The Rufford Foundation
Final Report

Congratulations on the completion of your project that was supported by The Rufford Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other format. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to jane@rufford.org.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Kateryna Konovalenko
Project title	Indirect status assessment of Siberian grouse (*Falcipennis falcipennis*) in Russian Far East
RSG reference	15851-1
Reporting period	September 2015 - Jun 2016
Amount of grant	£4250
Your email address	katarina.konovalenko@gmail.com
Date of this report	8 June 2016

1. Please indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
Collect habitat and forest structure data			X	Two field seasons have been carried out and the first empirical data set on the species habitat has been established.
Create local and regional habitat models		X		First local scale habitat model is produced. Robust regional models require more habitat data with wider spatial coverage.
Delineate most suitable Siberian grouse habitat patches		X		Requires a robust regional model based on geographically extensive habitat data. However the local model already outlines several important features of the Siberian grouse habitat.
Model the change in Siberian grouse distribution			X	Change in the species distribution has been modelled across the extent of the study region.
Improve local knowledge about the species		X		We stay in touch with our local partners and update them about the interim project results. Final results will be shared through the network of local partners.

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

The initial sampling strategy that was designed based on random points spread across several land cover types was altered to opportunistic sampling along the transects. This decision has been taken due to logistic difficulties. The geographical scope of the fieldwork has been more limited than expected.

Transects were situated along the forest roads as well as offroad. Random points at 200 m intervals along transects have been described. The team documented forest structure and signs of species presence. Ground truth data for land cover classification of satellite images was obtained by taking 360 degrees panorama pictures at the sampling points to achieve higher efficiency in field.

3. Briefly describe the three most important outcomes of your project.

1) The first data set on the habitat requirements of Siberian grouse has been collected.

Signs of Siberian grouse and hazel grouse (feathers, faeces, dust baths, footprints, and direct observations) were sampled both, along forest roads and cross-country transects. We found dust baths and molting feathers especially along forest road edges as well as in the roots of large fallen trees inside the forest. In Miochan mountain ridge, we directly encountered from 0.25 (early September) to 0.4 Siberian grouse/ km (late September) compared to only 0.13/km in Charpin-Baktor interfluve. Furthermore, we mimicked songs of territorial hazel grouse with a whistle. For all signs and additional random points at intervals of approximately 200m we mapped forest and vegetation structure within 20 m radius.

2) With the 295 sampling points and a finding rate of 10% the first empirical habitat model for Siberian grouse has been created.

To find correlates of Siberian grouse occurrence, we calibrated a generalised linear model with logit-link function, binary error terms and low collinearity between predictors (Spearmans ρ (Rho) < 0.5). The most parsimonious model with the lowest AIC (Akaikes Information Criterion) explained 20% of the deviance in the data. Three variables contributed to the model: proportion of coniferous trees (spruce and fir), proportion of birch, and proportion of rejuvenation in the forest. Siberian grouse positively responded to high amounts of coniferous trees in the forest and while high proportions of birch and rejuvenation decreased the probability of Siberian grouse occurrence (Fig. 1).

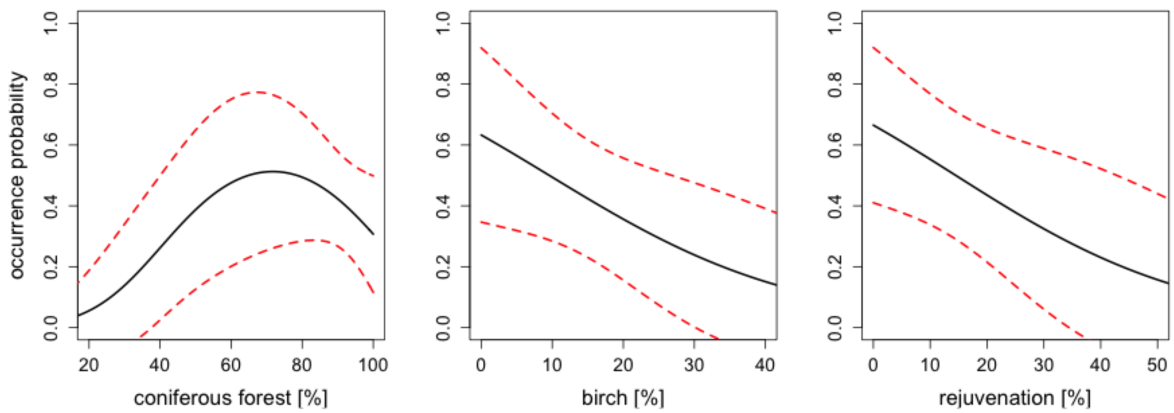

Figure 1. Partial dependence of Siberian grouse probability of occurrence on predictor variables (solid black lines). Hatched red lines demarcate the 95%-

confidence intervals. Graphs were plotted by varying the variable under consideration over the range of values, observed in the field, and keeping all other predictors in the model at their median values.

Our model emphasises the strong relationship between Siberian grouse and coniferous forests, which are dominated by Yezo spruce and Manchurian fir. The negative responses of Siberian grouse to high amounts of birch and rejuvenation otherwise propose that large scale clear-cut forestry with subsequent growth of dense, pure deciduous stands will negatively influence Siberian grouse habitat. As we found positive responses of hazel grouse to birch and rejuvenation, our results further suggest that the niches of sympatric Siberian and hazel grouse are separated along these gradients. This finding coincides with those from earlier studies where Hazel grouse responded positively to dense forests with high proportions of softwood and rejuvenation (Swenson & Angelstam, 1993; Bergmann et al., 1996; Åberg et al., 2003). High densities of hazel grouse may attract predators, which will then switch to other prey species (Andreev, 1990), a potential threat to Siberian grouse.

Interesting information can be derived from the field observations that are not yet included into modelling. Interim results suggest that larch is not obligatory during the breeding season. However, this has to be further investigated. So far the presence of hens with juveniles in late August/September and lekking of males in May suggest that the birds stay on the mountain ridge without any larch all year round. On the other hand, larch forests are only 4-5 km away, a distance that might be bridged by nesting hens. Radio-telemetry and other observations also suggest that raspberry plays an important role as cover and food. Birds seem to like forest gaps where grass is taller and raspberry bushes are well developed.

3) Analysis of the land cover changes over the last 30 years has been accomplished.

We classified Landsat images and distinguished different forest types and clear cuts. Imagery was acquired from Landsat Archive via USGS earth explorer. In order to create a time series, seven satellite images covering a 30-year time period starting in 1985 were processed.

The time series consisted of 5 year time steps. Images from early to mid-September were given a preference due to the minimal cloud cover and improved spectral discretion between vegetation types. For the first three time steps we relied on images from December (1985, 1995) and April (1990). We performed an automatic (supervised) classification, first. However, a manual (digitization) classification turned out more precise.

The main outcome of remote sensing analyses was the detection of an almost two-fold increase in clear-cuts and subsequent successional stages from 23% to 44% in the last 10 years. Fig. 2 describes the change in land cover in the study region over the timespan of our analysis. The share of area under forest clear cuts (shown in light blue) has increased in two steps. In 1990 clear cuts occupied 2.6% compared to 0.7% in 1985. The next increase occurred in 2005 when the area of forest under clear cuts reached 4.2%. The share of the area affected by clear cuts in the last 30 years sums up to 15% of the study site (cumulative function is demonstrated by purple line on the graph). Forestry had the strongest effect on the proportion of larch-ledum and evergreen coniferous forests that have declined by 8.4% and 4.4% respectively.

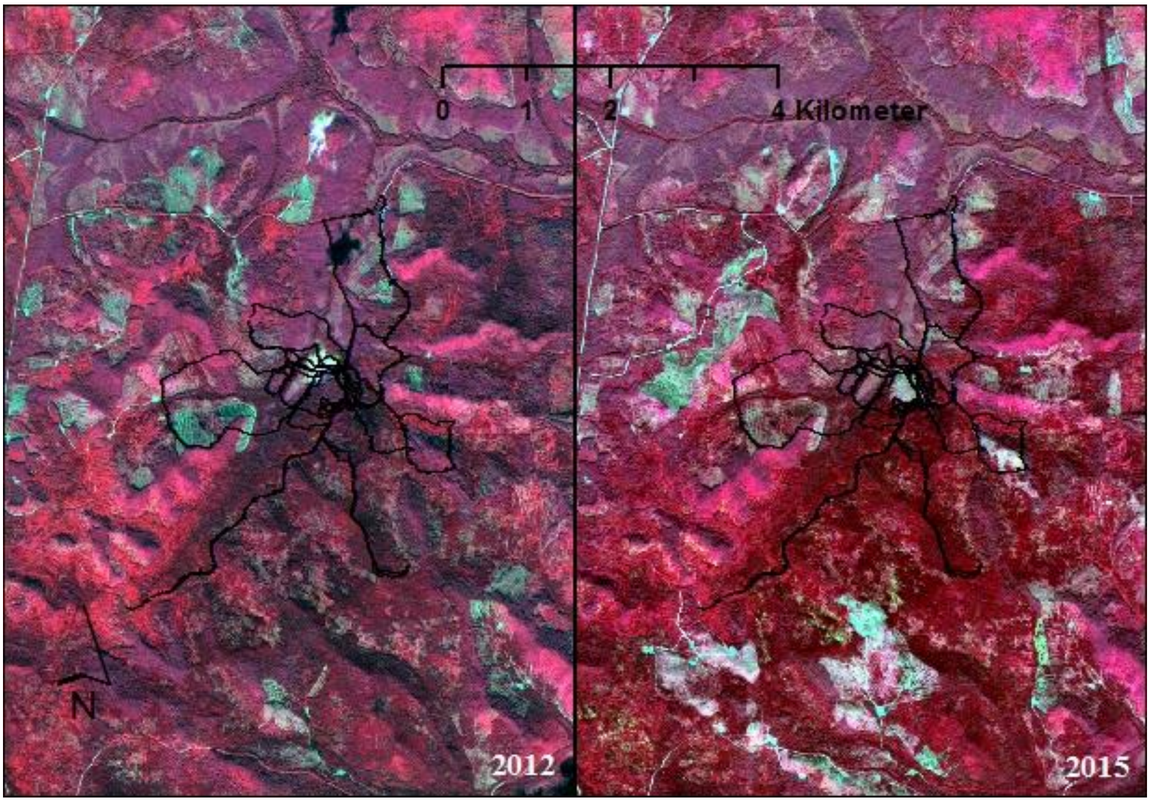

Fig.2. A change in land cover composition in the study area between 1985 and 2015 according Landsat imagery analysis.

Significant increase in clear-cut area within a 3-year period can be detected visually on the following two RapidEye satellite images (Fig. 3). The results from habitat modelling and remote sensing suggest that the Siberian grouse population in Charpin-Baktor interfluve and similar regions that undergo intensive forestry may strongly decline in the future.

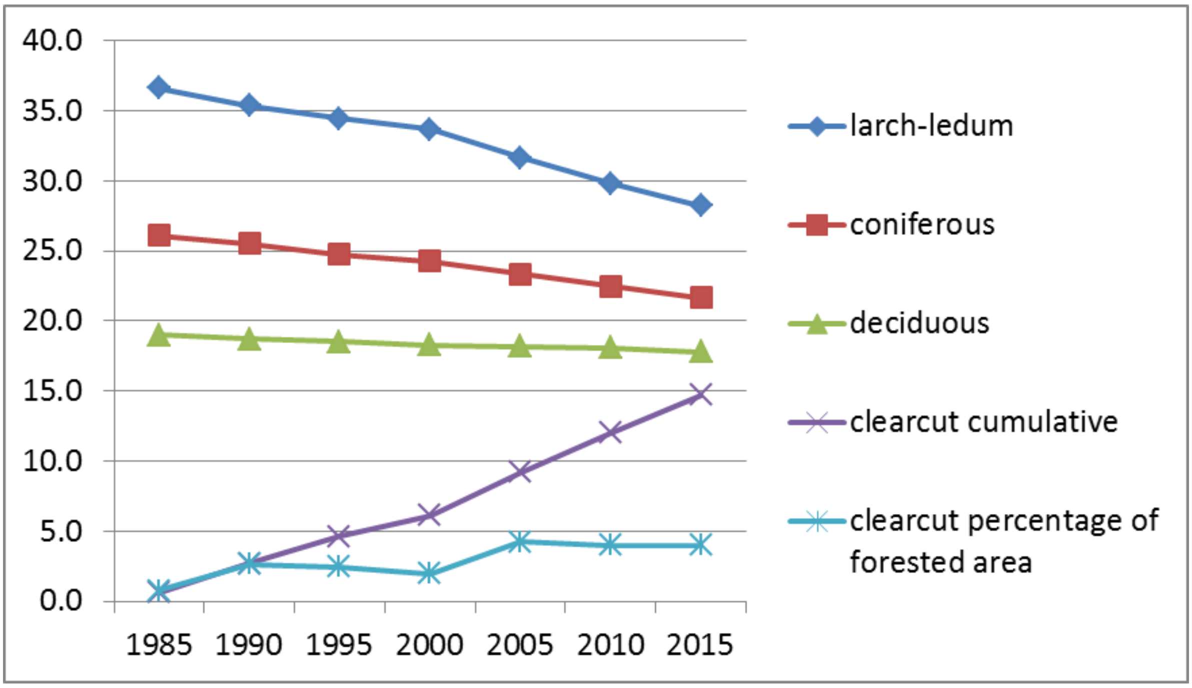

Figure 3. RapidEye satellite images from September 2012 (left) and 2015 (right) from the center of Charpin-Baktor interfluve. Active vegetation is displayed in red, clearcuts appear in green with striped pattern. Solid black lines are transects walked during fieldwork in September 2014. New clear-cuts in 2015 are highly visible south and west from these transects.

4. Briefly describe the involvement of local communities and how they have benefitted from the project (if relevant).

5. Are there any plans to continue this work?

The Landsat and RapidEye satellite scenes will be further processed to allow estimates of transition rates between successional stages and thus temporal analyses of Siberian grouse habitat. We will also work on improving our Siberian grouse habitat model with the inclusion of detection probabilities based on repeated surveys from past years. Another field session was carried out in May 2016. Its main objectives were to retrieve Siberian grouse individuals that had been marked and radio-tagged during September 2015 by Professor Alexander V. Andreev but also to further investigate the roles of certain forest structures as well as that of forestry on the occurrence of sympatric Siberian and hazel grouse.

6. How do you plan to share the results of your work with others?

Results will be presented in two peer reviewed publications and shared in research and NGO network of the region via our local contacts (Prof. Andreev, WWF and research department of Bureinski Nature Park). Currently a publication on the habitat selection in Siberian grouse is being prepared.

7. Timescale: Over what period was The Rufford Foundation grant used? How does this compare to the anticipated or actual length of the project?

The Rufford Foundation Grant has been used over the field season that has taken place from 20.08.2014 to 28.09.2014. The remaining funds have been used to cover the costs of international transport to the field site in August-September 2015.

8. Budget: Please provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used.

Item	Budgeted Amount	Actual Amount	Difference	Comments
International transport	1400	1600	-200	Exchange rate: **1 GBP = 60 RUB**
Car rental for 1 month	1080	0	1080	The group was not able to rent a car for fieldwork.
Fuel	350	0	350	The group was not able to rent a car for fieldwork.
Local transport	0	530	-530	Instead of a car public transportation has been used.
Food	500	580	-80	Food prices have been underestimated.
Local salaries (an assistant and a driver)	320	0	320	Salaries for driver and field assistant have not been used.
Guides in nature reserves	600	430	170	The region that has been covered by observations has been much smaller than initially planned. Therefore services of guides were used to a smaller extent.
Total	4250	**3140**	1110	The spared funds are going to be used in a following field campaign (August-September 2015)

9. Looking ahead, what do you feel are the important next steps?

Stakeholder involvement. The project would strongly profit from involvement of more local people in data collection. This could be efficiently achieved by reaching out to local University students and research organisations. This step would help us to reach two objectives: increase the outreach of the project and data speed up field data collection. Moreover, locals may be more successful in obtaining historical data from the forestry departments and regional authorities. Consequently, the strategic objectives of the project would be achieved within a narrower timeframe.

Designing a suitable sampling system. The project team faced difficulties applying the stratified random design based on classified satellite data. The main reasons were: 1) difficulty of access and orientation in an unknown area, and 2) increased amount of time needed to approach and the proposed sampling points. A sampling design currently used balances the accessibility by road network with sufficient coverage of the forest types and time/labour intensity of the sampling effort. The main challenge lies in including new study sites and thus extending the scope of the study.

10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the RSGF receive any publicity during the course of your work?

T. Ludwig, R.Siano and A. Andreev, 2015. A reconnaissance travel to the Okhotsk taiga in the Russian Far East. - Grouse news 49: 8-14.

Ludwig, T., Andreev, A. V, and Siano, R. (2015). Auswirkungen von Kahlschlägen auf das Sichelhuhn Falcipennis falcipennis: erste Ergebnisse zweier Forschungsreisen in die Ochotskische Taiga in Fernost-Russland. Vogelwarte 53, 368–369.

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ANDREEV, A. (1990) The winter biology of Siberian spruce grouse (Falcipennis falcipennis) in the Priamurye. *Zoologichesky Zhurnal*, 69, 69–80. MEZHDUNARODNAYA KNIGA 39 DIMITROVA UL., 113095 MOSCOW, RUSSIA.

BERGMANN, H.H., KLAUS, S., MÜLLER, F., SCHERZINGER, W., SWENSON, J.E. & WIESNER, J. (1996) Die Haselhühner. Westarp Wissenschaften, Magdeburg, Germany.

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SWENSON, J.E. & ANGELSTAM, P. (1993) Habitat separation by sympatric forest grouse in Fennoscandia in relation to boreal forest succession. *Canadian Journal of Zoology*. .