

Quest

The Journal of Global Underwater Explorers



Vol. 25, No. 3 – August 2024

**PHOTOGRAPHER
PORTFOLIO:
RINIE LUYKX**

SAMPLE

MINE DIVING IN SWEDEN

Långban is a treasure trove for mine divers and history buffs

GUE PROJECT DIVING

Diving with a purpose, from foundational to exploration-grade

AREA9 – BONAIRE

Building an education and exploration research facility

CAVE EMERGENCIES

Understanding stress in accidents and fatalities

EDUCATION · CONSERVATION · EXPLORATION · COMMUNITY

GET THE MOST OUT OF YOUR DIVING



THE FUNDAMENTALS OF BETTER DIVING



Global Underwater Explorers

\$24.95
€19.95

GUE's strong commitment to exploration and conservation sometimes requires high-tech tools such as submersibles.

showed the degradation in water quality in a way that scientific measurements, data, and graphs never could. In light of this process, at least once per year, many groups, consistently perform more elaborate documentation, further submersible programs, such as GUE's documentation and Science Diver by curricula. All these efforts, small and large, lead to a growing body of data that means changes to the environment that are often difficult to observe. This process and the resulting data support public awareness and the development of more sophisticated measurements where appropriate.

As a steadily growing initiative, more than 100 Project Baseline divers, under the banner of Project Baseline, are now active around the world in environments ranging from coral to tropical reefs and from shipwrecks to freshwater lakes. They also online meetings take place, coordinated by Project Baseline staff and volunteers who share their and support each other in their global endeavors. Divers have also started to visit other projects, enjoying the friendship and hospitality of their teams while sharing equipment and expertise to their diving. Project Baseline is a GUE initiative but remains open to all divers, or even non-divers. As a volunteer endeavor, this project has many important roles to fill, whether that means joining the documentation of the water's surface, acting in a supporting

an ambitious program, including a diving vessel and two submersibles capable to 300 m/1000 ft. With these assets, GUE's most multi-site project that began in Florida and concluded in the Mediterranean. The vessel began her journey in Florida and sailed to the Bahamas, where participants continue to conduct more deep-water survey work. This effort continued along the coast of Portugal, engaging with existing deep research crews already underway for several years. All projects were able to work in tandem with the other divers, organize themselves into teams, and operate at project level with little or no preparation. After Portugal, GUE teams made their way into the Mediterranean, where divers visited contemporary and ancient shipwrecks, culminating in the exploration of a 2300-year-old trading vessel off the coast of Sicily. GUE maintains a close relationship with the Italian military known as the Operative of the Sea, and supports advanced conservation initiatives across Italy. In this case, GUE divers were able to recover 16 artifacts from 150 m/300 ft. These artifacts included a range of amphora alongside one of the most exciting finds, an ancient star burner used for sacrifice by mariners. GUE divers accumulated a wealth of documentation, including video and thousands of images, ultimately producing a full-scale 3D digital replica of several dive sites, thereby developing

45 YET, THE SIMPLEST TOOL OFTEN PROVED TO BE THE MOST POWERFUL. TWO PHOTOGRAPHS, SEPARATED BY 10 YEARS.

RELIANCE UPON ARBITRARY RULES WHEN DETERMINING IMPORTANT PARAMETERS SUCH AS GAS PLANNING IS A RECIPE FOR DISASTER.

Get more information on an important part of safe diving and must be included in every training program.

Read and prepared for this eventually will likely respond more comfortably. The GUE system focuses on helping the diver in late a safe rescue. Even if the out-of-gas diver remains calm and first breath is guaranteed to be an effective one, as it comes from the diver was just breathing from.

The first part of our regulator configuration is the direct feed to the wing inflator. This hose should be an appropriate length to match the compressed hose on the wing itself. In a double cylinder configuration, the hose is fed from the right post first stage. In the event of a leaking or free-flowing inflator, divers can shut down that valve with their right hand, and since both the compressed hose and the rear wing dump are on the left, divers can use their left hand to dump gas.

THE CAT FORMULA

$$CAT = C \text{ (consumption)} \times A \text{ (average depth)} \times T \text{ (time to surface)}$$

CONSUMPTION X A X T = AVAILABLE GAS

CAT Formula example
 Planning a recreational dive to 30 m/100 ft, while using a 12-liter tank filled to 230 bar. What is the MDT needed for this dive?

Metric
 $C = 40 \text{ Liters (20 Liters } \times 2 \text{ diver)}$
 $A = 2.5 \text{ ATA (30 meters } \times 2 = 21m + 3)$
 $T = 11 \text{ minutes (30 meters from 30 m plus one minute at depth)}$
 $MDT = 40 \text{ Liters } \times 2.5 \text{ ATA } \times 11 \text{ minutes} = 1100 \text{ Liters } 12 \text{ L tank}$

Two divers sharing gas from the deepest point require at least 1000 L in their 12 L tank to safely reach the surface while sharing from one cylinder.

Imperial
 Planning a 100 ft dive while using a single aluminum 80 ft tank. What is the MDT?

THE SINGLE TANK/DOUBLE TANK - SAME CONFIGURATION
 The single tank diver and the double tank diver have exactly the same regulator configuration. The pressure gauge memory and favorably low-air warning is placed in the water marker in front of the diver on either what type tank is used.

THE DRY SUIT ALSO NEED A DIRECT FEED. This comes from the left post regulator and runs under the left arm and across to the back, or divers in cold water, a dedicated drysuit inflator bottle used. Given the lack of a second stage to feed the drysuit inflator is first stage requires an over-pressure valve. If the pressure builds in the first stage this allows the pressure to be vented safely. Nothing else is required on the regulator.

Finally, the submersible pressure gauge, or SPG, comes from the left post regulator on a 56-62 cm/22-24 in hose and is clipped to the hose near to the SPG. The SPG is fed from the bulkhead port to enable divers to gain some information about the status of their valves. If divers plan to check their SPG approximately

THE FUNDAMENTALS OF BETTER DIVING

110

111

© 2018 GUE. ALL RIGHTS RESERVED.

NEW EDITION AVAILABLE NOW!

Order today at www.GUE.com

Available in English, German, Italian, Spanish, Chinese, and Korean.

EDITOR'S LETTER

WRECKS & MINES

Wreck diving offers a glimpse into the past, with sunken ships acting as time capsules. These vessels tell stories of tragedy, loss, human ingenuity, and resilience. From grand ocean liners to simple cargo ships, wrecks capture moments in history, transporting divers to the times when these ships sailed the seas. This historical immersion makes wreck diving a favorite among many divers.

Some divers prefer exploring natural caves for their beauty and the thrill of discovering uncharted passages. But what if there were an activity that combines the historical intrigue of wreck diving with the excitement of exploring overhead environments? Enter mine diving! See page 26 in this issue of *Quest* for a fascinating feature on a Swedish mine, Långban.

What do wreck diving and diving in flooded mines have in common? At first glance, they may seem worlds apart, but they share remarkable similarities that offer unique insights into our industrial past.

Diving in flooded mines reveals a different aspect of history. These submerged labyrinths are remnants of the resource pursuits that fueled progress. Both wrecks and flooded mines serve as underwater museums, preserving artifacts that tell human stories. Rusting ship hulls and eerie mine passages are filled with tools, machinery, and personal items, each fragment contributing to a larger narrative for divers to uncover.

“Wrecks and mines provide more than an adrenaline rush—they offer a tangible link to our collective history.”

Diving in these environments requires unique skills and a deep respect for history. Both wrecks and flooded mines are challenging and potentially hazardous, demanding meticulous planning and strict adherence to safety protocols. However, the rewards are unparalleled, offering a profound connection to the past and a sense of being part of something larger.

Wrecks and mines provide more than an adrenaline rush—they offer a tangible link to our collective history. They allow us to step back in time, witness the stories of those who came before us, and reflect on their legacies. As we explore these underwater worlds, let us do so with respect, curiosity, and deep appreciation for the hidden histories beneath the surface.

Jesper Kjøller
Editor-in-Chief
jk@gue.com



Editor-in-chief

// Jesper Kjøller

Editorial panel

// Michael Menduno

// Amanda White

Design and layout

// Jesper Kjøller

Copy editing

// Pat Jablonski

// Kady Smith

Writers

// Brad Beskin

// Jenn Thomson

// Constantin Ene

// Martina Utzinger

// Ulrik Juul Christensen

// Kirill Egorov

// Daniel Riordan

// Nuno Padrao

// Fred Devos

// Todd Kincaid

// Chris Le Maillot

// Jarrod Jablonski

Photographers

// Kirill Egorov

// Constantin Ene

// Jesper Kjøller

// Adam Beard

// Bori Bennett

// Ulrik Juul Christensen

// Jacob Juul Christensen

// SJ Alice Bennett

// Lauren Wilson

// Sean Romanowski

// Rinie Luykx

// Julian Mühlenhaus

Illustrations

// Alexandra Huth

Quest is published quarterly by
Global Underwater Explorers
18487 High Springs Main Street,
High Springs, Florida 32643
www.GUE.com

IN THIS ISSUE

6 QC CORNER // CO-TEACHING

GUE diving is best enjoyed in teams, promoting safety and enjoyment through collaboration. This team-focused approach is evident in our projects and exploration efforts, but also in teaching.

12 GUE PROJECT DIVING

To support aspiring divers, GUE introduces new initiatives, including resource development and a training curriculum, ensuring the next generation excels in exploration-grade projects.

26 SWEDEN // A DREAM FOR MINE DIVERS

Långban is a diver's dream and a geologist's paradise. With rich mineral diversity, it's a treasure trove of stories. Explore its history, modern facilities, and the unique blend of past and present.

40 BONAIRE // BUILDING A FACILITY

Area9 Mastery Diving is a premier training and research center in Bonaire, leveraging top facilities and expert instruction. The commitment to excellence ensures divers achieve the highest levels of safety, performance, and mastery, pushing the boundaries of diving education.

54 PORTFOLIO // RINIE LUYKX

Rinie, a passionate diver since 1990, captures marine life in the challenging waters of the Netherlands. He also travels the world, freelancing for diving magazines. Rinie emphasizes relaxation and enjoyment, believing these lead to the best photos.

60 UNDERWATER COMMUNICATION, PART 2

Wetnotes are crucial for data collection, dive plans, and decompression schedules, and team diving enhances safety and communication. Mastering positioning strategies helps tackle challenges and emergencies effectively.

72 CAVE DIVING // EMERGENCIES, PART 2

Understanding and managing stress in diving is crucial, as it can mean the difference between life and death. This article examines stress in cave diving, its signs, coping strategies, and handling unconscious divers.

6



12



26



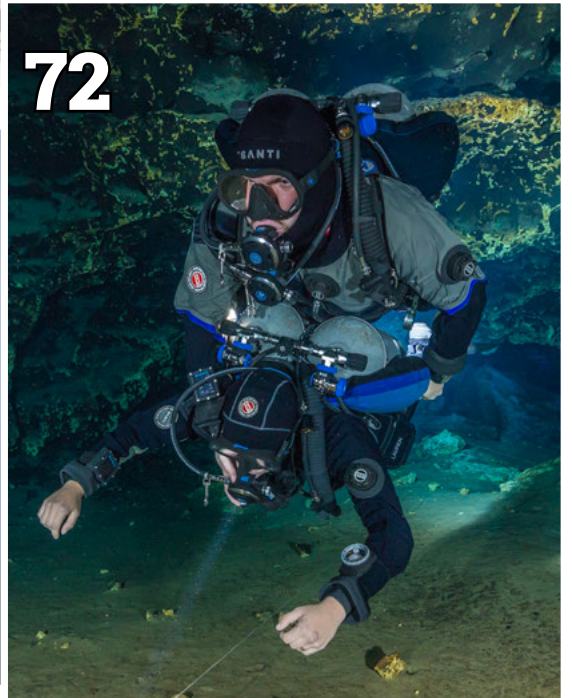
40



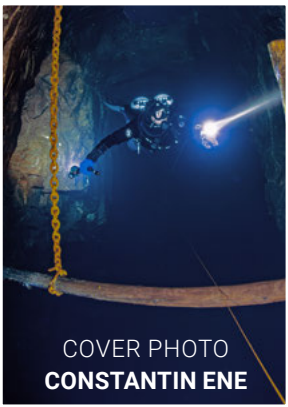
54



72



60



COVER PHOTO
CONSTANTIN ENE

CO-TEACHING

– The benefits and risks

Our pursuits as GUE divers are best enjoyed in teams. GUE has embraced this mantra since its inception because diving is safer and more enjoyable when shared with other like-minded divers. This is codified in our prohibitions against solo diving and our emphasis on two- and three-person teams. It is evident in our focus on collaborative, team-based projects and exploration efforts.

The benefits of team diving are many, and the annals of *Quest*, *InDepth*, and GUE's course materials detail them well. But what about team teaching? Co-teaching (also "collaborative teaching") denotes a coordinated instructional effort by two or more GUE instructors to work with trainees at the same time.

"The logic behind co-teaching is intuitively appealing. Co-teaching reduces the student-teacher ratio, and the presence of two educators, each with distinctive expertise, should make it easier to connect students at a range of abilities to grade-level content." Jones & Winters (2023), *Are Two Teachers Better Than One?*, *Education Next*, 23(1), 54-59.

Can GUE instructors benefit from working together? And, more importantly, can GUE

trainees benefit from such an undertaking? I would put forward a resounding "absolutely!" in response. But, as many of you have learned in working with me, there is almost always a "but." Co-teaching carries with it potential lasting rewards, which can only bear fruit when the instructor team works diligently to minimize the risks associated with co- or team teaching. Failure to manage these risks and plan for success will likely lead to a less-than-stellar outcome for the trainees and, thus, the instructors.

Embracing co-teaching in GUE

To be certain, GUE embraces a co-teaching model when employed (a) for the benefit of the trainee and (b) with sufficient planning to ensure success. However, it is not the norm; rather, most GUE courses follow a familiar mode: one instructor and somewhere between two and six trainees (depending on the course and seg-

Co-teaching offers lasting rewards but requires diligent risk management. Without careful planning, it can lead to poor outcomes for both trainees and instructors.





PHOTO BORI BENNETT

An instructor team can offer personalized attention and solve problems more effectively, than a single instructor.

ment—in-water or theory). However, GUE courses are easily adapted to a co-teaching model with a bit of planning and finesse.

Moreover, GUE’s instructor development model already embraces co-teaching through its internship and signature process. Aspiring instructors must intern in live courses. They must participate in instructional workshops and Instructor Training Courses (ITCs). And they must complete an evaluation under the watchful eye of an Instructor Evaluator (IE).

When employed correctly, co-teaching should provide enhanced course outcomes and benefits to both the trainee and the instructor.

Benefits of co-teaching

Trainee facetime: Co-teaching can maximize the amount of quality one-on-one time each trainee receives in the course from an instructor. This should be highly beneficial for trainees, so long as it does not become disjointed and erratic. Additionally, two sets of eyes, ears, and minds can observe and evaluate students more comprehensively and with different outcomes or takeaways, which should make for more com-

prehensive feedback and coaching throughout the course.

This principal outcome should afford substantial benefit to trainees. If such benefits do not materialize, the instructors need to re-evaluate the effectiveness of the endeavor.

Troubleshooting: In most courses, instructors must manage trainee development and acuity at different paces. Rarely do teammates arrive for a GUE course with perfectly matched fundamental skills, preparation, and capacity. This can split the instructor’s focus between trainees, with some needing micro refinements while others need macro development. Seasoned instructors should find little challenge in managing disparate trainee needs, so long as basic prerequisite trainee skills are present. For example, read “GUE Cave DPV—Fundamentals on Turbo” in *Quest* 23.3, where Lauren Wilson and I discuss the differences between her seasoned DPV skills and my complete lack thereof, each managed expertly by our instructor at the same time.

However, a collaborative team of instructors can pivot and provide customized attention as needed. Additionally, an instructor team brings



PHOTO BORI BENNETT

Co-teaching prevents drift in procedures, methodology, and approach that can occur when an instructor teaches alone.

additional problem-solving resources to bear. Whether weather, illness, or other logistical challenges arise, a team of instructors is likely more capable of responding with a comprehensive solution than one instructor alone.

These trainee-focused outcomes—facetime and troubleshooting—should be the instructor’s principal objective at all times. However, co-teaching can provide ancillary benefits (so long as they do not cannibalize trainee outcomes in any way).

Instructor advancement

Of course, any instructor who wishes to advance in GUE needs to demonstrate the ability to manage a full team of novel trainees at their current level of instruction. But, with this in mind, co-teaching can afford instructors substantial benefits.

Co-teaching creates exposure to other teaching styles and methods, which—whether for better or for worse—provide the instructor with valuable perspective, options, and aspirations. Instructors can learn from each other’s experiences as both educators and divers. For exam-

ple, a technical instructor and a cave instructor co-teaching a Fundamentals class will give each of them an opportunity to see how the other environment influences training—which aspects are emphasized differently and what circumstances are considered.

Co-teaching also helps avoid drift—if an instructor teaches for a while in isolation, a natural drift in procedures, methodology, and approach will happen, and teaching with someone else can help to avoid it. It as well can be inspirational and motivational—to train more, to change habits, or to learn new things. A quest for excellence is also a quest for self-improvement as an instructor and educator.

In many instances, instructors in similar regions have interested trainees without teammates for the course in question. By combining with another instructor in a similar position, they can fill the course and provide each trainee the benefits of a full team of novel trainees.

Risks

These benefits can be easily offset by the risks associated with co-teaching. In short, failure to

plan for and manage a co-teaching arrangement can result in disaster. Instructors who are unwilling to shoulder this work (i.e., who may be looking to co-teaching merely to lighten the load) are likely to encounter disaster more readily than those who put in the work necessary to ensure success.

“While co-teaching is broadly popular among educators, its effectiveness for improving student outcomes depends on a key assumption—that the presence of a second adult results in more effective learning opportunities for students. Our findings appear more consistent with studies suggesting that just putting two teachers in the same room does not necessarily improve the quality of instruction students receive. In practice, co-teachers often do not work in the idealized way advocates of the approach recommend. Colocation does not necessarily cause effective collaboration.” Jones & Winters, *supra*.

Organization: Successful co-teaching requires an added layer of organization and planning. Collaborative instructors must know ahead of time who is responsible for which aspects of the course.

Competition: Instructors may fall into the trap of enforcing their favorite solutions over those of their co-instructor. This care creates confusion and ineffective learning. Additionally, instructors who fail to embrace a collaborative mindset will often repeat the same feedback as their colleagues, waste trainee time, and risk confusing them.

Conflict: Failure to plan accordingly likely leads to conflict between the instructors. This is unacceptable, as it may create a distraction from the paramount responsibility each instructor owes to trainee safety and supervision. It can also create a poor impression on trainees’ part as to instructor proficiency, preparedness, and professionalism.

Development: Co-teaching can provide an instructor a crutch to support certain deficiencies. There is value in an instructor managing, for example, a three-trainee team in a Level 1 course without any assistance. This is unquestionably challenging, but the ability to do so necessarily (but not sufficiently) demonstrates the instructor’s readiness to advance and should

der additional responsibility. Thus, instructors with aspirations for advancement should use caution not to overload their diving resume with co-taught courses.

Manage risk, maximize success

Ultimately, the trainee’s impression will always control the success of any given course. If the trainee perceives a less-than-unified instructor team, that will assuredly impact the quality of the trainee’s experience and offset other successful outcomes. This is unacceptable.

Thus, to ensure a positive outcome, instructors intent upon co-teaching must plan, communicate, define roles, structure methods, and treat each other with patient, mutual respect.

Planning: Critically, any pair of instructors attempting a co-teaching arrangement needs to clearly demarcate the method they will employ. A laissez-faire approach here can be disastrous and give trainees the impression the instructors do not know what they are doing or do not value the trainee’s time sufficiently.

Experts suggest a two-phased planning process for co-teaching arrangements: “The first component involves sharing key decisions and discussing the most critical topics...[.] The companion to this planning is the second component, which includes the on-the-fly conversations that occur ... as needed. If the former type of planning is supported, the latter type can supplement it and result in co-teaching success.” Friend, *Co-Teaching: A Simple Solution That Isn’t Simple After All*, JoCI 2-2 (2008). However, the latter cannot sacrifice time for meaningful trainee instruction and must be limited to only the most as-needed scenarios.

Co-Instructors should debrief each day on what worked well and what needs improvement. Requests from trainees for feedback should include requests specifically tailored to the co-teaching model and roles.

Communication: Co-instructors must leverage clear and closed-loop communication throughout the process to ensure success.

Defined roles: To ensure success, instructors must agree ahead of time on structure, schedule, locations, responsibilities, etc. If one instructor is serving in a primary role, the team must

agree ahead of time whether the secondary instructor is welcome to engage in responding to questions or should defer to the primary. If instructors plan to switch roles from unit to unit, that must be decided in advance with a clear transition planned.

Structured methods: There are an array of effective co-teaching methods, including “one teach/ one assist”, alternative, and team teaching. Instructors should work closely in advance of the course to devise which method(s) will work most effectively given their respective expertise, the environment, and the trainees involved. Instructors may choose one or many methods given the needs of the course.

Employing the proper method such that it appears coordinated, smooth, and effective to the trainee requires a great deal of coordination in advance of the course. However, failure to do so

will likely diminish trainee outcomes such that instructors unwilling to put forth that planning effort may choose to reconsider co-teaching pursuits.

Mutual respect: Finally, and perhaps most importantly, instructors must conduct themselves with an air of mutual respect and consummate professionalism at all times. Conflict must occur in private, outside the critical eye of trainees, in a dignified and professional fashion.

“Remember, however, that healthy discourse and discussion of GUE values and ethos—reflection toward a deeper understanding of GUE’s “why”—with trainees is a powerful and valuable exercise. Co-instructors should embrace such discussions and involve their trainees toward that end.” Ulrik Juul Christensen, M.D.

The trainee must, at all times, perceive a unified team intently focused on that trainee’s success.

“Co-teaching relationships are often likened to marital relationships in that they depend on commitment, negotiation, and flexibility. To be successful, co-teaching relies on two committed educators who care deeply about reaching their students and work diligently to achieve that goal. They problem solve to generate new strategies, resolve differences of opinion, and try alternative solutions if the original one is not successful. Co-teach-

ers have a commitment to each other, as well, in terms of nurturing their professional relationship. Each educator works to bring out the best in the other person, and the result is improved outcomes for students and strong teaching partnerships.” Friend, supra.

GUE, as a values-based organization, thrives on the shared contributions of its explorers and educators. Co-teaching fits squarely in this ethos and affords substantial benefit when applied correctly—through proper planning and mindset on the part of each instructor involved. ■

“ Successful co-teaching requires an added layer of organization and planning. Collaborative instructors must know ahead of time who is responsible for which aspects of the course.



Brad Beskin

Brad Beskin has been diving actively for approximately 29 years. He first became involved with GUE by taking Fundamentals in 2001, and then Cave 1 with Tamara Kendel in 2003. He is now a proud GUE DPV Cave diver and is actively working his way through

GUE’s technical curriculum. When he is not diving, he earns his living as a civil litigator in Austin, Texas, and he also finds time to act as Director of Quality Control and the Chair of the Quality Control Board for Global Underwater Explorers.

PHOTO SJ ALICE BENNETT

GU



THE PROJECT DIVING

*– From foundational
to exploration-grade*

TEXT JENN THOMSON

PHOTOS SEAN ROMANOWSKI, SJ ALICE BENNETT,
BORI BENNETT, JESPER KJØLLER & LAUREN WILSON



From the original exploration of the Woodville Karst Plain Project (WKPP) to the local teams around the world that dive with a purpose, project diving has always been an integral component of GUEs philosophy. However, project diving is complex, requiring both hard and soft skills as well as a plethora of experiences to reach exploration-grade levels in globally relevant projects. This is the challenge that aspiring divers face. To address that challenge, GUE is introducing several initiatives—from resource development to a new training curriculum—in order to provide support for the next generation of project divers.

Global Underwater Explorers' philosophy comprises a holistic approach to scuba diving that ultimately promotes self-improvement, intellectual curiosity, and meaningful experiences. Most importantly, GUE divers are both highly skilled and motivated to undertake goal-oriented and purposeful diving, helping to facilitate the broad range of conservation and exploration objectives the agency promotes. Indeed, GUE began with a team of explorers who used their approach to enhance project diving around the world and elevate quality of instruction at all levels. Now, the next steps are to combine these two branches. This article summarizes several GUE resource and training initiatives in active development for project divers.

GUE project definition

While not officially GUE Standards per se, the first iteration of the Project Diving Definition v1.0

aims to standardize the main features of a GUE Project, such as its types, taxonomy, values, and benefits, while allowing for flexibility and contingency.

A GUE Project is defined as a goal-oriented scientific, educational, explorational, and/or conservational endeavor. Projects require a team of divers and support personnel who use advanced planning techniques, unique diving skills, and appropriate technology to realize their objectives.

Project goals should be measurable, specific, and defined within these categories:

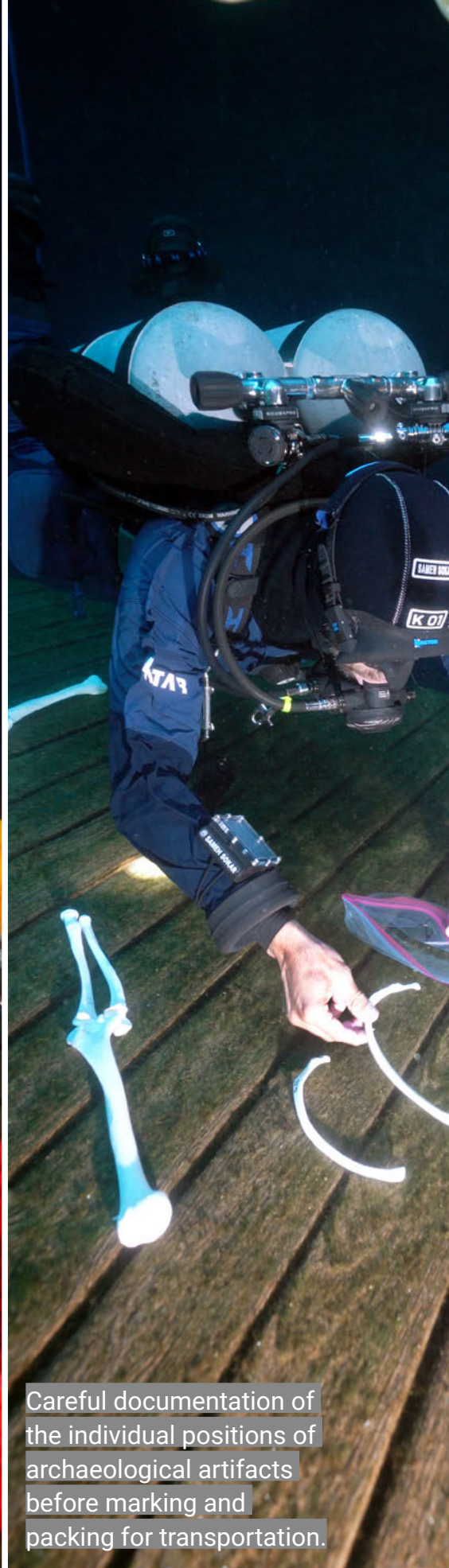
- Exploration (e.g., scouting, searching, prospecting)
- Documentation (e.g., photo/video, survey, photogrammetry)
- Sample collection (e.g., data and/or specimens for scientific research)
- Conservation (e.g., beach cleanup, ghost net removals, planting sea grass)



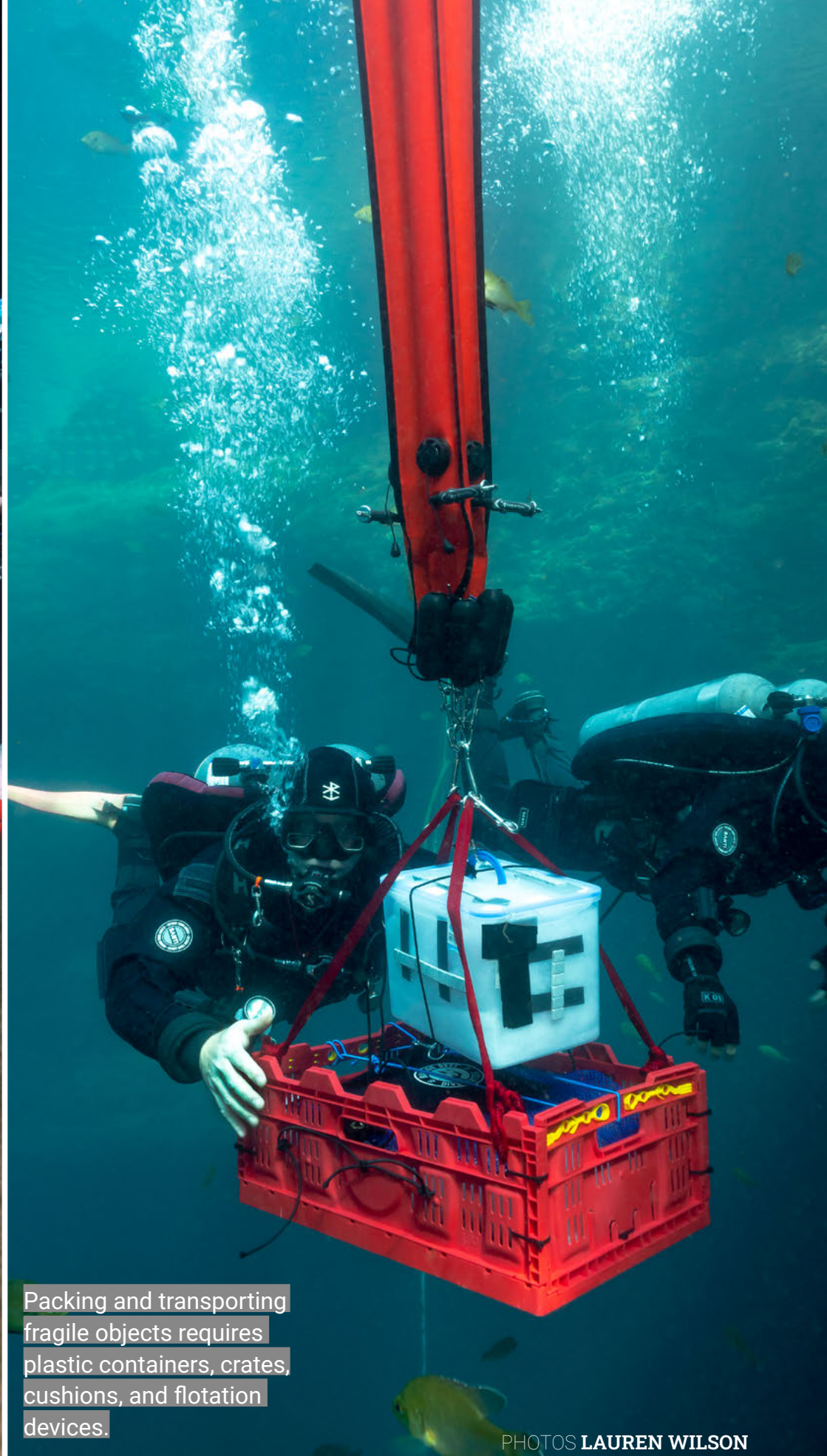
A GUE Project is a goal-oriented scientific, educational, exploratory, or conservation effort involving divers and support staff, using advanced planning, unique skills, and technology.



Underwater archaeology simulations start with documenting samples and conducting site photogrammetry.



Careful documentation of the individual positions of archaeological artifacts before marking and packing for transportation.



Packing and transporting fragile objects requires plastic containers, crates, cushions, and flotation devices.

PHOTOS LAUREN WILSON

Habitats are gas-filled underwater spaces that allow divers make decompression more enjoyable. Careful setup is required to ensure stability, balance, and safety.



PHOTO SJ ALICE BENNETT

A GUE Project must also meet several administrative requirements. Missions are led by Project Managers and should be registered with GUE Headquarters prior to being promoted. All participants should sign appropriate liability releases, be governed by a thorough Risk Management Plan and Crisis Response Plan, and be ultimately designed to bring value to GUE's organizational initiatives.

There are also taxonomic recommendations. GUE Project types can be recreational or technical, or a mix of the two. Recreational GUE Projects are depth limited to 30 m/100 ft in back-mount open-circuit and must be conducted in open water within minimum decompression limits. Project Managers must be GUE-certified for the level of planned project diving, at minimum. Recreational project participants are not limited to GUE standard equipment configurations or certifications, but nevertheless must adhere to GUE General Diving Standards. Technical and Cave GUE Projects are more complex in nature

and involve deep water, overhead environments, specialized equipment, and/or extended decompression obligations. Ninety percent of the divers need to be GUE-certified at an appropriate level and use GUE standard gases and equipment configurations, unless the Project Manager decides otherwise—within reason—or if the environment, goals, or circumstances necessitate variations. This way, projects maintain a balance between adherence to GUE standards and catering to unique contexts of real-world projects.

The Project Portal

So, you want to set up a project yourself but have no idea where to begin. Or, you are a seasoned project manager but desire additional support for social media outreach or templates of risk assessment forms, for example. The newly developed Project Portal is intended to help both dive participants and project managers and is part of GUE's DREAM initiative that will help divers to clearly:

- Define their project's objective(s)
- Research properties that illuminate that objective
- Explore their environment and record observations
- Analyze and assemble observations in an accessible manner
- Motivate individuals in support of the underwater environment

FACT FILE // 12 STEPS FOR A SUCCESSFUL PROJECT

1. Defining/overview/goals
2. Plans/permits/budgeting
3. Registration
4. Team recruitment
5. Medical and liability admin
6. Health/SOPs
7. Logistics/travel
8. Project timelines
9. Diving plans/gear
10. Data management
11. Media/outreach
12. Reports/delivery

The portal itself is a standardized set of planning tools that form the stepping stones of a successful project (12 steps to be exact). Each of these 12 steps forms their own veritable library of resources from which divers can pick and choose to aid in their own project development. The intended result is the inception of a broad range of individual projects that are context-specific while still guided by the standards of excellence in conservation, education, and exploration. So, what are these steps?

First steps

Defining an overview (1) sets the scene for each project: information that will inform the project goals (specific measurables of success), taxonomy (the type of recreational or technical GUE project), and its values (the “why”). Clear definitions upon inception will in turn help project managers decide on the resources, team members, and deliverables needed—avoiding a drift

in the overall mission's focus. Planning (2) is the next important step, whether one decides to use a Gantt chart to document a general timeline of all phases (e.g., planning, project, debrief), or already has defined project weeks with specific recruitment days. Of course, economic factors come into play: Do you have grant money already? Do you need to apply for funding to procure specialized scientific or filming equipment? Do you need to require participants to pay a fee for logistics, gear rental, and accommodation? And, of course, there is the small issue of gaining the appropriate permissions. This could mean scientific permits for biological or archaeological research, landowner permission if on private property, or filming permits in culturally important or environmentally fragile sites.

Registered projects

GUE Projects that are registered (3) with HQ will benefit from having the mission publicly available on the GUE website so team recruitment (4) can begin. This is surprisingly complex. For starters, numbers. How big are the objectives, and how many divers will the project need to achieve reasonable success on a single dive? Will a single team complete multiple dives, or will multiple teams alternate in single dives to divide labor and capacity? How many individuals can fit on a boat? Then there are the skill sets to fill—both hard and soft skills. Are there enough divers that have medical, photogrammetry, or filming experience? Yes, there needs to be a minimum certification level, but can others participate to help as safety divers, conduct data analysis, and help topside? And, maybe most important of all, are the soft skills—teams that can effectively carry out contingency and emergency situations that have good cohesion and can act as ambassadors for the underwater world.

More planning

To be prepared for emergency situations, teams should file the appropriate paperwork, especially related to medical and liability matters (5) for legal protection and emergency contacts. If necessary, a diving safety officer might be required for some projects. In addition, GUE Projects must follow or use:



GUE divers are equipped and trained to engage in purposeful diving, supporting the agency's wide range of conservation and exploration objectives.

- Standard Operating Procedures (6)
- Forms, including crisis response and risk management plans
- Emergency equipment and procedures that match the level of project remoteness

With this we come to the arrangements for logistics and travel (7). Again, there are a lot of moving parts here. Are participants making their own way there, or is the entire group catching a plane or boat to the site? Is the accommodation a hotel that can cater to all dietary preferences, or is it a remote camp in a jungle that necessitates self-sufficiency and save-a-dive kits? How will one transport specialty goods such as lithium batteries and oxygen? What about drying rooms for wetsuits, on-site compressors, tank availability, and the ability (or not) to pop to a local hardware store?

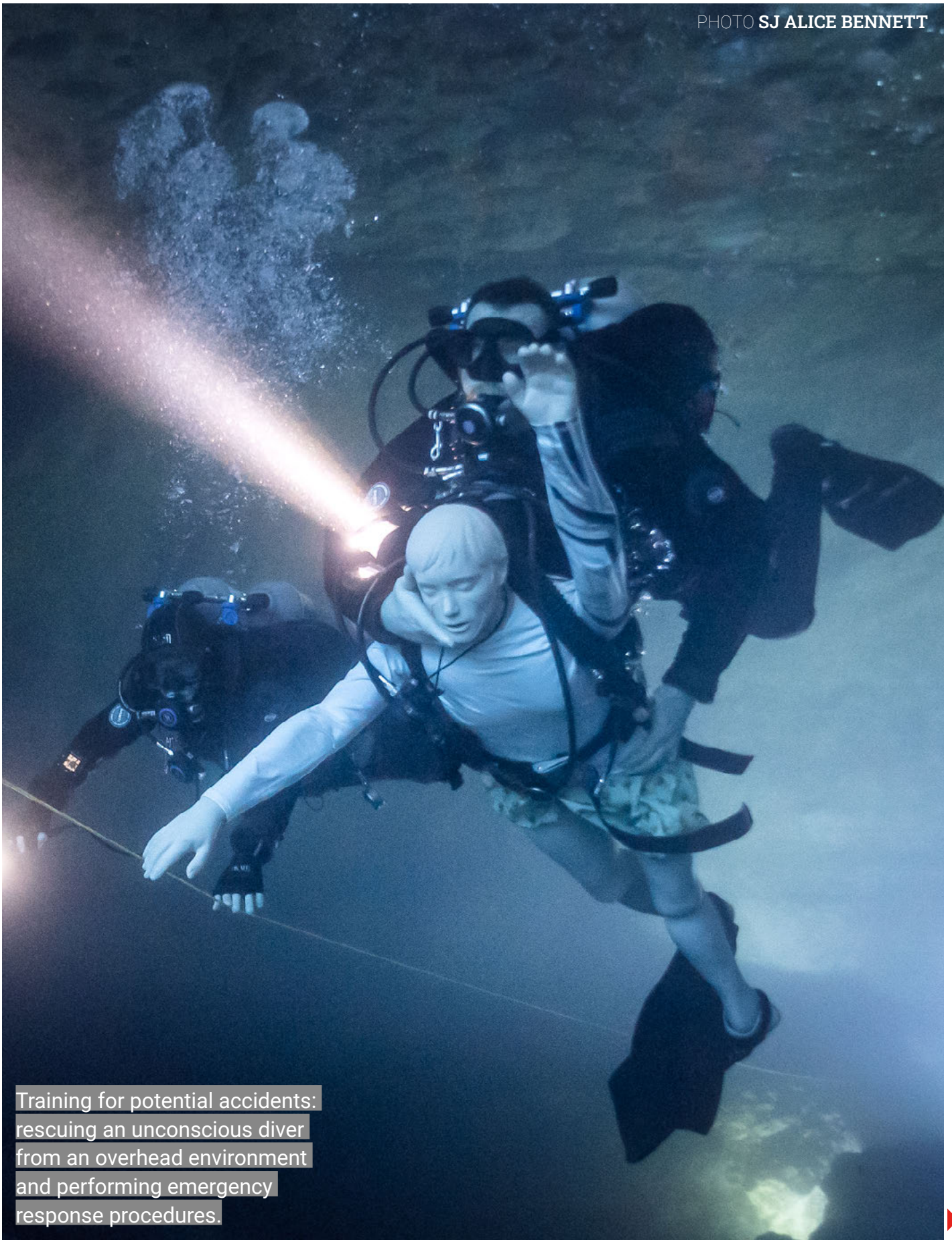
Execution

What about the actual mission itself? A weekly project timeline (8) can include preliminary briefings, dry runs, dive site scouting, data collection,

processing, wrap up, and evaluation/analysis if necessary. In essence, a project timeline should provide a clear overview of the goals for each day, potentially keeping a few spare days flexible for contingencies. Communication is essential for team awareness regarding project progress. Teams should:

- Host online information meetings before the project or on day 0 to acquaint all participants with the site
- Complete a shakedown on day 1 to assign responsibilities
- Debrief after any major changes, milestones, or objective completion.

Additionally, let's not forget each individual dive plan (9) with associated activities and gear required (10). Are there any specifics or project variations that need to be included alongside the standard GUE EDGE for dive planning? What are the steps that need to be followed regarding scientific protocols, both in terms of data collection underwater and special equipment prepara-



Training for potential accidents: rescuing an unconscious diver from an overhead environment and performing emergency response procedures.



Removing ghost nets is a complicated and risky endeavor, but it's a prime example of projects where GUE-trained divers can contribute effectively.

PHOTO SEAN ROMANOWSKI

tion beforehand? What are the surface support roles on that day? Who is driving the boat, who are the on-deck support for the divers, and/or who is receiving the artifacts topside? Are there any changes that need to occur based on the previous dive?

Pics or it didn't happen

Finally, you can have the best project in the world, but what happens if nobody knows about it? A good social media plan (11) and reporting/deliverables (12) at the end of the project support outreach goals and help future project iterations gain traction. Social media best practice requires publication permissions—especially with scientific data collection content. Photogrammetry models often need to be released with a watermark and the creator's name. Any volunteers or collaborations can also be mentioned in the acknowledgements of academic papers, along with any data analysis conducted for transparency. This is why it is so important to have a good data management system (10) throughout as well as after the project. Memory

cards, photos, and wetnotes data must be included in an inventory or file system and backed up daily (or as soon as possible). One can then see any gaps or lost samples. It also saves time writing reports.

For a good example of these steps and project-specific considerations in action, see "Cave Exploration 101" in Volume 25.1 of *Quest*.

Project Diver Curriculum

And then we come to those that seek more formal training, or training in a safe manner at a high level for the exploration-grade projects. This is where the Project Diver curriculum comes into play. By developing a new, formalized training pathway that will bring together the experiences of project diving with the rigors of a GUE course, the organization will elevate community dive teams to new heights.

From its past inception to its current development phase, the GUE Project Diver curriculum has always had a high-level goal in mind: to help facilitate programs that explore and preserve the global aquatic environment. Such goal-orient-

tated diving can be as simple as a shallow-water conservation project or as sophisticated as a large-scale photogrammetry mission with integrated GIS data collection systems, or exploratory work that combines archaeological preservation with remote logistics.

Considering both mandatory knowledge and project-specific requirements, the Project Diver Curriculum will include specific Core Modules and Apprentice Projects designed for individual skill levels and chosen environments (e.g., cave divers, technical divers, or ocean projects). In the Core Module, aspiring divers will explore their own tailor-made curriculum for project needs; this will cover theory and dive workshops, complex project organizational skills, credible scientific data collection, and report/deliverable production. After successful completion, divers will put the theory and skills into real-world contexts during Apprentice Projects, where they will complete an entire project from start to finish.

Core Module

The content of a Core Module is very diverse; a selection of topics is below:

Project management and planning. These lectures focus on the steps to a successful project, including factors such as team selection, funding, managing large amounts of data, liability and risk management, and scientific report writing. There is a large overlap between the topics here, and the steps are similar to GUE's Project Portal resources.

Photogrammetry. This is a technique that uses 2D photographs to measure and map objects and environments. Upon taking multiple overlapping photographs, specialized software can identify common points between the images

and calculate their positions in 3D space. The use of unique markers or natural features in photogrammetry can result in geo-rectified models. If these markers have known locations (measured using GPS or other methods) within the area being photographed, the model can be aligned with real-world geographical coordinates to create accurate GIS maps and visualizations.

This technique is particularly useful for documenting shipwrecks, coral reefs, or archaeological sites.

Underwater archaeology.

What happens if we need to lift delicate archaeological remains at an underwater site rather than simply photographing the objects? The Core Module also covers techniques for removing such fragile artifacts. Divers

can practice removing "human bones" by packing and transporting them in a mix of plastic containers, crates, cushions, and flotation devices. Such simulations are supported by lectures with real-world examples, such as the notable collection of "Naia," one of the earliest American human skeletons at ~13,000 years old in Mexico's Hoyo Negro cave. GUE divers played a role in the discovery, collection, and documentation of that skeleton.

Decompression habitats. Habitats are gas-filled underwater spaces that allow divers to remain at pressure and often make decompression more enjoyable if the deco time is several hours at depth in cold environments. Careful setup of habitats is required to ensure stability, balance, and safety within the enclosure, especially if the habitats are custom-made (upturned rigid bathtubs and inflatable smaller tarpaulins come to mind). In the Core Module, divers can practice bringing in the habitat, maximizing the air space with gas fills, and making sure that the system will not tip over (by either securing it to a "ceiling" akin to a cave system, or anchoring it down using ropes and attachment points).

By developing a new, formalized training pathway that will bring together the experiences of project diving with the rigors of a GUE course, the organization will elevate community dive teams to new heights

“ From its past inception to its current development phase, the GUE Project Diver curriculum has always had a high-level goal in mind: to help facilitate programs that explore and preserve the global aquatic environment.

In-water recompression. Divers suffering from decompression sickness (DCS) in remote areas can benefit from in-water recompression (IWR) in certain contexts and situations. This technique involves bringing the diver back down to depth to reduce bubble formation/symptoms. Albeit controversial with safety concerns and additional planning required, it is recommended to use a full-face mask to lower the risks of drowning during IWR, and to communicate with the victim to check responsiveness and full consent in the first place. Hence, the Core Module simulates dedicated complex rescue scenarios as well as full-face mask skills.

Remote operations. Workshops can include the field maintenance of gear, such as drysuits, rebreathers, DPVs, and regulators.

Medicine. Using the latest resources and research from DAN (Divers Alert Network), the Core Module can include modules and sessions on different physiological and medical topics.

For example, topics can include first aid and the Diver Medical Technician course, the link between heart rate variability and DCS, and real-time physiological diver monitoring. The latter refers to the DAN-SMART Program (Sports Monitoring and Advanced Remote Telemedicine) that has developed wearable clothing technology for real-time monitoring/recording of physiological signals and vital signs. So, for example, expedition divers can have their body position, blood oxygen saturation, breath rate, and body temperature continuously measured. Depending on the changes in the diver's physiological status, medical personnel can either advise the divers to change the plan or send out support teams in an emergency.

Next steps

Several Core Modules have been run in six-day pilot tests to explore these different topics (Deep Dive Dubai, May 2022 and High Springs, October 2022). The next step is to curate online content so that a growing part of the Core

FACT FILE // MORE INFO

Project Diver Curriculum
indepthmag.com/introducing-gues-new-project-diver-program/

Project Portal
www.gue.com/project-portal

Remote
indepthmag.com/the-making-of-the-biometric-diver-an-interview-with-dan-europe-founder-dr-alessandro-marroni/

Decompression Habitats
indepthmag.com/decompression-habitats/

NextGen Legacy Project
www.gue.com/nextgen-legacy-project

Deep Dive Dubai 2022 Core Module
www.youtube.com/watch?v=WYvZm8yDPsg

High Springs October 2022 Core Module
www.youtube.com/watch?v=mZbdqFQzPQM



PHOTO JESPER KJØLLER

Projects require a team of divers and support personnel utilizing advanced planning, unique diving skills, and appropriate technology to achieve their objectives.

Module can be a remote learning experience designed to prepare participants for practice in their specific Apprentice Project. While there will be generic modules for everyone to participate in (e.g., project management and rescue scenarios), unique elements will be taught at different levels (e.g., augmented academics and in-water skills) for those with cave and technical requirements. These topics are in active development within the agency.

We recognize that teaching project diving to the next generation of aspiring scientists—at both the foundational and exploration levels—is of primary importance.

This is why GUE is actively crafting the Project Diving curriculum standards to include recreational Apprentice Projects in addition to Technical and Cave iterations. We hope to soon offer a full set of resources for all levels of GUE project diving. ■



Jenn Thomson

Jenn was GUE's NextGen Scholar for 2022-2023, showcasing recreational scuba's role in scientific operations. She highlighted NASA astronaut training, Middle East ecosystem surveys, and global GUE events to inspire young divers. Jenn completed Drysuit and Doubles Primers, the Scientific Diver and Rec 2 course, and an ITC. She aims to connect space

and marine sectors via scuba diving and exploration. In January 2024, Jenn joined GUE HQ part-time as the Global Project Coordinator, Project Baseline manager, and facilitator of NextGen Scholarship Legacy Projects. She is developing the Project Portal and Project Diver curriculum.



GUE PREMIUM DIVE CENTERS

Area 9 Mastery Diving – Kralendijk, Bonaire

➔ www.masterydiving.com



Base1 – Sardinia, Italy

➔ www.baseone.it



Deep Dive Dubai – Dubai, UAE

➔ www.deepdivedubai.com



Dive Centre Bondi – Bondi, NSW, Australia

➔ www.divebondi.com.au



Duikcentrum de Aalscholvers – Tilburg, Netherlands

➔ www.aalscholvers.nl



Eight Diving – Des Moines, WA, USA

➔ www.8diving.com



Exploration Diver – Hangzhou, China

➔ www.facebook.com/qiandaolake

Extreme Exposure – High Springs, FL, USA

➔ www.extreme-exposure.com



Islas Hormigas – Cabo de Palos, Spain

➔ www.islashormigas.com



Living Oceans – Singapore

➔ www.livingoceans.com.sg



Scuba Academie – Vinkeveen, Netherlands

➔ www.scuba-academie.nl



Tech Korea – Incheon, South Korea

➔ www.divetechkorea.com



Third Dimension Diving – Tulum, Q. Roo, Mexico

➔ www.thirddimensiondiving.com



Zen Dive Co – Los Angeles, USA

➔ www.zendive.com

zen dive co.

Zero Gravity – Quintana Roo, Mexico

➔ www.zerogravity.com.mx



GUE DIVE CENTERS

Buddy Dive Resort – Bonaire

➔ www.buddydive.com



Dive Alaska – Anchorage, AK, USA

➔ www.divealaska.net



Faszination-Tauchsport – Sauerlach, Germany

➔ www.faszination-tauchsport.de



KrakenDive – Tossa de Mar, Spain

➔ www.krakendive.com



Living Oceans Malaysia – Kuala Lumpur, Malaysia

➔ www.livingoceans.com.my



Moby Tek Dive Center – Pahang, Malaysia

➔ www.moby-tek.com



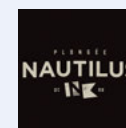
Paragon Dive Group – Arizona, USA

➔ www.paragondivestore.com



Plongée Nautilus – Quebec City, QC, Canada

➔ www.plongeenautilus.com



Scuba Adventures – Plano, TX, USA

➔ www.scubaadventures.com



Scuba Seekers – Dahab, Egypt

➔ www.scubaseekers.com



Tauchservice Münster – Münster, Germany

➔ www.tauchservice.info



Tech Asia – Puerto Galera, Philippines

➔ www.techasia.ph



Unique Diving Center – Shanghai, China

➔ www.uniquediving.cn



SUPPORT GUE

Become a member today and get full access to the rest of Quest!

Sign up at www.gue.com/membership

Additional benefits include:

	Conservation \$39	Silver \$150 \$200+ in perks	Gold \$350 \$600+ in perks	Platinum \$1,000 \$1200+ in perks
Limited edition Platinum member-only jacket				✓
Free admission to the biennial GUE Conference for each year of membership				✓
Free access to GUE PDF books; discount on GUE's DecoPlanner 4 software			50%	FREE!
Free registration for all GUE classes for the duration of your membership (intern registrations not included)			*Limit Two	✓
Discount on GUE.tv, GUE's video learning site designed to educate and inspire divers of all training levels		50% OFF \$150 Value	FREE! \$300 Value	FREE! \$300 Value
Personalized GUE gear stickers		5 Small 5 Large	10 Small 10 Large	20 Small 20 Large
Member-exclusive mask strap with monochrome GUE logo		✓	✓	✓
Free high-quality, annual member t-shirt; receive a new shirt with every renewal!		✓	✓	✓
Free access to all current GUE course presentation materials (PDFs)		✓	✓	✓
Your membership helps support conservation initiatives, including Project Baseline	✓	✓	✓	✓
Discount on GUE Store purchases	5%	10%	15%	25%
Quest PDF: GUE's quarterly online journal	Quest	Quest	Quest	Quest
Subscription to GUE's private Quest mailing list	✉	✉	✉	✉
Access to GUE training supplements and procedural manuals	✓	✓	✓	✓