

## **Surgical and husbandry techniques for Red-throated divers marked with implantable transmitters and example of surgeries performed in Lithuania**

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Satellite telemetry has been used in many studies around the world to learn more about breeding, molting and wintering areas of diving birds. During these projects ~ 1800 diving birds of at least 12 species were implanted with the transmitters.

In Lithuania, Red-throated divers were studied along with Velvet Scoters and Long-tailed ducks as a part of the EU LIFE+ funded DENOFLIT project, with the aim to investigate their movements off the Lithuanian coast of the Baltic Sea during the wintering period. The divers were captured on wintering grounds 0.5-2 km off the coast of Lithuania using the night lighting technique. The captured divers were transported in well ventilated animal travel crates and cardboard boxes to a veterinary clinic ~20 km away for surgery. The surgery procedure was adopted from veterinarians at the USGS-Patuxent Wildlife Research Center.

PTT-100 transmitters manufactured by Microwave Telemetry were surgically implanted into the bird's abdominal cavity to right abdominal air sac, following general anesthesia using isoflurane gas for both induction and maintenance. In some cases divers were additionally premedicated with Xylazine and Ketamine. Two types of transmitters were used: larger ones measured approximately 6×3.5×1.5 cm and weighed 46 g, while smaller units measured 4.5×2×2.5 cm and weighed 31 g. Transmitters were made to withstand pressure at depths of up to 30 m.

The transmitter's 20 cm antenna exited the skin laterally to the sacral vertebrae. The transmitters used in this study were with no abrupt edges and were additionally dressed with nylon mesh. After the surgery divers were spritzed bupivacaine as an analgesic to the incision place.

After the surgery divers were injected with fluids and carefully washed with water and dried. Birds were kept for ~1 h in crates at a room temperature for recovery. The next 3-7 hours before the release, divers were kept at a temperature of +1 - -4 °C. After the sunset birds were force-fed with small fish and released from the seacoast, close to the capture site.

In 2012-2013 transmitters were implanted to 9 divers, 6 of them survived longer than 1 month, 1 bird survived about 10 days, and two birds produced no signals. Five divers were successfully tracked for over 6 months from the wintering areas to the breeding grounds.