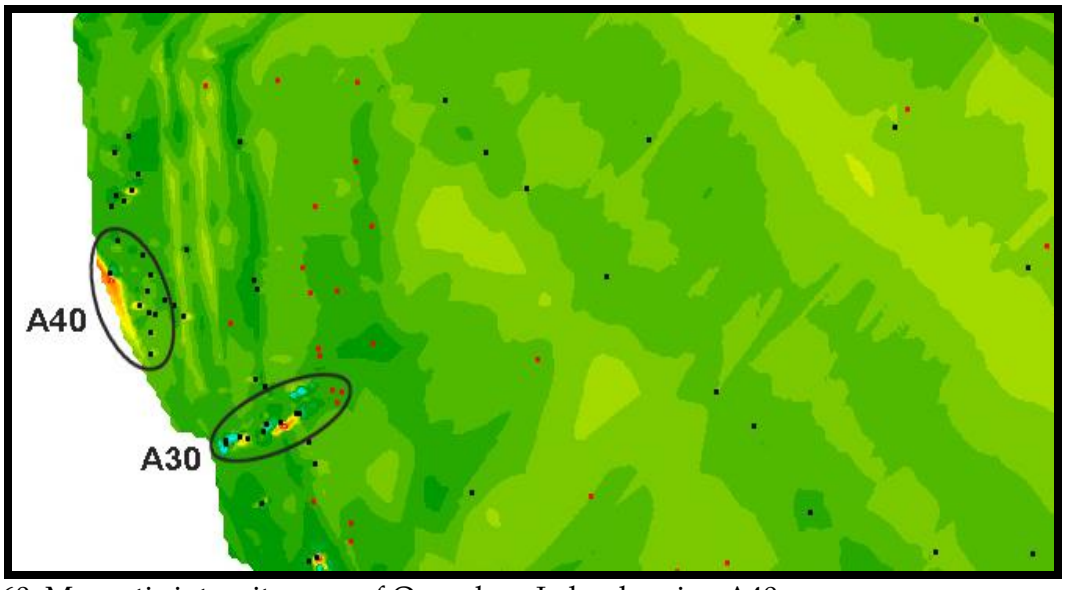


Figure 60. Magnetic intensity map of Onondaga Lake showing A40.

Anomaly 41

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
41	No	No	Yes	Series of 32 pilings arranged in a square suggesting building or pier footings (similar to A21)	No

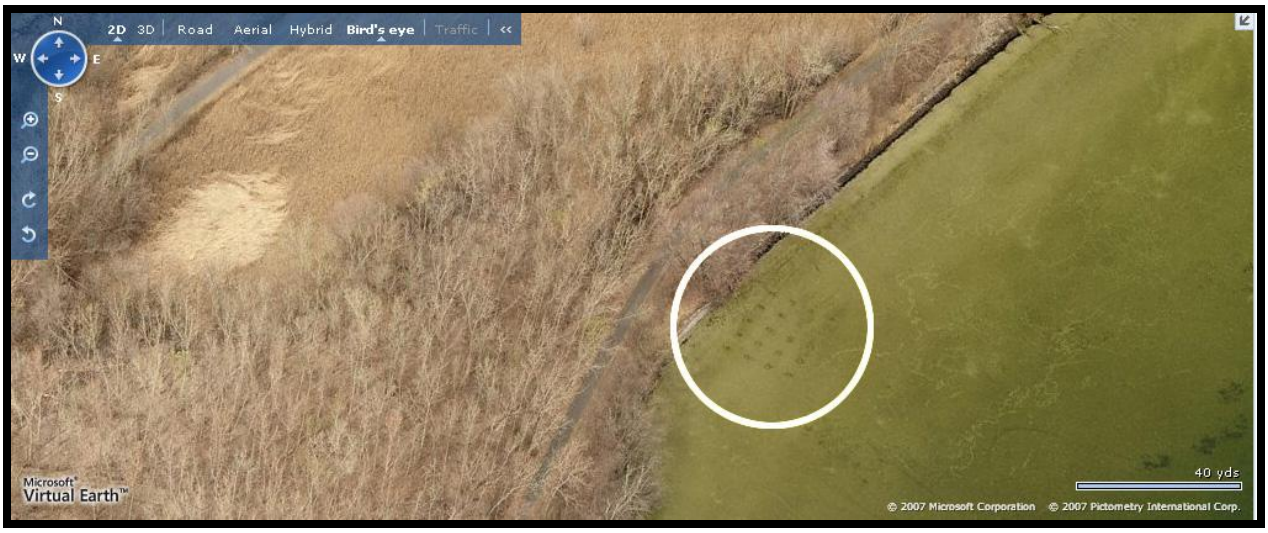


Figure 61. Aerial view showing Anomaly 41 (courtesy Microsoft Virtual Earth).

Anomaly 42

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
42	No	29, 50	No	Large magnetic anomaly between Pleasant Beach Resort and Manhattan Beach Resort	No

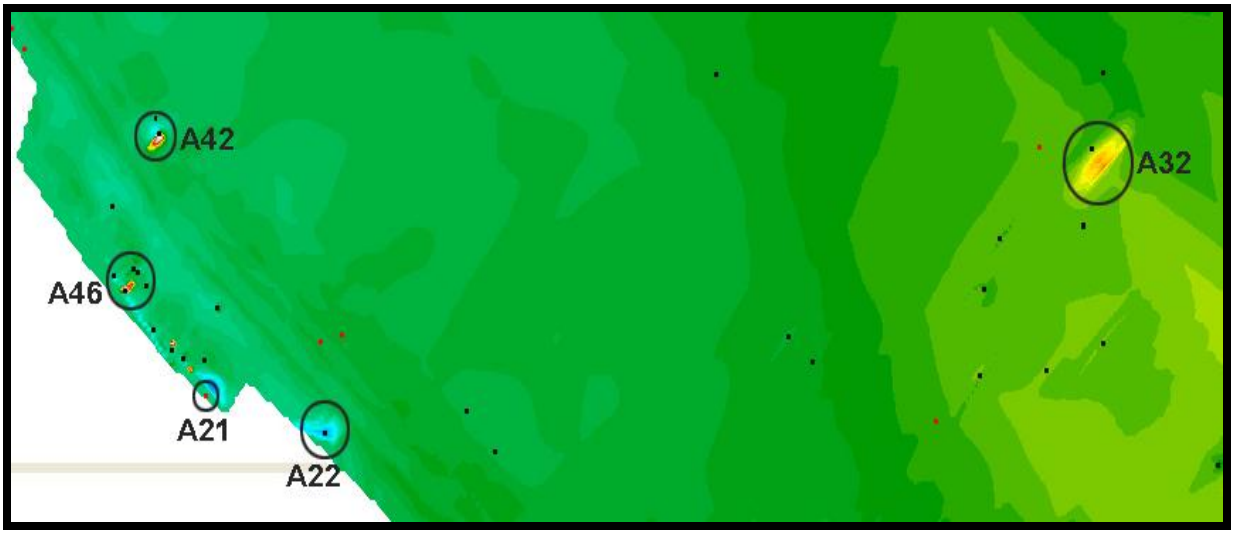


Figure 62. Magnetic intensity map of Onondaga Lake showing A42.

Anomaly 43

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
43	No	177, 1069	No	Magnetic anomaly adjacent to A20 (barge) without sonar	Yes

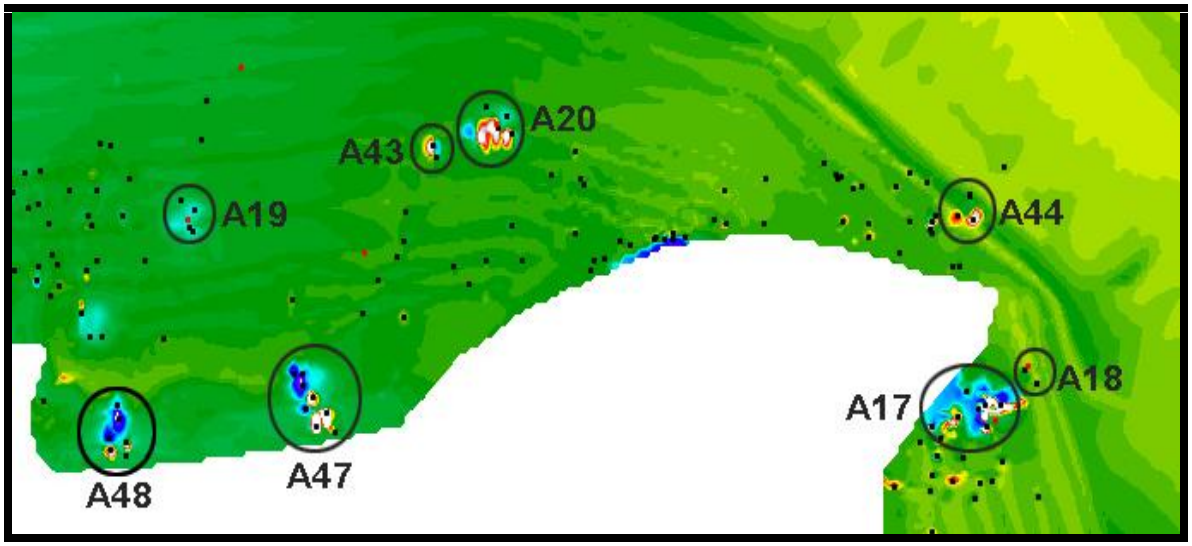


Figure 63. Magnetic intensity map of Onondaga Lake showing A43.

Anomaly 44

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
44	No	301, 300, 1049, 1051, 1079, 1052	No	Magnetic anomalies likely associated with navigational markers	No

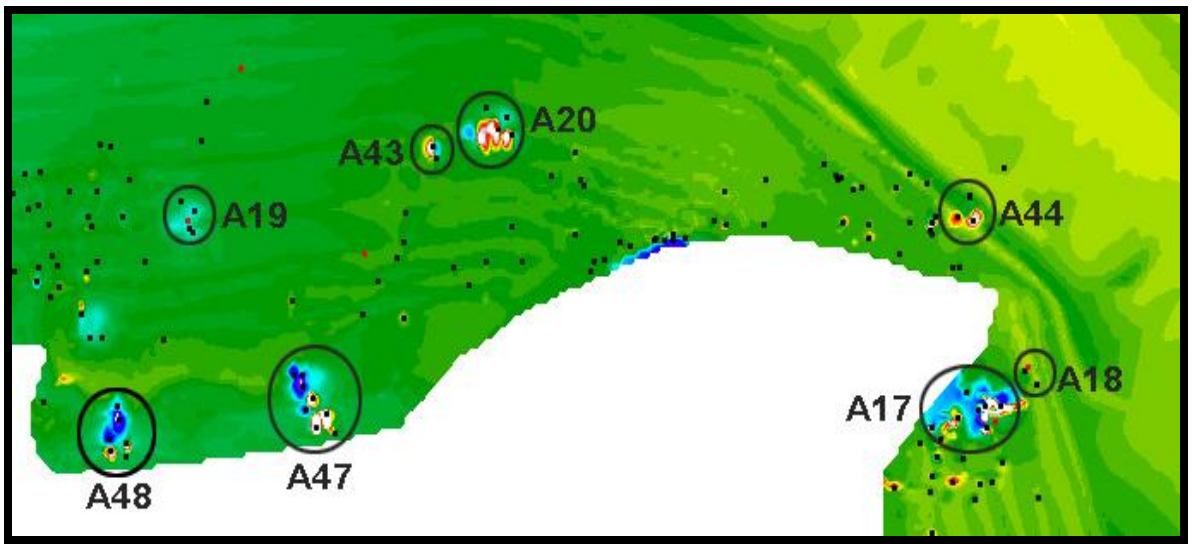


Figure 64. Magnetic intensity map of Onondaga Lake showing A44.

Anomaly 45

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
45	No	705, 796, 810, 817, 732, 773, 766, 712, 797, 811	Yes	Magnetic anomalies associated with former barge canal entrance dock	Yes

Figure 65. Aerial view showing Anomaly 45 (courtesy Microsoft Virtual Earth).

Anomaly 46

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
46	No	345, 338, 839, 337, 341	No	Near shore magnetic anomalies between Pleasant Beach Resort and Manhattan Beach	No

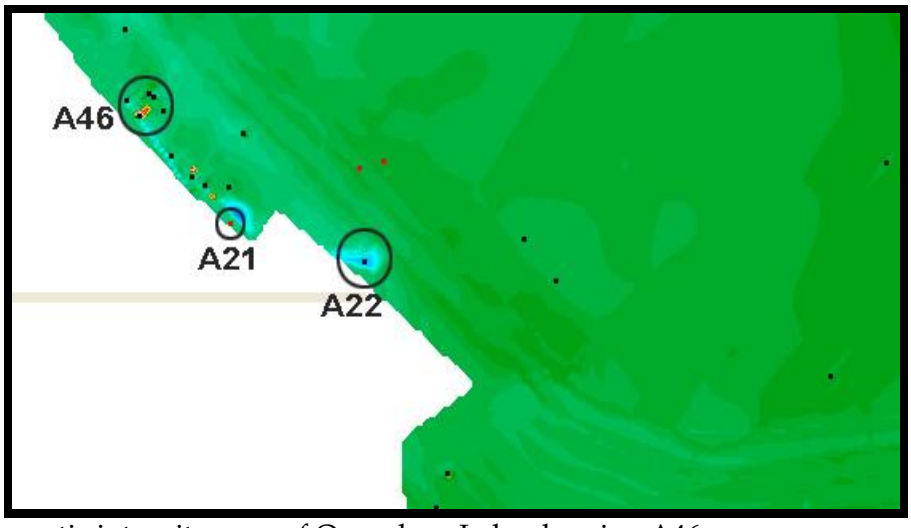


Figure 66. Magnetic intensity map of Onondaga Lake showing A46.

Anomaly 47

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
47	No	899, 896, 873, 871, 405, 404, 401, 402	No	Near shore magnetic anomaly near mouth of Nine Mile Creek. Notes from the remote sensing survey suggest that some of the anomalies may be the result of an adjacent Parsons platform.	Yes

Additional note: A47 may be in a previously dredge area.

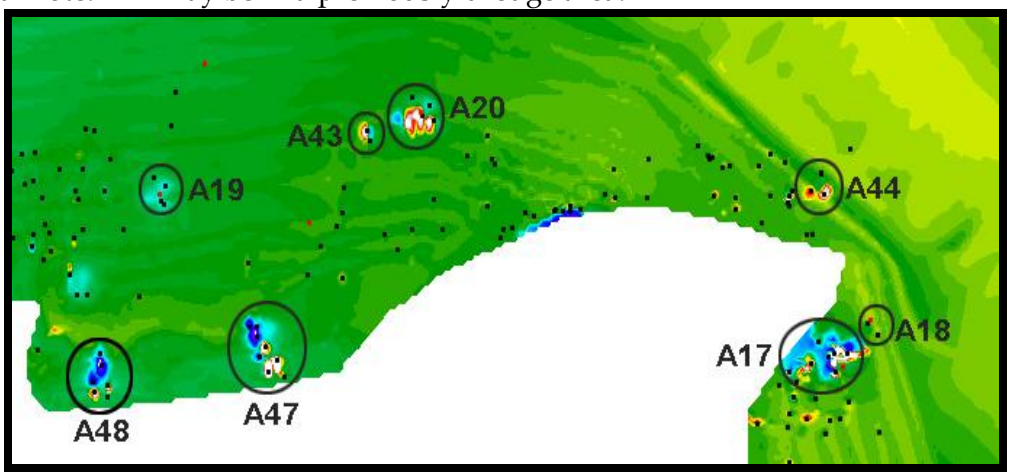


Figure 67. Magnetic intensity map of Onondaga Lake showing A47.

Anomaly 48

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
48	No	898, 897, 872, 406, 403	No	Near shore magnetic anomaly near mouth of Nine Mile Creek. Notes from the remote sensing survey suggest that some of the anomalies may be the result of an adjacent Parsons platform.	Yes

Additional note: A48 may be in a previously dredge area.

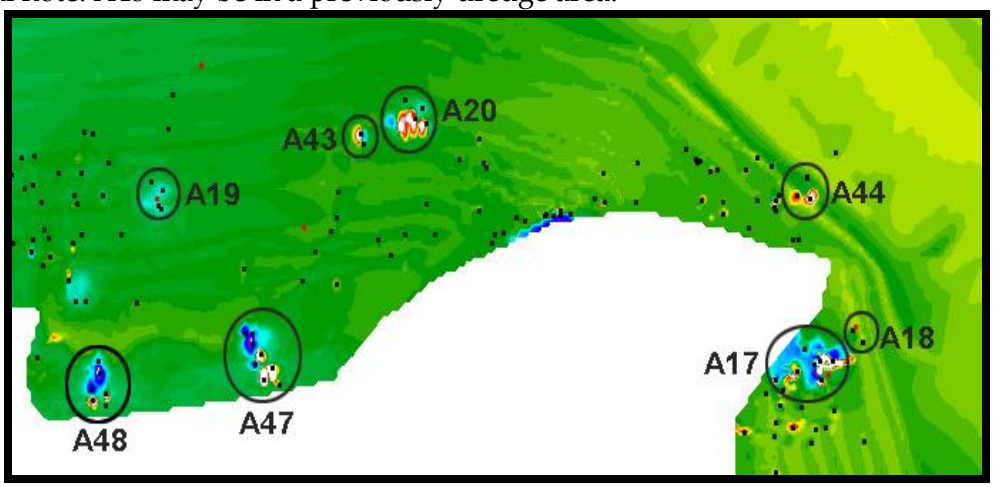
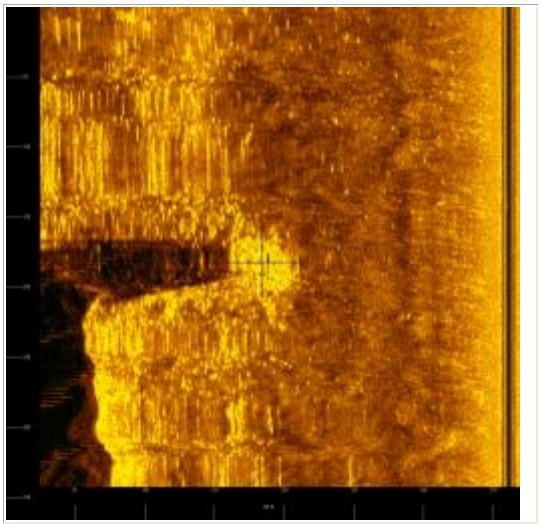


Figure 68. Magnetic intensity map of Onondaga Lake showing A48.

Anomaly 49

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
49	532	No	Yes	Stone dock/pier structure	No



Target: Contact0532 Target Click Position (GEO): 43° 05.71504' N 076° 12.08032' W Target Click Position (NY83-CF): N:1128022.51 E:922236.10	Target Description: Debris or structure. Target Height=1.71 US Feet Target Length: 34.93 US Feet Target Width: 44.94 US Feet Target Shadow: 116.46 US Feet Range to Target: 192.49 US Feet User Classification (1): debris

Figure 69. Sonar contact information from Anomaly 49 (courtesy CR Environmental, Inc).

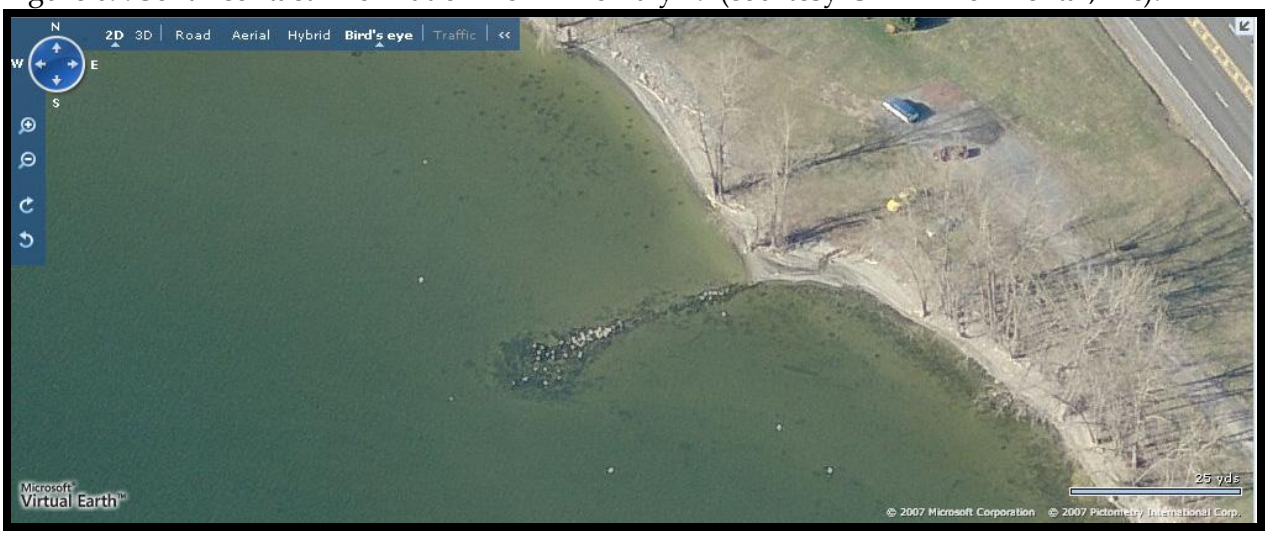
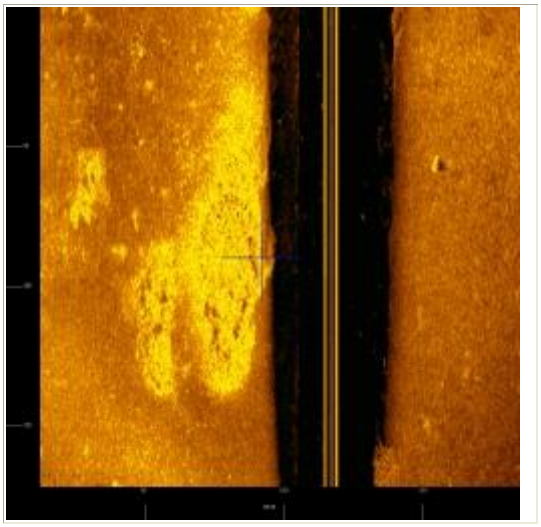


Figure 70. Aerial view showing Anomaly 49 (courtesy Microsoft Virtual Earth).

Anomaly 50

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
50	579	109, 127, 128	Yes	Stone dock/pier structure	No



Target: Contact0579
Target Click Position (GEO): 43° 05.95516' N 076° 12.74711' W
Target Click Position (NY83-CF):
N:1129467.73
E:919261.41

Target Description: Debris field. Appears to be composed of coarse material (e.g. cobble, rubble). Shape suggests barge disposal.
Target Height=1.37 US Feet
Target Length: 103.44 US Feet
Target Width: 46.15 US Feet
Target Shadow: 2.52 US Feet
Range to Target: 23.58 US Feet
User Classification (1): debris

Figure 71. Sonar contact information from Anomaly 50 (courtesy CR Environmental, Inc).

Figure 72. Aerial view showing a faint linear structure (courtesy Google Earth).

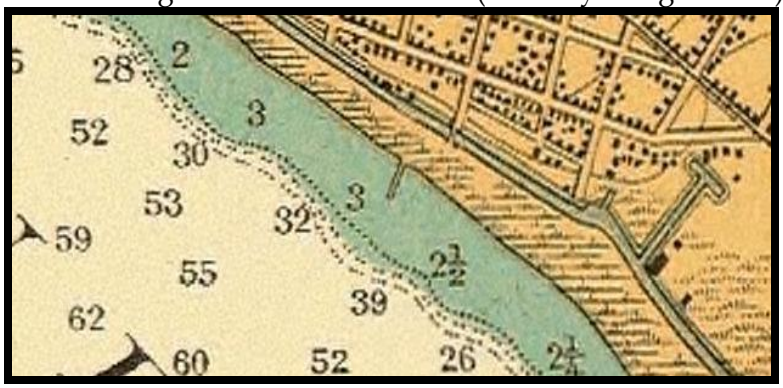
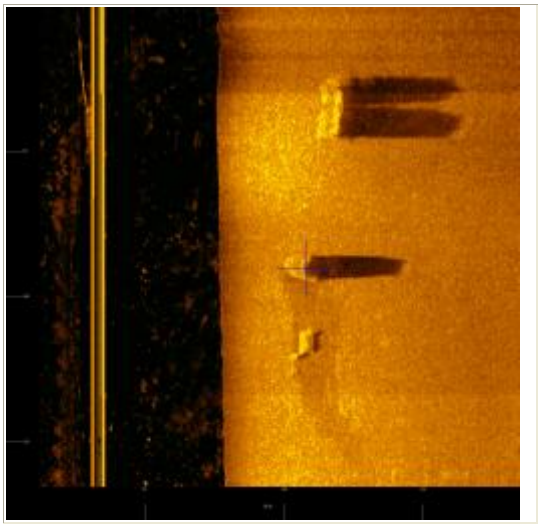


Figure 73. 1915 navigational chart showing a dock at the location of Anomaly 50.

Anomaly 51

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
278, 275, 280	579	479, 486, 480, 484, 1233, 200, 483, 201, 468. 459, 101, 99, 407, 412, 413, 419, 420, 465, 463, 433, 432, 428, 203, 434, 449, 204, 205, 450, 844, 843, 842, 841, 837, 836, 834, 835, 838, 839, 840	No	Three suction pipes (42in, 30in and 16in) related to the Solvay Process Company. The pipes are buried, but they appear to have an intake on the ends. These structures appear on the 1908 Hopkins map.	Yes



Target: Contact0280 Target Click Position (GEO): 43° 04.22548' N 076° 11.77348' W Target Click Position (NY83-CF): N:1118980.70 E:923643.77	Target Description: N/A Target Height=14.78 US Feet Target Length: 8.62 US Feet Target Width: 8.81 US Feet Target Shadow: 35.44 US Feet Range to Target: 74.38 US Feet User Classification (1): debris (man-made)

Figure 74. Sonar contact information from Anomaly 51 showing intake structures at the end of (courtesy CR Environmental, Inc).

Anomaly 52

Anomaly	Sonar	Magnetometer	Aerial	Analysis	In Remediation Area
52	333	1139; 285	No	Sonar target a pickup truck. Further investigation will determine if anomalies are from the Syracuse Yacht Club.	Yes

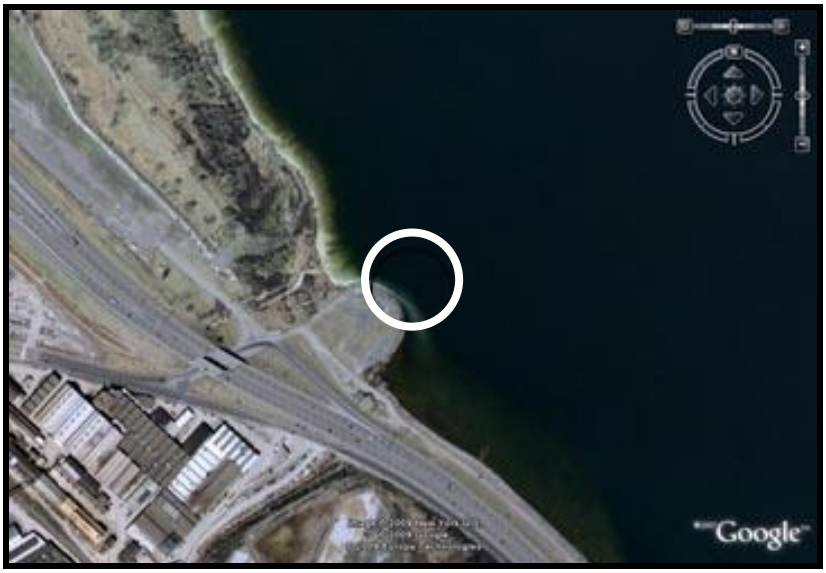


Figure 75: Aerial photograph showing the approximate location of Anomaly 52 (courtesy of Google Earth)

APPENDIX 2: SHORELINE SURVEY WORKPLAN

Excerpt from: *Cultural Resource Management Report, Phase 1B Archaeological Work Plan Onondaga Lake Project, Upland And Shorline Area Wastebed 13, Geddes Brook IRM, Tributary of Geddes Brook Ninemile Creek RI/FS, Shoreline Survey and Wastebed B/Harbor Brook IRM:* Christopher D. Hohman and Dr. Nina Versaggi of Public Archaeology Facility, October 2, 2009. Pgs. 76-78. (See full workplan for figures and bibliography)

VII. SHORELINE SURVEY

This survey is located along the present shoreline of Onondaga Lake, just to the northwest and southeast of the present confluence of Ninemile Creek and Onondaga Lake. No impacts are planned in these areas. They are included in the work plan solely based on their close proximity to the proposed dredging impacts within Onondaga Lake.

7.1 Environmental Setting

The area encompasses the edge of the present shoreline of Onondaga Lake on the northwestern edge of Wastebeds 1-8, as well as just to the northwest of the present confluence (Figure 63). The small sections of the shoreline survey, measure approximately 80 to 100 m (265 to 328 ft) in length. The current location of the shoreline survey adjacent to Wastebeds 1 to 8 is in the vicinity of or adjacent to the 19th century confluence of Ninemile Creek and Onondaga Lake. Ninemile Creek was channelized into its present course in 1926 to allow for the use of Wastebeds 1-8 from the 1920s through 1944 (Figures 72 and 73). During their earlier use, the wastebeds received Solvay waste and accumulated to an elevation of 6-9 m (20-30 ft) above Onondaga Lake. During the later use of the wastebeds, additional accumulations extended the total elevation up to 21 m (70 ft) above Onondaga Lake (Stein 2004).

The section of shoreline survey to the northwest of the present confluence of Ninemile Creek and Onondaga Lake could contain remnants of the original shoreline of Onondaga Lake, which included black ash swamps and salt springs. A portion of this area was covered by fill from the dredging of the mouth of Ninemile Creek. Much of the current project area depicted on a late 18th/early 19th century map (Figure 16, p . 24)) suggests that the APE adjacent to Wastebeds 1-8 was located in a black ash swamp, while the area to the northwest of the current confluence was located in a black ash swamp with nearby salt springs. By 1938 (Figure 64), the soil survey notes that the area adjacent to Wastebeds 1-8 was already Made Land, suggesting that the wastebeds had already been created by this time. To the northwest of the present confluence, the shoreline is identified as Warners soils (Wa) or Muck (Mu). In 1977, the soils are recorded as Saprists (Sa) and Fluvaquents (Figures 65-66). As described previously, muck deposits are deep, very poorly drained soils that formed in woody organic deposits. These soils were generally created over a mineral substratum of calcareous marl, or sand, silt, and clay combinations (USDA 1977). Warners soils are a poorly drained silt loam underlain by strongly calcareous marl that formed in alluvial deposits along streams. They are frequently found on floodplains of streams and have a prolonged high water tableat or near the surface during spring and in wet periods. Saprists and fluvaquents are commonly characterized as part of fresh water marshes, which are permanently overlain by water a few inches to .9 m (3 ft) deep. Some of these marshes can be the result of

man-made constructions, such as dams, locks, and dikes (USDA 1977). Soil borings were taken in areas to the northwest of the Nine Mile Creek confluence, and around the confluence itself (Figures 24-29, pp. 32-37). However, most of these soil borings only contained 15 to 30 cm (6 to12 inches) of sediment and therefore provide minimum evidence in regards to the location of the shoreline in the precontact period.

7.2 Precontact History

The APE is located just to the southeast and northwest of the current confluence of Ninemile Creek and Onondaga Lake. The site files identified at least five known precontact sites within 1.6 km (1 mi) of the project area. These sites include an unidentified precontact period village or possible hamlet about 360 m (1200 ft) west of Onondaga Lake; a campsite (or multiple campsites) with Native American artifacts around Pleasant Beach and east of Ninemile Creek; an unidentified earthwork adjacent to Ninemile Creek; an unidentified precontact period mound adjacent to Ninemile Creek; and an unidentified precontact period mound 305 m (1000 ft) north of Ninemile Creek. In addition, Parker (1920) recorded traces of precontact occupation along Ninemile Creek approximately 1.6 km (1 mi) to the west of the lake, as well as a number of projectile points along Ninemile Creek (Hohman 2004). The sites identified as adjacent to Ninemile Creek may have been near its original confluence with Onondaga Lake (located in the vicinity of the easternmost shoreline survey area The late 18 /early 19 century map (Figure 16, p. 24) suggests that salt springs and swamp with black ash were located in the vicinity of the present shoreline. Salt may have been used as a means to preserve food and black ash would have been a source of staves for basket-making.

Precontact Sensitivity Assessment

The shoreline of Onondaga Lake in the vicinity of the Ninemile Creek confluence would have been sensitive for a variety of precontact period sites. Since most of the original shoreline in this area appears to have been marshy (based on the late 18th/early 19th century map), the potential for large or small residential sites is low. Instead, the marshes and salt springs would have provided essential natural resources for Native American groups. Small resource procurement and processing stations along the edges of the marshes and at the confluence would be likely. Similarly, hunting and fishing activities would be expected, especially surrounding the Nine Mile Creek confluence. These sensitivities are tempered by the impacts from land modifications that have occurred through time that could have impacted the archaeological remains of these activities.

7.3 Postcontact History

As discussed in previous sections, much of the Onondaga Nation settlement was situated to the southeast of Onondaga Lake with the exception of the village of Kaneenda (Bradley 1987) and a number of Native American cabins along the west bank of Onondaga Creek (Bruce 1896). Although much of the long-term settlement was not around Onondaga Lake, the area within and adjacent to the lake continued to be used by the Onondaga for purposes of everyday activities, including short-term settlement, the procurement of various resources, as well as for ceremonies. Historic maps from the 19th century and early 20th century (Figures 67-72) did not identify any structures within the project area.

Postcontact Sensitivity Assessment

Much of the area around the confluence of Nine Mile Creek and Onondaga Creek may have been used by Native Americans (specifically the Onondaga Nation) in the 17th century and beyond for a variety of purposes, including short-term camps, resource procurement and processing, and for ceremonies. Historic structures from the 19th and 20th centuries were not located within the project area suggesting a low sensitivity for cultural material from that period.

7.4 Potential Impacts

Dredging is expected within Onondaga Lake close to the shoreline in the three areas proposed for shoreline survey (Figure 75). The shoreline survey is being accomplished to determine if precontact or postcontact period resources may be present on the existing shoreline. If resources are present on the existing shoreline, it may suggest that cultural resources are present under the present water surface of the lake on benches of land that may represent the original shoreline of the lake. No impacts are expected along the shoreline in these areas; impacts will be limited to the lake bottom adjacent to these three shoreline survey areas (Figure 74).

7.5 Proposed Archaeological Work

The work in this area will involve two possible field testing strategies: STPs and, if necessary, 1 x 2 m (3.3 x 6.6 ft) units. After the geoarchaeologist reviews existing borings, they will confer with PAF archaeologists about the possible location of the original shoreline. Based on the resulting recommendations, professional archaeologists from PAF will select appropriate field strategies (STPs, interval, and/or units). It is expected that in areas with the potential for intact soils, archaeologists will excavate STPs to 1 m (3.3 ft) in depth, unless obstructed by rocks, roots or water table. If a high water table is encountered, STPs will be excavated through the water table as deep as possible. If deeper excavations are necessary in areas of potential intact soils, 1 x 2 m units will be used to excavate to the present water table. Fill soils (Solvay waste) will not be screened. Intact soil horizons below fill soils will be screened through 1/4 inch mesh onto plastic. All STPs/units will be backfilled after completion of excavation and data recording. If necessary, the geoarchaeologist will accompany crews to the field to examine a sample of excavations. The results of archaeological testing will be used in conjunction with the soil borings to refine interpretations regarding the location of the original shoreline, and the potential for cultural resources offshore in the proposed areas of dredging. At the discretion of the Onondaga Nation, archaeological work will be monitored by a representative of the Nation who has completed the required OSHA training for HazMat sites. Any minor deviations from this work plan requested by the Nation monitor (e.g., a small number of extra STPs) will be executed if feasible, and noted in writing to PARSONs. Major deviations from this work plan will require consultation among all involved parties prior to execution of the changes.

APPENDIX 3: RESUMES OF KEY PROJECT PERSONNEL

ARTHUR BRUCE COHN

Executive Director
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Education

Doctor of Science, Honorary. Middlebury College – 2003
Doctor of Laws, Honorary. University of Vermont - 1996
JD Boston College Law School - 1974
BA University of Cincinnati (Sociology) - 1971

Professional Experience

Executive Director, Lake Champlain Maritime Museum. Co-founder and chief planner for the Museum. 1984 - present

Delegate, Member of the U.S. State Department Delegation to the United Nations Educational, Science and Cultural Organization's (UNESCO) Convention for the Protection of Underwater Cultural Heritage. June 2000 - present

Committee Member, National Maritime Heritage Initiative Grants Advisory Committee. 1997 - present.

Proposal Evaluator, National Oceanographic and Atmospheric Administration (NOAA) Ocean Exploration Program. 2001

Adjunct Assistant Professor, Texas A&M University, Nautical Archaeology Program. 1995 - present

Adjunct Assistant Professor, University of Vermont, Instructor of Maritime History, Nautical Archaeology and Historic Preservation. 1991 - present

Diving Certifications

- 1974 - NAUI Instructor (3795)
- TDI - Nitrox Instructor
- 1997- 2005 Diver's Alert Network, Member (Master Insurance)
- 2000 – Tri-mix certified, Crystal River, FL, active Deep Technical Diving, Mixed gases.
- Current: CPR for the Professional Rescuer, First Aid, and Oxygen Administration.

Selected Publications

<u>Books and Book Sections</u>

Cohn, Arthur B.

1994 *Afterword*: *In Lake Champlain as Centuries Pass*, by A. P. Beach, pp. 107-115. Lake Champlain Maritime Museum, Ferrisburgh, VT.

1995a *Afterword:* Building and Sailing the Replica. In *The Gunboat* Philadelphia *and the Defense of Lake Champlain in 1776*, by P. Lundeberg, pp. 61-84. Lake Champlain Maritime Museum, Ferrisburgh, VT.

1995b *Epilogue:* Treasures Beneath an Inland Sea. In *Lake Champlain: Key to Liberty*, by R. N. Hill, pp. 283-299. Countryman Press, Woodstock, VT.

1997a *Forward, Afterword:* The Roaring '20s: Death by Automobile and Archaeology of Lake Champlain Steamboats. In *The Steamboats of Lake Champlain, 1809-1930*, by O. B. Ross, pp. ix-xi, 185-201, 202-207. Vermont Heritage Press, Quechee, VT.

1997b Lake Champlain. In *Encyclopedia of Underwater and Maritime Archaeology*, edited by J. P. Delgado, pp. 231-233. British Museum Press, London.

2003a Contributor: The Plenum Series in Underwater Archaeology *Submerged Cultural Resource Management: Preserving and Interpreting Our Maritime Heritage.* Kluwer Academic/Plenum Publishers.

2003b Contributor: The Vermont Encyclopedia. *University Press of New England, New Hampshire.*

2003c Author: Lake Champlain's Sailing Canal Boats: An Illustrated Journey from Burlington Bay to the Hudson River. *Lake Champlain Maritime Museum, Basin Harbor, VT.*

Crisman, Kevin J. and Arthur B. Cohn

1998 *When Horses Walked on Water: Horse-Powered Ferries in Nineteenth-Century America.* Smithsonian Institution Press, Washington, DC.

1999 Preface: Lake Champlain A Great Lake. In *Chronicles of Lake Champlain: Journeys in War and Peace* by Russell P. Bellico. Purple Mountain Press. Fleischmanns, New York.

2002 Contributor: The Plenum Series in Underwater Archaeology *International Handbook of Underwater Archaeology*. Kluwer Academic/Plenum Publishers

<u>Research Reports</u>

Cohn, Arthur B. (editor)

2000 *Lake Champlain Underwater Cultural Resources Survey; Volume II: 1997 Results & Volume III: 1998 Results*. Lake Champlain Maritime Museum, Ferrisburgh, VT. Submitted to Vermont Division for Historic Preservation, Montpelier, VT.

2001 *Underwater Barge Documentation for the Alburg-Swanton Bridge Replacement Project*. *Alburg, Grand Isle County, Vermont*. Submitted to the Vermont Agency of Transportation, Montpelier, VT.

2001 *Lake Champlain Underwater Preserve Expansion Plan.* Lake Champlain Basin Program.

2002 *Lake Champlain Underwater Cultural Resources Survey: Volume IV: 1999 Results and Volume V: 2000 Results.* Lake Champlain Maritime Museum, Ferrisburgh, VT. Submitted to Vermont Division for Historic Preservation, Montpelier, VT.

2003 *Lake Champlain Underwater Cultural Resources Survey: Volume VI: 2001 Results and Volume VII: 2002 Results*. Lake Champlain Maritime Museum, Ferrisburgh, VT. Submitted to Vermont Division for Historic Preservation, Montpelier, VT.

Cohn, Arthur B., Joseph R. Cozzi, Kevin J. Crisman, and Scott A. McLaughlin

1996a *Archaeological Reconstruction of the Lake Champlain Canal Schooner* General Butler *(VT-CH-590), Burlington, Chittenden County, Vermont*. Lake Champlain Maritime Museum, Ferrisburgh, VT. Submitted to Department of Public Works, Burlington, VT.

1996b *Archaeological Reconstruction of the Lake Champlain Canal Schooner* O. J. Walker *(VT-CH-594), Burlington, Chittenden County, Vermont*. Lake Champlain Maritime Museum,

Ferrisburgh, VT. Submitted to Vermont Division for Historic Preservation, Montpelier, VT.

Cohn, Arthur B. and Adam I. Kane
2002 Spitfire *Management Plan: Phase One Draft Report*. Prepared for the Naval Historical Center, Washington Navy Yard, D.C.

Cohn, Arthur B., Adam I. Kane, Christopher R. Sabick, and Edwin Scollon
2003 *Valcour Bay Research Project: 1999-2002 Results from the Archaeological Investigation of a Revolutionary War Battlefield in Lake Champlain, Clinton County, New York.* Lake Champlain Maritime Museum, Ferrisburgh, Vermont. Submitted to the Naval Historical Center, Washington Navy Yard, D.C.

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Education

MA Anthropology, Texas A&M University, College Station, Texas, 2001.
Thesis: *Archaeology of the Western River Steamboat, 1811 – 1860*

BA Anthropology, minor Environmental Geography (honors), Millersville University of Pennsylvania, 1995.

Professional Experience

Nautical Archaeology Project Manager, Lake Champlain Maritime Museum, October 2000–present.

Basin Harbor Site Manager, Lake Champlain Maritime Museum, May 2005 – October 2006.

Lake Champlain Underwater Historic Preserve Monitor, Vermont Division for Historic Preservation, May 2001 – present.

Nautical Archaeologist, Lake Champlain Maritime Museum. May 2000 – October 2000.

Nautical Archaeology Intern, Lake Champlain Maritime Museum. May 1999 - August 1999.

Archaeological Conservator, Texas A&M University Conservation Research Laboratory. August 1998 – May 2000.

Archaeological Consultant, R. Christopher Goodwin & Associates, Inc. August 1998 - May 2000.

Nautical Archaeologist, Remote Sensing Specialist, and Assistant Diving Safety Officer, R. Christopher Goodwin & Associates, Inc. October 1995 - August 1998.

Archaeologist, Cultural Heritage Resource Services, Inc. May 1995 - October 1995.

Archaeological Crew Chief, Millersville University, Archaeological Field School. June - July 1994.

Laboratory Assistant, Millersville University, Archeology Laboratory. February 1992 - May 1995.

Field Archaeologist, Delaware Department of Natural Resources and Environmental Control. June -August 1991 -1993.

Certifications/Memberships

New Haven Community Center Committee, member 2002 - 2005**.**

American Heart Association, Healthcare Provider. 4/2003

Divemaster, PADI. 1997

Nitrox Diver, NAUI. 2002

Diver's Alert Network, member since 1997.

Selected Publications

Books

Adam I. Kane

2004 *The Western River Steamboat.* Texas A&M University Press (Nautical Archaeology Series, number 8).

Adam I. Kane (contributing author and editor)
2003 *Lake Champlain's Sailing Canal Boats: An Illustrated Journey from Burlington Bay to the Hudson River*. Lake Champlain Maritime Museum.

Articles

Adam I. Kane (editor)
2005 Lake Champlain Maritime Museum and Lake Champlain's Sailing Canal Boats. *Sea History*, Summer 2005.
2003 The Lake Champlain Maritime Museum. *Maritime Life and Traditions*, winter 2003.

McLaughlin, Scott A. and Adam I. Kane
2003 Sloop Island Canal Boat: A Preliminary Report on the Phase III Study of an Early Twentieth Century Canal Boat Wreck. *Journal of Vermont Archaeology* 4.

Research Reports

Cohn, Arthur B. and Adam I. Kane
2002a Spitfire *Management Plan: Phase One Draft Report*. Lake Champlain Maritime Museum, Ferrisburgh, VT. Prepared for the Naval Historical Center, Washington Navy Yard, D.C.
2002b *Lake Champlain Underwater Historic Preserve Expansion Plan.* Lake Champlain Maritime Museum, Ferrisburgh, VT. Prepared for the Lake Champlain Basin Program.

Cohn, Arthur B., Adam I. Kane, Christopher R. Sabick, and Edwin Scollon
2003 *Valcour Bay Research Project: 1999-2002 Results from the Archaeological Investigation of a Revolutionary War Battlefield in Lake Champlain, Clinton County, New York.* Lake Champlain Maritime Museum, Ferrisburgh, VT. Submitted to the Naval Historical Center, Washington Navy Yard, D.C.; American Battlefield Protection Program; New York State Museum, NY.

Goodwin, Christopher, John Seidel, Adam I. Kane, David Robinson and Martha Williams
2000 *Phase II and III Archeological Investigations of the Shipwreck* Kentucky *(site 16BO358) at Eagle Bend, Pool 5, Red River Waterway, Bossier Parish, Louisiana.* R. Christopher Goodwin & Associates, Inc., Frederick, MD. Prepared for the U.S. Army Corps of Engineers, Vicksburg and New Orleans Districts

Kane, Adam I. (editor)
2000 *Report on the Phase I Submerged Cultural Resource Survey for the Village of Alburg Zebra Mussel Control Project, Grande Isle County, Vermont.* Lake Champlain Maritime Museum, Ferrisburgh, VT. Prepared for Phelps Engineering, Inc., Middlebury, VT.
2001a *Underwater Barge Documentation for the Alburg-Swanton Bridge Replacement Project. Alburg, Grand Isle County, Vermont*. Lake Champlain Maritime Museum, Ferrisburgh, VT. Submitted to the Vermont Agency of Transportation, Montpelier, VT.
2001b *Conservation of a War of 1812 Anchor from Plattsburgh Bay, Clinton County, New York.* Lake Champlain Maritime Museum. Lake Champlain Maritime Museum, Ferrisburgh, VT.

2002 *Lake Champlain Underwater Historic Preserve: Management Plan for the State of New York.* Lake Champlain Maritime Museum, Ferrisburgh, VT. Prepared for the State of New York.

Kane, Adam I., A. Peter Barranco, Christopher R. Sabick and Sarah E. Lyman
2005 *Lake Champlain Underwater Cultural Resources Survey, Volume VIII: 2003 Results and Volume IX: 2004 Results*. Lake Champlain Maritime Museum, Ferrisburgh, VT. Prepared for the Lake Champlain Basin Program.

Kane, Adam I., and Christopher R. Sabick
2001 *Conservation Assessment of Metal Artifacts from the Key Corp Site*. Lake Champlain Maritime Museum, Ferrisburgh, VT. Prepared for the New York State Museum, Albany, New York.
2002 *Lake Champlain Underwater Cultural Resources Survey: 1999 and 2000 Results.* Lake Champlain Maritime Museum, Ferrisburgh, VT. Submitted to Vermont Division for Historic Preservation, Montpelier, VT.

Kane, Adam I., Christopher R. Sabick, and Sara R. Brigadier
2003 *Lake Champlain Underwater Cultural Resources Survey: Volume VI: 2001 Results and Volume VII: 2002 Results*. Lake Champlain Maritime Museum, Ferrisburgh, VT. Submitted to Vermont Division for Historic Preservation, Montpelier, VT.

Kane, Adam I., David Robinson and Martha Williams
1998 *Phase I Archeological Survey of Items 3B-2 and 4 in the Upper Yazoo River.* Goodwin & Associates, Inc., Frederick, MD Prepared for the U.S. Army Corps of Engineers.

Robinson, David S., John L. Seidel, and Adam I. Kane
1996 *Phase I Remote sensing Marine Archeological Survey of the Proposed Atchafalaya Ocean Dredged Materials Disposal Area, Terrebonne and St. Mary's Parishes, Louisiana* Goodwin & Associates, Inc., Frederick, MD Prepared for the U.S. Army corps of Engineers. November 1996.

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Education

MA Anthropology: Archaeology Focus, University of Denver, 2006
Thesis: *Paleoindian Occupations of South Park, Colorado*
BA Anthropology (Minor in Spanish), University of Vermont, 2001

Professional Experience

Maritime Research Institute Archaeologist, Lake Champlain Maritime Museum, May 2005 to present
Adjunct Professor, University of Vermont, Anthropology Department, January 2007 to present
Artifact Conservation Intern, Lake Champlain Maritime Museum, January 2005-May 2005
Staff Archaeologist, South Park Archaeology Project, South Park, CO, August 2002-November 2004
Archaeological Assistant, Skidmore College Archaeological Field School, June 2004-July 2004
Teaching Assistant, University of Denver, Department of Anthropology, September 2002-June 2004
Archaeological Collections Analyst, University of Denver, Museum of Anthropology, January 2003-January 2004
Native American Graves Protection and Repatriation Act (NAGPRA) Consultation Assistant, University of Denver, Museum of Anthropology, September 2003-May 2004
Assistant Archaeologist, Environmental Permitting Division, Vermont Agency of Transportation, May 2001-June 2002
Staff Archaeologist, Rescue Archaeology Project, Instituto Nacional del Patrimonio Cultural, La Libertad, Ecuador, November 1999
Field Archaeologist, University of Vermont, Archaeological Field School, Anguilla, British West Indies, July 1999

Clubs/Memberships

2004-Present	Gamma Chapter of Colorado Lambda Alpha Honors Society
2001-Present	Society for American Archaeology
2001-Present	Vermont Archaeological Society

Selected Publications

National Register of Historic Places Nominations
Joanne M. DellaSalla
2007 *The Gunboat* Spitfire *National Register Nomination*. Submitted to the State of New York National Register Review Board. Lake Champlain Maritime Museum, Vergennes, Vermont.

Technical Reports

DellaSalla, Joanne M.
2004 *The Ludlow Massacre Site (5LA1829): Analysis of Metal and Miscellaneous Artifacts from Feature 73; Stratum E II.* Submitted to the University of Denver, Colorado Coalfield War Project.

1999 *Informe de la excavación del cateo 6 en el barrio 10 de augusto, La Libertad, Ecuador*. Report on the excavation of site 6 in the 10th of August neighborhood in La Libertad, Ecuador. Site report submitted to the Instituto Nacional del Patrimonio Cultural del Ecuador. Quito, Ecuador.

DellaSalla, Joanne M., T. Lincoln, E. Friedman, R. Brunswig, S. Bender and J. Klawon.
2003 *South Park Archaeology Project: Final Report of Archaeological Investigations Conducted in 2001 and 2002, South Park, Colorado.* Submitted to the Colorado State Historic Fund, Contract No. 0202014.

Kane, Adam I. and Joanne M. DellaSalla
2007 *Phase I Underwater Archaeological Survey for the Champlain Water District's Proposed Water Intake Staging Area in Shelburne Bay, Chittenden County, Lake Champlain*. Prepared by the Lake Champlain Maritime Museum, Vergennes, Vermont. Submitted to the Champlain Water District and the Vermont Division for Historic Preservation.

Kane, Adam I., Joanne M. DellaSalla and Christopher Sabick
2007 *Phase I Archaeological Survey of Burlington Harbor in Lake Champlain, Burlington, Chittenden County, Vermont.* Prepared by the Lake Champlain Maritime Museum, Vergennes, Vermont. Submitted to the Army Corps of Engineers, Albany Office.

Kane, Adam I., Joanne M. DellaSalla and Brian R. Spinney
2007 *Phase I Underwater Archaeological Survey for the Proposed Dredging of Lake George's Foster Brook Delta in Dresden, Washington County, New York*. Prepared by the Lake Champlain Maritime Museum, Vergennes, Vermont. Submitted to the New York State Historic Preservation Office and the Lake George Association.

Kane, Adam I., Joanne M. DellaSalla, Scott A. McLaughlin and Christopher R. Sabick
2007 *Sloop Island Canal Boat Study: Phase III Archaeological Investigation in Connection with the Environmental Remediation of the Pine Street Canal Superfund Site*. Lake Champlain Maritime Museum, Ferrisburgh, VT. Prepared for USEPA Region 1 and the Vermont Division for Historic Preservation.

Kane, Adam, Peter Barranco, Joanne M. DellaSalla, Sarah Lyman and Christopher Sabick
2007 *Lake Champlain Underwater Cultural Resources Survey, Volume VIII: 2003 Results and Volume IX: 2004 Results*. Lake Champlain Maritime Museum, Ferrisburgh, VT. Prepared for the Lake Champlain Basin Program.

APPENDIX 4: HUMAN REMAINS DISCOVERY PROTOCOL

New York State Historic Preservation Office/New York State Office of Parks, Recreation and Historic Preservation
Human Remains Discovery Protocol

1. At all times human remains must be treated with the utmost dignity and respect. Should human remains be encountered work in the general area of the discovery will stop immediately and the location will be immediately secured and protected from damage and disturbance.
2. Human remains or associated artifacts will be left in place and not disturbed. No skeletal remains or materials associated with the remains will be collected or removed until appropriate consultation has taken place and a plan of action has been developed.
3. The county coroner and local law enforcement as well as the SHPO and the involved agency will be notified immediately. The coroner and local law enforcement will make the official ruling on the nature of the remains, being either forensic or archeological. If the remains are archeological in nature, a bioarchaeologist will confirm the identification as human.
4. If human remains are determined to be Native American, the remains will be left in place and protected from further disturbance until a plan for their protection or removal can be generated. The involved agency will consult SHPO and appropriate Native American groups to determine a plan of action that is consistent with the Native American Graves Protection and Repatriation Act (NAGPRA) guidance.
5. If human remains are determined to be Euro-American, the remains will be left in place and protected from further disturbance until a plan for their avoidance or removal can be generated. Consultation with the SHPO and other appropriate parties will be required to determine a plan of action.[26]

APPENDIX 5: BIBLIOGRAPHY

Bell, T. and M. A. P. Renouf
2003 "Precontact Cultures, Reconstructed Coasts: Maritime Archaic Indian Site Distribution in Newfoundland" *World Archaeology* 35:350-370.

CR Environmental, Inc.
2005 *Onondaga Lake Phase 1 Pre-Design Investigation Geophysical Survey Report*

Dwyer, T.R., H. T. Mullins and S.C. Good
1996 "Paleoclimatic Implications of Holocene Lake Level Fluctuations, Owasco Lake, New York" *Geology* 24(6):519-522.

Drzyzga, S. A.
2007 "Relict Shoreline Features at Cockburn Island, Ontario" *Journal of Paleolimnology* 37: 411-417.

Faught, M. K.
2002 "Submerged Paleoindian and Archaic Sites of Big Bend, Florida" *Journal of Field Archaeology* 29:273-290.
2004 "The Underwater Archaeology of Paleolandscapes, Apalachee Bay, Florida" *American Antiquity* 69(2): 275-289.

Fedje, D. W. and J. Heiner
2000 "Drowned Forests and Archaeology on the Continental Shelf of British Columbia, Canada" *Geology* 28:99-102.

Finkelstein, S. A. and A. M. Davis
2006 "Paleoenvironmental records of water level and climate changes from the middle to late Holocene at Lake Erie coastal wetland, Ontario, Canada" in *Quarternary Research* 65:33-43.

Hohman, C.
2004 *Cultural Resource Management Report Phase 1A Cultural Resource Assessment, Onondaga Lake Project, Onondaga Lake, Wastebed B and Wastebed 13, Towns of Camillus, Geddes and Salina and City of Syracuse, Onondaga County, New York.* Public Archaeology Facility, Binghamton, NY.

Hohman, C. D. and N. Versaggi.
2009 *Cultural Resource Management Report, Phase 1B Archaeological Work Plan Onondaga Lake Project, Upland And Shorline Area Wastebed 13, Geddes Brook IRM, Tributary of Geddes Brook Ninemile Creek RI/FS, Shoreline Survey and Wastebed B/Harbor Brook IRM*. Public Archaeology Facility, Binghamton, NY.

Jackson, L. J., C. Ellis, A. V. Morgan and J. H. McAndrews
2000 "Glacial Lake Levels and Eastern Great Lakes Palaeo-Indians" *Geoarchaeology* 15:415-440.

Mullins, H. T.
1998 "Holocene Lake Level and Climate Change Inferred from Marl Stratigraphy of the Cayuga Lake Basin, New York" *Journal of Sedimentary Research* 68(4):569-578.

National Park Service
1983 *Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines* Government Printing Office, Washington D.C.

New York Archaeological Council
1994 *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New York State*. New York Archaeological Council, Albany, New York.

New York State Historic Preservation Office
2005 *Phase I Archaeological Report Format Requirements*. New York State Office of Parks, Recreation and Historic Preservation, Waterford, NY.

New York State Department of Environmental Conservation and United States Environmental Protection Agency
2005 *Onondaga Lake Bottom Subsite of the Onondaga Lake Superfund Site, Syracuse, New York.* Record of Decision, Albany, NY.

O'Shea, J.M. and Meadows, G. A.
2009 "Evidence for Early Hunters Beneath the Great Lakes" *Proceedings of the National Academy of Sciences* 106(25):10120-10123.

Pendersen, L., A. Fischer and B. Aaby (eds.)
1997 *The Danish Storebaelt Since the Ice Age-Man, Sea and Forest.* A/S Storebaelt Fixed Link in cooperation with Kalundborg Regional Museum, the National Forest and Nature Agency and the National Museum of Denmark, Copenhagen, DK.

Robinson, D. S., B. Ford, H. Herbster and J. N. Waller, Jr.
2003 *Marine Archaeological Sensitivity Assessment, Cape Wind Energy Project, Nantucket Sound, Massachusetts*. Public Archaeology Lab, Pawtucket, RI.

Sonnenburg, Elizabeth,
n.d. *Holocene Lake Level Change and Submerged Archaeological Site Potential in Rice Lake, Ontario.* Unpublished PhD Proposal, McMaster University, School of Geography and Earth Sciences.

Yu, Z., J. H. McAnderews and U. Eicher
1997 "Middle Holocene Dry Climate Caused by Change in Atmospheric Circulation Patterns: Evidence from Lake Levels and Isotopes" *Geology* 25(3):251-254.

ENDNOTES

[1] National Park Service, *Archeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines* (Washington, DC: Government Printing Office, 1983).

[2] New York Archaeological Council, *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections in New York State* (Albany: New York Archaeological Council, 1994).

[3] New York State Historic Preservation Office, *Phase I Archaeological Report Format Requirements* (Waterford, NY: New York State Office of Parks, Recreation and Historic Preservation, 2005)

[4] Onondaga Lake Bottom Subsite of the Onondaga Lake Superfund Site, Syracuse, New York, Record of Decision (Albany, NY: NYSDEC and USEPA, 2005).

[5] Christopher Hohman, *Cultural Resource Management Report Phase 1A Cultural Resource Assessment, Onondaga Lake Project, Onondaga Lake, Wastebed B and Wastebed 13, Towns of Camillus, Geddes and Salina and City of Syracuse, Onondaga County, New York* (Binghamton, NY: Public Archaeology Facility, 2004).

[6] Ibid., i.

[7] The eight wrecks are contained in seven anomalies because Anomaly 4 consists of two barges.

[8] The four wrecks are contained in three anomalies because Anomaly 4 consists of two barges.

[9] Hohman, *Cultural Resource Management Report Phase 1A,* 2004.

[10] Sarah A. Finklestien and Anthony M. Davis "Paleoenvironmental records of water level and climate changes from the middle to late Holocene at Lake Erie coastal wetland, Ontario, Canada" in *Qarternary Research* 65 (2006) 33-43.

[11] Henry T. Mullins "Holocene Lake Level and Climate Change Inferred from Marl Stratigraphy of the Cayuga Lake Basin, New York"in *Journal of Sedimentary Research* 68 (4) July 1998: 569-578; T. R. Dwyer, H. T. Mullins, and S. C. Good "Paleoclimatic Implications of Holocene Lake Level Fluctuations, Owasco Lake, New York" in *Geology* 24(6) June 1996: 519-522.

[12] Mullins, 1998 "Holocene Lake Levels"

[13] Maine Climate Institute, Maine Geologic Survey
http://www.maine.gov/doc/nrimc/mgs/explore/surficial/facts/dec00.htm

[14] Z. J. Yu, H. McAnderews and U. Eicher "Middle Holocene Dry Climate Caused by Change in Atmospheric Circulation Patterns: Evidence from lake levels and isotopes" in *Geology* 25(3) 1997: 251-254.

[15] Elizabeth Sonnenburg, *Holocene Lake Level Change and Submerged Archaeological Site Potential in Rice Lake, Ontario.* Unpublished PhD Proposal, McMaster University, School of Geography and Earth Sciences, n.d.

[16] S. A. Drzyzga, "Relict Shoreline Features at Cockburn Island, Ontario" *Journal of Paleolimnology* 37 2007: 411-417; Yu, McAnderews and Eicher "Middle Holocene Dry Climate"

[17] Sonnenburg, n.d.

[18] M. K. Faught, "Submerged Paleoindian and Archaic Sites of Big Bend, Florida" *Journal of Field Archaeology* 29 2002:273-290; M. K. Faught, "The Underwater Archaeology of Paleolandscapes, Apalachee Bay, Florida" *American Antiquity* 69 (2)2000:275-289.

[19] Ibid.

[20] Faught, 2004 *American Antiquity*

[21] T. Bell and M. A. P. Renouf "Precontact cultures, reconstructed Coasts: Maritime Archaic Indian site Distribution in Newfoundland" *World Archaeology* 35 2003:350-370; D. W. Fedje and J. Heiner "Drowned Forests and Archaeology on the Continental Shelf of British Columbia, Canada" *Geology* 28 2000:99-102; Faught, 2002 *Journal of Field Archaeology*

[22] J. M. O'Shea and G. A. Meadows "Evidence for Early Hunters Beneath the Great Lakes" *Proceedings of the National Academy of Sciences* 106 (25) 2009:10120-10123; L. J. Jackson, C. Ellis, A. V. Morgan and J. H. McAndrews "Glacial Lake Levels and Eastern Great Lakes Palaeo-Indians." *Geoarchaeology* 15 2000:415-440.

[23] See Sonnenburg, n.d.

[24] CR Environmental, Inc., *Onondaga Lake Phase 1 Pre-Design Investigation Geophysical Survey Report*

[25] Hohman, *Cultural Resource Management Report Phase 1A,* 2004

[26] New York State Historic Preservation Office, *Phase I Archaeological Report Format Requirements* (New York SHPO, 2005)