



## Meeting DoD's Environmental Challenges

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### Biodegradable Sonobuoy Decelerators (WP-201222)

#### Objective

The Navy currently uses tens of thousands of sonobuoys world-wide for testing, training, and operations. Currently, these sonobuoys use a non-degradable rip-stop nylon decelerator for deployments from fixed wing aircraft and helicopters. [Note: "Decelerator" is the technical Navy term for parachutes used for non-personnel cargo. The public refers to the decelerators attached to sonobuoys as parachutes.] During recent (2009-2011) Navy at-Sea training Environmental Impact Statements (EISs), there were concerns from Federal Regulators, Non-Governmental Organizations (NGOs), and the public about the long-term effects of expended sonobuoy parachutes. These concerns and their relevant regulatory drivers include: entanglement of and ingestion by marine mammals and sea turtles (Endangered Species Act [ESA]), as well as damaging or smothering benthic resources such as coral (ESA) and Essential Fish Habitat (Magnuson – Stevens Fishery Conservation and Management Act). In line with Department of Defense (DoD) and Department of Navy (DON) green initiatives, this project will continue testing and evaluation of biodegradable parachute material that would minimize cumulative impacts from sonobuoy parachutes.

According to the Undersea Warfare Training Range (USWTR) EIS, approximately 3,000 sonobuoys per year will be deployed by ASW helicopters and maritime patrol aircraft operating on the training range, to be located off the coast of Jacksonville, Florida. For the Northwest Training Range Complex (NWTRC) the number is over 9,000 to be deployed by maritime patrol aircraft only. Naval Air Systems Command (NAVAIR) is the Navy command responsible for establishing the design, performance and acceptance criteria for sonobuoys, their associated packaging, and deceleration device (parachute).

The objective of this project is to develop a dissolving and biodegradable material for use in Navy sonobuoy parachutes which will address concerns associated with shelf life management, storage, reutilization, and environmental impact. The scope of this effort includes parachute and packaging design, selection and evaluation of materials, and drop tests. Specific technical objectives include:

1. Optimize biodegradable parachute material to produce a parachute that meets NAVAIR performance requirements.
2. Develop packaging to optimize shelf life and storage, maximize biodegradability of all components, and perform environmental evaluation of technology versus traditional nylon parachute.
3. Conduct system verification and operational validation testing.

#### Technology Description

Traditional nylon parachute fabric is being replaced with polyvinyl alcohol (PVOH) based film. Because the material properties for the PVOH film are not identical to the woven nylon fabric, the



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sonobuoy parachute design had to be modified. This modified design has been field tested from a helicopter and meets NAVAIR design and performance criteria thus far. PVOH is a non-toxic, water soluble synthetic polymer. When PVOH film is submersed in water, it dissolves in less than one minute and will biodegrade in a matter of weeks. Laboratory testing to determine rate of dissolution and biodegradation is being conducted at the Natick Soldier Research, Development Center (NSRDEC) Marine Biodegradation Laboratory.

### Benefits

1. A dissolving parachute would reduce smothering impacts to benthic resources and ingestion risk to marine mammals and sea turtles. Based on the attainable dissolution rate, minimal, if any, risk of entanglement and ingestion would remain.
2. This dissolving and biodegradable material technology could be leveraged to provide benefits to other DoD efforts, such as the need for discreet small scale aerial delivery operations. Special Warfare, as well as other services, use forward deployed embedded sensors for which the parachutes and casings could bio-degrade leaving less for enemy forces to recover.
3. Upon implementation of the biodegradable parachutes, studies would not be required to determine the direct and cumulative impacts of parachutes on benthic communities and ESA species.

The current cost of nylon decelerator assembly compared to the projected cost of the bio- degradable decelerator assembly in terms of the materials and manufacturing process is expected to be similar.

### Points of Contact

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