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Science and technology serving the sea

Oil and Gas development on the Atlantic OCS

What happens after the airguns go into the water?

If a decision is made to explore the Atlantic OCS for offshore hydrocarbons it will commence a transformation of an "urban marine habitat" populated with the noises of commercial, military, and recreational uses toward a "marine industrial soundscape" saturated with the continuous hum and roar of industrial equipment and processes.

Some of the noises (and their dominant frequency band) will include:

1. Ongoing and regular 4D seismic surveys to monitor hydrocarbon deposit extraction progress. (< 2kHz)
2. Dynamically positioned, thruster stabilized operation platforms will continuously run powerful motors driving large propellers around the clock - forever. (250Hz – 4Khz)
3. Seafloor and equipment-mounted acoustical navigation beacons will sound continuously to keep tabs on equipment and ocean conditions. (10kHz – 100kHz)
4. Deepwater "Subsea" processing equipment such as seafloor separators, multi-phase pumps, and re-injectors will process product and waste under extremely high pressures and noise.(500Hz – 2.5kHz)
5. Underwater Autonomous Vessels controlled through acoustical modems in single channel and multi-nodal communications networks will be relentlessly puttering away. (20kHz – 75kHz)
6. Service vessels, offloading transport tankers, and personnel carriers will increase marine ambient vessel noise exponentially. (250Hz – 4kHz)

How the Marine Soundscape Will Change

Oil and gas development on the Outer Continental Shelf involves a whole series of marine-based procedures that begins with seismic exploration and ends with landing the extracted hydrocarbons at refinery onshore. Each one of these stages has an impact and poses risks to the surrounding marine environment - and all of the humans and animals that depend on that environment for their own survival and quality of life.

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What are all these noises?

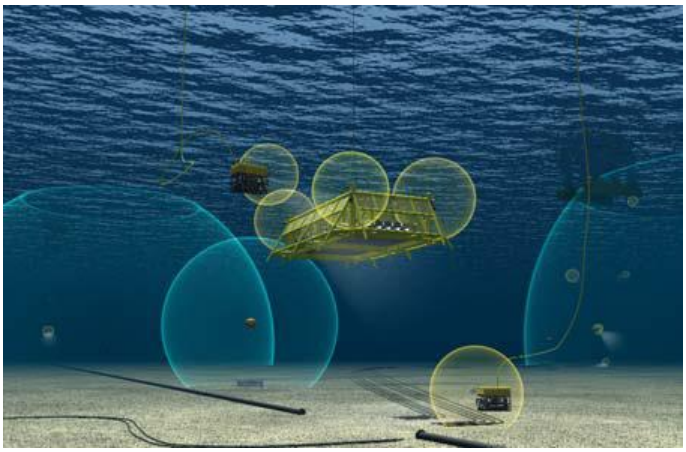
There are a few procedures of which people are most familiar: seismic airgun surveys, drilling, and oil tanker transport.

There are a lot of scientific data on biological disruptions caused by seismic surveys – and the impacts that around-the-clock seismic impulses have on marine mammals, fisheries, and even marine invertebrates. And there is also a pretty thorough understanding of the consequences of drilling gone bad and transport gone astray. Just saying "BP" or "Exxon Valdez" conjures up a large ration dread and anger.

But there are many other processes and procedures that occur in and under the water that are less known but which also impose impacts on marine habitat in the process of "Extraction and Processing" (E&P) of offshore hydrocarbons. The following is an explanation of some of these processes with a focus on the noise impacts they impose.

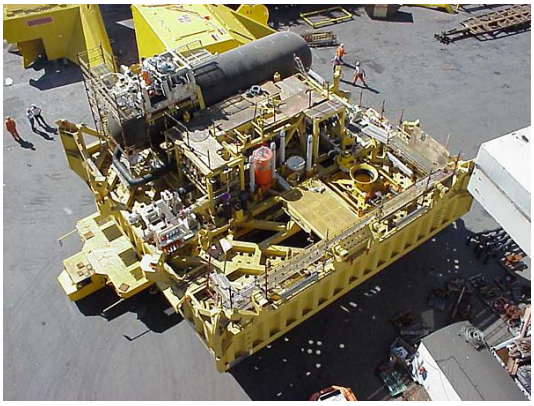
Dynamically positioned operating platforms and Floating Production, Storage, and Offloading (FPSO) vessels.

Deepwater drilling platforms are not rigs built on an iron tower; rather because of the depths of these operations they are often vessels that are held in place (dynamically positioned) with continuously operating "thrusters" – propellers driven by huge electrical motors. A platform stabilized by six to eight 3-meter diameter propellers each driven by 5000hp motors is not uncommon. So these drilling and operations platforms are stabilized by the equivalent of six to eight mid-weight cargo ships (and the attendant propeller noise) concentrated in the area of a single drilling and operations rig.



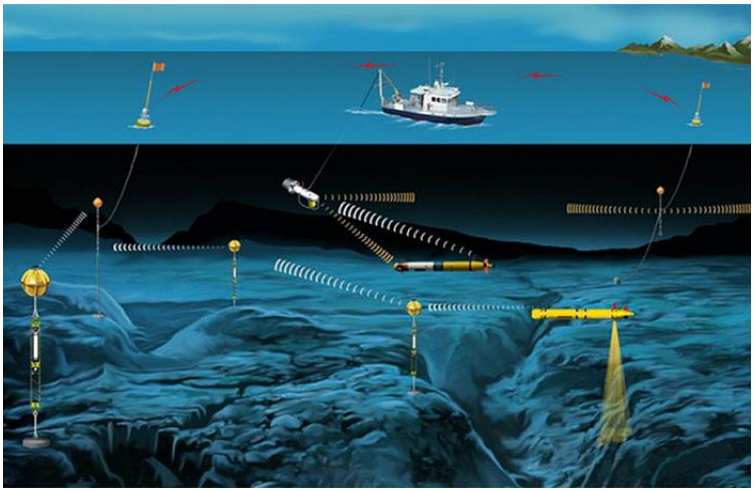
Seafloor and equipment-mounted navigation beacons

Deepwater (subsea) operations employ various acoustical navigation and orienting beacons to locate equipment (Acoustic Positioning and Control Systems – APCS) , Acoustic Doppler Current Profilers (ADCP) to monitor currents and depth, and sighting beacons to locate operation areas. These noise sources are similar in function to airport radio beacons, except they are acoustical – and often operate continuously in the 10kHz – 100kHz range – overlapping the communication and bio-sonar ranges of odontocetes, and the detection frequencies of "forage fish" (shad, herring, menhaden, and sardines).



Deepwater "Subsea" processing equipment

Deepwater equipment and practices that involve seafloor mounted equipment used to "pre-refine" (separate wanted product from unwanted brine, gas, mud, and solids), re-inject unwanted materials and substances back into a deposit, and pump or pressure-drive wanted product to the surface. In most locations this materials handling is being done across high differential pressures – causing noise that one industry professional describes as "really screaming."



Acoustical control of Underwater Autonomous Vessels

Increasingly offshore enterprises are managed by Autonomous Underwater Vessels (AUV) controlled by way of acoustical single-channel or multi-nodal communication networks. These often operate in the 25kHz – 100kHz range, overlapping the communication and bio-sonar ranges of odontocetes, and the detection frequencies of "forage fish" (shad, herring, menhaden, and sardines).

Service vessels, offloading transport tankers, and personnel carriers

Each floating platform will become a hub of industrial shipping activity delivering equipment and supplies, offloading oil and gas, and transporting personnel to the platform.

The offshore developers are taking their chances that they can avoid another catastrophic oil spill. But there is no "gamble" on these noises. If the fossil fuel industry is encouraged to develop the Atlantic OCS, these noises WILL occur and will have negative impacts on commercial and recreational fisheries, on marine mammals, and even on the health and survival of marine invertebrates.