



UNITED STATES DEPARTMENT OF COMMERCE
 National Oceanic and Atmospheric Administration
 NATIONAL MARINE FISHERIES SERVICE
 NORTHEAST REGION
 One Blackburn Drive
 Gloucester, MA 01930-2298

FEB 27 2004

Mr. Joel Mitchell
 Environmental Engineer
 National Aeronautics and Space Administration
 Goddard Space Flight Center
 Wallops Flight Facility
 Wallops Island, VA 23337-5099

Dear Mr. Mitchell:

The National Marine Fisheries Service (NOAA Fisheries) has reviewed your letter dated February 2, 2004, which requests initiation of consultation pursuant to section 7 of the Endangered Species Act of 1973 (ESA), as amended, on the National Aeronautics and Space Administration's (NASA) use of an airborne laser to measure primary productivity potential and chlorophyll and phycoerythrin fluorescence of phytoplankton in coastal and estuarine waters along the mid-Atlantic Bight. Along with the letter, NASA submitted a complete project description and analyses of the laser's effects on marine mammals and sea turtles.

The activity under consultation is associated with the Estuarine Habitat Project (EHP), a joint program between NASA's Goddard Space Flight Center (GSFC) and NOAA's Center for Coastal Fisheries and Habitat Research. EHP is designed to explore the potential of an airborne laser and a passive spectroradiometer for measuring chromophoric dissolved organic matter (CDOM) and phytoplankton chlorophyll and phycoerythrin pigments in coastal and estuarine water masses. The experiments involve the use of an Airborne Oceanographic Lidar (AOL) Big Sky CFR 400 laser operated at full power from a NOAA Twin Otter aircraft to measure chlorophyll fluorescence under fully light-saturated conditions while a second laser transmitter will be operated at varying reduced levels to measure chlorophyll fluorescence under partially light-saturated conditions. A total of 50 hours of flight time per year are scheduled to take place during two windows, one in early March to mid-April and the other from October through mid-November, which are set to coincide with annual phytoplankton blooms along the east coast. During the spring bloom (approximately six weeks), satellite validation missions will be conducted on all clear days. These flights would include missions flown out of the GSFC's Wallops Flight Facility (WFF) over coastal, shelf, slope, and Gulf Stream waters as well as missions over the Pamlico and Albemarle Sounds. The fall flight window has similar objectives as the spring mission, and will also investigate the utility of the AOL sensor suite to identify, delineate, and potentially measure harmful algal blooms within the Chesapeake Bay. These surveys are ongoing, and are expected to take place over multiple years.

The following federally endangered and threatened species may be present in the area during the proposed timeframes: leatherback (*Dermochelys coriacea*), loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempii*), green (*Chelonia mydas*), and hawksbill (*Eretmochelys imbricata*) sea turtles; and North Atlantic right (*Eubalaena glacialis*), humpback (*Megaptera novaeangliae*), fin (*Balaenoptera physalus*), sei (*Balaenoptera borealis*), and sperm (*Physeter macrocephalus*) whales.

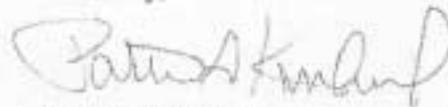


The density of energy in the laser spot on the sea surface has been calculated as 1.7×10^4 Joules/cm², which is much lower than the maximum permissible energy (MPE) threshold for human skin damage (2×10^2 J/cm²). The laser would therefore need to be 118 times more intense to harm human skin ($.02 \text{ J/cm}^2 / .00017 \text{ J/cm}^2 = 117.6$). There has been no research conducted on the threshold for marine mammal or marine turtle skin damage. However, even if marine mammal or sea turtle skin were more sensitive than human skin, it could be 100 times more sensitive than human skin and still suffer no damage from the laser (J. Churnside, pers. comm. to Joel Mitchell). Therefore, the only anticipated effect of the laser would be the effect of radiation on the eyes of marine species. However, a significant effect of radiation upon a marine mammal or turtle eye exposed to a laser beam would only occur if the eye is directed toward the zenith of the laser source such that the laser image is focused on the retina. The diameter of the laser spot on the water surface is only 30 cm. As such, the probability of a marine mammal or sea turtle staring directly into the laser beam is discountable considering the diameter of the beam, the limited number of flight hours (50 hours/year) and the density of marine species in the action area. In addition, the energy of the beam is expected to diminish to levels below the ocular damage threshold for marine mammals with mean eye sensitivity at a depth of 3.0 m in clear ocean waters and 1.5 m for coastal waters of the Chesapeake Bay. The NOAA Twin Otter will be flying at an altitude of 150 m and a speed of 120 knots, which are within the ranges appropriate for marine mammal and sea turtle aerial surveys, and AOL surveys are only carried out in cloudless conditions. NOAA Twin Otter pilots and co-pilots are familiar with sighting marine mammals and sea turtles under these conditions, and will be scanning the water ahead of the aircraft. If an animal is sighted, it can easily be avoided by maneuvering the aircraft or blocking the laser beam with a shutter, which can be closed within 1-2 seconds.

Upon consideration of the above information, due to the low likelihood of the laser beam directly encountering a marine mammal or sea turtle eye, NOAA Fisheries has concluded that the proposed use of the AOL laser system is not likely to adversely affect federally endangered and threatened species under NOAA Fisheries' jurisdiction. As such, no further consultation pursuant to section 7 of the ESA, as amended, is required for this action. Should project plans change or new information become available that changes the basis for this determination, consultation must be reinitiated.

Thank you for your cooperation during this consultation. If you have any further questions or comments, please contact Kristen Koyama at (978) 281-9328 ext. 6531.

Sincerely,



Patricia A. Kurkul
Regional Administrator

Cc: Scida, NER3
Williams, GCNE

File Code: Section 7 NASA