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Underwater Archeological
Investigations

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Introduction

The following guidelines provide an expanded discussion of archeological, historical, and geophysical methods for identifying, evaluating, and documenting underwater archeological resources in Wisconsin waters. These guidelines *supplement* standard Wisconsin Archeological Survey (WAS) guidelines; when there is a discrepancy, the special underwater archeological guidelines are to *replace* general WAS guidelines.

The following guidelines are meant to be used in conjunction with accepted underwater archeological methods and are adopted from, and in general conformity with, guidelines developed by the U.S. Department of Interior Minerals Management Service and the U.S. Army Corps of Engineers. Technology for underwater archeological investigations is subject to rapid advances and changes; it is anticipated that these guidelines will require frequent updates. In any case, most underwater archeology in Wisconsin takes place in waters regulated by the State of Wisconsin or the U.S. Army Corps of Engineers and will usually be subject to specific project scopes of work and permit conditions. Permit applicants and others conducting underwater archeology in Wisconsin waters are encouraged to contact the State Underwater Archaeology Program well in advance of anticipated work to confer on specific project methodology and permit requirements.

General Requirements

It is the responsibility of the archeological principal investigator (hereafter “archeologist”) to ensure satisfactory completion of all archival research, field survey, excavation, recovery, conservation, curation, and reporting requirements. These tasks include

- obtaining or providing all necessary materials, equipment, personnel, and permits needed to complete the project
- developing a project research proposal
- conducting the necessary investigations
- making recommendations regarding possible National Register of Historic Places eligibility and additional research and evaluations as required
- preparing and submitting draft and final reports
- conserving and curating all artifacts, notes, maps, photos, original manuscripts and figures and any other materials generated from this research, according to federal guidelines 36 CFR 79 and accepted professional guidelines

The methods and techniques used in conducting underwater archeological investigations must be in accordance with *Archeology and Historic Preservation; Secretary of the Interior Standards and Guidelines* and the *Abandoned Shipwreck Act; Final Guidelines* prepared by the National Park Service (U.S. Department of the Interior 1983, 1990), and the Wisconsin Archeological Survey (WAS) guidelines. The principal investigator and the

field director (if different from the principal investigator) must be qualified archeologists in accordance with NPS and WAS guidelines.

The archeologist is responsible for obtaining any permits associated with conducting archeological research on state bottomlands, including but not limited to (1) a Wisconsin Department of Natural Resources (WDNR) Bureau of Water Regulation and Zoning permit to disturb bottom sediments in the course of test excavation; (2) a Field Archeology permit from the Office of the State Archaeologist, State Historical Society of Wisconsin (SHSW), for survey and excavation of archeological remains on public lands; and (3) any county or municipal permits required to anchor vessels or conduct diving operations in the project area. The archeologist is, of course, also responsible for complying with federal, state, and local laws pertaining to all facets of the work, including environmental protection, worker safety, labor standards, vessel operations, and diving operations.

Archeologists are referred to Breiner (1973), Anderson (1988), Green (1990), Dean (1992), and the Museum Small Craft Association (1993) for additional discussion of professional archeological, historical, and geophysical methods and technology applications.

Literature and Records Search

A comprehensive literature and records search for the project area must be conducted prior to field investigation. This research must provide documentation of prehistoric and historic sites believed to be present in the project area, including wrecks of vessels and small craft, harbor structures, and other prehistoric and historic remains. Historical documentation must include a project area history (including phases of harbor construction, if relevant); photographs and maps; data on construction, operation, loss, and salvage of vessels in the project area (including, if possible, builders' plans or records and photographs); and present location of known or suspected sites.

The archeologist should consult, at a minimum, records of the State Historical Society of Wisconsin, local and county historical socie-

ties, the respective state Regional Archaeology Center, the Milwaukee Public Library marine collections, the Institute for Great Lakes Research, the Duluth Canal Park Marine Museum, the Wisconsin Maritime Museum, and other repositories having information relative to the prehistory, history, navigation, waterfront and harbor development, and shipwrecks of the project area. Historians, divers, archeologists, and other individuals knowledgeable in these subjects should also be consulted for further information and to determine whether any underwater archeological resources may lie within the project area.

Phase I: Minimum Technical Specifications

The methods and techniques used in underwater archeological surveys must be adequate to identify all significant archeological resources, prehistoric or historic, within a project area.

Phase I field survey should be conducted with a complete (100% coverage) marine remote-sensing survey of the project area, employing dual instrumentation that will detect both buried and exposed cultural remains. Remote sensing instrumentation must represent state-of-the-art technology and be properly deployed and tuned, and all recorded data must be legible, accurate, and properly annotated.

Instrumentation

Shipboard survey equipment should include at a minimum

1. A **navigation/positioning control system** (geographical positioning system [GPS] or continuous microwave positioning system) with a minimum accuracy of ± 5 meters, digitally interfaced or manually correlated with all other remote sensing records.
2. A **marine magnetometer**, a towed sensor-type, with ± 1 gamma resolution, with the data sampling rate not to exceed 1-second intervals. The sensor must be towed as near as possible to the lake or

riverbed, optimally at a distance of 6 meters or less. A mechanical or digital depth sensor must be attached to the magnetometer sensor, and each survey line must be annotated with tow sensor depth and start of line (SOL) and end of line (EOL) times. In all instances where a magnetic anomaly is encountered, the sensor depth must be annotated on the magnetometer record. The magnetometer must not be operated in “zero mode,” as this setting does not measure the ambient magnetic field. Background noise levels must not exceed three gammas, peak to peak.

Analog strip chart recorders must be equipped with dual trace pens. Recording scales must include both 1,000-gamma and 100-gamma full scale. Position fixes and recorder speed must be annotated on the strip charts for each survey line. The strip chart recorder speed must be approximately 2 inches per minute. Whenever possible, the magnetometer must be towed a minimum distance of 2.5 vessel lengths behind the survey vessel to eliminate any magnetic influence from the vessel.

3. A **side-scan sonar**, a towed 500-kHz dual-channel sensor, with high resolution. Side-scan sonar must be used to record continuous planimetric images of the project area lake or riverbed, providing 100% coverage of the survey area. Data obtained must be of such quality to permit detection and evaluation of objects, structures, and features lying upon the lake or riverbed within the project area. Whenever possible, the side-scan sonar sensor must be towed above the bed at a distance of 10 to 20 percent of the instrument range. The vertical sound beam width must be appropriate to the water depth, and the horizontal sound beam width must provide optimum resolution. Tuning must be accomplished in a manner that enhances the echo returns from small nearby objects and features without sacrificing the quality of echo returns from more distant objects and features.
4. A **depth recorder/fathometer** with minimum 1-foot resolution. Continuous water depth measurements must be made using a

high-frequency, narrow-beam depth sounder. Bathymetric data must be recorded with a recording sweep appropriate to topography and water depth.

Optional equipment includes

5. A **sub-bottom profiler** with minimum 2-meter resolution. As required by the project scope of work, a sub-bottom profiler may be necessary to determine the location and nature of sediments, geological features, and archeological remains beneath the floor of a lake or river. Data obtained must be of sufficient quality to permit evaluation of these features and remains for determining possible prehistoric or historic significance. The system used must be capable of providing data for the upper 15 meters of sediment; however, the actual bottom penetration achieved will vary with bottom sediment type and conditions.
6. **Other equipment** as needed. Under certain conditions, additional remote sensing systems or methods such as underwater television; still, video, or movie cameras; remote or manned submersibles; bottom coring; or other equipment may be required.

Survey Parameters

The following navigation and survey parameters are recommended for conducting underwater archeological remote sensing surveys:

Area surveys. An area survey must cover the entire area of a proposed bottom-disturbing activity as well as that portion external to the project area within which activities may cause physical and/or long-term magnetic disturbances. The survey must be run along parallel primary lines spaced at a maximum of 50 meters. Tighter line spacing may be required in spatially restricted areas, in areas of known or suspected underwater archeological resources, or where otherwise required by the nature of bottom sediments, bathymetry, or the archeological resources themselves.

Linear surveys. The parameters for all linear surveys (such as pipelines and cables) must

include a transect along the proposed project centerline, and one or more offset parallel lines on either side of the center transect at a maximum spacing of 50 meters. The number of parallel transects must be sufficient to provide 100% coverage of the area within which the project may cause physical and/or long-term magnetic disturbances. A minimum of two offset parallel transects are required. The area of physical disturbance includes, but is not limited to, the area where anchors will be placed during construction activities.

Data Collection and Analysis

Transects shall be run at a survey vessel speed not to exceed 2 to 4 knots, to provide for accurate data recovery. All analog records shall be manually annotated with position coordinates at a minimum of every 100 feet along a transect, unless continuous remote-sensing/positioning data correlation is provided automatically through a shipboard computer interface.

For reporting and analysis purposes, magnetometry data shall be contour plotted, in at least 10-gamma contour intervals. Side-scan data may be graphically depicted either through scanned or photoprinted annotated images or by supplying original sonargraphs. Acoustic (sonar) targets that appear to be shipwrecks must be recorded from several different aspects to facilitate target identification. Magnetic targets must also be recorded on sonar (if detectable) to facilitate identification.

Magnetic anomalies and sonar targets shall be ground-truthed by diver reconnaissance. Exposed cultural remains shall be ground-truthed by visual inspection. Subsurface anomalies shall be ground-truthed by manual or hydraulic probing, and if necessary, by test excavation using induction dredge, airlift, or water jet, as appropriate to conditions. Ground-truthing shall include documentation by measured sketches, verbal description, and photography/video if necessary.

Project Reporting and Record Keeping

The archeologist is responsible for keeping standard archeological records for the project, including field notes and maps, site survey

forms, excavation records, photographs, videography, sonargraphs, magnetometry data, and field logs. State archeological survey forms must be prepared for all sites discovered during the survey, and records on previously reported sites updated if new information is obtained.

The consultant is responsible for providing a detailed report of the survey and/or excavation operations in accordance with the WAS Technical Report Guidelines. Reports shall present information in whatever combination of graphic, textual, and tabular data the archeologist finds most effective, while still conforming with WAS minimum guidelines. Specialized underwater archeological figures must include, but are not limited to, magnetic contour maps of the project area, sonargraphs of acoustic targets, and line drawings and photographs of important architectural, engineering, and archeological features.

Additional report sections, figures, or topics may be added at the discretion of the archeologist. Although the reports are to be printed and bound as separate documents, they must be of a quality and scope that would make them suitable for publication in professional archeological journals such as *Historical Archaeology*, *The Wisconsin Archeologist*, and the *International Journal of Nautical Archaeology*.

Special Reporting Requirements

The following requirements are in addition to, or in deviation from, WAS guideline requirements:

Methods. This section will describe all archival and field methods, equipment, and personnel used on the project. It will also provide project dates, number of staff, and approximate person-hours devoted to different aspects of the project.

Results. This section will describe field conditions, site environment, archeological findings, and general project results. It will, in detail, review survey findings and provide a full description and analysis of wreckage, structures, features, artifacts, and remote sensing

anomalies encountered by the survey. Maps and schematic drawings shall be used to show the location of and fully describe all archeological findings. National Ocean Service charts may be used in lieu of USGS 7.5' quadrangle maps to plot site locations.

References. This section will provide bibliographic references in accordance with *Historical Archaeology* format (vol. 25, pp. 124–37) for every publication or data source cited or otherwise used in the report.

Special Curation Requirements

Materials recovered from underwater archeological sites pose extraordinarily complex conservation problems and therefore require special consideration for recovery and curation. As discussed in the WAS curation guidelines, archeologists are responsible for conserving and curating all project notes, maps, photos, original manuscripts and figures, artifacts, and any other materials generated from archeological research according to federal guidelines 36 CFR 79, *Curation of Federally-Owned and Administered Archeological Collections*, and accepted professional guidelines. An underwater archeologist may seek assistance from the State Underwater Archaeology Program, State Historical Society of Wisconsin, in finding suitable in-state repositories for project records and artifacts. However, acceptable provision for conservation of recovered artifacts will generally be a precondition for issuance of state archeology permits.

As a detailed discussion of professional guidelines in artifact conservation and curation cannot be attempted within these guidelines, specific requirements are to be written into individual project scopes of work and artifact custody agreements. As a general guideline, only professionally accepted, safe, and reversible methods for artifact conservation must be employed (see Singley 1988). Due to the extensive training and experience required to safely and successfully undertake conservation work, conservation treatments must be undertaken only under the supervision of a conservation professional meeting the code of ethics and guidelines of practice of such organizations as the American Institute for Conserva-

tion (AIC) and the International Institute for Conservation (AIC 1991).

References Cited

- American Institute for Conservation
1991 *Guidelines for Selecting a Conservator*. American Institute for Conservation of Historic and Artistic Works, Washington, DC.
- Anderson, Richard K., Jr.
1988 *Guidelines for Recording Historic Ships*. National Park Service, U.S. Department of the Interior, Washington, DC.
- Breiner, Sheldon
1973 *Applications Manual for Portable Magnetometers*. Geometrics, Sunnyvale, California.
- Dean, Martin (editor), et al.
1992 *Archaeology Underwater: The NAS Guide to Principles and Practice*. Nautical Archaeology Society. Dorset Press, Dorchester, Great Britain.
- Green, Jeremy
1990 *Maritime Archaeology: A Technical Handbook*. Academic Press, San Diego.
- Museum Small Craft Association
1993 *Boats: A Manual for Their Documentation*. American Association for State and Local History, Nashville, Tennessee.
- Singley, Katherine
1988 *The Conservation of Archeological Artifacts From Freshwater Environments*. Lake Michigan Maritime Museum, South Haven, Michigan.
- U.S. Department of the Interior, National Park Service
1983 Archaeology and Historic Preservation: Secretary of the Interior's Standards and Guidelines. *Federal Register* 48(190, Part IV):44716–42. U.S.

Government Printing Office, Wash-
ington, DC.

- 1990 Abandoned Shipwreck Act; Final
Guidelines. *Federal Register* 55(253,
Part III):50116-45. U.S. Government
Printing Office, Washington, DC.