

Table 1. Summary of environmental management measures, implementation responsibilities, and reporting procedures.

Measure Number	Description	Resources Protected	Implementation Responsibility	Monitoring	Reporting
1 Scheduling	The seismic surveys should be conducted from January through June. No surveys should be conducted from July through December.	Marine mammals (especially humpback whales)	Anadarko Moçambique Área 1, Lda. (AMA1)	---	---
2 Buffer zone	A geo-referenced map of reefs, shorelines, identified turtle nesting beaches, and recreational diving areas should be prepared and updated as needed. Using this map, the final survey plan should be reviewed to verify all survey lines are at a minimum depth of 50 m and at least 500 m from known turtle nesting areas. A 2.5-km safety zone will be enacted around the seismic vessel for divers. To the extent possible, any east/west maneuvers of the seismic vessel should be planned to take place away from dive sites.	Divers; Turtle nesting beaches; Coastal habitats	AMA1; CGGVeritas – <i>Geo Challenger</i>	---	---
3 Marine mammal and sea turtle observers	The seismic survey contractor should appoint one or more experienced Marine Mammal and Sea Turtle Observers (MMOs). The MMOs should be employed solely for the purpose of monitoring the implementation of these guidelines and visual observation of marine mammals and turtles during the seismic survey.	Marine mammals; Sea turtles	CGGVeritas – <i>Geo Challenger</i> MMOs	---	Post-survey reports required.
4 Soft start	Every time the use of the seismic array is initiated, “soft-start” procedures must be used to allow time for marine mammals and turtles to move away before the array reaches full power. The process should begin with the smallest source in an array and build up slowly over 20 to 40 minutes.	Marine mammals; Sea turtles	CGGVeritas – <i>Geo Challenger</i> MMOs	---	Post-survey reports required.

Table 1. (Continued).

Measure Number	Description	Resources Protected	Implementation Responsibility	Monitoring	Reporting
5 Pre-startup monitoring	Beginning at least 30 minutes before startup during daylight hours, an MMO should monitor a safety (exclusion) zone of a 1-km radius around the source vessel. Startup of the array cannot begin until the MMO verifies that the safety zone is clear of marine mammals (including dugongs) and turtles for at least 30 minutes.	Marine mammals; Sea turtles	CGGVeritas – <i>Geo Challenger</i> MMOs	Visual monitoring of a safety zone around the seismic survey vessel before operations.	Post-survey reports required.
6 Visual monitoring during operations	After a “soft start” has been completed, visual monitoring by an MMO should continue while seismic operations are being conducted until the operations cease or sighting conditions do not allow observation of the sea surface (e.g., fog, rain, or darkness).	Marine mammals; Sea turtles	CGGVeritas – <i>Geo Challenger</i> MMOs	Visual monitoring of a safety zone around the seismic survey vessel during operations.	Post-survey reports required.
7 Array shutdown	During visual monitoring, any time a whale or dugong is observed within 1 km of the center of the source array due to the animal’s movement, the vessel’s movement, or because the animal surfaced inside the safety zone, the array must be shut down. A whale is defined as a cetacean other than Family Delphinidae (i.e., including any baleen, sperm, or beaked whale species). The array will also be shut down if a sea turtle is observed within 500 m of the center of the source array.	Marine mammals; Sea turtles	CGGVeritas – <i>Geo Challenger</i> MMOs	Visual monitoring of a safety zone around the seismic survey vessel during operations.	Post-survey reports required.
8 Restart after shutdown	Any shutdown due to a whale, dugong, or sea turtle sighting within the exclusion zone must be followed by a 30-minute all-clear period and then a “soft start” (i.e., the safety zone must be inspected for at least 30 minutes to ensure the absence of marine mammals and sea turtles).	Marine mammals; Sea turtles	CGGVeritas – <i>Geo Challenger</i> MMOs	Visual monitoring of a safety zone around the seismic survey vessel during operations.	Post-survey reports required.

Table 1. (Continued).

Measure Number	Description	Resources Protected	Implementation Responsibility	Monitoring	Reporting
9 Line changes	For line changes that take longer than the time required to undertake a “soft start,” seismic sources should cease firing at the end of each line and commence a full soft start at the appropriate time before commencing the next line (i.e., a soft start of at least 20 minutes prior to commencement of the next line). For line changes that take less time than that required to undertake a soft start, seismic sound sources should continue firing the full array during the line turn (e.g., for a line change of 5 minutes, continue firing at full power).	Marine mammals; Sea turtles	CGGVeritas – <i>Geo Challenger</i> MMOs	Visual monitoring of a safety zone around the seismic survey vessel during operations.	Post-survey reports required.
10 Dugong watch	Support vessel(s) traveling to Pemba for supplies will maintain a watch for dugongs and travel at slow speeds while operating in coastal areas.	Dugongs	CGGVeritas – <i>Geo Challenger</i> ; Support vessel operators	Visual observations when entering the Pemba nearshore area for supplies.	Dugong observations (if any) will be reported to the MMOs for inclusion in their post-survey report.
11 Fisheries Liaison Officers	The AMA1 Environmental and Public Affairs Manager should designate Fisheries Liaison Officers who will maintain daily contact with fishing communities in the area and provide updated information on where the seismic survey vessel will be at specific times, allowing fishers to plan their excursions in areas well away from seismic operations.	Artisanal fishing community	AMA1 Environmental and Public Affairs Manager	Daily activity logs will be kept showing vessel location, expected area of coverage, and stakeholders contacted.	Final report summarizing all activities and contacts at the conclusion of the survey.
12 Appropriate chase boat crew members	At least one of the crew members on the chase boat should be fluent in local languages and have knowledge of local fishing practices. This will help to avoid misunderstandings and minimize the potential for conflict between the chase boat crew and fishers.	Artisanal fishing community	CGGVeritas – <i>Geo Challenger</i>	---	---