



E-SLATE

American Academy of Underwater Sciences (AAUS)

EDITORIAL BOARD NOTE – April 2011

Welcome to the April issue of the *E-Slate*. This month's issue is filled with several new job positions and publications. Be sure to read the AAUS Symposium Update and the note on the change in AAUS bylaws.

Thank you so much for the submissions this month! Please continue to submit news, announcements, job postings, and images of underwater work to aauus@disl.org. Current and past issues of the *E-Slate* are available at www.aauus.org.

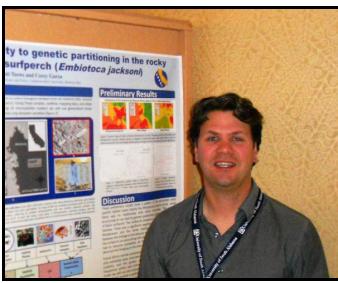
NEWS/ANNOUNCEMENTS

AAUS at Benthic Ecology Meeting 2011

AAUS was one of the sponsors of the 40th Benthic Ecology Meeting from March 16-19 in Mobile, AL. Heather Fletcher and Mike Dardeau staffed a booth during the meeting to answer questions about AAUS and to recruit new members. Both of last year's Kevin Gurr AAUS student scholarship winners presented posters of their research at the Benthic Ecology Meeting.



BEM hosts John Valentine, Sean Powers and Ken Heck stand in front of the AAUS table (photo credit: Lisa Young).



AAUS student scholarship runner up, Tania Eskin, gives thumbs up to AAUS support. Scott Toews, AAUS student scholarship winner, gives his preliminary results (photo credit: Mike Dardeau).

AAUS Symposium Update

OM Poster Reception - Friday, October 14

The 2011 AAUS scientific meeting will include an opportunity for organizational members (OMs) to highlight their scientific diving programs and underwater research activities through a poster session/reception at the Gulf of Maine Research Institute. Several common elements should be incorporated: scientific diving program background, structure, DCB members, notable accomplishments, course offerings, operational strengths, and underwater research highlights. We encourage all OMs to take advantage of this opportunity to showcase individual programs. Presented posters will be made available on the AAUS website and in future editions of the *E-Slate*. There is no cost for this event, but please register on the symposium site if you plan to present (<http://guest.cvent.com/d/ydqgkt>). Poster guidelines and samples will be provided in the next *E-Slate* issue.

New Workshop Added for 2011 Symposium

In addition to a PSI certification course already scheduled, a PSI recertification course will be offered for those who have a certification less than three years old that needs to be updated. It will be held Thursday October 13 at the Portland Regency Hotel. The price is \$165. Please register through the symposium website (<http://guest.cvent.com/d/ydqgk>).

Lodging for the 2011 Symposium

Please note that pre-symposium meetings and workshops (October 10-12) will be held at Darling Marine Center (DMC). Driving time from Portland to the DMC is about 90 minutes. Most attendees will likely prefer to arrange housing for DMC-based events through DMC or surrounding Inns. AAUS events do not begin in Portland until October 13. The AAUS group rate at the Portland Regency is only available Wednesday-Sunday (October 12-16). Bookings at Portland Regency outside of these dates will be at the regular retail price.

AAUS Statistics Due

2010 statistics are due no later than June 30, 2011. While that might seem far away, the field season with all its attendant duties is coming up fast so please budget the time. AAUS has a new URL (<http://stats.diveaaus.org>) and a new look to the stats entry page. By logging in, you can enter your stats and review, not only your OMs previous numbers but the AAUS summary statistics as well. If you have any questions about AAUS data collection criteria, please review the AAUS Statistics Collection Criteria and Definitions available at the site or contact Mike Dardeau

(mdardeau@disl.org) directly. The reason behind the upgrade is that over the Christmas holidays, the Board of Directors found that Ego Factory would be replacing the server running our stats software with a new server. Problematically, the new server would not run our old Cold Fusion programming, so we had the choice to move our program to a different old school server or rewrite the code for the new server. The statistics committee felt it was an opportunity to update the look of the site and restore some of the function lost with the separation of stats from the old Virtual Office. So, with the help of Brenda Babin, a PhD candidate at LSU, the site has a new look and more flexible administrative control.

Call for Abstracts – AAUS 2011

Abstracts (150-250 words) for the upcoming AAUS symposium can be submitted until June 01. As discussed in the February 2011 *E-Slate*, the minimum manuscript obligation has changed from full papers to extended abstracts (800-1200 words). Note: longer manuscripts can be submitted if authors prefer. The deadline for final extended abstract or manuscript is August 01. The published proceedings will be available at the fall meeting. Details are posted on the AAUS website (<http://www.aaus.org>).

AAUS Bylaws Change

A review and consideration of the Bylaws and California Corporate Code by the Board of Directors to encourage greater participation of the membership in future elections resulted in a Board decision to change two sections:

Qualifications of Directors (Article IV Section 2):

Old - *"Directors of the Academy shall be full members in good standing for at least two consecutive years prior to nomination."*

New - *"Directors of the Academy shall be full members in good standing."*

Qualification of Officers (Article V, Section 2):

Old - *"Officers of the Academy shall be voting members in good standing for at least two consecutive years prior to nomination. The President-Elect must have previously served as a member of the Board of Directors"*

New - *"Officers of the Academy shall be voting members in good standing."*

These changes allow for a broader, less restrictive pool of AAUS members to qualify to be elected to contribute to the future governance of the Academy. The requirement for being a full member in good standing is the first screening element that an individual is committed to the AAUS mission and goals and (a) holds a diving certification from a recognized national certifying agency or equivalent, and (b) has engaged in sustained or successive scientific diving activities during the past two years, or (c) has completed a course in scientific diving that meets the requirements as specified by the most current edition of the AAUS Standards for Scientific Diving. A full voting member also enjoys all powers and privileges conferred by AAUS

Bylaws and by law, including full participatory, voting and office holding privileges. The second screening is the consideration by the nomination committee whether that individual has the experience, resources and ability to contribute to the AAUS in a board member capacity. The President-Elect position, by the nature of its two-year term, is in essence the apprenticeship period to subsequently assume duties of President. The third screening is the approval by the Board of Directors of the slate of candidates for election. Finally, the members of the Academy elect the officers, which can now consist of an increased range of qualified candidates.

OceansWatch Seeking 2011 Volunteers

OceansWatch is looking for volunteers to serve as the expedition crew for projects in Vanuatu, the Solomon Islands and Papua New Guinea. The 2011 volunteer positions include: Expedition leaders (2), Divers (3), Marine Scientists (3), and Crew. OceansWatch is a not-for-profit organization focusing on marine conservation and education and supporting sustainable livelihoods in coastal communities in developing countries. Visit:

<http://www.oceanswatch.org/international/pages/volunteer>.

Obituary - Dr. Christian J. Lambertsen

May 15, 1917 – February 11, 2011

Christian J. Lambertsen, MD, DSc (Hon) received a BS Degree from Rutgers University in 1938 and a MD Degree from the University of Pennsylvania in 1943. During his medical school period, he invented the initial self-contained closed-circuit oxygen rebreathing apparatus used by the US military for neutral buoyancy underwater swimming and diving. As a student, he aided the early Office of Strategic Services (OSS) in establishing the first cadre of US military operational combat swimmers. Dr. Lambertsen became a US Army medical officer on graduation from medical school in early 1943, and immediately joined the OSS Maritime Unit on active duty through its period of function in World War II. He joined the University of Pennsylvania Medical Faculty in 1946, and became Professor of Pharmacology in 1952. While a faculty member he combined diving research and further underwater rebreathing equipment developments for the Army and Navy. In 1967 he served as Founding President of the Undersea Medical Society (now Undersea and Hyperbaric Medical Society). Dr. Lambertsen is recognized by the Naval Special Warfare community as 'The Father of US Combat Swimming.' His hand has touched every aspect of military and commercial diving. Dr. Lambertsen's active contributions to diving began during WWII and became even more progressive in the post-war period through the evolutions of the US Navy Deep Submergence and Naval Special Warfare developmental programs. Those who would like to send condolences may send them to: Lambertsen Family, c/o Chris Lambertsen, 3500 West Chester Pike, Suite 129, Newtown Square, PA 19073-4101.

Call for Nominations - Conrad Limbaugh Award

The Conrad Limbaugh Memorial Award is presented annually to an individual who has made a significant contribution in diving safety and diving leadership on behalf of the scientific diving community. Conrad Limbaugh was an underwater naturalist and Chief Diving Officer of Scripps Institution of Oceanography, where he directed the diving program. He was killed in a scuba diving accident in the Mediterranean on March 20, 1960. Limbaugh graduated from Whittier College in 1948 and did graduate work at the University of California at Los Angeles before going to Scripps Institution in 1950. He was largely responsible for developing the diver-training program at Scripps, as well as many research techniques used by marine scientists. Please send all nominations with a justifying paragraph by the nominating member, along with the nominee's biosketch and contact information, to the AAUS Awards Committee, c/o John Heine, via e mail to: jheine@ucsd.edu.

AAUS BOD Call for Nominations

AAUS is seeking individuals willing to run for the position of Director-at-Large for the 2012 Board of Directors. The Director-at-Large position is for a three year term starting January 1, 2012. Specific committee duties will be assigned by the president. To qualify, individuals must be voting members in good standing with the Academy. The list of nominees along with candidate bios will be presented to the BOD on March 31, 2011. Candidates will be asked to submit responses to several questions to be provided to the AAUS membership as part of the election process. Balloting is open May 01 through June 30. Please submit nominations to one of the Nominating Committee members:

Jeff Godfrey (jeff.godfrey@uconn.edu)

William Dent (wdent@research.usf.edu)

Vallorie Hodges (val.hodges@aquarium.org)

AAUS Diving for Science Proceedings

Printed copies of the Diving for Science 2009 symposium proceedings have been sent to attendees and OMs. Free PDFs are available at www.aaus.org. Printed copies may be purchased from AAUS – Lulu:

(<http://www.lulu.com/product/paperback/diving-for-science-2009/15102215>).

UPCOMING EVENTS

Tenerife Int'l Practical Anesthesiology Conference

The International Congress of Anesthesiology will meet November 7-10 at the Abama Golf & Spa Resort on Tenerife, Canary Islands. The topic of the conference is 'Hyperbaric medicine and its applications in daily practice.' The event is accredited by INAMI/RIZIV. Visit: www.tipactenerife.org for more information.

DAN Diving and Hyperbaric Medicine Course

The 69th DAN Diving and Hyperbaric Medicine Course will be held April 9-16 at the Little Cayman Beach Resort. This six-day course is designed primarily for physicians. Emergency medical personnel, paramedics, nurses and professionals with interest in diving medicine will also find the course valuable. The program is jointly sponsored by DAN and Wilderness Medical Society for continuing education credit. A special dive package supplements the course. Contact DAN Education at 919-684-2948, ext. 555 or 800-496-446-2671, ext. 555 or cme@dan.org. Visit: <http://www.diversalertnetwork.org/Events/Event.aspx?EventID=829>.

CIEE Tropical Ecology Summer Program 2011

The Council on International Educational Exchange (CIEE) is accepting applications for the two part summer program. Students can register for Summer I, Summer II or both. Summer I is May 28 – June 18 when two linked courses are offered: Marine Ecology Field Research Methods (three credit hours). Summer Session II is from June 18 – July 02 when one course is offered: Marine Biology and Ecology in the Southern Caribbean (three credit hours). The course provides an introduction to basic ecological concepts such as competition, diversity, symbiosis, disturbance, and adaptation using examples from the surrounding tropical ecosystems in Bonaire, Netherlands Antilles. Biology of corals and coral reef fish is covered as is identification of the major taxa living in coral reef ecosystems. Course descriptions can be found using the following link: <http://www.cieebonaire.org/courses.html>. **The deadline for application to the summer course is April 15.** Interested students should contact Dr. Rita Peachey, Director of CIEE Research Station Bonaire, at RPeachey@ciee.org or visit www.ciee.org/study to apply. Contact the study abroad office at your institution to assist you with registration and course approval.

CIEE Tropical Marine Ecology and Conservation

CIEE is accepting applications for the fall study-abroad program in Bonaire, Dutch Caribbean. Students register for 17 semester hours: Coral Reef Ecology (4), Marine Ecology Field Research Methods (3), Advanced Scuba (1), Environmental and Cultural History of Bonaire (2), Marine Conservation Biology (3) and Independent Research (4). The program description can be found at: <http://www.cieebonaire.org/courses.html>.

The Independent Research course provides students with the opportunity to conduct a research project of their choice in marine science and to publish the results in a student journal, *PHYSIS: Journal of Marine Science*. In addition, the program provides dive training that prepares students for AAUS certification at their home universities. Students will receive the following training in the Advanced Scuba course: Open Water, Advanced Diver, Rescue Diver, Emergency First Responder, CPR + First Aid, DAN Oxygen Rescue, underwater photography and videography, night

diving, and underwater navigation. Students will learn internationally recognized monitoring protocols including REEF and AGRRA in the Field Research Methods course. Prerequisites: Overall GPA 2.75 or better; two semesters of biology, chemistry, geology, ecology or environmental science; an upper level biology course; and a nationally recognized open water scuba certification (or a PADI referral – you can do your check out dives in Bonaire). **The deadline for application to the fall semester program is April 15.** Interested students should contact Dr. Rita Peachey, Director of CIEE Research Station Bonaire, at RPeachey@ciee.org or visit www.ciee.org/study to apply.

SPUMS Annual Scientific Meeting 2011

The 40th annual scientific meeting of the South Pacific Underwater Medicine Society (SPUMS) will be held May 22-27 at the Hilton Resort and Spa, Tumon Bay, Guam. Meeting themes include: medical aspects of military, occupational and recreational technical diving; head injury and diving workshop – review of clinical cases and guidelines; and management of acute diving injuries. Keynote speakers include: David Dolette, PhD, US Navy Experimental Diving Unit, Panama City, FL, USA; Simon Mitchell, MD/PhD, University of Auckland, New Zealand; and Andrew Fock, MD, Alfred Hospital, Melbourne, Australia. Contact: SPUMS ASM 2011 Convener Dr. Sarah Lockley (splumssecretary@gmail.com or secretary@splums.org.au). Register via the SPUMS website (www.splums.org.au).

Science of Wound Care, Diving, & Hyperbaric Med

The conference will be held at the Ritz Carlton in Palm Beach, FL, August 04-07, 2011. Visit: www.orf2011.com or contact Sharon Phillips at sphillips@orf2011.com.

EUBS Annual Scientific Meeting 2011

The 37th annual scientific meeting of the European Underwater and Baromedical Society (EUBS) will be held August 24-27 at the Medical University of Gdansk, in Gdansk, Poland. Main topics of the conference will include: diving physiology and medicine; non-dysbaric disorders; research in deep diving and dysbaric diving disorders; basic research and clinical hyperbaric medicine; and hyperbaric safety, technology and organization. Abstract submission deadline is May 01. Several satellite meetings will also be conducted: ECHM workshop 'HBO in Emergency Medicine,' EBAss meeting, EDTCmed meeting and DAN Divers Day. Visit: www.EUBS2011.org.

AAUS Symposium 2011

The 2011 AAUS Symposium will be held in Portland, ME October 10-15. The Portland Regency will serve as the symposium hotel and the University of Maine Darling Marine Center will host the preconference workshops, annual DSO meeting and AAUS Business meeting.

Workshops include:

- PSI - VCI certification course and recertification course
- PSI - Eddy Current Testing
- DAN Instructor Certification
- Diver-based suction sampling: a monitoring tool for newly settled lobsters
- Quantitative observation of the adult American lobster (*Homarus americanus*)
- New DSO Orientation
- DUI Demo Day

There will be boat and shore diving opportunities as well as our annual Bubble Breaker sponsored by Ocean Enterprises. October is a beautiful time of year in Maine but also a busy tourist season. Make travel and lodging arrangements early to avoid missing out. Look for additional information and registration materials in an email invitation that will go out to all members or on our website (www.aaus.org). You can register directly at <http://guest.event.com/d/ydqgk/4W>. Contact Chris Rigaud at craigaud@maine.edu or the AAUS office at aaus@disl.org for more information.

JOB OPPORTUNITIES

Tropical Marine Conservation Biology faculty

The CIEE Tropical Marine Ecology and Conservation Program in Bonaire (Dutch Caribbean), a study abroad program for upper level, undergraduate students, is hiring a full time faculty for a 1 year period (July 31, 2011 – July 31, 2012) to teach Tropical Marine Conservation Biology and co-teach Independent Research during the fall and spring semester programs. During summer sessions, the faculty will co-teach Marine Ecology Field Research Methods, Advanced scuba and Tropical Ecology of the Southern Caribbean. In addition to teaching, duties include participating in CIEE's long-term monitoring project and assisting with program logistics. Qualifications include: a PhD in Biology (or related field) or equivalent experience; scientific diving experience; comprehensive dive physical (AAUS); broad field experience in marine ecology and excellent analytical skills; field experience in coral reef ecology in the Caribbean ideal; demonstrated ability to work as a team member; a commitment to education and research in marine ecology and conservation; an eagerness to work closely with students; an appreciation for field-based education; current certifications in First Aid, CPR, DAN Oxygen Rescue; DAN dive insurance; a driver's license and the ability to drive a standard vehicle. Salary will be based on experience.

To apply, send a cover letter and a CV with three references to Dr. Rita Peachey (rpeachey@ciee.org) by the deadline, April 22. A letter of recommendation from one of the references should be emailed directly to rpeachey@ciee.org from the letter writer. For more information, visit: www.cieebonaire.org.

So. California Kelp Monitoring – Seasonal Position

Laboratory Assistant III; full-time, seasonal (~6 months); April - May 2011; compensation: \$2794/month.

Summary of Job Duties: Under direct supervision, conduct biological surveys of artificial and natural reefs off southern California using scuba. Surveys include monitoring the abundance of common kelp forest algae, invertebrates and fish. Process field samples in the laboratory and analyze them using dissecting and compound microscopes. Prepare diving and sampling gear for use in the field. Perform data entry, quality assurance and quality control procedures, assorted errand and data-related tasks as needed.
Requirements: Current AAUS Research Diving certification, nitrox certification from accredited certifying agency, familiarity with taxonomy and classification of Pacific coast marine invertebrates, algae and fish. Send cover letter, resume, and reference contact information to David Huang (david.huang@lifesci.ucsb.edu).

Dive Tech. - University of Alaska

Researchers at the University of Alaska Fairbanks are seeking an AAUS-certified diver to assist with a field experiment in Juneau, AK. The job will involve assisting a PhD student in Dr. Ginny Eckert's lab conducting predation experiments using juvenile red king crabs. This supports a king crab stock enhancement feasibility study:

<https://www.uakjobs.com/applicants/jsp/shared/frameset/FrameSet.jsp?time=1298299888679>

Georgia Aquarium Assistant DSO

The Assistant Dive Safety Officer (DSO)/Volunteer Coordinator will work with a diverse team of divers in the implementation of dive safety procedures to ensure the safety of all employees at the facility and offshore. The Assistant DSO will possess a broad knowledge base in all aspects of diving and diving technology. S/he should also possess broad technical and scientific expertise in research and research-related diving. The Assistant DSO's level of knowledge and diving skills should span the reach of the Georgia Aquarium's dive program, with particular attention to the volunteer diving program. Contact Jeff Reid, DSO/Manager (404-581-4310; jreid@georgiaaquarium.org) for more information and application.

NEW PUBLICATIONS

Budal OH, Risberg J, Troland K, Moen G, Nordahl SH, Vaagboe G, Grønning M. Pneumocephalus, a rare complication of diving. Undersea Hyperb Med. 2011; 38(1):73-9.

BACKGROUND: Pneumocephalus is a recognized complication from head and facial traumas, sinus surgery and as a complication from otitis media acuta. Only a few cases of pneumocephalus related to diving have been reported. **HISTORY:** We report an occupational diver who suffered spontaneous subarachnoidal

pneumocephalus related to a dive to 20 meters. At a depth of 17 msw he suffered from sudden onset of headache, dizziness, nausea and feeling of disorientation. He had no recognized risk factors such as documented facial fractures, rapid ascent or blocked sinuses. CT showed air in the subarachnoidal space. Otoneurological tests revealed pathological smooth pursuit tracking eye movements and substantial imbalance indicating a central neurological injury. CT and MRI showed a bony defect in the sphenoid sinus covered only by arachnoidea. This was probably the communicative fistula for the entrance of air. On follow-up examination one year later he still had central nervous symptoms and signs, as well as symptoms of post-traumatic stress disorder (PTSD). He was not able to do any work and was declared unfit for further diving. We chose not to treat him with hyperbaric oxygen (HBO₂) in the acute state because we thought HBO₂ might have increased the amount of intracranial air. **CONCLUSION:** Pneumocephalus is a rare, but serious complication of diving. The condition should be suspected in a diver with increasing headache or other central nervous disturbances during ascent. The treatment of pneumocephalus in divers is a matter of debate.

Fränberg O, Ericsson M, Larsson A, Lindholm P. Investigation of a demand-controlled rebreather in connection with a diving accident. Undersea Hyperb Med. 2011; 38(1):61-72.

This paper describes the examination of a Halcyon RB80 semi-closed underwater breathing apparatus used in a diving accident in 2007. The apparatus was supplied with trimix (oxygen, nitrogen and helium) containing 31% oxygen. The duration of the dive was 105 minutes at 28 meters' average depth in fresh water, with a 19-minute oxygen decompression stop at 6 meters. Upon surfacing the diver experienced seizures and signs of severe neurological deficits. The apparatus was tested with regard to the oxygen fraction drop from the supply gas to the breathing loop--i.e., the oxygen fraction inhaled by the diver (F_iO₂) was investigated. The F_iO₂ was measured and found to be lower than the value stated on the manufacturer's web page at the time of the accident. This investigation suggests that during the dive, the actual F_iO₂% was 17.9-25.3%, which is considerably lower than the F_iO₂% used for decompression calculations (30%). The underestimation of F_iO₂ resulted in too short and/or too few decompression stops during ascent. The low F_iO₂ would also put a diver at risk of hypoxia at shallow depths. It is concluded that inadequate information on the performance of the rebreather was a major contributing factor to this accident.

Koss B, Sieber A. Development of a graphical head-up display (HUD) for rebreather diving. Underwater Technol. 2011; 29: 203-8.

Head-up displays (HUDs) are mounted in the field-of-view in close proximity to the eye. The present work describes the development of HUDs for rebreather diving. The developed HUDs feature a micro-screen instead of LED-based systems found in nearly all existing available commercial units. Two mouthpiece-mounted prototypes were developed. However, this approach turned out to be impractical and a better solution was found with mounting the HUD directly onto the diver's mask. A split optical path, where the HUD is glued to the visor, and a small lens located inside the diving mask were key features enabling a compact and lightweight design while, at the same time, withstanding pressure and water ingress.

Kuch B, Buttazzo B, Sieber A. Bubble model based decompression algorithm optimised for implementation on a low power microcontroller. Underwater Technol. 2011; 29: 195-202.

The calculation of a decompression schedule, according to the Varying Permeability Model (VPM) with Boyle's Law compensation extension, requires many sophisticated arithmetic operations. Therefore if it is calculated with a limited arithmetic instruction set on a microcontroller, a decompression schedule cannot be calculated in an acceptable time frame. This paper describes the principles behind an optimisation in calculation speed of the VPM with the Boyle's Law compensation extension for the determination of decompression schedules on a low power microcontroller. It was accomplished in three independent steps: converging the cubic root equation of the Boyle's Law compensation algorithm; using a set of predictive models to calculate the adapted bubble radius without using a cubic root solver; and pre-calculating the exponential terms of the Haldane and Schreiner equations, in order to reduce processing time and dynamic adjustment of the step size within the iterative process of the decompression schedule calculation. The modified algorithm was tested on an Atmel ATmega644P running at 8MHz. Calculating decompression schedules with these enhancements were approximately five times faster than with the original algorithm.

McGillis WR, Langdon C, Loose B, Yates KK, and Corredor J. Productivity of a coral reef using boundary layer and enclosure methods. Geophys. Res. Lett. 2011; 38: L03611, doi:10.1029/2010GL046179.

The metabolism of Cayo Enrique Reef, Puerto Rico, was studied using *in situ* methods during March 2009. Benthic O₂ fluxes were used to calculate net community production using both the boundary layer gradient and enclosure techniques. The boundary layer O₂ gradient and the drag coefficients were used to calculate productivity ranging from -12.3 to 13.7 mmol O₂ m⁻² h⁻¹. Productivity

measurements from the enclosure method ranged from -11.0 to 12.9 mmol O₂ m⁻² h⁻¹. During the study, the mean hourly difference between the methods was 0.65 mmol O₂ m⁻² h⁻¹ ($r^2 = 0.92$), resulting in well-reconciled estimates of net community production between the boundary layer (-33.1 mmol m⁻² d⁻¹) and enclosure (-46.3 mmol m⁻² d⁻¹) techniques. The results of these independent approaches corroborate quantified rates of metabolism at Cayo Enrique Reef. Close agreement between methods demonstrates that boundary layer measurements can provide near real-time assessments of coral reef health.

Palozzi R, Quartararo M, Marcelli M, Arati FM, Boccanera P. Combining underwater visual census and self-organising maps: a freshwater ecology application. Underwater Technol. 2011; 29: 173-81.

A very small and deep lake (a sinkhole) in Central Italy was studied during summer 2010 adopting an artificial intelligence based method, the self-organising map (SOM), for the analysis of data collected by a slightly modified underwater visual census (UVC) technique (strip-transects). The data were collected on the assemblage structure and individual age/size of the summer fish found in the sinkhole. UVC data are known to be in some cases partially unreliable for common quantitative statistical analysis (being noisy, uncertain and redundant, particularly in small systems). A specific type of artificial neural network (the SOM) was therefore put forward as a suitable solution for properly extracting information from this kind of data. In the past two decades SOMs have proved to be often more appropriate than other common multivariate techniques in assessing a range of ecological issues. Nevertheless, no study has explicitly taken advantage of the potential of using SOMs with UVC data. The paper gives a brief example of how SOMs can be used to represent and analyse multivariate patterns of a fish assemblage.

Smith SG, Ault JS, Bohnsack JA, Harper DE, Luo J, McClellan DB. Multispecies survey design for assessing reef-fish stocks, spatially explicit management performance ecosystem condition. Fish Res. 2011; 109:25-41.

Principles of statistical sampling design were used to guide refinement of a 30-year multispecies fishery-independent diver visual survey of population abundance and size structure of more than 250 exploited and non-target fishes in the Florida coral reef ecosystem. Reef habitat features and no-take marine reserves (NTMRs) were used to partition the 885 km² sampling domain into sub-areas (or strata) to control the variation of fish density. For the period 1999–2008, survey precision of population density and abundance (CV, coefficient of variation, ratio of standard error to mean) ranged from 7% to 20% for the majority of 13 primary exploited species in

the Florida Keys and Dry Tortugas regions. Population sustainability metrics like species average length in the exploited life stage were comparable between our fishery-independent survey and fishery-dependent catch-sampling. The survey design also performed well for non-target fishes, yielding CVs between 6% and 15% for population density for the majority of 36 species. Sampling efficiency was improved over time via an iterative learning process by which past survey data was used to refine the stratification and allocation schemes of future surveys. We show how survey data are used to support multispecies stock assessments, evaluate the effectiveness of NTMRs, and assess ecosystem condition for the reef fish community.

The mission of the American Academy of Underwater Sciences is to facilitate the development of safe and productive scientific divers through education, research, advocacy, and the advancement of standards for scientific diving practices, certifications, & operations.

American Academy of Underwater Sciences
101 Bienville Boulevard, Dauphin Island, AL 36528
Tel 251 591 3775 Fax 251-861-7540
aaus@disl.org www.aaus.org

Editor: Roxanne Robertson - aaus@disl.org
Editorial Board: Neal Pollock, Michael Dardeau, Heather Fletcher

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