



United States Department of the Interior



U.S. FISH AND WILDLIFE SERVICE

The U.S. Fish and Wildlife Service's Process for Telemetry Attachment on Nesting Sea Turtles and Sea Turtles Housed in a Rehabilitation Facility

This document provides the process and conditions for the use of telemetry transmitters for all species of nesting sea turtles and sea turtles being released from a rehabilitation facility in the United States under the authority of a U.S. Fish and Wildlife Service (Service) permit pursuant to section 10(a)(1)(A) of the Endangered Species Act of 1973, as amended.

Approval Process and Considerations

An investigator or facility proposing to attach an animal-borne electronic device (e.g., dataloggers, transmitters, electronic tags, cameras) to a nesting sea turtle or to a sea turtle housed in a facility due for release must obtain a Service permit or a modification to their current rehabilitation permit. Applications should be submitted prior to obtaining/capturing the sea turtle(s).

For Rehabilitation facilities: A permit application may be submitted if the facility intends to conduct telemetry attachment. The permit application should include the project purpose and goal (see Project Specific Information below). Size, species, and tagging specific information may not be available at the time of the application. This information will be provided to the Service on a case by case basis 10 days prior to the proposed attachment. The Service will evaluate the risk to the rehabilitated sea turtle and the conservation benefit and provide a response within 5 days as to whether the activity falls within the scope of their permit.

Application Requirements

The following information must be submitted with the telemetry attachment permit application. This information will be used to evaluate the benefit to the conservation of the species in the wild versus the additional energy cost to that specific animal as a result of the attached device. The proposal must contain the following information:

Project Specific Information:

- Describe the project purpose and goal.
 - Include information on whether the goal is to determine migration, behavior, rehabilitation-specific treatment outcomes, and/or identification of habitats used.

- Identify the benefit to the conservation of the species in the wild, including specific Recovery Actions identified in the species' Recovery Plan.
 - Include how the transmitter information will help identify appropriate conservation management actions for recovering sea turtle populations by understanding their migration routes, distribution, habitat use, and resource requirements, or other important biological information.
 - Include information obtained from any previous tagging event(s), and information needs/gaps to be addressed by the proposed tagging.
 - If the benefit is solely outreach, provide information on the specific threats that will be highlighted and conservation needs that would be addressed for that species, and explain how information will be disseminated.
- Provide information, referencing peer-reviewed literature, on the estimated duration of transmitter attachment. Include details on any specialty tags that will be used (e.g., animal-borne cameras) that are not intended to stay on the animal for long periods. For instance, an animal-borne camera secured via suction cups is typically designed to pop-off after 72 hours.
- Provide information, referencing peer-reviewed literature, showing that the telemetry device chosen has the smallest footprint available that will meet the purpose of the study.
- Provide information on whether an attempt to recapture the turtle will be made. If so, describe the method of recapture. Additional authorization may be required if recapture is intended.
- Describe the species, approximate size (include age or size class), and weight of the turtle(s) proposed for telemetry tagging. If the turtle entered the facility for treatment as a result of stranding, include the stranding form and details regarding current anomalies (physical and behavioral) for which the turtle was treated.
- Specify the size and weight of the transmitter (in air) proposed for the turtle(s). The total combined weight of all transmitters and all combined adhesives must be less than 5 percent of the turtle's body mass.
- Detail the method of attachment including location on carapace.
- Provide information about the individual(s) who will be performing the attachment, including their contact information, and a resume that includes a history of their experience with attaching animal borne devices, including the specific device and species.
- Provide information on timing and location of release. If the turtle is housed in a facility, the turtle must be released within two weeks of being medically cleared (Note: If this timeframe is expected to be longer, contact the Service immediately to coordinate the projected timing of release). Nesting turtles must be released from the

beach they were encountered. Rehabilitated turtles must be released near the site where the turtle stranded or in an area where that species and size class is found based on stranding data and peer-reviewed literature. The release location must be reviewed and approved by the Service's Sea Turtle Coordinator in coordination with the Sea Turtle Stranding Coordinator for that State.

- Describe how the transmitter data will be analyzed.
- For sea turtles housed in a facility, a letter from the on-site veterinarian stating that the attachment of the transmitter will not compromise the health of the turtle is required.
- If applicable, provide a copy of the research authorization from your facility's or institution's Animal Care Committee.

The release of the sea turtle must not be delayed to obtain permits or to facilitate the attachment of a device. The attachment of a telemetry device on sea turtles has the potential to negatively impact the natural behaviors of the sea turtle (Watson and Granger, 1998; Wilson and McMahon 2006; Godley et al. 2008; Sherill-Mix and James 2008; Jones et al. 2013). The energetic cost of carrying telemetry transmitters and the effects to the animal's behavior, ecology and physiology will be considered when considering permit requests.

Because the Animal Welfare Act addresses only mammals, the Service has had to rely on its experience and consulting with experts in the field in order to advise on healthful and humane measures for telemetry attachment on sea turtles that would meet the intent of our regulations.

Individual Sea Turtle Information:

In order to conduct an assessment of the expected or possible impacts to the sea turtle as a result of the transmitter attachment, the following information must be provided:

- Information on the increase in drag of the satellite transmitter, calculated as below, adapted from Jones et al. (2013):
 - a. Measure the Frontal Area (FA) of the tag as width (cm) multiplied by height (cm). FA includes the height and width of the attachment including the adhesive material. Antenna area can also be added to estimate total FA of the tag. Add an additional 10–15 cm² if the antenna does not bend backward when the turtle is swimming (Jones et al. 2011).
 - b. Identify the shape (square, rectangular, or tear drop shaped) of the tag.
 - c. Match the FA of the tag on the y-axis in Figure 1 below.

- d. Continue along the x-axis until reach the Straight Carapace Length (SCL) of the turtle.
- e. The drag must be less than 5% (Figure 1). The lower the drag, the closer the study will mimic natural conditions with less impact to the animal.

If the drag is between 5% and 10%, the Service will conduct a risk assessment on the increase in the sea turtle's annual energy output using the following information: size of the turtle; life history of species, life stage of passive or active swimming (including predator avoidance), length of time the transmitter is expected to stay on the animal, expected migration patterns, foraging behavior, and time held in rehabilitation facility (if applicable). The risk assessment will include the specific Recovery Actions that apply to the project and are identified in the species' Recovery Plan, size of the turtle; life history of species, life stage of passive or active swimming (including predator avoidance), length of time the transmitter is expected to stay on the animal, expected migration patterns or residential location, and foraging behavior.

If the drag is more than 10%, or the size of the turtle is smaller than 30cm SCL for loggerheads, greens, hawksbills, Kemp's ridley, and olive ridley sea turtles; 50cm SCL for leatherbacks, the Service will conduct a risk assessment as this increase in drag can pose a substantial impact to the animal. The risk assessment will include the specific Recovery Actions that apply to the project and are identified in the species' Recovery Plan, size of the turtle; life history of species, life stage of passive or active swimming (including predator avoidance), length of time the transmitter is expected to stay on the animal, expected migration patterns or residential location, and foraging behavior. If it is found that the attachment of the telemetry device will substantially impact the animal during a crucial behavior for that life stage, the permit will not be approved.

For short-term, pop-off/retrievable attachments (tags that are expected to stay attached to the turtle for less than 1 month), additional information on the automatic detachment (e.g., a burn wire, zinc fittings, or suction cups) and the high probability of recapture (e.g., nesting turtle, high fidelity foraging ground) is needed to make our assessment.

Turtles that have been housed in a facility for more than 6 months may have lost a significant portion of their muscle mass. Loss of muscle mass will be considered when assessing the risk to the turtle particularly those that are expected to migrate long distances as determined by their size class.

Once the information listed above is reviewed and approved by the Service and the Sea Turtle Stranding Coordinator (if applicable) to weigh the risk to the animal versus the benefit to the recovery of the species in the wild, the Service's Standard Permit Conditions for Telemetry Attachment must be followed.

The Service's Standard Permit Conditions for Telemetry Attachment

Nesting sea turtles must not be removed from the beach to attach the device. An exception will be considered if the risk to the nesting sea turtle is greater if the attachment occurs on the nesting beach. In this case, justification must be provided with an explanation of the risk to the animal along with specific protocol for transport, holding location, holding times, and release times.

NOTE: Telemetry devices and attachment material selection and protocol should first use best available, current published methods, especially with regard to risk for thermal injury. Products not previously used for animal attachment should be tested (including monitoring of temperature) by mock application prior to use on sea turtles.

1. The FA of the tag must be minimized and the tag must have a low profile.
2. The tag must be streamlined and cover as small of an area on the sea turtle as possible.
3. The antenna length and diameter must be minimized to reduce risk of entanglement and/or drag.
4. The tag must not be placed at the peak height of the carapace. Place tags slightly anterior or posteriorly to the peak where uplinks will be maintained and the salt water switch will still be exposed to the air during breathing but the FA is minimized, as well as exposure to the incoming fluid flow rate.
5. Adhesives, use of base plates, and building up of adhesive material should be minimized.
6. Total combined weight of all transmitter attachments and combined adhesives must not exceed 5% of the animal's body mass. NOTE: Up to 2 transmitters (e.g. one sonic tag and one radio tag) may be placed on an animal at one time if the risk has been reviewed and assessed by the Service.
7. Drag must be less than 5% to avoid altering natural turtle behavior and additional stress.
8. Drag between 5% and 10%, approval will be based on the assessment of the increase in the sea turtle's annual energy output and the benefit to sea turtles in the wild (as described above). If the drag is more than 10% or the size of the turtle is smaller than 30cm SCL for loggerheads, greens, hawksbills, Kemp's ridley, and olive ridley sea turtles or 50cm SCL for leatherbacks, approval will be based on the risk assessment (as described above). If it is found that the attachment of the telemetry device will substantially impact the animal during a crucial period for that life stage, the permit will not be approved.

NOTE: If the drag is more than 10% and the conservation benefit is solely for educational purposes, the permit will not be approved based on the high risk to the animal and the availability of other methods of educational outreach.

9. Each attachment must be made so that there is minimal risk of entanglement. The transmitter attachment must contain a weak link (where appropriate) or have no gap between the transmitter and the turtle that could result in entanglement. For tethered instruments, the lanyard length must be less than half of the turtle's carapace length. It must include a corrosive, breakaway link that will release the unit after its battery life.

10. Adequate ventilation must be provided around the head of the turtle during the attachment of transmitters if attachment materials produce fumes. Turtles must not be held in water during application to prevent skin or eye contact with harmful chemicals.
11. For hard-shelled turtles, procedures for drilling through marginal scutes must follow aseptic techniques with two alternating applications of medical disinfectant (e.g., Betadine, Chlorhexidine) followed by 70% alcohol. A separate drill bit must be used for each turtle. Bits may be reused if sterilized by autoclave or cold sterilization (e.g., gluteraldehyde) before reuse. Similar aseptic protocols must be used for direct attachment of devices to leatherbacks, with sterilized drill bits used for each turtle.
12. The use of “smart” pills or other devices intended to be ingested and passed or otherwise retrieved must be used according to a veterinary-approved protocol that includes the minimum size of sea turtle to be used and clear explanation of safety relative to body size and monitoring of transmitter, and anticipated risk for obstruction.

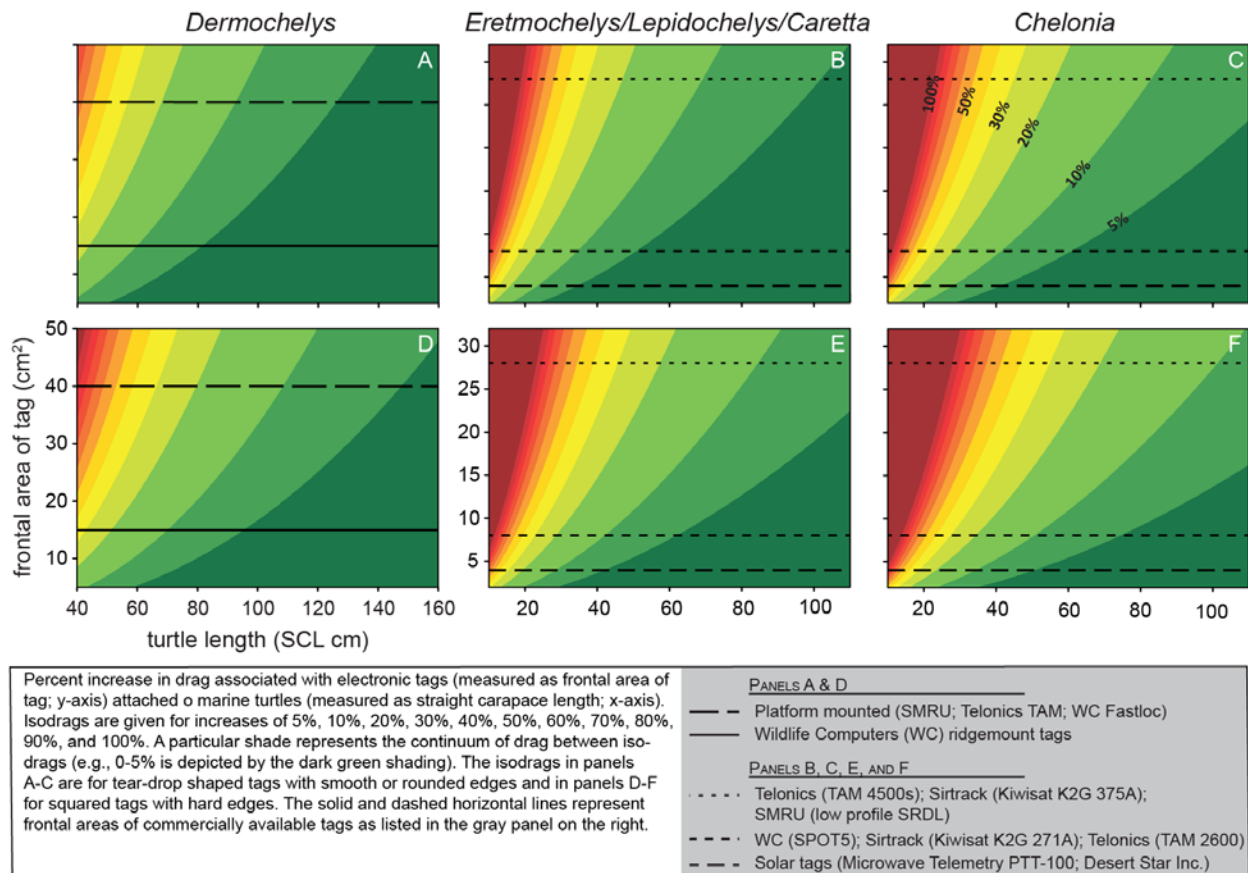


Figure 1. Percent increase in drag

Reporting:

Upon completion of the project (but no less than once every five years), the permit holder must submit a final report to the Service, within 90 days, summarizing the following:

- a. A title that matches the original title of the tagging proposal and report sections for introduction, methods, results, discussion, and literature cited.
- b. Beginning and end dates of study.
- c. Sea turtle stranding information as appropriate.
- d. Photograph of sea turtle with telemetry device.
- e. Number and type of tags deployed.
- f. Release site for the turtle(s).
- g. Tag duration.
- h. Species and size class.
- i. Results of the study, analysis of data, summary of tagging methodology including any recommendations for future attachments, and success of the research relative to its goals.
- j. Provide a summary of the observed impacts of the tag unit to the animal. Include physical impacts observed at the time of tagging and any abnormal behavior after release or as revealed in tag data.