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Private landowners and protected species: What sort of noncompliance should we be worried about?

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ABSTRACT

Species protection legislation has been used as one of the main approaches in conservation – yet in many cases we know only little about the effectiveness and side-effects of such regulation. Noncompliance can limit effectiveness of legislative protection, and deliberate harmful actions by landowners have sometimes been reported as a response to restrictions. We studied attitudes of 186 Finnish forest owners toward the protection of Siberian flying squirrel *Pteromys volans* – a species which is protected according to the European Union Habitats Directive and is a well-known example for species protection in Finland. We explored the attitudes and claims of harming protected species by comparing the responses of persons with and without direct experience of legal protection by structural equation modelling. We found that experience did not explain forest owners' attitudes toward having the species in their forest. Claims of harming protected species were connected to policy attitudes and should be interpreted as a political phenomenon: they reflect political discourse on conservation policy and are a part of debate between stakeholders. Accidental and reckless noncompliance seem more important phenomena than intentional harming, especially as the chance in Finnish Nature conservation likely Act likely affects information of nest sites on logging areas. Other instruments than legislative protection of known nest sites might be more effective in protecting the flying squirrel population.

1. Introduction

When a species becomes endangered, the expected course of collective policy response is to protect it by international treaties and national legislation (Epstein, 2006). During the recent decades, some steps to go even further have been taken: e.g. member states of the European Union have agreed to protect a wide range of species and habitats by the so-called Nature Directives: the Birds Directive (2009/147/EC) and the Habitats Directive (92/43/EEC).

Despite the Nature Directives are implemented for the most part, a recent evaluation showed that the conservation status of a very high proportion of protected species and habitats is still unfavourable (European Commission, 2011, 2015; European

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Parliament, 2016). One of the major challenges for effective implementation of the Directives has been stakeholder engagement (European Parliament, 2016). Conflicts with local people have frequently occurred when the Directives have been put into practice through national legislation; for example, establishment of the *Natura 2000* protected area network resulted some severe local conflicts (Hiedanpää, 2002, 2011; 2013; Grodzinska-Jurczak and Cent, 2011; European Parliament, 2016). Also, some of the protected species, like wolves, are still under a threat due to local resistance and persecution (e.g. Borgström, 2012; Liberg et al., 2012; Gangaas et al., 2013; Fairbrass et al., 2016; Pohja-Mykrä, 2016).

Case-specific analyses can be used not only in solving existing implementation problems, but also in choosing the most effective policy options in the future. The Siberian flying squirrel *Pteromys volans* (henceforth the flying squirrel), currently found in the EU only in Finland (Santangeli et al., 2013) and in Estonia (Timm and Kiristaja, 2002), is one of those species of which protection by the EU legislation has generated negative public discourses and faced resistance (see Nygren and Jokinen, 2013; see also Section 2.1). The flying squirrel is included in Annex IV a of the Habitats directive (92/43/EEC). Article 12 (1) of the Directive obliges member states to establish a system of strict protection for these species and to ban the 'deterioration' or 'destruction' of all 'breeding sites' and 'resting places' of them. This ban has had certain implications for forest management in Finland (see section 2.1.). As from 60 to 90% of forest is privately owned in the species distribution area in southern Finland (Finnish Forest Research Institute, 2012, 2014; see also Appendix 2), private forest owners can play a major role in determining the future for the species.

Landowners can see command-and-control approaches in nature protection as a risk for their economic or other interests. They may, therefore, try to remove the protected species or destroy protected habitats before the government places restrictions on how landowners may use their property (the so called '*Shoot, Shovel & Shut Up*' -method; see e.g. Brook et al., 2003; Lueck and Michael, 2003; Zhang, 2004). In the case of the flying squirrel, violations of law are almost impossible to detect due to the lack of information on nest sites (see Jokinen et al., 2015) and the lack of supervision. It has been claimed that some Finnish forest owners fell on purpose those trees that are important for flying squirrels (see Section 2.1), but conclusions about support for conservation cannot be drawn solely from such stories (see Winslott-Hiselius et al., 2009). Neither can we completely rely on direct questioning as personal or social reasons, like social norms (see Gavin et al., 2010; Steinel, 2010), may motivate respondents to provide modified answers in certain situations. Authorities and restrictions can be resisted non-communicatively as well as communicatively. Poaching of wolves is an example of non-communicative resistance (Pohja-Mykrä, 2016), but stories of harmful actions against protected species could be used in 'stakeholder game' (see Hiedanpää and Bromley, 2013). If such stories are reproduced to impact policy, perhaps some of them are also fabricated for this reason.

In this study, our goal was to achieve a better understanding on forest owners' reactions when they have found out that their forest is occupied by the species or when they have faced some restriction for forest management because of it. Information on forest owners' reactions can be used for estimating the risk of negative actions and thus helps to find the right balance between informative, legal-administrative and economic steering.

1.1. Theoretical background and study hypotheses

A complex set of values, norms, attitudes, beliefs, goals, former life experiences and institutional and situational factors could explain behavioural intentions and actions of Finnish forest owners toward the species. In this study, we did not try to measure all those variables. Instead, we focused on the effect of *experience on the legal protection procedure* for the flying squirrel (henceforth ELPP) on forest owners' verbal responses to a set of statements. Measuring agreement or disagreement is used commonly in studies on attitudes. 'Attitude' can be understood as a latent, theoretical construct that explains the relationship between stimulus events and the individual's responses (DeFleur and Westie, 1963). A relevant stimulus event arouses a person's cognitive, affective, and/or behavioural processes. These processes produce an attitude toward the object involved in the stimulus situation, and the presence of the attitude give rise to observable verbal or nonverbal behavioural reactions to the attitude object (DeFleur and Westie, 1963; Ajzen, 2005). We thus measured the verbal behavioural reactions to the attitude object. In addition, we gave forest owners the choice to say if they are trying to favour or harm the protected species that occur on their lands (or if they are doing neither). We interpreted the responses as a measure of forest owner's willingness and motivation to present claims that forest owners are harming protected species.

It is suggested, that behaviour is guided mainly by strong attitudes, while weak attitudes may instead follow behaviour in accordance with self-perception principles (Holland et al., 2002). In this case, we expect that attitudes toward one's own forest should be relatively strong because of the direct connection to oneself. And, as the attitude object is one's own forest and forest management, these attitudes should also be connected to forest owner's actions. On the other hand, attitude items that represent more abstract and general level attitudes e.g. attitudes related to national conservation policy, could be weaker and have limited predictive power on actions. If experience affect these attitudes, strong attitudes and person's behaviour should impact on the direction of their change (Holland et al., 2002).

We were interested in differences between experienced and non-experienced forest owners for the following reasons. Direct experience in the legal protection procedure and information of species occurrence in one's own forest could be stimulus events that activate norms and attitudes related to either personal interest or to altruistic responsibility toward nature. Direct experience is also known to increase the association between the attitude and behaviour by means of increased accessibility of attitudes (see Glasman and Albarracín, 2006), Likewise, experience increases the ability to either favour or harm the animals as forest owner gets information on the locations of nest sites. Last but not least, experience should affect

the perceived limitations to personal freedoms and perceived risk of restrictions (see e.g. Folkes, 1988), and person's reactions to experience and risk of restrictions could be used to predict his/her likely actions.

According to reactance theory (Brehm, 1966), individuals will experience an adverse state of arousal when his/her behavioural freedoms are threatened. This can be observed in verbal reports of attitudes or perceptions, or sometimes in behaviour directed at exercising the threatened freedom or attacking the source of the restriction (see Laurin et al., 2012). Thus, reactance theory would predict that forest owners with logging restrictions or risk of restrictions should experience higher level of reactance toward protection compared to non-experienced forest owners. We assume that if experience of protection increases reactance among forest owners, this could also indicate high risk of negative actions.

Consistency theories offer an alternative prediction for how people should respond to restrictions. It is known that people try to maintain consistency among their 'cognitive elements': e.g. items of knowledge, information, attitudes and beliefs that a person holds about himself or herself, others or the world (Festinger, 1957). When person's freedoms are restricted, he/she can engage in cognitive processes that serve to cast the restrictions in more positive light especially if the restrictions are complete, certain, and permanent (e.g. Kay et al., 2002). This rationalization of restrictions might not happen in the case of the flying squirrel as logging restrictions are temporary, but cognitive dissonance might still be relevant as it can explain change in beliefs and attitudes (for a review of theories about attitude change see e.g. Oskamp and Schultz, 2005). For example, cognitive dissonance can lead to self-persuasion (see Aronson, 1999), that can induce denial of the negative effects of one's actions. In this case, it could be that forest owners deny the ecological effects of forestry, and specifically the vulnerability of the flying squirrel.

Based on the theories and reasoning represented above, we made following hypotheses (see Fig. 1.):

1) Negative attitudes are explained by reactance and/or observed effects of the protection and logging restrictions for the forest owner (e.g. Laurin et al., 2012).
2) Alternatively (or in addition) the perceptions on the issue could be biased by underlying attitudes (e.g. Holland et al., 2002)

We also hypothesise that:

3) Presenting stories about personal intentions of harming protected species could indicate real actions against protected species. Direct experience of legal protection can activate negative attitudes and as a result lead to harmful actions (e.g. Glasman and Albarracín, 2006).

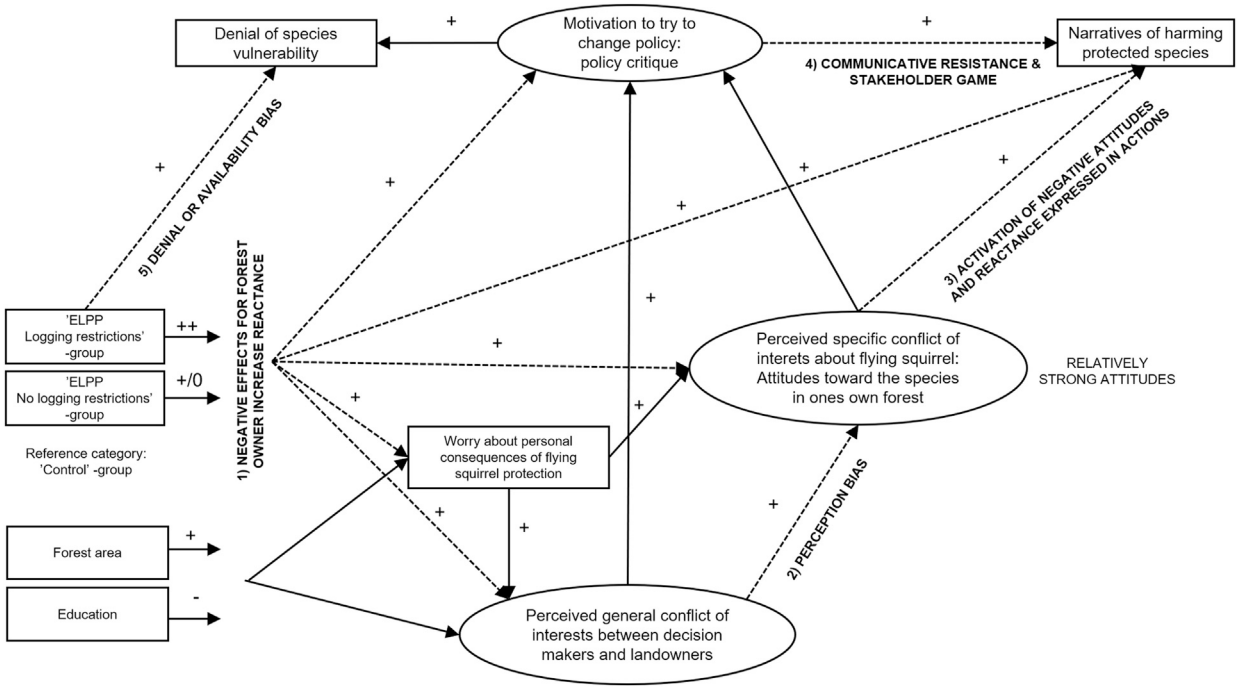

Fig. 1. Simplified diagram of all our alternative study hypotheses (with dashed lines) and processes (solid lines) evaluated with the full model structural equation model (SEM). Rectangles represent measured variables; ovals the latent variables of the SEM. The experience on the legal protection procedure is abbreviated as 'ELPP' (see Section 2.2). Arrows show tested effects: the predictive relationships between the variables (regression paths). The expected direction of correlations are marked with "-" (negative correlation between the variables) and "+" (positive correlation between the variables). In case of the effect of experiences, we expect that the effect of logging restrictions should be stronger ("++") than the effect of experience without logging restrictions (either "+" or "0" = no effect).

4) Alternatively (or in addition) these stories could be a form of verbal defiance and connected to attempt to affect the protection policy (e.g. Hiedanpää and Bromley, 2013).

And that:

5) Forest owners who have observed the species in their forest may claim that it is not vulnerable either because they deny the negative effects of forestry (e.g. Aronson, 1999), or because availability bias affects their interpretations (Tversky and Kahneman, 1973).

2. Methods

2.1. The context of the study: legal protection procedure for the flying squirrel in Finland

Forestry has been heavily regulated by law in Finland. Until very recently, forest owners had very limited freedoms to choose how their forest property was managed; e.g. uneven-aged forest stands were not allowed and there were age and diameter limits in regeneration.

Supervision of compliance with the law is largely based on the obligation for forest owner or the holder of the felling rights to notify Forest Centre before felling for commercial use (Forest Act 1093/1996). Forestry Centre has also a register of flying squirrel observations (updated by environmental authorities) and notifies the regional environmental authority (Centre for Economic Development, Transport and the Environment), forest owner and the holder of the felling rights if planned felling site overlaps with observations of the species. During 2005–2016 the regional environmental authority had to determine the permitted management of the forest in such cases (Finnish Nature Conservation Act 1096/1996). Authorities visited felling sites with the forest owners prior to harvest and searched faecal pellets and potential nest sites of the species. If a breeding site and resting place was found, its size was usually determined to be less than 0.3 ha (Jokinen et al., 2015). Such small areas have been considered economically insignificant by the legislator and, therefore, not compensated financially. Based on the number of forest owners and authority decisions, about one of 400 Finnish forest owners had personal experience on flying squirrel protection procedure at the time of the survey, but only half of them had some restrictions (Jokinen et al., 2015).

Although legal protection of the species has affected so small proportion of forest owners and restrictions have been mostly miniscule, the public discourse has many times been strongly negative: '*The flying squirrel stole the Christmas Spirit*', stated for example a headline in Aarre magazine (a Finnish magazine for forest owners, November 2014, translation by authors). Moreover, protection has been presented as a reason for harmful actions against the species: '*There are many true stories about cases where the favourite trees of flying squirrel are felled before all others. This ensures that the squirrel will not find appropriate nesting trees and the forest owner need not worry about protection measures when logging the forest.*' (Forest.fi, Webpage of the Finnish Forest Association, October 1, 2015). Also, the need for legal protection is questioned: '*When flying squirrels were counted last time in Finland, the result was 143 000 females … …The number of elks in Finland is 1/3 of that number. So, if the flying squirrel is vulnerable, then the elk must be endangered. Yet, 30 000 elks were shot last year.*' (Lauri Kotro, editor in chief, Finnish newspaper 'Maaseudun tulevaisuus' meaning: 'the Rural Future', 30.05.2014, translation by authors).

Due to a change in the Nature Conservation act in 2016, environmental authorities are not setting boundaries for breeding sites and resting places anymore; instead of doing primary control they will give advices and do ex-post supervision (Ministry of environment, 2015). Forest owners can thus have bigger role in conservation of the species.

2.2. The survey and sampling

We carried the telephone interview survey between June 1, 2014 and 15 May 15, 2015. The full questionnaire (Appendix 1) includes a series of questions and arguments concerning beliefs, opinions and attitudes and relevant background factors.

We selected the sample representing forest owners who have experienced the legal protection procedure of those persons who had been contacted by regional environmental authorities because of the flying squirrel during the past three years ($n = 81$). Out of these respondents 48 had forest management restrictions because of the flying squirrel and formed the 'ELPP logging restrictions' group, while 33 had no restrictions because of the species and formed the 'ELPP no logging restrictions' group. Contact information for the 'Control' group (no ELPP no logging restrictions, $n = 105$), was randomly drawn from the register of Central Union of Agricultural Producers and Forest Owners, MTK.

As response activity of different forest owners could lead to sampling bias, we carried out a dropout analysis (Appendix 2). The study area consists of the main part of the species distribution area in Finland (Fig. 2). Dropout analysis (Appendix 2) indicated that our sample of forest owners represent the general forest owner population quite well. Size of the forest estate and forestry activity differed between the control group and flying squirrel experienced groups, and this was taken into account in analyses.

Fig. 2. Study area and distribution of flying squirrel in Finland (see Santangeli et al., 2013).

2.3. Factor analysis

We used exploratory factor analysis EFA (SPSS: Extraction: maximum likelihood, Rotation: Varimax), to reduce the number of variables used in further analysis.

We constructed three latent variables: i) perceived 'General conflict of interests between decision makers and land-owners'; this was expressed as worry of property rights because of nature protection and the power of the EU, ii) perceived 'Specific and personal conflict of interest' over flying squirrel protection; this was expressed by attitudes toward the flying squirrel and its conservation in one's own forest and, iii) 'Policy critique'; this was expressed by attitudes toward species' conservation policy and its justification with species vulnerability (see Table 1). We had also some individual questions or arguments (see Table 1) that were not included in the model but are represented in section 3.

Relationships between measured background variables, latent variables, feelings of worriedness over flying squirrel conservation in one's own forest and claims of harming protected species (see Table 1) were tested with structural equation modelling (SEM).

2.4. The structural equation model

We tested all potentially relevant background variables (Appendix 2, e.g. Uliczka et al., 2004) and paths in the full model. SEM with Bayesian estimation-method (Markov chain Monte Carlo MCMC algorithm) was used because the model included an endogenous variable that was binary. A 'non-informative' uniform distribution from -3.4×10^{-38} to 3.4×10^{38} was used as prior distribution for parameters.

The model was trimmed by removing insignificant hypothetical paths according to 95% confidence limits to get the value of posterior predictive p as nears as 0.5 as possible. The trimmed model is presented in Fig. 3 and the model estimates in Table 2. The overall convergence statistic (C.S.) was <1.002 for both models; posterior predictive $p = 0.39$ and 0.42 for the full and trimmed model, respectively.

All analyses were made with IBM SPSS statistic 23 and IBM SPSS AMOS 24 software packages.

3. Results and discussion

3.1. Reactance without personal experience is common

As one might have expected on the basis of public debate in Finland, we observed relatively high proportion of negative attitudes toward the flying squirrel protection. Out of the respondents in the control group 39.1% disagreed or somewhat disagreed with the statement that they would like to have flying squirrels in their own forest. Effect of strict protection and negative publicity was seen in expressed worriedness over the effects of protection for forest owners. Out of all respondents 56% said that they would be worried about losing their freedom of making forest management decisions if their forest would be occupied by flying squirrels, and 39% were worried about the economic consequences. Negative effect of protection was further proved by the difference of responses toward nest boxes for pygmy owls vs. nest boxes for flying squirrels: while only 3.8% of respondents of the control group disagreed or somewhat disagreed to take nest boxes for the Eurasian pygmy owl *Glaucidium passerinum,* 52.4% did so to flying squirrel nest boxes. The pygmy owl is also a protected species but is protected

Table 1
Construction of latent variables of the SEM, background variables included in the full model and individual attitude items used in the model. The table presents the attitude sum variables and their reliability indexes (Cronbach's Alpha for 3-item variables and by Spearman-Brown for 2-item variables).

	Variables	Components of the variable: arguments or questions	Coded variable	Reliability	Mean	SE	SD
Latent variables	General conflict of interests between decision makers and landowners	I am worried that I cannot manage my forests as I like because of nature protection.	agree (= 5), somewhat agree (= 4), neither agree nor disagree (= 3), somewhat disagree (= 2), or disagree (= 1). *Transversed scale	0.562	3.56	0.11	1.50
		It is a bad thing that the EU has restricted local authority's power to make decisions.			4.34	0.08	1.08
		There is already too much protected forest in Southern Finland.			2.97	0.09	1.21
	Specific and personal conflict of interests	I am happy that I have, or I would like to have, flying squirrels in my forest.*		0.742	2.75	0.12	1.58
		I would allow introduction of nest boxes for the flying squirrel in my forests.*			3.41	0.12	1.67
	Policy critique	Flying squirrel is vulnerable in Finland because the population has been declining ever since the 1940s.*		0.777	3.31	0.10	1.38
		It is a good thing that we try to stop the decline of the flying squirrel population.*			2.39	0.10	1.35
		There are already too much restrictions for logging because of the flying squirrel.			3.73	0.09	1.26
Background variables	Dummy: ELPP Logging restrictions -group		Yes = 1, other = 0. Declared as ordered-categorical, the variable's variance is fixed at a constant.				
	Dummy: ELPP no logging restrictions -group		Yes = 1, other = 0. Declared as ordered-categorical, the variable's variance is fixed at a constant.				
	Forest area		Lo_{10} transformation made for linearity				
	Highest formal education		Primary school = 1, basic education or comprehensive school (9 years) = 2, upper secondary education = 3, higher education = 4				
Individual attitude items	Claims to harm protected species	Do you take nature values like endangered or rare species into consideration when you decide how do you like to manage your forest? a) No effect, b) tries to manage the forest so that the nature values of the forest stay the same or increase, c) tries to manage the forest so that protected nature values will not develop.	Harming of the protected species or nature values: try to manage the forest so that protected nature values will not develop = 1, else = 0. Declared as ordered-categorical, the variable's error variance is fixed at a constant.				
		In the case your forest would be occupied by flying squirrel, would you be worried about economic costs or/and your freedom to decide how you manage your forest?	Not worried either = 0, worried one but not other = 1, worried both = 2				
		I would allow introduction of nest boxes for the European pygmy owl in my forests.	Agree (= 5), somewhat agree (= 4), neither agree nor disagree (= 3), somewhat disagree (= 2), or disagree (= 1).		4.57	0.07	0.97

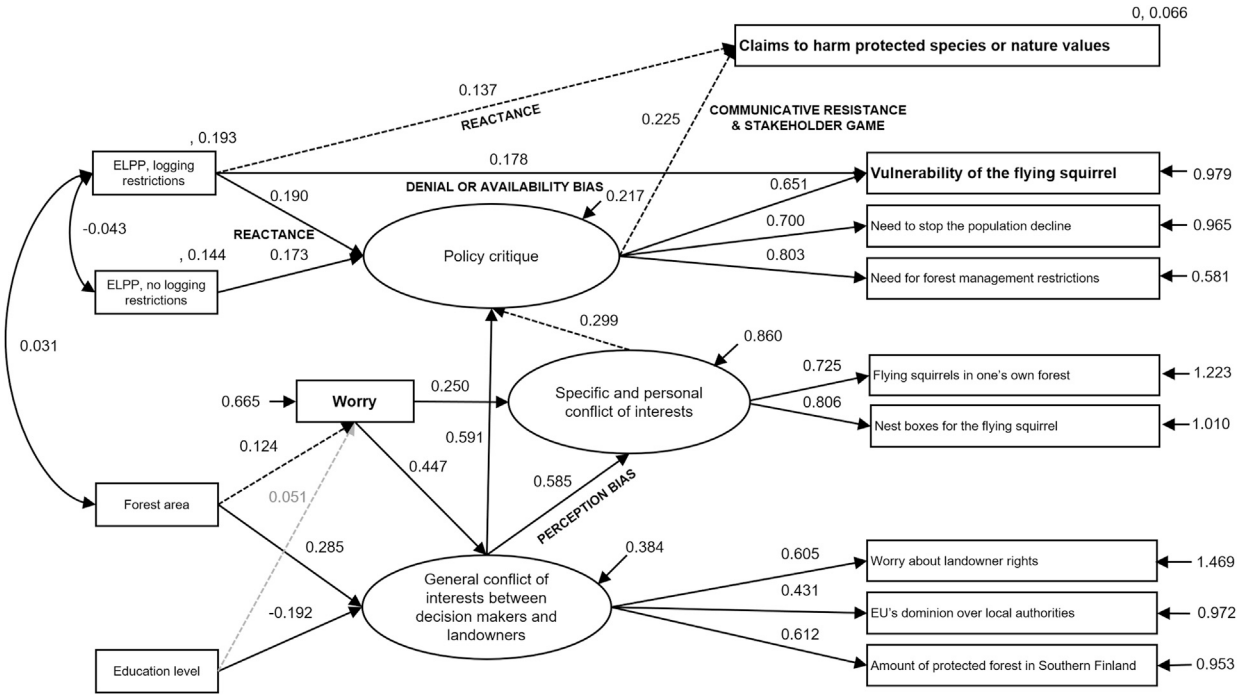

Fig. 3. The trimmed SEM. Standardised direct effects for the paths considered as significant according to 95% confidence limits (continuous black arrows), nearly significant paths (dotted black arrows), and non-significant paths (dotted grey arrows). Rectangles represent measured variables; ovals the latent variables. Parameter values and credibility intervals are reported in Table 2.

Table 2
The marginal posterior distribution of model parameters. Posterior means, S.D. (analogous to the S.E. in maximum likelihood estimation) and Bayesian 95% credibility intervals for the full model.

			Posterior Mean	S.D.	95% Lower bound	95% Upper bound	Significance
General conflict of interests	←	Forest area	0.448	0.135	0.199	0.721	*
General conflict of interests	←	Education	−0.149	0.063	−0.279	−0.027	*
General conflict of interests	←	Worry	0.404	0.084	0.24	0.572	*
General conflict of interests	←	ELPP logging restrictions	0.134	0.157	−0.179	0.437	
General conflict of interests	←	ELPP no logging restrictions	−0.066	0.176	−0.418	0.273	
Specific conflict of interests	←	General conflict of interests	1.067	0.263	0.614	1.643	*
Specific conflict of interests	←	Worry	0.428	0.17	0.072	0.747	*
Specific conflict of interests	←	ELPP logging restrictions	−0.022	0.241	−0.492	0.446	
Specific conflict of interests	←	ELPP no logging restrictions	0.442	0.295	−0.118	1.041	
Policy critique	←	General conflict of interests	0.751	0.264	0.336	1.352	*
Policy critique	←	Specific conflict of interests	0.222	0.134	−0.063	0.459	nearly
Policy critique	←	ELPP logging restrictions	0.369	0.168	0.031	0.702	*
Policy critique	←	ELPP no logging restrictions	0.472	0.189	0.125	0.861	*
Claims to harm	←	Policy critique	0.055	0.049	−0.039	0.151	nearly
Claims to harm	←	Specific conflict of interests	0.015	0.034	−0.051	0.084	
Claims to harm	←	ELPP logging restrictions	0.09	0.051	−0.012	0.188	nearly
Claims to harm	←	ELPP no logging restrictions	−0.004	0.055	−0.11	0.105	
Worry	←	Forest area	0.2	0.127	−0.055	0.449	nearly
Worry	←	Education	0.042	0.062	−0.081	0.163	
Worry	←	ELPP logging restrictions	0.156	0.143	−0.122	0.441	
Worry	←	ELPP no logging restrictions	−0.153	0.161	−0.475	0.161	
Vulnerability	←	ELPP logging restrictions	0.567	0.198	0.187	0.958	*
Vulnerability	←	ELPP no logging restrictions	−0.164	0.166	−0.487	0.158	

mainly from hunting. Therefore, while the flying squirrel has been in media headlines in the context of the EU directives, legal protection and different restrictions to landowners, the pygmy owl is usually represented just as one of the owl species. As flying squirrels and pygmy owls use similar nest boxes, our results mean that forest owners' attitudes toward the same conservation measure (setting nest boxes) depends whether the measure is framed as conservation of flying squirrels or conservation of something else.

3.2. Personal experience generates reactance towards the conservation policy

The observed risk (Laurin et al., 2012) and magnitude of restrictions (Rains and Turner, 2007) should, in theory, affect occurrence of reactance. We hypothesized (Fig. 1., hypotheses 1) that if experience and negative effects on forest owners explain negative attitudes, ELPP and logging restrictions should increase reactance, and this could be seen in attitudes. We found that ELPP or logging restrictions did not affect the perceived conflict of interest, while vested interests (the size of the forest estate) and educational level had expected effects. ELPP and logging restrictions seemed to increase disagreement with the protection conservation policy (see Fig. 3 and Table 2.). Thus, the results support our alternative hypothesis (Fig. 1., hypothesis 2): underlying attitudes explain forest owners' perceptions on the matter (see Fig. 1, Hypothesis 2). Perceived general conflict of interest between decision makers and landowners, and worry about landowner's right, explained attitudes toward species' conservation in one's own forest (Fig. 3., Table 2). Attitudes toward a formerly rather unknown and ignored species seem to be now framed from the perspective of attitudes toward private property rights, rural-urban conflict, and power of the EU.

Negative attitudes toward the species seem somewhat disproportionate compared to actual consequences for forest owners (see section 2.1). Indeed, contrary to the high degree of expressed worry, most respondents seemed to perceive authorities and their decisions as fair and appropriate (see Tyler, 2003): out of the experienced respondents 52 (64%) said that they were mostly satisfied to authority's actions and decision concerning their forest management, while only 16 (20%) respondents said that they were mostly unsatisfied to the decision. It seems that while Finns may be critical toward EU-level regulation on nature conservation on a general level (see European Commission, 2013b), forest owners have mostly positive opinions about national authorities they have interacted with.

3.3. Claims of harming protected species: mainly communicative resistance?

Although forest owners were mostly satisfied to authority's actions, logging restrictions seemed to provoke claims of harming protected species (Figs. 3 and 4(a), Table 2). In the logging restriction group ¼ of respondents said that they are taking negative actions against the flying squirrel. In most cases when respondent said that they are harming protected species they said that they were worried about their freedom to use their land; economic reasons seemed to be less important. There has been somewhat similar situation in USA, where the property right movement has fought against the Endangered Species Act in USA by claiming it forces landowners to harm protected species (Lueck and Michael, 2003). Exaggerated reactions to species protection are not uncommon and could be explained e.g. by perceived power imbalance (see Dickman, 2010). The observed effect of educational level could support this explanation.

Our finding that the claims of harming protected species were connected mostly to policy attitudes seems to somewhat correspond the observations made on illegal hunting of wolfs in Finland: poaching is connected to the disagreements with the large carnivore policy (Pohja-Mykrä, 2016). The significant difference, though, is that the presence of wolfs can directly affect the lives of the local people (Borgström, 2012), and removing them is thus a feasible solution to the problem. Presence of flying squirrels does not directly affect forest owners: the problem is not the animal itself, but authorities and restrictions set

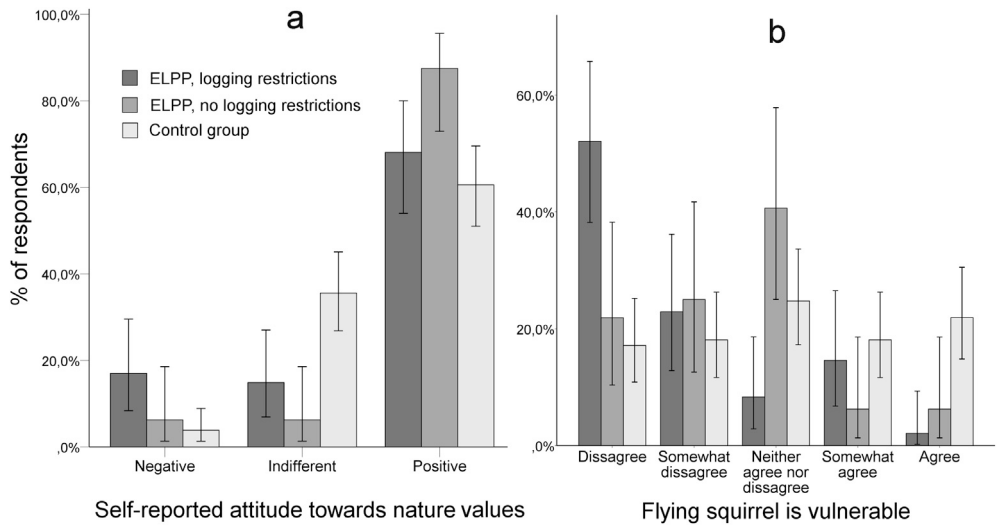

Fig. 4. Effects of experience on landowners' attitudes: a) Distribution of self-reported attitude toward nature values in the study groups with 95% control limits, b) Distribution of responses on the fact statement: "Flying squirrel is vulnerable in Finland because the population has been declining ever since 1940s'" with 95% control limits. At the time of the survey flying squirrel was classified in Finland as vulnerable species, currently its conservation status is Near Threatened NT (Liukko et al., 2016).

by them. The problem seems to be the top-down conservation in general – not flying squirrels or their nest sites. From this perspective, the co-occurrence of general satisfaction to authority decisions and frequent claims of negative actions seem to imply that communicative resistance would be more appropriate response than harming the species.

3.4. Significance of compliance problems for effectiveness of conservation

When considering the effects of noncompliance and ways to decrease it, one should make a distinction between different types on noncompliance: whether it is mainly accidental-, reckless, or intentional and malicious. Illegal hunting of wolves could be seen mainly as reckless noncompliance: people do not hunt the wolves because they are protected, but despite of the protection. What is claimed in the case of flying squirrels is that forest owners behave differently explicitly because of the regulations: they are breaking the regulations either in order to avoid future restrictions or for defiance. These narratives are potentially problematic even if they would not be true because they may have harmful effects. Self-justification processes can lead to escalation of questionable actions (Lowell, 2012). Furthermore, communication among group members creates norms (Kincaid, 2004), and norms affect behavioural intentions (e.g. Fishbein and Ajzen, 2010).

However, in this case accidental and reckless noncompliance are likely greater problems than malicious noncompliance. Accidental noncompliance happens in situations where forest owners and forest operators do not know that there are nest sites in the forest (or that they should be saved). Reckless noncompliance happens when persons behave as there would not be nest sites or legislative restrictions, although they know about them. Majority of the nest sites of the species remain unknown (Jokinen et al., 2015), at least half of private forest are owned by persons who lack intrinsic motivation to comply with flying squirrel-related regulations or follow recommendations, and resources to enforce the protection are likely diminishing.

In general, effectiveness of any environmental regulation depends on the will and ability of the regulated to comply with the rules, and of the authorities to enforce them (e.g. Rowcliffe et al., 2004; Keane et al., 2008). The obligation to obey a law may come from an internalized sense of duty (Winter & May 2001; Vandenbergh, 2005), but compliance can also be induced by social pressure or a fear of external sanctions (Winter & May 2001). To produce a sense of duty to act somehow, an individual must be aware of the consequences of his/her actions and see these consequences as negative (Babcock, 2009). If a person lacks the intrinsic motivation, the perceived risk of detection is relevant for compliance (Winter & May 2001). Due to the abandonment of primary control, both the social pressure to comply and the perceived risk of detection will diminish. Although absolute compliance is not needed for achieving the law's purposes (Echeverria, 2005), severe compliance problems together with the observed insufficiency of forest management recommendations (Jokinen et al., 2015) have the potential to totally impair this conservation strategy.

In order to promote compliance, resources could be put to alternative enforcement measures like surveys and publication of flying squirrel information. As providing information on the nest sites may not be enough to motivate forest owners to consider the species in their forest management plans, also ex-post supervision would be needed. When considering possibilities to develop implementation, it should be noted that in most cases the cutting area is planned, and/or the logging performed, by forestry experts and logging companies. The risk/benefit perception of the companies may differ from the perceptions of private forest owners. It could be possible to focus on these actors instead of forest owners. Also, because interpersonal similarity can reduce reactance (Silvia, 2005), forestry actors might be a good party to communicate restrictions for logging to forest owners.

The above is not to say that the best solution to the actual problem, in the first place, is to implement and enforce individual level protection by reactive administrative activity (see Hiedanpää, 2013). Delineation of known breeding sites and resting places from logging have had miniscule impact on the population (Jokinen et al., 2015). This is a general failure of the EU Biodiversity Strategy: conservation status of forest habitats and species shows no signs of improvement (European Commission, 2011, 2015). Forestry has negative effect on a variety of threatened (Rassi et al., 2010) as well as non-threatened forest species in Finland (e.g. Virkkala, 2016) and in the EU (European Commission, 2015). Species and individual level solutions do not seem plausible way to solve the problem of general ecological unsustainability. The case of flying squirrel and forestry is not a unique in this sense; e.g. the moor frog *Rana arvalis* has the same strict legislative protection status in the EU and is common and wide spread in Finland. The general condition of shallow water areas and wetlands and adjacent natural/semi-natural habitats likely affect the population, yet the focus of conservation has been on single building projects.

3.5. Norm activation, cognitive dissonance, denial and availability bias

Facing a situation in which forest owner comes aware that he/she is felling a forest occupied by a vulnerable species or the knowledge that someone is watching could activate existing pro-environmental attitudes or norm, and therefore lead to positive actions. However, denial of negative effects can inactivate the sense of duty (Heberlein, 2012), and it seems that experiences related to logging restrictions raised dismissal of information of vulnerability of the flying squirrel (see Fig. 4(b)). Denial and dismissal of information are part of many environmental conflicts (e.g. Opotow and Weiss, 2000; Hiedanpää and Bromley, 2013); even extreme rarity or endangeredness of species will not make all local stakeholders see conservation measures as necessary (Tonder and Jurvelius, 2004). Denial is an unconscious defence mechanism that protects a person from anxiety, guilt, or other ego threats (see Opotow and Weiss, 2000): information can be dismissed or avoided if it demands

undesired action or causes unpleasant emotions (Sweeny et al., 2010). In this case, cognitive dissonance could lead to denial of negative consequences of one's actions: experience might change beliefs rather than actions. Information on flying squirrels' vulnerability could cause unpleasant emotions when a forest owner is logging forest occupied by the species. Also, in theory any information that would decrease the attractiveness of the chosen behaviour (cut the forest) should be dismissed (Brehm, 1956; Olson and Stone, 2005). Although clearcutting is a standard regeneration measure in Finland, it is not liked by many forest owners (Valkeapää and Karppinen, 2013), which could mean that forest owners may experience some post-decisional dissonance after selling timber. All in all, the connection between beliefs or attitudes and behaviour is complex; it is claimed that behaviour affects attitudes more often than attitudes affect behaviour (Bem, 1967; Olson and Stone, 2005; Rebellon et al., 2014). We found that the size of the forest estate affected respondents' attitudes and beliefs. This implies that the cognitive processes affecting attitudes might not be triggered by policies or restrictions alone, but together with forest owner's own decisions and actions.

An alternative explanation for experience induced denial of vulnerability (Fig. 4 b) is that people often assess the probability of an event by the ease with which instances or occurrences can be brought to mind – a mental shortcut called availability heuristic (Tversky and Kahneman, 1973). Because of resent observation of the species on their land flying squirrel experienced forest owners could be prone to think that the species is common (and therefore not threatened).

4. Conclusions

Our study shows that species- and individual level protection can have high risk for negative side-effects irrespective from observed consequences to landowners. Enforcing protection on specific sites according to occurrence information has been shown to be ecologically ineffective in this case (Jokinen et al., 2015). We show that in addition it has led to negative attitudes toward conservation of the species because of the link to attitudes toward private property rights, rural-urban conflict, and the power of the EU. Although the actual issue and target of Finnish forest owners' critique and protest may not be the flying squirrel itself, negative narratives may harm the conservation efforts. There is a risk that the change from prior control to ex-post control, and transfer of the responsibility of conservation form administration to forest owners, could provoke new conflicts between forest owners, conservationists, national authorities and the EU. It seems that we should speak more about the species in itself and less about its legislative status in EU, avoid reproducing the prevailing negative discourse and challenge the misleadingly one-sided and polarized narratives.

Increasing the contribution of forestry to maintaining biodiversity has been challenging: conservation status of forest habitats and species shows still no signs of improvement in the EU (European Commission, 2011, 2015, 2016). As around 60% of the forests in the EU are privately owned (European Commission, 2013a), we would need both ecologically effective and locally accepted ways to implement the Directives – and above all: achieve their ecological goals. Limited conservation resources should not be put in ecologically ineffective measures with negative side-effects. Protecting individual animals is clearly needed in some cases, but when the species is relatively common and wide spread, it would likely be more effective to focus on policies affecting important resources for the species than enforcing protection on specific sites. With a careful consideration of both intentional and unintentional disincentives, we could avoid creating situations which create opportunities or motivation to harm protected species.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.gecco.2018.e00407.

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