Evidence of a five-year population cycle in Rusty Blackbirds (*Euphagus carolinus***)**

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• The Rusty Blackbird has received much attention in the last decade because of widespread evidence of a drastic decline.

 There has been much speculation about the causes of this decline.





 While some have blamed, in part, blackbird control programmes in the US, others do not consider it a likely cause.

 This is because other blackbirds targeted by these controls have not declined as much as Rusty Blackbirds.



 We present data that suggest high annual variability in Rusty Blackbird reproductive success in the boreal forest, with a possible 5 year cycle in productivity.

 This could explain why Rusty Blackbirds are more susceptible to control programmes than Red-winged Blackbirds, Brown-headed Cowbirds and Common Grackles.





Data from the Observatoire d'oiseaux de Tadoussac (OOT), were analysed.

The St. Lawrence is oriented soutwest, in the migration direction of Rusty Blackbirds







Study area

 The 'Observatoire d'oiseaux de Tadoussac' (OOT) is an ideal site to study movements of boreal forest birds who concentrate along the north shore of the St. Lawrence River during their diurnal fall migration.









Methods

- Migrating birds are counted daily each hourly period as they fly over the two observers, located 800m apart from each other; one on the coast and one inland.
- Counts start each day at 8:00 AM and stop at around 4:00 PM.

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12 years of data from the Tadoussac observatory were analysed.









Methods

- Data from the ÉPOQ data base, which contains thousands of bird checklist records, were also analysed.
- Only checklists with at least one Rusty Blackbird observation were used (mean number of birds per checklist)
- Data were divided according to season: spring (early March to late May) and fall (August to late November).







The OOT has been banding Northern Sawwhet and Boreal Owls since 1996.

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Population Trends







Trend in Rusty Blackbird number in Québec



Trends from EPOQ data base

The fall ÉPOQ data suggest a possible decline in Rusty Blackbird abundance
R² = 0.24



Relationships between the Fall and following spring numbers

 Pearson's correlation for Fall and Spring Rusty Blackbird abundance: R² = 0.70; (P< 0.001; n = 27 years)



Rusty Blackbird Trend at OOT







 OOT data suggest a greater decline than EPOQ
(R² = 0.55, p = 0.01)

• with a trend of -23% (90% Cl: -37% to -9%)

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 It should be noted that the area covered by the OOT is much smaller than that covered by the ÉPOQ data base.

 There was no significant correlation between ÉPOQ and Tadoussac data: R2
= -0.11, n = 10 years





 Because the OOT samples a smaller portion of the boreal forest, it is likely that it provides a more sensitive picture of yearly fluctuations in the Rusty Blackbird reproductive success.





Reproductive success





 Of the 90 birds banded in 2007, 76 (84.4 %) were young of the year

 Thus years with high numbers of Rusty Blackbirds in the fall at Tadoussac may indicate years with high reproductive success.





Trend in Rusty Blackbird number in Québec





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- The boreal forest is characterised by several abundance cycles:
 - Seed and fruit production: 2 years
 - Small mammal cycles: 4 years
 - American Hare cycles: 10 years

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- These cycles affect prey and predator abundance, as well as reproductive success.
- Most species breeding in the boreal forest are affected by these fluctuations



 The relationship between Boreal Owl and Red-backed Vole abundances is well documented.

 Boreal Owls move out of the boreal forest in years of low vole abundance, which occurs approximately every four years.



 Large movements of Rusty Blackbirds recorded at the OOT (n = 3) occurred in years when relatively few Boreal Owls were captured at the OOT, indicating abundance of voles in the boreal forest during these years.





 In years of low vole abundance, small predators such as the Pine Marten and other weasels, as well as avian predators, prey more on birds, have lower reproductive success, and greater mortality rates.

 Predation on birds by weasels has been shown to be inversely correlated with vole density.





Years with large movements of Boreal Owls outside the boreal forest corresponded to low productivity years for Rusty blackbirds.













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There was a positive correlation between the wintertime North Atlantic Oscillation (NAO) index and the number of Rusty Blackbirds recorded at Tadoussac in the fall (R2 = + 0.26, n = 12, p < 0.001)

But a stronger negative one with the NAO index of the preceding year (R2 = -0.74, n = 12, p < 0.001).

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• If we use the PC NOA index, the correlations are slightly stronger (R2 = + 0.42, p < 0.001 and R2 = -0.75, p < 0.001 respectively).

 In fact strong negative differential between the NAO indices of the two previous winters corresponded with high Rusty Blackbird numbers at Tadoussac in the fall.





 The three pulses in Rusty Blackbird abundance at Tadoussac coincided with three winters of slightly negative phase of North Atlantic Oscillation followed by a winter with a positive phase





 The negative phase usually corresponds with warmer than usual winters in the eastern portion of the boreal forest whereas the positive phase corresponds to colder winters.





The reverse is true for the wintering areas, with the positive phase implying warmer winters and the negative phase colder ones



 Such cyclical reproductive success in the boreal forest could explain why Rusty Blackbirds are more vulnerable to blackbird control programs than other blackbirds, whose reproductive success may not vary as much.





 Thus the urgency for an in-depth look at blackbird control programs, and perhaps, at winter habitat modifications as the main causes of past and ongoing Rusty Blackbird decline.





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