

# MOLT PHENOLOGY MEDIATES COLONY ATTENDANCE IN WEDDELL SEALS

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## BACKGROUND

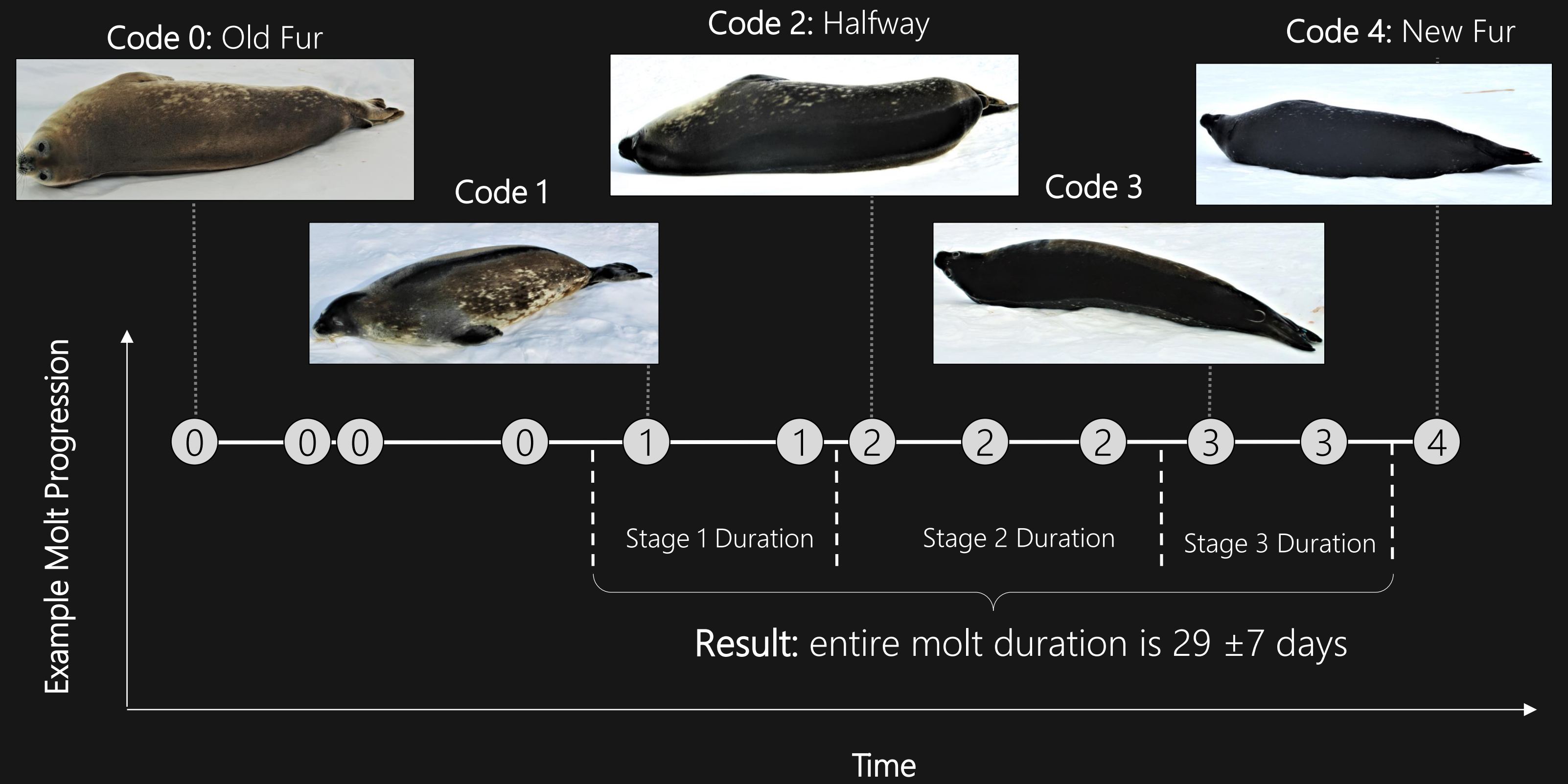
- In seals, the annual replacement of fur (hereafter, molt) is important for maintaining hydrodynamic function and enabling skin protection [1].
- Molt duration and phenology have been quantified in a limited number of seal species [2-5].
- Molt is an intermediate life history event between two reproductive events; however, the links between molt timing and reproductive success are poorly understood.

## OBJECTIVES

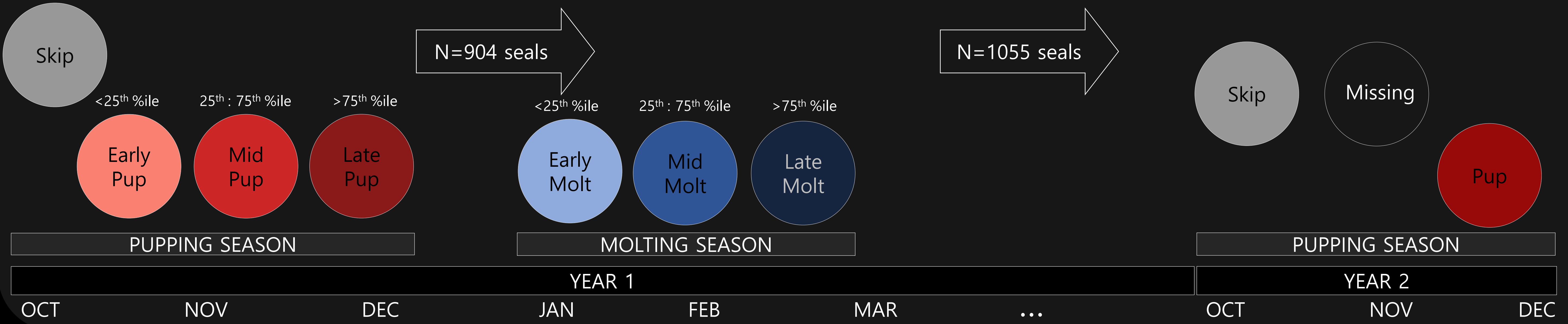
- Quantify molt duration in Weddell seals.
- Identify links between pup birth timing and molt timing.

## METHODS

- Determine progression through molt stages
- Calculate molt duration and start date
- Determine pup birth date
- Calculate molt start %iles for each year



Conceptual model of study design: previously parturient adult female seals were divided into categories:



## RESULTS

		Year 1 Molting Season		
		Early Molt (26%)	Mid Molt (48%)	Late Molt (26%)
Year 1 Pupping Season	Skip	54% +28% **	43% -5% **	3% -23% **
	Early Pup	13% -13% **	51% +4% **	36% +9% **
	Mid Pup	13% -13% **	48% +1% **	39% +12% **
	Late Pup	11% -15% **	43% -5% **	46% +20% **

Expected transition probability (based on random chance).  
Actual transition probability.  
Difference between actual and expected.  
*p*-value evaluating difference between actual and expected using Markov simulations on a multinomial draw, \*\**p*<0.05.

the following year

		Year 2 Pupping Season				
		Skip (24%)	Early Pup (16%)	Mid Pup (32%)	Late Pup (17%)	Missing (12%)
Year 1 Molting Season	Early Molt	28% +5% **	18% +3% **	30% -2% **	16% -1% **	8% -4% **
	Mid Molt	23% -1% **	14% -2% **	33% +1% **	18% +1% **	12% 0% **
	Late Molt	19% -4% **	16% 0% **	31% -1% **	16% -1% **	18% +6% **

- Pupping success delays molt start by ~2 weeks.
- Late pupping corresponds with late molting.

- Early molt ↑ probability of attending the colony.
- Late molt ↓ probability of attending the colony.

## DISCUSSION

- Successful reproduction has been found to delay molt in mammals [6,7] and birds [8-11], but no study has linked late offspring birth to late molt start.
- Unclear whether colony attendance patterns are due to molt phenology or carry-over from reproductive success in the previous year.
- Colony attendance is a tradeoff:
  - Benefits: breeding opportunities, predator avoidance
  - Costs: conspecific conflict, food competition
- Evidence that molt phenology is influenced by ice break-up phenology
  - ↑ ice = ↓ primary productivity = ↓ foraging success = ↓ body condition
- Future directions:
  - Energetics of molt timing (Skyla Walcott poster)
  - Physiological drivers of molt timing (Amy Kirkham poster)
  - Phenological flexibility in life history event phenology

**Citations:** [1] Ling 1972 Am. Zool.; [2] Johanos 1994 Mar. Mamm. Sci.; [3] Boyd 1993 Phys. Zool.; [4] Badosa 2006 Afr. Zool.; [5] Scheffer 1944 Am. Mid. Nat.; [6] Boily 1996 Am. J. Phys. Int. Comp. Phys.; [7] Kirkman 2003 SA J. Wild. Res.; [8] Morton 1990 Cond.; [9] Newton 1966 Ibis; [10] Flinks 2008 Ibis; [11] Pitelka 1958 Cond.

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