Goose families project:
Data from Kolguyev

March 21, 2017

Background

I tried to count family sizes of Whitefronts and characterise associated variables. Data are presented as a csv file. The variables I wanted to measure, and their status is below:

Variable	N_group	n_het	n_ad	n_juv
Measured?	yes	yes	yes	yes
Variable	n_parent	n_alloparent	n_tag	tag_ID
Measured?	yes	no	no	yes
Variable	activity	terrain	position	weather
Measured?	yes	yes	yes	yes
Variable	predator_last_seen	predator_species	predator_number	date/time
Measured?	no	no	no	yes

Table 1: Variables, and whether measured.

Sampling

1. Sampling took place over 10 days from the 6th - 15th of August. 6 days were spent with the catching crew, 3, walking, and 1, the final day.

2. With the catching crew, most families were counted as or after geese had been confined to the targeted lake. Geese and other birds were usually to be found in a flock in the centre of the lake. Families were identified as pairs of geese sheltering juveniles between them or guiding juveniles around. In all cases, the presence of juveniles closely associated (similar polarisation and strong cohesion) with adult geese was considered an indicator of a family. This was borne out in cases where the central flock was allowed to disperse to feed at the lake shore before the catching process began; geese identified as being in a family group maintained this group when leaving or joining the central flock. This pattern was seen across species, with Barnacle and Bean geese behaving similarly.

3. While walking, geese were spotted in two situations: either at long range, in which case their activity was recorded (see below) or at close range, either hiding or actively escaping, in which case their activity was recorded as evasion (e). In the first case, many some observations were made at ranges around 500 metres, while in the second, geese attempting to hide would allow approaches as close as 50 cm away without flight.
   In both cases, goose families were fairly easy to count since Whitefronts tended to feed in loose groups where family sizes were much more readily counted than group sizes. This pattern was strongly contrasted with that found in Barnacle geese, where group size was much easier to estimate than family size.

4. The dataset is fairly straightforward in terms of column naming. Some values for certain columns, such as activity, terrain and weather are explained here. Activity has four levels, `e (evading), f (foraging), r (resting), s (swimming), and w (walking)`; terrain has four levels, `a (air), b (both of), l (land), w (water)`; and weather has five levels, `clear (>70% blue sky), cloudy (>20%), overcast (<20%), fog, and rain`. Pairs with no young have `n.par`, `n.male` and `n.fem` as NA.

What wasn't measured, and why

1. Field size: This could not be feasibly measured. Observations of geese took place largely in the following ways: Geese confined to lake in preparation for capture, evading observers, in flight or on foot, and, resting, foraging or walking, at distances of around 200 - 300 metres. None of these was conducive to estimating the size of the patch of vegetation of which geese were then feeding. Vegetation was mostly grass, with patches of shrubs or bare ground. Goose droppings were ubiquitous, indicating that geese probably fed nearly everywhere. Since grass was also nearly universal, it was impossible to guess even rough sizes of the "field".

2. Of the group/family count data, number of alloparents (adult birds remaining with parents from the previous year) and number of tagged birds was quickly discarded as a significant dataset. In only seven cases were more than two adults were part of a family. By contrast, 32 pairs or groups of adults were found with no juveniles. Only three tagged birds (1VS, U01, U26) were seen, of which the U birds were tagged this season.

3. All predator related variables were discarded for sampling.

   (a) Predators, especially Glaucous gulls and Arctic skuas, were ubiquitous, and quantifying them would have been impossible.

   (b) Team members opined that gulls were drawn to humans, as indicators of disruptions to goose groups (see below), making gull counts meaningless.

   (c) Only one Arctic fox was seen, though other dens were found.

Other issues

1. Issues leading to poor detection of geese:
   (a) Bad weather and poor visibility, and thus,
   (b) Low detection probability and distance.
   (c) High flight initiation distance,
   (d) Incomplete detection of groups and families due to terrain.
2. Issues with groups:
   (a) No clear definition of a group for grazing geese,
   (b) Forced grouping immediately preceding capture; might not indicate real group sizes,
   (c) Difficulties estimating distances between families at ranges above 100 metres, making arbitrary group definitions difficult.
3. Miscellaneous:
   (a) Juvenile Beans and Whitefronts very similar, not easy to distinguish when together in groups on the water.
   (b) Recorded positions of families often 200 metres or more from actual position.
   (c) Geese movements across the island, and the low percetage of tagged birds make it impossible to say whether families were being recounted or under-counted.
   (d) Non-linear transects might have had the same effect, of either over- or under-counting geese. It is much more likely that geese were under-counted, since I only counted geese in one direction of a walk, not both.

Not-very-relevant observations

No goose families were fitted with transmitters. While finding and counting goose families was not difficult, the tactics employed could not have led to the successful *capture* of a goose family. On the whole, the catching process was best suited to snaring younger, unfledged geese of any species. The process was highly indiscriminate, with ducks also caught and ringed. Adult geese, especially of *Anser*, tended to escape if they could by flying, while Barnacle geese were more likely to stay on the ground if their young could not fly. Overall, most geese could fly by the 13th of August, and the expedition ended on that day.

Selecting a lake and the goose families on it for capture seemed to be a very strong predictor of juvenile mortality in the short term, especially for Whitefronts and Bean geese. This could be attributed to human induced mortality, which took the form of suffocation(?) in the keeping cages or a strange form

of leg paralysis which rendered some young geese unable to walk or swim, and to predation by Glaucous gulls, which took advantage of the massive disruption caused by the catching process and targeted juveniles when separated from adults. Geese judged to have a low chance of survival were killed and neckbands, if any, recovered. The resistance of Barnacle geese to both forms was remarkable.