

Review of potential impacts to sea turtles from underwater explosive removal of offshore structures

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Abstract

The purpose of this study was to collect and synthesize existing information relevant to the explosive removal of offshore structures (EROS) in aquatic environments. Data sources were organized and summarized by topic — explosive removal methods, physics of underwater explosions, sea turtle resources, documented impacts to sea turtles, and mitigation of effects. Information was gathered via electronic database searches and literature source review. Bulk explosive charges are the most commonly used technique in EROS. While the physical principles of underwater detonations and the propagation of pressure and acoustic waves are well understood, there are significant gaps in the application of this knowledge. Impacts to sea turtles from explosive removal operations may range from non-injurious effects (e.g. acoustic annoyance; mild tactile detection or physical discomfort) to varying levels of injury (i.e. non-lethal and lethal injuries). Very little information exists regarding the impacts of underwater explosions on sea turtles. Effects of explosions on turtles often must be inferred from documented effects to other vertebrates with lungs or other gas-containing organs, such as mammals and most fishes. However, a cautious approach should be used when determining impacts to sea turtles based on extrapolations from other vertebrates. The discovery of beached sea turtles and bottlenose dolphins following an explosive platform removal event in 1986 prompted the initiation of formal consultation between the U.S. Department of the Interior, Minerals Management Service (MMS) and the National Marine Fisheries Service (NMFS), authorized through the Endangered Species Act Section 7, to determine a mechanism to minimize potential impacts to listed species. The initial consultation resulted in a requirement for oil and gas companies to obtain a permit (through separate consultations on a case-by-case basis) prior to using explosives in Federal waters. Because many offshore structure removal operations are similar, a “generic” Incidental Take Statement was established by the NMFS that describes requirements to protect sea turtles when an operator’s individual charge weights did not exceed 50 lb (23 kg). Requirements associated with the Incidental Take Permit were revised in 2003 and 2006 to accommodate advances in explosive charge technologies, removals of structures in deeper waters, and adequate protection of deep water marine mammal species in Gulf of Mexico waters. Generally, these requirements include pre- and post-detonation visual monitoring using standard surface and aerial survey methods for sea turtles and marine mammals, and, in some scenarios, passive acoustic survey methods for marine mammals within a specified radius from an offshore structure. The survey program has been successful in mitigating impacts to sea turtles associated with EROS. However, even with these protective measures in place, there have been observations of sea turtles affected by explosive platform removals.

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1. Introduction

This paper focuses on a review of existing information pertaining to the potential impacts to sea turtles from the underwater explosive removal of offshore structures (EROS). The introduction is followed by background sections that briefly summarize the current regulatory environment, available explosive removal methods, and the physics of underwater explosions. Review sections summarize the potential biological impacts of explosive removal to sea turtles and highlight current mitigation techniques. The discussion section summarizes existing data gaps and identifies a series of recommendations to expand our current knowledge of explosive removal impacts on sea turtles.

The U.S. Department of the Interior, Minerals Management Service (MMS) is responsible for management of mineral resource leases and activities on submerged Federal lands of the U.S. Outer Continental Shelf (OCS) seaward of State boundaries. Nearly 4000 oil and gas structures currently exist in Federal waters, with most located in the Gulf of Mexico. These offshore structures are used by offshore operators to develop and produce oil, natural gas, and/or gas condensates from offshore hydrocarbon reservoirs. When offshore production from producing fields becomes uneconomic, leases may be terminated at the request of the offshore operator. MMS decommissioning requirements specify that offshore oil and gas structures be removed within 1 year of lease termination. Offshore structure removal typically involves the use of explosives to sever platform legs and other components. During the 10-year period between 1994 and 2003, an average of 156 platform decommissionings occurred per year, with more than 60% involving explosive severance activity. Based on forecast modeling and assessment of historical trends and industry projections, MMS (2005) estimated that 170 to 273 explosive removal operations will occur annually during the next several years. EROS has the potential to cause environmental impact.

The MMS has a strong directive to develop approaches for managing the Nation's OCS mineral resources in an environmentally sound and safe manner. The MMS has funded numerous projects under its Environmental Studies Program to obtain information useful for decisions related to potential impacts associated with mineral activities. This paper presents the results of an MMS-funded project that reviewed explosive removal methods and the physics of underwater explosions, the potential impacts to marine mammals, sea turtles, and fishes from underwater EROS (Continental Shelf Associates, Inc., 2004), and available mitigation measures. This analysis

addresses those elements pertinent to potential impacts to and feasible mitigation efforts for sea turtles.

2. Regulatory environment

The MMS is mandated by the OCS Lands Act, as amended, to manage the development of OCS oil, gas, and mineral resources, while protecting the human, marine, and coastal environments. Regulations relevant to OCS oil and gas operations are codified in 30 Code of Federal Regulations (CFR) Part 250. Specifically, 30 CFR 250 Subpart Q was implemented to (1) determine that decommissioning activities comply with regulatory requirements and approvals and (2) ensure that offshore structure removal and site clearance are properly performed to protect marine life and the environment, and do not conflict with other users of the OCS. MMS oversees EROS activities through existing Notices to Lessees and Operators (NTLs) and permit requirements. A recent history of these requirements is as follows:

- MMS implemented restrictions on explosive removal activities in NTL 2001-G08.
- MMS issued a final rule amending its regulations governing oil and gas operations on the OCS to update decommissioning requirements on 17 May 2002 (67 Federal Register [FR] 35398). MMS decommissioning rules were restructured and regulations updated to make requirements more user-friendly and reflect changes in technology.
- Corrections to the final rule were made 1 July 2002 (67 FR 44265) and 30 October 2002 (67 FR 66046) to ensure that lessees and pipeline right-of-way holders conduct their decommissioning operations safely and effectively.
- MMS issued NTL 2004-G06 on 5 April 2004 to provide further guidance and clarification on structure removal operations requirements in the Gulf of Mexico OCS. This NTL superseded and replaced NTL 2001-G08 and provided additional information on Federal requirements for protecting endangered and threatened species, including sea turtles and select marine mammals.

The MMS also completed two Programmatic Environmental Assessments (PEAs) and Findings of No Significant Impact, the first in 1987 (Minerals Management Service, 1987) and most recently in 2005 (Minerals Management Service, 2005), satisfying regulatory requirements of the National Environmental Policy Act. One of the alternatives considered in the 2005 PEA evaluated all potential removal scenarios

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