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В сборнике опубликованы материалы III Международной научной конференции «Биологическое разнообразие азиатских степей».В докладах рассмотрены итоги исследований и перспективы сохранения биологического разнообразия степных экосистем, островных и ленточных лесов и водного-болотных угодий степной зоны Евразии, охраны природных территорий и популяций видов особого природоохранного значения, формирования экологической сети и вклада вузов в изучение биоразнообразия. Книга предназначена для ученых и практиков, работающих в области изучения и сохранения биологического разнообразия, преподавателей вузов, аспирантов, студентов, работников природоохранных учреждений.

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6 Outram A.K. et al. The earliest horse hamessing and milking // Science, 2009, vol.323, №5919. – p.1332-1335.

7 [Online: 10.11.2016] https://ru.wikipedia.org/wiki/одомашнивание лошади.

8 [Online: 10.11.2016] https://ru.wikipedia.org/wiki/тарпан.

9 Ригина Е.Ю. Сохранение биологического разнообразия лошадей (Perissoclactyla, Equidae, Equus) // Степи Евразии: материалы международного симпозиума. – Оренбург, 2006 – с. 102-109.

10 Переладова О.Б. Возрождение тарпана // Степной бюллетень. Новосибирск, 2001, №10 с. 6-9.

11 Звери Казахстана. – Алма-Ата: Академия Наук Казахской ССР, 1953. – 535с.

12 Нурушев М.Ж. Адаевская лошадь: эволюция, современное состояние и перспективы разведения (монография). Астана-полиграфия. 2005 – 383 С.

13 Нурушев М.Ж., Байтанаев О.А. Реинтродукция степного тарпана: мечта или реальность// Известия НАН РК, серия биологическая и медицинская, 2015, №4. – с.86-97

14 [Online: 10.11.2016]https://mic.qov.kz/ru/competition

ARE NEST BOXESECOLOGICAL TRAPS FOR RED-FOOTED FALCONS *FALCO VESPERTINUS*AT NAURZUM[a]

Являются ли гнездовые ящики экологическими ловушками для кобчика Falco vespertinus в Наурзуме

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Summary

Nest box programs are frequently implemented for conservation of cavity-nesting birds, but their effectiveness is rarely evaluated in comparison to birds not using nest boxes. In the European Palearctic, Red-Footed Falcon (*Falco vespertinus*) populations are both of high conservation concern and are strongly associated with nest box programs in heavily managed landscapes. We used a 21-year monitoring dataset developed from monitoring 753 nesting attempts by Red-footed Falcons at the Naurzum Zapovednick to evaluate response of demographic parameters of Red-footed Falcons to environmental factors including use of nest boxes. Variations in lay date and in numbers of eggs were not well explained by any one model, but instead by combinations of models with terms for nest type, land cover type and degree of coloniality. In contrast, variation in both offspring loss and numbers of fledglings produced were fairly well explained by a single model including terms for nest type, land cover type, and an interaction between the two parameters (65% and 81% model weights respectively). Because, for other species, early lay dates are associated with individual fitness, this interaction highlighted a potential ecological trap where falcons using nest boxes on forest edges at Naurzum lay eggs earlier but suffer greater offspring loss and produce lower numbers of fledglings than do those in other nesting settings.

Introduction

A commonly implemented conservation actions for birds is establishment of nest box programs. Nest boxes are appealing because they are inexpensive and easy to create and install, they are heavily used by cavity nesting birds, and they are an effective tool for engaging the general public in conservation and for creating citizen scientists (Brossard et al. 2012). Nest boxes also are convenientfor avian scientists because they can be placed in accessible locations and therefore can form the relatively inexpensive foundation of a behavioral, ecological or conservation research program (Møller 1989).

Red-Footed Falcons (*Falco vespertinus*) have a large distribution that stretches from central Europe through central Asia and even into Siberia (Ferguson-Lees and Christie 2001, Birdlife 2016).The species is currently the focus of extensive conservation efforts built aroundscientific study and on recovery of breeding populations via provisioning of large numbers of nest boxes,especially in Hungary (Fehérvári et al. 2012) and Serbia (e.g., Purger 2008).

We studied the nesting demography of Red-footed Falcons atthe Naurzum Zapovednik (Naurzum National Nature Reserve)in the core of the species' Palearctic breeding range. We used a monitoring dataset developed over 21 yearsthat we collected in Kazakhstan between 1978 and 2015. Unusually for cavity-nesting birds, this dataset presented the opportunity for us to compare large numbers of nesting attempts in natural nests and in nest boxes. We focused on four demographic parameters associated with the nesting cycle: lay date, the number of eggs produced, the number of fledglings produced, and the number of offspring lost between egg laying and fledging (offspring loss). We asked two primary research questions: (1) how do demographic parameters vary over time? and (2) how do demographic parameters vary in response to three environmental factors (use of human-provided nest boxes, by landcover at nest sites, and if nests were solitary or colonial)?

Methods

Study Area& Focal Species. We monitoredRed-footed Falcon breeding biology in and around the Naurzum Zapovednick (National Nature Reserve), in the Naurzum Region of the Kostanay Oblast (state) of north-central Kazakhstan.Established in 1931, the Zapovednik encompasses 191,381ha at 51ºN, 64ºE, approximately at the juncture of the northern Siberian forest and the southern Eurasian steppe. The Zapovednik is described in detail in Katzner et al. (2003). Typical arrival dates for Red-footed Falcons are in early May, egg laying starts about 30 days later, and the incubation and nestling stages both last about 28 days(Bragin 1989). Falcons depart from breeding grounds in early September, and they winter insouthern Africa (Katzner et al. 2016).

Red-footed Falcons are associated with forest-steppe habitat; in general, they nest in trees and forage over grasslands. At Naurzum, nests are either natural, usuallyin usurped or abandoned nests of solitary Magpies (*Pica pica*) and Crows (*Corvus corone*) or colonial Rooks (*Corvus frugilegus*), or in human-provided nest boxes (Bragin 1989).

Data Collection. Over 21 years between 1978 and 2015 (1978-1989, 1991, 1993 and 2009 – 2015), we surveyed the Zapovednick and surrounding lands for evidence of breeding by Red-footed Falcons. At each nest we described (1) nest type (naturalor human-provided nest boxes), (2) colonial status (solitary or colonial), and (3) the land cover in which falcon nests occurred (classified as forest interior orforest edge, the latter including not only true edges but also planted rows of trees in the steppe). Finally, at each nest we measured three demographic parameters, including (1) lay date (the date on which the clutch was complete) and thenumbers of (2) eggs, and (3) fledglings produced. We also calculated a fourth parameter that we called "offspring loss" and that we defined as the difference between the number of eggs produced and the number of fledglings produced.

Data Analysis. We built a series of generalized linear mixed models (GLMMs) fit with maximum likelihood methods to understand the response of each demographic parameter to variation in categorical environmental factorsthat we modeled as fixed effects.Because of the different constraints on and structures of the different demographic parameters we measured, we specified different distributions for each demographic response.

We evaluated performance of not only the full model (the response variable as a function of fixed effects for nest type, coloniality and land cover), but also the performance ofall combinations ofsub-models (n = 6) and of a null model ("Intercept only", with random effects but no fixed effects). We also evaluated the performance of two interactions among model parameters (Nest Type * Land Cover and Nest Type * Coloniality, included only in models with those two terms). We only included models with interactions in the final model set if the interaction term improved performance of the same model without the interaction. We used Akaike Information Criterion values corrected for small sample size (AICc) to rank models and estimate model weights, and we model averaged parameters across all models with full-model averaging to incorporate model selection uncertainty.

Results. Of the models describing variation in lay date, the one with the most support in the datahad a single fixed effect for nest type (39% of weight in our model set; Table 1). Model averaged estimates suggested that moving from a natural nest to a nest box changed lay date by -0.25 ± 0.086(SE) days (i.e., lay dates were earlier in nest boxes than in natural nests). All other model parameters were uninformative (i.e., confidence intervals for these parameters included zero).

No single model explained a large amount of the variation in egg production by Red-footed Falcons. The null model for egg production (with a random effect for year) had the most support in the data. All models in the model set were separated by a maximum ΔAIC of 5.59, and models with interactions performed poorly. There were no informative model parameters in the final averaged model.

The best model describing variation in offspring loss had 64% of the support in the data. This model had three terms, nest type, land cover and an interaction between those two parameters (Table 1). Model averaged estimates suggested that the least offspring loss was in a natural nest and that switching to a nest box on a forest edge increased offspring loss by 0.39 ± 0.20 (i.e., more offspring died in a nest boxon the forest edge than in a natural nest). There were no other informative model parameters in the final averaged model.

The best model describing variation in numbers of fledglings produced had 80% of the support in the data and was separated from the second model by a ΔAICc of 5.13. This first model again included terms for nest type, land cover and an interaction between the two parameters (Table 1). Model averaged estimates suggested that the greatest number of fledglings was in a natural nest on the forest edge, and that moving to a nest box on the forest edge resulted in a substantial decrease in fledgling production (-0.24 ± 0.12). There were no other informative model parameters.

Table 1. - Selection tables for models describing drivers of reproductive performance of Red-footed Falcons in unmanaged forest-steppe in north-central Kazakhstan. See text for details on models.

	Model	df	logLikelihood	AICc	weights
Lay Date	Nest Type	4	-806.543	1621.1	0.389
	NestType + Coloniality	5	-805.898	1621.9	0.269
	NestType + Land Cover	5	-806.439	1623.0	0.157
	NestType + Land Cover + Coloniality	6	-805.746	1623.6	0.113
	Coloniality	4	-810.468	1629.0	0.057
	Intercept only	3	-812.321	1630.7	0.003
	Land Cover + Coloniality	5	-810.422	1630.9	0.003
	Land Cover	4	-812.317	1632.7	0.001
# of	Intercept only	2	-995.361	1994.7	0.369

Eggs	Nest Type	3	-995.147	1996.3	0.166
	Land Cover	3	-995.355	1996.7	0.135
	Coloniality	3	-995.360	1996.8	0.135
	NestType + Land Cover	4	-995.123	1998.3	0.062
	NestType + Coloniality	4	-995.132	1998.3	0.061
	Land Cover + Coloniality	4	-995.354	1998.8	0.049
	NestType + Land Cover + Coloniality	5	-995.118	2000.3	0.023
Offspring Loss	Nest Type + Land Cover + Nest Type*Land Cover	6	-791.437	1595.0	0.644
	NestType + Land Cover	5	-793.779	1597.7	0.172
	NestType + Land Cover + Coloniality	6	-793.734	1599.6	0.065
	Nest Type	4	-796.263	1600.6	0.040
	Land Cover	4	-796.662	1601.4	0.027
	NestType + Coloniality	5	-795.822	1601.8	0.022
	Intercept only	3	-796.309	1602.7	0.014
	Land Cover + Coloniality	5	-796.657	1603.4	0.010
	Coloniality	4	-798.110	1604.3	0.006
# of Fledglings	Nest Type + Land Cover + Nest Type*Land Cover	5	-1063.352	2136.8	0.800
	NestType + Land Cover	4	-1066.932	2141.9	0.062
	Land Cover	3	-1068.397	2142.8	0.039
	NestType + Land Cover + Coloniality	5	-1066.715	2143.5	0.028
	Intercept only	2	-1070.201	2144.4	0.018
	Nest Type	3	-1069.218	2144.5	0.017
	Land Cover + Coloniality	4	-1068.345	2144.8	0.015
	NestType + Coloniality	4	-1068.515	2145.1	0.013
	Coloniality	3	-1069.829	2145.7	0.009

Discussion. Nest boxes are a widespread, cost-effective conservation tool whose implementation has multiple benefits to birds, science and society. Use of nest boxes in this study allowed us to gather a far greater number of measurements on falcon demography, with concomitant increases in the strength of our inference, than would otherwise be possible. Because of this, we were able to observe potential for unexpected demographic effects (e.g., an ecological trap; Schlapfer et al. 2002, Robertson and Hutto 2006) falcons faced by using some nest boxes.

The interaction between nest type and land cover illustratesthe unexpected consequences ofconservation actions for Red-footed Falcons (Table 1). There was weak evidence that lay dates in nest boxes were slightly earlier than in natural nests. Studies of other species suggest that early nesters are dominant individuals that arrive to nesting grounds earlier and in better condition than their peers (Marra et al. 1998, Harrison et al. 2011). However, there was good evidence that the subset of these nest boxes on forest edges had higher offspring loss and, consequentially, lower output of fledglings. Thus, Red-footed Falcons that nested earlier – presumably those that were dominant and in better condition – may have ended up in an ecological trap that depressedtheir reproductive success.

Nest boxes are known to be ecological traps in other settings. In Estonia, Great Tits (*Parus major*)that nested in boxes in food-rich deciduous forest laid eggs earlier and produced larger clutches,but those that nest in boxes in coniferous forest fledged more young that had higher return rates (Mänd et al 2005). Similarly, ducks of several species have lower reproductive success in nest boxes because of density dependence or higher brood parasitism (Schlapfer et al. 2002, Mänd et al. 2005).Likewise, Barn Owls hatched in nest boxes had lower survival than those hatched in church towers without boxes (Klein et al. 2007).

Although the functional cause of the lower quality of certain nest boxes at Naurzum is unclear, there are several possible candidate explanations. These include (1) a potential increase in predation rates at artificial nests on edges, (2) overheating in unventilated nest boxes exposed to greater sunlight on edges than in the interior, or (3) fluctuations in habitat quality such that edge habitats are better earlier in the season but become lower quality during the rearing phase.There is evidence from other systems to support all three of these explanations. Regardless of the cause, these circumstancesmay have minimal short-term relevance in transformed landscapes where nest boxes are the only good option to supplement breeding opportunities (e.g., Red-footed falcons in central Europe).

LITERATURE CITED

1 Bragin, E. A. 1989. Biology of birds of prey of pine forests of the Kustanay Steppe. Ph.D. dissertation, Kazakhstan Academy of Sciences, Almaty, Kazakhstan. [In Russian].

2 Brossard, D., B. Lewenstein and R. Bonney. 2012. Scientific knowledge and attitude change: The impact of a citizen science project. International Journal of Science Education. 27: 1099 – 1121.

3 Fehérvári, P., S. Solt, P. Palatitz, K. Barna, A. Ágoston, J. Gergely, A. Nagy, K. Nagy and A. Harnos. 2012. Allocating active conservation measures using species distribution models: a case study of red-footed falcon breeding site management in the Carpathian Basin. Animal Conservation. 15: 648 – 657.

4 Harrison, X.A., J.D. Blount, R. Inger, D.R. Norris and S. Bearhop. 2011. Carry-over effects as drivers of fitness differences in animals. Journal of Animal Ecology, 80: 4-18.

5 Klein, A., T. Nagy, T. Csörgő and R. Mátics. 2007. Exterior nest-boxes may negatively affect Barn Owl *Tyto alba* survival: an ecological trap. Bird Conservation International. 17: 273 – 281.

6 Katzner, T., E. Bragin, S. Knick and A. Smith. 2003. Coexistence in a multi-species assemblage of eagles in central Asia. Condor. 105: 538-551.

7 Katzner, T.E., E.A. Bragin, A.E. Bragin, M. McGrady, T.A. Miller & K.L. Bildstein. 2016. Unusual clockwise loop migration lengthens travel distances and increases potential risks for a central Asian, long-distance, trans-equatorial migrant, the Red-footed Falcon. Bird Study/Ringing & Migration. 63: 406-412.

8 Mänd, R., V. Tilgar, A. Lõhmus and A. Leivits. 2005. Providing nest boxes for hole-nesting birds – Does habitat matter? Biodiversity and Conservation 14: 1823 – 1840.

9 Marra, P.P., K.A. HobsonandR.T. Holmes. 1998. Linking winter and summer events in a migratory bird by using stable-carbon isotopes. Science 282: 1884–1886.

10 Møller, A.P. 1989. Parasites, predators and nest boxes: facts and artefacts in nest box studies of birds? Oikos 56: 421-423.

11 Purger, J. 2008. Numbers and distribution of Red-footed Falcons (*Falco vespertinus*) breeding in Voivodina (northern Serbia): a comparison between 1990-1991 and 2000-2001. Belgian Journal of Zoology 138: 3-7.

12 Robertson, B.A. and R. L. Hutto. 2006. A Framework for Understanding Ecological Traps and an Evaluation of Existing Evidence. Ecology 87: 1075 – 1085.

13 Schlapfer, M.A., M.C. Runge and P.W. Sherman. 2002. Ecological and evolutionary traps. Trends in Ecology and Evolution 17: 474-480.

ЛЕТНЯЯ ОРНИТОФАУНА УЧАСТКА БУРТИНСКАЯ СТЕПЬ ГОСУДАРСТВЕННОГО ПРИРОДНОГО ЗАПОВЕДНИКА «ОРЕНБУРГСКИЙ»

Summer avifauna of the site Burtinskaya steppe Orenburg national nature reserve

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АЗИЯ ДАЛАЛАРЫНЫҢ ЕРЕКШЕ ҚОРҒАЛАТЫН ТАБИҒИ АЙМАҚТАРЫ ЖӘНЕ ЖАНУАРЛАР МЕН ӨСІМДІКТЕРДІҢ СИРЕК КЕЗДЕСЕТІН ТҮРЛЕРІ

ОСОБО ОХРАНЯЕМЫЕ ПРИРОДНЫЕ ТЕРРИТОРИИ И РЕДКИЕ ВИДЫ ЖИВОТНЫХ И РАСТЕНИЙ АЗИАТСКИХ СТЕПЕЙ

PROTECTED AREAS AND RARE SPECIES OF ANIMALS AND PLANTS OF ASIAN STEPPES