

Effects of Surgically Implanted Transmitters with Percutaneous Antennae on Breeding Behavior of Captive Seaducks and Lesser Scaup

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Instrumented incubating female lesser scaup.

Captive White-winged Scoters (*Melanitta fusca*; WWSC), Surf Scoters (*Melanitta perspicillata*; S USC), and Long-tailed Ducks, (*Clangula hyemalis*; LT DU). at Patuxent Wildlife Research Center in Laurel, Maryland, USA, were instrumented with 26 g and 39 g dummy PTT-100 transmitters (Microwave Telemetry, Inc. to determine the long-term influence of surgically implanted satellite transmitters. Lesser Scaup (*Aythya affinis*; LESC) were also used as surrogates for seaducks due to their known ability to produce large numbers of eggs in captivity. All ducks were paired by “free-pair bonding” in pens with 4-7 ducks each and then individual pairs were placed in separate pens. Pairs were randomly selected for instrumentation or for control. Instrumentation was conducted in a veterinary hospital at Patuxent and controls were handled similarly except for surgery. Females were instrumented for all species except for S USC where males were used due to low sample size of females.

Behaviors were recorded by observers outside of pens during the 2007 and 2008 breeding season (April-June) for LESC and in 2008 (April-June) for WWSC and S USC. No differences ($p > 0.05$) between the instrumented and the control ducks were detected for major groups of behaviors for WWSC and S USC (Table 1). However, there were differences for LESC for reproductivity between controls and both groups of ducks with transmitters during spring (2008) (Table 1). Differences were mainly due to increased incubation for controls

Behavior	WWSC		S USC		LESC		
	39 g	Ctr.	39 g	Ctr.	26 g	39 g	Ctr.
Reproductivity	1	1	2	0	8	5	38
Foraging	4	6	6	11	5	7	4
Inactivity	33	33	13	15	37	28	28
Locomotion	6	9	4	6	11	14	5
Maintenance	27	28	34	28	14	14	7

Table 1. Behavior of instrumented white-winged scoters, surf scoters, and lesser scaup in comparison to controls, April – July, 2008.



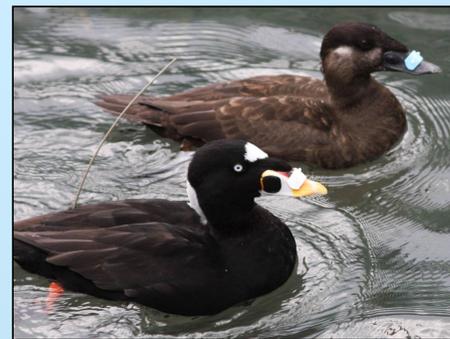
Dried, shell-less WWSC egg



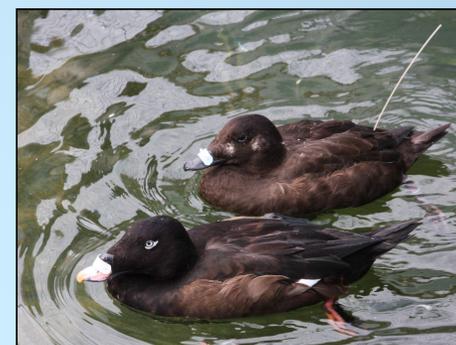
Instrumented captive LT DU diving.



Duck diving in dive tank to test foraging behavior of instrumented ducks.



Instrumented male S USC with female.



Instrumented female WWSC with male

In 2007, control LESC females laid 8.2 eggs per duck and instrumented females laid 3.8 eggs per duck. The instrumented ducks laid 16 malformed eggs, whereas no malformed eggs were laid among control ducks. In 2008, control ducks laid 8.7 eggs per duck, whereas ducks with 39 g transmitters laid 7.0 eggs per duck and those with 26 gram transmitters laid 7.3 eggs per duck (Table 2). Ducks with 39 g transmitters laid 15 malformed eggs and ducks with 26 gram transmitters laid 10 malformed eggs. No malformed eggs were laid by controls.

Statistical analyses on the length, width, and weight of eggs indicated that there were differences ($p < 0.05$) between the instrumented and control ducks. Some of the malformed eggs were not measured because they were crushed or had no eggshell. Transmitter position near the oviduct appeared to be affecting the shape of the egg, but size of transmitter did not appear to be a factor in causing the malformed eggs, as number and degree of malformed eggs was similar for both groups of ducks with 39 or 26 gram transmitters.

An unexpected finding was that one of the five female Lesser Scaup ejected the 39 g dummy transmitters through a hole in the skin at antenna site, and another female has partially ejected the transmitter. Surgical attachment has been modified to prevent loss of transmitter.



Malformed eggs with normal egg in middle.



Rubbery, elongated egg with normal egg (right).



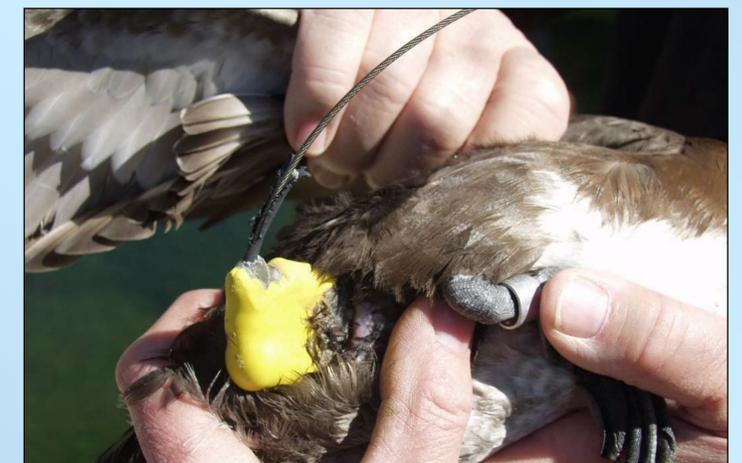
Instrumented lesser scaup female with young.

Other species that were tested with dummy transmitters did not produce eggs in sufficient quantities to provide adequate data. The effect of instrumentation on diving and foraging behavior is being tested in large dive tanks, and preliminary data indicate no differences between control and instrumented ducks. Modifications of the implantation techniques have been made and are presently being tested on diving ducks in Nantucket Sound and in Argentina.

	Total/Mean Eggs Laid	Ave. Length (mm±1SD)	Ave. Width (mm±1SD)	Ave. Weight (g±1SD)
2007 - Control (n=5)				
	41/8.2	55.7±1.8	39.7±1.0	48.3±4.1
2007 - Instrumented (39 g) (n=5)				
	19/3.8	58.3±3.2	38.3±1.4	45.2±6.2
2008 - Control (n=3)				
	26/8.67	55.7±1.8	39.6±0.8	46.3±5.8
2008 - Instrumented (39 g) (n=5)				
	35/7.00	57.4±2.4	39.8±2.1	47.2±9.4
2008 - Instrumented (26 g) (n=4)				
	29/7.25	59.8±2.8	39.6±1.4	50.7±6.3

Table 2. LESC egg production and measurements spring 2007 and 2008.

Acknowledgements: Marie Brady, Betsy Elkinton, Tara Frankish, Maria Gutierrez, Peter Osenton, and Steve Noyes provided numerous hours of behavioral observations and also monitored egg production. Some photographs were provided by C. Bond.



Transmitter being ejected from female lesser scaup.