

WLF 419 - Waterfowl and Wetlands Ecology and Management

Lecture 6 - Nesting and Incubation

Next Time - Brood Care

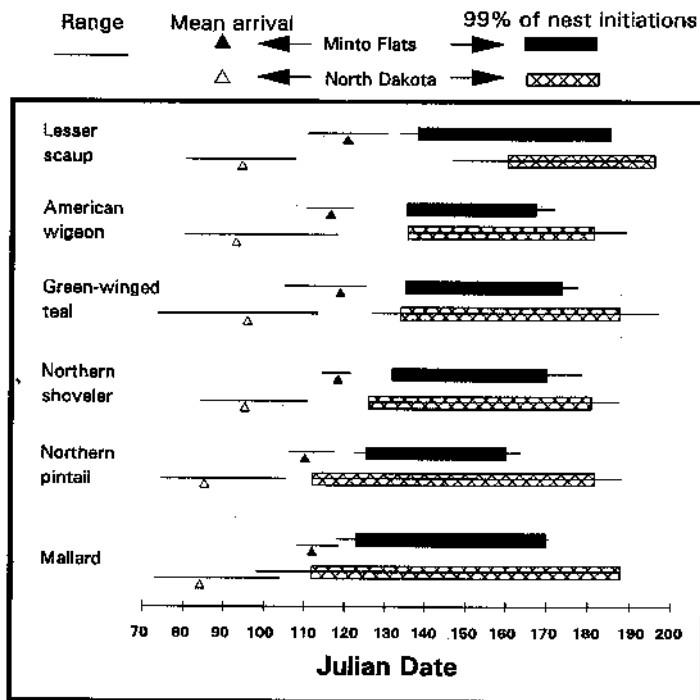
Incubation - Heat necessary for embryonic development is applied to an egg after it has been laid

- ! 3 Main components
 - " Embryonic Development
 - " Metabolic Requirements of Parents (Female)
 - " Predation on Eggs and Parents

- ! Terms
 - " Sessions - period spent of nest by parents
 - " Recesses - period spent off nest by parents
 - " Incubation Constancy - Average time spent on the nest
 - " Incubation Period - time from the laying of the 1st egg to hatch

- ! Nest-site selection?
 - " Upland
 - Most dabblers and pochards
 - Some sea ducks
 - Swans and geese
 - Nest success and cover
 - " Cavity
 - Wood Duck, Hooded Merganser, Goldeneyes, Bufflehead, Whistling Ducks
 - " Overwater
 - Canvasback, Redhead, some dabbling ducks
 - " Nest structures
 - Boxes
 - Tubs
 - Platforms

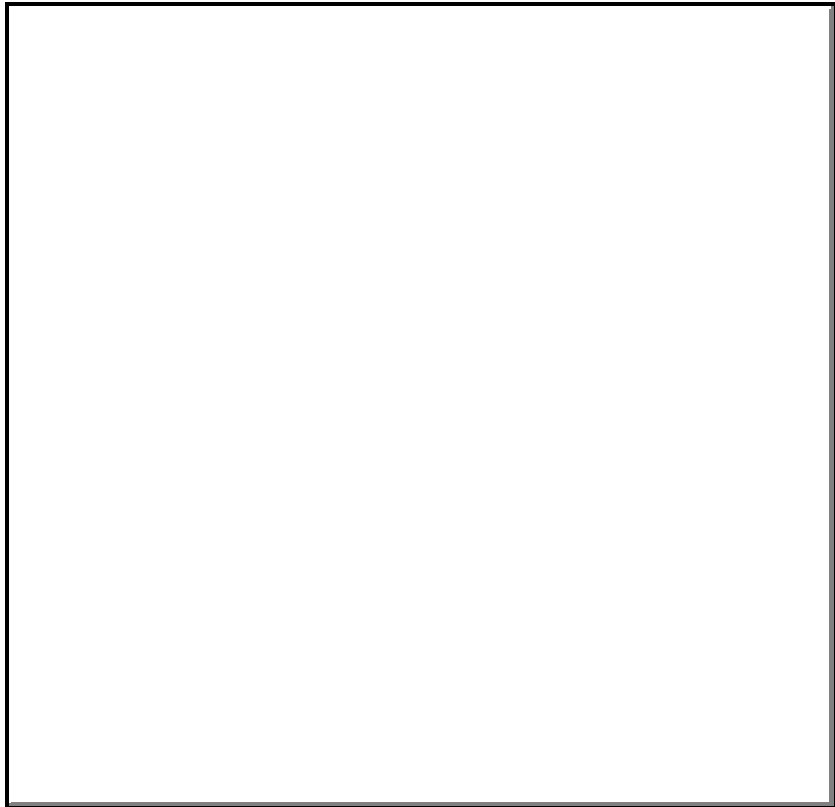
- ! Timing of Nest
 - " Relationship to population dynamics
 - Inter- and Intra-specific variation
 - " Latitudinal variation
 - " renesting (boom or bust for northern nesting species)



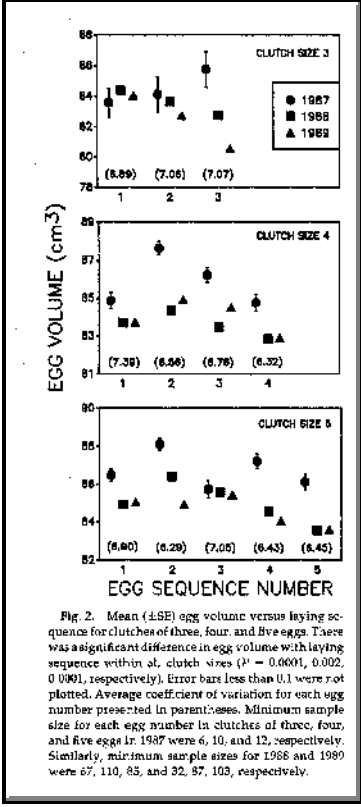
From Petrula (1994)

! Start of Incubation

- " At end of laying?
 - Synchronous hatching
- " Before the completion of clutch
 - Egg viability
 - Maintain synchronous hatching?
 - # Inter-egg vocalization
 - # Egg size/nutrient pattern
- " Incubation constancy increases as laying progresses



From Cooper (1978)



From Flint and Sedinger (1992)

- ! Incubation Strategies
 - " Shared Incubation
 - Magpie Geese (pairs and trios)
 - Whistling Ducks
 - Black Swans
 - # Other Swans?
 - " Female-only incubation
 - Most Common
 - " Parasitism
 - Intra- and Inter-specific

Table 9-1. Summary of the Known Occurrence of Brood Parasitism in Waterfowl of the World^a

Tribe	Number of species			
	Not reported	Infrequent	Occurs	Probable
Anseranatini	-	-	1	-
Dendrocygnini	-	-	6	3
Anserini	11	4	3	4
Cereopsini	1	-	-	-
Stictonettini	-	-	-	1
Tadornini	7	-	4	3
Tachyerini	-	3	-	1
Cairinini	-	-	3	10
Merganettini	1	-	-	-
Anatini	24	7	6	2
Aythiini	1	-	10	4
Mergini	3	7	7	1
Oxyurini	-	-	8	-
Total	48 (33%)	21 (14%)	48 (33%)	29 (20%)

^aSee Appendix for the occurrence of brood parasitism by species. Tribal classification follows Johnsgard (1978).

From Sayler (1992)

! Embryo Requirements

" Thermal Environment

- body heat transferred from parents via. brood patch
- Internal egg temp range (31 - 39N C) - 22 species
- Much larger range of nest temperatures
- # Importance of egg position in nest
- # Rotation of egg

" Gaseous Environment

- Humidity

! Parents

" Incubation constancy averaged 88.1% (58 species)

" Factors

- weather
- body size (intra- and inter-specific)
- predation
- # Ground vs upland strategies

" Cost

- starvation
- body size

" Incubation length

- 21 to 37 days
- body size

Table 3-9. Summary (mean \pm SE) of incubation rhythm components in various groups of waterfowl

Group	Incubation constancy (%)	Recess time/d (min)	Recess freq./d	Recess duration (min)
Swans	84.3 \pm 3.3 (3;7) ^a	226 \pm 47 (3;7)	4.5 \pm 0.8 (3;5)	54 \pm 27 (3;5)
Geese	95.1 \pm 1.2 (7;17)	70 \pm 17 (7;17)	3.0 \pm 0.9 (5;14)	19 \pm 1 (5;14)
Ducks	85.4 \pm 1.0 (24;34)	210 \pm 15 (24;34)	2.7 \pm 0.3 (21;29)	80 \pm 8 (21;28)
<i>Anas</i> spp.	86.0 \pm 1.4 (11;16)	202 \pm 19 (11;16)	2.2 \pm 0.2 (9;13)	88 \pm 10 (10;14)
Diving ducks ^b	84.2 \pm 1.7 (11;16)	227 \pm 24 (11;16)	3.5 \pm 0.5 (10;13)	70 \pm 13 (10;13)
Aythiini	84.1 \pm 2.5 (5;6)	229 \pm 36 (5;6)	4.2 \pm 0.7 (5;5)	55 \pm 9 (4;4)
Mergini	86.7 \pm 2.6 (4;7)	191 \pm 37 (4;7)	2.4 \pm 0.5 (4;7)	97 \pm 23 (4;6)

^a(No. of species; No. of studies); estimates of mean and SE based on No. of studies

^bIncludes Aythyini, Mergini, and Oxyurini.

From Afton and Paulus (1992)

- ! Hatching
- " pipping
- " emergence and drying
- " brooding

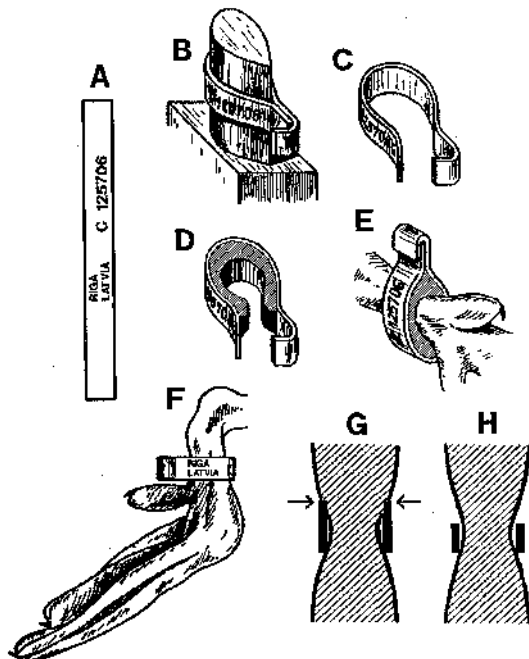


Fig. 1. Design and positioning of oval bands used for marking day-old ducklings in Latvia. Narrow aluminum sheet (a) bent around the mold (b). Half-opened band (c) removed from mold, provided with plasticine layer (d) and tightly positioned on day-old duckling's leg (e). Leg of adult diving duck at first recapture with properly positioned oval band (f). Schematic cross-section of wide (g) and narrow (h) oval bands of equal sizes on the tarsus of an adult duck. Arrows indicate potential locations for damage.

From Blums et al. (1994)

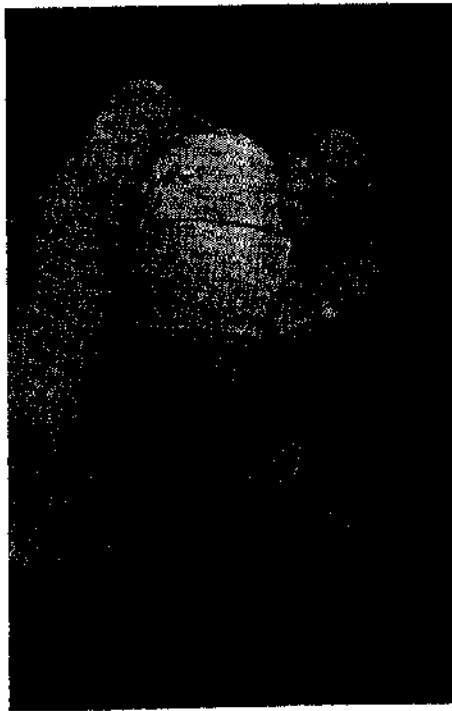
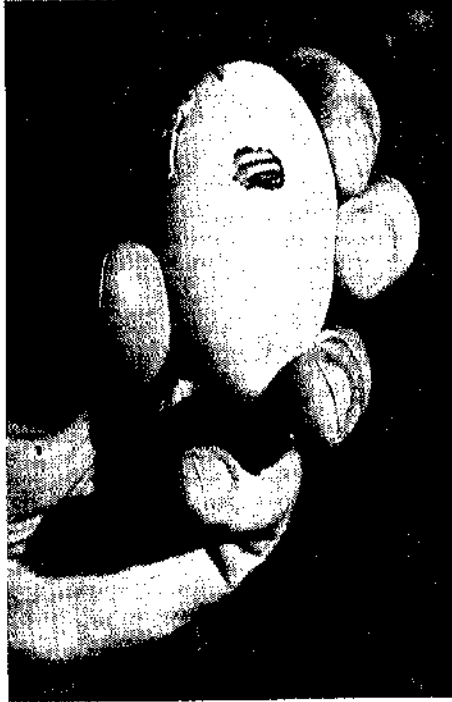


Fig. 1. Web-tagging a duckling in a pipped egg. Upper left, pipped egg ready for tagging (probe indicates position of foot); upper right, exposed foot after shell, shell membranes, and chorio-allantois have been removed; lower left, extracted foot with web-tag applied; and lower right, egg with foot replaced and hole covered with tape.

From Alliston (1975)

Literature Cited

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