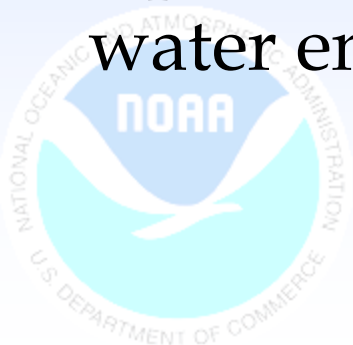


# Introduction to Scientific Diving



# Scientific diving has been conducted in a wide variety of environments...

- Coral reefs
- Mangroves
- Kelp forests
- Rocky shores
- Soft bottom habitats
- Polar environments
- Open ocean/blue water environments
- Offshore platforms
- Estuaries
- Hot springs
- Hypersaline environments
- Caves
- Lakes
- Rivers



# ...and been used in many different sciences

- Chemical
- Geological
- Biological
- Paleontological
- Archaeological



# Chemistry

- Diving has been used to support research such as determining the chemical ecology of invertebrates and collecting marine organisms for the extraction of chemical compounds



# Geology

Divers may obtain core samples of rock and sediment or dig holes to examine depositional history



Scuba is very useful for visual identification of sediments – and for collecting representative and relatively undisturbed samples





# Biology

Divers may perform a wide variety of tasks such as measuring various community structural parameters like fish counts, algal counts, macroinvertebrate counts, percent cover of benthic algae and invertebrates, etc..., or measuring physiological responses of organisms in natural environments



# Paleontology

Divers recover fossils from the underwater realm...



*Dinosaur fossils from the waters off the Isle of Wight*



# Archaeology

Diving is integral to the study of underwater archaeology



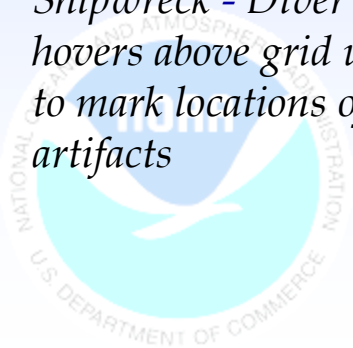
*Serçe Liman1  
excavation - 11th  
Century Byzantine  
Shipwreck - Diver  
hovers above grid used  
to mark locations of  
artifacts*



*Serçe Liman1 excavation –  
Diver raises fragile hull  
timber using a lifting box*



*Excavation of 4<sup>th</sup> – 6<sup>th</sup>  
century AD harbor site  
in Malta*





# Scientific Diving - General

- The diversity of disciplines involved in scientific diving, and the varied environments where this diving is performed, has necessitated the development of a wide variety of techniques for observing and sampling underwater



# *Why use diving for research?*

*The purpose of the project using scientific diving is the advancement of science. The tasks of a scientific diver are those of an observer and data gatherer.*

*Scientific divers, based on the nature of their activities, must use scientific expertise in studying the underwater environment, and, therefore are scientists, or scientists-in-training.*



# *Diving is a research tool*

*Scientific divers must be trained to use this tool to a level of proficiency that allows them to focus on the research task.*

*Most scientific institutions and universities require extensive training and specialized experience before authorizing their scientists and research support staff to conduct underwater research using scuba or other wet -diving technologies.*



# *The pursuit of science*

*Scientific diving differs from recreational diving and commercial diving in many ways. The advancement of science is the single goal.*

*For many recreational divers, the thrill of breathing on scuba and enjoying the panoramic view of life beneath the sea is in itself the end goal of learning to dive.*

*Commercial divers are underwater construction workers, builders and trouble shooters.*





# Scientific Diving

*“Scientific diving is diving performed solely as a necessary part of a scientific, research, or educational activity by employees whose sole purpose for diving is to perform scientific research tasks.”*



*As defined by OSHA regulations (29 CFR 1910.402)*



# *Scientific Diving Safety*

- *establishment of the first scientific diving safety program: Scripps Institution of Oceanography, 1954*
- *two-fold purpose:*
  - *a research support function that assists the diving scientist with specialized underwater equipment, advice, and diver support*
  - *a risk management function that protects the safety and health of the individual scientist, and the employing organization from excessive liability exposure*



# A Brief History of the Creation of AAUS

- *Organized in 1977, AAUS was incorporated in the State of California in 1983.*
- *The Academy submitted arguments to OSHA on October 15, 1979 citing:*
  - *Self regulation and consensual standards for over 20 years.*
  - *And an accident/incidence rate lower than the Commercial Diving Industry.*
- *After extensive negotiation and Congressional Hearings, the scientific diving exemption to commercial diving standards was issued, effective November 28, 1982.*



# A Brief History of the of AAUS

- *AAUS is an organization of Organizations*
- *AAUS certifies Scientific Diving Programs NOT individual divers*
- *The strength of the Academy is this Organizational Membership (OM)*





# Scientific Diver Population

- *~4000 individuals in the U.S.*
- *majority of long-term, career scientific divers (e.g. federal employees, university professors) in the 35+ average age category*
- *high turnover of scientific divers at the university student level (18–34 age category)*
- *no upper age limit for certification, the lower limit is generally 18 years of age*
- *of the total scientific diver population, approximately 25% is estimated to be women*



# *Scientific Diving Entities*

- *research institutions*
- *public and private universities, museums and aquaria (predominantly research, education and teaching)*
- *consulting companies (predominantly contractual environmental, geological and archaeological investigations)*



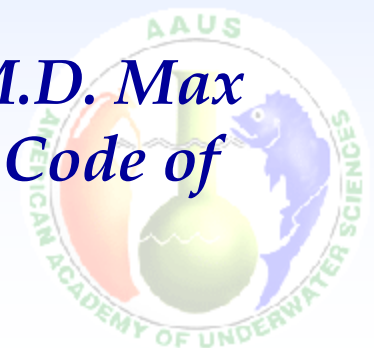
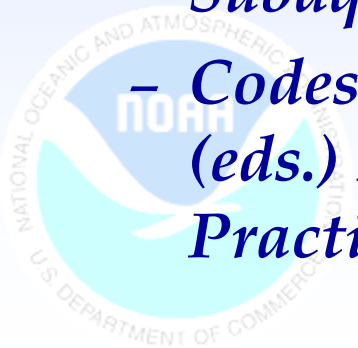
# Regulatory Authority

- **USA:**

- *Federal (OSHA): Diving Safety Manual, Diving Control Board of active scientific divers;*
- *State; and,*
- *Employer.*

- **International:**

- *EU and country regulations;*
- *Confédération Mondiale des Activités Subaquatiques (CMAS); and,*
- *Codes of Practice (Flemming, N.C. and M.D. Max (eds.) 1996. Scientific Diving: A General Code of Practice, UNESCO, Paris. 278 p.*



# 29 CFR Ch. XVII Subpart T 1910.401 – Labor (OSHA)

*(iv) Defined as scientific diving and which is under the direction and control of a diving program containing at least the following elements:*

*A. Diving Safety Manual*

*B. Diving Control Board*





# *Appendix B to Subpart T - Guidelines for Scientific Diving*

- 1. diving control board : majority are active scientific divers - autonomous and absolute authority over program operations;*
- 2. purpose of diving is advancement of science;*
- 3. scientific diver is observer and data gatherer; and,*
- 4. scientific divers use scientific expertise under water.*



# AAUS OM / AAUS Relationship

- *AAUS consensual standards are the AAUS OM scientific diving minimum.*
- *It is the responsibility of the AAUS OM to review and augment these standards to fit their program if they deem it necessary.*
- *These completed standards become the AAUS OM operational standards.*
- *The liability related to these standards falls upon the AAUS OM not AAUS.*



# Scientific Diver Certification

## • *OM's Certify Scientific Divers to AAUS Level*

### ***REQUIREMENTS FOR CERTIFICATION***

- Scuba Certification
- Swimming evaluation
- Skin diving evaluation
- Current and approved Scientific Diving Medical Examination
- 100 hours of theoretical and practical study
- Test of knowledge/Written examination
- Current CPR, First Aid and Oxygen Administration Training
- 12 Supervised training dives

### ***MAINTANCE OF CERTIFICATION***

- 1 logged dive every six months
- 12 logged dives per year
- Hold current certification in CPR, First Aid and O2 Administration
- Approved Diving Medical Examination within specified age requirements



# AAUS RECIPROCITY

- *Based on the idea that all AAUS OM are training to the same minimum AAUS Standards.*
- *This process allows interaction between AAUS OM programs with minimum overlap in paperwork and training.*
- *This process usually utilizes the “Letter of Reciprocity” which is a verification of training.*
- *Some AAUS OM may require additional steps to be taken before full reciprocity is granted.*
- *Contracts providing reciprocity may be established with outside organizations – (e.g. – NOAA, NPS)*





# Diving Safety Officer

- *The liaison between the DCB and the day to day operations of the Scientific Diver/ Research Diving program*
- *Qualifying a Scientific Diver:*
  - *Diver Application Process*
  - *Qualification Areas*
    - *Academics*
    - *Diving Medical*
    - *Dives*
- *Dive Plans*
- *Dive Logs*



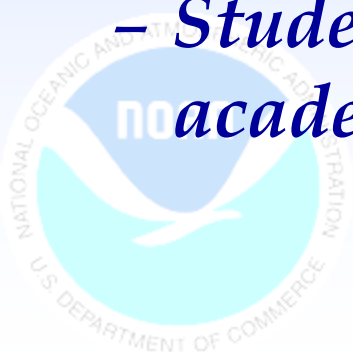
# Member Participation in AAUS

- *Membership in the Academy*

- *Full Membership - Voting*

- *Associate Membership – Non-voting*

- *Student Membership – must be enrolled in academic program of study*



# Member Participation in AAUS

- Annual Symposium
  - *An annual symposium held at a host AAUS OM*
  - *Any AAUS OM can submit an offer to host*
  - *Typically the symposium alternates between East and West coast AAUS OM's*



# Member Participation in AAUS

- *AAUS Web Site [www.aaus.org](http://www.aaus.org)*
  - *The AAUS Web Site is the nexus for all AAUS business and information exchange.*
  - *It consists of a Public Access area and a members only area known as the Member Clicks (MC).*
    - *MC areas are password protected and offer an increasing number of functions.*



# Member Participation in AAUS

- *“The E-Slate”*
  - *The official AAUS monthly publication*
  - *The publication of the E-Slate is overseen by a volunteer editor and staff*
  - *Content is provided by membership contribution*





# Member Participation in AAUS

- Standards
  - The membership participates by having the ability to propose and review any standards revisions.



# Member Participation in AAUS

- AAUS Student Scholarships

- Kevin Gurr Scholarship

- Masters Level Student - \$2,500

- Kathy Johnston Scholarship

- Ph.D. Level Student - \$2,500

<http://www.aaus.org/mc/page.do>



# *The American Academy of Underwater Sciences*

**101 Bienville Boulevard**

**Dauphin Island, Alabama 36528**

**Phone: (251) 861-7504**

**Fax: (251) 861-7540**

***aaus@disl.org***

**[www.aaus.org](http://www.aaus.org)**



# Acknowledgements

- Bill Dent - University of South Florida
- Michael Lang – Smithsonian Institute
- Ted Maney – Northeastern University
- Steve Sellers – East Carolina University
- Gregg Stanton – formally FSU
- Michael Dardeau - DISL



# Sources

- American Academy of Underwater Sciences, Proc. of Scientific Diving Symposia, [aaus.org](http://aaus.org).
- Haddock, S.H.D., Heine J.N. 2005. Scientific Blue-Water Diving. California Sea Grant Publ. No. T-057.
- Heine, J.N. 1999. Scientific Diving Techniques. Best Publishing Company, Flagstaff, AZ.
- Joiner, J.T. (ed.). 2001. NOAA Diving Manual - Diving for Science and Technology, Fourth Edition. Best Publishing Company, Flagstaff, AZ.

