

**Sonic Depths:**  
The Layers of the Ocean, the Life within them,  
and their Methods of Communication

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## Abstract

I will be analyzing and explaining my original composition which is a seamless, multi-movement, creative interpretation of the ocean layers and the life found within them. I will research each layer of the ocean as organized by depth to learn about differences in species, the amount of sunlight, and the amount of water pressure. When I discover a species that uses sound to communicate, I will analyze and recreate the noise using instruments and include it in the composition. The composition will above all be based on how I want to convey the feelings of each layer as I learn more about them, but will contain segments of my findings throughout.

The ocean is a huge and vastly unexplored part of our planet. It is home to an estimated 50-80% of all the life on Earth, consists of five separate layers, and holds 97% of the Earth's water. Humans have explored roughly 10% of the ocean, leaving an overwhelming majority to ponder over as we build technology to help us discover more. This is not meant to discredit what is currently known about the ocean, though. Being as big as the ocean is, 10% goes a long way and has provided scientists with a wealth of knowledge. However, with so much left to be discovered it is easy to let one's mind wander, imagining all the things we have yet to find.

At my projects conception, I needed to find inspiration that went beyond my love for the ocean to create the music. In order to submerge myself in the environment I wanted to musically recreate, I went to Virginia Beach and stayed there for a night. I spent a significant portion of my time on the beach, where I took pictures, videos, recorded sounds, played my guitar, and even got in the freezing February water. This was an effective kickstart to my creative process and allowed me to lay the musical foundation for my piece. Following this excursion, I took myself to the Baltimore Aquarium where I spent the day observing many different kinds of ocean life. I also recorded sounds and took pictures of the things I saw to help boost my inspiration while writing at home or otherwise. In the moments where I needed to be in an aquatic environment but could not travel far, I would go to the Rappahannock River with my guitar. At home, I would turn to my pictures and recordings when I needed help capturing the mood I wanted in the composition.

At the surface of the ocean is the Epipelagic layer. The Epipelagic, also called the Sunlight zone, ranges from 0-200 meters and houses roughly 90% of (known) ocean life, including most of the fish that humans regularly consume. This layer also holds an abundant

amount of sunlight, making it the only layer suitable for photosynthesis. This allows for plenty of plants, seaweed, and algae.

The next layer of the ocean is the Mesopelagic. The Mesopelagic layer, also called the Twilight zone, is measured at 200-1,000 meters. There is much less sunlight in this layer compared to the Epipelagic, but one is able to begin see the faint shine of bioluminescent creatures. Creatures in this zone include the squid, cuttlefish, and swordfish.

Below the Mesopelagic is the Bathypelagic. Also called the Midnight zone, the Bathypelagic ranges from 1,000-4,000 meters. The only visible light in this layer is created by the creatures themselves. The water pressure in this area is approximately 5,850 pounds per square inch. Despite this, there are a considerable amount of creatures at this layer, most of which are black or red due to the lack of natural light. One creature that can be found here is the sperm whale, which can occasionally be found in this layer looking for food.

Beneath the Bathypelagic is the Abyssopelagic. This layer is also referred to as the Lower Midnight zone, or simply, the Abyss. This zone is measured from 4,000-6,000 meters and holds no light. The water in this zone is near freezing. Despite these conditions, there are a few creatures that can be found down there, such as basket stars and tiny squids. This zone makes up three-quarters of the ocean floor.

The final layer is the Hadopelagic, otherwise known as the trenches. This layer ranges from 6,000 meters to the absolute deepest parts of the ocean. The lowest known point is the Mariana Trench which measures at 10,911 meters deep. The water temperature is just above freezing in this zone, and the water pressure is eight tons per square inch. In the face of these extreme conditions, starfish and tube worms manage to make this layer their home.

With all of this information in mind, I began to imagine my piece. I wanted to try to convey the feelings that each layer gave me as I learned more about them. For the Epipelagic layer, I wanted to write something pleasant. Since this layer includes the surface, it was easy to also imagine the beach when writing for this layer. That being said, I decided to write something that reminded me of the beach and being in the water. This resulted in the Epipelagic being the only layer I wrote in a major key for. The use of ocean wave sounds in the very beginning is meant to make it clear that the listener is beginning on the surface. The bright guitar, quick tempo, and tom-heavy drums are meant to create a fun energy that one might feel on the beach. The trumpet melody can be compared to a seagull and the cello sounds like the flowing of water. As for including the sounds of an ocean creature, I have recreated the sound of the toadfish in the Epipelagic layer. To begin, I found an audio recording of a toadfish call. I played the recording and used a chromatic tuner to measure the frequency of the sound. The toadfish makes a noise similar to cell phone vibrating, and does so in a way that sounds like a stuttered glissando up to a G<sub>2</sub>, which is 98Hz. This is the same G that can be found on the lowest string of a contrabass, which I have implemented in the beginning of the composition. The contrabass begins right away, imitating the toadfish's croak among the sounds of the waves.

For the Mesopelagic, I wanted something that sounded a little chilling, yet also smooth and aquatic. It's the layer we know the second most about, so I wanted to avoid anything too mysterious sounding. However, the transition from the Epipelagic's D major to the Mesopelagic's G minor is meant to reflect the abandonment of one's comfort zone, as I imagine anyone would start to experience when leaving the beach and descending 200 meters below the water. In order to keep it somewhat light-hearted, raised 6th's remained present occasionally and

some major resolutions were used throughout the section. The use of cello and violin are meant to keep the timbre flowing like water, which remains consistent throughout the next layer. The vibraphone has an aquatic sound to me, which allowed for its introduction in this layer. For the live performance, a marimba will be used instead. Within the Mesopelagic, one can find the humpback whale. In measuring an audio recording of a humpback whale call using a chromatic tuner, it was discovered that the range was roughly 523 to 880Hz. These frequencies almost exactly match the range of C5-A5 on the A string of a violin, and therefore allowed for the instrument to imitate the humpback whale in the piece.

The Bathypelagic zone is arguably the largest layer of the ocean. It's depth range is only beat by the Hadopelagic, but since the Hadopelagic only consists of trenches it is reasonable to assume that the Bathypelagic covers a larger area. With this layer being the biggest portion of open ocean, I wanted to create sounds that droned and repeated frequently in an effort to mimic the feeling of dark water all around the listener no matter where they looked or swam. Grand cello and trumpet melodies were included to portray just how vast and intimidating the heart of the ocean is. The layer ends with a resolution amongst all instruments to signal the bottom of the layer.

The fourth layer, the aptly named Abyssopelagic, takes a dark turn. Being the layer that cover 3/4 of the ocean floor, it was necessary to make the music creepier. This layer begins to abandon regular diatonic consonance to create tension and fuel the impending resolution. The key signature drops from G minor to C minor and the layer begins with a Ab7 to offer a stark contrast to the key of the layer before it. The layer goes on to feature accidentals like B natural in order to keep some dissonance intact. With the instruments dancing around diminished and

minor triads, the pure darkness of the layer begins to settle in. All of the instruments decrease in volume to create a more haunting and desolate environment.

The final layer, the Hadopelagic, only consists of the trenches of the ocean. This layer is the darkest, loneliest, most pressurized, and most intimidating. For these reasons, the key signature is dropped yet again from C minor to F minor. All instruments begin the layer softly, forming an F minor chord. Within four measures, only the trumpet, euphonium, cello, and piano are left. The trumpet and euphonium drone on for another eight measures before they too abandon the piece. Leaving only the cello and the piano represents the true black emptiness at the bottom of the sea. In the darkest crevices of the ocean, there is next to no life and a complete absence of light. With only two remaining core instruments as well as the use of the relatively lowest key signature yet to occur in the piece, the listener is meant to feel they are falling alone through the cracks of the sea floor. The end of the piece, meant to signify finally reaching the ocean floor and resting on the bottom, ends on a Bb major chord as the journey has ended and there is no more deep, dark ocean left to discover. The listener can make peace at the bottom of the ocean.

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