Attacks and Battles, Small and Large

**In what battles were submarines involved?**

This question usually is asking about the major naval battles of WW2 such as Coral Sea, Midway, The Philippine Sea and Leyte Gulf. Submarines were involved in most of the major battles of the war, but usually indirectly or at the edges. It makes sense that submarines did not want to be in the middle of a major gun battle. That would be too much like being dog in the middle of a bison stampede. It would be too easy to be run over while no one noticed.

Submarines did provide important intelligence. The most important information would be the location, composition and heading (sailing direction) of enemy forces. They sometimes had the opportunity to attack those forces before or after the big battles and, at times, were very successful. In other cases, our submarines contributed by destroying supplies, destroying troop ships or providing lifeguard duty for our aviators. They did contribute even without being in the middle of the battle.

The history of submarines participating around the great naval battles of WW2 will be described further below.

However, submarines were in many smaller battles. Nearly every time a submarine attacked Japanese ships, they found themselves in a battle. The Japanese did not take kindly to having their ships attacked and they fought back. The intensity and duration of the battles varied. Sometimes the Japanese had trouble finding our submarines and they would just drop depth charges to try to deter another attack. Sometimes there was a limited number of escorts and it was more important to guard the remaining ships than to find and sink the submarine. At other times the attacks were ferocious and prolonged.

**What were some examples of the worst attacks?**

Here are four examples of the most effective attacks, plus some information about the strongest attack on the *Pampanito* on her first war patrol.

***USS Puffer***

The *USS Puffer*, on her first patrol in late 1943, was held down longer than any other boat during the war. It began with an attack on a tanker. The captain hit the tanker with two torpedoes, but it wouldn’t sink. While the captain maneuvered for another shot, the enemy escort, identified by the captain as a *Chidori*-type destroyer but more likely actually a sub chaser, attacked and did some minor damage in multiple areas. However, some gaskets may have been damaged, allowing water to leak into the main induction piping and the boat. The captain then went to 400 feet and expected to wait out the escort. But it didn’t happen that way. The sub-chaser captain was determined and skilled and he had excellent sonar operators. Each time the *Puffer* maneuvered, the sub-chaserpicked her up. About every hour the sub-chaser dropped a few more depth charges.

The crew of the *Puffer* later suspected that they were leaving a trail of bubbles or oil. That may well have been true since they later found the main induction piping flooded, which added about 12 tons of extra weight to the boat. Naturally, that made depth control that much harder.

*Puffer* went down to 500 feet. The captain had ordered the air conditioning secured to save the battery and the temperature in the boat reached 125 degrees. The hours dragged on. The men faded from stress and heat. The conditions on the boat continued to get worse. The heat sucked the energy out of the men. It dehydrated them and made them nauseous. Some crew members would drink water only to vomit it back up again. The decreasing level of oxygen in the air left the men with hypoxia, making them more likely to be confused, angry and anxious. It certainly left them fatigued. The prolonged exposure to adrenalin left the men euphoric at first and then with negative attitudes. Those who had something to do fared better.

By now, the sub-chaser had run out of depth charges with his (approximately) hourly attacks. However, the Japanese skipper still tracked the *Puffer* hoping to force it to the surface. The crew of the *Puffer* was very aware of the enemy above them and the skill of their hunters. The enemy’s propellor noises were easily heard through the hull. Eventually, a second and perhaps a third sub-chaser joined in. Depth charges were again being dropped.

After 18 to 20 hours, the discipline on the boat began to break down. The official submarine historian reported that “The hurriers and worriers had all crapped out, leaving the plodders to bring home the ship.” The historian further relates:

Both officers and men were “mad at everything and anything. They were particularly mad at themselves for allowing themselves to be caught in such a situation. They cursed themselves for being such fools as to serve in submarines. They cursed the enemy for their persistence. They spent much time daydreaming about what they would do to the sub-chaser above them – discussing such fantastic schemes and ideas as discharging acid around the ship [above] to eat holes in the hull.”

The captain of the *Puffer* had been broadcasting a “play-by-play” over the PA system (the 1 MC.) That just angered some of the crew who believed it just made too much noise. Eventually, the play-by-play information was passed over sound-powered phones, which could be much quieter. That later became standard procedure.

By now, many of the men had sunk into a stupor and watch stations were manned by volunteers. Many of the others were past caring. The captain did an informal poll of the boat as to whether the crew would prefer to surface and fight it out. In spite of their situation, most men said no, preferring to wait it out.

*Puffer* remained at 500 feet all that night and the next day as conditions worsened. After dark on the second day, the captain felt he had no choice – surface or suffocate. The last of the emergency oxygen had been released into the boat. The CO2 absorbent had all been used and the battery was nearly completely discharged. He took the boat up to 250 feet and then blew ballast and went directly to the surface, without stopping at periscope depth for the normal look around. One sub-chaser appeared on radar but *Puffer* was able to escape by presenting a small profile and using a darkened land mass for cover. *Puffer* had been submerged for almost 38 hours. The boat returned to Fremantle, submerging by day to continue making repairs.

It turns out that *Puffer* was pushed about 12 miles to the northeast by currents during her ordeal. It appeared that the sub-chasers had remained closer to the area of the initial attack.

As the investigation proceeded, it was suggested that the captain, officers and crew should all be reassigned to other boats. The thinking was that it would be very difficult for any new crew members to be accepted by those who underwent the ordeal. “Puffer’s ordeal welded her men together in a fraternal, almost mystic bond, and no newcomer was able to penetrate the inner circle.”

The initial story was that about 50% of the crew were reassigned, but it turned out be less than that. The captain was reassigned along with one other officer and about 30% of the crew. The new captain had to do a lot of training as a result. He wrote: “And it was not only ‘training’ but ‘retraining’ since I felt it necessary to change attack procedures and various other things for psychological reasons.”

*Puffer* went on to make eight more war patrols. Wartime credit was for sinking 14 ships plus one shared for a total of 102,800 tons. JANAC reduced that to 8 ships plus one shared credit for 38,707 tons. Other ships were damaged. Smaller vessels, such as barges, luggers and sea trucks, likely were sunk but were too small to be credited.

Her captain during that first war patrol was reassigned as assistant for submarine operations on the staff of Commander Submarines, 7th Fleet. There, he earned a commendation for being largely responsible for the successful interception of two enemy task forces.

There was no indication whether any of the crew asked to leave submarine service.

Sources: “Silent Victory” by Clay Blair Jr., pages 499 to 501

“The USS Puffer in World War II” by Craig R. McDonald, pages 61 to 80

“Sink ‘Em All” by V.Adm. Charles A. Lockwood, pages 121 to 122

“United States Submarine Operations in World War II” by Theodore Roscoe, pages 274 to 278

***USS Salmon***

The *Salmon,* the lead boat in a class of six, was built by Electric Boat Company. She was commissioned in March of 1938. As one of the “fleet boats” built between the wars, she was slightly shorter than the boats built during the war, such as the *Pampanito.* Another important difference is that she was a 250-foot boat; she was only tested to a depth of 250 feet.

In October of 1944, while on her 11th war patrol, Salmon was part of a wolfpack led by the captain of the *Silversides*. *Trigger*, also in that wolfpack had found a large tanker with four escorts and attacked. One torpedo broached and was spotted. The tanker turned away and the torpedoes missed. The next salvo by *Trigger* blew the stern off the tanker. The tanker was dead in the water but still afloat and *Trigger* had to go deep. Upon surfacing, she notified the rest of the pack about the tanker.

*Salmon* was the next boat to attack that night. The tanker was not moving but was still guarded by four alert escorts. *Salmon* fired four torpedoes with two hitting the target. *Salmon* went to 300 feet. The escorts administered a “severe depth-charging.” That included four patterns nearby, with a total of about 30 depth charges.

*Salmon* was badly damaged, with a score of leaks, and driven down to about 500 feet – below the scale of the depth gauges.

* The main induction piping was flattened and flooded. This added almost seven tons to the weight of the boat even though the piping had flattened.
* The steering gear was out of commission.
* The engine exhausts were jammed.
* Stern planes were jammed in the dive position.
* The After Torpedo Room hatch was blown open, but the boat was saved by the fact that a bottom plate had been bolted to the hatch trunk. Other hatch trunks flooded as well.
* The vent for Fuel Ballast Tank #7 ruptured and 7,000 gallons of diesel fuel were replaced by heavier sea water.
* There were serious leaks in the Conning Tower.
* Water levels began to approach the main motors.
* Numerous other pressure gauges, meters and instruments were damaged by shock.
* The main gyrocompass panel short-circuited.
* The flooding from pressure fittings had not been controlled and exceeded the ability to pump water out.
* Salmon had difficulty maintaining depth and at one point went to a reported 578 feet.

The captain decided that his only hope was to surface and fight it out, which is usually futile. When he surfaced the boat, he found that the nearest escort was 7,000 yards (3.5 nautical miles) away.

For some reason, the escort did not attack right away, perhaps not seeing her. That gave *Salmon* more time to patch some leaks, correct a 15-degree list and open the engine exhausts. The engines came to life. Finally, the escort charged, probably to ram *Salmon*. However, *Salmon* also charged, thinking that offense was the best defense. The boat passed the escort within 50 yards while firing every gun available. That included “two coke bottles which an excited seaman hove at her”. The charge apparently killed everyone topside on the escort, which stopped dead in the water, on fire. *Salmon* fended off a charge from a second escort.

She then hid in a rain squall and radioed for help. Six other boats responded. The boats sent spurious radio messages to make it sound like more ships were coming. *Salmon* was then able to make enough repairs to submerge again to await the arrival of assistance.

While some of the boats were gathering, *Sterlet* took the time to finally sink the tanker, for which *Trigger, Salmon* and *Sterlet* all shared the credit, one-third each. *Sterlet* escorted *Salmon* back to Saipan. When the engineers inspected the boat, they decided that the damage was so extensive that it wasn’t practical to repair the boat for combat. *Salmon* was sent to Portsmouth to be patched up. She could then serve as a training boat, although one source indicated that *Salmon* was just scrapped. The entire crew was transferred to the *Stickleback*, which was being built in Mare Island.

Sources: “Silent Victory” by Clay Blair Jr., pages 764 to 765

Naval History and Heritage Command web site – [WWW.history.navy.mil](http://WWW.history.navy.mil) for the *Salmon*, SS-182

“Sink ‘Em All” by V.Adm. Charles A. Lockwood, pages 209-210

“The Fleet Submarine in the U. S. Navy” by CDR John S. Alden, USN, Appendix 6.

***USS Sculpin***

*Sculpin*was a Sargo class “fleet boat” completed at Portsmouth Naval Shipyard in 1939, along with her sister ship the *Squalus.* Both boats had been operating off the New Hampshire coast in 1939 when the *Squalus* sank. The main induction valve on *Squalus* had been left open or came open. When the *Squalus* was noted as overdue, the search for her began. *Sculpin* was the vessel that located the *Squalus* and the rescue effort began. *Sculpin* was able to communicate with *Squalus* to help keep spirits up. The submarine rescue ship *Falcon* was rushed to the scene. Using a diving bell, all the survivors of the initial flooding were rescued.

*Squalus* was raised in 1940 and cleaned up. She was recommissioned as the *Sailfish* and served through the war. However, the new name didn’t fool any of the sailors. They knew her as the “Squalusfish.”

In a series of events tinged with irony, *Sculpin* was lost with the majority of her crew in November of 1943. She had found a convoy and prepared to attack. However, *Sculpin’s* periscope was spotted and the convoy turned to ram the boat. *Sculpin* went deep to avoid the attack. After the convoy had passed, the captain returned to the surface, intending to do an “end around” and attempt an attack. However, he was surprised to find the Japanese destroyer *Yamagumo* waiting for them. *Sculpin* dove again quickly and the destroyer attacked.

*Sculpin* was damaged, went deep again and remained there for several hours. As the boat was coming toward the surface again, the depth gauge stuck at 125 feet. Not realizing what was happening, the diving officer kept pumping water overboard. As a result, the boat broached the surface. The *Yamagumo* was still waiting for *Sculpin* and attacked. Sculpin headed back down. This time, the damage from 18 depth charges was severe. The leaks were serious and the bow and stern planes and the steering gear were out of commission.

The captain decided that surfacing to fight it out with the deck gun was his only choice. As was usually the case in such a gun dual, the submarine did not fare well. One of the first rounds from the destroyer hit *Sculpin’s* bridge, killing the captain, the executive officer and the gunnery officer. The next senior officer remaining decided to scuttle the boat and passed the word to “abandon ship.” The crew donned life jackets and the chief of the watch started to open the vents.

The division commander, Captain John Cromwell, was aboard *Sculpin* for the possibility of arranging a wolfpack. Captain Cromwell was concerned about the information he knew about future operations and about Ultra, the fact that we were able to break Japanese codes. He feared that he might not be able to keep these secrets when tortured and decided he would go down with the *Sculpin.* The young diving officer, probably feeling responsible for the disaster, decided he too would stay with the boat along with 10 others. Captain Cromwell was recommended for the Medal of Honor after the war. It was awarded to his widow.

The Japanese rescued three officers and 39 men. However, one man was injured and the Japanese simply threw him over the side. After interrogation at Truk, the survivors were divided into two groups and put aboard the Japanese escort carriers *Chuyo* and *Unyo.* Those carriers sailed with the large carrier *Zuiho.* Both *Skate* and *Gunnel* attempted attacks on *Zuiho* but were thwarted.

In a great storm, *Sailfish* found the carriers. The Japanese commander had rescinded the submarine warning and stopped zigzagging due to the storm and high seas. In three separate attacks, *Sailfish* sank the *Chuyo*. All but one of that group of 21 *Sculpin* survivors were lost with the *Chuyo.* However, at this point, no one from the *Sculpin* had been present when she had located the *Squalus* back in 1939.

Sources: “Silent Victory” by Clay Blair Jr., pages 524 to 529

“United States Submarine Operations in World War II” by Theodore Roscoe, pages 288

***USS Halibut* (SS-232)**

*Halibut*was a Gato class boat completed in 1942. In November of 1944, she was on her 10th war patrol operating as part of a wolfpack in the area of the Formosa (now Taiwan) Strait. *Halibut* had found a small convoy with three escorts. The captain fired four torpedoes at the largest ship from 3,100 yards. This was much farther away than usual, but as close as they could get. *Halibut* thought they had two hits but could not confirm them.

Shortly after that Skeeter, the mascot (a dog) on board, started to growl and the sonar operator also picked up a strange noise. It was later believed to be a low-flying airplane with a magnetic anomaly detector. This aircraft dropped a depth bomb that rocked the *Halibut.* It is also likely that the aircraft also dropped a marker of some sort.

Shortly after the aircraft attack, two escorts took turns working together to drop series of depth charges in “a short, very severe depth-charging.” The explosions happened in such rapid succession that the total count was lost.

The damage to *Halibut* wassevere and nearly fatal. It included:

* The Conning Tower was dished in by one sequence of depth-charges that also pushed the boat deep.
* Various tanks and the deck were “rippled.”
* Other charges pushed the *Halibut* deep, beyond her test depth.
* The skids in the forward room jumped up about a foot, damaging the torpedoes.
* The deck plates in the forward room also jumped, shearing the bolts holding them in place. The men in the space were dumped into the bilges.
* Sea valves spun open and the escape trunk leaked.
* “Meanwhile the line to the #1 air bank in the forward battery well carried away. The rush of high-pressure air, and the combined odors of hair tonic, shaving lotion, glypton [sic] and food caused the personnel in the compartment to believe it was flooding and chlorine gas was escaping; hence they abandoned and secured the compartment. #1 bank bled down, creating a 50# pressure in the compartment. This prevented opening the after door or the flappers.” (From the captain’s report.) After carefully determining that there was no chlorine gas, the overpressure had to be vented into the Forward Torpedo and Control Rooms, a loud and slow process. Even Skeeter, the mascot, couldn’t tell if the Japanese were still searching from above.
* Motors for the sound heads (sonar) failed, requiring they be turned manually.
* The breech of the 4-inch deck gun was pierced by shrapnel. The gun was wrecked.
* The main induction valves, meant to bring in air on the surface, had been damaged and were letting in seawater.
* The gyrocompasses no longer worked.
* The radio was out of commission. *Halibut* could only communicate with other boats using the SJ radar and Morse Code.
* The Control Room clock was frozen at 13:46:24.
* One of the periscopes “had all its insides torn loose.”
* Compartments were littered with hydraulic fluid, cork insulation and glass.
* The were endless leaks from pipes and valves.

The Japanese then left the *Halibut*. “For some reason the Jap[anese] shoved off. A little persistence would have paid off. The beating the ship took and survived brings our admiration and respect to the men who designed her, the people who built the *Halibut* and those who recently overhauled her at Bethlehem Steel Company.” (Captain’s report.)

“First aid” repairs were completed at Saipan and Pearl Harbor. *Halibut* was then sent to the Portsmouth Naval Shipyard for final assessment. The detailed list of damage covered three typewritten pages. It was determined that the damage was too extensive to justify the needed repairs. *Halibut* was “relieved from active service.” Plans to convert *Halibut* to a school (training) boat were cancelled and she was sold for scrap.

After the war, Skeeter was adopted by one of the ship’s cooks.

Sources: “Silent Victory, The U.S. Submarine War Against Japan” by Clay Blair Jr., pages 771 to 772

“The Last Cruise of the Halibut” by CDR Graham C. Scarbro, USN in “Naval History Magazine” of April 2021.

“United States Submarine Operations in World War II” by Theodore Roscoe, pages 424 to 425.

“Sink ‘Em All” by VADM Charles Lockwood, pages 249 to 250.

***Pampanito***

Pampanito started her first war patrol on March 15, 1944, one year to the day after her construction was started. *Pampanito’s* assignment was as part of a group of ten submarines providing lifeguard duty for our aircraft. The planes were attacking Japanese bases at Yap and the Palau islands in the Carolines. *Pampanito’s* services as a lifeguard were not required. She was then reassigned to an area south of Guam.

While in that area, *Pampanito* attacked a convoy and believed she had two hits on a large ship. The Japanese escorts counter-attacked. Among the resulting damage, the most significant was probably a crack in the main induction piping. That resulted in a loud squealing noise that was disturbing in itself. It also meant that the Japanese could hear *Pampanito* on their sonar. When the main induction piping finally filled, the boat went quiet. However, she also went deep since the piping held about 15 tons of water.

*Pampanito* went down below 600 feet (the designed depth for the boat) and could not pump water out of the boat since it would make too much noise. They couldn’t speed up, for easier depth maintenance, because that too would make excess noise. They kept a large up angle on the boat in order to maintain depth at low speed. This worked. Eventually, *Pampanito* was able to get away and drain the piping.

There was still the need to fix the piping so they could submerge safely in the future. If they couldn’t fix it, they would have to end the patrol. Crew members looked over the piping to find the leak. (The piping is below the deck but above the pressure hull.) However, they couldn’t find the problem. The best solution they could think of was to give a wrench and a flashlight to the smallest sailor on the boat. They then put that man into the pipe, closed it up behind him, and submerged. His job then was to crawl through the pipe until he found the leak and bang on the pipe with his wrench. Once it was located, the crew was able to repair the pipe well enough to remain on patrol.

For more information, review the details of *Pampanito’s* first war patrol in the War Patrol Summary section.

Sources: “USS Pampanito, Killer-Angel” by Gregory Michno, Chapter 3.

**How did submarines find targets?**

Submarines had various ways to find targets during WW2. One was just to search in the area they were given to patrol. It would be up to the captain to try to determine the most likely areas for successful hunting. That would be based on their own experience, information from other captains in patrol reports and general intelligence information.

If enemy shipping had gotten past another American submarine, that boat would broadcast the location and best estimate of base course and speed. That would hopefully allow other boats to get into position to attack.

We began to formally use wolfpacks in the fall of 1943**.**  Now submarines were working together to identify the most likely routes for enemy shipping and to plan coordinated attacks. Once ships were sighted, then the wolfpack executed their attack plans while not endangering each other.

The captains also applied their own analysis to all the information they had and make their best estimate of what the enemy could do and might do. For example, if a captain had been successful in a particular area, he might estimate that for the next few days, at least, enemy shipping might be routed away from him. Where they might go could be limited by geography, likely shelters or ports, etc.

Or, perhaps as the *Batfish* found, there could be more Japanese ships passing along the same route and they should quietly stay in that area. In the case of the *Batfish*, the targets were submarines. *Batfish* simply remained where they had just sunk one Japanese boat and claimed two more over the next 72 hours.

**Note:** Two books that provide insight into the thinking of our captains are “Thunder Below” by Gene Fluckey and “Clear the Bridge” by Richard (Dick) O’Kane. One of the books on the *Batfish* is “In the Course of Duty – The Heroic Mission of the USS Batfish” by Don Keith.

There were also the “Ultra” or “Magic” messages. These contained information provided to the captains based on our intercepts of Japanese messages. We had broken most of the Japanese naval codes. If we could decipher the message in time, we could provide the information to captains helping them to intercept and attack the targets.

Then there was just plain luck. An enemy vessel might just happen to be transiting through your assigned area. In that case, you had to be looking for clues that targets might be nearby. Radar might have picked up unidentified contacts. (The use of radar was often limited to avoid giving away one’s own location.) Other methods were sighting smoke on the horizon and hearing propellor sounds through sonar. It might even be possible to notice an aircraft in the distance flying circle patterns that could be protective cover for a convoy.

**Could they go anywhere they wanted to find targets?**

Definitely not. Boats were assigned to specific areas, both for safety and coverage. If you were outside your assigned area, you might be attacked by friendly forces who weren’t very good at distinguishing our submarines from the Japanese. Or you might incorrectly identify another of our submarines and attack. You might also miss shipping that was proceeding through your assigned area that the higher commanders assumed you would intercept.

This was likely frustrating for some captains. The most successful captains were often assigned to the most promising areas. That might mean that the less successful captains might have a difficult time finding the targets to become successful, and to then get the better assignments.

**What did they do if they found a possible target?**

The first thing the Officer of the Deck (OOD) would do would be to order a course to point the submarine at the target. Then the OOD would immediately alert the captain. Once the boat was pointed at the target, the captain could determine which way it was moving relative to the boat. He could then decide what course to take to get in front of the target to be able to attack.

At some point, if there was a chance of getting close enough for an attack, the captain would call for the tracking party. It would help provide confirmation of the captain’s estimates and allows him to make needed adjustments. Eventually, if it appears that the submarine can get within firing range of the target, the captain will call the full crew to battle stations and attack.

**How did they know they were enemy ships?**

The first indication would be a lack of information about any friendly ships in the area. In WW2, submarines were operating deep into enemy areas and could start with the assumption that any ship was likely to be hostile. If there were friendly ships in the area, did the potential targets match any of that information?

Then it was a matter of identification. The US had books that described the known Japanese warships, merchant ships and tankers. Captains would use features such as the type of bow and stern, the types of masts and funnels to compare what was seen in the periscopes to what could be found in the book. Captains would be very familiar with the outlines of the Japanese warships, and that made identification faster and easier.

One could also be more confident that it was an enemy ship if it was shooting at you.

However, by the end of the war, we had sunk most of the Japanese merchant fleet. It then became easier to find another American submarine than it was a Japanese ship to attack. (The joke was that you could cross the South China Sea just stepping from one American periscope to another.) Obviously, more caution was needed then.

**Did anyone ever make a mistake in ship identification?**

Definitely, although most of those were mistakes in confusing one Japanese ship for another. Captains might identify a cruiser as a battleship or a destroyer as a cruiser. They might overestimate the size of the cargo ship or tanker that they attacked.

In other cases, our submarines were attacked by friendly aircraft or ships, particularly early in the war. As a result, submarines quickly learned to never trust any airplanes except, perhaps, those planes that would escort the boat into port. It isn’t completely clear, but we may have lost one or two submarines to our own aircraft.

In one of the saddest incidents in the war, an American submarine sank a Russian hospital ship. It was misidentified in the fog as an enemy combatant, and the captain had not seen the notice that the hospital ship would be transiting the area. It was a diplomatic disaster. The captain lost his command.

**What is the tracking party?**

This is the group of sailors who would help the captain track the progress of the target. It would include the personnel to log events, plot the target’s movements relative to the boat, and to man the Torpedo Data Computer or TDC. This is the device that calculates the final course for any torpedoes. However, at this early stage, the TDC is important because it provides a running estimate of the target’s location and movement. It helps the captain assess the status of his attack plan.

**What is fire control?**

Fire control is the equipment and process of aiming the appropriate weapons at a target. In the case of WW2 submarines, this usually meant the Torpedo Data Computer (TDC) which sent the final course, to collide with the target, to the torpedo. The torpedo stored that information in a gyroscope.

**How many torpedoes would be fired at a target?**

This would depend on what type of ship the target is. Generally, the larger the ship, the more torpedoes that would be used. The more armored the ship, the more torpedoes that would be needed. If the target is pointed right at you, such as a destroyer or other escort, you would likely only fire one at a time if you dared the shot at all.

Carriers and battleships would rate all six torpedoes if firing from the Forward Torpedo Room or all four from the After Torpedo Room. Destroyers might rate two or three. Cruisers and large cargo ships and tankers might rate three or four. Smaller cargo ships might rate only two.

**How many torpedo hits would it take to sink a ship?**

That also depends on a variety of factors. What type of ship is it? Is it in good condition? What is it carrying? Is it fully loaded or nearly empty? What part of the target did you hit? Here are some examples:

* US submarines sank only one Japanese battleship. The *Sealion* sank the battleship *Kongo* in November of 1944. That required threehits from a salvo of six fired.
* Carriers normally required multiple hits because of their size. However, *Albacore* managed to sink the Japanese carrier *Taiho* with a single torpedo. *Albacore* had help from a fatal mistake by Japanese damage control. More details are below in the Battle of the Philippine Sea.
* Sam Dealey, captain of the *Harder*, was the destroyer killer. He was sometimes using “down the throat” shots which meant the destroyer was coming directly at him to attack. Dealey would fire torpedoes and the destroyer would try to turn away. That actually presented a wider target. Typically, only one torpedo would hit the destroyer. It was a very dangerous method unless it worked. Few other captains used this method.
* Hitting an ammunition ship could easily result in a huge explosion and a quick sinking.
* Tankers could explode with one torpedo hit if it carried gasoline. In that case, the explosion could be a blinding flash and the ship would just be gone when the smoke cleared. However, if it were carrying crude oil, it might not sink unless a fire was started. (Crude doesn’t start burning easily.)
* An empty tanker could be very difficult to sink unless it was hit in the engineering spaces. Since the tanks were designed to be full of fuel or ballast water, a torpedo might only fill them with seawater. Such damage would need to be repaired, but might have only slowed the ship a little.
* The *Salmon* actually sank a ship with a torpedo that didn’t explode. It was an old ship and the dud torpedo punched right through its side. That was enough to flood and sink the target.
* The *Rakuyo Maru*, the ship from which the Pampanito rescued the 73 British and Australian soldiers, who were POWs, was carrying raw rubber. Although rubber is too dense to float, the fact that it filled that hold and absorbed most of the explosion, left the *Rakuyo Maru* sinking very slowly. It allowed the soldiers time to climb back aboard and to find a little food, water and materials for rafts.

**What usually happened after we attacked Japanese ships?**

For some reason, that seemed to make the Japanese angry and they would respond. Sometimes we were fortunate and, in the chaos that followed, the Japanese would drop depth charges indiscriminately. They might not be anywhere near the attacking boat. In those cases, they seemed to be hoping mostly just discourage another attack or to scare the submarines away.

Other times, the counter attacks were very effective. Remember that we did lose 52 submarines during the war and at least 27 were due to Japanese anti-submarine warfare forces.

**How were our submarines detected?**

If our captains were lucky or very good, the first indication of one of our submarines would be a torpedo exploding against the side of a Japanese ship. Note, however, that our captains would often be firing from inside the Japanese escorts. In addition, the steam torpedoes that we used during WW2 left a trail of bubbles and smoke that pointed back to where the submarine fired them. It wasn’t always difficult to figure out where the submarine had been.

The Japanese did have electronics such as radar and sonar. However, they did not seem to place as much importance on them as we did. Some ships did not have radar until late in the war. It also appears that we and the British were making far more upgrades to our equipment. Still, the Japanese electronics were good enough that they were sometimes able to detect our submarines. They could also detect our radio and radar transmissions. That is a large part of the reason why American submarines used radar sparingly and transmitted few messages.

Japanese aircraft would patrol the routes that their ships used most often. Another good place to look for submarines is around their convoys. Sometimes they were able to catch our boats on the surface. That would still be useful information even if the plane was not able to attack.

**How did submarines escape?**

If the submarine was submerged, the most important thing would be to be very quiet so that the Japanese sonar didn’t pick us up. Most often, that also meant moving very slowly.

Once an attack run was started by a Japanese ASW ship, they would approach at high speed. They too have to get clear of the explosion. When they are running at high speed their sonar would be overwhelmed by their own ship noises and the flow of water over their equipment. That allows the submarine captain a brief opportunity for evasion tactics such as turning or changing depth or speed. However, if there are multiple ships attacking the submarine, the others can move slowly enough for their sonars to still be effective.

Generally, it was a cat and mouse game. It would be the wits and ingenuity of the submarine captain against his attacker(s). The submarine also had the advantage of using all three dimensions. The attackers had to estimate not just where the submarine was but also how deep it was. Depth charges had to get pretty close - probably within 25 feet or so - to the submarine to breach the hull and sink it.

Our submarines were rather sturdy and could absorb a fair amount of damage. Sometimes the key was to contain and repair the damage long enough so that the Japanese would just assume that they must have been successful.

Outlast them %%%%

There is also an ejection tube in the After Torpedo Room. That tube can be used to launch a countermeasure. The most primitive version is a compound that generates bubbles when it is ejected into water. (It behaves very much like a giant Alka Seltzer.) This provides two targets for the Japanese sonar since any change in density will reflect sonar, either the steel hull or the empty bubbles. This only a temporary decoy since the bubbles will disburse and rise to the surface.

%%%% Was this available to US boats in WW2. It was to the Germans.

Captains would also be looking for a “layer.” That is a sudden change in temperature as the boat goes deeper. The change in temperature can distort sonar, bending it to confuse the pulse, or even reflect it allowing the submarine to hide. Such a layer is called a thermocline. There is a bathythermograph in the Control Room. It is a small box that records the water temperature at various depths.

If the submarine is on the surface, other factors come into play. Of course, one choice is to submerge quickly and then turn or go deep before the attacker comes close.

Assuming that it is in the hours of darkness, there are things that can help make the submarine less visible to an attacker.

Point away for lowest profile.

Experimented with colors to be least visible.

Might be able to outrun the attacker if it is small enough.

Fog or rain squalls

Hope no bioluminescence

Up moon or down?

**Where were attacks controlled from?**

**Depth charge**

a bomb that is thrown or dropped over the side of an anti-submarine vessel. The charge sinks down and when it reaches a preset depth it used a pressure switch to explode. If it explodes within 50 feet of the submarine it will likely do significant damage. If it is within 25 feet, it is likely to sink the sub.

**Depth bomb –**

**What other things can surface ships do to attack a submarine?**

Force it to the surface

Ram

Torpedo?

Cavitate – Cavitation is the collapsing of bubbles along the edge of the propellor blades. The bubbles are created by operating at higher speeds. The collapsing noise can usually be heard by the sonar of anti-submarine vessels.

ASW – anti-submarine warfare. Vessels and aircraft designed to locate and destroy submarines. What submariners consider to be the other guys.

**Battle of Savo Island near the Solomons:**

This was early in the war when we were still learning how to fight it. When the Japanese were withdrawing after one particularly damaging engagement for the US, the *S-44* sank the Japanese heavy cruiser *Kako*.

**Midway:**

We had arranged a semi-circle of submarines to look for the Japanese fleet. Our code breakers had figured out that they were going to attack Midway, but we didn’t know exactly where they were coming from. The Japanese were very good at radio silence as they had demonstrated prior to the attack on Pearl Harbor. The *Nautilus* found the attacking ships (or more accurately they found her.) *Nautilus* wasn’t able to attack but contributed indirectly.

The Japanese had left a destroyer behind to keep the *Nautilus* down until the fleet was safely past. Our carrier aircraft were already in the air but were having difficulty finding the Japanese carriers. Fortunately, some of our planes spotted the destroyer and correctly guessed that it was racing to catch up with the main body. They turned in that direction and found the carriers. Luck was on our side since the Japanese planes were preoccupied with our torpedo bombers and because their admiral had his planes on deck being rearmed and refueled. Many bomb hits on the Japanese carriers resulted in huge fires and secondary explosions. The result was a devastating victory for the US.

After the main battle, *Nautilus* found a battleship with escorts and fired two torpedoes. One misfired and the other missed. Later, *Nautilus* found one the Japanese carriers aflame. She fired four torpedoes at the carrier *Kaga* and heard explosions. Nautilus thought they had sunk the carrier but one torpedo had misfired, two missed and the fourth hit the target but didn’t explode.

This could have been another indication of problems with our torpedoes, specifically the Mark XIV (14).

One submarine, the *Grayling*, was attacked by US B-17 bombers who thought they had sunk a Japanese cruiser in fifteen seconds. The *Grayling* had exchanged recognition signals with the aircraft. When the planes continued their attack, *Grayling* immediately crash-dived and escaped. This was after the main engagement.

NOTE: American submariners learned to never trust **any** airplane – ours or the Japanese. The standard procedure was always to dive when aircraft approached unless the plane was escorting the boat into port. During the war, one American submarine was sunk by an American pilot %%%%% while in a “safe lane” where the pilot was not supposed to attack any vessel, whether ours or Japanese.

In the early morning dark of the next day, *Tambor* found a group of Japanese ships near Midway. She sent a contact report, thinking they had located the Japanese invasion force. However, the cruisers she spotted had only been sent to bombard Midway and would be recalled shortly. Unfortunately, the contact report led to confusion and allowed the main group to sail west for home with no further attacks. On the positive side, a Japanese lookout spotted *Tambor* and in the maneuvering to avoid *Tambor*, two cruisers collided and were significantly damaged. US aircraft sank one of the cruisers soon after and further damaged the other.

**Philippine Sea (AKA the Great Marianas Turkey Shoot) and the Invasion of Saipan:**

Both the Americans and the Japanese expected that the invasion of Saipan, Tinian and Guam would trigger a major battle at sea. Japan was still looking for the major victory at sea that would regain control of the western Pacific. Our submarines were deployed to locate the Japanese fleet, hopefully to inflict some damage on the fleet and to intercept their supply lines.

Even before the battle began, submarine warfare had reduced the fuel available to the Japanese fleet. Due to that shortage, Japanese pilots had limited training and air time. Because he had limited fuel at his disposal, Admiral Toyoda had to be sure of the American objectives before sailing and was slow to implement his defensive plan. The prior damage inflicted by submarines had already put the Japanese at a disadvantage.

*Pampanito* had been assigned lifeguard duty near Yap Island when our aircraft attacked the Japanese bases there. In preparation for the invasion of Saipan, we wanted to put those nearby airfields out of commission.

In preparation for the invasion, submarines were assigned to clear the area near Saipan of Japanese supply ships. Some examples are:

* The *Tang* spotted a supply convoy of five vessels in the vicinity of the Marianas and sank two of them. A day or two later they sank three more supply ships.
* *Sunfish* sank two other cargo ships.
* *Trout* found a convoy bringing three regiments of Japanese troops to the Marianas. *Trout* sank one ship and damaged another. Of the 4,000 reinforcements troops, only 1,720 made it ashore and a third of those went straight to a hospital.
* As part of a wolfpack, *Pintado* and *Shark* sank three large cargo ships with terrible losses to the embarked soldiers.

Intelligence about the location and progress of the Japanese fleet was provided by:

* *Redfin* spotted the Japanese fleet with its six carriers plus battleships and cruisers as they departed Tawi Tawi headed for Saipan.
* *Harder* had also reported three battleships in the same area, including one of the super battleships of the *Musashi* class.
* *Flying* *Fish* reported three carriers and battleships as they exited the San Bernardino Straight in the Philippines.
* *Seahorse* reported four warships and six other ships east of Surigao Straight, near the Philippines.
* *Cavalla*, relieving *Seahorse*, reported three tankers but couldn’t get close enough to attack. This provided enough information for Admiral Spruance to get a clear picture of Japanese intentions. It also helped Admiral Lockwood deploy his submarines in the area. *Cavalla* was then able to reestablish contact and make another report.

Two Japanese carriers were sunk during the battle by submarines including:

* Shortly after the Japanese had launched aircraft against the American carriers, *Albacore* managed to hit the Japanese carrier *Taiho* with a single torpedo. Although this would not normally be a fatal blow, the *Albacore* got some help from the Japanese damage control parties. The *Taiho* was opened up internally in order to ventilate smoke and gasoline vapors. Instead, the gasoline fumes ignited and the resulting fires wrecked the carrier.
* A few hours later, *Cavalla* found the carrier *Shokaku* and fired six torpedoes at her. Three of them hit the Japanese carrier and set off secondary explosions among the torpedo planes being fueled on the hangar deck. *Shokaku* actually sank about thirty minutes before *Taiho*. These were two of the largest and best carriers that the Japanese had remaining.

In the battle of the Philippine Sea, the Japanese lost a total of three carriers and over 400 aircraft. As at Midway, they again lost most of their seasoned pilots. The Japanese would never be able to send an effective carrier task force to sea after this.

**Leyte Gulf:**

This was intended by the Japanese to be a gun battle. The plan was to divide the Japanese forces into three groups. The Central and Southern Forces were to break through the American forces and destroy the landing fleet taking back the Philippines. The Northern Force was a decoy to draw the American carriers away from the landing fleet.

The submarines *Darter* and *Dace* reported contacts with three cruisers, possibly of the Central Force. At the time, they were not able to get into position to attack. Very early the next day, they rendezvoused to discuss plans when they were interrupted by a radar contact. This was a much larger group of contacts which turned out to be the very large Central group. The submarines set a trap and sank the heavy cruisers *Atago* and *Maya* and seriously damaged the heavy cruiser *Takao*.

The *Bream* was credited with damage to the heavy cruiser *Aoba*, which had been detached from the Central Force as a troop movement detachment. The *Angler* and *Guitarro* were able to report the movement of the Central Force and confirm that it was headed to the San Bernardardino Straight. After this, there was no further involvement of our submarines with the Southern or Central Forces.

The Northern group did attract Admiral Halsey with his large carriers and fast battleships. After the carrier pilots engaged the Japanese ships, our submarines in the area were free to engage with any targets they could find. The *Halibut* found what was thought to be a battleship. Captain Galantin fired six torpedoes and believed he had five hits. He later observed what he believed to be a capsized hull and two escorts picking up survivors. However, he was not credited with the sinking.

The *Haddock* observed gun flashes and star shells from a surface engagement by our cruisers. Captain Roach “decided not to get into this melee until our forces quit, then try to catch them (Japanese ships) on the way home.” Unfortunately, by then the targets were out of range.

The *Jalleo* picked up two targets on radar and fired four torpedoes at a cruiser from close range. He saw three hits accompanied by bright flashes. When he surfaced 30 minutes later, there was nothing in sight. That was because the target, the *Tama*, had sunk in plain sight of the *Pintado*.

**Individual battles of note**

**Parche/Ramage**

Barb

**NOTES:**

1. A depth charge is a bomb dropped or thrown from an anti-submarine vessel. It consists of a few hundred pounds of explosive and a pressure switch to detonate it. The charge sinks down until it reaches the depth set in the pressure switch and then explodes. A depth charge explosion within 50 feet of the boat can do significant damage. Within 25 feet, the hull will most likely rupture and the boat will probably sink.
2. The reduction gear is between the main motors and the propeller shaft. It allows the motor to run at a higher, more efficient speed while the propeller turns more slowly. Damaged reduction gears tend to make noise and can give away the boat’s location. Main motors were redesigned to eliminate the reduction gear. That was completed late in the war by an engineer named LCDR Hyman Rickover. Yes, that Rickover.
3. Bioluminescence is cause by certain plankton which come toward the surface to feed at night. These plankton glow when disturbed. A ship, torpedo or even a dolphin passing through the plankton will leave a glowing trail of where they had been until the plankton settle down again. It is very disconcerting for a submarine, which depends on stealth, to discover that it is leaving a glowing arrow in the water behind it.
4. A night surface attack was often preferred as long as there wasn’t a bright moon. Submarines were painted a specific dark gray color on vertical surfaces to make them hard to see at night. Sonar did not usually find and identify a submarine on the surface, and most Japanese escorts did not have radar until late in the war.

References:

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Pampanito war patrol history from the Maritime Museum website.