ADM E-Zine

Advanced Diver Magazine's Internet Publication

- Sheck Exley Remembering a Legend
- ADM E-Zine Gas Station
- Truk Lagoon CCR Invasion
- Key West Deep Wrecks
- 2007 CCR & Wreck Weeks Dominican Republic
- Maldives on the Eagle Ray
- Critter Heaven
 Gulf Islands British Columbia
- Wrecks of the Duane and Bibb
- Packing for an Expedition
- S-16 WWI US Submarine

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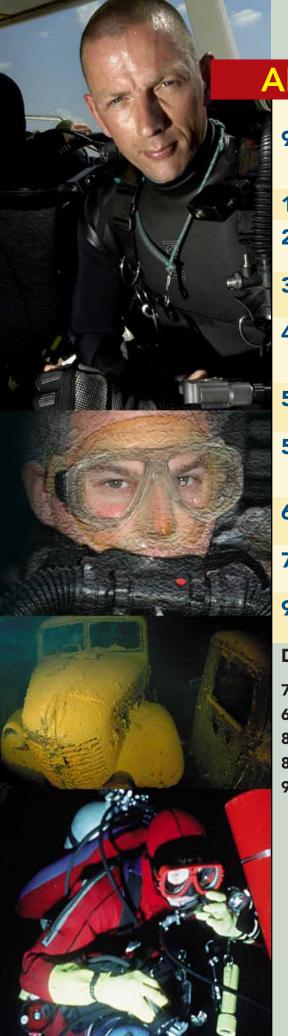




Ocean Management Systems

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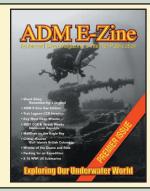
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Cover:

Closed circuit rebreather diver Jim Rozzi, explores the bow deck artillery on the San Francisco Maru, Truk Lagoon.

Photo by Curt Bowen





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| Aug 11-12 | Mermet Springs, Mermet, IL |
| Aug 18-19 | Brownstone Park, Portland, CT |
| Aug 25-26 | Hudson Grotto, Hudson, FL |
| Sept 08-09 | Gilboa Quarry, Ottawa, OH |
| | |

MORE DATES COMING SOON!

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Publishers Notes

For the last couple of years, I have been watching closely the evolution of on-line dive publications. As one of the last baby boomers, I still appreciate a hard-copy paper magazine in my hands that I can read whenever and wherever I wish. As I travel around the globe, however, I am seeing more and more younger — and some older — people staring into their laptops while they wait in airports, coffee shops, libraries, bars, or just about any place they can connect to the Internet.

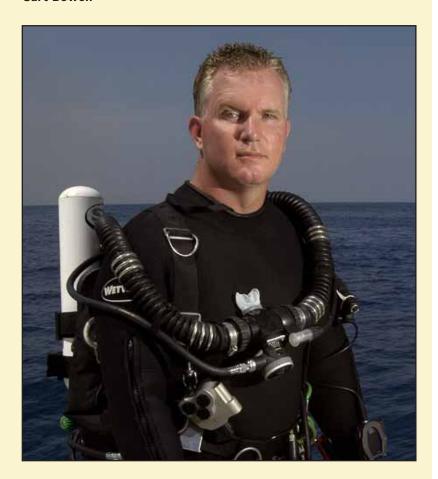
Not wanting to miss the boat, I have decided to develop this online PDF publication. It is not designed to replace Advanced Diver Magazine nor copy it, but to work side by side with the hard-copy edition to promote ADM events, ADM expeditions, and each other. Because ADM E-Zine is an Internet-based publication, it is also our ultimate goal to reach more divers worldwide while at the same time providing larger exposure for our paid advertisers. Advanced Diver Magazine (Hard Copy) paid advertisers will receive the same advertisement inside ADM E-Zine at no additional cost.

If you're reading this Publisher's Notes, then obviously you are one of the 30,000 expected new readers.

Welcome Aboard! Now, get off the boat and DIVE!

Publisher

Curt Bowen





Publisher..... Curt Bowen Co-Publisher..... Linda Bowen

Copy Editor....... Victoria Leigh
Chief Staff Writer... John Rawlings
Web Master..... Jakub Rehacek
Photojournalist.... Jeff Toorish
Trike Master..... Savannah Bowen

ADM Staff Photojournalist

Mel Clark • Richard Harris
Tom Isgar • John Rawlings

Tamara Thomsen

Contributing Writers / Photographers

Keith Ambrose Thaddius Bedford Leigh Bishop
Kevin Denlay Joseph Dovala Erik Foreman
Jill Heinerth Brian Kakuk Cass Lawson Gavin Newman
Jim Rozzi Wes Skiles Dr. Bruce Wienke

Editorial Contributors & Dive Assistants

Jim Bowden • Jack & Karen Bowen Rich & Doris Chupak • Doug Ebersole • Rob Infante Sheck Exley • Kim Smith • Tim Taylor Charlie Tulip • Chris Williams

Contact Information:

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REVERNIGATION BCK BXFL Text by Jim Bowden Excerpt from ADM Issue 1 March 1999 d v a n c e d D i v e r M a g



important for him to make the dive. It was personal. He already had the record. Still he had to go deeper, not to make the record unbreakable, but for his need to achieve as much as he could. He had to go deeper for himself

I first met Sheck in 1988 when he was making his world record dive to 780 feet / 237 M in Nacimiento Mante, another deep spring in Mexico. He was alone in that great beautiful system. His support team of three was waiting his return. In this egomaniacal discipline of cave diving, it was refreshing to see a man accomplishing the impossible without the fanfare and entourage that we so often see in much lesser endeavors. Perhaps the bond we formed as dive partners was because so much of our diving history had been solo. We worked together, but the dive was our independent effort. Space and time separated our major efforts. We needed the focus that comes from being independent of others and masters of our own destiny.

Sheck took little advantage of his fame as the deepest diver. He was a modest individual, a gentleman, respectful of his colleagues and fellow cave explorers, both wet and dry. It is an unfortunate truth that the greater your accomplishments, the greater the opposition and animosity. Still, I cannot remember him ever saying a bad word about anyone. There are so many critics with an acute case of the Jehovah Complex, wanting to save us all from ourselves. I am sure that he had reservations about some of his critics and the bad manners that seem to be so much a part of the cave diving community, but he would softly say, "They are probably better divers than I am" and let it go at that. I am reminded of Mark Twain who said, "Indecency, vulgarity, obscenity — these are strictly confined to man; he invented them. Among the higher animals there is no trace of them." Sheck was, indeed, a higher being.

Perhaps the greatest complement to an individual's lifetime of accomplishments is in the respect of his peers. The best diving champions in the world still mourn Sheck. Some of these individuals, like Olivier Isler, were and still are deeply saddened by his absence. What a wonderful legacy because I believe, as Sheck did, that Olivier is the greatest cave diver in the world today. Interesting enough, he too, is a solo actor





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Recently I made a trip to Zacaton to check the water conditions before we mounted a major effort. Standing alone, waist deep in the waters of El Nacimiento, the spring entrance to El Pasajae de Tortuga Muerta and beyond to Zacaton, I noticed that the day was unsettled, stormy, windy, like the day Sheck died. The winds were blowing the palms and gusts swirling in that massive system moved the grass islands like relentless behemoths. I was alone this time, and although I had traversed the cave so many times in the last several years, I found this reminder evoked more emotion than I anticipated. We had such plans to follow our successful dive to the bottom of Zacaton. There were so many places we wanted to dive around the world. This too is my loss. I may yet dive those exciting virgin places but I cannot dive them with Sheck.

Some years ago I selfishly dedicated my life to live my dreams and to never put off the opportunities that are so often relinquished because of perceived obligations and responsibility. When we were invited to go to South Africa and dive Bushmansgat the summer before our dive in Zacaton, I declined, knowing that I needed to train and that we had a deeper system over here. Besides, I was sure that the future held great promise for us to dive exotic and exciting systems in Yugoslavia, Namibia and other we places we plan to dive after Zacaton. Not joining him in South Africa was a contradiction to my pledge. I put off something dear for another day that will never come.

This tribute to Sheck has been a difficult task for me. I chose to try and show the spirit he possessed rather than to simply chronicle his many achievements. Those achievements are indeed grand, but it was his passion that made them possible. He was an inspiration to us all because of his spirit and passion for his craft. He was a banner for the individual and what one man could accomplish, often against great odds. Historically it is one individual's pioneering breakthrough that leads the rest of us out of the trees. And they often pay a tremendous price for the boon we receive.

Sheck still dives with me on every dive I make. He is discussed around the campfire as if he were still here. I am not a religious man, so immortality to me is in the memories of our friends, the worth of our work, the legacy of gentlemanly conduct and the inspiration that will drive future efforts to accomplish the impossible. Sheck said one night in our camp in Mexico that the greatest complement to a teacher is to have his students go on to surpass all their teacher's accomplishments, to go to greater heights in life, and I would suppose, to greater depths.

| Exley' | s World | Record Dives |
|----------|-----------|----------------------|
| Wor | ld Dept | h Records |
| 1977 | 340 ft | Boiling Hole |
| 1981 | 360 ft | Die Polder |
| 1987 | 660 ft | Mante |
| 1988 | 780 ft | Mante |
| 1989 | 867 ft | Mante |
| 1993 | 863 ft | Bushmansgat |
| Cave | Penetra | tion Records |
| 6/29/70 | 2099 ft | Blue Spr, FL |
| 4/12/72 | 2450 ft | Devils Eye, FL |
| 3/31/74 | 3000 ft | Devils Eye, FL |
| 4/13/75 | 3105 ft | Devils Eye, FL |
| 4/20/75 | 3305 ft | Devils Eye, FL |
| 5/4/75 | 3956 ft | Manatee Spr, FL |
| 5/11/75 | 4110 ft | Manatee Spr, FL |
| 3/19/78 | 4457 ft | Hole in the Wall, FL |
| 3/26/78 | 4527 ft | Hole in the Wall, FL |
| 10/14/78 | 4802 ft | Blue Spr, FL |
| 11/4/78 | 4816 ft | Blue Spr, FL |
| 6/21/81 | 5847 ft | Big Dismal, FL |
| 7/26/81 | 5914 ft | Manatee, FL |
| 8/8/81 | 6867 ft | Manatee, FL |
| 8/23/81 | 7665 ft | Manatee, FL |
| 1/28/89 | 10,244 ft | Chips Hole, FL |
| 12/16/90 | 10,939 ft | Cathedral, FL |

"....THE CREDIT BELONGS TO THE MAN WHO IS ACTUALLY IN THE ARENA, WHOSE FALL IS MARRED BY DUST, AND SWEAT,WHO AT THE WORST, IF HE FAILS, AT LEAST FAILS WHILE DARING GREATLY, SO THAT HIS PLACE SHALL NEVER BE WITH THOSE COLD, TIMID SOULS WHO KNOW NEITHER VICTORY NOR DEFEAT."

Mohandas K. Gandi













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...Sold



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R D M

Zine GRS STRTION

Nitrox PO2 & EADs

| | | | | | | | 2 770 000 | | | | | | 7 | | | | | | | | | | | |
|-----|-----|------------|------------|------|------|------|-----------|------------|------------|------|-------|------|------|------|------------|-------|-------|-------|------------|-------|----------|-------|--------|---|
| | | | | | | | | | P | erc | e n t | 0> | yg | e n | | | | | | | | | | ı |
| _ | | | 25% | 26% | 27% | 28% | 29% | 30% | 31% | 32% | 33% | 34% | 35% | 36% | 37% | 38% | 39% | 40% | 50% | 60% | 70% | 80% | 90% | ı |
| | 30 | PO2 | 0.48 | 0.50 | 0.52 | 0.53 | 0.55 | | 0.59 | | | 0.65 | | 0.69 | 0.71 | 0.73 | 0.74 | 0.76 | 0.95 | 1.15 | 1.34 | 1.53 | 1.72 | |
| | | EAD | 27 | 26 | 25 | 24 | 24 | 23 | 22 | 21 | 20 | 20 | 19 | 18 | 17 | 16 | 16 | 15 | 7 | 0 | 0 | 0 | 0 | ı |
| | 40 | PO2 | 0.55 | 0.58 | 0.60 | 0.62 | 0.64 | 0.66 | 0.69 | 0.71 | 0.73 | 0.75 | 0.77 | 0.80 | 0.82 | 0.84 | 0.86 | 0.88 | 1.11 | 1.33 | 1.55 | 1.77 | 1.99 | 1 |
| | | EAD | 36 | 35 | 34 | 34 | 33 | 32 | 31 | 30 | 29 | 28 | 27 | 26 | 25 | 24 | 23 | 22 | 13 | 4 | 0 | 0 | 0 | J |
| | 50 | PO2 | 0.63 | 0.65 | 0.68 | 0.70 | 0.73 | | 0.78 | 0.80 | 0.83 | 0.86 | 0.88 | 0.91 | 0.93 | 0.96 | 0.98 | 1.01 | 1.26 | 1.51 | 10000000 | 2.0 | | |
| | | EAD | 46 | 45 | 44 | 43 | 42 | 41 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 | 31 | 30 | 20 | 9 | 0 | 0 | | |
| | 60 | PO2 | 0.70 55 | 0.73 | 0.76 | 0.79 | 0.82 | 0.85 | 0.87 | 0.90 | 0.93 | 0.96 | 0.99 | 1.01 | 1.04 | 1.07 | 1.10 | 1.13 | 1.41 | 1.69 | 1.97 | | | |
| ≥ | 70 | EAD | | 54 | 53 | 52 | 51 | | 48 | 47 | 46 | 45 | 44 | 42 | 41 | 40 | | 38 | 26 | | 2 | | | |
| £ s | 70 | PO2 EAD | 0.78 | 0.81 | 0.84 | 0.87 | 0.91 | 0.94 58 | 0.97 57 | 1.00 | 1.03 | 1.06 | 1.09 | 1.12 | 1.15 | 1.19 | 1.22 | 1.25 | 1.56 | 1.87 | | | | |
| | 00 | | | | | | | | | | | | | | 0.0 | | | | | | | | | |
| | 80 | PO2 EAD | 0.86 | 0.89 | 0.92 | 0.96 | 0.99 | 1.03 | 1.06 | 1.10 | 1.13 | 1.16 | 1.20 | 1.23 | 1.27 57 | 1.30 | 1.34 | 1.37 | 1.71 39 | 2.05 | | | | |
| ۵. | 90 | PO2 | 0.93 | 0.97 | 1.01 | 1.04 | 1.08 | 1.12 | 1.16 | 1.19 | 1.23 | 1.27 | 1.30 | 1.34 | 1.38 | 1.42 | 1.45 | 1.49 | 1.86 | 24 | ı | | | |
| ш | 70 | EAD | 84 | 82 | 81 | 79 | 78 | 76 | 74 | 73 | 71 | 70 | 68 | 67 | 65 | 64 | 62 | 60 | 45 | | | | | |
| | 100 | PO2 | 1.01 | 1.05 | 1.09 | 1.13 | 1.17 | 1.21 | 1.25 | 1.29 | 1.33 | 1.37 | 1.41 | 1.45 | 1.49 | 1.53 | 1.57 | 1.60 | 2.02 | | | | | |
| | 100 | EAD | 93 | 92 | 90 | 88 | 87 | 85 | 83 | 81 | 80 | 78 | 76 | 75 | 73 | 71 | 70 | 68 | 51 | | | | | |
| 1 | 110 | PO2 | 1.08 | 1.13 | 1.17 | 1.21 | 1.26 | 1.30 | 1.34 | 1.39 | 1.43 | 1.47 | 1.52 | 1.56 | 1.60 | 1.65 | 1.69 | 1.73 | | 1 | | | | |
| | | EAD | 103 | 101 | 99 | 97 | 96 | 94 | 92 | 90 | 88 | 86 | 85 | 83 | 81 | 79 | 77 | 76 | | Nitro | ox PC |)2 & | EADs | |
| 1 | 120 | PO2 | 1.16 | 1.21 | 1.25 | 1.30 | 1.34 | 1.39 | 1.44 | 1.48 | 1.53 | 1.62 | 1.67 | 1.72 | | | -1 | | ١. | | | | | |
| | | EAD | 112 | 110 | 108 | 106 | 105 | 103 | 101 | 99 | 97 | 95 | 93 | 91 | | | | | | | | | s the | |
| | 130 | PO2 | 1.23 | 1.28 | 1.33 | 1.38 | 1.43 | 1.48 | 1.53 | 1.58 | 1.63 | 1.68 | | | | | | | | | | | ı feet | |
| | | EAD | 122 | 120 | 118 | 116 | 113 | 111 | 109 | 107 | 105 | 103 | | sea | | | | | | | | | pO2) | |
| | 140 | PO2 | 1.31 | 1.36 | 1.42 | 1.47 | 1.52 | 1.57 | 1.63 | 1.68 | | | | | in a | atmos | spher | e's a | bsolu | te fo | r vari | ous r | nitrox | |

mixtures at depth. To use this chart, find the desired maximum depth (fsw) in the

left column. Then, follow the column to the right until the desired pO2 or EAD is located. Next, follow that column upward to the top row to find the percentage of oxygen required to give the desired results. Please note that the red squares indicate a partial pressure greater than 1.6 ATA and that these percentages should be avoided due to the increased risk of oxygen toxicity.

Oxygen Fill Pressures for Nitrox

| | | | | | | | | | Pe | rce | erce | ent (| Dxy | gen | | | | | | | | | | 1 |
|----------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|-------|-----|------|-----|-----|-----|-----|------|-------|------|------|------|---|
| | | 24% | 25% | 26% | 27% | 28% | 29% | 30% | 31% | 32% | 33% | 34% | 35% | 36% | 37% | 38% | 39% | 40% | 50% | 60% | 70% | 80% | 90% | L |
| | 2200 | 83 | 111 | 139 | 167 | 194 | 222 | 250 | 278 | 306 | 334. | 362 | 389 | 417 | 445 | 473 | 501 | 529 | 807 | 1086 | 1364 | 1643 | 192 | |
| e e | 2300 | 87 | 116 | 145 | 174 | 203 | 232 | 262 | 291 | 320 | 349 | 378 | 407 | 436 | 465 | 494 | 524 | 553 | 844 | 1135 | 1426 | 1717 | 2008 | |
| | 2400 | 91 | 121 | 151 | 182 | 212 | 243 | 273 | 303 | 334 | 364 | 394 | 425 | 455. | 486 | 516 | 546 | 577 | 881 | 1184 | 1488 | 1792 | 2096 | |
| 0 | 2500 | 94 | 126 | 158 | 189 | 221 | 253 | 284 | 316 | 348 | 379 | 411 | 443 | 474 | 506 | 537 | 569 | 601 | 917 | 1234. | 1550 | 1867 | 2183 | |
| 5 | 2600 | 98 | 131 | 164 | 197 | 230 | 263 | 296 | 329 | 362 | 394 | 427 | 460 | 493 | 526 | 559 | 592 | 625 | 954 | 1283 | 1612 | 1941 | 2270 | |
| N N | 2700 | 102 | 136 | 170 | 205 | 239 | 273 | 307 | 341 | 375 | 410 | 444 | 478 | 512 | 546 | 581 | 615 | 649 | 991 | 1332 | 1674 | 2016 | 2358 | |
| ö | 2800 | 106 | 141 | 177 | 212 | 248 | 283 | 318 | 354 | 389 | 425 | 460 | 496 | 531 | 567 | 602 | 637 | 673 | 1027 | 1382 | 1736 | 2091 | 2445 | |
| 7 | 2900 | 110 | 146 | 183 | 220 | 256 | 293 | 330 | 367 | 403 | 440 | 477 | 513 | 550 | 587 | 624 | 660 | 697 | 1064 | 1431 | 1798 | 2165 | 2532 | |
| | 3000 | 113 | 151 | 189 | 227 | 265 | 303 | 341 | 379 | 417 | 455 | 493 | 531 | 569 | 607 | 645 | 683 | 721 | 1101 | 1481 | 1860 | 2240 | 2620 | |
| 疆 | 3100 | 117 | 156 | 196 | 235 | 274 | 313 | 353 | 392 | 431 | 470 | 510 | 549 | 588 | 627 | 667 | 706 | 745 | 1137 | 1530 | 1922 | 2315 | 2707 | |
| | 3200 | 121 | 162 | 202 | 243 | 283 | 324 | 364 | 405 | 445 | 486 | 526 | 567 | 607 | 648 | 688 | 729 | 769 | 1174 | 1579 | 1984 | 2389 | 2794 | |
| o o | 3300 | 125 | 167 | 208 | 250 | 292 | 334 | 375 | 417 | 459 | 501 | 543 | 584 | 626 | 668 | 710 | 751 | 793 | 1211 | 1629 | 2046 | 2464 | 2882 | |
| | 3400 | 129 | 172 | 215 | 258 | 301 | 344 | 387 | 430 | 473 | 516 | 559 | 602 | 645 | 688 | 731 | 774 | 817 | 1248 | 1678 | 2108 | 2539 | 2969 | |
| 8 | 3500 | 132 | 177 | 221 | 265 | 310 | 354 | 398 | 443 | 487 | 531 | 575 | 620 | 664 | 708 | 753 | 797 | 841 | 1284 | 1727 | 2170 | 2613 | 3056 | |
| | 3600 | 136 | 182 | 227 | 273 | 318 | 364 | 410 | 455 | 501 | 546 | 592 | 637 | 683 | 729 | 774 | 820 | 865 | 1321 | 1777 | 2232 | 2688 | 3144 | |
| | 3700 | 140 | 187 | 234 | 281 | 327 | 374 | 421 | 468 | 515 | 562 | 608 | 655 | 702 | 749 | 796 | 843 | 889 | 1358 | 1826 | 2294 | 2763 | 3231 | |
| | 3800 | 144 | 192 | 240 | 288 | 336 | 384 | 432 | 481 | 529 | 577 | 625 | 673 | 721 | 769 | 817 | 865 | 913 | 1394 | 1875 | 2356 | 2837 | 3318 | |
| | 3900 | 148 | 197 | 246 | 296 | 345 | 394 | 444 | 493 | 543 | 592 | 641 | 691 | 740 | 789 | 839 | 888 | 937 | 1431 | 1925 | 2418 | 2912 | 3406 | |
| | 4000 | 151 | 202 | 253 | 303 | 354 | 405 | 455 | 506 | 556 | 607 | 658 | 708 | 759 | 810 | 860 | 911 | 962 | 1468 | 1974 | 2481 | 2987 | 3493 | |

Oxygen Fill Pressures for Nitrox:

131 129 127 125 122 120

The above chart provides the amount of oxygen to add (in psi) to an empty cylinder to create the various nitrox mixtures. To use the chart, intersect the row containing the desired ending cylinder pressure (at left), and the column containing the desired percentage of oxygen (at top).

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| | חו | ΝA | | | He | liair N | lix (O | 2 % / | He%) | | | | | | |
|-------|--------------------|------------|-------------|---------------|-------------|--------------|-------------|---------------|---------------|-------------|-------------|-------------|-------------|--------------|------------|
| F | <u> 1</u> | IVI | 18/14 | 17/ 19 | 16/24 | 15/28 | 14/33 | 13/ 38 | 12/ 43 | 11/49 | 10/52 | 9/57 | 8/62 | 7/ 67 | 6/72 |
| | 100ft. | PO2 END | 0.72 81 | 0.68 74 | 0.64 68 | 0.60 62 | 0.56 56 | 0.52 49 | 0.48 42 | 0.44 34 | 0.40 30 | 0.36 24 | 0.32 17 | 0.28 10 | 0.24 |
| | 120ft. | PO2 END | 0.83 98 | 0.78 90 | 0.74 83 | 0.69 77 | 0.64 69 | 0.60 61 | 0.55 54 | 0.51 44 | 0.46 40 | 0.41 32 | 0.37 25 | 0.33 17 | 0.27 |
| | 140ft. | PO2 END | 0.94 115 | 0.89 107 | 0.83 98 | 0.78 91 | 0.73 83 | 0.68 74 | 0.62 65 | 0.57 54 | 0.52 50 | 0.47 41 | 0.41 32 | 0.35 23 | 0.31 15 |
| | 160 ^{ft.} | PO2 END | 1.05 133 | 0.99 123 | 0.93 113 | 0.87 106 | 0.81 96 | 0.76 86 | 0.70 76 | 0.64 64 | 0.58 59 | 0.52 50 | 0.46 40 | 0.38 30 | 0.35 20 |
| | 180 ^{ft.} | PO2 END | 1.16 150 | 1.09 139 | 1.03 128 | 0.96 120 | 0.90 109 | 0.83 99 | 0.77 88 | 0.71 74 | 0.64 69 | 0.58 58 | 0.51 47 | 0.45 37 | 0.38 26 |
| | 200 ^{ft.} | PO2 END | 1.27 167 | 1.20 155 | 1.12 143 | 1.05 135 | 0.98 123 | 0.91 111 | 0.84 99 | 0.77 84 | 0.70 79 | 0.63 67 | 0.56 55 | 0.49 43 | 0.42 31 |
| fsw | 220ft. | PO2 END | 1.38 184 | 1.30 171 | 1.22 159 | 1.15 149 | 1.07 136 | 0.99 123 | 0.92 111 | 0.84 95 | 0.76 88 | 0.69 75 | 0.61 63 | 0.52 50 | 0.46 37 |
| th fs | 240ft. | PO2 END | 1.48 201 | 1.40 188 | 1.32 174 | 1.24 163 | 1.15 150 | 1.07 136 | 0.99 122 | 0.91 105 | 0.82 98 | 0.74 84 | 0.66 70 | 0.58 56 | 0.49 43 |
| Depth | 260ft. | PO2 END | 1.59 219 | 1.50 204 | 1.42 189 | 1.33 178 | 1.24 163 | 1.15 148 | 1.06 133 | 0.97 115 | 0.88 107 | 0.79 93 | 0.71 78 | 0.63 63 | 0.53 48 |
| | 280ft. | PO2 END | 1.70 236 | 1.61 220 | 1.51 204 | 1.42 192 | 1.32 176 | 1.23 161 | 1.13 145 | 1.04 125 | 0.94 117 | 0.85 101 | 0.75 85 | 0.65 70 | 0.56 54 |
| | 300 ^{ft.} | PO2 END | 1.81 253 | 1.71 236 | 1.61 219 | 1.51 207 | 1.41 190 | 1.31 173 | 1.21 156 | 1.11 135 | 1.00 127 | 0.90 110 | 0.80 93 | 0.70 76 | 0.60 59 |
| | 320ft. | PO2 END | 1.92 270 | 1.81 252 | 1.71 235 | 1.60 221 | 1.49 203 | 1.39 185 | 1.28 168 | 1.17 145 | 1.06 136 | 0.96 118 | 0.85 101 | 0.74 83 | 0.64 65 |
| | 340ft. | PO2 END | 2.03 288 | 1.92 269 | 1.80 250 | 1.69 236 | 1.58 217 | 1.46 198 | 1.35 179 | 1.24 155 | 1.13 146 | 1.01 127 | 0.90 108 | 0.89 89 | 0.67 70 |
| | 360ft. | PO2 END | 2.14 305 | 2.02 285 | 1.90 265 | 1.78 250 | 1.66 230 | 1.54 210 | 1.42 190 | 1.31 165 | 1.19 156 | 1.07 136 | 0.95 116 | 0.83 96 | 0.71 76 |
| | 380ft. | PO2 END | 2.25 322 | 2.12 301 | 2.00 280 | 1.87 264 | 1.75 244 | 1.62 223 | 1.50 202 | 1.37 176 | 1.25 165 | 1.12 144 | 1.00 123 | 0.88 102 | 0.75 82 |
| | 400ft. | PO2 END | 2.36 339 | 2.23 317 | 2.09 295 | 1.96 279 | 1.83 257 | 1.70 235 | 1.57 213 | 1.44 186 | 1.31 175 | 1.18 153 | 1.04 131 | 0.92 109 | 0.79 87 |

The above chart gives the Equivalent Narcosis Depth (END) in seawater and partial pressure of oxygen (ppO2) in atmospheres absolute for various heliair mixtures at depth. To use this chart, find the desired maximum depth (fsw) in the left column. Next, follow the column to the right until the desired ppO2 or END is located. Then, follow that column upward to the top row to find the percentage of oxygen and helium (O2/HE). See the below chart for mixing instructions.

Helium Fill Pressures for Heliair

| | Desired Fill Pressure 2000 2100 2200 2300 2400 2500 2600 2700 2800 2900 3000 3100 3200 3300 3400 3500 3600 3700 3800 3900 400 | | | | | | | | | | | | | | | | | | | | | |
|-----------|--|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| _ | | 2000 | 2100 | 2200 | 2300 | 2400 | 2500 | 2600 | 2700 | 2800 | 2900 | 3000 | 3100 | 3200 | 3300 | 3400 | 3500 | 3600 | 3700 | 3800 | 3900 | 4000 |
| | 18/14 | 280 | 294 | 308 | 322 | 336 | 350 | 364 | 378 | 392 | 406 | 420 | 434 | 448 | 462 | 476 | 490 | 504 | 518 | 532 | 546 | 560 |
| % | 17/19 | 380 | 399 | 418 | 437 | 456 | 475 | 494 | 513 | 532 | 551 | 570 | 589 | 608 | 627 | 646 | 665 | 684 | 703 | 722 | 741 | 760 |
| 4 | 16/24 | 480 | 504 | 528 | 552 | 576 | 600 | 624 | 648 | 672 | 696 | 720 | 744 | 768 | 792 | 816 | 840 | 864 | 888 | 912 | 936 | 960 |
| | 15/28 | 560 | 588 | 616 | 644 | 672 | 700 | 728 | 756 | 784 | 812 | 840 | 868 | 896 | 924 | 952 | 980 | 1008 | 1036 | 1064 | 1092 | 1120 |
| % | 14/33 | 660 | 693 | 726 | 759 | 792 | 825 | 858 | 891 | 924 | 957 | 990 | 1023 | 1056 | 1089 | 1122 | 1155 | 1188 | 1221 | 1254 | 1287 | 1320 |
| Ž | 13/38 | 760 | 798 | 836 | 874 | 912 | 950 | 988 | 1026 | 1064 | 1102 | 1140 | 1178 | 1216 | 1254 | 1292 | 1330 | 1368 | 1406 | 1444 | 1482 | 1520 |
| 9 | 12/43 | 860 | 903 | 946 | 989 | 1032 | 1075 | 1118 | 1161 | 1204 | 1247 | 1290 | 1333 | 1376 | 1419 | 1462 | 1505 | 1548 | 1591 | 1634 | 1677 | 1720 |
| .× | 11/49 | 980 | 1029 | 1078 | 1127 | 1176 | 1225 | 1274 | 1323 | 1372 | 1421 | 1470 | 1519 | 1568 | 1617 | 1666 | 1715 | 1764 | 1813 | 1862 | 1911 | 1960 |
| Σ | 10/52 | 1040 | 1092 | 1144 | 1196 | 1248 | 1300 | 1352 | 1404 | 1456 | 1508 | 1560 | 1612 | 1664 | 1716 | 1768 | 1820 | 1872 | 1924 | 1976 | 2028 | 2080 |
| .⊨ | 9/57 | 1140 | 1197 | 1254 | 1311 | 1368 | 1425 | 1482 | 1539 | 1596 | 1653 | 1710 | 1767 | 1824 | 1881 | 1938 | 1995 | 2052 | 2109 | 2166 | 2223 | 2280 |
| <u>:e</u> | 8/62 | 1240 | 1302 | 1364 | 1426 | 1488 | 1550 | 1612 | 1674 | 1736 | 1798 | 1860 | 1922 | 1984 | 2046 | 2108 | 2170 | 2232 | 2294 | 2356 | 2418 | 2480 |
| 9 | 7/67 | 1340 | 1407 | 1474 | 1541 | 1608 | 1675 | 1742 | 1809 | 1876 | 1943 | 2010 | 2077 | 2144 | 2211 | 2278 | 2345 | 2412 | 2479 | 2546 | 2613 | 2680 |
| _ | 6/72 | 1440 | 1512 | 1584 | 1656 | 1728 | 1800 | 1872 | 1944 | 2016 | 2088 | 2160 | 2232 | 2304 | 2376 | 2448 | 2520 | 2592 | 2664 | 2736 | 2808 | 2880 |

The above chart provides the amount of helium to add (in psi) to an empty scuba cylinder to create the various heliair mixtures. To use this chart find the intersection point between the row containing the desired ending cylinder pressure (at left), and the column containing the desired heliair mixture (at top). The number located at the intersection is the amount (in psi) of helium required for the mixture.

Trimix Best-Mix (END 80 ft.) Fill Pressures

Best Mix Defined as $ppO^2 = 1.4$ ATA, END = 80 fsw

| | Adva | nced Dive | r Magazine | |) e | s i r | ec | l E | n | d i r | n g | C | y l i | n c | leı | r P | re | SS | u r | 'e |
|----------|-----------|-------------|--------------------------|------|-------------|-------------|------|-------------|-------------|-------|-------------|------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | 7 101 101 | 110001 1110 | 1 111494 | 2400 | 2500 | 2600 | 2700 | 2800 | 2900 | 3000 | 3100 | 3200 | 3300 | 3400 | 3500 | 3600 | 3700 | 3800 | 3900 | 4000 |
| | 13 | Oxygen | 28% Psi O2 | 330 | 344 | 358 | 372 | 385 | 399 | 413 | 427 | 441 | 454 | 468 | 482 | 496 | 510 | 523 | 537 | 551 |
| | 13 | Helium | 17% Psi He | 405 | 422 | 439 | 456 | 472 | 489 | 506 | 523 | 540 | 557 | 574 | 591 | 608 | 624 | 641 | 658 | 675 |
| | 14 | Oxygen | 27% Psi O2 | 311 | 324 | 337 | 350 | 363 | 376 | 389 | 402 | 415 | 428 | 441 | 454 | 467 | 480 | 493 | 506 | 519 |
| | 14 | Helium | 22% Psi He | 520 | 542 | 564 | 585 | 607 | 629 | 650 | 672 | 694 | 715 | 737 | 759 | 780 | 802 | 824 | 846 | 867 |
| | 15 | Oxygen | 25% Psi O2 | 294 | 306 | 319 | 331 | 343 | 356 | 368 | 380 | 392 | 405 | 417 | 429 | 442 | 454 | 466 | 478 | 491 |
| | 13 | Helium | 26% Psi He | 623 | 649 | 675 | 701 | 727 | 753 | 779 | 805 | 831 | 857 | 883 | 909 | 935 | 960 | 986 | 1012 | 1038 |
| i | 16 | Or, Oxygen | 24% Psi O2 | 279 | 291 | 302 | 314 | 325 | 337 | 349 | 360 | 372 | 384 | 395 | 407 | 419 | 430 | 442 | 454 | 465 |
| | 10 | Hellulli | 30% Psi He | 715 | 745 | 775 | 804 | 834 | 864 | 894 | 924 | 953 | 983 | 1013 | 1043 | 1073 | 1102 | 1132 | 1162 | 1192 |
| | 17 | Oxygen | 23% Psi O2 | 265 | 276 | 287 | 298 | 309 | 321 | 332 | 343 | 354 | 365 | 376 | 387 | 398 | 409 | 420 | 431 | 442 |
| | 17 | Hellum | 33% Psi He | 798 | 831 | 864 | 898 | 931 | 964 | 997 | 1031 | 1064 | 1097 | 1131 | 1164 | 1197 | 1230 | 1264 | 1297 | 1330 |
| | 18 | Oxygen | 22% Psi O2 | 253 | 263 | 274 | 284 | 295 | 305 | 316 | 327 | 337 | 348 | 358 | 369 | 379 | 390 | 400 | 411 | 421 |
| | | nellum | 36% Psi He | 873 | 909 | 946 | 982 | 1019 | 1055 | 1091 | 1128 | 1164 | 1201 | 1237 | 1273 | 1310 | 1346 | 1383 | 1419 | 1455 |
| | 19 | Oft Oxygen | 21% Psi O2 | 241 | 251 | 261 | 272 | 282 | 292 | 302 | 312 | 322 | 332 | 342 | 352 | 362 | 372 | 382 | 392 | 403 |
| | ' / | nellum | 39% Psi He | 942 | 981 | 1020 | 1059 | 1099 | 1138 | 1177 | 1216 | 1256 | 1295 | 1334 | 1373 | 1413 | 1452 | 1491 | 1530 | 1570 |
| | 20 | Oft Oxygen | 20% Psi O2 | 231 | 241 | 250 | 260 | 270 | 279 | 289 | 298 | 308 | 318 | 327 | 337 | 347 | 356 | 366 | 376 | 385 |
| L | | Helium | 42% Psi He | 1004 | 1046 | 1088 | 1130 | 1172 | 1213 | 1255 | 1297 | 1339 | 1381 | 1423 | 1465 | 1506 | 1548 | 1590 | 1632 | 1674 |
| | 21 | Oft Oxygen | 19% Psi O2 | 221 | 231 | 240 | 249 | 258 | 268 | 277 | 286 | 295 | 305 | 314 | 323 | 332 | 342 | 351 | 360 | 369 |
| | | Helium | 44% Psi He 18% Psi O2 | 1062 | 1106 | 1150 | 1194 | 1239 | 1283 257 | 1327 | 1371 | 1416 | 1460 293 | 1504 301 | 1548 310 | 1593 319 | 1637 328 | 1681 337 | 1725 346 | 1770 355 |
| | 22 | Oft Oxygen | 46% Psi He | 1114 | 1161 | 1207 | 1254 | 1300 | 1347 | 1393 | 1440 | 1486 | 1533 | 1579 | 1625 | 1672 | 1718 | 1765 | 1811 | 1858 |
| | | 0 | 18% Psi O2 | 205 | 213 | 222 | 230 | 239 | 247 | 256 | 264 | 273 | 281 | 290 | 299 | 307 | 316 | 324 | 333 | 341 |
| | 23 | Oft Helium | 48% Psi He | 1163 | 1212 | 1260 | 1309 | 1357 | 1406 | 1454 | 1503 | 1551 | 1600 | 1648 | 1697 | 1745 | 1794 | 1842 | 1891 | 1939 |
| ! | | Owner | 17% Psi O2 | 197 | 205 | 214 | 222 | 230 | 238 | 246 | 255 | 263 | 271 | 279 | 288 | 296 | 304 | 312 | 321 | 329 |
| l 🕌 | . 24 | Oft Helium | 50% Psi He | 1209 | 1259 | 1309 | 1360 | 1410 | 1460 | 1511 | 1561 | 1612 | 1662 | 1712 | 1763 | 1813 | 1863 | 1914 | 1964 | 2015 |
| L | | Ovugan | 16% Psi O2 | 190 | 198 | 206 | 214 | 222 | 230 | 238 | 246 | 254 | 262 | 269 | 277 | 285 | 293 | 301 | 309 | 317 |
| i | 25 | Oft Helium | 52% Psi He | 1251 | 1303 | 1355 | 1407 | 1459 | 1511 | 1563 | 1616 | 1668 | 1720 | 1772 | 1824 | 1876 | 1928 | 1980 | 2033 | 2085 |
| : I | 0.4 | Oxygen | 16% Psi O2 | 184 | 191 | 199 | 207 | 214 | 222 | 230 | 237 | 245 | 253 | 260 | 268 | 276 | 283 | 291 | 299 | 306 |
| | 26 | Oft Helium | 54% Psi He | 1290 | 1344 | 1397 | 1451 | 1505 | 1559 | 1612 | 1666 | 1720 | 1774 | 1827 | 1881 | 1935 | 1989 | 2043 | 2096 | 2150 |
| <u> </u> | _ | Oxygen | 15% Psi O2 | 177 | 185 | 192 | 200 | 207 | 215 | 222 | 229 | 237 | 244 | 252 | 259 | 266 | 274 | 281 | 289 | 296 |
| | 27 | Oft Helium | 55% Psi He | 1326 | 1382 | 1437 | 1492 | 1548 | 1603 | 1658 | 1714 | 1769 | 1824 | 1879 | 1935 | 1990 | 2045 | 2101 | 2156 | 2211 |
| | 28 | Or. Oxygen | 15% Psi O2 | 172 | 179 | 186 | 193 | 201 | 208 | 215 | 222 | 229 | 236 | 244 | 251 | 258 | 265 | 272 | 279 | 287 |
| ! | 20 | Helium | 57% Psi He | 1361 | 1417 | 1474 | 1531 | 1588 | 1644 | 1701 | 1758 | 1815 | 1871 | 1928 | 1985 | 2041 | 2098 | 2155 | 2212 | 2268 |
| ! | 29 | Of Oxygen | 14% Psi O2 | 166 | 173 | 180 | 187 | 194 | 201 | 208 | 215 | 222 | 229 | 236 | 243 | 250 | 257 | 264 | 271 | 278 |
| | | Helium | 58% Psi He | 1393 | 1451 | 1509 | 1567 | 1625 | 1683 | 1741 | 1799 | 1857 | 1915 | 1974 | 2032 | 2090 | 2148 | 2206 | 2264 | 2322 |
| | 30 | Off Oxygen | 14% Psi O2 | 161 | 168 | 175 | 182 | 188 | 195 | 202 | 209 | 215 | 222 | 229 | 236 | 242 | 249 | 256 | 263 | 269 |
| | | Helium | 59% Psi He | 1423 | 1482 | 1542 | 1601 | 1660 | 1720 | 1779 | 1838 | 1898 | 1957 | 2016 | 2076 | 2135 | 2194 | 2254 | 2313 | 2372 |
| | 31 | Oft Oxygen | 13% Psi O2 | 157 | 163 | 170 | 176 | 183 | 189 | 196 | 203 | 209 | 216 | 222 | 229 | 235 | 242 | 248 | 255 | 262 |
| | | Helium | 61% Psi He | 1452 | 1512 | 1573 | 1633 | 1694 | 1754 | 1815 | 1875 | 1936 | 1996 | 2057 | 2117 | 2178 | 2238 | 2299 | 2359 | 2420 |
| | 32 | Oft Oxygen | 13% Psi O2 62% Psi He | 152 | 159 | 165 1602 | 171 | 178 | 184 | 190 | 197 1910 | 203 | 210 2033 | 216 2095 | 222 | 229 2218 | 235 2280 | 241 | 248 | 254 |
| | | Helium | 62% Psi He 13% Psi O2 | 1478 | 1540 154 | 1602 | 1663 | 1725 173 | 1787 179 | 1848 | 1910 | 1971 | 2033 | 210 | 2156 | 2218 | 229 | 2341 | 2403 | 2464 |
| | 33 | Oft Oxygen | 63% Psi He | 1504 | 1567 | 1629 | 1692 | 1755 | 1817 | 1880 | 1943 | 2005 | 2068 | 2131 | 2193 | 2256 | 2319 | 2381 | 2444 | 2507 |
| | | Ovygen | 12% Psi O2 | 144 | 1507 | 156 | 162 | 168 | 174 | 180 | 186 | 192 | 198 | 204 | 2193 | 216 | 222 | 228 | 234 | 240 |
| | 34 | Oft Helium | 64% Psi He | 1528 | 1592 | 1655 | 1719 | 1783 | 1846 | 1910 | 1974 | 2037 | 2101 | 2165 | 2228 | 2292 | 2356 | 2419 | 2483 | 2547 |
| | | Ovugon | 12% Psi O2 | 140 | 146 | 152 | 158 | 164 | 170 | 176 | 181 | 187 | 193 | 199 | 205 | 211 | 217 | 222 | 228 | 234 |
| | 35 | Oft Helium | 65% Psi He | 1551 | 1615 | 1680 | 1744 | 1809 | 1874 | 1938 | 2003 | 2068 | 2132 | 2197 | 2262 | 2326 | 2391 | 2455 | 2520 | 2585 |
| | | Lichard | 55 75 1 31 116 | | .5.0 | .000 | ., | | | | | | 0_ | | | | 2071 | 00 | | |

The above chart provides the amount of helium and oxygen to add (in psi) to an empty scuba cylinder to create the best-mix for a given depth. The above listed mixtures yield a ppO2 of 1.4 ATA and an END of 80 fsw. To use the chart, first, locate on the left, the maximum planned depth. Next, locate the desired ending fill pressure of the cylinder at the top of the chart. The intersecting point between the two will designate the amount of helium and oxygen to use to create the best-mix for the planned depth.

Partial Pressure Blending Instructions:

- 1. Empty scuba cylinder of any previous gas.
- 2. Locate and add the required psi of helium from the bank cylinders into the scuba cylinder.
- 3. Allow ample time for the scuba cylinder to cool to room temperature. After cooling, adjust helium back to desired psi.
- 4. Allow cylinder to cool. Add the required psi of oxygen on top of the helium. Cool and adjust oxygen to desired psi.
- 5. Allow cylinder to cool. Top the scuba cylinder to the ending pressure with filtered air from a scuba compressor.
- 6. Allow cylinder to cool and adjust ending pressure.

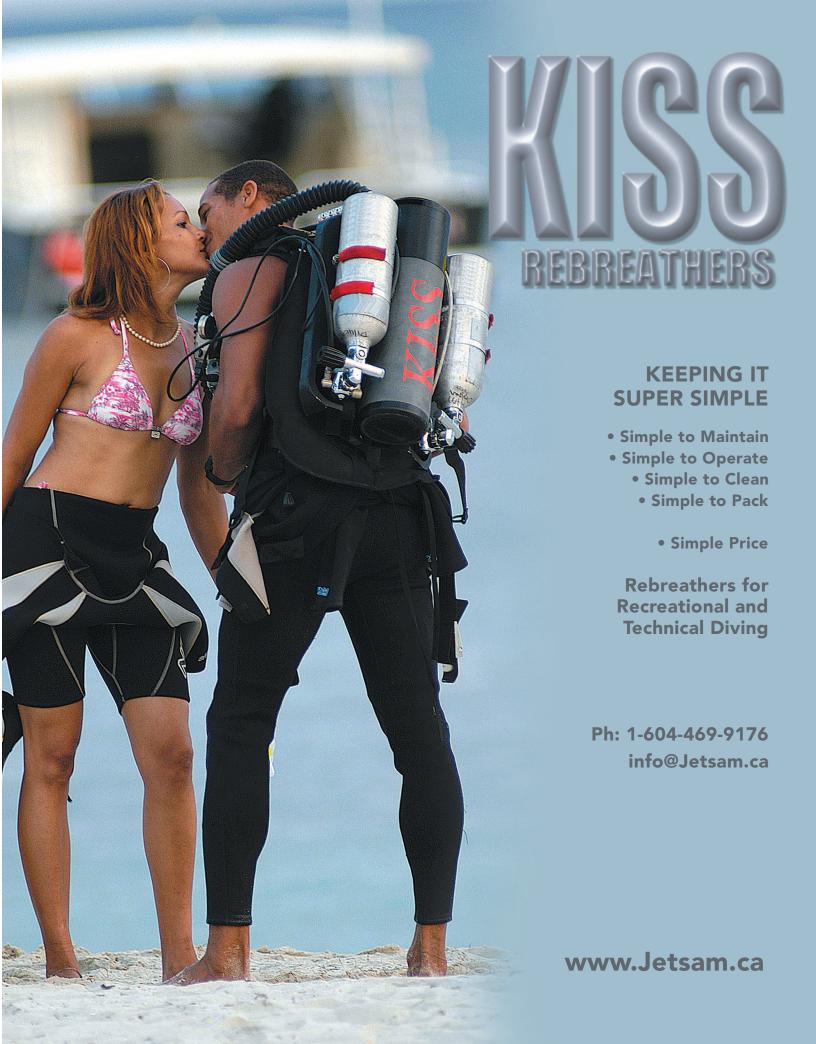
WARNING: Gas blending should be conducted by a certified blending technician only.

Trimix Best-Mix (END 130 ft.) Fill Pressures

Best Mix Defined as $ppO^2 = 1.4$ ATA, END = 730 Isw

| 1 1 1 | | Oxygen Helium Oxygen | 25% | | 2400 | 2500 | 2600 | 0700 | | | | | | | | | | | | _ | e |
|-------------|------------------|----------------------------|------------------|------------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 1 1 | 60ft | Helium | 73 24 12 24 24 2 | | | | | 2700 | 2800 | 2900 | 3000 | 3100 | 3200 | 3300 | 3400 | 3500 | 3600 | 3700 | 3800 | 3900 | 4000 |
| 1 | | | 4% | Psi He | 156 105 | 163 109 | 170 114 | 176 118 | 183 122 | 189 127 | 196 131 | 202 136 | 209 140 | 215 144 | 222 149 | 228 153 | 235 157 | 242 162 | 248 166 | 255 171 | 261 175 |
| 1 | | | 24% | Psi O2 | 148 | 155 | 161 | 167 | 173 | 179 | 186 | 192 | 198 | 204 | 210 | 217 | 223 | 229 | 235 | 241 | 248 |
| | 70 ft | Helium | 9% | Psi He | 224 | 233 | 242 | 252 | 261 | 270 | 280 | 289 | 298 | 308 | 317 | 326 | 336 | 345 | 354 | 364 | 373 |
| 4 | | Oxygen | 22% | Psi O2 | 141 | 147 | 153 | 159 | 165 | 171 | 176 | 182 | 188 | 194 | 200 | 206 | 212 | 218 | 224 | 229 | 235 |
| | | Helium Oxygen | 13% | Psi He Psi O2 | 331 134 | 345 140 | 359 146 | 372 151 | 386 157 | 400 162 | 414 168 | 428 174 | 179 | 455 185 | 469 191 | 483 196 | 497 202 | 510 207 | 524 213 | 538 219 | 552 224 |
| <u> </u> | 80ft | Helium | 18% | Psi He | 428 | 446 | 464 | 482 | 499 | 517 | 535 | 553 | 571 | 589 | 607 | 624 | 642 | 660 | 678 | 696 | 714 |
| 1 | 90ft | Oxygen | 21% | Psi O2 | 128 | 134 | 139 | 144 | 150 | 155 | 161 | 166 | 171 | 177 | 182 | 187 | 193 | 198 | 203 | 209 | 214 |
| _ <u></u> | 7011 | Helium | 22% | Psi He | 516 | 538 | 559 | 581 | 603 | 624 | 646 | 667 | 689 | 710 | 732 | 753 | 775 | 796 | 818 | 839 | 861 |
| 2 | 00ft | Oxygen Helium | 20% | Psi O2 Psi He | 123 597 | 128 622 | 133 647 | 138 672 | 143 697 | 148 722 | 154 747 | 159 772 | 164 796 | 169 821 | 174 846 | 179 871 | 184 896 | 190 921 | 195 946 | 200 971 | 205 996 |
| _ | | Oxygen | 19% | Psi O2 | 118 | 123 | 128 | 133 | 137 | 142 | 147 | 152 | 157 | 162 | 167 | 172 | 177 | 182 | 187 | 192 | 197 |
| 2 | 10 _{ft} | Helium | 28% | Psi He | 671 | 699 | 727 | 755 | 783 | 811 | 839 | 867 | 895 | 923 | 951 | 979 | 1007 | 1035 | 1063 | 1091 | 1119 |
| 2 | 20ft | Oxygen | 18% | Psi O2 | 113 | 118 | 123 | 127 | 132 | 137 | 141 | 146 | 151 | 156 | 160 | 165 | 170 | 175 | 179 | 184 | 189 |
| _ | -,-,- | Helium | 31% | Psi He | 740 | 771 | 801 | 832 | 863 | 894 | 925 | 956 | 986 | 1017 | 1048 | 1079 | 1110 | 1141 | 1171 | 1202 | 1233 |
| 2 | 30 _{ft} | Oxygen Helium | 18% 33% | Psi O2 Psi He | 109 803 | 113 836 | 118 870 | 122 903 | 127 937 | 131 970 | 136 | 141 | 145 1071 | 150 1104 | 154 1138 | 159 1171 | 163 1204 | 168 1238 | 172 1271 | 177 1305 | 182 1338 |
| | 40- | Oxygen | | Psi O2 | 105 | 109 | 114 | 118 | 122 | 127 | 131 | 135 | 140 | 144 | 149 | 153 | 157 | 162 | 166 | 171 | 176 |
| 2 | 4Utt | Helium | | Psi He | 861 | 897 | 933 | 969 | 1005 | 1041 | 1077 | 1113 | 1149 | 1184 | 1220 | 1256 | 1292 | 1328 | 1364 | 1400 | 1436 |
| T 2 | 50ft | Oxygen | | Psi O2 | 101 | 105 | 109 | 114 | 118 | 122 | 126 | 131 | 135 | 139 | 143 | 148 | 152 | 156 | 160 | 164 | 169 |
| | 200 (00) | Helium Oxygen | 38% 16% | Psi He Psi O2 | 916 98 | 954 102 | 992 106 | 1030 | 1068 | 1107 | 1145 | 1183 | 1221 | 1259 | 1297 138 | 1336 | 1374 | 1412 | 1450 155 | 1488 | 1526 163 |
| 2 | 60ft | Helium | 40% | Psi He | 966 | 1007 | 1047 | 1087 | 1127 | 1168 | 1208 | 1248 | 1289 | 1329 | 1369 | 1409 | 1450 | 1490 | 1530 | 1571 | 1611 |
| 2 | 70ft | Oxygen | 15% | Psi O2 | 94 | 98 | 102 | 106 | 110 | 114 | 118 | 122 | 126 | 130 | 134 | 138 | 142 | 146 | 150 | 154 | 158 |
| | 2 0.1 | Helium | 42% | Psi He | 1014 | 1056 | 1098 | 1140 | 1183 | 1225 | 1267 | 1309 | 1352 | 1394 | 1436 | 1478 | 1521 | 1563 | 1605 | 1647 | 1690 |
| 2 | 80ft | Oxygen | 15% | Psi O2 | 91 | 95 | 99 | 103 | 107 | 110 | 114 | 118 | 122 | 126 | 130 | 133 | 137 | 141 | 145 | 149 | 152 |
| | | Helium Oxygen | 44% 14% | Psi He Psi O2 | 1058 | 1102 92 | 1146 96 | 1190 | 1234 | 1278 107 | 1322 | 1367 | 1411 | 1455 | 1499 126 | 1543 129 | 1587 133 | 1631 | 1675 140 | 1719 | 1763 148 |
| <u> </u> | 90ft | Helium | 46% | Psi He | 1099 | 1145 | 1191 | 1237 | 1283 | 1329 | 1374 | 1420 | 1466 | 1512 | 1558 | 1604 | 1649 | 1695 | 1741 | 1787 | 1833 |
| 2 | 00ft | Oxygen | 14% | Psi O2 | 86 | 89 | 93 | 97 | 100 | 104 | 107 | 111 | 115 | 118 | 122 | 125 | 129 | 133 | 136 | 140 | 143 |
| 20.5 | | Helium | 47% | Psi He | 1138 | 1186 | 1233 | 1281 | 1328 | 1376 | 1423 | 1471 | 1518 | 1566 | 1613 | 1660 | 1708 | 1755 | 1803 | 1850 | 1898 |
| Ш 3 | 10 _{ft} | Oxygen Helium | 13% 49% | Psi O2 Psi He | 83 1175 | 87 1224 | 90 1273 | 94 1322 | 97 1371 | 101 1420 | 104 1469 | 108 1518 | 111 1567 | 115 1616 | 118 1665 | 122 1714 | 125 1763 | 129 1812 | 132 1861 | 136 1910 | 139 1959 |
| _ | 20. | Oxygen | 13% | Psi O2 | 81 | 84 | 88 | 91 | 94 | 98 | 101 | 105 | 108 | 111 | 115 | 118 | 122 | 125 | 128 | 132 | 135 |
| 3 | 20 _{ft} | Helium | 50% | Psi He | 1210 | 1260 | 1311 | 1361 | 1412 | 1462 | 1513 | 1563 | 1613 | 1664 | 1714 | 1765 | 1815 | 1866 | 1916 | 1966 | 2017 |
| | 30ft | Oxygen | 13% | Psi O2 | 79 | 82 | 85 | 89 | 92 | 95 | 98 | 102 | 105 | 108 | 112 | 115 | 118 | 122 | 125 | 128 | 131 |
| - | | Helium | 52% 12% | Psi He Psi O2 | 1243 77 | 1294 80 | 1346 83 | 1398 86 | 1450 89 | 1502 93 | 1553 96 | 1605 99 | 1657 | 1709 | 1761 | 1812 | 1864 115 | 1916 118 | 1968 121 | 2020 125 | 2071 128 |
| 3 | 40 _{ft} | Oxygen Helium | 53% | Psi He | 1274 | 1327 | 1380 | 1433 | 1486 | 1539 | 1592 | 1645 | 1698 | 1752 | 1805 | 1858 | 1911 | 1964 | 2017 | 2070 | 2123 |
| 2 | EΩα | Oxygen | 12% | Psi O2 | 75 | 78 | 81 | 84 | 87 | 90 | 93 | 96 | 100 | 103 | 106 | 109 | 112 | 115 | 118 | 121 | 125 |
| 3 | 50 _{ft} | Helium | 54% | Psi He | 1303 | 1357 | 1412 | 1466 | 1520 | 1575 | 1629 | 1683 | 1738 | 1792 | 1846 | 1901 | 1955 | 2009 | 2064 | 2118 | 2172 |
| 3 | 60ft | Oxygen | 12% | Psi O2 Psi He | 73 1331 | 76 1386 | 79 1442 | 82 1497 | 85 1553 | 88 1608 | 91 1664 | 94 1719 | 97 1775 | 100 1830 | 103 1886 | 106 1941 | 109 1997 | 112 2052 | 115 2108 | 118 2163 | 121 2219 |
| | 70 | Oxygen | | Psi O2 | 71 | 74 | 77 | 80 | 83 | 86 | 89 | 92 | 95 | 98 | 1000 | 103 | 106 | 109 | 112 | 115 | 118 |
| 3 | 70 ft | Helium | | Psi He | 1357 | 1414 | 1471 | 1527 | 1584 | 1640 | 1697 | 1754 | 1810 | 1867 | 1923 | 1980 | 2036 | 2093 | 2150 | 2206 | 2263 |
| 3 | | Oxygen | _ | Psi O2 | 69 | 72 | 75 | 78 | 81 | 84 | 86 | 89 | 92 | 95 | 98 | 101 | 104 | 107 | 110 | 113 | 115 |
| | | Helium | | Psi He Psi O2 | 1383 | 1440 70 | 1498 73 | 1556 76 | 1613 79 | 1671 82 | 1729 84 | 1786 87 | 1844 | 1901 93 | 1959 96 | 2017 99 | 2074 101 | 2132 104 | 2190 107 | 110 | 2305 113 |
| 3 | | Oxygen Helium | | Psi He | 1407 | 1465 | 1524 | 1583 | 1641 | 1700 | 1759 | 1817 | 1876 | 1934 | 1993 | 2052 | 2110 | 2169 | 2228 | 2286 | 2345 |
| 4 | | Oxygen | | Psi O2 | 66 | 69 | 71 | 74 | 77 | 80 | 82 | 85 | 88 | 91 | 93 | 96 | 99 | 102 | 105 | 107 | 110 |
| 4 | OUtt | Helium | | Psi He | 1430 | 1489 | 1549 | 1608 | 1668 | 1728 | 1787 | 1847 | 1906 | 1966 | 2026 | 2085 | 2145 | 2204 | 2264 | 2324 | 2383 |
| 4 | | Oxygen | | Psi O2 | 64 | 67 | 70 | 72 | 75 | 78 | 81 | 83 | 86 | 89 | 91 | 94 | 97 | 99 | 102 | 105 | 108 |
| | | Helium Oxygen | | Psi He Psi O2 | 1452 63 | 1512 | 1573 68 | 1633 71 | 1694 73 | 1754 76 | 1815 79 | 1875 81 | 1936 84 | 1996 87 | 2057 89 | 2117 92 | 2178 95 | 2238 97 | 100 | 103 | 105 |
| 4 | | Helium | - | Psi He | 1473 | 1534 | 1595 | 1657 | 1718 | 1779 | 1841 | 1902 | 1964 | 2025 | 2086 | 2148 | 2209 | 2270 | 2332 | 2393 | 2455 |
| 1 | 30 _{f+} | Oxygen | | Psi O2 | 62 | 64 | 67 | 69 | 72 | 74 | 77 | 80 | 82 | 85 | 87 | 90 | 93 | 95 | 98 | 100 | 103 |
| | | Helium | | Psi He | 1493 | 1555 | 1617 | 1679 | 1741 | 1804 | 1866 | 1928 | 1990 | 2052 | 2115 | 2177 | 2239 | 2301 | 2363 | 2426 | 2488 |
| 4 | | Oxygen Helium | 2010000000 | Psi O2 | 60 | 63 | 65 | 68 | 70 | 73 | 75 | 78 | 80 | 83 | 86 | 88 | 91 | 93 | 96 | 98 | 101 |
| _ | | Oxygen | | Psi He Psi O2 | 1512 59 | 1575 61 | 1638 | 1701 | 1764 | 1827 71 | 1890 74 | 1953 76 | 2016 79 | 2079 81 | 2142 84 | 2205 86 | 2268 89 | 2331 91 | 2394 94 | 2457 96 | 2520 99 |
| 4 | 50ft | Helium | | Psi He | 1530 | 1594 | 1658 | 1721 | 1785 | 1849 | 1913 | 1977 | 2040 | 2104 | 2168 | 2232 | 2295 | 2359 | 2423 | 2487 | 2550 |

The above chart provides the amount of helium and oxygen to add (in psi) to an empty scuba cylinder to create the best-mix for a given depth. The above listed mixtures yield a ppO2 of 1.4 ATA and an END of 130 fsw. To use the chart, first, locate on the left, the maximum planned depth. Next, locate the desired ending fill pressure of the cylinder at the top of the chart. The intersecting point between the two will designate the amount of helium and oxygen to use to create the best-mix for the planned depth.



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Text, photography, and illustrations by Curt Bowen

Excerpt from ADM Issue 23

To protect this base, the Japanese built large fortifications on and around the islands located within Chuuk Atoll. Large battery artillery, submarine/ship mines, and bunkers were constructed to defend against any possible Allied landing invasion. Chuuk Atoll was rumored to be impenetrable by Allied naval forces. March 17th, 1944, would provide the Allied forces with the truth about Chuuk's military might.

second invasion hailed down upon the world famous Truk Lagoon as a group of technical CCR divers, headed by Going Under Dive Center's Ron Benson, coordinated a 10-day closed circuit rebreather only assault on the sunken Japanese fleet. The use of CCR's enabled divers to conduct dives upon some of the more remote, deeper wrecks, doubled normal open circuit bottom times, and greatly cut down on outrageous helium and oxygen prices.

History of Truk (Chuuk) Lagoon

For more than a decade prior to World War II, the Japanese Empire had secretly planned their assault upon the United States at Pearl Harbor. Their intention was to swiftly cripple the U.S. naval strike capability, and gain superiority in the Pacific. Chuuk Atoll, a naturally protected deep-water port, was a superb geographical location to construct a massive military base. This base became the main supply, refueling, and armament location for the Japanese Pacific fleet. All Imperial assaults upon Allied forces were, in some manner, routed or supplied through Chuuk Atoll.

Allied forces would not attempt to penetrate Chuuk's stronghold by the land and sea invasion that the Japanese had expected. Instead, they mounted one of the largest air-sea strikes in naval history. Massing together an immense naval force that included three strike groups and nine aircraft carriers, the Enterprise, Yorktown, Belleau Wood, Essex, Intrepid, Cabot, Bunker Hill, Cowpens, and Monterey, provided the Allied forces with the ability to deliver over five hundred quickmoving, high-punching aircraft. Additional naval attack vessels also included seven battleships, six heavy cruisers, four light cruisers, twenty-seven destroyers, and ten patrol submarines.

Photo: Closed circuit

rebreather diver

explores the bow deck artillery on the San Francisco Maru.

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The initial air attacks upon Chuuk at 0600 hours were intended to obtain air superiority by engaging Japanese fighter aircraft, disabling airfields, and striking anti-aircraft positions. The following strike at 0700 hours was intended to deliver a massive blow upon enemy shipping with an emphasis on warships. Air strikes continued in fifteen to twenty minute intervals, pounding assigned enemy land and shipping targets throughout the day. March 18th, 1944, included clean-up strikes on missed and damaged shipping targets, airfields, and land based fortifications.

Within thirty-six hours after the initial assault, the Allied forces had destroyed or damaged two hundred and fifty to two hundred and seventy-five Japanese planes, sunk forty-five ships, damaged an additional twenty-seven vessels, destroyed ninety percent of Chuuk's oil supplies, and damaged over fifty percent of ground installations and airstrips.

Allied losses were minimal at twelve fighters, seven torpedo bombers, and six dive-bombers. A total of twenty-nine Allied pilots and crewmen were lost or reported missing.

Truk (Chuuk) Lagoon 2006 CCR Expedition

Going Under Dive Center's owner, and closed circuit rebreather diver, Ron Benson envisioned exploring the deeper wrecks of Truk Lagoon without the limitations of using standard open circuit equipment, and breathing gases other than air. Obviously, rebreathers in Truk would be the answer to these problems; but their use would open up a whole new can of logistical problems.

The two dive facilities of Truk provided only basic recreational wreck diving, with minimal excursions to some of the deeper wrecks by using double aluminum 80s and deep air diving.

In 2002, Ron started working closer with Blue Lagoon Resort and Dive Center, located on the main island of Moen. His desire was to bring in additional equipment such as small rebreather cylinders, sodasorb, oxygen, and helium, thus making mixed gas CCR diving possible.

After four years, CCR mixed gas diving is now possible in Truk, extending the standard 20-25 minute deep dive, using air and aluminum cylinders, to 45-60 minutes of bottom time. Non-existent helium mixtures — because of the high \$150-\$200 per open circuit fill — can become manageable at \$25. Oxygen fill costs are also reduced to a few dollars rather than the \$40 - \$50 open circuit cost. With increased bottom times and reduced decompression obligations, CCR diving is the only way to experience some of the world's greatest wreck diving.

Included in this editorial are some of the interesting and historical wrecks you can visit while in Truk Lagoon.



Japanese Destroyer Oite

Takemutsu Matsuda, captain of the Japanese light cruiser Agano, searched the horizon for any possible enemy vessels as the sun's last rays dipped below the western horizon. About 160 miles north of Truk Lagoon, the Agano, escorted by the Japanese destroyer Oite, steamed westward towards Saipan.

Lieutenant Commander W.P. Gruner, captain of the U.S. Submarine *Stark*, kept his eyes glued to the periscope as he studied the silhouette of a slow moving ship on the horizon. Dusk — a perfect time to attack and escape undetected, he thought.

"Load torpedo tubes 1, 2, 3, and 4. Range 2,400 yards, 340 degrees," barked Captain Gruner. Slowly the submarine turned nose forward into position. "Fire 1, 2, 3, and 4 torpedoes," commanded the captain. The load sound of rushing air, followed by the high pitch of spinning props echoed throughout the submarine.

Lieutenant Yasuhiko Uono, captain of the Japanese destroyer *Oite*, was also searching the glistening waters as the sun descended. He noticed the prop trails of the four speeding torpedoes heading straight for the *Agano*.

Captain Matsuda never saw the 3000-pound tubes of death before they slammed broadside into his ship. The *Agano* shuddered violently as three of the four torpedoes exploded just behind the amidships, knocking the captain and his crew to the deck. Giant flashes of light and fire engulfed much of the ship's stern. "Abandon ship," echoed throughout the *Agano*.

"Hard to port, full power ahead," ordered the captain of the Oite, as he frantically searched the waters for the hidden submarine. Large air-powered catapults launched 300-pound anti-submarine depth charges 75 yards to port and starboard off the Oite. The water behind his ship mushroomed into giant boils of steam and light as the charges exploded a hundred feet below the surface.

The last rays of the sun faded, and darkness engulfed the seas as panicked sailors rushed for lifeboats. The only light was the flame from the burning *Agano*. The *Oite* dared not light a single search strobe for fear of the prowling U.S. submarine. Rescue must wait until the morning light.

Next morning, as the sun's rays illuminated the eastern skies, the *Agano* was surprisingly still floating, listing hard to port. The *Oite* began to pick survivors out of the salty waters, the men still clinging to the floating wreckage. Over all, the *Oite* was able to rescue over 450 sailors, including Captain Matsuda. With the overload of sailors aboard the *Oite*, her captain had no choice but to run for the protection of Truk Lagoon. On March 17th, the *Oite* was radioed that a large invasion of Truk was underway, and the captain was ordered to continue into the Lagoon to assist with the battle.

Steaming south, the *Oite* entered the north pass on the morning of March 18th, a day after the initial attack. Still overloaded with survivors from the *Agano*, the *Oite* steamed full power ahead towards Moen Island.

March 18th, just before sunrise, nine American torpedo bomber pilots aboard the aircraft carrier,

Bunker Hill, slipped into their cockpits. Their mission was to search the northern atoll and attack any remaining vessels trying to escape or left floating from the previous day's assault. Launching off the aircraft carrier, the torpedo bombers' engines whined as they climbed above the clouds. Within an hour, the bombers were over the northern atoll. To their surprise, they found a Japanese destroyer steaming into the Lagoon.

"Evasive maneuvers," commanded Captain Uono as he attempted to ward off the aerial attack upon the Oite. Under full power, the destroyer turned sharp to port, then to starboard. Anti-aircraft fire from the deck filled the skies with bullets in an attempt to ward off their attackers. The 450 survivors of the Agano were ordered below deck as bullets from the strafing attacks of the enemy planes took their toll of casualties.

Dropping in from the low clouds, two U.S. torpedo bombers lined up the Japanese destroyer. Skimming 50 feet off the surface of the water, the two bombers screamed into position to unleash their deadly payload. Less than 1000 feet from the destroyer, both planes dropped their 2000 pound torpedoes, then banked hard upwards and to the left to escape the onslaught of anti-aircraft guns aboard the *Oite*.

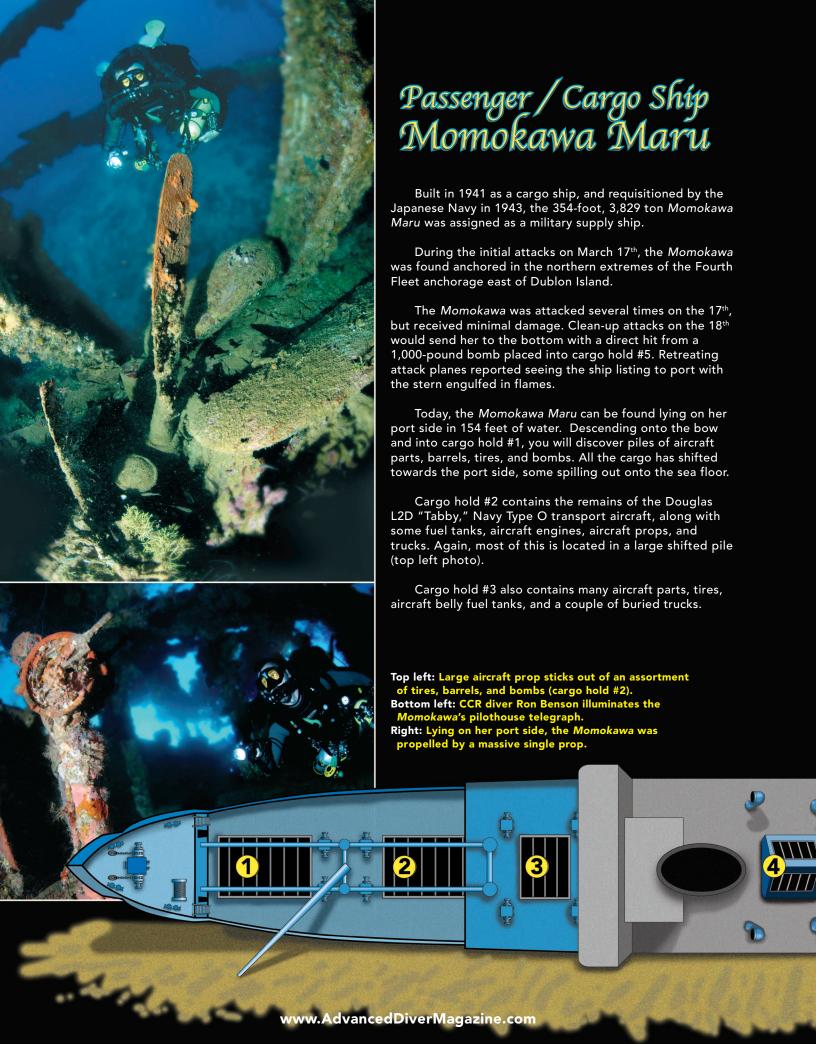
Captain Uono's eyes followed the white paths of death as they sped towards his ship. He had no time to maneuver away as the torpedoes slammed into the *Oite*'s port side. One impacted just behind the bow anchors, and the second directly at the ship's engine room. A deafening explosion rocked every inch of the ship as it tore metal from metal, and bone from flesh. Sailors below deck were killed instantly by the explosion, or lay dazed and confused. Sailors above deck were either blown into pieces or hurled from the ship like papers in a tornado. As the water rushed in, no sailor could even save himself.

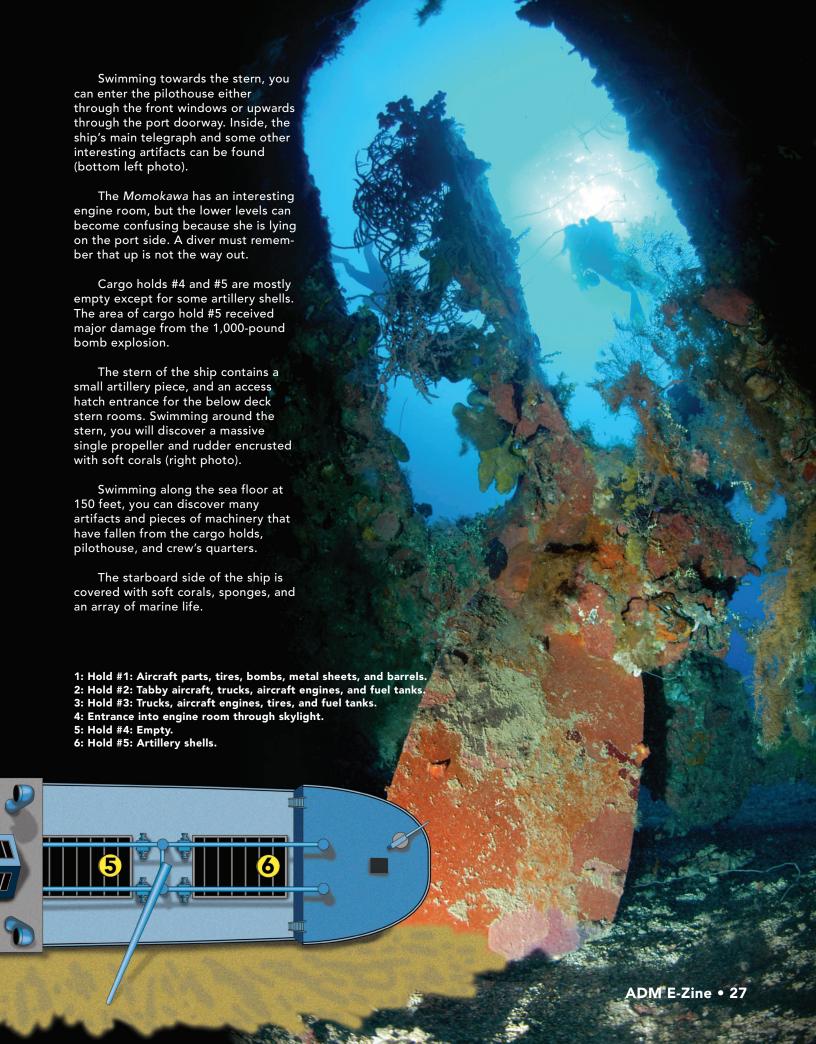
As the bombers raced away from the destroyer, the pilots watched as their torpedoes smashed into the *Oite's* side. The massive explosions engulfed the ship with smoke and flames as the bow section buckled under the pressure. The *Oite* split in half and sank in less than one minute, taking over 600 Japanese sailors to the bottom of Truk Lagoon with her.

Diving the Oite

Due to its distance from the main diving wreck zones and increased depths, the *Oite* is seldom explored. As the *Oite* split in half during the sinking, the section from just aft of the pilothouse to the bow turtled and smashed hard into the sand floor, crushing all the superstructure and deck guns underneath the hull. Tilted slightly to the port side, it is possible to squeeze up underneath the bow section and into some of the bow sections. The forward bow torpedo explosion is easily seen from the massive hole and destruction. The stern of the *Oite*, from just aft of the engine room, sits upright on the sand floor. The main deck sits at 180 feet, with the sand at 202 feet. The *Oite* has twin brass props half buried in the sand. Anti-aircraft guns and a large main battery gun point towards the sky. Lifeboat davits and a depth charge rack can be examined on top of the deck.

Many artifacts, including china, bullet casings, the ship's bell (or maybe the *Agano*'s bell), are stowed away just below the stern battery gun. Multiple human remains can be found within the wreckage, along with some books.







The pilothouse, galley, and crew's quarters have received major damage. The primary reason for visiting the *Hoki Maru* is located in holds #4 and #5, towards the stern of the ship.

Hold #4 contains many radial A/C engines, bombs, depth charges, beer bottles, and mines.

Descending through the hatch cover beams of cargo hold #5, you will come upon a large bulldozer supported on hatch cover beams (top right photo). Swimming below deck, towards the starboard side, you will find an interesting tractor (bottom right photo). Continuing below deck and towards the stern, a strange white mist encompasses several Isuzu Type 94 trucks. Continuing around towards the port side of the cargo hold, several more flatbed type trucks come into view along with a diesel steamroller.

Descending over the stern, large twin screws and rudders come into view, with the sea floor at 165 feet.

Exploring in the masses of twisted metal below the pilothouse, crew's quarters, and partially collapsed engine room, some gauges, machinery, and human remains can be located (left photo).

Caution must be taken not to stir up the silt in lower sections of this wreck. It contains large amounts of some type of caustic chemical that can cause skin burns and eye irritation.

Left: Diver discovers a pile of human bones within the wreckage.

Upper right: CCR diver Jim Rozzi examines the large bulldozer in cargo hold # 5.

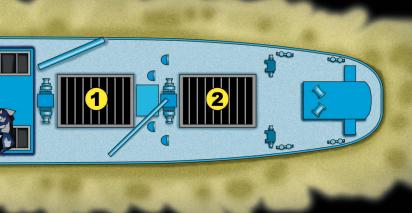
Middle right: Isuzu-type 94 trucks located on level 2 in cargo hold #5.

Lower right: Farm-type tractor located on level 2 in cargo hold #5.

1: Hold #4: Mines, depth charges, bombs, and radial AC engines. 2: Hold #5: Bulldozers, movers, trucks, tractors, and diesel roller.

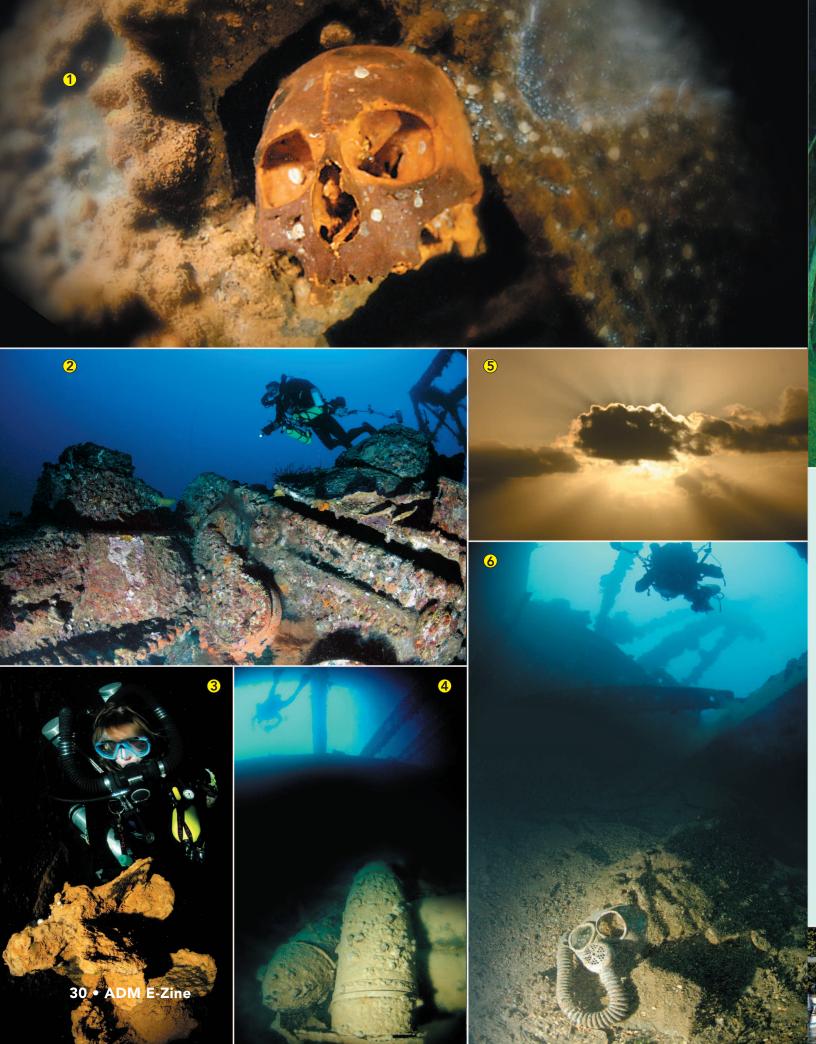


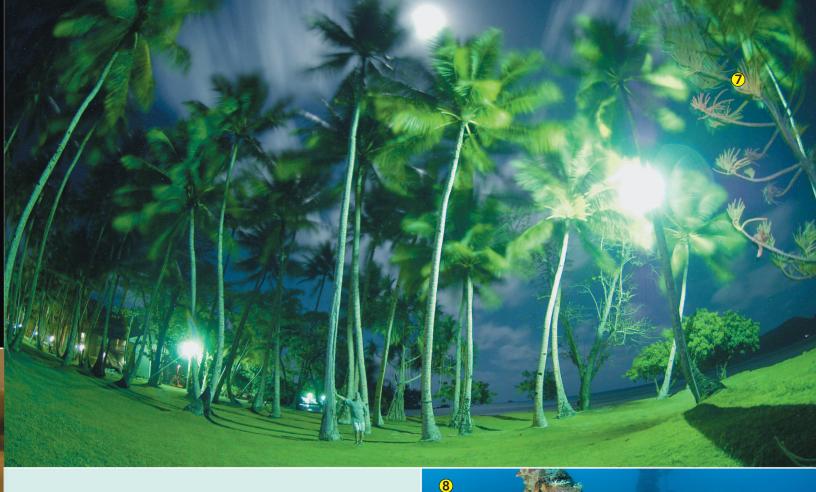






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- 1: Signs of the sacrifices of war, a Japanese sailor's skull and bones are located deep within the engine room of the Yamagiri Maru.
- 2: Japanese-type 95 light battle tanks are located on the starboard foredeck of the San Francisco Maru.
- 3: CCR diver Amy Ferguson examines the prop of a 25-foot long, 2000-pound torpedo, located within hold #2 of the Heian Maru.
- 4: Scattered throughout cargo hold #5, these 14-inch diameter artillery shells were destined for one of the large Japanese battleships, Yamato or Musashi.
- 5: After a long day of awesome wreck diving, it is nice to grab a couple drinks at the Blue Lagoon's tiki hut and watch the beautiful Pacific sunset.
- 6: A lone gas mask sits upon a pile of small arms debris, as CCR diver Jim Rozzi drops into cargo hold #1 of the Nippo Maru.
- 7: A 25-second night camera exposure creates an interesting photography effect as the full moon illuminates the Blue Lagoon's palm tree covered grounds (author in photo).
- 8: Several Japanese Howitzers with splinter shields sit on the aft deck of the Nippo Maru (diver Jim Rozzi).
- 9: Exploring deep into the third engine room level of the *Heian Maru*, CCR diver Ron Benson discovers this engine room telegraph and engine pressure gauge panel.

Below: Workers for the Blue Lagoon Resort travel from distant islands each morning aboard these small motorboats.









Built in 1938, and requisitioned in 1940 by the Japanese Navy as a special aircraft transport vessel, the 437-foot, 6,928-ton Fujikawa Maru served many roles during WWII.

On the morning of March 17th, the Fujikawa was anchored just off the southeastern side of Eten Island. In the early morning light, a skeleton crew was attending to standard morning duties. Many of the crewmembers were ashore working on construction details.

As all hell broke loose with the arrival of the Allied Air Force from the north, the Fujikawa became a sitting duck, unable to pull anchor and escape because of the lack of crew. It would be only a matter of time before the inevitable torpedo would breach her hull. And at 1420 hours, the attack aircraft of the Bunker Hill strike force 3E recorded a direct torpedo hit, with a large smoke and fire burst to follow.

On March 18th, the Fujikawa was found by the clean-up attack aircraft, heavily damaged but still floating, anchored in the same location; nothing that a 1,000-pound bomb on her port quarter wouldn't take care of. Thus, the Fujikawa Maru was sent to her final resting place.

Today, the highlight of the Fujikawa is the Japanese Zero aircraft fuselage located in cargo hold #2 (cover of this issue), and the ship's engine room that is accessible through skylights just behind the smoke stack.

- 1: Toolbox located on the lowest starboard level of the ine room.
- 2: CCR diver Ron Benson swims over the massive engine
- 3: Pressure gauges located on the lower third level of the starboard engine room.
- 4: Pair of pilot binoculars located beside an airplane
- cockpit in cargo hold #2. 5: Standard pressure gauge located just aft of the engine
- 6: CCR diver Ron Benson examines the inside of a Zero tack aircraft, located in cargo hold #2 (cover photo). Above right: Thousands of beer bottles scatter the

second level of hold #5.

Right: CCR diver Ron Benson illuminates a large air compressor located in the lower level of the engine

1: Hold #1: Aircraft parts, machine guns, torpedo, and boat motor.

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- 2: Hold #2: Zero aircraft fighters, fuel barrels, and aircraft wings.
- 3: Hold #3: Empty. 4: Hold #4: Barrels.
- 5: Hold #5: Gas cylinders, beer bottles, and hose sections. 6: Hold #6: Bottles, china, mess kits, and water tanks.

MILITATION







Searching cargo hold #2, you will discover the remains of four of the famous Japanese Zero fighter aircraft, along with wing sections and some personal artifacts.

Exiting the cargo hold and swimming towards the stern, you will pass the upper superstructure and over the engine room.

Descending through the engine room skylight, you will encounter a large, triple-level engine room separated by grated catwalks and walls. Winding past the massive engine cylinders, and to the second level, you will discover a very interesting workshop containing a large air compressor, nicknamed R2D2, a workbench, lathe, supply rooms, and tool chests. Further exploration, along the forward engine room and down to the third level, will bring you to a wall of electrical contacts, pressure gauges, and the ship's engine room telegraph (see above). Additional exploration reveals a multitude of gauges, tools, and equipment.

Exiting the engine room and swimming towards the stern, you will find two more cargo holds containing many different sized gas cylinders, beer bottles, and debris.

The Fujikawa was fitted with two large 6" deck guns, one on the bow and another on the stern. Descending over the stern towards the sea floor, the rudder and massive single screw propeller come into view (right).

The Fuji's engine room is a must-do for exploration and photography.

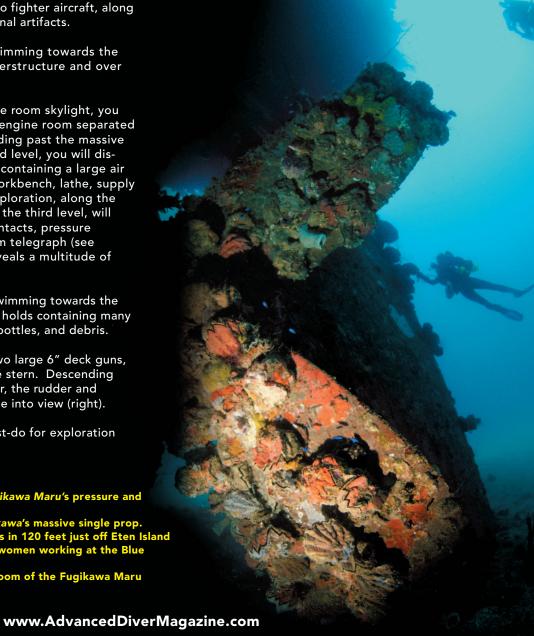
Above: Ron Benson examines the Fugikawa Maru's pressure and

- Right: A diver poses behind the *Fugikawa*'s massive single prop.

 1: Japanese torpedo bomber "Jill" sits in 120 feet just off Eten Island

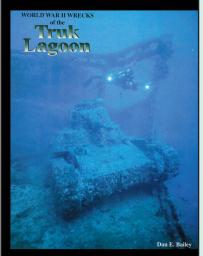
 2: One of the lovely Chuuknese local women working at the Blue
- 3: Gauges located inside the engine room of the Fugikawa Maru

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Above: Our quest for the ten-day visit at Truk Lagoon was to visit and photograph as many of the best wrecks and their artifacts as possible. Jim Rozzi and I hired the "best" guides Blue Lagoon had to offer. Anthony Sickemen (left) and Rendy Rotenis (right) proved invaluable and well worth the extra money.



Do not visit Truk Lagoon without first buying this incredible book. Your visit to the shipwrecks and islands of Chuuk will be a hundred times better knowing the impressive history of Operation Hailstone.

518 pages with hundreds of color and B/W photography.

ISBN 0-911615-06-07



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Below: CCR Divers: (Left to right) Lee Selisky, Curt Bowen, Maria Nordlund, Patty Mortara, Jim Rozzi Chris Jackson, Rick Peters, Amy Ferguson, Rob Infante, Bob Ferguson Keith Holmes, Bill Mattson, Ron Benson, Mel Clark

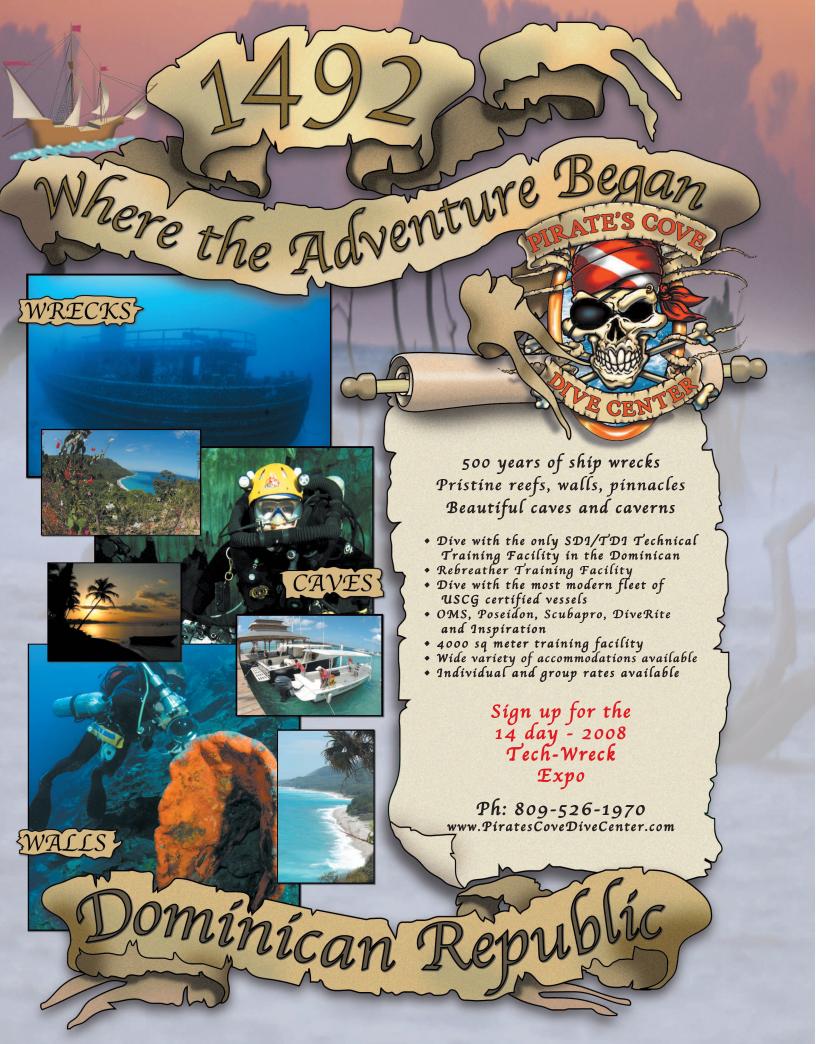
Curt McNamee, Ren Mortara











KEY WEST DEEP WRECK-INVASION

Text by Rob Infante Photography by Tim Taylor

he Ghost Fleet of Key West conjures up images of Spanish galleons. In fact, it refers to a number of US WWII-vintage warships that were sunk for weapons testing. In early November a group of us visited it with Andrew Driver of Mad Dog Expeditions. Louis Barson, Tim Robinson, Fabrice Pilato, Chuck Wade and Andrew dove Megs, Simon Hutchins dove a Vision-equipped Classic Inspiration, Doug Rice dove an Evolution, and I had my Prism. Rounding out the bunch was Joe Zimmerman, OC Joe, who reminded us all why we dive rebreathers!

Photo: Andrew Driver (foreground) and Doug Rice decompressing over the wreck of the Wilkes Barre

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The RV Tiburon is an excellent platform for this kind of diving, with a fill station on board, plenty of space for 9 divers, and wireless internet access even when we were on the wrecks. Thanks to Jackie it also supplies the best food, hands down, I've ever had on a dive trip. A trained chef, each breakfast, lunch and dinner was a delight, with steak sandwiches, pork roasts with mango salsa, stuffed salmon, grilled chicken with yoghurt curry sauce, etc. Cracking good tucker. We all had our own rooms, so no one had to be offended by snoring (or worse - Jackie makes a killer bean salad), and with four outlets per room we were able to skip the musical-rechargers game.

For Day One we decided to make a shallower acclimation dive onto the USS Curb. Something was lost in translation though, and what several of us thought was going to be a 130' dive was actually 190' to the sand. No worries, we all had basically the same setup for the whole week, so with a little tweaking of the dive plan it was Game On. The Curb, a salvage vessel, is 214' long, intact and upright, with a history noteworthy to Northeast wreck divers: She was one of the first vessels to arrive when the Shalom struck the Stolt Dagali, and helped escort the Stolt's stricken bow portion back to port. Chuck, Joe and I were Team One, with Chuck splashing a couple of minutes early to secure the line. The seas were moderate when we rolled in, and it took a bit of work to pull down the line. A goliath grouper greeted us on the deck, and another visited me when I went down to the sand at the keel. I spent the week diving wet with no hood or gloves, though I had to relearn not to touch things. I poked at one of the pink lichen-looking shells attached to the hull and got a nice slice in my finger. At that depth red colors were long

since filtered out, so it looked like black ink spilling out of me. Kind of neat, I felt like a squid. There were plenty of places to penetrate, albeit with lots of monofilament, and it seemed like all of us were entangled at one point or another. The ascent got a little more exciting for me when my Prism went tits-up. I heard a {tink!} sound, then O2 started dumping out. Joe Z was right there, so he helped me unplug the line, then safeguarded a precious handful of manual-injector parts until I could get topside. First time I've had to do OC bailout, there's no drill like for real. For the rest of the dive I was running through calling SMI and having them overnight me parts, but when I got back onboard I found I could work it out. The circlip holding my injector snapped, but by lucky happenstance it matches exactly the one diverite uses for their reels, and better yet supplies in the kit for same.

Andrew Driver talks about how much he hates Day One on a trip, and I can see his point. Besides my cut finger, minor entanglement and exploding O2 injector, I also had a misfilled diluent bottle (66%!) and issues with my dive computer. After a midday nap I came onto the deck to see my Prism looking like an extra from a bondage porno film. While lurching from some wave action it had made a good-faith effort to slip under the bench and over the side! I can not even contemplate in the theoretical how I would respond if my rig had actually disappeared. Probably it would involve wailing, histrionics, maybe some smelling salts, the five stages of grief, sackcloth and ashes. You know, dignified stuff. Fortunately that was it for issues with me, and the rest of the week was smooth as silk.





It was a fun group on this trip. Some of the guys I had dived with before, others I knew by name, and a few were new to me. There was a nice vibe, and we had a good time kicking back on the Tiburon, telling stories and busting chops. We hadn't even left the dock before Fabrice's pale skin had him dubbed French Vanilla. By the end of day one I was GDR for Go Deep Rob, as I always like to see what is all the way down on the bottom. Not the worst thing I've been called, even if you use the more conventional take on the first two letters. Louis had a little flooding incident, but didn't seem too fond of it when I called him Louis Leakey. The black cowling on my Prism was too hard to see from above, so at Andrew's behest I put a large white X on it with duct tape. It made me feel like a target. I especially enjoyed Tim's tales of doing business in Japan, and Simon's stories about working on a billionaire's yacht were a window to a life I'd never thought about. Perhaps I should try this whole billionaire thing, it sounds like fun!

Dive Two was on the Wilkes Barre, the Lethal Lady. Built at the Philadelphia Navy Yard in '44, she received 4 battle stars for service in the Pacific during World War Two. Numerous airmen owed their lives to her rescue operations after being shot down, and she also came to the assistance of the Bunker Hill after it was crippled and set ablaze by kamikaze aircraft. Off Iwo Jima she served in a ground support role, pounding shore defenses, and later turned back a determined counterattack on the ground. It took 7 minutes to descend the 210' to the deck, due to the current and scope on the line. Chuck again did the tie in, setting up a mooring so we could easily return throughout the week. The ship, originally 608' long with a 63' beam, was blown in half during weapons testing in 1972, with the stern intact and upright. We set off down the deck, pulling ourselves up each of the massive 6" turrets (that would be the bore size, not the actual height of the turret!) They were amazing; you pull over the top of one and are looking right down the muzzles of the ones behind it. Each one was like a Joseph Cornell box, its own little still life of fish, crabs, shrimp, yellow and red sponges, and red oysters. Returning to the stern, I dropped down to 257' looking for the props, but they had been removed. Ascending the starboard stern was incredible, a 50' wall of steel and life. Barracudas swirled all about us, including a 7' beast, and kept us company through our hour of decompression. In the spirit of Key West we all engaged in some frantic man-on-man action, at least until we brought jon lines and were able to spread out on the deco stops.

Rob Infante tries out the LAR-V oxygen rebreather ADM E-Zine • 39





For Tuesday we returned to the Wilkes Barre. A scooter team was formed so Joe, Chuck and Andrew could cut loose, and for the rest of the week I buddied up with Simon and Louis. Conditions were much finer than the day before, and descent was a breeze down the much-more-vertical anchor line. Dive One I led off down the deck to the cut, then curled up and over the superstructure for the return. High on the port side is a rope that leads to the bow section, which lies on its starboard side 250 away. Nice time to have a scooter! For Dive Two I brought my camera along, and took some shots of the long gun barrels as we weaved in and out of them. Things got a little squirrelly later when we surfaced, as one of the divers exhibited symptoms of a type 1 decompression hit in the shoulder. He stayed on O2 for a while, but when symptoms didn't improve it was time to go to the next level. Fortunately we were eminently well equipped to help him. One of the beautiful things about going on a trip with Mad Dog Expeditions is that Andrew brings a portable decompression chamber (Greg Norman's old one, for you golf fans.) Within about 30 minutes we had it rolled out and inflating, with the diver inside. Simon has been training on the same type of chamber for the yacht, so it was a perfect opportunity for him to do some hands-on work under Andrew's watchful eyes. Joe too has chamber training, so he stayed inside to assist as a tender. Louis and I made ourselves useful by keeping the two sets of doubles in rotation, since the chamber uses standard tanks to pressurize. It was fascinating to watch, and fortunately all symptoms disappeared after a few hours in the pot.

The following day we headed out to the USS Kendrick, with F-18's doing over flights as we left the harbor. Commissioned in 1942, the Kendrick spent World War II serving in the Mediterranean. In 1968 she was destroyed in weapons testing, and came to rest in 320' of water, intact and upright. 348' long with a 36' beam, she is long, sleek and mean. Captain Tim dropped a shot bag, and the scooter team splashed 30 minutes before the rest of us to tie it in. It had fallen only 60 or so feet from the wreck, and by the time we descended they had it tied in beautifully right by the stack. There was no current whatsoever. Louis, Simon and I dropped like parachutists straight down the line. Simon clipped a strobe and I led off, eager to see the propellers. They did not disappoint, with 60' long prop shafts, and a wicked pitch befitting a 35 knot vessel. The ship is cracked in half just abaft the main superstructure, and came to rest about 15' back and inline, like a giant cross-section. We were moving with a purpose, and managed to circumswim the ship. The Kendrick struck bow first, buckling the deck upwards at a 25 degree angle. I slipped over the bow just to see that knife-like keel pointed at me.

Above left: The portable chamber in action. From left: Rob Infante, Tim Robinson, Simon Hutchins, Andrew Driver.

Bottom left: Doug Rice gearing up for another exciting wreck dive.

The next day we decided to take it easy, which in the context of the trip meant only doing one dive to 250', again on the Wilkes Barre. The scooter boys took the opportunity to follow the line out to the bow, and were given a tour by a friendly 6' reef shark. My group did a little penetrating, but it was mighty silty (all the more so when Louis pulled an old phone from the muck), not to mention full of wires and line. The hangar in the stern was especially interesting, with rails for shuttling and launching the planes. The lovely weather held up, and deco was spent on a dead-vertical line, with the boat aimlessly pirouetting atop it.

Andrew had brought along his LAR V oxygen rebreather, which used to belong to Will Smithers. He was kind of enough to set it up, so Joe and I spent some time playing around with the crabs and juvenile fish at the dock. It felt very strange to be on a chest-mounted rebreather with no PO2 monitor, but it sat fairly nicely on the body and was fun for a change.

For the last day we elected to return to the Kendrick. The seas had kicked up a bit, but were still reasonable. Oddly, I found myself fairly narc'd at first, though it went away after a few minutes. An enormous Roughtail Stingray lay placidly in the sand, easily the size of my dining room table. On deco I was the farthest

back on the stern line, and started to get concerned when I realized Joe was missing. Not good, not good at all. I finally decided that if his buddies didn't seem too upset then he must be ok, and put morbid thoughts aside. Then I looked next to me where Fabrice had been a moment ago. He was nowhere to be seen. I looked up, down, each side - Holy Shit! No Fabrice! Finally I looked behind me, to see him 20' back and chugging into the current - apparently he had used both hands to get his jon line out, and was swept back a bit. After that I decided to put my head down and mind my own damn business, this den mother stuff is not good for the nerves.

After a week of moderate to excellent weather Mother Nature showed us the back of her hand, but it still only cost us the last day. It had its upside too: what cooler way to leave Key West than in a convertible in the rain, flying over the bridges and still dry with the top down?

The Wreck Diving Gang: From left: Fabrice Pilate, Tim Robinson, Andrew Driver, Rob Infante (top), Doug Rice, Chuck Wade. Absent: Louis Barson, Simon Hutchins





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PIRATES COVE DOMINICAN REPUBLIC

Text By Curt Bowen
Photography by Mel Clark and Curt Bowen

ouching down at Santa Domingo's airport in the Dominican Republic, I made my way through customs and grabbed my standard two oversized dive equipment boxes from baggage claim.

Exiting the airport I quickly spotted Heiko Kretschmer, one of Pirate's Cove Dive Center's coordinators and a good buddy from previous trips to the DR, standing in the reception area holding a sign that read Kim Smith. Apparently Kim Smith, owner of Jetsam Technologies, was scheduled to land in about 30 minutes.

The bow of a small tugboat is covered with a living kaleidoscope of color. A CCR diver examines the wreckage for possible photo opportunities.

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You know, in life there is always some type of job that you've always wanted to do, such as be a fireman, a policeman, school crossing guard, one of the guys who sells cologne and mints in the men's room at a club, etc. Call me a freak, but I have always wanted to stand in an airport holding a sign with someone's name on it. So, for the next half an hour or so, I stood holding Kim Smith's sign and hollering "Kim!" in the direction of some of the toughest, roughest-looking biker-type guys exiting the airport.

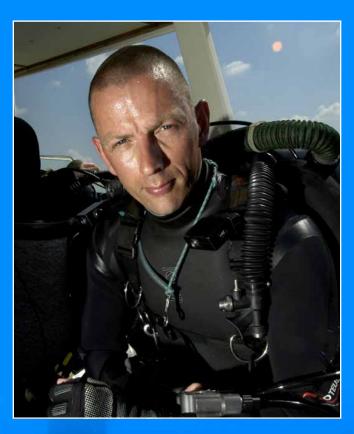
Finally, the smiling face of the real Kim Smith exited the airport. "Lucky you showed up," I told her. "I had three big guys wanting to take your spot."

Pirate's Cove, the Dominican Republic's only technical dive center, is located about a 45-minute drive east from Santa Domingo, the capital of the Dominican Republic. A dream child of the owner, John Mattera, Pirate's Cove has been under continuous construction and development for over three years. The final plans are for an extensive resort / dive center that will contain multiple guest rooms, a 10,000 square foot dive training facility, pool, tiki bar, bungalow-style rooms, and a complete professional staff to coordinate any dive desired by the guests.

I had flown to the DR to cover a unique event called Rebreather / Wreck Weeks. Not to be confused with only rebreather divers who dive wrecks, the event was more of a combination of open circuit divers mingling with closed circuit divers. It was designed as an educational event for those who might be interested in purchasing a rebreather, but needed that little additional personal experience before deciding what to buy.

Right: Jetsam Technologies owner Kim Smith, manufacturer of the KISS Classic and Kiss Sport, returns from a casual reef dive, just a short swim from shore.





The week did not center only around rebreathers, but also featured wreck hunting courses on how to operate magnetometers, side-scan sonar units, and special guest speakers who spoke on shipwreck hunting and artifact recovery procedures.

As a bonus for the attendees, a representative from several of the rebreather manufacturers also attended, such as Diverites Optima, Silent Diving Systems Evolution and Inspiration, the new Evo CCR, Delta P's Ouroboros, and Jetsam Technologies with the Kiss Sport and Kiss Classic. Each was scheduled for an evening presentation of their rebreather configurations and inpool demonstrations.

Diving the Dominican

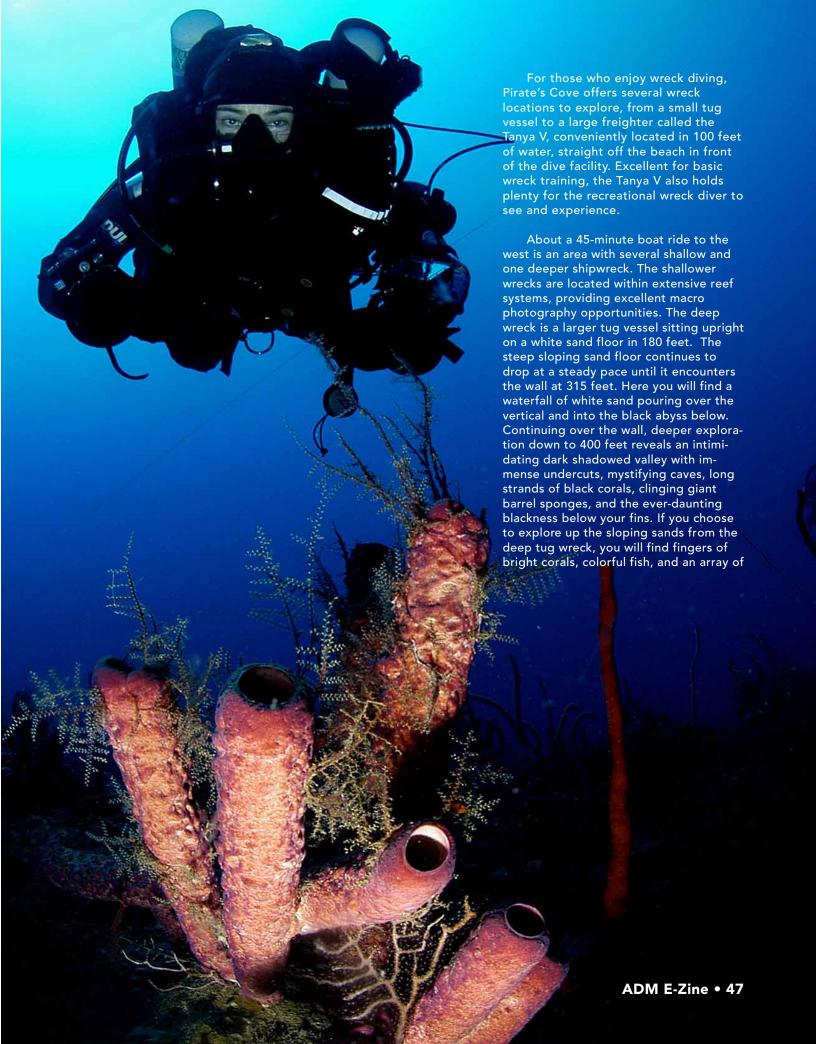
The Dominican Republic's southeastern shores are a technical diver's training playground. Within a few minutes, one of the multiple Pirate's Cove dive vessels can transport you to a large variety of dive environments: shallow, midrange, and deep reefs, pinnacles, shallow wrecks, deep wrecks, and unexplored walls.

Left page, top: Ouroboros diver Phil Short prepares for a deep reef dive onto the "B Cup" reef. Starting at a depth of 90 feet, the sea mound type reef drops on both sides to well over 200 feet and onto sloping sand flats.

Left page: The deep tugboat wreck sits upright on white sloping sand in 180 feet. CCR diver swims around the bow and alongside the starboard side of the vessel.

Right page: CCR Instructor Mel Clark poses above a clump of red tube sponges located on the dive site called "Blue Mountain," a large mountain-shaped reef that rises up from a depth of over 250 feet to the summit at 70 feet.

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Haskel Mini Sport Booster 4" Drive Air Driven Gas Booster

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| 100 | FILL TIMES (min) | | | | | | |
| | Fill Target Pressure (PSI) | | | | | | |
| 2000 | | | 2400 | 3000 | | | |
| | (1) | Pump-Up Time After Equalization: 19 CUFT Cylinder (Minutes:Seconds) | | | | | |
| | Gas Supply Pressure (PSI) | 500 | 4:31 | 6:00 | | | |
| | sur | 1000 | 1:44 | 3:00 | | | |
| | Pres | 1500 | 0:33 | 1:31 | | | |
| 100 | pply | 2000 | 0:12 | 1:00 | | | |
| The same | Sul | 2400 | 0:00 | 0:32 | | | |
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DIVING OFF THE BEATEN TRACK

Maldives on the Eagle Ray liveaboard Indian Ocean

had been on three aircraft out of three different cities on two continents, and had logged about sixteen hours of in-flight entertainment and airline food. I needed a break. Now I stood on the dock of the water taxi service on Male Island in the Maldives Islands archipelago, feeling a cool breeze blowing off the Indian Ocean. Had all of the traveling been worth it? All would be revealed over the next ten days. I had been invited by my pals to join them on the liveaboard MV Eagle Ray, and here was the tender boat, known locally as a dhoni, just berthing at the water taxi dock.

My bags are loaded, and our Divemaster for the week, Malik, is all smiles and handshakes as he organizes everything. After a twenty minute boat ride, he proudly points out the *Eagle Ray*, our home for the next ten days.

Of course, the first question is: "When are we going to have our first dive?" Malik, who knows my pals, tells us that he will have us in the water within a few hours. And true to his word, we are dropping into the 82°F water and gently blowing bubbles. (I had to leave my CCR at home as the Eagle Ray is not set up for pumping oxygen.)

The water is a deep blue as we drop down onto Kuda Giri pinnacle that starts at 20 feet (6m) and drops down to about 110 feet (32m) where an old Japanese trawler lies disconsolately waiting for more divers to inspect her deteriorating hulk. The bow rises from the sandy bottom, and it is covered in dark



red coral that coats it like a living shawl. The old wheelhouse is a veritable jungle of hanging cables that make it difficult to penetrate much more than a few feet, especially as I have my camera rig with me. Inside the wheelhouse, myriad species of fish seem to be playing tag oblivious to my presence.

Exploring the rest of the wreck allows me to see schools of bannerfish, butterfly fish, and lonely grouper patrolling the decks, again unmindful of me or the other divers probing and exploring their home. I didn't get time to explore the stern of the wreck to see what the propeller looked like; I'm diving open circuit and had already been down for 40 minutes. Leaving the wreck, I swim to the wall and I'm amazed at the very active life on the reef; anthias, fusiliers, basslets, grouper, and rock cod of every size and hue all congregating among the coral reef. All too soon the dive is over, and I'm back on board the tender chewing on fresh coconut, and looking forward to a cold drink.

Our next dive is exhilarating, to say the least. Malik has warned us that there are strong currents at this dive site, Bodu Muli. Sure enough, my buddy, Tim, and I are ensconced in a rollercoaster of a dive, swept along in about a one and a half knot drift dive. Take photos? No chance, we were moving too quickly! We eventually surface, and the tender eventually picks us up as it has been following the line of SMBs that litter the surface of the sea. The divers seem to be scattered over a large area of the dive site. Our agenda allows us to go back to the Eagle Ray for lunch, and then we are off to Cocoa Corner for a spectacular dive along a long wall just teeming with fish and a huge selection of morays. Giant, clouded, honeycomb, and yellow-mouth all seem to live in harmony with each other, and again they show little or no fear of the divers. Turtles forage for food in the coral, white-tip sharks cruise by, and the everpresent grouper swim close by inspecting us, then darting away when I need them to pose for photos. In all, a great day of diving.

And this is repeated over the next few days. One thing I've noticed is that most of the dive sites look like anagrams that would be at home in the New York Times. Names like Gurado Chul, Matha Kandu, Gethi Muli, Hemando Tila nestle between site names that I can pronounce like Aquarium (isn't there one in every diving location?) and Lion's Head.





Another invigorating dive is had at Biya Giri as the currents carry us around at speed, and up-currents whisk us up and down the wall. All the divers are suitably awestruck with the dive site, as we discuss the dive later over breakfast. This is where I am awarded the "klutz of the day" award as I slice my finger on my dive knife, and need stitches to seal the wound. Luckily, Dr Rob Strauss is one of my buddies, and, sure enough, he has come prepared. He inserts four stitches in my finger with number four thread (tech medical jargon), sterilizes the wound, administers an antibiotic, and we agree that it would be prudent for me to sit out the next dive to give my wound a chance to start healing. I'm told that it was a great dive at Gurado Channel. But I'm not really listening to my fellow divers, as I'm sulking because I didn't dive. But the afternoon dive beckons. Again I'm not disappointed, even though I'm beginning to get a bit fed up with the strong currents. There are times when I surface after a dive, and see that Eagle Ray's dhoni is an alarming 800 yards away — and I have to wait ten minutes while it chugs along to collect me.

In all, the diving is pleasant and easy. We are lucky enough to see eagle rays, mantas, and large pelagics of many types. The walls are in great shape, and the sheer numbers of fish defy belief; the life really puts the Caribbean to shame. As far as looking after the divers, there is plenty of food, albeit usually lukewarm, but I guess that just matches the temperature of the showers in the cabins. Eagle Ray is not the most luxurious liveaboard I've ever been on, but it is adequate. As it used to say on my reports from school, "Could do better with more attention to detail." But all in all, it is a good diving vacation.



"Critter Heaven" The Southern Gulf Islands of British Columbia

Article and photos by ADM Staff Writer John Rawlings

he very first time anyone dives with me they quickly understand some thing: I am a "Critter Guy." From the moment I enter the water, I am "on-scan," and an unusual or rare species will turn an ordinary dive into a treasure for me. My long-suffering dive buddy and best friend, "Sparky" Campbell, has spent many a dive hovering nearby while I happily spend most of our bottom time photographing some tiny creature that caught my eye. My bookshelves quite literally groan with marine mammal, fish, and invertebrate identification books, most of them dog-eared from years of constant use. Two of my absolute favorites are Coastal Fishes of the Pacific Northwest, and Marine Life of the Pacific Northwest, both co-authored by Andy Lamb.

A self-described marine naturalist, Andy began his career while majoring in Zoology at the University of British Columbia. Working at the Vancouver Aquarium, he managed to "weasel" his way into the back where the fish were cared for...his love affair with the denizens of the undersea world was well on its way. While still a student, he dived, fished, and trawled all over the Pacific Northwest gathering specimens for the aquarium, gaining valuable knowledge that would serve him well throughout his career. Earning a Bachelor of Science Degree in Biology and Life Sciences, Andy was hired as a "Fish Culturalist" for the Department of Fisheries and Oceans Canada, a position he held for 22 years. He began teaching a 10-week marine identification course out of his home – a hugely popular course. The interest from divers led to a book, and in 1986 Andy and underwater photographer Phil Edgell published **Coastal Fishes of the Pacific Northwest**, which has since sold over 40,000 copies.

In 1996 downsizing struck, and Andy found himself 50 years old and unemployed. Returning to his "roots," he was hired as a School Program Coordinator specializing in marine invertebrates at the Vancouver Aquarium, where he spent the next decade in a position that he loved. In 2005, a new book appeared - *Marine Life of the Pacific Northwest*, co-authored with his friend Bernie Hanby. This book was the project of a lifetime. Originally intended to cover only invertebrates, it instead evolved into the "ultimate" book covering everything from seaweed to fishes. The first and second printings sold out quickly, and a third is planned. The moment I laid eyes on it, I knew I had to have a copy. 2005 was also the year that Andy bid farewell to the Vancouver Aquarium.

Left: A colony of Yellow Zoanthids, Epizoanthus scotinus, dances lazily in the current. This species reproduces both sexually and asexually and is thus capable of producing large and extremely dense colonies, sometimes carpeting a particular location. Most divers mistake them for tiny anemones

In early 2007, I heard that Andy had retired to the Canadian Gulf Islands in British Columbia. The Canadian Gulf Islands lie like a gleaming necklace of green emeralds alongside the east coast of Vancouver Island. With over a dozen large islands and hundreds of smaller islets, the diving around them can be absolutely superb. Together with his wife, Virginia, Andy had opened the Cedar Beach Resort, a small island bed-and-breakfast on Thetis Island — specially catering to critter-loving divers! I was on the telephone that very day arranging a six-dive weekend trip!

Three weeks later, Sparky and I were crossing the Canadian border and heading to the first of our ferry rides across to Vancouver Island, the truck heaped with scuba gear and camera equipment. We caught the ferry at Tsawwassen on the British Columbia mainland, and traveled west for several hours across the Strait of Georgia, finally disembarking at Nanaimo on the eastern shore of Vancouver Island. From Nanaimo, we drove south to catch our next ferry at Chemainus, a friendly little town facing the chain known as the Gulf Islands. A small ferry, befitting its tiny destination, then took us across to Thetis Island.

Thetis Island is a tiny, emerald green jewel – a perfect location for getting away from it all as well as diving! The island was named after H.M.S. *Thetis*, a British 36-gun frigate that surveyed the area between 1851 and 1853. Appropriately, "Thetis" was originally the name of a sea goddess from Greek mythology. Only around 350 permanent residents live on Thetis, all of them intensely proud of their island and the friendly community they have built together – one in which doors are never locked, fresh eggs are delivered in your mailbox, and children attend classes in a one-room school house. We loved it at first sight.

Andy has a partnership with a gentleman named Peter Luckham...the kind that isn't a written agreement but based on a handshake and the trust between two friends. Peter has lived on Thetis Island for about 20 years, and owns 49th Parallel Dive Charters. Andy and Virginia spoil visiting divers ashore while Peter spoils them afloat – together they make a fine team. Peter is constantly searching for new dive sites, and knows the underwater contours of the area like the back of his own hand, locating dozens of dive sites over the years. He has a particular love for historical shipwrecks (we will be



returning to dive a few with him!), while also working hard with the Artificial Reef Society of British Columbia to bring new wrecks to the area. Peter spent a year of his life working tirelessly toward getting a Boeing 737 aircraft sunk off Chemainus – a massive undertaking. Sparky and I had seen and photographed the aircraft when it was being prepped on the mainland two years before, and we now had the opportunity to dive the airliner to see for ourselves how much has been claimed by the sea.

Our first day on the water dawned clear and cold, the sun glinting off the surface like diamonds, and a radiant blue sky stretching off past the horizon with only a whisper of clouds. After a deep sleep and a marvelous breakfast at Cedar Beach, we were well rested, the camera gear was prepared, and we were ready to dive! Peter collected us at the public pier with his 37-foot dive boat Xihwu (pronounced like "key-kwah"), which is the local Coast Salish dialect's word for the Red Sea Urchin. The Xihwu is a spacious dive boat – I'm 6' 4" tall, yet I found myself easily able to stand up inside the cabin.

Our first dive site was the Active Point Pinnacle in Stuart Channel, a long rock formation set in mid-channel like a spine. Gazing into the water from the stern, the visibility looked like it was going to be superb and our excitement built. I chose to dive with my AF-S Nikkor 12–24 lens, thinking that the visibility at depth would be conducive to wide-angle photography. That proved to be an error. My enthusiasm had taken us to the islands in the spring – not the best time of year to dive the Pacific Northwest due to the heightened chance of plankton blooms and subsequent low visibility. (Fall and winter are the best times of year for diving, when at times visibility can approach 100 feet and rival the tropics.)

Horizontal visibility for the first 15 feet from the surface was superb, but then we entered what can only be politely described as a layer of snot. This layer was a plankton bloom typical of spring in the Pacific Northwest...a little disappointment after our initial euphoria. We dropped beneath the bottom of the plankton layer at around 50 FSW and entered a darkened realm, virtually all light from the surface blocked by the thick layer above. Visibility was around 15 feet at best, and there was a lot of particulate matter in the water.

An abundant and intensely predatory species of sea star, a Sunflower Star, Pycnopodia helianthoides, encounters a Red Sea Urchin, Stroffgylocentrotus fanciscanus, while hunting. Receiving a spiny reception from the urchin, the Sunflower Star's arms recoil back from the contact. Valued for its roe, the Spiny Red Sea Urchin is collected commercially up and down the West coast of North America.

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I stewed over my decision to shoot wide-angle, took a few test shots, grimaced at the results, and promptly shifted over to shooting wide-angle/close-up shots of the variety of animals abounding on the long rocky reef, the Tube-Dwelling Anemones (*Pachycerianthus fimbriatus*) in particular attracting my eye. Despite the disappointing visibility, we emerged after the dive with some fine photos, grinning broadly at Andy and Peter while the former thrust bowls of hot clam chowder into our hands to warm our souls as we eagerly chatted with him about some of the species we had seen.

Another dive on the first day was Xihwa Reef – home of the sunken Boeing 737. Ever since we had first seen the plane perched on huge blocks near Vancouver, we had wondered where she would end up. We eagerly strode off the stern, dropping into the rich emerald green water. Plunging down the line through the soupy plankton layer, the outline of the huge aircraft slowly began to take shape, a few bright white Plumose Anemones on the fuselage becoming visible before anything else. Perched above the bottom on huge metal stands, the plane sits as if flying and divers can swim both beneath her and into the interior. Fascinated by the marine growth on the exterior, I photographed several species now making the plane their home, while Sparky entered an open hatchway and proceeded to the cockpit

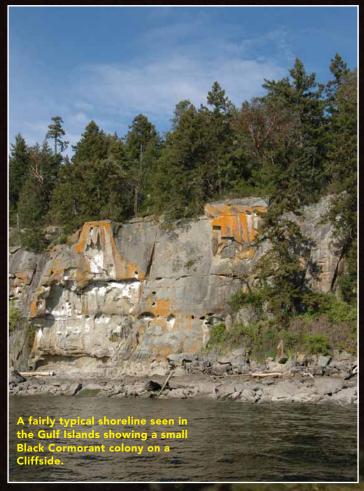
to ham it up for the camera. The plane has been down for just over a year and already there is a lot of life on her – she will become increasingly impressive in years to come.

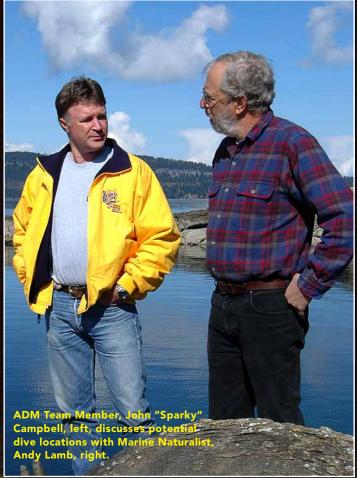
A sloping rocky wall adjoins the plane, home to wolf eels, massive sunflower sea stars, and invertebrates of all kind. Heading back to shore at the end of the day, slurping down more of Virginia Lamb's delicious homemade chowder, we grinned at each other...it had been a good day.

The next day dawned with Peter collecting us directly from the rocks in front of Cedar Beach, and shooting over toward Galiano Island, where the first dive of the day would be on Spanish Hills Wall. Andy had told us that the wall was covered with life of all kinds, and I grinned in anticipation as we slowly sank down into the deep green depths alongside its rocky face.

I had set up my system for macro photography using my AF Micro Nikkor 60mm lens, and within seconds of leaving the surface I was delightedly aware that the choice had been a good one. Creatures of all kinds scuttled or swam about while the often garish colors of stationary invertebrates looked as though I were peering through a kaleidoscope. Looking like plants but actually extremely active animals, Feather Stars, Florometra









serratissima, remained stationary until touched and then waved their arms about in an excited flurry. Sparky actually found one hitching a ride, attached to the carapace of a large Puget Sound King Crab. Bright red Slipper Sea Cucumbers, *Psolus chitonoides*, dotted the wall – resembling bright red Christmas tree lights whenever the spotting lights from my DS-125 strobes happened to chance upon them. Tiny Scalyhead Sculpins with their starburst eyes darted here and there while the larger Copper Rockfish, Kelp Greenlings, and the occasional Lingcod perched haphazardly on ledges, waiting until our approach to show alarm and then dart away into the murk.

The creatures I shall remember most, however, were the crabs...they were everywhere...huge fluorescent Puget Sound King Crabs, large spider-like Tanner Crabs, the physically bizarre Rhinoceros Crabs and Heart Crabs, and hundreds upon hundreds of tiny colorful Hermit Crabs of various species. There were so many crabs that sometimes the wall seemed to "move" with their scurrying. Had I been using film and limited to 36 shots, I would have been frustrated; but, due to the wonders of digital technology, I surfaced with well over 100 shots from this one dive alone. Until Andy and Peter point me toward something even better, Spanish Hills Wall will remain etched in my mind as the dive site to remember from this trip.

Returning to shore at the close of the day's diving, Sparky and I each went in different directions as we prepared to bid farewell to this magical location. He took off in a sea kayak, exploring across the bay, while I sat on shore with my laptop going through photos from the dives. It wasn't ALL work for me, though! I was later to be found taking advantage of the aromatic cedar sauna down by the cove, and sipping on a glass of wine while watching an otter play along the shore. Just more pleasant memories of a place that I'm certain I will return to again and again.

Cedar Beach Resort: www.cedar-beach.com 250-246-9770

49th Parallel Dive Charters:

www.divemaster.ca 250-252-0758

Below: The bizarre heart-shape on its carapace indicating how it received its common name, the red eyes of a Heart Crab, *Phyllolithodes papillosus*, glare back at the camera lens. As with many lithode crabs, the Heart Crab is naturally camouflaged and often overlooked by divers. The Northern Pacific has more different species from the Lithodidae family than any other region on Earth, which strongly suggests that the family may have evolved in this area.

Expedition Grade Dive Gear



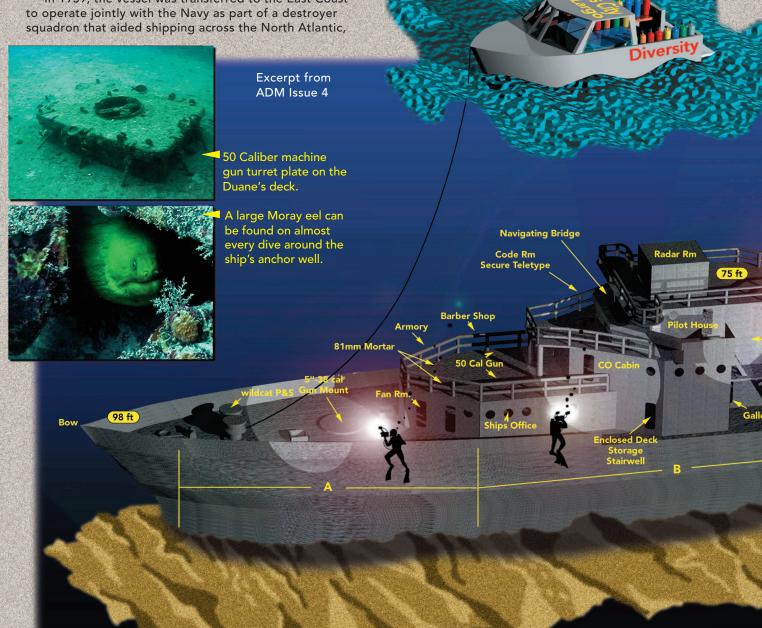


History of the Duane

The USCGC Duane was so named after William Duane, Secretary of the Treasury to President Andrew Jackson. Launched and commissioned in 1936, she was built at the Navy Yard in Philadelphia, Pennsylvania. The Duane was also a 327-foot Cutter, and her primary assigned duties were law enforcement, as well as search and rescue off the coast of California.

In 1939, the vessel was transferred to the East Coast

as well as detailed weather patrol. Some of her achievements during World War II included a rescue of 46 survivors from the Tresillian, A British merchant ship torpedoed by a German U-boat in 1941. In 1943 with



assistance of a sister ship named Spencer, The Duane sank a German U-boat and true to her rescue assignments promptly picked up the 22 crew members from the Nazi vessel.

One of the most histrionic episodes in the Duane's career occurred in 1942. For three days she aided the rescue of 250 survivors of a tragedy involving the U.S. Army Transport Dorchester. An accident that sadly claimed the lives of 350 crew members, 4 of them clergymen who graciously gave up their life preservers to save other men. An act of heroism that will continue to sound in our collective memory.

In Vietnam, the Duane served as part of the Coastal Surveillance Force from 1957-1968. Upon her return from Vietnam, she resumed her peacetime mission as an OSV. Suppression of drug trafficking along the East Coast of the U.S., training future officers, and maintaining military readiness were among her new duties. On August 1, 1985 she was decommissioned as the oldest active United States military vessel.

History of the USCGC Bibb

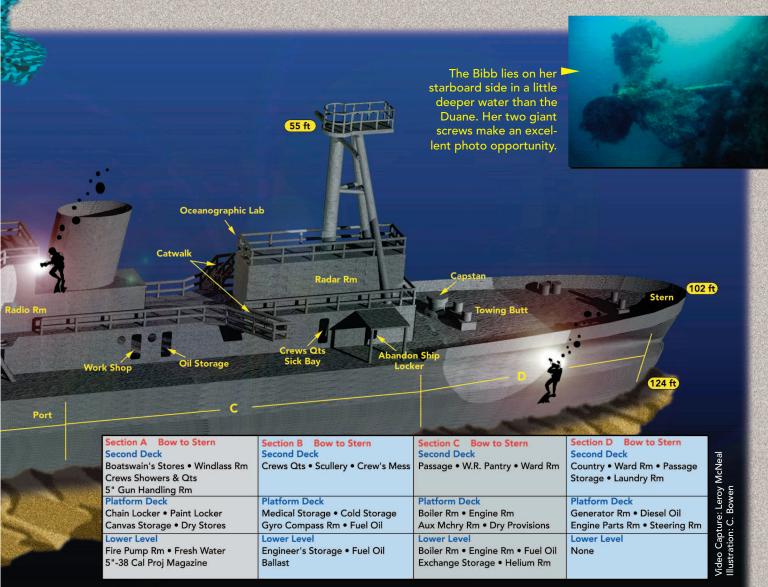
The 327-foot United States Coast Guard Cutter Bibb was built in 1935 and launched in January of 1937 by the

U.S. Navy Yard in Charleston, South Carolina. Named after George Bibb, Secretary of the Treasury under President John Tyler, the ship was commissioned in March of that same year for a series of routine assignments before becoming one of the first cutters in the North Atlantic assigned to weather station patrol.

With America's involvement in World War II, the Bibb found herself transferred to the Navy by Executive Order in 1941. After undergoing extensive modifications which included weaponry, the Bibb now took on patrol and convoy duties in the North Atlantic, Mediterranean and Caribbean.

The Bibb enjoyed some notable successes during wartime. In 1942, she recovered 61 survivors from the British Merchant ship S.S. Penmar. In 1943, the crew of the Bibb rescued a total of 235 men. 202 came from the U.S. Merchant vessel S.S. Henry Mallory, and the remaining 33 were from a torpedoed Greek Merchantman called the S.S. Kaliope. This single-year rescue total was unequaled by any other ship.

After the war, the Bibb returned to her peacetime duties, and once again became a vital part of the Coast Guard's life



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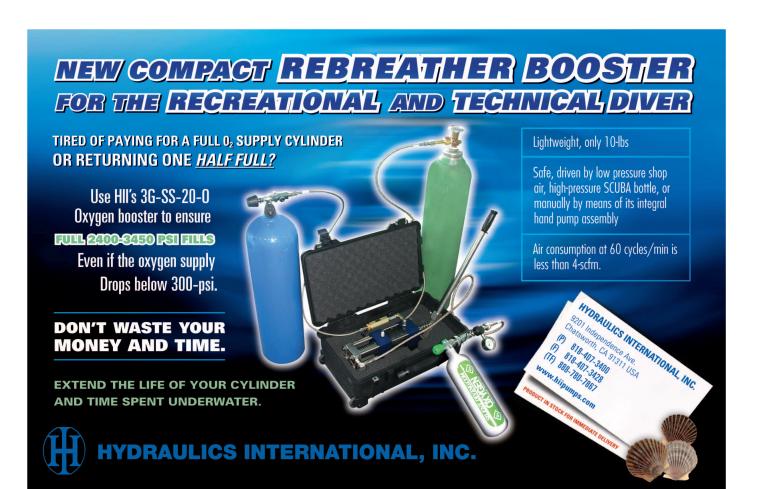
saving force. The ship's most dramatic rescue came in 1948, as the vessel braved gale force winds and dangerous seas to rescue all 69 survivors of the Bermuda Sky Queen, a transatlantic airliner which plunged into the icy cold waters of the Atlantic. Though her greatest contribution lay in saving lives, the Bibb's successes also included several drug seizures before being decommissioned on September 30, 1985.

Both the Duane and the Bibb were turned over to the U.S. Maritime Administration for disposal after being decommissioned. An association of Florida Keys' businesses lobbied successfully to have both ships sunk off of Key Largo for the purpose of becoming artificial reefs. In November of 1987, the two proud cutters were sent to the Keys to carry out their final mission-a one way trip to the bottom. The utmost care was used in sinking the two ships, without the use of dynamite in order to protect their structural integrity. The Duane was the first to go on the 27th and the Bibb followed on the 28th. Two new artificial reefs were now gained in the Florida Keys.

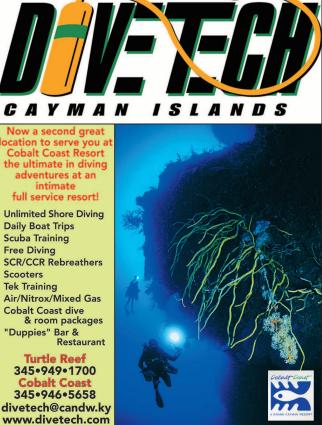
You may choose to dive either the Duane or the Bibb. However the Duane is dived more frequently because of her shallower depth. Lying on a flat, sandy bottom the Duane rests upright with her stern at a depth of 120ft, approximately 1 mile south of Molasses Reef past the Sanctuary borders. Her position is indicated by a large yellow marker and mooring buoy visible even in choppy seas. On good days, visibility can exceed 100 feet, however due to her location in the Gulf Stream, strong currents can make this wreck undivable.

The Bibb overturned while sinking and rests on her starboard side at a depth of 140 feet. At present, she is designated by a lone buoy, and is slightly more difficult to locate. As with the Duane, the currents here are also extremely powerful. Visibility is about the same as the Duane given the type of day. The two ships rest about a quarter mile from each other.

In order to make the Duane and Bibb safer for divers to explore, openings, hatches and doorways to areas below the main deck were welded shut. Doorways above the main deck were welded open in most places to lessen the chances of trapping divers. Most areas are accessible and safe above the main deck. They are still in relatively good condition with an abundance of marine life inhabiting numerous crevasses and spaces of the two vessels. Both ships are equally rewarding and despite being comparatively modern, both ships possess an equally interesting history.







39th Annual NACD Seminar



featuring

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Brett Hemphill

"Karst Underwater Research Exploration at Weeki Wachee Cave System"

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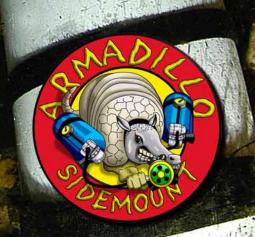


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The Death of Technical Diving Dragons Lair - Crystal Beach Cave

Liftbag Ops

One Hand Numbering

Ponderosa

Remembering Sheck Exley

Submarine Coast Terrence Tysall

Vienna

by: Curt Bowen

by: Curt Bowen

by: Shelly Orlowski

by: Jarrod Jablonski

by: Michael Garman

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by: Stephen Brady by: ADM

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ADM Issue 2 *Additional articles not listed*

N.E.S.T.

XlacahExploration

Tank Marking for Multiple Mixtures

Hydro Atlantic

Lake Invaders Beneath Cloud Mountain

Truk

World Record Traverse 14,000 feet

Equipment Configuration

Northern Lights - Key Largo Florida

Drift Decompression

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by: Jesse Armantrout

by: J. Jablonski & G. Irvine

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by: Joe Rojas

by: J. Bowden & A. Kristovich

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ADM Issue 3 *Additional articles not listed*

Sidemount Diving

Grand Cayman Carrie Lee Wreck

Oxygen Énriched Trimix HID High Intensity Discharge

Methox!

Halcyon Rebreather Fantastico

S-16 WWI US Submarine

Sabak-Ha

Extreme Depth

Advanced Nitrox Dive Planning

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Lake Erie's Mystery X Schooner

by: Lamar Hires by: ADM

by: ADM by: Curt Bowen

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by: James Rozzi by: Andreas Matthes

by: B. Vestol & J. Bowden

by: Curt Bowen

by: Chris Laughrey

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ADM Issue 4 *Additional articles not listed*

In Search of New Life Cis-Lunar Rebreather Cenotes of the Riviera Maya Scientific Diving

GUE - Britannic Expedition Artifact Preservation - IRON Duane & Bibb - Key Largo Florida

Cannon Ball Cave **RGBM Deep Stop Modeling** Cave Survey Techniques

Cave Diving Group - John S. Buxton Wes Skiles - Capturing Nature

Survival at Sea

by: Curt Bowen by: Richard R. Nordstrom by: Steve Gerrard

by: Joe Rojas

by: Anthony Rue

by: Andrew White

by: C. Williams & L. Bowen

by: Joe Rojas by: T. O'Leary & B. Wienke

by: Curt Bowen

by: Jim Rozzi

by: Wes Skiles

by: Andrew White





ADM Issue 5 *Additional articles not listed*

Antarctica

Arrested for Shipwreck Diving! Beneath the Top of the World Daniel J. Morrell Lake Huron Larry Curtis Photography Lost Mines of Wisconsin

Back Mount / Side Mount Recreational Wrecker RGBM Full Up Phase Tables

Silver Bank Humpback Whale Yonaguni Pre-Ice Age Temple? by: Henrik Lovendahl

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by: Dr. Brett Cormick by: Richard J. Reichenbacher

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by: B. Wienke and T. O'Leary

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Additional articles not listed Steven J. Auer Cave Photography by: ADM Beacon Woods Cave Exploration by: Tony Hyatt Diving into the Kauhako Crater Lake by: Michael Garman Dzonote Maya by: Curt Bowen ADM Gas Fill Charts by: ADM **GUE Global Underwater Explorers** by: Tina Rhea Journey Beneath Jurassic Park by: M.Salvarezza Lowrance Pompano Beach Florida by: Curt Bowen Featured Photographer / William M. Mercadante Neon Photography by: ADM The Pit Sistema Dos Ojos by: Jill Heinerth

Additional articles not listed

ADM Issue 7 Altitude Diving Bonito Brazil Into the Abyss Jungle Mix Gaining Access Straits of Mackinac Oxygen Mathematical Computations Roatan Honduras Roatan Express USS Saufley DD-465 Southern California Featured photographer - Steve May U-352 Class VII-C German Submarine

Lake Huron's Elusive Wexford?

by: Bruce Weinke by: Curt Bowen by: Jeffrey Bozanic by: Curt Bowen by: ADM by: Dr. Bruce Wienke by: ADM by: Rusty Farst by: B.Lawson by: Michael Kane by: ADM

by: Jeff Barris

by: Steve Lewis

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Lake Erie's Schooner C.B. Benson Stolt Dagali - Manasquan New Jersy Dive Planning Dzonot-lla The Furtive Frogfish Hole in the Wall Return to the Ice Queen's Palace Medical Concerns for the Tech Diver OXFORD - Lake Erie Brett Seymour - Photography Gulf of Mexico Oil Rig Diving Continous Nitrox - Trimix Blending Warm Mineral Springs

by: Roberto Hashimoto by: Tom Isgar by: Varesha Ives by: Brian Kakuk by: Bruce Wienke by: Mike Wachter by: Michael Salvarezza by: Bart Bajorkman

by: Curt Bowen

by: Georgann Wachter

by: Jeff Barris by: Eric Fine

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ADM Issue 9 *Additional articles not listed* Deep Into the Abyss USS Algol - New Jersy Armadillo - Side Mount Rig **Expedition Bacalar** CUBA - Liveaboard Oceanus by: Rusty Farst Diamond Knot Wreck Jungle Mix II - The Ascent

MS Rhein - Dry Tortugas Florida Wⁱlliam Dooley - Featured photographer

Yonaguni - The Stage

Where White Sharks Fly In Search of Virgins - Yucatan 2001

by: Joel Silverstein by: Jeff Barris

by: Brett Hemphill by: Linda Bowen

by: John Rawlings by: Linda Bowen by: Michael Barnette

by: Tom Isgar by: ADM

by: Gary Hagland by: Chris Fallows by: Curt Bowen





Additional articles not listed ADM Issue 10 **Exploration Beyond the Sump** by: Jason Richards Reduced Gradient Bubble Model by: Bruce Wienke Cave Diving and Conservation by: Jeffrey Bozanic Coral Sea Trio by: Bob Halstead Wild Dolphin Filming Expedition by: Dan Malone Cities Service Empire Looking Deeper into the Florida Keys by: Mark Zurl by: Michael C. Barnette Oxygen Clean is a Myth Speleo Plongee by: Bart Bjorkman by: Jon Bojar Pacific Northwest Photographer by: ADM by: Jeff Barris RMS Oregon Side Scan Sonar by: Curt Bowen Silty Secrets by: Jitka Hyniova

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Bikini Atoll

John J. Boland - Lake Erie

CDG Britain's Cave Diving Group DZIBILCHALTUN Exploration XLACAH

Giant Pacific Octopus

Deep in Grand Cayman

Hidden Worlds Cenotes Paddlewheel Wreck

Sistema de Paraiso - Cozumel Mexico

Diving the Salem Express Sting of the Scorpionfish USS Wilkes-Barre

by: Curt Bowen by: Jeffrey Bozanic

by: Jeff Barris

by: jon Bojar

by: Michael Garman

by: John Rawlings

by: Leroy McNeal

by: Brain Renton

by: Jim Rozzi

by: Scott Carnahan

by: John Duggan

by: Tom Isgar

by: Jim Holt

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Tulamben Bali

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The Emerald Sea

USS Emmons

Fossil Diving on the Cooper River

Galloping Gertie

High-Tech Diving in a Low-Tech Era

Pozzo Del Merro

PWLL-y-Cwm Wings - Tools of the Trade by: Miria Denlay

by: Tom Isgar

by: Bruce Wienke

by: Aldo Ferrucci

by: Robert Underhill

by: John Rawlings

by: Gary Hagland

by: Curt Bowen

by: John Rawlings

by: Rob Polich by: Dr. Giorgio Caramanna

by: Duncan Price

by: Scott Carnahan





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Canada's Barkley Sound Deep Helium

Interview with Martyn Farr

Gavin Newman Photography

Ice Island

Return to the Lusitania

Diving into a 72 Year-Old Mystery NASIM II

Beacon Woods / Waynes World Cave

Endangered Cave - Bermuda

The Discovery of the SS Keilawarra

Diving the Moravian Karst

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by: John Rawlings by: Bruce Wienke

by: Jon Bojar

by: ADM

by: Jill Heinerth

by: Leigh Bishop

by: John Rawlings

by: Aldo Ferrucci

by: Beth Somers by: Thomas M. Iliffe

by: Kevin Denlay

by: Jitka Hyniova

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Wolf Eels NAECO Wreck Fiat BR20 Cicogna

Kamloops

Seventy Fathoms Deep

Cave Diving for Science Sea Fever - Bahamas Diving Adventure

Deep RGBM Swimming with Arctic Whales CH47 Chinook Helicopter

Rancho Cenote Perdido La Paz - Pearl of the Sea of Cortez by: John Rawlings

by: Jeff Barris

by: Aldo Ferrucci

by: Rob Polich

by: Leigh Bishop by: Brian Kakuk

by: Curt Bowen

by: Bruce Wienke

by: Graham Dickson by: Riccardo Malatesta

by: Sam Meacham

by: John Rawlings





Additional articles not listed ADM Issue 15

Armadillo Sidemount Tony Karacsinyi Photography

Boiling Spring on the Casconade

The Sydney Project SS Tahoe - The Mile High Challenge

Megalodon CCR St. Lawrence River Diving

Puget Sound King Crab Jesse Cancelmo Featured Photographer

Zero Gravity 3.0 Grenada

Gaby Nenadal Featured Photographer Discovering Ligpo

by: Curt Bowen by: ADM

by: Tamara Thomsen

by: Samir Alhafith

by: Martin McClellan

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by: Jim Rozzi

Featured Photorgapher Ziggy Livnat Exuma Cave Expedition

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Isla de Coco

by: ADM by: Curt Bowen

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by: Robert Underhill by: Tom Isgar by: Richard Harris by: B.R. Wienke by: John Rawlings by: Curt Bowen by: John Rawlings by: Jitka Hyniova by: Curt Bowen by: John Rawlings by: Tom Wilson by: Michael C. Barnette by: John Coffey





ADM Issue 18 *Additional articles not listed* Wreck of the Capilano

by: John Rawlings by: John Rawlings **Bonaire** No Limits - Zero Gravity 4.0 by: Curt Bowen Beyond Megadome by: Eric Osking Sport Kiss Rebreather by: Curt Bowen Wookey to the Max by: Duncan Price by: Tamara Thomsen Wreck of the William Young From Bali to Komoto by: Tom Isgar Kissing the Lady by: Richard Harris Looking thru the Oxygen Window by: B.R. Wienke Diving the Titanic by: Leigh Bishop Thresher Sharks of Malapascua by: Tony Karacsonyi by: Michael Barnette The Loss of the Holstein

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by: Jakub Rehacek by: Brian Kakuk by: Vlada Dekina by: John Janzen by: Peter Schneider by: Tamara Thomsen by: Greg Doyle by: Rusty Farst by: B.R. Wienke by: Rob Polich by: Andreas Kerner

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by: Dan MacMahon by: By John Rawlings by: Jill Heinerth by: David Cani by: Michael Barnette by: B. Wienke & T. O'Leary by: Leigh Bishop by: Cass Lawson by: Keith Mererden by: Tom Isgar by: John Rawlings by: Cass Lawson by: Curt Bowen



ADM Issue 21 *Additional articles not listed* by: Leigh Bishop

Shipwrecks of Crimea SS Metropole

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Good Luck comes in Threes

HIJMS Amagiri Doorway to Bloody Bay Wall

The Helmet Wreck Bermuda High

The Walls of Quadra Island

Diverite's O2ptima CC Rebreather Ouroboros CCR

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by: David Trotter

by: Curt Bowen by: Richard Harris

by: Kevin Denlay by: John Rawlings

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Gashkiria Cave Expedition / Russia

The Sarakata Resurgence

Featured Photographer Radek Husak Featured Photographer Petr Vaverka Diving OC like a CCR

Raja Ampat Islands

Wreck of the North Wind Schooner Daniel Lyons

P4Y-2 Privateer Bomber

The 1000 Islands, Brockville, Canada

X-Scooter by Dive Xtras inc.

by: Tracy Raz by: Kim Smith

by: Phil Short

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Wreck of the Selah Chamberlain Evolution CCR

The Ghosts of Sunda Strait

Rebreather Piracy Diving Northern Sulawsesi Indonesia

Operation Hailstorm CCR Invasion

Where Currents Collide

Exploring the Blue Holes of Abaco UNEXSO

Thaddius Bedford

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Warren Lo Photography

Shearwater GF

Bonaire San Salvador

Guadalupe Island

New kid on the block. COPIS MCCR

Video Shipwreck Photo Mosaics Featured Photographer • Dos Winkel

CCR Sidemount

Anatomy of a HIT

Kija Blue

All Hands Lost • Kamloops

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Coelacanth Fever

The Wreck of the SS William Dawes

Getting the Shot

Inca Gold Lake Titicaca, Bolivia Featured Photographer Becky Kagan

Wreck Divers Paradise Manitowac Discovery of the USS Perch SS

Tobago War and the Thistlegorm

Transition to Rebreather Diving

2007 Yucatan Expedition

by: Jitka Hyniova

by: Richard Harris

by: Jill Heinerth

by: Erik Foreman

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by: Mel Clark

by: Tom Isgar by: Jill Heinerth

by: Howard Packer

by: Jeff Toorish

ADM Issue 26

Mayans, Myths, Monsters, & "Maximon" British Virgin Islands BVI Dave Harasti Photography

Deeper into the Pearse Resurgence Diving the RMS Niagara Exploration of Rodham Lead & Zinc Mine

Her Majesty's Canadian Ship Columbia Joseph Dovala's Photography Sharkwater, The Movie

The Russian Underground Wreck Diving • Sardinia, Italy by: Jeff Toorish

by: Curt Bowen by: ADM

by: Richard Harris

by: Richard Harris by: Tamara Thomsen

by: Mel Clark by: ADM

by: Rob Stewart

by: Jill Heinerth by: Jim Rozzi



Getting There is Half the Fun Packing for an Expedition

By ADM Staff Photojournalist Jeff Toorish

What to Bring?

Before there can be any discovery or exploration, there must be travel. Simply getting to any remote dive location can be almost as great a challenge as some dives themselves. Often exploration diving is near familiar tourist locations; for example, recent ADM expeditions to Yucatan, Mexico. If you mention the Yucatan to most people, they conjure up images of Playa del Carmen or Cancun. But remote diving in the center of Yucatan's scrub jungle is anything but a tourist resort. Knowing how and what to pack; negotiating the shifting mosaic of airport security and airline baggage rules; and, making it through customs can make the difference between a successful expedition and a disaster.

Technical diving has been called the most equipment intensive sport on earth. I'm not sure it is technically a sport, but it is clearly equipment intensive. Add climbing gear, photography and video equipment and international travel and the journey becomes extremely tough. Most exploring divers pass on the regular rolling gear bags for more utilitarian hinged and locking plastic boxes. Plastic zip ties serve as the locks, easily replaced when airport security wants to take a peek inside.

When packing for any trip, it is important to know as much about the location as possible. What is the availability of tanks for example; are they DIN or yoke? Is there a dive shop near the prospective dive locations and does that shop normally stock any gasses other than





Traveling with all this equipment makes an expeditionary dive team look like some sort of **non**-covert military unit. There are often grumbles and moans from other travelers as we bottleneck airport security or customs and immigration checkpoints.

Check, Double-Check and Triple-Check

Consider packing and travel as part of your dive, not separate events. Use the same care in researching the travel requirements and restrictions that you would to research the dive location. Just as you check, double-check and triple-check your gear before making a complex dive, you should double and triple-check possible changes in travel rules.

If you booked your trip in June but you aren't leaving until December, there may have been some significant change in what the airlines will allow. In the US, the Transportation Safety Administration (TSA) is constantly tinkering with what is and is not allowed on an airplane. The most recent example, lighters were forbidden for years, now they are allowed, but only disposable butane and Zippo-style lighters. Refillable butane lighters are still off-limits.

The key here is to not become complacent –sound familiar? Just because the last time you flew to some-place exotic something was allowed does not mean it still is.

Below: Much like the competition of seeing home many people you can successfully stuff into a VW Bug, so is expedition dive travel. Below Jason and Chrissy Richards unpack after a long, hot day in the Yucatan jungle. Tamara Thomsen sets on a scuba cylinder and ponders; "how in the hell did they get all that crap in the truck in the first place".

Carry-On vs. Checked and the Dreaded Nightmare

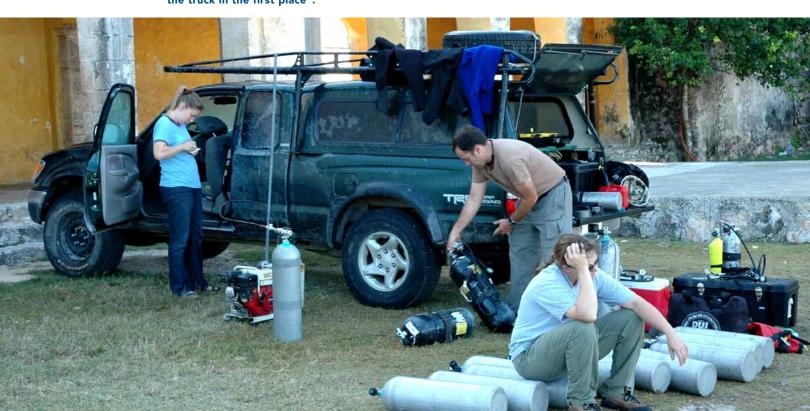
The age old question for many seasoned travelers is, what do I carry on and what do I check? The answer is, that depends.

It depends on what you are uncomfortable with being out of your direct control. For me, that would be anything I could not reasonably expect to replace at the dive location. I try to carry on one bag of camera gear and another bag of computer gear and small, critical dive equipment such as mixed-gas computers.

Many divers seem to get apoplectic at the notion of checking their regulators. I usually check mine because regulators, by their nature are pretty tough. Also, if the bag is lost or delayed, I can usually find regulators to borrow or rent. I check almost all of my scuba gear itself because it takes up a lot of room. If you wear a prescription mask, I would suggest carrying that on with you.

In the past I have checked underwater housings but in the future I am going to carry those on with me because it's unlikely I could find the correct housing to fit the cameras I use in a third world country.

The entire checked versus carry-on debate really centers on one issue, lost baggage. What do you do if your bags are lost? It is a recurring nightmare and it is getting worse. Reported statistics show that airlines are losing luggage more frequently and for apparently longer periods. While most bags are not truly lost, they are just incorrectly routed, that is little comfort. There is no possible way to prevent lost bags so the best thing we can do is minimize the chances of your bags taking a trip to Maui while you are going to Poland.





Here are some tips:

- Get to the airport EARLY. That means hours before your flight! You have gear that looks threatening and you are probably over weight –so is your gear. Okay, bad joke, but you get the idea. I suggest AT LEAST two hours before a domestic US flight and three hours before an international flight.
- Be aware of what may potentially be going on at the airport that day. If you are flying out of Miami on Super Bowl weekend and the Super Bowl is in Miami, that just might impact Miami International Airport (which is what happened on a recent ADM Expedition). You will need to adjust just your schedule accordingly.
- Know what is and is not allowed in your carry-on luggage.
- Try to avoid connections at airports with a high incidence of lost luggage. A couple of the bad ones I know of are JFK and Philadelphia but there are more.

Know which airports have the best record for flights getting in and leaving on time, that is an excellent indicator of the chances they will also get your gear boxes on your plane. At the end of this article are resource links, including one to airport ratings.

Living in Maine, I often have an extra flight or two to meet up with other team members who normally gather in Florida before heading to our exploration destination. I usually allow at least two extra days at the beginning of the trip. That way, if my gear is lost from Maine to Florida, I have a fighting chance of it showing up in time for my final flight to the dive location. Failing that, I still have a chance to beg, borrow or rent spare gear for the expedition. Try to always leave yourself with some options when it comes to travel.

Once on the Ground

By its very nature, expeditionary diving is inconvenient. While it is important to have a local guide or contact, this isn't a resort trip where someone is waiting to pick you up at the airport and whisk you to the resort. More likely, you will be dealing with some sort of rental car or van company. That by itself is tough. Remember, these companies normally have relatively few vehicles that they hold on to for years. If there is damage to the vehicle when you return it, there will be a problem.

Carefully check the vehicle for damage before accepting it. If there is damage, even scratches, note that on the rental agreement and have the company representative initial the page.

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If you are planning to travel to remote areas, it is a good idea to use at least two vehicles. On some expeditions, a breakdown may mean becoming stranded far away from help. The vehicles should stay together.

Make sure the vehicles can handle not just the daily compliment of gear, but every single piece of gear and every team member for the trips into and out of the bush.

A GPS or two is a good idea; so are walkee-talkees. Use reliable walkee-talkees that have a range of at least a few miles. Ensure every member of the team, including local guides and helpers have one. Nothing is more frustrating than needing some piece of gear and not being able to notify the team member that is already at the truck to bring it. You are likely going to be walking extended distances to and from the actual dive spot, don't make more work for yourself.

Coming Home –The Tougher Trip

Also when packing remember that you have to come back home at some point (even if you don't want to). We all go through some consumables on an expedition, such as batteries. Theoretically that means there should be more room in luggage on the return trip. This is one of those places where the theoretical and the real worlds are a train wreck.

Here's why; on the way to the expedition we have the luxury of taking our time to pack, move things around, and balance the boxes and bags until everything is just right. If you are like me, 'just right' means every square centimeter of every bag is filled and every bag is within one ounce of whatever airline weight limit I am dealing with.

But immediately upon arriving at the base camp, everything starts coming out and it's never going back into the boxes in the same way again. Never. Usually we don't have the luxury of taking a lot of time to repack and make it all work again.

However, there are a couple of tricks that are useful:

- If it is possible, consider sending some equipment or personal items home via package delivery service such as UPS or FedEx. That is not always an option but I have successfully used it on occasion.
- Try filling each box only about 3/4 full. This is tough but probably the best solution to the return-home packing crisis.
- If you decide to bring a third box, leave it about half full and all your problems will be in the past.

Just remember, you invariably wind up bringing home more than you left with so try to plan for that in your initial packing.



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Some Tricks of the Travel Trade

The key to minimizing travel difficulty for an expedition is anticipating problems. Most of us write notes to security officers and place them inside our gear boxes explaining that this is life support equipment. Include your cell phone number on the outside and inside of the box. We also have spare plastic ties taped on the underside of the lid so the TSA or other security agencies can re-seal the box. Whenever possible, I stay with my gear until it has cleared security.

Some pieces of equipment, such as canister lights, are more likely to set off security alarms. Pack them on top so they can be easily found by security. That helps move things along. Realize that anything dense and heavy is going to set off alarm bells if you try to carry it on the plane so be prepared.

Other tips include accepting the fact that some boxes or bags are going to be overweight. I've discovered that if you inform a gate agent that a bag is heavy and you know it, they are more likely to let a few extra pounds slide without charging you. It is similar to admitting to the police that you were speeding. Admitting things seems to get you further. If you know you are going to be really overweight, it may be best to simply pack an additional box and pay the extra fee. It is also a very good idea to check with their airline about the ever changing baggage policy.

Some airlines are becoming more restrictive on carry-on luggage weights. Believe it or not, there are limits for carry-on bags which seem to vary pretty dramatically by airline and destination. It is a good idea to check with the individual airlines and be specific about where you are traveling and when as restrictions often vary by time of year and destination.

Grab a rolling cart as soon as you can at the airport. In fact, grab two. You are going to need them. In foreign countries, use porters to help with your gear, they often know the fastest routes through congested airports and they are not very expensive. In fact, because the porter probably knows (or, Hell, may be *related to* the customs officer) they sometimes know which customs line is better to get into.

We also learned that the best tip of all is to always remain calm and cool, never showing any temper or arrogance. That seems to move thing along faster than anything.

Safe travels.

Jeff Toorish is a member of the ADM World Exploration Team, and a writer and photographer for ADM, ADM Online and ADM E-zine. As a child he logged hundreds of thousands of miles traveling with his show business family.

Additional Resources:

Luggage information

http://www.thetravelinsider.info/travelaccessories/airlinecarryonluggageallowances.htm

http://www.smartertravel.com/travel-advice/there-weight-size-limit.html?id=15819

http://lifehacker.com/software/travel/check-your-airlineweight-limits-189253.php

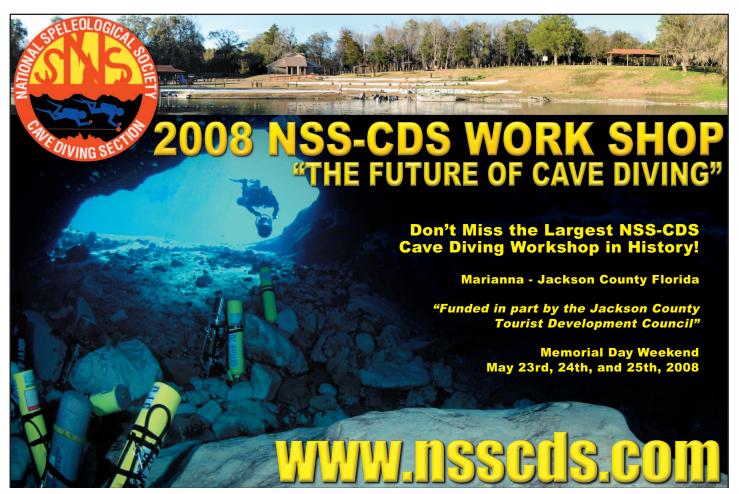
Plastic Travel Boxes

http://www.walmart.com/catalog/ product.do?product_id=2476189

Airport Information

http://www.flightstats.com/go/Home/home.do











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One of the nice things about the Dive Shows is that many divers come and talk to us about our products and tell us what they need. It does help to keep us on our toes! Although there are other small reels on the market, one thing that we were

regularly asked for was a small reel. Divers told us they needed a 160 ft line

reel that could be used when performing many tasks. For example, as a jump reel, safety reel, when deploying a D-SMB or simply stashing as a backup. As the name suggests this is quite a dinky reel, thus allowing diver to not only hold the reel in one hand, but also lets them select the Free Running Mode, simply by depressing the spring auctioned pawl with their finger. One of the main reasons the Ratchet has been so popular with divers is that they can adjust the spool tension to their need or taste, while still enjoying snag free line deployment.

When it comes to line, as with all our reels, the Pocket Reel comes with a 216 pound breaking strength 2mm line in a choice of white, neon yellow or pink line. The Pocket Reel is an ideal 'divers first reel'.

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Ratchet Reels (right)

These reels have been designed to offer both ratchet and free run functions. The required mode is selected by pulling and turning the spring knob which is located at the bottom of the spool. Because of its unique design, the reels are **snag-free** and the tension of the spool run may be adjusted to suit individual needs. The reels are now available in three sizes, 410 ft, 230ft and the new 132ft, with a choice of white, neon yellow or pink line.

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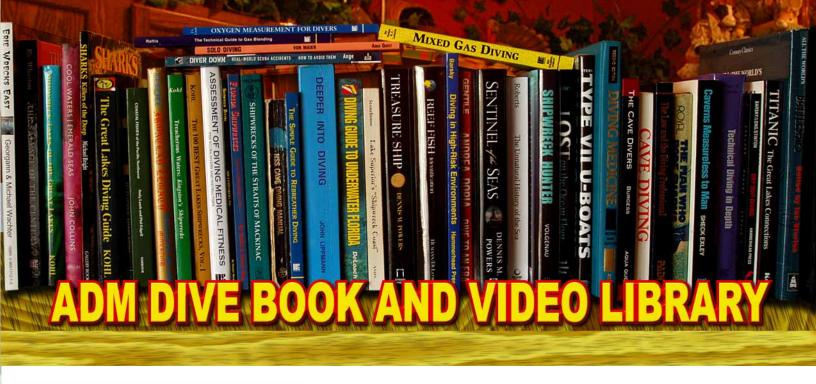
The RAT is JR's bigger brother containing increased LED brightness and burn times.

The 10-Watt Handheld is Salvo's ultimate emergency bailout, which can also be used as a primary recreational light.



| | BULB TYPE | WATTS | FOCUS BEAM | BATTERY TYPE | BURN TIME | LENGTH (INCHES) | DIAMETER (INCHES) | DEPTH RATED |
|------------------|--------------|-------|---------------|--------------------------------|--------------|--------------------|----------------------|----------------|
| RAT JR | LED | 2 | 13º | 2 CR123 | 360 MIN | 5″ | 1.35" | +500FT |
| RAT | LED | 3 | 80 | 3 C-CELL | 600 MIN | 8" | 1.75″ | +500FT |
| 10 WATT HANDHELD | HID | 10 | 6º | 2.6AMP LI-ION (RECHARGABLE) | 135MIN | 7.5″ | 1.8″ | +500FT |

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Scubazoo is a dedicated team of divers, photographers, marine biologists, and conservationists, who have devoted their lives to the filming and preservation of reefs worldwide. Their work includes filming for productions broadcast on National Geographic, Discovery, Animal Planet, BBC, and NBC News.

- Features reefs worldwide, from Southeast Asia to the Red Sea and Hawaii
- Captions identify plant and animal life and quotes give additional background information
- Photographic narratives demonstrate how reefs live/die, and how creatures depend on them

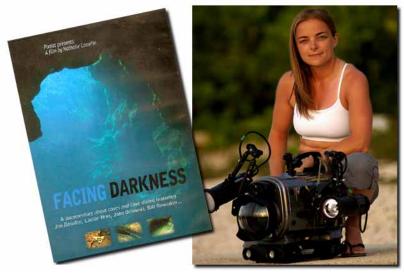
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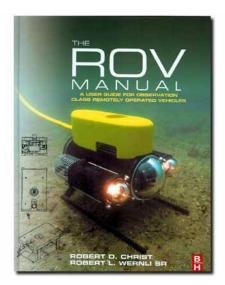
Though cave diving is one of the most dangerous sports, it unlocks a most fascinating world, that of darkness. Following some of the greatest cave divers in north Florida, Facing Darkness is a documaentary which invites you to discover the underwater caves and the safety in which divers explore them.

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Hardbound, 320 pages, publication date: JUL-2007

ISBN-13: 978-0-7506-8148-3 ISBN-10: 0-7506-8148-9 **www.elsevier.com**

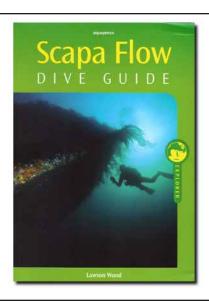
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By: James Rozzi

Excerpt from ADM Issue 3

U.S. Submarine S-16 Surface Displacement 876 Tons

Submerged Displacement 1092 Tons Length 231 ft. Breadth 22 ft. Draught 13 ft. Surface Speed 15 knots Submerged Speed 11 knots Compliment 38 crew

Side View

STEERING ROOM

ENGINE ROOM

CONTROL RO



Top View

Rudder

STERN

- 2. Diving Rudder
- 3. Three Blade Prop
- 4. Steering Wheel
- 5. Metal Lathe
- 6. Ballast Pump
- 7. Main Electric Engine 17. Refrigerator
- 8. Steering Hatch
- 9. Main Engines
- 10. Mufflers

- 11. Engine Rm. Hatch
- 12. Oil/Bilge Pump
- 13. Galley
- 14. Radio Rm.
- 15. Kingston Levers
- 16. Kingston Valves
- 18. Periscopes
- 19. Steering/Depth Gauges 29. Mess Tables
- 20. Control Rm. Hatch

- 21. Air Intake
- 22. Gyro Compass
- 23. Ward Rm.
- 24. Officers Ouarters
- 25. Radar Rm.
- 26. Officers Quarters
- 27. Crews Hatch
- 28. Engine Batteries
- 30. 4" Cannon

- 31. 36 Crew Berths
- 32. Air Storage

- 33. Crew Lockers
- 34. Air Vent Motors
- 35. Torpedo Rm. Hatch

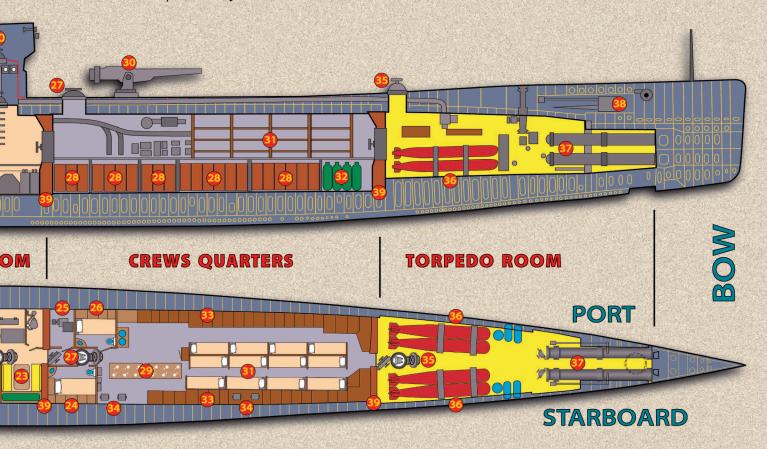
- 36. Torpedoes
- 37. Torpedo Tubes
- 38. Bow Diving Gear
- 39. Bulk Head W/Door

Bowen j Illustration: arch 19th, 1918 the S-16 submarine was constructed by the Torpedo Boat Company of Bridgeport Connecticut. Launched on December 23rd, 1919 and commissioned on December 17th,1920. She would serve under Lt. Commander Andrew C. Bennett and left New London, Connecticut on May 31st, 1921. Sailing through the Panama canal the S-16 traveled to California, Hawaii, Guam, the Philippine Islands and reached her new base at Cavite, Luzon on December 1st, 1921. For the next several years she would be placed on many active duties and patrolled the waters off China, Japan and the Philippines.

November 3rd, 1924 the S-16 was ordered back to the U.S. and for the next 12 years she was to patrol the California coast, Hawaii and the Panama canal. May 22nd, 1935 the S-16 was decommissioned and sent to Philadelphia for dry dock.

With the involvement of the United States in WW-II the S-16 was recommissioned on December 2nd, 1940. During World War two she would patrol the eastern coast of the United States with voyages to Bermuda, St. Thomas and the Panama Canal zones. During the last stages of WW-II the S-16 was again decommissioned on October 4th, 1944 and struck from the Navy list.

April 3rd, 1945 in calm seas just off Key West, Florida the S-16 was towed to her final resting place. With all hatches open the scuttle plugs were pulled and water rushed in, filling the inside compartments as the U.S. sailors scrambled up through the hatchways towards safety. With a blast of air from the open hatches the U.S. WW-I submarine S-16 dipped below the waves and to her final resting place.



| Submarine Wrecks in U.S. Waters | | | | | | |
|---------------------------------|---------|-------------------|---|--|--|--|
| German Submarines | | | | | | |
| Submarine | Depth | Location | ı | | | |
| U-1105 | 85 fsw | Potomac River | ı | | | |
| U-85 | 100 fsw | Oregon Inlet, NC | ı | | | |
| U-701 | 110 fsw | Cape Hatteras, NC | ı | | | |
| U-352 | 120 fsw | Morehead City, NC | ı | | | |
| U-853 | 130 fsw | Block Island, RI | ı | | | |
| U-2513 | 215 fsw | Dry Tortugas | ı | | | |
| U-869 | 230 fsw | NJ | ı | | | |
| UC-97 | 250 fsw | Lake Michigan | ı | | | |
| U-140 | 267 fsw | Virginia Coast | | | | |

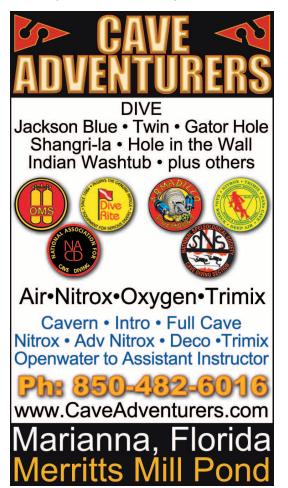
| United States Submarines | | | | | |
|--------------------------|---------|--------------------|--|--|--|
| Submarine | Depth | Location | | | |
| S-37 | 35 fsw | San Diego, CA | | | |
| Blenny | 70 fsw | Ocean City, MD | | | |
| G-2 | 75 fsw | Connecticut | | | |
| G-1 | 100 fsw | Newport, RI | | | |
| L-8 | 110 fsw | Rhode Island | | | |
| S-49 | 125 fsw | Patuxent River, MD | | | |
| Tarpon | 140 fsw | Hatteras, NC | | | |
| Dragonet | 150 fsw | Chesapeake Bay | | | |
| S-21 | 160 fsw | Maine Coast | | | |
| Bass | 160 fsw | Block Island, RI | | | |
| S-5 | 170 fsw | NJ | | | |
| Spikefish | 260 fsw | Block Island, RI | | | |

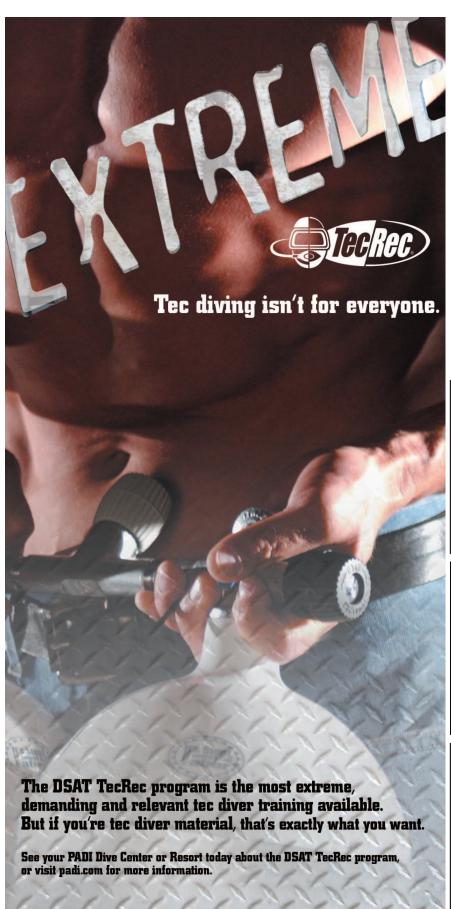


Today the S-16 sets upright with a slight 20 degree tilt to her starboard side in 265 feet of water, 17 miles from Key West. Currents from the Gulf Stream flow over her hull and can make diving the sub very difficult to impossible. She is still in very good condition with little coral growth. Large amberjack and Barracuda circle above the submarine. Snapper and grouper hide within her water vents and hatches and an occasional shark can be seen darting in and out of view.

Interesting parts of the wreck include the conning tower, two large props and rudders. The large stern hatch into the steering room allows penetration with a set of doubles, all others would require the removal of scuba equipment and possible a no mount system. Extreme caution should be taken as submarines are designed with tight cramped spaces in mind. Visibility will quickly be reduced to a few inches because of the percolation of rust from the walls. Multiple wires, pipes and grates are potential snag problems.

Divers: James Rozzi, Jim Webber and Curt Bowen. Special Thanks to Capt. Billy Deans







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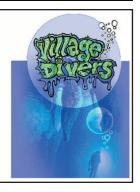
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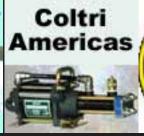
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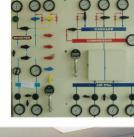
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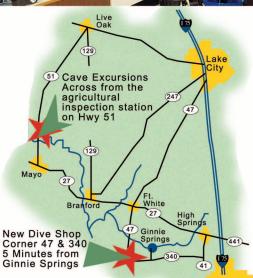
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