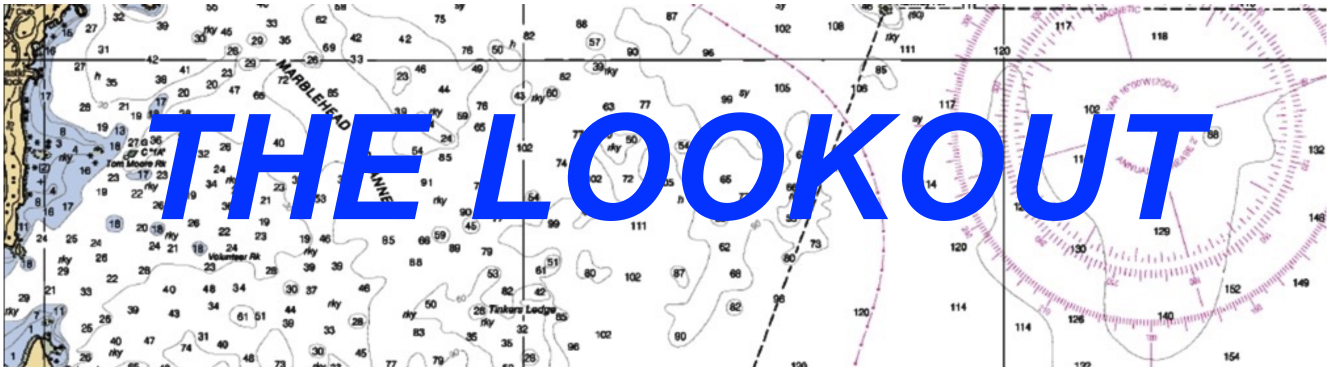

MANIFEST

THE LOOKOUT

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A Message From the Wheelhouse

Thanks for checking out Issue #7 of The Lookout, our periodic newsletter covering wide ranging topics that are historical, technical, and relevant to our diving community in Massachusetts Bay. This issue includes articles on our 2014 summer diving season of exploration and great dives on local shipwrecks. In addition, we are introducing a new piece examining in-water incidents that we observe or experience ourselves in an effort to add an aspect of information sharing and learning to the newsletter. Finally, we are sharing some exciting news about our new relationship with the Hollis PRISM 2 rebreather!

We'd like to thank all our customers and crew for your continued support and participation aboard Gauntlet, and for helping to create great adventures on the high seas!

We hope you enjoy this issue of The Lookout!

Heather and Dave

The Return of the Patriot

The F/V Patriot sank on January 3, 2009 in heavy seas with the loss of the two fishermen. It was a tragic event, and both a mysterious and controversial story with initial reports suggesting the Patriot was run down by a tug and tow or perhaps even struck by another vessel. The Coast Guard had been accused of responding too slowly and in general, the investigation seemed to lack transparency in the public's eye. There were delays in conducting dives to observe the wreck, and the investigation concluded with a finding that the Patriot sank due to a loss of stability. In other words, the vessel itself had become unstable and capsized. This could have been due to modifications that were made to the Patriot and/or due to deck loads shifting that altered its stability in heavy seas. There was no collision or wrong-doing that led to the deaths of two men. Such tragic accidents are always much harder to accept for family and sometimes even the public.

The Patriot in 2012; the name was still visible on the port side hull.

The Patriot came to rest in 100 feet of water on Stellwagen Bank approximately 15 miles off Gloucester, MA. After the Coast Guard investigation concluded, salvage and survey divers studied the wreck extensively, looking for clues and alternative explanations as to the cause of the sinking. The starboard side of the wreck held particular interest because some believed the wreck may have been struck on that side. Since the wreck was resting on its starboard side and that section was not accessible, pieces of the wreck were cut away to expose possible damage from a collision on the starboard side. Eventually the site became so contaminated by the effects of nature and salvage attempts that no new information to suggest another scenario ever emerged. Meanwhile, the Patriot became a popular dive site for recreational divers looking to experience diving in Stellwagen Bank National Marine Sanctuary. But then the Patriot vanished.

In the early summer of 2013, a local charter boat was unable to locate the Patriot. Despite searching, the wreck could not be located. Word spread throughout the local diving community that the wreck appeared to have moved, and other charter boats searched for the wreck to no avail. The Patriot was gone. Many asked, "How could it have moved?" Indeed, it was surprising given the wreck had been on the ocean floor for approximately 3 years. However, there are other well-known examples where wrecks have moved (Chester Poling) or turned-over (Spiegel Grove) after several years on the bottom in demonstrations of the ocean's power.

Over the winter of 2013-2014, the Patriot was relocated by searchers using side scan sonar. The Patriot moved approximately 900 feet from the previous known position. This was outside the search area that had been the focus of efforts to relocate the wreck over the summer. Of course, everyone became curious about the condition of the wreck and what such a move may have done to it. A short dive performed by the group that relocated the wreck confirmed it was still on its starboard side and intact. The depth was still approximately 100 feet of water.

We hoped to reach the wreck and photograph its present condition on our first trip scheduled in May 2014. The weather had not been cooperating, but we managed to make the run. We quickly found the Patriot using the new position of the wreck, which had been graciously shared with everyone. The conditions were poor though, with rough seas and a fairly strong current despite the dive being planned around the slack water window. The first dive reports of the day described very low visibility, obviously not ideal for photography; however, our objective remained that of documenting the wreck.

Upon descending to the Patriot, we found the wreck to be in a shockingly different condition. Indeed, it was on its starboard side and relatively intact; however, the wreck was considerably buried in the seafloor and all of the fishing gear was gone. The wreck appeared to have been uprooted from the bottom and may have even rolled as if it were a tumbleweed on the bottom, ripping many of the deck structures away before burrowing into the sand again. The pilot house door on the port side was jammed closed. Some derelict fishing gear remained, mainly in a tangled mass about amidships. For sure, the Patriot did not appear to be the same wreck.

Nevertheless, the Patriot remains largely the same dive—a small fishing vessel wreck that is transforming into an artificial reef for marine life on a sand bottom in an otherwise ocean desert. For this reason, the Patriot remains an interesting dive despite a clear reduction in the "size" of the wreck due to it becoming more sanded in. In fact, some of the most thrilling marine life encounters occurred on the Patriot over the summer of 2014.

Since the wreck is the most accessible distance-wise of all the shallow wrecks on Stellwagen Bank, charter boats visit this wreck more than the others. This season, outstanding offshore visibility, which averaged 30-50+ feet on most dives, allowed for landscape photography capturing the entire wreck as it rests on the seafloor. Some of the most spectacular dives were those with marine life encounters; whales were spotted on two dives. In one case, divers reported observing a small humpback whale swimming a short distance off the wreck and in another case, several divers observed a minke whale near the surface. Both whale sightings were particularly exciting since it's not often that one is able to observe a whale underwater.

The Patriot also hosted a large school of hake that congregated around the wreck in the latter part of the summer. On several dives, divers observed hundreds, if not thousands, of hake blanketing the seafloor around the Patriot. In addition to these spectacular sights, much of the typical marine life of Stellwagen Bank could be seen hiding in or around the wreck, such as large lobsters and sculpin.

The Patriot in 2014. The wreck is heavily sanded in and in this photo, surrounded by hake. The visibility on this dive was approximately 50 feet.

The return of the Patriot allowed many divers to visit the sanctuary for the first time and observe the incredible marine life that can be found there. Some have asked, "Will the Patriot move again?" It is entirely possible. Certainly a powerful ocean storm that was able to move it after 3 years on the seafloor could conceivably do it again. The edge of the bank, where the depths drop off to approximately 300 feet, is only about a quarter mile from the present location of the wreck. If the wreck moved several times and in the direction of the deeper water off the bank, the Patriot could, for all practical intents and purposes, disappear for good one day.

Alternatively, the Patriot could become more sanded in and simply become a “smaller” wreck. The sand on Stellwagen Bank is dynamic; it swallows up some wrecks and exposes others. It changes year to year. One thing is for sure, take the opportunity to visit these wrecks like the Patriot before they vanish or change dramatically.

No one knows when the Patriot will *ghost* again.

The Evolution of PRISM CCR Diving: The Hollis PRISM 2

The Steam Machines Inc. (SMI) PRISM Topaz became available in 1995 and held a place in the rebreather market up to about 2008 when Hollis, a subsidiary of American Underwater Products (AUP), acquired the PRISM Topaz. Since that time, the Hollis PRISM 2 has, for all intents and purposes, replaced the Topaz. SMI discontinued manufacturing the Topaz in 2008, but it still provides parts and repair services, and parts are also available on the secondary market. Many divers, including the authors of this newsletter, continue to use it with success.

The design of the PRISM Topaz incorporated a number of features that distinguished it from other commercially available rebreathers. These include, but are not limited to:

- Ability to repair with common adhesives and electrical parts. These design decisions make the Topaz highly serviceable by ordinary divers using easily obtained parts and adhesives. This design has both strengths and weaknesses; although repairs can be performed by the user, the rebreather has fragile components.
- A radial scrubber that efficiently eliminates carbon dioxide (CO2) from the breathing loop. Gas flows outward from the inner tube of the scrubber basket (i.e., it “radiates” out); the design intent is to increase the gas contact time with the CO2 absorbent. The scrubber basket is housed in a plastic bucket with an air gap between the scrubber and bucket walls; the air gap and plastic bucket are intended to insulate the scrubber to provide a higher operating temperature. The gas flow direction and bucket are designed to increase scrubber efficiency. In addition, this radial scrubber remains functional if the unit is partially flooded.
- Addition of oxygen on the exhalation side of the loop (manual and solenoid) to ensure that the oxygen is mixed with the loop gas (occurs while passing through the scrubber) and that the mixed gas flows across the sensors before it is breathed.
- The ability to operate the rebreather manually or electronically. The Topaz has a solenoid and electronics (powered by a standard 9 volt battery) that maintain a predetermined partial pressure of oxygen (PPO2) set-point. It also has an on/off switch. In the event of an electronics failure, or if the diver choses to operate the unit manually, the diver can turn the rebreather off. The Topaz has an analog secondary display that monitors each individual oxygen sensor and is powered by high mili-volt (mV) output sensors; therefore, it does not require batteries to operate.

Hollis is part of the AUP group, one of the largest dive equipment manufacturers in the world. Hollis brings the capability of manufacturing the PRISM at a large scale and with a greater degree of quality control. In addition, Hollis created an upgradable platform that incorporates the latest technology. Hollis preserved many of the key features of the Topaz in the PRISM 2 design and made some noteworthy improvements:

- Utilization of more durable materials and improved manufacturing
- Keyed fittings that can be assembled only one way to reduce the risk of improper assembly
- State-of-the-art PID (Proportional - Integral - Derivative) Control loop feedback circuitry. The PID controller controls the solenoid and utilizes an algorithm that incorporates both history of what has occurred and predictions for what may occur in the future to make “decisions” about oxygen injection
- Incorporation of the Shearwater Petrel dive computer, including the DiveCAN standard, which allows for use of different devices and ensures error-checked communications
- Ability to incorporate in Generation 3 units the Shearwater NERD (Near Eye Remote Display)
- Modular design that compartmentalizes the solenoid and oxygen electronics (SOLO), which allows for the unit to be operated independently of the handset
- Optional Bail-Out Valve (BOV)
- Optional Back-Mounted Counterlungs

Essentially, Hollis has taken the proven PRISM Topaz design and improved it.

For current owners of the PRISM Topaz, service continues to be available from SMI and the authors hope to see this continue indefinitely. For new rebreather divers making their first rebreather purchase or crossing-over from another rebreather, purchasing the PRISM 2 may be a better option from a practical and long-term support perspective.

The Hollis PRISM 2 rebreather.

Training is available on the Hollis PRISM 2 and the SMI PRISM Topaz through Northern Atlantic Dive Expeditions. If you are interested in purchasing a PRISM 2 unit, or training on either the PRISM 2 or Topaz, contact us to discuss what might be the best option.

Finally, in case you are wondering, “PRISM” stands for **P**eter **R**eadey’s **I**ncredible **S**team **M**achine, and that is still at the core of the PRISM 2 CCR.

What’s Ahead for 2015?

- Beneath the Sea dive show in Seacaucus, NJ. Hope to see you there!
- PRISM 2 CCR and Introduction to Technical Diving (Open Circuit) classes; scheduling is in process. Contact us if you are interested in these classes or any other training.
- Another great line-up of local diving, including trips to dive sites in Stellwagen Bank National Marine Sanctuary!

Reflecting on In-Water Dive Incidents

The Lookout team has added a new topic to the newsletter, which will appear on a semi-regular basis, as there are incidents to discuss. As the title suggests, the authors will use "Reflecting on In-Water Dive Incidents" to present and review real minor and major incidents. The incidents discussed herein are limited to those for which we know the facts. This newsletter focuses on two closed-circuit rebreather (CCR) failures.

Divers prepare dive plans to increase the probability of having incident-free dives, and to prepare for issues that may occur. These issues include environmental problems such as becoming lost or entangled, equipment failures such as a CCR electronics malfunction, and many other risks. In the case of CCR diving, major CCR equipment problems typically result in the diver bailing-out to open circuit. Although bailing-out solves the CCR equipment problems, it can create other problems.

Trained CCR divers consider the risks associated with CCR diving and bailing-out, and learn/develop protocols to mitigate the risks. We often assume our situation improves upon bail-out to open circuit, because we eliminate the apparent cause of the problem, the CCR. However, bail-out to open circuit creates other complications and may introduce new problems that must be resolved under stress. These include open circuit equipment issues (e.g., inoperable or free-flowing regulator), limited or insufficient gas volume, gas switches, bottle exchanges among buddies, adjusting a decompression computer to open circuit mode or accessing printed tables, different buoyancy management (e.g., still have to manage the CCR loop), etc.

Two real-world examples illustrate different situations concerning CCR failure and bail-out.

EXAMPLE 1

A CCR diver and buddy (also on a CCR) performed a dive to 120 feet sea water (fsw). One diver was carrying a single 40 cu ft aluminum bail-out gas cylinder and the other diver (the CCR diver that experienced the failure) was carrying a single 80 cu ft aluminum bail-out gas cylinder. Approximately 4 minutes into the dive, the diver experienced a CCR electronics failure and decided to bail-out to open circuit via a Bail-Out Valve (BOV); the BOV was only plumbed to the onboard gas supply. The onboard diluent gas supply was nearly exhausted in a few breaths so the diver switched to the off-board open circuit gas supply. Upon switching to off-board gas, the diver realized that the second stage regulator had failed and was delivering water instead of gas, making the off-board gas supply inaccessible. Understanding the situation, the buddy provided a functioning regulator to the distressed diver and then passed the cylinder and the team aborted the dive.

Discussion:

The CCR diver experienced an electronics failure and decided to bail-out. In many instances, bailing-out is the safest and appropriate action, as taught during training. If not for the second stage regulator failure, bailing-out would have been the most appropriate action in this instance as well. However, because of the "double failure" in which there was both a failure of the primary life support system (the CCR) and the back-up life support system (the open circuit regulator), the CCR failure escalated to a life-threatening situation where the team exhausted nearly all of its redundancies. So, what if the buddy had a CCR failure or the one functioning bail-out systems failed (e.g., o-ring failure resulting in loss of gas)? Well, the limited options could be:

- Attempt semi-closed operation of a failed CCR. The question is, "would a stressed diver would have the mental capacity to realize this solution and execute it?" In this particular case, it would not have mattered because there was probably insufficient onboard diluent for semi-closed operation.

- Buddy breathe. Difficult for even skilled divers assuming there was sufficient gas supply to support this between the two divers.
- Rocket to the surface. Not a solution.

In this incident, the diver was fortunate to have been diving with a competent and aware buddy, and the team was fortunate not to experience another failure. Depending on how the team planned the dive, any number of problems could have worsened this incident. For example, if this dive team were using a “team bail-out gas” approach and pooling their bail-out gas supply and the problem occurred later in the dive, there may not have been enough bail-out gas available (this depends on the gas calculation assumptions vs. actual demand). If it had been a solo dive, the double failure could have resulted in a fatality, as the diver would not have had an alternate gas source other than returning to the CCR and attempting semi-closed operation (assuming there was sufficient onboard gas remaining) or rocketing to the surface and hoping for the best.

This incident highlighted some points to consider, such as planning assumptions and some weakness in the equipment configuration, including:

- Buddy diving. It may have saved the diver’s life. A competent buddy is critical.
- Sufficient bail-out. It is a good idea for each diver to carry his or her own bail-out when practical. At some point access, depth, and/or duration may reduce the practically, at which point the dive team needs to evaluate and accept or reject the risks of sharing a bail-out gas supply. When using team bail-out, consider increasing the size of the team to three divers and/or utilizing support divers to increase safety. Divers must also consider a reasonable surface air consumption rate (SAC) for gas volume planning and understand that there may not be a reasonable SAC for a moderate-to-severe carbon dioxide (CO_2) hit.
- Off-board regulator maintenance. Diver should evaluate off-board open circuit regulators prior to each dive as a standard pre-dive check (it can happen at home while setting up the CCR).
- CCR/BOV access to off-board gas. It is important to configure the CCR equipment in such a way that off-board gas is plumbed to the CCR for closed-circuit and semi-closed circuit operation. Also, off-board gas plumbed to a BOV (if installed) ensures that the diver does not have to make a regulator switch, and it provides a redundant second stage.

EXAMPLE 2

A CCR diver and buddy (also on a CCR) performed a dive to 220 fsw. Each diver was carrying two 80 cu ft aluminum bail-out gas cylinders (one containing bottom bail-out gas and the other containing a mid-water decompression gas; oxygen was available from a surface supply system). Approximately 12 minutes into the dive, while descending from the top of a wreck at 180 fsw, the diver realized that the partial pressure of oxygen (PO2) in the CCR breathing loop was rising in an unexpected fashion. The diver observed a high PO2 alarm and the PO2 reached 1.5 before the diver intervened to lower it. The diver stopped the descent and performed a loop flush, which lowered the PO2. The PO2 continued to climb back to 1.5 so the diver continued to perform diluent flushes to “hold” the PO2 around 1.3-1.4 while attempting to diagnose the problem. After determining that the problem was not solvable, the diver and buddy returned to the line and ascended while diluent flushing in small amounts to maintain a PO2 of 1.3-1.4 throughout the ascent and decompression. It was not possible to hold the PO2 at 1.2, which was the chosen set point for the dive. The diver did not bail-out or turn off the onboard oxygen (O2) supply. Upon surfacing, the diver determined that the solenoid failed partially open, allowing oxygen to continuously flow into the breathing loop at a slow rate. Upon later inspection of the solenoid during repair, the service technician found the solenoid contained water.

Discussion:

The diver did not recognize that O2 was leaking into the breathing loop until a high PO2 alarm triggered and persisted longer than expected. Short duration high PO2 alarms sometimes occur because a diver expects the PO2 to rise with the increasing depth. Although it was not immediately apparent what was causing the high PO2 (solenoid failure vs manual O2 addition valve malfunction), the diver quickly recognized that it was possible to control the PO2 in the breathing loop within reason and determined that bail-out to open circuit was not necessary. Both the diver's metabolic oxygen consumption rate and addition of diluent "held" the PO2 below that which must trigger bail-out (PO2≥1.6 is one criterion). Although the PO2 was elevated for short time periods, the PO2 had not reached dangerously high levels for the time at depth.

In this case, one might ask, "What is the preferred option – stay on the malfunctioning CCR or bail-out?" Is it reasonable to problem solve on the CCR and avoid, if possible, bailing-out? To answer this question, one needs to examine the specific circumstances of the problem and situation.

In this case, the diver was diving with a competent dive buddy and each diver carried adequate bail-out gas for themselves, and based on the duration of the dive to that point, the volume of bail-out gas was sufficient for the amount of decompression required and the diver's SAC. Nevertheless, bailing-out would have added a degree of task loading and complication. Additional failures could have occurred, as described in Example 1. One could argue that regularly flushing the loop also added task loading and complication. In this situation, it appears that either decision (staying on the CCR or bailing-out) would have been a correct one.

Finally, despite diving with well-maintained equipment that passed all pre-dive checks, this failure illustrates the potential to have a major failure "lurking." It is possible that the divers missed a "clue" during pre-dive checks, as the diver initially had difficulty achieving a successful negative pressure test on the first pre-dive check. After checking connections, the problem appeared to disappear; subsequent negative pressure tests were successful. The manufacturer stated water most likely entered the solenoid as a result of using a tank containing water. The water in the tank probably blew into the regulator and consequently, the solenoid, when turned on. The tanks used during the dive were rentals. Based on the relationship between the first failed negative pressure test and the in-water failure, it is possible that water entered the solenoid prior to this dive and the solenoid failed during this dive (or setup for the dive) due to corrosion that caused it to seize partially open.

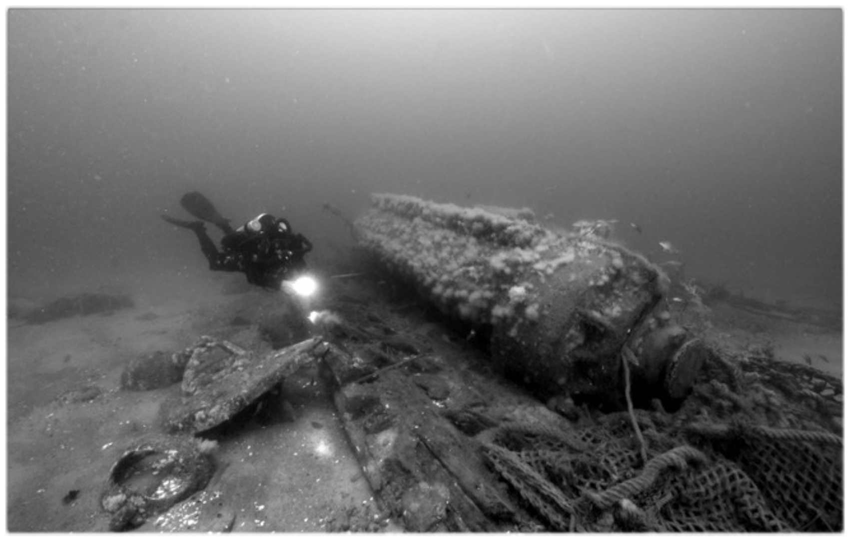
SUMMARY

The examples illustrate the point that the decision to bail-out is sometimes a judgment call depending on the circumstances and the diver's ability to manage the problem on the CCR, and that bailing-out is also associated with risk. Bailing-out to open circuit is absolutely necessary in some circumstances, which include, but are not limited to, CO_2 contamination and flooding of the unit (different CCR units can tolerate different degrees of flooding before they become unsafe). Bailing-out is never the "wrong" decision, but it is important to recognize that it may not turn out to be the best decision because it may create new risks that become actual problems. For that reason, all CCR divers should periodically spend the time to reflect on incidents they experience and hear about, and their diving practices. Change may be appropriate if it is determined that the chosen bail-out strategy and/or equipment configuration carries a higher degree of risk than the diver/team accepts (e.g., insufficient gas supply, lack of redundancy or other limitations from equipment configuration).

Summer Diving Highlights

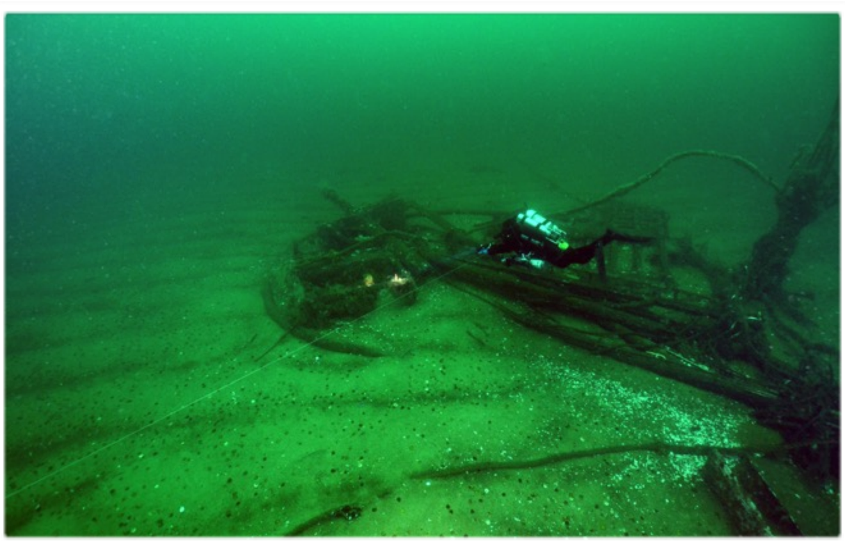
Most would agree that the summer of 2014 was far from a hot summer with stretches of scorching heat that make beach and boating a must-do. Often times, we found ourselves wearing sweatshirts with our shorts, and sadly, we could not find the inspiration to don a bathing suit and do any post-dive tubing. However, this summer did deliver some great diving, particularly in Stellwagen Bank National Marine Sanctuary.

In May, we made our first trip out to the wreck of the Patriot, recently re-discovered. The story of the Patriot is covered in another article included in this issue of The Lookout.



The large Atlas diesel engine of the Heroic.

In June, we completed a mooring project for a wreck in the sanctuary believed by NOAA to be the Heroic. The Heroic, originally built in 1941 as the Accentor Class Coastal Minesweeper AMc-44, later underwent conversion to an eastern-rig fishing vessel like many of its kind. The history of the Heroic as a fishing vessel and the details of its sinking remains somewhat of a mystery; however, the wreck came to rest in 100 feet of water on Stellwagen Bank. The Heroic was this year's focus of our ongoing project funded by the PADI Foundation documenting marine debris. As part of the project, the Heroic became the third site to have a mooring installed. Importantly, this site is the first historic shipwreck to have a mooring, which is representative of continued efforts to create low-impact, accessible methods to visit sanctuary dive sites.

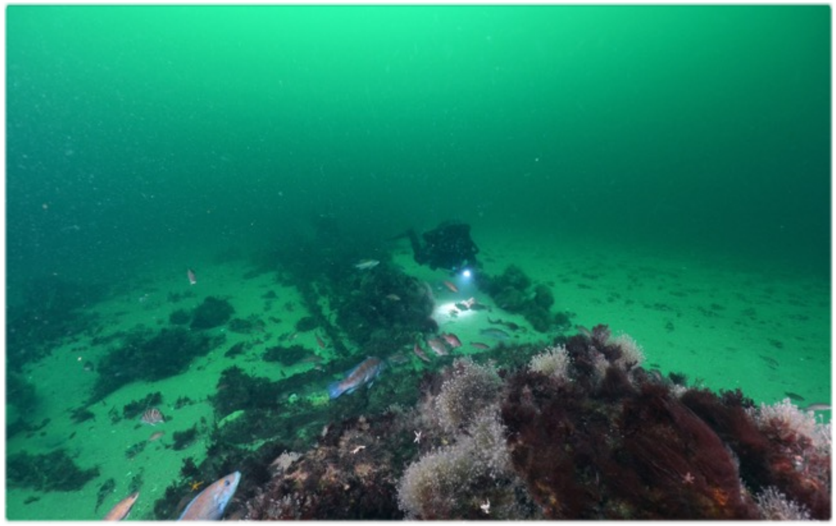


The wreckage of the F/V North Star.

Following the completion of the Heroic mooring installation, we continued to enjoy good conditions that allowed us to visit some of the other shallow-water sanctuary wrecks, such as the North Star and Unidentified Trawler. The North Star dive was quite memorable; on this dive, we saw "flying scallops," which were seed scallops that would suddenly "jump" and flutter across the bottom.

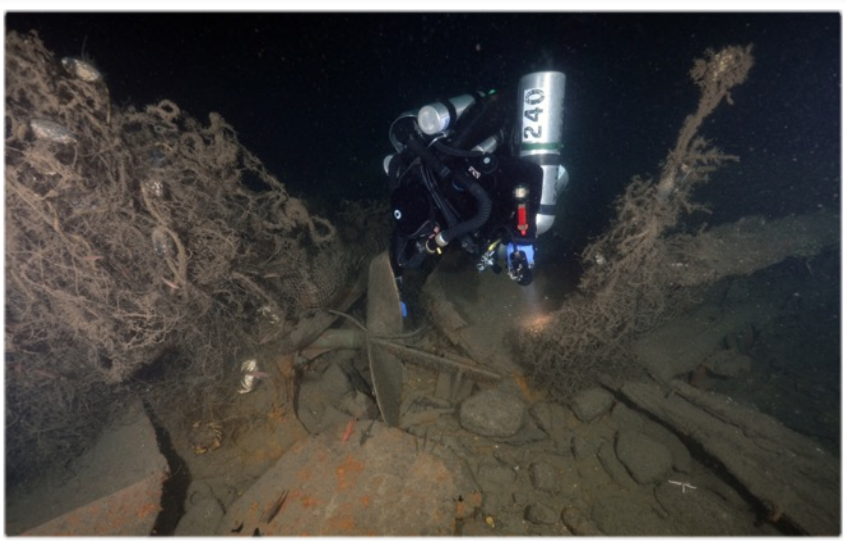
Finally, in August, we visited the wreck of the Paul Palmer, where we enjoyed observing the abundant and diverse marine life that calls this wreck home. In particular, we saw small schools of dogfish, which we haven't seen much of these past several years.

Overall, it was one of the best diving seasons we've experienced in the sanctuary in years. It was clearly a "stock year" for many marine life species. Divers were treated to whale sightings (underwater), large schools of hake on the Patriot, schools of mackerel on decompression, large lobsters, and all the usual marine life like sculpin, ocean pout, sea ravens and wolfish. In addition, visibility was outstanding. We had 50-plus feet of visibility on several dives, including dives on the Patriot and the North Star. Hopefully, diving in Stellwagen Bank National Marine Sanctuary in 2015 will be just as good or better!



The Paul Palmer, looking aft from the chain pile. The wreck was very sanded in this year.

Unfortunately, there was some bad weather that did tamper with our plans. We had a trip planned to dive the wrecks off Chatham, but a stretch of bad weather prevented us from making the long trip down. Instead, we did our best to salvage some of the weekend, and we made a day trip to the wreck of the tugboat, Mars. The Mars is a long run, but it's well worth the trip, especially when the conditions are good. We had 12-15 feet of visibility, which may not appear impressive, but indeed, it is. In fact, it was some of the best visibility we've seen on this wreck. The Mars will definitely be on the schedule next year.



Exploring the wreckage of the target, STB041.

Finally, we had an incredible season of exploration, which is also covered in this issue of The Lookout. Overall, we had the great fortune of doing some excellent wreck diving this summer. We hope to see you all out on the Gauntlet, helping to create new adventures in 2015!

Exploration Report


A porthole on the Unknown Wreck 114.

The 2014 dive season was a productive one for exploration. Most significantly, the team initiated a five-year collaborative research project with NOAA's Stellwagen Bank National Marine Sanctuary to explore, document, and research shipwrecks within the sanctuary.

Unknown Wreck 114:

In the fall of 2013, the team located an obstruction on the sea floor in 240 feet of water. The obstruction was confirmed to be a shipwreck. The site primarily consists of a large upright two cylinder compound steam engine amidst a debris field. A small portion of the top of the boiler and a propeller is visible. However, much of the hull structure lies beneath the sea floor. Based on cylinder diameter measurements, the team excluded several potential matches. Although the identity of this shipwreck remains elusive, the team's current thinking is that the vessel sank sometime after 1917 and may be that of a steam trawler.

The STB042 team after a successful dive.

Collaborative Research Project:

The Collaborative Research Project aims to contribute to the characterization of shipwrecks in the Stellwagen Bank National Marine Sanctuary through an agreement with the National Oceanic and Atmospheric Administration (NOAA), through the Stellwagen Bank National Marine Sanctuary. The project goals include conducting exploration dives on unidentified shipwrecks to collect information about them. The exploration team collects data through observation, obtaining photographic imagery and performing archival research.

This summer, the project began with exploration dives on two sonar targets. The team successfully dived and documented these sites. One site (STB042) is believed to be a small schooner carrying granite block cargo and the other site (STB041) is believed to be an eastern rig fishing vessel. Both shipwrecks lie in more than 200 feet of water.

In addition, the team participating in the collaborative research project had the honor of carrying Explorer's Club Flag #151, which dates back to 1952. Pioneering cave explorer Sheck Exley carried this flag on a 1988 expedition. The project continues in 2015 with exploration dives planned on several sonar targets. The team hopes to present this work in the near future.