

**SUPPLEMENTAL INFORMATION REQUEST (SIR) 03/03/03**

This document has been prepared in response to a request for supplement information in support of the originally submitted (02/14/03) “*Request for a Letter of Authorization for the Incidental Harassment of Marine Mammals Resulting from the Programmatic Mission Activities within the Eglin Gulf Test and Training Range (EGTTR)*”; *Eglin Air Force Base (EGTTR-LOA)*. The request for clarification and supplemental information was received via email on Monday, March 3<sup>rd</sup>, 2003 from Mr. Ken Hollingshead; National Marine Fisheries Service – HQ in Silver Spring, MD.

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**NMFS Request:** (1) A concern is that the application does not request an authorization for injury or mortality for small arms fire, yet the PEA calculates a 0.2/year which equates to at least one mortality/serious injury for the 5-year period of the regulations. Please explain.

**Eglin Response:** The following analyses were extracted from the *EGTTR – Programmatic Biological Assessment*, prepared and submitted to NMFS-SERO in support of the formal section 7 consultation and ESA compliance. These analyses were not carried forward to the EGTTR-LOA, as they resulted in minimal impacts leading to Eglin’s conclusion that small arms fire will a not likely to adversely affect (nor harm) protected marine species by harassment, injury, nor mortality.

Impact calculations for DPI utilize marine mammal density estimates derived from aerial surveys during the GulfCet II (1996–1997) surveys. To provide better species conservation and protection, the species density estimate data were adjusted to reflect more realistic encounters of these animals in their natural environment and considered 1) temporal and spatial variations, 2) surface and submerged variations, 3) individual and group associations, and 4) overall density estimate confidence. An upper confidence limit of two standard deviations was utilized to further adjust the density estimate for each species.

Three key sources of information are necessary for estimating DPI impacts to marine species from small arms fire operations: 1) the number of distinct firing or test events must be determined, 2) the zone of impact must be defined, and 3) the density of animals that could be potentially impacted must be determined. In conjunction with these three things, various assumptions were made to best characterize the small arms fire missions and use of ordnance (.50 cal, 5.56 mm, and 7.62 mm):

- (1) Since the number of rounds fired within a given test mission can vary, the primary assumption for analyses establishes that all firing will occur within a given and discrete time period and thus constitutes a single event. This premise establishes that potential impacts may only occur once within the given time period (Advanced Research Projects Agency, 1995). Thus an estimation of the number of “events,” rather than the number of “rounds” was used as the primary mission criteria.
- (2) The estimation of test events is further defined by the approximated firing accuracy. Firing accuracy has been determined to occur within a 5 meter radius from the actual target flare.

The *Event* estimation is primarily based upon a *spatial* assumption that all ordnance firing did occur within a 5 meter radius target area. The second basic assumption supporting the *Event* estimation further defines the *temporal* criteria that all the ordnance firing has occurred within a limited time frame, with additional stipulations outlined below:

- (1) Continuous live firing with no pauses in excess of 10 minutes, using the same target location (all rounds and flares were within 0.8 km [ $\frac{1}{2}$  mile]), will constitute a single event.
- (2) Pauses between firings in excess of 10 minutes will indicate the end of one event and the beginning of another.
- (3) Each small caliber sortie (.50 cal, 5.56 mm, or 7.62 mm) is considered a single live fire event.

In summary, the Small Arms Firing operation activities have been estimated to constitute a total of **606 Events** for the proposed action gunnery missions. The process used for determining the total number of Small Arms Firing operations events follows the assumptions above and the calculations in Table SIR-1.

**Table SIR-1. Proposed Action Gunnery Missions as *Events***

Activity Description of EGTTR Events	Percentage	Number
Small arms .50 cal ball events	16.3%	99
Small arms 5.56 mm linked events	0.8%	5
Small arms 7.62 mm ball events	82.8%	502
Total Small Arms Firing Events	100%	606

Source: Author Created

Eglin has submitted analyses which support a very conservative estimate of potential direct physical impacts (DPI) resulting from Small Arms Firing on an annual basis. The potential for direct physical impacts (either by injury or mortality) to marine mammals swimming at the surface by Small Arms projectiles was determined to be extremely remote. An estimate of only 0.21 animals potentially struck per year represents the combined impacts to individuals of all marine mammal species potentially residing within the northern Gulf of Mexico. Particularly, the calculated number of impacts to individuals of any given species is substantially lower. For example, impacts to the most abundant population, the pantropical spotted dolphin, are only 0.051 per year. As such, no single individual of any given species is anticipated to result in any harm, as the possibility of injury or mortality is extremely remote.

Although most of the Small Arms Firing activities occur over the nearshore shelf region, for conservative impact assessments, the greatest species density estimate available for any given season (summer or winter), location (shelf or slope), or survey type (aerial or ship) was utilized. Here, densities have been totaled as cetaceans, pantropical spotted dolphin, and the sperm whale (Table SIR-2).

**Table SIR-2. Small Arms DPI Metrics and Potential Impacts to Marine Species in the EGTTR**

Species	Adjusted Density (#/km <sup>2</sup> )	Impact Zone Area <sup>1</sup> (km <sup>2</sup> )	Animals in Impact Zone (#)	Events Necessary to Impact 1 Animal <sup>2</sup> (#)	Impacts <sup>3</sup> (#/Yr.)
Cetaceans	4.326	0.000079	0.000340	2,943	0.206
Pantropical spotted dolphin	1.071	0.000079	0.000084	11,900	0.051
Sperm whale	0.011	0.000079	0.000001	1,157,490	0.001

Source: Author created.

1. Impact Zone Area based on 5 meter radius around target that would contain all A/S Gunnery impacts.

2. 105 mm, 40 mm, and 25 mm represent **606 Events**.

3. Number of potential impacts calculated by dividing the number of events it would take to impact one animal by the number of events that occurred.

In support of this conclusion, analyses demonstrate that it would take a gunnery activity level of approximately 11,900 events, or nearly 20 times the current annual mission activity level (606 events) in order to take by injury, a single individual of the most abundant population, the pantropical spotted dolphin. The probability of projectiles from a Small Arms Fire activity striking a marine mammal on the surface waters represents an “independent event” or occurrence. As such, the occurrence or likelihood of encountering an individual from one mission event in no way affects the probability of encountering an individual on subsequent events separated both spatially and temporally. To demonstrate the extreme remote chance of striking marine mammals from these small arms activities, Eglin has chosen to broadly evaluate the probability of encountering any marine mammal on an annual basis.

Due to these remote annual probabilities (not to mention the independence of events) for a take by injury either to a small portion (0.21) of the composite of Gulf of Mexico marine mammals, or the most abundant species (0.05), it is inappropriate for DPI analyses to consider a cumulative or additive annual estimate for the 5 year authorization.

***Direct physical impacts resulting from Small Arms Fire, are therefore, not likely to result in any harm (by injury nor mortality) to marine mammals.***

**NMFS Request: (2)** The application dismisses the potential for serious injury or mortality during gunnery exercises even though the difference between gunnery and small arms is that the gunnery exercises contain explosives. Please provide calculations, similar to small arms, using "events" instead of number of expendables and why you would not anticipate any injuries or mortalities during the 5-year authorization. The alternative of course would be for us to consider all Level B as a potential for injury/mortality, but I don't believe that is the way Eglin would want to proceed. Please provide calculations, similar to small arms, using "events" instead of number of expendables and why you would not anticipate any injuries or mortalities during the 5-year authorization.

**Eglin Response:** The following analyses were based on similar analyses performed for the assessments of the Small Arms Fire and were extracted from the ***EGTTR – Programmatic Biological Assessment***, prepared and submitted to NMFS-SERO in support of the formal section 7 consultation and ESA compliance. These analyses were not originally performed nor carried

forward to the EGTTR-LOA, since similar analyses for the Small Arms Fire resulted in minimal impacts leading to Eglin's conclusion that Small Arms Fire will a not likely to adversely affect (nor harm) protected marine species by harassment, injury, nor mortality. The following analyses demonstrate a similar conclusion of a not likely to adversely affect (nor harm) protected marine species by harassment, injury, nor mortality for the Air-to-Surface (A/S) gunnery operations.

Impact calculations for A/S Gunnery DPI utilize marine mammal density estimates derived from aerial surveys during the GulfCet II (1996–1997) surveys. To provide better species conservation and protection, the species density estimate data were adjusted to reflect more realistic encounters of these animals in their natural environment and considered 1) temporal and spatial variations, 2) surface and submerged variations, 3) individual and group associations, and 4) overall density estimate confidence. An upper confidence limit of two standard deviations was utilized to further adjust the density estimate for each species. Although these gunnery rounds also contain high explosive, only the potential for DPI are investigated within this section.

Three key sources of information are necessary for estimating DPI impacts to marine species from A/S Gunnery missions: 1) the number of distinct firing or test events must be determined, 2) the zone of impact must be defined, and 3) the density of animals that could be potentially impacted must be determined. In conjunction with these three things, various assumptions were made to best characterize the A/S Gunnery missions and use of ordnance (25 mm, 40 mm, and 105 mm):

- 1) Since the number of rounds fired within a given test mission can vary, the primary assumption for analyses establishes that all firing will occur within a given and discrete time period and thus constitutes a single event. This premise establishes that potential impacts may only occur once within the given time period (Advanced Research Projects Agency, 1995). Thus an estimation of the number of "events," rather than the number of "rounds" was used as the primary mission criteria.
- 2) The estimation of test events is further defined by the approximated firing accuracy. Firing accuracy has been determined to occur within a 5 meter radius from the actual target flare.

The *Event* estimation is primarily based upon a *spatial* assumption that all ordnance firing did occur within a 5 meter radius target area. The second basic assumption supporting the *Event* estimation further defines the *temporal* criteria that all the ordnance firing has occurred within a limited time frame, with additional stipulations outlined below:

- 1) Continuous live firing with no pauses in excess of 10 minutes, using the same target location (all rounds and flares were within ½ mile), will constitute a single *Event*.
- 2) Pauses between firings in excess of 10 minutes will indicate the end of one *Event* and the beginning of another.
- 3) Each gunnery mission including the 105 mm and 40 mm live fire will constitute two events (for each ordnance type), whereas the 25 mm live fire is considered a single event mission (as it is a continuous fire). The estimation of events also accounts for an unanticipated fire of the 105 mm and 40 mm explosive shells outside of the intended target

area. Accordingly, for the purposes of the noise impact analyses, the average gunnery mission, utilizing all three ordnance types will constitute a total of seven events.

In summary, the A/S Gunnery missions have been estimated to constitute a total of **844 Events** for the proposed action gunnery missions. The process used for determining the total number of A/S Gunnery operations events follows the assumptions above and the calculations in **Table SIR-3**.

**Table SIR-3. A/S Gunnery Mission Activity as Events**

Activity Description of EGTTR Events	Percentage	Number
105mm Test and Training	32.0%	270
40 mm Test and Training	65.8%	555
25 mm Test and Training	2.2%	19
Total A/S Gunnery Test and Training Events	100%	844

Source: Author Created

Eglin has submitted analyses which support a very conservative estimate of potential direct physical impacts (DPI) resulting from A/S Gunnery missions on an annual basis. The potential for direct physical impacts (either by injury or mortality) to marine mammals swimming at the surface by A/S Gunnery operation projectiles was determined to be extremely remote. An estimate of only 0.21 animals potentially struck per year represents the combined impacts to individuals of all marine mammal species potentially residing within the northern Gulf of Mexico. Particularly, the calculated number of impacts to individuals of any given species is substantially lower. For example, impacts to the most abundant population, the pantropical spotted dolphin, are only 0.051 per year. As such, no single individual of any given species is anticipated to result in any harm, as the possibility of injury or mortality is extremely remote.

Although most of the ordnance testing and training activities occur over the shelf region, for conservative impact assessments, the greatest species density estimate available for any given season (summer or winter), location (shelf or slope), or survey type (aerial or ship) was utilized. Here, densities have been totaled as cetaceans, pantropical spotted dolphin, and the sperm whale (Table SIR-4).

**Table SIR-4. A/S Gunnery DPI Metrics and Potential Impacts to Marine Species in the EGTTR**

Species	Adjusted Density (#/km <sup>2</sup> )	Impact Zone Area <sup>1</sup> (km <sup>2</sup> )	Animals in Impact Zone (#)	Events Necessary to Impact 1 Animal <sup>2</sup> (#)	Impacts <sup>3</sup> (#/Yr.)
Cetaceans	4.326	0.000079	0.000340	2,943	0.287
Pantropical spotted dolphin	1.07	0.000079	0.000084	11,900	0.071
Sperm whale	0.011	0.000079	0.000001	1,157,490	0.001

Source: Author created.

1. Impact Zone Area based on 5 meter radius around target that would contain all A/S Gunnery impacts.
2. 105 mm, 40 mm, and 25 mm represent 844 events.
3. Number of potential impacts calculated by dividing the number of events it would take to impact one animal by the number of events that occurred.

In support of this conclusion, analyses demonstrate that it would take a gunnery activity level of approximately 11,900 events, or nearly 14 times the current annual mission activity level (844 events) in order to take by injury, a single individual of the most abundant population, the pantropical spotted dolphin. The probability of projectiles from a small arms mission activity striking a marine mammal on the surface waters represents an “independent event” or occurrence. As such, the occurrence or likelihood of encountering an individual from one mission event in no way affects the probability of encountering an individual on subsequent events separated both spatially and temporally.

To demonstrate the extreme remote chance of striking marine mammals from these small arms activities, Eglin has chosen to broadly evaluate the probability of encountering any marine mammal on an annual basis. Due to these remote annual probabilities (not to mention the independence of events) for a take by injury either to a small portion (0.29) of the composite of Gulf of Mexico marine mammals, or the most abundant species (0.07), it is inappropriate for DPI analyses to consider a cumulative or additive annual estimate for the 5 year authorization.

***Direct physical impacts resulting from gunnery operations, are therefore, not likely to result in any harm (by injury nor mortality) to marine mammals.***

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**NMFS Request: (3)** Please clarify aircraft height to ensure no marine mammals, sea turtles or humans are within the 5 nm safety zone. The application does not give information other than not being very effective at 15,000 to 20,000 ft. Since it appears that the gunship flies to the site at a lower altitude (4,700 ft?), is that the "clearance" altitude for the site too? We are required to mitigate impacts to the "lowest level practicable" and as Eglin has not provided information that the standard altitude for marine mammals (1,000 ft) is not practicable, that would likely be the altitude required to ensure a clear safety zone for marine mammals. If a higher altitude is to be used, please explain capability of locating individual animals that might be within the safety or even the "flare zone."

**Eglin Response:** There does appear to be some confusion over clearance altitudes and orbits during A/S Gunnery clearance procedures, and probably stems from the difference between the daytime testing and the nighttime training mission activities. A general description of the clearance procedures are outlined in the EGTTR-LOA; Section 13 - Monitoring and Reporting Measures, pages 18-19. The following required clearance procedures for the air-to-surface gunnery testing missions (daytime) will still be followed as outlined in the December 18<sup>th</sup>, 1998 AFSOC Biological Opinion from NMFS-SERO:

“The AC-130 will conduct at least two complete orbits at a minimum safe airspeed around a prospective target area at a maximum altitude of 1500 feet, with a recommended altitude of 1000 feet. The aircraft will then continue orbiting the selected target point as it climbs to the mission testing altitude. During the low altitude orbits and the climb to testing altitude, aircraft crew will visually scan the sea surface within the aircraft’s orbit circle for the presence of listed and non-listed marine mammals. Primary emphasis for the surface scan will be upon the flight crew in the cockpit and personnel stationed at the tail observer bubble and

starboard viewing window. The AC-130's optical and electronic sensors will also be employed for target clearance. If any listed species or non-listed mammal species are detected within the AC-130's orbit circle, either during initial clearance or after commencement of live firing, the aircraft will relocate to another target and repeat these clearance procedures."

The A/S Gunnery training (nighttime) missions will follow the general description of the clearance procedures are outlined in the EGTTR-LOA; Monitoring and Reporting Measures, pages 18-19. Unfortunately, visual monitoring to detect the presence of marine mammals during gunnery training at night is not considered very effective, even if the AC-130 were to initiate with a low altitude orbit procure as identified for the daytime testing missions. Additionally, low altitude orbits (@ 1000 ft) are considerably less safe at night. Clearance procedures at the operational altitude of 15,000 to 20,000 feet are considered even less effective at night, unless there is a large herd or pod of marine mammals.

Even though the forfeit of some mission aspects may potentially improve overall mitigation effectiveness, the gunnery mission itself does not accommodate typical aerial surveying as performed by smaller aircraft. As such, Eglin has employed conservative analyses to serve as a functional mitigation technique. Eglin is committed to assessing the mission activity for opportunities to provide operational mitigations (i.e. ramping up and using nighttime training rounds) while potentially sacrificing some mission flexibility. This commitment to use the 105mm training round for nighttime training demonstrates a significant and powerful mitigation tool (Table SIR-5); with nearly a 96% reduction in potential harassment impacts to marine mammals.

**TableSIR-5. Example of Mitigation Effectiveness Using the 105-mm Training Round**

Threshold (dB)	105 mm TR (~0.3 lbs. HE)		105 mm FU (~4.7 lbs. HE)		Mitigation (Percent Reduction)	
	ZOI (km <sup>2</sup> )	Affected Animals (#)	ZOI (km <sup>2</sup> )	Affected Animals (#)	ZOI (%)	Affected Animals (%)
<b>160</b>	6.8	29.4	179.2	775.2	96	96

TR = training round; HE = high explosive; km<sup>2</sup> = square kilometers;

The risk of harassment (Level A & B) to marine mammals has been determined to be very small (EGTTR-LOA; Section 6 -Numbers and Species Taken). Eglin has determined that due to the ineffective and unsafe nature of nighttime clearance, the implementation and commitment to utilize the "operational" mitigations (EGTTR-LOA; Section 11 - Means of Affecting the Least Practicable Adverse Impacts) during the conduct of nighttime training precludes the use of nighttime visual monitoring techniques.