

VOCAL BEHAVIOUR IN THE KITTIWAKE GULL (*Rissa Tridactyla*):

A Summary and Progress Report

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Because of its unique geological structure and geographical location, Lundy provides an ideal habitat for many sea birds which following a winter at sea return to land during the Spring to breed. Most visitors to Lundy are aware of the Alcidae (the Razorbills, Guillemots, Puffins) that surround Lundy at their particular times and if only because of their raucous vocal disputes, the Laridae too make their presence known on Lundy during the early Spring and Summer. Less noted breeding visitors are the Procellariidae, the Fulmars and the Shearwaters. However, it is with the vocal behaviour of one of the gull species *Rissa tridactyla* or the Kittiwake, that this article is concerned.

The first published study of Kittiwake behaviour was published by Paludan (1955) who studied a colony of Kittiwakes on the island of Tyvholm just off the coast of Denmark. The colony nested on the ground very much as does the Herring Gull (*Larus argentatus*). However, the Kittiwakes of Lundy inhabit the sheer precipitous cliffs of the West and North East coasts of Lundy, ranging from Jenny's Cove around to Puffin Slope. Cullen (1957) in her erudite study of similar breeding habitats on the Farne Islands, argued that the ancestral breeding habitat of the Kittiwake was the grassy slopes above the sea and it was only as a result of severe pressure from predation that the Kittiwake was forced to colonise the inhospitable narrow ledges of north-facing cliffs. Cullen observed that the breeding behaviour of the cliff nesting Kittiwake differed significantly from the behaviour of ground-nesting gulls and suggested that the changes noted were behavioural adaptations which ensured a continued presence on the ledges. Parental behaviour and behaviour during courtship in cliff nesting Kittiwakes was less demonstrative and, therefore, less likely to dislodge partners, nests, eggs and young chicks from the tiny ledges. McLannahan (1973) has discovered that cliff-nesting Kittiwakes have undergone anatomical changes in the feet ensuring greater adherence to the ledges.

In his earlier study Paludan had described eight (possibly nine) vocal calls and associated behavioural displays in ground-nesting Kittiwakes, and Cullen had little to add regarding vocal behaviour in cliff-nesting Kittiwakes. Interest in the vocal behaviour of the Kittiwakes of Lundy developed through my staying on Lundy as a visitor during the summer and through organising undergraduate field courses in the Spring. Gradually, following many hours of observation and recording it seemed likely that the cliff-nesting Kittiwake had more discernably different calls than its ground nesting conspecific. A serious investigation of Kittiwake vocal behaviour was commenced in 1979 and has been supported financially by the University of Exeter and by the Lundy Field Society. To date, fourteen calls have been distinguished, twelve of which it has been possible to record for subsequent spectrographic analysis in the laboratory. Many of these calls differ from each other in both temporal and tonal aspects (Daniels & Heath, 1984). Thus it appears that the vocal repertoire of the cliff-nesting Kittiwake has diversified from the more limited repertoire of ground-nesting Kittiwake. Zahavi (1982) cogently argues that vocal behaviour is an analogue of overt non-vocal behaviour and the latter has been accepted (Hinde, 1969) as an index of motivational state. Therefore, since the cliff-nesting Kittiwake's overt displays are less expansive yet the vocal behaviour appears to be more elaborate, it is likely that vocal behaviour is used far more by cliff-nesting Kittiwakes as a means of communicating motivational state. Wooller (1978) had shown that cliff-nesting Kittiwakes were able to recognise their partners, by voice alone and that the tone and rhythm of individual Kittiwake's Long Call, the four syllable "Ki-ti-wa-ak" sound from which the bird derives its name, differed between individual birds. The ability to recognise a partner call is of obvious importance in a densely crowded cliff colony where early in the breeding season as many as a thousand birds may be

competing for nest-sites (e.g. in Puffin Gully) and partners. The Long-Call is used in at least seven different behavioural situations by the Kittiwake and of these, the most familiar is of course when it is used in the Greeting Ceremony, i.e. when following a period of separation partners will once on the nest-site, bow 8-10 times to each other whilst emitting the Long Call, the ceremony is terminated by each bird tossing the bill into the vertical position uttering a rapid "ak-ak-" sound called Upward Choking. In studying this particular behavioural Heath et al (1983), discovered that the length of the Greeting Ceremony was correlated with length of absence of one partner, in other words, the longer the period of separation the longer the Greeting Ceremony. However, as Daniels and Heath (in press) have observed, the Greeting Ceremony becomes truncated to occasionally only Upward Choking as the partners enter the Incubation stage of breeding when eggs are present in the nest. A similar pattern persists throughout the Post-Incubation stage when chicks are present, but there is a gradual resurgence in the vigour of the Greeting Ceremony as the chicks develop and become more active.

The importance of vocal communication in the cliff-nesting Kittiwake have been emphasised by Daniels et al (1984) who showed that one of the calls, the Pre-Departure call, is a declaration of intended absence from the nest. This call is uttered by one partner prior to departure from the nest or nest-site. When this soft "powk-powk" sound is made it results more often than not in the vocalising bird leaving the nest/partner/eggs/chicks, but on some occasions the calling bird does not leave, Daniels et al, revealed that non-departure was linked to the partners vocal reply. For example, if the Pre-Departure call was followed by either Low Intensity Choking (an "i ee-ah ak") sound) or the Long Call, then the calling bird always departed, whereas if the partners response was Head Tossing (a high pitched tseep-tseep — sound reminiscent of food begging in the Kittiwake chick and often used by adult birds during Courtship Feeding) then the calling bird remained on the nest. So the former vocalisations sanction or condone absence whereas the latter inhibits or denies absence.

When a predator, such as a Greater Black Backed Gull (*Larus marinus*) or Peregrine Falcon (*Falco peregrinus*), appear in the vicinity of a colony of cliff-nesting Kittiwakes, the entire colony emits a massive sound, here called the Antipredator Call. The Call appears to be a mixture of Long Calls, Bow-and-Moan and Flight Calling and is incredibly loud and is, of course, amplified by the narrow confines of the gully. No similar vocal behaviour has been reported in ground-nesting gulls and this particular behaviour may be a further adaptation by the cliff-nesting Kittiwake.

Work is continuing on each of the calls identified and described by Daniels and Heath (ibid) and gradually the motivational basis and functional significance of the vocalisations are being discovered. Investigations continue on Lundy, but are now also being carried out in South Devon. Collaborative work has also been commenced with Dr. E. Danchin in Paris, and Dr. Jean-Yves Monnat at Brest.

TABLE 1. The calls emitted by the cliff-nesting Kittiwake (*Rissa tridactyla*)

Name of Call	Sound Emitted	Function/Display
Downward Choking	eh-uh; eh-uh	distance reducing, attracts female
Low Intensity Choking	i-ee-ah-ak; i-ee-ah-ak	intersperses bouts of aggressive behaviour
Upward Choking	ak-ak-ak-ak	terminates and occasionally substitutes for the Greeting Ceremony
Jabbing	rhythmic repetitive muffled Long-Call i-ee-a-a	distance increasing, used during standing attacks on neighbours
Head Tossing	tseep-tseep-tseep	solicits courtship feeding

Head Shaking	jik-jik-jik	emitted by male prior and during copulation
Long Call	ki-ti-wa-ak	(a) Greeting Ceremony and partner recognition (b) sanctions absence (c) soft sound made by parent when chicks are present
Bow-and-Moan	rhythmic cooing sound	defence of adopted territory
Flight Calling	soft aspirant wailing	possibly an aerial continuation of Bow-and-Moan. Function unclear
Pre-Departure Call	pohk-pohk-pohk	signals intention to leave partner
Alarm Call	gak-gak-gak	signal possible danger
Anti Mass Predator Calling	entire colony erupts into loud cacophonous sound	occurs in response to a predator in the gully. Not observed in ground-nesting Kittiwakes

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