Skills in Maritime Archaeology
ANTH 608
Syllabus

SPRING 2021
Wednesdays, 9:00 AM-12:00 PM
Location: This class will be held synchronously on Zoom
Course credits: 3

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Office hours: Wednesdays 3:00-5:00 PM. If you want to confirm a meeting, I can be reached by telephone at (W) 979 847-9257, (M/Text) 979 574-7693 or by e-mail (swachsmann@tamu.edu).

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Students seeking a future in maritime archaeology require a wide knowledge of techniques, tools and methods used in the field. This seminar aims to introduce students to primary themes and tools in maritime archaeology. It will acquaint participants with remote sensing and mapping, interpreting, recording, and storing data used in maritime archaeological surveys. Students will study the theory pertaining to these topics and will also have opportunities to practice the required skills in exercises.

Specifically, this course will familiarize students with the following topics: A) concepts associated with remote sensing, B) basic methodologies for mapping an archaeological site, C) basic software available to map and record an archaeological site, D) fundamental ethical questions and legislation related to the survey and excavation of submerged cultural resources, E) advanced methods of recording artifacts, F) the most common analysis and sciences associated with the interpretation of a submerged site.

Topics covered in this course vary somewhat from year to year but may include, while not being limited to, aspects of maritime cultural resource management and deep-submergence archaeology, as well as relevant technologies pertaining to field work and artifact study such as Geographic Information Systems (GIS), remote-sensing technologies, laws pertaining to maritime cultural resources, documentation tools (Faro Arm and X-ray fluorescence [XRF]) and methods. Some meetings may include practical training in handling equipment and recording archaeological sites, using library resources, learning specific computer software, and developing a clear vision of the problems associated with underwater survey, excavation and cultural resource management. Students will be required at the end of the course to submit a seminar paper and an essay.

During the course students will have the opportunity to interact directly with leaders in the various themes that compose the field of maritime archaeology as well as with experts in the technologies that makes this research possible.

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Zoom Meetings

This course will be taught synchronously on Zoom. These are the details of the recurring Zoom Meeting:
URL:
https://tamu.zoom.us/j/92261711198?pwd=dXZjdVBlemRMUHBCK2V5UkNkcmVpQT09
Meeting ID: 922 6171 1198
Passcode: 2f054t
NB: Students must have their cameras turned on during class.

System of Grading

Grades in this course will be based on your class participation (20 percent), on a seminar paper (60 percent) and an essay (20 percent). In those classes in which we will be having presentations by external experts I will expect you to have read the references and to display a clear knowledge of the subject matter. Letter grades assigned will follow the standard TAMU scale: 100-90 = **A**, 89-80 = **B**, 79-70 = **C**, 69-60 = **D**, 59 and below = **F**.

Papers

The research seminar paper.—This paper, about 5,000 words/20 double-spaced pages, allows you to demonstrate your proficiency in one of the aspects of the course. The choice of a topic for your paper is yours and I am open to any and all reasonable proposals as long as they fit within the limits of the seminar: I recommend finding a topic in which you wish to develop an expertise or that you find of particular interest. The paper should be carefully researched, using primarily original sources and focused on a well-defined topic. Use *American Journal of Archaeology* (*AJA*) reference style: download a copy of the style instructions here (http://www.ajaonline.org/submissions). With the exception of books, almost all the readings required for this course are available on line on Canvas and/or at specified URLs (see below). I encourage you to meet with me regularly outside of class hours to ensure that you are keeping up with the material and remain on schedule to complete your course requirements.

The essay.—This paper, about 1,500 words/6 double-spaced pages, should be a thoughtful discussion of any aspect related to maritime archaeology. Essay topics may include, but are not limited to, for example, the significance of a particular shipwreck, aspects of maritime museum conservancy, technological issues, etc. Note that your seminar paper and proposal cannot deal with the same topic.

Topic selection and abstract.—As topic selection can be a difficult process, and lead to procrastination, I encourage you to look over the material that we will cover and select a topic early in the semester. Please drop by to discuss your topic ideas with me. To help you in selecting topics so that you will have time to work on them I require that you submit to me 250-word abstracts together with a preliminary bibliography for both the seminar paper and the essay (two abstracts) no later than our *third* meeting (Wednesday, February 3rd). *Remember, deadlines*

are our friends. Note that these abstracts should be statements of intent that describe the topics and explain why they are important.

Due date.—Seminar papers and essays are due in my mailbox no later than 5 PM on the last day of class (Wednesday, April 28th). Late submissions will automatically be docked a letter grade. (If both papers are late, only one letter grade will be docked.) Given human nature, I highly recommend that you aim to submit your seminar paper and proposal a week or two prior to the deadline.

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Attendance Policy

The university views class attendance and participation as an individual student responsibility. Students are expected to attend class and to complete all assignments.

Please refer to Student Rule 7 (https://student-rules.tamu.edu/rule07/) in its entirety for information about excused absences, including definitions, and related documentation and timelines.

Makeup Work Policy

Students will be excused from attending class on the day of a graded activity or when attendance contributes to a student's grade for the reaons stated in Student Rule 7, or other reason deemed appropriate by the instructor.

Please refer to Student Rule 7 (https://student-rules.tamu.edu/rule07/) in its entirety for information about makeup work, including definitions, and related documentation and timelines.

Absences related to Title IX of the Education Amendments of 1972 may necessitate a period of more than 30 days for make-up work, and the timeframe for make-up work should be agreed upon by the student and instructor" (Student Rule 7, Section 7.4.1).

"The instructor is under no obligation to provide an opportunity for the student to make up work missed because of an unexcused absence" (Student Rule 7, Section 7.4.2).

Students who request an excused absence are expected to uphold the Aggie Honor Code and Student Conduct Code. See Student Rule 24.)(https://student-rules.tamu.edu/rule24/).

The Americans with Disabilities Act (ADA)

Texas A&M University is committed to providing equitable access to learning opportunities for all students. If you experience barriers to your education due to a disability or think you may have a disability, please contact Disability Resources in the Student Services Building or at (979) 845-1637 or visit http://disability.tamu.edu. Disabilities may include, but are not limited to attentional, learning, mental health, sensory, physical, or chronic health conditions. All students are encouraged to discuss their disability related needs with Disability Resources and their instructors as soon as possible.

Title IX and statement on Limits to Confidentiality

Texas A&M University is committed to fostering a learning environment that is safe and productive for all. University policies and federal and state laws prohibit gender-based discrimination and sexual harassment, including sexual assault, sexual exploitation, domestic violence, dating violence, and stalking.

With the exception of some medical and mental health providers, all university employees (including full and part-time faculty, staff, paid graduate assistants, student workers, etc.) are Mandatory Reporters and must report to the Title IX Office if the employee experiences, observes, or becomes aware of an incident that meets the following conditions (see University Rule 08.01.01.M1):

• The incident is reasonably believed to be discrimination or harassment.
•The incident is alleged to have been committed by or against a person who, at the time of the incident, was (1) a student enrolled at the University or (2) an employee of the University.

Mandatory Reporters must file a report regardless of how the information comes to their attention—including but not limited to face-to-face conversations, a written class assignment or paper, class discussion, email, text, or social media post. Although Mandatory Reporters must file a report, in most instances, a person who is subjected to the alleged conduct will be able to control how the report is handled, including whether or not to pursue a formal investigation. The University's goal is to make sure you are aware of the range of options available to you and to ensure access to the resources you need.

Students wishing to discuss concerns in a confidential setting are encouraged to make an appointment with Counseling and Psychological Services (CAPS) (https://caps.tamu.edu).

Students can learn more about filing a report, accessing supportive resources, and navigating the Title IX investigation and resolution process on the University's Title IX webpage (https://titleix.tamu.edu).

Statement on Mental Health and Wellness

Texas A&M University recognizes that mental health and wellness are critical factors that influence a students's academic success and overall wellbeing Students are encouraged to engage in healthy self-care by utilizing the resources and services available from Counseling & Psychological Services (CAPS). Students who need someone to talk to can call the TAMU Helpline (979-845-2700) from 4:00 p.m. to 8:00 a.m. weekdays and 24 hours on weekends. 24-hour emergency help is also available through the National Suicide Prevention Hotline (800-273-8255) or at https://suicidepreventionlifeline.org.

Academic Integrity

An Aggie does not lie, cheat or steal, or tolerate those who do.

Texas A&M University students are responsible for authenticating all work submitted to an instructor. If asked, students must be able to produce proof that the item submitted is indeed the work of that student. Students must keep appropriate records at all times. The inability to

authenticate one's work, should the instructor request it, may be sufficient grounds to initiate an academic misconduct case" (Section 20.1.2.3, Student Rule 20).

For more information regarding academic integrity, please visit the Honor Council Rules and Procedures on the web: http://aggiehonor.tamu.edu).

Statement on Diversity

Respect for cultural and human biological diversity are core concepts of Anthropology. Anthropological research provides perspectives and data that can be used to examine many current social issues that may be appropriate to discuss in this class. Students and faculty should expect to both defend and critique diverse points of view in a respectful manner. Please respect the different experiences, beliefs and values expressed by your fellow students and instructor, and refrain from derogatory comments about other individuals, cultures, groups, or viewpoints. There is no justification for discrimination or hateful speech or behavior in any form. The Anthropology Department supports the Texas A&M University commitment to Diversity, and welcomes individuals regardless of age, background, citizenship, disability, education, ethnicity, family status, gender, gender identity, geographical location, language, military experience, political view, race, religion, sexual orientation, socioeconomic status, and work experience (See http://diversity.tamu.edu/).

Campus Safety Measures

To promote public safety and protect students, faculty, and staff during the coronavirus pandemic, Texas A&M University has adopted policies and practices for the Spring 2021 academic term to limit virus transmission. Students must observe the following practices while participating in face-to-face courses and course-related activities (office hours, help sessions, transitioning to and between classes, study spaces, academic services, etc.):

- Self-monitoring—Students should follow CDC recommendations for self-monitoring. **Students who have a fever or exhibit symptoms of COVID-19 should participate in class remotely if that option is available, and should not participate in face-to-face instruction.**
- Face Coverings—Face coverings (cloth face covering, surgical mask, etc.) must be properly worn in all non-private spaces including classrooms, teaching laboratories, common spaces such as lobbies and hallways, public study spaces, libraries, academic resource and support offices, and outdoor spaces where 6 feet of physical distancing is difficult to reliably maintain. Description of face coverings and additional guidance are provided in the Face Covering policy and Frequently Asked Questions (FAQ) available on the Provost website.
- Physical Distancing—Physical distancing must be maintained between students, instructors, and others in course and course-related activities.
- Classroom Ingress/Egress—Students must follow marked pathways for entering and exiting classrooms and other teaching spaces. Leave classrooms promptly after course activities have concluded. Do not congregate in hallways and maintain 6-foot physical distancing when waiting to enter classrooms and other instructional spaces.
- To attend a face-to-face class, students must properly wear an approved face covering If a student refuses to wear a face covering, the instructor should ask the student to leave and join the class remotely. If the student does not leave the class, the faculty member should

report that student to the Student Conduct office for sanctions. Additionally, the faculty member may choose to teach that day's class remotely for all students, or dismiss the class in the case of a traditional face to face lecture.

Personal Illness and Quarantine

Students required to quarantine must participate in courses and course-related activities remotely, if that option is available, and must not attend face-to-face course activities. Students should notify their instructors of the quarantine requirement. Students under quarantine are expected to participate in courses and complete graded work unless they have symptoms that are too severe to participate in course activities.

Students experiencing personal injury or Illness that is too severe for the student to attend class qualify for an excused absence (See Student Rule 7, Section 7.2.2.) To receive an excused absence, students must comply with the documentation and notification guidelines outlined in Student Rule 7.

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ANTH 608 SCHEDULE SP 2021

1) January 20th➢ Introduction

2) January 27th➢ Dr. Chris Dostal: Overview of 3D Digitization Techniques

3) February 3rd➢ Ms. Amy Borgens: On Being a State Nautical Archaeologist: The Skill Set?

4) February 10th➢ Dr. Robert Walker: The Fun of Fundraising

5) February 17th➢ Mr. Jeff Morris: Introduction to Side-Scan Sonar and Magnetometers, Principals and Interpretation

6) February 24th➢ Mr. JB Pelletier: Workshop: Hands on (Zoom) with Side-Scan Sonar, Magnetometers and Hypack

7) March 3rd➢ Dr. Douglas Inglis: From Dirt to Digital Museum: 3D Archaeology Workflows and Troubleshooting, by Land, Sea, and Air

8) March 10th➢ Ms. Sierra Laddusaw: Sailing the Maritime Library

9) March 17th➢ Dr. Amanda Evans: Project Planning & Data Interpretation

10) March 24th➢ Ms. Kim Faulk: Digital Interpretation Packages and Procedures

11) ➢ March 31st➢ Dr. Isabel Rivera-Collazo: Community Engagement in Coastal Settings & the Use of Maritime Heritage in Support of Climate Action

12) April 7th➢ Dr. Dana Yoerger: Deep Submergence Archaeology: The Final Frontier

13) April 14th➢ Mr. Ole Varmer: Underwater Cultural Heritage Law 101: An Overview of International and U.S. Law

14) April 21st➢ Students present their papers

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READINGS FOR CLASS MEETINGS

There is no specific textbook for this course: in the place of a textbook, we will use the following materials:

Week 1➢ Introduction

The Chicago Manual of Style. Fourteenth Edition, Revised and Expanded. Chicago. 1993.
Flesch, R.F., 1949. *The Art of Readable Writing.* New York.
Hacker, D., 1988. *Rules for Writers: A Concise Handbook.* New York.
Hodder, I., 1989. Writing Archaeology: Site Reports in Context. *Antiquity* 63: 268-274.
Provost, G., 1990. *Make Your Words Work.* Cincinnati.
Strunk, W., Jr. and E.B. White, 1979. *The Elements of Style.* Third Edition. London.
Tichy, H. J., 1988. *Effective Writing for Engineers * Managers * Scientists.* Second Edition. New York, John Wiley & Sons, Inc.

Reflections on Writing
Orwell's Law of Language:[1] "The great enemy of clear language is insincerity. When there is a gap between one's real and one's declared aims, one turns as it were instinctively to long words and exhausted idioms, like a cuttlefish squirting out ink..."

Orwell suggested six rules to improve one's writing: Never use a metaphor, simile or other figure of speech, which you are used to seeing in print.

• Never use a long word where a short one will do.

• If it is possible to cut a word out, always cut it out.

• Never use the passive where you can use the active.

•Never use a foreign phrase, a scientific word, or a jargon word if you can think of an everyday English equivalent.

• Break any of these rules sooner than say anything outright barbarous.

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Week 2➢ Dr. Chris Dostal: Overview of 3D Digitization Techniques
Aimers, J. J., D. J. Farthing and A. N. Shugar, 2011. Handheld XRF Analysis of Maya Ceramics: A Pilot Study Presenting Issues Related to Quantification and Calibration. In *Studies on Archaeological Sciences: Handheld XRF for Art and Archaeology.* A. N. Shugar and J. Mass, eds. Leuven, Leuven University Press**:** 423-448.
Allen, P., S. Feiner, A. Troccoli*, et al.*, 2004. Seeing into the Past: Creating a 3D Modeling Pipeline for Archaeological Visualization. In *Proceedings of the 2nd International Symposium on 3D Data Processing, Visualization, and Transmission (6-9 September, 2004, Thessaloniki, Greece).* J. Aloimonos, ed. Los Alamitos, CA, IEEE Computer Society.

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[1] H. Rawson, 1997. *Unwritten Laws: The Unofficial Rules of Life as Handed Down by Murphy and Other Sages.* New York: 174-175.

Artioli, G., 2009. Spectroscopy between Physics and Chemistry. In *Scientific Methods and Cultural Heritage: An Introduction to the Application of Materials Science to Achaeometry and Conservation Science.* G. Artioli, ed. Oxford, Oxford University Press**:** 28-37.

Boehler, W. and A. Marbs, 2004. 3D Scanning and Photogrammetry for Heritage Recording: A Comparison. In *Geoinformatics 2004 (Proceedings of the 12th International Conference on Geoinformatics − Geospatial Information Research: Bridging the Pacific and Atlantic (University of Gävle, Sweden, 7-9 June 2004).* 291-298.

Drap, P., J. Seinturier, B. Hijazi*, et al.*, 2015. The ROV 3D Project: Deep-Sea Underwater Survey Using Photogrammetry: Applications for Underwater Archaeology. *ACM Journal on Computing and Cultural Heritage* 8(21): 21:1-24.

Ferguson, J. R., 2012. X-Ray Fluorescence of Obsidian: Approaches to Calibration and the Analysis of Small Samples. In *Studies on Archaeological Sciences: Handheld XRF for Art and Archaeology.* A. N. Shugar and J. Mass, eds. Leuven, Leuven University Press**:** 401-422.

McCarthy, J., 2014. Multi-Image Photogrammetry as a Practical Tool for Cultural Heritage Survey and Community Engagement. *Journal of Archaeological Science* 43:175-185.

Moens, L., A. von Bohlen and P. Vandenabeele, 2000. X-Ray Fluorescence. In *Modern Analytical Methods in Art and Archaeology.* E. Ciliberto and S. Guiseppe, eds. New York, John Wiley & Sons**:** 55-79.

Rajapakse, R. P. C. J., Y. Tokuyama and R. Somadeva, 2011. Virtual Reconstruction and Visualization of Pre and Proto Historic Landscapes in Sri Lanka. In *The Proceedings of the 2011 International Conference on Biometrics and Kansei Engineering, IEEE.***:** 198-203.

Week 3➢ Dr. Amy Borgens: On Being a State Nautical Archaeologist: The Skill Set

Cho, H., 2014. The Challenges and Needs of Museums in Safeguarding Underwater Cultural Heritage. *Museum Management and Curatorship* 29(5): 429-444.

Weeks 4➢ Dr. Robert Bob Walker: The Fun of Fundraising

Walker, R. L., 2015. Footprints in Aggieland. College Station, Texas A&M University Press: 115-124 (On Fundraising).

Week 5➢ Mr. Jeffrey Morris: Side-Scan Sonar, Principals and Interpretation

Fish, J. P. and H. A. Carr, 1990. *Sound Underwater Images: A Guide to the Generation and Interpretation of Side Scan Sonar Data.* Orleans, EG&G Marine Instruments.

Mazel, C., 1985. *Side Scan Sonar Record Interpretation.* Klein and Associates, Salem, NH.

Week 6➢ Mr. JB Pelletier: Workshop: Hands on (Zoom) with Side-Scan Sonar, Magnetometers and Hypack

(NB. Links are also available under "Readings" on the course's eCampus website.)

1) Understanding Coordinate Systems and Projections for ArcGIS - YouTube (https://www.youtube.com/watch?v=-2z_WP7N7to)

2) HYPACK 2020: Intro to Surveying and HYPACK - YouTube (https://www.youtube.com/watch?v=Yk9QRJzBuVQ&t=3723s)

3) HYPACK 2020: Single Beam Survey - YouTube (https://www.youtube.com/watch?v=FwMdfzdfK9I)

4) New HYPACK Hardware Setup and Side Scan Survey Signal Tips – YouTube (https://www.youtube.com/watch?v=ySk0iuBCXnA)

5) HYPACK Side Scan Mosaicing - YouTube (https://www.youtube.com/watch?v=STusiXjky8U)

6) HYPACK: Marine Search: Post-Processed Mosaics - YouTube (https://www.youtube.com/watch?v=mIW-7GdAuG8)

WRPLOT VIEW software (free):

Lakes Environmental | WRPLOT View [free] - Wind Rose Plots for Meteorological Data (weblakes.com) (https://www.weblakes.com/products/wrplot/index.html)

1) WRPLOT View (Windrose Plotting Software) - YouTube (https://www.youtube.com/watch?v=yQij7LrwnZk)

2) How to make a wind rose in excel - YouTube (https://www.youtube.com/watch?v=goLqJp2g87c)

Week 7➢ Dr. Douglas Inglis: From Dirt to Digital Museum: 3D Archaeology Workflows and Troubleshooting, by Land, Sea, and Air

McCarthy, J., J. Benjamin, T. Winton*, et al.*, 2019. The Rise of 3D in Maritime Archaeology. In *3D Recording and Interpretation for Maritime Archaeology.* J. McCarthy, J. Benjamin, T. Winton and W. van Duivenvoorde, eds. (Electronic), Springer International Publishing**:** 1-10.

Sapirstein, P. and S. Murray, 2017. Establishing Best Practices for Photogrammetric Recording During Archaeological Fieldwork. *Journal of Field Archaeology* 42(4): 337-350.

Weeks 8➢ Ms. Sierra Laddusaw: Sailing the Maritime Library

Blouin, F. X., Jr., 2010. Thoughts on Special Collections and Our Research Communities. *RBM: A Journal of Rare Books, Manuscripts, & Cultural Heritage* 11(1): 23-31.

Iorga, A., 2019. Archives as Ruins: Means of Understanding the Future in an Era of Wrecks. *Martor* 11(1): 43-54.

Week 9➢ Dr. Amanda Evans: Project Planning & Data Interpretation

TBD

Week 10➢ Ms. Kim Faulk: Digital Interpretation Packages and Procedures

Baeye, M., R. Quinn, S. Deleu*, et al.*, 2016. Detection of Shipwreck in Ocean Colour Satellite Imagery. *Journal of Archaeological Science* 66: 1-6.

Carrier, B. M., A. Pulkkinen and M. Heinz, 2016. Recognizing Geomagnetic Storms in Marine Magnetometer Data: Toward Improved Archaeological Resource Identification Practices. *Science and Technology of Archaeological Research* 2(1): 1-14.

Bingham, B., B. Foley, H. Singh*, et al.*, 2010. Robotic Tools for Deep Water Archaeology: Surveying an Ancient Shipwreck with an Autonomous Underwater Vehicle. *Journal of Field Robotics* 27(6): 702-717.

Warren, D. J., C.-W. Wu, R. Church*, et al.*, 2010. Utilization of Multibeam Bathymetry and Backscatter for Documenting and Planning Detailed Investigations of Deepwater Archaeological Sites. In *OTC-20853-MS, Offshore Technology Conference (Houston, Texas, USA 3-6 MAY 2010):* 1-8.

Week 11➢ Dr. Isabel Rivera-Collazo: Community Engagement in Coastal Settings & the Use of Maritime Heritage in Support of Climate Action

Boger, R., S. Perdikaris and I. Rivera-Collazo, 2019. Cultural Heritage and Local Ecological Knowledge Under Threat: Two Caribbean Examples from Barbuda and Puerto Rico. *Journal of Anthropology and Archaeology* 7(2): 1-14.

Rivera-Collazo, I., 2018. Grassroots Activism and Catastrophes: The Case of Cultural Heritage and Hurricane Maria in Puerto Rico. *The SAA Archaeological Record* (January): 21-24.

Rivera-Collazo, I., 2019. Severe Weather and the Reliability of Desk-Based Vulnerability Assessments: The Impact of Hurricane Maria to Puerto Rico's Coastal Archaeology. *Journal of Island and Coastal Archaeology* 15(2): 244-263.

Rivera-Collazo, I., C. Rodríguez-Franco, J. J. Garay-Vázquez*, et al.*, 2020. Towards a Definition and Practice of Communal Archaeology: Ethics, Informal Learning, and Citizen Science in the Practice of Indigenous Archaeology. *Journal of Community Archaeology & Heritage* 7(2): 120-134.

Stewart, T. J., 2019-2020. The Threat of Climate Change. *American Archaeology* (Winter 2019-2020): 19-25.

Week 12➢ Dr. Dana Yoerger: Deep Submergence Archaeology: The Final Frontier

Wachsmann, S., 2011. Deep-Submergence Archaeology. In *The Oxford Handbook of Maritime Archaeology.* A. Catsambis, B. Ford and D. Hamilton, eds. Oxford University Press, New York: 202-231.

Week 13➢ Mr. Ole Varmer: Underwater Cultural Heritage Law 101: An Overview of International and U.S. Law

Varmer, O., 2014. *Underwater Cultural Heritage Law Study.* OCS Study BOEM 2014-005. Herndon, VA, U.S. Department of the Interior Bureau of Ocean Energy Management.

Week 14➢ N/A (Students present their papers)

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ADDITIONAL READINGS

Geographic Information Systems (GIS) (Compiled by Dr. Cecilia Smith)

General
Getting Started with GIS
http://training.esri.com/gateway/index.cfm?fa=catalog.webCourseDetail&courseid=2500
The Geospatial Revolution
http://geospatialrevolution.psu.edu/trailer.php
ORBIS, the Stanford Geospatial Network Model of the Roman World
http://orbis.stanford.edu/

GIS in Maritime Archaeology
(= Recommended references for getting started with GIS)*

Bampton, M., 1993. Coastal Management Planning in Maine: Geoarchaeology in Service of Society. In *Abstracts: 1993 AAG Annual Meeting*, Atlanta, Georgia Association of American Geographers (AAG), 1993: 11.

Beitzel, B.J., 2007. Joint Nautical Ventures on the Mediterranean Sea by Tyrian Phoenicians and Early Israelites. In *The Association of American Geographers 2007 Annual Meeting* (San Francisco, California Association of American Geographers [AAG], 2007): 17-21.

Breen, C. and W. Forsythe, 2001. Management and Protection of the Maritime Cultural Resource in Ireland." *Coastal Management* 1: 41-51.

Breen, C., R. Quinn, and W. Forsythe, 2007. A Preliminary Analysis of Historic Shipwrecks in Northern Ireland. *Historical Archaeology* 3: 4-8.

*Breman, J., 2003. Marine archaeology goes underwater with GIS. *Journal of GIS in Archaeology* 1: 23-32.

Broodbank, C., 1993. Ulysses without Sails: Trade, Distance, Knowledge and Power in the Early Cyclades. *World Archaeology* 3: 315-31.

Brown, A. G., Davis, F., Dinnin, Y. and D. Walling, 2004. Late Holocene Biodiversity, Baseline Conditions and Floodplain Rehabilitation. *The 30th Congress of the International Geographical Union*, August 2004.

Callaghan, R., and C. Scarre, 2009. Simulating the Western Seaways. *Oxford Journal of Archaeology* 4: 357–72.

Ford, B., 2007. Down by the Water's Edge: Modeling Shipyard Locations in Maryland, USA. *International Journal of Nautical Archaeology* 1: 125–37.

Ford, B. 2011. Coastal Archaeology. In *The Oxford Handbook of Maritime Archaeology.* A. Catsambis, B. Ford and D. Hamilton, eds. Oxford University Press, New York: 763-785.

Green, D. 2010. *Geoarchaeology of Prehispanic Agricultural Landscapes in the Bais-Tanjay Basin Negros, Oriental*. Illinois, University of Illinois at Chicago.

Green, D.R., 1995. Preserving a Fragile Marine Environment: Integrating Technology to Study the Ythan Estuary. *Mapping Awareness* 3(April): 28–30.

Groom, D. M., D. Wheatley, G. P. Earl, S. J. Poppy, and I. Oxley, 2000. Maritime Fife: Managing Fife's Underwater Heritage: A Feasibility Study for a Maritime Archaeological GIS. In *Contemporary Themes in Archaeological Computing: Computer Applications in Archaeology 1997 Conference Proceedings*. University of Birmingham/Oxbow Monographs, Oxford.

Grossman-Bailey, I., 2001. *"The People Who Lived by the Ocean:" Native American Resource Use and Settlement in the Outer Coastal Plain of New Jersey*. Temple University.

Ilves, K., 2009. Discovering Harbours? Reflection on the State and Development of Landing Site Studies in the Baltic Sea Region. *Journal of Maritime Archaeology* 2: 149-163.

Joslin, T. 2010. *Middle and Late Holocene Hunter-Gatherer Adaptations to Coastal Ecosystems along the Southern San Simeon Reef, California*. California, University of California, Santa Barbara.

Keller, K.E., 2007. Maritime Archaeology GIS Tool for the NWHI Marine National Monument. In *2007 Esri International User Conference* (San Diego, CA ESRI, 2007).

Leidwanger, J. 2013. Modeling Distance with Time in Ancient Mediterranean Seafaring: A GIS Application for the Interpretation of Maritime Connectivity. *Journal of Archaeological Science* 40: 3302-3308.

Mather, R. 1999. Technology and the Search for Shipwrecks. *Journal of Maritime Law and Commerce* 2: 175-184.

Nadine, S. 1984. Supply Routes and the Consumption of Glass in First Millennium CE Butrint (Albania). *Journal of Archaeological Science* 11: 2939-2948.

Nicolardi, M., 2010. Interpreting a Coherent Post-Medieval Shipwreck: A Qualitative Spatial Approach Supported by GIS: 9.

Oxley, I., 1998. The Investigation of the Factors that Affect the Preservation of Underwater Archaeological Sites. In *Maritime Archaeology*, Springer US: 523-529.

Pitts, M., 2007. Mapping an underwater world. *Archaeology 60*(1): 30-34

Reeder, L.A., C.R. Torben and J.M. Erlandson, 2012. Our Disappearing Past: A GIS Analysis of the Vulnerability of Coastal Archaeological Resources in California's Santa Barbara Channel region. *Journal of Coastal Conservation* 16(2): 187-197.

Rogers, A., 2011. Reimagining Roman Ports and Harbours: The Port of Roman London and Waterfront Archaeology. *Oxford Journal of Archaeology* 2: 207-225.

Sharfman, J., 1994. The Application of a Geographical Information System on a Maritime Archaeological Project: The Example of the Excavation of the VOC-Ship 'Oosterland' (1697). *Department of Archaeology*.

Titanic, Exploring with GIS: A) (http://storymaps.esri.com/stories/titanic/), B) (http://edcommunity.esri.com/resources/arclessons/lessons/e/exploring_the_titanic_with_gis)

*Wright, Dawn J., 2005. Spatial Reasoning for Terra Incognita: Progress and Grand Challenges of Marine GIS. In *Place Matters: Geospatial Tools for Marine Science, Conservation and Management in the Pacific Northwest*. Corvallis, OR, Oregon State University Press: 272–286.

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