DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 96TH AIR BASE WING (AFMC)
EGLIN AIR FORCE BASE FLORIDA

22 JAN 2007

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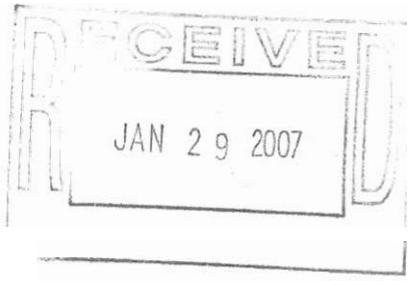


Mr. Steve Leathery
Office of Protected Resources
National Marine Fisheries Service (NMFS)
1315 East-West Highway
Silver Spring, MD 20910-3226

Dear Mr. Leathery

Eglin Air Force Base would like to request an addendum to their Incidental Harassment Authorization Request for Air-to-Surface Gunnery Missions in the Eglin Gulf Test and Training Range. Eglin would like to have these changes incorporated into the Letter of Authorization. On May 3, 2006, the National Marine Fisheries Service (NMFS) issued an Incidental Harassment Authorization (IHA) to Eglin Air Force Base for conducting air-to-surface gunnery missions in the Eglin Gulf Test and Training Range. The IHA includes a number of mitigation, monitoring, and reporting requirements. As of October 27, 2006, two missions have been attempted (one of the missions was ultimately aborted due to sea state). As a result of flying live missions, aircrews have requested revision to three components of the IHA requirements. The components are protected species surveys, ramp-up procedures, and sea state restrictions.

Protected Species Surveys – Altitude and Equipment

Currently, pre-mission surveys must be commenced at a maximum altitude of 1,500 feet (1,000 feet recommended) during the day and at 2,000 feet (1,500 feet recommended) at night. Visual scans, as well as all applicable instruments, are to be used to survey for protected species at the water surface. Aircrews have reported that these altitudes are not considered safe, and that the instrumentation used for surveys actually performs better at higher altitude.

The propeller-driven AC-130 aircraft, which is used for all air-to-surface gunnery missions, is among the largest and heaviest in the Air Force, weighing up to approximately 150,000 pounds depending on equipment configuration. If an emergency situation, such as a malfunction of one or more engines, occurred during protected species surveys, the aircraft would likely lose altitude initially. The AC-130 does not perform well with less than a full compliment of engines. At 1,000 to 2,000 feet, the pilots would have little time to recover before striking the water surface, which would result in potential human fatalities and certain loss of the aircraft. The AC-130 is

typically flown at a minimum altitude of 4,500 feet. It should be noted that amendments to the Marine Mammal Protection Act, as defined in the Defense Authorization Act of 2004, require consideration of personnel safety during military readiness activities.

AC-130 gunships are equipped with low-light television (TV) cameras and AN/AAQ-26 Infrared Detection Sets (IDS). The TV cameras operate in a range of electromagnetic radiation of 532 to 980 nanometers (visible and near-visible light), and the IDS system operates in the infrared (IR) portion of 7.5 to 11.7 micrometers. IR systems are capable of detecting differences in temperature from thermal energy (heat) radiated from living bodies, or from reflected and scattered thermal energy. In contrast to typical night-vision devices, visible light is not necessary for object detection. IR systems are equally effective during day or night use.

The AN/AAQ-26 IDS system produces a composite video signal which is displayed on a television monitor. The IDS provides imagery and accurate line-of-sight information for an operator to detect, acquire, identify, and track targets. Additional capabilities include providing imagery suitable for reconnaissance and low-level navigation. The IDS is capable of detecting very small thermal differences (the exact thermal sensitivity is classified).

Three fields-of-view (FOV) are available for the IDS. All are typically used during a mission to survey the area and acquire targets.

- Wide FOV (1.80 magnification) aides in low altitude flight, navigation, and area search, and also provides sufficient resolution to recognize typical terrain features such as roads, rivers, and bridges.
- Medium FOV (10.8 magnification) provides for immediate target area orientation and target detection.
- Narrow FOV (42.9 magnification) provides small target identification, target recognition, and precise line-of-sight angular adjustments.
- 2X (85.80 magnification) provide electronic magnification of the Narrow FOV.

The IDS provides pointing information regarding its optical line-of-sight, and features a continuous 360-degree azimuth Field of Regard (FOR) and +60 degree up-look to -105 degree down-look elevation FOR. The line-of-sight is inertial-stabilized with regard to airplane angular motions and is directed to pointing angles via programmed commands, operator commands, or position commands from the avionics systems.

IR and low-light TV systems are used during both daytime and nighttime missions (ambient light is sufficient for the TV system at night). The IDS is the primary detection system and is used during all gunship missions. Low-light TV and visual surveys are used to supplement the IDS system as appropriate. The magnification of the TV system is comparable to that of the IDS. Although the IDS is capable of detecting infrared emissions at altitudes in excess of 12,500 feet, an altitude range of 6,000 to 9,000 feet affords the optimal slant range for overall sensor performance and target orientation.

The sensor suite is considered superior to the human eye for detecting targets on the water surface, even at altitudes as low as 1,000 feet. This is particularly true for night observations. IR systems have been used to detect whales and dolphins (Baldacci et al., 2005). Although the central portion of cetacean bodies are insulated with blubber, peripheral areas such as the flukes and fins are relatively poorly insulated. These areas may be detected thermally. Also, the movement of a cetacean's body at the surface causes heat to be radiated at different angles, resulting in an apparent temperature difference that can be detected by IR sensors. Additional areas of thermal discrimination include the blowhole, the blow, and areas of water disturbance where water of different temperatures is mixed. However, high humidity, rain, fog, high waves, and whitecap conditions can decrease the effectiveness of IR detection.

Figure 1 shows examples of all FOVs for the IDS system, as an operator would see them on a monitor. All examples represent a 7.8-foot long dolphin at 6,000 feet altitude (above ground level, or AGL) and at a slant range of 8,000 feet. All four FOVs would be used during protected species surveys.

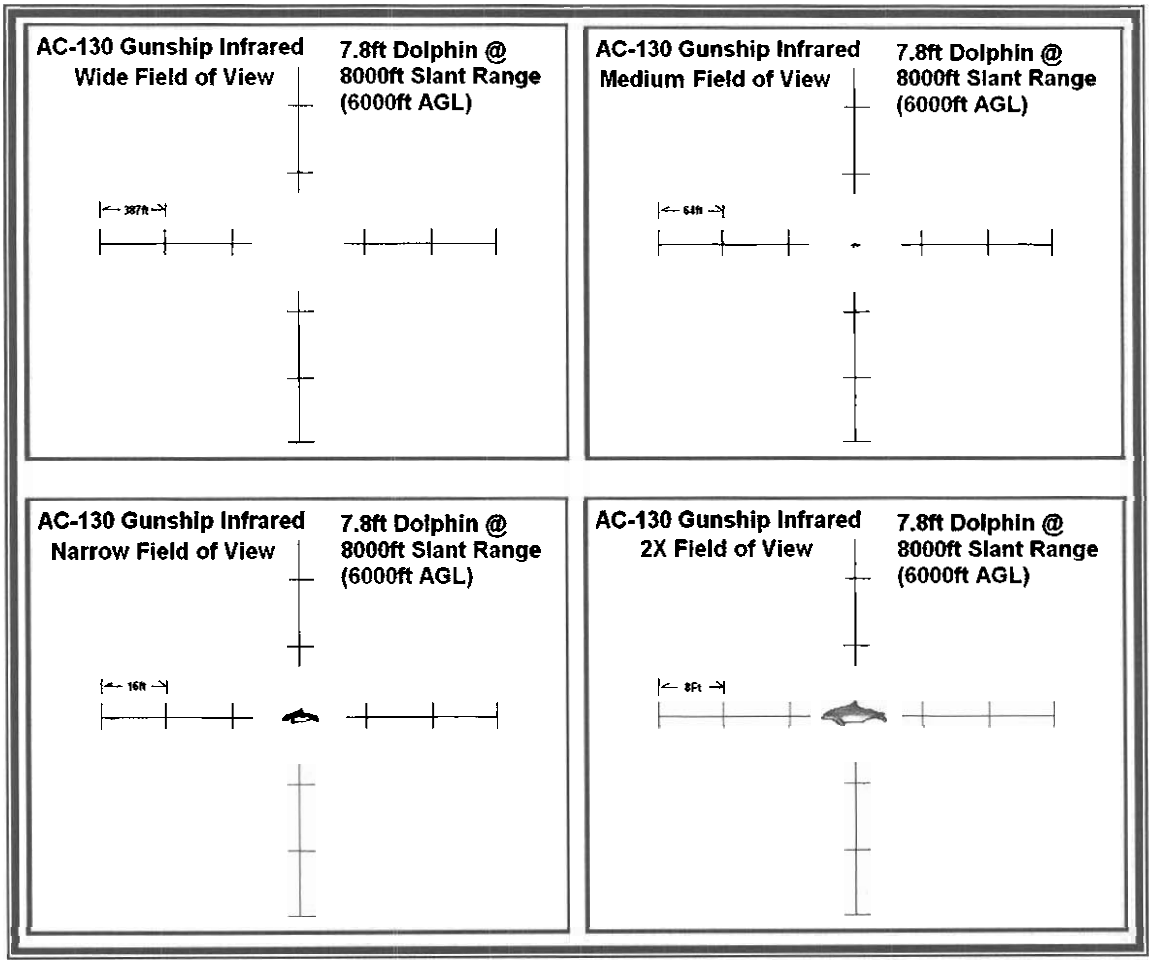


Figure 1. Examples of a Dolphin in Various AN/AAQ-26 Fields of View

Based on the above discussion, the AC-130 aircrews recommend a protected species survey altitude of 6,000 feet, using all sensors, for both day and night missions. The gunship sensor suite provides the best daytime/nighttime performance in normal weather/sea conditions at this altitude range. At lower altitudes, the sensors' area of coverage is smaller for any given field of view. In addition, the sensors' effectiveness is diminished due to magnification factors. For example, at an altitude of 1,000 feet the 2X and Narrow FOV settings would cause over-magnification, resulting in decreased ability to discriminate targets. In addition to considerations of sensor performance, a 6,000 foot survey altitude would be significantly safer than the current 1,000- to 2,000-foot range. Eglin therefore proposes the following revised protocol for protected species surveys:

AC-130 gunships would travel to a potential mission location at an altitude of 6,000 feet.

After arriving at the site, the aircrew would initiate a surface vessel and protected species survey at 6,000 feet altitude.

The aircraft would circle the target site and continue the survey for 15 minutes.

During the survey, aircrews would use the AN/AAQ-26 IDS to search the water surface for vessels and marine species. The low-light TV system would be used to supplement the IDS system. For missions conducted during daylight hours, the aircrew would visually scan the water surface as well.

- The live fire phase of the mission would not begin until the site is determined to be clear of vessels and protected species during the 15-minute survey.
- If a protected species is identified during the pre-mission survey or during the mission, or if any object besides the target is detected but cannot conclusively be identified, the mission would be paused or relocated as appropriate.
- Aircrews would conduct a post-mission survey for 5 minutes at an altitude of 6,000 feet using the IDS and low-light television systems and, for daytime missions, visual scans.

Eglin considers that the protocol described above would provide effective mitigation to the risks posed to protected species during air-to-surface gunnery missions. Sensor-based observation effectiveness at 6,000 feet altitude is considered superior to visual survey effectiveness at 1,000 feet altitude.

Ramp-up Procedures

The IHA stipulates that ramp-up procedures are to be used during air-to-surface gunnery missions. This process involves beginning with the smallest round, which has the least impact, and proceeding to subsequently larger size rounds. The rationale is that this process may allow animals to perceive steadily increasing noise levels and to react, if necessary, before the noise reaches a threshold of significance.

The gunships' weapons are used in two phases. First, the guns are checked for functionality and calibrated. This step requires an abbreviated period of live fire, after

the guns are determined to be ready for use, the mission proceeds under various test and training scenarios. This second phase involves a more extended period of live fire and can incorporate use of one or any combination of the munitions available (25-, 40-, and 105-milimeter rounds). The IHA is somewhat ambiguous regarding whether the ramp-up procedure is required only for the first (calibrating) phase or throughout the entire mission.

Eglin proposes that the ramp-up procedure be required for the initial gun calibration, and that after this phase the guns may be fired in any order. Eglin believes this process complies with the intent of the ramp-up requirement. Marine species will have opportunity to respond to increasing noise levels. If an animal leaves the area during ramp-up, it is unlikely to return while the live-fire mission is proceeding. This protocol would allow a more realistic training experience. In combat situations, gunship crews would not likely fire the complete ammunition load of a given caliber gun before proceeding to another gun. Rather, a combination of guns would likely be used as required by an evolving situation. An additional benefit of this protocol is that mechanical or ammunition problems on an individual gun can be resolved while live fire continues with functioning weapons. This diminishes the possibility of a lengthy pause in live fire which, if greater than 10 minutes, would necessitate re-initiation of protected species surveys.

Sea State Restrictions

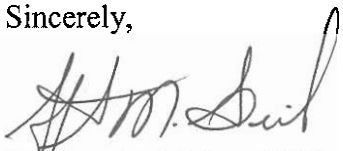
The IHA currently states that air-to-surface gunnery missions are to be conducted only in sea state of 3 or less on the Beaufort scale. A sea state of 3 or less, with a maximum wind speed of 10 knots (11.5 miles per hour) which is considered a gentle breeze, is fairly common off the Gulf coast of Florida; however, a large portion of time can be categorized as a sea state of 4 [11-16 knots (13-18 miles per hour) which is considered a moderate breeze]. Therefore, the availability of the Eglin Gulf Test and Training Range for gunship use is limited during anything over sea state 3 especially during the winter.

Eglin proposes for gunship missions to be allowed in sea states up to 4 on the Beaufort scale. This sea state encompasses wind speed up to a maximum of 16 knots (18 miles per hour). Under these conditions, whitecaps are fairly frequent on the sea surface, but sea spray does not occur. Sea spray, whitecaps, and large waves can decrease the effectiveness of IR detection. However, missions are not conducted if such conditions make observation of the target problematic. It is expected that marine species can be observed in weather conditions that allow observation of the target flare. Wave height is difficult to determine from the air, particularly at night. Therefore, Eglin proposes that wind speed, as provided by accepted forecasting outlets such as the National Weather Service, be considered the determining factor for weather restrictions.

Literature Cited

Baldacci, Alberto, Michael Carron, and Nicola Portunato. December 2005. Infrared Detection of Marine Mammals. NATO Undersea Research Centre. Technical Report SR-443. The Journal of Experimental Biology 202, 2763-2769 (1999).

Sincerely,



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