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DEEP WRECKS

Ostfriesland 338

Andrea Doria 240

Oregon 130

Algol 120

GAS
CONSUMPTION

DEHYDRATION

NEW PRODUCTS

EVENTS

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HOW DEEP IS DEEP?

If you have ever wondered why some divers go deeper than 130 feet this issue may answer some of those questions. Before I go on about how wonderful it is to dive deep, let me say deep is any dive below 60 feet. If you want to dive below that depth, think it through. Be prepared in advance, know the tables, contingencies, risks. Deep diving is not an activity to be taken lightly. The men and women who dive to extreme depths have many years of training and in-water experience. Diving deep is not for everyone nor should it be; the hazards and risks involved are great, some deadly.

Recently, four divers died while deep wreck diving here in the North East. I am deeply saddened and concerned by their deaths, so much so that this issue was almost pulled. Rather than not discuss this very real aspect of diving, we have tried to add a note of caution in every story; a very real note.

Unfortunately, two of the deaths occurred on the *Andrea Doria* less than two weeks apart. It was reported that one diver was untrained in mixed-gas diving and ran out of gas. The other diver deviated from the plan with his buddies, got lost inside the wreck, and also ran out of gas. Another diver was "home brewing" nitrox and used the wrong mix for his depth. The fourth diver's cause of death has not yet been disclosed.

My point is, although there are many things to see below 130 feet (and in many respects this issue glorifies them) deep diving is dangerous. If you want to venture far into the deep, please, take the time to learn and develop the skills necessary to dive with the greatest safety procedures possible. It's not worth dying for.

In this issue, Barb Lander leads off with a pioneering effort by some extraordinary divers who visit the *Ostfriesland* in 338 feet of water. Their team leader was test diving a new gas mix called neox. Dan Berg tenaciously completes working dives to 120 feet, revisiting the *USS Algol* to recover the auxiliary helm. I make my maiden voyage to the *Andrea Doria* after four years of training. Hank Garvin shares some insights on when not to dive. Kirby gets another chance at diving the *Oregon* (one of my favorites) but opts for dinner and artifacts rather than celluloid memories.

Captain Lachenmeyer "drops in" to share some insights on weight belt solutions. Hillary tells why staying wet on the inside can prevent decompression sickness. This issue also includes two new product reviews and an exciting new book on deep wrecks by diver Brad Sheard.

Authors Bret Gilliam and Robert Von Maier share a timely excerpt from their latest book with some sensible methods of planning your gas consumption. When you're out of air you're out of life. Let's be responsible down there.

Deep Diving — the focus of this issue — is dedicated to all who venture in search of their dreams.


Joel D. Silverstein, Editor

THE GLOW FROM B E L O W

by Barbara Lander

The sun was high in the sky but the usual pre-dive hustle and horseplay was missing. A complicated maze of lines was being rigged beneath the *Miss Lindsey*. Dozens of regulators and tanks were being carefully checked and re-checked. Dive plans and contingency plans were reviewed with team members and support divers for what seemed to be the hundredth time.

Crises happened — a staged bottle disappeared and lines fouled. Patiently, the crew reset the lines, divers rigged and placed another bottle. Tensions mounted while a TV news team

milled about the crowded dive deck filming and interviewing as preparations continued. Finally, after four hours of preparation, the first team disappeared beneath the fortuitously calm water 72 miles off Cape Charles, Virginia.

More than 300 feet below the divers would explore the *Ostfriesland*, a World War I German battleship; a war prize. She had been sunk in 1921 by aircraft as part of an experiment conducted by General Billy Mitchell. The success of aircraft against naval vessels ushered in a new era of military strategy.

Explorers Ken Clayton, Gary Gentile, Tom Packer, Steve Gatto and Brad Sheard were themselves heralding a new era. Only a few years ago wrecks as deep as the

Ostfriesland were labeled "undivable." Clayton and Gentile marked their third visit to the historic battleship in two years. Packer, Gatto and Sheard, although not newcomers to deep diving, chalked up their first dive to the *Ostfriesland*.

Such an extreme depth is not feasible on air; the toxic effects of oxygen under pressure would likely overcome the divers long before they could complete their dive, if they didn't succumb to narcosis first.

Most of the divers were using heliox 12% as their bottom mix. The exception was Ken Clayton who with the co-operation of Union Carbide was field testing a neon-oxygen mixture. Ken believes he is the first recreational

diver to use "neox." Despite the hazing Ken endured prior to the dive he did not glow in the water. (Although later that night tired divers thought they detected a red glow from Ken's bunk. . . NOT!)

Ken has plans for another neox dive using a second bottom mix of heliox. He believes he can achieve an optimal decompression by breathing heliox first, off-gassing that mix by switching mid-dive to neox. Hold on to your thesaurus he — calls this "deep tissue isobaric inert gas counter diffusion and subsaturation." As good as the idea sounds it is probably not something you want to try. Lou Sarlo, of the Gas Station, Inc. calculates the cost of a neox fill at over \$700.

Because this group was breaking new ground on several frontiers, the *Explorers Club* awarded its coveted flag based on the Scientific, Historic, and Adventure Merit of the expedition.

After nearly three hours in the water — with only 11 minutes on the battleship — divers climbed out of the water exhilarated. TV camera rolling they answered the inevitable question "Was it worth it?" Eyes aglow with excitement (Ken's eyes glowing perhaps more than the others) they answered as one, "Of course."



On the *Ostfriesland* 338 feet below the surface, Brad Sheard captures this pioneering moment on film.



Ken Clayton & Gary Gentile display the *Explorers Club* flag.

The ALGOL Revisited

by Dan Berg

Hank Garvin and I had finished our second dive of the day. We were just starting a long decompression schedule and were impatiently waiting for a lift bag to ascend. The water just below the twenty-foot thermocline was murky, making horizontal visibility only ten feet or so. Then, suddenly a white blur raced past us on its way to the surface.

We hoped for the best but could not clearly see what was attached to the bag. Hank swam out on the loose end of my tether line to take a closer look. When he returned I could clearly see the smile on his face. Our project was finally complete.

Two months earlier Hank and I had made our first trip to the *USS Algol* since she was scuttled as an artificial reef back in November of 1991. Over the winter we had corresponded with two of the *Algol's* crew members, Rollie Broell and Stanley Simmons. They had toured the vessel just before her sinking and informed



me that the auxiliary helm was still there.

Hank and I were going to look for the helm and recover it while filming the entire operation for one of the *Dive Wreck Valley* Cable television episodes. Stan and Rollie provided a wealth of information including detailed three dimensional blue prints of the *Algol*, which we had studied before descending. On the first trip we packed few tools as our plan was just to locate the auxiliary steering room and see how the helm was attached; little did we know this would be the beginning of an artifact ordeal.

Captain Bill Reddan anchored the *Jeanne II* just behind the wreck's pilot house. Visibility was at least 60 feet and there was little current. We swam toward the stern and within a few minutes had located the first doorway, which lead down a staircase to the second deck. We then located a floor hatch which would lead directly into the auxiliary steering room. I was amazed at the amount of silt that had accumulated on the floor of this room in only five months. It had to be six inches thick!

The square hatch was the only way in and out of the room. Our entry was blocked by some pipes and cables hanging by a cable to the ceiling. We could have squeezed past the obstruction but it is always better to clear an entry so that exiting a room after silt has risen will be unhampered.

Hank quickly cut through the wire and we headed for the starboard side of the ship. Then I heard him yell "It's here, it's here." And there it was, right where we were told it would be. The helm had two wheels, with embossed writing on each hub that read, *Webster Brinkley Co. Seattle, USA*.

Hank and I were like kids in a candy store. We had accomplished our plan with time to spare. On the way out we casually picked up a cage lamp and a few brass tags. These would be sent to Stan and Rollie as a small token of our appreciation. Back onboard the *Jeanne II* we began planning our next trip.

The salvage would be relatively easy. We decided to take the wheels off the helm stand rather than unbolting the entire apparatus from the floor. We didn't think the helm and stand would fit up through the square deck hatch. We were so sure it would

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work that we began planning other projects for the second dive of our next trip back.

After five weeks and two additional trips to the wreck aboard the dive boats *Wahoo*, *Rebel* and *Sea Lion*, we had made very little progress. The helm was still as securely mounted as when we found it because the wheels would not separate from the shaft even after we used a wheel puller.

A week later we were back aboard the *Sea Lion*. For the first time I left the video camera on the boat, this was going to be a serious working dive. The helm is in 120 feet of water so Hank and I were both using double 120 cubic foot Sherwood tanks. I would go in first using a twelve-pound sledge hammer and a wrench on a three-foot bar to try freeing the wheel with additional leverage and power. We also brought four hack saws, in case we had to cut through the shaft. Hank would join me in the hole 25 minutes later and take over where I left off.

After trying the wheel puller one last time I decided to remove the helm stand cover held in place by four bolts. Quickly removing them, inside I found two pillow block bearings supported by another four bolts which I also removed rather fast as Hank joined me in the room.

The twin helm wheels were now only held on by the chain drive. With a hack saw we tried cutting through a chain thicker than a motorcycle link. But the helm wheels created an obstruction, I could only saw on an angle without getting deeper than half-way through the link.

On the surface we contemplated different strategies to cut the chain. Without a bolt cutter, we devised a plan using the limited tools aboard. Finally Captain Brennan came up with an idea. If we could turn the wheel and put a steel pin between the chain and the sprocket as a wedge directly under the cut, we could possibly force the chain to split by rotating the helm wheels. We did it with both Hank and I pulling on the helm wheels for leverage. Only ten minutes into our second dive and the helm was free.

A lift bag supported some of the weight as we managed the bulky helm to the staircase. It would be a close fit but we were confident that the wheel would fit through the hatch. Even so, neither one of us wanted to be below it in case the artifact got stuck and blocked our exit. We added air to the lift bag so the helm was just a little negatively buoyant. When we'd both ascended to the next deck, I held Hanks legs as he went headfirst back down to guide the helm through the hatch. It took ten minutes to maneuver our prize out of the deck hatch. Rapidly running out of bottom time, Hank looked at his gauges then at me. I knew what he was saying and signaled for him to leave the helm, already on my way out.

Due to our air, bottom time and required decompression, it was time to ascend. Even though we were within a minute of sending our prize to the surface, we both knew our limitations and would never push

ourselves past our own preset safety margins for any artifact. We did however have one last hope. Before our dive we had asked mate Mark Patterson to look in the hole before he pulled the anchor. We were sure Mark would send the bag up for us and he did. The recovery project, which had looked so simple in the beginning, was finally complete.

Later that evening over dinner, I told Hank where Rollie and Stan told me there were two compasses and a telegraph on the *Algol*. But for some reason I didn't think Hank was ready for another so-called simple artifact recovery in an area known as Wreck Valley.

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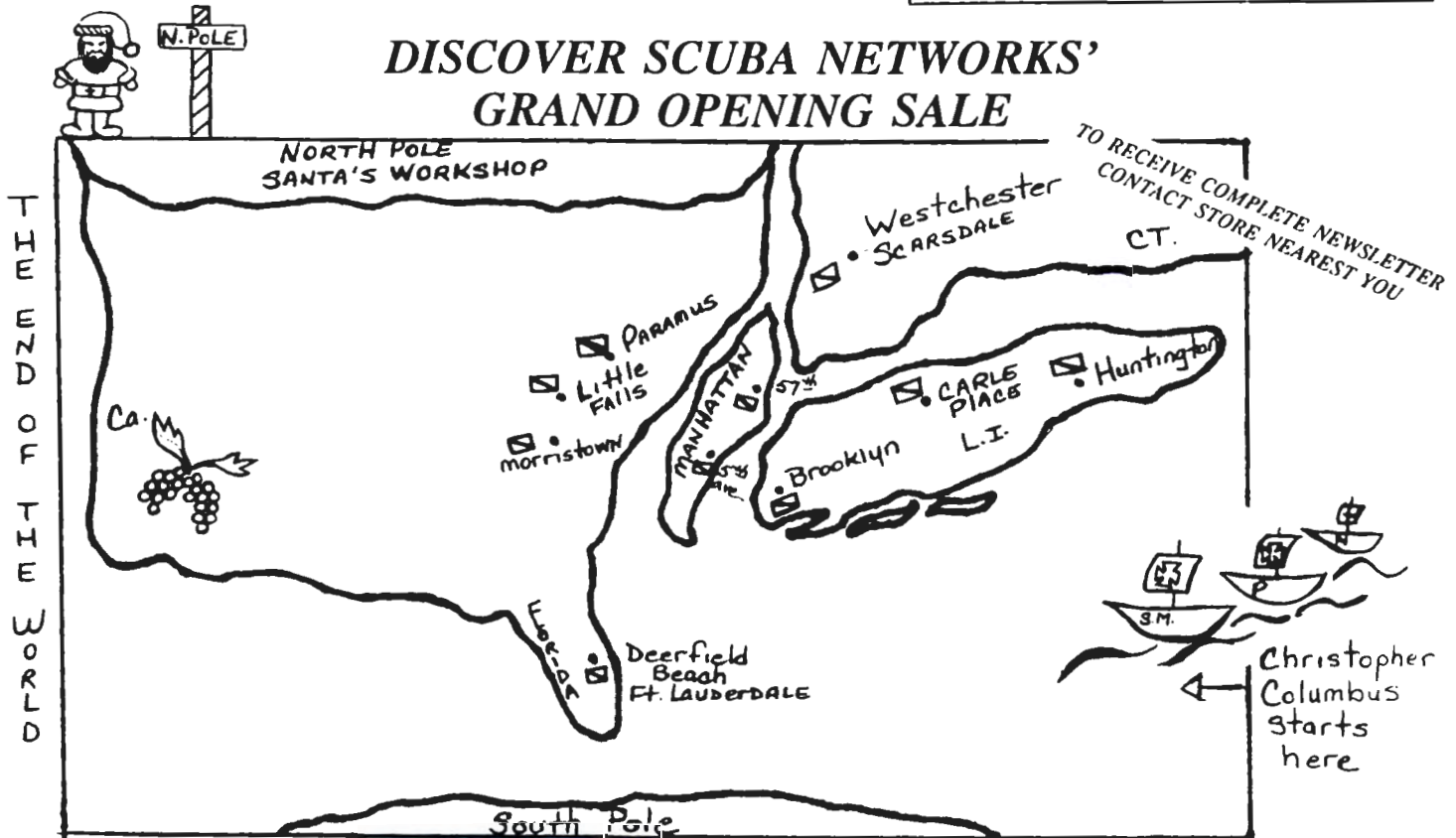
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DIVING THE DORIA

by Joel Silverstein

Diving the *Andrea Doria*. What does it mean? For me it was training since 1988. Everything I learned, every mistake I made and every dive I completed was to be the training ground for this trip. Four years of training to dive a wreck for four days.

It was late '88 when Captain Bielenda spoke about diving the *Doria* at my club's monthly meeting. I was in awe of these people who trekked across the ocean to dive 200 feet below the surface to find a tea cup, a dish, a window — the ship's bell. Now that's adventure, maybe lunacy, but it's a fine line. At that meeting, diving the *Doria* became my goal.

Built in 1950 by the Ansaldo Shipyards at Sestri, near Genoa, Italy, the *Andrea Doria* was to be the finest ocean liner ever built. At 700 feet long, over 90 feet wide and a rise of 45.4 feet, this massive yet sleek vessel appeared to move even while at dock. Owned by *Italia Societa per Azioni di Navigazione* — Italia Line — she featured accommodations for 218 first class, 320 cabin (2nd) class and 703 tourist class passengers.

A postwar floating museum, the *Doria* carried the finest Italian artwork of the time. There was a sixteen-hundred square foot mural by Salvatore Fiume, paintings by Zuffi, Bragalini, Predozani, Luzzati and Frai. The halls and public walkways were embraced with frescoes, fabrics, tapestries, crystals, wood carvings and a full-sized bronze statue of the naval officer for which the ship was named. The elegance, opulence and in some ways, the decadence that stemmed from ancient Rome seemed to have been captured within the hull of this ship.

Some of my diving buddies and instructors discouraged my quest; "It's too dangerous," they said, "people die diving the *Doria*." The best comment was, "You could never do it." Fortunately there were supporters of my goal, and over the years I gravitated toward their tutelage. Their comments were more positive yet realistic; "You will not appreciate what it takes to dive the *Doria* until you do it." There was solid advice too, explaining that I would need time, training and a maturity in diving that is found only with experience.

After almost 100 transatlantic voyages the *Andrea Doria* met her fate on the evening of July 25, 1956. She collided with the Swedish-American liner *Stockholm*. After fifty-two people died and eleven hours passed, she slipped beneath the waves.



Gary Gilligan and Gary Gentile display one of the *Doria*'s ceramic frescoes.

My plan was to dive her in 1991 but a bends hit the previous year set my training schedule back; that extra year made the difference. It was a training crossover point for me, entering the world of deep diving. Honing my skills and education, learning about thermal problems, gas management and serious decompression schedules. The time also allowed for another hundred or so in-water experiences at deeper and deeper levels. Yet even with training this dive would

continues on page 10



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Diving and Dehydration: The Inside Story

by Hillary Vidars, PhD, EMT

Staying well hydrated before and after diving is essential to safe diving. Water makes up 60% of our total body weight and 70% of our muscles so there are many ways in which our bodies become dehydrated. Dive trips requiring air travel can dehydrate us with salty food, caffeinated beverages and low moisture levels. At a typical cruising altitude of 30,000 feet, the humidity level is just about zero percent — drier than the Sahara desert!

Caffeinated beverages or alcohol ingested act as a diuretic, accelerating dehydration. Seasickness remedies and decongestants can also dry out body tissues. Every time we exhale, we lose water through evaporation, despite the weather or temperature.

Diving itself contributes further to water loss. Gearing up at the dive site and remaining cocooned in a dive suit contributes to water loss through perspiration. The compressed air that we breathe is dry, our body has to moisten it so we can use it effectively. The more muscular you are, the more water you lose. Muscle tissue is more metabolically active and contains more water than fat does. Immersion stimulates urination which reduces fluids even more.

Dehydration in a diver spells trouble with a capital T. It results in decreased blood volume *hypovolemia* which makes the blood sludgy and less effective in circulating and off-gassing nitrogen. Not surprising is that dehydration is often an implicating factor in decompression sickness. But dehydration can cause more than just compressed gas injury.

Inadequately hydrated our bodies will experience chills, clammy skin, throbbing heart beats, nausea, cramps, breathing difficulty and dizziness. Dehydration can also predispose us to *hypothermia*. Also known as "heat stress," it

occurs when the body's core temperature rises, then progresses through three phases — heat cramps, heat exhaustion and heat stroke. At the most serious level, dehydration can result in hallucinations, deafness, visual problems and/or kidney failure. Unfortunately,

there aren't always clear cut borderlines between these maladies because symptoms often overlap.

The most dangerous aspect of dehydration is that we can't always detect it! If you wait until you're thirsty to drink, it may be too late. Most people consume

only 50-60 % of their daily fluid needs and our thirst mechanisms don't keep up with the need for fluid. It is possible for a person to lose up to 1 percent of their body weight in fluid before thirst sets in. By the time you lose 2% of your body weight in fluid (that's only 2 1/2 lbs. of fluid per 120 lbs.) your stamina will be reduced by 15%!

The best way to tell if you're adequately hydrated is to check the color and amount of your urine. It should be clear and copious. If it is very dark and scanty, it's concentrated with metabolic wastes, and you need to drink more fluids until it becomes clear. If vitamins or medication turns your urine dark, lack of volume is your best indicator of dehydration. Feeling fatigued, dizzy, and chilly after an unstressful dive should also lead you to suspect dehydration.

The way to avoid dehydration is to DRINK, DRINK, DRINK! What should divers drink? Water is your best bet. Drink several cups of water at least two hours before diving and have 16 ounces immediately before each dive. This followed by another eight ounces of water every hour or so after diving will keep you well hydrated.

Fluids from juices and soft drinks can take up to 45 minutes to be of any use, as their high sugar content slows absorption. The glucose polymer drinks such as Gatorade, Exceed, Max, etc. may be valuable for marathon runners and endurance athletes whose exercise seriously depletes the body's electrolytes. These were designed to empty from the stomach somewhat faster, but they must be diluted to a 5 - 15% solution, and drunk in small quantities.

After diving, watery fruits such as watermelon, oranges and grapes are excellent snacks which not only replace fluid but supply vitamins and minerals as well. What a great way to end a day of diving! Remember, stay wet!

The most dangerous aspect of dehydration is that we can't always detect it!

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SURFACE INTERVAL

by Barbara Lander

John Moyer is having an affair. Not a discrete back-door kind of thing — it's hard to be discrete when your mistress is 700 feet long and displaces 29,803 gross tons. Her name: *Andrea Doria*.

John first visited the *Doria* in 1982. Since then he has racked up about 38 dives on the "Grand Dame." *Doria* china, silver, crystal, vases, plaques, windows, and other trinkets grace his home.

But, John's *Andrea Doria* collection only begins with the artifacts recovered while diving. When he is not diving, John fills much of his free time pursuing his passion. He scours flea markets, antique shops, and used bookstores in search of *Doria* memorabilia.

John has assembled comprehensive scrapbooks of press coverage the *Doria* received, before and after her sinking. Stunned by the hundreds of original clippings, I asked John how he found his material. "It was hard," he said.

John has also corresponded extensively with officials of the Italia line, the *Doria* crew, as well as former passengers and other *Doria* experts such as the late Peter Gimble. Their replies carefully scrutinized, sometimes translated and finally stored in John's ever-growing file.

The pride of John's *Andrea Doria* collection is a six-foot, scale model commissioned by the Italia line. He estimates that only four or five models were ever made, and his evokes all the grace and beauty of the original *Doria* in stunning detail.



The seed was planted for John's love-affair with the *Andrea Doria* in 1982 when he first descended to her immense hull. Three years later he began his research in earnest. Perhaps this was because 1985 marked the year John was a member of the team that recovered one of the *Doria*'s bells. A bend hit on the *Goulandris* a few weeks earlier kept him on the deck,

but all involved acknowledge the bell's recovery was a team effort.

Quiet and soft-spoken, John has been diving since 1975. A stint as an instructor kept him in diving- and spending-money during college. Now John prefers to leave the training to others leaving his time unencumbered for diving.

When a deep wreck expedition is planned, John Moyer's name is one of the first to come up. In early June he was a member of the expedition that discovered the first ever WW I U-boat in 270 feet of water off Virginia. Although the U-Boat was an air dive, John has recently done mixed gas training with an eye to increasing safety.

A survivor of two bends hits, one necessitating airlift to a chamber, John says "I'm more conservative now; I know I can't do the profiles that some of the others do."

Concern for safety, a willingness to be a team player and a passion for diving that encompasses the *Andrea Doria*, have made John Moyer one of the most respected and admired divers on the east coast.

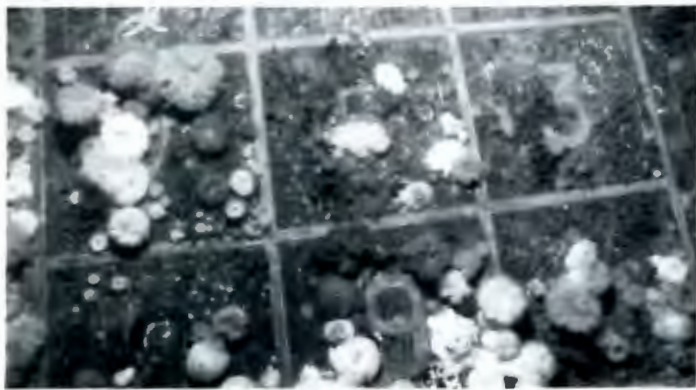
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So simple it's ingenious.

DIVING THE DORIA continues

involve critical planning in advance, cooperation among the dive teams and quality surface support.

The days before departure were culminated in checking gear; getting air, tri-mix and nitrox tanks filled and analyzed; gathering the proper spares and packing it all efficiently. In between I reviewed my pre-dive planning process, re-reading *Doria* books and articles, viewing video tapes and documentaries. I re-ran my safety drills, visualizing what gear goes where, what to do if equipment fails so nothing would be left to chance.



As the parade of divers passed over the gunnels of the *Wahoo* I was reminded that preparation is 95% of the game. Each diver stowing gear checked and re-checked it to insure that everything was in top order. By 6:30 PM we had over 100 sets of doubles, 40 stage bottles and six large oxygen cylinders on board. There was more dive gear and cameras than I imagined could fit, all neatly stowed.

The dock had filled as friends and loved ones came by to see us off. This has become a ritual over the years, wishing the explorers good fortune and safety. We left the dock and land at seven, there was a quiet moment amid the rumbling engine.

By morning the coffee was brewing, the sun was shining and the goddess of diving smiled down upon us — we had flat seas and beautiful conditions. Our group was a cooperative one, all working together so that each would have a safe and productive day. Safety would not be compromised on this trip.

Mates Gary & Gary performed their annual ritual of tying the anchor into the *Doria*. Their target was the promenade deck near the second class dish hole. Within a few minutes the cups were spotted off the bow — we were tied in. The oxygen lines were tossed over the side for Gary & Gary would soon be up.

Mark and I were diving together today — two virgins — our plan was to cruise the prome-

nade deck and orient ourselves with the wreck. In the brief moments before we jumped in, I thought about diving with a new partner, our different deco schedules, and my long-awaited goal below. Then the *Doria's* hull appeared out of the darkness, covered with beautiful large, white, puffy sea anemone neatly arranged like



John Griffiths and Steve Berman could never have found these in a cave.

a flower bed. Between us and the safety of the boat was almost 200 feet of water and ninety minutes of decompression time. The chill of 38-degree water kept us alert.

Ambient light filtered down through the water like it does on a fall afternoon coming home late from school; dark and eerie. Each corner felt full of adventure and danger. We swam over the empty boat davits and stopped at the silent shuffle board courts. Then for perspective I leaped out into the open ocean and swam about fifty feet away from the deck. Floating in the water column I could see all the decks, some crumbling others untouched by the elements. There were huge fishing nets snagged and tangled, draping over the decks disappearing down into the blackness. For a moment I wanted to follow the nets to the bottom, then I realized it was time to head back to my partner. As we climbed up the anchorline I looked back knowing the sea and weather above could change and this would be our only dive. This would have been enough.

Onboard treasures other divers had raised unfolded: china, crystal and silverware. Those that were here last year described how the dish room's opening had gotten larger and more items were easily retrievable. Maybe tomorrow we would share in the finds too.



On day two Rob joined up with me and Mark, agreeing to show us where the dish room was. Our plan was for Mark to hold the light at the entrance while I dug for china and bagged it.



Bill and Brian study the *Doria's* deck plans.

At 200 feet your air goes fast. My lighted console kept me informed of my life line, within ten minutes my fingers were numb from the extreme cold. Up the hull we crawled with the heavy bag. Rob was waiting at the anchorline right on time to help send our haul up on the lift bag.



What we accomplished as a team in twenty minutes was more than I could have imagined. *Doria* dishes! It was nearly two hours later when we counted thirty-five dinner plates — a fine haul for newcomers.

It would be another six hours before we could go in again but our time on deck was not idle. Captain Billy was giving a course in field stripping regulators, Gary & Gary were attempting to fix the compressor, around the boat maps and plans of the "Grand Dame" were being studied.

By now we were all in tune to each other's goals. John and Billy were working forward, Gary & Gary were recovering frescoes and first class china, Captain Janet was collecting shuffleboard numbers, Lisa was touring around, Brian was after images, Roy and Steve were collecting stemware. The rest of us were after china. Hank and Captain Steve kept a watchful eye over all of us on the surface.

On dive three Mark and I planned to find the dish room again but no luck this time, we were without our guide. We strolled

Roy Matthews and Steve McDougal bag up the crystal.



down the promenade deck instead where many of its large windows are still intact. I peered through a port-hole at what must have been a stateroom — its elegance destroyed by time.



The teak decking where people walked lay unbroken in many areas; cold water has preserved it well. Some of that water leaked into my suit, a bone-chilling and humbling experience.

The evening's fog was still with us Sunday morning, all that lay between us and the large ships that pass this way was the radar alarm. By now we had all begun to look as if we had been at sea a few days. Uncombed hair, unshaven faces and the signs of fatigue were beginning to set in. Today would be our last day diving.

Rob and I teamed up again to go after some more dishes. The silt billowed up as I fanned the area searching for another grasp at time. The cabinet was almost empty, the search this time more difficult, groping in the darkness the glow of Rob's light was comforting. After about ten dishes it was time to leave. As I scrambled out of the hole full of blackness the daylight from above was a welcome sight. We looked at each other as we went up the line knowing this was the last we would see of the *Andrea Doria* on this trip.

The *Andrea Doria*, a ship unlike any other, should never have been here. She was fitted with the finest navigational equipment, yet it was the misinterpretation of two small blips on a radar screen that sent the *Doria* to her grave. She continues to bring pleasure to her new passengers in some paradoxical way, while we glide along her decks and though her halls beneath the ocean.

We sailed away from the patch of ocean we called home for a few days, thankful for our accomplishments and the new friends we had made. The night moved quickly as we sailed west. When the sun peeked through the blackness of the sky we rounded the channel buoy for the last leg of our trip. Pulling into the dock at five AM, we were home and safe.



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GAS CONSUMPTION A MEANS TO SURVIVAL

by Bret Gilliam and Robert Von Maier

In addition to requiring proficiency in both technical and emotional skills, deep diving mandates the proper supply of breathing gas. Whether it is air, nitrox or tri-mix when you are out of gas you're out of life. The following is an excerpt from the book,

DEEP DIVING An Advanced Guide to Physiology Procedures and Systems, by Bret Gilliam and Robert Von Maier. Published by Watersport Publishing Inc. 800 776-3483.

GAS CONSUMPTION CALCULATIONS

It is essential that enough gas be available to allow the diver to complete his scheduled decompression (aborted or omitted decompression increases the risk of development of DCS, and has been known to "ruin a diver's day"). Thus, gas consumption calculations need to be made prior to the dive to assure that adequate amounts of gas will be available for the dive plan. Since you'll probably be diving with a buddy, each diver should plan his gas supplies to take into account the possibility of "problems" in which each diver has enough gas for his planned dive decompression, and sharing with his partner. Planning for two times the minimal amount of gas calculated is recommended.

How do you calculate gas requirements? The deep diver should have a good idea of his gas consumption (at the surface at rest). This gas consumption rate (expressed as RMV - respiratory minute volume) is utilized in the rest of the calculation presented here. Surface consumption rates may vary from 0.3 cu. ft./min. to as much as 3.0 c.u. ft./min.

In order to calculate your air consumption, you must first understand the following term: The "Respiratory Minute Volume (RMV)" is the amount of air consumed in one minute on the surface.

RMV's vary from diver to diver, and a diver's own RMV will change due to variations in his breathing rate. Obviously, if we are anxious, cold, or just out of

shape, our breathing rate will be greater than expected. Also, if we are swimming against a strong current, we will be breathing more than at rest.

It follows from the ideal gas law and Boyle's Law, that our RMV will vary with depth. If we double the ambient pressure, we will double our RMV. Thus, if an 80 cu. ft. tank will last 60 minutes at the surface, then it will only last 30 minutes at 33 fsw, 20 minutes at 66 fsw, 15 minutes at 99 fsw, and only last 10 minutes at 165 fsw. The following relationship holds:

**RMV x Ambient Pressure (ATA) =
Consumption At That Depth**

1 cu. ft. x 1 ATA = 1 cu. ft. per minute
1 cu. ft. x 2 ATA = 2 cu. ft. per minute
1 cu. ft. x 3 ATA = 3 cu. ft. per minute
1 cu. ft. x 4 ATA = 4 cu. ft. per minute
1 cu. ft. x 5 ATA = 5 cu. ft. per minute

The aspiring deep diver will be well rewarded for taking the time to evaluate his surface consumption rate, as this is the only effective way to estimate his gas requirements for any given deep dive.

Once a RMV has been determined, then the surface equivalent consumption is easily calculated by the following equations:

**Total Gas Required = Sum of the Gas
Required at Each Stage of the Dive**

**Gas Required at Each Stage =
ATA x RMV x Time x Work Modifier**

**ATA = Pressure at each Stage
(ATA) = (Depth x 33) + 1**

**RMV = Respiratory Minute Volume
(expressed in cu. ft./minute)**

**Time = Time in minutes spent at that
stage/depth**

**Work Modifier = A factor by which the
gas requirements are multiplied by re-
flecting the fact that gas consumption
increases with increasing work levels.**

Suggested work modifiers are:

AT REST = 1

MILD WORKLOAD = 1.5

MODERATE WORKLOAD = 2.0

HEAVY WORKLOAD = 3.0 - 5.0

Now, the dive is planned (bottom time and decompression requirements). Gas requirements are calculated based on the RMV and anticipated work load. Descent times are treated as if they were included in the bottom time. Ascent rates are calculated by using the average depth and the ascent time as below:

AVERAGE DEPTH =

$$\frac{(\text{Maximum depth} + 1\text{st Stop depth})}{2}$$

This Average Depth is then used in your calculation for gas consumption during ascent (and can be used for extremely deep dive descents). These calculations need to be carried out for every different gas utilized during the dive.

Once you have calculated your gas requirements for your planned dive, then consideration must be made for the "unplanned." Gas supply amounts should be "padded" to allow for emergencies. If you are diving with a partner, then each diver should plan on having enough gas to support both divers in case of a catastrophic gas supply failure by one of the divers.

This reserve supply can be calculated by doubling the amount of gas originally calculated. However, this allowance is not enough if you are planning a dive with significant penetrations (i.e., wreck and/or cave diving). For these situations, the cave divers "thirds rule" is more appropriate. One third of the gas supply is allowed for the penetration, one third for the exit and one third reserved for emergencies. This should allow adequate gas to provide gas for your partner if he suffered a total gas supply failure at maximum penetration or depth.

Editors note: *At 130 fsw the average person will use about 5 cubic feet of gas per minute while at rest. A typical 20-minute dive with the required conservative safety stops (and no contingencies) to the Oregon would require no less than 146 cubic feet of gas.*

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Patience

by Hank Garvin

I've always had a basic dive philosophy that says, "If you don't feel right — DON'T DIVE."

Now, as a regular dive boat mate, many people have told me that it's an easy rule to keep when you're diving every week. Well, that may be true to some degree; however, I'm very jealous of my dive time and I honestly don't like giving any of it up.

It was a Friday morning and I had taken the day off from work to dive the *Coimbra*. Something I don't do often, but we were doing the traditional warm-up deep dive before our *Andrea Doria* trip. I had been in pain all night from a racquet ball injury to my left elbow. Unknown to me at the time, it was developing into a really bad infection.

What do I do? Let me list the rationalizations:

- It hurts but I'm tough, I can just *hang* a little longer.
- They *need* me to set the hook.
- I *want* to do the dive.
- I've lost a day's work and we just traveled 60 miles.

Will it all be for nothing?

I sat down with Captain Steve Bielenda, who reminded me that I know my own body and if I felt it wasn't right for me to do the dive, he would stand behind my decision.

The choice, while still mine, was not easy . . . I didn't do the dive.

Now fourteen days later, my arm is still not right. The *Doria* trip is here. Do I go or not? I know it's real iffy that I'll get in the water, but the excitement of the whole expedition is too overwhelming an experience for me to miss. I know I'll be able to make the correct decision with regards to diving when the time comes.

One hundred sixty nautical miles and a day and a half go by quickly. The arm feels fine to lift things and is just a little sore to the touch. I felt I



was ready until I put on my dry suit. The pain in my arm made my mind up immediately. I'm watching everybody do *their* dives. The conditions are great, virtually no current and clear water with 50 - 60 foot visibility (I am told).

There are some first-timers on board who will pay a visit to the once great ocean liner. The fear and excitement of the unknown nearly overwhelms them all getting ready to go into the water. Ninety minutes later the look of pure joy in the expression on their faces helps lift the feeling of depression that has come over me. Now they are no longer first-timers — now they are hooked too! The *Doria* is like a drug; the more you get, the more you want.

The experience of coming on this expedition has helped me to reaffirm my own philosophy of diving. "Just because you're on the boat and have paid your way doesn't mean you have to dive."

By the way, if this whole experience was the fates cruel way of reconditioning me, it failed. As Arnold says, "I'LL BE BACK!"

Editors note: The infection went away, the swelling went down and Hank's doctor cleared him for diving. I'm sure by now you have figured out that Hank took off another week from work and went on the second trip to the Doria.

EVENTS CALENDAR

AUGUST

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21 R.C. Mohawk 6:00 PM
28 USS Algal 5:30 PM

21 **John Crea — Mixed Gas Diving**
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SEPTEMBER

1 **ROCKLAND AQUANAUTS**
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OCTOBER

9 - 11 **NAUI IQ 92**
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NOVEMBER

1 **Dive New Jersey... And Beyond**
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BEYOND Sportdiving!

EXPLORING THE DEEPWATER SHIPWRECKS OF THE ATLANTIC
by BRADLEY SHEARD

A Review by Melissa Orenstein

The cover image of *Beyond Sportdiving!* clued us in that Brad Sheard was definitely off to the deep end. From the introduction, he captivatingly tells of adventure, history, and the risks of "deep, dark, and dangerous" diving in his backyard, the *Mudhole* and elsewhere in the North Atlantic.



You don't have to be a deep diver, or a diver at all to enjoy the very personal, poignantly written experiences of those who dare beyond the conventional 130-foot sportdiving limit. Bradley features the wrecks of the *Durley Chine*, *Sommerstad* (aka *Virginia*), *Andrea Doria*, *U-123*, *SS Suffolk*, *Bal-aena*, and even takes us to the *Wilkes-Barre* off Key West.

He dares to take us even further, questioning the reach of future divers. Look for Brad's book in your local dive store and when you've put it down, check out his latest photo from the deep in this issue. "Beyond Reach?" Not for Brad Sheard.

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WEIGHT BELT PROBLEMS

by Captain John Lachenmeyer

Most divers who have been on a boat or beach have witnessed a diver returning missing a weight belt or with one barely in place. Sometimes actually hanging down at the knees.

This may not be entirely the diver's fault but may be due to their inability to recognize weight buckle overload; a problem which is somewhat unique to northern diving.

In tropical waters divers frequently need only 6 to 12 pounds of lead to compensate for natural buoyancy and the extra salinity of water. However, northern wreck divers like myself use heavier weights ranging from 25 to 35 pounds to compensate for neoprene, dry suits and thermal underwear. In addition, a hammer, prybar, and bug bag are often clipped to the belt. With this setup the buckle can slip — especially a new nylon belt with some types of plastic buckles — due to the heavier weight load.

Years ago I experienced the same problem having found my own tools laying on the bottom because the belt unbuckled. Luckily the weights stayed on my back preventing an undesirable and possibly dangerous positive buoyancy situation.

It was then that I pioneered the double idea: *if one buckle is marginal then two buckles should be able to handle the large weight load.* Simply put two buckles on the belt, one behind the other, and feed the strap end through both buckles.

The quick release feature remains intact and each buckle shares the load. Steel buckles are my preference. I've been using the two-buckle setup for more than 10 years and have never experienced a loose belt. You might give this idea a try if you have experienced weight belt problems. Remember safe diving is your responsibility.


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for environmentally enriching accomplishments with the annual NAUI Marine Environmental Achievement Award. The advisory board includes such noted experts as Dr. Sylvia Earl and Stan Waterman. NAUI Environmental Horizons will have its debut at NAUI IQ in Philadelphia, October 9-11.

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KIRBY'S KORNER

The Oregon

by Kirby Kurkomelis

It seemed like a dream. A large lionsmane jellyfish with gleaming blue green tentacles crossed my path, sucking in and expelling water like a blue mist running across a midnight sky, while a small black and yellow pilot fish ducked for cover inside this living minefield. It reminded me of a great movie I once saw about a big squid looking for a few friends to munch on. But I felt at home, sinking fast. At the bottom of the line lay the Cunard steamer *Oregon*.

Moving closer to her clearly massive outline in the sand, I could feel the presence of a great spirit. Her smoke stacks lay silent now, half buried in the sand along with her rigging. Her decks have given way, leaving a mountain of artifacts with vast marine life swimming in and out of the wreckage. Not to mention monster lobsters!

The *Oregon*, built in 1881, was to be one of the largest and fastest steamers of her time. She was 518 feet long with 54 foot of beam. Her high speed steam engines broke all transatlantic records. One dark morning in 1886, en route to New York from Liverpool, the *Oregon* collided with an unknown schooner. Staying afloat for eight hours, her crew managed to save all passengers. Pumps working throughout the morning hours, she slowly sank. Today the *Oregon* lies in 130 feet of water, 21 miles southeast of Fire Island Inlet.

Our boat had anchored just behind the steering quadrant, a magnificent sight. Hiding under the rudder was an eight-pound lobster who was trying to

duck for cover between some hull plates. Swimming alongside the rudder I noticed plenty of mussels sharing space with sea anemone on the broken hull plates. Half buried in the sand was a piece of broken china. Reaching down for it, a lobster caught my eye as he stuck his head out, the dish didn't move.

With the current pushing me gently backward, I ventured forward to the boilers in search of some dishes. Along the way I saw two divers working on a porthole. In the distance, cod fish were swimming in and out of twisted rubble, enjoying the cold water. With 15 minutes into the dive, I began to think about china . . . a rare but prized find from this wreck.

Torn fishing net covers part of the *Oregon's* stern snaring and trapping small fish. The crabs on the webbing enjoyed their free meal. Lying underneath was a small cup, opening my bug bag to put it in, the two lobsters tried to make a break but failed.

Off in the sand at the end of the crow's nest lay a debris field. I signalled to my partner that I would be in that direction. Off I went and soon lost sight of the wreck. In the rubble was a five-pound lobster; the fight began. It looked like he was going to win the struggle but in the end he backed into a shallow hole and was mine.

It was time to head back towards the wreck and up the anchorline. Those two divers finally attached their lift bag to the porthole. Up she went leaving a trail of small bubbles behind. And so did I . . .



Sketch of the Oregon by Captain Stephen Bielenda.

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MASSACHUSETTS

Grey Eagle*

Capt. Erik Takakjian
Yarmouthport
(508) 362-6501
Bourne Marina

- | | | |
|------|----|------------------------|
| Aug | 1 | Mars |
| | 2 | Mars |
| | 7 | Seaconnet / Vinyard |
| | 8 | Trojan & YSD |
| | 9 | Vinyard Light |
| | 14 | June K |
| | 15 | Yankee/Cowin |
| | 16 | Kingfisher |
| | 21 | Mars |
| | 22 | Dwight/Yonkee |
| | 23 | Fighter Plane |
| | 28 | Endicott |
| | 29 | Yankee/Cowin |
| | 30 | Catherine |
| Sept | 1 | USS Bass |
| | 2 | U-853 |
| | 3 | U-853 |
| | 4 | U-853 |
| | 5 | U-853 |
| | 6 | U-853 |
| | 7 | U-853 |
| | 8 | USS Bass |
| | 9 | U-853 |
| | 13 | Cowin |
| | 18 | Lobster Dive |
| | 19 | Mars Commemorative |
| | 20 | Mars Commemorative |
| | 26 | Port Hunter Expedition |
| | 27 | Cowin & Yankee |
| | 30 | Cowin & Yankee |

Scuba Charters*

Capt. Butch Amaral
Taunton
(508) 822-5639
Sub Specialist, 6 Pac

NEW JERSEY

Blue Fathoms*

Capt. Tony Donetz
(908) 369-2260
Daily, Weekends & Evenings
Point Pleasant

Porthole*

Capt. Duane Clause
(908) 985-4887
Wednesday Nite Dives
Manasquan Inlet, 6 Pac

Sea Lion*

Capt. George Hoffman
Capt. Kevin Brennan
(908) 528-6298
Weekday Nite & Weekend
Brielle

Venture III*

Capt. Paul Hepler
(908) 928-4519
Shark River Inlet

NEW YORK

Apache*

Capt. Dom Carbone
(212) 885-0843
City Island

Defiance*

Capt. Mike Carew
(212) 885-1588
Dive the L.I. Sound
City Island

- | | | |
|--------|----|----------------------|
| August | 1 | Artifical Expedition |
| | 2 | Artifical Expedition |
| | 8 | Huckleberry |
| | 9 | Maine |
| | 15 | Condor |
| | 16 | Gwendolyn Steers |
| | 22 | Capt's. Choice |
| | 23 | Capt's. Choice |
| | 29 | Secret Spot |
| | 30 | Secret Spot |

Eagle's Nest*

Capt. Howard Klein
(516) 735-2254
Point Lookout

- | | | |
|-----|----|---------------|
| Aug | 1 | Arundo |
| | 2 | Stolt Dagali |
| | 5 | Texas Tower |
| | 9 | Pinta |
| | 11 | Virginia |
| | 12 | USS San Diego |
| | 15 | Lizzie D |
| | 16 | Oregon |
| | 19 | Resor |
| | 22 | Pipe Barge |
| | 23 | Lizzie D |
| | 25 | Coimbra |
| | 29 | Linda |

Jeanne II*

Capt. Bill Reddan
(718) 332-9574
Brooklyn
Call for afternoon and Nite dives.

- | | | |
|------|----|-----------------|
| Aug | 1 | RC Mohawk |
| | 1 | Asfalto Nite |
| | 2 | Pentland Firth |
| | 5 | Mystery Wreck |
| | 8 | Harvey's Woody |
| | 9 | Veronica |
| | 10 | USS Algal |
| | 12 | RC Mohawk |
| | 15 | Lizzy D |
| | 16 | Martin's Misery |
| | 19 | Cindy |
| | 22 | Pinta |
| | 23 | Bald Eagle |
| | 26 | RC Mohawk |
| | 29 | Cindy |
| | 30 | Masadonia |
| | 31 | Asfalto |
| Sept | 2 | Local Lobster |
| | 5 | Pipe Barge |
| | 6 | Mystery Wreck |
| | 7 | USS Algal |
| | 9 | Local Lobster |
| | 13 | Immaculata |
| | 16 | Local Lobster |
| | 19 | Lizzie D |
| | 20 | Pilot Ship |
| | 26 | Iberia |
| | 27 | Cindy |

Northern Star*

Capt. Paul Pellegrino
(516) 366-4231
Captree

Rebel*

Capt. Pat DeFeis
Capt. Bill DeCoursey
(718) 897-2885
Brooklyn

Two Trips Each Day

- | | | |
|------|----|------------------|
| Aug | 8 | Black Warrior |
| | 9 | British Korvette |
| | 15 | USS Turner |
| | 16 | Stolt Dagali |
| | 22 | RC Mohawk |
| | 23 | Robert Snow |
| | 29 | Black Warrior |
| | 29 | USS Algal |
| | 30 | Lizzie D |
| Sept | 5 | Pipe Barge |
| | 6 | Sandy Hook |
| | 12 | Petland Firth |
| | 13 | RC Mohawk |
| | 19 | Mistletoe |
| | 20 | British Korvette |
| | 26 | Lizzie D |
| | 27 | Fran S |

Sea Hawk*

Capt.'s Frank Persico
& John Lachenmeyer
(718) 279-1345

- | | | |
|----------|----|-------------------|
| Freeport | | |
| Aug | 5 | Oregon |
| | 12 | Linda |
| | 15 | G & D |
| | 19 | Tarantula |
| | 22 | USS San Diego |
| | 26 | USS San Diego |
| | 29 | Ambrose Light |
| | 30 | Oregon |
| Sept | 2 | USS Algal |
| | 5 | Yankee |
| | 6 | Iberia |
| | 7 | RC Mohawk |
| | 9 | USS San Diego |
| | 16 | RC Mohawk |
| | 19 | USS San Diego |
| | 26 | Ambrose Lightship |

Shearwater II*

Capt. Jim McKay
Capt. Tom Conlan
(516) 242-0529
Fishing & Diving Charters
Captree

Southern Cross*

Capt. Phil Galletta
(516) 587-3625
Babylon

- | | | |
|-----|----|---------------|
| Aug | 1 | Linda |
| | 2 | Fran S |
| | 7 | Oregon |
| | 8 | USS San Diego |
| | 15 | USS San Diego |

- | | | |
|------|----|---------------|
| | 16 | G & D |
| | 23 | USS San Diego |
| | 29 | Kenosha |
| | 30 | Hylon Castle |
| Sept | 5 | Reggie |
| | 7 | USS San Diego |
| | 12 | Kenosha |
| | 13 | Lizzie D |
| | 20 | Fran S |
| | 27 | USS San Diego |

Wahoo*

Capt. Steve Bielenda
Capt. Janet Bieser
(516) 928-3849
Captree

- | | | |
|------|----|---------------------|
| Aug | 1 | Yankee |
| | 2 | USS San Diego |
| | 7 | Coimbra |
| | 8 | USS San Diego |
| | 9 | Oregon |
| | 12 | USS San Diego |
| | 15 | Texas Tower |
| | 16 | USS San Diego |
| | 19 | USS San Diego |
| | 21 | Oregon Overnight |
| | 23 | USS San Diego |
| | 26 | USS San Diego |
| | 29 | Oregon |
| | 30 | USS San Diego |
| Sept | 2 | U-853 |
| | 3 | U-853 |
| | 4 | USS Bass |
| | 5 | 3-day Block Island |
| | 6 | USS Bass, U-853 |
| | 7 | Grecian & Morel |
| | 9 | USS San Diego |
| | 12 | USS San Diego |
| | 13 | USS San Diego |
| | 16 | USS San Diego |
| | 19 | USS San Diego |
| | 20 | Oregon |
| | 23 | USS San Diego |
| | 26 | Tarantula & Kenosha |
| | 27 | USS San Diego |
| | 30 | USS San Diego |

NORTH CAROLINA

Margie II*

Capt. Art Kirchner
(919) 986-2835
Cape Hatteras

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LOCAL HEROES:

July 1992



Andrea Doria Expedition II aboard the R/V Wahoo.



Aqua Woman '92: Lance captures the fun aboard the Eagle's Nest.



Aqua Crazy Harvey & The Aquarians "pig out" Independence weekend.



Steve McDougal sounds off!



Capt. Eric Takakjian, Grey Eagle



The Gas Station training dive aboard the Seeker.



Pat Rooney's sterling smile.



Jim Cleary & Di Dieter aboard the Karen.

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