The Legal Status of Autonomous Underwater Vehicles

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COMMENTARY

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AUVs, Autonomous Underwater Vehicles, are the cutting edge of technology used to explore the world's oceans. Today, AUVs can explore areas of the oceans scientists only dreamed about mere decades ago. These robots provide unprecedented access to hydrothermal vents and other mysteries of the deep. AUVs can swim under the polar ice caps and venture into underwater canyons. But scientists are not the only group benefiting from these machines. Once the exclusive purview of the United States Navy and academic institutions, recent advances are bringing AUVs into the commercial sector. AUVs can search for offshore oil and mineral deposits, lay submarine cables, and search for mines. Private individuals and corporations can now purchase AUVs for use in salvage operations, underwater archaeology, or simple exploration. The possibilities appear limitless and the benefits incalculable.

Unlike tethered and remotely operated vehicles which are a simple extension of the research vessel, AUVs are, and legally should be, considered separate entities. AUVs, as the name suggests, are designed to operate freely in the vast oceans. Ideally, AUVs would be released and tracked from shore, eliminating the need for a costly support vessel. The AUV's autonomous nature, however, creates a regulatory gap. AUVs, as discussed in more detail below, may or may not be vessels as defined by U.S. maritime laws. The use of AUVs is virtually unregulated by the federal government, mostly due to a combination of the newness of the technology, difficulties with classification, and the unwillingness of overburdened federal agencies to incur additional responsibilities.

No legal framework currently exists to regulate the use of AUVs. Permits and licenses are only required in a few narrow circumstances. While there is no indication that the oceans are in danger of being overrun by AUVs, their growing availability and popularity warrant investigation into the potential regulatory implications of the widespread use of AUVs. This commentary examines the current legal status of AUVs under U.S. law and suggests that a permitting regime may already exist.

Technology often outpaces regulatory regimes, whose adaptability is hindered by the legislative process and administrative agency resources. In general, the international treaties and domestic law governing marine activities apply only to vessels. While AUVs are autonomous vehicles that operate on and below the service of the ocean, the application of U.S. maritime laws, including the International Regulations for Preventing Collisions at Sea (COLREG), is unclear because these machines may not be considered "vessels" under U.S. law.

A vessel "includes every description of watercraft or other artificial contrivance used, or capable of being used, *as a means of transportation on water*." (1 U.S.C. § 3). The "vessel" test is simple: is the structure "fairly engaged in or suitable for, commerce or navigation and as a means of transportation on water?" (*Hitner Sons Co. v. U.S.*, 13 Ct. Cust. 216, 222 (1922)). For a boat, barge, or other floating structure to be considered a vessel, "it must have some relation to commerce or navigation, or at least some connection with a vessel employed in trade." (*Hitner* at 222).

The current AUV models have no such connection to commerce or navigation. AUVs are used to study and explore the ocean environment. The majority, due to their size and design, are unable to be used as a means of transportation for goods or people on water. Small AUVs used for scientific purposes are probably not vessels subject to U.S. maritime regulations and need not comply with the COLREGs.

Some AUVs, however, could be considered vessels and would be required to comply with the COLREGs and other maritime laws. For example, research is underway to develop cargo carrying AUVs to "deliver payloads or cargoes [sonar arrays, underwater cables, scientific instruments, etc.] to places that manned ships or submarines cannot operator cost-effectively or safely" (Griffiths, 2003). Already the Canadian Defense Research Establishment and the U.S. Office of Naval Research have proved that AUVs can be used to lay cables. In the spring of 1996, during a cable laying mission in the Artic, the *Theseus* AUV laid two fibre optic cables under the polar ice cap over a distance of 175 km. (Griffiths, 2003). The ability of certain classes of AUVs to operate in commercial activities, such as laying cables and carrying cargo, significantly alters the legal analysis of whether AUVs are vessels. If AUVs are used to carry cargo, a strong argument can be made that they are also vessels capable of being used for transportation on the water.

So let's assume for a moment that AUVs are vessels. One class clearly would have to adhere to the COLREG provisions—the semi-submersibles. A semi-submersible AUV is "designed to operate like a snorkeling submarine and consequently, is limited to operations near the sea surface" (Griffiths, 2003).

Rule 22 of the COLREGs requires inconspicuous, partly submerged vessels to display a white all-round light visible up to a minimum of three miles. Vessels are also required to carry equipment for sound signals which varies depending on the size of the vessel. Rule 33 states that vessels less than twelve meters long are not obliged to carry the whistles and bells required on larger vessels. However, if the vessel is not so equipped, it must be provided with some other means of making an efficient sound signal. Semi-submersible AUVs should, therefore, also be outfitted with some type of sound signaling device.

Unlike the semi-submersible AUVs, the majority of AUVs are designed to operate completely under the water. It is important to note that the COLREGs are only applicable to vessels operating *on the water*. There are no lighting and signal requirements for underwater operations, unless a vessel on the surface is engaged in underwater operations, such as fishing or laying cables. Submarines only have to display lights when operating on the surface. There may be situations, however, when the AUV might operate on the surface. It may need to surface to send or retrieve data or as part of its emergency abort system. Once on the surface, the AUV would be subject to the COLREGs.

For vessels less than twelve meters in length, Rule 22 requires a masthead light, sternlight, and towing light visible up to two miles; a sidelight visible up to one mile; and a white, red, green, or yellow all-round light visible up to two miles. For vessels more than twelve meters long but less than fifty meters long, a masthead light, visible up to five miles, is required unless the vessel is less than twenty meters long. For vessels between twelve and twenty meters long, the masthead light need only be visible for three miles. A sidelight, sternlight, towing light, and a white, red, green or yellow all-round light must also be visible for a range of two miles.

Although it is unclear whether AUVs are subject to the maritime regulations for vessels, to reduce damage and liability concerns, it is advisable for AUV operators to adhere to the COLREG provisions dealing with lighting and signals when the AUV is on the surface. While an AUV may not be able to fully comply with these requirements due to design limitations, comparable lighting should be incorporated into the design whenever possible. Failure to adhere to the international lighting and signal requirements may result in a maximum civil penalty of $5,000 which can be assessed against both the vessel operator and the vessel itself. Proactive engineering may facilitate compliance with the COLREGs and actually eliminate the need to determine whether an AUV is a vessel.

In addition to classification problems, questions often arise regarding whether an AUV operator needs to secure permits prior to commencing research. To reduce user conflicts and minimize environmental impacts, a permitting regime is necessary. The foundations of a regime are already in place. If AUVs are to be used in foreign waters, authorizations must be obtained from the foreign nation in accordance with Part XIII of the UNCLOS. Researchers may also be required to secure temporary export licenses through the Departments of State and/or Commerce for research activities in foreign waters. In addition, federal permits are currently required for AUV activities impacting the continental shelf, conducted within a marine sanctuary, or impacting endangered species or marine mammals.

Activities on the outer continental shelf and in marine sanctuaries clearly require permits. The waters are much murkier, however, if a researcher intends to use an AUV to explore U.S. waters outside a marine sanctuary and without contacting the continental shelf. While a researcher can restrict an AUV to a particular area of the ocean, a researcher has no control over whether animals enter the designated area during data collection. The ocean is not a static environment. Endangered species and marine mammals move freely, some over great distances.

The remainder of this Commentary focuses on marine mammal interactions. Because of the overwhelming number of legal questions currently surrounding the use of AUVs, I chose to limit my Comment to a discrete area of the law. Marine mammal interactions, however, are not an AUV operator's most serious concern. An AUV is much more likely to collide with a surface vessel or become entangled in a net. A longer article, which will discuss a variety of AUV legal issues, including vessel collisions, net entanglement, salvage, and liability, is currently in the draft stages.

AUV operators do need to be aware that a regulatory regime exists to protect marine mammals from noise and harassment. If the use of an AUV will "take" an endangered species or a marine mammal, an incidental take permit is required from the National Oceanic and Atmospheric Administration (NOAA) within the Department of Commerce. An incidental take permit may be authorized under either the Endangered Species Act (ESA) or the Marine Mammal Protection Act (MMPA). The MMPA addresses all interactions with marine mammal stocks, regardless of their endangered status.

In theory, an AUV could result in the take of a marine mammal in violation of the MMPA. The MMPA defines "take" as "to harass, hunt, capture, or kill, or attempt to harass, hunt, capture, or kill any marine mammal." While a number of worst case scenarios can be imagined, such as a marine mammal–AUV collision, it is unlikely that an AUV will kill or directly injury a marine mammal. Most AUVs travel rather slowly, averaging about three to eight knots, which should allow any marine mammal plenty of time to avoid the robot. Rather, the question is whether the operation of an AUV would be considered harassment.

Operational noise is the most likely trigger for a violation of the MMPA. While the actual AUV makes very little noise, AUVs are used as sensor platforms and can be equipped with a variety of scientific instruments, including multi-beam echo sounders, side-scan sonars, and sub-bottom profilers (Griffiths, 2003). It is this sensory equipment, not the AUV, which would trigger the application of the MMPA. The impact of anthropogenic (human-generated) noise on marine mammals is not well documented, but some preliminary studies indicate that marine mammal "behavior responses [to noise] range from subtle changes in surfacing and breathing patterns, to cessation of vocalizations, to active avoidance

or escape from the region of the highest sound levels." (National Research Council, 2003). On a basic level, therefore, the noise generated by the surveying equipment on an AUV could potentially disrupt the behavioral patterns of marine mammals.

Fortunately, it is not enough to simply disrupt the behavioral patterns of marine mammals or every marine activity would violate the MMPA. To rise to the level of a violation of the MMPA, the harassment must involve a direct and significant intrusion on the normal behavioral patterns of a marine mammal. Unless an AUV generates a significant amount of noise, it is unlikely that the use of an AUV would rise to the level of a direct and significant intrusion.

Precedent does exists, however, for the delay and/or prohibition of marine research projects based on noise. In 2002, the District Court for the Northern District Court of California in *Center for Biological Diversity v. National Science Foundation* enjoined acoustical research by the National Science Foundation (NSF) due to concerns over the noise that would be generated by air guns. The testing of sonar systems by the U.S. Navy has also been delayed based on concerns regarding noise.

While the lack of a regulatory structure for AUVs operations may not be high on the federal government's priority list, it should be. As increasing numbers of AUVs are utilized by the private sector and research institutions, user conflicts and marine mammal interactions are inevitable. AUV operators have a right to be concerned regarding their potential liability in the event of an AUV malfunction or collision. While not all operators will want to obtain permits or notify NOAA of their activities, prudent operators may want to consider obtaining an Incidental Harassment Authorization from NOAA under the MMPA.

As a general rule under the MMPA, the Secretary of Commerce may issue permits authorizing the taking of marine mammals. Additionally, citizens of the United States who engage in a specified activity other than commercial fishing within a specific geographical region may petition the Secretary to authorize the incidental, but not intentional, taking of small numbers of marine mammals within that region. "Small take" authorizations, also known as Letters of Authorization (LOA), may permit the direct taking of marine mammals through death and/or serious injury. The process to secure a "small take" authorization is rather lengthy. Upon receiving an application, NOAA must provide notice and an opportunity for public comment and issue regulations setting forth permissible methods of taking and monitoring and reporting requirements. Recently, the United States Navy utilized this provision of the MMPA to obtain a "small take" authorization for its operation of SURTASS LFA sonar systems.

LOAs usually involve the direct taking of marine mammals through death or serious injury, and for AUV operators, the concern is not death or injury. Initiating the LOA process for AUV operations is not advisable, therefore, due both to the considerable amount of time involved and low risk of an actual taking. In fact, because of the low risk of serious injury or mortality and the fact that any potential for injury or mortality could most likely be mitigated, an LOA is not needed. Rather, an AUV operator should seek an Incidental Harassment Authorization or IHA.

An IHA allows the incidental, but not intentional, taking of small numbers of marine mammals of a species or population stock. Incidental taking means an accidental taking—those takings that are infrequent or unavoidable. The National Marine Fisheries Service defines "specified activity" as "any activity, other than commercial fishing, that takes place in a specified geographical region and potentially involves the taking of small numbers of marine mammals"

The Secretary may issue an IHA only if he or she finds that the harassment will have a negligible impact on such species or stock and will not have an unmitigable adverse impact on the availability of the species or stock for subsistence uses. A "negligible impact" is "an impact resulting from a specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival." The authorization must prescribe the permissible methods of taking by harassment, measures determined by the Secretary to be necessary to ensure no unmitigable impact, and monitoring and reporting requirements. Most importantly for applicants, the approval process is extremely streamlined. Within 45 days of receiving an application for an IHA, the Secretary must provide public notice and solicit comments for 30 days. The Secretary is then required to issue the authorization, with the appropriate conditions, within 45 days of the closure of the public comment period.

For the NMFS "to consider authorizing the taking of marine mammals incidental to a specified activity, *or to make a finding that an incidental take is unlikely to occur*," the applicant must submit a written request to the Office of Protected Resources and the Regional Office where the specific activity is planned. It is the above italicized language that indicates the IHA process could easily be used to determine whether AUV operations need permits. To date, most IHAs have authorized the incidental harassment of marine mammals through activities involving noise, including sonar and seismic testing. The potential application of the IHA program, however, is quite broad.

For example, in May 2003, NOAA issued an IHA for construction activities in Monterey, California. The United States Coast Guard applied for an IHA for the possible harassment of small numbers of California sea lions and Pacific harbor seals incidental to the installation of a new floating dock. It was estimated that as many as 600 California sea lions and 20 harbor seals could be affected by the activities at the dock. The potential effects of the construction activities included a temporary shift in the animals' hearing threshold during pile driving, behavior changes, and temporary cessation of normal activities, such as feeding. Several mitigation measures were imposed on the Coast Guard to reduce the potential for harassment, including time restrictions for pile driving. The NMFS concluded that "while behavioral modifications, including temporarily vacating the haulout, may be made by these species to avoid the resultant

visual and acoustic disturbance, this action is expected to have a negligible impact on the animals."

The IHA application process is an ideal avenue to force the issue of AUV regulation. Government action is too often reactionary, with agencies waiting until the activities are already firmly entrenched before taking steps to regulate. The IHA process is an excellent opportunity for NOAA and the industry to investigate the potential impacts of AUV use on marine mammals and marine habitats. Researchers and private operators concerned about the potential impacts of AUV use on marine mammals should seriously consider applying for an IHA prior to their next cruise. If the agency discovers, after processing a few IHAs for AUV operations, that the risk of harassment is so minute that permitting is not necessary, AUV operations can continue unimpeded. Even if NOAA determines that harassment is likely, the benefits of securing approval should outweigh any costs associated with the additional paperwork.

Once in possession of an IHA, an individual is no longer "subject to the penalties under the [MMPA] for taking by harassment that occurs in compliance with such authorization." Besides immunizing an operator from prosecution under the MMPA for harassment, an IHA could be used to alleviate the concerns of insurers and institutions worried about liability and user conflicts. Through the application process, a researcher or operator should discover the frequency in which other activities are conducted in the area. Any potential user conflicts would then be avoidable, through either the voluntary actions of the operator or the mitigation requirements imposed by the agency.

Although a regulatory gap currently exists with regard to AUVs, options are available to obtain permission for AUV operations or at least notify the appropriate federal agencies. By working within existing regulatory programs, AUV operators can work with the federal government to make the oceans a safer place for both humans and animals. This proactive approach may enable the industry to postpone and even prevent regulation in the future, saving research institutions and operators valuable time and money. The wealth of data that AUVs could collect is unfathomable. Hopefully, the use of these little robots will continue to grow and enrich the scientific knowledge of the world.

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