

Does Artificial Lighting Affect Robins?



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Does Artificial Lighting Affect Robins?



- **Birds and artificial lighting**
 - **Street lights**
 - **The Robin**
 - **Studies**
 - **Future work**

Birds and Artificial lighting

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Howe



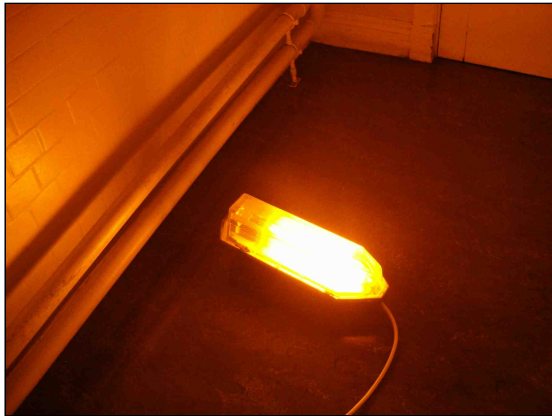
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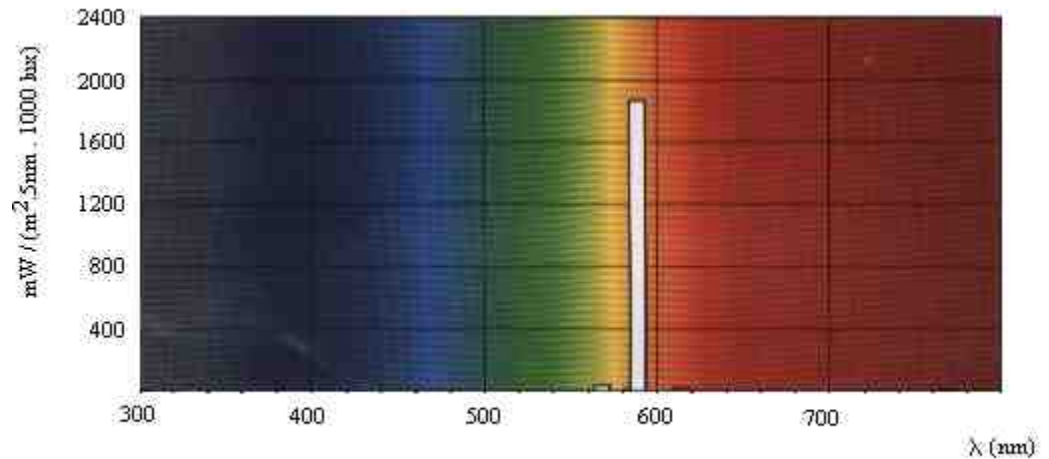
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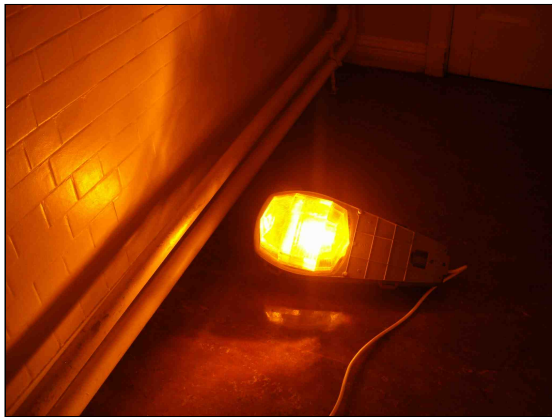
Artificial lights



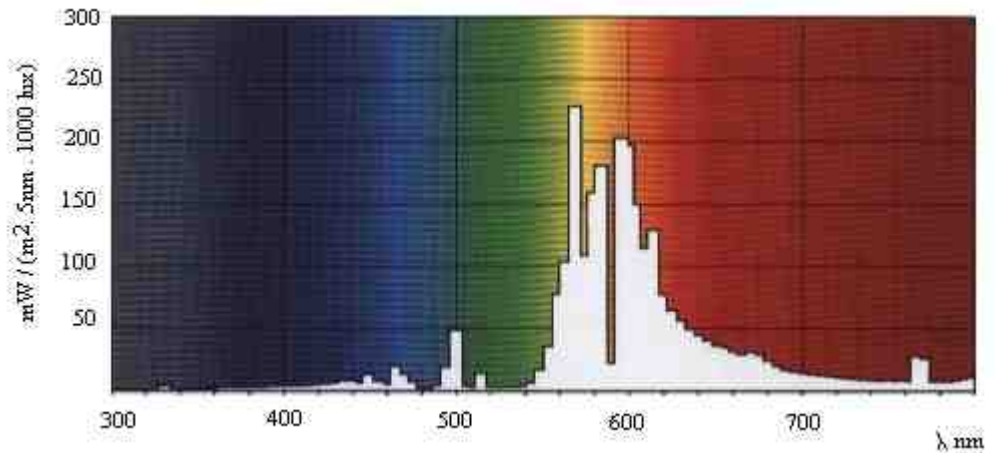
55W SOX



Low pressure sodium spectral power distribution (Philips SOX E 36W)



70W SON



High pressure sodium spectral power distribution (Philips SON PIA Plus)

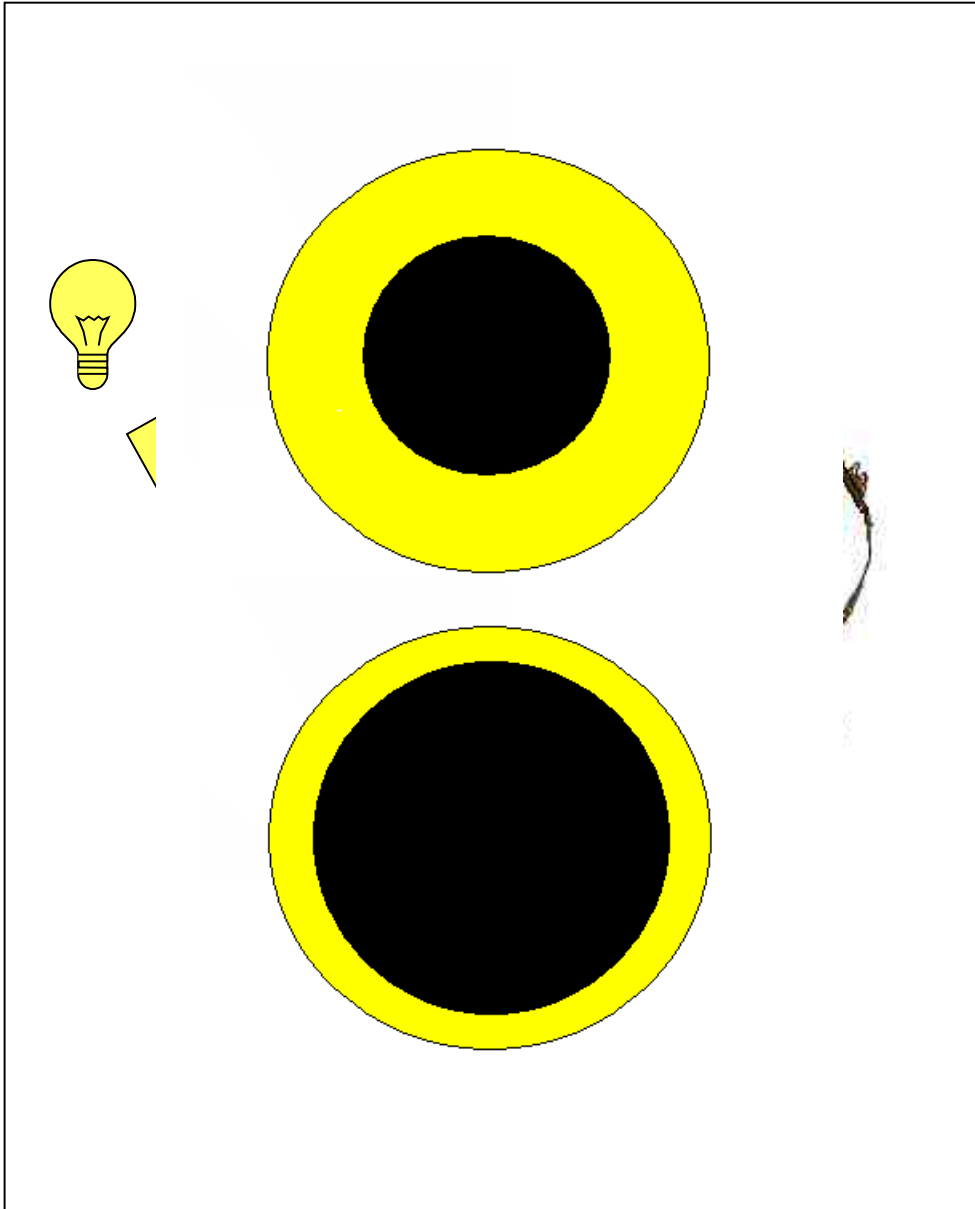
The European Robin

• *Erithacus rubecula*

- **Widely distributed and easy to find**
- **Territorial and sings throughout winter**
- **Known to occasionally sing at night**
- **Penchant for mealworms**
- **Large eyes**



Large eyes

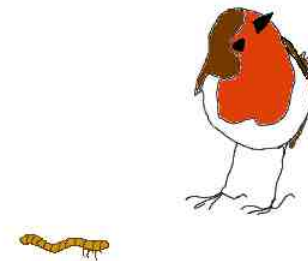


Birds generally have good vision

Light = information

Large eyes see better under low light conditions

. see at night with artificial lights



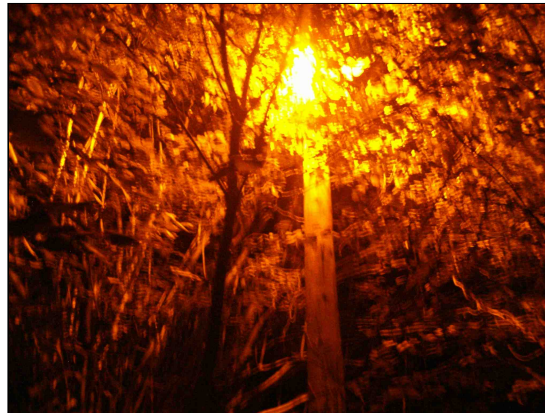
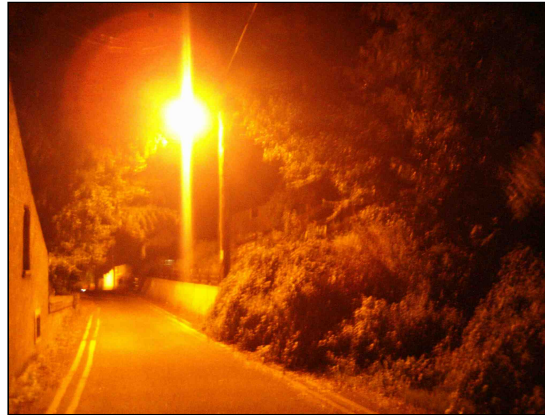
Aims

- Does artificial lighting affect a bird's behaviour?
 - Song
 - Foraging
 - Breeding
- Is it good or bad?



Methods

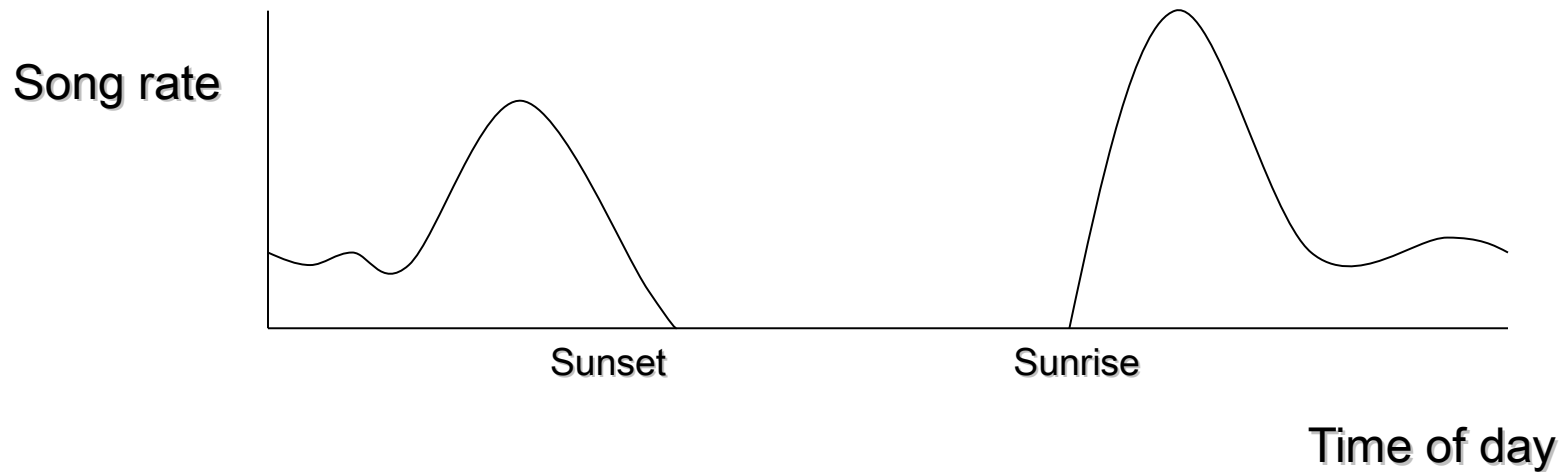
- Monitor song timing and rate from 1 hour before sunset until 1 hour after sunrise
 - Film a feeding station throughout night
- Monitor temperature, light intensity and cloud cover



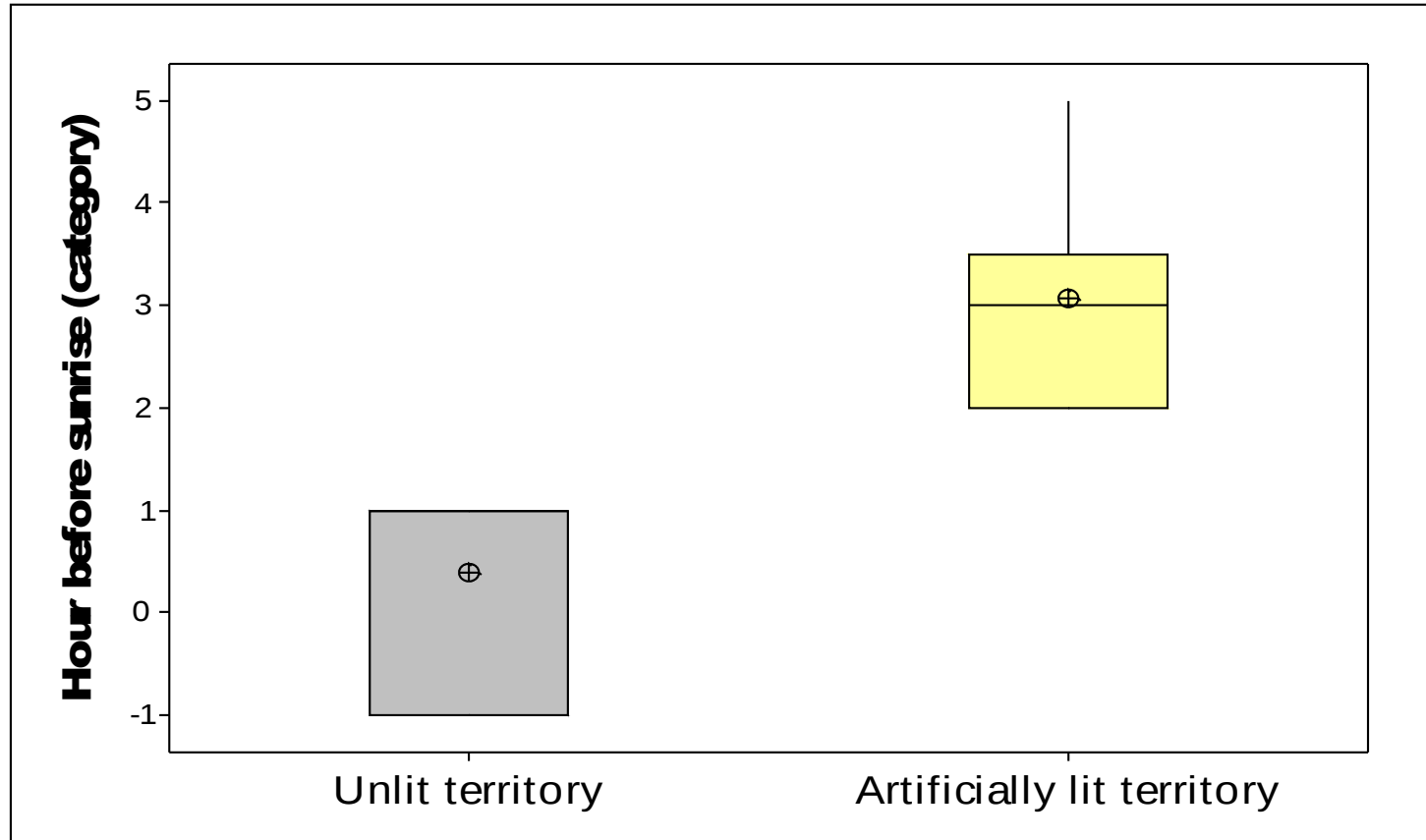
Song



- Normal song
 - Dawn chorus
 - Dusk chorus
 - Through day

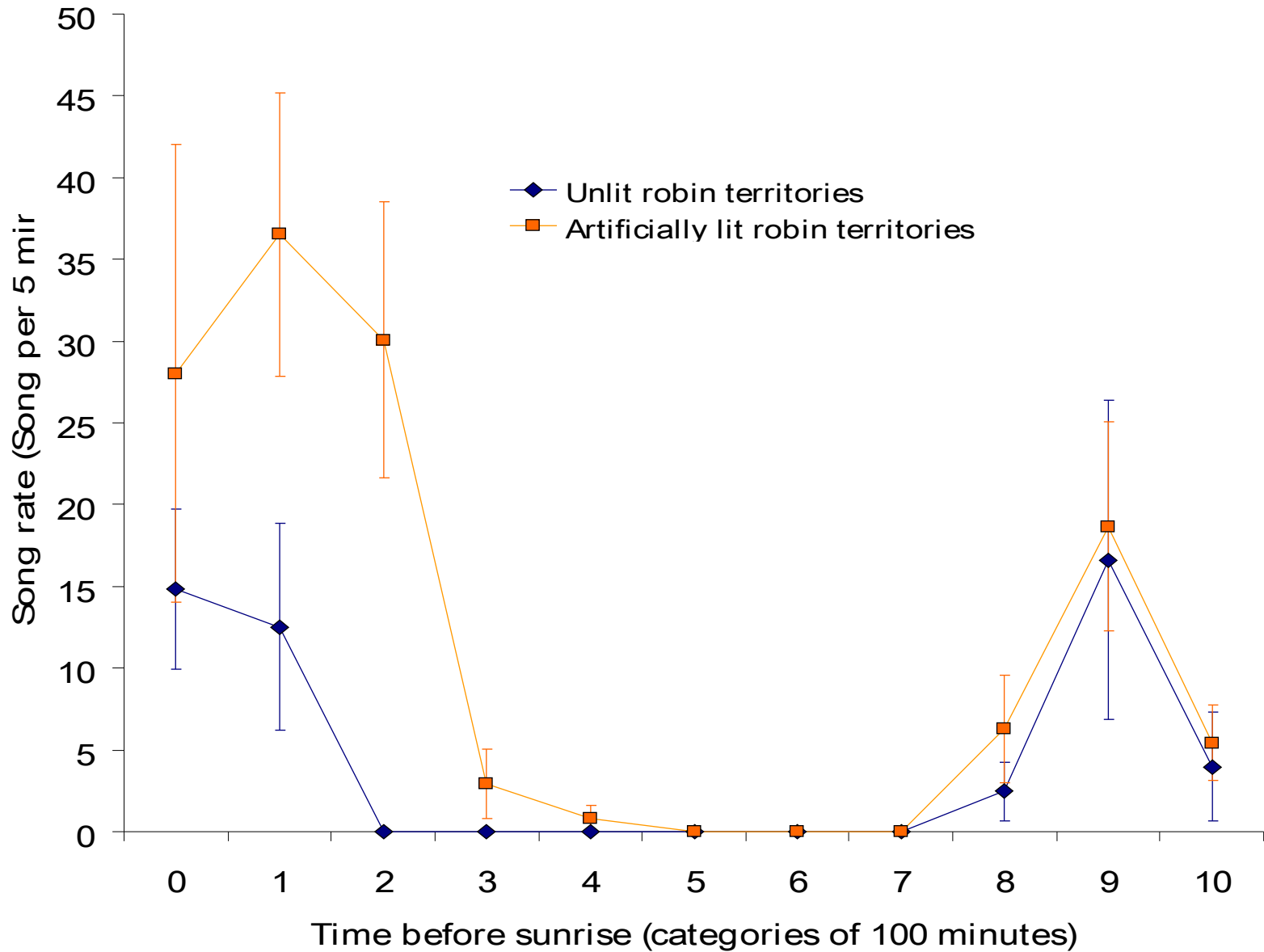


Results - Song



Mann-Whitney test, $U = 45$, $N1 = 9$ $N2 = 10$, $P = 0.0003$

Results - song

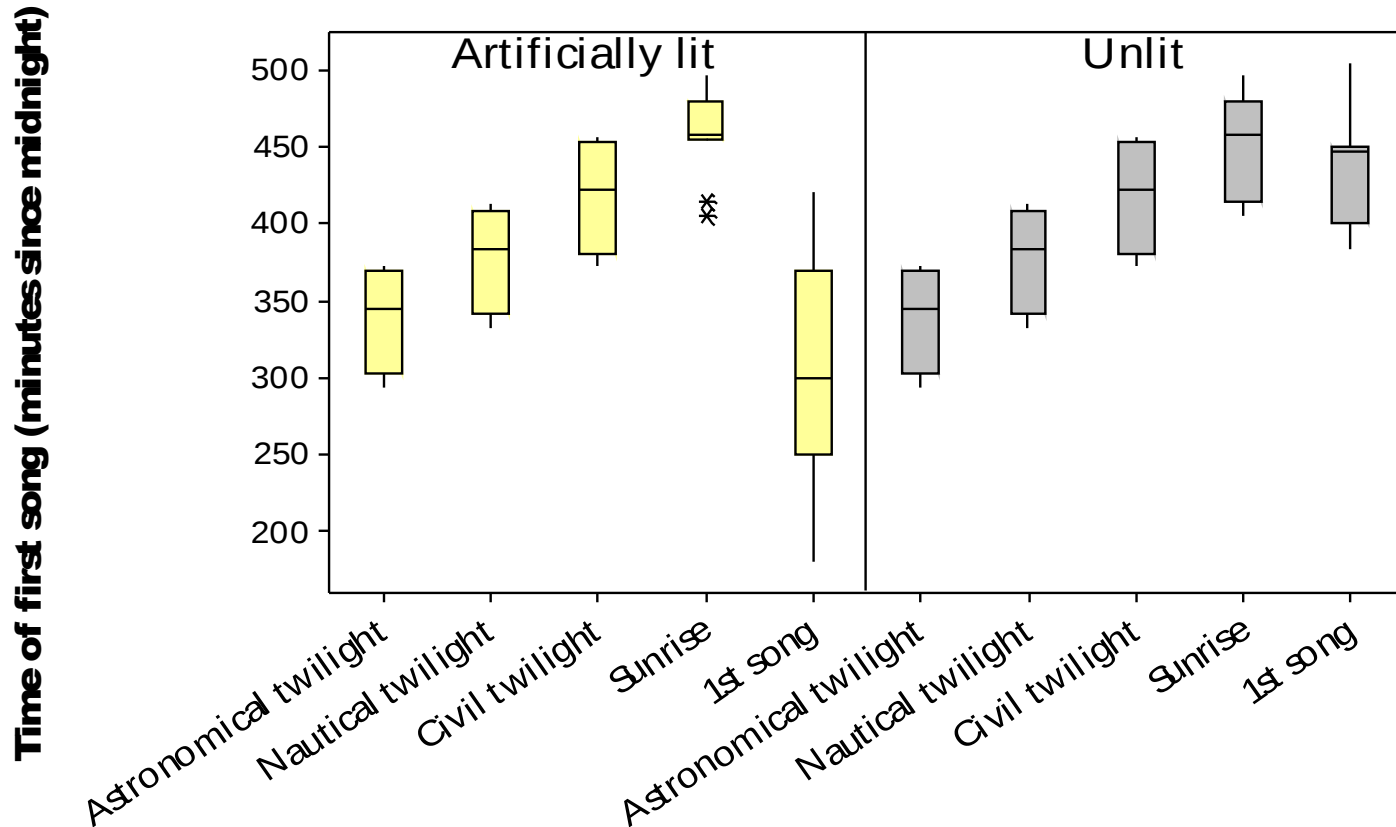


Results - Song



- **Artificially lit robins have an abnormal song routine**
- **Robins with lit territories begin to sing far earlier than those with unlit territories**
- **Both artificially lit and unlit birds had a similar timed dusk chorus**
- **Initially both artificially lit and unlit birds had similar song rates**
- **One hour after initial song, rate was highest for artificially lit robins**

Results - Song



- Robins with artificially lit territories began to sing at approximately the onset of astronomical twilight

- Robins with unlit territories began to sing between the onset of civil twilight and sunrise

Conclusions - Song

- Artificial lights cause robins to begin the day earlier, and sing longer and harder
 - Light is an important cue
- Combination of natural and artificial light
 - Change of colour of sky

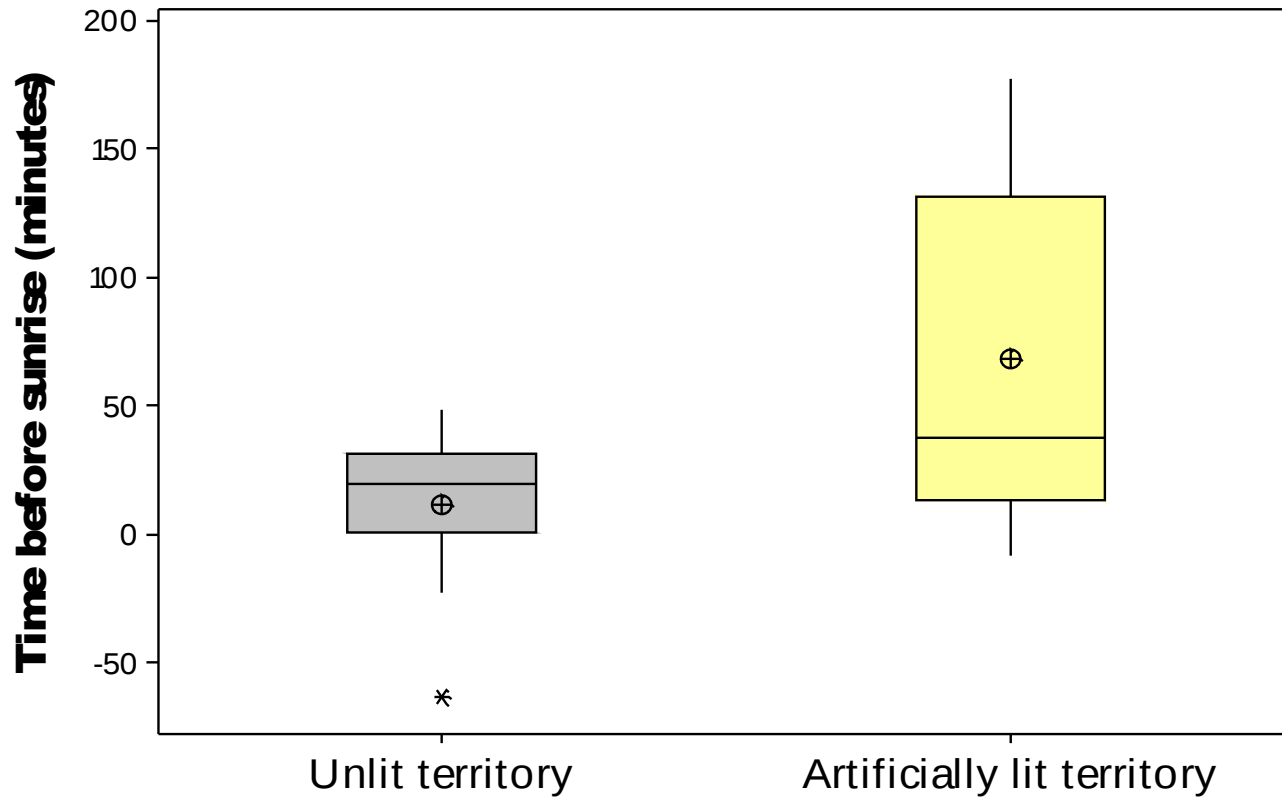


Foraging



- Birds usually begin to forage after they are able to see their environment
 - After dawn chorus
 - Before dusk chorus
 - See predators and prey
- Expect robins to utilise food throughout night

Results - Foraging



Mann-Whitney test: $U = 135.5$, $N1 = N2 = 13$, $P = 0.0427$

Results - Foraging

- Robins with artificially lit territories begin to forage earlier than those with unlit territories



- Only 18 minutes difference in average start times of foraging
- High variation between individuals
- Unlit robins start to forage sooner after song than artificially lit robins
- No difference at dusk



Conclusions - Foraging



- Artificial lights keep robins singing longer
 - Body mass regulations implications
 - Different pattern of foraging
 - Lights not giving any benefits

Body mass regulation

- Normally robins build up fat reserves during the day
- Fat reserves deplete overnight
- Robin resumes foraging to build up fat reserves
- Singing is energetically costly
- Expect to lose more mass overnight if active for longer



Results - Body mass regulation



- No difference in mass loss
- Light does not have an effect on body mass regulation
- Average overnight temperature and initial dusk mass are important in overnight mass loss

Conclusion - body mass regulation

- Unlit birds follow normal pattern of mass loss
- Artificially lit birds are following a different scheme??
 - Nocturnally active birds often have lower metabolic rates
- Consequences?
 - Repercussions in breeding cycle as seen in House Wren



Different street lights

Do robins behave differently under different street lamps?

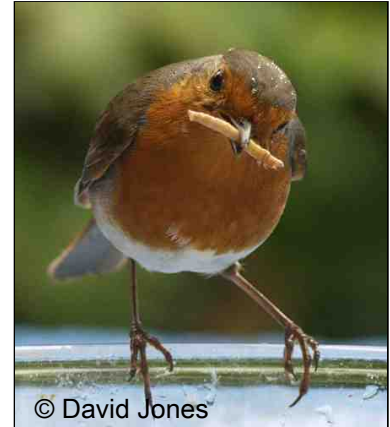


Foraging

- No difference

Singing

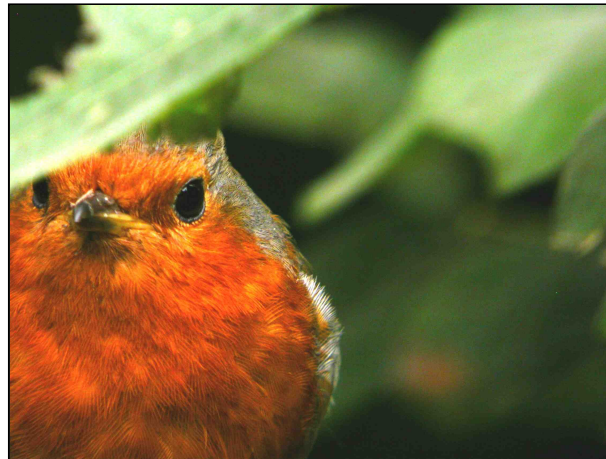
- Slightly early song in low pressure sodium lights
- No difference in song rate



- Robins may be particularly sensitive to the peak low pressure sodium wavelength
 - Statistical bias – low numbers of territories in each category
 - Inconclusive

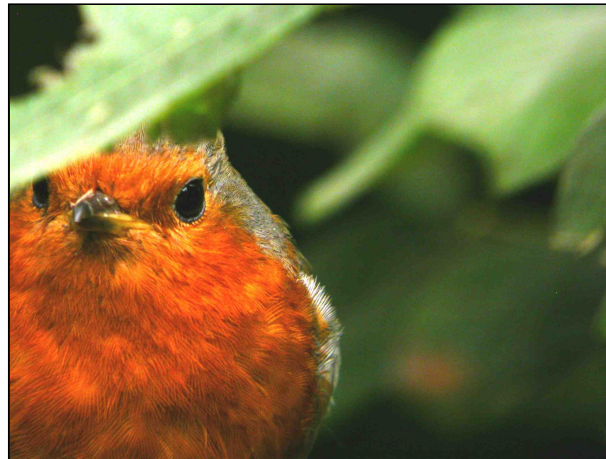
Conclusions and consequences

- Robins are affected by artificial lights
 - Lack of sleep
- Long term circadian rhythm disruption
 - Hormone disruption
- Why not take advantage of the 24 hour light?
 - Uni-hemispheric sleep?



What can be done?

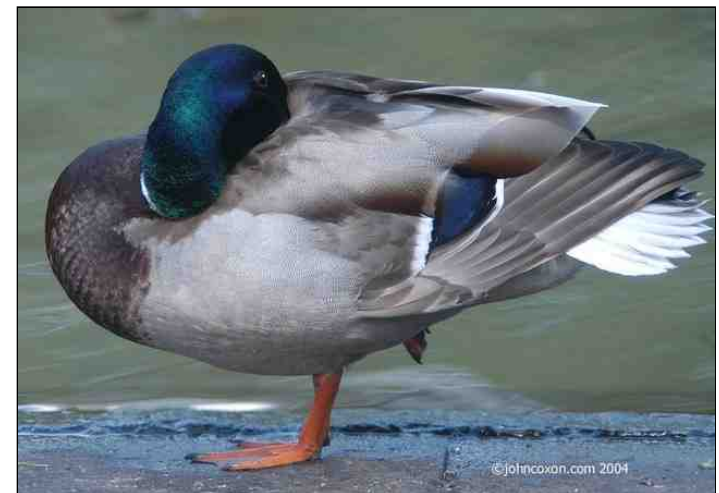
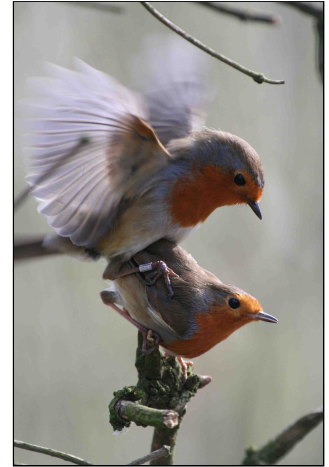
- Minimise light spill
- Use lights only where and when necessary
 - Maintain habitats
 - Provide food



Further Work...



- Sky colour changes from onset of astronomical twilight
- Predator prey dynamics
- Breeding behaviour (BTO collaboration)
- Aviary study
 - 24 hour monitoring
 - Sleep monitoring
 - Types of street light



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THANK YOU FOR LISTENING

Any questions?