Unmanned Undersea Vehicles: The Navy’s New Platforms Need a Tailored Environmental Law Framework

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Disclaimer

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Abstract

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Need a Tailored Environmental Law Framework

Unmanned undersea vehicles (UUVs) should be treated as an independent 
category of vessels during the assessment of various environmental law issues of testing 
and training in United States waters. Because UUVs are distinct from other types of 
surface and submarine vessels in many ways, analysis of environmental law issues 
stemming from domestic UUV testing and training should be tailored specifically for 
what UUVs do, what they can do and how they do it. There currently exists no legal 
analysis framework specifically for UUVs. A simple extension of the legal conclusions 
reached for, and currently applied to, those other types of vessels is inappropriate for 
UUVs. All parties involved with and interested in the testing and training of UUVs in 
domestic waters, as well as the environment and the goals of environmentally-focused 
statutes and programs, are best served with a legal structure designed distinctively for this 
category of vessels.

The capability of UUVs to minimize potential impacts upon the environment and 
to mitigate risk offer a beneficial mechanism for the United States Navy to execute its 
missions. Reduced harm and impact to the environment, and reduced threat of such harm 
and impact, equate to less risk when the Navy employs this new form of technology. New 
legal treatment and the application of new legal policies and conclusions about the 
domestic use of UUVs should follow accordingly.

Analysis of the issue, limited in this thesis to the United States Supreme Court’s 
ruling in Winter v. Natural Resources Defense Council, Inc., the Clean Water Act and the 
Endangered Species Act, highlights significant ways in which expanded use of UUVs
domestically will better achieve the goals of environmental protection and conservation, as well as national defense, simultaneously.
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Introduction

Environmental activists call for protection and conservation. Proponents of national defense and security call for unjeopardized positions and capability. Both groups stress that their interests are actually requirements, to serve and benefit important public interests. Often, the two worlds meet. Above and beyond the major difference between environmental interests reaching a global, international scale, and national defense and security being matters for individual countries, the two issues tend to go their separate ways more often than they align. Supporters of environmental responsibility may prefer bans or restrictions on military missions regardless of their objective, while advocates for a strong military force are willing to accept increased risk of environmental harm due to this cause. This conflict is not new. Instead, decades of thinking through the problem have identified ways to balance competing interests. During this same time, technology has continued to develop and has given both groups new tools with which to strike a wise balance.

Unmanned undersea vehicles (UUVs), casually considered underwater drones, are just one example of new technology that should spur transformation in the military and environmental law fields. With characteristics distinct from traditional surface and submarine military vessels, they offer improved capabilities with reduced environmental risk. UUV designs and functionality result in a lower impact to marine environments and continuous monitoring of operating environments, creating the ability to effectively avoid causing harm. Evolution in the methodology of military operations is crucial for maintaining naval superiority and executing successful national defense. Improving military tactics and available resources is a never-ending task.
Despite the benefits UUVs offer, program development and implementation of their use by the United States Navy are stifled by regulatory environmental schemes and policies. The full range of UUV potential cannot be realized with an outdated structure that does not accommodate for their unique features and impacts. Full capability to undertake new missions or current missions in better ways is prevented. Domestic UUV testing and training by the US Navy is an essential component of the effort towards more effective and environmentally-responsible military techniques, but is limited for legal reasons. The ability to capitalize on this opportunity to make long-lasting, major improvements to satisfy both environmental protection and military interests is likewise curtailed.

UUVs merit an independent environmental law analysis prior to their testing and training in United States waters. Merely using the same environmental legal parameters and policies created for traditional surface and submarines ships is illogical. Because of the strong potential for UUVs to reduce threatened or actual harm or impact to the environment and mitigate other risks, the current legal boundaries around their employment must flex.

This paper advocates for specialized legal treatment of UUVs on three main pillars: (1) an extension of the principles in the United States Supreme Court case of Winter v. Natural Resources Defense Council, Inc., (2) an analysis of compliance with the Clean Water Act and (3) an analysis of considerations relevant to the Endangered Species Act.

National defense and national security are essential missions that our Armed Forces must perform to the best of their ability. The Supreme Court has expressed the
importance of these interests when weighed against the promotion of environmental protection. The Navy must, and will, continue executing these missions because it is so tasked. But having an express obligation to meet certain ends does not necessarily justify all means. The Navy must comply with federal regulations like any other entity; it is not given free rein when making and implementing decisions and plans. The Clean Water Act and Endangered Species Act create boundaries for what the Navy can legally do. Accepting these limits and embracing the challenge to support their statutory goals, the Navy seeks ways in which to improve its methodology, equipment and procedures.

UUVs advance that cause. Their use during military operations can result in actual, beneficial impact to the environment. Rather than frustrate their environmental conservation and preservation purposes, these laws should permit more domestic UUV testing and training, supported by application of the principles in a recent Supreme Court case that weighed very similar competing interests. Without the ability to properly develop and lay the foundation for a solid UUV program, the Navy is prevented from taking this environmentally-protective approach to accomplishing what it needs, and has, to do.

The excitement of new technology is justified. New doors have opened that create a potential for enhanced environmental processes and programs that do not sacrifice military effectiveness nor readiness. A good forum exists now in which to develop this balance between military necessity and environmental impact to a degree not possible before – there is a budget devoted to defense operations, personnel on staff available for tasking, and a domestic location in which to grow the capability. Perhaps most important, though, is the Navy’s motivation, energy and commitment to making changes for the
better, and following through with required steps to making this balance a reality.

Acquisition and replacement of equipment, training of personnel, tailoring of missions, and collecting and evaluating performance are all necessary components. Similarly, the ability to legally expand UUV programs and domestic use is an essential element that needs attention and modification.

I. Background of UUV technology in the US Navy and the interest for further development and implementation

The Navy is already testing and using various models of UUVs, as it is currently permitted to do, but wants to move forward and develop and employ the technology more expansively. The building blocks are established, in terms of scientific capability (people and materials) and logistics (places and timing). To understand where the Navy wants to go and the legal hurdles in getting there, one must understand what UUVs are and how they are different from conventional military vessels and systems.

An “unmanned system” is defined as “[a] system that is not occupied by a human.”¹ UUV technology does not envision nor require the entire absence of human oversight; it simply intends that no persons are present onboard the vessel. The concept behind unoccupied submersibles involves preprogrammed missions requiring little or no direct human intervention.² UUVs are often characterized as autonomous systems, a type of system that “once activated, is capable of selecting and executing actions based on the system’s perception of its operating environment without further intervention by a human operator... The key attribute is an ability to perceive and react to changes in its

¹. DEPARTMENT OF THE NAVY, STRATEGIC ROADMAP FOR UNMANNED SYSTEMS 11 (draft).
². RAND NATIONAL DEFENSE RESEARCH INSTITUTE, A SURVEY OF MISSIONS FOR UNMANNED UNDERSEA VEHICLES xvi (2009).
environment by choosing and executing an action in the response without being prompted by a human operator.”³ UUVs possess distinct characteristics, as noted by the Navy, including the ability to conduct operations while fully submerged and capable of propulsion, without the need for humans in the command and control decision process.⁴

The Navy’s UUV program began after successful development of unmanned aircraft systems and have emerged as an aspect of naval superiority.⁵ In 2015, officials in the Department of Defense and in each of the military branches began to draft roadmaps, plans and concepts of operations (expressing what operations are intended to accomplish and how they will do it) for this new technology. Then Secretary of the Navy (SECNAV) Ray Mabus publicized his thoughts on how unmanned systems could be applied to naval operations. Mabus stated, “unmanned systems, particularly autonomous ones, have to be the new normal in ever-increasing areas.”⁶

The advantages offered by UUVs are numerous and not related solely to environmental law issues. “The overwhelming majority of potential military applications for autonomy are non-lethal and offer the potential for improved efficiencies or entirely new capabilities.”⁷ This technology reduces the need for manpower, lessens risk to personnel, lowers operating costs, expands operational ranges, processes data more accurately and faster, enables quicker decisions, and provides the flexibility of expendable assets.⁸ Furthermore, unmanned systems will provide the capability to access

³. STRATEGIC ROADMAP FOR UNMANNED SYSTEMS, supra note 1, at 10.
⁴. CHIEF OF NAVAL OPERATIONS, UNDERSEA WARFARE DIRECTORATE, AUTONOMOUS UNDERSEA VEHICLE REQUIREMENT FOR 2025 5 (2016).
⁵. STRATEGIC ROADMAP FOR UNMANNED SYSTEMS, supra note 1, at 8.
⁶. Id. at 9.
⁷. DEFENSE SCIENCE BOARD, SUMMER STUDY ON AUTONOMY 20 (2016).
⁸. STRATEGIC ROADMAP FOR UNMANNED SYSTEMS, supra note 1, at 1.
areas currently not within the range of manned platforms, along with better situational awareness of all operating areas. In other words, UUVs are able to operate “where manned submarines/ships cannot or should not” and execute military missions “either deeper or farther forward.” Enhanced capability, increased efficiency and greater access to information all combine to give our forces a competitive advantage over adversaries.

One of the problems, however, with developing these systems to acceptable levels of performance and reliability is that UUVs cannot fully be tested using conventional techniques, thus requiring new testing and training methods. Modeling and simulation of a wide range of test cases and scenarios are necessary, with real-world testing a critical element and next step of the process. Despite the fact that testing and analysis of UUV performance is quite different than that for surface ships and submarines, no legal regime has been established specifically for UUVs. Currently, domestic testing and training related to UUVs is limited to what is permitted for conventional ships and submarines that is based on considerations that do not apply to UUVs.

Individual tests cannot be singled out for purposes of a legal environmental analysis. Considering potential environmental impacts of each evolution in a vacuum, isolated from the overarching UUV development and implementation program, is bad policy driven by tunnel vision. Environmental law policies and regulations that exist

9. Id. at 2.
10. AUTONOMOUS UNDERSEA VEHICLE REQUIREMENT FOR 2025, supra note 4, at 3.
11. Id. at 8.
12. STRATEGIC ROADMAP FOR UNMANNED SYSTEMS, supra note 1, at 12.
13. SUMMER STUDY ON AUTONOMY, supra note 7, at 29.
15. Id.
today must embrace a broad scope that not only weighs potential risks from UUVs against the long-term benefits that they produce, but that also recognizes the key differences of those potential risks from those of traditional surface and submarine vessels. If a particular testing or training evolution, or worse yet an entire category of testing or training evolutions, is prevented because of environmental laws, the Navy is thwarted from obtaining any information or feedback critical to the success of its UUV program. The chain of causation carries on, resulting in decreased and ineffective technology, platforms, operators and crew. Cause and effect continues, leading to sustained use of less environmentally-friendly equipment and a lack of progress in reducing the risk of damage to marine operating environments, both “losses” in the eyes of environmental protection. The legal framework seems to frustrate itself in that it prevents positive change and innovation, the very things that enable the result it seeks.

Instead, legal flexibility must be afforded to domestic UUV testing and training, tailored to create a regime that accounts for UUV-specific characteristics (for example, power sources and discharges, discussed in sections that follow), as well as the advances in environmental responsibility they make possible. Our military faces stagnation if not permitted reasonable latitude to develop more reliable and accurate methods and environmentally-sound vessels, and ecosystems will pay the price. As part of the Navy’s entire portfolio of capabilities, UUV development is worth the environmental cost.

A. Background on the Navy’s desired use of UUVs

1. Identified mission sets and UUV models currently performing them

The Navy already employs and is designing a variety of UUVs, with platforms and capabilities that are as different as their mission sets. Sizes and specifications of
models are tailored to their precise functions. The express mission sets of UUVs include:

- Disable, confuse, deceive and/or destroy robust adversary systems designed to contest access to the maritime commons
- Conduct remote sensing to reduce risk to manned platforms
- Provide persistent ISR&T [intelligence, surveillance, reconnaissance and targeting] of undersea and surface platforms
- Act as data fusion and communications platforms
- Provide SA [situational awareness] and tactically relevant information
- Deploy increasingly capable decoys and deception systems
- Conduct well-defined repetitive tasks that do not require the full attention of manned assets
- Deliver electromagnetic-maneuver warfare, non-kinetic/non-lethal sea control, kinetic sea control, and power projection payloads at greater range and in more hazardous waters than manned platforms
- Distribute long-range detection and cueing sensors, eventually engaging potential adversaries to increase the adversary’s defensive area of regard
- Counter adversary UUVs attempting to operate near U.S. forces or home waters\textsuperscript{16}

In addition, UUVs can support the performance of inspection and identification missions in US waters, a critical component of homeland defense and antiterrorism/force protection. Efforts include inspections of ship hulls and piers for foreign objects, as well as underwater hull surveys, ship husbandry and repair.\textsuperscript{17} Other functions for UUVs include open ocean bathymetric collection and bottom surveys.\textsuperscript{18}

Self-propelled UVV models come in a variety of sizes, ranging from small to extremely large.\textsuperscript{19} “Small” UUVs have diameters between three inches and ten inches, are portable by humans, and are launchable and recoverable from almost any source, although submarines are usually not tasked with their recovery.\textsuperscript{20} “Medium” UUVs have

\textsuperscript{16} STRATEGIC ROADMAP FOR UNMANNED SYSTEMS, supra note 1, at 25.
\textsuperscript{17} A SURVEY OF MISSIONS FOR UNMANNED UNDERSEA VEHICLES, supra note 2, at xix.
\textsuperscript{18} AUTONOMOUS UNDERSEA VEHICLE REQUIREMENT FOR 2025, supra note 4, at 7.
\textsuperscript{19} Id. at 5-6.
\textsuperscript{20} Id. at 6.
diameters between ten inches and twenty-one inches, and they are launched and recovered from surface ships, submarines or shore.\textsuperscript{21} “Large” UUVs have diameters between twenty-one inches and eighty-four inches, and they are launched and recovered from submarines, some surface ships and the shore.\textsuperscript{22} “Extremely large” UUVs have diameters over eighty-four inches, and they are launched and recovered from the shore or ships with adequate handling equipment such as cranes.\textsuperscript{23}

Small UUVs are already employed in Naval operations; the designated missions for each listed model include:

- Swordfish: mine integration warfare and initial preparation of operational environment
- IVER: initial preparation of operational environment and battlespace awareness\textsuperscript{24}

Medium UUVs are also already employed in Naval operations; the designated missions for each listed model include:

- Kingfish: mine integration warfare and initial preparation of operational environment
- LBS-AUV: initial preparation of operational environment and battlespace awareness
- LBS-G: battlespace awareness\textsuperscript{25}

Another type of unmanned system, environmentally-operated UUVs include buoyancy gliders, which are small to medium UUVs with fixed fins or wings that use buoyancy changes to project themselves forward.\textsuperscript{26} Some gliders are also equipped with a

\begin{thebibliography}{99}
\bibitem{footnote1} Id.
\bibitem{footnote2} Id. at 5-6.
\bibitem{footnote3} Id. at 5.
\bibitem{footnote4} Jon Rucker, Unmanned Systems Overview 4 (2017).
\bibitem{footnote5} Id.
\bibitem{footnote6} Autonomous Undersea Vehicle Requirement for 2025, supra note 4, at 6.
\end{thebibliography}
propeller device. While limited in speed, they can typically complete longer missions, given their ability to conserve energy. Environmentally-operated UUVs can be launched and recovered from small boats or rigid hull inflatable boats.

“Wave gliders” are submerged vessels attached to a float at the surface. They have small fins or wings, are propelled by waves, and are sometimes equipped with a propulsor. The float can contain batteries and solar cells to recharge the batteries, enabling the wave glider to last longer missions. They are launched and recovered from ships and the shore.

2. System capabilities are limited, requiring further research and development

Unfortunately, many of these types of unmanned systems “have limited navigation capability, autonomy, and communications, and up to only a few days of endurance (weeks for undersea gliders) under human-in-the-loop supervision.” To be successful in their missions, nine capabilities for UUVs have been identified and prioritized, as follows:

1. Intelligence, Surveillance, and Reconnaissance
2. Mine Countermeasures
3. Anti-Submarine Warfare
4. Inspection/Identification
5. Oceanography
6. Communication/Navigation Network Node
7. Payload Delivery

27. Id.
28. Id.
29. Id.
30. Id.
31. Id.
32. Id.
33. Id.
34. STRATEGIC ROADMAP FOR UNMANNED SYSTEMS, supra note 1, at 23.
8. Information Operations
9. Time Critical Strike\textsuperscript{35}

In order to equip UUVs with the abilities necessary to perform these functions, continued development, testing and training are required. The legal boundaries within which the UUV program is operating were designed for other vessel platforms and restrain nontraditional research and the ultimate expansion of UUV use.

B. Background on current testing and training of UUVs in US waters

In addition to the UUV platforms already being used in operations, as outlined in earlier paragraphs, the following medium UUVs are currently in testing, listed along with their identified mission sets:

- LBS-AUV(S) RAZORBACK: mine integration warfare, initial preparation of operational environment and battlespace awareness
- Knifefish: buried and volume mine hunting\textsuperscript{36}

The large and extra large versions of the Office of Naval Research Innovative Naval Prototype are currently in testing.\textsuperscript{37}

Large UUVs currently in development, listed along with their identified mission sets, include:

- SNAKEHEAD Ph1 Vehicle: concept of operations development, initial preparation of operational environment and intelligence, surveillance and reconnaissance
- SNAKEHEAD Ph2 Vehicle: extended range intelligence, surveillance and reconnaissance and extended range initial preparation of operational environment\textsuperscript{38}

\textsuperscript{36} Unmanned Systems Overview, supra note 24.
\textsuperscript{37} Id.
\textsuperscript{38} Id.
Extra large UUVs currently in development, listed along with their identified mission sets, include:

- ORCA: concept of operations development, mine integration warfare and payload integration
- XLUUV future capabilities: strike capability, mine integration warfare, payload integration, mine countermeasures, anti-submarine warfare, anti-surface warfare, electronic warfare, and intelligence, surveillance and reconnaissance\textsuperscript{39}

Presently, the Navy’s UUV test sites are located at Panama City, Florida; San Diego, California; Naval Special Warfare Center Carderock, Florida; and Keyport, Washington.\textsuperscript{40}

Limitations on domestic UUV testing and training exist, however.

The notion that autonomous systems can be fully tested is becoming increasingly infeasible as higher levels of selfgoverning systems become a reality. As these systems react to more environmental stimuli and have larger decision spaces, the standard practice of testing all possible states and all ranges of inputs to the system becomes an unachievable goal. Existing TEVV [Test and Evaluation, Verification and Validation] methods are, by themselves, insufficient for TEVV of autonomous systems; therefore a fundamental change is needed in how we validate and verify these systems.\textsuperscript{41}

The Navy identified early on that “[e]xperimentation with systems should be expanded to provide risk reduction for technology and operations. It is essential to involve Navy operators with outreach to operational, doctrine, and training commands to expand and refine employment concepts. Innovation must be pursued with test and

\textsuperscript{39} Id.
\textsuperscript{40} Interview with Captain Jon Rucker, \textit{supra} note 14.
evaluation programs using UUV technologies from government, academia, and industry.”

The Navy recognizes that its objectives include “[e]ngag[ing] in policy definition and revision to allow implementation of these capabilities and ensur[ing] that developed capabilities are legal and that they advance US interests,” along with “[e]stablish[ing] formal technology review process to ensure [unmanned systems] pass legal muster.”

The difficulty with development is summarized as follows:

To operate within the existing regulatory environment, programs must comply with existing policy framework or get policy waivers because policies tailored to unmanned systems are still in development. Regulatory and cultural hurdles must be carefully considered early in system development. In this paradigm, technology development and tests will help shape the appropriate requirements, standards, and regulations…Once the standards and regulations are complete, PORs [programs of record] can then create requirements for their systems with a complete set of expectations.

The Navy also recognizes the need to coordinate with other services, agencies and nations. For full implementation of UUV programs, the Navy must promote new military policies, laws, treaties and customs involving UUV systems both domestically and internationally so that the results are legal and US interests are advanced.

A realistic way for the Navy to begin to meet the specific demands of unmanned system programs is to “conduct developmental and operational testing, experimentation, and training…in facilities that already exist for manned platforms,” modifying facilities as

42. THE NAVY UNMANNED UNDERSEA VEHICLE MASTER PLAN, supra note 35, at xxiv.
43. STRATEGIC ROADMAP FOR UNMANNED SYSTEMS, supra note 1, at 4.
44. Id. at 84.
46. STRATEGIC ROADMAP FOR UNMANNED SYSTEMS, supra note 1, at 6.
47. Id. at 20.
required.\textsuperscript{48} Efforts must be made to ensure that UUVs “can be tested to failure to fully explore and validate the operational envelope and the limits of operator trust in the [unmanned system.]”\textsuperscript{49} The Navy is interested in reforming its processes, policies and tangible assets to clear the path for UUV innovation and expansion. Now is the time to create a specialized legal structure.

The Navy has identified significant environmental policy questions that need answering, among them whether adverse environmental effects are acceptable, whether mitigation techniques are required and whether unrecoverable or disposable UUVs are acceptable.\textsuperscript{50} Other environmental considerations involving full development or implementation of UUV systems that have been identified include “alternative primary and secondary energy sources used on [unmanned systems], litter, hazardous material regulations for lithium ion batteries, and sea floor ecosystem disruption.”\textsuperscript{51}

Also acknowledging the public opinion aspect of unmanned technology, the Navy must keep in mind that “[a]utonomous systems with a minimal impact on the environment will be more readily accepted by the global public.”\textsuperscript{52} Key steps in this area of concern include minimizing hazardous material in manufacturing unmanned system components and crafting systems in which material can be reused or recycled, is biodegradable and is easily recoverable after release.\textsuperscript{53}

\textsuperscript{48} Id. at 79.
\textsuperscript{49} Id.
\textsuperscript{50} Id. at 80-81.
\textsuperscript{51} Id. at 88.
\textsuperscript{52} Id. at 72.
\textsuperscript{53} Id.
C. How the Navy proposes to use, test and train UUVs in US waters

Having expressed the importance of advanced UUV capability, autonomy was identified by the Secretary of Defense in 2011 as a science and technology priority for fiscal years 2013-2017 planning, specifically “to achieve autonomous systems that reliably and safely accomplish complex tasks, in all environments.” The Assistant Secretary of Defense for Research and Engineering established an autonomy community of interest and built a working group to specifically tackle the issues of testing, evaluation, verification and validation of such unmanned systems.

SECNAV concluded that there are other, better ways in which the Navy can achieve unmanned system capability. In November of 2015, he published the “Treat Unmanned as Unmanned” memorandum, designed to advance the development and implementation of unmanned systems and to integrate those efforts within the Navy. That memorandum directed the Assistant Secretary of the Navy for Research, Development, and Acquisition to identify requirements relevant to the testing and evaluation of unmanned systems and also to “determine how to eliminate those [testing and evaluation requirements] which cause an undue burden.”

In this memo, SECNAV stated that, “Policies and procedures which apply to the design, development, testing and evaluation of manned systems do not necessarily support unmanned system development.” “[E]xisting policies and requirements must be

54. ROBERT M. GATES, SCIENCE AND TECHNOLOGY (S&T) PRIORITIES FOR FISCAL YEARS 2013-17 PLANNING 1 (2011).
56. STRATEGIC ROADMAP FOR UNMANNED SYSTEMS, supra note 1, at 9.
57. Id.
59. Id.
tailored to support expeditious and risk-appropriate processes for unmanned systems.”

There are no expressed, on-point reference in SECNAV’s words to the adaptation of environmental law analysis for UUVs; however, his advocacy for customized approaches to making unmanned system execution a reality parallels the argument in this thesis, as well as the expressed conclusions of other Navy departments.

The Navy has identified specific areas for UUV expansion. Believing that mine countermeasure missions can be adapted successfully to incorporate use of UUVs, mine threats identified for consideration in proper UUV development and planning include reconnaissance and detection, classification and identification, clearance and neutralization, sweeping, spoofing and jamming. UUVs are likewise potentially advantageous for certain oceanography missions, including bottom mapping and sub-bottom profiling, bathymetry and water column characterization, and acoustic and optical imagery. UUVs can help gather information on ocean current profiles, temperature profiles, salinity profiles, water clarity and bioluminescence. The quality and quantity of data and research can be enhanced with increased use of gliders, which can operate in adverse weather conditions and be built to last for years.

Other tasks in which UUVs may be helpful include ship hull and pier inspection, hull identification and critical aspects of homeland defense and antiterrorism. These activities have typically been carried out by explosive ordnance disposal (EOD) divers,

60. Id.
61. THE NAVY UNMANNED UNDERSEA VEHICLE MASTER PLAN, supra note 35, at 11.
62. Id. at 13-14.
63. Id.
64. A SURVEY OF MISSIONS FOR UNMANNED UNDERSEA VEHICLES, supra note 2, at xviii.
demanding a lot of time and manpower.\textsuperscript{65} After September 11, 2001, the demand for these types of security swims has increased six-fold.\textsuperscript{66} EOD diver teams cannot effectively meet the additional demand of this work, which is already inherently dangerous.\textsuperscript{67} Employing UUVs in this context can decrease the risk to EOD divers and crew. By either replacing the humans in the water or by facilitating the gathering and processing of information, UUVs enable safer, faster and more effective security sweeps. UUVs can “provid[e] precise location of suspicious objects, while relieving the divers of the tedious search process in cluttered environments.”\textsuperscript{68} “UUVs could perform a barrier patrol in and around harbors to search for undersea threats to ships, piers, and harbor infrastructure… While there is no need to perform the homeland defense mission clandestinely, in some cases it may be beneficial to place the vehicle and sensor underwater with the threat.”\textsuperscript{69}

These additional and complex tasks will require new parameters for testing and training beyond those currently in place. Focusing on these UUV tasks requires a legal analysis that is distinct from that which is currently used for other Naval vessels, performing missions that are traditionally operationally-focused.

The Navy’s demand for UUVs goes beyond testing and training and into real world implementation, seeking to increase the size and composition of the UUV force.\textsuperscript{70} The Navy has also expressed a specific interest in UUVs having the capability to be out

\textsuperscript{65} THE NAVY UNMANNED UNDERSEA VEHICLE MASTER PLAN, supra note 35, at 13.
\textsuperscript{66} Id.
\textsuperscript{67} Id.
\textsuperscript{68} Id.
\textsuperscript{69} Id. at 15.
\textsuperscript{70} AUTONOMOUS UNDERSEA VEHICLE REQUIREMENT FOR 2025, supra note 4, at 3.
performing missions for days or weeks at a time.\textsuperscript{71} Demonstrating its commitment and investment in UUV technology, the Navy established the first UUV squadron, UUVRON 1, on 26 September 2017.\textsuperscript{72} It will be equipped with all platforms of UUVs and tasked with testing future platforms.\textsuperscript{73}

II. Characteristics and potential environmental impacts unique to UUVs

Many features and traits of UUVs are unlike those of other surface and submarine vessels. Employing UUVs to execute traditional as well as innovative military missions highlights the difference between UUVs and the types of vessels that have been in operation for many years, especially in the context of environmental impact. In general, UUVs present less potential for harm than other platforms.

Many types of UUVs, for example, are designed to incorporate a battery as their power source.\textsuperscript{74} While some types do require gasoline or diesel fuel, many are powered primarily by either silver zinc batteries, lithium ion batteries or alkaline batteries.\textsuperscript{75} As UUVs replace older types of surface vessels powered by gas turbine engines,\textsuperscript{76} oil and grease discharges from military missions are reduced. With no humans onboard, UUVs do not create nor release refuse into surrounding waters, as manned ships unavoidably do.

UUVs improve the overall environmental impact of their missions. First, they enable better understanding of the environmental impact, allowing more informed decision-making and planning. “The Navy has a long and distinguished history in the

\textsuperscript{71} Id.
\textsuperscript{73} Id.
\textsuperscript{74} Interview with Captain Jon Rucker, supra note 14.
\textsuperscript{75} Interview with Captain Jon Rucker, supra note 14.
\textsuperscript{76} Interview with Captain Jon Rucker, supra note 14.
development and testing of methods for monitoring the sea environment.”\textsuperscript{77} UUV technology is the next tool for the Navy to assess and understand the environmental situation of the areas in which it intends to operate, including the presence of marine mammals and plants. This gathering of information allows the Navy to then make well-informed and calculated decisions on how to proceed with its plans or how to adapt them to minimize the effects of its activities upon the environment. “[H]igh-resolution, accurate environmental fields to guide tactics and strategy” are ideal, however, “[t]hese data cannot be provided by remotely sensed, overhead assets but require direct, in situ measurements…The answer has been autonomous vehicles.”\textsuperscript{78}

UUVs enable the Navy to operate in areas formerly unavailable to it. This advantage is crucial to the Navy’s ability to flex its plans when environmental conditions exist, such as the presence of endangered or threatened species. UUVs can both protect the environment by reducing potential harm and facilitate the continuation of military missions.

UUVs provide enhanced capability to collect data and perform research, even if unrelated to military interests. Underwater environmental data-gathering and oceanography research will be especially helpful to multiple communities, given the issue of climate change. If used consistently and frequently, UUVs could shed light on facts and trends, perhaps filling in some of the information gaps regarding impacts from climate change. Past, current and future impacts to the marine environment and to marine life, for example, death of coral reefs or changes to a species’ feeding pattern due to

\textsuperscript{77} \textit{National Research Council of the National Academies, Autonomous Vehicles in Support of Naval Operations} 133 (2005).
\textsuperscript{78} \textit{Id.} at 119.
rising sea temperatures, could be better understood.

UUVs increase the Navy’s capability to rid waters of mines and prevent their detonation and associated wreckage. By improving techniques of mine warfare, including detection, control and neutralization, unmanned vessels reduce the damage, both actual and potential, to the environment caused by mines.

III. Application of the Supreme Court’s holding in Winter v. Natural Resources Defense Council, Inc. on the US Navy’s testing and training of UUVs in US waters

A. A brief explanation of sonar

Mid-frequency active (MFA) sonar sends out underwater sound pulses, which then bounce off nearby objects. Those contacts send echoes back to underwater acoustic receivers, providing information that helps determine the size, distance, direction and speed of objects. Active sonar differs from passive sonar in that active sonar actually sends out sound waves, while passive sonar merely receives the reflections bouncing off nearby objects. The Navy indicates that passive sonar cannot detect quiet vessels, such as submarines, including those that run on batteries.

Experts contend that MFA sonar may harm marine mammals, especially beaked whales. Excessive noise may rupture the ears of marine mammals or can disorient them, perhaps causing them to surface too quickly or causing a fatal condition called “the bends,” in which nitrogen is released from the blood.

80. Id.
81. Id.
82. Id.
83. Id.
84. Id. at 2.
The Navy understands that UUVs “must comply with other rules and regulations, such as for [radio frequency] communication equipment operation and for environmental restrictions covering the operation of sonars and underwater acoustic instruments.”

B. A summary of the procedural history and Supreme Court’s holding on the US Navy’s use of MFA sonar

Between February 2007 and January 2009, the US Navy planned to conduct 14 operational exercises off the southern coast of California using MFA sonar. The Navy conducted an environmental assessment and concluded that its activities would not cause a significant impact on the environment, and accordingly that it was not required to prepare an environmental impact statement. Environmental protection groups filed a complaint in the district court for the Central District of California, seeking a preliminary injunction on the Navy’s use of MFA sonar.

Upon its initial hearing of the case in August 2007, the district court granted the request for the preliminary injunction. This ruling was based largely on the finding that the complaining environmental activity groups would likely be successful on their claims that the Navy failed to prepare an adequate environmental assessment and an adequate environmental impact statement for such planned use of MFA sonar, in violation of the National Environmental Policy Act (NEPA) and the Administrative Procedure Act. The opinion highlighted evidence presented which showed that using MFA sonar disrupted normal activities of marine mammals and that the exercises would cause roughly 170,000

87. Id.
88. Id.
89. Id. at 841.
90. Id. at 847.
takes$^{91}$ of marine mammals$^{92}$ and 466 permanent injuries to certain types of whales.$^{93}$ The anticipated harm was concentrated on five endangered species.$^{94}$ The grant of the preliminary injunction was also based on the court’s finding that the environmental groups would likely be successful on their claim that the Navy’s proposed mitigation measures were inadequate to protect marine mammals against any harmful effects of the MFA sonar.$^{95}$

The Navy appealed the grant of the preliminary injunction, and the Ninth Circuit Court of Appeals heard the case in November 2007. The Ninth Circuit remanded to the district court for it to issue a modified preliminary injunction which included appropriate mitigation measures.$^{96}$ The court of appeals upheld the finding that the environmental protection groups were likely to succeed on the merits of their claims involving inadequate environmental assessments and environmental impact statements.$^{97}$ It opined, however, that the district court did not explain how an absolute injunction for two years was necessary to prevent the environmental harm alleged.$^{98}$ The Ninth Circuit applied the rule that “[i]njunctive relief must be tailored to remedy the specific harm alleged, and an overbroad preliminary injunction is an abuse of discretion.”$^{99}$ Therefore, it found an injunction with narrowly-tailored mitigation measures appropriate for the Navy’s use of

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93. Id. at 846.
94. Id. at 849.
95. Id. at 850.
96. NRDC v. Winter, 508 F.3d 885, 886 (9th Cir. 2007).
97. Id.
98. Id.
99. Id. (citing Lamb-Weston, Inc. v. McCain Foods, Ltd., 941 F.2d 970, 974 (9th Cir. 1991)).
MFA sonar in the remaining exercises, and remanded to the district court.\textsuperscript{100} The district court would then determine the appropriateness of the actual mitigation measures or conditions.\textsuperscript{101}

On remand in January 2008, the district court for the Central District of California issued a revised preliminary injunction.\textsuperscript{102} It imposed the following restrictions on the Navy’s use of MFA sonar during these training exercises: (1) constant maintenance of a 12 nautical mile exclusion zone from the coastline of California;\textsuperscript{103} (2) stopping the use of MFA sonar when marine mammals are spotted within 2,200 yards;\textsuperscript{104} (3) pre-exercise and concurrent monitoring for the presence of marine mammals, using lookouts, aerial monitoring and passive acoustic monitoring;\textsuperscript{105} (4) helicopter monitoring before active dipping sonar;\textsuperscript{106} (5) decreasing sonar when surface ducting conditions are detected;\textsuperscript{107} and (6) prohibition of using MFA sonar in the Catalina Basin.\textsuperscript{108}

The Navy then turned to the Council on Environmental Quality (CEQ) for relief from the injunction.\textsuperscript{109} Exercising its authority to permit “alternative arrangements” when there is insufficient time to complete an EIS before a federal agency must decide on an action, CEQ found “emergency circumstances” and determined that the Navy would still comply with NEPA if it continued on with its training exercises using voluntary

\begin{itemize}
  \item 100. \textit{Id.} at 887.
  \item 101. \textit{Id.}
  \item 102. NRDC v. Winter, 530 F. Supp. 2d 1110 (9th Cir. 2008).
  \item 103. \textit{Id.} at 1119.
  \item 104. \textit{Id.}
  \item 105. \textit{Id.} at 1120.
  \item 106. \textit{Id.}
  \item 107. \textit{Id.} at 1121.
  \item 108. \textit{Id.}
\end{itemize}
mitigation measures that it had used before.\textsuperscript{110}

Given the CEQ’s finding and authorization, the Navy moved to vacate the district court’s preliminary injunction.\textsuperscript{111} The district court denied the motion, and the Ninth Circuit affirmed that denial, doubting the lawfulness of the CEQ’s interpretation of “emergency circumstances” and again holding that the plaintiffs showed a likelihood of success on the merits, specifically noting that they demonstrated a “possibility” of irreparable injury should the injunction not be granted.\textsuperscript{112} The Court of Appeals again found the injunction to be an appropriate balance of interests and that the public interest favored the environmental protection groups’ argument.\textsuperscript{113} Finally, the appellate court held that any negative consequence to the Navy of the terms of the injunction would be “speculative” and minimal, either because they required measures already employed by the Navy at other times of an exercise or because the triggers for execution of a mitigation measure would rarely occur.\textsuperscript{114}

The case made its way to the Supreme Court. The Navy argued that the standard of “possibility” of irreparable harm was too lenient, and the Court agreed, ruling that the proper standard for granting a preliminary injunction required a showing that irreparable injury was “likely” in the absence of an injunction.\textsuperscript{115} It vacated the preliminary injunction, ruling that the district court failed to properly consider and balance the equities and public interests, which “tip[ped] strongly in favor of the Navy.”\textsuperscript{116}

\textsuperscript{110} Id. at 373-374.  
\textsuperscript{111} Id. at 374.  
\textsuperscript{112} Id.  
\textsuperscript{113} Id.  
\textsuperscript{114} Id.  
\textsuperscript{115} Id. at 375.  
\textsuperscript{116} Id. at 378.
held that the groups’ alleged interests “are plainly outweighed by the Navy’s need to conduct realistic training exercises to ensure that it is able to neutralize the threat posed by enemy submarines.\textsuperscript{117} Putting these two holdings together means that even if the environmental groups had shown a likelihood of irreparable injury, the public interest in “effective, realistic training of its sailors” outweighed the harm alleged.\textsuperscript{118} Not doubting the importance of the groups’ ecological, scientific and recreational interests, the Court balanced the competing interests and opined that the determination of the higher public interest “does not strike the Court as a close question.”\textsuperscript{119}

Specifically related to the six required mitigation measures, the Court ruled that the district court abused its discretion when it required implementation of a measure\textsuperscript{120} previously adopted by the Navy (1) at an unreasonably increased rate, and (2) under circumstances that would cost the Navy days’ worth of training.\textsuperscript{121} It also found an abuse of discretion in the requirement to implement a mitigation measure\textsuperscript{122} that prevented the Navy from training on the precise things on which training was needed.\textsuperscript{123} Furthermore, the Supreme Court disagreed with the Ninth Circuit’s view that the Navy could merely seek relief from the district court should the Navy experience an actual inability to train.\textsuperscript{124} The Court opined that it did not think the Navy is required to wait until the injunction actually prevented an ability to adequately train before seeking its

\textsuperscript{117} Id. at 382. \\
\textsuperscript{118} Id. at 376. \\
\textsuperscript{119} Id. at 378. \\
\textsuperscript{120} This specific measure required shutdown of MFA sonar if/when a marine mammal was detected to be within 2,200 yards of a sonar-emitting vessel. \\
\textsuperscript{121} Id. at 379. \\
\textsuperscript{122} The measure required less MFA sonar during significant surface ducting conditions. \\
\textsuperscript{123} Id. at 380. \\
\textsuperscript{124} Id.
dissolution. In the Court’s view, such reactive measures were “cold comfort to the Navy.”

The Court found merit in the Navy’s argument that the injunction “will hinder efforts to train sonar operators under realistic conditions, ultimately leaving strike groups more vulnerable to enemy submarines.” Comparing and balancing the alleged harms, the Court noted the most significant possible injury alleged by the environmental groups was “harm to an unknown number of the marine mammals that they study and observe.” On the other hand, it opined, “forcing the Navy to deploy an inadequately trained antisubmarine force jeopardizes the safety of the fleet.”

Given this comparison of harm, it is important to note that the Court emphasized “military interests do not always trump other considerations…” However, the opinion stated that the district and appellate courts did not properly defer to senior Naval officers on their judgments about the negative impacts that the injunction would cause. Because the case involved complex issues and decisions regarding the composition, training and equipping of the military, the Court opined that the “professional judgment of military authorities concerning the relative importance of a particular military interest” was entitled to greater deference.

Finally, the Supreme Court found error in the Ninth Circuit’s logic comparing

125. Id. at 380-381.
126. Id. at 380.
127. Id.
128. Id. at 378.
129. Id.
130. Id.
131. Id.
132. Id.
MFA sonar to low-frequency active (LFA) sonar. The appellate court’s determination that the 2,200 yard shutdown mitigation measure was appropriate, based on evidence that the Navy had adopted a similar protocol for LFA sonar, was faulty. The Court found that sufficient weight was not given to the fact that the two types of sonar were vastly different, in terms of both use and impact.

C. What similar legal analysis concludes for domestic UUV testing and training

The Supreme Court’s opinions and principles in *Winter v. NRDC* are appropriately applicable to the Navy’s desired use of UUVs in US waters. A good balance between any adverse environmental impacts of UUV use and the advantages that such employment provides to our military and our national defense is necessary in this context, just as it is with MFA sonar. Applying the holdings found in *Winter v. NRDC* results in a number of arguments in favor of expanded domestic use of UUVs for testing and training, beyond what is currently permitted. These points involve advancing our country’s national defense, securing effective and realistic training of our Naval force, and promoting the Navy’s real-world efforts to comply with the various environmental statutes and goals to execute its missions with the least negative effect to the environment as is practical.

1. The public interest in national defense outweighs the public interest in protecting marine mammals even more so in the case of UUVs

As noted above, the Supreme Court placed a high degree of importance on the effectiveness of our national defense capability. When comparing the interests of national

133. Id. at 380.
134. Id.
135. Id.
security and protection from theoretical environmental harm in the case of UUVs, the scale tips even more in favor of the former. Because UUVs present less risk to marine mammals than MFA sonar and their impact from domestic testing and training is less expansive than that of MFA sonar in extensive military exercises, the balancing test becomes easier. Furthermore, the need for UUV testing and training in US waters is great, as program development and implementation depend on it. It is even more apparent that the higher interest lies with advancing national defense, using a technology that presents less potential harm than that at issue in Winter v. NRDC and which adversaries are potentially developing for their own use. The current legal framework surrounding domestic UUV use prevents adequate training under realistic conditions, ultimately leaving our forces more vulnerable and less prepared, an interest the Court found significant and essential.

The Supreme Court’s holding should be extended for UUV domestic use in order to permit the building of a robust fleet capable of providing superior national defense. Enhanced use of UUVs is indeed a means to affect the national defense objective, deemed so crucial by the Supreme Court. As discussed earlier, they offer capabilities for the Navy to ensure effective training and a better equipped military force, as well as safety to Sailors. The fact that they simultaneously reduce potential environmental harm supports the argument that their use should be afforded its own framework of legal analysis, factoring these differences into consideration.

Central to the argument supporting expansion of Winter v. NRDC to domestic use of UUVs is the Court’s disapproval of the injunction’s requirements for the Navy to implement measures it had previously adopted, specifically because these measures were
an unreasonable increase in pre-existing procedures, would cost the Navy valuable training time, or prevented training on the exact functions on which training was needed. These three scenarios are currently plaguing the Navy’s UUV program, given the lack of any special legal treatment. Forced to operate under a legal rubric ill-fitted for UUVs, current policies are unreasonably applied to plans for their use. A limited ability to strategically deploy UUVs results, forcing the Navy to employ other capabilities that are more time-consuming and resource-intensive, and less efficient at achieving the same objective. Finally, stifling employment of UUVs in US waters results in an inability for the Navy to hone its skills at executing current and future objectives, improving its competency, and developing more successful techniques. These adverse consequences are precisely what the Supreme Court noted as problematic.

Another point from Winter v. NRDC that should be extended to create and implement an environmental law regime tailored to UUVs concerns the disfavor for reactive procedures that only offer the Navy the potential for relief should it experience difficulty in training due to current regulations. In the MFA sonar case, the Court held that the Navy should not be required to wait until it actually suffered an inability to train before it sought to have the injunction removed, a motion which may or may not be successful. In the same vein, regulations concerning the domestic testing and training of UUVs should not require tangible negative impacts before giving permission or making exceptions. They should allow for flexibility in these programs, with built-in fail safes and standards outlining limitations for unacceptable impacts.

Finally, a noteworthy point of the Court’s opinion relevant to the need to create a UUV-specific legal framework is found in the comments regarding the Ninth Circuit’s
comparison between LFA sonar and MFA sonar. In sum, the two technologies should not have been treated as similar, for the purpose of setting limitations on the Navy’s use of them. LFA and MFA sonar were too distinct to use boundaries for the former to set similar boundaries for the latter. The same notion applies with UUVs – they are too dissimilar from other types of submarine and surface vessels to create regulations and policies that are mere extensions of what currently exist. As the Court was concerned that reasonable limitations on MFA sonar accurately reflect its impact and capability, so too should the parameters regarding domestic use of UUVs.

2. Using UUVs aligns with the federal government’s responsibility to consider the environmental impacts of its actions

To begin discussion of this argument, one must keep in mind that the district court’s initial ruling granting the preliminary injunction was based largely on the grounds that the Navy did not conduct an adequate environmental assessment, nor environmental impact statement, regarding MFA sonar use during the various southern California exercises. This is a crucial point to explore, as the logic behind it stems from both a procedural and a substantive perspective. In other words, the district court found a failure in the Navy’s process of considering the full environmental impacts of its activities, as well as the content of its conclusions. Notwithstanding the fact that the district court’s injunction did not withstand further review, it is important to distinguish this part of the factual scenario in Winter v. NRDC from the current situation with domestic use of UUVs.

It is only after much consideration of positive and negative impacts to the environment from UUVs that the Navy has decided to continue and to increase using such technology. The facts as originally stated by the district court in Winter v. NRDC
include an allegation of failure to thoroughly consider effects to the environment, but that concern is alleviated regarding impacts due to UUV use, both procedurally and substantively. The Navy recognizes that UUVs are a reasonable alternative to traditional methods and equipment used in years past. This new capability demonstrates the Navy’s commitment to reducing environmental impact and to seeking better ways to achieve the same objective. Put another way, the courts at all stages of Winter v. NRDC emphasized the requirement for the Navy to consider and employ mitigation measures to either replace or reduce the use of other, older technologies and operating procedures, and UUVs are the answer for some naval missions. Legal policies designed for their use should follow, furthering the goal to not just consider, but to actually use, environmentally-friendly alternatives for military operations.

The statutory requirements under NEPA to “identify and develop methods and procedures…which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations”\(^\text{136}\) and to “study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources”\(^\text{137}\) are likewise satisfied by the Navy’s research and desired development of UUVs. These testing and training efforts should be supported, not suppressed. It is essential to remember that NEPA does not require any certain result or decision after an adequate environmental assessment and/or environmental impact statement is completed. Rather, NEPA’s goals are to ensure that

agencies make informed decisions after careful consideration of detailed information, and that other parties are made aware of such information that led to the agency’s decision.\textsuperscript{138} “The NEPA process is intended to help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment.”\textsuperscript{139} Whether domestic use of UUVs is the subject of a proposed federal agency action or the alternative identified in a federal agency proposal concerning another type of action, these goals are better advanced with a UUV-specific legal analysis, which would allow improved decision-making and information-sharing processes.

3. The likelihood of injury from UUVs is even less than that of MFA sonar

The Supreme Court ruled that, for plaintiffs seeking preliminary injunctions for environmental protection reasons, the required standard to show irreparable injury was “likely,” not “possible.” Given the facts stated earlier to demonstrate diminished adverse environmental impacts from UUVs over traditional technologies, this standard of proof is even harder to meet than it was in \textit{Winter v. NRDC}. The Court’s opinion against upholding injunctive prohibitions that only seek to prevent a possibility of theoretical injury is clear and should be applied in favor of special legal consideration of UUVs.

The likelihood of irreparable injury due to their use is no more than merely speculative based on the discussion below. On the other hand, the restrictive effects on domestic testing and training are more fully identifiable and understood. Keeping in mind the Court’s respect for the professional military judgment of senior officers, strong

\textsuperscript{138} \textit{NRDC v. Winter}, 645 F.Supp.2d at 847. \textsuperscript{139} 40 C.F.R. § 1500.1(c) (1978).
deference should be given to senior Naval leaders, individuals who are already tasked with completing their missions in ways compliant with a wide range of policies and directives.

To summarize, the capability of UUVs, (more efficient technology with less environmental risk), allows the execution of national defense, a priority advocated by the Supreme Court. Its holding in Winter v. NRDC should be expanded to create legal policies that allow further testing and training of UUVs in US waters, as the public interest for environmental protection is even less able to show concrete harm, and these vessels embody the pursuit and achievement of reasonable alternatives.

IV. Potential discharges of pollutants to waters of the United States due to UUV testing and training, and applicability of the Clean Water Act (CWA)

Because UUVs are the source of fewer and different discharges than other surface and submarine Naval vessels, they reduce overall water pollution and embody the drive toward improved pollution control methods and environmentally-responsible equipment. Legal analysis of CWA compliance should favor the domestic testing and training of UUVs because they already comply with applicable provisions for vessels and because they exceed the underlying standards. Unmanned system platforms move the Navy toward achieving relevant statutory goals in ways not originally anticipated and not possible with conventional ships.

A. UUVs fall under vessel exemptions

Statutory provisions exist, exempting many discharges from vessels from the National Pollutant Discharge Elimination System (NPDES) permitting scheme. The Code of Federal Regulations provides that “discharge of sewage from vessels, effluent from properly functioning marine engines… or any other discharge incidental to the normal
operation of a vessel” does not require a NPDES permit.\textsuperscript{140} Section 502 of the CWA contains a parallel provision, excluding discharges from “a vessel or other floating craft” from the definition of “discharge of a pollutant.”\textsuperscript{141} Related specifically to vessels of the Armed Forces, this same section of the CWA excludes “a discharge incidental to the normal operation of a vessel of the Armed Forces” from the “pollutant” definition.\textsuperscript{142, 143}

These statutory provisions demonstrate that discharges from vessels are regulated differently than those from any other point source. Having an independent legal analysis for UUVs is in line with that current statutory structure and furthers the goal of the CWA to restore and maintain the integrity of the nation’s waters.\textsuperscript{144} The blanket vessel exemption and the exemption for discharges from vessels of the Armed Forces do not distinguish between types of vessels. In other words, such discharges are not regulated under the CWA’s permitting scheme, regardless of the kind of ship from which it comes. Similarly, the exemptions apply regardless of whether the most effective method, or for that matter the least effective method, of “normal” operation is used. There is no preference in the statutes for enhanced technology that provides better protection for the environment. They do not encourage nor even mention the use of equipment or systems that would mitigate environmental harm. It seems to be that the potential risks to the

\begin{footnotesize}
\textsuperscript{140} 40 C.F.R. § 122.3(a) (2013).  
\textsuperscript{142} Id. § 1362(6).  
\textsuperscript{143} “Pollution” is defined in the CWA as “the man-made or man-induced alteration of the chemical, physical, biological, and radiological integrity of water.” (Id. § 1362(19)) Not withstanding the exclusion for incidental discharges due to normal operations of Armed Forces vessels, many substances that may potentially be released from UUVs do not meet the definition of “pollutant,” and instead fall under the umbrella of “pollution,” which is not regulated by the CWA.  
\textsuperscript{144} Id. § 1251.
\end{footnotesize}
environment due to exempted vessel discharges was deemed legally acceptable. This result comes without any scrutiny or evaluation of the kind of “normal operations” used.

UUVs offer a better approach. Given their ability to execute missions with reduced impact to the environment, they not only fall under the vessel exemptions cited above, but improve the effects of their application. The benefit of the NPDES exclusion assists with making domestic UUV testing and training possible, but one must take the analysis one step further. Whatever potential adverse impacts allowed under the blanket exemptions can be prevented or reduced by UUVs. It follows that domestic use of UUVs should be permitted and encouraged, in light of the fact that greater and more harmful risks have already been assumed. Simply applying these current vessel-related provisions to UUVs does not recognize their beneficial impact and therefore supports the argument that a special legal framework would be a beneficial change to older policies not designed for new technologies.

A. UUVs promote better pollution control by vessels of the Armed Forces

Section 312(n) of the CWA is even more enlightening to the water pollution law issues of military vessels, and hence, of UUVs. This section requires the Administrator of the Environmental Protection Agency (EPA) and the Secretary of Defense (SECDEF) to “jointly determine the discharges incidental to the normal operation of a vessel of the Armed Forces for which it is reasonable and practicable to require use of a marine pollution control device to mitigate adverse impacts on the marine environment.”145 For identified discharges, the EPA Administrator and SECDEF are then required to “jointly

145. Id. § 1322(n)(2)(A).
promulgate Federal standards of performance for each marine pollution control device required with respect to the discharge.” The goals of these uniform national discharge standards for vessels of the Armed Forces are to control or decrease the environmental impacts from such discharges and to encourage both improved pollution control methods and development of environmentally sound military ships. The discharge standards only apply to discharges in waters of the United States and waters within 12 nautical miles from domestic coastlines.

In making these determinations, the factors to be considered include the nature of the discharge, its environmental effects, the practicality of using the pollution control device, the effect the control device would have on the operation or capability of the vessel, applicable domestic and international law, and the economic costs of the pollution control device.

Of note, these performance standards may “(i) distinguish among classes, types, and sizes of vessels; (ii) distinguish between new and existing vessels; and (iii) provide for a waiver of the applicability of the standards as necessary or appropriate to a particular class, type, age, or size of vessel.” Finally, SECDEF has the statutory discretion to find that compliance with any promulgated performance standard would not be in the interest of national security, and then such standard would not apply to the normal operation of the particular type of military vessel or vessels.

146. *Id.* § 1322(n)(3)(A).
148. *Id.*
150. *Id.* § 1322(n)(3)(C).
151. *Id.* § 1322(n)(1).
UUVs are directly on point with the objectives of this law. The definition of “marine pollution control device” mentions “any equipment or management practice” that is designed to, among other actions, “retain” or “control” incidental and normal discharges from military vessels.\textsuperscript{152} This is precisely the result that UUVs offer: a better technology, in terms of both equipment and practices, to eliminate discharges as well as to minimize them. By reducing the amount of discharges necessary and by changing the type of discharges, UUVs satisfy the goals of better water pollution control and decreased adverse environmental impact. The law requires the EPA Administrator and SECDEF to determine what constitutes “the most effective equipment or management practice to reduce the environmental impacts of the discharge.”\textsuperscript{153} A legal framework tailored for the use of UUVs would allow these agencies to satisfy their requirements and to give full consideration of the capabilities of unmanned systems as they interlace with water pollution laws and present a better way to achieve goals.

This statute supports the creation of separate legal treatment for UUVs. In its list of considerations, it permits different standards for vessels depending on their type and size, and on whether they are new or pre-existing. These are the same major factors that make UUVs unlike traditional Naval ships. Since this law already acknowledges that different categories of vessels may require individualized standards, it follows that the UUV class merits its own legal analysis.

Taking a closer look at the national uniform discharge standards for vessels of the Armed Forces, one can see that “small boat engine wet exhaust”\textsuperscript{154} may be a substance of

\textsuperscript{152} Id. § 1322(a)(13).
\textsuperscript{153} Id.
\textsuperscript{154} 40 C.F.R. § 1700.33 (2017).
incidental discharge relevant to the normal operation of some types of UUVs. Defined as “the seawater that is mixed and discharged with small boat propulsion engine exhaust to cool the exhaust and quiet the engine,” small boat engine wet exhaust is included in the category of substances that require the establishment and implementation of a marine pollution control device.\textsuperscript{155} This is just one example of how a legal structure that permits domestic testing and training of UUVs, and ultimately more use of UUVs in real world missions, can improve the overall environmental impact from Naval vessels. With many UUVs being sourced by batteries or by environmental sources such as waves and buoyancy changes, the amount of discharges of small boat engine wet exhaust is reduced.\textsuperscript{156} UUV technology takes pollution control to a whole other level – rather than installing equipment on vessels to manage discharges, it eliminates the discharge altogether.

Small boat engine wet exhaust is not an anomaly. There are other statutorily listed substances deemed incidental discharges in the normal operation of vessels of the Armed Forces that similarly support the argument that UUVs better solve the problem of water pollution control. Motor gasoline and compensating discharge\textsuperscript{157} and gas turbine water wash are other discharges which require installation and use of a marine pollution control device.\textsuperscript{158} Once again, battery or environmentally-powered UUVs do not just

\textsuperscript{155} Id. § 1700.4.
\textsuperscript{156} Of note, 40 C.F.R. § 1700.33 refers only to discharges from vessels that are less than 79 feet in length.
\textsuperscript{157} 40 C.F.R. § 1700.4 defines “motor gasoline and compensating discharge” as “the seawater taken into, and discharged from, motor gasoline tanks to eliminate free space where vapors could accumulate.”
\textsuperscript{158} Id.
make the risk of adverse impact from discharges more acceptable; they remove the risk by eliminating the discharge.

“Sonar dome discharge” is another relevant substance under this same set of regulations. Defined as “the leaching of antifoulant materials into the surrounding seawater and the release of seawater or freshwater retained within the sonar dome,” sonar dome discharge requires employment of a marine pollution control device.159 Any UUV model that incorporates sonar dome equipment must comply with this requirement, and with the corresponding national performance standard. This thesis does not submit that UUVs are exempt from pollution control mitigation measures altogether, but herein lies the problem: without the ability to adequately test UUV capability and new UUV designs, the Navy is restricted from developing this area of environmental law compliance. A legal analysis that permits UUV program personnel to comprehensively test vessel development and design will serve environmental protection goals well in the long-run.

It is also worthwhile to take a closer look at the types of discharges that the EPA Administrator and SECDEF have determined do not require marine pollution control devices during the normal operation of Armed Forces vessels. These listed substances, relevant to UUVs, remain free from any required equipment or pollution control performance standard which would alleviate adverse impacts to the marine environment:160 mine countermeasures equipment lubrication,161 rudder bearing

159. Id.
160. Id. § 1700.5.
161. Id. (defining “mine countermeasures equipment lubrication” as “the constituents released into the surrounding seawater by erosion or dissolution from lubricated mine countermeasures equipment when the equipment is deployed and towed”).
lubrication, submarine emergency diesel engine wet exhaust,\textsuperscript{162} and submarine outboard equipment grease and external hydraulics.\textsuperscript{163} Exempted because their mitigation is either unreasonable or impracticable, one can argue that when the Navy does identify a technology or equipment that does affect positive change on reducing the environmental impact of its operations, it should be permitted and even encouraged to further develop it and use it. The Navy has shown that UUVs do present a reasonable and practicable way to allay potential harm; a structure that allows their domestic testing and training to pass legal muster is both necessary and appropriate.

Turning now to the statutory language allowing SECDEF the ability to exempt certain vessels from uniform national discharge standards, this provision is especially important given the discussion of \textit{Winter v. NRDC} above and the importance that the Supreme Court has placed on national defense. Having this fallback stipulation further supports the notion that increased risk of adverse discharge and environmental impact is accepted when military necessity or circumstances so require. Given that position, the case in favor of special legal policies for UUVs is not only made, but fostered as reasonable alternatives to replace equipment that might require the SECDEF exemption.

These regulations of the Clean Water Act apply to the various platforms of UUVs. While application of many of them does not present a great deal of conflict, some demonstrate grounds for consideration to legally permit the deeper development and

\textsuperscript{162} \textit{Id.} (defining “submarine emergency diesel engine wet exhaust” as “the seawater that is mixed and discharged with submarine emergency diesel engine exhaust to cool the exhaust and quiet the engine”).

\textsuperscript{163} \textit{Id.} (defining “submarine outboard equipment grease and external hydraulics” as “the grease released into the surrounding seawater by erosion or dissolution from submarine equipment exposed to seawater”).
design of UUVs. To not only ensure compliance, but to also advance the goals of better reduction and control of discharges of pollutants, legal leeway for UUVs should be created. Policies that already exist are not well-suited for achievement of the technology’s full potential.

C. The potential for other, specific types of discharges including munitions and used equipment

Depending on their design and assigned mission, many UUVs are less likely than conventional surface and submarine vessels to discharge particular types of pollutants into waters of the United States. Munitions, for example, a substance included in the CWA’s list of “pollutant,”164 would otherwise be regulated but for the Armed Forces vessel exception discussed above. It is worth noting here, however, for a complete conversation about the legal implications of domestic use of UUVs, that none of the models yet are armed.165 However, if given the requisite amount of flexibility to continue to test and train UUV development as this thesis advocates, some models may be equipped with munitions in about three years.166 Without assuming that any potential munitions discharge would necessarily fall under the exception for vessels of the Armed Forces, further detail and legal analysis would be necessary to determine whether or not such discharge would be incidental to their normal operation.

Also worthy of further legal discussion is the issue of UUV “scuttle.” Some types, typically of smaller sizes and single-mission only models, are non-recoverable.167

165. Interview with Captain Jon Rucker, supra note 14.
166. Id.
167. Id.
Referred to as “scuttle,” a strategic decision is made, prior to their launching, not to collect them after their release.168 The commercial sector conducts operations in which surveillance sensors are left behind and not recovered.169 These operations typically pertain to the laying of undersea cables or to planning pipeline routes for commercial gas and oil developers.170 The Navy does not normally intend nor conduct scuttle in testing, training and evaluation evolutions, as not retrieving the UUV would effectively defeat the purpose of the evolution.171

For this reason, the potential adverse environmental impacts from discharges of used equipment during domestic UUV development is minimal. “Wrecked or discarded equipment” constitutes a “pollutant” under the CWA.172 Again, however, the exception for incidental discharges in the normal operation of a vessel of the Armed Forces applies. The point to acknowledge here is that with other surface and submarine military vessels, any potential negative environmental impact due to scuttle is legally permissible, after application of the “pollutant” exception. On the other hand, the call for a flexible legal framework for testing and training UUVs stateside does not present this danger. In other words, it presents less risk than what has legally already been deemed acceptable.

Regardless of the Armed Forces vessel exception to the CWA’s regulation of pollutants, UUVs present less of a threat of discharges of substances identified as harmful to the environment than traditional military ships. Decreased risk from UUVs is more in line with the CWA’s goals of improved water pollution control and environmentally-

168. Id.
169. A SURVEY OF MISSIONS FOR UNMANNED UNDERSEA VEHICLES, supra note 2, at xvii.
170. Id.
171. Interview with Captain Jon Rucker, supra note 14.
responsible equipment, and not inconsistent with how risks from military operations are generally weighed and statutorily accepted. Legal provisions should permit increased domestic testing and training of UUVs.

V. Potential impacts upon endangered species, threatened species and critical habitat due to UUV testing and training in US waters

The Endangered Species Act (ESA) is designed “to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, [and] to provide a program for the conservation of such endangered species and threatened species…”\textsuperscript{173} The ESA’s comprehensive approach seeks to protect not only the species themselves, but also their critical habitats.\textsuperscript{174} The main, relevant thrusts of the ESA are (1) its prohibition against “takings” of listed species of fish or wildlife,\textsuperscript{175} (2) its mandate for holistic conservation, and (3) its requirement for federal agencies to consult with biological expert agencies on potential jeopardy impacts to listed species, prior to taking agency action. Analysis for compliance with the ESA is both pertinent and worthwhile in a discussion advocating for domestic use of UUVs.

The ESA has a wide reach, influencing projects and activities of all sizes, in all types of locations and settings, and without much distinction between the intended purposes of the actions which may impact listed species and their habitats. It is this breadth that brings attention to the ESA in the context of domestic UUV use – this activity must comply with the statutory scheme just like any other. We turn first to the Act’s prohibition against “takes.”

\textsuperscript{174} Id. § 1533(a)(3)(A)(i); Id. § 1533(b)(2).
\textsuperscript{175} Id. § 1538(a)(1)(B).
A. Potential “takes” of endangered and threatened species and harm to their habitats, distinct from impacts other types of vessels may cause

Due to their reduced impact upon animals, plants and the environment as a whole, UUVs will lead to fewer takes, less harassment, less jeopardy to listed species and less impact to critical habitats. As they replace traditional platforms and are employed for surveillance and real-time collection of information regarding the status of operating areas, UUVs will render moot many of the threats that these manned surface and submarine vessels create.

While “takes” are not a foreign concept to operations in the Navy, a tailored analysis for UUVs is in order. “Take” has a specific meaning in ESA application: it means, among other things, “to harass, harm…wound, kill… or to attempt to engage in any such conduct.”176 While the Navy does not seek to commit these acts, one could argue that such results can occur as collateral effects of the Navy’s execution of its UUV testing and training missions. “Wound” and “kill” are not difficult concepts to understand, and it is not unreasonable to argue that the potential exists for a listed species to be present in the area in which a UUV is operating, and something unplanned happens, causing physical injury or death to that animal.

Possibility, however, is not the same concept as probability. A unique feature of UUV designs, sensing and perception systems are dynamically used to collect, interpret and update data about their current marine environment, creating a digital representation which accounts for such things as the terrain and obstacles.177 Monitoring of the area can be performed throughout the duration of the mission, enabling the most current

176. Id. § 1532(19).
177. AUTONOMOUS VEHICLES IN SUPPORT OF NAVAL OPERATIONS, supra note 77, at 47.
information relevant to potential harm to be passed to the operators, or operating system, for decision-making. UUVs can possess sensory equipment that reaches back to the human operator, relaying data about its surroundings that the operator would not otherwise know. Thus, UUVs offer the unique capability to assess the current state of their location, enabling a better understanding of environmental factors present and the ability to weigh risk more reasonably. This is precisely the type of advantage that military vessels should possess, in order to minimize any likelihood of wounding or killing listed species.

Additionally, UUVs can be pre-programmed for appropriate responses to potential encounters with marine mammals and life. They would treat such encounter as a “contact,” and rely upon pre-programming to initiate and execute response actions. This is vastly different than encounters between marine mammals and manned vessels. Manned Navy vessels employ human mammal watches during testing and training operations. The same concept of a standard operating procedure applies – human servicemembers or contractors tasked with the marine mammal watch would invoke pre-planned responses – but the effectiveness is diminished due to inferior vantage points from which to collect information about any impending encounter.

In this context, it is worth noting again the smaller size of UUVs, compared to most other Naval vessels. Remembering that “medium” UUVs are a maximum of twenty-one inches in diameter, they present less potential to cause physical injuries and deaths.

178. Strategic Roadmap for Unmanned Systems, supra note 1, at 37.
179. Id.
180. Interview with Captain Jon Rucker, supra note 14.
181. Id.
due to their smaller size. Quite frankly, many species of marine mammals can outsize “small” or “medium” UUVs.¹⁸² In sum, while UUV sensory equipment and pre-programmed responses do not eliminate the risk of takes by wounding or killing altogether, they do effectively reduce it and to a degree impossible by other traditional types of vessels.

An analysis of takings by “harm” and “harassment” is not so straightforward. “Harm” under the ESA is defined to include “an act which actually kills or injures fish or wildlife,” emphasizing that such acts may include significant habitat modification or degradation that significantly impairs essential behavioral patterns.¹⁸³ Case law from the United States Supreme Court extends this definition to include indirect harms, thereby prohibiting these types of effects on the same grounds as direct harms.¹⁸⁴ Thus, “harm” is a broad concept that focuses on direct or indirect injuries, deaths or substantial changes to the habitats of listed species to the degree of interrupting their normal biological activities.

The definition of “harass” is similar – it includes “an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not

¹⁸². For comparison, the Hawaiian monk seal averages in length from seven feet to seven and a half feet and in weight from 375 pounds to 400 pounds. HAWAIIAN MONK SEAL, https://www.fisheries.noaa.gov/species/hawaiian-monk-seal (last visited Feb. 12, 2018). The average length of a false killer whale is 15 to 20 feet and average weight is 1,500 pounds. FALSE KILLER WHALE, https://www.fisheries.noaa.gov/species/false-killer-whale (last visited Feb. 12, 2018).
¹⁸³. 50 C.F.R. § 222.102 (2015).
limited to, breeding, feeding, or sheltering.”\textsuperscript{185} There is some overlap between “harm” and “harass” with respect to “wound” and “kill” – physical injury or death could fall under multiple definitions. The extra issues unique to “harm” and “harass” to focus on in an analysis of UUV use relate to impacts upon species’ critical habitats and behavior.

Critical habitat designations are not always made as species are listed, and there exists no bright line requirement for changes to designations. The ESA mandates designation of critical habitat concurrently with the listing of the species only “to the maximum extent prudent and determinable.”\textsuperscript{186} The ESA merely authorizes revisions of such designations “from time-to-time thereafter as appropriate.”\textsuperscript{187} Even given this loose statutory language, impacts to critical habitat of listed species still play a major role in compliance with the ESA and are important to examine in light of the ESA’s description as “the most comprehensive legislation for the preservation of endangered species ever enacted by any nation.”\textsuperscript{188}

For the same reasons explained earlier, UUVs present less risk of harm to their surrounding marine environments, translating into less harmful impact to any area that might be designated as critical habitat. With their smaller sizes and fewer discharges, combined with the fact that they derive power from either batteries, waves or buoyancy changes, UUVs generally leave less of a physical footprint. More likely than traditional Naval vessels to execute a mission without disturbing the operating area, UUVs help preserve all habitat, whether formally designated as critical or not, and regardless of the

\textsuperscript{185} 50 C.F.R. § 17.3.
\textsuperscript{187} Id. § 1533(a)(3)(A)(ii).
\textsuperscript{188} Tennessee Valley Authority (TVA) v. Hill, 437 U.S. 153, 180 (1978).
listing status of marine life that live there.

It is crucial to remember that UUVs are unmanned. Their design, by default, eliminates any potential annoyance or disruption to listed species due to humans being physically present in the area. Speaking specifically in terms of noise, UUV designs incorporate only equipment that is necessary for safe and effective execution of a set mission, reducing any possible annoyance or disruption caused by auxiliary systems or functions. Even smaller UUVs fueled by gasoline or diesel engines create less noise than larger vessels that carry humans. Having a vessel tailored to its purpose, with state-of-the-art equipment and features equates to lesser effects and a smaller mark left upon its surroundings – in other words, protection of critical habitat.

It is this type of potential disruption that is key to a discussion of harassment under the ESA. The relevant question to ask before a domestic UUV operation is conducted is whether it will impact listed species to the degree that their normal behavioral patterns are significantly disturbed – will a particular proposed UUV testing or training mission negatively interrupt any listed species’ typical eating, breeding or sheltering activities?

There are a few key words in this question to keep in mind. First, the disruption from UUVs must be “significant.” The presence of this qualifying term in the statute suggests that minor disruptions do not constitute harassment and would not be prohibited as a take. Operating UUVs independently or for missions of short durations mitigates the likelihood of causing significant impact on listed species’ biological patterns. Furthermore, a large amount of domestic testing and training would be performed in routine areas, locations in which the presence or absence of listed species is currently
known or currently being ascertained. Armed with this information, along with data on the regular behavioral patterns of any listed species in nearby areas, domestic use of UUVs is already narrowly tailored in terms of location, and can be further tailored.

If equipped with sensory equipment and programmed to continuously monitor their present environments, the argument could be made that UUVs incorporate an extra layer of protection against significant disruptions to breeding, feeding and sheltering patterns. Their steady processes of gathering and assessing information are tools that aid in identifying conduct that may cause a significant impact to the patterns of listed species, enabling timely adjustments to plans or tactics. This capability takes prevention of harassment to a new level of effectiveness. Understanding the real-time effects of UUV use allows operators to apprehend what impacts, if any, are occurring; why they might be occurring; to what degree they are affecting marine life; whether the impacts actually disrupt normal patterns; whether the impacts are negative; and what courses of action may be necessary to reduce or eliminate the disruption. The close connection that UUVs have with their operating environment enables direct and prompt feedback essential to the avoidance of harassment of endangered and threatened species, as well as proper responses should a harassment concern arise.

The second key word in this analysis of harassment is “normal,” qualifying “behavioral patterns.” Not every impact to a member of a listed species necessarily relates to what it normally does. Only those natural or routine activities are the subjects of ESA protection against harassment. Irregular or atypical behavior would not be afforded the same kind of safeguard. Likewise, the prohibition pertains to “patterns.” Such language indicates that sporadic or solitary occurrences, not constituting a pattern, would
not fall under the scope of the ESA’s prohibition against harassment and not warrant protection. These ESA limitations are not unique to UUVs, but can and should be incorporated into a tailored environmental law framework, building upon policies and statutory provisions that already exist.

These key elements are of great consequence – they limit application of a statute that is otherwise very broad. While not inconsistent with the ESA’s goals, they help balance actual application of the Act with realization of real world activities and endeavors. These types of requirements demonstrate that the ESA was not designed to limit any and every action that might harass members of listed species. Focusing only on protecting certain naturally-occurring and consistent behaviors, the ESA allows flexibility for the carrying out of some pursuits in locations where listed species may be present.

Expansion of domestic UUV testing and training is one such pursuit that should be given this leeway. With their reduced footprint, surveillance capability and quick environmental responsiveness, UUVs exemplify an effort toward more prudent and cautious methods of pursuing military interests. The ESA’s goals and prohibitions can be respected and complied with while simultaneously creating and employing new techniques.

B. Applicability of incidental takings by UUVs under the ESA

The ESA allows for some exceptions to its prohibition against takes. One type, known as an “incidental taking,” conditionally permits a taking of a member of a listed species if it “is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.” An authorization for incidental takings is given after formal

consultation by federal agencies with either the Department of the Interior or the Department of Commerce and “specifies those reasonable and prudent measures that the Secretary [of the Interior or of Commerce, as appropriate] considers necessary or appropriate to minimize such impact.”\(^{190}\) It also “sets forth the terms and conditions (including, but not limited to, reporting requirements) that must be complied with by the Federal agency” to implement such reasonable and prudent mitigation measures, as well as measures necessary to impose the least practicable adverse impact on listed species of marine mammals and their habitats.\(^{191}\)

The first question to ask about incidental takings is whether the taking is the purpose of the underlying activity, or whether it is truly incidental to execution of an otherwise lawful activity. A definition from the Marine Mammal Protection Act, a statute with goals similar to the ESA, is insightful – “incidental taking” refers to takings that are “infrequent, unavoidable or accidental.”\(^{192}\) Certainly any taking that may occur is not the purpose, goal or intent of domestic use of UUVs. It cannot be argued that UUVs are employed in US waters by the Navy with the objective of taking members of listed species. The Navy clearly seeks to use UUVs domestically for program development, specifically testing of designs and capabilities, and training of operators and crews. Takings of members of listed species is avoided in UUV plans and procedures as much as possible, disproving claims that such takings are anything other than incidental.

The next element to consider involves the process of formal consultation under the ESA. A detailed discussion on this point follows, and is mentioned here merely to


\(^{192}\) 50 C.F.R. § 216.103 (2002).
acknowledge that incidental take permits must be preceded by a complete formal consultation. The Navy recognizes that any tailored application of incidental take provisions for expanded use of UUVs must include satisfaction of formal consultation requirements.

Incidental take permit applications require a good deal of evaluation of the underlying activity, as well as consideration of its specific consequences. No such permit may be issued without the action agency submitting a conservation plan. This conservation plan, tailored to the action that the agency seeks to do, must then focus on the impacts of the takings themselves. In other words, the analysis must address the secondary impacts of the agency’s actions – the taking being the primary impact – and it is not enough for the agency to merely state that takings may occur. What this portion of the conservation plan seeks to achieve is an assessment of the overall, long-term effects that may take place on listed species should incidental take permits be issued.

Information relevant to this inquiry is especially insightful to weighing the appropriateness of allowing an agency to conduct what it proposes to do. In the case of domestic UUV use by the Navy, special attention should be paid to this component, rather than concentrating only on the possibility and negative perception of takes. A thorough weighing of all of these matters enables a good understanding of the benefits that can be gained in total, despite the potential occurrence of unintentional takes.

For reasons previously discussed, UUVs offer a more environmentally-responsible approach to necessary military operations. These new techniques and

194. Id. § 1539(a)(2)(A)(i).
procedures do not come without a cost, however, and as is often the case with
development of technology, some margin of freedom is necessary to permit concepts to
become reality, and average methods to become improved methods. There is always risk
associated with evolution and progress; the Navy does not claim that growth of its UUV
program is risk-free. Speaking strictly in terms of incidental takes, however, the risk is
worthwhile. With a lower likelihood of causing takes, as discussed earlier, domestic
UUV use brings more advantages to the table than it costs in environmental impact. In
short, a limited number of incidental take permits is a justified expense, given the amount
of gains to be realized overall.

The required conservation plan must also outline the steps that will be taken “to
minimize and mitigate such impacts, and the funding that will be available to implement
such steps.”195 The Navy is positioned well to describe how its UUVs function,
expounding on processes and safeguards already in place that achieve mitigation of
impacts to all marine life and operating environments. Mitigation measures are already
built in, as evidenced by UUV sensing and perception systems that continuously collect
and use data about the surrounding location, and anything present therein, to build digital
maps. Conservation plans can adjust for specific locations, times of the year and stages of
biological lifecycles in which operations are planned, and any other information obtained
from UUV surveillance and monitoring, yet the foundation of analysis of mitigation
measures is already laid, further demonstrating that the chance of incidental takes is
worth taking.

A conservation plan must also assess alternative actions and “the reasons why

195. Id. § 1539(a)(2)(A)(ii).
such alternatives are not being utilized.” Applying this question to the Navy’s domestic testing and training of UUVs, alternative actions are few. One alternative is to simply forego a UUV program altogether. A reasoning against this alternative is well-founded in the numerous advantages that UUV capability creates. When faced with the alternative of not developing or using UUVs, it becomes clear that this option is inferior due to the number of positive changes that would simultaneously be rendered impossible.

Another alternative is to forego only this component of the program and to deploy UUVs without prior domestic testing and training. This alternative is just as irrational as the first – it is not responsible nor logical to operate a technology in the field that was not exhaustively tested. It would similarly be irresponsible to deploy UUVs without a full understanding of how to operate them safely and correctly. These reasons, based upon common sense and a multitude of financial, safety and practicality interests, render this alternative inconsistent with the goals of risk mitigation and conservation, and thus, not a good option over incidental take permits for testing and training of UUVs in US waters. Identifying any other legitimate alternatives is difficult, supporting the theory that reasonable and tailored incidental take permits is in line with ESA objectives.

Finally, while not directly originating from the ESA, but worth a discussion concurrently with incidental take permits under the ESA, is the Marine Mammal Protection Act’s (MMPA) own provisions on incidental takes. Specifically, the MMPA requires analysis of “the availability and feasibility (economic and technological) of equipment, methods, and manner of conducting [the underlying] activity or other means of effecting the least practicable adverse impact upon the affected species or stocks, their

196. *Id.* § 1539(a)(2)(A)(iii).
habitat, and on their availability for subsistence uses…” Once again, the analysis must focus on the overall pros and cons of building and employing a full UUV program, not solely its developmental stage. Testing and training is a necessary step to achieving the improvements over traditional Naval operations and systems, and it simply is not worth passing on such a substantial opportunity because of a restrictive and limited analysis of one individual component. The standard refers to the least practicable adverse impact, and is achieved through the safeguards of testing and training already in place. Crafting plans that incorporate the best timing, duration, location and personnel for each type of mission set and size of UUV, combined with a continuous surveillance and feedback loop, ensures that the fewest adverse impacts are imposed to the degree practicable.

ESA provisions allowing incidental take permits apply appropriately to domestic use of UUVs for testing and training by the Navy. Any takings in the course of these operations would be purely incidental or accidental, and would not lead to significant secondary effects that are adverse to listed species or their habitat. Quite the opposite, these tests and trainings open the door to progressive military techniques that actually reduce the risk of environmental harm that other, current operations can pose. Mitigation and conservation measures are inherent in UUV programs, and no other alternatives exist that can accomplish what UUV development brings to the table. Put another way, incidental takes that may occur would be avoided to the maximum extent practicable, and worth the risk when balanced with the long-term benefits to be gained.

197. 50 C.F.R. § 216.104(a)(11).
C. UUVs are in accord with the ESA goal of conservation

UUVs enable better and more productive conservation and recovery efforts than other, traditional types of Naval vessels. “Conservation” under the ESA is a concept that extends beyond mere species survival. It is important to remember that the ESA’s first express purpose is to conserve ecosystems upon which endangered and threatened species depend. The focus here is on ecosystems, not the species themselves. Its statutory definition directly refers to “all methods and procedures” necessary to improve the status of listed species to the point that conservation efforts are no longer needed. This perspective suggests that the ESA supports broad thinking, as well as identification and implementation of innovation, as ways to achieve positive impacts on whole ecosystems, which may in turn cause either direct or indirect benefits to members of listed species. The motivation behind the ESA’s provisions on critical habitat is analogous. Designation of a critical habitat is done “to carve out territory that is not only necessary for the species’ survival but also essential for the species’ recovery.”

UUVs embrace and espouse the conservation goal. For the same reasons that their use demonstrates better Clean Water Act compliance, and leaves less of a footprint from military operations, they help make conservation efforts productive. Replacing traditional vessels with UUVs can assist with preventing larger scale environmental harm which may filter down to impacting endangered or threatened species or their habitats. Their capability to collect more precise and current information about the marine environment

199. Id. § 1532(3).
in general, or about specific locations, is an invaluable tool in gauging the effectiveness of conservation techniques, progress done or progress lacking, and the need for different types or degrees of conservation measures.

As one example, UUV surveillance before and during an operation permits meaningful understanding of the operating environment and the effects of the mission, avoiding the potential for harm which makes conservation, survival and recovery necessary in the first place. This is notably pertinent to the idea that adverse modification of a critical habitat can happen through substantial delay or impairment of the ability of that habitat to develop features that support conservation of listed species. This viewpoint focuses on the value of the critical habitat for the conservation of listed species, looking past its current state and into its potential future state and potential future ability to support conservation. With such an expansive inquiry, UUVs can only be helpful in reducing the cumulative effects from military operations and in providing information as the Navy assesses long-term environmental impacts.

D. Applying the ESA consultation requirement to UUVs shows unique implications

The ESA’s provisions on interagency cooperation require federal government agencies to ensure that any action they authorize, fund or carry out are not likely to jeopardize the continued existence of endangered or threatened species, or destroy or adversely modify critical habitat. To accomplish this cooperation, the ESA requires federal government agencies seeking to take action to consult with the services delegated

authority to implement the ESA if the agency has reason to believe that listed species may be present in the location for which the action is planned and that execution of the action will likely affect them. In this case of domestic UUV testing and training, which pertains to marine species rather than terrestrial species, the Navy would need to consult with the National Marine Fisheries Service (NMFS) regarding the likelihood of jeopardy, destruction or modification due to its proposed marine activities.

The consultation process involves various degrees of interagency cooperation, ranging from early consultation to informal consultation and finally to formal consultation. Multiple considerations come into play during consultation in general, and given the large scope of a UUV development program, the analysis that follows will focus more on components that tend to flow from formal consultation.

In this formal consultation process, the NMFS would be required to issue a biological opinion. A biological opinion has a number of elements to it, but an important feature for those that find a likelihood of jeopardy to listed species or destruction or adverse modification of critical habitat is the requirement that the NMFS discuss with the action agency “the availability of reasonable and prudent alternatives” to the proposed action. The NMFS is required to “utilize the expertise of the Federal agency…in identifying these alternatives.” It is crucial to keep in mind that the Navy

203. Id. § 1536(a)(3).
204. 50 C.F.R. § 402.01.
205. Id. § 402.11.
206. Id. § 402.13.
207. Id. § 402.14.
208. Id. § 402.14(g)(4).
209. Id. § 402.14(g)(5).
210. Id.
has other operations already being executed and others also proposed. These operations may have required a similar jeopardy analysis and evaluation of alternatives.

This is the point at which piecemeal legal analysis, or analysis focused exclusively on individual proposed agency actions, can blind us to the bigger environmental picture. In many cases, use of UUVs can be the reasonable and prudent alternative itself. Their substitution for larger vessels, traditional submarine or surface ships, or manned platforms may be the actual alternative that is both reasonable and prudent, satisfying ESA requirements, while also permitting the Navy to accomplish the tasks it is mandated to do. “Reasonable and prudent alternatives” are defined as those actions “that can be implemented in a manner consistent with the intended purpose of the action, that can be implemented consistent with the scope of the Federal agency’s legal authority and jurisdiction, that [are] economically and technologically feasible, and that...would avoid the likelihood of jeopardizing the continued existence of listed species or resulting in the destruction or adverse modification of critical habitat.”

UUVs satisfy all such elements in that their use is consistent with the Navy’s purposes and goals of its proposed actions and with what the Navy is legally permitted to do. With continued development, UUVs become more financially and technologically feasible, making the ability to test and train domestically all the more necessary and worthwhile.

On a similar note, a biological opinion may include reasonable and prudent measures. Such measures refer to actions “necessary or appropriate to minimize the impacts...of incidental take.” For the same reasons that UUVs qualify as reasonable

211. *Id.* § 402.02.
212. *Id.* § 402.12(g)(8).
213. *Id.* § 402.02.
and prudent alternatives, they can also serve as reasonable and prudent measures. Of note, the ESA directs that reasonable and prudent measures “along with the terms and conditions that implement them, cannot alter the basic design, location, scope, duration, or timing of the action and may involve only minor changes.”214 UUVs are the ideal solution that maximize the Navy’s efficiency and ESA compliance, offering an approach that the NMFS can support. Incorporating UUVs into reasonable and prudent measures supports the overarching theory that the Navy’s operations merit incidental take permits. Once again, a narrow focus on environmental impacts from use of UUVs in US waters does not do justice to the benefits it offers from the perspective of cumulative Naval operations.

Analyzing the issue of ESA compliance in such an expansive way is in line with the scope of a jeopardy determination. The NMFS assessment of jeopardy, and any resulting biological opinion, must consider impacts to both the likelihood of survival and recovery of listed species.215 Direct and indirect effects must simultaneously be factored into the analysis.216 Finally, the jeopardy determination must include potential cumulative effects of other actions.217 It is from this necessary viewpoint that the overall picture of domestic UUV testing and training must be evaluated. As UUV programs reduce the risks of environmental harm and allow a better understanding of marine environments and impacts actually caused, the direct, indirect and cumulative effects lead to positive

214. Id. § 402.14(i)(2).
215. “Jeopardize the continued existence of” means “engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.” Id. § 402.02.
216. Id.
217. Id. § 402.14(g)(3) and (4).
changes in the execution of military operations. Legal flexibility must be granted in favor of domestic UUV testing and training, an indispensable element to a successful program.

Also germane to this ESA discussion is the statutory exemption for actions related to national security. An exemption to the interagency cooperation requirements shall be granted if the Secretary of Defense deems an exemption “necessary for reasons of national security.” This authority parallels the exemption discretion granted to the Secretary of Defense in the Clean Water Act, highlighting the special legal treatment that must be afforded federal agency actions when national security interests are at stake. A comparison of risk is appropriate here, as the national security exemption would apply to all types of vessels, regardless of the potential degree or category of harm. In this context also, a blanket acceptance of risk is already in place. With the increased ability to act and react with better information, and to avoid takes in the first place due to their smaller size and lack of auxiliary systems, UUVs present less of the risk that has already been deemed legally acceptable. Lumping UUVs into the same legal framework as other types of vessels does not account for their attributes and does not promote the goal of environmental protection.

E. Evaluating the “best scientific and commercial data available” concerning domestic use of UUVs and the associated biological assessments and opinions

At the core of the requirement for all federal agencies and the NMFS to complete analysis of the likelihood of jeopardy to the continued existence of listed species or of destruction or adverse modification of critical habitat is the standard to use the “best

218. 16 U.S.C. § 1536(j); 50 C.F.R. § 453.03(d).
scientific and commercial data available.” Availability of data and information is somewhat of a subjective concept, and specifics on the impacts of UUV deployment are limited due to the current restrictions on such operations. Permitting additional domestic testing and training could expand the information bank, as well as the amount and quality of data available to assess ESA risks of other proposed federal agency actions. Using UUVs enables more informed decision-making in ESA implementation, not only related to jeopardy determinations, but also with initial determinations of the presence of endangered or threatened species in areas subject to federal agency action. A distinct legal structure should be created to accommodate for UUV capability, given the advantages it provides to application of the ESA to other federal agency actions.

Congressional intent behind the ESA is described as “halt[ing] and revers[ing] the trend toward species extinction, whatever the cost.” Use of UUVs for testing and training in US waters should not, however, be thought of in terms of cost. Given the likelihood of reduced impacts upon the environment as a whole, UUVs will lead to fewer takes, less harassment, less jeopardy to listed species, and less destruction and adverse modification of critical habitats. Their capability for surveillance and information collection empowers better understanding of environmental factors and weighing of risk. Such domestic use helps achieve conservation and recovery of endangered and threatened species and critical habitats, advancing efforts for protection of entire ecosystems.

Advanced technology and vessel designs customized for their missions secure an added defense against significant disruptions to breeding, feeding and sheltering patterns

219. 50 C.F.R. § 1536(a)(2); § 1536(c)(1).
of listed species. Offering a better policy than the blanket exemption for national security, the advantages from a full UUV program justify the aspects of its development. Speaking strictly in terms of incidental takes, they are the connection between mitigation measures and preservation of the original military objective. Tailored operational plans, surveillance and monitoring ensure that any risk of incidental take is worth the advantage to be gained. Alternatives to testing and training are few, if any, and foregoing these actions would result in a less responsible and practical implementation of a UUV program. The ESA challenges of UUV development and crew training are minimal when compared with potential impacts from similar actions of other military vessels and with the obstacles they create against improving the program and instituting better techniques to accomplish Navy missions. Viewing UUVs as an actual reasonable and prudent alternative or measure that the Navy is required to identify and employ supports creating a special legal treatment to allow their increased use.

VI. Conclusion

The Navy is simultaneously committed to both superior military readiness and comprehensive environmental law compliance. Critics argue that progressing the interests of one necessitates regressing those of the other. A new technology, however, proves that argument wrong.

UUVs bring new capabilities into the realm of possibility while not sacrificing either pursuit. The Navy is positioned to move forward on developing and employing UUVs, making the most of the enhanced environmental processes and programs that UUVs generate. Statutory goals of water pollution control, conservation and recovery of wildlife and habitat are similarly served. The result is improved military capability with
reduced environmental risk. A UUV program is dependent on initial and continued testing and training, however, and these critical steps cannot be short-changed. A new legal framework to permit expansion of domestic UUV use is necessary and justified.

Current UUV testing and training operations by the Navy are restrained by regulatory environmental schemes and policies. Realizing full UUV potential is not feasible when using an outdated environmental law structure that does not account for unique UUV considerations. Capitalizing on this opportunity to better balance military interests and environmental protection requires specialized legal treatment of UUVs.

The principles related to national defense and national security, defended by the United States Supreme Court in the case of *Winter v. Natural Resources Defense Council, Inc.*, support such an endeavor. Compliance with the Clean Water Act is amplified. Impacts from UUVs are in line with the comprehensive goals of the Endangered Species Act. Merely using the same legal parameters and policies created for traditional surface and submarines ships frustrates all objectives and prevents all stakeholders from long-term benefits. A tailored environmental law structure should exist for testing and training of UUVs in US waters.